

FOR LIQUIDS AND SOLIDS

NIVOSWITCH

VIBRATING FORK LEVEL SWITCHES



3 YEARS WARRANTY @ NIVELCO – WHERE ELSE?

NIVELCO

LEVEL SWITCHES

NIVOSWITCH VIBRATING FORK LEVEL SWITCHES

MAIN FEATURES

- Compact and mini compact type
- Rod extension up to 3 meters (10 feet)
- Plastic (PFA) coated version (option)
- Polished vibrating part
- Switching performance does not depend on the change of liquid conductivity, dielectric constant, viscosity, pressure and temperature
- Selectable sensitivity
- Relay or electronic output
- Hygienic versions with various process connections and 0.5 micron fine polishing (option)
- Medium temperature max. 130°C (266 °F)
- Output test with optional test magnet
- Ex version
- IP 67, 65/68 protection

APPLICATIONS

- For liquids: min. 0.7 kg/dm³ (700 oz/ft³) density and max. 10⁴ mm²/s (0.1 ft²/s) viscosity, for solids: min. 0.01 kg/dm³ (10 oz/ft³) density
- For liquids / free-flowing, powdered solids, granules
- Food & beverages, animal feed, chemical-, 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 or dry run protection, pump controls



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 overflow- 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 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.

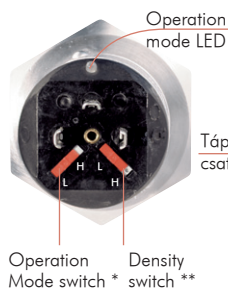
TYPE SELECTION

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.

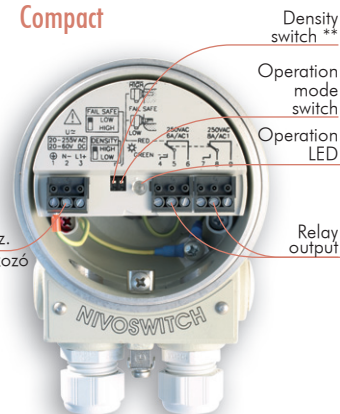
Application	Liquids	Solids
Features	 Mini compact	 Compact
Steel housing	■	■
Plastic housing	■	■
Extension	■	■
Highly polished version	■	■
Plastic coated fork	■	■
1" process connection	■	■
1 1/2" process connection		■
Relay output		■
Electronic output	■	■
Electrical connection	terminal	■
	DIN connector	■
	M12 connector	■
	Cable	■
Intrinsically safe version	■	■
Dust Ex version		■
Germanischer Lloyd		■
Function setting (low-high level)	■*	■*
Function indication	■	■
Density selection		■
Output test magnet	■	■

WIRING

Mini compact (connector version)



Compact



* Only for 3-wire DC versions

** Only for vibrating forks for solids

TECHNICAL DATA

Type	Mini compact		Compact	
	For liquids	For solids	For liquids	For solids
Insertion length	69-3000 mm (2.7 inch - 10 feet)	137-3000 mm (5.4 inch - 10 feet)	69-3000 mm (2.7 inch - 10 feet)	137-3000 mm (5.4 inch - 10 feet)
Material of wetted parts	DIN 1.4571 (316 Ti) PFA coating	DIN 1.4571 (316 Ti)	DIN 1.4571 (316 Ti) PFA coating	DIN 1.4571 (316 Ti)
Process connection	As per order codes			
Medium tempera	-40°C ... +130°C (-40°F ... +266°F)(see: temperature diagrams)			
Ambient temperature	-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/dm ³ (700 oz/ft ³)	≥ 0.01 kg/dm ³ (10 oz/ft ³)	> 0.7 kg/dm ³ (700 oz/ft ³)	≥ 0.01 kg/dm ³ (10 oz/ft ³)
Medium viscosity	≤ 10000 mm ² /s (cSt) (0.1 ft ² /s)	-	≤ 10000 mm ² /s (cSt) (0.1 ft ² /s)	-
Power supply	2-wire DC: 15-29 V DC 2-wire AC: 20-255 V AC; 3-wire DC: 12-55 V DC		20-255V AC or 20-60V DC	
Power consumption	AC: depending on load; DC: < 0.6 W		AC:1.2-17 VA; DC: < 3 W	
Housing material	DIN 1.4571 (316 Ti)		Paint coated aluminium or plastic (PBT)	
Electrical connection	Connector, or 3 m (10 ft) cable ⁽¹⁾ 2x0.5mm ² (AWG20) / 4x0.75mm ² (AWG18) / 5x0.5mm ² (AWG20)		2xM20x1.5 cable gland, for Ø 6-12 mm (0.25 ... 0.5 inch) cable, terminal, for 0.5 - 1.5 mm ² (AWG20 ... AWG15) 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 (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: max. 30 m

