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Subject to technical change
 All dimensions in mm (inches).

We assume no liability for typing errors.
 Different variations than specified are possible.
 Please contact our technical consultants.

Safety notes / Technical support

Notes

- Installation, maintenance and commissioning may be accomplished only by qualified technical personnel.
- The product must be used only in the manner outlined in this instruction manual.

Special attention must be paid to warnings and notes as follows:

WARNING



Relates to a caution symbol on the product: A failure to observe the necessary precautions can result in death, serious injury and/or considerable material damage.

WARNING



Relates to a caution symbol on the product: Risk of electric shock

WARNING






A failure to observe the necessary precautions can result in death, serious injury and/or considerable material damage.

This symbol is used, when there is no corresponding caution symbol on the product.

CAUTION

A failure to observe the necessary precautions can result in considerable material damage.

Safety symbols

In manual and on product	Description
	CAUTION: refer to accompanying documents (manual) for details.
	Earth (ground) Terminal
	Protective Conductor Terminal

Technical support

Please contact your local supplier (for address see www.uwt.de). Otherwise you can contact:

UWT GmbH
 Westendstr. 5
 D-87488 Betzigau

Tel.: 0049 (0)831 57123-0
 Fax: 0049 (0)831 76879
info@uwt.de
www.uwt.de

Introduction

Applications

The ROTONIVO is an electromechanical Level limit switch and is used for level monitoring of bulk goods.

The units can be delivered with a wide range of Ex-approvals for use in Hazardous Areas.

They can be equipped for process over- and lowpressure and also for very high or low process temperatures.

Selected applications:

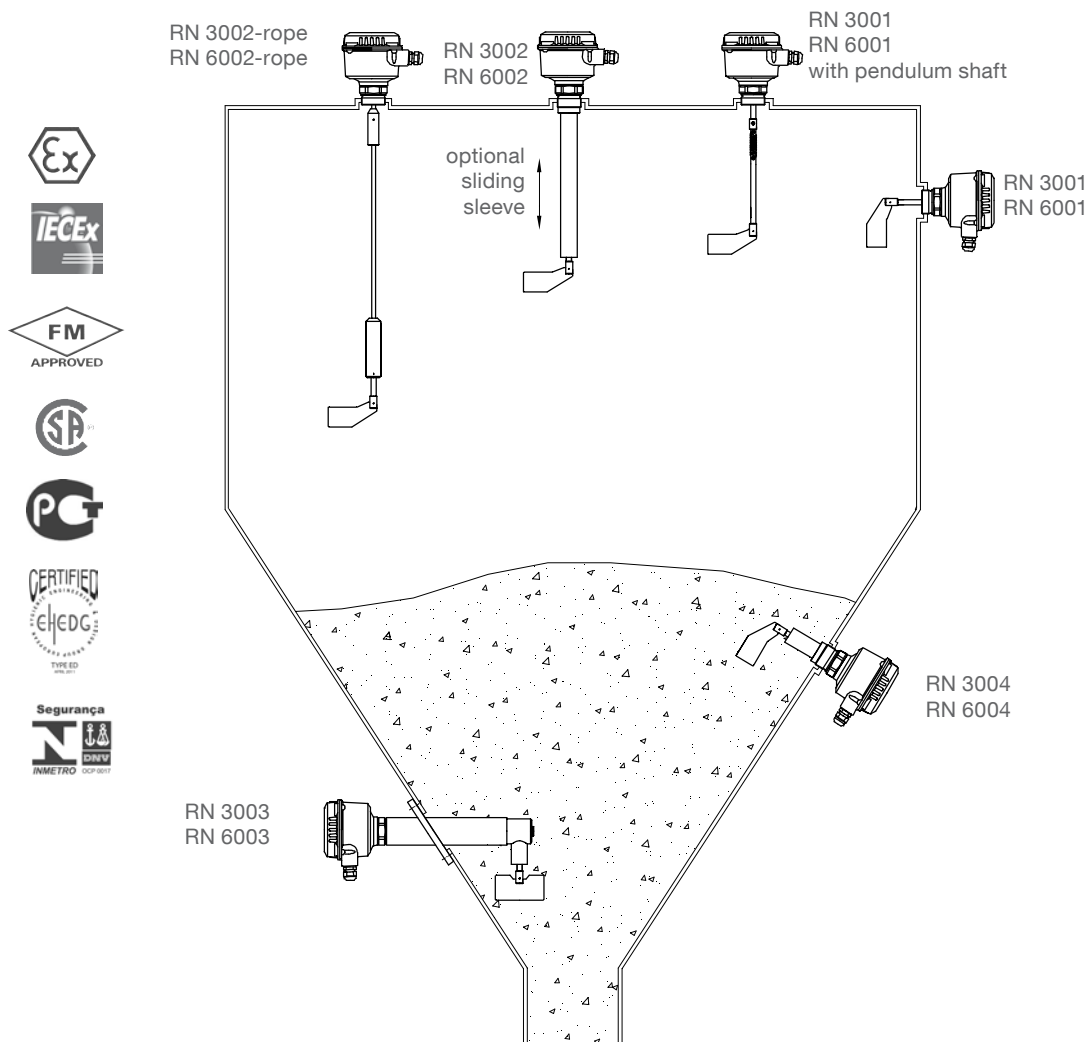
- **building materials industry**
lime, styrofoam, moulding sand, etc.
- **food industry**
milk powder, flour, salt, etc.
- **plastics industry**
plastics granules etc.
- **timber industry**
- **chemical industry**
- **mechanical engineering**

The ROTONIVO is normally screwed into the lateral container wall so that it is level with the filling height to be registered and monitored.

The device can also be mounted from the top of the container. In this case an extension piece is used to mount the probe level with the height to be registered.

The length of the probe can be up to 4m (158") with an extension tube or up to 10m (394") with an extension rope.

The use of a sliding sleeve for the version RN 3002 / 6002 is recommended so that the switch point can be changed easily during operation of the device.



Function

A brushless synchronous motor drives a rotating measuring vane.

When the material level reaches the measuring vane, it is handicapped in its rotation. The motor is freely suspended within the housing. The caused reaction torque is used to operate a switch giving a signal output and to stop the motor (figure 2).

When the paddle becomes free again due to falling material level, a spring draws the motor back into his operating position, the switch returns to his initial position and the motor is switched on. The output signal is switched back (figure 1).

Signal output delay:

The version "Universal voltage" and "PNP" has an integrated adjustable delay for the signal output.

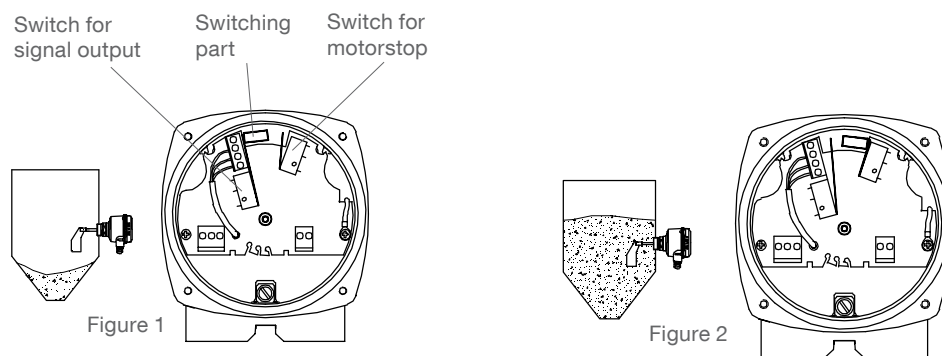
Option fail safe alarm

With the fail safe alarm it is possible to recognize a fault of the unit in time and to initiate an alarm relay. The following faults are observed:

- Motor
- Gear
- Electronic for motor power supply
- Supply voltage failure
- Defect of the connecting wires

Switchable signal output (Fail safe high / low)

With version "Universal voltage", "PNP" and optional "AC" a switchable signal output FSH/FSL is integrated.



Selection guide

	RN 3001 RN 6001	RN 3001 RN 6001 pendulum	RN 3002 RN 6002	RN 3002- rope RN 6002-	RN 3003 RN 6003	RN 3004 RN 6004
Full detector	x	x*	x	x	x	x
Demand detector	x			x*	x	x
Empty detector	x			x*	x	x
Vertical mounting	x	x	x	x*		x
Oblique from the top	x		x**			x
Horizontal mounting	x				x	x
Oblique from the bottom	x					x

* consider max. permitted mech. traction force

** only with option "bearing at tube end"

Function

Shaft sealing and metal material

Application	Sealing material ⁽¹⁾			Metal		Bearing
	NBR	FPM (Viton)	PTFE (Teflon)	Aluminium	Stainless steel ⁽²⁾	Stainless steel
Animal feed press			x		x	x
Synthetic granules, powders	x			x		
Salt			x		x	x
Dust filter (temp. up to 392°F)			x		x	
Dust filter (temp. up to 302°F)		x			x	
Bitumen			x		x	
Cement	x			x		
Wood chip dryer			x		x	
Pressure conveying vessel,			x		x	
Sugar	x			x		
Flour	x			x		
Carbon black	x			x		

⁽¹⁾ Delivered in version with process temperature and process pressure as following (see also option pos.17):

NBR: max 80°C and max. 0.8bar
 FPM (Viton): max. 150°C and max. 0.8bar
 PTFE (Teflon): max. 250°C and max. 0.8bar
 max. 80°C/ 150°C/ 250°C and max. 5bar/ 10bar

⁽²⁾ In particular cases 1.4404 (SS316L) is recommended

Electronic

RN 3000							
Power supply		Output signal					
		SPDT ⁽¹⁾	DPDT	PNP	FSH/ FSL ⁽²⁾	Adjustable delay	Fail safe alarm
AC version	24V or 48V or 115V or 230V AC	•	-	-	option	-	-
DC version	24V DC	•	-	-	-	-	-
DC version	24V DC PNP	-	-	•	•	•	-
Universal voltage	24V DC / 22...230V AC	•	-	-	•	•	option

RN 6000							
Power supply		Output signal					
		SPDT ⁽¹⁾	DPDT	PNP	FSH/ FSL ⁽²⁾	Adjustable delay	Fail safe alarm
AC version	24V or 48V or 115V or 230V AC	•	with option FSH/ FSL	-	option	-	-
DC version	24V DC	•	-	-	-	-	-
Universal voltage	24V DC / 22...230V AC	-	• ⁽³⁾	-	•	•	option

⁽¹⁾ Microswitch, with Universal voltage Relais

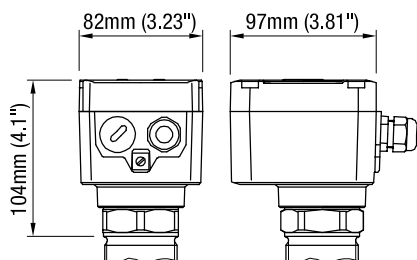
⁽²⁾ Switchable signal output (Fail safe high /low)

⁽³⁾ For Ex approval "Increased safety" (pos.2 C,R,S) not in combination with option Fail safe alarm

