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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 must be carried out 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 and means, that a failure to observe the necessary precautions can result in death, serious injury and/or considerable material damage.



#### WARNING

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

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

## 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:

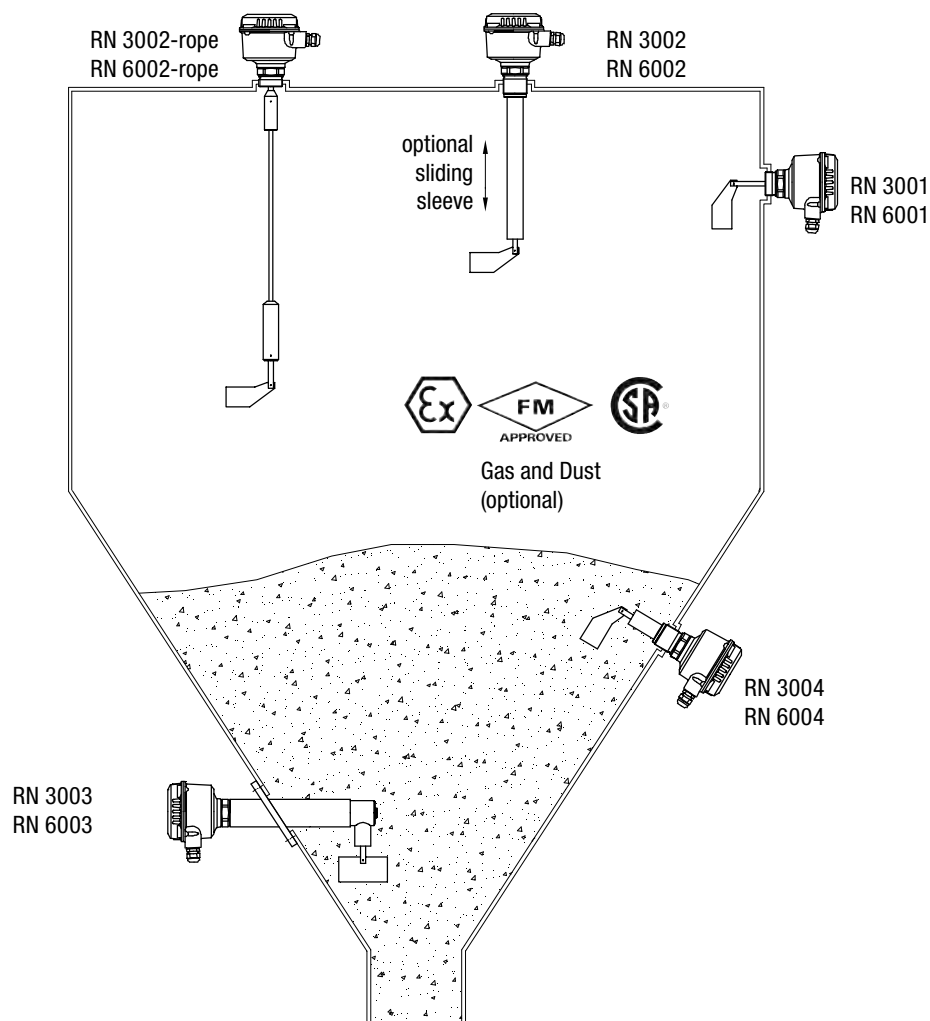
- **building materials industry**  
lime, styrofoam, moulding sand, etc.
- **food industry**  
milk powder, flour, salt, etc.
- **plastics industry**  
plastics granules etc.
- **timber industry**
- **chemical industry**
- **mechanical engineering**

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 10m (394") with an extension tube or 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 micro 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 micro switch returns to his initial position and the motor is switched on. The output signal is switched back (figure 1).

### 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

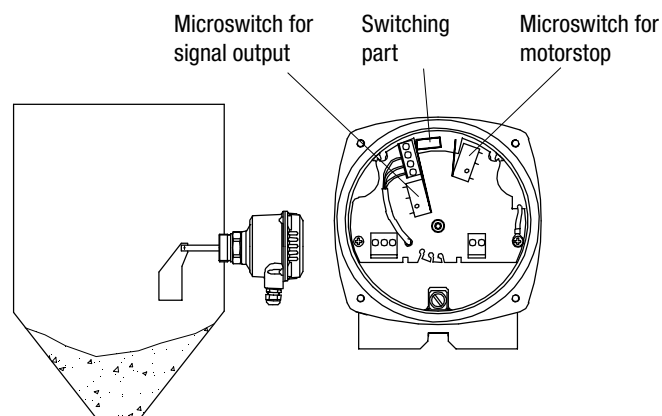


Figure 1

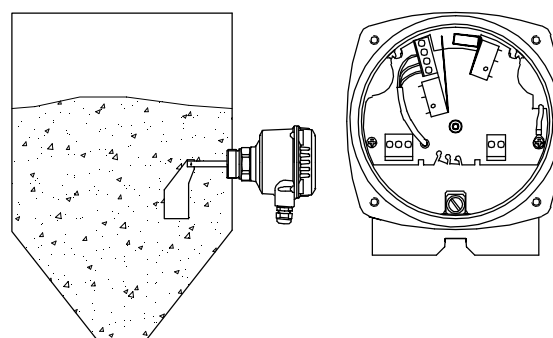
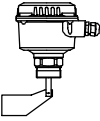
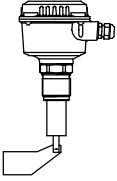
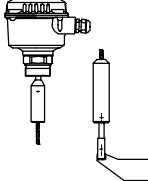
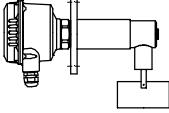
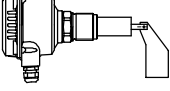


Figure 2

## Function

### Selection guide

|                         | RN 3001<br>RN 6001  | RN 3002<br>RN 6002  | RN 3002-rope<br>RN 6002-rope   | RN 3003<br>RN 6003  | RN 3004<br>RN 6004  |
|-------------------------|---|---|--|---|---|
|                         |  |  |  |  |  |
| Full detector           | X   | X   | X  | X   | X   |
| Demand detector         | X   |   | X*   | X   | X   |
| Empty detector          | X   |   | X*   | X   | X   |
| Vertical mounting       | 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"

### Shaft sealing and metal material

| Application                     | Sealing material <sup>(1)</sup> |             |               | Metal material |                                   | Bearing                           |
|---------------------------------|---------------------------------|-------------|---------------|----------------|-----------------------------------|-----------------------------------|
|                                 | NBR                             | FPM (Viton) | PTFE (Teflon) | Aluminium      | Stainless steel<br>1.4301/ SS 304 | Stainless steel<br>1.4301/ SS 304 |
| Animal feed press               |                                 |             | X             |                | X                                 | <b>X</b>                          |
| Synthetic granules, powders     | X                               |             |               | X              |                                   |                                   |
| Salt                            |                                 |             | X             |                | X                                 | <b>X</b>                          |
| 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, 8bar |                                 |             | X             |                | X                                 |                                   |
| Sugar                           | X                               |             |               | X              |                                   |                                   |
| Flour                           | X                               |             |               | X              |                                   |                                   |
| Carbon black                    | X                               |             |               | X              |                                   |                                   |

<sup>(1)</sup> Used in version with process temperature and process pressure as following:

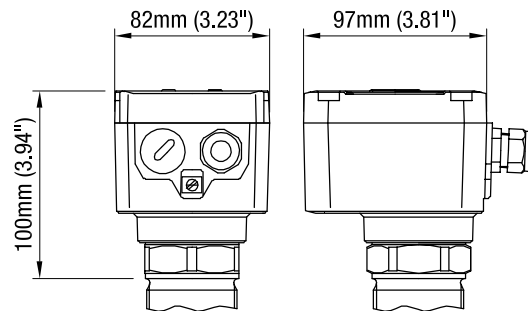
NBR: max 80°C and max. 0.8bar  
 FPM (Viton): max. 150°C and max. 0.8bar  
 PTFE (Teflon): max. 250°C/ 350°C and max. 0.8bar  
 max. 80°C/ 150°C/ 250°C and max. 5bar/ 10bar

