NIVOCONT R

VIBRATING ROD LEVEL SWITCHES

User's manual
9th edition

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CERTIFICATES		Reference document number
	BKI ATEX, Certificate No.: BKI16ATEX0005/1	rkh5021m060bh_09
	BKI IECEx, Certificate No.: IECEx BKI 13.0001x issue No.: 0	rkh5021m0600h_04

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Thank you for choosing a NIVELCO instrument!

1. INTRODUCTION

The **NIVOCONT R** vibrating rod level switches are suitable for low and high level detection of powders, granules, bulk materials with a min. 0.05 kg/dm³ density such as cement, lime, sand, grain, feed, sugar, etc. Dust Ex versions are available for use in hazardous environments.

2. ORDER CODES (NOT ALL COMBINATIONS POSSIBLE!)

NIVOCONT R ☐ ☐ - ☐ ☐ ☐ - ☐ *

Version	Code
Base model	K
Base model with polished probe	S
High-temperature	H(1)
High-temperature with polished probe	T(1)

Housing	Code
Aluminum (powder-coated)	5
Plastic, PBT	6

Output / Certificates / Ex	Code
20…255 V AC/DC / relay	1
20…255 V AC/DC / solid state output	3
20…250 V AC vagy 20…50 V DC / relay / Ex	5

Process connection	Code Extension			
	Standard	Pipe	Cable	Custom
1½" BSP	H	R	K	E
1½" NPT	N	L	C	F

Insertion length	Code Extension			
	Standard	Pipe	Cable	Custom
207 mm	02	—	—	
0.3…3 m	—	03…30	—	
1…20 m	—	—	01…20	
0.2…2 m				02

(1) only for standard and pipe versions
** Order codes of Ex versions end in 'Ex'.*

2.1 Accessories

- User's manual
- Warranty card
- EU-Declaration of Conformity
- 2× plug-in type, 3-pole terminal block
- 1× 2 mm thick KLINGER OILIT sealing (only for 1½" BSP-threaded process connection)

3. TECHNICAL DATA

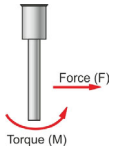
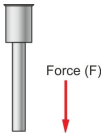
3.1 General data

Type		RH–□□□–□, RN–□□□–□	RR–□□□–□, RL–□□□–□	RK–□□□–□, RC–□□□–□	RE–□□□–□, RF–□□□–□
Insertion length		207 mm (8.15")	0.3…3 m (1…10 feet)	1…20 m (3.3…65.5 feet)	0.2…2m (0.65…6.5 feet)
Material of wetted parts		1.4571 (316Ti)		Vibrating part: 1.4571 (316Ti), Cable: PE cover	1.4571 (316Ti)
Housing material		Powder-coated aluminum **(R–500 series)**; or plastic (PBT) **(R–600 series)**			
Process connection		**RH, RR, RK, RE:** 1½" BSP; **RN, RL, RC, RF:** 1½" NPT			
Temperature range		See Temperature diagram			
Medium pressure		max. 25 bar (2.5 MPa, 363 psi)		max. 6 bar (0.6 MPa, 88 psi)	See Chapter 7!
Medium density [1]		min. 0.05 kg/dm³ (grain size max. 10 mm [0.4"])			
Response time (selectable)	Getting immersed	<1.8 sec or 5 ±1.5 sec			
	Getting free	<2 sec or 5 ±1.5 sec			
Power supply (universal)		Standard type: 20…255 V AC/DC			
Power consumption		≤2.5 VA / 2 W			
Electrical connections		2× M20x1.5 cable glands for Ø6…12 mm (Ø0.25"…0.5") cable; 2× terminal blocks for max. 1.5 mm² (AWG16) wire cross section; 2× internally threaded ½" NPT connection for protective pipes.			
Ingress protection		Housing: IP67			See Chapter 7!
Electrical protection		Class I. (must be grounded!)			
Weight	plastic housing	1.5 kg (3.3 lb)	1.5 kg +1.4 kg/m (3.3 lb + 1 lb/ft)	1.5 kg +0.6 kg/m (3.3 lb + 0.4 lb/ft)	1.5 kg (3.3 lb)
	aluminium housing	1.88 kg (4.15 lb)	1.88 kg +1.4 kg/m (4.15 lb + 1 lb/ft)	1.88 kg +0.6 kg/m (4.15 lb + 0.4 lb/ft)	1.88 kg (4.15 lb)