SPECIAL DATA FOR EX CERTIFIED MODELS

Type	Stainless steel vibrating part		PFA coated vibrating part
Mini compact vibrating forks for liquids (2-wire DC version)			
Ex marking	⊕ II 1 G Ex ia IIC T6...T4 Ga		⊕ II 1 G Ex ia IIB T6...T4 Ga
Intrinsically safe data ⁽²⁾	Ui=29 V, Li=100 mA, Pi=1.4W; Ci=7 nF, Li=0 mH		
Mini compact and compact vibrating forks for solids	Connector version (IP 65) ⁽³⁾	Cable version (IP 68) ⁽³⁾	Compact type (IP 67) ⁽⁴⁾
Ex marking	⊕ II 1/2 D IP 6xT160°C		

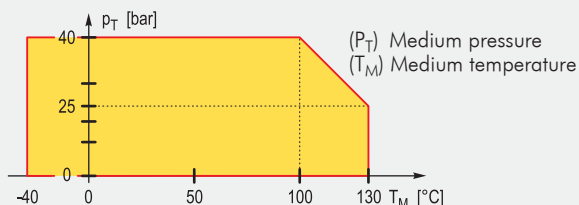
(2) intrinsically safe vibrating forks should be powered by Ex ia certified and approved devices

(3) only for 2-wire AC, or 3-wire DC version

(4) only with aluminium housing

TEMPERATURE DATA

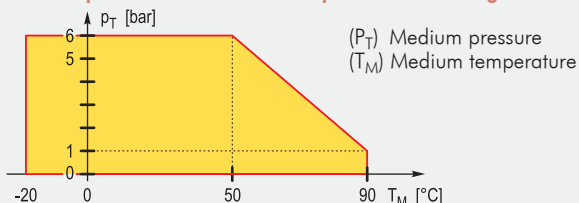
Medium pressure – Medium temperature



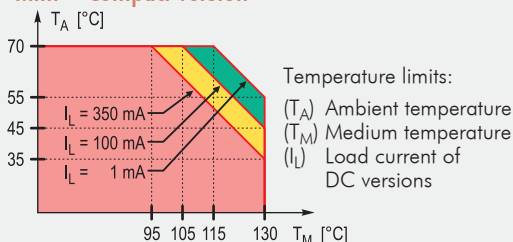
Mini compact Ex types for liquids

Temperature classes	T6	T5	T4	
Max. ambient temperature	+70°C	+60°C	+60°C	+60°C
Min. ambient temperature	DIN con.	-40°C		
	M12 con.	-25°C		
Max. medium temperature	+70°C	+75°C	+95°C	+130°C