## Technical Data

### Housing versions

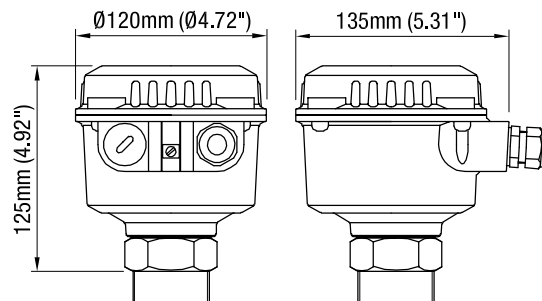
#### Series RN 3000

Standard



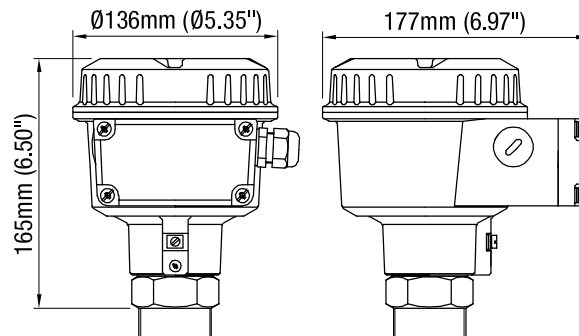
#### Series RN 6000

Standard



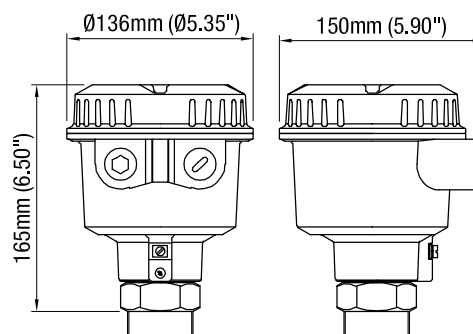
de

explosionproof with  
 increased safety  
 terminal box



d

flameproof /  
 explosionproof

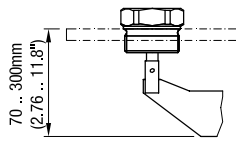


## Technical Data

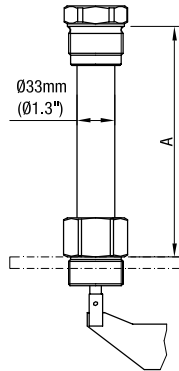
### Extensions

#### RN 3001 RN 6001

| Process temperature          | A                |
|------------------------------|------------------|
| 150 / 250°C<br>(302 / 482°F) | 200mm<br>(7.87") |
| 350°C (662°F)                | 300mm<br>(11.8") |



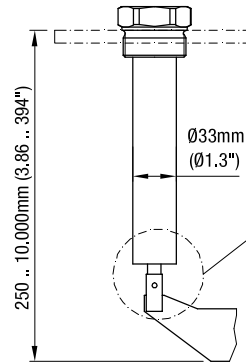
Thread / Flange



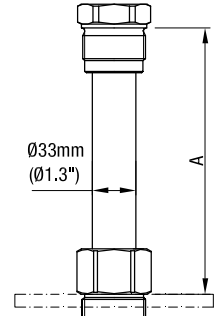
Temperature extended shaft

#### RN 3002 RN 6002

| Process-temperature          | A                |
|------------------------------|------------------|
| 150 / 250°C<br>(302 / 482°F) | 200mm<br>(7.87") |
| 350°C (662°F)                | 300mm<br>(11.8") |



Thread / Flange

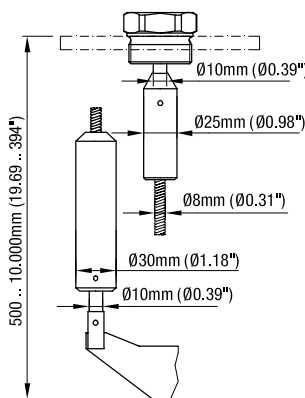


Temperature extended shaft

Without sealing and bearing at tube end (see also option pos.32)

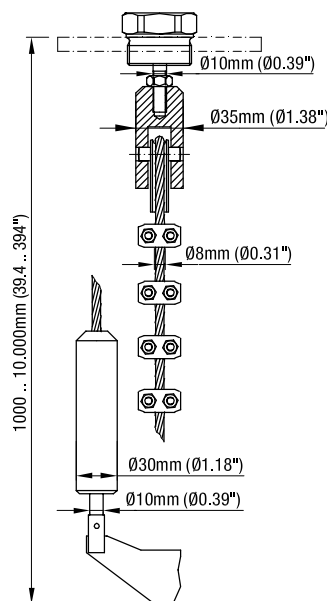
#### RN 3002 - rope RN 6002 - rope

Type standard (pos.1 C)  
(max. 4kN load)

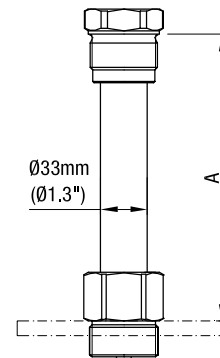


Thread / Flange

Type reinforced (pos.1 H)  
(max. 28kN load)



Thread / Flange

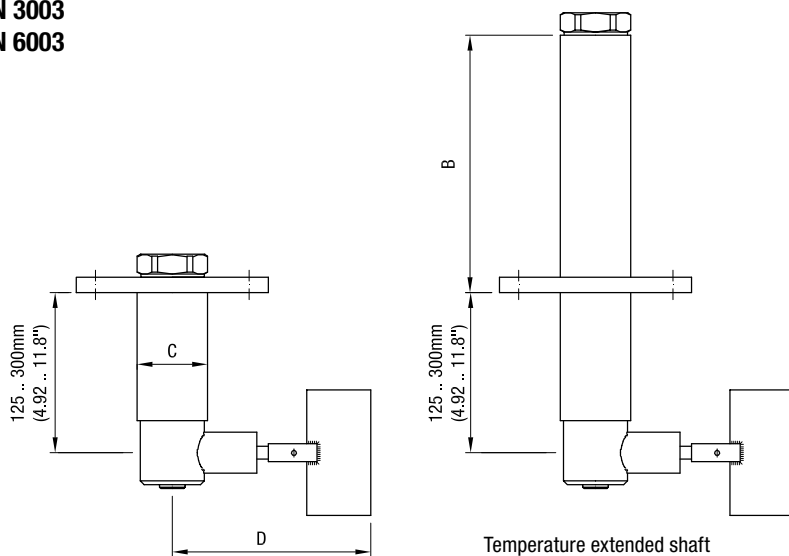


Temperature extended shaft

| Process-temperature          | A                |
|------------------------------|------------------|
| 150 / 250°C<br>(302 / 482°F) | 200mm<br>(7.87") |
| 350°C (662°F)                | 300mm<br>(11.8") |

## Technical Data

**RN 3003  
 RN 6003**

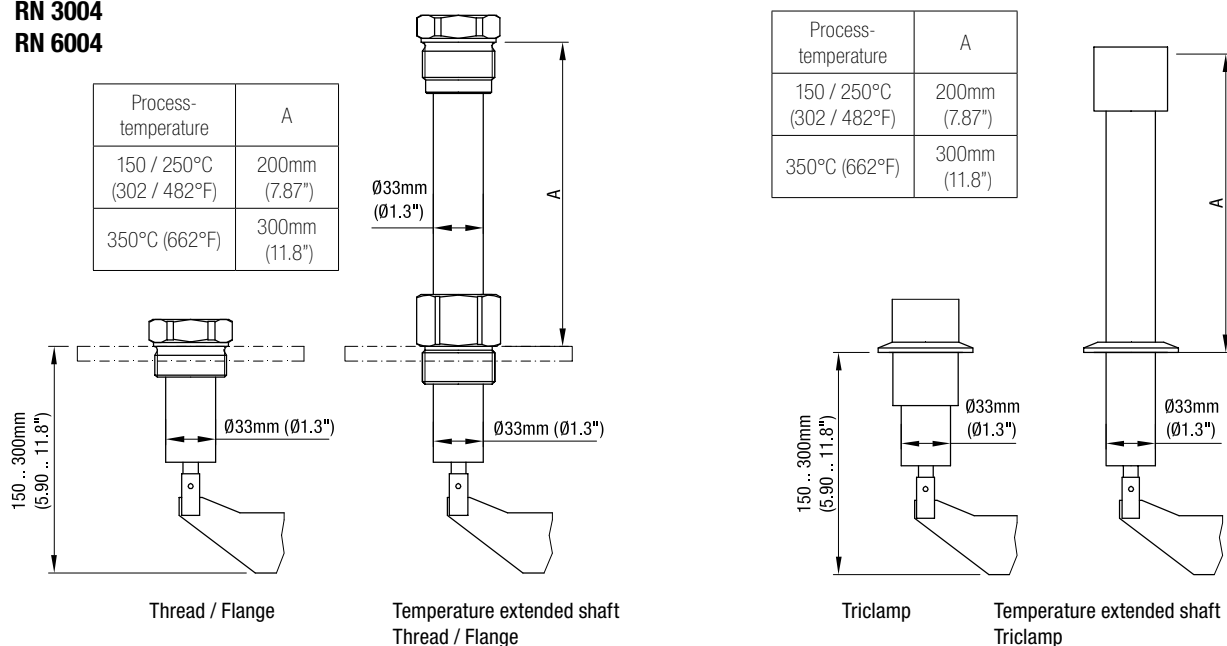


| Process-temperature  | B             |
|--|---------------|
| 80°C (176°F)<br>0.8 bar (11.6psi)                              | 10mm (0.39")  |
| 80°C (176°F)<br>5/ 10bar (73/ 145psi)                          | 75mm (2.95")  |
| 150/ 250°C<br>(302/ 482°F)<br>0,8/5/10 bar<br>(11,6/73/145psi) | 210mm (8.27") |

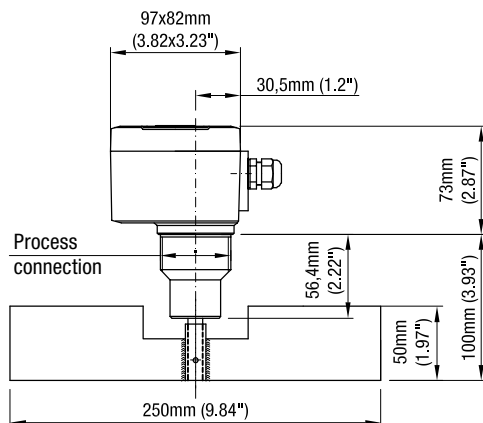
| Material  | C             |
|-----------|---------------|
| Steel     | ø55mm (2.17") |
| Aluminium | ø60mm (2.36") |

| Vane                         | D             |
|------------------------------|---------------|
| 50mm x ..mm<br>(1.97" x ..") | 139mm (5.47") |
| 98mm x ..mm<br>(3.86" x ..") | 187mm (7.36") |

