

Inoving

Vibration fork level switches type INOVING R-400 / R-500

General description

KFG Level has revamped the popular Inoving 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 interface-free operation if used on vibrating structures.

Media: The Inoving 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 granulates and powders.

Application: The Inoving 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 Inoving:

- 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 3m 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

NOVING 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.



NOVING 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.



INOSWITCH 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.



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.



WHG

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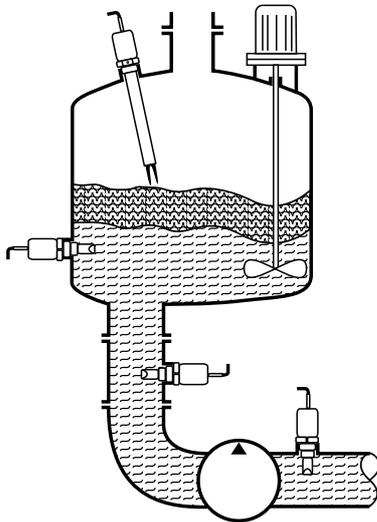
APPLICATION AND INSTALLATION

Application on liquids

In applications on liquids with

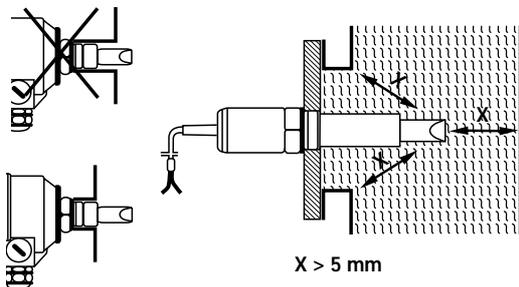
- low viscosity (without risk of remaining material on the fork-tines) any of the mounting shown beside is possible,
- high viscosity (due to risk of remaining material on the fork-tines) only vertical (top) mounting can be suggested.

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

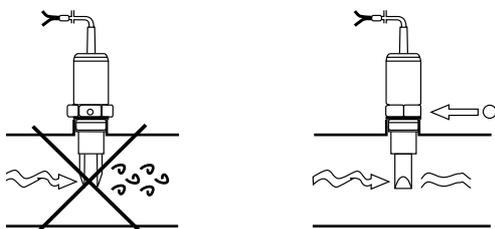


Use always HIGH density setting ($\rho \geq 0.7 \text{ kg/dm}^3$) for application on liquids!

Installation on liquids

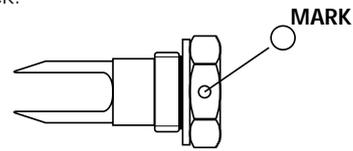


For dry/wet detection, fork-tines must be parallel to the direction of flow

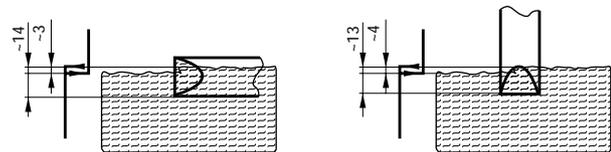


Positioning and switching point

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

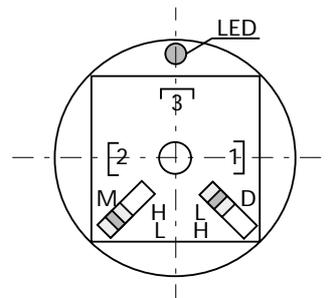
«MINI» models in stainless steel housing

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

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

Top view with removed connector:

All models expect the «SHORTY»