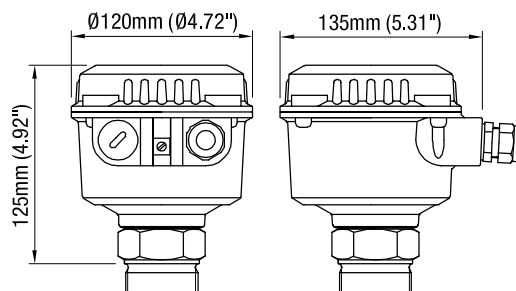
Technical Data

Housing versions

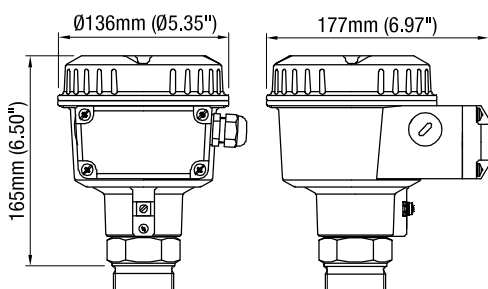
Series RN 3000
Standard



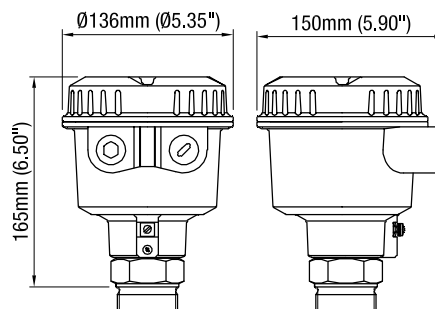
Series RN 6000
Standard



Series RN 6000
de explosionproof with increased
safety terminal box

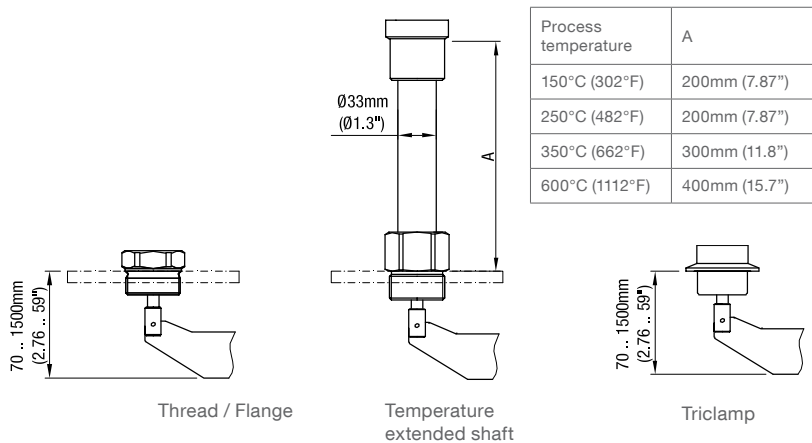


Series RN 6000
d flameproof /explosionproof



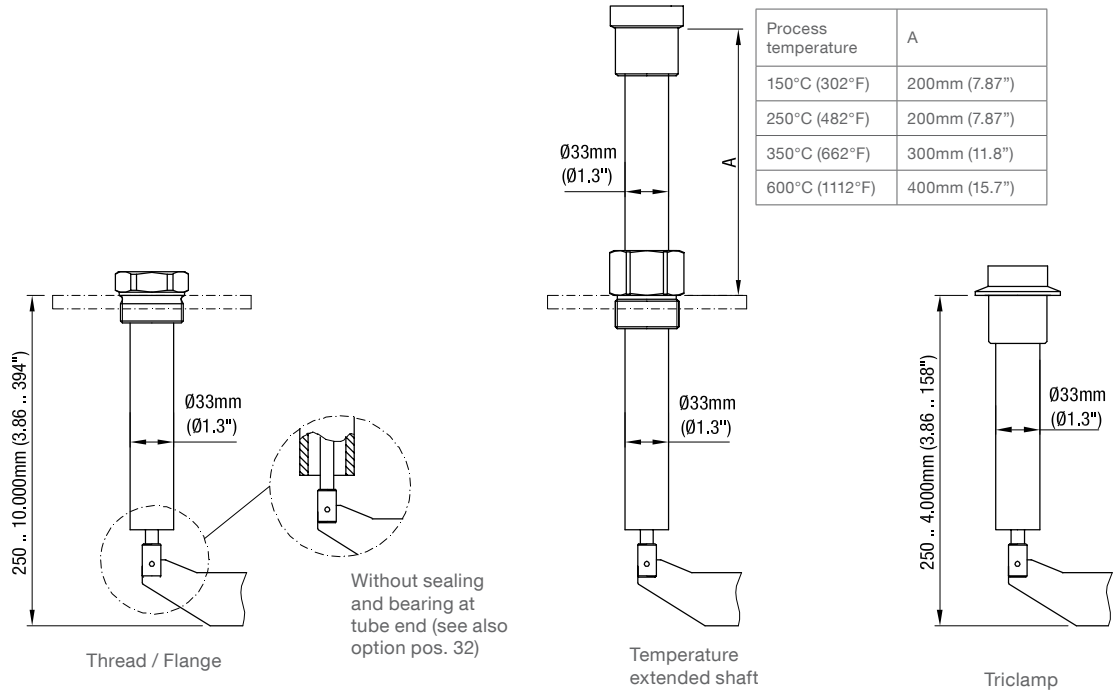
Extensions

RN ..001

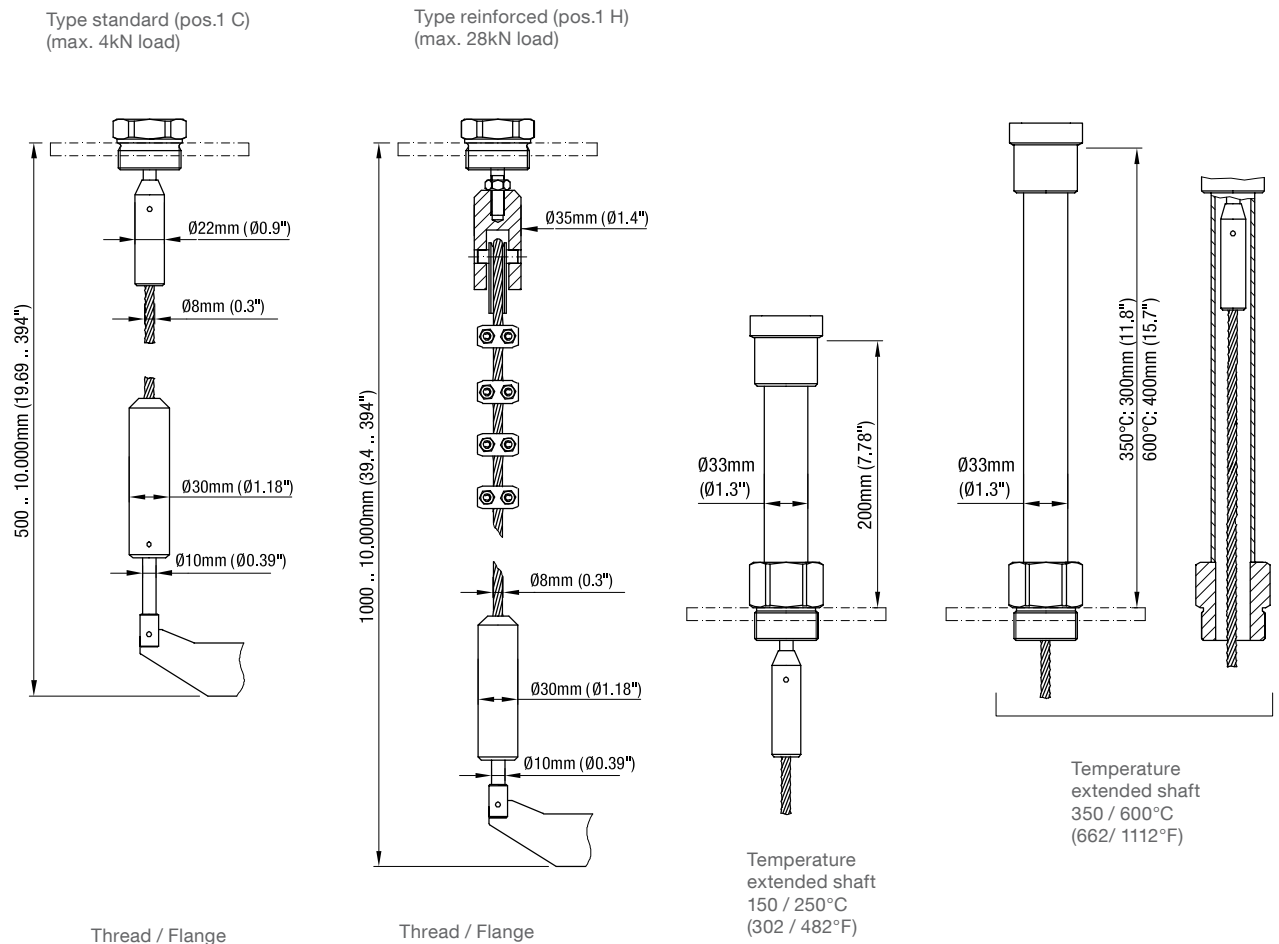


Technical Data

RN ..002

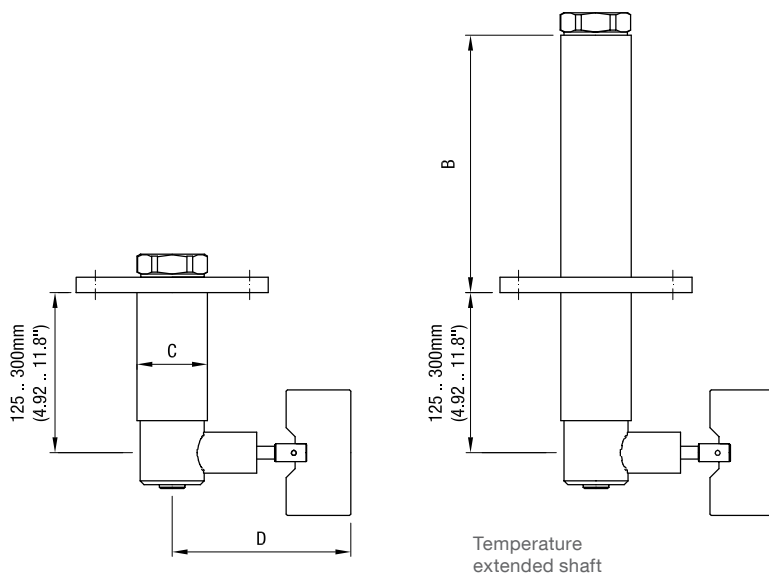


RN ..002 rope



Technical Data

RN ..003

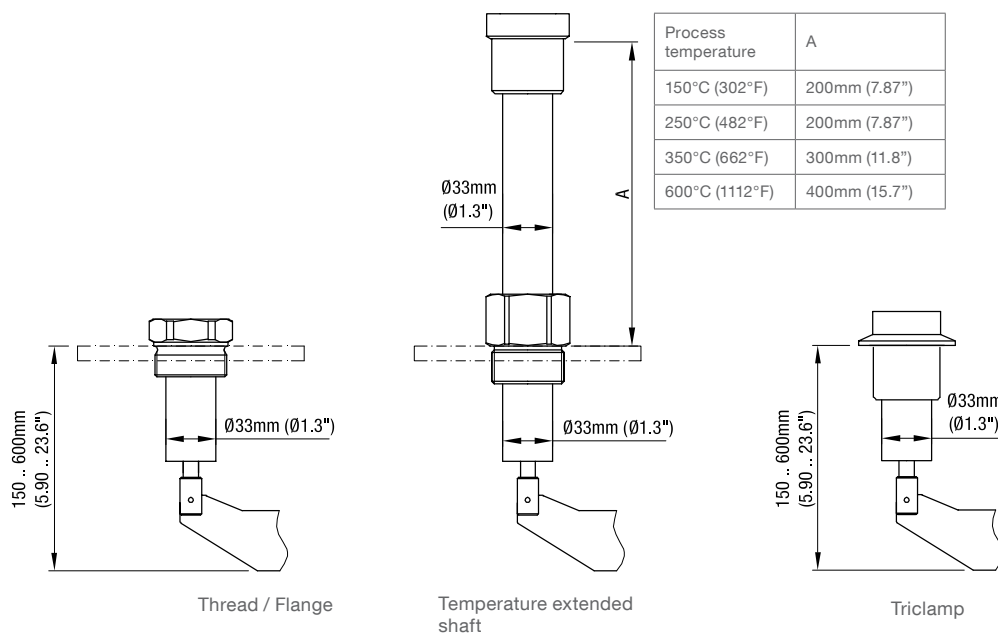


Process temperature	B
80°C (176°F) 0.8 bar (11.6psi)	10mm (0.39")
80°C (176°F) 5/ 10bar (73/ 145psi)	75mm (2.95")
150/ 250°C (302/ 482°F) 0.8/5/10 bar (11.6/73/145psi)	210mm (8.27")

Material	C
steel	ø55mm (2.17")
aluminium	ø60mm (2.36")

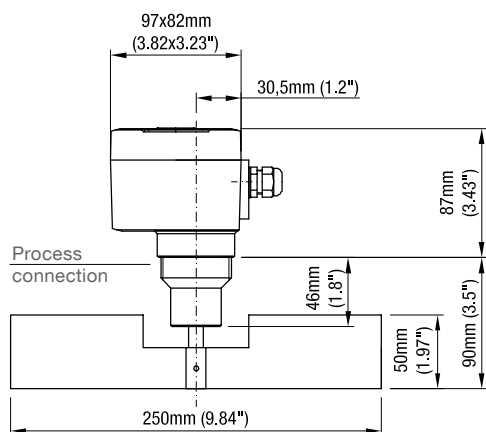
Vane	D
50mm x ..mm (1.97" x ..")	139mm (5.47")
98mm x ..mm (3.86" x ..")	187mm (7.36")

RN ..004



Process temperature	A
150°C (302°F)	200mm (7.87")
250°C (482°F)	200mm (7.87")
350°C (662°F)	300mm (11.8")
600°C (1112°F)	400mm (15.7")

RN 3005

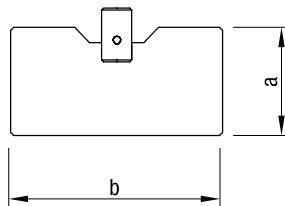


Technical Data

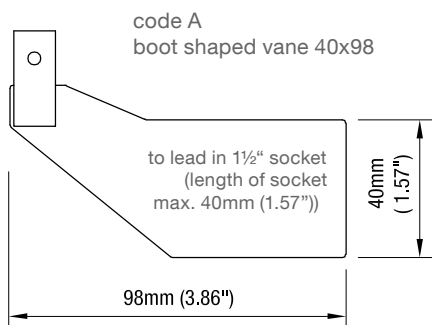
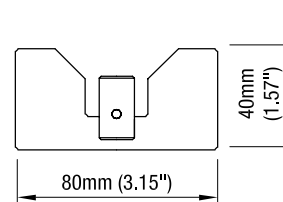
Measuring vanes

code	type	a	b
B	rectangular	50mm (1.97")	98mm (3.86")
C	rectangular	50mm (1.97")	150mm (5.90")
E	rectangular	50mm (1.97")	250mm (9.84")
F	rectangular	98mm (3.86")	98mm (3.86")
G	rectangular	98mm (3.86")	150mm (5.90")
I	rectangular	98mm (3.86")	250mm (9.84")

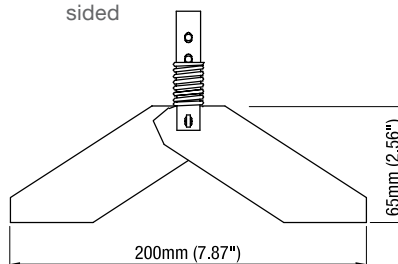
code B,C,E,F,G,I
 rectangular vane



code P
 notched 40x80

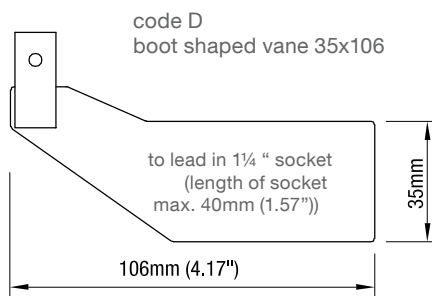
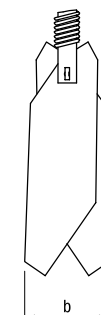


code K
 hinged vane 98x200 double
 sided

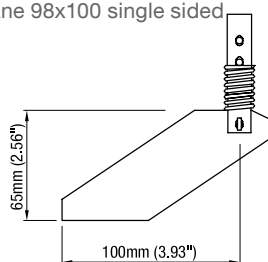


b=37mm (1,46")
 for 1½" / 1¼"

b=28mm (1,1")
 for 1" / M32x1,5

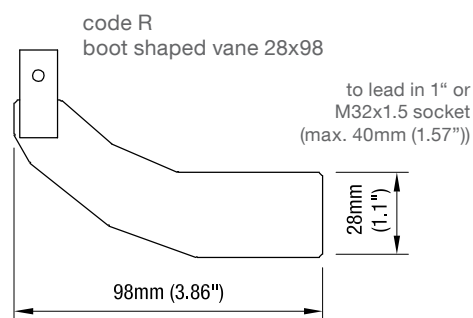


code S
 hinged vane 98x100 single
 sided

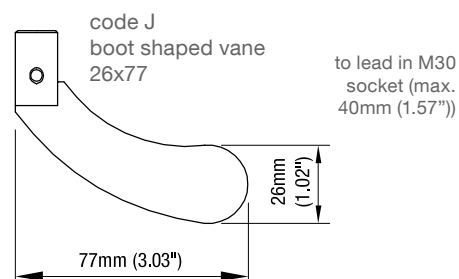
