



NIVOSWITCH R-400/R-500

VIBRATION FORK LEVEL SWITCHES



- ◆ Dual purpose level switch with intelligent electronics applicable for:
 - almost all liquids
 - light, free flowing solids
- ◆ Excellent noise immunity through high frequency excitation
- ◆ Various output versions:
 - 2-wire AC, 2-wire DC
 - 3-wire PNP/NPN transistor
 - up to 2 SPDT power relays
- ◆ Polished probe as standard
- ◆ CENELEC EEx ia approved versions
- ◆ ECTFE (HALAR®) coated flanged versions and hygienic connections

ABOUT THE NIVOSWITCH

Nivelco has revamped the popular NIVOSWITCH range of Vibrating Forks for an even higher performance and for a greater flexibility of use. The reengineered extreme short fork section enables applications in tight spaces and also on pipes. The 6 times increased excitation frequency will ensure interference-free operation if used on vibrating structures.

Media: The **NIVOSWITCH** can be used in almost all media like explosive and non-explosive liquids, aggressive liquids (acids, solvents), high viscosity liquids; unaffected by foam, turbulence, gas content.

It can also be used on light and medium density free flowing granules and powders.

Application: The **NIVOSWITCH** covers a large variety of level detection applications and more...: high/low fail safe limit switch, overflow or dry run protection, pump controls, dry/wet indication in pipes.

Highlights of the NIVOSWITCH:

- Fit and forget device: simple installation -no maintenance.
- Switching performance does not depend on the change of liquid conductivity, dielectric constant, viscosity, pressure and temperature.
- Probe extension up to 3 m length.
- Flange or sliding sleeve options.
- ECTFE (HALAR®) coated versions for aggressive or sticky media.
- Hygienic versions with various process connections and 0.5 micron fine polishing.
- High or low fail-safe mode, as well as the medium density is field programmable on most models.
- Operation test of installed units can be performed with the help of a test magnet on some of the models.

GENERAL

The **NIVOSWITCH** is offered in the following versions:



NIVOSWITCH RF-400 or **RF-500** is the "Standard" version with paint coated, robust Aluminium or plastic housing; visible, large bicolour output state indication LED; 1 or 2 power relay output and universal AC/DC power supply.



NIVOSWITCH RC-400 is the "Mini" version incorporating a stainless steel tube housing, visible bicolour output state indication LED, and 2-wire AC, 2-wire DC or 3-wire PNP/NPN transistor output.

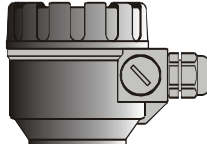
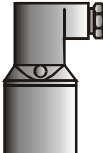



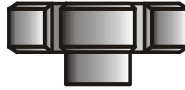






NIVOSWITCH JDT-131 Ex the CENELEC approved 2-wire RC-400 Ex vibration forks requires an intrinsically safe remote switching unit containing the intrinsically safe barrier and a potential free output.

PRODUCT OVERVIEW

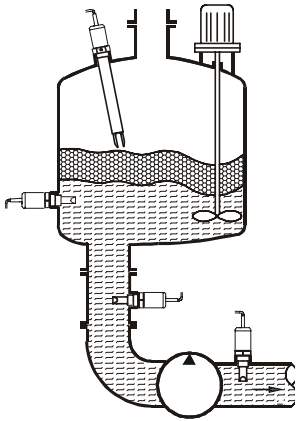
The **NIVOSWITCH** is made to vibrate at its resonant frequency by a pair of piezoceramic discs. By coming in contact with the medium, the frequency and amplitude of the vibration changes. This change is detected, processed and converted into a switch signal by the integral electronics built in SM (Surface Mount) technology.

As a standard feature, all forks are polished. A highly polished version for hygienic applications are available with all wetted parts highly polished.