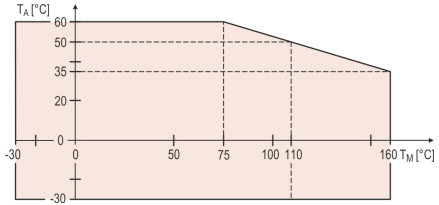
[1] Depends on friction and granular size of the medium.

Output properties	Relay	Solid state
Output type	SPDT	SPST (electronic)
Output rating	250 V AC, 8 A, AC 1	50 V, 350 mA
Output protection	–	Overvoltage, overcurrent and overload
Voltage drop (switched on)	–	<2.7 V 350 mA
Residual current (switched off)	–	<10 μA

Loadability

	Standard	With extension pipe	With extension cable
Type of load			
Force	max. 500 N	–	max. 45 kN
Torque	max. 100 Nm	max. 100 Nm	–

Temperature diagram



Ambient temperature (TA) versus medium temperature (TM)

Mounting options

	Standard version		With extension pipe	With extension cable
High level switching	Top-mounted	Side-mounted (1)	Vertical mounting from the top	
Low level switching	Side-mounted (1)			

(1) Protect the device against falling material by installing a baffle plate. The device must be installed with a slope greater than the slope angle for powdery materials.

3.2 Dimensions

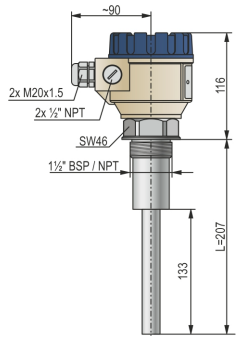
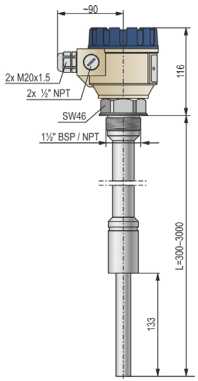
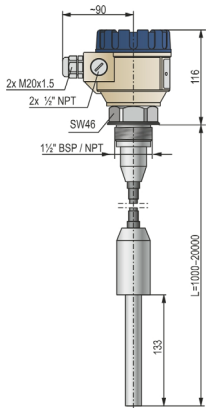
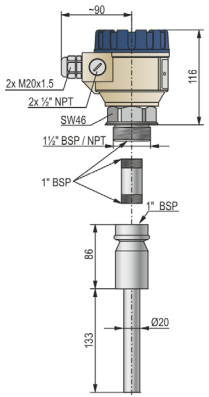
Standard version R□H-□□□-□, R□N-□□□-□	With extension pipe R□R-□□□-□, R□L-□□□-□	With extension cable R□K-□□□-□, R□C-□□□-□	With custom extension R□E-□□□-□, R□F-□□□-□
			

Figure 3.

3.3 Explosion protection data

3.3.1 ATEX Certificate, No. BKI16ATEX000/1

Type	RK□–5□□–5Ex, RH□–5□□–5Ex, RS□–5□□–5Ex, RT□–5□□–5Ex
Ex marking	⟨Ex⟩ II1/2 D Ex ta/tb IIIC T90 °C…T170 °C Da/Db
Power supply (universal)	20…250 V AC (50 / 60 Hz) or 20…50 V DC
Electrical connections	2× M20×1.5 cable glands with Ex ta IIIC protection type for Ø7…Ø12 mm (Ø0.276"…0.472") cabel, 2× plug-in type terminal blocks for max. 1.5 mm² (AWG16) wire cross section, Two internally threaded ½" NPT connection for protective pipes.