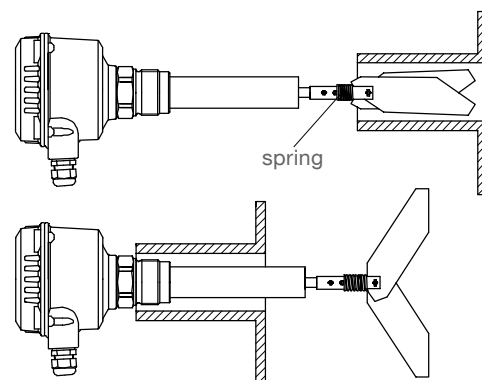


b=37mm (1,46")
 für 1½" / 1¼"

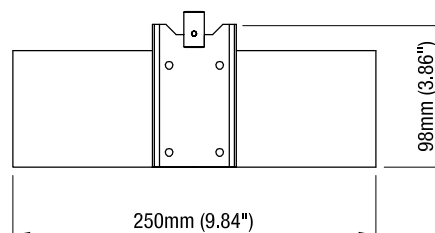
b=28mm (1,1")
 for 1" / M32x1,5



Insertion of the hinged vane
 through a long socket



code M
 rubber vane 98x250



Technical Data

Electrical data

Connection terminals	see page G22/23
Cable entry	M20 x 1,5 screwed cable gland NPT 1/2" conduit connection NPT 3/4" conduit connection (only RN 6000)
Protection class	I III (Version 24V DC PNP)
Overvoltage category	II
Pollution degree	2
Power supply	see page G22/23
Installed load	see page G22/23
Signal and alarm output	see page G22/23
Isolation	Power to signal and alarm output: 2225 Vrms Signal output to signal output (DPDT): 2225Vrms
Indicating light	By built-in LED (apart form AC version)

Mechanical data

Housing	Aluminium housing, powdercoated, RAL 5010 gentian blue RN3000: optional plastic PA6 GF, RAL 5010 gentian blue
Degree of protection	RN 3000: IP 66 (EN 60529) RN 6000: IP 66 (EN 60529), NEMA Type 4 Types with process connection and extension in stainless steel: IP 66 (EN 60529), NEMA Type 4X (not for: RN 600* with process temperature $\geq 150^{\circ}\text{C}$ (302°F), RN 6002 with sliding sleeve, RN 6003)
Process connection	Material: aluminium or stainless steel, 1.4301 (304) / 1.4305 (303) / 1.4541 (321) or stainless steel 1.4404 (316L) Thread: Metric or G (DIN 228) or NPT (tapered ANSI B 1.20.1) according to selection Triclamp Flanges: according to selection
Vane shaft and measuring vane	Material: stainless steel, 1.4301 (304) / 1.4305 (303) or stainless steel 1.4404 (316L)
Tolerance length "L"	$\pm 10\text{mm}$ ($\pm 0.39"$)
Bearing	Ball bearing, dust-tight
Sealing	Radial rotary shaft sealing Material: NBR (Acrylnitril-Butadien-rubber) FPM (Viton) PTFE (Teflon) Graphite based (version 600°C/1112°F) See also selection guide on page G5.
Friction clutch	Protects the gear unit against impacts of the measuring vane
Speed of measuring vane	1 rotation or 5 rotations per minute

Technical Data

Overall weight
(ca.)