«M» - Operation mode

«H» - High - level limit switch

«L» - Low - level limit switch

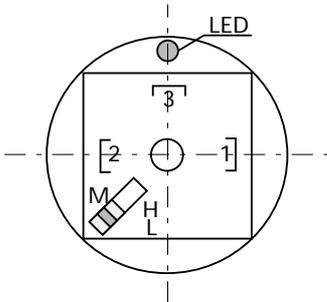
«D» - Density

«H» - High

«L» - Low

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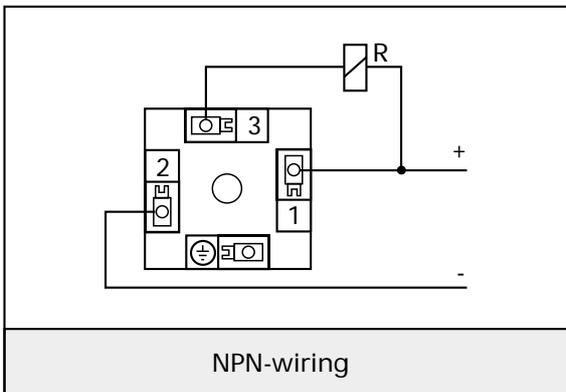
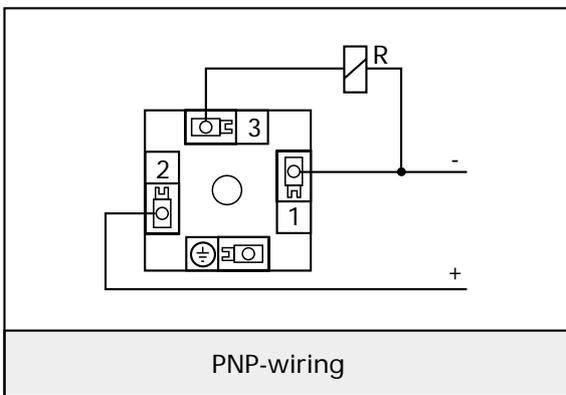
The «SHORTY» models for liquid only



- «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: $\rho < 0,5 \text{ kg/dm}^3$

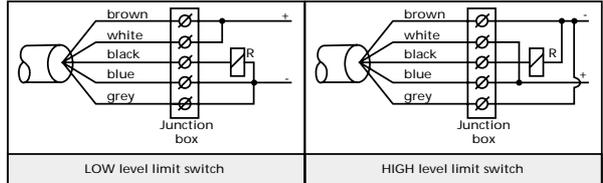


Integral cable output version R □ □ - 4 □ □ - 4

PNP mode

HIGH density

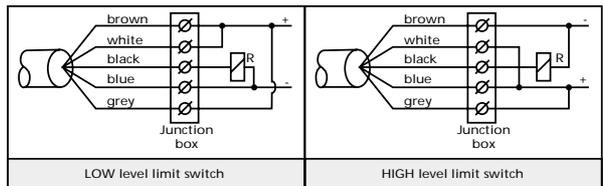
(liquids $\rho \geq 0,7 \text{ kg/dm}^3$, Solids $\rho \geq 0,5 \text{ kg/dm}^3$)



PNP mode

LOW density

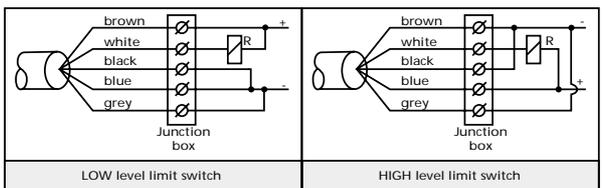
(Solids $\rho < 0,5 \text{ kg/dm}^3$)



NPN mode

HIGH density

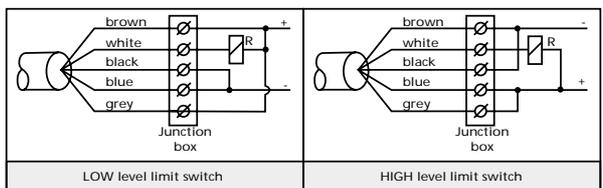
(liquids $\rho \geq 0,7 \text{ kg/dm}^3$, Solids $\rho \geq 0,5 \text{ kg/dm}^3$)



NPN mode

LOW density

(Solids $\rho < 0,5 \text{ kg/dm}^3$)