Thermal Properties	With extension cable			Standard model and version with an extension pipe				
	R□K–5□□–5Ex R□C–5□□–5Ex			RK□–5□□–5Ex, RS□–5□□–5Ex (except versions with an extension cable or custom extension)				High-temperature RH□–5□□–5Ex, RT□–5□□–5Ex
Medium temperature min.: −30 °C (−22 °F) … max.:[3]	+60 °C (+140 °F)	+70 °C (+158 °F)	+80 °C[2] (+176 °F)	+60 °C (+140 °F)	+70 °C (+158 °F)	+95 °C (+203 °F)	+110 °C (+230 °F)	+160 °C (+320 °F)
Ambient temperature min.: −30 °C (−22 °F)…max.:[3]		+50 °C (+122 °F)	+60 °C (+140 °F)		+50 °C (+122 °F)	+60 °C (+140 °F)	+50 °C (+122 °F)	+35 °C (+95 °F)
Max. surface temperature of process connection	+85 °C (+185 °F)		+95 °C (+203 °F)	+85 °C (+185 °F)		+95 °C (+203 °F)		+135 °C (+275 °F)
Max. surface temperature						+95 °C (+203 °F)	+110 °C (+230 °F)	+160 °C (+320 °F)
Temperature classes	T90°C		T100°C	T90°C		T100°C	T115°C	T170°C

[2] Medium temperature for max. 1 hour: +95 °C (+203 °F)

[3] To use the level switch at the maximum values of the corresponding thermal properties, the cable must also be able to withstand +90 °C (+194 °F) temperature continuously.

3.3.2 IECEx Certificate, No. IECEX BKI 13.0001 X

Type	RK□–5□□–5Ex, RH□–5□□–5Ex, RS□–5□□–5Ex, RT□–5□□–5Ex
Ex marking	Ex t IIIC T* Da/Db IP67 *(see Thermal Properties table)
Power supply (universal)	20…250 V AC (50 / 60 Hz) vagy 20…50 V DC
Electrical connections	2× M20×1.5 cable glands with Ex ta IIIC protection type for Ø7…Ø12 mm (Ø0.276"…0.472") cabel, 2× plug-in type terminal blocks for max. 1.5 mm² (AWG16) wire cross section, Two internally threaded ½" NPT connection for protective pipes.

Thermal Properties	With extension cable			Standard model and version with an extension pipe				
	R□K–5□□–5Ex R□C–5□□–5Ex			RK□–5□□–5Ex, RS□–5□□–5Ex (except versions with an extension cable or custom extension)				High-temperature RH□–5□□–5Ex, RT□–5□□–5Ex
Medium temperature min.: −30 °C (−22 °F) … max.:[3]	+60 °C (+140 °F)	+70 °C (+158 °F)	+80 °C[2] (+176 °F)	+60 °C (+140 °F)	+70 °C (+158 °F)	+95 °C (+203 °F)	+110 °C (+230 °F)	+160 °C (+320 °F)
Ambient temperature min.: −30 °C (−22 °F)…max.:[3]		+50 °C (+122 °F)	+60 °C (+140 °F)		+50 °C (+122 °F)	+60 °C (+140 °F)	+50 °C (+122 °F)	+35 °C (+95 °F)
Max. surface temperature of process connection	+85 °C (+185 °F)		+95 °C (+203 °F)	+85 °C (+185 °F)		+95 °C (+203 °F)		+135 °C (+275 °F)
Max. surface temperature						+95 °C (+203 °F)	+110 °C (+230 °F)	+160 °C (+320 °F)
Temperature classes	T90°C		T100°C	T90°C		T100°C	T115°C	T170°C

[2] Medium temperature for max. 1 hour: +95 °C (+203 °F)
[3] To operate the level switch with the maximum values of the related thermal properties the applied cable should permanently) withstand up to +90 °C (+194 °F) temperature.