RN 3000	Version			Extension	
	80°C (176°F)		150/250/600°C (302/482/662°F)		
	Aluminium *	Stainl. steel *		Aluminium	Stainl. steel *
RN 3001	1.2kg (2.6 lbs)	1.5kg (3.3 lbs)	+1.2kg (+2.6 lbs)	-	-
RN 3002	1.3kg (2.9 lbs)	1.6kg (3.5 lbs)	+1.2kg (+2.6 lbs)	+1.3kg/m (+2.9 lbs per 39.3")	+2,7kg/m (+5.9 lbs per 39.3")
RN 3002- rope	2.1kg (4.6 lbs)	2.4kg (5.3 lbs)	+1.2kg (+2.6 lbs)	-	+0,25kg/m (+0.6 lbs per 39.3")
RN 3003	3.7kg** (8.1 lbs)	6.1kg** (13.4 lbs)	+1.2kg (+2.6 lbs)	+0.4kg/100mm (+0.9 lbs per 3.93")	+0.6kg/100mm (+1.3 lbs per 3.93")
RN 3004	1.3kg (2.9 lbs)	1.6kg (3.5 lbs)	+1.2kg (+2.6 lbs)	+0.15kg/100mm (+0.3 lbs per 3.93")	+0.3kg/100mm (+0.7 lbs per 3.93")
RN 3005	1.3kg (2.9 lbs)	1.6kg (3.5 lbs)			

* Process connection

** Version with flange 150x150x12mm (5.9x5.9x0.47"), L=250mm (9.84")

All weights are without flanges (except RN 3003) and smallest measuring vane.

RN 6000	Version			Extension	
	80°C (176°F)		150/250/600°C (302/482/1112°F)		
	Aluminium *	Stainl. steel *		Aluminium	Stainl. steel *
RN 6001	1.5kg (3.3 lbs)	1.8kg (4.0 lbs)	+12kg (+2.6 lbs)	-	-
RN 6002	1.6kg (3.5 lbs)	1.9kg (4.2 lbs)	+1.2kg (+2.6 lbs)	+1.3kg/m (+2.9 lbs per 39.3")	+2,7kg/m (+5.9 lbs per 39.3")
RN 6002- rope	2.4kg (5.3 lbs)	2.7kg (5.9 lbs)	+1.2kg (+2.6 lbs)	-	+0.25kg/m (+0.6 lbs per 39.3")
RN 6003	4.0kg** (8.8 lbs)	6.4kg** (14.1 lbs)	+1.2kg (+2.6 lbs)	+0.4kg/100mm (+0.9 lbs per 3.93")	+0.6kg/100mm (+1.3 lbs per 3.93")
RN 6004	1.6kg (3.5 lbs)	1.9kg (4.2 lbs)	+1.2kg (+2.6 lbs)	+0.15kg/100mm (+0.3 lbs per 3.93")	+0.3kg/100mm (+0.7 lbs per 3.93")

All mentioned weights are with Standard-housing.

By use of de-housing: +1.4kg (+3.1lbs)
 d-housing: +1.0kg (+2.2lbs)

* Process connection

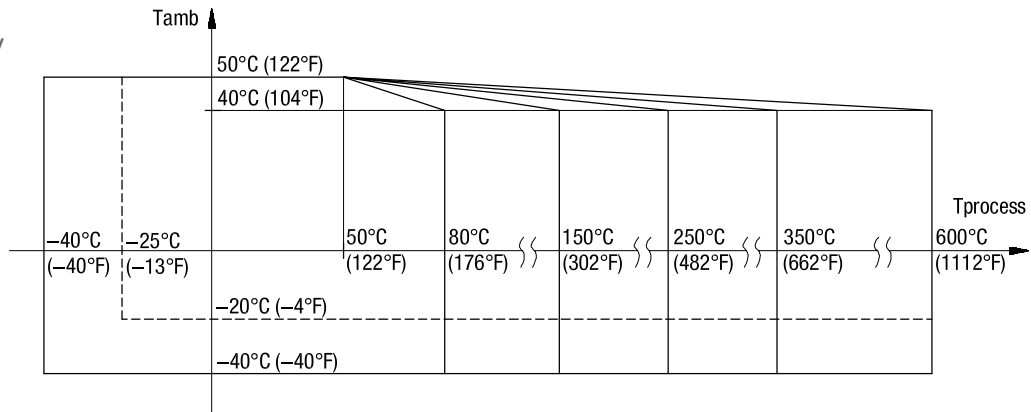
** Version with flange 150x150x12mm (5.9x5.9x0.47"), L=250mm (9.84")

All weights are without flanges (except RN 6003) and smallest measuring vane.

Technical Data

Operating conditions

Ambient temp. (housing) /
 process temperature



-40°C (-40°F) ambient and process temperature for version with heating of housing (pos. 26)
 -40°C (-40°F) ambient temperature not for version with plastic housing in ATEX and IEC-Ex
 +350/600°C (+662/1112°F) process temperature not for version RN 3003 / 6003, not for Ex-approvals
 For versions with Ex-approvals: see remarks on page G28.

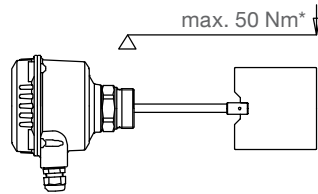
Min. powder density / sensitivity	see section "Sensitivity" on page G26.		
Output signal delay	Version	AC, DC	Universal voltage
	Sensor free -> covered*	ca. 1.3 sec	ca. 1,5 sec + 0 ..20 sec adjustable
	Sensor covered -> free	ca. 0.2 sec	ca. 0,2 sec + 0 ..60 sec adjustable

*after blocking of the measuring vane

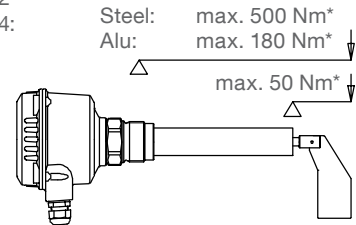
Features of bulk material Hardly any limitations.

Max. permitted mechanical torque

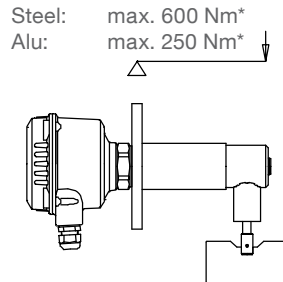
RN 3001 / 6001:



RN 3002 / 6002
 RN 3004 / 6004:



RN 3003 / 6003:



* at 40°C

For version with reinforced rib on request

Protective measures in case of high load: mounting of a protective canopy above the probe (horizontal installation) or fixing of the extension tube.

Max. tractive force	RN 3001 / 6001 pendulum shaft:	400N (only applicabel as full detector)
	RN 3002 / 6002-rope:	4kN (type standard) 28kN (type reinforced)

Max. process pressure -0.9 .. +0.8bar (-13.1 .. 11.6psi) or -0.9 .. +5 bar (-13.1 .. 73psi) or -0.9 .. +10 bar (-13.1 .. 145psi)
 -0.1 .. +0.1bar (-1.5 ..1.5psi) for 600°C (1112°F) version
 For pressure over 0.8 bar (11.6psi) the Teflon sealing is used.
 For versions with Ex-approvals: see remarks on page G27.

Relative Humidity 0-100%, suitable for outdoor use

Altitude max. 2.000m (6.562ft)

Approvals

	RN 3000 RN 6000	
General Purpose * (Ordinary Locations)	<ul style="list-style-type: none"> • • • FM • CSA • GOST-R 	EN 61010-1 (IEC/CB)
Hazardous Locations *	<ul style="list-style-type: none"> • • • • • • • • • • • • • • • • • • • • 	ATEX Dust explosion ATEX II 1/2 D Ex t IIIC T! Da/Db IP6X Gas explosion flameproof ATEX II 2G Ex d IIC T! Gb flameproof / increased safety ATEX II 2G Ex de IIC T! Gb IEC-Ex Dust explosion IEC-Ex t IIIC T! Da/Db IP6X Gas explosion flameproof IEC-Ex d IIC T! Gb flameproof / increased safety IEC-Ex de IIC T! Gb FM Dust explosion Cl. II, III Div. 1 Gr. E,F,G Gas explosion flameproof XP Cl. I Div. 1 Gr. B-D Gas explosion flameproof / increased safety Cl. I Zone 1 AEx d IIC Cl. I Zone 1 AEx de IIC CSA Dust explosion Cl. II, III Div. 1 Gr. E,F,G Ex DIP A20/21 Gas explosion flameproof XP Cl. I Div. 1 Gr. B-D Gas explosion flameproof / increased safety Cl. I Zone 1 Ex d IIC Cl. I Zone 1 Ex de IIC RTN Ex Dust explosion INMETRO Dust explosion Ex t IIIC T! Da/Db IP6X Gas explosion flameproof Ex d IIC T! Gb Gas explosion flameproof / increased safety Ex de IIC T! Gb Detailed allocation of types and electronic modules to approvals: see selection list.
EMC	<ul style="list-style-type: none"> • • 	EN 61326 -A1
Hygiene*	<ul style="list-style-type: none"> • • 	EHEDG
Food grade material	<ul style="list-style-type: none"> • • 	According to directive 1935/2004/EC
RoHS Conform	<ul style="list-style-type: none"> • • 	According to directive 2011/65/EU

Pressure Equipment Directive (97/23/EC)

The units are not subject to this directive, because they are classified as „pressure-keeping equipment“ and do not have a pressurized housing (see Art.1, clause 2.1.4).
 The units are designed and manufactured in accordance to the Pressure Equipment Directive.



The unit is NOT intended for use as a "equipment part with safety function" (Art.1, clause 2.1.3).
 If the units should be used as "equipment part with safety function", please contact the manufacturer.

* Depending on selected version

Options

Weather protection cover

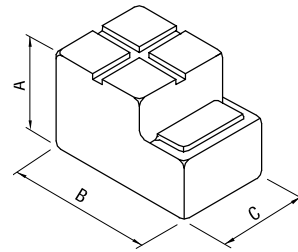
If the measuring device is used outdoors, the use of the weather protection cover is recommended. It protects the device from all atmospheric influences such as:

- rain water
- condensation water
- excessively high temperatures due to insolation
- excessively low temperatures in winter

Material: PE, weather and temperature stable



Not available for housing version d and de.
 For use in Hazardous Locations: only permitted for zone 2 and 22 or Division 2.

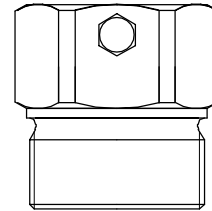


Sliding sleeve

RN 3002 / 6002 Process connection and material as chosen

Version with selection code pos. 30:
 Only for applications without process pressure.
 Not available for Ex-approvals.

Version with selection code pos. 31: For applications with process pressure. Sealing material to the extension tube: viton.



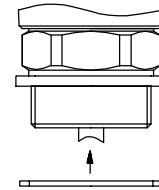
Mounting set

Screws and washers for fixing the unit on a flange.

Flat gasket

On the face sealing of the process connection thread.
 Incl. sealing face for version with G 1 1/2" thread.

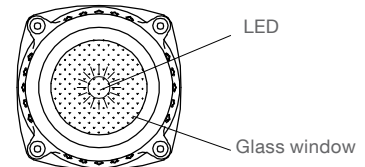
Not available for 600°C version.



LED (Glass window in lid)

To see the indicating light on the electronic module from outside.

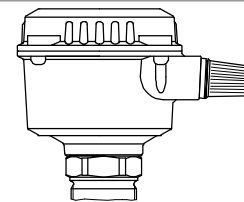
Not available for housing version d and de.



