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UNICONT

PKK-312

CURRENT CONTROLLED SWITCH

User's manual

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1. APPLICATION

The **UNICONT PKK–312–□** series comprises 4…20 mA current controlled limit switches. The relay output of the units switch at the current limit values (taught to the unit), depending on the limits, switching difference or window comparison modes. Error status indication can be programmed so that the relay gets energized or de-energized when detecting a failure. Failure may be discontinuity in the cable / lower value fault current or short circuit / upper value error current. The unit is suitable for powering all NIVELCO manufactured 2-wire (4…20 mA) transmitters. Some models of this series meet the requirements of intrinsically safe operation. The **UNICONT PKK–312–8 Ex** can monitor the DC powered, 2-wire NIVOSWITCH Ex type vibrating fork's output current changes between freely vibrating and immersed states without any further programming.

2. TECHNICAL DATA

2.1 GENERAL

Type		PKK–312–□
Nominal input current range		1…22 mA
Accuracy of switching level / Threshold level		±0.1 mA
Discontinuity threshold / Lower value fault current		3.7 mA
Short circuit threshold / Upper value fault current		22 mA
Input impedance		10 Ω
Input overload capability		Max. 100 mA (continuous)
Switching delay		0.1 s; 1 s; 2 s; 5 s selectable
Relay	– Output	1× SPDT
	– Rating	250 V AC, 8 A, AC1
	– Insulation strength	4000 V 50 Hz
	– Electrical / Mechanical life expectancy	10^5 / 2 x 10^6 switching
Electrical connection		Max. 2.5 mm² (AWG14) twisted, or max 4 mm² (AWG12) solid wire
Mechanical connection		EN 60715-35 rail
Ingress protection		IP20
Weight		~210 g (~0.5 lb)

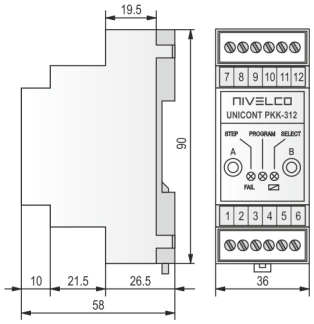
2.2 SPECIAL DATA

	Ex version				Standard version			
Type	**PKK–312–5Ex**	**PKK–312–6Ex**	**PKK–312–7Ex**	**PKK–312–8Ex**	**PKK–312–1**	**PKK–312–2**	**PKK–312–3**	**PKK–312–4**
Power supply range	230 V AC ±10% 50…60 Hz	110 V AC ±10% 50…60 Hz	24 V AC ±10%, 50…60 Hz, 24 V DC ±15%		230 V AC ±10% 50…60 Hz	110 V AC ±10% 50…60 Hz	24 V AC ±10% 50…60 Hz	24 V AC ±10%, 50…60 Hz, 24 V DC ±15%
Power consumption	< 2.5 VA		< 2.5 VA or < 2.5 W		< 2.7 VA			< 2.5 W
Safety maximum voltage	U_m = 253 V AC				–			
Switching levels	2 values in the range of 1…22 mA			10.5 mA; 12.5 mA	2 values in the range of 1…22 mA			
Ex marking	⟨Ex⟩ II (1) G [Ex ia Ga] IIB ⟨Ex⟩ II (1) D[Ex ia Da] IIIC		⟨Ex⟩ II (1) G [Ex ia Ga] IIC ⟨Ex⟩ II (1) D[Ex ia Da] IIIC		–			
Intrinsic safety data	U_0 = 28.4 V; I_0 = 140 mA; P_0 = 1 W; L_0 = 6 mH; C_0 = 50 nF		U_0 = 28.4 V; I_0 = 80 mA; P_0 = 0.6 W L_0 = 4 mH; C_0 = 50 nF		–			
Output load capability	I_T = 22 mA when U_{OUT} ≈ 12 V		I_T = 22 mA when U_{OUT} ≈ 15 V	–	U_0 = 30 V I_{MAX} = 70 mA $U_{OUT\ min}$ = 16 V			U_0 = 24 V I_{MAX} = 80 mA $U_{OUT\ min}$ = 23 V
Electrical protection	Class II		Class III		Class II			Class III
Reference document number	pkk3121m060bh_06				–			
Ambient temperature	−25…+55 °C (−13…+131 °F)							

2.3 ACCESSORIES

– User's Manual
– Warranty Card
– EU Declaration of Conformity

2.4 DIMENSIONS



2.5 ORDER CODE

P K K – 3 1 2 – ☐ Ex*

POWER SUPPLY / EX		CODE
230 V AC		1
110 V AC		2
24 V AC		3
24 V AC / DC		4
230 V AC	Ex	5
110 V AC	Ex	6
24 V AC / DC	Ex	7
24 V AC/ DC	Ex	8**

* *Order codes of an Ex versions end in 'Ex'*

** *For DC powered, 2-wire NIVOSWITCH Ex vibrating fork of NIVELCO*

3. INSTALLATION

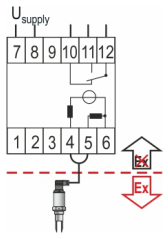
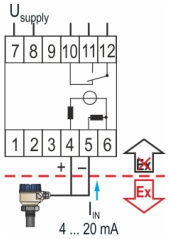
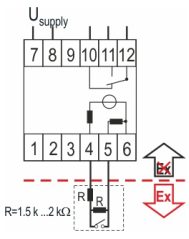
UNICONT PKK–312–□ must be mounted on an EN 60715-35 rail.