3.4 Special conditions for safe use

- The enclosure must be not opened while it is energized!
- The IECEx certified apparatus may be used only in explosive dust atmospheres where the temperature class of the selected type of the apparatus does not exceed two-third parts of the minimum ignition temperature of the dust/air mixture.
- The IECEx certified equipment must be assembled with cable glands certified according to protection Ex t IIIC IP67, size M20x1.5.
- In hazardous atmosphere environment the unit can be only powered on after properly closing the housing cover and fixing the screws of the safety locking bolt.

4. MOUNTING

It is recommended to test the switching function with a sample of the particular material prior to installing the device (see: Installation, Commissioning).

The unit may not work with mediums that are within the specified density range but have very large grain size or have extremely little friction.

WARNING! *Handle the device, especially the sensing probe, with great care. Any impact on the sensing probe may ruin its resonance system. In addition, a protective shield must be installed (see Figure 6) if the probe is exposed to falling material or excessive mechanical load.*

Screw the device in by its hexagon neck. After tightening the process connection, the housing can be rotated (max. 300°) to adjust the cable gland to the required position. It might be necessary to install the device at an offset level position relative to the switching level to take the caving or arching of the material in the silo into account (see Figure 4).

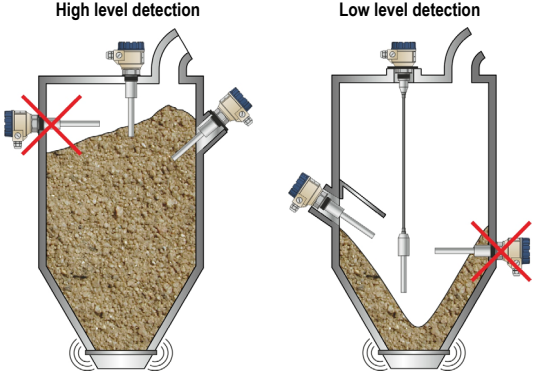


Figure 4

When detecting the level of powders, the device must be installed at an angle exceeding the repose angle (or, in the case of high level detection, vertically), to prevent the forming of powder deposits on the vibrating rod that might substantially reduce the self-cleaning effect. Avoid mounting the rod in a recess (see Figure 5).

In the case of tanks that are likely to be exposed to intense vibrations, the vibrations acting on the device must be dampened (e.g., vibration-damping inserts made of rubber have to be applied).

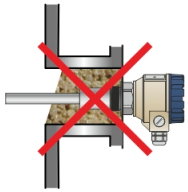


Figure 5

Figure 6

5. INSTALLATION, COMMISSIONING

Remove the top cover of the housing to access the connection terminals and adjustment switches. The housing cover of Dust Ex instruments can only be opened after removing the safety locking bolt fastened with bolts. Do not remove the wire from terminal pin 1 (Figure 7) because it is an internal connection. Use the PE (Protective Earth) grounding screw to ground the unit.

After the device is installed and connected electrically, test if the device is ready for operation.

The LED lights up when the device is switched on.

The DENSITY (switch A) switch must be set in accordance with the density of the material:

- LOW position, recommended for loose and light materials with **density** below 0.1 kg/dm^3 represents **small energy** and **amplitude** of vibration as well as **great sensitivity** of detection.
- HIGH position, recommended for (thick and heavy) materials with **density** over 0.1 kg/dm^3 represents vibration with **great energy** and **amplitude** and **small sensitivity** of detection.

The instrument may not switch correctly in mediums with density less than 0.05 kg/dm^3 or with very small internal friction.

To obtain FAIL SAFE alarm (switch **C**), use the de-energized or open state of the output as an alarm, thus a power failure will also be considered as alarm (see 6.1 Operation diagram Table). The delay (switch **B**) must be selected to comply with requirements of the process control technology the units are used for.