Bulb in cable gland

Bright indicating light seen from outside.

Not available for use in Hazardous Locations.



Plug

Used instead of cable gland.

Not available for use in Hazardous Locations and FM / CSA general purpose.

Connection of the plug wires to the internal terminals of the unit must be done on site or according to customer demands.

Valve connector (incl. mating plug)

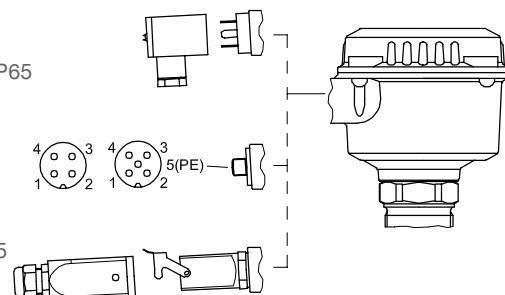
4-pole (incl. PE), max. 230V, enclosure plastic, IP65

Plug M12 (without mating plug)

4-pole, max. 25V or 5-pole, max. 60V
 Enclosure brass, IP67

Plug Han 4A (incl. mating plug)

5-pole (incl. PE), max. 230V, enclosure zinc, IP65

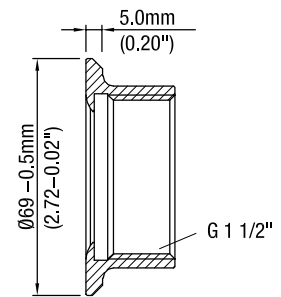


Options / Mounting

EHEDG approval

EHEDG conform design (material and construction in contact with the process).

Approved with flush welding socket
 Material: aluminium or 1.4301(304) or 1.4404 (316L)
 (details see: mounting instructions EHEDG version, page G17).



Food grade material

Food grade material in contact with the process food (sealing and grease FDA conform). The option does not automatically implement a food conform design (food conform gaps, surface and radiuses).

Mounting



General Safety Instructions

Process pressure

Improper installation may result in loss of process pressure.

Chemical resistance against the medium

Materials of construction are chosen based on their chemical compatibility (or inertness) for general purposes. For exposure to specific environments, check with chemical compatibility charts before installing.

Mechanical load

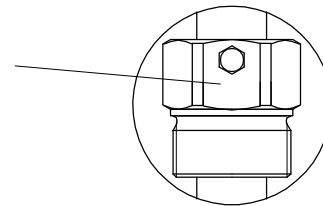
The torque at the fastening spot must not exceed the specified ratings. See page G13 for details.

Mounting location

Keep away from incoming material and from silo walls.
 The installation has to be carried out, that the sensor elements cannot hit the wall of the silo. The flow of the medium and fixtures in the container must be considered. This is especially important for extension length of more than 3000mm (118")

Sliding sleeve

Tighten both straining screws M8 with 20 Nm to obtain resistance against pressure



Flange mounting

A plastic seal must be used to tighten the flange.

EHEDG-approval / Food grade material

The materials are available for the use under normal and predictable applications (according to directive 1935/2004 Art.3). Other conditions can influence the safety.



Additional Safety Instructions for Hazardous Locations

Installation regulations

For devices to be used in Hazardous Locations the respective valid installation regulations must be observed.

Sparks

The installation has to be done in a way, that mechanical friction or impact does not cause sparks between the aluminium enclosure and steel.

Sealings for flanges and sliding sleeve

For process temperatures over 230°C the delivered sealings of the flanges and of the sliding sleeve must be checked regularly for good order and condition.

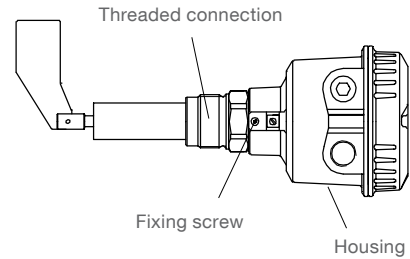
Mounting

Mounting instructions

Rotatable housing

The housing can be rotated against the threaded connection after mounting.

RN 6000: For the d- and de- housing:
 Fixing screw must be unfastened to enable rotation. Fix the screw again, when the housing has the right position.



Direction of the cable glands When the unit is mounted from the side, ensure, that the cable glands face downwards and are closed to avoid water penetration into the housing.

Sealing Seal the process connection thread with teflon tape against process pressure. Alternative use of a flat gasket is possible (option pos. 15)

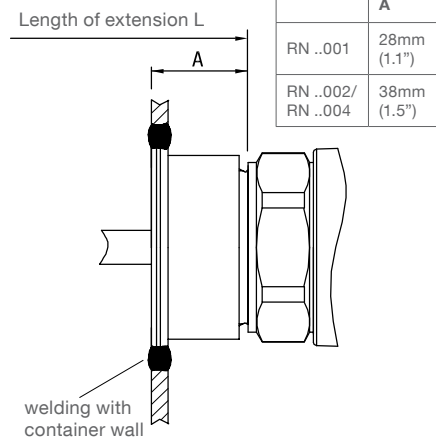
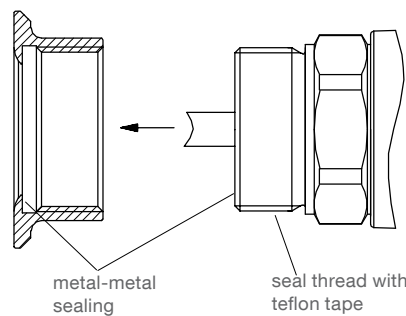
Precaution for later dismantling Use teflon tape to avoid seizing of aluminium process connection thread with the socket
EHDG-Approval Seal the thread with teflon tape against process pressure.

Metal-metal sealing:

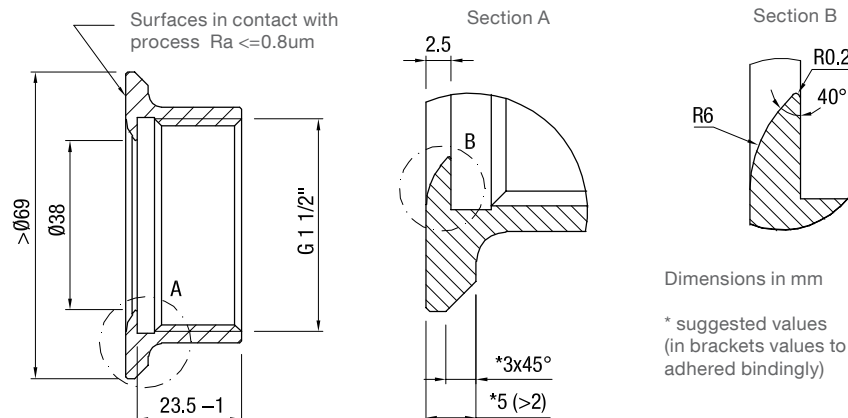
- The support muß be plane and without any gap. No teflon tape (or similar) is allowed to be in between.
- Fixing torque 100Nm

The quality of the welding with the container wall must be according to the respective regulations (e.g. gaps, transitions, surface finish).

Flush welding socket

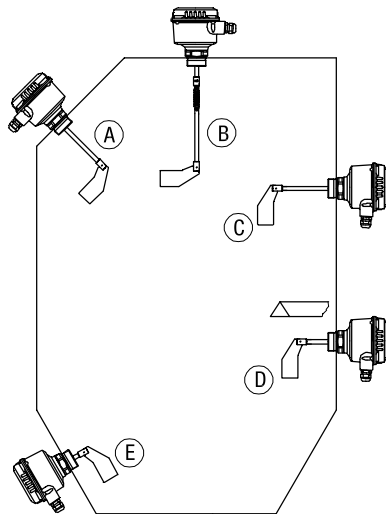


Dimension of flush welding socket (for optional on site manufacturing):



Mounting

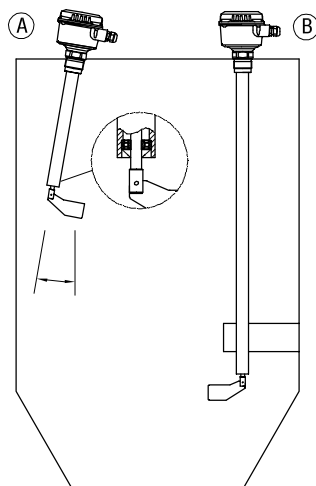
RN 3001
 RN 6001



- A Full detector vertical and oblique from the top
max. „L“ = 600 mm (23.62”)
- B With pendulum shaft: Full detector vertical from the top. Observe max. pulling force.
- C Full detector horizontal
max. „L“ = 300 mm (11.8”)
- D Demand or empty detector horizontal
max. „L“ = 150 mm (5.9”)
Protective angle recommended depending on load.
- E Empty detector oblique from the bottom
max. „L“ = 150 mm (5.9”)
Protective angle recommended depending on load.

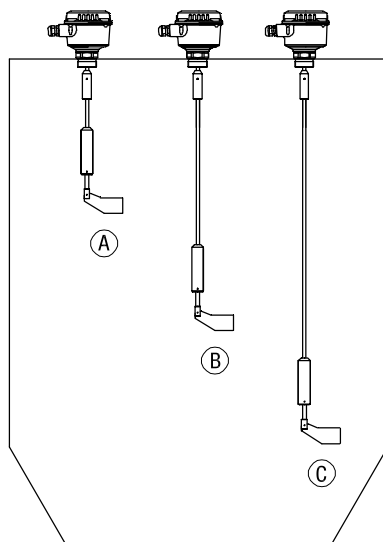
Horizontal mounting: Boot shaped vane recommended (min. mech. load, because the vane aligns to the movement of the material).

RN 3002
 RN 6002



- A Full detector vertical from the top
max. „L“ = 3.000 mm (118“)
- Remark:
 Deviation up to max. 10° from vertical installation with option „Bearing at tube end“ possible.
- B Full detector vertical from the top
max. „L“ = 4.000 mm (158“)
- Support from side recommended.

RN 3002-Rope
 RN 6002-Rope

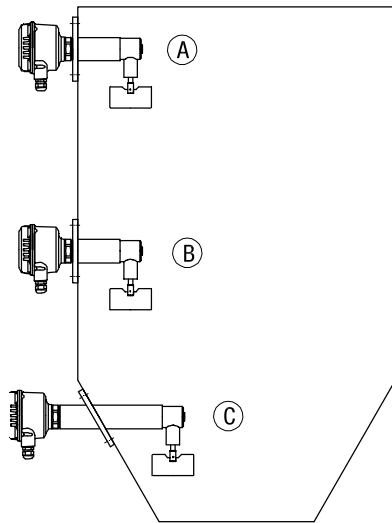


- A Full detector vertical
- B Demand detector vertical
- C Empty detector vertical

max. „L“ = 10.000 mm (394“)
 Observe max. tractive force.