Medium pressure – Medium temperature PP flange version

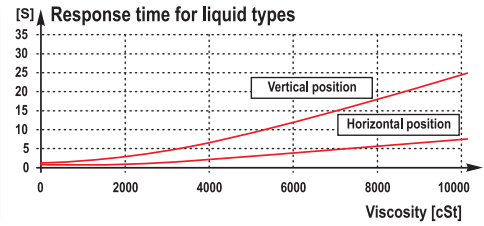


Mini – Compact version



OUTPUT DATA

Compact type			
Output	For liquids	For solids	
Relay	1 or 2 pcs (SPDT) relays 250VAC, 8A, AC1/250 V AC, 6A, AC1		
Response time	when immersed	≤ 0.5 sec	
	when free	≤ 1sec*	≤ 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): < 6mA		
	Current load	max. continuous	350 mA, AC 13	350 mA, AC 13; Ex version: 140 mA
		min. continuous	10 mA / 255V; 25 mA / 24V	
	max. impulse	1.5 A / 40msec		
3-wire DC	Transistor switch	Connector version: Field selectable NPN- and PNP Cable version: galvanically isolated PNP/NPN		
	Voltage drop (in switched-on state)	< 4.5 V	< 1.8 V	
	Current load (max. continuous)	350 mA / U _{max} =55V	350 mA / U _{max} =55V; Ex version: 200mA	
	Residual current (in switched-off state)	< 100µA	< 10µA	
	Response time	when immersed	0.5 sec	
	when free	< 1sec*	≤ 1 sec – H density < 3 sec – L density	

* see viscosity diagram

OPERATION

Compact and Mini compact type						
Power supply	Switching	Fail-Safe switch**	Status LED	Output		
				Relay	Electronic	
ON	High level					
	Low level					
OFF	–	–	High or Low			

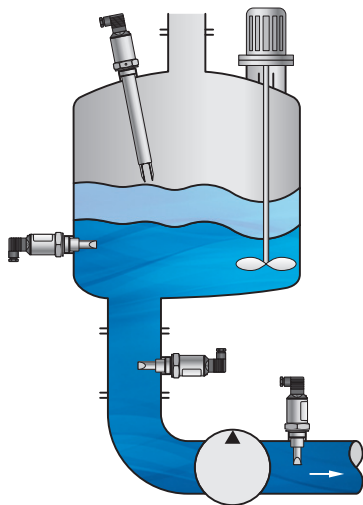
2-wire DC version			
Power supply	Switching	Status LED	Output
ON			14 ± 1 mA
			9 ± 1 mA
OFF	Fork immersed, or fork is free		–

OPERATION MODE SWITCHES

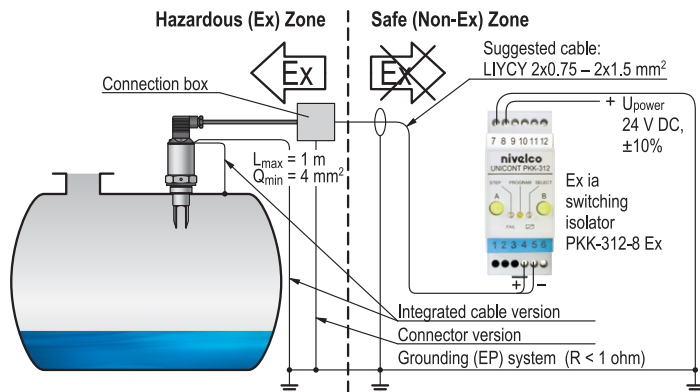
Compact Fail-Safe		Compact Density	
	Fail-safe alarm is indicated with de-energised relay or open state of the output		Medium density ≥ 0.5 kg/dm ³
			Medium density < 0.5 kg/dm ³

** Mini compact type: With appropriate wiring or with Fail-Safe switch on the connector

INSTALLATION



RECOMMENDED SET-UP VARIATION

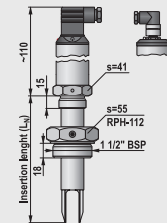
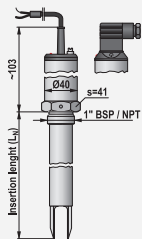


- Applied in low viscosity medium (no risk of subsidence remaining on the fork-tines) any of the mounting varieties shown is possible.
- Applied in higher viscosity medium (risk of subsidence remaining on the fork-tines) only vertical (top) mounting can be suggested.
- If applied as side mount, take care of the positioning mark (Mark "0")