	"STANDARD" models Aluminium or Plastic	"MINI" models Stainless steel
Housing / Electronics	 <ul style="list-style-type: none"> Potential free relay output (SPDT or DPDT) Universal power supply 	  <p>Connector output</p> <p>Integrated cable output</p> <ul style="list-style-type: none"> 3-wire PNP/NPN transistor output 2-wire AC output 2-wire DC output 2 wire Ex (intrinsically safe)
Process connections	 <ul style="list-style-type: none"> Stainless steel 1" BSP or NPT male threads 	  <ul style="list-style-type: none"> DIN, ANSI and JIS flanges Stainless steel, PP or ECTFE (HALAR[®]) coated st. st. DN 40 and DN 50 pipe-thread connections (DIN 11851)
Extension	<ul style="list-style-type: none"> up to 3 m Stainless steel or PFA coated st. st. 	
Fork	 <ul style="list-style-type: none"> Stainless steel ECTFE (HALAR[®]) coated st. st. Protrusion length without extension: 69 mm 	
Accessories	 <ul style="list-style-type: none"> Stainless steel weld-in socket with O-ring for flush mounting <p>Order code: RPG-101</p>	 <ul style="list-style-type: none"> Stainless steel sliding sleeve for atmospheric pressure <p>Order codes: RPH-112 1 1/2" BSP RPN-112 1 1/2" NPT</p>

APPLICATION AND INSTALLATION

Application on liquids

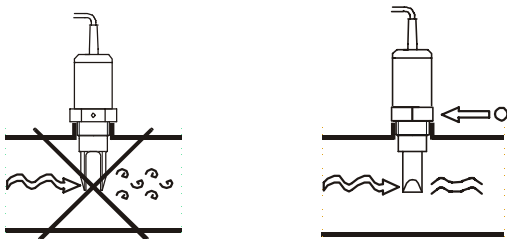
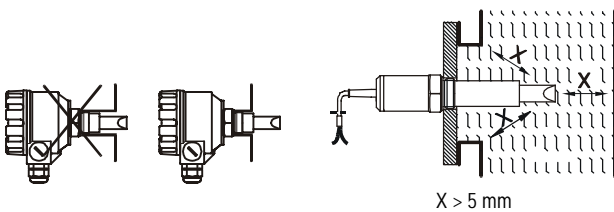


- In applications on liquids with
- *low viscosity* (without risk of remaining material on the fork-tines) any of the mounting shown beside is possible,
 - *high viscosity* (due to risk of remaining material on the fork-tines) only vertical (top) mounting can be suggested.

In applications with side mounting take care of the positioning mark.

Use always HIGH density setting ($\rho \geq 0.7 \text{ kg/dm}^3$) for application on liquids!

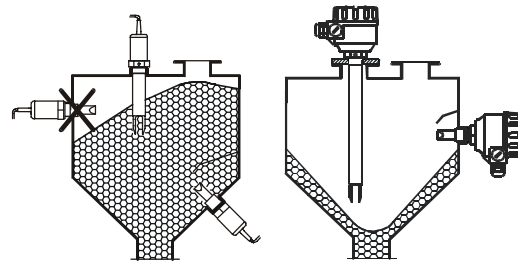
Installation on liquids



For dry/wet detection, fork-tines must be parallel to the direction of flow

Application on free flowing solids

Use only on free flowing materials stored in small vessels, hoppers.



Side mounting is recommended only in case the fork-tines are easily freed from the process medium (ex.: through gravity). In case of side mounting, the NIVOSWITCH must be mounted with the fork-tines standing vertically (look for the positioning marks).

Applying the 2-wire AC output versions for solids should be carried out with considerations. The short versions (protrusion length: 69 mm) are not applicable for solids!

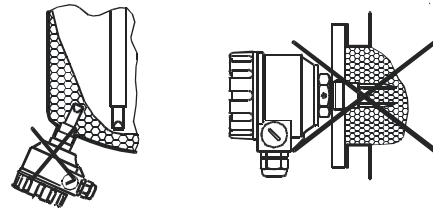
Installation on free flowing solids

Protect the probe from down falling material! Fork tines should not be exposed to mechanical load.