**RN 3004  
 RN 6004**



**RN 3005**



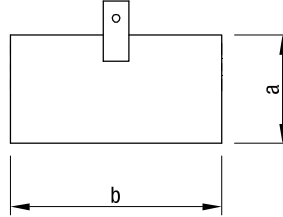


## Technical Data

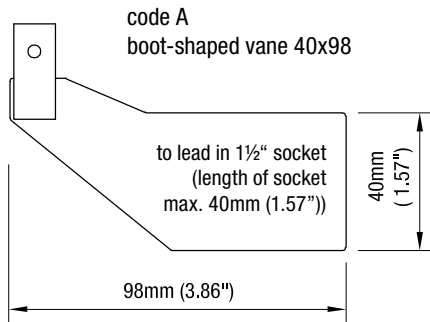
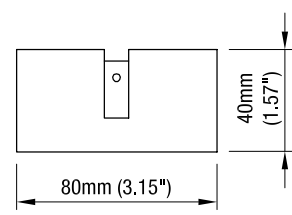
### Measuring vanes

| 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") |

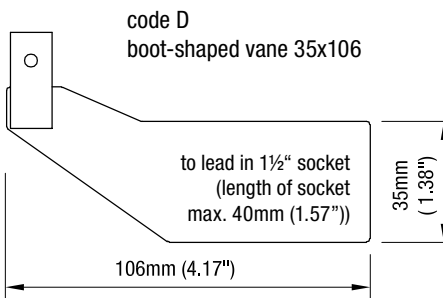
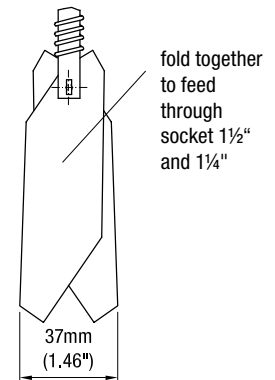
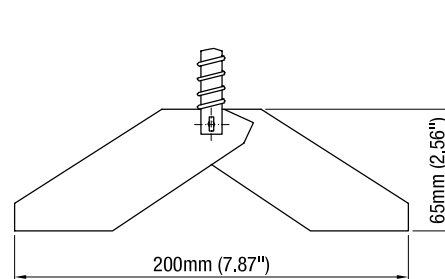
code B,C,E,F,G,I  
 rectangular vane



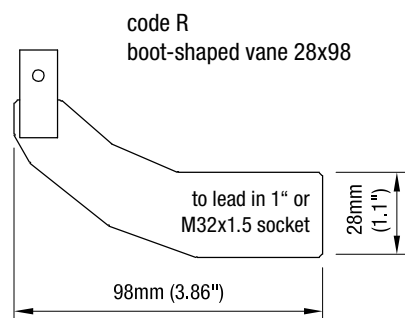
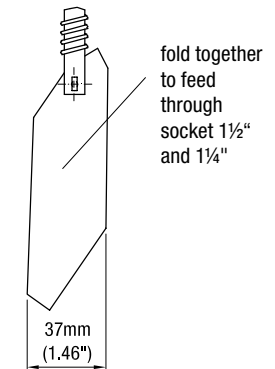
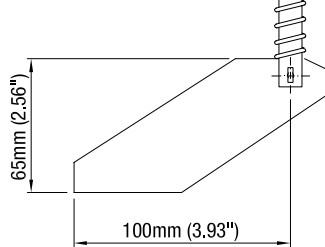
code P  
 notched 40x80



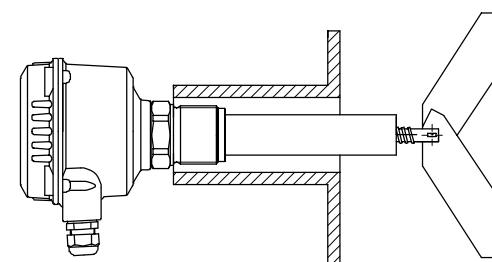
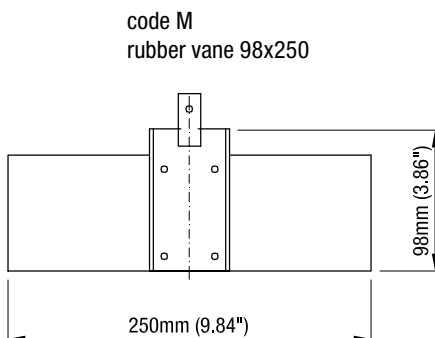
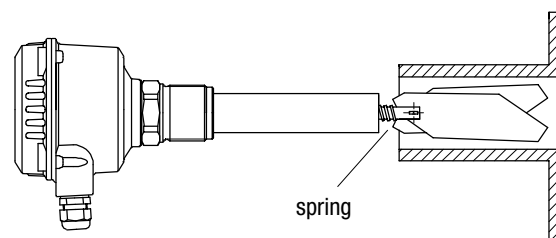
code K  
 hinged vane 98x200 double sided



code S  
 hinged vane 98x100 single sided



Example: insertion of the hinged vane through a long socket



## Technical Data

### Electrical data

**Connection terminals** RN 3000 max. 1.5mm<sup>2</sup> (AWG 16)  
 RN 6000 max. 4mm<sup>2</sup> (AWG 12)

**Cable entry** 20 x 1,5 screwed cable gland  
 NPT 1/2" conduit connection  
 NPT 3/4" conduit connection (only RN 6000)

**Protection class** I

**Installation category** III

**Pollution degree** 2

| Electronics             | AC version  | DC version  | Multivoltage version  |
|-------------------------|---|---|---|
| <b>Power supply</b>     | 24V or 48V or 115V or 230V<br>50/60Hz<br><br>All voltages ±15%<br>(including 10% of EN 61010) | 24V DC<br><br>±15%<br>(including 10% of EN 61010) | 24V DC or<br>115V 50/60Hz or<br>230V 50Hz<br>All voltages ±15%<br>(including 10% of EN 61010)                                   |
| <b>Installed load</b>   | max. 4VA  | max. 2.5W   | 24V DC max. 2.5W<br>115V AC max. 4VA<br>230V AC max. 6VA  |
| <b>Signal output</b>    | RN 3000: Microswitch SPDT contact:<br><br>RN 6000: Microswitch SPDT or DPDT contact:          |   | max. 250V AC, 2A, 500VA (cosφ= 1)<br>max. 300V DC, 2A, 60W<br>max. 250V AC, 5A, non inductive<br>max. 30V DC, 4A, non inductive |
| <b>Indicating light</b> | —   | Status of signal output<br>by built-in LED        | Status of signal output<br>by built-in LED  |
| <b>Isolation</b>        | Power supply to signal output: 2225 Vrms  |   |   |

| Electronics             | AC version<br>with fail safe alarm  | DC version<br>with fail safe alarm                |
|-------------------------|---|---|
| <b>Power supply</b>     | 24V or 48V or 115V oder 230V<br>50/60Hz<br>All voltages ±15%<br>(including 10% of EN 61010)   | 24V DC<br><br>±15%<br>(including 10% of EN 61010) |
| <b>Installed load</b>   | max. 5VA  | max. 2.5W   |
| <b>Signal output</b>    | Relay and micro switch contact:<br>RN 3000: max. 250V AC, 2A, 500VA (cosφ = 1)<br>max. 300V DC, 2A, 60W<br>RN 6000: max. 250V AC, 5A, non inductive<br>max. 30V DC, 4A, non inductive |   |
| <b>Indicating light</b> | Status of signal output and alarm output by built-in LED  |   |
| <b>Isolation</b>        | Power supply to signal and alarm output: 2225 Vrms  |   |



## Technical Data

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### Mechanical data

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

## Technical Data

Overall weight  
(ca.)