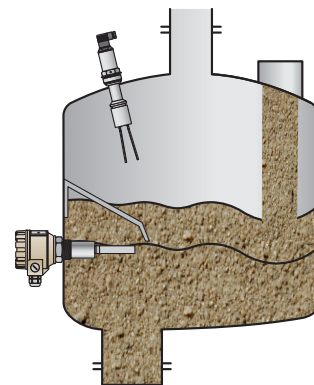
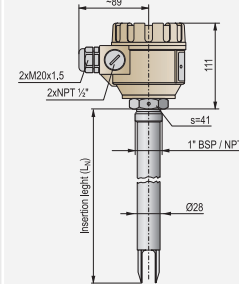
DIMENSIONS

Vibrating forks for liquids

Mini compact

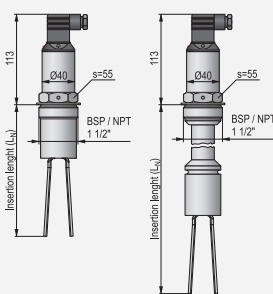


Compact

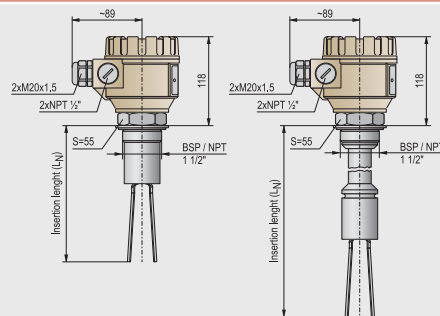


Vibrating forks for solids

Mini compact



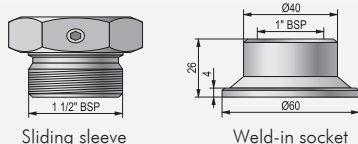
Compact



Flanges

- DIN, ANSI and JIS flanges Stainless steel, PP or plastic (PFA) coated stainless steel
- DN 40 and DN 50 pipe-coupling process connections (DIN 11851)
- 1 1/2" and 2" Triclamp process connections (ISO 2852)
- other hygienic (food-industry) process connections

Other process connection



ACCESSORIES TO ORDER

Name		For vibrating forks	
		for liquids	for liquids with plastic coating
Weld-in socket	1" BSP	RPG - 101	-
Sliding sleeve for extended versions	1 1/2" BSP	RPH - 112	RPH - 122
	1 1/2" NPT	RPN - 112	RPN - 122

RPS-101 test magnet for mini compact versions

ORDER CODES (NOT ALL CODE VARIATION AVAILABLE)

