

Thank you for choosing a NIVELCO instrument!

1. APPLICATION

NIVOSWITCH R-300 series vibrating forks are for level detection of powder, lumpy solids and granules. Overfilling and emptying of silos or vessels can be prevented when using them as high or low fail-safe switches. The RC series (basic type insertion length = 125 mm [4.9"]) with casted forks are recommended for small granules, while the RL series (basic type insertion length = 137 mm [5.4"]) with welded forks are recommended for larger granules. Both RC and RL series are also available in dust Ex versions.

2. TECHNICAL DATA

2.1 GENERAL DATA

Type	R00-300-0, R00-300-0Ex	
Medium pressure	40 bar (580 psi), 6 bar (87 psi) with PP flange See Derating diagram	
Insertion length	0.125...3 m (4.9"...10 feet)	
Material of wetted parts	Casted fork DIN 1.4404, welded fork DIN 1.4571	
Medium temperature	-40...+130 °C (-40...+266 °F), See Derating diagram	
Ambient temperature	-40...+70 °C (-40...+158 °F), See Derating diagram	
Medium	$\rho \geq 0.01 \text{ kg/dm}^3$	
Switching delay	Getting immersed	0.5 sec
	Getting free	$\leq 1 \text{ s}$ – selected high density (H) ($\rho \geq 0.5 \text{ kg/dm}^3$) $\leq 3 \text{ s}$ – selected low density (L) ($\rho < 0.5 \text{ kg/dm}^3$)
Indication of operation	Bi-color LED	
Test of operation	Output state can be changed with test magnet	

2.2 TWO-WIRE DC VERSION

Type	2-WIRE DC	
	R00-300-6	R00-300-7
Electric connection	Connector	3 m (10 feet) cable (2 x 0.5 mm ² [AWG20])
Ingress protection	IP65	IP68
Output	DC current change: fork free: 9 ± 1 mA; fork immersed: 14 ± 1 mA	
Power consumption	< 0.5 W	
Supply voltage	15...27 V DC	
Selection of operation	LOW fail-safe L or HIGH fail-safe H on suggested isolator, by switch	
Selection of sensitivity	By inverting the polarity of connection	
Electric protection	Class III	

2.3 2-WIRE AC, 3-WIRE DC VERSION

Type	2-WIRE AC		3-WIRE DC	
	R00-300-1	R00-300-2	R00-300-3	R00-300-4
Electric connection	connector	3 m (10 feet) cable, 4 x 0.75 mm ² (AWG18) max. cable length 30 m (100 feet)	connector	3 m (10 feet) cable 5 x 0.5 mm ² (AWG20) max. cable length 30 m (100 feet)
Ingress protection	IP65	IP68	IP65	IP68
Selection of operation (Low fail-safe – L, High fail-safe – H)	By altering the connection		By switch on the cover	By inverting the polarity of connection
Selection of density. (Low density – L, high density – H)	Not possible $\rho \geq 0.5 \text{ kg/dm}^3$		By switch on the cover	With wiring
Output	serial AC output		By changing polarity NPN- and PNP transistor switch	Galvanically isolated PNP/NPN transistor switch
Output protection	—		changing polarity, over surge, short cut	
Supply voltage	20...255 V AC, 50/60 Hz		12...55 V DC	
Power consumption	Depending on load		< 0.6 W	
Voltage drop between terminal points during operation	< 10.5 V		0...1.8 V	
Electric protection	Class I		Class III	
Current load	max. continuous	350 mA AC 13, for Ex version (C, D) 140 mA	$I_{\text{max}} = 350 \text{ mA}$ for Ex version 200 mA DC / $U_{\text{max}} = 55 \text{ V DC}$	
	min. continuous	10 mA / 255 V, 25 mA / 24 V	—	
	max. impulse	1.5 A / 40 ms	—	
Residual current after switch off	< 6 mA		< 10 μA	
Mark of explosion protection	Ⓔ II ½ D IP65 T160°C for C, E output codes, Ⓔ II ½ D IP68 T160°C for D, F output codes			

2.4 ACCESSORIES

- User's Manual
- Warranty Card
- EU Declaration of Conformity
- 1 x 2 mm (0.08") thick KLINGER OILIT seal

Components and accessories (sold separately):

- RPS-101 type screw driver with test magnet
- Sliding sleeve: RPH-112 (max. up to 6 bar [87 psi] medium pressure)

NIVOSWITCH

R-300
VIBRATING FORK LEVEL SWITCH

USER'S MANUAL



Manufacturer:

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NIVELCO

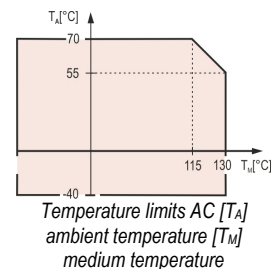
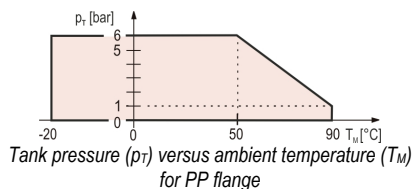
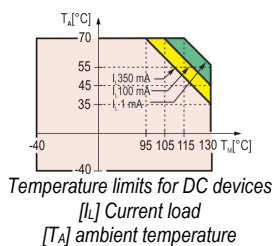
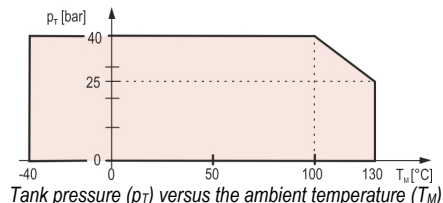
2.5 ORDER CODE

NIVOSWITCH R - 3 - *

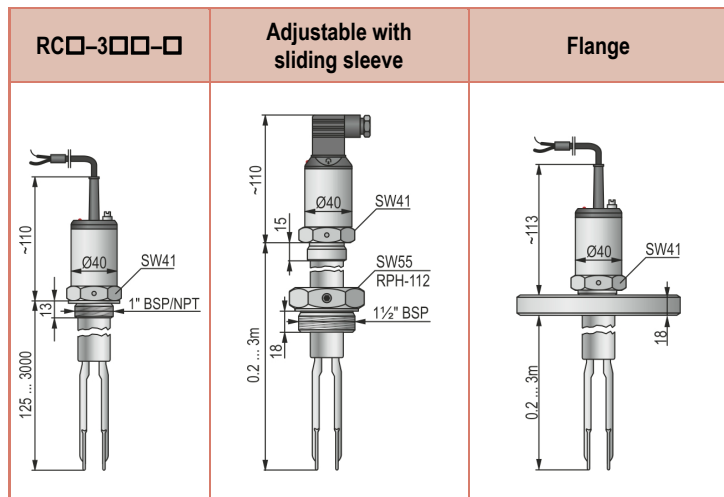
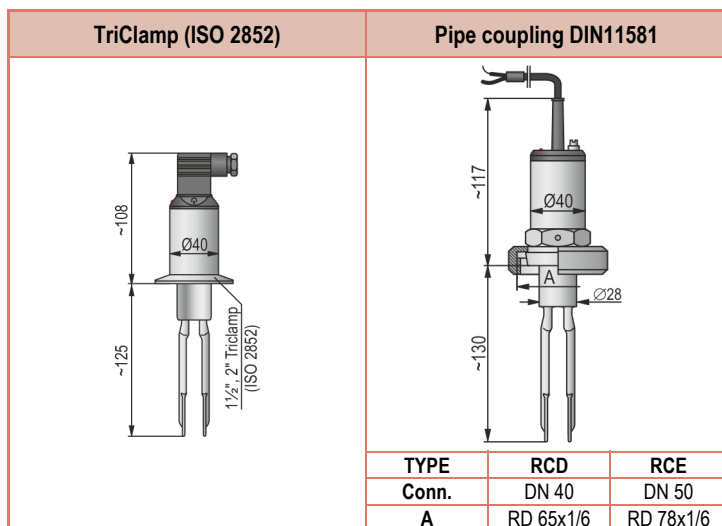
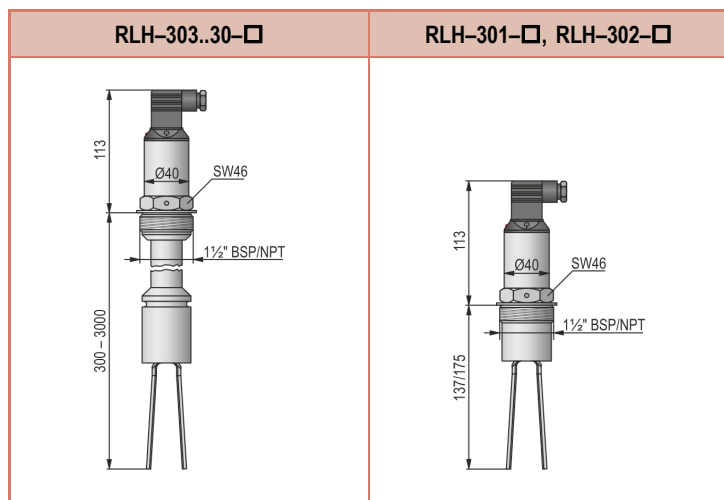
TYPE	CODE	CONNECTION	CODE	CONNECTION	CODE	INSERTION LENGTH	CODE	OUTPUT	CODE
Casted fork	C	1" BSP	M	2" ANSI RF 600 1.4571	B	125 / 137 mm	01	2-wire AC+ connector	1
Welded fork	L	1½" BSP	H	JIS 10K 50 A PP	J	200 / 175 mm	02	2-wire AC + cable	2
		1" NPT	P	JIS 40K 50 A 1.4571	K	0.3...3 m	03...30	3-wire DC + connector	3
		1½" NPT	N	1½" TriClamp	T			3-wire DC + cable	4
		DN50 PN16 PP DIN	F	2" TriClamp	R			2-wire DC+ connector	6
		DN50 PN40 1.4571 DIN	G	Pipe coupling DN40	D			2-wire DC + cable	7
		2" ANSI RF150 PP	A	Pipe coupling DN50	E			Dust Ex	
								2-wire AC+ connector	C
								2-wire AC + cable	D
								3-wire DC+ connector	E
								3-wire DC + cable	F