| RN 3000      | Version              |                       |                                  | Extension                             |                                      |
|--------------|----------------------|-----------------------|----------------------------------|---------------------------------------|--------------------------------------|
|              | 80°C<br>(176°F)      |                       | 150/250/350°C<br>(302/482/662°F) |                                       |                                      |
|              | Aluminium *          | Steel *               |                                  | Aluminium                             | Steel *                              |
| RN 3001      | 1.2kg<br>(2.6 lbs)   | 1.5kg<br>(3.3 lbs)    | +1.2kg<br>(+2.6 lbs)             | -                                     | -                                    |
| RN 3002      | 1.3kg<br>(2.9 lbs)   | 1.6kg<br>(3.5 lbs)    | +1.2kg<br>(+2.6 lbs)             | +1.3kg/m<br>(+2.9 lbs per 39.3")      | +2,7kg/m<br>(+5.9 lbs per 39.3")     |
| RN 3002-rope | 2.1kg<br>(4.6 lbs)   | 2.4kg<br>(5.3 lbs)    | +1.2kg<br>(+2.6 lbs)             | -                                     | +0,25kg/m<br>(+0.6 lbs per 39.3")    |
| RN 3003      | 3.7kg**<br>(8.1 lbs) | 6.1kg**<br>(13.4 lbs) | +1.2kg<br>(+2.6 lbs)             | +0.4kg/100mm<br>(+0.9 lbs per 3.93")  | +0.6kg/100mm<br>(+1.3 lbs per 3.93") |
| RN 3004      | 1.3kg<br>(2.9 lbs)   | 1.6kg<br>(3.5 lbs)    | +1.2kg<br>(+2.6 lbs)             | +0.15kg/100mm<br>(+0.3 lbs per 3.93") | +0.3kg/100mm<br>(+0.7 lbs per 3.93") |
| RN 3005      | 1.3kg<br>(2.9 lbs)   | 1.6kg<br>(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<br>(176°F)      |                       | 150/250/350°C<br>(302/482/662°F) |                                       |                                      |
|              | Aluminium *          | Steel *               |                                  | Aluminium                             | Steel *                              |
| RN 6001      | 1.5kg<br>(3.3 lbs)   | 1.8kg<br>(4.0 lbs)    | +12kg<br>(+2.6 lbs)              | -                                     | -                                    |
| RN 6002      | 1.6kg<br>(3.5 lbs)   | 1.9kg<br>(4.2 lbs)    | +1.2kg<br>(+2.6 lbs)             | +1.3kg/m<br>(+2.9 lbs per 39.3")      | +2,7kg/m<br>(+5.9 lbs per 39.3")     |
| RN 6002-rope | 2.4kg<br>(5.3 lbs)   | 2.7kg<br>(5.9 lbs)    | +1.2kg<br>(+2.6 lbs)             | -                                     | +0.25kg/m<br>(+0.6 lbs per 39.3")    |
| RN 6003      | 4.0kg**<br>(8.8 lbs) | 6.4kg**<br>(14.1 lbs) | +1.2kg<br>(+2.6 lbs)             | +0.4kg/100mm<br>(+0.9 lbs per 3.93")  | +0.6kg/100mm<br>(+1.3 lbs per 3.93") |
| RN 6004      | 1.6kg<br>(3.5 lbs)   | 1.9kg<br>(4.2 lbs)    | +1.2kg<br>(+2.6 lbs)             | +0.15kg/100mm<br>(+0.3 lbs per 3.93") | +0.3kg/100mm<br>(+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)** RN 3000: -20 .. +70°C (-4 .. +158°F)  
 RN 6000: -25 .. +60°C (-13 .. +140°F)

Version with heating of housing (pos. 26):  
 RN 3000: -40 .. +70°C..(-40 .. +158°F)  
 RN 6000: -40 .. +60°C..(-40 .. +140°F)

**Process temperature** -25 .. + 80°C (-13 .. +176°F)  
 -25 .. +150°C\* (-13 .. +302°F)  
 -25 .. +250°C\* (-13 .. +482°F) (220°C (428°F) for series RN 3000 with ATEX)  
 -25 .. +350°C\* (-13 .. +662°F) (not for version RN 3003 / 6003, not for Ex-approvals)

Version with heating of housing (pos. 26):  
 -40 .. + 80°C (-40 .. +176°F)  
 -40 .. +150°C\* (-40 .. +176°F)  
 -40 .. +250°C\* (-40 .. +482°F)  
 -40 .. +350°C\* (-40 .. +662°F) (not for version RN 3003/ RN6003)

\* with temperature extended shaft

For versions with Ex-approvals: see remarks on page G28.

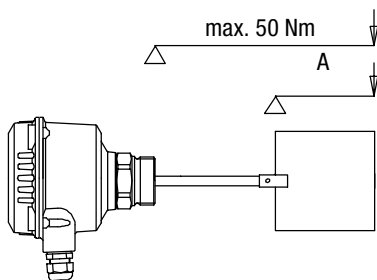
**Min. powder density / Sensitivity** see section "Sensitivity" on page G27

**Signal delay** Sensor free -> covered ca. 1.3 sec  
 Sensor covered -> free ca. 0.2 sec

**Features of bulk material** Hardly any limitations.

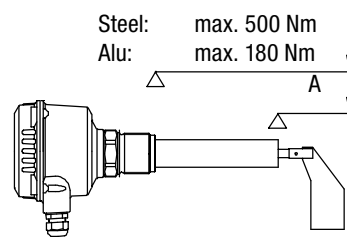
**Max. permitted mechanical torque**

RN 3001 / 6001:



A: with reinforced measuring vane

RN 3002/ 6002  
 RN 3004/ 6004:



max. 50 Nm

Type RN 3003 / 6003 on request.

Protective measures in case of high loading: mounting of a protective canopy above the probe.

**Max. tractive force** RN 3002 / 6002-rope: 4kN (type standard) 28kN (type reinforced)

**Max. process pressure** -0.5 .. +0.8bar (-6.8 .. 11.6psi) or -0.8 .. +5 bar (-10.4 .. 73psi) or -0.8 .. +10 bar (-10.4 .. 145psi)  
 For pressure over 0.8 bar (11.6psi) the Teflon sealing is used.  
 For versions with Ex-approvals: see remarks on page G28.

**Relative Humidity** 0-100%, suitable for outdoor use

**Altitude** max. 2.000m (6.562ft)



## Approvals

|   | RN 3000 | RN 6000 |   |                              |
|---|---------|---------|---|------------------------------|
| <b>General Purpose *<br/>(Ordinary Locations)</b> | • •     | • •     | CE EN 61010-1 (IEC/CB)  |                              |
|   |         |         | FM  |                              |
|   |         |         | CSA   |                              |
| <b>Hazardous Locations *</b>                      | • •     | • •     | ATEX Dust explosion   | ATEX II 1/2 D                |
|   |         |         | Gas explosion flameproof  | ATEX II 2G EEx d IIC         |
|   |         |         | Gas explosion flameproof / increased safety   | ATEX II 2G EEx de IIC        |
|   | • •     | • •     | 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       |
|   |         |         | Gas explosion flameproof / increased safety   | Cl. I Zone 1 AEx de IIC      |
|   | • •     | • •     | CSA Dust explosion  | Cl. II, III Div. 1 Gr. E,F,G |
|   |         |         | Gas explosion flameproof  | Ex DIP A20/21                |
|   |         |         | Gas explosion flameproof / increased safety   | XP Cl. I Div. 1 Gr. B-D      |
|   |         |         | Gas explosion flameproof / increased safety   | Cl. I Zone 1 Ex d IIC        |
|   |         |         | Gas explosion flameproof / increased safety   | Cl. I Zone 1 Ex de IIC       |
|   |         |         | Detailed allocation of types and electronic modules to approvals: see pricelist.  |                              |
| <b>EMC</b>  | • •     | • •     | EN 61326 -A1  |                              |
| <b>Pressure Equipment Directive (97/23/EC)</b>    |         |         | <p>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, Abs. 2.1.4).<br/>                     The units are designed and manufactured in accordance to the Pressure Equipment Directive.</p> <p><b>!</b> The unit is NOT intended for use as a "equipment part with safety function" (Art.1, Abs. 2.1.3).<br/>                     If the units should be used as "equipment part with safety function", please contact the manufacturer.</p> |                              |

\* Depending on selected version in pricelist.

## Options

### Weather protection cover

When 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:

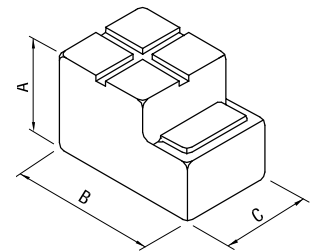
- rain water
- condensation water
- excessively high temperatures due to insolation
- excessively low temperatures in winter

Material: PE, weather and temperature stable

Not available for housing version d and de.



For use in Hazardous Locations: only permitted for Category 3 (zone 2 and 22) or Division 2.



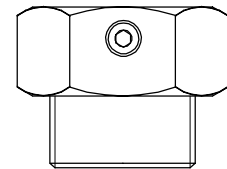
|   | RN 3000       | RN 6000       |
|---|---------------|---------------|
| A | 100mm (3.94") | 130mm (5.12") |
| B | 160mm (6.30") | 200mm (7.87") |
| C | 90mm (3.54")  | 125mm (4.92") |

### Sliding sleeve

RN 3002 / 6002 Process connection and material as chosen

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

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



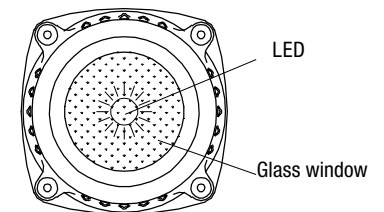
### Mounting set

Screws and washers for fixing the unit on a flange.

### Glas window in lid (RN 6000)

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

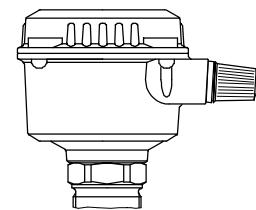
Not available for housing version d and de.



### Bulb in cable gland

Bright indicating light seen from outside.

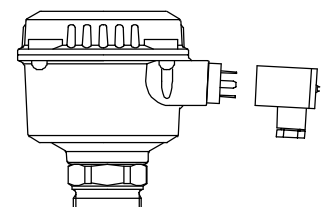
Not available for use in Hazardous Locations.



### Plug 4-pole (incl. PE)

Used instead of cable gland.

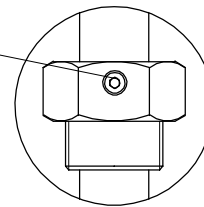
Not available for use in Hazardous Locations and FM / CSA general purpose.