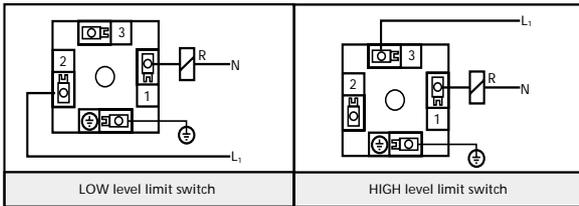


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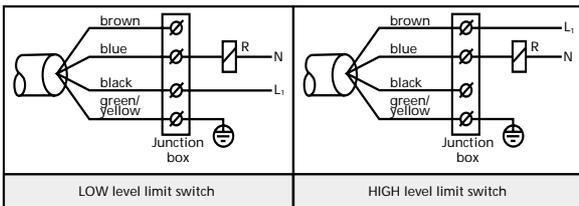
⇒ 2-wire AC versions to drive relays, PCL-s

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.

⇒ 2-wire DC versions to drive controllers with current sensitive input

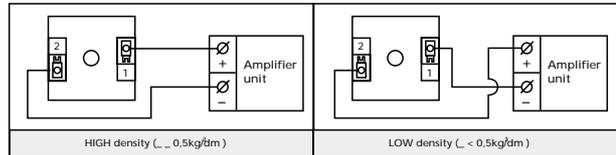
Two-wire loop powered devices, operate according to the DC diagram beside.

Please note, that the 2-wire DC versions can not be programmed for HIGH or LOW FAILSAFE on the device itself.

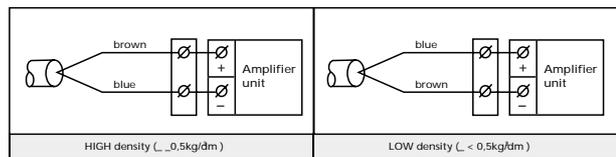
Operating diagram

Fork	Status LED	Output
Immersed	RED	14 ± 1 mA
Free	GREEN	9 ± 1 mA

Connector output version R □ □ - 4 □ □ - 6



Integral cable output version R □ □ - 4 □ □ - 7

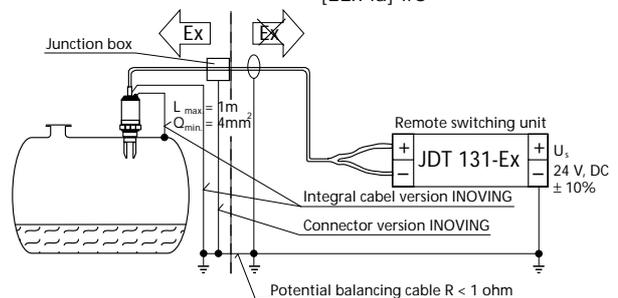


⇒ Ex versions

An intrinsically safe, CENELEC Ex approved system, consists of the following:

Intrinsically safe vibration fork
«INO Ving R-400-8,9»
EEx ia IIC T4...T6

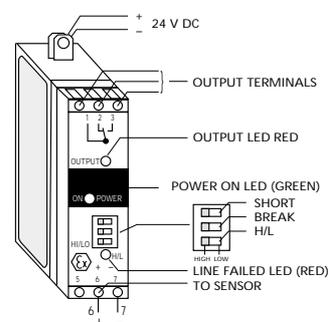
Intrinsically safe remote switching unit
«INO Ving JDT-131 Ex»
[EEx ia] IIC



The Ex level limit switch is powered by the remote switching unit JDT-131 Ex. The remote switching unit receives the switch signal through a current loop. The remote switching unit provides for a potentialfree power relay output.