Adjust the Density switch according to table below:

Density setting	Density
HIGH	$\rho \geq 0.5 \text{ kg/dm}^3$
LOW	$\rho < 0.5 \text{ kg/dm}^3$

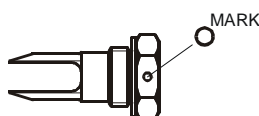
Do not adjust a lower density than necessary, as this may result in the probe switching even if slight residues of material adhering to it.



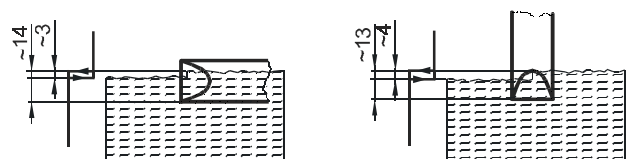
Avoid above mountings on highly viscose liquids and powders

POSITIONING AND SWITCHING POINT

For positioning the fork-tines, use the marking on the hexagon neck.



Use a TEFLON (PTFE) tape to aid the positioning of the fork-tines. If the fork-tine position is irrelevant, use the sealing ring provided.



Values are for water at 25 °C

Liquids: switching point as well as the switch differential slightly depends on liquid density and mounting position.

Solids: switching point as well as the switch differential slightly depends on material quality and mounting position.

ELECTRICAL CONNECTIONS

"MINI" models in stainless steel housing

➔ 3-wire DC versions with PNP/NPN transistor output, to drive relays, PLC-s

Connector output version R □ □ - 4 □ □ - 3

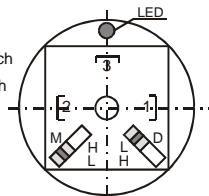
Integral cable output version

R □ □ - 4 □ □ - 4

Top view with removed connector:

All models expect the "SHORTY"

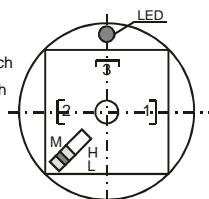
"M" - Operation mode
H= High - level limit switch
L= Low - level limit switch



"D" - Density
H= High
L= Low

The "SHORTY" models for liquids only

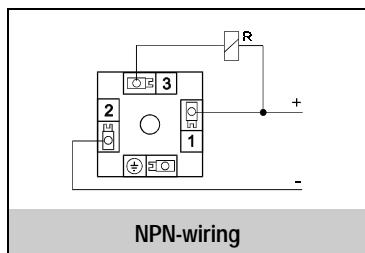
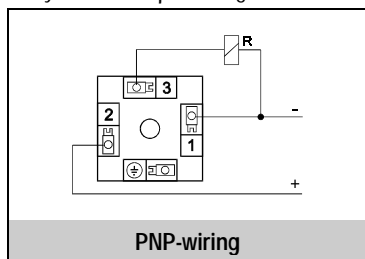
"M" - Operation mode
H= High - level limit switch
L= Low - level limit switch



Density setting

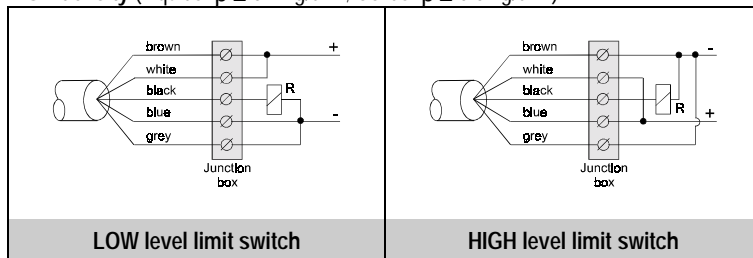
HIGH density Liquids: $\rho \geq 0.7 \text{ kg/dm}^3$;
Solids: $\rho \geq 0.5 \text{ kg/dm}^3$