## Mounting

### General Safety Instructions

|   |  |
|---|--|
| <b>Process pressure</b>                       | ! Improper installation may result in loss of process pressure.  |
| <b>Chemical resistance against the medium</b> | ! 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.   |
| <b>Mechanical load</b>                        | ! The torque at the fastening spot must not exceed the specified ratings. See page G12 for details.  |
| <b>Mounting location</b>                      | Keep away from incoming material and from silo walls.<br>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") |
| <b>Sliding sleeve</b>                         | Tighten both straining screws M8 with 20 Nm to obtain resistance against pressure  |
| <b>Flange mounting</b>                        | A plastic seal must be used to tighten the flange.   |



### ! Additional Safety Instructions for Hazardous Locations

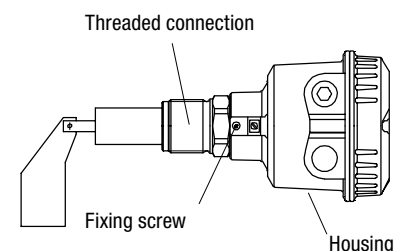
|                                 |  |
|---------------------------------|--|
| <b>Installation regulations</b> | For devices to be used in Hazardous Locations the respective valid installation regulations must be observed.<br><br>ATEX: The requirements of EN 50281-1-2 (e.g. regarding dust deposits and temperatures) must be observed |
| <b>Sparks</b>                   | The installation has to be done in a way, that mechanical friction or impact does not cause sparks between the aluminium enclosure and steel.  |

## 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.

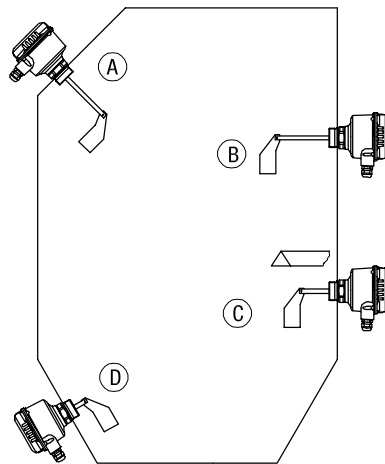


|                                      |  |
|--------------------------------------|--|
| <b>Direction of the cable glands</b> | When the unit is mounted from the side, ensure, that the cable glands face downwards and are closed to avoid water penetration into the housing. |
| <b>Sealing</b>                       | Seal the process connection thread with Teflon tape against process pressure.  |



## Mounting

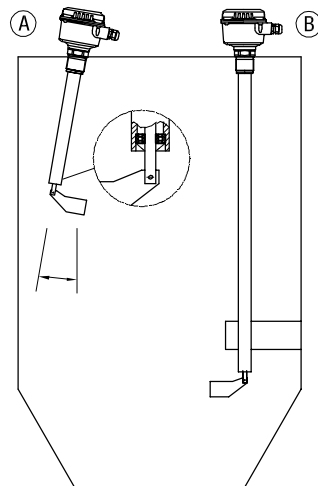
### RN 3001 RN 6001



- A Full detector vertical and oblique from the top  
max. „L“ = 600 mm (23.62”)
- B Full detector horizontal  
max. „L“ = 300 mm (11.8”)
- C Demand or empty detector horizontal  
max. „L“ = 150 mm (5.9”)  
Protective angle recommended depending on load.
- D 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, for the vane aligns to the movement of the material).

### RN 3002 RN 6002



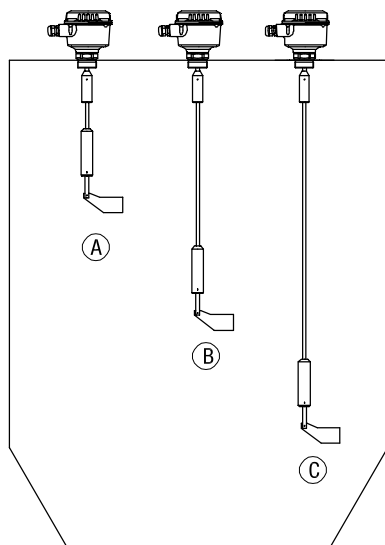
- A Full detector vertical from the top  
max. „L“ = 3.000 mm (118”)

Remark:  
 Deviation upto max. 10° from vertical installation with option  
 „Bearing at tube end“ possible.

- B Full detector vertical from the top  
max. „L“ = 10.000 mm (394”)

Support from side recommended.

### RN 3002-Rope RN 6002-Rope

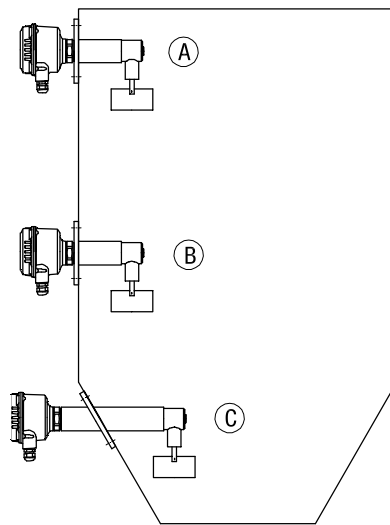


- A Full detector vertical
- B Demand detector vertical
- C Empty detector vertical

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

## Mounting

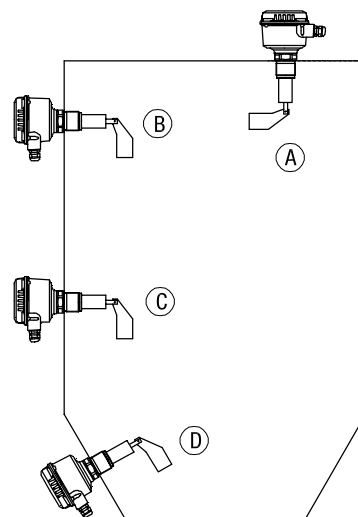
**RN 3003  
 RN 6003**



- 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

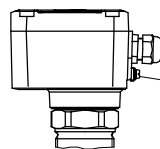
### General Safety Instructions

|   |   |
|---|---|
| <b>Handling</b>                           |  In the case of improper handling or handling malpractice, the electric safety of the device cannot be guaranteed.   |
| <b>Installation regulations</b>           | The local regulations or VDE 0100 (Regulations of German Electrotechnical Engineers) must be observed.  |
| <b>Fuse</b>                               | Use a fuse as stated in the connection diagrams (see pages G21 and G23).  |
| <b>RCCB protection</b>                    | 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.  |
| <b>Power supply switch</b>                | A voltage disconnection switch must be provided near the device.  |
| <b>Wiring diagram</b>                     | The electrical connections are made in accordance with the wiring diagram.  |
| <b>Supply voltage</b>                     | Compare the supply voltage applied with the specifications given on the electronic module and name plate before switching the device on.  |
| <b>Cable gland</b>                        | 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.   |
| <b>Conduit system</b>                     | 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. |
| <b>Field wiring cables</b>                | All field wirings must have insulation suitable for at least 250V AC. The temperature rating must be at least 90°C (194°F).   |
| <b>Microswitch protection</b>             | Provide protection for microswitch contacts to protect the device against inductive load surges.  |
| <b>Protection against static charging</b> | 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.  |

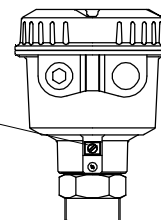
### Additional Safety Instructions for Hazardous Locations

#### 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.

## Electrical installation

### Cable glands for ATEX Dust and Gas Hazardous Locations

#### General requirements:

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

#### **RN 6000:**

##### Flameproof enclosure "d":

The cable entry devices of a flameproof enclosure "d" shall be of certified flameproof types of EEx "d" IIC, suitable for the conditions and correctly installed. Not used entries have to be closed with adequate blanking elements of certified flameproof types of EEx "d" IIC.

##### Increased Safety "e" ("de") and Dust Hazardous enclosures:

For increased safety "e" and dust hazardous applications, the cable entry devices and blanking elements are provided from the manufacturer and shall be in a certified type of explosion protection increased safety EEx "e" IIC or flameproof enclosure EEx "d" IIC. Not used entries have to be closed with adequate blanking elements of a certified increased safety type EEx "e" IIC or flameproof type EEx "d" IIC.

### Conduit system for ATEX 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  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ) to  $+80^{\circ}\text{C}$  ( $176^{\circ}\text{F}$ ). In addition they shall be suitable for the conditions and correctly installed. Where applicable the provided original parts of the manufacturer must be used.

#### **RN 6000:**

##### 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 of a type EEx "d" IIC. This flameproof seals shall be installed directly in or at the conduit entries of the flameproof enclosure "d". Not used entries have to be closed with adequate blanking elements of a certified flameproof type EEx "d" IIC.

### 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  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ) to  $+80^{\circ}\text{C}$  ( $176^{\circ}\text{F}$ ). In addition they shall be suitable for the conditions and correctly installed. Where applicable the provided original parts of the manufacturer must be used.

