

Ingeniously simple and reliable
level measurement

40
Anniversary



UWT - the level measurement experts since 1977

Catalogue 2017/18

Useful Information & Tools

All the information you need at a glance



Celebrating 40 years of UWT and a look back on a very successful journey

We have been concentrating on our core competence for 40 years now:

Developing, manufacturing and selling level limit and contents measurement sensors for silo plants and the material processing industry. Reliable and fault free performance of UWT measuring devices is our top priority. Our experts continually work on improving our existing products to adapt them to meet the demands of the ever changing technical challenges. With our in-house development team we are also focusing on the future: new solutions, new methods, new technologies.

Fit for Future – this is our motto for 2017!

Highlights:

- 40 years of healthy business growth
- Worldwide expansion across 60 countries
- More than a million successfully solved applications across the globe
- Forward looking, long term and sustainable corporate strategy



Making the right choice - your guide to finding the perfect sensor!

Each industry and each application has specific requirements with regards to level measurement technology.



Application database

Configure your application using our online application database:

www.uwt.de/applicationdatabase



1 Million
applications
solved worldwide

Application examples

Each industry comes with its own challenges. Case studies for each industry are available to view and download: www.uwt.de/solutions



UWT sensors provide solutions for the most challenging conditions

Benefit from our experience and you will find a suitable product for all types of application.

Product Matrix		Level Limit Measurement					Content Measurement		
Product		Rotonivo®	Vibranivo®	Mononivo®	RFnivo®	Capanivo®	Nivobob® 3000	Nivobob® 4000	NivoRadar® 3000
Measuring principle		Rotation	Vibration	Vibration	Capacitive	Capacitive	Lot System	Lot System	Radar
Material properties	Granulate / Powder	✓	✓	✓	✓	✓	✓	✓	✓
	Slurry / Liquids	-	-	-	✓	✓	✓	✓	✓
	Solids in liquid	-	✓	-	-	-	✓	-	-
	Material prone to caking	✓	-	-	✓	●	✓	✓	●
	Abrasive Material	✓	✓	✓	●	-	✓	✓	✓
Process conditions	Sensitivity (bulk density/DK)	≥ 15 g/l	< 5 g/l	≥ 20 g/l	≥ 1,5 DK	≥ 1,6 DK	≥ 20 g/l	≥ 20 g/l	≥ 1,6 DK
	Process temperature	1.100° C	150° C	150° C	500° C	180° C	250° C	80° C	200° C
	Process pressure	10 bar	16 bar	16 bar	25 bar	25 bar	1,7 bar	0,2 bar	3 bar
	High mechanical load	✓	●	●	✓	-	●	●	●
	High humidity	✓	-	-	✓	✓	✓	✓	●
	Vibration in process	●	✓	●	✓	●	●	●	✓
Cert.	EHEDG	✓	✓	-	✓	-	-	-	-
	EX Certification	✓	✓	✓	✓	✓	✓	✓	✓
	Sensor Material	316L	316L	316L	316L/PPS	PPS/FDA	304/303/316	AI/303/316	316L/PEEK

✓ perfect choice
● can be used (details to be clarified)
- not recommended



Rotonivo® 3000 / 6000

Rotating level limit switch

The trusted, multifunctional and maintenance free unit for reliable level monitoring of bulk goods – versatile, modular structure; for application in hazardous locations (gas and dust). RN 6000 series SIL 2 compliant.



Rotonivo® 3000 / 6000



- Suitable for virtually all bulk goods
- Insensitive to dust, electrical charge, adhesion, temperature and pressure
- Simple and reliable measuring principle, easy and fast installation

Application: Rotonivo® paddle switches can be used as full, demand or empty detectors in bulk good silos. They are suitable for applications in a wide variety of materials. Rotonivo switches are available with international certificates for applications in hazardous locations (gas and dust).

Types of Rotonivo flanges:

Rotonivo ..002

Full detector with rope extension or protection tube, vertical installation

Rotonivo ..001

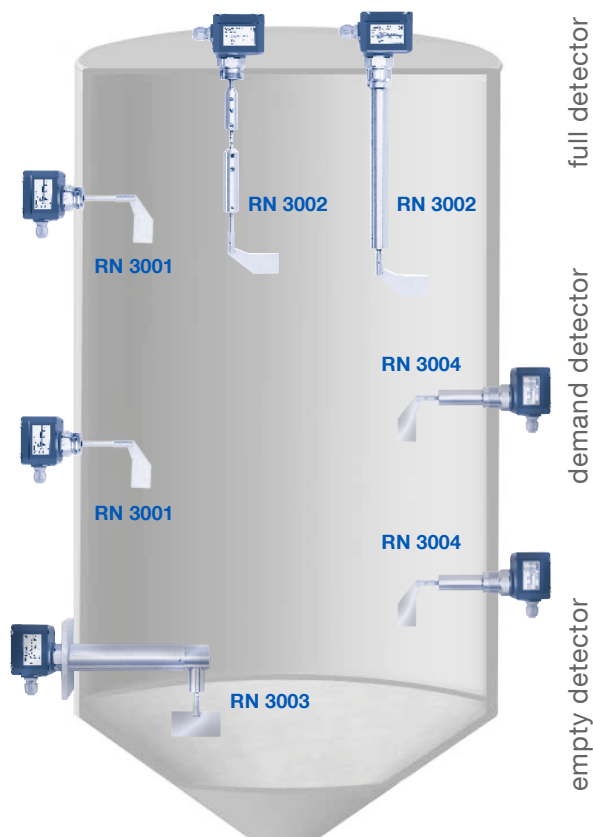
Standard design, vertical, horizontal and oblique installation

Rotonivo ..003

Design with protection tube and angled extension, horizontal installation

Rotonivo ..004

Design with protection tube, vertical, horizontal and oblique installation



Technical Data

Housing	Aluminium IP 66 / NEMA Type 4
Pressure range	-0.9 up to +10 bar (-13.1 up to +145 psi)
Supply voltage	Universal Voltage Electronic AC: 24V / 48V / 115V / 230V, DC: 24V
Signal output	Microswitch or Relais SPDT / DPDT contact
Versions with certificates	ATEX II 1/2D and II 2G, INMETRO FM Cl. I, II, III, Div.1 Gr. A-G; Zone 1 CSA Cl. I, II, III Div.1 Gr. B-G; Zone 1 TR-CU, IEC Ex, NEPSI-Ex, EHEDG
Process temperature range	-40°C up to +1100°C (3001 / 3002) (-40°F up to +2012°F) (3001 / 3002)
Bearing	Encapsulated ball bearing with shaft sealing
Process connection	G 1", 1½" and 1¾"; NPT 1½" and 1¾"; M30x1,5 and M32x1,5; various flanges available
Material	Aluminium or stainless steel 1.4305 (SS303)
Process connection	or 1.4404 (SS316L)
Material measuring vane and shaft	Stainless steel 1.4301 (SS304) or 1.4404 (SS316L)

Housing types

RN 3000
standard



RN 6000
standard



RN 6000
flameproof

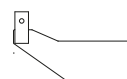


RN 6000
flameproof,
increased
safety



Various measuring vanes and special solutions

Boot shaped vane



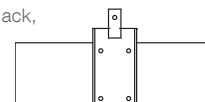
Hinged vane

Foldable version for easy insertion through a long socket



Rubber vane

For lightweight materials (e.g. carbon black, styrofoam, etc.)



Rotonivo® 3005
extra compact version
for installation in
loading bellow

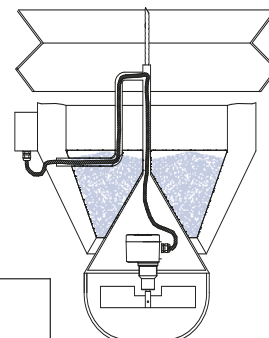
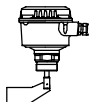


Table of contents

	Page
Overview	2
Specifications	4
Applications	6
<hr/>	
RN ..001 Short extension length	8
	
<hr/>	
RN ..002 Pipe extension vertical	10
	
<hr/>	
RN ..002-rope Rope extension	12
	
<hr/>	
RN ..003 Angled extension	14
	
<hr/>	
RN ..004 Pipe extension horizontal	16
	
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RN 3005 Extra short version	18
	
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Options	20
Dimensions	24
Detailed Ex-markings	29
Electrical installation	30
Spare parts	32

Subject to change.

All dimensions in mm (inches).

All prices in Euro, excluding VAT.

All prices are EXW Betzigau, excluding packaging costs.

Valid: From 01.04.2017 until 31.03.2018, unless otherwise agreed.

By publishing this selection list all other lists become invalid.

We assume no liability for typing errors.

Different variations to those specified are possible. Please contact our technical consultants.

Overview

- Level limit detection in bulk goods / solids
- Compact unit
- Very robust and reliable sensors
- Wide range of applications, no maintenance
- Full-, demand-, empty detector

- ATEX, IEC-Ex, FM, CSA, TR-CU, INMETRO
- SIL 2
- 1935/2004/EC
- 2011/65/EU

Gas Ex and Dust Ex approvals

Functional safety
 Food grade material
 RoHS Conform

Series	RN 3000	RN 6000
	ATEX / IEC-Ex / TR-CU / INMETRO	ATEX / IEC-Ex / FM / CSA / TR-CU / INMETRO / SIL 2
	Small housing Sensitivity > 15 g/l (0.9lb/ft³)	Spacious housing Sensitivity > 15 g/l (0.9lb/ft³)

Housing

Standard



Standard

d

de



RN ..001
 Short extension length

RN 3001



RN 6001



RN ..002
 Pipe extension vertical








RN 3002



RN 6002



Overview

RN ..002-rope Rope extension	RN 3002-rope 	RN 6002-rope 
	RN 3003 	RN 6003 
RN ..003 Angled extension	RN 3004 	RN 6004 
	RN ..004 Pipe extension horizontal	
RN 3005 Extra short version for use in loading bellow	RN 3005 	

Specifications

Series			RN 3000		RN 6000				
Approvals	CE		•		•				
	ATEX /IEC-Ex/INMETRO:								
	Zone 20/21	Dust Ignition Proof	•		•				
	Zone 1	Flameproof / Increased Safety			•				
	FM / CSA:								
	Ordinary Locations				•				
	Cl. II, III Div. 1	Dust Ignition Proof			•				
	Cl. I Div. 1	Explosionproof			•				
	Zone 1	Flameproof / Increased Safety			•				
	TR-CU:								
	Ordinary Locations		•						
	Zone 20/21	Dust Ignition Proof	•		•				
	Zone 1	Flameproof / Increased Safety			•				
	Functional safety	SIL 2 (IEC 61508)			•				
Technical data	Ambient temperature		-20°C .. +70°C (-4°F ..+158°F) CE -20°C .. +60°C (-4°F ..+140°F) EX -40°C with heating		-20°C .. +50°C (-4°F ..+122°F) -40°C with heating				
	Type of protection		IP66 and NEMA Type 4/4X (RN6000)						
	Material housing		Aluminium or plastics PA6 (RN3000, optional)						
	Process connection material		Aluminium or 1.4305 (303) / 1.4541 (321) or 1.4404 (316L)						
	Material of measuring vane and shaft		1.4301 (SS 304) / 1.4305 (303) or 1.4404 (316L)						
Electronics	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	•	-	-	-	-	-	
	DC version	24V DC	•	-	-	-	-	-	
	DC version	24V DC PNP	-	-	•	•	•	-	
	Universal voltage	24V DC / 22...230V AC	•	-	-	•	•	option	
	RN 6000								
	Power supply		Output signal						
			SPST	SPDT ⁽¹⁾	DPDT	PNP	FSH/ FSL ⁽²⁾	Adjustable delay	Fail safe alarm
	AC version	24V or 48V or 115V or 230V AC	-	•	-	-	-	-	-
	DC version	24V DC	-	•	-	-	-	-	-
	Universal voltage	24V DC / 22...230V AC	-	-	• ⁽³⁾	-	•	•	option
	Universal voltage SIL 2	24V DC / 22...230V AC	•	• ⁽⁴⁾	-	-	•	•	-

⁽¹⁾ Micro switch, 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

⁽⁴⁾ Additional output, not SIL conform

Specifications

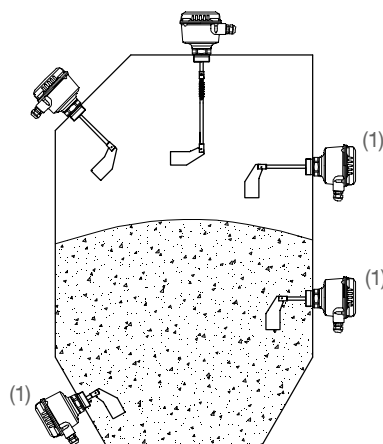
Extensions	RN .001	Process temperature	-40/ -25 .. +80 /150 /250 /350 /600 /1100°C (-40/ -13 .. +176 /302 /482 /662 /1112 /2012°F)
		Process pressure	-0.9 .. +0.8bar; -0.9 .. +5 / 10bar (-13.1 ..+11.6; -13.1 .. +72.5 / 145psi)
		Length of extension	
		Full detector vertical from the top	70 .. 300mm (2.76 .. 11.8")
		Full detector with pendulum shaft, vertical from the top	300 .. 1000mm (11.8 .. 39.4")
		Full detector oblique from the top	70 .. 300mm (2.76 .. 11.8")
		Full detector horizontal	70 .. 300mm (2.76 .. 11.8")
		Demand or empty detector horizontal	70 .. 150mm (2.76 .. 5.9") *
		Empty detector oblique from the bottom	70 .. 150mm (2.76 .. 5.9") *
	RN .002	Process temperature	-40/ -25 .. +80 /150 /250 /350 /600 /1100°C (-40/ -13 .. +176 /302 /482 /662 /1112 /2012°F)
		Process pressure	-0.9 .. +0.8bar; -0.9 .. +5 / 10bar (-13.1 ..+11.6; -13.1 .. +72.5 / 145psi)
		Length of extension	
		Full detector vertical from the top	250 .. 3.000mm (9.84 .. 118") / 4.000mm (158") with support of the extension pipe
		Full detector oblique from the top	250 .. 3.000mm (9.84 .. 118") with option "Bearing at tube end"
	RN..002-rope	Process temperature	-40/-25 ..+80 /150 /250 /350 /600°C (-40/-13 ..+176 /302 /482 /662 /1112°F)
		Process pressure	-0.9 .. +0.8bar; -0.9 .. +5 / 10bar (-13.1 ..+11.6; -13.1 .. +72.5 / 145psi)
		Length of extension	
		Full detector vertical from the top	500 .. 10.000mm (19.7 .. 394") (observe max. traction)
	RN .003	Process temperature	-40/-25 .. +80 /150 /250°C (-40/-13 .. +176 /302 /482°F)
		Process pressure	-0.9 .. +0.8bar; -0.9 .. +5 / 10bar (-13.1 ..+11.6; -13.1 .. +72.5 / 145psi)
		Length of extension	
		Demand or empty detector horizontal	125 .. 300mm (4.92 .. 11.8")
		Empty detector oblique from the bottom	125 .. 300mm (4.92 .. 11.8")
	RN .004	Process temperature	-40/-25 .. +80 /150 /250 /350 /600°C (-40/-13 .. +176 /302 /482 /662 /1112°F)
		Process pressure	-0.9 .. +0.8bar; -0.9 .. +5 / 10bar (-13.1 ..+11.6; -13.1 .. +72.5 / 145psi)
		Length of extension	
		Full detector vertical from the top	150 .. 300mm (5.90 .. 11.8")
		Full detector oblique from the top	150 .. 300mm (5.90 .. 11.8")
		Full detector horizontal	150 .. 300mm (5.90 .. 11.8")
		Demand or empty detector horizontal	150 .. 300mm (5.90 .. 11.8") *
		Empty detector oblique from the bottom	150 .. 300mm (5.90 .. 11.8") *
	RN 3005	Process temperature	-40/-25 .. +80°C (-40/-13 .. +176°F)
		Process pressure	-0.9 .. +0.8bar (-13.1 .. +11.6psi)
		Length of extension	
		Application "Loading bellow"	90mm (3.5")

* A protective canopy is recommended for applications with high mechanical loads

Applications

RN..001

Short extension length



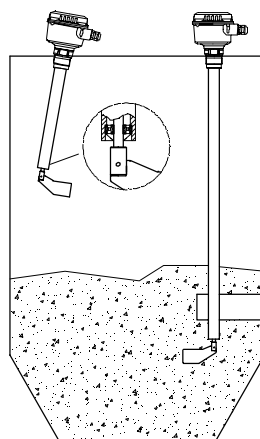
Extension for vertical
 instalation with pendulum shaft

(1) Not for version 1100°C

Horizontal mounting:
 Boot shaped vane
 recommended
 (min. mech. loading as
 the vane aligns itself to
 the material flow).

RN..002

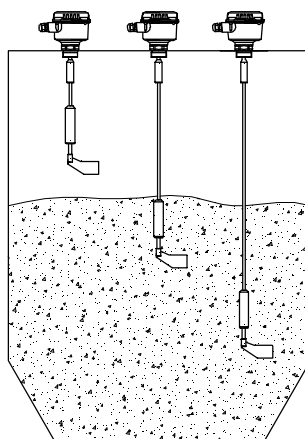
Pipe extension vertical



Deviation up to max.
 10° from vertical
 installation only with
 option „bearing at
 tube end“ possible

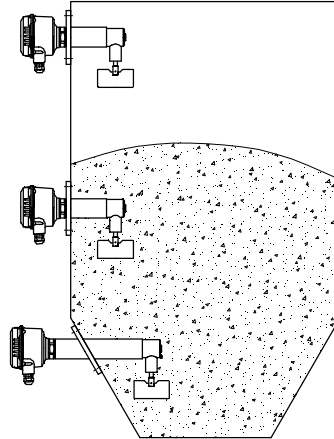
RN..002 - rope

Rope extension

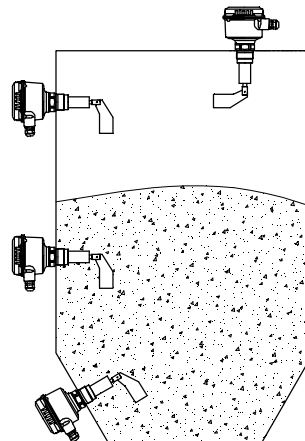


Applications

RN ..003
 Angled extension

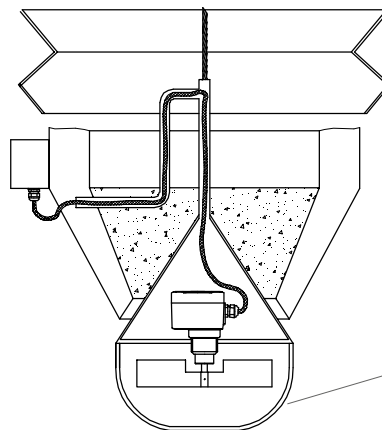


RN ..004
 Pipe extension horizontal



Horizontal mounting:
 Boot shaped vane
 recommended
 (min. mech. loading as
 the vane aligns itself to
 the material flow).

RN 3005
 Extra short version



Application
 „Loading bellow“

mechanical
 protection for
 sensor

RN ..001 Short extension length

RN 3001



RN 6001



Housings RN 6001



Standard



d (flameproof)



de
(flameproof/
increased safety)

Cable entries (by default)

Depending on model selected, the following cable entries will be delivered (options see pos 28 on page 20):

Version:	Cable entries:
ATEX / IEC-Ex flameproof (pos.2 T)	M20x1.5 (1x open conduit + 1x Ex-d blind plug)
FM and CSA (pos.2 M,N,S,U)	NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x Ex-d blind plug)
All other versions	M20x1.5 (1x screwed cable gland + 1x blind plug)

Dimensions see pages 24 - 28

Basic Type

RN 3001	.....	•
RN 6001	.....	•

pos. 2 **Certificate** (detailed Ex-markings: see page 29)

Certificate	Zone / Div		Protection method
	Dust	Gas	
0 CE/ TR-CU	-	-	
W ATEX	Zone 20/21	-	Dust Ignition Proof
R ATEX	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
T ATEX	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
A IEC-Ex/ INMETRO	Zone 20/21	-	Dust Ignition Proof
C IEC-Ex/ INMETRO	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
D IEC-Ex/ INMETRO	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
M FM /CSA	-	-	General purpose
N FM /CSA	Cl. II, III, Div.1	-	Dust Ignition Proof
CSA	A 20/21		
S FM /CSA	Cl. II, III, Div.1	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
CSA	A 20/21		
U FM /CSA	Cl. II, III, Div.1	Cl. I Div.1 / Zone 1	Explosion Proof / Dust Ignition Proof
CSA	A 20/21		
E TR-CU	Zone 20/21	-	Dust Ignition Proof
K TR-CU	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
L TR-CU	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof

pos. 3 **Process temperature**

1	max. + 80°C (176°F)	.....	•
2	max. + 150°C (302°F)	.....	•
3	max. + 250°C (482°F)	.....	•
4	max. + 350°C (662°F)	..... (not for pos.10 K,S in 1.4404; not for Ex, only with pos. 4.1, L min=200mm)	•
5	max. + 600°C (1112°F)	..... (not for pos.10 K,S in 1.4404; not for Ex, only with pos. 4.1)	•
6	max. + 1100°C (2012°F)	..... Installation vertical / obliquely downward .....on request	•

pos. 4 **Process overpressure**

1	max. 0,8 bar (11,6psi)	..... (0,1bar (1.45psi) with Pos. 3.5 and Pos. 3.6)	•
2	max. 5 bar (73psi)	.....	•
3	max. 10 bar (145psi)	.....	•

page 9

RN ..002 Pipe extension vertical

RN 3002



RN 6002



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

Housings RN 6002



Standard



d (flameproof)



de (flameproof/ increased safety)

Cable entries (by default)

Depending on model selected, the following cable entries will be delivered (options see pos 28 on page 20):

Version:	Cable entries:
ATEX / IEC-Ex flameproof (pos.2 T)	M20x1.5 (1x open conduit + 1x Ex-d blind plug)
FM and CSA (pos.2 M,N,S,U)	NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x Ex-d blind plug)
All other versions	M20x1.5 (1x screwed cable gland + 1x blind plug)

Dimensions

see pages 24 - 28

Basic Type

RN 3002

RN 6002

pos. 2

Certificate

(detailed Ex-markings: see page 29)

Certificate	Zone / Div		Protection method
	Dust	Gas	
0 CE/ TR-CU	-	-	
W ATEX	Zone 20/21	-	Dust Ignition Proof
R ATEX	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
T ATEX	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
A IEC-Ex/ INMETRO	Zone 20/21	-	Dust Ignition Proof
C IEC-Ex/ INMETRO	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
D IEC-Ex/ INMETRO	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
M FM /CSA	-	-	General purpose
N FM /CSA	Cl. II, III, Div.1	-	Dust Ignition Proof
CSA	A 20/21		
S FM /CSA	Cl. II, III, Div.1	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
CSA	A 20/21		
U FM /CSA	Cl. II, III, Div.1	Cl. I Div.1 / Zone 1	Explosion Proof / Dust Ignition Proof
CSA	A 20/21		
E TR-CU	Zone 20/21	-	Dust Ignition Proof
K TR-CU	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
L TR-CU	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof

RN ..002 Pipe extension vertical

pos. 3	Process temperature		
• •	1	max. + 80°C (176°F)	•
• •	2	max. + 150°C (302°F)	•
• •	3	max. + 250°C (482°F)	•
• •	5	max. + 600°C (1112°F) (not for pos.10 K,S in 1.4404; not for Ex, only with pos. 4.1)	•
• •	6	max. + 1100°C (2012°F) Installation vertical / obliquely downward on request	
pos. 4	Process overpressure		
• •	1	max. 0,8 bar (11,6psi) (0,1bar (1,45psi) with pos. 3.5, pos. 3.6) ..	•
• •	2	max. 5 bar (73psi)	•
• •	3	max. 10 bar (145psi)	•
pos. 5	Power supply		
• •	A / S	230V AC 50-60 Hz Motor Speed: A=1/min S= 5/min	• / •
• •	B / T	115V AC 50-60 Hz Motor Speed: B=1/min T= 5/min	• / •
• •	C / U	48V AC 50-60 Hz Motor Speed: C=1/min U= 5/min	• / •
• •	D / V	24V AC 50-60 Hz Motor Speed: D=1/min V= 5/min	• / •
• •	E / W	24V DC Motor Speed: E=1/min W= 5/min	• / •
• •	G / H	24V DC PNP Motor Speed: G=1/min H= 5/min	• / •
• •	F / X	24V DC / 22...230V AC universal voltage Motor Speed: F=1/min X= 5/min	• / •
pos. 6	Process connection		
• •	A	thread G 1½", DIN 228	• • •
• •	B	thread G 1¼", DIN 228 (max. 250°C (482°F))	• • •
• •	F	thread NPT 1½", conical ANSI B1.20.1	• • •
• •	Q	thread NPT 1¼", conical ANSI B1.20.1 (max. 250°C (482°F))	• • •
• •	P	Triclamp 2" (DN 50) ISO 2852 (max. 250°C (482°F))	• • •
• •	H	flange 150x150, 4x ø18 LK-ø170 (max. 0.8 bar (11.6psi))	• • •
• •	I	flange 150x150, 4x ø14 LK-ø170 (max. 0.8 bar (11.6psi))	• • •
• •	K	flange DN32 PN6, EN 1092-1 (max. 5 bar (73psi))	• • •
• •	N	flange DN50 PN16, EN 1092-1	• • •
• •	L	flange DN100 PN6, EN 1092-1 (max. 5 bar (73psi))	• • •
• •	M	flange DN100 PN16, EN 1092-1	• • •
• •	S	flange 2" 150lbs ANSI B16.5	• • •
• •	T	flange 3" 150lbs ANSI B16.5	• • •
• •	U	flange 4" 150lbs ANSI B16.5	• • •
pos. 7	Material Process connection		
• •	1	aluminium (max. 0.8 bar (11.6psi) / 80°C (176°F))	• • •
• •	3	stainless steel 1.4305 (303) A-Q / 1.4301 (304) P-I / 1.4541 (321) K-U	• • •
• •	7	stainless steel 1.4404 (316L) (only with pos. 9.7)	• • •
pos. 8	Length of extension "L"		
• •	Z	price per 100mm (3.94") or part thereof (starting from 0mm) min. 250mm (9.84"), max. 4.000mm (158")	• • •
pos. 9	Material of extension "L"		
• •	1	aluminium (max. 0.8 bar (11.6psi) / 250°C (482°F))	• • •
• •	3	stainless steel 1.4305 (303)/1.4301 (304)	• • •
• •	7	stainless steel 1.4404 (316L) (only with pos.7.7 and 10.A,D,F,K,S,P and 32x)	• • •
pos. 10	Measuring vane		
• •	A	boot-shaped ⁽¹⁾ 40 x 98mm (1.57 x 3.86") for 1 1/2" socket (with pos.9.7 L=10mm)	•
• •	D	boot-shaped ⁽¹⁾ 35 x 106mm (1.38 x 4.17") for 1 1/4" socket ("L"=10mm longer) ...	•
• •	B	rectangular 50 x 98mm (1.97 x 3.86")	•
• •	C	rectangular 50 x 150mm (1.97 x 5.90")	•
• •	E	rectangular 50 x 250mm (1.97 x 9.84")	•
• •	F	rectangular 98 x 98mm (3.86 x 3.86")	•
• •	G	rectangular 98 x 150mm (3.86 x 5.90")	•
• •	I	rectangular 98 x 250mm (3.86 x 9.84")	•
• •	K	hinged vane 98 x 200mm (3.86 x 7.87") double sided ... (L=10mm longer) 1.4301 / 1.4404	• / • (1.4404)
• •	S	hinged vane 98 x 100mm (3.86 x 3.93") single sided..... (L=10mm longer) 1.4301 / 1.4404	• / • (1.4404)
• •	M	rubber vane 98 x 250mm (3.86 x 9.84") .. (max.80°C (176°F))	•
• •	Y	without including splint pin for fixation	•

Basic Type

Further options and accessories: see page 20

	B						Z		
Position	1	2	3	4	5	6	7	8	9

All positions are available in special design (use code "Z").

L =	mm
-----	----

Order code

⁽¹⁾ maximum length of socket 40mm

RN ..002-rope Rope extension

RN 3002 - rope



RN 6002 - rope



Housings RN 6002-rope



Standard



d (flameproof)



de
(flameproof /
increased safety)

Cable entries (by default)

Depending on model selected, the following cable entries will be delivered (options see pos 28 on page 20):

Version:	Cable entries:
ATEX / IEC-Ex flameproof (pos.2 T) FM and CSA (pos.2 M,N,S,U) All other versions	M20x1.5 (1x open conduit + 1x Ex-d blind plug) NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x Ex-d blind plug) M20x1.5 (1x screwed cable gland + 1x blind plug)

Dimensions

see pages 24 - 28

Basic Type

RN 3002-Rope	.....	•
RN 6002-Rope	.....	•

pos. 1

Types

C	Standard	..... (max. 4kN load)	.....	•
H	Strengthened	..... (max. 28kN load) (max. 80°C (176°F), only with pos7 3, with pos.2 R,S,T,U on request)	.....	•

pos. 2

Certificate

(detailed Ex-markings: see page 29)

Certificate	Zone / Div		Protection method
	Dust	Gas	
0 CE/ TR-CU	-	-	
W ATEX	Zone 20/21	-	Dust Ignition Proof
R ATEX	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
T ATEX	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
A IEC-Ex/ INMETRO	Zone 20/21	-	Dust Ignition Proof
C IEC-Ex/ INMETRO	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
D IEC-Ex/ INMETRO	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
M FM /CSA	-	-	General purpose
N FM /CSA	Cl. II, III, Div.1	-	Dust Ignition Proof
CSA	A 20/21		
S FM /CSA	Cl. II, III, Div.1	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
CSA	A 20/21		
U FM /CSA	Cl. II, III, Div.1	Cl. I Div.1 / Zone 1	Explosion Proof / Dust Ignition Proof
CSA	A 20/21		
E TR-CU	Zone 20/21	-	Dust Ignition Proof
K TR-CU	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
L TR-CU	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof

RN ..002-rope Rope extension

pos. 3	Process temperature			
	1	max. + 80°C (176°F)	.....
	2	max. + 150°C (302°F)	.....
	3	max. + 250°C (482°F)	.....
	5	max. + 600°C (1112°F)	..... (not for pos.10 K,S in 1.4404; not for Ex, only with pos. 4.1)	
pos. 4	Process overpressure			
	1	max. 0,8 bar (11,6psi)	..... (0,1bar (1.45psi) with pos. 3.5)	
	2	max. 5 bar (73psi)	.....
	3	max. 10 bar (145psi)	.....
pos. 5	Power supply			
	A / S	230V AC 50-60 Hz	..... Motor Speed: A=1/min S= 5/min	/
	B / T	115V AC 50-60 Hz	..... Motor Speed: B=1/min T= 5/min	/
	C / U	48V AC 50-60 Hz	..... Motor Speed: C=1/min U= 5/min	/
	D / V	24V AC 50-60 Hz	..... Motor Speed: D=1/min V= 5/min	/
	E / W	24V DC	..... Motor Speed: E=1/min W= 5/min	/
	G / H	24V DC PNP	..... Motor Speed: G=1/min H= 5/min	/
	F / X	24V DC / 22...230V AC universal voltage	..... Motor Speed: F=1/min X= 5/min	/
pos. 6	Process connection			
	A	thread G 1½", DIN 228	.....
	B	thread G 1¼", DIN 228	..... (max. 250°C (482°F))	
	F	thread NPT 1½", conical ANSI B1.20.1	.....
	Q	thread NPT 1¼", conical ANSI B1.20.1	..... (max. 250°C (482°F))	
	H	flange 150x150, 4x ø18 LK-ø170	..... (max. 0.8 bar (11.6psi))	
	I	flange 150x150, 4x ø14 LK-ø170	..... (max. 0.8 bar (11.6psi))	
	K	flange DN32 PN6, EN 1092-1	..... (max. 5 bar (73psi) / 250°C (482°F))	
	N	flange DN50 PN16, EN 1092-1	.....
	L	flange DN100 PN6, EN 1092-1	..... (max. 5 bar (73psi))	
	M	flange DN100 PN16, EN 1092-1	.....
	S	flange 2" 150lbs ANSI B16.5	.....
	T	flange 3" 150lbs ANSI B16.5	.....
	U	flange 4" 150lbs ANSI B16.5	.....
pos. 7	Material Process connection			
	1	aluminium	..... (max. 0.8 bar (11.6psi) / 80°C (176°F)	
	3	stainless steel 1.4305 (303) A-Q / 1.4301 (304) P-I / 1.4541 (321) K-U	.....
pos. 8	Length of extension "L"			
	Z	price per 100mm (3.94") or part thereof (starting from 0mm)	..... min. 500mm (19.69") pos 1C / 1000mm (39.4") pos 1H; max. 10.000mm (394")	
	Y	without rope (incl. rope fixing parts) (only with pos.1.C)	.....
pos. 10	Measuring vane			
	A	boot-shaped ⁽¹⁾ 40 x 98mm (1.57 x 3.86")	..... for 1 1/2" socket	
	D	boot-shaped ⁽¹⁾ 35 x 106mm (1.38 x 4.17")	..... for 1 1/4" socket ("L=16mm longer)	
	B	rectangular 50 x 98mm (1.97 x 3.86")	.....
	C	rectangular 50 x 150mm (1.97 x 5.90")	.....
	E	rectangular 50 x 250mm (1.97 x 9.84")	.....
	F	rectangular 98 x 98mm (3.86 x 3.86")	.....
	G	rectangular 98 x 150mm (3.86 x 5.90")	.....
	I	rectangular 98 x 250mm (3.86 x 9.84")	.....
	K	hinged vane 98 x 200mm (3.86 x 7.87") double sided (L=10mm)	.....
	S	hinged vane 98 x 100mm (3.86 x 3.93") single sided (L=10mm longer)	.....
	M	rubber vane 98 x 250mm (3.86 x 9.84")	..... (max.80°C (176°F))	
	Y	without	..... including splint pin for fixation	

Further options and accessories: see page 20

Basic Type

								Z	3	
Position	1	2	3	4	5	6	7	8	9	10

— **L =** **mm** ← **Order code**

All positions are available in special design (use code "Z").

⁽¹⁾ maximum length of socket 40mm

RN ..003 Angled extension

RN 3003



RN 6003



Housings RN 6003



Standard



d (flameproof)



de (flameproof /
increased safety)

Cable entries (by default)

Depending on model selected, the following cable entries will be delivered (options see pos 28 on page 20):

Version:	Cable entries:
ATEX / IEC-Ex flameproof (pos.2 T) FM and CSA (pos.2 M,N,S,U) All other versions	M20x1.5 (1x open conduit + 1x Ex-d blind plug) NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x Ex-d blind plug) M20x1.5 (1x screwed cable gland + 1x blind plug)

Dimensions

see pages 24 - 28

Basic Type

RN 3003

RN 6003

pos. 2

Certificate

(detailed Ex-markings: see page 29)

Certificate	Zone / Div		Protection method
	Dust	Gas	
0 CE/ TR-CU	-	-	
W ATEX	Zone 20/21	-	Dust Ignition Proof
R ATEX	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
T ATEX	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
A IEC-Ex/ INMETRO	Zone 20/21	-	Dust Ignition Proof
C IEC-Ex/ INMETRO	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
D IEC-Ex/ INMETRO	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
M FM /CSA	-	-	General purpose
N FM /CSA	Cl. II, III, Div.1	-	Dust Ignition Proof
CSA	A 20/21		
S FM /CSA	Cl. II, III, Div.1	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
CSA	A 20/21		
U FM /CSA	Cl. II, III, Div.1	Cl. I Div.1 / Zone 1	Explosion Proof / Dust Ignition Proof
CSA	A 20/21		
E TR-CU	Zone 20/21	-	Dust Ignition Proof
K TR-CU	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
L TR-CU	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof

RN ..003 Angled extension

pos. 3	Process temperature			
• •	1	max. + 80°C (176°F)	•	
• •	2	max. + 150°C (302°F)	•	
• •	3	max. + 250°C (482°F)	•	
pos. 4	Process overpressure			
• •	1	max. 0,8 bar (11,6psi)	•	
• •	2	max. 5 bar (73psi)	•	
• •	3	max. 10 bar (145psi)	•	
pos. 5	Power supply			
• •	A / S	230V AC 50-60 Hz	Motor Speed: A=1/min S= 5/min	• / •
• •	B / T	115V AC 50-60 Hz	Motor Speed: B=1/min T= 5/min	• / •
• •	C / U	48V AC 50-60 Hz	Motor Speed: C=1/min U= 5/min	• / •
• •	D / V	24V AC 50-60 Hz	Motor Speed: D=1/min V= 5/min	• / •
• •	E / W	24V DC	Motor Speed: E=1/min W= 5/min	• / •
• •	G / H	24V DC PNP	Motor Speed: G=1/min H= 5/min	• / •
• •	F / X	24V DC / 20...230V AC universal voltage	Motor Speed: F=1/min X= 5/min	• / •
pos. 6	Process connection			
• •	H	flange 150x150, 4x ø18 LK-ø170 (max. 0,8 bar (11.6psi))	•	•
• •	I	flange 150x150, 4x ø14 LK-ø170 (max. 0,8 bar (11.6psi))	•	•
• •	L	flange DN100 PN6, EN 1092-1 (max. 5 bar (73psi))	•	•
• •	M	flange DN100 PN16, EN 1092-1	•	•
• •	U	flange 4" 150lbs ANSI B16.5	•	•
pos. 7	Material Process connection			
• •	1	aluminium (max. 0.8 bar (11.6psi) / 80°C (176°F))	•	•
• •	3	stainless steel 1.4301 (304) / 1.4541 (321)	•	•
pos. 8	Length of extension "L"			
• •	1	125 mm (4,92")	•	•
• •	2	150 mm (5,90")	•	•
• •	3	200 mm (7,87")	•	•
• •	4	250 mm (9,84")	•	•
• •	5	300 mm (11,8")	•	•
• •	Z	other lengthes price per 50mm (1.97") or part thereof (starting from 0mm) min. 350 mm (13.8"), max. 600mm (23.6")	•	•
pos. 9	Material of extension "L"			
• •		(must be the same material as pos.7)		
• •	1	aluminium	•	•
• •	3	stainless steel 1.4305 (303)/1.4301 (304)	•	•
pos. 10	Measuring vane			
• •	A	boot-shaped ⁽¹⁾ 40 x 98mm (1.57 x 3.86")	•	
• •	B	rectangular 50 x 98mm (1.97 x 3.86")	•	
• •	C	rectangular 50 x 150mm (1.97 x 5.90")	•	
• •	E	rectangular 50 x 250mm (1.97 x 9.84")	•	
• •	F	rectangular 98 x 98mm (3.86 x 3.86")	•	
• •	G	rectangular 98 x 150mm (3.86 x 5.90")	•	
• •	I	rectangular 98 x 250mm (3.86 x 9.84")	•	
• •	K	hinged vane 98 x 200mm (3.86 x 7.87") double sided	•	
• •	S	hinged vane 98 x 100mm (3.86 x 3.93") single sided	•	
• •	M	rubber vane 98 x 250mm (3.86 x 9.84") (max.80°C (176°F))	•	
• •	Y	without including splint pin for fixation	•	

Further options and accessories: see page 20

Basic Type

	D								
--	---	--	--	--	--	--	--	--	--

Position 1 2 3 4 5 6 7 8 9 10

All positions are available in special design (use code "Z").