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

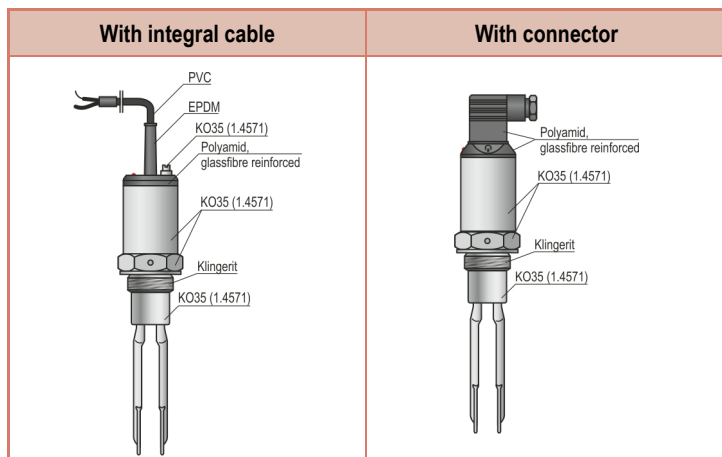
2.6 DERATING DIAGRAMS



2.7 DIMENSIONS

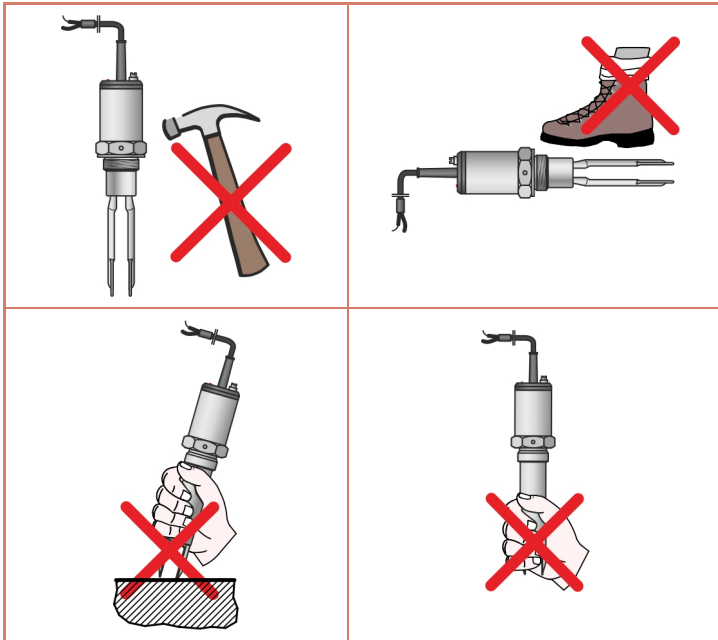


2.8 MATERIALS

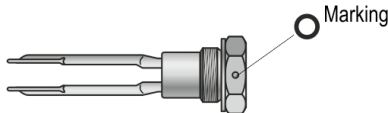


3. INSTALLATION

Prevent device from being damaged during delivery, storage, mounting and test.