#### **RN 6000:**

##### 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:**

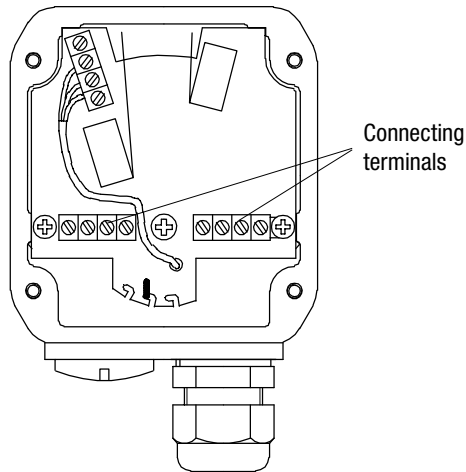


Units with flameproof GasExplosion approval (d-housing):  
 To prevent ignition of hazardous atmospheres, do not remove the lid (cover) while circuits are alive.

## Electrical installation

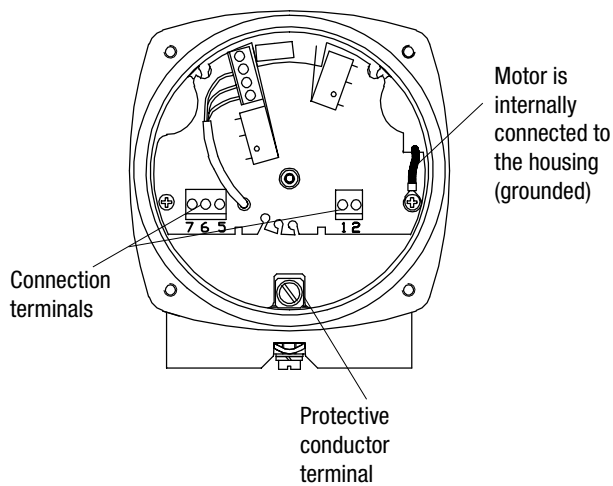
### Connection

#### RN 3000: Standard housing



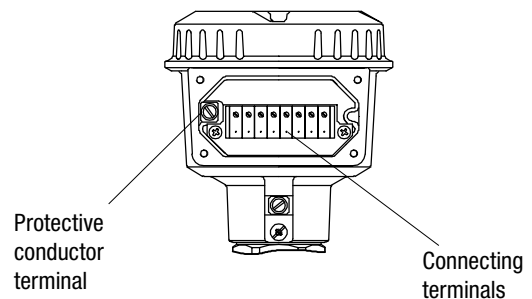
#### RN 6000: Standard and d-housing

Connection is done directly on the PCB



#### de-housing

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



## Electrical installation

**AC version**  
**DC version**  
 without fail safe  
 alarm

### RN 3000:

**Power supply AC version:**  
 24V or 48V or 115V or 230V 50/60Hz  
 max. 4VA

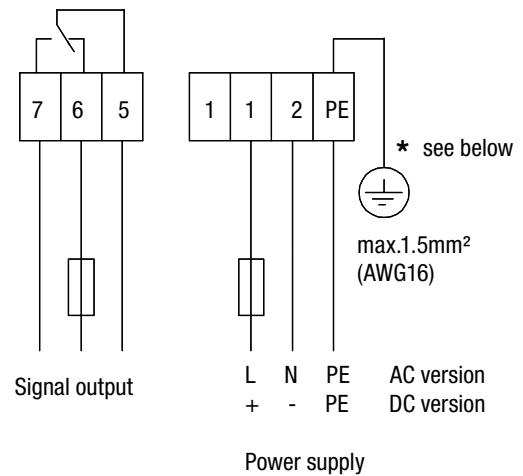
Supply voltage as selected (see type plate).  
 All voltages  $\pm 15\%$  (including 10% of EN 61010)  
 Fuse on power supply: max 10A

**Power supply DC version:**  
 24V DC max. 2.5W

Voltage  $\pm 15\%$  (including 10% of EN 61010)  
 Fuse on power supply: not necessary

**Signal output:**  
 Micro switch SPDT contact:  
 max. 2\*50V AC, 2A, 500VA ( $\cos\phi = 1$ )  
 max. 300V DC, 2A, 60W

Fuse on signal output: max 10A



### RN 6000:

**Power supply AC version:**  
 24V or 48V or 115V or 230V 50/60Hz  
 max. 4VA

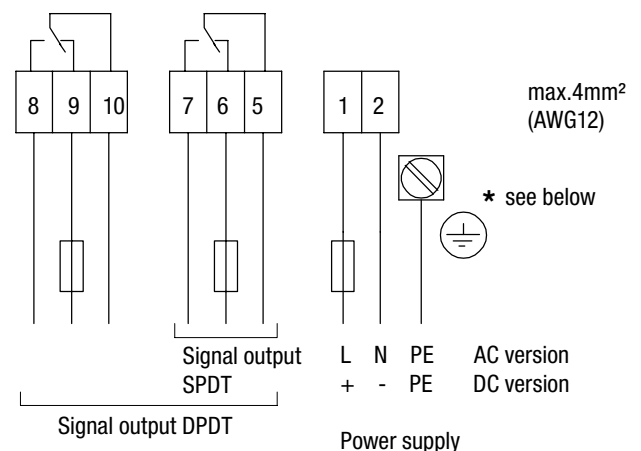
Supply voltage as selected (see name plate).  
 All voltages  $\pm 15\%$  (including 10% of EN 61010)  
 Fuse on power supply: max 10A

**Power supply DC version:**  
 24V DC max. 2.5W

Voltage  $\pm 15\%$  (including 10% of EN 61010)  
 Fuse on power supply: not necessary

**Signal output:**  
 Micro switch SPDT or DPDT contact:  
 max. 250V AC, 5A, non inductive;  
 max. 30V DC, 4A, non inductive

Fuse on signal output: max 10A



**\* Protection against static charging:**  
 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

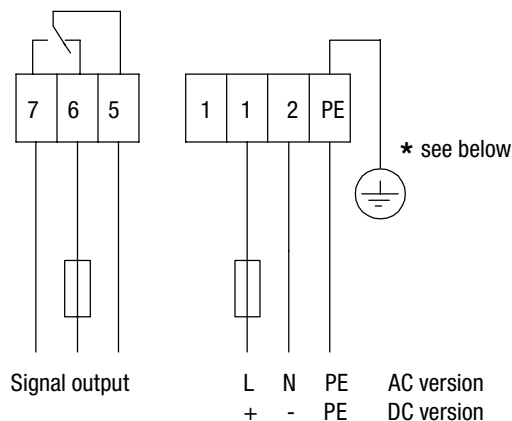
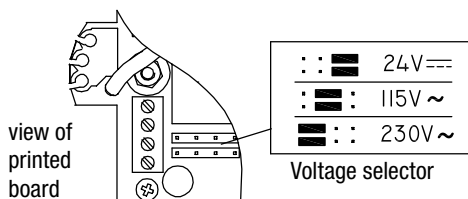
**Multivoltage**  
 without fail safe  
 alarm

### RN 3000:

**Power supply:**

|              |           |    |
|--------------|-----------|----|
| 24V DC       | max. 2.5W | or |
| 115V 50/60Hz | max. 4VA  | or |
| 230V 50Hz    | max. 6VA  |    |

Set the voltage-selector on the PCB to the desired voltage.



**Signal output:**

Micro switch SPDT contact:  
 max. 250V AC, 2A, 500VA ( $\cos\phi = 1$ )  
 max. 300V DC, 2A, 60W

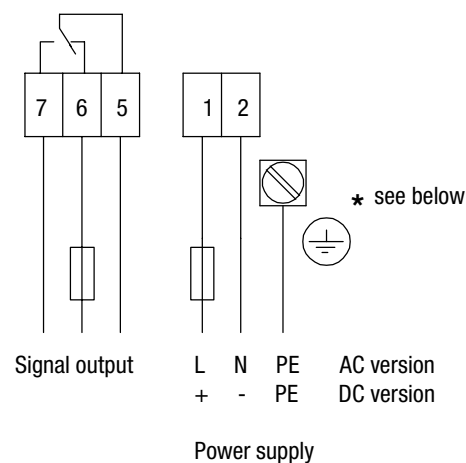
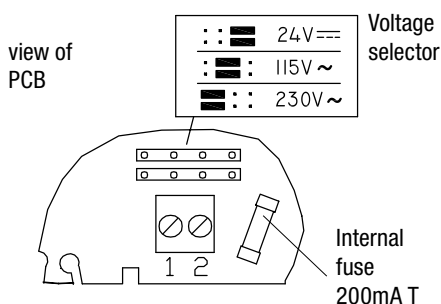
Fuse on signal output: max 10A

### RN 6000:

**Power supply:**

|              |           |    |
|--------------|-----------|----|
| 24V DC       | max. 2.5W | or |
| 115V 50/60Hz | max. 4VA  | or |
| 230V 50Hz    | max. 6VA  |    |

Set the voltage-selector on the printed board to the desired voltage.