LOW density Solids: $\rho < 0.5 \text{ kg/dm}^3$



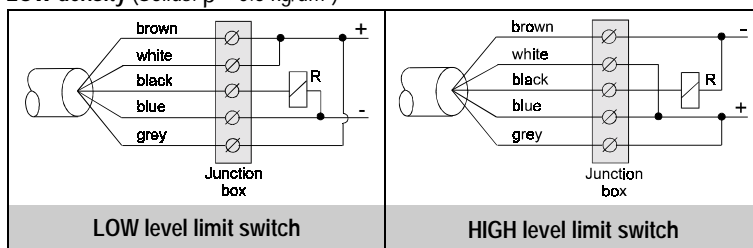
PNP mode

HIGH density (Liquids: $\rho \geq 0.7 \text{ kg/dm}^3$; Solids: $\rho \geq 0.5 \text{ kg/dm}^3$)



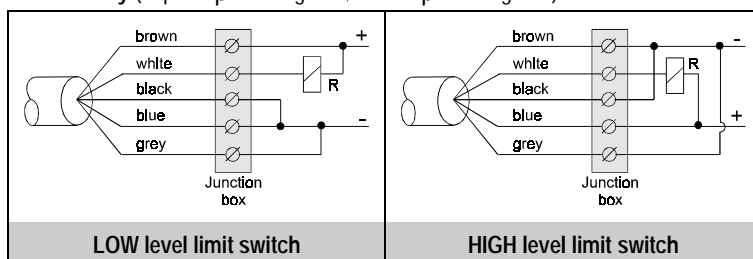
PNP mode

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



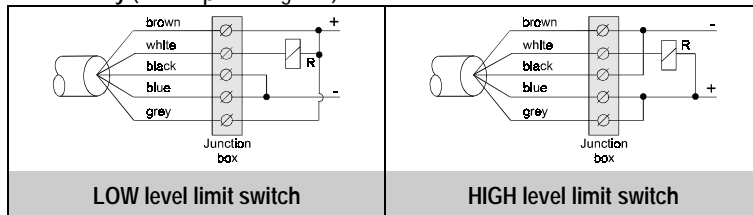
NPN mode

HIGH density (Liquids: $\rho \geq 0.7 \text{ kg/dm}^3$; Solids: $\rho \geq 0.5 \text{ kg/dm}^3$)



NPN mode

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



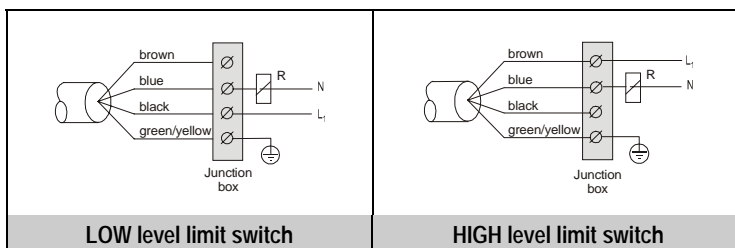
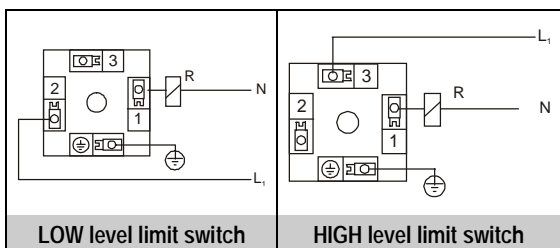
➔ 2-wire AC versions, to drive relays, PLC-s

Do not power up 2 wire AC devices without a load connected in series with the unit and without grounding it!

Connector output version R □ □ - 4 □ □ - 1

Integral cable output version

R □ □ - 4 □ □ - 2



Please note the 2-wire AC versions can not be programmed for medium density. The units are manufactured with fixed HIGH Density setting.