ATTENTION!

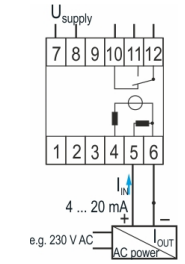
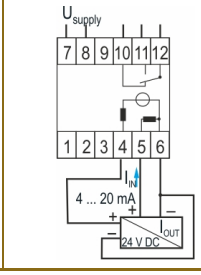
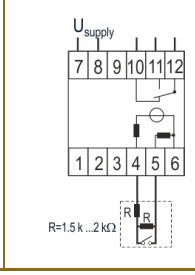
Before installing the device, make sure that the input current values can be provided by the loop of the application. If not, teach the current values to the device before installing it. (See chapter 5 "Commissioning, Setting, Programming")

4. WIRING

4.1 EX MODELS

PKK–312–8Ex with NIVOSWITCH Ex vibrating fork	**PKK–312–7Ex** with 2-wire Ex transmitter (e.g. EchoTREK SEA–380–6 Ex)	**PKK–312–5Ex … PKK–312–7Ex** for monitoring of **Ex** passive switch and cable
		

4.2 STANDARD MODELS

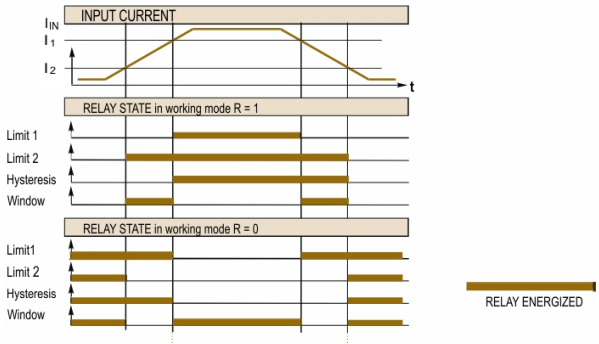
PKK–312–1 … PKK–312–4 with 4-wire active transmitter (e.g. EchoTREK STA–460)	**PKK–312–1 … PKK–312–4** with 4 wire active transmitter (e.g. MICROSONAR UTS–211)	**PKK–312–1 … PKK–312–4** for monitoring of passive switch
		

5. COMMISSIONING, SETTING, PROGRAMMING

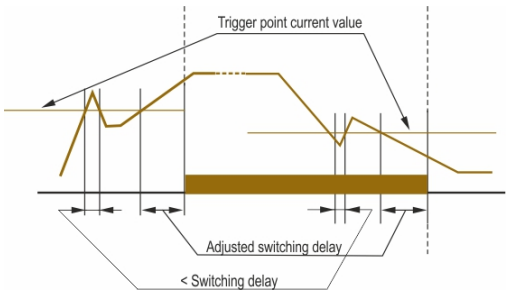
3 seconds after powering up, the unit begins to work with the signals as per the table of WORKING STATUS.

Working status		
LED	**Status**	**Interpretation**
(SELECT)	GREEN	Relay energized R = 1
	RED	Relay de-energized R = 0
FAIL (STEP)	SIMULTANOUS RED BLINKING OF BOTH LED	Memory failure, Relay state sustained
	GREEN	No cable fault/No fault current. No cable monitoring
	RED	Cable fault, or. fault current

The relay states relating to the operating modes and the input current are shown in the first diagram. Operation with delayed switching is demonstrated in the second diagram below.



State of the relay depending on the input current



Relay operation with delayed switching

CAUTION!

If the input current is between the trigger points in hysteresis comparison mode when the unit is switched on, the relay will always be de-energized (R = 1 or R = 0) regardless of the operating mode.

Depending on the actual task, the unit may need programming, which involves setting the operating mode (except **PKK–312–8Ex** type) and the re-learning of the switching points.
The **PKK–312–8Ex** device without any additional programming is also suitable for the attenuated and unattenuated monitoring of the 2-wire DC-powered NIVOSWITCH Ex vibrating fork and for the monitoring of the current consumption associated with its unattenuated state and, based on this, to influence the state of the relay output.
For this type the trigger points current values of 10.5 and 12.5 mA and switching differential operating mode cannot be changed.

Settings:

Relay operating mode	(Default: R = 1)
Cable discontinuity monitoring	(Default: NONE)
Cable short circuit monitoring	(Default: NONE)
Damping	(Default: 0.1 s)
Revert to default	

A **PKK–312–1 … PKK–312–7Ex**

Settings:

Teaching current value	(Default: 10.5 mA and 12.5 mA)
Relay operating mode	(Default: R = 1)
Selecting comparison type	(Default: Switching difference)
Cable discontinuity monitoring	(Default: NONE)
Cable short circuit monitoring	(Default: NONE)
Damping	(Default: 0.1 s)
Revert to default	

PROGRAMMING

Programming involves setting the operating mode and learning of the input current values.

