Thank you for choosing a NIVELCO instrument!

NIVOSWITCH

R–400, R–500
VIBRATING FORK LEVEL SWITCHES

USER'S MANUAL

1. APPLICATION

NIVOSWITCH vibrating fork level switches are suitable for level detection of liquids. Mounted on pipes or tanks, it controls filling/emptying and can also generate fail-safe alarms for overfill or dry run protection. The operating principle involves an electronic circuit that induces vibration in the fork probe. When the medium reaches and covers the fork, the vibration changes or stops. The fork will start vibrating freely again when the medium drops to a level where it no longer touches the prongs. The electronics senses the change in the vibration and sends out an output signal after a preset delay. The plastic-coated version is recommended for aggressive mediums, the highly polished version is recommended for abrasive mediums. The flameproof version allows using the device in Ex rated environments.

2. TECHNICAL DATA

2.1 GENERAL DATA

		RN□–4□□–□ Ex RM□–4□□–□ Ex	RV□	RF□, RJ□
Insertion length		69…3000 mm (2.72"…10 ft), As per order code		
Process connection		As per order code		
Material of wetted parts		1.4571 (316Ti)	ECTFE / PFA Coating	1.4571(316Ti)
Process temperature		See: Chapter 2.5.4	–40…+130 °C (–40…+266 °F), (see: diagram 2.3); PP flange: –20…+90 °C (–4…+194 °F); PFA-coated 1.4571 (316Ti) flange*: –40…+120 °C (–40…248 °F)	
Ambient temperature			**R□□–4□□:** –40…+70 °C (–40…+158 °F) **R□□–5□□:** –30…+70 °C (–22…+158 °F)	
Process pressure		Up to 40 bar (4 MPa, 580 psi) (see: 2.3 Diagram)	6 bar (0.6 MPa, 87 psi)	Up to 40 bar (4 MPa, 580 psi) (with PP flange) 6 bar [0.6 MPa, 87 psi]) (see: Diagram 2.3)
Medium density		≥ 0.7 kg/dm³		
Medium viscosity		≤ 10,000 mm²/s (cSt) (see: 2.4 Diagram)		
Supply voltage		See: Chapter 2.5	20…255 V AC, 20…60 V DC	
Power consumption		< 3 W		
Housing material		Painted aluminum	**R□□–4□□:** fiberglass-reinforced plastic (PBT) **R□□–5□□:** painted aluminum	
Response time	Getting immersed	≤ 0.5 s		
	Getting free	≤ 1 s (see: 2.4 Diagram)		
Indication of operating mode		Two-tone LED		
Selecting the operating mode		Switch for selecting HIGH or LOW fail-safe mode		
Output		1 or 2 SPDT relays 250 V AC, 8 A, AC1 / 250 V AC, 6 A, AC1		
Electrical connection		See: Chapter 2.5	2× M20×1.5 cable glands for Ø6…12 mm (Ø0.24"…0.47") cable; 2× internally threaded ½" NPT connection for protective pipes	
		Terminal blocks for max. 1.5 mm² (AWG16) wire cross section		
Electrical protection		Class I		
Ingress protection		IP67		
Weight		2.1 kg + 1.2 kg/m (~4.63 lb + 0.8 lb/ft)	**R□□–4□□:** 1.3 kg + 1.2 kg/m (~2.85 lb + 0.8 lb/ft) **R□□–5□□:** 0.95 kg + 1.2 kg/m (~2 lb + 0.8 lb/ft)	

** The temperature difference between inner and outer surface of the ECTFE-coated flanges must not exceed +60 °C (+140 °F). If necessary, insulate outer surface of the flange.*

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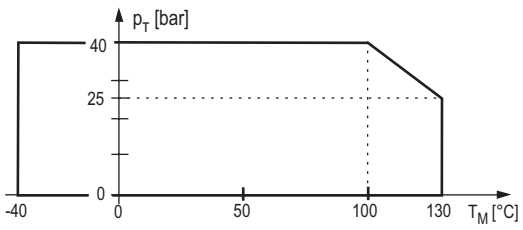
E-mail: sales@nivelco.com ■ nivelco.com