NIVOSWITCH vibrating fork level switches for liquids

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Type	Code	Process conn.	Code	Insertion length	Code	Output / Ex	Code																																																																																													
Mini compact	PFA coated fork	A	1" BSP	M	69 mm	0 0	<table border="1"> <tr> <td rowspan="4">DIN connector</td> <td>2 wire AC</td> <td>1</td> </tr> <tr> <td>3 wire DC</td> <td>3</td> </tr> <tr> <td>2 wire DC</td> <td>6</td> </tr> <tr> <td>2 wire DC/Ex</td> <td>8</td> </tr> <tr> <td rowspan="4">M12 con.</td> <td>2 wire DC</td> <td>K</td> </tr> <tr> <td>2 wire DC/Ex</td> <td>L</td> </tr> <tr> <td>3 wire DC</td> <td>M</td> </tr> <tr> <td>2 wire AC</td> <td>2⁽⁵⁾</td> </tr> <tr> <td rowspan="3">Compact⁽⁶⁾</td> <td>PFA coated fork</td> <td>D</td> <td>2" TRICLAMP</td> <td>R</td> <td>900 mm</td> <td>0 9</td> <td rowspan="6"> <table border="1"> <tr> <td rowspan="3">Cable</td> <td>3 wire DC</td> <td>4⁽⁵⁾</td> </tr> <tr> <td>2 wire DC</td> <td>7⁽⁵⁾</td> </tr> <tr> <td>2 wire DC/Ex</td> <td>9⁽⁵⁾</td> </tr> <tr> <td rowspan="3">Compact</td> <td>1.4571 fork</td> <td>F</td> <td>DN40 pipe-coupling, DIN 11851</td> <td>D</td> <td>1 m</td> <td>1 0</td> <td rowspan="3"> <table border="1"> <tr> <td>1 relay</td> <td>0</td> </tr> <tr> <td>2 relay</td> <td>A</td> </tr> </table> </td> </tr> <tr> <td>1.4571 fork, highly polished</td> <td>J</td> <td>DN50 pipe-coupling, DIN 11851</td> <td>E</td> <td>3 m</td> <td>3 0</td> </tr> <tr> <td></td> <td></td> <td>DN 50 PN40, 1.4571</td> <td>G^(2,3)</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2" ANSI RF600, 1.4571</td> <td>B^(2,3)</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>JIS40K50A, 1.4571</td> <td>K^(2,3)</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>DN50 PN40, PP</td> <td>F⁽⁴⁾</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2"ANSI RF150, PP</td> <td>A⁽⁴⁾</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>JIS10K50A, PP</td> <td>J⁽⁴⁾</td> <td></td> <td></td> <td></td> </tr> </table></td></tr></table>	DIN connector	2 wire AC	1	3 wire DC	3	2 wire DC	6	2 wire DC/Ex	8	M12 con.	2 wire DC	K	2 wire DC/Ex	L	3 wire DC	M	2 wire AC	2 ⁽⁵⁾	Compact ⁽⁶⁾	PFA coated fork	D	2" TRICLAMP	R	900 mm	0 9	<table border="1"> <tr> <td rowspan="3">Cable</td> <td>3 wire DC</td> <td>4⁽⁵⁾</td> </tr> <tr> <td>2 wire DC</td> <td>7⁽⁵⁾</td> </tr> <tr> <td>2 wire DC/Ex</td> <td>9⁽⁵⁾</td> </tr> <tr> <td rowspan="3">Compact</td> <td>1.4571 fork</td> <td>F</td> <td>DN40 pipe-coupling, DIN 11851</td> <td>D</td> <td>1 m</td> <td>1 0</td> <td rowspan="3"> <table border="1"> <tr> <td>1 relay</td> <td>0</td> </tr> <tr> <td>2 relay</td> <td>A</td> </tr> </table> </td> </tr> <tr> <td>1.4571 fork, highly polished</td> <td>J</td> <td>DN50 pipe-coupling, DIN 11851</td> <td>E</td> <td>3 m</td> <td>3 0</td> </tr> <tr> <td></td> <td></td> <td>DN 50 PN40, 1.4571</td> <td>G^(2,3)</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2" ANSI RF600, 1.4571</td> <td>B^(2,3)</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>JIS40K50A, 1.4571</td> <td>K^(2,3)</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>DN50 PN40, PP</td> <td>F⁽⁴⁾</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2"ANSI RF150, PP</td> <td>A⁽⁴⁾</td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>JIS10K50A, PP</td> <td>J⁽⁴⁾</td> <td></td> <td></td> <td></td> </tr> </table>	Cable	3 wire DC	4 ⁽⁵⁾	2 wire DC	7 ⁽⁵⁾	2 wire DC/Ex	9 ⁽⁵⁾	Compact	1.4571 fork	F	DN40 pipe-coupling, DIN 11851	D	1 m	1 0	<table border="1"> <tr> <td>1 relay</td> <td>0</td> </tr> <tr> <td>2 relay</td> <td>A</td> </tr> </table>	1 relay	0	2 relay	A	1.4571 fork, highly polished	J	DN50 pipe-coupling, DIN 11851	E	3 m	3 0			DN 50 PN40, 1.4571	G ^(2,3)						2" ANSI RF600, 1.4571	B ^(2,3)						JIS40K50A, 1.4571	K ^(2,3)						DN50 PN40, PP	F ⁽⁴⁾						2"ANSI RF150, PP	A ⁽⁴⁾						JIS10K50A, PP	J ⁽⁴⁾			
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Housing	Code
Steel	4
Plastic	5