Programming / reading the operating mode

To initiate programming mode, press and hold the **A** button for about 5 seconds till the LED **'PROGRAM'** lights up. To access the adjusting columns (as per the table below), press the **A** button briefly while in programming mode, and the steps will be indicated by the relevant LED **'STEP'.** The rows of the columns can be selected by pressing the **B** button, and the **'SELECT'** LED will indicate the choice. After performing the necessary adjustments, exit programming mode by pressing and holding the **A** button for about 5 seconds until the LED **'PROGRAM'** goes off.

PROGRAMMING / READING THE OPERATING MODE

Enter programming mode: press key **A** (for about 5 s) till the **LED PROGRAM** lights up					
Adjustment columns with corresponding LED **STEP** states, accessed by short pressing of key **A**					Adjustment row with relevant state of the **LED SELECT**, selected by short pressing of key **B**
GREEN	***GREEN BLINKING***	***RED***	***RED BLINKING***	***OFF***	
Relay operation mode	**Comparison operation mode**	**Cable short circuit */ monitoring lower current**	**Cable discontinuity */ monitoring upper current**	**Switching delay**	
R = 1	Limit value 1.	ON, relay should be activated	ON, relay should be activated	0.1 s	***GREEN***
R = 0	Limit value 2.	ON, relay should be released	ON, relay should be released	1 s	***GREEN BLINKING***
--	Hysteresis	NO	NO	2 s	***RED***
--	Window	--	--	5 s	***RED BLINKING***
Quit programming mode: press key **A** (for about 5 s) till the LED **PROGRAM** goes off.					

** Cable monitoring can only be applied with Ex certified 2-wire units*

AUTO-QUIT PROGRAMMING MODE

The unit will operate during programming by the previous parameters. The new, modified parameters will only take effect after quitting programming mode.
If the transmitter is left in programming mode, it will automatically quit programming mode after 30 seconds, and the modified values will not take effect.

RELAY TEST

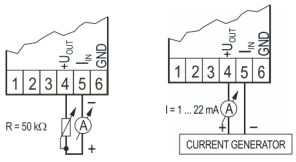
The proper operation of the relay can be tested by pressing the **B** button for about 5 seconds. The state of the relay and the color of the LED will change (e. g., from green to red). Releasing the key makes the relay and the LED revert to their previous state.

REVERT TO DEFAULT

The device reverts to the factory default programming values if buttons **A** and **B** are pressed together before/during power-up.

TEACHING CURRENT VALUE OF TRIGGER POINT

Teaching input currents involves saving the I_{in} current values for switching points 1 and 2 between the terminals (figure on the right) at the moment of the teaching.
The circuits on the application site can produce necessary current values.
If the circuit of the actual application produces the input current, the actual current values do not have to be known.



Arrangements for teaching input currents

To teach the current values, press the buttons **A** and **B** simultaneously for about 5 seconds until the device enters teaching mode, indicated by the blinking of LED **'PROGRAM'**. Release one of the buttons (**A** or **B**), and the momentary current value will be assigned to switching point 1 or 2. Release the other button, and the teaching process is completed, indicated by the going off of LED **'PROGRAM'**.

You can teach the other limit value without exiting programming mode if you do not release the other button and press the one that was released for 5 seconds, then release the button you kept pressed while teaching the first value.

Teaching					
	Status of key **A**	Status of key **B**	**STEP** LED	**PROGRAM** LED	**SELECT** LED
Entering teaching mode	KEEP PRESSED > 5 s		OFF	blinking	OFF
Teaching current value for point 1	KEEP PRESSED	RELEASE	OFF		GREEN if SUCCESSFUL RED blinking if FAILED
Quitting teaching mode	RELEASE	-	According to WORKING STATUS	OFF	According to WORKING STATUS
Entering teaching mode	KEEP PRESSED > 5 s		OFF	blinking	OFF
Teaching current value for point 2	RELEASE	KEEP PRESSED	GREEN if SUCCESSFUL RED blinking if FAILED		OFF
Quitting teaching mode	-	RELEASE	According to WORKING STATUS	OFF	According to WORKING STATUS

6. MAINTENANCE AND REPAIR

The device does not require regular maintenance. The warranty card contains the terms and conditions. Before returning the device for repairs, it must be cleaned thoroughly. The parts in contact with the medium may contain harmful substances; therefore, they must be decontaminated. Our official form (Returned Equipment Handling Form) must be filled and enclosed in the parcel. Download it from our website www.nivelco.com. The device must be sent back with a declaration of decontamination. A statement must be provided in the declaration that the decontamination process was successfully completed and that the device is clean from any hazardous substances.

7. STORAGE CONDITIONS

Ambient temperature: −30…+60 °C (−22…+140 °F)
Relative humidity: max. 98%.

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NIVELCO reserves the right to change anything in this manual without notice!

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