TECHNICAL DATA

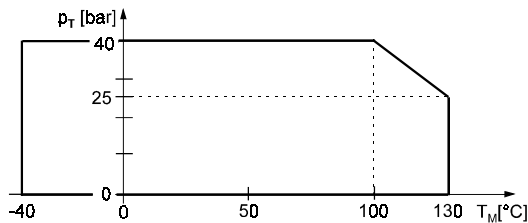
GENERAL SPECIFICATION

Model	Non-coated	ECTFE (HALAR) coated
Probe material	1.4571 (X 6 CrNiMoTi 17122)	1.4404 (X 2 CrNiMo 17132); ECTFE coated
Process connection material	1.4571 (X 6 CrNiMoTi 17122)	Polypropylene flange (max.: 6 bar) ECTFE coated st.st. flange.
Probe extension material	1.4571 (X 6 CrNiMoTi 17122)	PFA coated st.st.
Maximum pressure	40 bar, for derating see Derating diagrams below	PP flange: 6 bar, - St.st. flange: 40 bar, for derating see Derating diagrams
Medium temperature range	-40 °C to +130 °C	PP flange: -20 °C to +90 °C ECTFE coated st.st. flange: -40 °C to +120 °C *
Ambient temperature range	Standard models in Alu-cast/plastic housing with relay output: -30 °C to +70 °C; "Mini" models in stainless steel housing with electronic output: -40 °C to +70 °C Ex version: -20 °C to +60 °C	
Sealing material	VITON	
Probe length	69 to 3000 mm	
Medium density	Liquids	$\geq 0.7 \text{ kg/dm}^3$
	Solids	$\geq 0.05 \text{ kg/dm}^3$
Liquid viscosity	$\leq 10000 \text{ mm}^2/\text{s}$ (cSt) (see Derating diagrams)	
Response time	When immersed	0.5 sec
	When free	$\leq 1 \text{ sec}$ at high density setting ($\rho \geq 0.5 \text{ kg/dm}^3$) $\leq 2 \text{ sec}$ at low density setting ($\rho < 0.5 \text{ kg/dm}^3$) (see Derating diagrams)
Output mode indicator	Bi-colour Status LED on outside of housing	

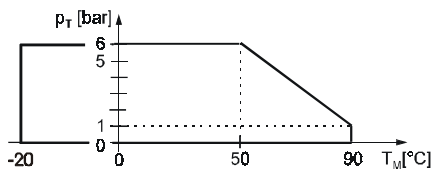
* Please note, that temperature difference between inner and outer surface of ECTFE coated flanges must not exceed 60 °C. If necessary, insulate outer surface of flange.

DERATING DIAGRAMS

- mechanical

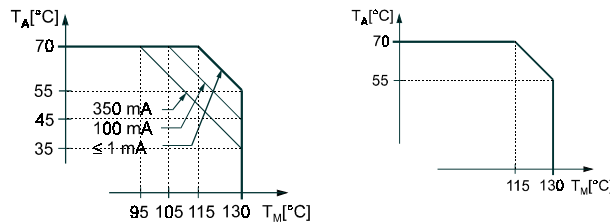


Process pressure (p_T) versus medium temperature (T_M) for all models (except ECTFE coated and PP flanged)

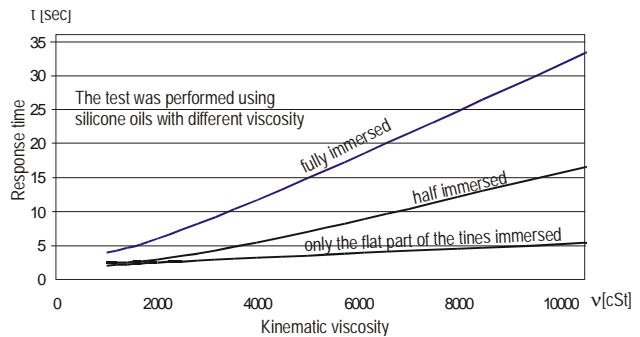


Process pressure (p_T) versus medium temperature (T_M) for models with Polypropylene flange

- output related



Current load, versus process- (p_T) and medium temperature (T_M) for transistor output versions
Temperature limits for 2-wire AC and EX versions