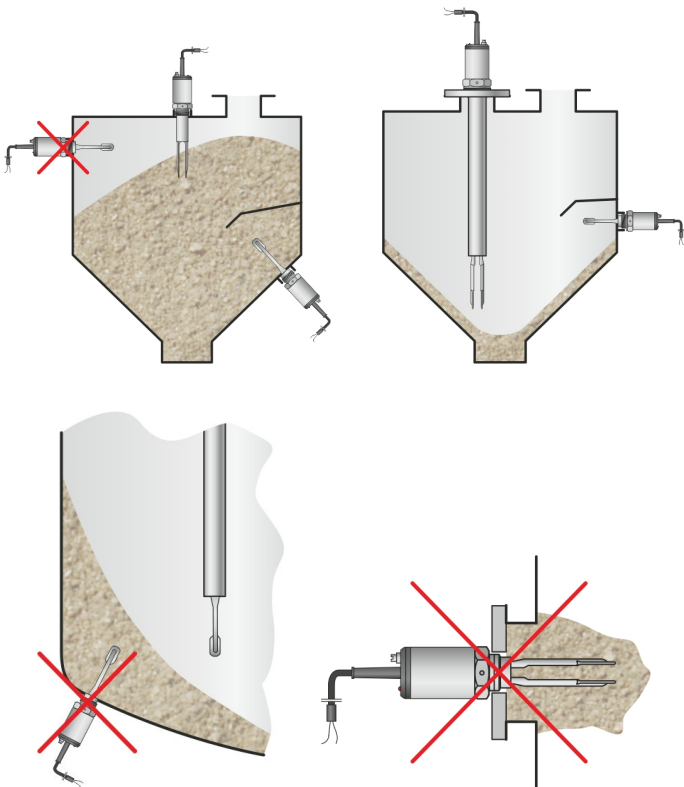


Before installation it is advised to try the operation of the level switch in a small sample of material in order to set the proper density. Tightening of the model with thread process connection should only be done with open end SW41, SW46 or SW55 spanner.



For positioning of the fork tine use the marking on the hexagonal neck.

The recommended mounting position of the fork for light, free flowing solids, is vertical (top) mounting. Side mounting is recommended only in cases when the fork-tines are easily freed from the process medium. In case of side mounting, **NIVOSWITCH** must be mounted with the fork-tines standing vertically. When determining mounting location, take into account the possible caving or arching of the material in the tank. The fork should be protected against falling materials. This is to be done so that material could not clog between the fork and the protection plate.



4. WIRING

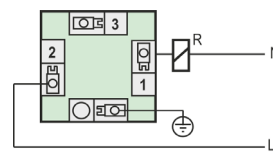
IMPORTANT! The NIVOSWITCH level switches incorporate overvoltage-protection circuit. Nevertheless, this overvoltage protection may not be enough in case of inductive loads. It is recommended to use external protection circuits installed next to the inductive loads (the suitable schematic diagrams can be found in the catalogues of the relay manufacturers).

4.1. 2-WIRE AC

ROO-300-1 with connector
ROO-300-2 with cable

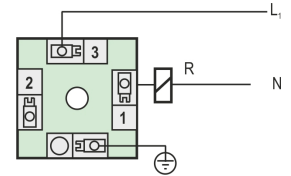
THE UNIT SHOULD NOT BE POWERED UP WITHOUT GROUNDING AND EXTERNAL LOAD!

4.1.1. Model with connector ROO-300-1



Wiring of Low fail-safe mode (L)

4.1.1. Model with connector ROO-300-1

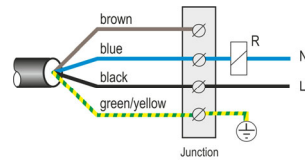


Wiring of High fail-safe mode (H)

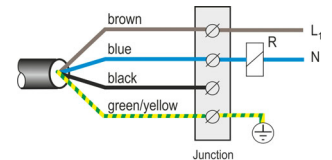
Terminal block cover can be rotated in 90° steps to ensure appropriate cable positioning.

4.1.2. Integral cable version ROO-300-2

The integrated cable has 4 wires. The connection to the AC network is done with 3 wires. Since there cannot be any unconnected wire all the 4 wires should be connected to a junction box as seen below.