Order code

⁽¹⁾ maximum length of socket 40mm

RN ..004 Pipe extension horizontal

RN 3004



RN 6004



Housings RN 6004



Standard



d (flameproof)



de (flameproof/
increased safety)

Cable entries (by default)

Depending on model selected, the following cable entries will be delivered (options see pos 28 on page 20):

Version:	Cable entries:
ATEX / IEC-Ex flameproof (pos.2 T)	M20x1.5 (1x open conduit + 1x Ex-d blind plug)
FM and CSA (pos.2 M,N,S,U)	NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x Ex-d blind plug)
All other versions	M20x1.5 (1x screwed cable gland + 1x blind plug)

Dimensions

see pages 24 - 28

Basic Type

RN 3004

RN 6004

pos. 2

Certificate

(detailed Ex-markings: see page 29)

Certificate	Zone / Div		Protection method
	Dust	Gas	
0 CE/ TR-CU	-	-	
W ATEX	Zone 20/21	-	Dust Ignition Proof
R ATEX	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
T ATEX	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
A IEC-Ex/ INMETRO	Zone 20/21	-	Dust Ignition Proof
C IEC-Ex/ INMETRO	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
D IEC-Ex/ INMETRO	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
M FM /CSA	-	-	General purpose
N FM /CSA	Cl. II, III, Div.1	-	Dust Ignition Proof
CSA	A 20/21		
S FM /CSA	Cl. II, III, Div.1	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
CSA	A 20/21		
U FM /CSA	Cl. II, III, Div.1	Cl. I Div.1 / Zone 1	Explosion Proof / Dust Ignition Proof
CSA	A 20/21		
E TR-CU	Zone 20/21	-	Dust Ignition Proof
K TR-CU	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
L TR-CU	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof

RN ..004 Pipe extension horizontal

pos. 3	Process temperature				
• •	1	max. + 80°C (176°F)	.....	•
• •	2	max. + 150°C (302°F)	.....	•
• •	3	max. + 250°C (482°F)	.....	•
• •	4	max. + 350°C (662°F)	(not for pos.10 K,S in 1.4404; not for Ex, only with pos. 4.1) (Lmin=200mm)	•	
• •	5	max. + 600°C (1112°F)	(not for pos.10 K,S in 1.4404; not for Ex, only with pos. 4.1)	•	
pos. 4	Process overpressure				
• •	1	max. 0,8 bar (11,6psi)	..... (0,1bar (1.45psi) with pos. 3.5)	•	
• •	2	max. 5 bar (73psi)	.....	•
• •	3	max. 10 bar (145psi)	.....	•
pos. 5	Power supply				
• •	A / S	230V AC 50-60 Hz	..... Motor Speed: A=1/min S= 5/min	•	/ •
• •	B / T	115V AC 50-60 Hz	..... Motor Speed: B=1/min T= 5/min	•	/ •
• •	C / U	48V AC 50-60 Hz	..... Motor Speed: C=1/min U= 5/min	•	/ •
• •	D / V	24V AC 50-60 Hz	..... Motor Speed: D=1/min V= 5/min	•	/ •
• •	E / W	24V DC	..... Motor Speed: E=1/min W= 5/min	•	/ •
• •	G / H	24V DC PNP	..... Motor Speed: G=1/min H= 5/min	•	/ •
• •	F / X	24V DC / 22...230V AC universal voltage	..... Motor Speed: F=1/min X= 5/min	•	/ •
pos. 6	Process connection				
• •	A	thread G 1½", DIN 228	.....	•	• •
• •	B	thread G 1¼", DIN 228	..... (max. 250°C (482°F))	•	• •
• •	F	thread NPT 1½", conical ANSI B1.20.1	.....	•	• •
• •	Q	thread NPT 1¼", conical ANSI B1.20.1	..... (max. 250°C (482°F))	•	• •
• •	P	Tricomp 2" (DN 50) ISO 2852	..... (max. 250°C (482°F))	•	• •
• •	H	flange 150x150, 4x ø18 LK-ø170	..... (max. 0.8 bar (11.6psi))	•	• •
• •	I	flange 150x150, 4x ø14 LK-ø170	..... (max. 0.8 bar (11.6psi))	•	• •
• •	K	flange DN32 PN6, EN 1092-1	..... (max. 5 bar / 250°C)	•	• •
• •	N	flange DN50 PN16, EN 1092-1	.....	•	• •
• •	L	flange DN100 PN6, EN 1092-1	..... (max. 5 bar (73psi))	•	• •
• •	M	flange DN100 PN16, EN 1092-1	.....	•	• •
• •	S	flange 2" 150lbs ANSI B16.5	.....	•	• •
• •	T	flange 3" 150lbs ANSI B16.5	.....	•	• •
• •	U	flange 4" 150lbs ANSI B16.5	.....	•	• •
pos. 7	Material Process connection				
• •	1	aluminium	..... (max. 0.8 bar (11.6psi) / 80°C (176°F))	•	• •
• •	3	stainless steel 1.4305 (303) A-Q / 1.4301 (304) P-I / 1.4541 (321) K-U	.....	•	• •
• •	7	stainless steel 1.4404 (316L)	..... (only with Pos. 9.7)	•	• •
pos. 8	Length of extension "L"				
• •	N	150 mm (5,90") (only with vane A, D, B, C, E)	.....	•	• •
• •	P	200 mm (7,87")	.....	•	• •
• •	Q	250 mm (9,84")	.....	•	• •
• •	R	300 mm (11,8")	.....	•	• •
• •	Z	other lengths price per 50mm (1.97") or part thereof (starting from 0mm) min. 350 mm (13.8"), max. 600mm (23.6")	.....	•	• •
pos. 9	Material of extension "L"				
• •	1	aluminium	..... (max. 0,8 bar / 80°C)	•	• •
• •	3	stainless steel 1.4305 (303)/1.4301 (304)	.....	•	• •
• •	7	stainless steel 1.4404 (316L)	..... (only with pos.7.7 and 10.A,D,F,K,S,P)	•	• •
pos. 10	Measuring vane				
• •	A	boot-shaped ⁽¹⁾ 40 x 98mm (1.57 x 3.86")	for 1 1/2" socket (with pos.9.7 L=10mm)	•	
• •	D	boot-shaped ⁽¹⁾ 35 x 106mm (1,38 x 4,17")	for 1 1/4" socket (L =10mm longer)	•	
• •	B	rectangular 50 x 98mm (1.97 x 3.86")	.....	•
• •	C	rectangular 50 x 150mm (1.97 x 5.90")	.....	•
• •	E	rectangular 50 x 250mm (1.97 x 9.84")	.....	•
• •	F	rectangular 98 x 98mm (3.86 x 3.86")	.....	•
• •	G	rectangular 98 x 150mm (3.86 x 5.90")	.....	•
• •	I	rectangular 98 x 250mm (3.86 x 9.84")	.....	•
• •	L	hinged vane 98 x 200mm (3.86 x 7.87") double sided (L= 10mm longer) 1.4301/1.4404	.....	•	/ • 1.4404
• •	S	hinged vane 98 x 100mm (3.86 x 3.93") single sided(L= 10mm longer) 1.4301/1.4404	.....	•	/ • 1.4404
• •	M	rubber vane 98 x 250mm (3.86 x 9.84")	..... (max.80°C (176°F)).....	•	
• •	Y	without	..... including splint pin for fixation	•	

Basic Type		Further options and accessories: see page 20							
	E								
Position	1	2	3	4	5	6	7	8	9 10

Order code

⁽¹⁾ maximum length of socket 40mm

All positions are available in special design (use code "Z").



RN 3005 Extra short version

RN 3005



RN 6005
 not available

Cable entries (by default)
 M20x1.5 (1x screwed cable gland + 1x blind plug)
 Options see pos.28 on page 20

Dimensions see pages 24 - 28

RN 3005 Extra short version

Basic Type

RN 3005		•
pos. 2	Certificate	
•	0 CE ⁽¹⁾	•
•	W ATEX Zone 20/21 Dust Ignition Proof (ATEX II 1/2D)	•
•	A IEC-Ex ⁽²⁾ Zone 20/21 Dust Ignition Proof (ta/tb IIIC)	•
•	E TR-CU Zone 20/21 Dust Ignition Proof (DIP A20/ A21)	•
pos. 5	Power supply	
•	A / S 230V AC 50-60 Hz	Motor Speed: A=1/min S= 5/min • /
•	B / T 115V AC 50-60 Hz	Motor Speed: B=1/min T= 5/min • /
•	C / U 48V AC 50-60 Hz	Motor Speed: C=1/min U= 5/min • /
•	D / V 24V AC 50-60 Hz	Motor Speed: D=1/min V= 5/min • /
•	E / W 24V DC	Motor Speed: E=1/min W= 5/min • /
•	G / H 24V DC PNP	Motor Speed: G=1/min H= 5/min • /
•	F / X 24V DC / 22...230V AC universal voltage	Motor Speed: F=1/min X= 5/min • /
pos. 6	Process connection	
•	A thread G 1½", DIN 228	•
•	F thread NPT 1½", conical ANSI B1.20.1	•
pos. 7	Material process connection	
•	1 aluminium	•
•	3 stainless steel (1.4305 / 303)	•
pos. 10	Measuring vane	
•	N VT-vane	•
•	others on request	•

Further options and accessories: see page 20

Basic Type

RN 3005	F		1	1				A	3	
Position	1	2	3	4	5	6	7	8	9	10

All positions are available in special design (use code "Z").

Order code

(1) TR-CU (Ordinary Locations) included

(2) INMETRO included

RN 3001	RN 6001	RN 3002	RN 6002	RN 3002- rope	RN 6002- rope	RN 3003	RN 6003	RN 3004	RN 6004	RN 3005
1	1	1	1	1	1	1	1	1	1	1
•	•	•	•	•	•			•	•	
•	•	•	•	•	•			•	•	
•	•	•	•	•	•			•	•	
2		2		2		2		2		2
3	3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5			5	5	•
6	6	6	6	6	6	6	6	6	6	6
•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	•
8		8		8			8		8	
•	9	•	9	•	9	•	9	•	9	•
10	10	10	10	10	10	10	10	10	10	10
11	11	11	11	11	11	11	11	11	11	11
11	11	11	11	11	11	11	11	11	11	11
	12		12		12		12		12	
13		13		13		13		13		13
•	14	•	14	•	14	•	14	•	14	•
	15		15		15		15		15	
•	16	•	16	•	16	•	16	•	16	•
	•		•		•		•		•	
17	17	17	17	17	17	17	17	17	17	17
18	18	18	18					18	18	
18	18	18	18					18	18	
18	18	18	18					18	18	
18	18	18	18					18	18	

pos. 11x **Guarantee extension to 5 years**

pos. 15a **Flat gasket** (max. 250°C)
for process connection thread 1½, incl. sealing face in aluminium

pos. 15b for process connection thread 1½, incl. sealing face in 1.4404 (316L)

pos. 15c for process connection thread 1¼ / 1" / M32x1.5 / M30x1.5

pos. 16a **Material of housing plastics PA6**

pos. 17a **Radial shaft sealing**
FPM (Viton)

pos. 17b PTFE (Teflon)

pos. 18x **Stainless steel ball bearing**
for RN ..001/ RN ..002/ RN ..004/ RN ..005
for RN ..003

pos. 21x **Weather protection cover** (for Ex, only for Zone 2/22/Div. 2)

pos. 22a **Mounting set for flange mounting**

	for flange	for counter flange with	consists of			
			screws*	nuts*	washers*	sealing**
pos. 22a	H	hole ø18	4 x M16x50	4 x M16	4 pcs	1 piece
pos. 22b	H	thread M16	4 x M16x30		4 pcs	1 piece
pos. 22c	L	hole ø18	4 x M16x60	4 x M16	4 pcs	1 piece
pos. 22d	L	thread M16	4 x M16x40		4 pcs	1 piece
pos. 22e	M	hole ø18	4 x M16x60	8 x M16	8 pcs	1 piece
pos. 22f	M	thread M16	4 x M16x40		8 pcs	1 piece

* material stainless A2 **max. 250°C

pos. 24a **Hexagon nut**
aluminium 1 pc

pos. 24b aluminium 2 pcs

pos. 24e stainless steel 1.4305 (303) 1 pc

pos. 24f stainless steel 1.4305 (303) 2 pcs

pos. 25b **Functional safety SIL 2** (IEC 61508)

pos. 25x **Fail safe alarm** (for 24V DC/22 .. 230V AC universal voltage)

pos. 26x **Heating of housing** 2,5 watts for ambient/process temp. to -40°C (-40°F)

pos. 27a **Signal lamp**
Bulb, mounted in cable entry M20x1,5, 2W green

Pos. 27c Bulb, mounted in cable entry M20x1,5, 2W red

pos. 27b LED (glass window in lid)

pos. 27d LED (transparent lid section)

pos. 28x **Cable entry** optionally available:
Selection of the following options only necessary, if a deviation from the default cable gland / conduit is required:

pos. 28d M20x1,5 1x screwed cable gland +1x blind plug

pos. 28a NPT½" tapered ANSI B1.20.1 (1x conduit + 1x Ex-d blind plug)

pos. 28c NPT¾" tapered ANSI B1.20.1 (1x conduit + 1x Ex-d blind plug)

pos. 29y **Food grade materials** (in contact with process)
(according to 1935/2004/EC, with FDA conform sealing)

pos. 29a **EHEDG approval**
Process connection G1½" (without flush welding socket)

pos. 29b Process connection flush welding socket ø69/G1½" made of Aluminium

pos. 29c Process connection flush welding socket ø69/G1½" made of 1.4301 (304)

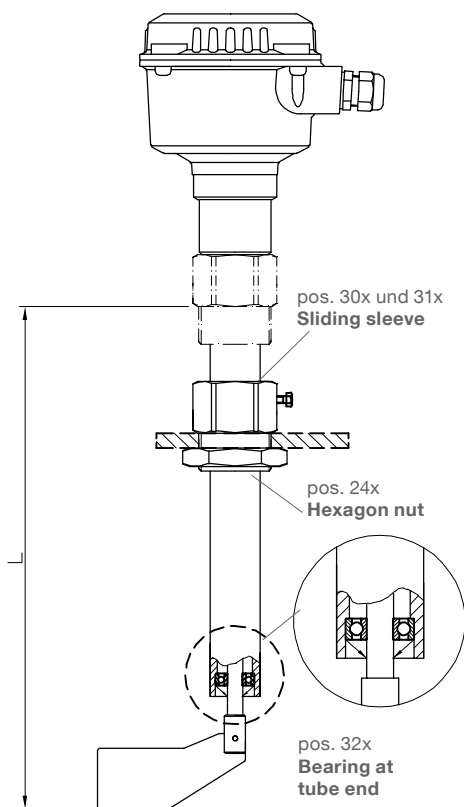
pos. 29d Process connection flush welding socket ø69/G1½" made of 1.4404 (316L)

Options

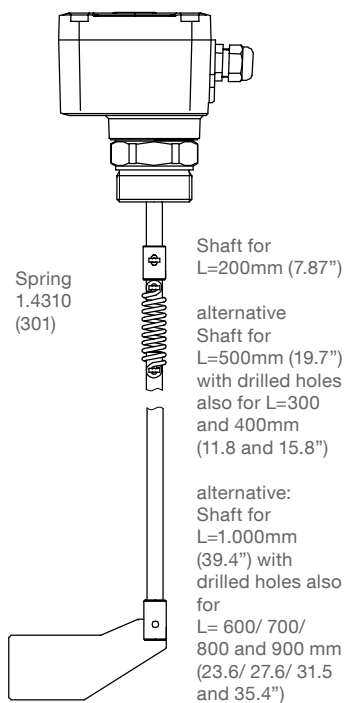
	19	19								pos. 30x	Sliding sleeve	for applications without process overpressure	•
	20	20								pos. 31x	Sliding sleeve	for applications with process overpressure	•
	21	21								pos. 32x	Bearing at tube end		
	21	21									max. +80°C (176°F)		•
	21	21									max. +150°C (302°F)		•
	21	21									max. +250°C (482°F)		•
	21	21									max. +600°C (1112°F)		•
	•	•									max. +1100°C (2012°F)	on request	
										pos. 33x	Extension and flange welded	$\alpha =$ ° min. 0° max. 45°	
											for aluminium (see pos. 7/9)		•
											for stainless steel (1.4305 (303)) (see pos. 7/9)		•
										pos. 34x	Reinforced rib	(only with pos. 33, max. $\alpha = 30^\circ$)	•
											Plug		
22	22	22	22	22	22	22	22	22	22	pos. 35x	Valve connector (incl. mating plug)	4-pole (incl. PE) max. 230V	•
22	22	22	22	22	22	22	22	22	22	pos. 35a	M12 (without mating plug)	4-pole max. 25V	•
22	22	22	22	22	22	22	22	22	22	pos. 35b	M12 (without mating plug)	5-pole (incl. PE) max. 60V	•
22	22	22	22	22	22	22	22	22	22	pos. 35c	Harting Han 4A (incl. mating plug)	5-pole (incl. PE) max. 230V	•
											Kit pendulum shaft		
											Max. pulling force 400N, only with pos.8 A		
											For vertical and horizontal installation:		
	•	•								pos. 36w	L=200 mm (7,87")		•
											For vertical installation:		
	•	•								pos. 36x	L=500 mm (19.7") (drilled holes also for 300 and 400mm (11.8 and 15.8"))		•
	•	•								pos. 36y	L=1.000 mm (39,4") (drilled holes also for 600/ 700/ 800 and 900mm (23,6/ 27,6/ 31,5 und 35,4"))		•
23	23									pos. 39x	Kit rope extension		
											L=2m, only available as full detector		•

- Available for temperatures up to 250°C (pos.3 1,2,3).
- Available for certificat CE, ATEX, IEC-Ex and TR-CU dust explosionproof (pos.2 0, W, A,E). Not with cable entry NPT (pos.28 a, c) and control lamp LED (pos.27 b). For ATEX, IEC-Ex and TR-CU the min. ambient temperature is -20°C (-4°F).
- Available for temp. up to 80°C and for pressure up to 0.8 bar, except M30x1.5 (pos. 6E). Note: 150°C version including FPM as standard.
- Available for temp. up to 150°C and for pressure up to 0.8 bar, except M30x1.5 (pos. 6E). Note: 250°C and 5bar/10bar PTFE included as standard.
- Available for temperature up to 250°C except M30x1.5 (pos. 6E), not for RN3002-rope strengthened (pos. 1H).
All bearings mounted in the extension are made of stainless steel.
- Available for all versions except explosionproof / flameproof version (pos.2 R,T,C,D,S,U,K,L).
- Available with universal voltage (pos.5 F,X). Not for CSA. Not in combination with fail safe alarm pos. 25x.
- Not with Ex-certification "increased safety" (pos. 2 R,C,S,K).
- Available with universal voltage (pos.5 F,X) and PNP (pos.5 G,H). Consider reduced switching sensitivity (see technical data).
Note: For temperatures down to -20°C (-4°F) the electronic "universal voltage" and "PNP" have "heating of housing" implemented by default (in this case option pos. 26x is not required).
- Available for CE (pos.2 0), not in combination with weather protection cover (pos 21) and cable entries pos.28 x,a,c.
In combination with universal voltage (pos.5 F, X) three bulbs (24V, 115V and 230V) will be delivered.
Connection of bulb signal lamp wires with internal terminals: without (standard) or according to customer specification.
- Available for all versions except explosionproof / flameproof version (pos.2 R,T,C,D,S,U,K,L), not in combination with power supply AC (Pos.5 A,B,C,D,S,T,U,V), not in combination with weather protection cover (pos 21).
- Available for certificate CE (pos. 2,0), not in combination with power supply AC (Pos.5 A,B,C,D,S,T,U,V).
- Available for all versions except flameproof version (pos.2 T,D,U,L) not in combination with power supply AC (Pos.5 A,B,C,D,S,T,U,V).
- Available for FM/CSA versions (pos.2 M,N,S) except flameproof version (pos.2 T,D,U,L).
- Available for CE, ATEX, IEC-Ex, TR-CU (pos.2 0,W,R,T,A,C,D,E,K,L)
- Available up to max. 250°C. Not for M30x1.5 (pos.6 E), vane (pos.10 M), flange sealings (pos.22). The option does not automatically implement a food conform design (food conform gaps and radiuses).
- Certificate only valid with the use of the "flush welding socket". With pos.29a this socket must be manufactured on site.
Available up to max. 250°C. Only for G 1 1/2" (pos.6 A). Not with vane pos.10 K, P,S,M,Y. Only vane D,R,J can be inserted through the flush welding socket. RN 3002/6002 only with bearing at tube end (pos 32x). Not in combination with options pos.15, 22, 24, 29y, 30, 31, 36, 39.
- Available for CE (pos.2 0). Process connection and material as choosen in pos.6 and 7.
- Available for temperatures up to 250°C. Process connection as choosen in pos.6. Not with material process connection alu (pos.7 1).
- Available for length L>300mm (pos.8 Z).
- Available for CE (pos.2 0). Without connection of stranded wires for installation and internal terminals (standard) or according to customer specification.
- Available for extension 100mm (pos.8,A) and 1.4305 (pos.9,3).

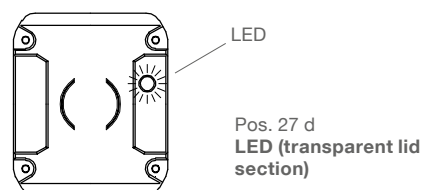
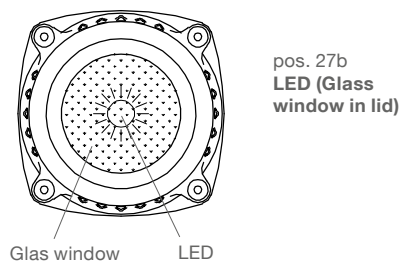
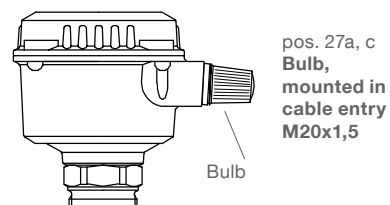
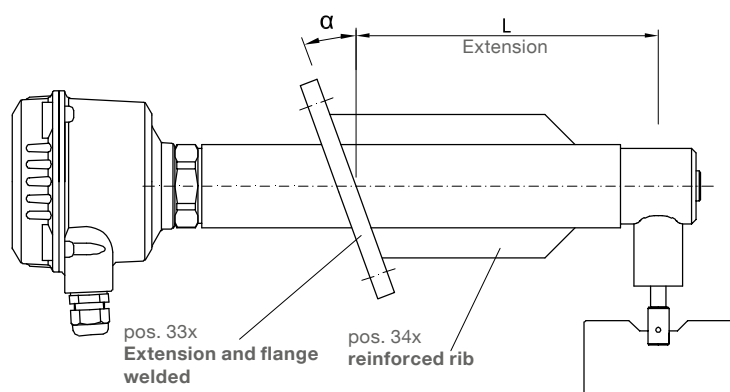
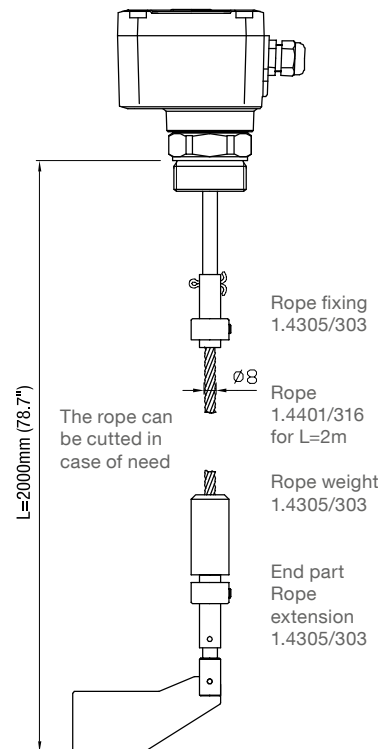
Options



pos. 36
Kit "pendulum shaft"

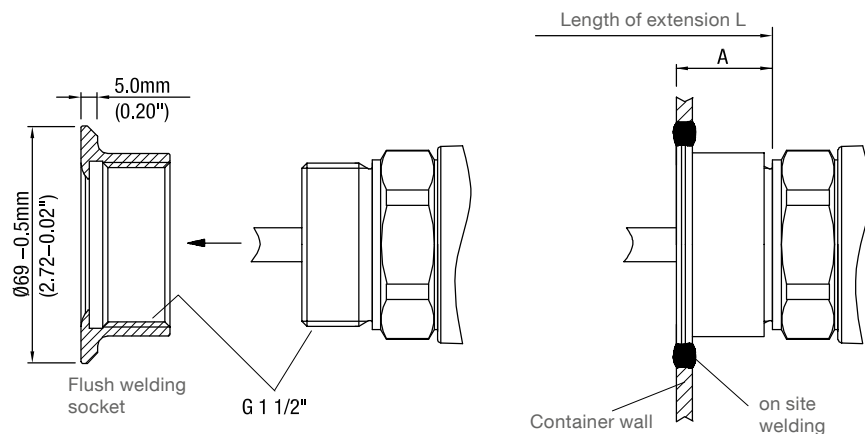


pos. 39
Kit „rope extension“

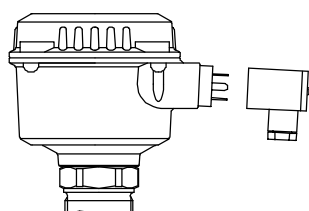


Options

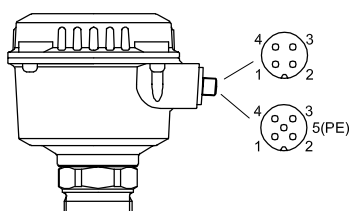
Pos. 29
EHEDG approval



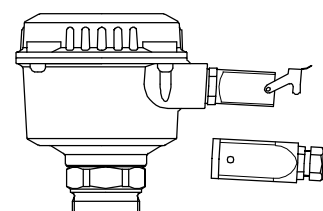
	A
RN ..001	28mm (1.1")
RN ..002/ ..004	38mm (1.5")



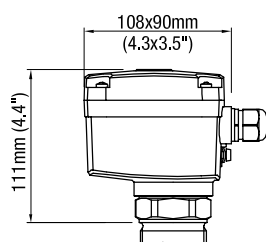
Pos. 35x
Valve connector
 Enclosure plastic
 Protection IP65



Pos. 35a,b
Plug M12
 Enclosure brass
 Protection IP67

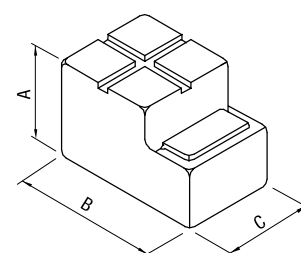


Pos. 35c
Plug Han 4A
 Enclosure zinc
 Protection IP65



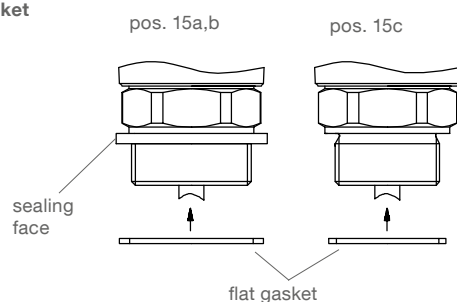
Pos. 16a
 Material of housing
 Plastics PA6

pos. 21x
Weather protection cover



	RN 3000	RN 6000
A	100mm (3.9")	130mm (5.1")
B	165mm (6.5")	200mm (7.9")
C	95mm (3.7")	125mm (4.9")

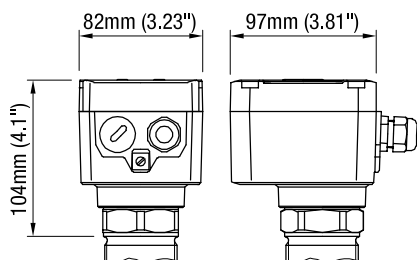
Pos. 15
Flat gasket



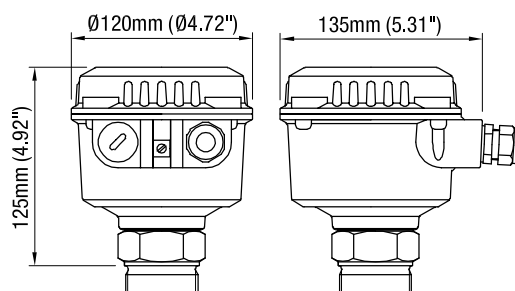
Dimensions

Housing versions

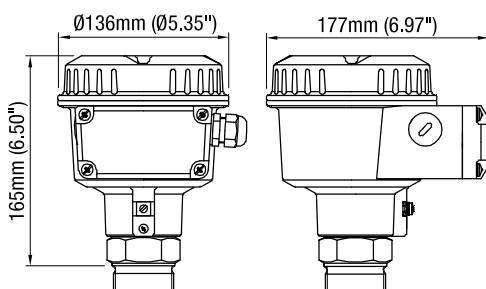
Series RN 3000
 Standard



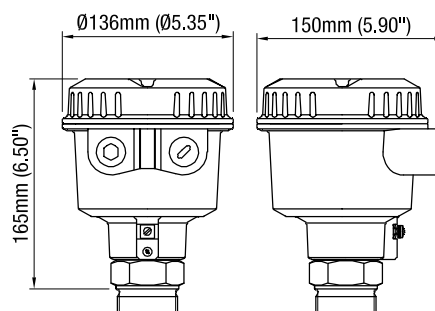
Series RN 6000
 Standard



Series RN 6000
 de explosionproof with increased
 safety terminal box

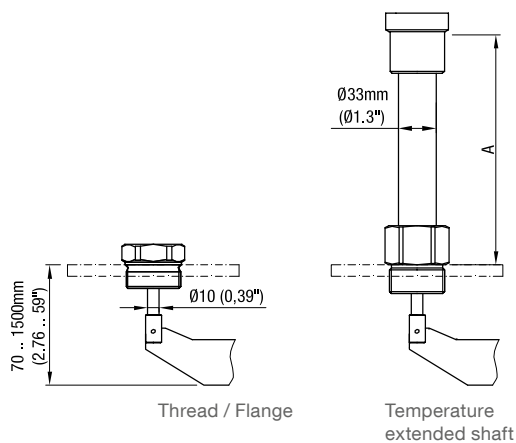


Series RN 6000
 d flameproof /explosionproof

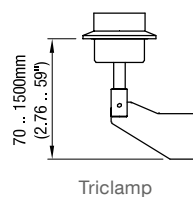


Extensions

RN ..001

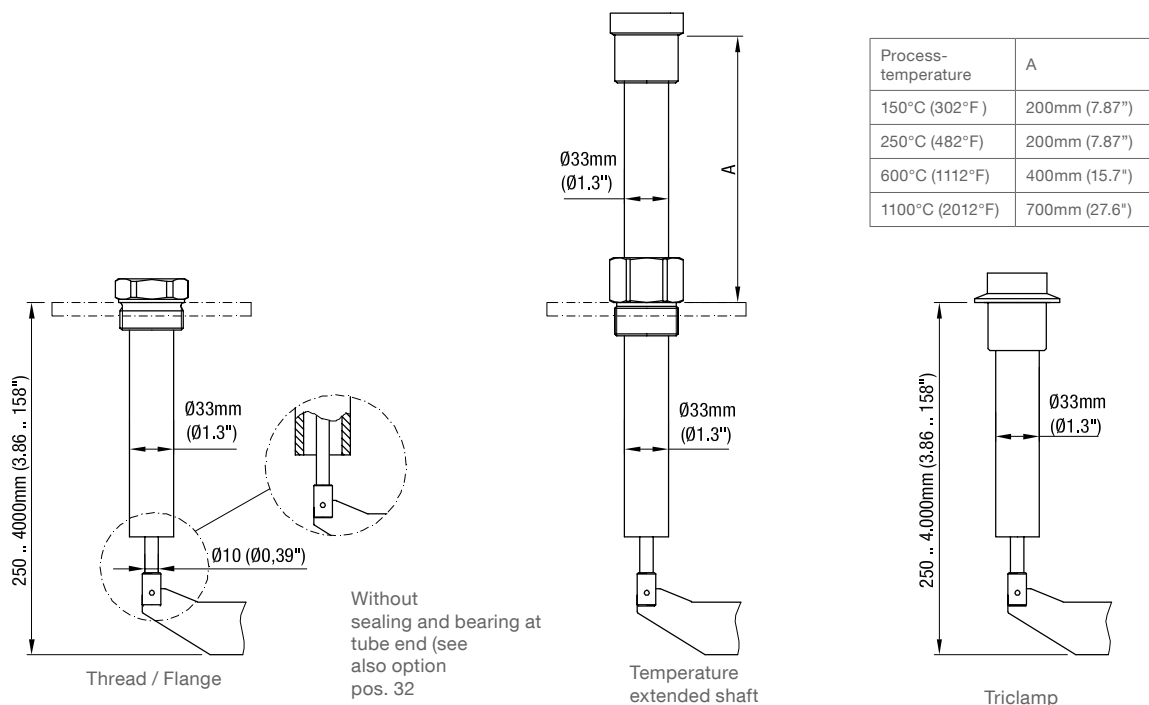


Process-temperature	A
150°C (302°F)	200mm (7.87")
250°C (482°F)	200mm (7.87")
350°C (662°F)	300mm (11.8")
600°C (1112°F)	400mm (15.7")
1100°C (2012°F)	700mm (27.6")

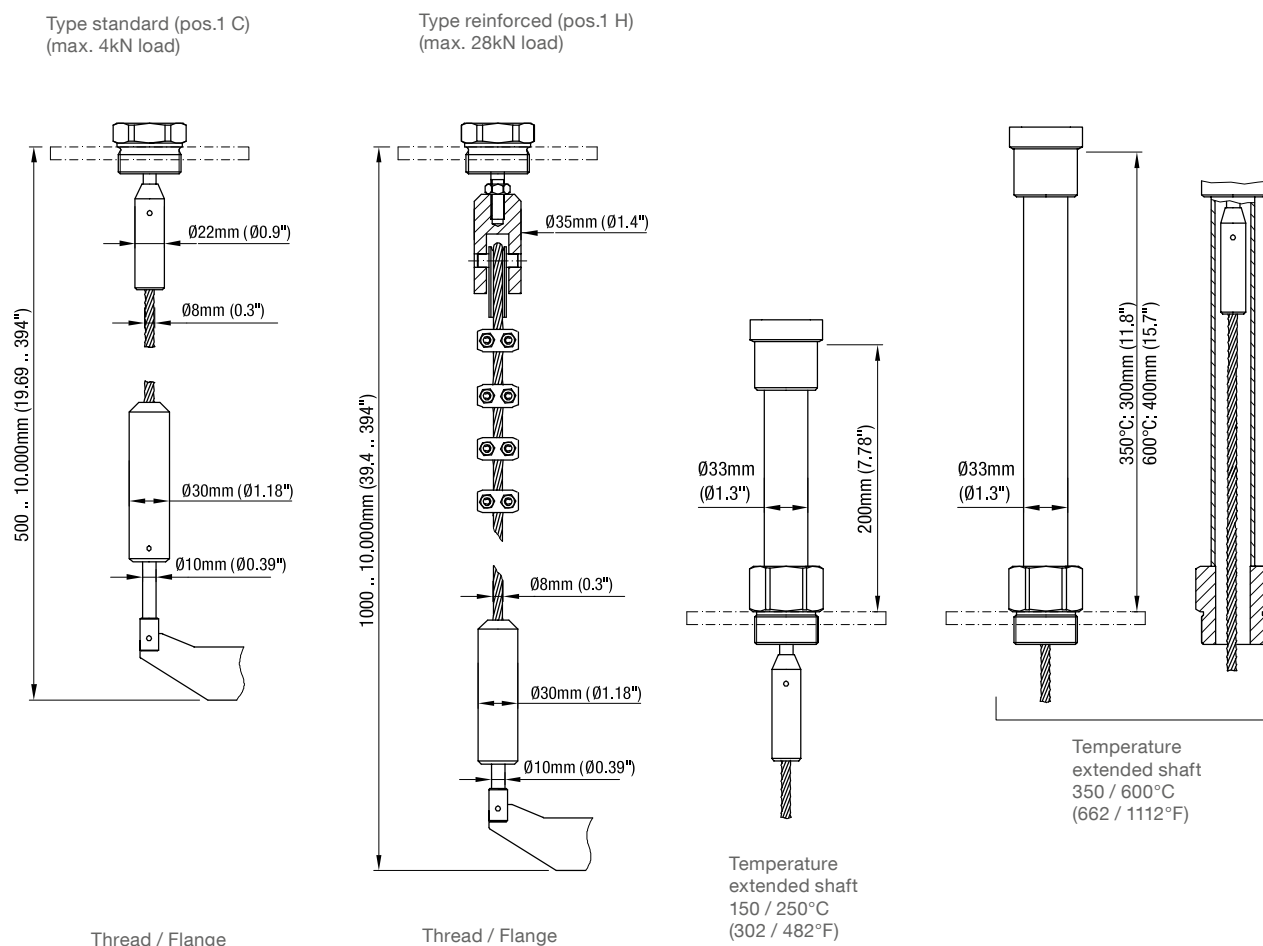


Dimensions

RN ..002

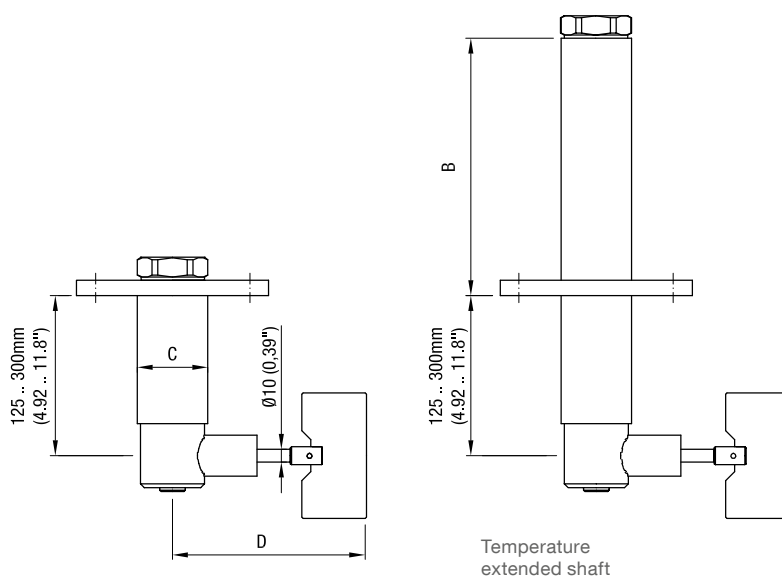


RN ..002 rope



Dimensions

RN ..003

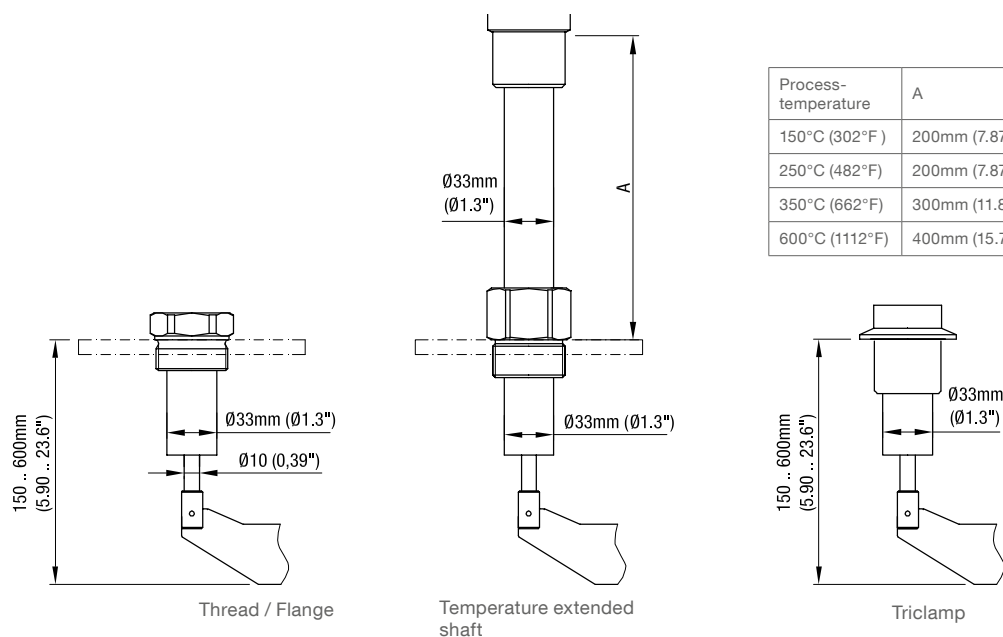


Process temperature	B
80°C (176°F) 0.8 bar (11.6psi)	10mm (0.39")
80°C (176°F) 5/ 10bar (73/ 145psi)	75mm (2.95")
150/ 250°C (302/ 482°F) 0.8/5/10 bar (11.6/73/145psi)	210mm (8.27")

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

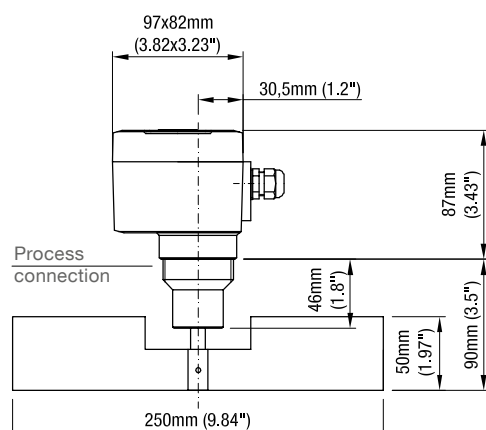
Vane	D
50mm x ..mm (1.97" x ..")	139mm (5.47")
98mm x ..mm (3.86" x ..")	187mm (7.36")

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

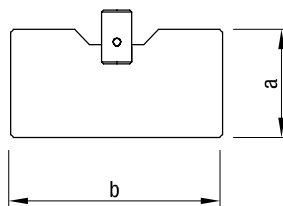


Dimensions

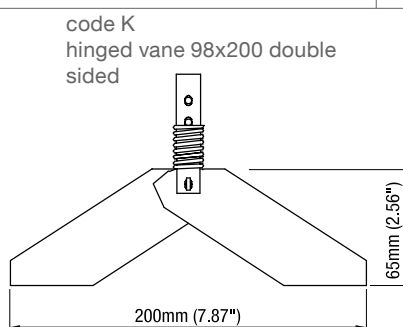
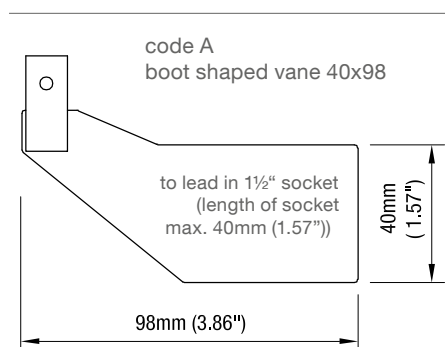
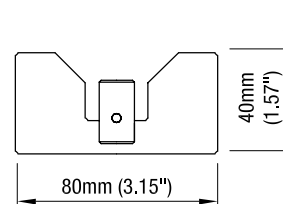
Measuring vanes

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")

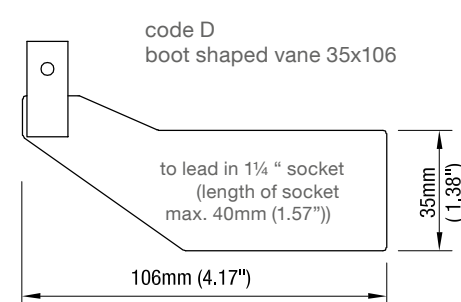
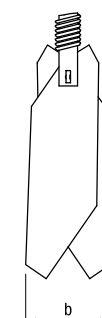
code B,C,E,F,G,I
 rectangular vane



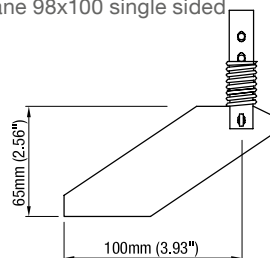
code P
 notched 40x80



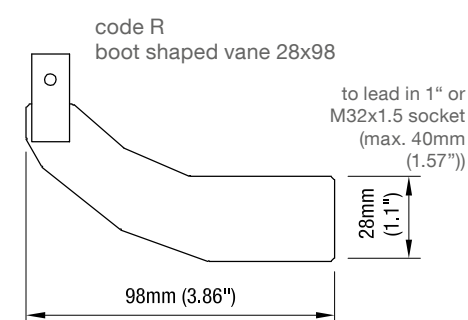
b=37mm (1,46")
 for 1 1/2" / 1 1/4"
 b=28mm (1,1")
 for 1" / M32x1,5



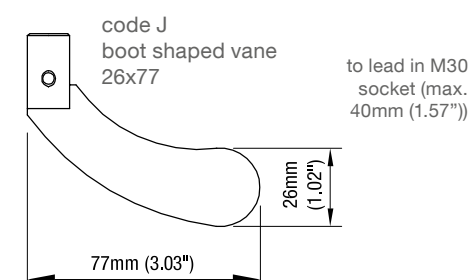
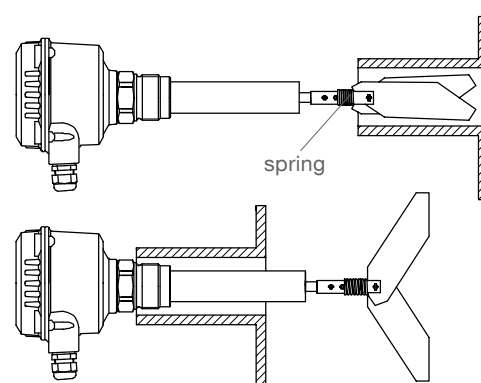
code S
 hinged vane 98x100 single sided



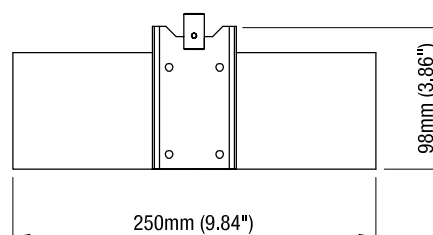
b=37mm (1,46")
 für 1 1/2" / 1 1/4"
 b=28mm (1,1")
 for 1" / M32x1,5



Insertion of the hinged vane
 through a long socket



code M
 rubber vane 98x250



Dimensions

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/m³ (lb/ft³) (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.