Response time (when getting free) versus medium viscosity

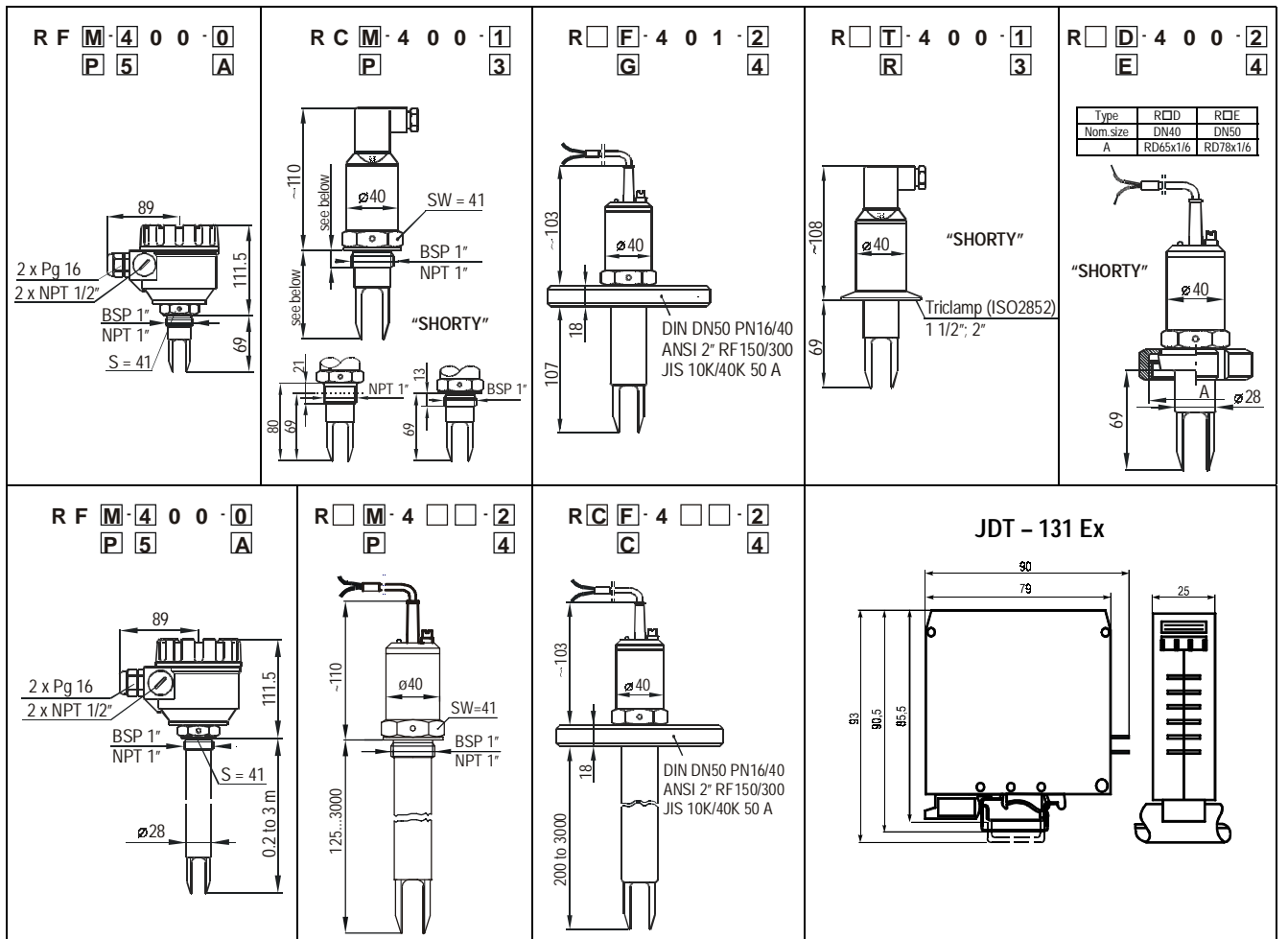
SPECIFICATIONS

"Standard" Model	Relay output version R □ □ - 4 □ □ - 0 R □ □ - 5 □ □ - A
Housing material	Paint coated Aluminium (RF-400) or plastic (RF-500)
Selection of High/low fail safe	By switch
Density programming	By switch
Output	Up to 2 SPDT relay
Output rating	Relay 1: 250 V AC, 8 A, AC 1 Relay 2: 250 V AC, 6A, AC1
Electric connections (wire cross section)	2 x Pg 16 for \varnothing 8 to 15 mm cables (0.75 to 2.5 mm ²)
Supply voltage	20 to 255 V AC and 20 to .60 V DC
Consumption	AC: 1,2 ... 17 VA; DC: < 3 W
Electrical protection	Class I.
Mechanical protection	IP 67 (NEMA 6)
Weight (threaded versions)	Alu housing: 1.3 kg + 1.2 kg/m Plastic housing: 0.95 + 1.2 kg/m

