

Thank you for choosing a NIVELCO instrument
We are sure that you will be satisfied throughout its use



NIVOCONT
R-300/R-400 SERIES
VIBRATING ROD LEVEL SWITCHES

1. APPLICATION

The vibrating rod is a mechanical resonant system excited and kept in resonance by an electronic unit. The medium to be measured, when reaching the vibration rod end, will damp the vibration. The change in vibration intensity is sensed by an electronic unit, which, upon the elapse of the delay time, actuates the output circuit.

2. TECHNICAL DATA

2.1. GENERAL SPECIFICATION

VERSION	STANDARD	PIPE EXTENDED	CABLE EXTENDED
Probe length	235 mm	0.3 ... 3 m	1 ... 20 m
Parts protruding into the tank	1.4571		Probe: 1.4571 Cable: PE coated
Housing material	Aluminium: Powder paint coated (R-300) Plastic: PBT fibre-glass reinforced, flame-retardant (DuPont®) (R-400)		
Process connection	RKH, RHH, RKR, RHR, RKK: 1 1/2" BSP RKN, RHN, RKL, RHL, RKC: 1 1/2" NPT		
Temperature ranges	see TABLE 2.1a and Derating diagram		
Max. pressure (absolute)	25 bar (2.5 MPa)**		6 bar (0.6 MPa)**
Minimum medium density*	0.05 kg/dm ³ (max. granular size: 10 mm)		
Response time (selectable)	Not vibrating (covered)	< 1.8 sec or 5 ± 1.5 sec	
	Vibrating (free)	< 2 sec or 5 ± 1.5 sec	
Supply voltage (universal)	Voltage version I: 16 ... 40V AC (50/60Hz) / 19 ... 55V DC Voltage version II: 85 ... 265V AC (50/60Hz) / 120 ... 375V DC		
Power consumption	Voltage version I: ≤ 2.5 VA, 1.2W Voltage version II: ≤ 2.5 VA, 1.3 W		
Electrical connections	2 pcs. Pg16 for Ø8 to 15 mm cables; 2 pcs. plug-in type terminal block for max. 1.5 mm ² wire cross section		
Ingress protection	IP 67 (NEMA6) MSZ EN 60529:2001		
Electrical protection	Class I.		
Explosion proof protection mark	Ex II 1/2D IP 65 (1D sensor/2D housing) (except version with plastic housing)		
Weight (with extension)	plastic housing	1.56 kg	1.56 kg (+1.4 kg/m)
	aluminium housing	1.94 kg	1.94 kg (+1.4 kg/m)

USER'S MANUAL



2.2 SPECIAL DATA

EX VERSION	TEMPERATURE DATA		
	RKH-3, RKN-3 RKL-3, RKR-3	RKK-3, RKC-3	RHH-3, RHN-3 RHL-3, RHR-3
Medium temperature range (category 1D)	-30 °C ... +110 °C	-30 °C ... +95 °C	-30 °C ... +160 °C
Max. surface temperature T	+110 °C	+95 °C	+160 °C
Ambient temperature range (category 2D)	-30 °C ... +50 °C	-30 °C ... +60 °C	-30 °C ... +35 °C
Max. surface temperature T at process connection (cable gland) category 2D	+90 °C	+85 °C	+135 °C

* may depend on friction and granular size of the medium

** in the presence of explosive atmosphere 0.8 ... 1.1 bar

VERSION	OUTPUT VERSIONS	
	RELAY	SOLID STATE
	R□□-□□□-1 R□□-□□□-2 R□□-□□□-5 R□□-□□□-6	R□□-□□□-3 R□□-□□□-4 R□□-□□□-7 R□□-□□□-8
Output	SPDT (potential free)	SPST (electronic)
Output rating	250 V AC, 8A, AC 1	350 mA/50V pick
Output protection	-	Overvoltage, overcurrent and overload protection
Voltage drop (switched of state)	-	< 1.7 V @ 350 mA
Residual current (switched on state)	-	< 10 µA

DERATING DIAGRAM

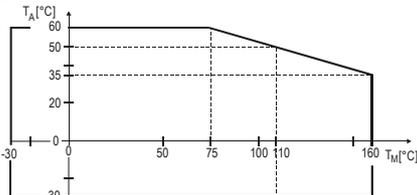


Figure 2

Ambient temperature (T_A) versus medium temperature (T_M)