High or low-fail safe mode is programmable by switch on the remote switching unit, while switching sensitivity is programmed via changing the polarity of the 2-wire output of the level sensor

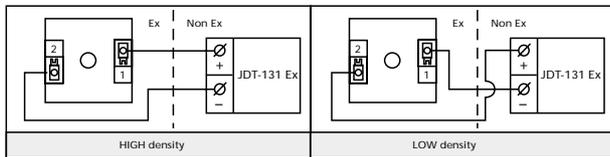
Temperature classification according to the Ex certificate:



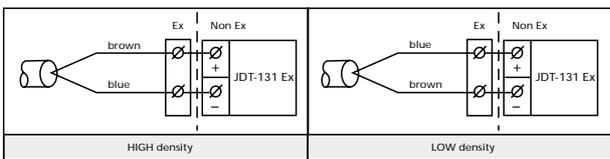
	T6	T5	T4
T Ambient [°C]	60	60	60
T Medium [°C]	80	95	130

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Connector output version R □ □ - 4 □ □ - 8



Integral cable output version R □ □ - 4 □ □ - 4



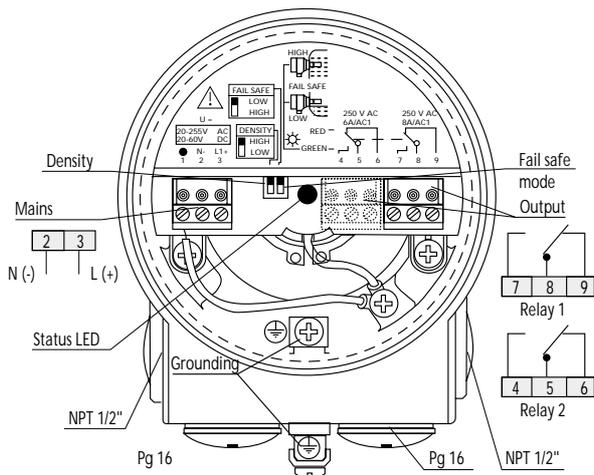
«STANDARD» models in Alu cast/plastic housing

⇒ Relay output versions

R □ □ - 4 □ □ - 0 R □ □ - 4 □ □ - A
R □ □ - 5 □ □ - 0 R □ □ - 5 □ □ - A

Top view with removed housing cover:
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: $\rho < 0,5 \text{ kg/dm}^3$



Use 8 ... 15 mm outer diameter circular cables, and tighten cable glands as well as housing cover after installation, to ensure an IP 65 protection.

Technical Data

GENERAL SPECIFICATION

Model	Non-coated
Probe material	1.4571 (X 6 CrNiMoTi 17122)
Process connection material	1.4571 (X 6 CrNiMoTi 17122)
Probe extension material	1.4571 (X 6 CrNiMoTi 17122)
Maximum pressure	40 bar, for derating see Derating diagrams below
Medium temperature range	-40°C to +130°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

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Model	ECTFE (HALAR) coated
Probe material	1.4404 (X 2 CrNiMo 17132); ECTFE coated
Process connection material	Polypropylene flange (max.: 6 bar) ECTFE coated st.st. flange.
Probe extension material	PFA coated st.st.
Maximum pressure	PP flange: 6 bar, - St.st. flange: 40 bar, for derating see Derating diagrams
Medium temperature range	-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 ≥ 0.7 kg/dm ³ Solids ≥ 0.05 kg/dm ³
Liquid viscosity	≤ 10000 mm ² /s (cSt) (see Derating diagrams)
Response time	
When immersed	0.5 sec
When free	> 1 sec at high density setting (ρ ≥ 0.5 kg/dm ³) ≤ 2 sec at low density setting (ρ < 0.5 kg/dm ³) (see Derating diagrams)
Output mode indicator	Bi-colour Staus 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.

SPECIFICATION

«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, AC1 Relay 2: 250 V AC, 6A, AC1
Electric connections (wire cross section)	2 x Pg 16 for ø 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: < 3W
Electrical protection	Class I.
Mechanical protection	IP 67 (NEMA 6)
Weight (threaded versions)	Alu housing: 1.3 kg + 1.2kg/m Plastic housing: 0.95 + 1.2 kg/m
Remote switching unit	
Model	(for Ex forks) JDT-131-Ex
Input	9 ±1 mA to 14 ±1 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 ± 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	0,1kg

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«MINI» Models»