Model	Remote switching unit (for Ex forks) J D T - 1 3 1 - Ex
Input	$9 \pm 1 \text{ mA}$ to $14 \pm 1 \text{ mA}$
Max. serial inductivity	5 mH
Max. parallel capacitance	0.04 μF
High/low mode selection	by switch
Output	SPDT relay
Output rating	AC: 100 VA (250 V or 5 A); DC: 100 W (24 V or 5 A)
Supply voltage/consumption	24 V DC $\pm 10\%$; max. 100 mA
Sensor voltage	16 to 26 V DC
Electrical protection	Class III.
Ex protection mark	[EEx ia] IIC
Ambient temperature	0°C to +45 °C
Mounting	NS 15, 35/75, 35/15, 32 DIN rail
Housing material	PA
Enclosure	IP 30
Weight	0.1 kg

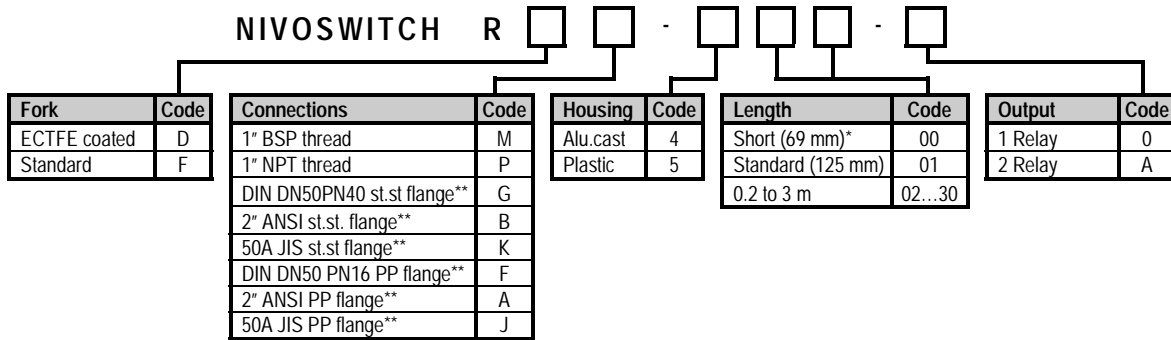
"Mini" Models	2-wire AC		3-wire DC (PNP/NPN transistor output)	
	R□□ - 4□□ - 1	R□□ - 4□□ - 2	R□□ - 4□□ - 3	R□□ - 4□□ - 4
Electric connections (wire cross section)	Connector	Integral cable (4 x 0.75 mm ²)	Connector	Integral cable (5 x 0.5 mm ²)
Mechanical protection	IP 65	IP 68	IP 65	IP 68
Selection of High/low fail safe mode	Within the connector	With wiring	By switch	With wiring
Density programming	Liquids: fixed to $\rho \geq 0.7 \text{ kg/dm}^3$ Solids: fixed to $\rho \geq 0.5 \text{ kg/dm}^3$		By switch	With wiring
Output	2-wire AC, in serial connection with the load		PNP/NPN transistor; field selectable	Galvanically isolated PNP/NPN transistor; field selectable
Output protection	—		Reverse polarity, over-current and overload protection	
Supply voltage	20...255 V AC, 50/60 Hz		12...55 V DC	
Consumption	Depending on load		< 0.6 W	
Voltage drop (switched-on state)	< 10.5 V		< 4.5 V	
Electrical protection	Class I.		Class III.	
Current load	max. continuous	350 mA AC13	350 mA / 55 V DC	
	min. continuous	10 mA / 255 V AC; 25 mA / 24 V AC	—	
	max. impulse	1.5 A / 40 ms	—	
Residual current (switched off state)	< 6 mA		< 100 μ A	
Function test	Optional test magnet (Order code: RPS-101)			
Weight (threaded versions)	0.5 kg + 0.1 kg / 100 mm			