Wiring of Low fail-safe mode (L)



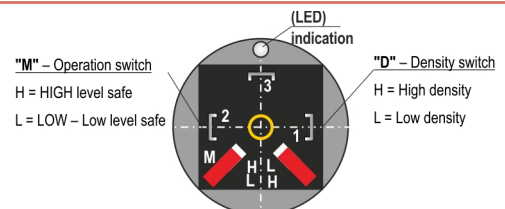
Wiring of High fail-safe mode (H)

4.2. 3-WIRE DC VERSION

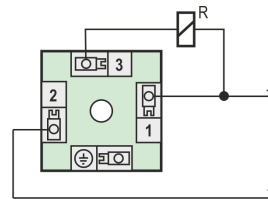
ROO-300-3
ROO-300-4

In case of overload caused by short circuit, the transistor will switch on and off, and the LED will start to blink.

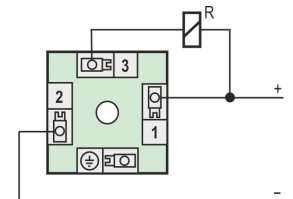
4.2.1. Connector version ROO-300-3



4.2.1.1. Wiring diagram of the 3-wire DC connector version with relay



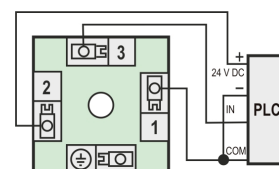
PNP wiring



NPN wiring

Terminal block cover can be rotated in 90° steps to ensure appropriate cable positioning.

4.2.1.2. Wiring diagram of the 3-wire DC connector version with PLC

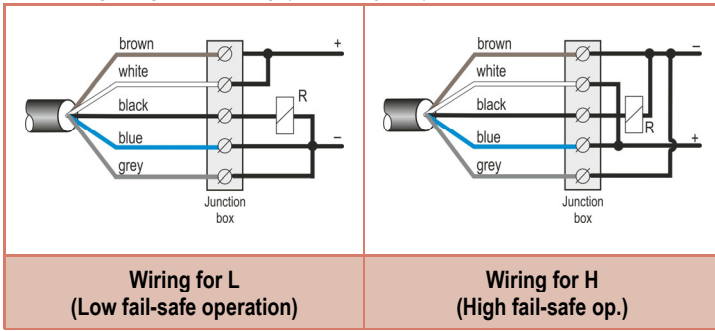


PNP wiring

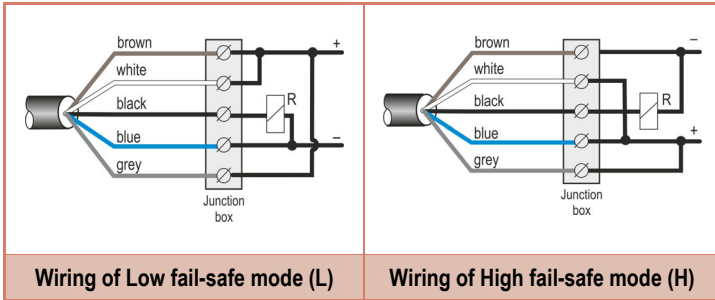
4.2.2. Integral cable version R□□-3□□-4

4.2.2.1. Wiring with relay

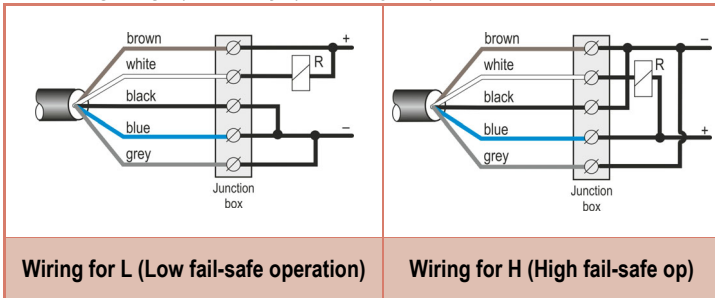
PNP wiring – high (H) density ($\rho \geq 0.5 \text{ kg/dm}^3$)



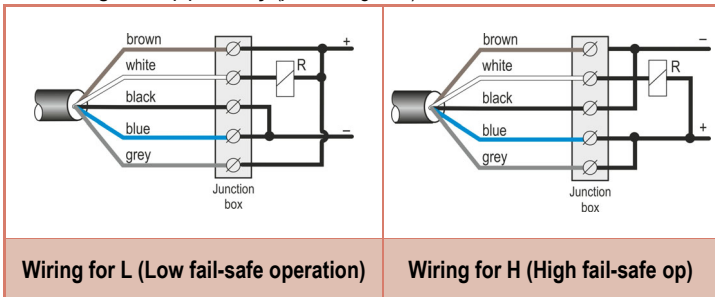
PNP output – low (L) density ($\rho < 0.5 \text{ kg/dm}^3$)