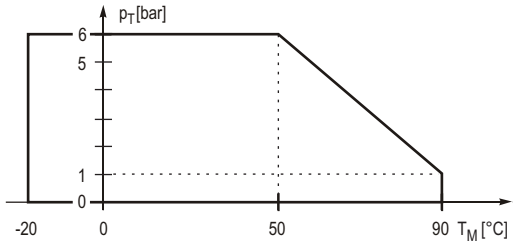
2.2 ACCESSORIES

- User's manual
- Warranty Card
- EU declaration of conformity
- 2× M20×1.5 plastic cable gland
  (only for non-explosion-proof models)
- 1× 2 mm (0.08") thick Klinger Oilit seal
  (for BSP threaded process connection only)
- 2× plug-in type, 3-pole terminal block
  (3× for models with 2 relays)

2.3 PRESSURE – TEMPERATURE DIAGRAMS

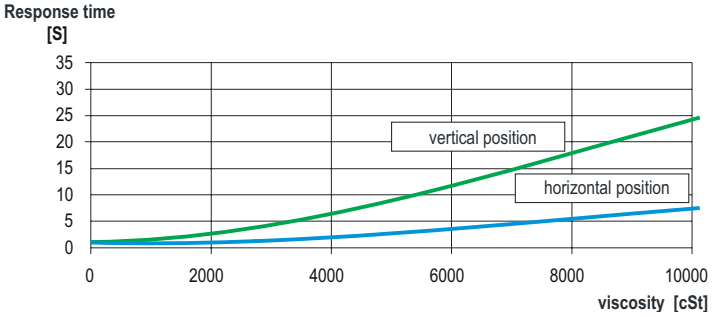


Medium pressure (p_T) – Medium temperature (T_M)



Medium pressure (p_T) – Medium temperature (T_M) PP flange version

2.4 RESPONSE TIME – MEDIUM VISCOSITY DIAGRAM



2.5 CERTIFICATES, EXPLOSION PROTECTION, Ex MARKINGS, Ex LIMIT DATA

2.5.1 DNV CERTIFICATE, NO. TAA000018W

2.5.2 ATEX CERTIFICATE, NO. BKI16ATEX0031/1

	RN□–4□□–N Ex, RN□–4□□–P Ex, RM□–4□□–N Ex, RM□–4□□–P Ex
Ex marking (ATEX)	⟨Ex⟩ II 1/2 G Ex db IIB T6…T4 Ga/Gb
Supply voltage (universal)	20…250 V AC (50 / 60 Hz) or 20…36 V DC
Electrical connection	2× M20×1.5 Ex d IIC cable glands; 2× internally threaded ½" NPT connection for protective pipes. Terminal blocks for max. 1.5 mm² (AWG16) wire cross section
Reference document number	rfm400hu21h08-b

2.5.3 IECEx CERTIFICATE NO. IECEx BKI 16.0002 Issue 1.

	RN□–4□□–□ Ex, RM□–4□□–P Ex
Ex marking (IECEx)	Ex db IIB T6…T4 Ga/Gb –40 °C (–40 °F) ≤ T_{amb} ≤ +70 °C (+158 °F)
Supply voltage (universal)	20…250 V AC (50 / 60 Hz) or 20…36 V DC
Electrical connection	2× M20×1.5 Ex d IIC cable glands; 2× internally threaded ½" NPT connection for protective pipes. Terminal blocks for max. 1.5 mm² (AWG16) wire cross section
Reference document number	rfm400en21h08-b