2-wire AC

R □ □ - 4 □ □ - 1

Electric connections (wire cross section)	Connector
Mechanical protection	IP65
Selection of HIGH/LOW fail safe mode	Within the connector
Density programming	Liquids fixed to $\rho \geq 0,7\text{kg/dm}^3$ Solids fixed to $\rho \geq 0,5\text{kg/dm}^3$
Output	2-wire AC, in serial connection with the load
Supply voltage	20...255V AC, 50/60 Hz
Consumption	Depending on load
Voltage drop (switched-on state)	< 10,5 V
Electrical protection	Class I.
Current load	
max. continuous	350 mA AC13
min. continuous	10mA/255V AC, 25mA/24V AC
max. impulse	1,5 A / 40 ms
Residual current (switched-off state)	< 6mA
Function test	Optional test magnet (Order code: RPS-101)
Weight (threaded version)	0,5kg + 0,1kg / 100mm

2-wire AC

R □ □ - 4 □ □ - 2

Electric connections (wire cross section)	integral cable (4x0,75mm ²)
Mechanical protection	IP68
Selection of HIGH/LOW fail safe mode	With wiring
Density programming	Liquids fixed to $\rho \geq 0,7\text{kg/dm}^3$ Solids fixed to $\rho \geq 0,5\text{kg/dm}^3$
Output	2-wire AC, in serial connection with the load
Supply voltage	20...255V AC, 50/60 Hz
Consumption	Depending on load
Voltage drop (switched-on state)	< 10,5 V
Electrical protection	Class I.
Current load	
max. continuous	350 mA AC13
min. continuous	10mA/255V AC, 25mA/24V AC
max. impulse	1,5 A / 40 ms
Residual current (switched-off state)	< 6mA
Function test	Optional test magnet (Order code: RPS-101)
Weight (threaded version)	0,5kg + 0,1kg / 100mm

3-wire DC PNP/NPN transistor output

R □ □ - 4 □ □ - 3

Electric connections (wire cross section)	Connector
Mechanical protection	IP65
Selection of HIGH/LOW fail safe mode	By switch
Density programming	By switch
Output	PNP/NPN transistor; field selectable
Output protection	Reverse polarity, over current and overload protection
Supply voltage	12...55V DC
Consumption	0,6 W
Voltage drop (switched-on state)	< 4,5 V
Electrical protection	Class III.
Current load	
max. continuous	350 mA / 55V DC
Residual current (switched-off state)	< 100µA
Function test	Optional test magnet (Order code: RPS-101)
Weight (threaded version)	0,5kg + 0,1kg / 100mm

3-wire DC PNP/NPN transistor output

R □ □ - 4 □ □ - 4

Electric connections (wire cross section)	Integral cable (5x0,5mm ²)
Mechanical protection	IP68
Selection of HIGH/LOW fail safe mode	With wiring
Density programming	With wiring
Output	Galvanically isolated PNP/NPN transistor; field selectable
Output protection	Reverse polarity, over current and overload protection
Supply voltage	12...55V DC
Consumption	0,6 W
Voltage drop (switched-on state)	< 4,5 V
Electrical protection	Class III.
Current load	
max. continuous	350 mA / 55V DC
Residual current (switched-off state)	< 100µA
Function test	Optional test magnet (Order code: RPS-101)
Weight (threaded version)	0,5kg + 0,1kg / 100mm

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«MINI» Models»

2-wire Ex

R □ □ - 4 □ □ - 8

Electric connections (wire cross section)	Connector
Mecanical protection	IP65
Selection of HIGH/LOW fail safe mode	By switch on the Inoving JDT-131-Ex
Sensitivity programming	With wiring
Output Type	2-wire DC
Data	When free: $9\pm 1\text{mA}$; when immersed; $14\pm 1\text{mA}$
Supply voltage	Powered by Inoving JDT-131-Ex
Consumption	$< 0,5 \text{ W}$
Electrical protection	Class III. intrinsically safe
Ex rating	EEx ia IIC T4...T6
Intrinsically safe data	$U_{\text{max}} 26,5\text{V DC}$, $I_{\text{max}} 100\text{mA}$, $P_{\text{max}} 1,4 \text{ W}$, $\text{LEQ}=0$; $C_{\text{eq,max}}=7\text{nF}$
Weight (threaded version)	$0,5\text{kg} + 0,1\text{kg} / 100\text{mm}$