2.4 ORDER CODE

NIVOCONT R □ □ □ - □ □ □ - □ □ □

VERSION	CODE	PROCESS CONN.	CODE			HOUSING	CODE	PROTRUSION LENGTH	CODE			SUPPLY / OUTPUT/ Ex	CODE
			STANDARD	PIPE	CABLE			STANDARD	PIPE	CABLE			
Standard	K	1 1/2" BSP	H	R	K	Alu cast	3	235 mm	02	—	—	85-265 V AC / 120-375 V DC / relay	1
High Temp.	H*	1 1/2" NPT	N	L	C	Plastic	4	0.5 ... 3 m	—	05...30	—	16-40 V AC / 19-55 V DC / relay	2
								1 ... 20 m	—	—	01...20	85-265 V AC / 120-375 V DC / solid state	3
												16-40 V AC / 19-55 V DC / solid state	4
												85-265 V AC / 120-375 V DC / relay / Ex	5
												16-40 V AC / 19-55 V DC / relay / Ex	6
												85-265 V AC / 120-375 V DC / solid state / Ex	7
												16-40 V AC / 19-55 V DC / solid state / Ex	8

* only for standard and pipe extended version

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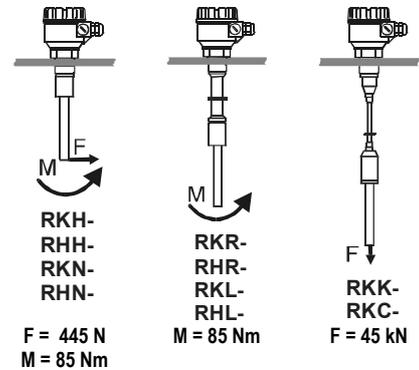


Figure 1
Torque and force

2.3 ACCESSORIES

- User's manual
- Warranty card
- Declaration of conformity
- 2 pcs. 3-pole terminal block
- 1 1/2" sealing, for BSP only
- 2 pcs. Pg 16 cable gland

2.5 DIMENSION

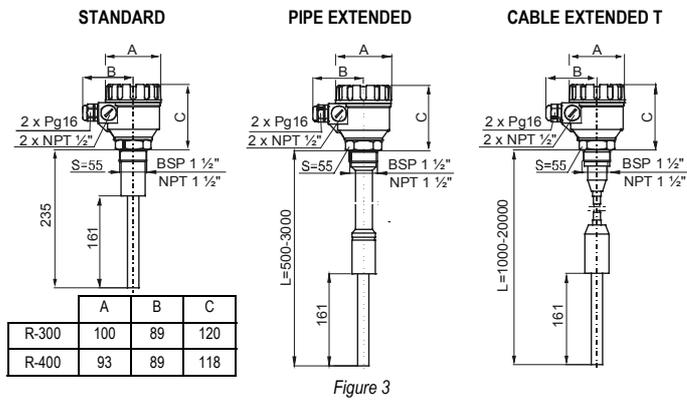


Figure 3

3. INSTALLATION

Prior to installation, it is advised to check the switching function for proper adjustment on a sample quantity of material (see Calibration). The unit may not work with mediums within the specified density range but having very large size of granules or extremely little friction.

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

Screw in the device by its hexagon neck. After screwing tight 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 actually required taking into account caving or arching of the material in the silo (see Figure 4)

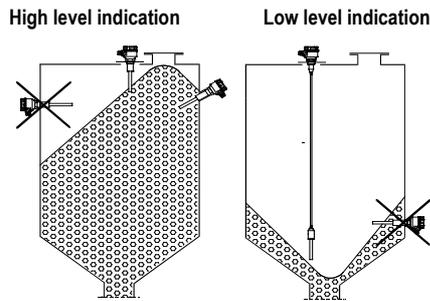


Figure 4

With powder level detection device should be installed at an inclination exceeding the angle of repose (or, in case of high level detection vertically), to prevent powder deposition on vibrating rod that might substantially reduce the self-cleaning effect. Also avoid mounting the rod in a recess (see Figure 5)

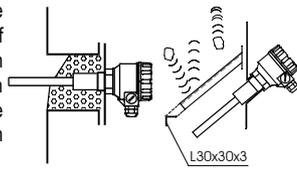


Figure 5

Figure 6

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

4. ADJUSTMENT

Remove the top cover of the housing to access the connection terminals and adjusting switches.