**Signal output:**

Micro switch SPDT contact:  
 max. 250V AC, 5A, non inductive;  
 max. 30V DC, 4A, non inductive;

Fuse on signal output: max 10A

**\* Protection against static charging:**  
 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

### AC version DC version

with fail safe alarm

#### RN 3000:

##### Power supply AC version:

24V or 48V or 115V or 230V 50/60Hz  
 max. 5VA

Supply voltage as selected (see name plate).  
 All voltages  $\pm 15\%$  (including 10% of EN 61010)

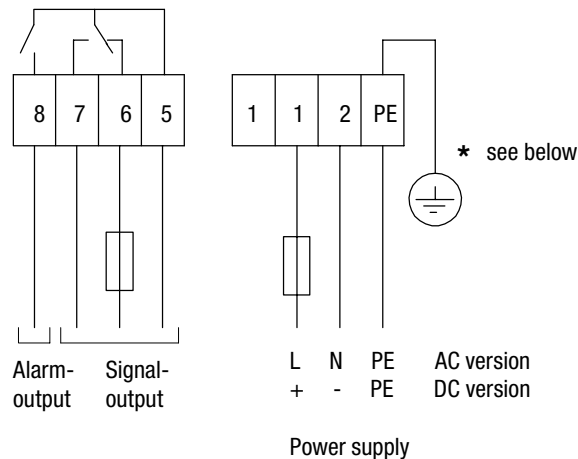
##### Power supply DC version:

24V DC max. 2,5W  
 voltage  $\pm 15\%$  (including 10% of EN 61010)

**Signal output:** Micro switch on terminal 5-6-7  
**Alarm output:** Relay on terminal 8

Relay and Micro switch SPDT contact:  
 max. 250V AC, 2A, 500VA ( $\cos\phi = 1$ )  
 max. 300V DC, 2A, 60W

Fuse on signal output: max 10A



#### RN 6000:

##### Power supply AC version:

24V or 48V or 115V or 230V 50/60Hz  
 max. 5VA

Supply voltage as selected (see name plate).  
 All voltages  $\pm 15\%$  (including 10% of EN 61010)

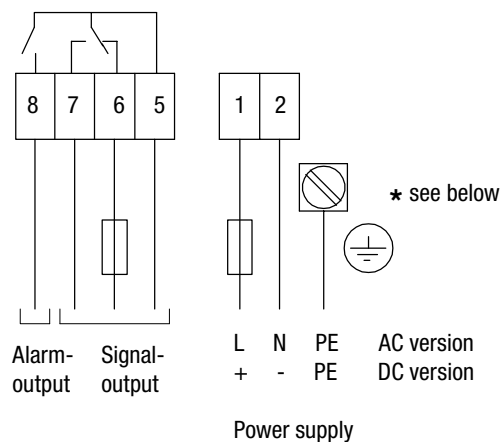
##### Power supply DC version:

24V DC max. 2.5W  
 voltage  $\pm 15\%$  (including 10% of EN 61010)

**Signal output:** Micro switch on terminal 5-6-7  
**Alarm output:** Relay on terminal 8

Relay and Micro switch SPDT contact:  
 max. 250V AC, 5A, non inductive;  
 max. 30V DC, 4A, non inductive;

Fuse on signal output: max 10A



**\* Protection against static charging:**  
 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.

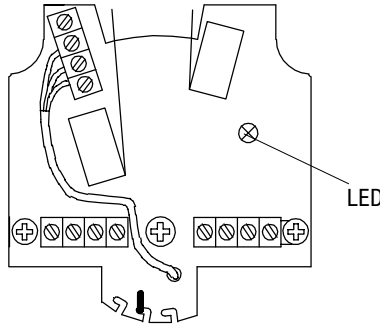


## Switching logic

### RN 3000

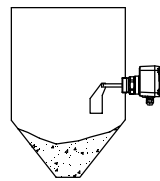
#### LEDs on PCBs

DC and Multivoltage versions



#### Signal output

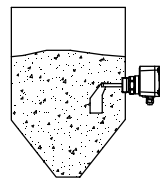
Versions without fail safe alarm



DC



Multivoltage

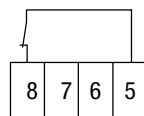


#### Alarm output

Versions with fail safe alarm

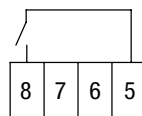
**No fault**

LED off



**Fault**

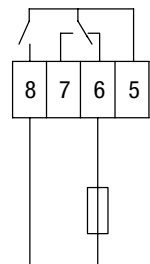
LED red



#### Connection example:

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

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



Signal output

#### Switching and timing behaviour:

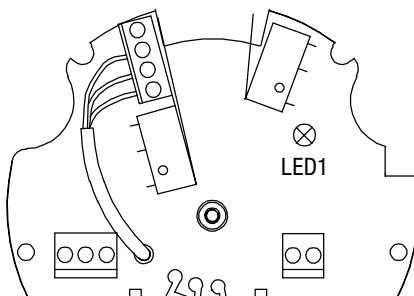
If the vane is not covered, the rotating vane shaft will send pulses at 20 sec. intervals. In case of fault, the pulses are missed. After 30 sec. the alarm relay will open.

## Switching logic

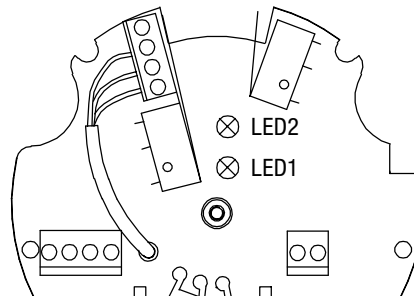
### RN 6000

#### LEDs on PCBs

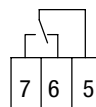
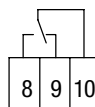
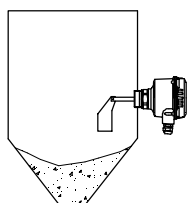
#### Version without fail safe alarm (DC and Multivoltage)



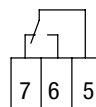
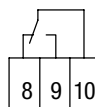
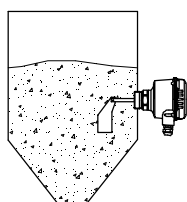
#### Version with fail safe alarm (AC and DC)



#### Signal output All versions



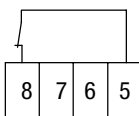
#### LED1



#### Alarm output Versions with fail safe alarm

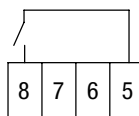
##### No fault

LED 2  
off



##### Fault

LED 2  
red

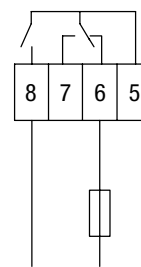


#### Connection example:

Full detector with maximum safety:

The output signal opens in case of:

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



Signal output

#### Switching and timing behaviour:

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

## Settings: Sensitivity / Maintenance

### Adjustment of the spring

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

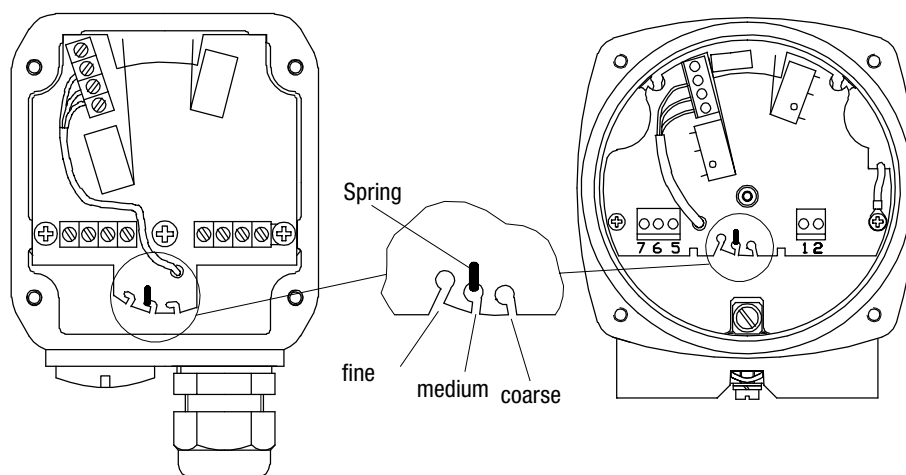
- „Fine“: for light material
- „Medium“: suitable for nearly every material
- „Coarse“: for very sticky material

Factory setting is „medium“.

The spring can be changed via small pliers.

#### RN 3000

#### RN 6000



### 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 <sup>3</sup> (lb/ft <sup>3</sup> ) (without guarantee) |                          |  |                          |
|-------------------------|---|--------------------------|--|--------------------------|
|                         | Vane completely covered with bulk material  |                          | Bulk material covers the vane upto 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)                 |
| 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      | 70 (4.2)  | 100 (60)                 | 35 (2.16)  | 50 (3)                   |

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

### ATEX Zone classification

|                   | Category | useable in zone |
|-------------------|----------|-----------------|
| Dust applications | 1 D      | 20, 21, 22      |
|                   | 2 D      | 21, 22          |
|                   | 3 D *    | 22              |
| Gas applications  | 1 G      | 0, 1, 2         |
|                   | 2 G      | 1, 2            |
|                   | 3 G      | 2               |

\*) in case of conductive dust additional requirements for the installation are necessary.

### General Notes

#### Marking

Devices with EX approval are marked on name plate.