2-wire Ex

R □ □ - 4 □ □ - 9

Electric connections (wire cross section)	Integral shielded cable ($2 \times 0,5\text{mm}^2$)
Mecanical protection	IP68
Selection of HIGH/LOW fail safe mode	By switch on the Inoving JDT-131-Ex
Sensitivity programming	With wiring
Output Type	2-wire DC
Data	When free: $9\pm 1\text{mA}$; when immersed; $14\pm 1\text{mA}$
Supply voltage	Powered by Inoving JDT-131-Ex
Consumption	$< 0,5 \text{ W}$
Electrical protection	Class III. intrinsically safe
Ex rating	EEx ia IIC T4...T6
Intrinsically safe data	$U_{\text{max}} 26,5\text{V DC}$, $I_{\text{max}} 100\text{mA}$, $P_{\text{max}} 1,4 \text{ W}$, $\text{LEQ}=0$; $C_{\text{eq,max}}=7\text{nF}$
Weight (threaded version)	$0,5\text{kg} + 0,1\text{kg} / 100\text{mm}$

2-wire DC

R □ □ - 4 □ □ - 6

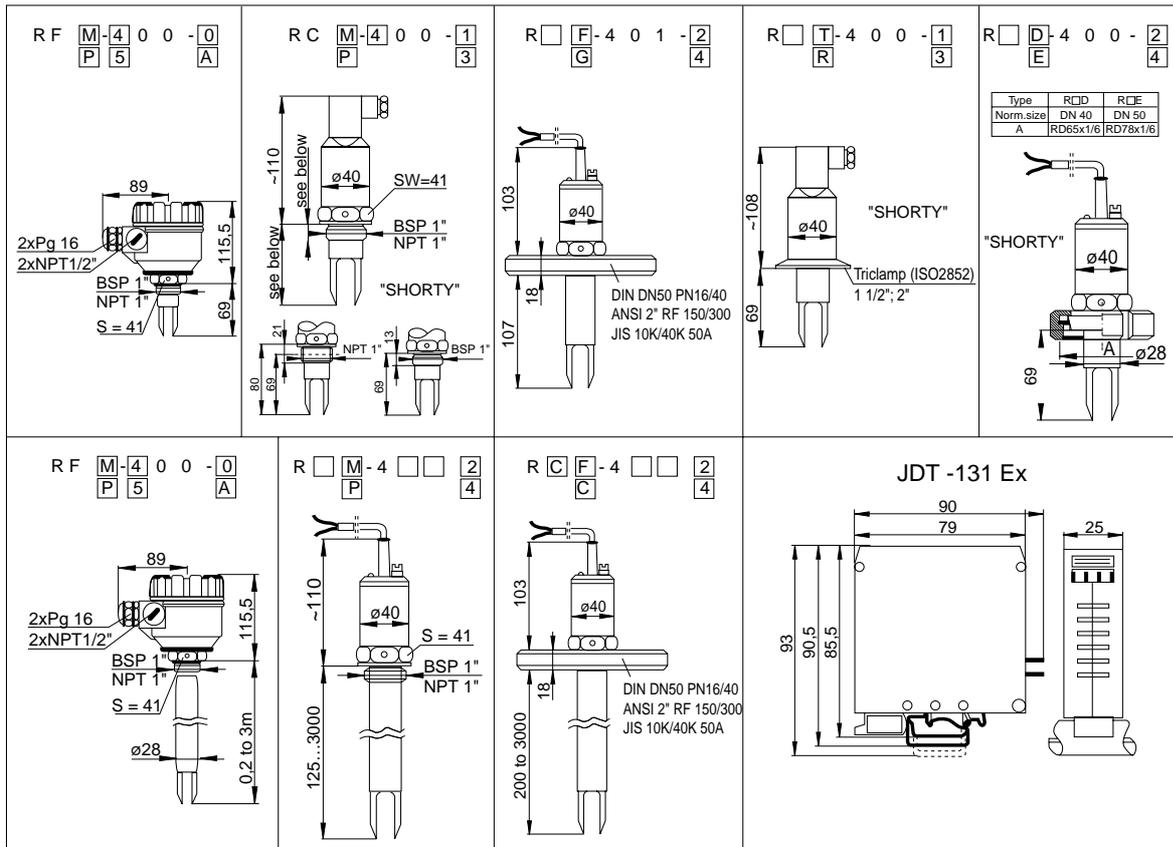
Electric connections (wire cross section)	Connector
Mecanical protection	IP65
Selection of HIGH/LOW fail safe mode	At the signal processing end
Sensitivity programming	With wiring
Output Type	2-wire DC
Data	When free: $9\pm 1\text{mA}$; when immersed; $14\pm 1\text{mA}$
Supply voltage	$15 \text{ to } 27\text{V DC}$
Consumption	$< 0,5 \text{ W}$
Electrical protection	Class III.
Weight (threaded version)	$0,5\text{kg} + 0,1\text{kg} / 100\text{mm}$