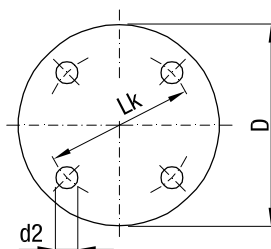
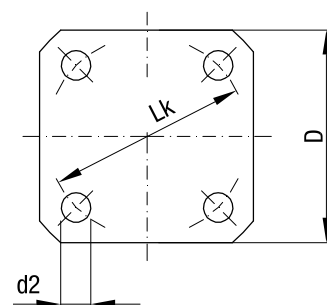
During the filling the bulk density can change (e. g. for fluidised material).

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

Dimensions / Detailed Ex-markings

Flanges

Code	Type	Number of holes	d2	Lk	D	T (thickness)
H	flange 150x150	4	18mm (0.71")	170mm (6.69")	150mm (5.90")	10mm (0.39")
I	flange 150x150	4	14mm (0.55")	170mm (6.69")	150mm (5.90")	10mm (0.39")
K	flange DN32 PN6	4	14mm (0.55")	90mm (3.54")	120mm (4.72")	14mm (0.55")
N	flange DN 50 PN16	4	18mm (0.71")	125mm (4.92")	165mm (6.50")	18mm (0.71")
L	flange DN100 PN6	4	18mm (0.71")	170mm (6.69")	210mm (8.27")	16mm (0.63")
M	flange DN100 PN16	8	18mm (0.71")	180mm (7.09")	220mm (8.66")	20mm (0.79")
S	flange 2" 150lbs	4	19.1mm (0.75")	120.7mm (4.75")	152.4mm (6.01")	19.1mm (0.75")
T	flange 3" 150lbs	4	19.1mm (0.75")	152.4mm (6.01")	190.5mm (7.5")	23.9mm (0.94")
U	flange 4" 150lbs	8	19.1mm (0.75")	190.5mm (7.5")	228.6mm (9")	23.9mm (0.94")



Detailed Ex-markings

pos. 2	Certificate	Housing
0	CE	Standard
W	ATEX II 1/2D Ex t IIIC T! Da/Db IP6X	Standard
R	ATEX II 2G Ex de IIC T! Gb and ATEX II 1/2D Ex t IIIC T! Da/Db IP6X	de
T	ATEX II 2G Ex d IIC T! Gb and ATEX II 1/2D Ex t IIIC T! Da/Db IP6X	d
A	IEC-Ex t IIIC T! Da/Db IP6X	Standard
C	IEC-Ex de IIC T! Gb and t IIIC T! Da/Db IP6X	de
D	IEC-Ex d IIC T! Gb and t IIIC T! Da/Db IP6X	d
M	FM / CSA general purpose	Standard
N	FM / CSA DIP Cl. II, III Div. 1 Gr. E,F,G CSA Ex DIP A20/21	Standard
S	FM Cl. I Zone 1 AEx de IIC and FM / CSA DIP Cl. II,III Div. 1 Gr. E,F,G CSA Cl. I Zone 1 Ex de IIC and CSA Ex DIP A20/21	de
U	FM XP Cl. I,II,III Div. 1 Gr. B-G and FM Cl. I Zone 1 AEx d IIC CSA XP Cl. I,II,III Div. 1 Gr. B-G CSA Cl. I Zone 1 Ex d IIC and CSA Ex DIP A20/21	d
E	TR-CU Ex ta/tb IIIC T! Da/Db X	Standard
K	TR-CU Ex de IIC T! Gb X Ex ta/tb IIIC T! Da/Db X	de
L	TR-CU Ex d IIC T! Gb X Ex ta/tb IIIC T! Da/Db X	d

Electrical installation Series RN 3000

Version:

- AC
- DC
- Universal voltage

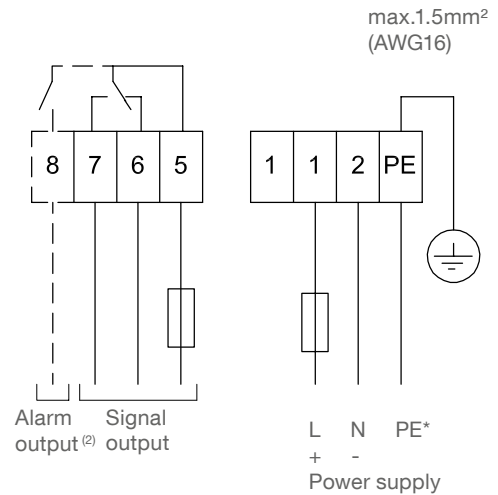
Power supply:

- **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 ($\cos\varphi = 1$)
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:

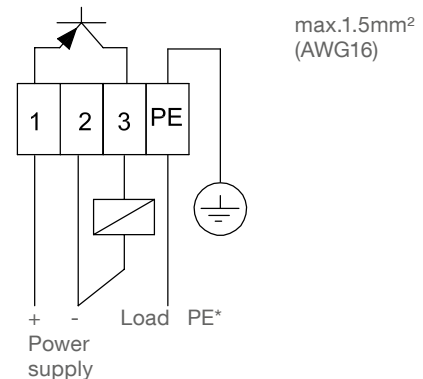
- PNP

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:

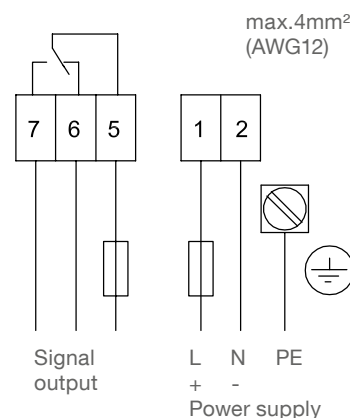
- **AC version:**
 24V or 48V or 115V or 230V 50/60Hz max. 4VA
 All voltages $\pm 10\%$ ⁽¹⁾
 Supply voltage as selected.
 External fuse: max 10A, fast or slow, HBC, 250V

- **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
 (ohne SIL 2)

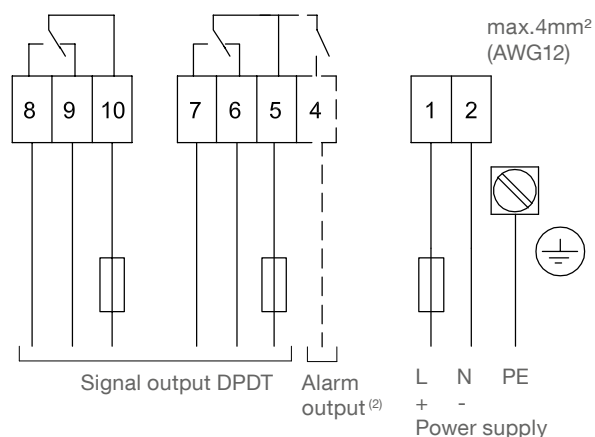
Power supply:

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

Version:

- Universal voltage
 SIL 2

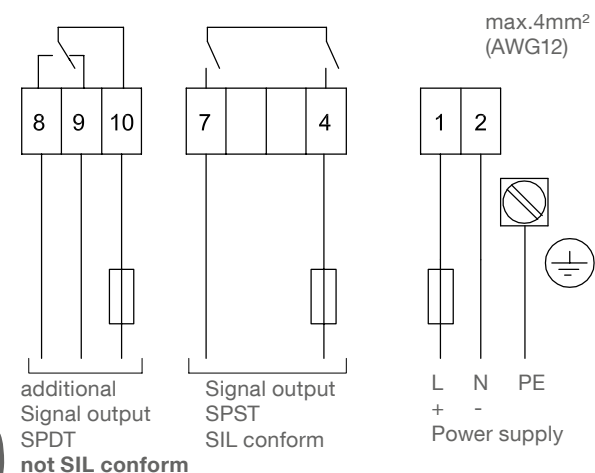
Power supply:

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

⁽¹⁾ including $\pm 10\%$ of EN 61010

Signal output:

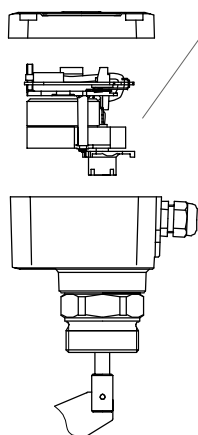
Relay SPST/ SPDT
 max. 250V AC, 5A, non inductive;
 max. 30V DC, 4A, non inductive
 External fuse: max 10A, fast or slow, HBC, 250V



* 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.

Spare parts



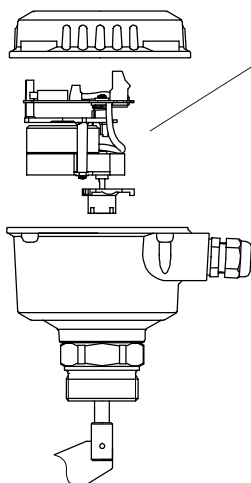
Series RN 3000 Motor / PCB

Order code			Voltage	Motor Speed	Spare part Article number	
Pos. 5 Power supply	Pos. 25x Fail safe alarm	Pos. 26x Heating of housing				
A	-	-	230V AC	1/min	gm402000	•
S	-	-		5/min	gm403000	•
B	-	-	115V AC	1/min	gm402005	•
T	-	-		5/min	gm403005	•
C	-	-	48V AC	1/min	gm402015	•
U	-	-		5/min	gm403015	•
D	-	-	24V AC	1/min	gm402010	•
V	-	-		5/min	gm403010	•
E	-	-	24V DC	1/min	gm402020	•
W	-	-		5/min	gm403020	•
G	-	-	24V DC PNP	1/min	gm402026*	•
H	-	-		5/min	gm403026*	•
F	-	-	24V DC / 22 ... 230V AC Universal voltage	1/min	gm402038*	•
F	x	-		1/min	gm404038* **	•
F	-	x		1/min	gm402039*	•
F	x	x		1/min	gm404039* **	•
X	-	-		5/min	gm403038*	•
X	x	-		5/min	gm405038* **	•
X	-	x		5/min	gm403039*	•
X	x	x		5/min	gm405039* **	•
M	-	-	230V AC/115V AC/24V DC Multivoltage	1/min	gm402025	•
Y	-	-		5/min	gm403025	•

* This module requires a higher housing lid than the other modules. Therefore it can not be mounted into a housing, where a different module was present before.

** This module requires a sensor to detect the motor rotation, which is mounted inside the housing. Therefore it can not be mounted into a housing where a different module was present before.

Spare parts



Series RN 6000 Motor / PCB

Equipment code				Voltage	Motor Speed	Spare part Article number
Pos. 5 Power supply	Pos. 25b SIL 2**	Pos. 25x Fail safe alarm	Pos. 26x Heating of housing			
A	-	-	-	230V AC	1/min	gm412000
S	-	-	-		5/min	gm413000
B	-	-	-	115V AC	1/min	gm412005
T	-	-	-		5/min	gm413005
C	-	-	-	48V AC	1/min	gm412015
U	-	-	-		5/min	gm413015
D	-	-	-	24V AC	1/min	gm412010
V	-	-	-		5/min	gm413010
E	-	-	-	24V DC	1/min	gm412020
W	-	-	-		5/min	gm413020
F	-	-	-	24V DC / 22 ... 230V AC Universal voltage	1/min	gm412038
F	-	x	-		1/min	gm414038*
F	-	-	x		1/min	gm412039
F	-	x	x		1/min	gm414039*
X	-	-	-		5/min	gm413038
X	-	x	-		5/min	gm415038*
X	-	-	x		5/min	gm413039
X	-	x	x		5/min	gm415039*
M	-	-	-	230V AC/115V AC/ 24V DC Mutivoltage	1/min	gm410000
Y	-	-	-		5/min	gm420000

* This module requires a sensor to detect the motor rotation, which is mounted inside the housing. Therefore it can not be mounted into a housing where a different module was present before.

** Moduls for units with SIL certificate must be replaced by the manufacturer.

Spare parts

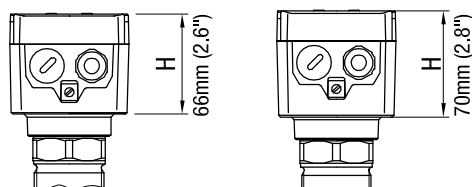
	Fitting to unit / model code	Description see page	Spare part Article number	
Measuring vane (delivery incl. cotter pin)				
Boot shaped 40 x 98mm (1.4305)	Pos.10 A with 9.3	P27	fg400605	•
Boot shaped 40 x 98mm (1.4404)	Pos.10 A with 9.7	P27	fg400502	•
Boot shaped 35 x 106mm (1.4305)	Pos.10 D with 9.3	P27	fg400508	•
Boot shaped 35 x 106mm (1.4404)	Pos.10 D with 9.7	P27	fg400509	•
Boot shaped 28 x 98mm (1.4305)	Pos.10 R with 9.3	P27	fg400603	•
Boot shaped 28 x 98mm (1.4404)	Pos.10 R with 9.7	P27	fg400604	•
Boot shaped 26 x 77mm	Pos.10 J	P27	fg400607	•
Rectangular 50 x 98mm	Pos.10 B	P27	fg400610	•
Rectangular 50 x 150mm	Pos.10 C	P27	fg400620	•
Rectangular 50 x 250mm	Pos.10 E	P27	fg400630	•
Rectangular 98 x 98mm (1.4305)	Pos.10 F with 9.3	P27	fg400635	•
Rectangular 98 x 98mm (1.4404)	Pos.10 F with 9.7	P27	fg400032	•
Rectangular 98 x 150mm	Pos.10 G	P27	fg400637	•
Rectangular 98 x 250mm	Pos.10 I	P27	fg400650	•
Hinged vane 98 x 200mm double sided (37mm for G 1 1/2" and G 1 1/4") (1.4305,max.250°C)	Pos.10 K with 9.3	P27	fg400081	•
Hinged vane 98 x 200mm double sided (37mm for G 1 1/2" and G 1 1/4") (1.4404,max.250°C)	Pos.10 K with 9.7	P27	fg400087	•
Hinged vane 98 x 200mm double sided (28mm for G 1" and M32) (1.4305,max.250°C)	Pos.10 K with 9.3	P27	fg400085	•
Hinged vane 98 x 100mm single sided (37mm for G 1 1/2" and G 1 1/4") (1.4305,max.250°C)	Pos.10 S with 9.3	P27	fg400084	•
Hinged vane 98 x 100mm single sided (37mm for G 1 1/2" and G 1 1/4") (1.4404,max.250°C)	Pos.10 S with 9.7	P27	fg400088	•
Hinged vane 98 x 100mm single sided (28mm for G 1" and M32) (1.4305,max.250°C)	Pos.10 S with 9.3	P27	fg400086	•
Rubber vane 98 x 250mm	Pos.10 M	P27	fg400565	•
Notched 40 x 80mm	Pos.10 P	P27	fg400614	•
VT vane	Pos.10 N	P18	fg400026	•

Extension parts

Extension shaft ø10mm: (delivery incl. fixing parts)	by 50mm	RN 3001/6001	-	we400005	•
	by 100mm	RN 3001/6001	-	we401023	•
	by 150mm	RN 3001/6001	-	we401025	•
	by 200mm	RN 3001/6001	-	we401026	•
Pendular shaft L=500mm (delivery incl. fixing parts)		RN 3001/6001/pos.36	P22	zu400131	•
Pendular shaft L=1000mm (delivery incl. fixing parts)		RN 3001/6001/pos.36	P22	zu400132	•
Kit rope extension L=2000mm (implements 2m single rope (zu400729) and rope fixing parts (zu400110))		RN 3001/6001/Pos.39	P22	zu400100	•
Single rope ø8mm, tail welded, price per meter		RN 3002/6002-rope RN3001/RN6001/Pos.39	P25 P22	zu400729	•
Rope fixing parts, usable for kit rope extension		RN3001/RN6001/Pos.39	P22	zu400110	•
Rope weight ø30mm (delivery incl. fixing parts)		RN 3002/6002-rope	P25 below	we400720	•
Rope holder ø22mm (for version Pos.1C) (delivery incl. fixing parts)		RN 3002/6002-rope	P25 below	we400700	•

Spare parts

	Fitting to unit / model code	Description see page	Spare part Article number	
Hexagon nut				
1 1/2" aluminium	Pos.6 A	P22	zu300170	•
1 1/2" stainless steel 1.4305	Pos.6 A	P22	zu300180	•
1 1/4" aluminium	Pos.6 B	P22	zu300171	•
1 1/4" stainless steel 1.4305	Pos.6 B	P22	zu300181	•
1" aluminium	Pos.6 C	P22	zu200150	•
1" stainless steel 1.4305	Pos.6 C	P22	zu200160	•
M32 aluminium	Pos.6 D	P22	zu200120	•
M32 stainless steel 1.4305	Pos.6 D	P22	zu200130	•
M30 aluminium	Pos.6 E	P22	zu200170	•
M30 stainless steel 1.4305	Pos.6 E	P22	zu200180	•
Flush welding socket				
Flush welding socket ø69/G 1½" made of Aluminium	Pos.29 b	P23	bu400500	•
Flush welding socket ø69/G 1½" made of 1.4301 (304)	Pos.29 c	P23	bu400501	•
Flush welding socket ø69/G 1½" made of 1.4404 (316L)	Pos.29 d	P23	bu400502	•
Weather protection cover				
RN 3000 (for lower housing, dimension H = 66mm)	Pos.21 x	P23	zu300230	•
RN 3000 (for higher housing, dimension H = 70mm)	Pos.21 x	P23	zu300232	•
RN 6000 standard housing	Pos.21 x	P23	zu300240	•





Rotonivo[®] 4000

Rotating level limit switch

The reliable solution with a plastic housing – versatile, robust construction, also for applications in hazardous locations



Rotonivo® 4000

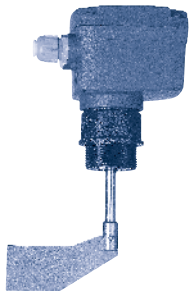


- Plastic version
- Suitable for nearly all bulk goods
- Simple and reliable measuring principle, easy, fast installation

Application: The Rotonivo® 4000 can be used as a full, demand or empty detector in bulk good silos depending on needs. It is mainly suited for lower mechanical loads in a variety of materials, e.g. cement, detergent, feed, chalk, grains, plastic granulate and much more.

RN 4001 Standard

Full, demand, empty detector
Standard design, vertical, horizontal and oblique installation
Extension up to 1000 mm



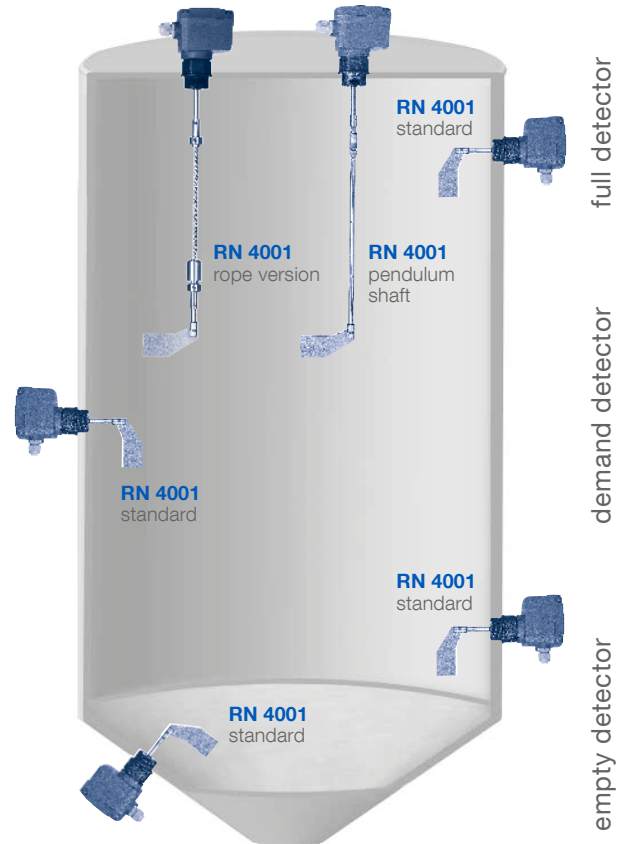
RN 4001 Pend. Shaft

Full detector
Design with option pendulum shaft, vertical installation



RN 4001 Rope

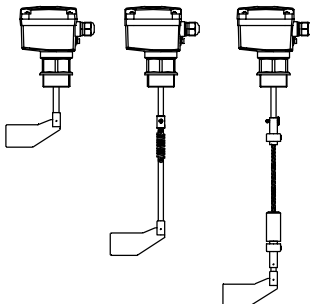
Full detector
Design with rope extension, vertical installation



Technical Data

Housing	Plastic PA 6 GF, IP 66	
Certificates	ATEX II 1/2D, IECEx, TR-CU	
Process temperature	-40°C up to +80°C (-40°F up to +176°F)	
Pressure	-0.9 up to +0.8 bar (-13.1 up to 11.6 psi)	
Sensitivity	From 100g/l (6lb/ft³) – adjustable in 3 steps	
Mains voltage	Universal-Voltage-Electronic AC: 24V / 48V / 115V / 230V, DC: 24V	
Process connection	G 1", G 1 1/4" and G 1 1/2", M30x1.5, M32x1.5 incl. sealing face	
Bearing	Process connection aluminium: ball bearing, dust tight Process connection plastics: slide bearing (maintenance-free, high-quality)	
Material	Process connection:	Plastic PA 6 GF, aluminium
	Shaft:	Stainless steel 1.4305
	Paddles:	Stainless steel 1.4301 Plastic PP

Table of contents

	Page
Overview / Specification / Applications	2
<hr/>	
Selection	3
	
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Options	4
Dimensions	6
Electrical connections	8
Spare parts	9

Subject to change.

All dimensions in mm (inches).

All prices in Euro, excluding VAT.

All prices are EXW Betzigau, excluding packaging costs.

Valid: From 01.04.2017 until 31.03.2018, unless otherwise agreed.

By publishing this selection list all other lists become invalid.

We assume no liability for typing errors.

Different variations to those specified are possible.
Please contact our technical consultants.

Overview / Specification / Applications

- Level limit detection in bulk goods / solids
- Compact unit
- Wide range of applications, no maintenance
- Full-, demand-, empty detector
- Flexible extensions (kits)
- ATEX / IEC-Ex / INMETRO approvals (Dust Ex)
- TR-CU
- 2011/65/EU RoHS conform



Approvals	CE	
	ATEX / IEC-Ex / INMETRO	Zone 20/21 (Dust Ignition Proof)
	TR-CU	Ordinary Locations Dust Ignition Proof

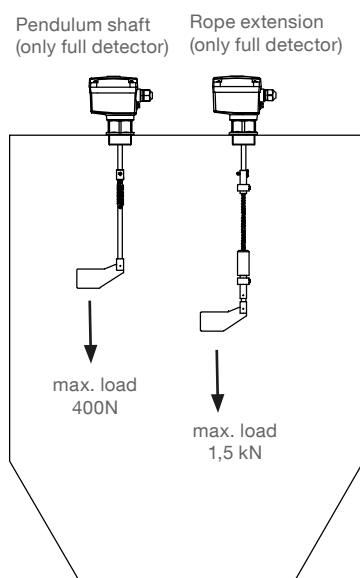
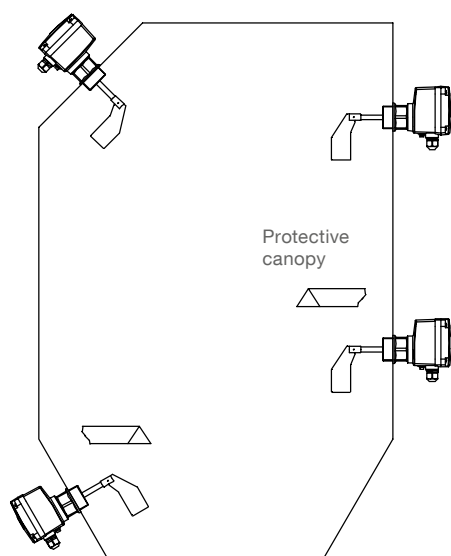
Technical data	Ambient temperature	-20 .. +60°C (-4 .. +140°F) -40 .. +60°C (-40 .. +140°F) with *heating *for certificate CE
	Process temperature	-20 .. +80°C (-4 .. +176°F) -40 .. +80°C (-40 .. +176°F) with *heating *for certificate CE
	Process pressure	-0.9 .. +0,8 bar (-13.1 .. 11.6psi)
	Type of protection	IP66
	Material housing	Plastics PA6
	Material process connection	Aluminum or plastics PA6
	Material of measuring vane / shaft / extensions	1.4301 (SS304) / 1.4305 (SS303)

Electronics						
Supply		Signal output				
		SPDT (1)	PNP	FSH/ FSL (2)	Adjust. delay	Fail safe alarm
AC version	24V or 48V or 115V or 230V AC	•	-	-	-	-
DC version	24VDC	•	-	-	-	-
DC version	24VDC PNP	-	•	•	•	-
Universal voltage	24VDC /22..230V AC	•	-	•	•	option

(1) Micro switch, Relais for universal voltage

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

Applications



•

[illegible]

← **Order code**

(1) TR-CU (Ordinary Locations) included
(2) maximum length of socket 40mm
(3) specification of length valid with process connection material plastics
(4) INMETRO included

Options

pos. 11	x	Guarantee extension to 5 years	•
pos. 15		Flat gasket	
	a	for process connection thread G 1 1/2" aluminium (pos.4.A, pos.5.2), incl. sealing face	•
	b	for all other process connections	•
pos. 21	x	Weather protection cover	•
pos. 23	a	Vane extension plastics, for universal vane pos. 6 U	•
pos. 24		Hexagon nut	
	a	aluminium 1 piece	•
	b	aluminium 2 pieces	•
	e	stainless steel (1.4305/303) 1 piece	•
	f	stainless steel (1.4305/303) 2 pieces	•
pos. 25	x	Fail safe alarm² (for 24V DC/22 .. 230V AC universal voltage)	•
pos. 26	x	Heating of housing³ 2,5 watt for ambient-/process temperature to -40°C (-40°F)	•
pos. 27		Control bulk⁴	
	a	bulk, mounted in cable entry M20x1,5 2W green	•
	c	bulk, mounted in cable entry M20x1,5 2W red	•
	d	LED (transparent lid section) ⁵	•
pos. 28	x	Second screwed cable gland M20x1,5 (not mounted)	•
pos. 39		Kit "rope extension" (only available as full detector)	
	x	L = 2m	•
pos. 40		Kit "pendulum shaft" max. tension 400N, only with Pos. 7A For vertical and horizontal installation:	
	w	L= 200mm	•
		For vertical installation:	
	a	L=500mm (drilled holes also for 300 and 400mm)	•
	b	L=1000mm (drilled holes also for 600, 700, 800 and 900mm)	•

2 Available with universal voltage (pos. 3 F, X)

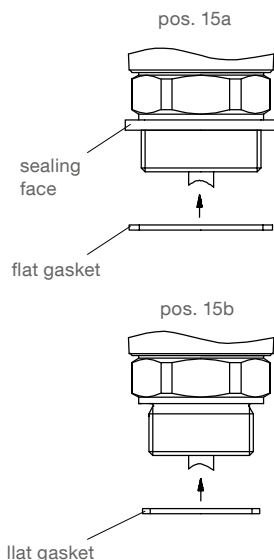
3 Available with CE (pos.2 0) and universal voltage (pos.3 F,X) and PNP (pos. 3 G,H). Consider reduced switching sensitivity (see technical data). Note: For temperatures down to -20°C (-4°F) the electronic "universal voltage" and "PNP" have a "heating of housing" implemented by default (in this case option pos. 26x is not needed).

4 Available for CE (pos. 2,0)

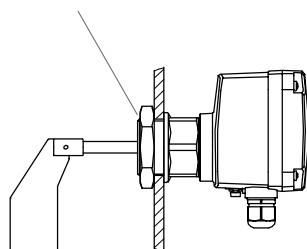
5 Not in combination with power supply AC (Pos. 3 A,B,C,D,S,T,U,V).

Options

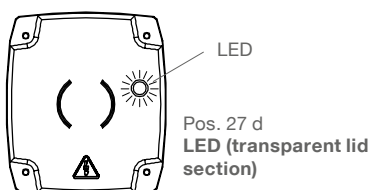
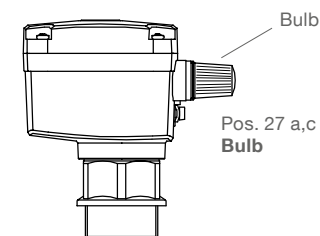
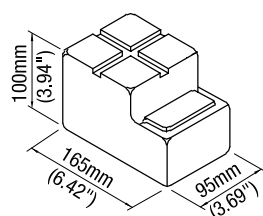
pos. 15
Flat gasket



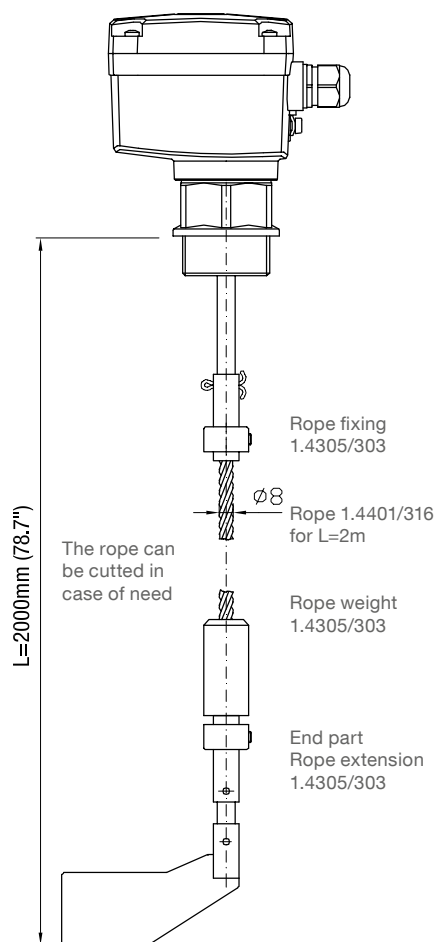
pos. 24
Hexagon nut



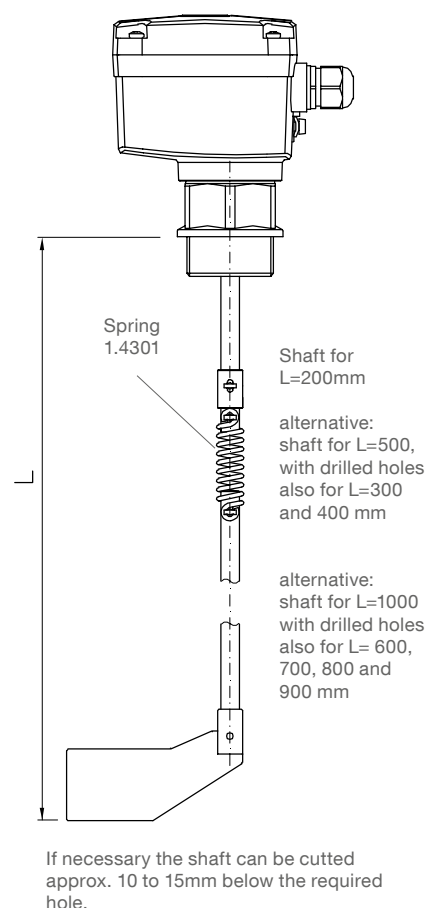
pos. 21
Weather protection cover



pos. 39
Kit „rope extension“

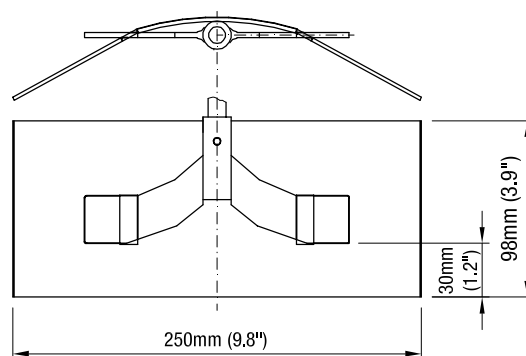


pos. 40
Kit „pendulum shaft“

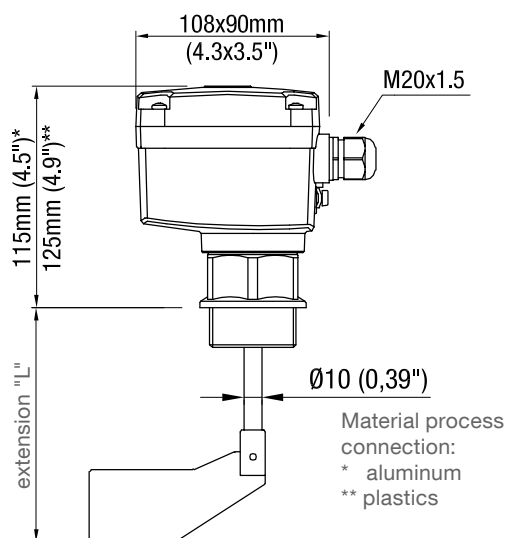


Pos. 27
Control lamp

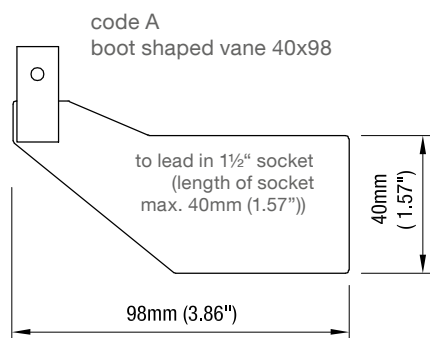
Pos. 23a
Vane extension (plastics)



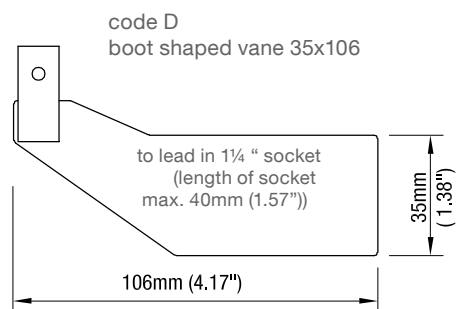
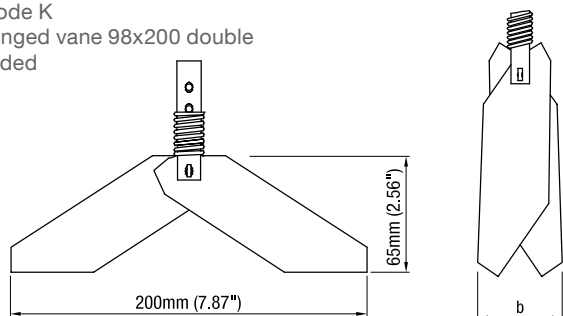
Dimension



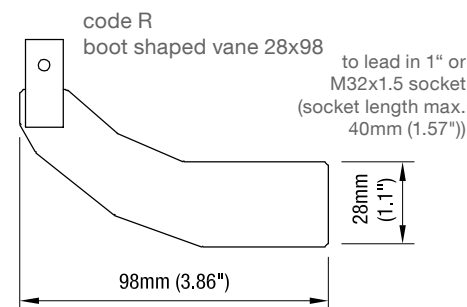
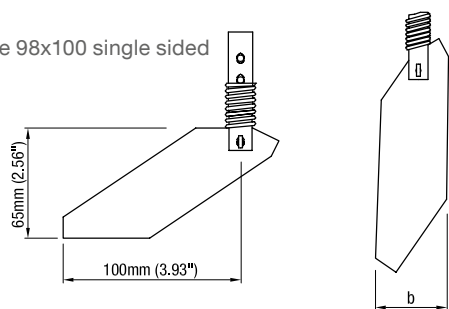
Measuring vanes



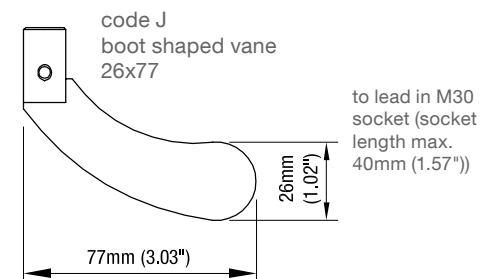
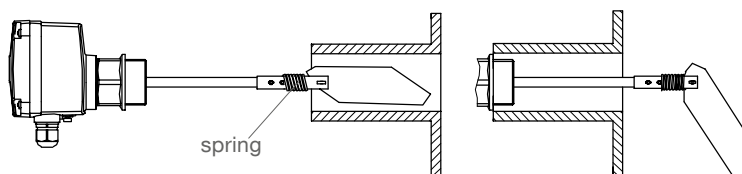
code K
 hinged vane 98x200 double
 sided



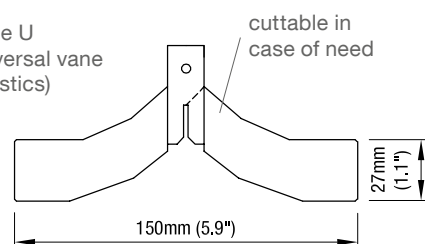
code S
 hinged vane 98x100 single sided



Insertion of the hinged vane through a long socket



code U
 universal vane
 (plastics)



Dimension

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/m³ (lb/ft³) (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 vane 26x77	350 (21)	560 (33)	200 (12)	250 (15)
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.

Electrical installation

Version:

- AC
- DC
- **Universal voltage**

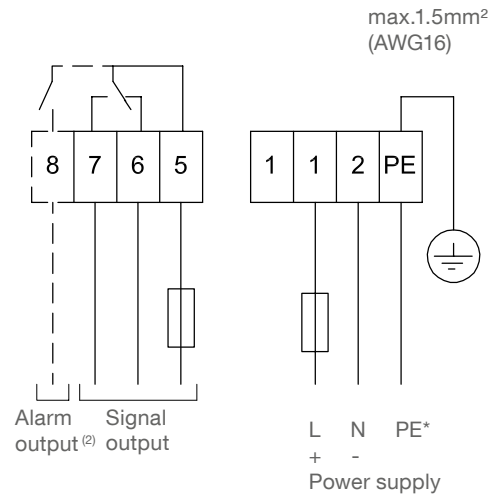
Power supply:

- **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:

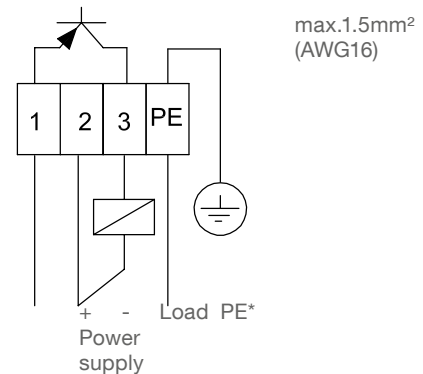
- PNP

Power supply:

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

Signal output:

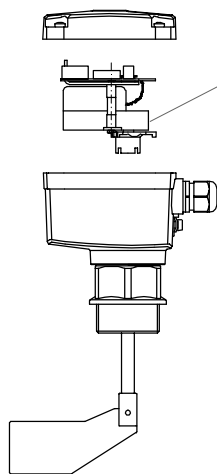
Load max. 0.4A
Output voltage equal to input voltage, drop < 2.5V
Open collector
Protected against short circuit and overload



* 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.

Spare parts

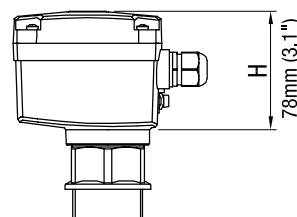
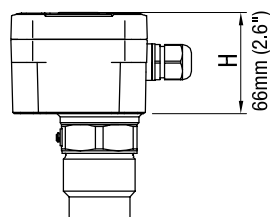


Motor / PCB

Order code			Voltage	Motor Speed	Spare part Article number
Pos. 3 Power supply	Pos. 25x Fail safe alarm	Pos. 26x Heating of housing			
A	-	-	230V AC	1/min	gm402000
S	-	-		5/min	gm403000
B	-	-	115V AC	1/min	gm402005
T	-	-		5/min	gm403005
C	-	-	48V AC	1/min	gm402015
U	-	-		5/min	gm403015
D	-	-	24V AC	1/min	gm402010
V	-	-		5/min	gm403010
E	-	-	24V DC	1/min	gm402020
W	-	-		5/min	gm403020
G	-	-	24V DC PNP	1/min	gm402026*
H	-	-		5/min	gm403026*
F	-	-	24V DC / 22 ... 230V AC Universal voltage	1/min	gm402038*
F	x	-		1/min	gm404038* **
F	-	x		1/min	gm402039*
F	x	x		1/min	gm404039* **
X	-	-		5/min	gm403038*
X	x	-		5/min	gm405038* **
X	-	x		5/min	gm403039*
X	x	x		5/min	gm405039* **
M	-	-	230V AC/115V AC/24V DC Mutivoltage	1/min	gm402025
Y	-	-		5/min	gm403025

* For lower housing (H=66mm): This module requires a higher housing lid than the other modules. Therefore it can not be mounted into a housing, where a different module was present before.

For higher housing (H=78mm): No restriction



** This module requires a sensor to detect the motor rotation, which is mounted inside the housing. Therefore it can not be mounted into a housing, where a different module was present before.