"Mini" Models	2-wire Ex		2-wire DC	
	R□□ - 4□□ - 8	R□□ - 4□□ - 9	R□□ - 4□□ - 6	R□□ - 4□□ - 7
Electric connections (wire cross section)	Connector	Integral shielded cable (2 x 0.5 mm ²)	Connector	Integral cable (2 x 0.5 mm ²)
Mechanical protection	IP 65	IP 68	IP 65	IP 68
Selection of High/low fail safe mode	By switch on the NIVOSWITCH JDT-131 Ex		At the signal processing end	
Sensitivity programming	With wiring		With wiring	
Output	Type	2-wire DC		
	Data	When free: 9 \pm 1 mA; when immersed: 14 \pm 1 mA		
	Transient overvoltage protection			
Supply voltage	Powered by NIVOSWITCH JDT-131Ex		15 to 27 V DC	
Consumption	< 0.5 W			
Electrical protection	Class III., intrinsically safe		Class III.	
Ex rating	EEx ia IIC T4...T6		—	
Intrinsically safe data	$U_{max} = 26.5 \text{ V DC}$; $I_{max} = 100 \text{ mA}$; $P_{max} = 1.4 \text{ W}$; $Leq \approx 0$; $Ce_{dmax} = 7 \text{ nF}$		—	
Weight (threaded versions)	0.5 kg + 0.1 kg / 100 mm			



ORDER CODES

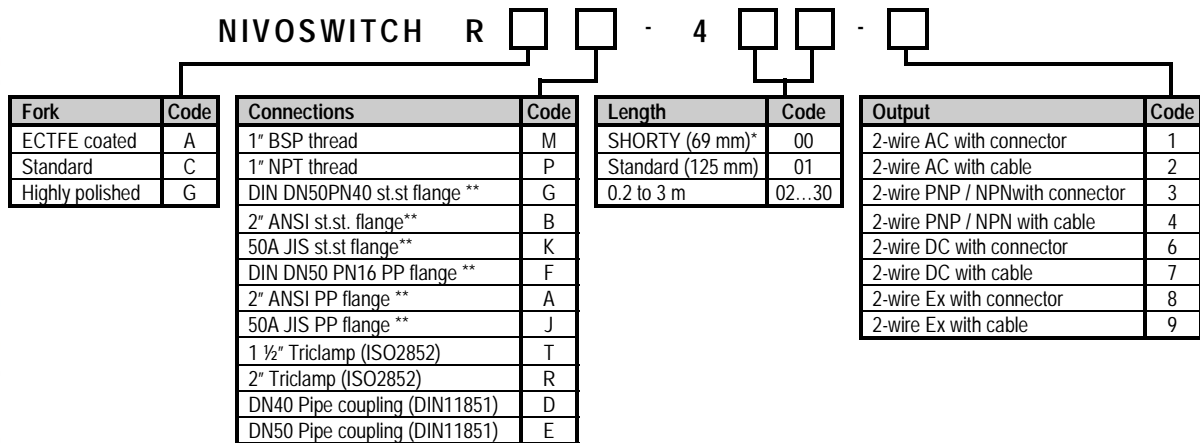
NIVOSWITCH "Standard" models in Alu-cast / plastic housing:



* The short versions are not applicable for solids

** Flanges are screw-in type as standard, please indicate welded flange requirement.

NIVOSWITCH "Mini" models in stainless steel tube housing:



* The „SHORTY“ models are not applicable for solids.

** Flanged versions as standard come with flanges screwed on the 1" process connection.

Intrinsically safe remote switching unit:

NIVOSWITCH J D T - 1 3 1 Ex (W) ***

*** Certified version for the use as overfill protection according to WHG