(1) The order code of an Ex version should end in „Ex“
 (2) Special versions with weld-in process connection are available to order. Flanges of the flanged models meet the requirements of DIN2501, DIN2526 Form C; ANSI B16.5 standards
 (3) PFA coated forks have PFA coated flanges
 (4) Max. 6 bar, -20°C ... +90°C
 (5) Maximal cable length: 30 m
 (6) Not available in Ex version

NIVOSWITCH vibrating fork level switches for solids

NIVOSWITCH R ■ ■ ■ - ■ ■ ■ - ■ ■ (1)

Type	Code	Process conn.	Code	Insertion length	Code	Output / Ex	Code																																																																		
Mini compact	L	1 1/2" BSP	H	137 mm	0 1	<table border="1"> <tr> <td rowspan="4">Connector</td> <td>2 wire AC</td> <td>1</td> </tr> <tr> <td>3 wire DC</td> <td>3</td> </tr> <tr> <td>2 wire DC</td> <td>6</td> </tr> <tr> <td>2 wire AC/Ex</td> <td>C</td> </tr> <tr> <td rowspan="4">Cable</td> <td>3 wire DC/Ex</td> <td>E</td> </tr> <tr> <td>2 wire AC</td> <td>2⁽⁵⁾</td> </tr> <tr> <td>3 wire DC</td> <td>4⁽⁵⁾</td> </tr> <tr> <td>2 wire DC</td> <td>7⁽⁵⁾</td> </tr> <tr> <td rowspan="3">Compact</td> <td>R</td> <td>1 1/2" NPT</td> <td>N</td> <td>175 mm</td> <td>0 2</td> <td rowspan="3"> <table border="1"> <tr> <td>2 wire DC/Ex</td> <td>D⁽⁵⁾</td> </tr> <tr> <td>3 wire DC/Ex</td> <td>F⁽⁵⁾</td> </tr> <tr> <td>1 relay / Ex</td> <td>B</td> </tr> </table> </td> </tr> <tr> <td></td> <td></td> <td>DN50 PN40, 1.4571</td> <td>G⁽²⁾</td> <td>300 mm</td> <td>0 3</td> </tr> <tr> <td></td> <td></td> <td>2" ANSI RF600, 1.4571</td> <td>B⁽²⁾</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>JIS40K50A, 1.4571</td> <td>K⁽²⁾</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>DN50 PN16, PP</td> <td>F⁽⁴⁾</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>2"ANSI RF150, PP</td> <td>A⁽⁴⁾</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td>JIS10K50A, PP</td> <td>J⁽⁴⁾</td> <td></td> <td></td> </tr> </table>	Connector	2 wire AC	1	3 wire DC	3	2 wire DC	6	2 wire AC/Ex	C	Cable	3 wire DC/Ex	E	2 wire AC	2 ⁽⁵⁾	3 wire DC	4 ⁽⁵⁾	2 wire DC	7 ⁽⁵⁾	Compact	R	1 1/2" NPT	N	175 mm	0 2	<table border="1"> <tr> <td>2 wire DC/Ex</td> <td>D⁽⁵⁾</td> </tr> <tr> <td>3 wire DC/Ex</td> <td>F⁽⁵⁾</td> </tr> <tr> <td>1 relay / Ex</td> <td>B</td> </tr> </table>	2 wire DC/Ex	D ⁽⁵⁾	3 wire DC/Ex	F ⁽⁵⁾	1 relay / Ex	B			DN50 PN40, 1.4571	G ⁽²⁾	300 mm	0 3			2" ANSI RF600, 1.4571	B ⁽²⁾					JIS40K50A, 1.4571	K ⁽²⁾					DN50 PN16, PP	F ⁽⁴⁾					2"ANSI RF150, PP	A ⁽⁴⁾					JIS10K50A, PP	J ⁽⁴⁾		
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Housing	Code
Plastic	2 ⁽⁶⁾
Steel	3

ACCESSORIES TO ORDER

DIN rail mountable switching amplifiers unit recommended for NIVOSWITCH vibrating forks

UNICONT PKK-312-■ (1)

Power Supply	Code	Power Supply / Ex	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.