#### Process pressure for ATEX

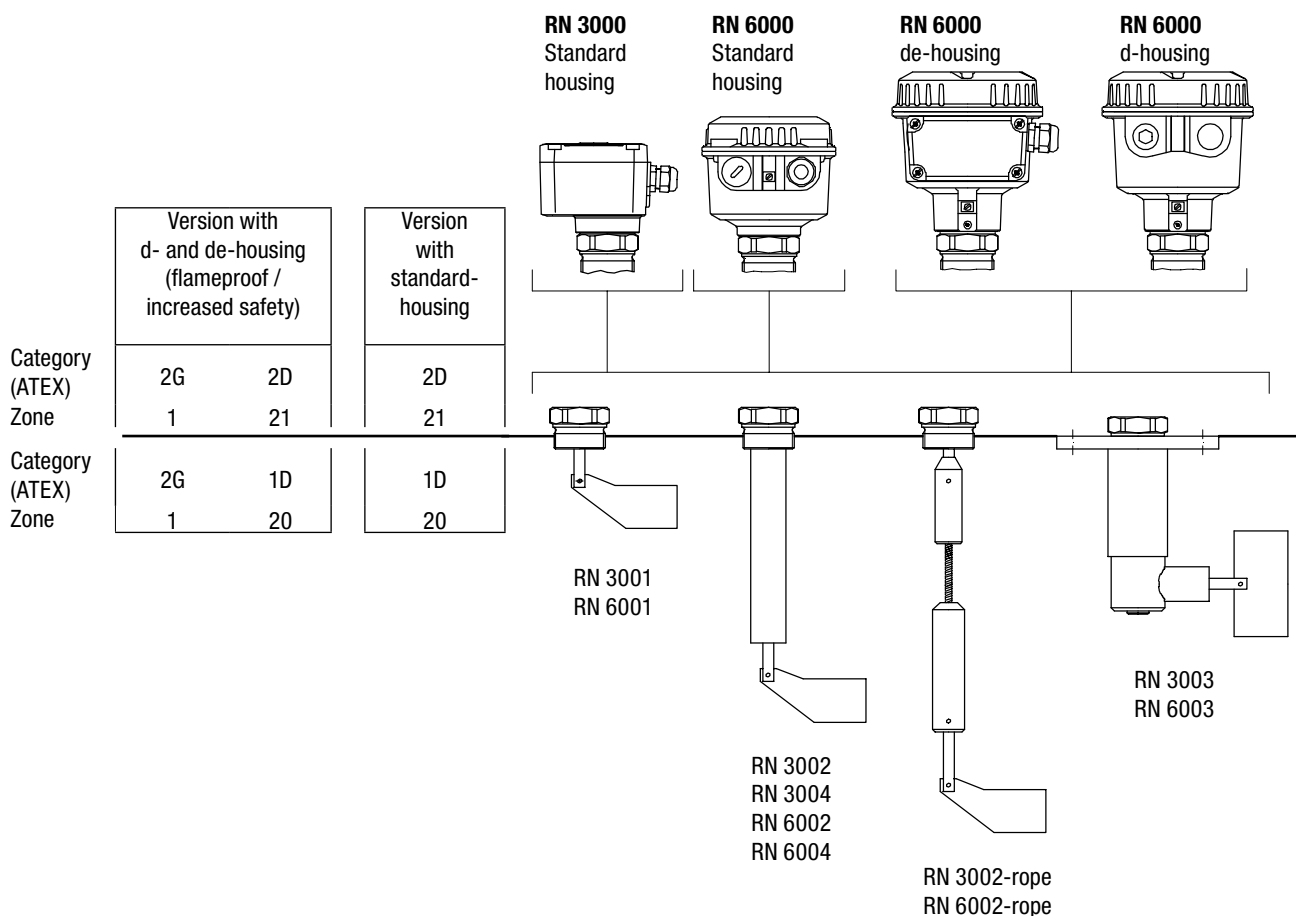


The device construction allows process over-pressure upto 0.8/5/10 bars (11.6/73/145psi) (see name plate). These pressures are allowed for test purposes. The definition of the ATEX is only valid for a container-over-pressure between -0.2..+0.1 bars (-2.9..+1.45psi). For higher or lower pressures the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

#### Process and ambient temperature


The permitted temperature ranges are marked on the name plate.

### Permitted zones (categories) for mounting in partition wall



## Notes for use in Hazardous Locations

### Max. Surface Temperature and Temperature Code

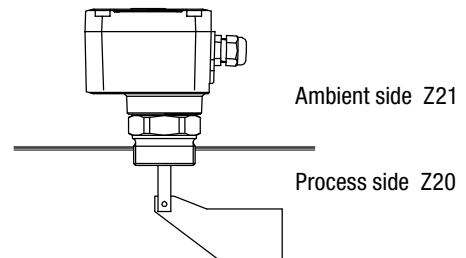
The temperature marking on the name plate  refers to the instruction manual.  
 In the following tables the relevant temperature ratings are shown.

The maximum surface temperature means the warmest area outside of the unit which can happen in failure case (according to EX definition).  
 The temperature class means the warmest area anywhere outside or inside the unit which can happen in failure case (according to EX definition).

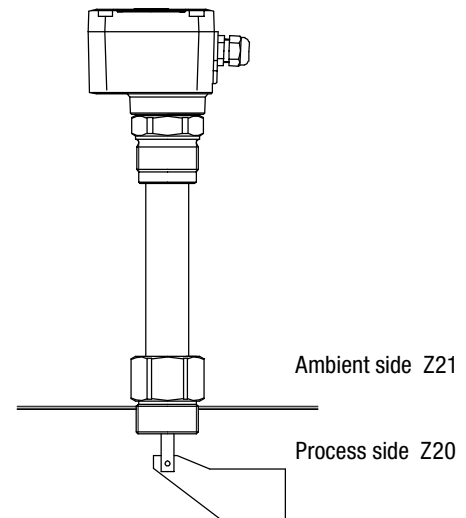
### RN 3000

#### Ratings on the different versions

| Enclosure directly mounted on the process connection |                                  |                           |
|--|----------------------------------|---------------------------|
| Max. ambient temperature zone 21                     | Max. process temperature zone 20 | Process or ambient side * |
|  |                                  | Max. surface temperature  |
| 40°C (104°F)   | 50°C (122°F)                     | 90°C (196°F)              |
| 50°C (122°F)   | 60°C (140°F)                     | 100°C (212°F)             |
| 60°C (140°F)   | 70°C (158°F)                     | 110°C (230°F)             |
| 70°C (158°F)   | 80°C (176°F)                     | 120°C (248°F)             |



| Enclosure mounted offset to the process connection |                                  |                           |
|--|----------------------------------|---------------------------|
| Max. ambient temperature zone 21                   | Max. process temperature zone 20 | Process or ambient side * |
|  |                                  | Max. surface temperature  |
| 70°C (158°F)                                       | 90°C (194°F)                     | 90°C (194°F)              |
|  | 100°C (212°F)                    | 100°C (212°F)             |
|  | 110°C (230°F)                    | 110°C (230°F)             |
|  | 120°C (248°F)                    | 120°C (248°F)             |
|  | 130°C (266°F)                    | 130°C (266°F)             |
|  | 140°C (284°F)                    | 140°C (284°F)             |
|  | 150°C (302°F)                    | 150°C (302°F)             |
|  | 160°C (320°F)                    | 160°C (320°F)             |
|  | 170°C (338°F)                    | 170°C (338°F)             |
|  | 180°C (356°F)                    | 180°C (356°F)             |
|  | 190°C (374°F)                    | 190°C (374°F)             |
|  | 200°C (392°F)                    | 200°C (392°F)             |
|  | 210°C (410°F)                    | 210°C (410°F)             |
| 220°C (428°F)                                      | 220°C (428°F)                    |                           |



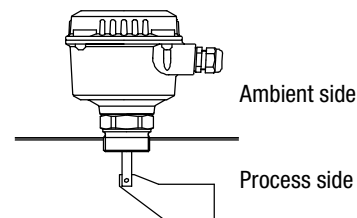
\* Whichever temperature is higher

## Notes for use in Hazardous Locations

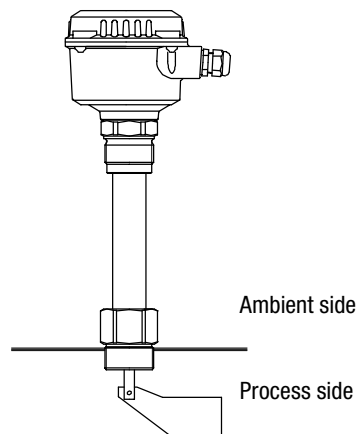
### RN 6000

#### Ratings on the different versions

| Enclosure directly mounted on the process connection |                          |                           |                                     |                                 |
|--|--------------------------|---------------------------|-------------------------------------|---------------------------------|
| Max. ambient temperature                             | Max. process temperature | Process or ambient side * |                                     |                                 |
|  |                          | Max. surface temperature  | Temperature class (division system) | Temperature class (zone system) |
| 40°C (104°F)   | 60°C (140°F)             | 100°C (212°F)             | T5                                  | T5                              |
| 50°C (122°F)   | 70°C (158°F)             | 110°C (230°F)             | T4A                                 | T4                              |
| 60°C (140°F)   | 80°C (176°F)             | 120°C (248°F)             | T4A                                 | T4                              |



| Enclosure mounted offset to the process connection |                          |                           |                                     |                                 |
|--|--------------------------|---------------------------|-------------------------------------|---------------------------------|
| Max. ambient temperature                           | Max. process temperature | Process or ambient side * |                                     |                                 |
|  |                          | Max. surface temperature  | Temperature class (division system) | Temperature class (zone system) |
| 60°C (140°F)                                       | 90°C (194°F)             | 90°C (194°F)              | T5                                  | T5                              |
|  | 100°C (212°F)            | 100°C (212°F)             | T5                                  | T5                              |
|  | 110°C (230°F)            | 110°C (230°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                                  | T3                              |
|  | 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                                  |                                 |



\* Whichever temperature is higher