Spare parts

	Fitting to unit / model code	Description see page	Spare part Article number	
Measuring vane (delivery incl. cotter pin)				
Boot shaped 40 x 98mm	Pos.6 A	6	fg400605	•
Boot shaped 35 x 106mm	Pos.6 D	6	fg400508	•
Boot shaped 28 x 98mm	Pos.6 R	6	fg400603	•
Hinged vane 98 x 200mm double sided (37mm for G 1 1/2" and G 1 1/4")	Pos.6 K	6	fg400081	•
Hinged vane 98 x 200mm double sided (28mm for G 1" and M32)	Pos.6 K	6	fg400085	•
Hinged vane 98 x 100mm single sided (37mm for G 1 1/2" and G 1 1/4")	Pos.6 S	6	fg400084	•
Hinged vane 98 x 100mm single sided (28mm for G 1" and M32)	Pos.6 S	6	fg400086	•
Boot shaped 26 x 77mm	Pos.6 J	6	fg400607	•
Universal vane 27 x 150mm	Pos.6 U	6	fg402010	•
Vane extension for universal vane 98 x 250mm	Pos.23	5	fg200070	•

Extension parts

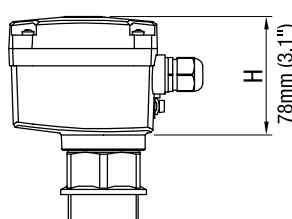
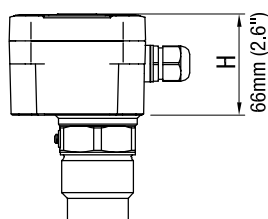
Extension shaft ø10mm: (delivery incl. fixing parts)	by 50mm	RN 4001	-	we400005	•
	by 100mm	RN 4001	-	we401023	•
	by 150mm	RN 4001	-	we401025	•
	by 200mm	RN 4001	-	we401026	•
Kit Pendular shaft L=500mm (delivery incl. fixing parts)		Pos.40	5	zu400130	•
Kit Pendular shaft L=1000mm (delivery incl. fixing parts)		Pos.40	5	zu400140	•
Kit rope extension L=2000mm (implements 2m single rope (zu400729) and rope fixing parts (zu400110))		Pos. 39	22	zu400100	•
Single rope ø8mm, tail welded, price per meter		Pos. 39	5	zu400729	•
Rope fixing parts, usable for kit rope extension		Pos. 39	5	zu400110	•

Hexagon nut

1 1/2" aluminium	Pos.24 A	5	zu300170	•
1 1/2" stainless steel 1.4305	Pos.24 A	5	zu300180	•
1 1/4" aluminium	Pos.24 B	5	zu300171	•
1 1/4" stainless steel 1.4305	Pos.24 B	5	zu300181	•
1" aluminium	Pos.24 C	5	zu200150	•
1" stainless steel 1.4305	Pos.24 C	5	zu200160	•
M32 aluminium	Pos.24 D	5	zu200120	•
M32 stainless steel 1.4305	Pos.24 D	5	zu200130	•
M30 aluminium	Pos.24 E	5	zu200170	•
M30 stainless steel 1.4305	Pos.24 E	5	zu200180	•

Weather protection cover

for lower housing, dimension H = 66mm	Pos.21 x	5	zu300230	•
for higher housing, dimension H = 78mm	Pos.21 x	5	zu300232	•





Vibranivo® 1000 / 5000

Vibration level limit switch

The universal unit for reliable level monitoring of granulated and powdered bulk goods – versatile, suitable especially for applications with high mechanical loading and measurement of bulk goods in liquids; certified for hazardous locations (gas and dust)



Vibranivo® 1000 / 5000



- Modular and simple design
- For applications with high mechanical loading
- Particularly suitable for interface measurement
- Absolutely maintenance free

Application: Vibranivo® probes can be used as full, demand or empty detectors in bulk good silos. They are especially suited for use in all solids which are conveyed or stored under extreme conditions as well as for interface measurement. The short fork design allows mounting in containers with very limited space. Vibranivo vibration forks are available with international certificates for applications in hazardous locations (gas and dust).

Types of Vibranivo demand, full and empty detectors:

Vibranivo ..020

Short extension length, vertical, horizontal and oblique installation



Vibranivo ..030

Design with pipe extension, vertical and oblique installation



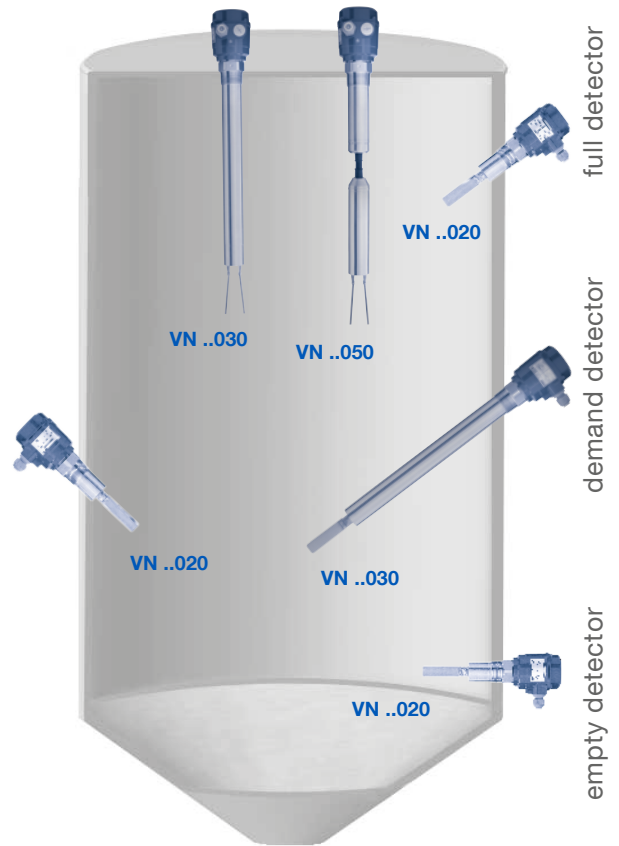
Vibranivo ..040

Delivery without pipe extension (reduced shipping costs, flexible length), vertical and oblique installation



Vibranivo ..050

Model with cable extension, vertical installation up to 7m measuring range



Technical Data

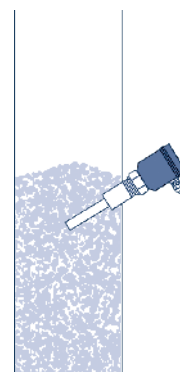
Housing	Aluminium IP66 / NEMA Type 4X	
Pressure range	-1 up to +16 bar (-14.5 up to +145 psi)	
Supply voltage/ Signal output	Relay SPDT	19..230V AC, 19..55V DC
	Relay DPDT	19..230V AC, 19..36V/55V DC
	PNP	18..50V DC 3-wire
	2-wire without contact	19..230V AC/DC
	8/16mA; 4-20mA	12,5-30/36V DC 2-wire
Versions with certificates	ATEX II 1D and 1/2D	
	ATEX II 1G and 1/2G EEx ia IIC	
	ATEX II 2G EEx de [ia] IIC, EEx d [ia] IIC	
	FM Cl. I, II, III, Div.1 Gr. A-G; Zone 0	
	CSA Cl. I, II, III Div.1 Gr. A-G; Zone 0	
	TR-CU, IEC Ex, EHEDG	
Process temperature	-40°C up to +150°C (-40°F up to +302°F)	
Sensitivity	From 50g/l (3lb/ft³) adjustable in 2 steps	
Process connection	R 1½" conical; NPT 1½"; various flanges available	
Vibration fork/ extension	Stainless steel 1.4301 (SS304) or 1.4404 (SS316L) various lengths available	

Housing types

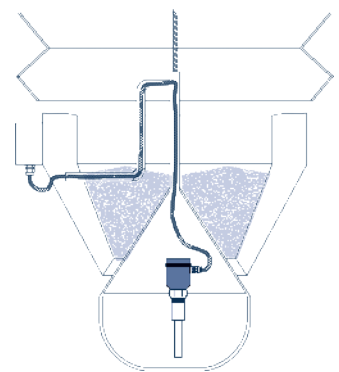
VN 1000 Standard	VN 5000 Standard	VN 5000 Flameproof	VN 5000 Flameproof, intrinsically safe

Installation

Mounting in downpipe
as back up switch



Mounting in loading bellow
as full detector





Vibranivo® 2000 / 6000

Vibration level limit switch

The universal unit for reliable level monitoring of granulated and powdered bulk goods – versatile, especially suitable for light media; certified for hazardous locations (gas and dust); complies with NAMUR standard



Vibranivo® 2000 / 6000



- Modular and simple design
- Suitable for virtually all bulk goods
- Absolutely maintenance-free

Application: Vibranivo® probes can be used as full, demand or empty detectors in bulk good silos. They are especially suited for use in all fine grain and powdered solids, including very light materials with a density below 5g/l. Vibranivo® vibration forks are available with international certificates for applications in hazardous locations (gas and dust).

Types of Vibranivo demand, full and empty detectors:

Vibranivo ..020
Short extension length, vertical, horizontal and oblique installation



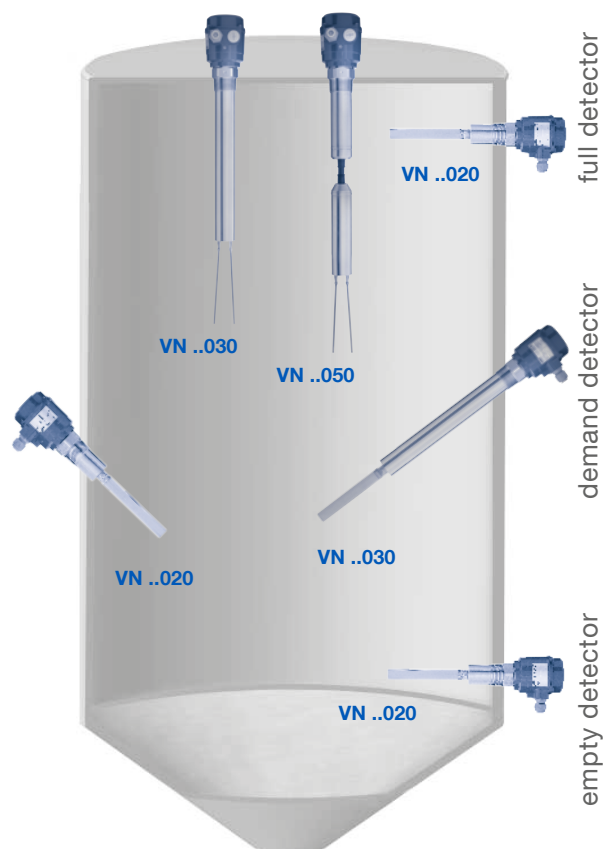
Vibranivo ..030
Design with pipe extension, vertical and oblique installation



Vibranivo ..040
Delivery without pipe extension (reduced shipping costs, flexible length), vertical and oblique installation



Vibranivo ..050
Model with cable extension, vertical installation up to 20m measuring range



Technical Data

Housing	Aluminium IP 66 / NEMA Type 4X
Pressure range	-1 up to +16 bar (-14.5 up to +145 psi)
Supply voltage/	Relay SPDT 19..230V AC, 19..55V DC,
Signal output	Relay DPDT 19..230V AC, 19..36V/55V DC
	PNP 18..50V DC 3-wire,
	2-wire without contact 19..230V AC/DC
	NAMUR IEC 60947-5-6 2-wire
	8/16mA; 4-20mA 12,5-30/36V DC 2-wire
Versions with certificates	ATEX II 1D and 1/2D ATEX II 1G and 1/2G EEx ia IIC ATEX II 2G EEx de [ia] IIC, EEx d [ia] IIC FM Cl. I, II, III, Div.1 Gr. A-G; Zone 0 CSA Cl. I, II, III Div.1 Gr. A-G; Zone 0 TR-CU, IEC Ex, EHEDG
Process temperature	-40°C up to +150°C (-40°F up to + 302°F)
Sensitivity	from 5g/l (0.3lb/ft³) adjustable in 2 steps
Process connection	R 1½" conical; NPT 1½"; various flanges available
Vibration fork/extension	Stainless steel 1.4301 (SS304) or 1.4404 (SS316L), various lengths available

Housing types

VN 2000
Standard



VN 6000
Standard



VN 6000
Flameproof



VN 6000
Flameproof,
intrinsically
safe



Vibrasil®-probe for Silicic acid

For very light and pneumatically conveyed solids. This specially designed Vibranivo vibration fork with enhanced sensitivity and an immediate switching reaction provides perfect measuring results e.g in fluidized silica with a **bulk density less than 5g/l.**

Vibranivo Vibrasil 70

Specially for flow control in material with a high percentage of air (extremely low bulk density)

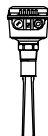
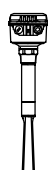

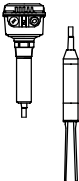


Vibranivo Vibrasil 90

Level limit switch for all kinds of silicic acid containers (low bulk density)



Table of content

	Page
Overview	2
Specifications	4
Applications	5
<hr/>	
VN ..020 Short extension length	6
	
<hr/>	
VN ..030 Pipe extension	8
	
<hr/>	
VN ..040 Pipe extension (screwed)	10
	
<hr/>	
VN ..050 Cable extension	12
	
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Options	14
Accessories	16
Dimensions	17
Detailed Ex-markings	21
Electrical installation	22
Spare parts Electronic modules	24

Subject to change.

All dimensions in mm (inches).

All prices in Euro, excluding VAT.

All prices are EXW Betzigau, excluding packaging costs.

Valid: From 01.04.2017 until 31.03.2018, unless otherwise agreed.

By publishing this selection list all other lists become invalid.

We assume no liability for typing errors.

Different variations to those specified are possible.
 Please contact our technical consultants.

Overview

- Level limit detection in bulk goods / solids
- Compact unit
- Die-casted housing aluminium
- Wide range of applications, no maintenance
- Full, demand, empty detector
- ATEX, IEC-Ex, FM, CSA, TR-CU, INMETRO
- 1935/2004/EC
- 2011/65/EU
- Gas Ex and Dust Ex approvals
- Food grade materials
- RoHS conform

Series

VN 1000	VN 2000	VN 5000	VN 6000
ATEX / IEC-Ex / TR-CU / INMETRO	ATEX / IEC-Ex / TR-CU / INMETRO	ATEX / IEC-Ex / FM / CSA / TR-CU / INMETRO	ATEX / IEC-Ex / FM / CSA / TR-CU / INMETRO
Small housing Short oscillating rods Sensitivity > 50g/l (3lb/ft³) For extreme mech. load For mounting in down pipes Advantageous design to avoid bridges Also for interface applications	Small housing Standard oscillating rods Sensitivity > 20 g/l (1.2lb/ft³) Option > 5g/l (0.3lb/ft³) Vibrasil® < 5g/l (0.3lb/ft³)	Spacious housing Short oscillating rods Sensitivity > 50g/l (3 lb/ft³) For extreme mech. load For mounting in down pipes Advantageous design to avoid bridges Also for interface applications	Spacious housing Standard oscillating rods Sensitivity > 20g/l (1.2lb/ft³) Option > 5g/l (0.3lb/ft³) Vibrasil® < 5g/l (0.3lb/ft³)

Housing

Standard



Standard

d

de



VN ..020

Short extension length

VN 1020



VN 2020



VN 5020



VN 6020



VN ..030
Pipe extension

VN 1030



VN 2030



VN 5030



VN 6030



Overview

VN ..040
 Pipe extension
 (screwed)

Custom made
 pipe for flexible
 lengths

VN 1040



VN 2040



VN 5040



VN 6040



VN ..050
 Cable extension

VN 1050



VN 2050



VN 5050



VN 6050



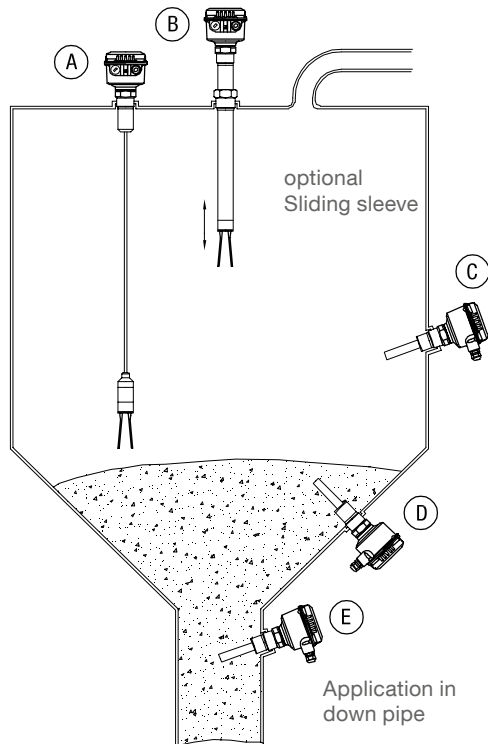
Specifications

Series			VN 1000	VN 2000	VN 5000	VN 6000
Approvals	CE		•	•	•	•
	ATEX / IEC-Ex/ INMETRO:					
	Zone 20 and 20/21	Dust Ignition Proof	•	•	•	•
	Zone 0	Intrinsic Safe	•	•	•	•
	Zone 1	Flameproof / Increased Safety			•	•
	FM / CSA:					
	General purp.				•	•
	Cl. II, III Div. 1	Dust Ignition Proof			•	•
	Cl. I Div. 1	Intrinsic Safe			•	•
	Cl. I Div. 1	Explosionproof			•	•
	Zone 0	Intrinsic Safe			•	•
	Zone 1	Flameproof / Increased Safety			•	•
	TR-CU:					
		Ordinary Locations	•	•	•	•
	Zone 20 and 20/21	Dust Ignition Proof	•	•		
	Zone 0	Intrinsic Safe	•	•		
	Zone 1	Flameproof / Increased Safety			•	•
Electronics	Relais SPDT	19..230V AC 19..55V DC	•	•	•	•
	Relais DPDT	19..230V AC 19..36V/55V DC	•	•	•	•
	PNP	18..50V DC	•	•	•	•
	2-wire without contact	19..230V AC/DC	•	•	•	•
	NAMUR	IEC 60947-5-6 2-wire		•		•
	8/16mA or 4-20mA	12.5-30/36V DC 2-wire	•	•	•	•

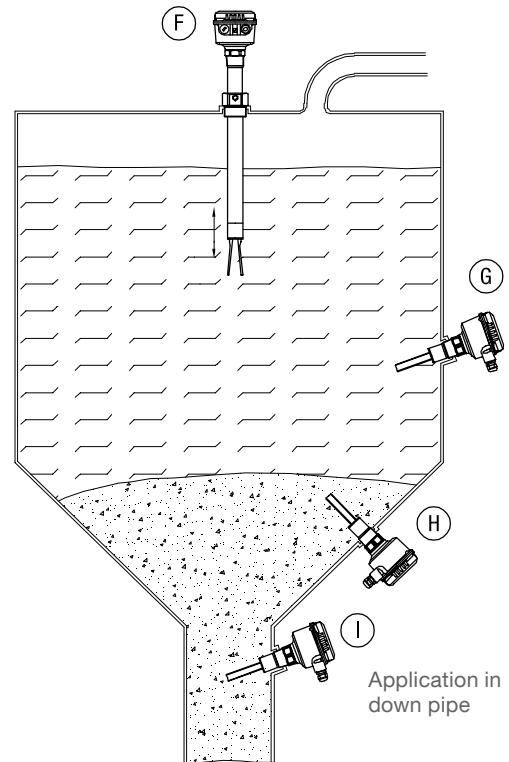
Extensions	VN ..020	Length of extension	165mm (6.47")	235mm (9.25")	165mm (6.47")	235mm (9.25")
		Ambient temperature	-40 .. +60°C (-40 .. +140°F)			
		Process temperature	-40 .. +150°C (-40 .. +302°F)			
		Process pressure	-1 .. +16bar (-14.5 .. +232 psi)			
		Process connection material / Extension	1.4301 (304) / 1.4541 (321) or 1.4404 (SS316L) / (food grade)			
	VN ..030	Length of extension	300 .. 4.000mm (11.8 .. 157")			
		Ambient temperature	-40 .. +60°C (-40 .. +140°F)			
		Process temperature	-40 .. +150°C (-40 .. +302°F)			
		Process pressure	-1 .. +16bar (-14.5 .. +232 psi)			
		Process connection material / Extension	1.4301 (304) / 1.4541 (321) or 1.4404 (SS316L) / (food grade)			
	VN ..040	Length of extension	1.500mm (59") or 4.000mm (157")			
		Ambient temperature	-40 .. +60°C (-40 .. +140°F)			
		Process temperature	-40 .. +150°C (-40 .. +302°F)			
		Process pressure	-1 .. +16bar (-14.5 .. +232 psi)			
		Process connection material / Extension	1.4305 (303) / 1.4541 (321) or 1.4404 (SS316L) / (food grade)			
	VN ..050	Length of extension	750 ... 20.000mm (27.6" .. 787")			
		Ambient temperature	-25 .. +60°C (-13 .. +140°F)			
		Process temperature	-25 .. +80°C (-13 .. +176°F)			
		Process pressure	-1 .. +6bar (-14.5 .. +87 psi)			
		Process connection material / Extension	1.4301 (304) / 1.4541 (321) Cable isolation: PUR (no food grade)			

Applications

Detection of solids



Detection of solids in water



	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)
VN 1020			•	•	•		•	•	•
VN 1030		•	•			•	•		
VN 1040		•	•						
VN 1050	•								
VN 2020			•	•	•				
VN 2030		•	•						
VN 2040		•	•						
VN 2050	•								
VN 5020			•	•	•		•	•	•
VN 5030		•	•			•	•		
VN 5040		•	•						
VN 5050	•								
VN 6020			•	•	•				
VN 6030		•	•						
VN 6040		•	•						
VN 6050	•								

VN ..020
Short extension length

VN 1020



VN 2020



VN 5020



VN 6020



Housings VN 5020 / 6020



Food grade materials

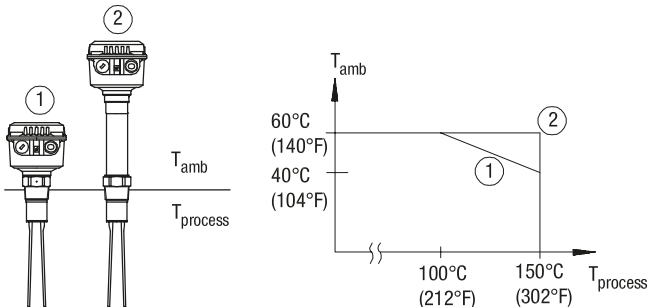
Cable entries (by default)
Depending on model selected, the following cable entries are supported (options see pos 23 on page 14):

Version:	Cable entries:
ATEX/IEC-Ex flameproof (pos.2 T,D)	M20x1.5 (1x open conduit + 1x Ex-d blind plug)
FM and CSA (pos.2 M,N,P,S,U)	NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x Ex-d blind plug)
All other versions	M20x1.5 (1x screwed cable gland + 1x blind plug)

Dimensions
see pages 17-20

pos. 3
Temperature extended shaft applications up to 150°C (302°F)

1 without
2 with



VN ..020 Short extension length

Basic type

- VN 1020**
VN 2020
VN 5020
VN 6020

pos. 2

Certificate (detailed Ex-markings: see page 20)

		Dust	Gas	Protection method
0	CE/ TR-CU	-	-	
W	ATEX	Zone 20 and 20/21	-	Dust Ignition Proof
Y	ATEX	Zone 20 and 20/21	Zone 0 and 0/1	Intrinsic Safe / Dust Ignition Proof
R	ATEX	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
T	ATEX	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
A	IEC-Ex/ INMETRO	Zone 20 and 20/21	-	Dust Ignition Proof
B	IEC-Ex/ INMETRO	Zone 20 and 20/21	Zone 0 and 0/1	Intrinsic Safe / Dust Ignition Proof
C	IEC-Ex/ INMETRO	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
D	IEC-Ex/ INMETRO	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
M	FM /CSA	-	-	General purpose
N	FM /CSA	Cl. II, III, Div.1	-	Dust Ignition Proof
	CSA	A 20/21		
P	FM /CSA	Cl. II, III, Div.1	Cl. I Div.1 / Zone 0	Intrinsic Safe / Dust Ignition Proof
	CSA	A 20/21		
S	FM /CSA	Cl. II, III, Div.1	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
	CSA	A 20/21		
U	FM /CSA	Cl. II, III, Div.1	Cl. I Div.1 / Zone 1	Explosion Proof / Dust Ignition Proof
	CSA	A 20/21		
E	TR-CU	Zone 20 and 20/21	-	Dust Ignition Proof
V	TR-CU	Zone 20 and 20/21	Zone 0 and 0/1	Intrinsic Safe / Dust Ignition Proof
K	TR-CU	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
L	TR-CU	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof

pos. 3

Temperature extended shaft

- 1 without (up to $T_{process} = 150^{\circ}\text{C}$ (302°F) at $T_{amb} < 40^{\circ}\text{C}$ (104°F))
 2 with (up to $T_{process} = 150^{\circ}\text{C}$ (302°F) at $T_{amb} > 40^{\circ}\text{C}$ (104°F))

pos. 4

Electronic module

- E Relay SPDT 19..230V AC 19..55V DC
 L Relay DPDT 19..230V AC 19..55V DC
 19..230V AC 19..36V DC
 D PNP 18..50V DC
 K 2-wire without contact 19..230V AC/DC
 M NAMUR IEC 60947-5-6 2-wire
 N 8/16mA or 4-20mA 12..36V* DC 2-wire
 N 8/16mA 12..36V DC 2-wire

*30V intrinsic safe

Available for certificates (pos.2)										
0	W/A/E	Y/B/V	R/C/K	T/D/L	M	N	P	S	U	
•	•	•	•	•	•	•	•	•	•	•
•	(1)		(3)	(3)	•	(1)	(3)	(3)		•
•	(2)		(4)	(4)		(2)	(4)	(4)		•
•	•	•	•	•	•	•	•	•	•	•
•	•		•	•	•	•	•	•	•	•
•	(1)	•	(3)	(3)						•
•	(2)		(4)	(4)						•

- (1) without pos.26 1/2 (3) with pos.3.1, without pos.26 1/2
 (2) with pos.26 1/2 (4) with pos.3.2 and/or pos.26 1/2

pos. 5

Process connection

- A Thread R1½", conical DIN 2999
 B Thread NPT1½", conical ANSI B1.20.1
 P Triclamp 2" (DN 50) ISO 2852
 G Cap nut (only with EHEDG (pos.30), not with pos.2 C,D,R,S,T,U)
 L Flange DN 100 PN6, EN1092-1 (max. 6 bar (87psi))
 M Flange DN 100 PN16, EN1092-1
 S Flange 2" 150lbs ANSI B16.5
 T Flange 3" 150lbs ANSI B16.5
 U Flange 4" 150lbs ANSI B16.5

pos. 8

Material of process connection / extension "L"

- 1 Stainless steel 1.4301 (304) / Flange in 1.4541 (321)
 2 Stainless steel 1.4404 (316L)
 Vibrating rods polished, $R_a \leq 0,75\mu\text{m}$; Teflon coating on request

Basic type

Further options and accessories: see page 14-16

	A					3	1	
Position	1	2	3	4	5	6	7	8

Order code

All positions are available with special design (use code "Z").

VN ..030 Pipe extension

VN 1030



VN 2030



VN 5030



VN 6030



Housings VN 5030 / 6030



Standard

d (flameproof)

de (flameproof / increased safety)

Food grade materials

Cable entries (by default)

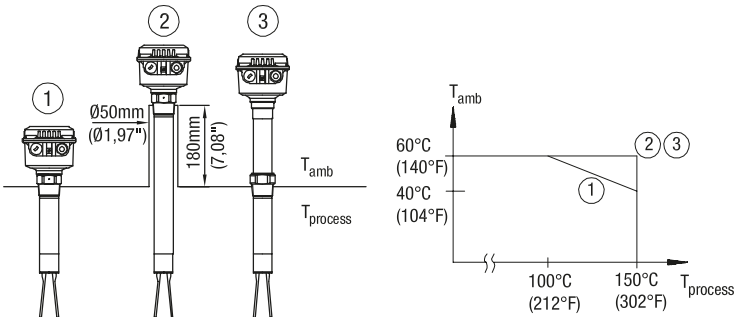
Depending on model selected, the following cable entries are supported (options see pos 23 on page 14):

Version:	Cable entries:
ATEX/IEC-Ex flameproof (pos.2 T,D)	M20x1.5 (1x open conduit + 1x Ex-d blind plug)
FM and CSA (pos.2 M,N,P,S,U)	NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x Ex-d blind plug)
All other versions	M20x1.5 (1x screwed cable gland + 1x blind plug)

Dimensions see pages 17-20

pos. 3
Temperature extended shaft
applications up to 150°C (302°F)

- 1 without
- 2 without and with extended socket
- 3 with



VN ..030 Pipe extension

Basic type

	VN 1030	.....	•
	VN 2030	.....	•
	VN 5030	.....	•
	VN 6030	.....	•

pos. 2

Certificate (detailed Ex-markings: see page 20)

	Dust	Gas	Protection method
0 CE/ TR-CU	-	-	
W ATEX	Zone 20 and 20/21	-	Dust Ignition Proof
Y ATEX	Zone 20 and 20/21	Zone 0 and 0/1	Intrinsic Safe / Dust Ignition Proof
R ATEX	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
T ATEX	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
A IEC-Ex/ INMETRO	Zone 20 and 20/21	-	Dust Ignition Proof
B IEC-Ex/ INMETRO	Zone 20 and 20/21	Zone 0 and 0/1	Intrinsic Safe / Dust Ignition Proof
C IEC-Ex/ INMETRO	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
D IEC-Ex/ INMETRO	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
M FM /CSA	-	-	General purpose
N FM /CSA	Cl. II, III, Div.1	-	Dust Ignition Proof
CSA	A 20/21		
P FM /CSA	Cl. II, III, Div.1	Cl. I Div.1 / Zone 0	Intrinsic Safe / Dust Ignition Proof
CSA	A 20/21		
S FM /CSA	Cl. II, III, Div.1	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
CSA	A 20/21		
U FM /CSA	Cl. II, III, Div.1	Cl. I Div.1 / Zone 1	Explosion Proof / Dust Ignition Proof
CSA	A 20/21		
E TR-CU	Zone 20 and 20/21	-	Dust Ignition Proof
V TR-CU	Zone 20 and 20/21	Zone 0 and 0/1	Intrinsic Safe / Dust Ignition Proof
K TR-CU	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
L TR-CU	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof

pos. 3

Temperature extended shaft

- without (up to $T_{process} = 150^{\circ}\text{C}$ (302°F) at $T_{amb} < 40^{\circ}\text{C}$ (104°F) or with extended socket)
- with (up to $T_{process} = 150^{\circ}\text{C}$ (302°F) at $T_{amb} > 40^{\circ}\text{C}$ (104°F) without extended socket)

pos. 4

Electronic module

E Relay SPDT	19..230V AC	19..55V DC	.....
L Relay DPDT	19..230V AC	19..55V DC	.....
	19..230V AC	19..36V DC	.....
D PNP	18..50V DC		.....
K 2-wire without contact	19..230V AC/DC		.....
M NAMUR IEC 60947-5-6	2-wire		.....
N 8/16mA or 4-20mA	12,5..36V* DC	2-wire	.....
N 8/16mA	12,5..36V DC	2-wire	.....

*30V intrinsic safe

Available for certificates (pos.2)											
0	W/A/E	Y/B/V	R/C/K	T/D/L	M	N	P	S	U		
•	•		•	•	•	•	•	•	•		
•	(1)					(1)					
•	(2)		•	•		(2)		•	•		
•	•		•	•	•	•	•	•	•		
•	•		•	•	•	•	•	•	•		
•		•									
•	(1)	•									
•	(2)		•	•							

(1) without pos.26 1/2

(2) with pos.26 1/2

pos. 5

Process connection

A Thread R1½", conical	DIN 2999	.....
B Thread NPT1½", conical	ANSI B1.20.1	.....
P Triclamp 2" (DN 50)	ISO 2852	.....
G Cap nut (only with EHEDG (pos.30), not with pos.2 C,D,R,S,T,U)		.....
L Flange DN 100 PN6, EN1092-1 (max. 6 bar (87psi))		.....
M Flange DN 100 PN16, EN1092-1		.....
S Flange 2" 150lbs ANSI B16.5		.....
T Flange 3" 150lbs ANSI B16.5		.....
U Flange 4" 150lbs ANSI B16.5		.....

pos. 7

Length of extension "L"

- Z (starting from 0mm) per 100mm (3.94") or part thereof; min. 300mm (11.8"), max. 4000mm (157")

pos. 8

Material of process connection / extension "L"

- Stainless steel 1.4301 (304) / Flange in 1.4541 (321)
 - Stainless steel 1.4404 (316L)
- Vibrating rods polished, $R_a \leq 0,75\mu\text{m}$; Teflon coating on request

Basic type

	B					3	Z	
Position	1	2	3	4	5	6	7	8

All positions are available with special design (use code "Z").

L= mm

Order code

VN ..040 Pipe extension (screwed)

VN 1040



VN 2040



VN 5040



VN 6040



Housings VN 5040 / 6040



Food grade materials

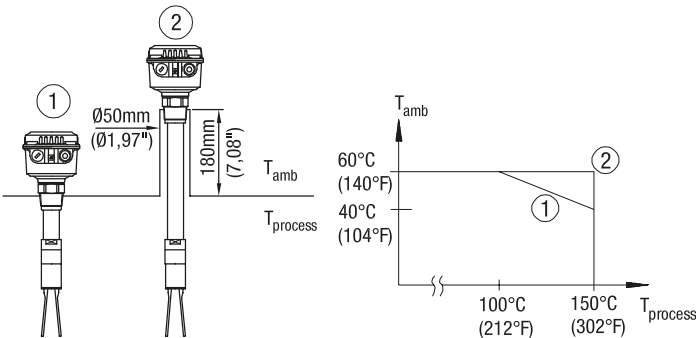
Cable entries (by default)
Depending on model selected, the following cable entries are supported (options see pos 23 on page 14):

Version:	Cable entries:
ATEX/IEC-Ex flameproof (pos.2 T,D)	M20x1.5 (1x open conduit + 1x Ex-d blind plug)
FM and CSA (pos.2 M,N,P,S,U)	NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x Ex-d blind plug)
All other versions	M20x1.5 (1x screwed cable gland + 1x blind plug)

Dimensions see pages 17-20

applications up to 150°C
(302°F)

- 1 without extended socket
- 2 with extended socket



VN ..040 Pipe extension (screwed)

Basic type

VN 1040	.....	•
VN 2040	.....	•
VN 5040	.....	•
VN 6040	.....	•

pos. 2	Certificate (detailed Ex-markings: see page 20)	
0	CE/ TR-CU	-
W	ATEX	Zone 20 and 20/21
Y	ATEX	Zone 20 and 20/21
R	ATEX	Zone 20/21
T	ATEX	Zone 20/21
A	IEC-Ex/ INMETRO	Zone 20 and 20/21
B	IEC-Ex/ INMETRO	Zone 20 and 20/21
C	IEC-Ex/ INMETRO	Zone 20/21
D	IEC-Ex/ INMETRO	Zone 20/21
M	FM /CSA	-
N	FM /CSA	Cl. II, III, Div.1
	CSA	A 20/21
P	FM /CSA	Cl. II, III, Div.1
	CSA	A 20/21
S	FM /CSA	Cl. II, III, Div.1
	CSA	A 20/21
U	FM /CSA	Cl. II, III, Div.1
	CSA	A 20/21
E	TR-CU	Zone 20 and 20/21
V	TR-CU	Zone 20 and 20/21
K	TR-CU	Zone 20/21
L	TR-CU	Zone 20/21

pos. 4	Electronic module	
E	Relay SPDT	19..230V AC 19..55V DC
L	Relay DPDT	19..230V AC 19..55V DC
		19..230V AC 19..36V DC
D	PNP	18..50V DC
K	2-wire without contact	19..230V AC/DC
M	NAMUR IEC 60947-5-6	2-wire
N	8/16mA or 4-20mA	12,5..36V* DC 2-wire
N	8/16mA	12,5..36V DC 2-wire
		*30V intrinsic safe

Available for certificates (pos.2)										
0	W/A/E	Y/B/V	R/C/K	T/D/L	M	N	P	S	U	
•	•		•	•	•	•	•	•	•	•
•	•				•	•				•
			•	•		•		•	•	•
•	•		•	•	•	•	•	•	•	•
•	•	•								•
			•	•						•

pos. 5	Process connection	
A	Thread R1½"	conical DIN 2999
B	Thread NPT1½"	conical ANSI B1.20.1
P	Triclamp 2"	(DN 50) ISO 2852
L	Flange DN 100 PN6,	EN1092-1 (max. 6 bar (87psi))
M	Flange DN 100 PN16,	EN1092-1
S	Flange 2"	150lbs ANSI B16.5
T	Flange 3"	150lbs ANSI B16.5
U	Flange 4"	150lbs ANSI B16.5

pos. 7	Length of extension "L"	
L	1.500mm (59")	(cuttable cable length)
M	4.000mm (157")	(cuttable cable length)

pos. 8	Material of process connection / extension "L"	
1	Stainless steel 1.4305 (303) / Flange in 1.4541 (321)	
2	Stainless steel 1.4404 (316L)	
	Vibrating rods polished, Ra ≤ 0,75µm; Teflon coating on request	

Basic type

	C	1	3				
--	---	---	---	--	--	--	--

Position 1 2 3 4 5 6 7 8

All positions are available with special design (use code "Z").

Further options and accessories: see page 14-16

Order code

VN ..050 Cable extension

VN 1050



VN 2050



VN 5050



VN 6050



Housings VN 5050 / 6050



Standard



d (flameproof)



de (flameproof /
increased safety)

Cable entries (by default)

Depending on model selected, the following cable entries are supported (options see pos 23 on page 14):

Version:	Cable entries:
ATEX/IEC-Ex flameproof (pos.2 T,D)	M20x1.5 (1x open conduit + 1x Ex-d blind plug)
FM and CSA (pos.2 M,N,P,S,U)	NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x Ex-d blind plug)
All other versions	M20x1.5 (1x screwed cable gland + 1x blind plug)

Dimensions see pages 17-20

VN ..050 Cable extension

Basic type

VN 1050

VN 2050

VN 5050

VN 6050

pos. 2

Certificate (detailed Ex-markings: see page 20)

		Dust	Gas	Protection method
0	CE/ TR-CU	-	-	
W	ATEX	Zone 20 and 20/21	-	Dust Ignition Proof
Y	ATEX	Zone 20 and 20/21	Zone 0 and 0/1	Intrinsic Safe / Dust Ignition Proof
R	ATEX	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
T	ATEX	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
A	IEC-Ex/ INMETRO	Zone 20 and 20/21	-	Dust Ignition Proof
B	IEC-Ex/ INMETRO	Zone 20 and 20/21	Zone 0 and 0/1	Intrinsic Safe / Dust Ignition Proof
C	IEC-Ex/ INMETRO	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
D	IEC-Ex/ INMETRO	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
M	FM /CSA	-	-	General purpose
N	FM /CSA	Cl. II, III, Div.1	-	Dust Ignition Proof
	CSA	A 20/21		
P	FM /CSA	Cl. II, III, Div.1	Cl. I Div.1 / Zone 0	Intrinsic Safe / Dust Ignition Proof
	CSA	A 20/21		
S	FM /CSA	Cl. II, III, Div.1	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
	CSA	A 20/21		
U	FM /CSA	Cl. II, III, Div.1	Cl. I Div.1 / Zone 1	Explosion Proof / Dust Ignition Proof
	CSA	A 20/21		
E	TR-CU	Zone 20 and 20/21	-	Dust Ignition Proof
V	TR-CU	Zone 20 and 20/21	Zone 0 and 0/1	Intrinsic Safe / Dust Ignition Proof
K	TR-CU	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
L	TR-CU	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof

pos. 4

Electronic module

E	Relay SPDT	19..230V AC	19..55V DC
L	Relay DPDT	19..230V AC	19..55V DC
		19..230V AC	19..36V DC
D	PNP	18..50V DC	
K	2-wire without contact	19..230V AC/DC	
M	NAMUR IEC 60947-5-6	2-wire	
N	8/16mA or 4-20mA	12,5..36V* DC 2-wire	
N	8/16mA	12,5..36V DC 2-wire	

*30V intrinsic safe

Available for certificates (pos.2)										
0	W/A/E	Y/B/V	R/C/K	T/D/L	M	N	P	S	U	

pos. 5

Process connection

A	Thread R1½", conical DIN 2999
B	Thread NPT1½", conical ANSI B1.20.1
L	Flange DN 100 PN6, EN1092-1 (max. 6 bar (87psi))
M	Flange DN 100 PN16, EN1092-1
S	Flange 2" 150lbs ANSI B16.5
T	Flange 3" 150lbs ANSI B16.5
U	Flange 4" 150lbs ANSI B16.5

pos. 7

Length of extension "L"

Z ((starting from 0mm) per 100mm (3.94") or part thereof; min. / max. see below

pos. 8

Material of process connection / extension "L"

- 1 Stainless steel 1.4301 (304) / Flange in 1.4541 (321)
 - 2 Stainless steel 1.4404 (316L)on request
- Vibrating rods polished, Ra ≤ 0,75µm; Teflon coating on request

Further options and accessories: see page 14-16

Extension "L":
min. 750mm (29,6")
max. 7.000mm (276") for VN 1050/5050
max. 20.000mm (787") for VN 2050/6050
max. 10.000mm (394") for VN 2050/6050 with pos.4M

Basic type

	D		1			3	Z	1
Position	1	2	3	4	5	6	7	8

All positions are available with special design (use code "Z").