2.5.4 Ex TEMPERATURE LIMIT DATA

Temperature data	RN□–4□□–N Ex, RN□–4□□–P Ex, RM□–4□□–N Ex, RM□–4□□–P Ex			
Process temperature minimum: −40 °C (−40 °F); Maximum:	+70 °C (+158 °F)	+80 °C (+176 °F)	+95 °C (+203 °F)	+130 °C (+266 °F)
Ambient temperature minimum: −40 °C (−40 °F); Maximum:	+65 °C (+149 °F)	+50 °C (+122 °F)	+65 °C (+149 °F)	+70 °C (+158 °F)
Highest surface temperature of the process connection	+70 °C (+158 °F)	+80 °C (+176 °F)	+95 °C (+203 °F)	+125 °C (+257 °F)
Highest surface temperature	+75 °C (+167 °F)	+80 °C (+176 °F)	+95 °C (+203 °F)	+130 °C (+266 °F)
Temperature class	**T6**		**T5**	**T4**

2.6 ORDER CODES *(NOT ALL COMBINATIONS POSSIBLE!)*

NIVOSWITCH R □ □ – □ □ □ – □ *

Type	Code
1.4571	F
Highly polished	J
Ex d housing + fork: 1.4571	N
Ex d housing + fork highly polished	M
ECTFE-coated	V

Process connection		Code
1" BSP		M
1½" BSP		H
1" NPT		P
1½" NPT		N
DN40 PN40 1.4571		S
DIN DN50	PN16 PP flange	F
	PN40 1.4571 flange	G
2" ANSI	PP flange	A
	1.4571 flange	B
50A JIS	PP flange	J
	1.4571 flange	K
1½" TriClamp		T
2" TriClamp		R
DN40	Pipe coupling (DIN11851)	D
DN50		E
2" BSP		C
2" NPT		L

Housing	Code
Aluminum (powder-coated)	4
Plastic, PBT	5

Probe length		Code
Standard probe	69 mm	00
	125 mm	01
Extended probe 0.2…3 m		02…30

Output / Ex	Code
1× SPDT relay	0
2× SPDT relay	A
1× SPDT relay / Ex d	N**
2× SPDT relay / Ex d	P**

*Ex versions are marked 'Ex' right after the type designation on the label.
**Only for RN and RM types

Available components and accessories I.

NIVOSWITCH R P □ – 1 □ □ – 0

Type
Accessories

Sliding sleeve	Code
1½" BSP	H
1½" NPT	N
2" ANSI	A
2" BSP	B
2" NPT	C
DIN DN50	F
JIS 10K 50A	J

Application	Code
For normal version	1
For coated version	2

Material	Code
A38	1
1.4571	2

NIVOSWITCH R P ☐ – 1 0 1 – 0

Type
Accessories

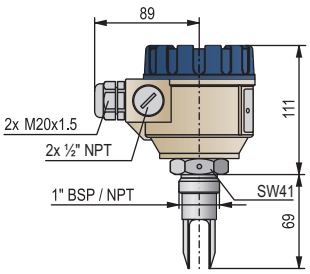
Accessories	Code
Weld-in socket 1" BSP	G
Weld-in socket 1" NPT	K
Magnetic test screwdriver	S