ATTENTION! *The instrument may be damaged through the switches by electrostatic discharge (ESD), thus the precautions commonly used to avoid ESD must be applied.*

6. WIRING

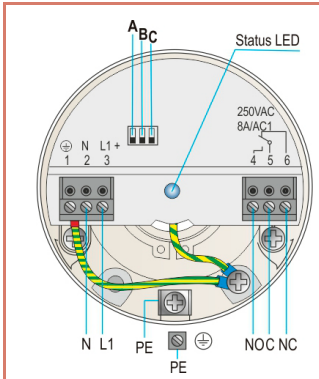


Figure 7
Wiring of relay output version

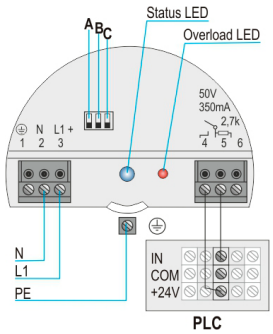


Figure 8
Wiring of optocoupled sink input to solid state ouput version supplied from a AC line

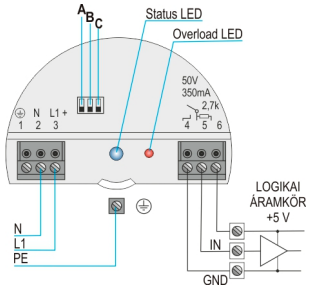


Figure 9
Wiring of a logical voltage input to a solid state output version supplied from AC line

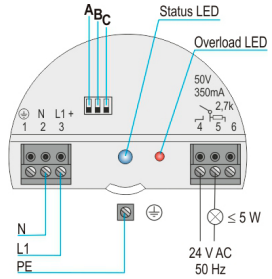
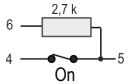
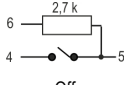
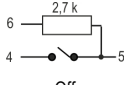
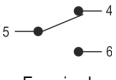
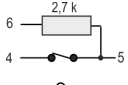
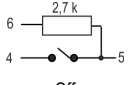


Figure 10
Wiring of a load to a solid state output version supplied from AC line

6.1 Operation diagram

Power supply	Rod	Fail-safe mode		Status LED	Relay	Solid state output
YES	Immersed		LOW	green	 Energized	 On
			HIGH	red	 De-energized	 Off
	Free		LOW	red	 De-energized	 Off
			HIGH	green	 Energized	 On
NO		LOW / HIGH		Off	 De-energized	 Off

7. MOUNTING THE CUSTOM EXTENSION TYPE

Attention! The device must not be installed with the temporary (plastic) extension pipe!

- Remove the temporary (plastic) extension pipe.
- Cut a 1" inch stainless steel (1.4571) extension pipe (not included) to the desired length.
- Cut a 20 mm (0.8") long 1" BSP thread on both ends of the pipe.
- Connect the wires of the lower and upper half correctly by color using the supplied cable set. The wires must be led through the pipe.
- Use the grounding screw terminal (see Figure11.) to ground the extension pipe. Caution! Life protection ground, 25 A class ground connection must be used.
- Class I. electrical protection.
- Lubricate the extension pipe's threads smoothly and seamlessly with sealing-fixing adhesive. For this use LOCTITE 620 retaining compound or a equivalent (not included).
- Screw the threaded connections between the lower and upper units all the way up to their limits.

Only the correct mounting, ensures the desired IP67 protection, max. 6 bar (0.6 MPa, 87 psi) maximum tank pressure and Class I. electrical protection. The user has to ensure these under his own authority!

The manufacturer declines liability for any damages or any issue due to nonconformity related to the above described installations performed by the customer.

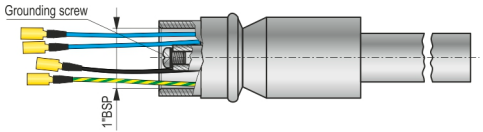


Figure 11

8. MAINTENANCE AND REPAIR

The device does not require regular maintenance. In some instances, however, the vibrating section may need to be cleaned from material deposits. **This must be carried out carefully.**

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.

9. STORAGE CONDITIONS

Ambient temperature: −35…+60 °C (−31…+140 °F)
Relative humidity: max. 98%

rkh502en21h09
October 2021
NIVELCO reserves the right to change anything in this manual without notice!