L= mm

Order code

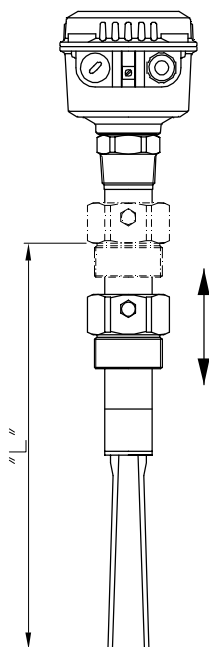
Options

VN 1020	VN 2020	VN 5020	VN 6020	VN 1030	VN 2030	VN 5030	VN 6030	VN 1040	VN 2040	VN 5040	VN 6040	VN 1050	VN 2050	VN 5050	VN 6050																																									
•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	pos. 11x	Guarantee extension to 5 years	•																																						
•	•	1	1	•	•	1	1	•	•	1	1	•	•	1	1	pos. 21	Weather protection cover (for Ex only approved for Zone 2 or 22 or Div. 2)	•																																						
																	Mounting set for flange mounting																																							
																	<table><tr><th rowspan="2">process connection flange</th><th rowspan="2">for counter flange with</th><th colspan="4">consists of</th></tr><tr><th>screws*</th><th>nuts*</th><th>washers*</th><th>sealing**</th></tr><tr><td>L</td><td>hole ø18</td><td>4 x M16x60</td><td>4 x M16</td><td>4 pcs</td><td>1 piece</td><td>•</td></tr><tr><td>L</td><td>thread M16</td><td>4 x M16x40</td><td></td><td>4 pcs</td><td>1 piece</td><td>•</td></tr><tr><td>M</td><td>hole ø18</td><td>4 x M16x60</td><td>8 x M16</td><td>8 pcs</td><td>1 piece</td><td>•</td></tr><tr><td>M</td><td>thread M16</td><td>4 x M16x40</td><td></td><td>8 pcs</td><td>1 piece</td><td>•</td></tr></table>	process connection flange	for counter flange with	consists of				screws*	nuts*	washers*	sealing**	L	hole ø18	4 x M16x60	4 x M16	4 pcs	1 piece	•	L	thread M16	4 x M16x40		4 pcs	1 piece	•	M	hole ø18	4 x M16x60	8 x M16	8 pcs	1 piece	•	M	thread M16	4 x M16x40		8 pcs	1 piece	•	
process connection flange	for counter flange with	consists of																																																						
		screws*	nuts*	washers*	sealing**																																																			
L	hole ø18	4 x M16x60	4 x M16	4 pcs	1 piece	•																																																		
L	thread M16	4 x M16x40		4 pcs	1 piece	•																																																		
M	hole ø18	4 x M16x60	8 x M16	8 pcs	1 piece	•																																																		
M	thread M16	4 x M16x40		8 pcs	1 piece	•																																																		
																	* material stainless steel A2 **max. 250°C (482°F), material not food grade																																							
																	Cable entry																																							
																	Selection of the following options only necessary, if a deviation from the default cable gland / conduit is required:																																							
•	•	2	2	•	•	2	2	•	•	2	2	•	•	2	2	pos. 23x	M20x1,5 2x screwed cable gland	•																																						
		3	3			3	3			3	3			3	3	pos. 23y	M20x1,5 1x screwed cable gland +1x blind plug	•																																						
•	•	4	4	•	•	4	4	•	•	4	4	•	•	4	4	pos. 23a	NPT 1/2" tapered ANSI B1.20.1 (1x conduit + 1x Ex-d blind plug)	•																																						
•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	pos. 23b	NPT 3/4" tapered ANSI B1.20.1 (1x conduit + 1x Ex-d blind plug) on req.																																							
																	Sliding sleeve (max. 16bar (232psi), max. 150°C (302°F))																																							
																	process connection as follows or flange as choosen; with Triclamp on request																																							
																	Not for Ex applications Zone 0/1 (Cat. 1/2) with separation wall																																							
				•	•	•	•									pos. 25w	G2" ISO 228 material 1.4301 (304)	•																																						
				•	•	•	•									pos. 25x	G2" ISO 228 material 1.4404 (316L)	•																																						
				•	•	•	•									pos. 25u	NPT 2" ANSI B1.20.1 material 1.4301 (304)	•																																						
				•	•	•	•									pos. 25v	NPT 2" ANSI B1.20.1 material 1.4404 (316L)	•																																						
				5	5	5	5									pos. 25t	Flange 1.4301 / 1.4541 (304/321)	•																																						
				5	5	5	5									pos. 25s	Flange 1.4404 (316L)	•																																						
																	Special versions																																							
•	•			•	•			•	•			•	•			pos. 26x	Enhanced sensitivity (> 5g/l (0,3lb/ft³))	•																																						
6	6			6	6			6	6			6	6			pos. 26a	Vibrasil 70 (sensitivity <5g/l (0,3lb/ft³))	•																																						
6	6			6	6			6	6			6	6			pos. 26b	Vibrasil 90 (sensitivity <5g/l (0,3lb/ft³))	•																																						
6	6	6	6	6	6	6	6	6	6							pos. 26c	Adjustable sensitivity for interface applications (only with CE)	•																																						
•	•	7	7	•	•	7	7									pos. 26.1	Separate housing cable length 1,5m (59")	•																																						
•	•	7	7	•	•	7	7									pos. 26.2	Separate housing cable length 4,0m (157")	•																																						
																	Signal lamp																																							
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	pos. 27a	Bulb, mounted in cable entry M20x1,5, 2W green	•																																						
8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	pos. 27c	Bulb, mounted in cable entry M20x1,5, 2W red	•																																						
9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	pos. 27b	LED (glass window in lid)	•																																						
																	Plug																																							
10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	pos. 29	Valve connector (incl. mating plug) 4-pole (incl PE) max. 230V	•																																						
																	EHEDG approval																																							
11	11	11	11	11	11	11	11									Pos. 30a	Without flush welding socket	•																																						
11	11	11	11	11	11	11	11									Pos. 30b	Process connection flush welding socket ø80 made of aluminium	•																																						
11	11	11	11	11	11	11	11									Pos. 30c	Process connection flush welding socket ø80 made of 1.4301 (304)	•																																						
11	11	11	11	11	11	11	11									Pos. 30d	Process connection flush welding socket ø80 made of 1.4404 (316L)	•																																						

- Available for all versions except explosionproof / flameproof and increased safety versions (pos.2 C,D,K,L,R,T,S,U)
- Available for all versions except flameproof version (pos.2 D,L,T,U)
- Available for FM/CSA versions (pos.2 M,N,P,S) except flameproof version (pos.2 U)
- Available for CE, ATEX, IEC-Ex, INMETRO, TR-CU (pos.2 O,W,Y,R,T,A,B,C,D,E,V,K,L)
- Flange and material as selected in pos.5 and 8. For FM/CSA on request.
- Available only with electronic module "Relais SPDT" (pos.4 E), Vibrasil 70 only with flange DN100/4"
- Available for all versions. Electronic module "8/16mA" and "8/16mA or 4-20mA" (pos.4 N) not for FM/CSA
- Available for CE (pos.2 O), not in combination with weather protection cover (pos.21) and cable entries pos.23 x,a,b.
For electronic module Relais SPDT and DPDT (pos. 4.E,L) three bulbs (24V, 115V and 230V) will be delivered. For PNP (pos.4.D) a 24V bulb will be delivered. For other electronics on request.
- Available for all versions except explosionproof / flameproof version (pos.2 C,D,K,L,R,T,S,U), not with weather protection cover (Pos. 21)
- Available only for CE (pos.2 O)
- Available only for cap nut (pos.5 G). Not with pos.22, 25, 26a. With pos.30a the flush welding socket must be manufactured on site.

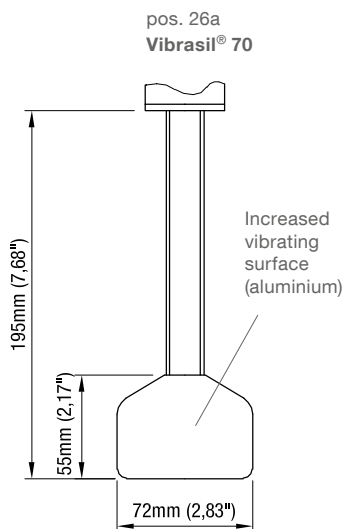
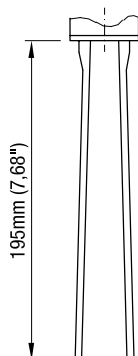
Options

pos. 25
 Sliding sleeve

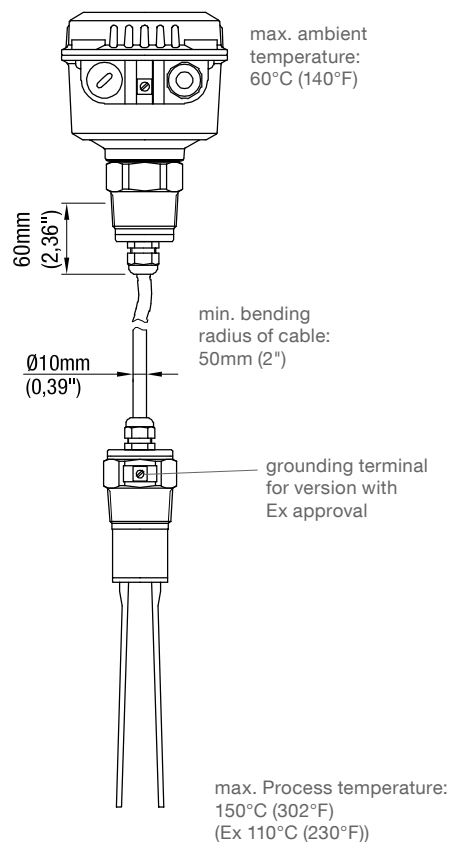


pos. 26x
 Enhanced sensitivity

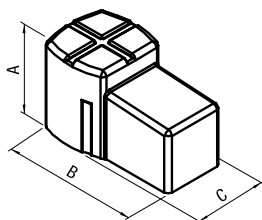
pos. 26b
 Vibrasil® 90



pos. 26 1-2
 Separate housing

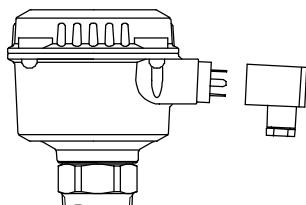


pos. 21
 Weather protection cover



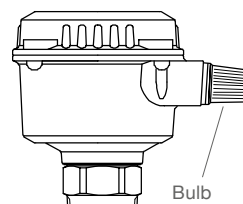
	VN 10..0	VN 50..0
	VN 20..0	VN 60..0
A	100mm (3.94")	130mm (5.12")
B	165mm (6.5")	200mm (7.87")
C	88mm (3.46")	125mm (4.92")

pos. 29
 Valve connector

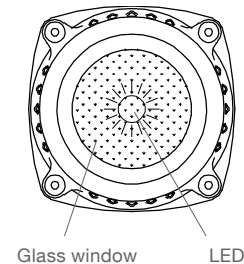


Signal lamp

pos. 27a, c
 Bulb, mounted in
 cable entry M20x1,5

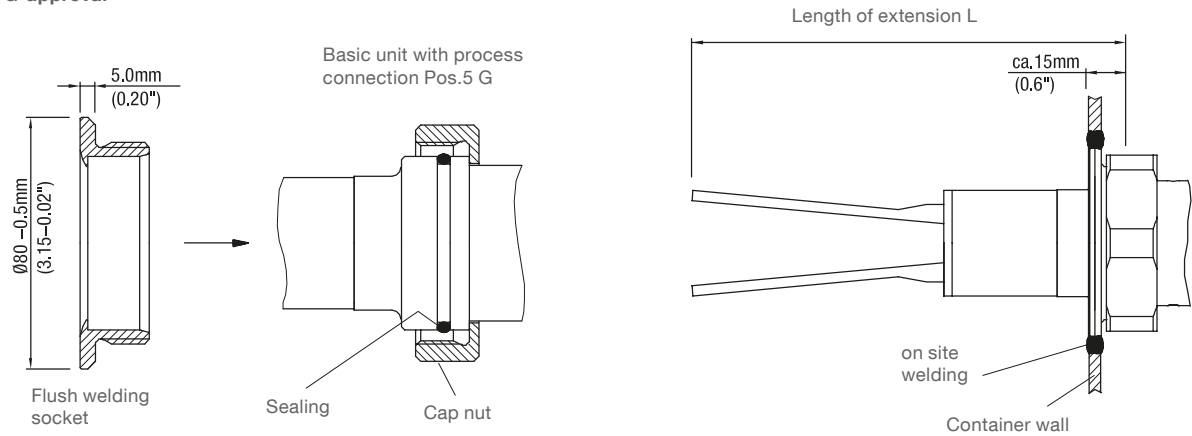


pos. 27b
 LED (glass window
 in lid)



Options / Accessories

Pos. 30
EHEDG-approval



NAMUR Isolating Switching Amplifier Protection method [Ex ia] IIC
(for Electronic module pos.4 M)



Terminal housing. Switchable signal output logic. Each channel has one independent output.

Channels	Signal output	Monito- ring*	Supply	Manufacturer / Type	Price
				Turck	
1	Relay (2x SPST)	x	20-125VDC, 20-250VAC	IM1-12EX-R	•
	2 transistor outputs (short-circuit proof, floating)	x		IM1-12EX-T	•
2	Relay (2x SPST)	x	20-125VDC, 20-250VAC	IM1-22EX-R	•
	2 transistor outputs (short-circuit proof, floating)	x		IM1-22EX-T	•
4	Relais (4x SPST)	x	20-125VDC, 20-250VAC	IM1-451EX-R	•
	4 transistor outputs (short-circuit proof, floating)	x		IM1-451EX-T	•

* Input circuit monitoring for wire-break, partial for short-circuit. Other types and manufacturers on request.
Partial additional monitoring signal output.

8/16mA Limit Value Monitor
(for Electronic module pos.4 N)



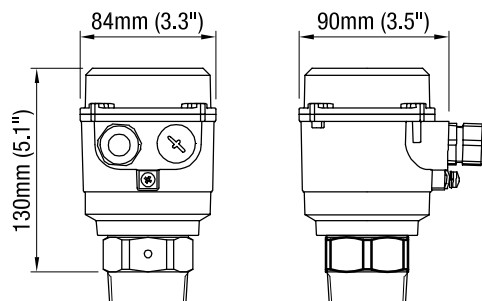
- Limit Value Monitor** Type IM43-13-R •
Input: 1 channel 4-20mA
Output: 3 Limit Value Relays for monitoring of 3 limit values of a current signal.
Terminal housing. Supply: 20-125VDC, 20-250VAC. Manufacturer: Turck.
Use in Hazardous Locations only with additional connected Isolating Transducer IM33.
- Isolating Transducer** Type IM33-11Ex-Hi/24VDC (1 channel) •
Isolating Transducer Type IM33-11Ex-Hi/24VDC (2 channels) •
Protection method [Ex ia] IIC.
Terminal housing.
Input/Output: 0/4-20mA (galvanic isolated). Supply: 19-29V DC.

Dimensions

Housing versions

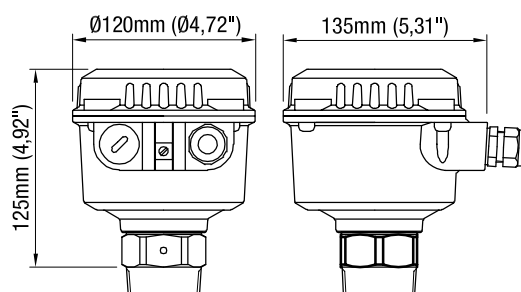
Series VN 1000 / 2000

Standard



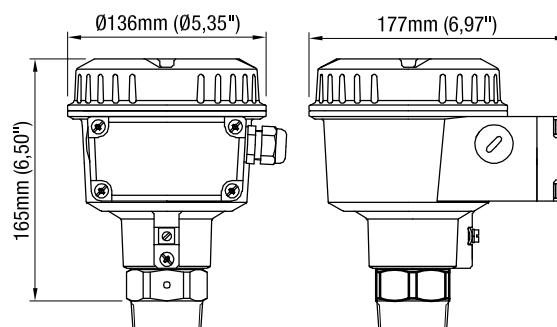
Series VN 5000 / 6000

Standard



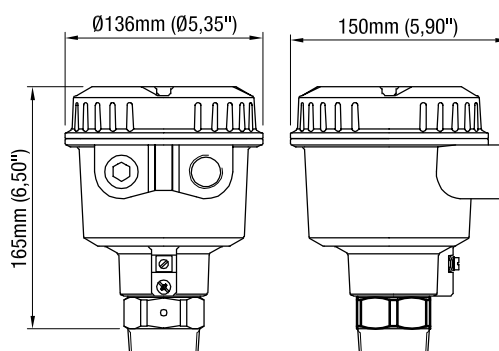
de

Explosionproof with
 increased safety
 terminal box



d

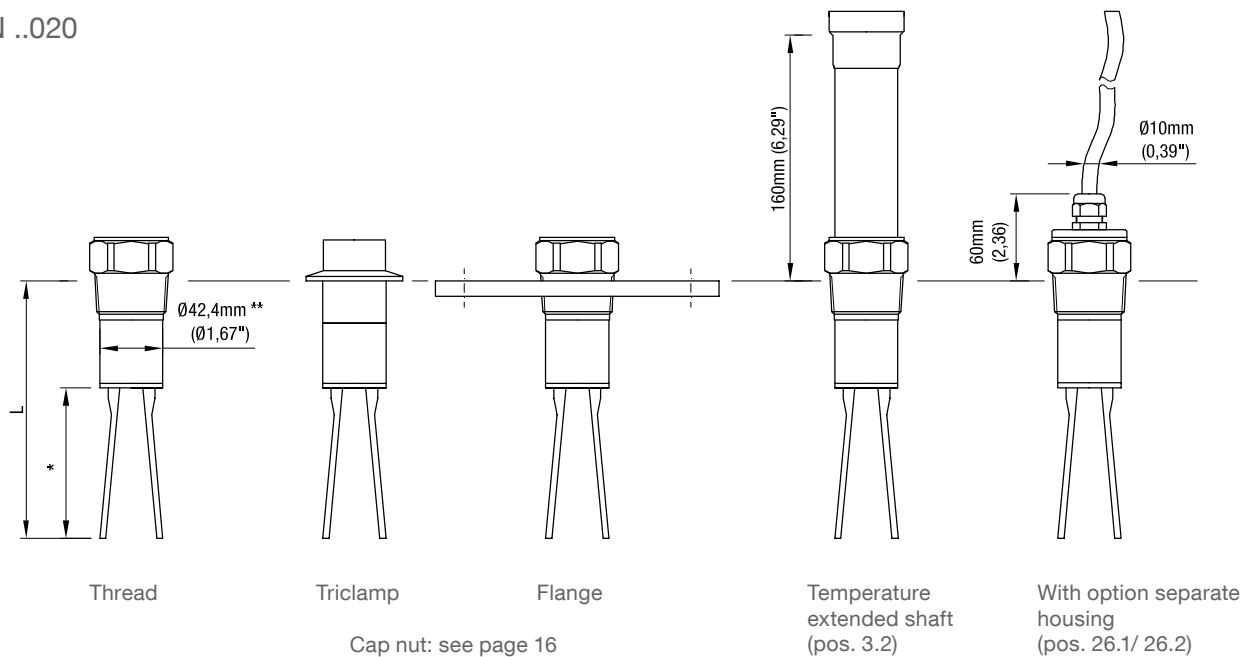
Flameproof /
 explosionproof



Dimensions

Extensions

VN ..020

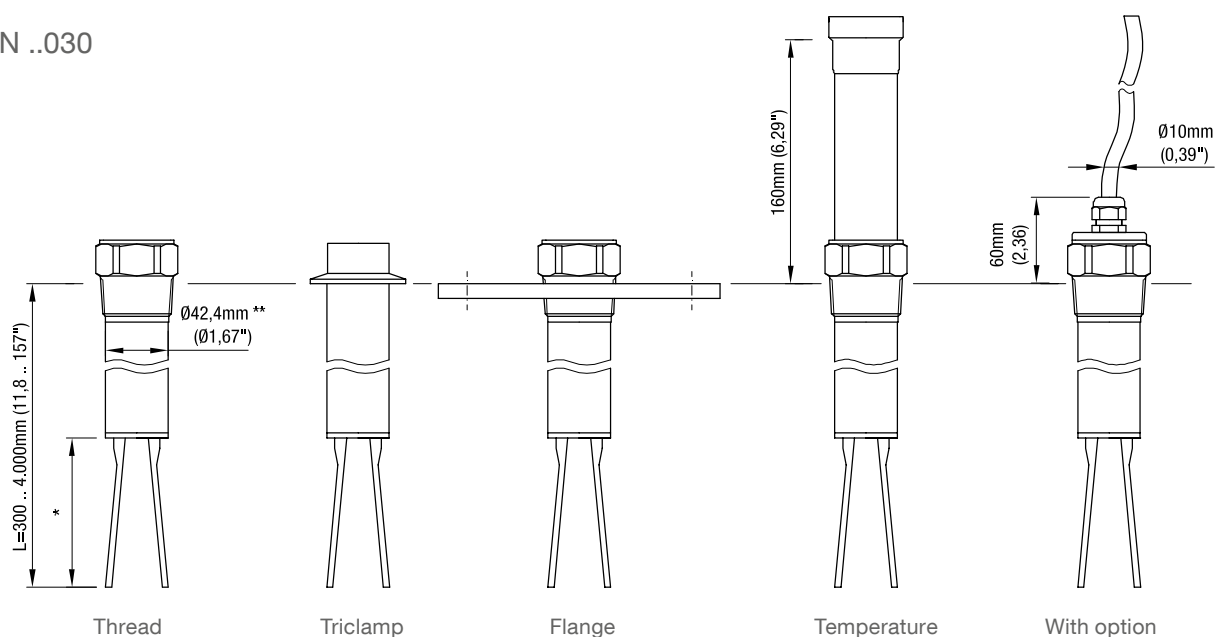


	L	
	without option	with option: Enhanced sensitivity (pos. 26x) Vibrasil® 70 (pos. 26a) Vibrasil® 90 (pos. 26b)
VN 1020 VN 5020	165mm (6.5")	
VN 2020 VN 6020	235mm (9.25")	260mm (10.24")

* see page 19 bottom right

** welding seam max. Ø43,8mm (1.72")

VN ..030



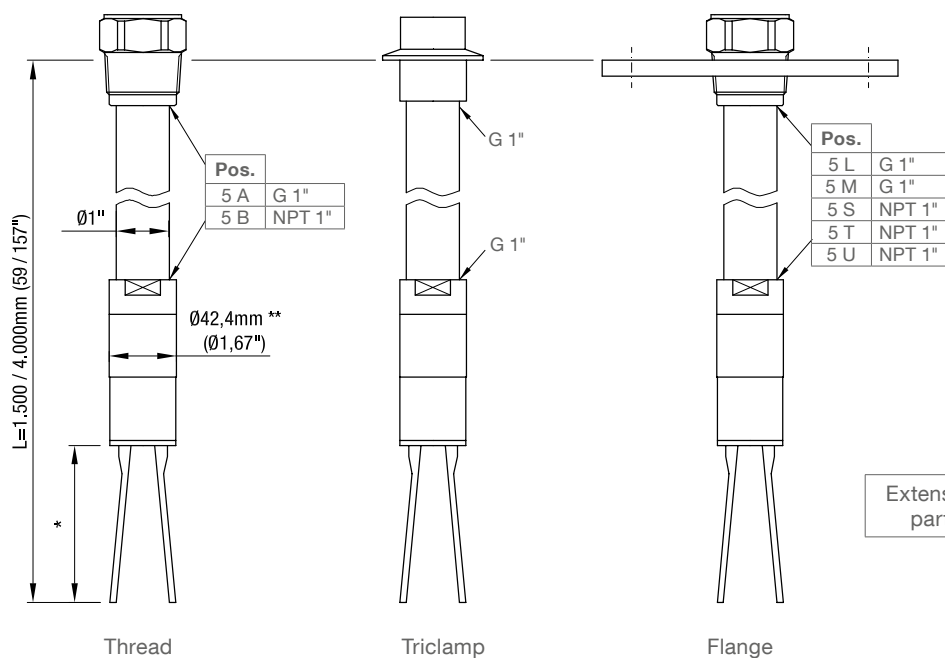
* see page 19 bottom right

** welding seam max. Ø43,8mm (1.72")

Cap nut: see page 16

Dimensions

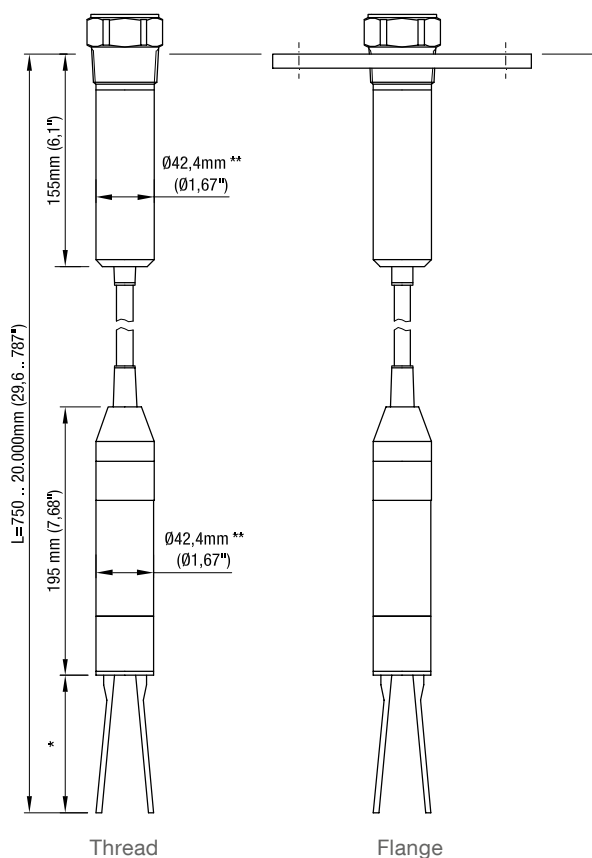
VN ..040



* see below right

** welding seam max. Ø43,8mm (1.72")

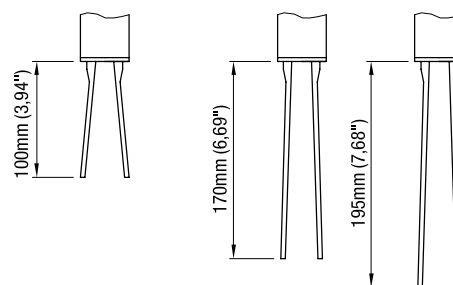
VN ..050



* Length of oscillating rods

VN 10..0
 VN 50..0

VN 20..0
 VN 60..0



with option
 Enhanced sensitivity (pos.26x)
 Vibrasil® 70 (pos.26a)
 Vibrasil® 90 (pos.26b)

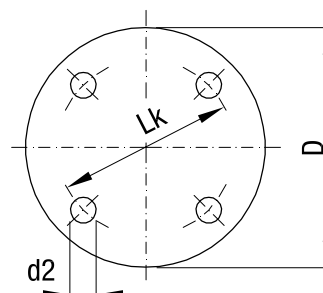
* see below right

** welding seam max. Ø43,8mm (1.72")

Dimensions

Flanges

Code	type	number of holes	d2	Lk	D	T (thickness)
L	Flange DN100 PN6	4	18mm (0.71")	170mm (6.69")	210mm (8.27")	16mm (0.63")
M	Flange DN100 PN16	8	18mm (0.71")	180mm (7.09")	220mm (8.66")	20mm (0.79")
S	Flange 2" 150lbs	4	19.1mm (0.75")	120.7mm (4.75")	152.4mm (6.01")	19.1mm (0.75")
T	Flange 3" 150lbs	4	19.1mm (0.75")	152.4mm (6.01")	190.5mm (7.5")	23.9mm (0.94")
U	Flange 4" 150lbs	8	19.1mm (0.75")	190.5mm (7.5")	228.6mm (9")	23.9mm (0.94")



Detailed Ex-markings

pos. 2	Certificate	Housing
0	CE	Standard
W	ATEX II 1D Ex t IIIC T! Da IP6X and 1/2D Ex t IIIC T! Da/Db IP6X	Standard
Y	ATEX II 1G Ex ia IIC T! Ga and 1/2G Ex ia IIC T! Ga/Gb and ATEX II 1D Ex t IIIC T! Da IP6X and 1/2D Ex t IIIC T! Da/Db IP6X	Standard
R	ATEX II 2G Ex de [ia]* IIC T! Gb and 1/2D Ex t IIIC T! Da/Db IP6X	de
T	ATEX II 2G Ex d [ia]* IIC T! Gb and 1/2D Ex t IIIC T! Da/Db IP6X	d
A	IEC-Ex t IIIC T! Da IP6X and t IIIC T! Da/Db IP6X	Standard
B	IEC-Ex ia IIC T! Ga and ia IIC T! Ga/Gb IEC-Ex t IIIC T! Da IP6X and t IIIC T! Da/Db IP6X	Standard
C	IEC-Ex de [ia]* IIC T! Gb and t IIIC T! Da/Db IP6X	de
D	IEC-Ex d [ia]* IIC T! Gb and t IIIC T! Da/Db IP6X	d
M	FM / CSA general purpose	Standard
N	FM / CSA DIP Cl. II, III Div. 1 Gr. E,F,G CSA Ex DIP A20/21	Standard
P	FM / CSA IS Cl. I, II, III Div. 1 Gr. A-G FM Cl. I Zone 0 and 0/1 AEx ia IIC CSA Cl. I Zone 0 and 0/1 Ex ia IIC and CSA Ex DIP A20 and A20/21	Standard
S	FM Cl. I Zone 1 AEx de [ia]* IIC and FM / CSA Cl. II,III Div. 1 Gr. E,F,G CSA Cl. I Zone 1 Ex de [ia]* IIC and CSA Ex DIP A20/21	de
U	FM XP-IS Cl. I,II,III Div. 1 Gr. B-G* and FM Cl. I Zone 1 AEx d [ia] IIC* CSA XP-IS Cl. I,II,III Div. 1 Gr. B-G* CSA Cl. I Zone 1 Ex d [ia]* IIC and CSA Ex DIP A20/21	d
E	TR-CU Ex ta IIIC T! Da X and Ex ta/tb IIIC T! Da/Db X	Standard
V	TR-CU Ex ia IIC T! Ga X and Ex ia IIC T! Ga/Gb X TR-CU Ex ta IIIC T! Da X and Ex ta/tb IIIC T! Da/Db X	Standard
K	TR-CU Ex de [ia] IIC T! Gb X and Ex ta/tb IIIC T! Da/Db X	de
L	TR-CU Ex d [ia]* IIC T! Gb X and Ex ta/tb IIIC T! Da/Db X	d

* [ia] or IS is not available for versions VN ..020 without temperature extended shaft (pos. 3.1)
 (In this case no intrinsic safe connection between Electronic module and Vibrating fork is used)

Electrical installation

Universal voltage

Relay SPDT

Power supply:

19..230V 50-60Hz +10% 8VA
 19..55V DC +10% 1,5W

Signal output:

Floating relay SPDT

VN 1000/ 2000:

AC max. 253V, 4A, 500VA at $\cos \Phi = 1$

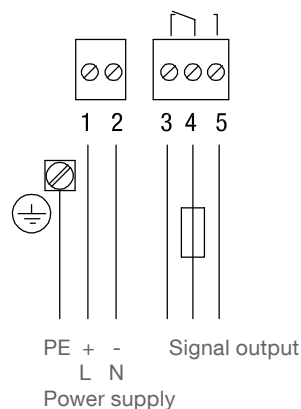
DC max. 253V, 4A, 60W

VN 5000/ 6000:

AC max. 250V, 8A, non inductive

DC max. 30V, 5A, non inductive

Fuse: max 10A, slow or fast, HBC, 250V



Universal voltage

Relay DPDT

Power supply::

19..230V 50-60Hz +10% 18VA
 19..55V (36V*) DC +10% 2W

Signal output:

Floating relay DPDT

VN 1000/ 2000:

AC max. 253V, 4A, 500VA at $\cos \Phi = 1$

DC max. 253V, 4A, 60W

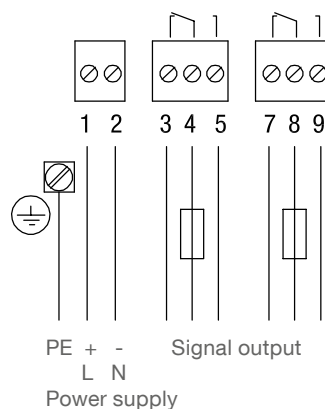
VN 5000/ 6000:

AC max. 250V, 8A, non inductive

DC max. 30V, 5A, non inductive

Fuse: max 10A, slow or fast, HBC, 250V

* Version with intrinsic safe connection between electronic module and vibration fork (see pos.4 in price list)



3-wire

PNP

Power supply:

18 .. 50V DC +10% 1,5W

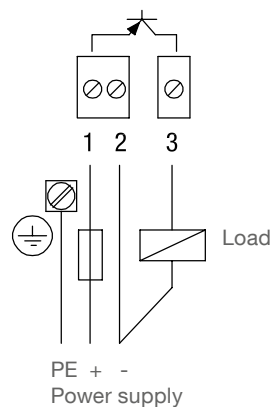
Fuse: max 4A, slow or fast, HBC, 250V

Signal output:

max. 0,4A

Load for example:

PLC, relay, contactor, bulb



Electrical installation

2-wire

without contact

Power supply:

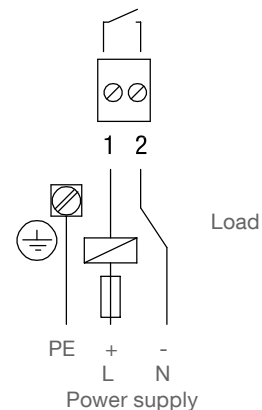
19..230V 50/60Hz +10% 1,5VA
 19..230V DC +10% 1W

Load:

min. 10mA
 max. 0,5A permanent
 (detailed ratings see
 "Technical data")

Load for example:
 relay, contactor, bulb

Fuse: max. 4A, slow or fast, HBC, 250V



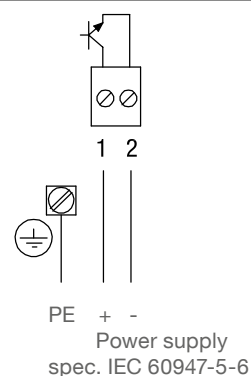
NAMUR

IEC 60947-5-6

Power supply:

ca. 7..9 V DC
 intrinsic safe
 (spec. IEC 60947-5-6)

<1mA or > 2,2mA
 (spec. IEC 60947-5-6)



8/16mA or 4-20mA

Power supply:

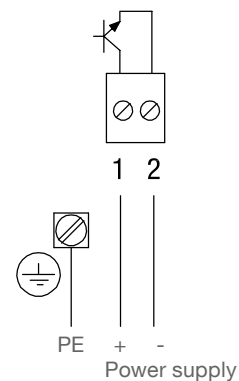
Non intrinsic safe version:
 12,5..36V DC +0%

Intrinsic safe version:
 12,5..30V DC +0%

Signal output

Setting 8/16mA:
 8mA or 16mA

Setting 4-20mA:
 Output current depends on the
 vibration amplitude of the fork: 6mA for
 dampened vibration and 20mA for full
 vibration.



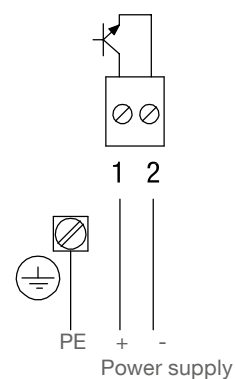
8/16mA

Power supply:

12,5..36V DC +0%

Signal output

8mA or 16mA



Electronic modules VN 1000 / VN 5000

* Intrinsic safe connection between Electronic module and Vibrating fork
** Intrinsic safe from supply and intrinsic safe between Electronic module and Vibrating fork



Vibranivo® 4000

Vibration level limit switch

The economic solution for reliable level monitoring of bulk goods.
Versatile and maintenance-free. Certified for hazardous locations (dust).



Vibranivo® 4000



- Sensational price-performance ratio
- Wide range of applications
- Maintenance-free

Application: Depending on the requirements, the Vibranivo® 4000 can be used as a full, demand or empty detector in bulk good silos. It is suitable for use in all fine grained and powdered materials that do not tend to form heavy deposits.

VN 4020

Full, demand, empty detector

Installation vertical, horizontal and oblique, also in limited spaces (e.g. downpipes)

VN 4030

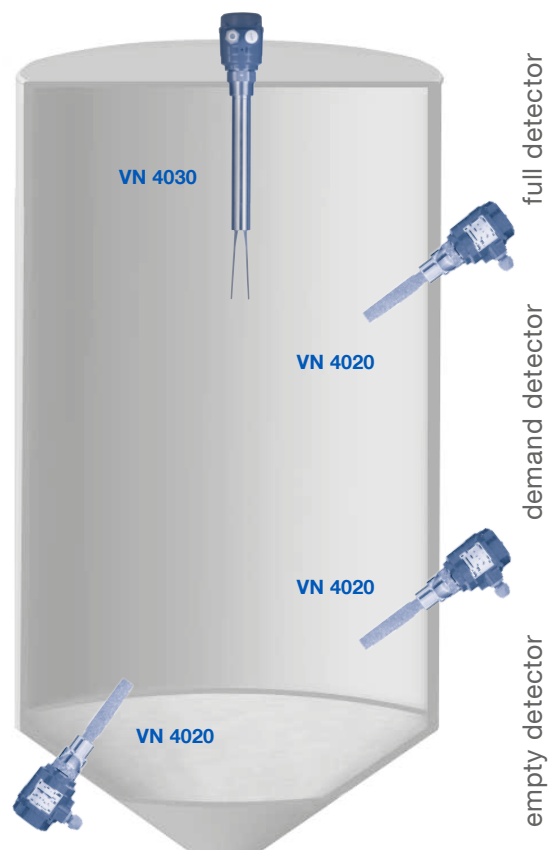
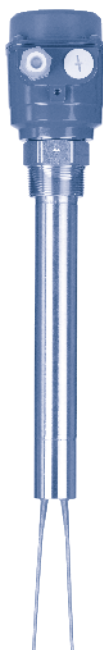
Full, demand, empty detector

Design with extension tube, vertical installation, sliding sleeve option

VN 4040

Full, demand, empty detector



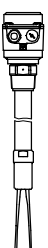
Delivery without pipe extension (reduced shipping costs, flexible length), vertical and oblique installation



Technical Data

Housing	Aluminium IP 67 / NEMA Type 4X
Certificates	ATEX II 1/2D; FM/ CSA Cl. II, III Div. 1 IEC Ex, TR-CU
Process temperature	-40°C up to +150°C (-40°F bis +302°F)
Pressure	-1 up to +16 bar (-14.5 up to +145 psi)
Sensitivity	Adjustable in 2 settings: 30g/l (3.8lb/ft³) or 150g/l (9.5lb/ft³)
Supply voltage	19-230V AC, 19-40V DC relay, 18-50V DC PNP 3-wire
Process connection	R 1½" conical, NPT 1½" or NPT 1¼"
Vibration fork/ Extension	Stainless steel 1.4581 (SS316) / 1.4301 (SS304) or 1.4404 (SS316L)

Table of contents

	Page
Specifications / Applications	2
<hr/>	
VN 4020 Short extension length	4
	
<hr/>	
VN 4030 Pipe extension	6
	
<hr/>	
VN 4040 Pipe extension (screwed)	8
	
<hr/>	
Options	10
Dimensions	12
Spare parts	13
Electrical installation	14

Subject to change.

All dimensions in mm (inches).

All prices in Euro, excluding VAT.

All prices are EXW Betzigau, excluding packaging costs.

Valid: From 01.04.2017 until 31.03.2018, unless otherwise agreed.

By publishing this selection list all other lists become invalid.

We assume no liability for typing errors.

Different variations to those specified are possible.
Please contact our technical consultants.

Specifications

- Level limit detection in bulk goods / solids
- Compact unit
- Die-casted housing aluminium
- Wide range of applications, no maintenance
- Full-, demand-, empty detector
- Sensitivity > 30 g/l (1.9lb/ft³)
- ATEX, IEC-Ex, FM, CSA, TR-CU approvals (DustEx)
- 1935/2004/EC Food grade materials
- 2011/65/EU RoHS conform

Approvals	CE	
	ATEX / IEC-Ex	Zone 20/21 (Dust Ignition Proof)
	FM / CSA	Ordinary Locations
		Cl. II, III Div. 1 (Dust Ignition Proof)
	TR-CU	Ordinary Locations Zone 20/21 (Dust Ignition Proof)

Electro-nics	Relay DPDT	19..230V AC 19..40V DC ± 10%
	PNP	18..50V DC ± 10%

VN 4020	Length of extension	170mm (6.68")
	Ambient temperature	-40 .. +60°C (-40 .. +140°F)
	Process temperature	-40 .. +150°C (-40 .. +302°F)
	Process pressure	-1 .. +16 bar (-14.5 .. +232 psi)
	Process connection material / Extension	1.4581 (316) or 1.4541 (321) (food grade)

VN 4030	Length of extension	300 .. 4.000mm (11.8 .. 157")
	Ambient temperature	-40 .. +60°C (-40 .. +140°F)
	Process temperature	-40 .. +150°C (-40 .. +302°F)
	Process pressure	-1 .. +16 bar (-14.5 .. +232 psi)
	Process connection material / Extension	1.4301 (304)/1.4541 (321) or 1.4571 (316Ti)/1.4404 (316L) (food grade)

VN 4040	Length of extension	max. 1500mm (59") or 4.000mm (157")
	Ambient temperature	-40 .. +60°C (-40 .. +140°F)
	Process temperature	-40 .. +150°C (-40 .. +302°F)
	Process pressure	-1 .. +16 bar (-14.5 .. +232 psi)
	Process connection material / Extension	1.4305 (303) / 1.4541 (321) or 1.4571 (316Ti) / 1.4404 (316L) (food grade)

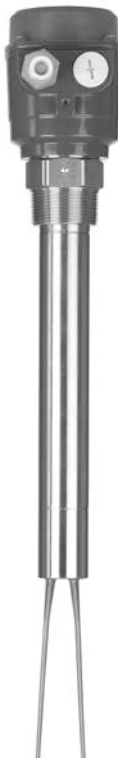
VN 4020



VN 4040



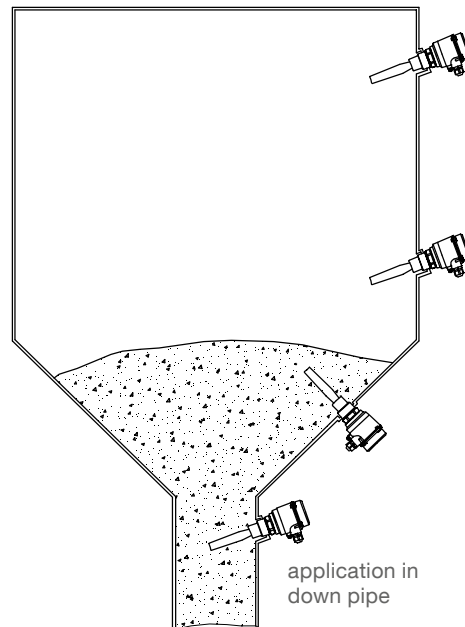
VN 4030



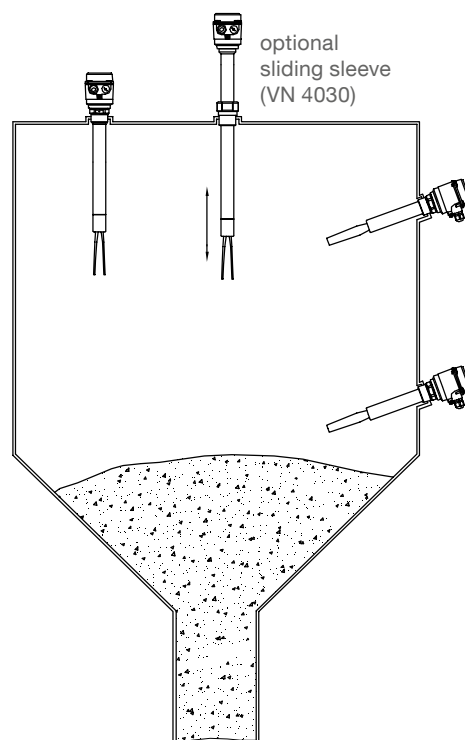
Applications

Detection of solids

VN 4020



VN 4030
VN 4040



VN 4020 Short extension length



Food grade materials

Cable entries (by default)
Depending on model selected the following cable entries are supported (options see pos 23 on page 10):

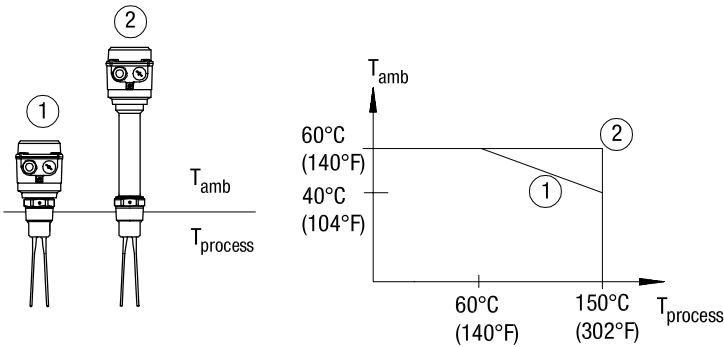
Version:	Cable entries:
CE / ATEX / IEC-Ex / TR-CU (pos.2 0,W,F,E)	M20x1,5 (1x cable gland + 1x blind plug)
FM and CSA (pos.2 M,N)	NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x blind plug)

Dimensions see page 12

pos. 3
Temperature extended shaft

Application up to 150°C
(302°F)

- 1 without
- 2 with



VN 4020 Short extension length

Basic type

VN 4020 •

pos. 2

Certificate

- 0 CE ⁽¹⁾ •
- W ATEX II 1/2D Ex ta/tb IIIC T! Da/Db IP6X •
- A IEC-Ex ta/tb IIIC T! Da/Db IP6X •
- M FM / CSA General Purpose •
- N FM / CSA DIP Cl. II, III Div.1 Group E, F, G and CSA DIP A20/21 •
- E TR-CU Ex ta/tb IIIC T! Da/Db X •

pos. 3

Temperature extended shaft

- 1 without (up to $T_{process} = 150^{\circ}\text{C}$ (302°F) at $T_{amb} < 40^{\circ}\text{C}$ (104°F)) •
- 2 with (up to $T_{process} = 150^{\circ}\text{C}$ (302°F) at $T_{amb} > 40^{\circ}\text{C}$ (104°F)) •

pos. 4

Electronic module

- L Relay DPDT 19..230V AC 19..40V DC •
- D PNP 18..50V DC •

pos. 5

Process connection

- A Thread R1½", conical DIN 2999 •
- B Thread NPT1½", conical ANSI B1.20.1 •
- D Thread NPT1¼", conical ANSI B1.20.1 •
- P Triclamp 2" (DN50) ISO 2852 •
- L Flange DN 100 PN6, EN1092-1 (max. 6 bar (87psi)) •
- M Flange DN 100 PN16, EN1092-1 •
- S Flange 2" 150lbs ANSI B16.5 •
- T Flange 3" 150lbs ANSI B16.5 •
- U Flange 4" 150lbs ANSI B16.5 •

pos. 8

Material of process connection / extension "L"

- 1 Stainless steel 1.4541 (321) •
- 2 Stainless steel 1.4581 (316)/1.4404 (316L) •

Further options: see page 10

VN 4020	A					3	1	
position	1	2	3	4	5	6	7	8

← **Order code**

All positions are available in special design (use code "Z").