Mounting

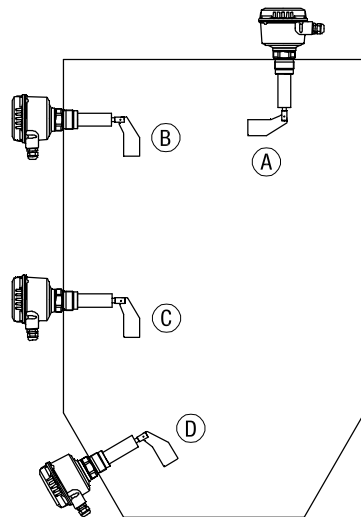
RN 3003
 RN 6003



- A Full detector horizontal
- B Demand detector horizontal
- C Empty detector horizontal

Protective angle recommended depending on load.

RN 3004
 RN 6004




- A Full detector vertical and oblique from the top
- B Full detector horizontal
- C Demand or empty detector horizontal
 Protective angle recommended depending on load.
- D Empty detector oblique from the bottom
 Protective angle recommended depending on load.

Horizontal mounting: Boot shaped vane recommended (min. mech. load, for the vane aligns to the movement of the material).

Electrical installation

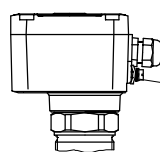
General Safety Instructions

Handling	 In the case of improper handling or handling malpractice, the electric safety of the device cannot be guaranteed.
Installation regulations	The local regulations or VDE 0100 (Regulations of German Electrotechnical Engineers) must be observed. Version 24V DC PNP (Protection class III): The Isolation of the connected power supply and the signal output must cope with the regulations.
Fuse	Use a fuse as stated in the connection diagrams (see pages G22 and G23).
RCCB protection	In the case of a fault, the supply voltage must be automatically switched off by a RCCB protection switch to protect against indirect contact with dangerous voltages.
Power supply switch	A voltage disconnection switch must be provided near the device.
Wiring diagram	The electrical connections are made in accordance with the wiring diagram.
Supply voltage	Compare the supply voltage applied with the specifications given on the electronic module and name plate before switching the device on.
Cable gland	The screwed cable gland and closing element must have following specifications: Ingress protection IP66, temperature range from -40°C to +70°C, UL or VDE certified (depending on the country where the unit is installed), pull relief. Make sure that the screwed cable gland safely seals the cable and that it is tight (danger of water intrusion). Cable glands that are not used have to be sealed with a blanking element. The diameter of the field wiring cable has to match to the clamping range of the used cable gland.
Conduit system	In case of using a conduit system (with NPT thread) instead of a cable gland the regulations of the country, where the unit is installed, must be observed. The conduit must have a tapered thread either NPT1/2" or NPT3/4" in accordance with the unit and ANSI B 1.20.1. Not used inlets must be closed tight with a metal blanking element.
Field wiring cables	All field wirings must have insulation suitable for at least 250V AC. The temperature rating must be at least 90°C (194°F).
Microswitch protection	Provide protection for microswitch contacts to protect the device against inductive load surges.
Protection against static charging	The housing of the unit must be grounded to avoid static charging of the unit. This is particularly important for applications with pneumatic conveying and non-metallic containers.

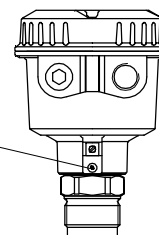
Additional Safety Instructions for Hazardous Locations

External equipotential bonding terminal

RN 3000



RN 6000



Connect to equipotential bonding of the plant

Field wiring

A strain relief must be provided for the field wiring cables, when the device is installed with the factory provided cable glands.

Field wiring terminals for "de" housing

Fixing torque : 0,5-0,6Nm
 Remove wire isolation: 9mm

Electrical installation

Cable glands and conduit system for ATEX / IEC-Ex (Dust and Gas Hazardous Locations)

Installation according to the regulations of the country, where the product is installed.

Not used entries have to be closed with blanking elements certified for this purpose.

Where available the factory provided parts must be used.

A strain relief must be provided for the field wiring cables, when the device is installed with the factory provided cable glands.

The diameter of the field wiring cable must match to the clamping range of the cable clamp.

If other than the factory provided parts are used, following must be ensured:

The parts must have an approval adequate to the approval of the level sensor (certificate and type of protection).

The approved temperature range must be from the min. ambient temperature of the level sensor to the max. ambient temperature of the level sensor increased by 10K.

The parts must be mounted according to the instructions of the supplier.

Installation of a flameproof/ explosion proof enclosure with a conduit system:

In a conduit system single electric conductors are installed in a certified pipe system. This pipe system is in a flameproof / explosion proof construction as well. The flameproof / explosion proof enclosure and the pipe system needs to be sealed from each other by a certified flameproof seal of a type "d" or explosion proof of a type "XP". This seals shall be installed directly in or at the conduit entries of the flameproof / explosion proof enclosure. Not used entries have to be closed with blanking elements certified for this purpose (flameproof type "d" or explosion proof type "XP").

Conduit system for FM and CSA (Dust and Gas Hazardous Locations)

General requirements:

In addition the regulations of the country must be observed. The used flameproof seals and blanking elements must have an adequate type approval and a temperature range of at least -40°C (-40°F) to $+80^{\circ}\text{C}$ (176°F). In addition they shall be suitable for the conditions and correctly installed. Where available the provided original parts of the manufacturer must be used.

Installation of a flameproof enclosure "d" with a conduit system:

In a conduit system single electric conductors are installed in a certified pipe system. This pipe system is in a flameproof construction as well. The flameproof enclosure "d" and the pipe system needs to be sealed from each other by a certified flameproof seal. Conduit entries of a flameproof enclosure "d" shall have installed the flameproof seal within 18 inches from the enclosure wall. Not used entries have to be closed with adequate blanking elements of a certified flameproof type AEx Cl.1 Div.1 A.

Commissioning

Commissioning only with closed lid.

Opening the lid



Units with Dust Explosion approval:
 Before opening the lid take care, that no dust deposits or whirlings are present.
 Do not remove the lid (cover) while circuits are alive.

RN 6000:

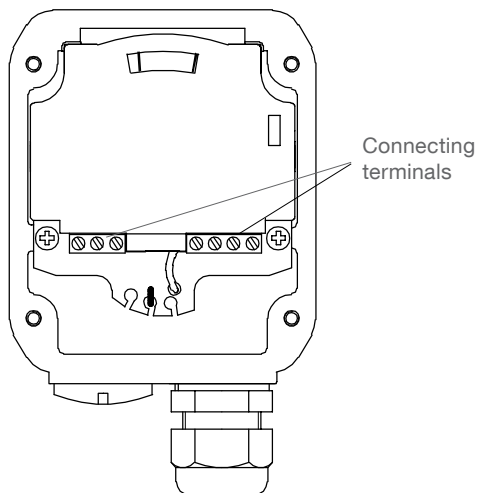


Units with flameproof GasExplosion approval (d-housing):
 To prevent ignition of hazardous atmospheres, do not remove the lid (cover) while circuits are alive.

Electrical installation

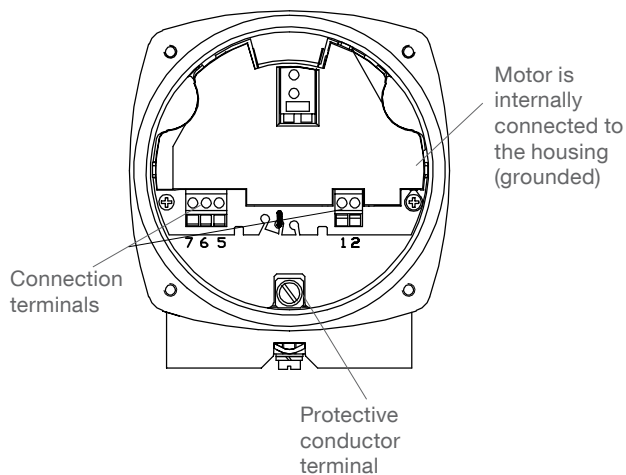
Connection

RN 3000: Standard housing



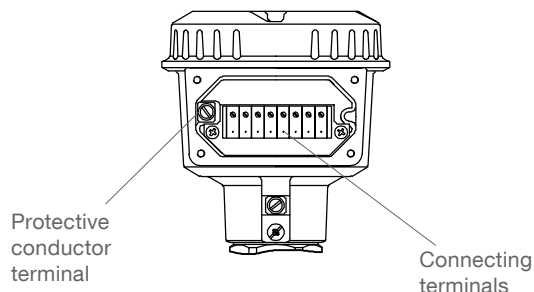
RN 6000: Standard and d-housing

Connection is done directly on the PCB



de-housing

Connection is done on the terminals inside the increased safety area.



Electrical installation Series RN 3000

Version:

- AC
- DC
- **Universal voltage**

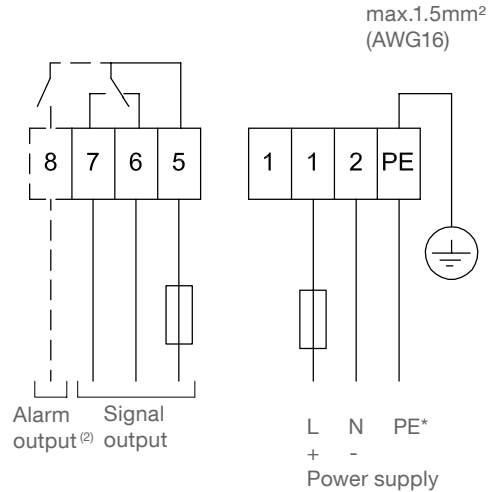
Power supply:

- **AC version:**
 24V or 48V or 115V or 230V 50/60Hz max. 4VA
 All voltages $\pm 10\%$ ⁽¹⁾
 Supply voltage as selected.
 External fuse: max 10A, fast or slow, HBC, 250V
- **DC version:**
 24V DC $\pm 15\%$ ⁽¹⁾ max. 2.5W
 External fuse: not required
- **Universal voltage:**
 24V DC $\pm 15\%$ ⁽¹⁾ max.4W
 22 .. 230V 50/60Hz $\pm 10\%$ ⁽¹⁾ max.10VA
 External fuse: not required

⁽¹⁾ including $\pm 10\%$ of EN 61010

Signal and alarm output:

Micro switch or relay, SPDT contact
 max. 250V AC, 2A, 500VA ($\cos\phi = 1$)
 max. 300V DC, 2A, 60W
 External fuse: max 10A, fast or slow, HBC, 250V



⁽²⁾ With option Fail safe alarm (rotation control)
 Contact open when de-energised

Version:

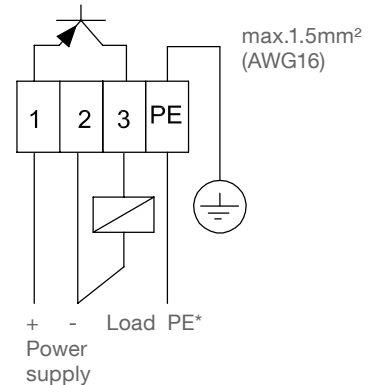
- PNP

Power supply:

24V DC $\pm 15\%$ ⁽¹⁾
⁽¹⁾ including $\pm 10\%$ of EN 61010
 Input current: max. 0.6A

Signal output:

Load max.0.4A
 Output voltage equal to input voltage, drop <2,5V
 Open collector
 Protected against short circuit and overload



* Protection against static charge:

The PE terminal of the unit must be grounded to avoid static charging of the unit.
 This is particularly important for applications with pneumatic conveying.