2-wire DC

R □ □ - 4 □ □ - 7

Electric connections (wire cross section)	Integral cable ($2 \times 0,5\text{mm}^2$)
Mecanical protection	IP68
Selection of HIGH/LOW fail safe mode	At the signal processing end
Sensitivity programming	With wiring
Output Type	2-wire DC
Data	When free: $9\pm 1\text{mA}$; when immersed; $14\pm 1\text{mA}$
Supply voltage	$15 \text{ to } 27\text{V DC}$
Consumption	$< 0,5 \text{ W}$
Electrical protection	Class III.
Weight (threaded version)	$0,5\text{kg} + 0,1\text{kg} / 100\text{mm}$

Vibration fork level switches type INOVING R-400 / R-500



TYPE CODE KEY

INOVING «STANDARD» models in Alu-cast / plastic housing:

INOVING R - -

Fork	Code	Connections	Code	Housing	Code	Length	Code	Output	Code
ECTFE coated	D	1" BSP thread	M	Alu. cast	4	Short (69mm)**	00	1 Relay	0
Standard	F	1" NPT thread	P	Plastic	5	Standard (125mm)	01	2 Relay	A
		DIN DN 50PN40 st.st.flange**	G			0,2 to 3m	02..30		
		2" ANSI st. st. flange**	B						
		50A JIS st. st. flange**	K						
		DIN DN50PN16 PP flange**	F						
		2" ANSI PP flange**	A						
		50A JIS PP flange**	J						

* The short versions are not applicable for solids
 ** Flanges are screw-in types as standard, please indicate welded flange requirement

INOVING «MINI» models in stainless steel tube housing:

INOVING R - 4 -

Fork	Code	Connections	Code	Length	Code	Output	Code
ECTFE coated	A	1" BSP thread	M	Short (69mm)**	00	2-wire AC with connector	1
Standard	C	1" NPT thread	P	Standard (125mm)	01	2-wire AC with cable	2
Highly polished	G	DIN DN 50PN40 st.st.flange**	G	0,2 to 3m	02..30	2-wire NPN with connector	3
		2" ANSI st. st. flange**	B			2-wire NPN with cable	4
		50A JIS st. st. flange**	K			2-wire DC with connector	6
		DIN DN50PN16 PP flange**	F			2-wire DC with cable	7
		2" ANSI PP flange**	A			2-wire Ex with connector	8
		50A JIS PP flange**	J			2-wire Ex with cable	9
		1 1/2" Triclamp (ISO2852)	T				
		2" Triclamp (ISO2852)	R				
		DN40 Pipe coupling (DIN11851)	D				
		DN50 Pipe coupling (DIN11851)	E				

* The short versions are not applicable for solids
 ** Flanges versions as standard come with flanges screwed on the 1" process connection.