⁽¹⁾ TR-CU (general purpose) included

VN 4030 Pipe extension



Food grade materials

Cable entries (by default)
Depending on model selected the following cable entries are supported (options see pos 23 on page 10):

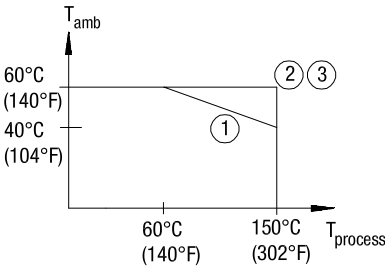
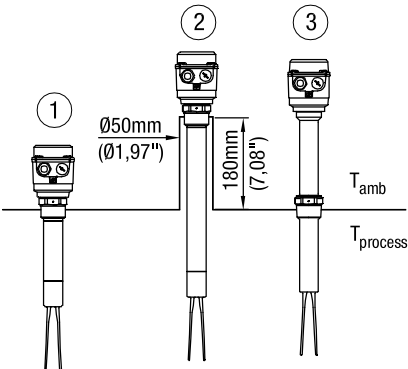
Version:	Cable entries:
CE / ATEX / IEC-Ex / TR-CU (pos.2 0,W,F,E)	M20x1,5 (1x cable gland + 1x blind plug)
FM and CSA (pos.2 M,N)	NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x blind plug)

Dimensions see page 12

pos. 3
Temperature extended shaft

Application up to 150°C (302°F)

- 1 without
- 2 without and with extended socket
- 3 with



VN 4030 Pipe extension

Basic type

VN 4030

pos. 2

Certificate

- | | |
|---|---|
| 0 | CE ⁽¹⁾ |
| W | ATEX II 1/2D Ex ta/tb IIIC T! Da/Db IP6X |
| A | IEC-Ex ta/tb IIIC T! Da/Db IP6X |
| M | FM / CSA General Purpose |
| N | FM / CSA DIP Cl. II, III Div.1 Group E, F, G and CSA DIP A20/21 |
| E | TR-CU Ex ta/tb IIIC T! Da/Db X |

pos. 3

Temperature extended shaft

- 1 without (up to $T_{\text{process}} = 150^{\circ}\text{C}$ (302°F) at $T_{\text{amb}} < 40^{\circ}\text{C}$ (104°F))
 2 with (up to $T_{\text{process}} = 150^{\circ}\text{C}$ (302°F) at $T_{\text{amb}} > 40^{\circ}\text{C}$ (104°F))

pos. 4

Electronic module

- | | | | | |
|---|------------|-------------|------------|-------|
| L | Relay DPDT | 19..230V AC | 19..40V DC | ..... |
| D | PNP | 18..50V DC | ..... | ..... |

pos. 5

Process connection

- | | | | | | |
|---|--|----------------------|-------|---|---|
| A | Thread R1½", | conical DIN 2999 | ..... | • | • |
| B | Thread NPT1½", | conical ANSI B1.20.1 | ..... | • | • |
| D | Thread NPT1¼", | conical ANSI B1.20.1 | ..... | • | • |
| P | Triclamp 2" (DN50) ISO 2852 | ..... | ..... | • | • |
| L | Flange DN 100 PN6, EN1092-1 (max. 6 bar (87psi)) | ..... | ..... | • | • |
| M | Flange DN 100 PN16, EN1092-1 | ..... | ..... | • | • |
| S | Flange 2" 150lbs ANSI B16.5 | ..... | ..... | • | • |
| T | Flange 3" 150lbs ANSI B16.5 | ..... | ..... | • | • |
| U | Flange 4" 150lbs ANSI B16.5 | ..... | ..... | • | • |

pos. 7

Length of extension "L"

- Z from 0mm per 100mm (3.94") and part thereof; min. 300mm (11.8"), max. 4.000mm (157")

pos. 8

Material of process connection / extension "L"

- 2 Stainless steel 1.4571 (316Ti)/1.4404 (316L) _____

Further options: see page 10

VN 4030 B **3 Z** - **L=** mm **← Order code**

position 1 2 3 4 5 6 7 8

All positions are available in special design (use code "Z").

⁽¹⁾ TR-CU (general purpose) included

VN 4040 Pipe extension (screwed)



Food grade materials

Cable entries (by default)

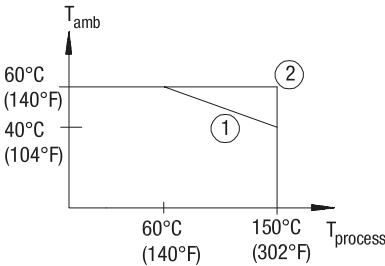
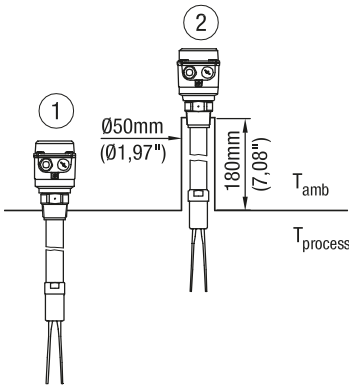
Depending on model selected the following cable entries are supported (options see pos 23 on page 10):

Version:	Cable entries:
CE / ATEX / IEC-Ex / TR-CU (pos.2 0,W,A,E)	M20x1,5 (1x cable gland + 1x blind plug)
FM (pos.2 M,N)	NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x blind plug)

Dimensions see page 13

Application up to 150°C (302°F)

- 1 without exteded socket
- 2 with extended socket



VN 4040 Pipe extension (screwed)

Basic type

VN 4040

pos. 2

Certificate

- | | | |
|---|--|-------|
| 0 | CE ⁽¹⁾ | |
| W | ATEX II 1/2D Ex ta/tb IIIC T! Da/Db IP6X | ..... |
| A | IEC-Ex ta/tb IIIC T! Da/Db IP6X | ..... |
| M | FM General Purpose | ..... |
| N | FM DIP Cl. II, III Div.1 Group E, F, G | ..... |
| E | TR-CU Ex ta/tb IIIC T! Da/Db X | ..... |

pos. 4

Electronic module

- | | | |
|--------------|------------------------|-------|
| L Relay DPDT | 19..230V AC 19..40V DC | ..... |
| D PNP | 18..50V DC | ..... |

pos. 5

Process connection

- | | | | | |
|---|------------------------------|----------------------|-------|---|
| A | Thread R1½", | conical DIN 2999 | ..... | • |
| B | Thread NPT1½", | conical ANSI B1.20.1 | ..... | • |
| P | Triclamp 2" (DN50) ISO 2852 |  | ..... | • |
| L | Flange DN 100 PN6, EN1092-1 | (max. 6 bar (87psi)) | ..... | • |
| M | Flange DN 100 PN16, EN1092-1 |  | ..... | • |
| S | Flange 2" 150lbs ANSI B16.5 |  | ..... | • |
| T | Flange 3" 150lbs ANSI B16.5 |  | ..... | • |
| U | Flange 4" 150lbs ANSI B16.5 |  | ..... | • |

pos. 7

Length of extension "L"

- L 1500mm (59") (cutable cable length)
- M 4000mm (157") (cutable cable length)

pos. 8

Material of process connection / extension "L"

- 1 Stainless steel 1.4305 (303) / Flange 1.4541 (321) _____
2 Stainless steel 1.4571 (316Ti) / 1.4404 (316L) _____

Further options: see page 10

VN 4040	C		1			3		
---------	---	--	---	--	--	---	--	--

position	1	2	3	4	5	6	7	8
----------	---	---	---	---	---	---	---	---

← **Order code**

All positions are available in special design (use code "Z").

⁽¹⁾ TR-CU (general purpose) included

Options

pos. 11x **Guarantee extension to 5 years** •

pos. 21 **Weather protection cover** •
(for Ex only approved for Zone 22 or Div. 2)

Mounting set for flange mounting

	process connection flange	for counter flange with	consists of				
			screws*	nuts*	washers*	sealing**	
pos. 22c	L	hole ø18	4 x M16x60	4 x M16	4 pcs	1 piece	•
pos. 22d	L	thread M16	4 x M16x40		4 pcs	1 piece	•
pos. 22e	M	hole ø18	4 x M16x60	8 x M16	8 pcs	1 piece	•
pos. 22f	M	thread M16	4 x M16x40		8 pcs	1 piece	•

* material stainless steel A2 **max. 125°C (256°F), material not food grade

Cable entry

Selection of the following options only necessary, if a deviation from the default cable gland / conduit is required:

pos. 23x M20x1.5 2x screwed cable gland •
pos. 23y M20x1.5 1x screwed cable gland +1x blind plug •
pos. 23a NPT 1/2" tapered ANSI B1.20.1 (1x conduit + 1x Ex-d blind plug) •
pos. 23b NPT 3/4" tapered ANSI B1.20.1 (1x conduit + 1x Ex-d blind plug) on request

Sliding sleeve ⁶

Process connection as follows or flange as choosen

³ For applications without overpressure, max. 150°C (302°F)
pos. 25a R 1½ inch DIN 2999 material 1.4301 (304) •
pos. 25b NPT 1½ inch ANSI B1.20.1 material 1.4301 (304) •
pos. 25c Flange ⁵ material 1.4301 (304)/1.4541 (321) •

For applications with overpressure max. 16bar (232psi), max. 150°C (302°F)
pos. 25e R 1½ inch DIN 2999 material 1.4571 (316 TI) •
pos. 25f NPT 1½ inch ANSI B1.20.1 material 1.4571 (316 TI) •
pos. 25g Flange ⁵ material 1.4571 (316TI)/1.4404 (316L) •

Signal lamp

pos. 27a Bulb, mounted in cable entry M20x1,5, 2W green ¹ •
pos. 27c Bulb, mounted in cable entry M20x1,5, 2W red ¹ •
pos. 27b LED (glass window in lid)⁴ •

pos. 29 **Plug 4-pole ² (incl. PE)** •

¹ Available for CE (pos. 2, 0), not in combination with weather protection cover (pos. 21) and cable entries pos.23 x,a,b.

For electronic module Relais DPDT (pos. 4.L) three bulbs (24V, 115V and 230V) will be delivered. For PNP (pos.4.D) a 24V bulb will be delivered.

² Available for CE (pos. 2, 0)

³ Available for CE and FM/CSA general purpose (pos. 2, 0, M)

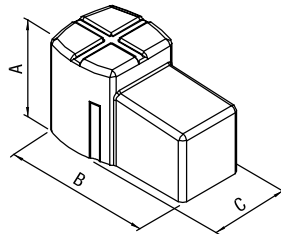
⁴ Not in combination with weather protection cover (Pos. 21)

⁵ Flange as selected in pos.5

⁶ Available for VN 4030

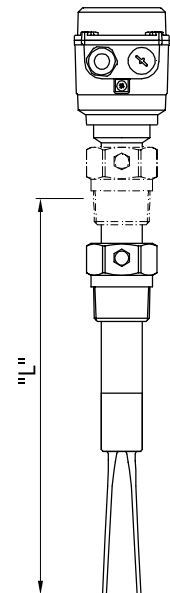
Options

pos. 21
Weather protection cover

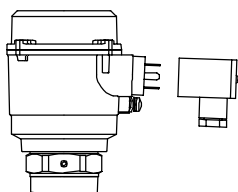


A	100mm (3.94")
B	165mm (6.5")
C	88mm (3.46")

pos. 25
Sliding sleeve

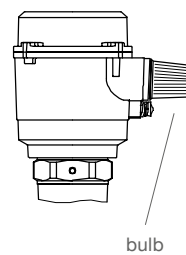


pos. 29
Plug 4-pole



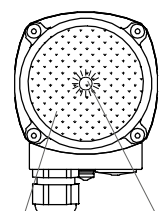
Signal lamp

Pos. 27a,c
Bulb, mounted in
cable entry M20x1,5



bulb

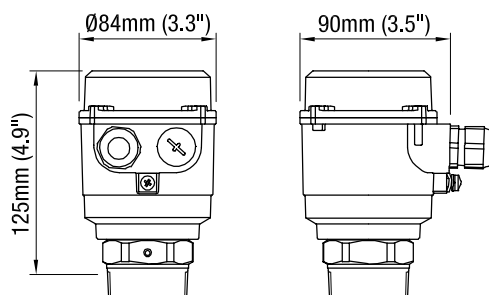
Pos. 27b
LED (glass window in lid)



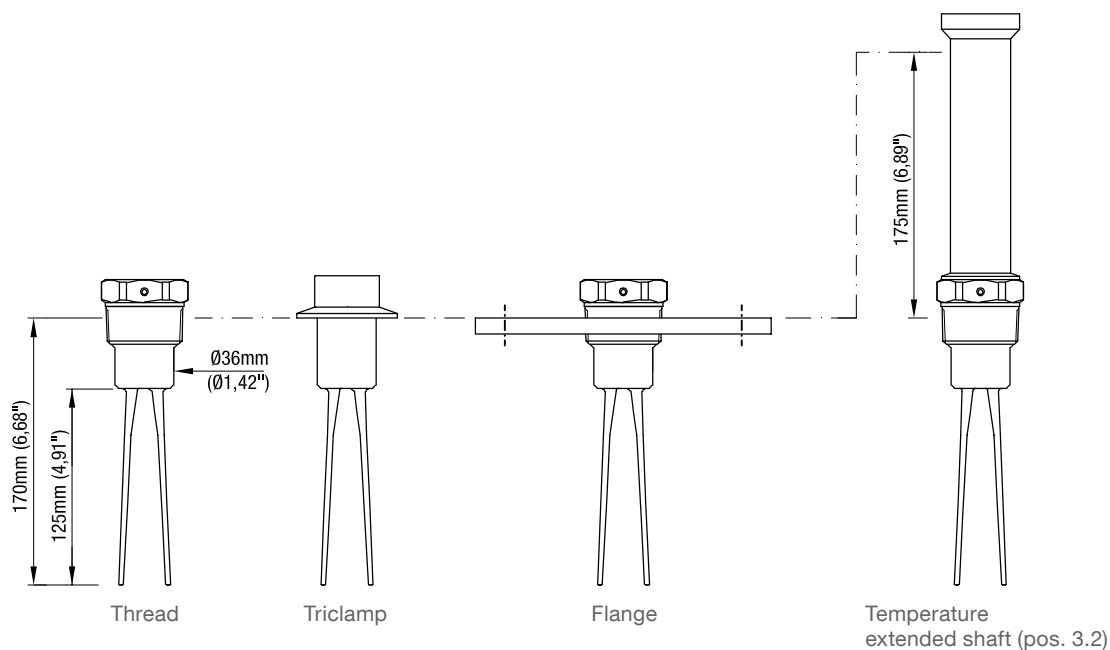
glass window

LED

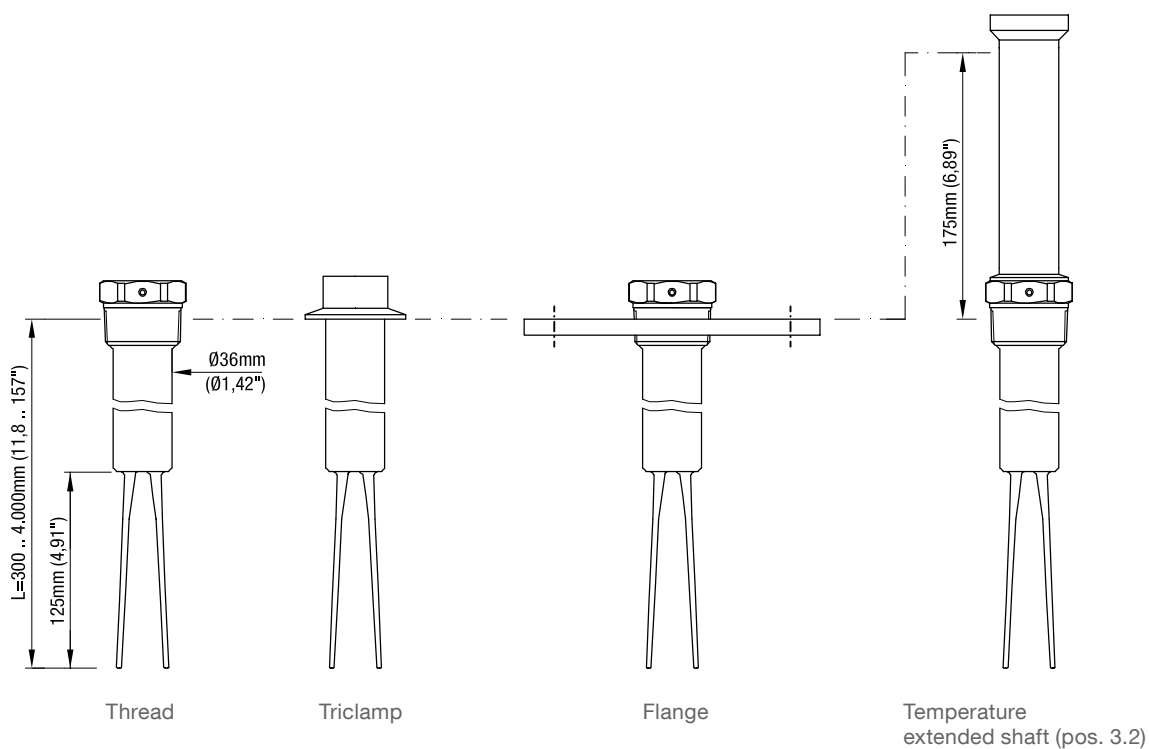
Dimensions



VN 4020

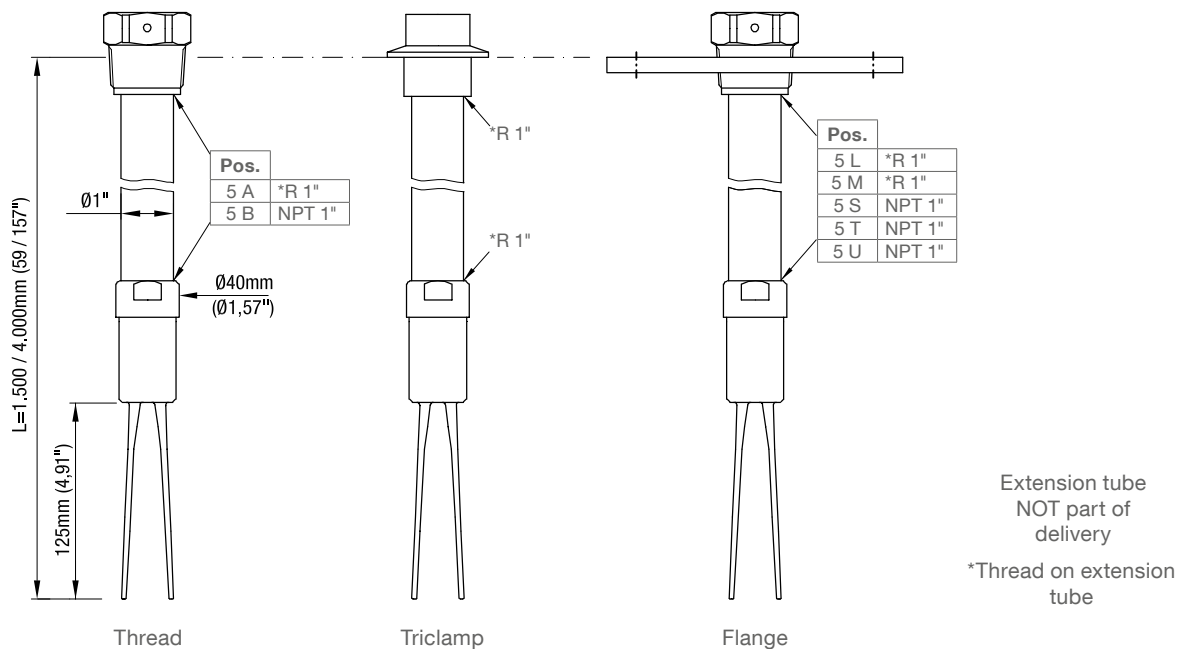


VN 4030



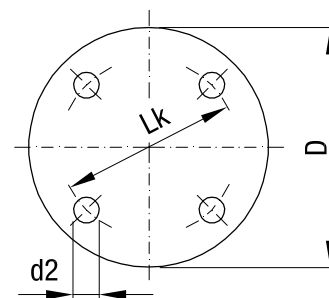
Dimensions / Spare parts

VN 4040



Flanges

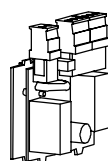
code	type	number of holes	d2	Lk	D	T (thickness)
L	flange DN100 PN6	4	18mm (0.71")	170mm (6.69")	210mm (8.27")	16mm (0.63")
M	flange DN100 PN16	8	18mm (0.71")	180mm (7.09")	220mm (8.66")	20mm (0.79")
S	flange 2" 150lbs	4	19.1mm (0.75")	120.7mm (4.75")	152.4mm (6.01")	19.1mm (0.75")
T	flange 3" 150lbs	4	19.1mm (0.75")	152.4mm (6.01")	190.5mm (7.5")	23.9mm (0.94")
U	flange 4" 150lbs	8	19.1mm (0.75")	190.5mm (7.5")	228.6mm (9")	23.9mm (0.94")



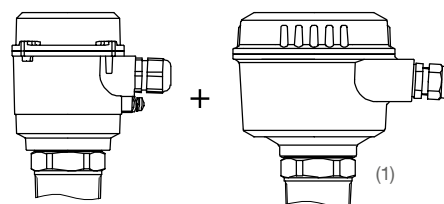
Spare parts

Electronic board	Article number	Price
Relais DPDT 19..230V AC 19..50V DC	pl408265	•
PNP 18..50V DC	pl408266	•

Electronic board



Fitting for housing



(1) Adapting plate included

Electrical installation

Universal voltage

Relay DPDT

Power supply:

19..230V 50-60Hz $\pm 10\%^*$ 22VA
 19..40V DC $\pm 10\%^*$ 2W
 *incl. $\pm 10\%$ of EN 61010

Fuse on power supply:

max. 10A, fast or slow, HBC, 250V

Signal output:

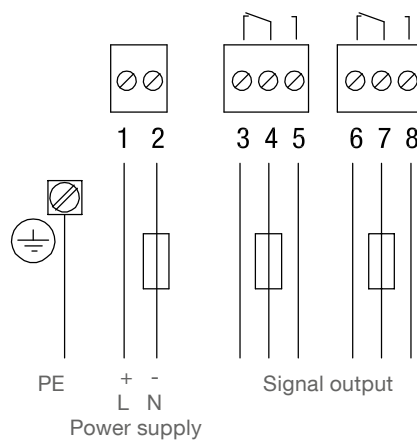
Floating relay DPDT

AC max. 250V, 8A, non inductive

DC max. 30V, 5A, non inductive

Fuse on signal output:

max 10A, fast or slow, HBC, 250V



3-wire

PNP

Power supply:

18 .. 50V DC $\pm 10\%^*$
 *incl. $\pm 10\%$ of EN 61010
 Input current: max. 0.5A

Fuse:

max. 4A, fast or slow, 250V

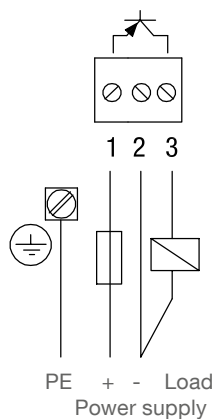
Signal output:

max. 0.4A

Output voltage equal to input
 voltage, drop $< 2.5V$

Load for example:

PLC, relay, contactor, bulb





Mononivo[®] 4000

Vibration level limit switch

The vibrating rod for reliable level detection for all bulk materials.
Versatile and maintenance-free. Certified for hazardous locations.



Mononivo® 4000



- Compact limit switch with threads from 1" available
- Adjustable sensitivity suitable for light bulk solids from 20g/l
- Easy installation and commissioning

Application: The Mononivo® 4000 can be used in silos and tanks as a full, demand or empty detector. The unit is also appropriate as an overflow detector within pipes and shafts. The MN 4000 handles even powdery material with strong caking properties as well as coarse-grained granulate.

MN 4020

Full, demand, empty detector

Installation vertical, horizontal and oblique, also within limited spaces (e.g. downpipes)

MN 4030

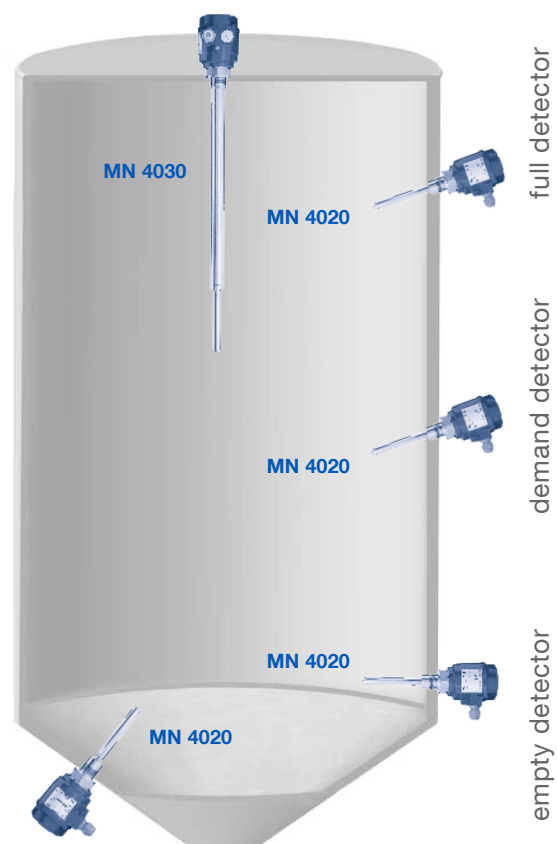
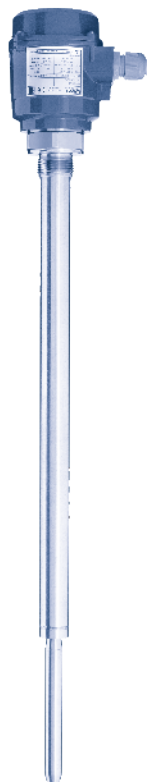
Full, demand, empty detector

Design with extension tube, vertical installation, sliding sleeve option

MN 4040

Full, demand, empty detector


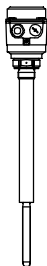
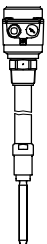
Delivery available without pipe extension (for reduced shipping costs/flexible length), vertical and oblique installation



Technical Data

Housing	Aluminium IP 67 / NEMA Type 4X
Certificates	ATEX II 1/2D Ex ta/tb IIIC T! Da/Db IP6X TR-CU Ex ta/tb IIIC T! Da/Db X IEC-Ex ta/tb IIIC T! Da/Db IP6X FM DIP Cl. II, III Div.1 Group E, F, G
Process temperature	-40°C up to +150°C (-40°F up to +302°F)
Pressure	-1 up to +16 bar (-14.5 up to +145 psi)
Sensitivity	Adjustable in 4 settings: from 20g/l (1.25lb/ft³)
Supply voltage	19-230V AC, 19-40V DC relay, 18-50V DC PNP 3-wire
Process connection	G 1"; G 1½"; NPT 1"; NPT 1¼"; NPT 1½" Triclamp 2"; various flanges available
Material Extension	Stainless steel 1.4301 (SS304) / 1.4541 (SS321) or 1.4404 (SS316L)

Table of contents

	Page
Specifications / Applications	2
<hr/>	
MN 4020 Short extension length	4
	
<hr/>	
MN 4030 Pipe extension	6
	
<hr/>	
MN 4040 Pipe extension (screwed)	8
	
<hr/>	
Options	10
Dimensions	12
Spare parts	13
Electrical installation	14

Subject to change.

All dimensions in mm (inches).

All prices in Euro, excluding VAT.

All prices are EXW Betzigau, excluding packaging costs.

Valid: From 01.04.2017 until 31.03.2018, unless otherwise agreed.

By publishing this selection list all other lists become invalid.

We assume no liability for typing errors.

Different variations to those specified are possible.
Please contact our technical consultants.

Specifications

- Level limit detection in bulk goods / solids
- Compact unit
- Die-casted housing aluminium
- Wide range of applications, no maintenance
- Full-, demand-, empty detector
- Sensitivity > 20 g/l (1.25 lb/ft³)
- 4 sensitivity settings selectable
- ATEX, IEC-Ex, FM approvals (DustEx)
- 1935/2004/EC Food grade materials
- 2011/65/EU RoHS conform

Approvals	CE	
	ATEX / IEC-Ex	Zone 20/21 (Dust Ignition Proof)
	FM	Ordinary Locations
		Cl. II, III Div. 1 (Dust Ignition Proof)
	TR-CU	Ordinary Locations Zone 20/21 (Dust Ignition Proof)

Electro-nics	Relay DPDT	21..230V AC 22..45V DC ± 10%
	PNP	20..40V DC ± 10%

MN 4020	Length of extension	160mm (6.3")
	Ambient temperature	-40 .. +60°C (-40 .. +140°F)
	Process temperature	-40 .. +150°C (-40 .. +302°F)
	Process pressure	-1 .. +16 bar (-14.5 .. +232 psi)
	Process connection material / Extension	1.4301 (304)/1.4541 (321) or 1.4404 (316L) (food grade)

MN 4030	Length of extension	200 .. 4.000mm (7.9 .. 157")
	Ambient temperature	-40 .. +60°C (-40 .. +140°F)
	Process temperature	-40 .. +150°C (-40 .. +302°F)
	Process pressure	-1 .. +16 bar (-14.5 .. +232 psi)
	Process connection material / Extension	1.4301 (304)/1.4541 (321) or 1.4404 (316L) (food grade)

MN 4040	Length of extension	max. 1500mm (59") or 4.000mm (157")
	Ambient temperature	-40 .. +60°C (-40 .. +140°F)
	Process temperature	-40 .. +150°C (-40 .. +302°F)
	Process pressure	-1 .. +16 bar (-14.5 .. +232 psi)
	Process connection material / Extension	1.4301 (304)/1.4541 (321) or 1.4404 (316L) (food grade)

MN 4020



MN 4040



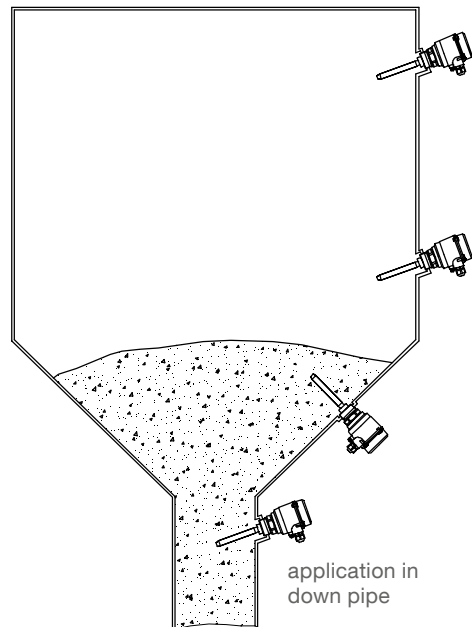
MN 4030



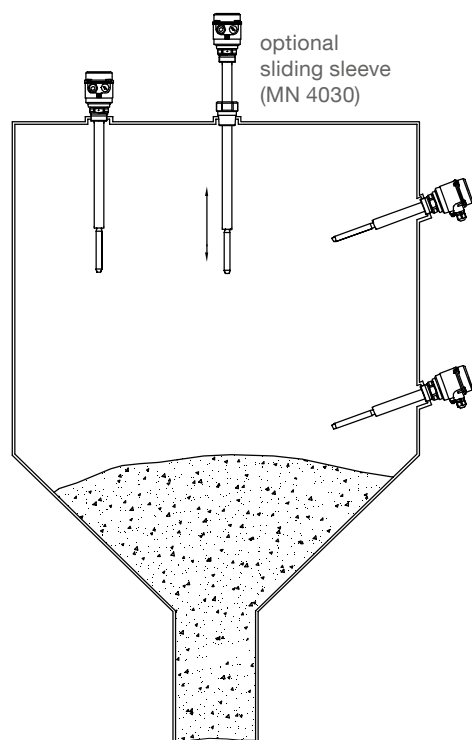
Applications

Detection of solids

MN 4020



MN 4030
MN 4040



MN 4020 Short extension length



Materials inside process: Food grade

Cable entries (by default)

Depending on model selected the following cable entries are supported (options see pos 23 on page 10):

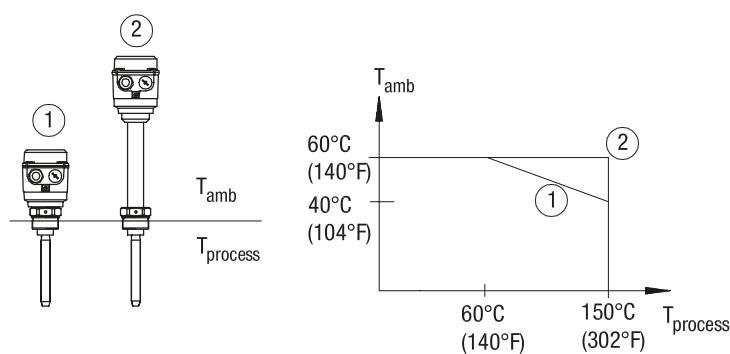
Version:	Cable entries:
CE / ATEX / IEC-Ex / TR-CU (pos.2 0,W,A,E)	M20x1,5 (1x cable gland + 1x blind plug)
FM (pos.2 M,N)	NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x blind plug)

Dimensions see page 12

pos. 3
 Temperature extended shaft

Application up to 150°C (302°F)

- 1 without
- 2 with



MN 4020 Short extension length

Basic type

MN 4020 •

pos. 2

Certificate

- 0 CE ⁽¹⁾ •
- W ATEX II 1/2D Ex ta/tb IIIC T! Da/Db IP6X •
- A IEC-Ex ta/tb IIIC T! Da/Db IP6X •
- M FM General Purpose •
- N FM DIP Cl. II, III Div.1 Group E, F, G •
- E TR-CU Ex ta/tb IIIC T! Da/Db X •

pos. 3

Temperature extended shaft

- 1 without (up to $T_{process} = 150^{\circ}\text{C}$ (302°F) at $T_{amb} < 40^{\circ}\text{C}$ (104°F)) •
- 2 with (up to $T_{process} = 150^{\circ}\text{C}$ (302°F) at $T_{amb} > 40^{\circ}\text{C}$ (104°F)) •

pos. 4

Electronic module

- L Relay DPDT 21..230V AC 22..45V DC •
- D PNP 20..40V DC •

pos. 5

Process connection

- A Thread G1½" DIN 228 • •
- B Thread G1¼" DIN 228 • •
- C Thread G1" DIN 228 • •
- F Thread NPT1½" conical ANSI B1.20.1 • •
- Q Thread NPT1¼" conical ANSI B1.20.1 • •
- G Thread NPT1" conical ANSI B1.20.1 • •
- P Tricomp 2" (DN50) ISO 2852 • •
- L Flange DN 100 PN6, EN1092-1 (max. 6 bar (87psi)) • •
- M Flange DN 100 PN16, EN1092-1 • •
- S Flange 2" 150lbs ANSI B16.5 • •
- T Flange 3" 150lbs ANSI B16.5 • •
- U Flange 4" 150lbs ANSI B16.5 • •

pos. 8

Material of process connection / extension "L"

- 1 Stainless steel 1.4301 (304)/ Flange 1.4541 (321) ↑
- 2 Stainless steel 1.4404 (316L) ↑

Further options: see page 10

MN 4020	A					3	1	
position	1	2	3	4	5	6	7	8

← **Order code**

All positions are available in special design (use code "Z").

⁽¹⁾TR-CU (general purpose) included

MN 4030 Pipe extension



Materials inside process: Food grade

Cable entries (by default)
Depending on model selected the following cable entries are supported (options see pos 23 on page 10):

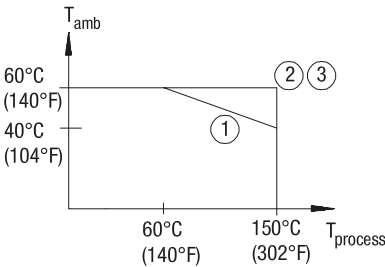
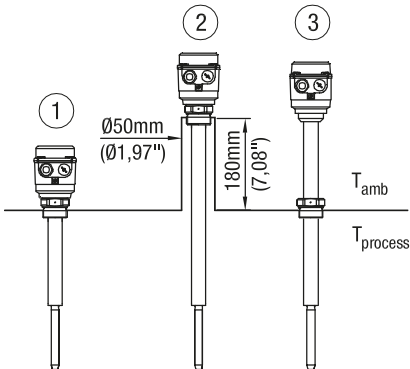
Version:	Cable entries:
CE / ATEX / IEC-Ex / TR-CU (pos.2 0,W,A,E)	M20x1,5 (1x cable gland + 1x blind plug)
FM (pos.2 M,N)	NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x blind plug)

Dimensions see page 12

pos. 3
Temperature extended shaft

Application up to 150°C (302°F)

- 1 without
- 2 without and with extended socket
- 3 with



MN 4030 Pipe extension

Basic type

MN 4030

pos. 2

Certificate

- | | |
|---|--|
| O | CE ⁽¹⁾ |
| W | ATEX II 1/2D Ex ta/tb IIIC T! Da/Db IP6X |
| A | IEC-Ex ta/tb IIIC T! Da/Db IP6X |
| M | FM General Purpose |
| N | FM DIP Cl. II, III Div.1 Group E, F, G |
| E | TR-CU Ex ta/tb IIIC T! Da/Db X |

pos. 3

Temperature extended shaft

- 1 without (up to $T_{\text{process}} = 150^{\circ}\text{C}$ (302°F) at $T_{\text{amb}} < 40^{\circ}\text{C}$ (104°F))
 2 with (up to $T_{\text{process}} = 150^{\circ}\text{C}$ (302°F) at $T_{\text{amb}} > 40^{\circ}\text{C}$ (104°F))

pos. 4

Electronic module

- | | | | | |
|---|------------|-------------|------------|-------|
| L | Relay DPDT | 21..230V AC | 22..45V DC | ..... |
| D | PNP | 20..40V DC |  | ..... |

pos. 5

Process connection

- | | | | |
|---|------------------------------|----------------------|-------|
| A | Thread G1½" | DIN 228 | ..... |
| B | Thread G1¼" | DIN 228 | ..... |
| C | Thread G1" | DIN 228 | ..... |
| F | Thread NPT1½" | conical ANSI B1.20.1 | ..... |
| Q | Thread NPT1¼" | conical ANSI B1.20.1 | ..... |
| G | Thread NPT1" | conical ANSI B1.20.1 | ..... |
| P | Triclamp 2" (DN50) ISO 2852 | ..... | ..... |
| L | Flange DN 100 PN6, EN1092-1 | (max. 6 bar (87psi)) | ..... |
| M | Flange DN 100 PN16, EN1092-1 | ..... | ..... |
| S | Flange 2" 150lbs ANSI B16.5 | ..... | ..... |
| T | Flange 3" 150lbs ANSI B16.5 | ..... | ..... |
| U | Flange 4" 150lbs ANSI B16.5 | ..... | ..... |

pos. 7

Length of extension "L"

- Z from 0mm per 100mm (3.94") and part thereof; min. 200mm (7.9"), max. 4.000mm (157")

pos. 8

Material of process connection / extension "L"

- 1 Stainless steel 1.4301 (304)/ Flange 1.4541 (321)
2 Stainless steel 1.4404 (316L)

Further options: see page 10

MN 4030	B					3	Z	
position	1	2	3	4	5	6	7	8

All positions are available in special design (use code "Z").