Electrical installation Series RN 6000

Version:

- AC
- DC

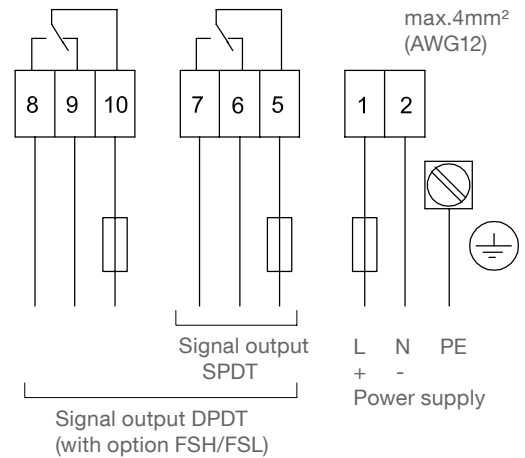
Power supply:

- **AC version:**
 24V or 48V or 115V or 230V 50/60Hz max. 4VA
 All voltages $\pm 10\%$ ⁽¹⁾
 Supply voltage as selected.
 External fuse: max 10A, fast or slow, HBC, 250V
- **DC version:**
 24V DC $\pm 15\%$ ⁽¹⁾ max. 2.5W
 External fuse: not required

⁽¹⁾ including $\pm 10\%$ of EN 61010

Signal output:

Micro switch, SPDT contact
 max. 250V AC, 5A, non inductive
 max. 30V DC, 4A, non inductive
 External fuse: max 10A, fast or slow, HBC, 250V



Version:

- Universal voltage

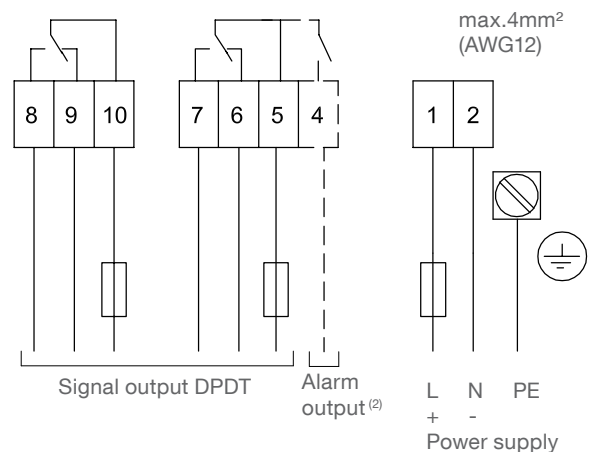
Power supply:

24V DC $\pm 15\%$ ⁽¹⁾ max.4W
 22 .. 230V 50/60Hz $\pm 10\%$ ⁽¹⁾ max.10VA

⁽¹⁾ including $\pm 10\%$ of EN 61010

Signal and alarm output:

Relay DPDT contact
 max. 250V AC, 5A, non inductive;
 max. 30V DC, 4A, non inductive
 External fuse: max 10A, fast or slow, HBC, 250V



⁽²⁾ With option Fail safe alarm (rotation control)
 Contact open when de-energised



* Protection against static charge:

The PE terminal of the unit must be grounded to avoid static charging of the unit.
 This is particularly important for applications with pneumatic conveying.

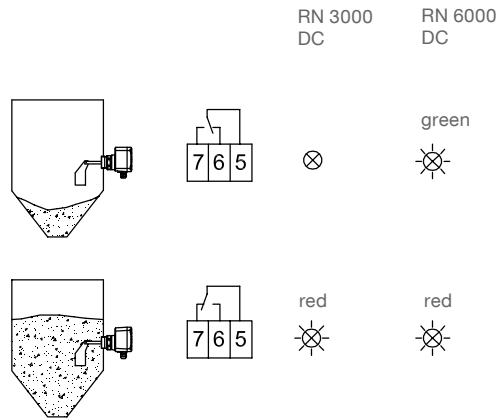
Signal and alarm output

Overview

Overview of signal and alarm output for the different electronic versions: see page G5

Signal output: Switching logic

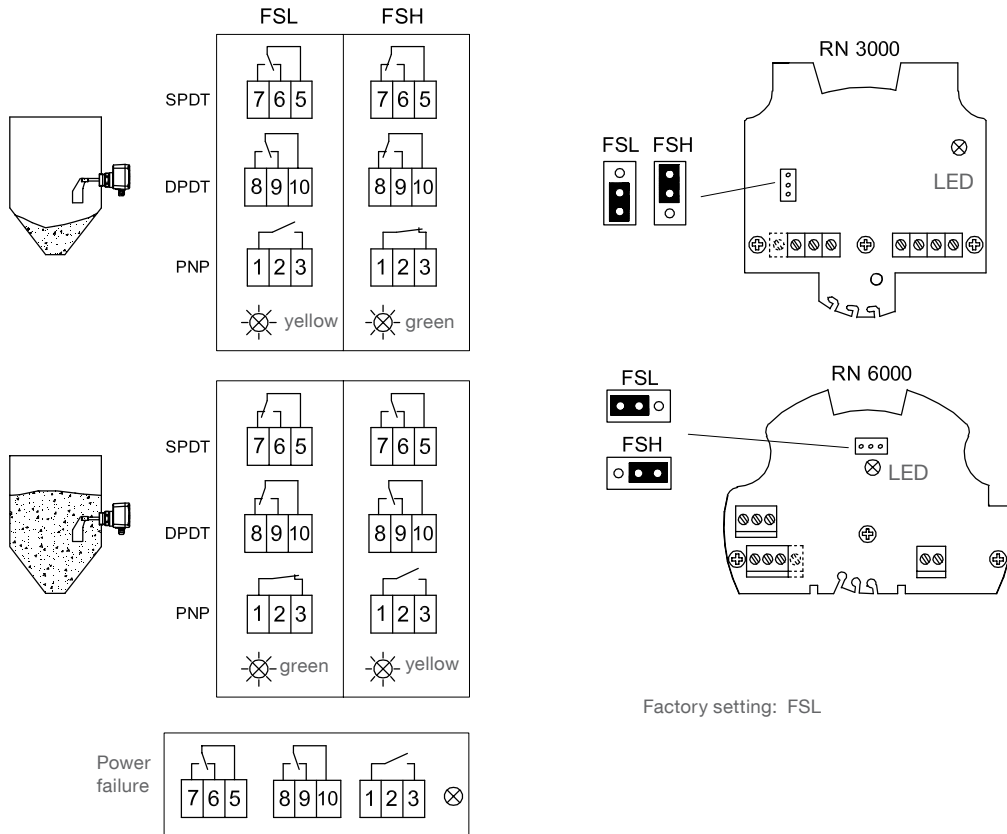
Versions without FSH/FSL



Versions with FSH/FSL

FSH: Use this setting when sensor is used as a full detector.
 Power failure or line break is regarded as „full“ signal (protection against overflowing).

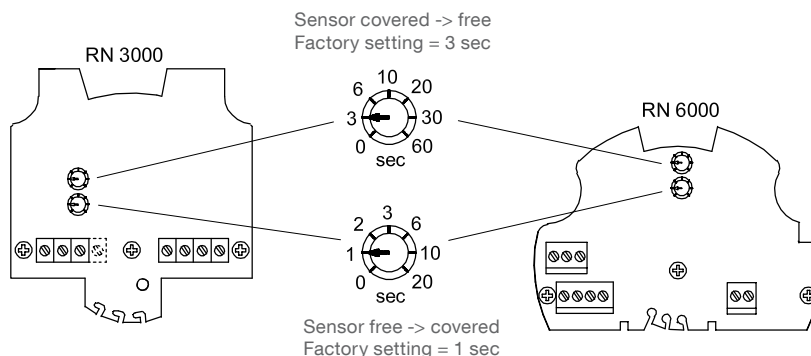
FSL: Use this setting when sensor is used as an empty detector.
 Power failure or line break is regarded as „empty“ signal (protection against running dry).



Factory setting: FSL

Signal and alarm output

Signal output: Delay



Alarm output (Fail safe alarm, Rotation control)

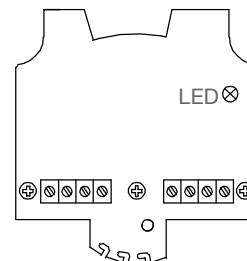
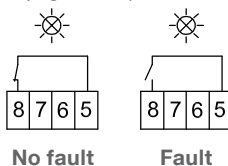
Switching and timing behaviour:

If the sensor is not covered, the rotating paddle shaft will send pulses at 20 sec intervals. In case of fault, the pulses are missed. After 30 sec the alarm relay will open.

RN 3000 Universal voltage

yellow or green
(see page before)

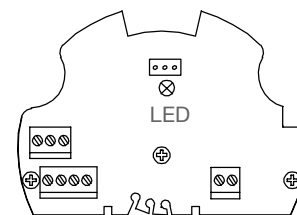
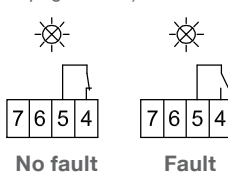
red



RN 6000 Universal voltage

yellow or green
(see page before)

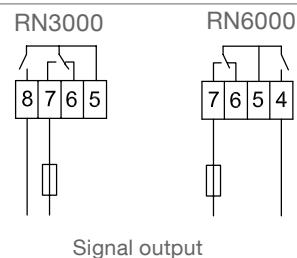
red



Connection example:

Full detector with maximum safety:
The output signal opens in case of:

- full signal or
- failure of supply voltage or
- defect of the connection wires or
- defective unit



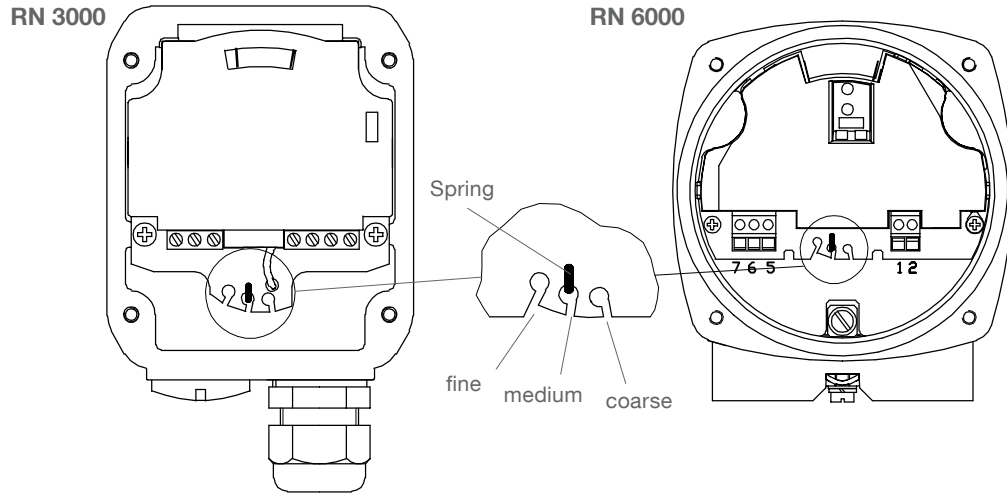
Settings: Sensitivity / Maintenance

Adjustment of the spring

The spring is adjustable in 3 positions. It should be changed only if necessary.