Material
1.4571

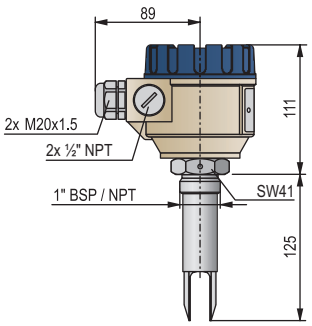
2.7 DIMENSIONS

Standard version

R☐M–☐00–☐, R☐P–☐00–☐

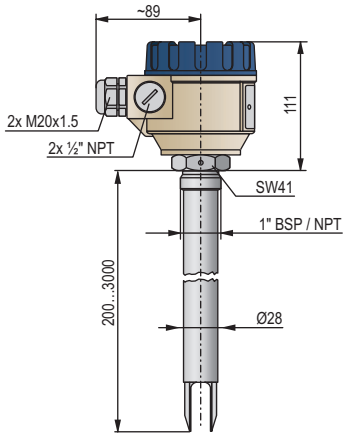


R☐M–☐01–☐, R☐P–☐01–☐



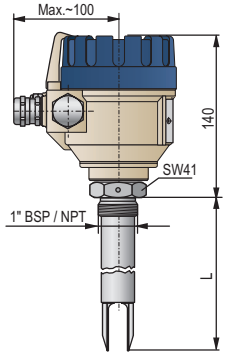
Extended version

R☐M–☐☐☐–☐, R☐P–☐☐☐–☐



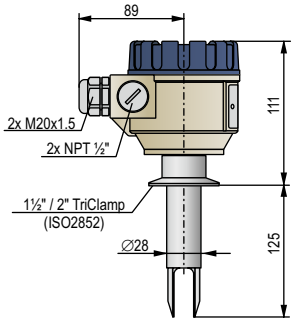
Ex d housing version

R☐M–4☐☐–☐ Ex



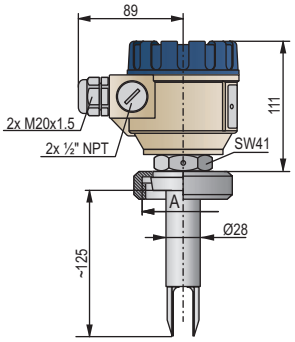
TriClamp version

R☐T–☐01–☐, R☐R–☐01–☐



Pipe coupling (DIN11851) version

R☐D–☐01–☐, R☐E–☐01–☐

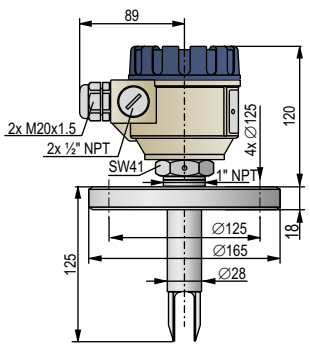


DIN 11851

	R☐D	R☐E
Size	DN40	DN50
A	RD 65x1/6	RD 78x1/6

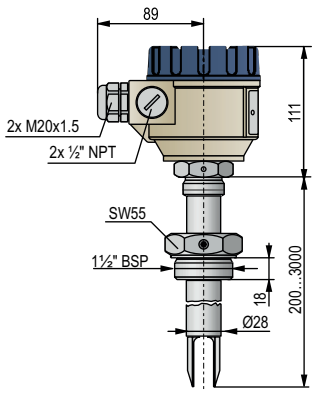
Flanged version

RFF–☐01–☐



Version with sliding sleeve

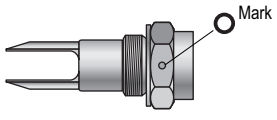
RFM–☐☐☐–☐ + RPH–112–0



3. INSTALLATION

Protect the device from any mechanical damage.

To adjust the position of prongs use the marking on the hexagonal neck.



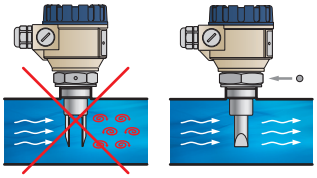
For side mounting, vertical positioning of the fork is suggested.

For a 1" BSP connection, the position of the prongs is irrelevant, use the sealing ring provided. If orientation of the fork is required *(e.g., for piping, side mounting)*, seal with PTFE tape to help positioning the prongs.

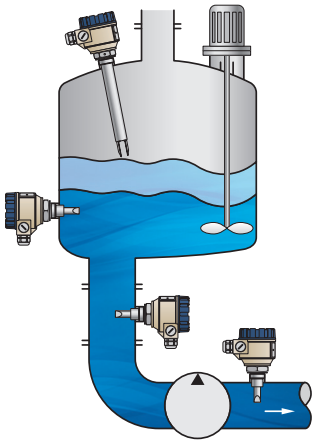
Do not use the housing to fasten the device!
When screwing the level switch into the tank, use the hex nut part of the device.