NPN wiring – high (H) density, ($\rho \geq 0.5 \text{ kg/dm}^3$)

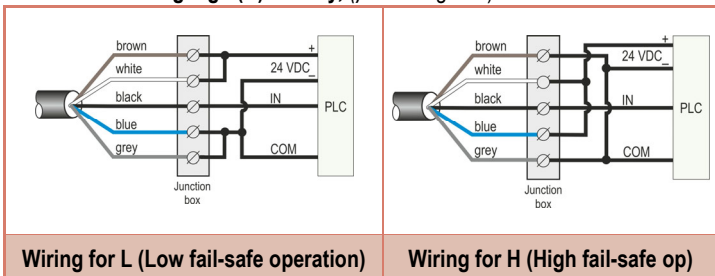


NPN wiring – low (L) density ($\rho < 0.5 \text{ kg/dm}^3$)

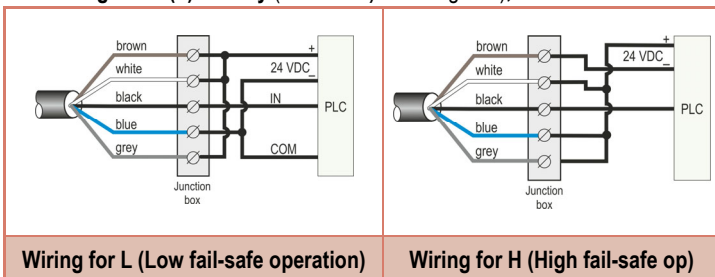


4.2.2.2. Wiring with PLC

4.2.2.3. PNP wiring high (H) density, ($\rho \geq 0.5 \text{ kg/dm}^3$)



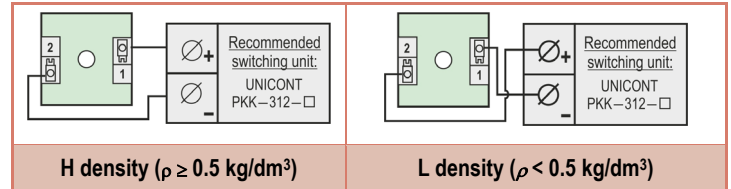
PNP wiring – low (L) density (for solids: $\rho < 0.5 \text{ kg/dm}^3$),



4.3. 2-WIRE DC VERSION

4.3.1. Connector version

R□□-3□□-6

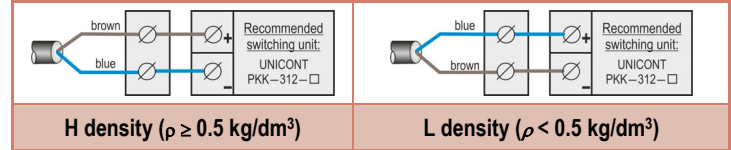


H density ($\rho \geq 0.5 \text{ kg/dm}^3$)

L density ($\rho < 0.5 \text{ kg/dm}^3$)

4.3.2. Integral cable version

R□□-3□□-7



H density ($\rho \geq 0.5 \text{ kg/dm}^3$)

L density ($\rho < 0.5 \text{ kg/dm}^3$)

5. SET UP, ADJUSTMENT, PUTTING INTO OPERATION

Check wiring and setting of switches (if any). After powering up the vibrating fork is operational. The operation is summarised in the table below

Power supply	Fork	Mode	Display (LED)	Output
ON	Immersed	High	Red	OFF
		Low	Green	ON
	Free	High	Green	ON
		Low	Red	OFF
NONE	Free or immersed	H or L	Off	OFF

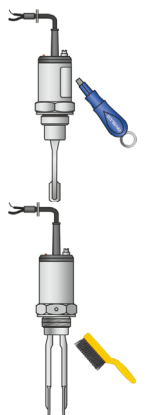
State of operation of the 2-wire DC version

Fork	Display (LED)	Output
Immersed	Red	14 ± 1 mA
Free	Green	9 ± 1 mA

OPERATION TEST

Operation of the switch can be verified with the help of the optional screwdriver with magnet (RPS-101).

When moving the magnet in front of the marking on the enclosure the state of the switch (color of the LED) should be changed.



6. 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.

7. STORAGE CONDITIONS

Ambient temperature: -25...+70 °C (-13...+158 °F)

Relative humidity: max. 98%

rcm301en1408h
rcm3014a0600h_08
November, 2014

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