- „Fine“: for light material
- „Medium“: suitable for nearly every material (factory setting)
- „Coarse“: for very sticky material

The spring can be changed via a small plier.



Sensitivity

The table shows approximate values for the minimum densities, at which a normal function should be possible.

Vane	*Minimum density in g/l = kg/m ³ (lb/ft ³) (without guarantee)			
	Vane completely covered with bulk material		Bulk material covers vane up to 100mm (3.93")	
	Spring adjustment		Spring adjustment	
	fine	medium (factory setting)	fine	medium (factory setting)
Boot shaped vane 40x98	200 (12)	300 (18)	100 (60)	150 (9)
Boot shaped vane 35x106	200 (12)	300 (18)	100 (60)	150 (9)
Boot shaped vane 28x98	300 (18)	500 (30)	150 (9)	200 (12)
Boot shaped 26x77	350 (21)	560 (33)	200 (12)	250 (15)
Vane 50x98	300 (18)	500 (30)	150 (9)	250 (15)
Vane 50x150	80 (4.8)	120 (7.2)	40 (2.4)	60 (3.6)
Vane 50x250	30 (1.8)	50 (3)	15 (0.9)	25 (1.5)
Vane 98x98	100 (60)	150 (9)	50 (3)	75 (4.5)
Vane 98x150	30 (1.8)	50 (3)	15 (0.9)	25 (15)
Vane 98x250	20 (1.2)	30 (1.8)	15 (0.9)	15 (0.9)
Hinged vane 98x200 b=37 double sided	70 (4.2)	100 (60)	35 (2.16)	50 (3)
Hinged vane 98x200 b=28 double sided	100 (60)	150 (9)	50 (3)	75 (4.5)
Hinged vane 98x100 b=37 single sided	200 (12)	300 (18)	100 (60)	150 (9)
Hinged vane 98x100 b=28 single sided	300 (18)	500 (30)	150 (9)	250 (15)

The above mentioned data is a guideline and is for loose, non compacted material.

During the filling the bulk density can change (e. g. for fluidised material).

*For versions with option 26 (heating of housing) the above mentioned data must be multiplied by 1.5.

Maintenance

Generally the device requires no maintenance.

Notes for use in Hazardous Locations

Zone classification

	Useable in zone	ATEX Category	IEC-Ex Equipment Protection Level (EPL)	
Dust applications	20, 21, 22	1 D	Da	*) in case of conductive dust additional requirements for the installation are necessary.
	21, 22	2 D	Db	
	22	3 D*	Dc	
Gas applications	0, 1, 2	1 G	Ga	
	1, 2	2 G	Gb	
	2	3 G	Gc	

General Notes

Marking

Devices with Ex approval are marked on name plate.

Process pressure

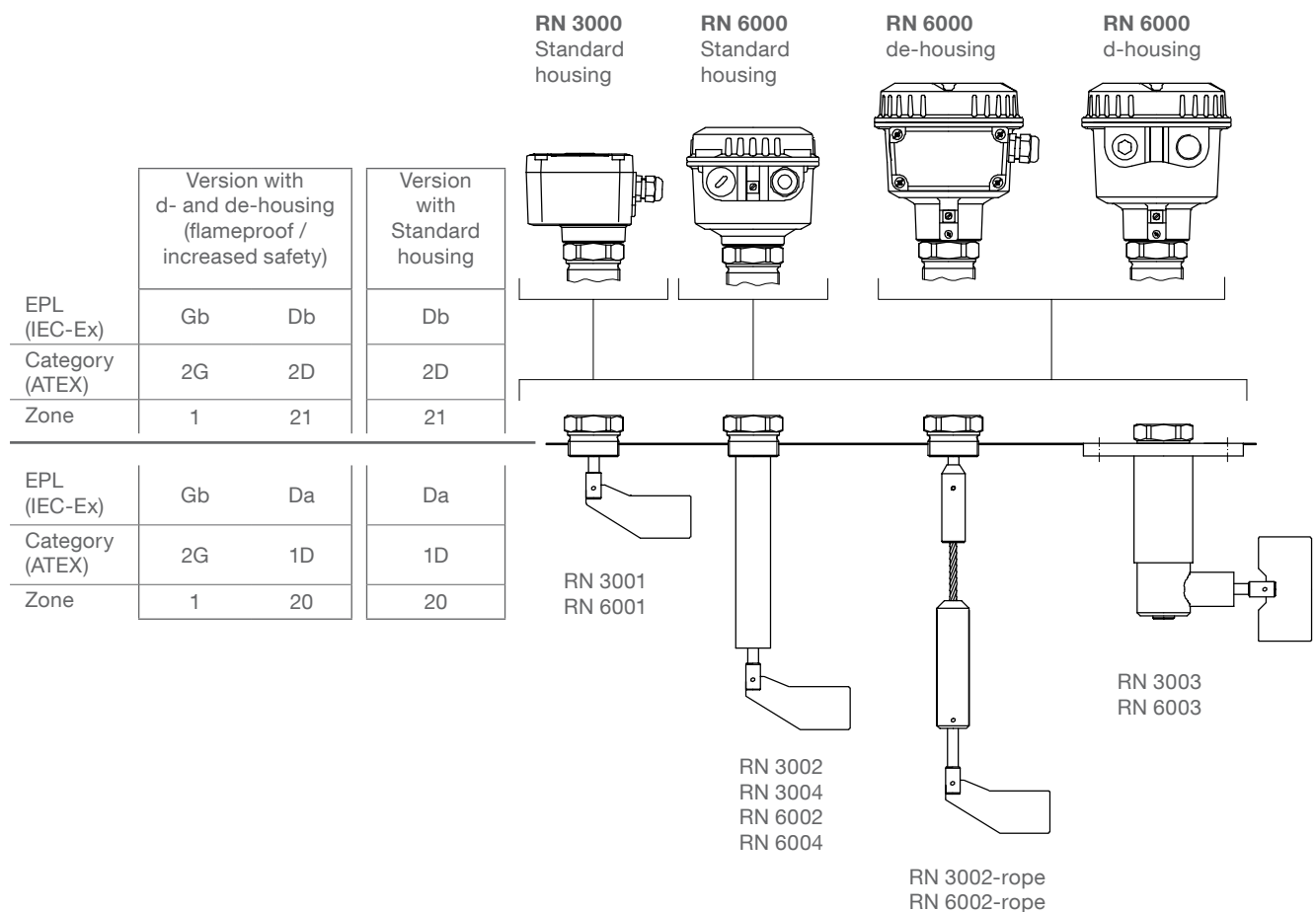


The device construction allows process over-pressure up to 0.8/5/10 bar (11.6/73/145psi) (see name plate). These pressures are allowed for test purposes. The definition of the Ex approvals are only valid for a container-over-pressure between -0.2..+0.1 bar (-2.9..+1.45psi). For higher or lower pressures the approvals are not valid.

Process and ambient temperature

The permitted temperature ranges are marked on the name plate.

Permitted zones for mounting in partition wall



Notes for use in Hazardous Locations

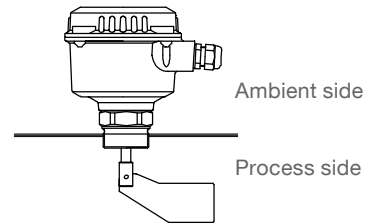
Max. Surface Temperature and Temperature Code

The temperature marking on the name plate  refers to the instruction manual.
 In the following tables the relevant temperature ratings are shown.

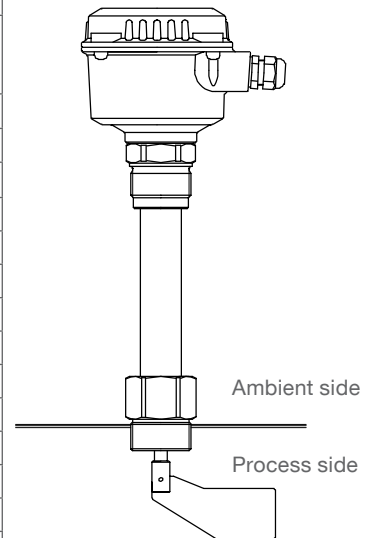
The maximum surface temperature (resp. temperature class) is the warmest temperature of the unit which could occur during malfunction (according to Ex-definition).

Enclosure directly mounted to the process connection				
Max. ambient temperature*	Max. process temperature	Max. surface temperature	Temperature class (Division system)	Temperature class (Zone system)
30°C (86°F)	50°C (122°F)	90°C (194°F) 120°C (248°F) ⁽¹⁾	T5 T4A ⁽¹⁾	T5 T4 ⁽¹⁾
40°C (104°F)	60°C (140°F)	100°C (212°F) 120°C (248°F) ⁽¹⁾	T5 T4A ⁽¹⁾	T4
50°C (122°F)	70°C (158°F)	110°C (230°F) 120°C (248°F) ⁽¹⁾	T4A	T4
50°C (122°F)	80°C (176°F)	120°C (248°F)	T4A	T4

*Ambient temperature derating see page G12



Enclosure mounted offset to the process connection				
Max. ambient temperature	Max. process temperature	Max. surface temperature	Temperature class (Division system)	Temperature class (Zone system)
50°C (122°F)	90°C (194°F)	120°C (248°F)	T4A	T4
	100°C (212°F)	120°C (248°F)	T4A	T4
	110°C (230°F)	120°C (248°F)	T4A	T4
	120°C (248°F)	120°C (248°F)	T4A	T4
	130°C (266°F)	130°C (266°F)	T4	T4
	140°C (284°F)	140°C (284°F)	T3C	T3
	150°C (302°F)	150°C (302°F)	T3C	T3
	160°C (320°F)	160°C (320°F)	T3C	T3
	170°C (338°F)	170°C (338°F)	T3A	T3
	180°C (356°F)	180°C (356°F)	T3A	T3
	190°C (374°F)	190°C (374°F)	T3	T3
	200°C (392°F)	200°C (392°F)	T3	T2
	210°C (410°F)	210°C (410°F)	T2D	T2
	220°C (428°F)	220°C (428°F)	T2C	T2
	230°C (446°F)	230°C (446°F)	T2C	T2
240°C (464°F)	240°C (464°F)	T2B	T2	
250°C (482°F)	250°C (482°F)	T2B	T2	



⁽¹⁾ With use of electronic "Universal voltage"