After screwing the device in tight, the housing can be rotated by hand (max. 300°), to adjust the cable outlets to the required position. In applications involving:

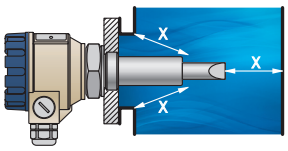
– Low-viscosity liquids *(without risk of material remaining on the fork)* any of the mounting positions shown on the right is possible.
– High-viscosity liquids *(due to risk of material remaining on the fork)* only vertical (top) mounting is recommended.



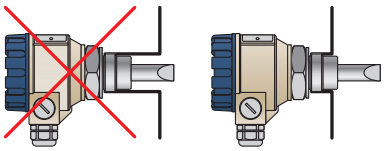
Mounting in pipe, the prongs must be parallel to the direction of flow



Installation Options

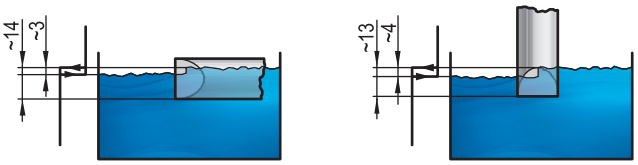


Critical distances (x_{min} = 5 mm [0.2"])



Mounting threaded versions

SWITCHING POINT, SWITCHING DIFFERENTIAL

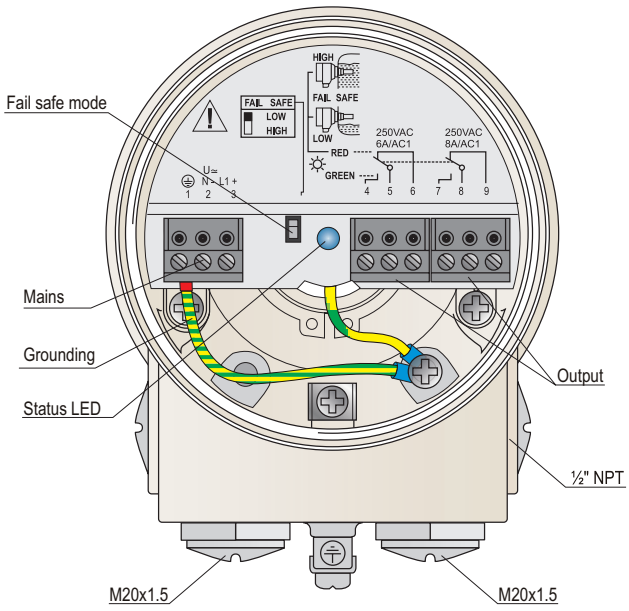


(Values are for water at +25 °C [+77 °F])

The switching point and the switching differential depends partly on the liquid's density and mounting position.

4. WIRING

Use Ø6…12 mm (Ø0.25"…0.5") outer diameter cables with max. 1.5 mm² (AWG16) wire cross section, and tighten the cable glands as well as the housing cover after installation, to ensure an IP67 sealing. Use outside or inside grounding screw terminal for grounding the unit. Common cables must not be used for AC and DC voltage, as well as for low and mains voltage.



5. ADJUSTMENT

Power supply	Fork	Operation mode		Output
		Switch pos.	Status LED	
Yes	Immersed	HIGH	red	De-energized
		LOW	green	Energized
	Free	HIGH	green	Energized
		LOW	red	De-energized
No	Free or immersed	HIGH / LOW	Not lit	De-energized

The mode indicator is still visible in the top view of the cover after the cover is closed. After wiring and adjustment, check the seals and close the cover carefully!

6. SPECIAL CONDITIONS FOR SAFE USE

To prevent ignition, the cover may not be opened while the electrical circuits are powered or if an explosive atmosphere is present! Devices must be grounded by connecting their grounding screws to the equipotential system. The unit can only be powered on after properly closing the housing cover and fixing the screws of the safety locking clamp.

7. 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.

8. STORAGE CONDITIONS

Ambient temperature: −40…+70 °C (−40…+158 °F)
Relative humidity: max. 98%

rfm400en24h11
February 2024