⁽¹⁾ TR-CU (general purpose) included

L= mm

Order code

MN 4040 Pipe extension (screwed)



Materials inside process: Food grade

Cable entries (by default)

Depending on model selected the following cable entries are supported (options see pos 23 on page 10):

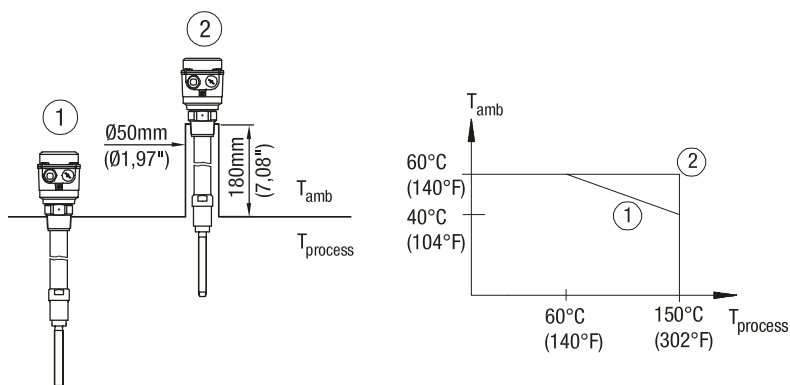
Version:	Cable entries:
CE / ATEX / IEC-Ex / TR-CU (pos.2 0,W,A,E)	M20x1,5 (1x cable gland + 1x blind plug)
FM (pos.2 M,N)	NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x blind plug)

Dimensions

see page 13

Application up to 150°C (302°F)

- 1 without exteded socket
- 2 with extended socket



MN 4040 Pipe extension (screwed)

Basic type

MN 4040		.....	•
pos. 2	Certificate			
	0	CE ⁽¹⁾	•
	W	ATEX II 1/2D Ex ta/tb IIIC T! Da/Db IP6X	.....	•
	A	IEC-Ex ta/tb IIIC T! Da/Db IP6X	.....	•
	M	FM General Purpose	.....	•
	N	FM DIP Cl. II, III Div.1 Group E, F, G	.....	•
	E	TR-CU Ex ta/tb IIIC T! Da/Db X	.....	•
pos. 4	Electronic module			
	L	Relay DPDT 21..230V AC 22..45V DC	.....	•
	D	PNP 20..40V DC	.....	•
pos. 5	Process connection			
	A	Thread G 1/2" DIN 228	.....	• •
	F	Thread NPT1 1/2" conical ANSI B1.20.1	.....	• •
	P	Triclamp 2" (DN50) ISO 2852	.....	• •
	L	Flange DN 100 PN6, EN1092-1 (max. 6 bar (87psi))	.....	• •
	M	Flange DN 100 PN16, EN1092-1	.....	• •
	S	Flange 2" 150lbs ANSI B16.5	.....	• •
	T	Flange 3" 150lbs ANSI B16.5	.....	• •
	U	Flange 4" 150lbs ANSI B16.5	.....	• •
pos. 7	Length of extension "L"			
	L	1500mm (59") (cutable cable length)	.....	•
	M	4000mm (157") (cutable cable length)	.....	•
pos. 8	Material of process connection / extension "L"			
	1	Stainless steel 1.4301 (304) / Flange 1.4541 (321)	.....	↑
	2	Stainless steel 1.4404 (316L)	.....	↑

Further options: see page 10

MN 4040	C		1			3		
----------------	----------	--	----------	--	--	----------	--	--

position 1 2 3 4 5 6 7 8

← **Order code**

All positions are available in special design (use code "Z").

⁽¹⁾ TR-CU (general purpose) included

Options

pos. 11x **Guarantee extension to 5 years** •

pos. 21 **Weather protection cover** •
(for Ex only approved for Zone 22 or Div. 2)

Mounting set for flange mounting

	process connection flange	for counter flange with	consists of				
			screws*	nuts*	washers*	sealing**	
pos. 22c	L	hole ø18	4 x M16x60	4 x M16	4 pcs	1 piece	•
pos. 22d	L	thread M16	4 x M16x40		4 pcs	1 piece	•
pos. 22e	M	hole ø18	4 x M16x60	8 x M16	8 pcs	1 piece	•
pos. 22f	M	thread M16	4 x M16x40		8 pcs	1 piece	•

* material stainless steel A2 **max. 125°C (256°F), material not food grade

Cable entry

Selection of the following options only necessary, if a deviation from the default cable gland / conduit is required:

pos. 23x M20x1.5 2x screwed cable gland •
pos. 23y M20x1.5 1x screwed cable gland +1x blind plug •
pos. 23a NPT 1/2" tapered ANSI B1.20.1 (1x conduit + 1x Ex-d blind plug) •
pos. 23b NPT 3/4" tapered ANSI B1.20.1 (1x conduit + 1x Ex-d blind plug) on request

Sliding sleeve ⁶

Process connection as follows or flange as choosen

³ For applications without overpressure, max. 150°C (302°F)
pos. 25a G 1½ " DIN 228 material 1.4301 (304) •
pos. 25b NPT 1½ inch ANSI B1.20.1 material 1.4301 (304) •
pos. 25c Flange ⁵ material 1.4301 (304)/1.4541 (321) •

For applications with overpressure max. 16bar (232psi), max. 150°C (302°F)
pos. 25e G 1½ " DIN 228 material 1.4404 (316L) •
pos. 25f NPT 1½ inch ANSI B1.20.1 material 1.4404 (316L) •
pos. 25g Flange ⁵ material 1.4404 (316L) •

Signal lamp

pos. 27a Bulb, mounted in cable entry M20x1,5, 2W green ¹ •
pos. 27c Bulb, mounted in cable entry M20x1,5, 2W red ¹ •
pos. 27b LED (glass window in lid)⁴ •

pos. 29 **Plug 4-pole ² (incl. PE)** •

¹ Available for CE (pos. 2, 0), not in combination with weather protection cover (pos. 21) and cable entries pos.23 x,a,b.
For electronic module Relais DPDT (pos. 4.L) three bulbs (24V, 115V and 230V) will be delivered. For PNP (pos.4.D) a 24V bulb will be delivered.

² Available for CE (pos. 2, 0)

³ Available for CE and FM general purpose (pos. 2, 0, M)

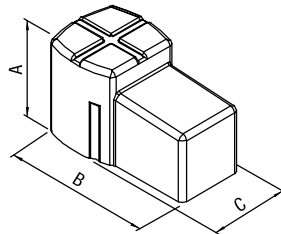
⁴ Not in combination with weather protection cover (Pos. 21)

⁵ Flange as selected in pos.5

⁶ Available for MN 4030

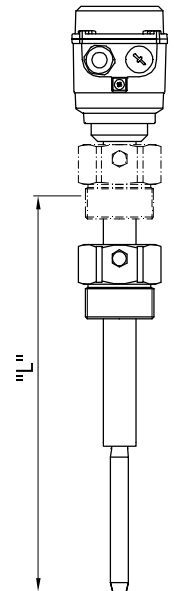
Options

pos. 21
Weather protection cover

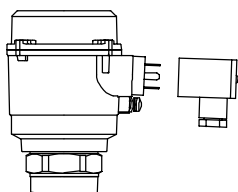


A	100mm (3.94")
B	165mm (6.5")
C	88mm (3.46")

pos. 25
Sliding sleeve

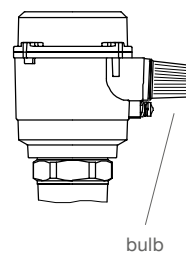


pos. 29
Plug 4-pole



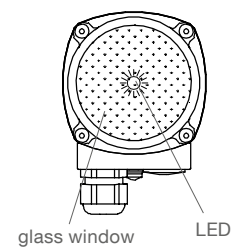
Signal lamp

pos. 27a,c
Bulb, mounted
in cable entry M20x1,5



bulb

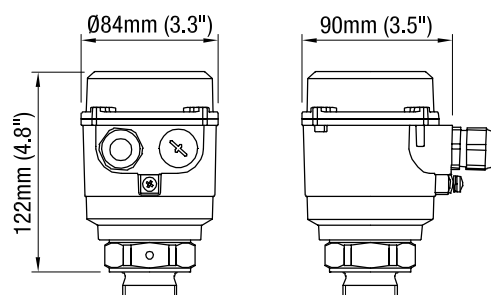
pos. 27b
LED (glass window in lid)



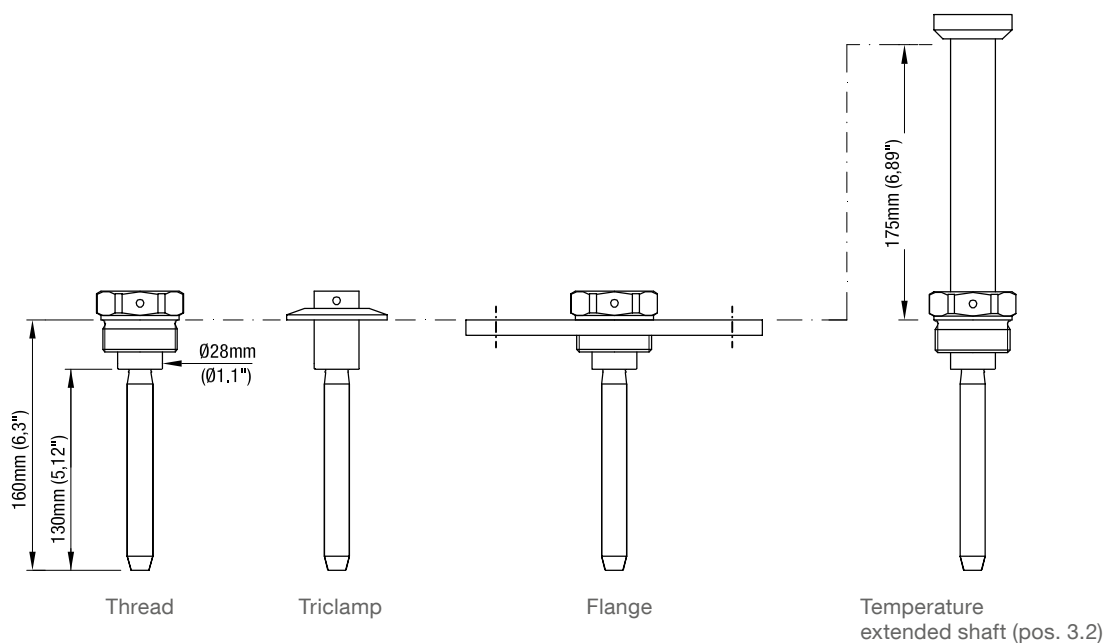
glass window

LED

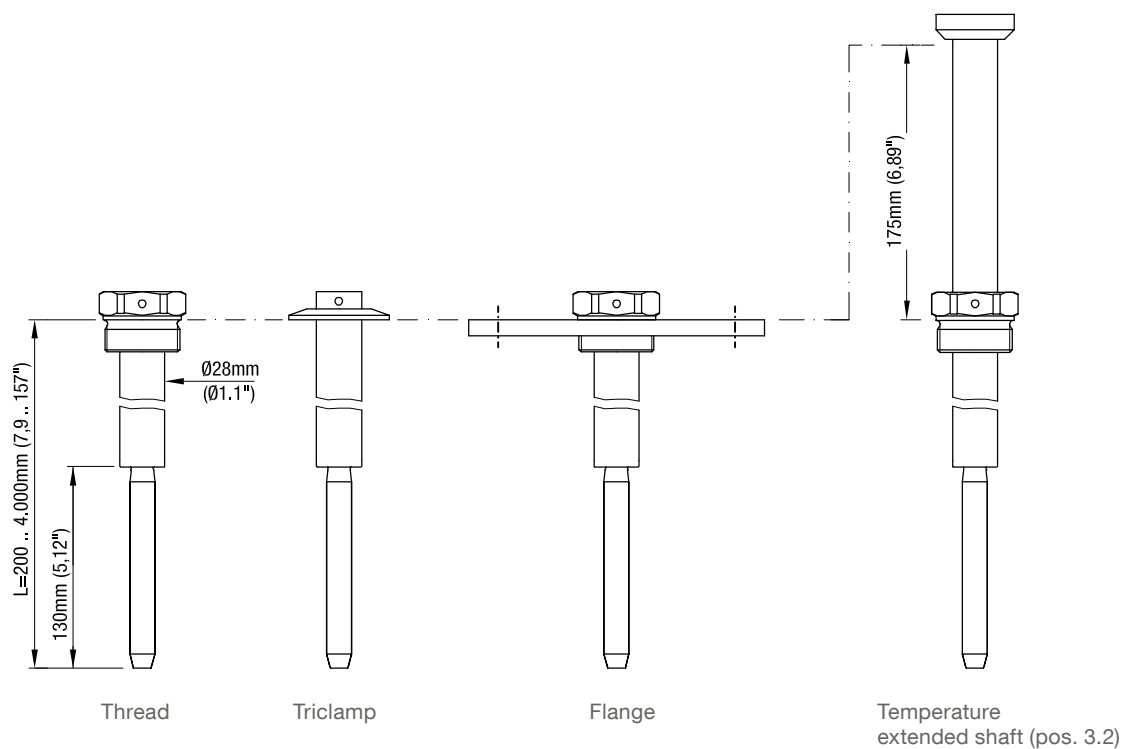
Dimensions



MN 4020

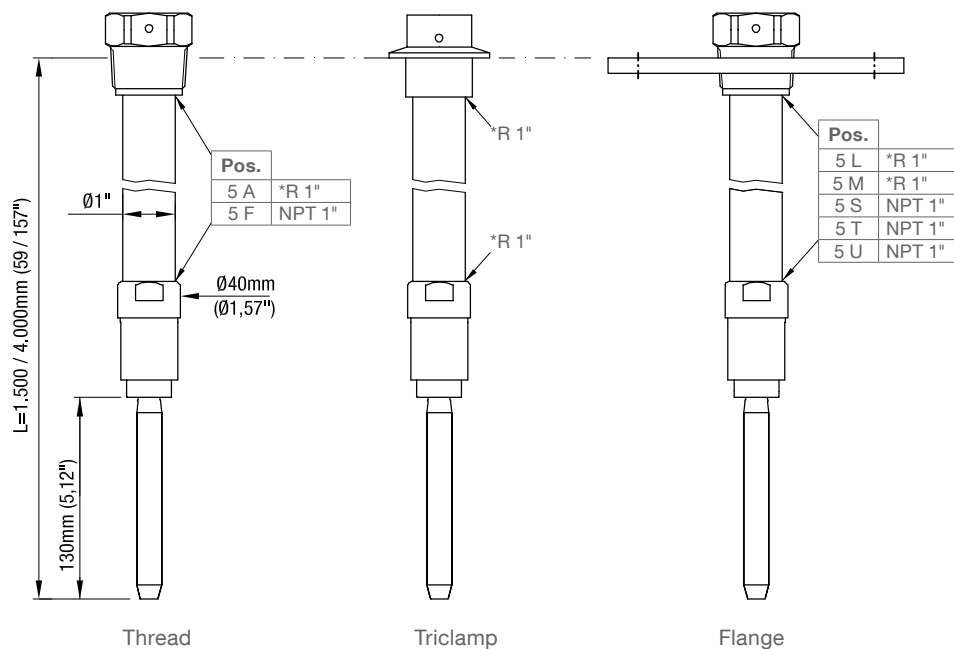


MN 4030



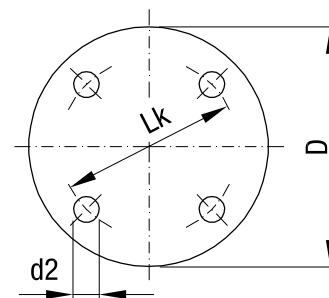
Dimensions / Spare parts

MN 4040



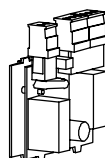
Flanges

code	type	number of holes	d2	Lk	D	T (thickness)
L	flange DN100 PN6	4	18mm (0.71")	170mm (6.69")	210mm (8.27")	16mm (0.63")
M	flange DN100 PN16	8	18mm (0.71")	180mm (7.09")	220mm (8.66")	20mm (0.79")
S	flange 2" 150lbs	4	19.1mm (0.75")	120.7mm (4.75")	152.4mm (6.01")	19.1mm (0.75")
T	flange 3" 150lbs	4	19.1mm (0.75")	152.4mm (6.01")	190.5mm (7.5")	23.9mm (0.94")
U	flange 4" 150lbs	8	19.1mm (0.75")	190.5mm (7.5")	228.6mm (9")	23.9mm (0.94")



Spare parts

Electronic board	Article number	Price
Relais DPDT 21..230V AC 22..45V DC	pl405265	•
PNP 20..40V DC	pl405266	•



Electrical installation

Universal voltage

Relay DPDT

Power supply:

21..230V 50-60Hz $\pm 10\%^*$ 22VA
 22..45V DC $\pm 10\%^*$ 2W
 *incl. $\pm 10\%$ of EN 61010

Fuse on power supply:

max. 10A, fast or slow, HBC, 250V

Signal output:

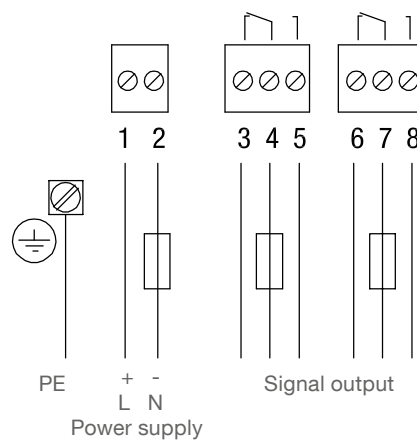
Floating relay DPDT

AC max. 250V, 8A, non inductive

DC max. 30V, 5A, non inductive

Fuse on signal output:

max 10A, fast or slow, HBC, 250V



3-wire

PNP

Power supply:

20 .. 40V DC $\pm 10\%^*$
 *incl. $\pm 10\%$ of EN 61010
 Input current: max. 0.5A

Fuse:

max. 4A, fast or slow, 250V

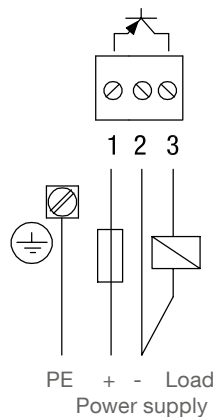
Signal output:

max. 0.4A

Output voltage equal to input voltage, drop $< 2.5V$

Load for example:

PLC, relay, contactor, bulb





RFnivo[®] 3000

Capacitive level limit switch

Capacitive limit detection for nearly all types of bulk material.
Certified for hazardous locations.



RFnivo® 3000



- Quick and easy setup with automatic calibration
- Maintenance free: Active Shield Technology against material build-up ensures high functional safety
- Suitable for use in applications with high pressure - up to 25bar and with temperatures of up to 500°C

Applications: RFnivo® 3000 is certified for all bulk solids applications such as flour, grain, sugar, cement, granulate, carbon black and also for slurry and liquids.

RF 3100 Standard

Full, demand, empty detector
Vertical, horizontal and oblique installation



RF 3100 version
with PFA coating
available

RF 3200 Heavy Duty

Full, demand, empty detector
Vertical, horizontal and oblique installation



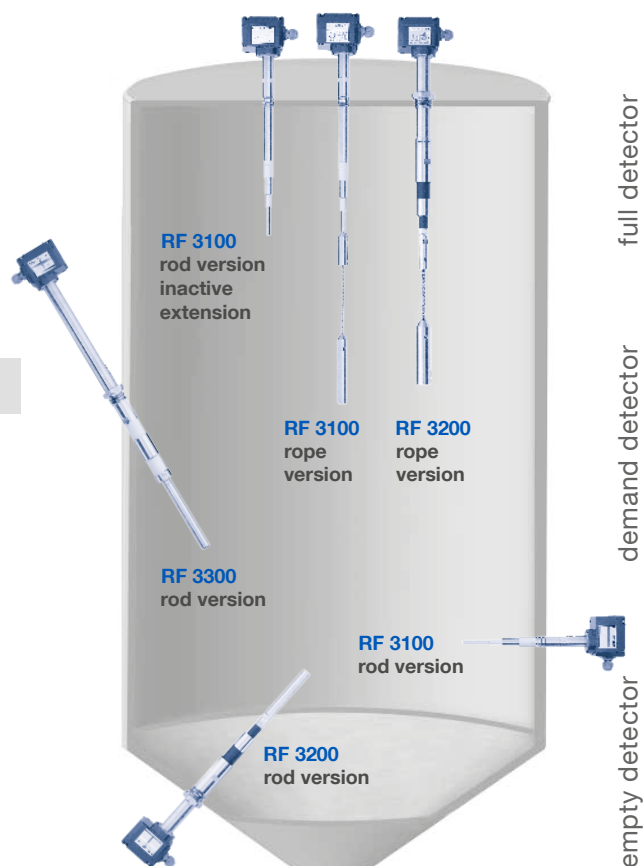
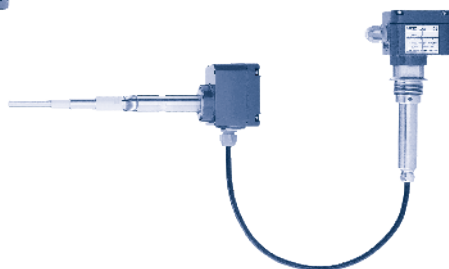
RF 3300 High Temperature

Full, demand, empty detector
Vertical, horizontal and oblique installation



Remote Version

Full, demand, empty detector
Vertical, horizontal and oblique installation, ie for applications with vibration



Housing types

RF 3000
standard



RF 3000
flameproof



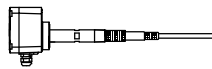
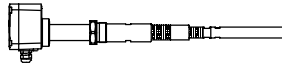
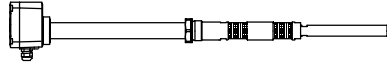
RF 3000
flameproof, in-
creased safety



Technical Data

Housing	Aluminium IP 66, NEMA Type 4X
Versions with certificates	ATEX II 1/2D, II 2G Ex d, II 2G Ex de IEC-Ex ia/tb IIIC Da/Db, d IIC Gb, de IIC Gb FM Cl. I, II, III Div.1 TR-CU, EHEDG
Process temperature	-40°C to +500°C (-40°F to +932°F)
Pressure	-1 .. +25 bar (-14.5 .. +363 psi)
Sensitivity	DK value > 1.5
Supply voltage	21.. 230V AC/21..230V DC Relay DPDT
Process connection	M30, M32, G ¾", G 1", G 1½" NPT ¾", NPT 1", NPT 1¼", NPT 1½"
Material probe	1.4301 (SS304) / 1.4305 (SS303) or 1.4404 (SS316L); Isolation PPS or ceramic FDA and 1935/2004 EC conform

Table of content

	Page
Overview	2
Applications	4
<hr/>	
RF 3100 Standard version	6
	
<hr/>	
RF 3200 Heavy Duty version	8
	
<hr/>	
RF 3300 High temperature version	10
	
<hr/>	
Options	12
Dimensions	17
Detailed Ex-markings	22
Electrical installation	23
Spare parts	24

Subject to change.

All dimensions in mm (inches).

All prices in Euro, excluding VAT.

All prices are EXW Betzigau, excluding packaging costs.

Valid: From 01.04.2017 until 31.03.2018, unless otherwise agreed.

By publishing this selection list all other lists become invalid.

We assume no liability for typing errors.

Different variations to those specified are possible. Please contact our technical consultants.

Overview

- Level limit detection in bulk goods / solids
- Compact unit
- Wide range of applications
- No maintenance
- Full, demand, empty detector
- Aluminium or plastics housing
- RF technology
- Active shield technology
- Self diagnostics
- Auto calibration
- ATEX, IEC-Ex, FM, FMc, TR-CU
GasEx and DustEx approvals
- FDA and 1935/2004/EC
Food grade materials

Approvals	CE	
	ATEX / IEC-Ex	
	Zone 20/21	Dust Ignition Proof
	Zone 1	Flameproof / Increased Safety
	FM / FMc	
	General purp.	
	Cl. II, III Div. 1	Dust Ignition Proof
	Cl. I Div. 1 Cl. I Zone 1	Explosionproof
	TR-CU	
	Zone 20/21	Dust Ignition Proof
	Zone 1	Flameproof / Increased Safety

Electronics	Supply voltage / Signal output	21 .. 230V AC/DC +-10% Relais DPDT
	Technology	RF with active shield
	Signal output delay	0.5 .. 60sec
	Measuring range / max.s ensitivity	3 .. 100pF / 0.5pF 3 .. 400pF / 2pF
	Preset sensitivy	2pF default, other sensitivity optional
	Calibration	Auto power up calibration at first time operation Auto recalibration with uncovered probe Push button calibration Manual calibration
	Display	4 digit LCD Display of actual measured capacitance, signal output state and self diagnostics
	Self diagnostics	Auto or manual function test Over and Under Range Actual calibrated switchpoint capacitance Min. and max. electronics temperature

Housings

Standard Aluminium	d Aluminium	de Aluminium
		

Overview

RF 3100 Standard version	
Total length L	200 .. 2.500mm (7.9 .. 98.4") rod 450 .. 20.000mm (17.7 .. 787") rope
Active rod / rope diameter	Rod ø10mm (0.39") Rope ø4mm (0.16")
Ambient temperature	-40 .. +70°C (-40 .. 158°F)
Process temperature	-40 .. +240°C (-40 .. +464°F)
Process pressure	-1 .. +25bar (-14.5 .. +363 psi)
Lateral load (rod version)	max. 20Nm (ø10mm probe), max. 125Nm (ø22mm pipe)
Tensile load (rope version)	max. 4kN
Process connection material / Extension material	1.4301/1.4305/1.4541 (SS303/304/321) or 1.4404/1.4401 (SS316L/316)
Probe isolation material	PPS reinforced FDA and 1935/2004/EC conform
Probe gasket material	FKM

Rod version
 Shortest length



Rod version
 Inactive
 extension



Rope version
 Inactive
 extension



Remote version



Overview / Applications

RF 3200 Heavy Duty version	
Total length L	300 .. 2.500mm (11.8 .. 98.4") rod 550 .. 20.000mm (21.7 .. 787") rope
Active rod / rope diameter	Rod ø22mm (0.87") Rope ø8mm (0.31")
Ambient temperature	-40 .. +70°C (-40 .. +158°F)
Process temperature	-40 .. +240°C (-40 .. +464°F)
Process pressure	-1 .. +25bar (-14.5 .. +363 psi)
Lateral load (rod version)	max. 90Nm (ø22mm probe), max. 525Nm (ø33mm pipe)
Tensile load (rope version)	max. 40kN
Process connection material / Extension material	1.4301/1.4305/1.4541 (SS303/304/321) or 1.4404/1.4401 (SS316L/316)
Probe isolation material	PPS reinforced FDA and 1935/2004/EC conform
Probe gasket material	FKM or FFKM



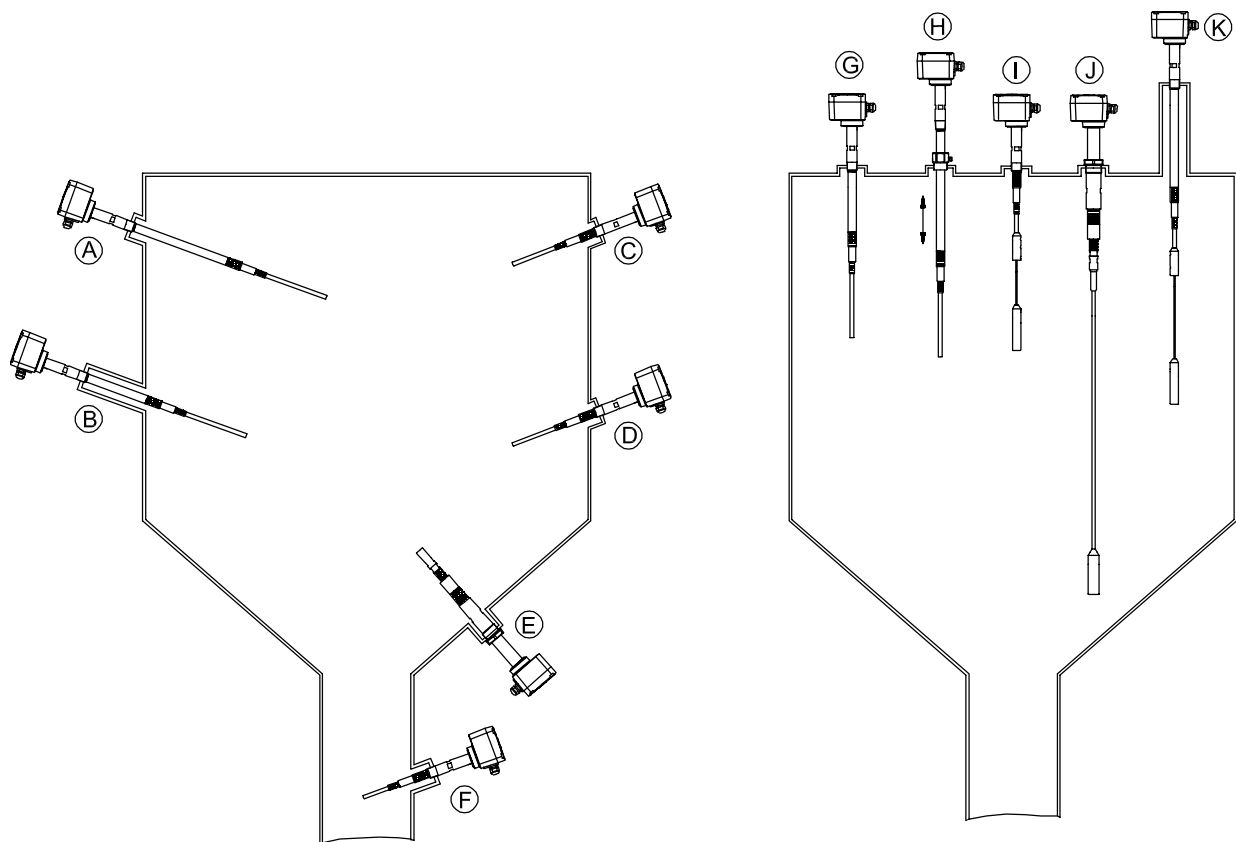
Example:
Rod version

RF 3300 High temperature version	
Total length L	320 ... 2.500mm (12.6 .. 98.4") rod 560 .. 20.000mm (22.0 .. 787") rope
Active rod / rope diameter	Rod ø22mm (0.39") Rope ø8mm (0.16")
Ambient temperature	-40 .. +70°C (-40 .. +158°F)
Process temperature	-40 .. +500°C (-40 .. +932°F) Ex versions: +445°C (833°F)
Process pressure	-1 .. +10bar (-14.5 .. +145 psi)
Lateral load (rod version)	max. 20Nm (ø22mm probe), max. 525Nm (ø33mm pipe)
Tensile load (rope version)	max. 10 kN
Process connection material / Extension material	1.4301/1.4305/1.4541 (SS303/304/321) or 1.4404/1.4401 (SS316L/316)
Probe isolation material	Ceramic FDA and 1935/2004/EC conform
Probe gasket material	Graphite



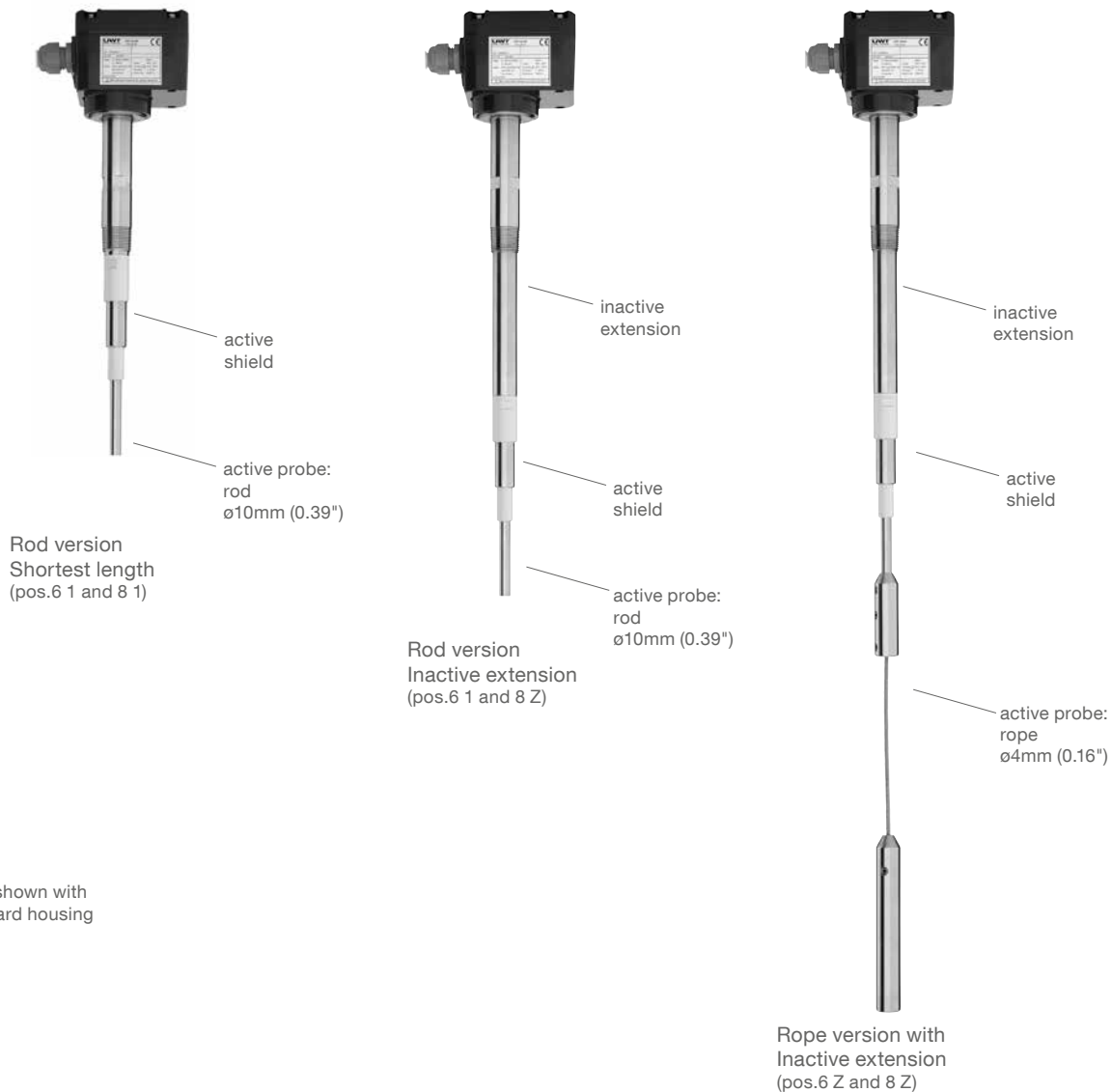
Example:
Rod version

Applications



		RF 3100	RF 3200	RF 3300
(A)	Inactive length to reach distance from silo wall	•	•	•
(B)	Inactive length due to long mounting nozzle	•	•	•
(C)	Full detector with short length	•	•	•
(D)	Demand detector with short length, observe max. load	•	•	•
(E)	Empty detector with short length, observe max. load	•	•	•
(F)	Application in down pipe, observe max. load	•	•	•
(G)	Inactive length to bring active probe to required level	•	•	•
(H)	Inactive length and sliding sleeve for adjustable height	•	•	
(I)	Full detector, rope version	•	•	•
(J)	Empty detector, rope version, observe max. load	•	•	•
(K)	Inactive length due to long mounting nozzle	•	•	•

RF 3100 Standard version



Units shown with
Standard housing

Cable entries (by default)

Depending on model selected, the following cable entries are supported (options see pos.33 on page 13):

Version:	Cable entries:
ATEX/IEC-Ex flameproof (pos.2 T,D)	M20x1.5 (1x open conduit + 1x Ex-d blind plug)
FM/FMc (pos.2 M,N,U)	NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x Ex-d blind plug)
All other versions	M20x1.5 (1x screwed cable gland + 1x blind plug)

Length L1

Rod version,
horizontal mounting

DK*
< 1.5
>=1.6
>=1.8
>=2.2
>=10

*see external
DK table

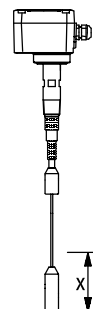
L1 (pos.6) / mm (inch)
n.a.
>=300 (11.8")
>=200 (7.9")
>=100 (3.9")
>=50 (2.0")

With stated L1 the
unit works with
factory setted
sensitivity (2pF).
For shorter L1 see
option pos.16

Switchpoint Rope version

x / mm (inch)
n.a.
<=300 (11.8")
<=200 (7.9")
<=100 (3.9")
<=50 (2.0")

The table states
the switchpoint
with factory
setted sensitivity
(2pF). For smaller
x see option
pos.16



Dimensions see pages 17, 18

RF 3100 Standard version

Basic type

RF 3100

pos. 2 **Certificate** (detailed Ex-markings: see page 22)

	Dust	Gas	Protection method
0	CE/ TR-CU	-	-
W	ATEX	Zone 20/21	-
R	ATEX	Zone 20/21	Zone 1
T	ATEX	Zone 20/21	Zone 1
A	IEC-Ex	Zone 20/21	-
C	IEC-Ex	Zone 20/21	Zone 1
D	IEC-Ex	Zone 20/21	Zone 1
M	FM /FMc	-	-
N	FM /FMc	Cl. II, III, Div.1	-
U	FM /FMc	Cl. II, III, Div.1	Cl. I Div.1 / Zone 1
E	TR-CU	Zone 20/21	-
K	TR-CU	Zone 20/21	Zone 1
L	TR-CU	Zone 20/21	Zone 1

pos. 4 **Electronic module**

L Relay DPDT 21 .. 230V AC/DC

pos. 5 **Process connection**

A	Thread G1½", DIN 228
B	Thread G1¼", DIN 228
C	Thread G1", DIN 228
W	Thread G¾", DIN 228
D	Thread M32 x 1.5
E	Thread M30 x 1.5
F	Thread NPT1½", conical ANSI B1.20.1
Q	Thread NPT1¼", conical ANSI B1.20.1
G	Thread NPT1", conical ANSI B1.20.1
J	Thread NPT¾", conical ANSI B1.20.1
P	Triclamp 2" (DN 50) ISO 2852
R	Triclamp 1" (DN 25) and 1 1/2" (DN 40) ISO 2852
L	Flange DN 100 PN6, EN1092-1 (max. 6 bar (87psi))
M	Flange DN 100 PN16, EN1092-1 (max. 16 bar (232psi))
S	Flange 2" 150lbs ANSI B16.5
T	Flange 3" 150lbs ANSI B16.5
U	Flange 4" 150lbs ANSI B16.5
V	Flange 40NB

pos. 6 **Active Probe length L1 ⁽¹⁾**

1	Rod, L1=100mm (3.94")
2	Rod, L1=200mm (7.87")
3	Rod, L1=300mm (11.8")
Y	Rod, L1=custom specified
Z	Rope, Base price
	L1=custom specified

pos. 8 **Inactive extension length L2 ^(2,3)**

1	Without
Z	L2=custom specified

pos. 9 **Material of process connection and extension "L"**

- 1 Stainless steel 1.4301/1.4305/1.4541 (303/304/321) and PPS, gaskets FKM
- 2 Stainless steel 1.4404 (316L), 1.4401(316) for rope, PPS, gaskets FKM

Further options: see page 12

(1) See recommendations on page before

(2) Inactive extension: the active probe shall have at least 50mm (1.97") distance to the vessel wall

(3) Total length L = L1 + L2 + 100mm (3.94")

RF 3100	A		3	L			A		
Position	1	2	3	4	5	6	7	8	9

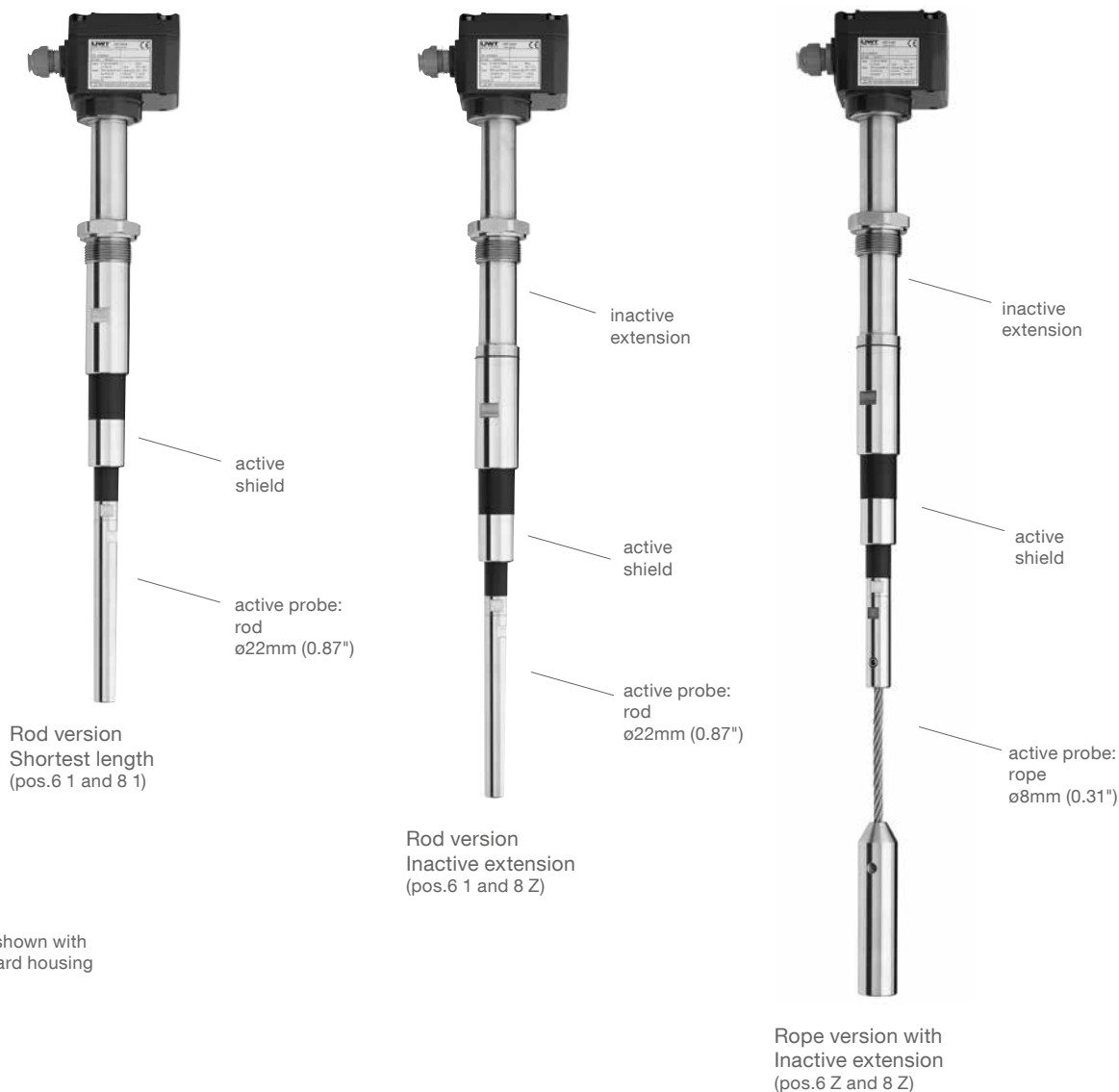
L1=	mm
L2=	mm

Order code

All positions are available with special design (use code "Z").