Do not remove the wire form terminal pin 1 (Figure 7) because it is an internal connection. For grounding the unit use the PE grounding screw terminal PE.

After proper installation and the electrical connection, established the device is ready for operation. The switched-on state is indicated by the lighting of the LED.

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

- LOW position, recommended for loose and light materials with density below 0.1 kg/dm³ 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/dm³ represents vibration with **great energy** and **amplitude** and **small sensitivity** of detection.

To obtain FAIL SAFE alarm (switch C), use the de-energised or open state of the output as an alarm, thus a power breakdown will also be considered as alarm (see Table below).

The delay (switch B) is to be selected to comply with requirements of the process control technology the units is used for.

Note: The instrument may be damaged via switches by electrostatic discharge (ESD), thus the precautions commonly used to avoid ESD is to be applied.

5. ELECTRICAL CONNECTION

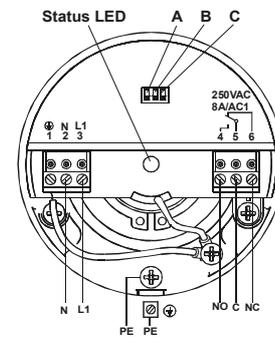


Figure 7

Electrical connection of relay output version

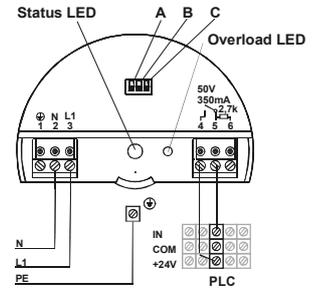


Figure 8

Electrical connection of a optocoupled sink input to a solid state output version supplied from a AC line

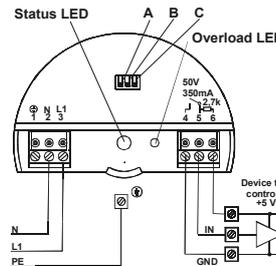


Figure 9

Electrical connection of a logical voltage input to a solid state output version supplied from a AC line

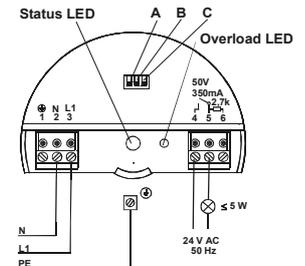


Figure 10

Electrical connection of a load to a solid state output version supplied from a AC line

5.1. OPERATING DIAGRAM

POWER	PROBE	FAIL-SAFE MODE	LED	RELAY	SOLID STATE OUTPUT
ON	NOT VIBRATING (COVERED)	LOW	GREEN	5-4-6 ENERGISED	6-4-5 2.7k ON
		HIGH	RED	5-4-6 DE-ENERGISED	6-4-5 2.7k OFF
	VIBRATING (FREE)	LOW	RED	5-4-6 DE-ENERGISED	6-4-5 2.7k OFF
		HIGH	GREEN	5-4-6 ENERGISED	6-4-5 2.7k ON
FAILS		LOW or HIGH	NOT LIT	5-4-6 DE-ENERGISED	6-4-5 2.7k OFF

5.2. The regulations of EN 50281-1-2 European Standard must be fulfilled (temperature, dust layer thickness etc.)

6. MAINTENANCE, REPAIR

The NIVOCONT R-300/R400 series devices do not require maintenance on a regular basis. In some instances, however, the vibrating section may need a cleaning from deposited material. **This must be carried out gently, without harming the vibrating section of the vibrating rod.**

Repairs during or after the guarantee period are effected at the Manufacturers. The equipment sent back for repairs should be cleaned or neutralised (desinfected) by the User.

7. STORAGE CONDITIONS

Ambient temperature: -35 to +60°C
Relative humidity: max. 98 %

8. WARRANTY

All NIVELCO products are warranted to be free from defects according to the Warranty Sheet, within two (2) years from the date of purchase.

July, 2003

Nivelco reserves the right to change technical specifications without notice.