RF 3200 Heavy Duty version



Units shown with
 Standard housing

Cable entries (by default)

Depending on model selected, the following cable entries are supported (options see pos.33 on page 13):

Version:	Cable entries:
ATEX/IEC-Ex flameproof (pos.2 T,D)	M20x1.5 (1x open conduit + 1x Ex-d blind plug)
FM/FMc (pos.2 M,N,U)	NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x Ex-d blind plug)
All other versions	M20x1.5 (1x screwed cable gland + 1x blind plug)

Length L1

Rod version,
 horizontal mounting

DK*	L1 (pos.6) / mm (inch)
< 1.5	n.a.
>=1.6	>=300 (11.8")
>=1.8	>=200 (7.9")
>=2.2	>=100 (3.9")
>=10	>=50 (2.0")

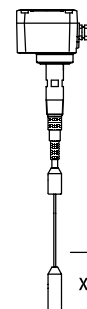
*see external
 DK table

With stated L1 the
 unit works with
 factory setted
 sensitivity (2pF).
 For shorter L1 see
 option pos.16

Switchpoint Rope version

x / mm (inch)
n.a.
<=300 (11.8")
<=200 (7.9")
<=100 (3.9")
<=50 (2.0")

The table states
 the switchpoint
 with factory
 setted sensitivity
 (2pF). For smaller
 x see option
 pos.16



Dimensions see pages 17, 18

RF 3200 Heavy Duty version

Basic type

RF 3200

pos. 2 **Certificate** (detailed Ex-markings: see page 22)

	Dust	Gas	Protection method
0	CE	-	-
W	ATEX Zone 20/21	-	Dust Ignition Proof
R	ATEX Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
T	ATEX Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
A	IEC-Ex Zone 20/21	-	Dust Ignition Proof
C	IEC-Ex Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
D	IEC-Ex Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
M	FM /FMc -	-	General purpose
N	FM /FMc Cl. II, III, Div.1	-	Dust Ignition Proof
U	FM /FMc Cl. II, III, Div.1	Cl. I Div.1 / Zone 1	Explosion Proof / Dust Ignition Proof
E	TR-CU Zone 20/21	-	Dust Ignition Proof
K	TR-CU Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
L	TR-CU Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof

pos. 4 **Electronic module**

L Relay DPDT 21 .. 230V AC/DC

pos. 5 **Process connection**

A	Thread G1½", DIN 228	
B	Thread G1¼", DIN 228	
F	Thread NPT1½", conical ANSI B1.20.1	
Q	Thread NPT1¼", conical ANSI B1.20.1	
L	Flange DN 100 PN6, EN1092-1 (max. 6 bar (87psi))	
M	Flange DN 100 PN16, EN1092-1 (max. 16 bar (232psi))	
S	Flange 2" 150lbs ANSI B16.5	
T	Flange 3" 150lbs ANSI B16.5	
U	Flange 4" 150lbs ANSI B16.5	
V	Flange 40NB	

pos. 6 **Active Probe length L1 ⁽¹⁾**

1	Rod, L1=100mm (3.94")	
2	Rod, L1=200mm (7.87")	
3	Rod, L1=300mm (11.8")	
Y	Rod, L1=custom specified	Price per 100mm (3.94") or part thereof (starting from 0mm) min. L1=100mm (3.94"), max. L1=2.000mm (78.7")
Z	Rope, Base price	
	L1=custom specified	Price per 100mm (3.94") or part thereof (starting from 0mm) min. L1=350mm (13.8"), max. L1=20.000mm (787")

pos. 8 **Inactive extension length L2 ^(2,3)**

1	Without	
Z	L2 = custom specified	Price per 100mm (3.94") or part thereof (starting from 0mm) Rod version: min. L2 = 100mm (3.93"), max. L2 = 2.300mm (90.6") - L1 Rope version: min. L2 = 100mm (3.93"), max. L2 = 1.800mm (70.9")

pos. 9 **Material of process connection and extension "L"**

- Stainless steel 1.4301/1.4305/1.4541 (303/304/321) and PPS, gaskets FKM
- Stainless steel 1.4404 (316L), 1.4401(316) for rope, PPS, gaskets FKM

Further options: see page 12

(1) See recommendations on page before

(2) Inactive extension: the active probe shall have at least 50mm (1.97") distance to the vessel wall

(3) Total length L = L1 + L2 + 200mm (7.87")

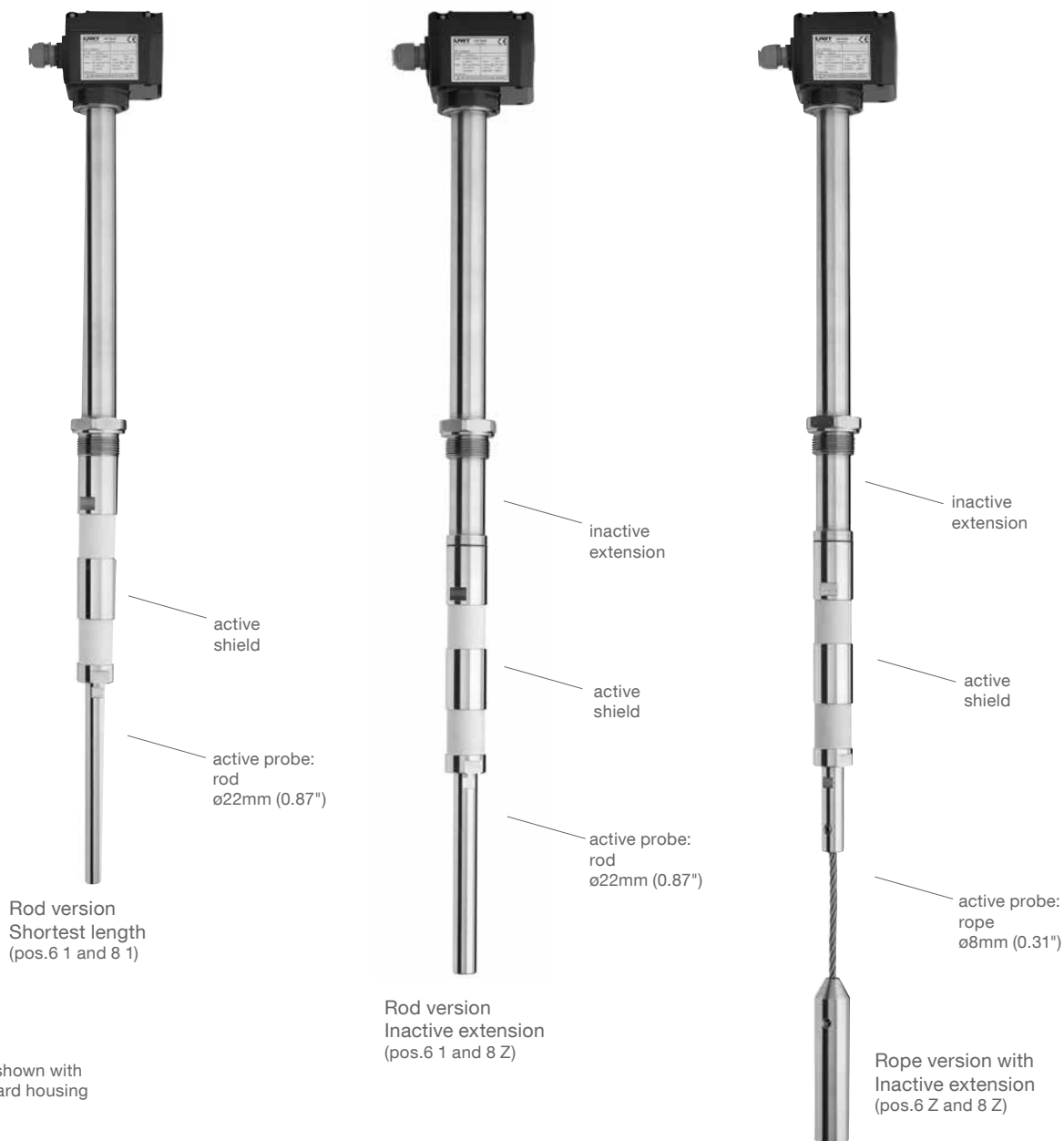
RF 3200	B		3	L			A		
Position	1	2	3	4	5	6	7	8	9

L1 =	mm
L2 =	mm

Order code

All positions are available with special design (use code "Z").

RF 3300 High Temperature version (500°C)



Units shown with
Standard housing

Cable entries (by default)

Depending on model selected, the following cable entries are supported (options see pos.33 on page 13):

Version:	Cable entries:
ATEX/IEC-Ex flameproof (pos.2 T,D)	M20x1.5 (1x open conduit + 1x Ex-d blind plug)
FM/FMc (pos.2 M,N,U)	NPT 1/2" tapered ANSI B1.20.1 (1x open conduit + 1x Ex-d blind plug)
All other versions	M20x1.5 (1x screwed cable gland + 1x blind plug)

Dimensions see pages 17, 28

Length L1

Rod version,
horizontal mounting

DK*	L1 (pos.6) / mm (inch)
< 1.5	n.a.
>=1.6	>=300 (11.8")
>=1.8	>=200 (7.9")
>=2.2	>=100 (3.9")
>=10	>=50 (2.0")

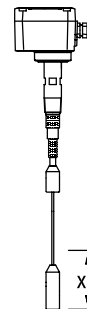
*see external
DK table

With stated L1 the
unit works with
factory setted
sensitivity (2pF).
For shorter L1 see
option pos.16

Switchpoint Rope version

x / mm (inch)
n.a.
<=300 (11.8")
<=200 (7.9")
<=100 (3.9")
<=50 (2.0")

The table states
the switchpoint
with factory
setted sensitivity
(2pF). For smaller
x see option
pos.16



RF 3300 High Temperature version (500°C)

Basic type

RF 3300

pos. 2 **Certificate** ⁽¹⁾ (detailed Ex-markings: see page 22)

	Dust	Gas	Protection method
0 CE	-	-	
W ATEX	Zone 20/21	-	Dust Ignition Proof
R ATEX	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
T ATEX	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
A IEC-Ex	Zone 20/21	-	Dust Ignition Proof
C IEC-Ex	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
D IEC-Ex	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof
M FM /FMc	-	-	General purpose
N FM /FMc	Cl. II, III, Div.1	-	Dust Ignition Proof
U FM /FMc	Cl. II, III, Div.1	Cl. I Div.1 / Zone 1	Explosion Proof / Dust Ignition Proof
E TR-CU	Zone 20/21	-	Dust Ignition Proof
K TR-CU	Zone 20/21	Zone 1	Flameproof / Increased Safety / Dust Ignition Proof
L TR-CU	Zone 20/21	Zone 1	Flameproof / Dust Ignition Proof

pos. 4 **Electronic module**

L Relay DPDT 21 .. 230V AC/DC

pos. 5 **Process connection**

A Thread G1½", DIN 228
 B Thread G1¼", DIN 228
 F Thread NPT1½", conical ANSI B1.20.1
 Q Thread NPT1¼", conical ANSI B1.20.1
 L Flange DN 100 PN6, EN1092-1 (max. 6 bar (87psi))
 M Flange DN 100 PN16, EN1092-1 (max. 16 bar (232psi))
 S Flange 2" 150lbs ANSI B16.5
 T Flange 3" 150lbs ANSI B16.5
 U Flange 4" 150lbs ANSI B16.5
 V Flange 40NB

pos. 6 **Active Probe length L1** ⁽²⁾

1 Rod, L1=100mm (3.94")
 2 Rod, L1=200mm (7.87")
 3 Rod, L1=300mm (11.8")
 Y Rod, L1=custom specified Price per 100mm (3.94") or part thereof (starting from 0mm)
 min. L1=100mm (3.94"), max. L1=1.000mm (39.4")
 Z Rope, Base price
 L1=custom specified Price per 100mm (3.94") or part thereof (starting from 0mm)
 min. L1=350mm (13.8"), max. L1=20.000mm (787")

pos. 8 **Inactive extension length L2** ^(3,4)

1 Without
 Z L2 = custom specified Price per 100mm (3.94") or part thereof (starting from 0mm)
 Rod version: min. L2 = 100mm (3.93"), max. L2 = 2.300mm (90.6") - L1
 Rope version: min. L2 = 100mm (3.93"), max. L2 = 1.800mm (70.9")

pos. 9 **Material of process connection and extension "L"**

- 1 Stainless steel 1.4301/1.4305/1.4541 (303/304/321) and ceramic, gaskets graphite
- 2 Stainless steel 1.4404 (316L), 1.4401(316) for rope, ceramic, gaskets graphite

Further options: see page 12

(1) Max. process temperature for Ex versions limited to 445°C

(2) See recommendations on page before

(3) Inactive extension: the active probe shall have at least 50mm (1.97") distance to the vessel wall

(4) Total length L = L1 + L2 + 220mm (8.66")

RF 3300	C		5	L			A		
Position	1	2	3	4	5	6	7	8	9

L1 =	mm
L2 =	mm

← Order code

All positions are available with special design (use code "Z").

Options

RF 3100 RF 3200 RF 3300				
• •	pos. 11x	Guarantee extension to 5 years	.....	•
		Remote version:		
• • •	pos. 12x	Remote version	.....	•
		Including hexagon nut, not including remote cable and angle bracket		
• • •	Pos. 13a	Remote cable, both sides wired		
		Spezial Triaxial cable, min. 1000mm (39.4"), max. 20m (65ft)		
		Basic price	.....	•
		Price per 1000mm (39.4") or part there of (starting from 0mm)	.....	•
• • •	pos. 13x	Remote cable, not wired specify cable length, price per 1000mm (39.4")	.....	•
		Special triaxial cable, no other cable permitted, max. 20m (65ft)		
• • •	pos. 14x	Angle bracket aluminium	.....	•
		Electronics:		
		Presetted sensitivity	.....	•
		Standard calibration is 2pF, other sensitivities as follows:		
• • •	pos. 16a	0,5pF		
• • •	pos. 16b	1pF		
• • •	pos. 16c	4pF		
• • •	pos. 16d	10pF		
		Probes:		
		Probe gaskets		
•	Pos. 17a	Material FFKM, for increased requirements (such as superheated steam applications)	..... on request	
		Coating (coating material PFA)		
1	pos. 18a	Coating of active probe (rod version)	.....	•
2	pos. 18b	Coating of complete probe (rod version) L1≤400mm (15.7") L≤880mm (34.6")	.....	•
2	Pos. 18d	Coating of complete probe (rod version) L1≤400mm (15.7") L=881 ... 1480mm (34.7" ... 58.3")	.....	•
3	pos. 18c	Coating of rope (rope version), price per meter or part thereof	.....	•
		Rod extension kit, rigid		
•	pos. 19a	For ø10mm (0.39") rod, length 400mm (15.7"), 1.4404 (316L)	.....	•
• •	pos. 19b	For ø22mm (0.87") rod, length 400mm (15.7"), 1.4404 (316L)	.....	•
		Rod extension kit, flexible (pendulum rod)		
•	pos. 20a	For ø10mm (0.39") rod, length 1.000mm (39.4"), 1.4301/1.4305 (304/303)	.....	•
		Rope extension kit		
•	pos. 21a	For ø10mm (0.39") rod, rope ø4mm (0.16"), length 2000mm (78.7"), 1.4301/1.4305 (304/303)	.....	•
•	pos. 21b	For ø10mm (0.39") rod, rope ø4mm (0.16"), length 2000mm (78.7"), 1.4404 (316L)/ rope 1.4401(316)	.....	•
• •	pos. 21c	For ø22mm (0.87") rod, rope ø8mm (0.31"), length 2000mm (78.7"), 1.4404 (316L)/ rope 1.4401(316)	.....	•
	pos. 22x	Fixing hole in probe rod		
•		For ø10mm (0.39") rod, for fixing of the extensions. Not with pos.18a,b and pos.25.	.....	•
		Mounting:		
		Sliding sleeve		
4 4	pos. 24a	Material 1.4305/1.4541 (303/321)	.....	•
4 4	pos. 24b	Material 1.4404 (316L)	.....	•
		EHEDG approval (Type ED)		
5	pos. 25a	Process connection G1½" (without flush welding socket)	.....	•
5	pos. 25b	Process connection flush welding socket ø69/G1½" made of aluminium	.....	•
5	pos. 25c	Process connection flush welding socket ø69/G1½" made of 1.4301 (304)	.....	•
5	pos. 25d	Process connection flush welding socket ø69/G1½" made of 1.4404 (316L)	.....	•

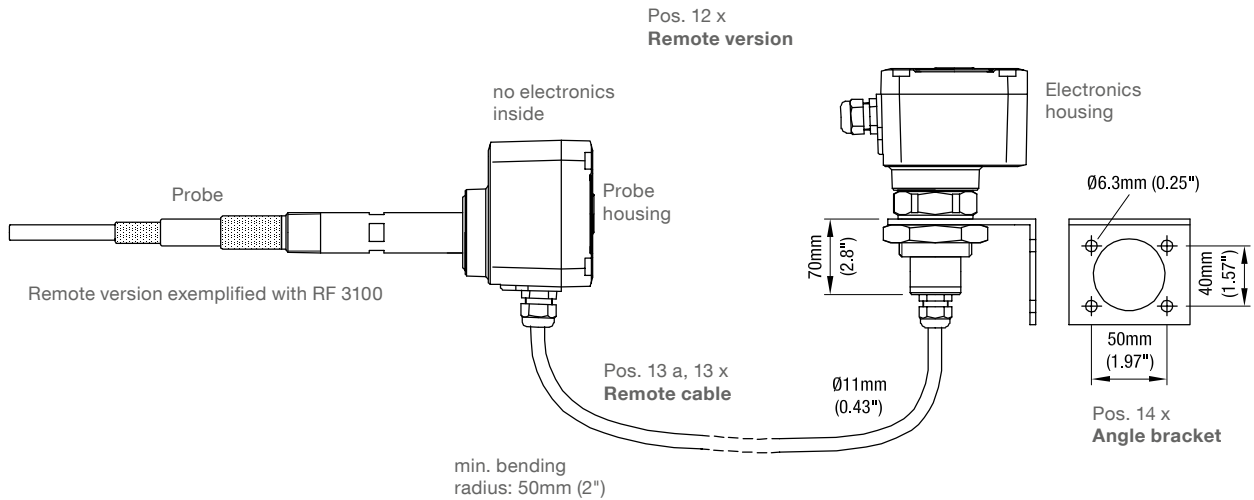
Options

		Mounting set for flange mounting								
		process connection flange	for counter flange with	consists of						
				screws*	nuts*	washers*	sealing**			
• • •	pos. 26c	L	hole ø18	4 x M16x60	4 x M16	4 pcs	1 pc	.....	•
• • •	pos. 26d	L	thread M16	4 x M16x40		4 pcs	1 pc	.....	•
• • •	pos. 26e	M	hole ø18	4 x M16x60	8 x M16	8 pcs	1 pc	.....	•
• • •	pos. 26f	M	thread M16	4 x M16x40		8 pcs	1 pc	.....	•
* material stainless steel 1.4301 (304) **max. 240°C (464°F), material not food grade										
Hexagon nut										
• • •	pos. 27e	For thread G 1 1/2", G 1 1/4", G 1", G 3/4", 1.4305 (303), 1 pc							.....	•
• • •	pos. 27f	For thread G 1 1/2", G 1 1/4", G 1", G 3/4", 1.4305 (303), 2 pcs							.....	•
Flat sealing										
• • •	pos. 28x	For process connection thread G 1 1/2", G 1 1/4", G 1", G 3/4", M32x1.5, M30x1.5, max. 240°C (464°F)							.....	•
Housing:										
6 6 6	pos. 31a	Housing material Plastics PA6 reinforced							.....	•
7 7 7	pos. 32x	Weather protection cover (for Ex approved for Zone 2 or 22 or Div. 2)							.....	•
Cable entry Selection of the following options only necessary, if a deviation from the default cable gland / conduit is required:										
8 8 8	pos. 33x	M20x1,5 2x screwed cable gland							.....	•
9 9 9	pos. 33d	M20x1,5 1x screwed cable gland +1x blind plug							.....	•
10 10 10	pos. 33a	NPT 1/2" tapered ANSI B1.20.1 (1x conduit + 1x Ex-d blind plug)							.....	•
11 11 11	pos. 33c	NPT 3/4" tapered ANSI B1.20.1 (1x conduit + 1x Ex-d blind plug)							.....	•
Signal lamp										
12 12 12	pos. 34a	Bulb, mounted in cable gland M20x1,5, 2W green							.....	•
12 12 12	pos. 34c	Bulb, mounted in cable gland M20x1,5, 2W red							.....	•
13 13 13	pos. 34d	LED (transparent lid section)							.....	•
Plug										
13 13 13	pos. 35x	Valve connector (incl. mating plug)	4-pole (incl. PE)	max. 230V					.....	•
13 13 13	pos. 35a	M12 (without mating plug)	4-pole	max. 25V					.....	•
13 13 13	pos. 35b	M12 (without mating plug)	5-pole (incl. PE)	max. 60V					.....	•
13 13 13	pos. 35c	Harting Han 4A (incl. mating plug)	5-pole (incl. PE)	max. 230V					.....	•

- Recommended with excessive, mainly conductive material buildup and for reduction of abrasion. Available for CE/ TR-CU and FM General purpose (Pos.2 0,M). Max. length L1 = 700mm (27.6").
- Recommended with corrosive materials. Available for CE/ TR-CU and FM General purpose (Pos.2 0,M). Process connection NPT 1 1/2", G 1 1/2".
- Recommended with excessive material buildup and for reduction of abrasion. Available for CE/ TR-CU and FM General purpose (Pos.2 0,M). Not in combination with rod or rope extension kits (pos. 19,20,21).
- Process connection as selected in pos.5. Material must be the same as selected in pos.9. RF 3100 available with NPT 1 1/4", NPT 1 1/2", G 1 1/4", G 1 1/2". RF 3200 available with NPT 1 1/2", G 1 1/2". Not with pos.18 b.
- Certificate only valid with the use of the "flush welding socket". With pos. 25a this socket must be manufactured on site. Only for G 1 1/2" (pos.5 A). Not in combination with rope version (pos.6 Z). Not in combination with options pos.18,19,20,21,24,26,27,28. Selected length "L" is increased by 9mm (0.35").
- Available for CE and ATEX/IEC-Ex/ TR-CU Dust Ignition proof (pos.2 0,W,A,E). Ambient temperature for ATEX/IEC-Ex/ TR-CU: -20°C (-4°F).
- Available for all versions except flameproof / increased safety versions (pos.2 R,T,C,D,U,K,L)
- Available for all versions except flameproof version (pos.2 T,U,D,L)
- Available for FM version (pos.2 M,N) except flameproof version (pos.2 U)
- Available for all versions except FM (pos.2 M,N,U)
- Available for all versions except pos.2 0,W,A,M,N,E
- Available for CE/ TR-CU (pos.2 0), not in combination with weather protection cover (pos.32 x) and cable entries pos.33 x,a,c Three bulbs (24V, 115V and 230V) will be delivered. Without connection of bulb wires to internal terminals (standard) or according to customer specification.
- Available for CE/ TR-CU (pos.2 0). Without connection of plug wires to internal terminals (standard) or according to customer specification.

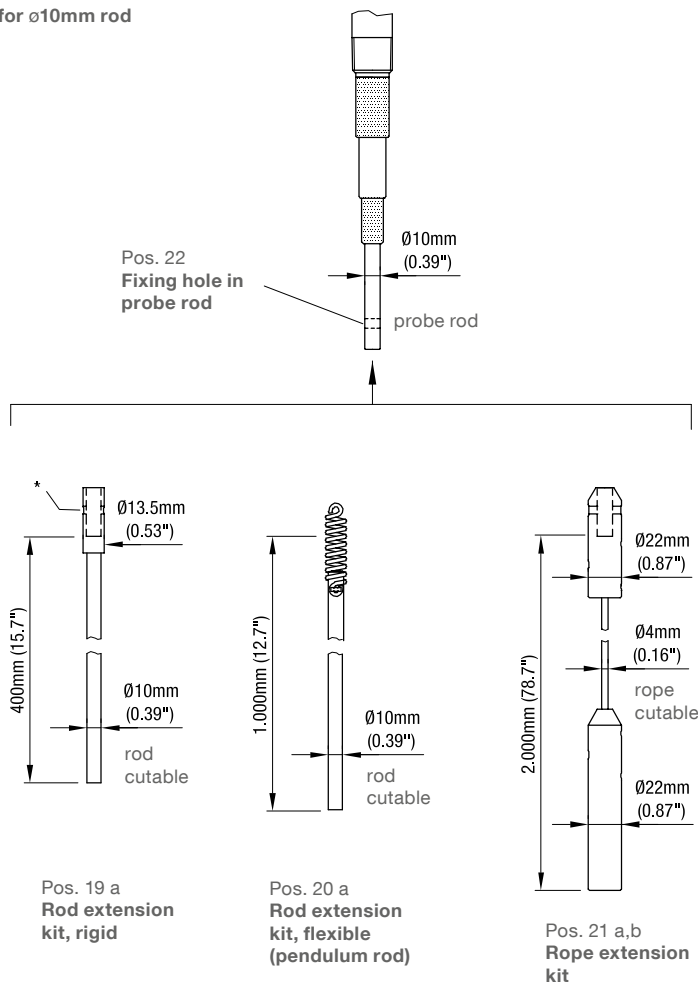
Options

Remote version



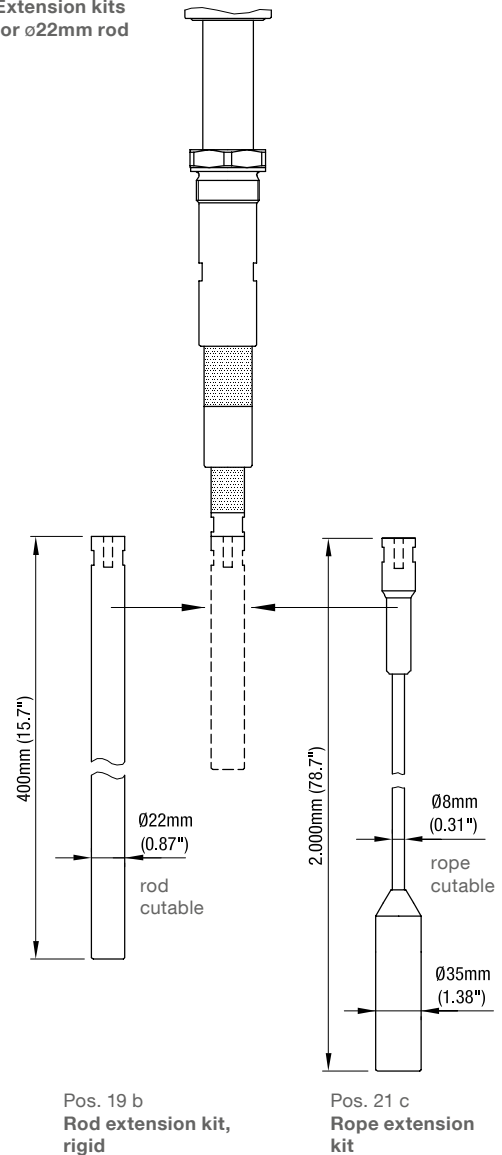
Probes

Extension kits for ø10mm rod



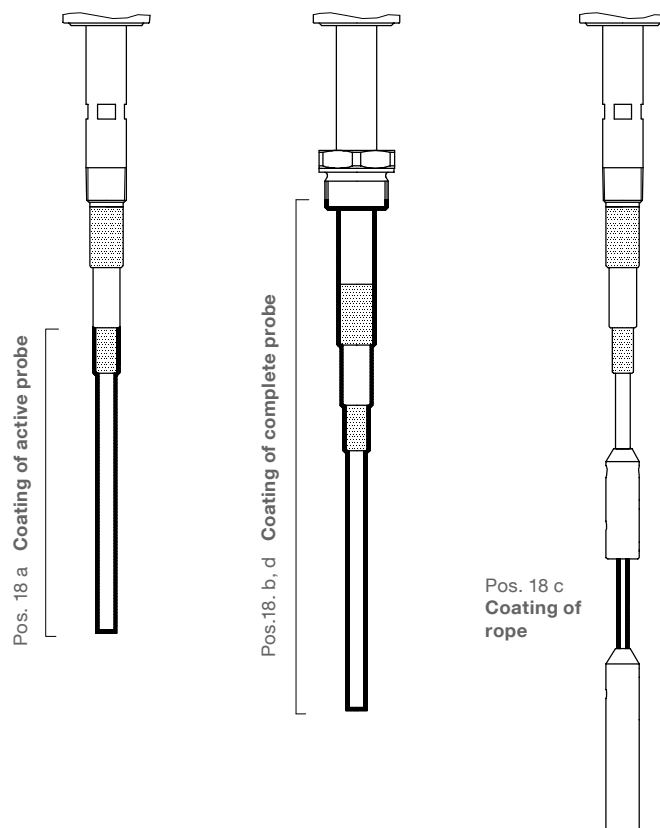
* Fixing by drilling a hole through the
probe rod and fixing with a split pin

Extension kits for ø22mm rod

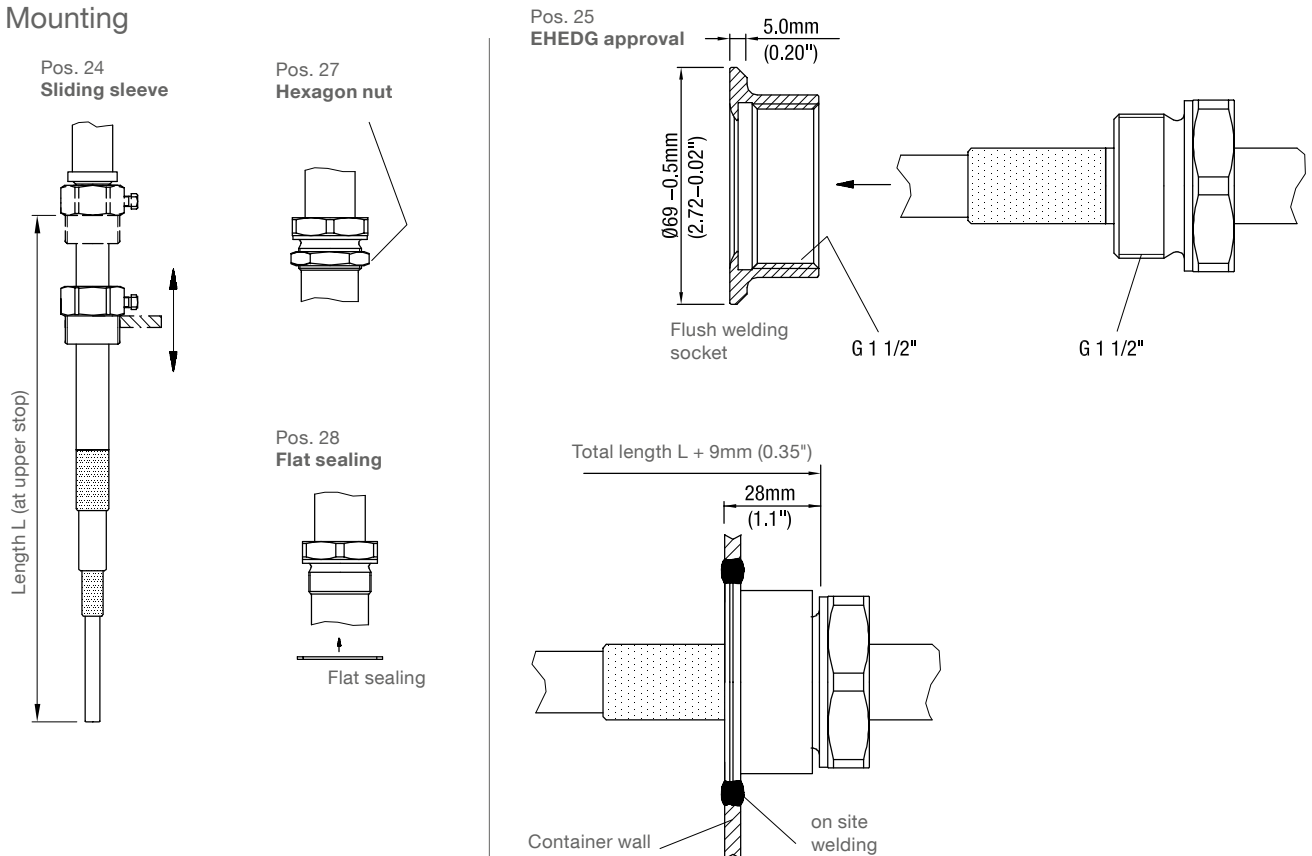


Options

Coatings

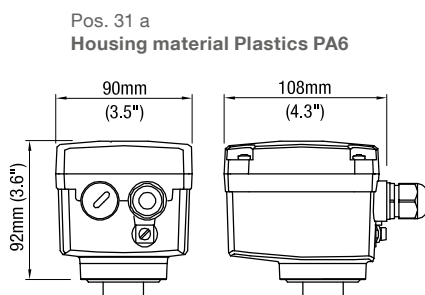


Mounting

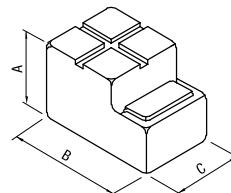


Options

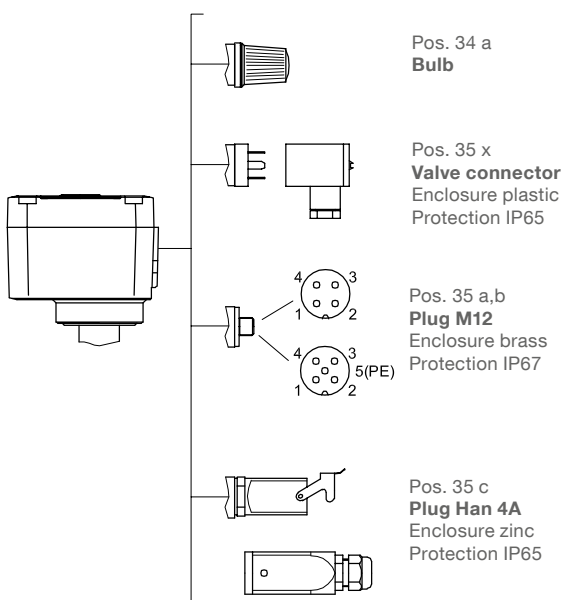
Housing



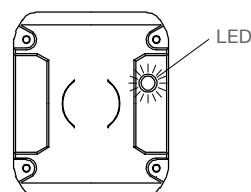
Pos. 32 x
Weather protection cover



A	100mm (3.94")
B	165mm (6.5")
C	95mm (3.7")



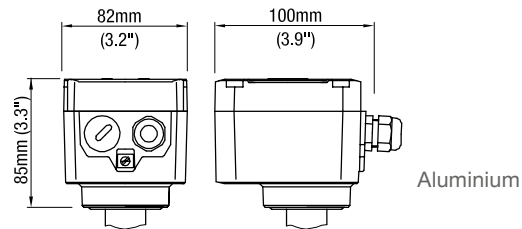
Pos. 34 d
LED (transparent lid section)



Dimensions

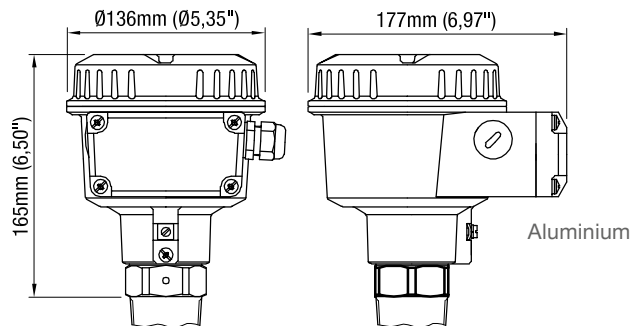
Housing versions

Standard



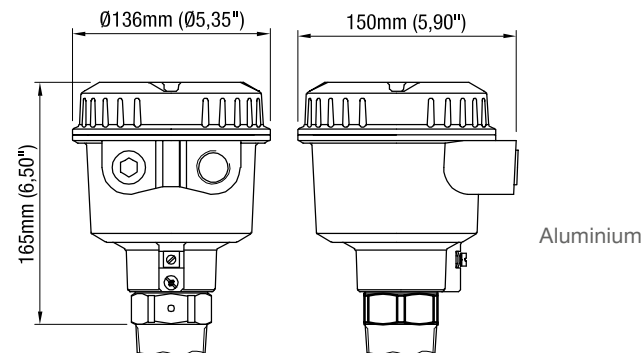
de

Explosionproof with
 increased safety
 terminal box



d

Flameproof /
 explosionproof

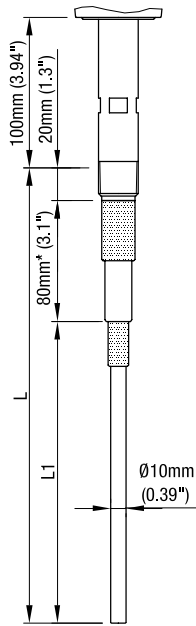


Dimensions

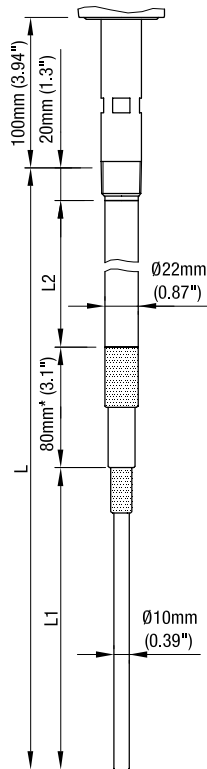
Probes

RF 3100 Standard version

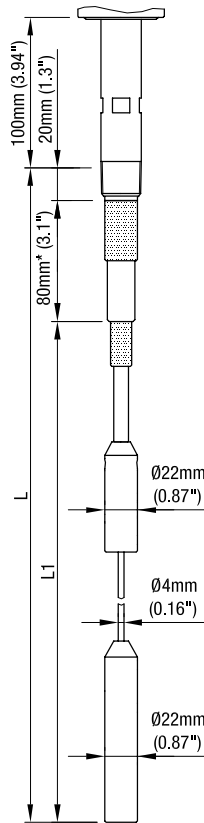
Rod version
 Shortest length



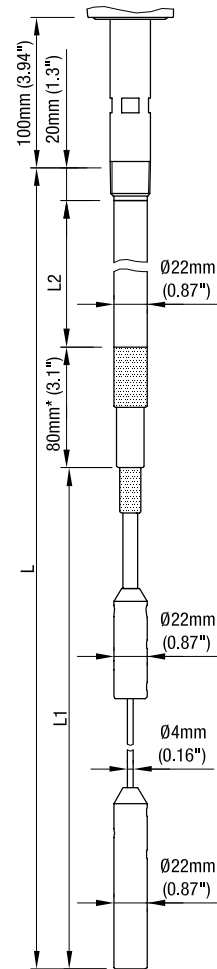
Rod version
 Inactive extension



Rope version
 Shortest length



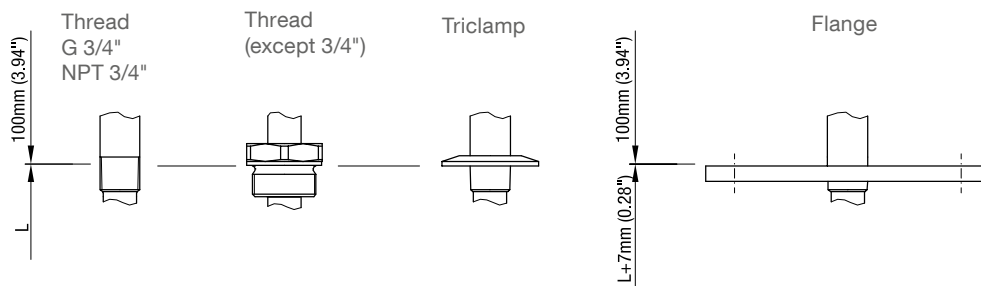
Rope version
 Inactive extension



* Active shield

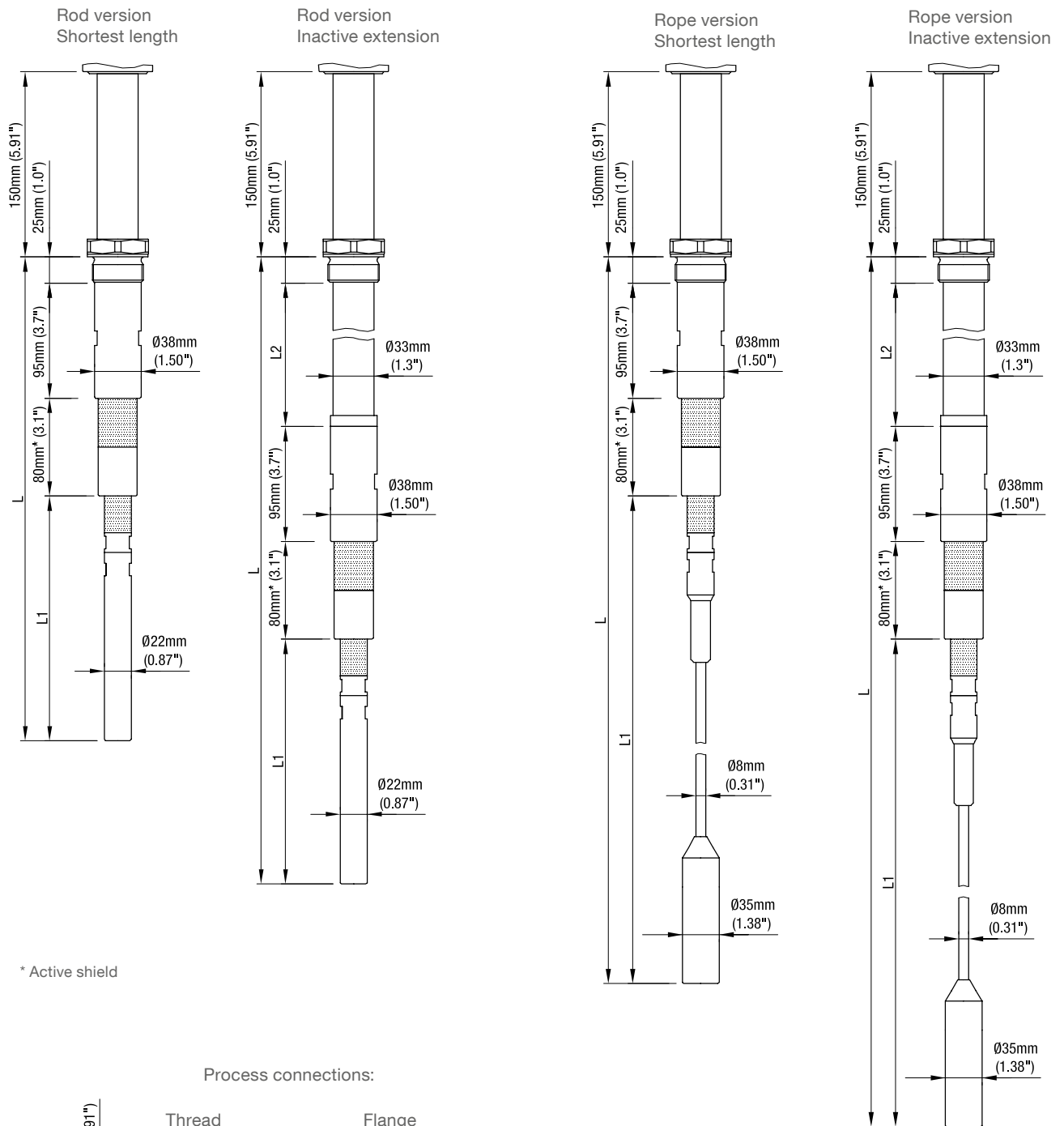
For units with rod version and EHEDG certificate
 the length "L" is increased by 9mm (0.35").

Process connections:



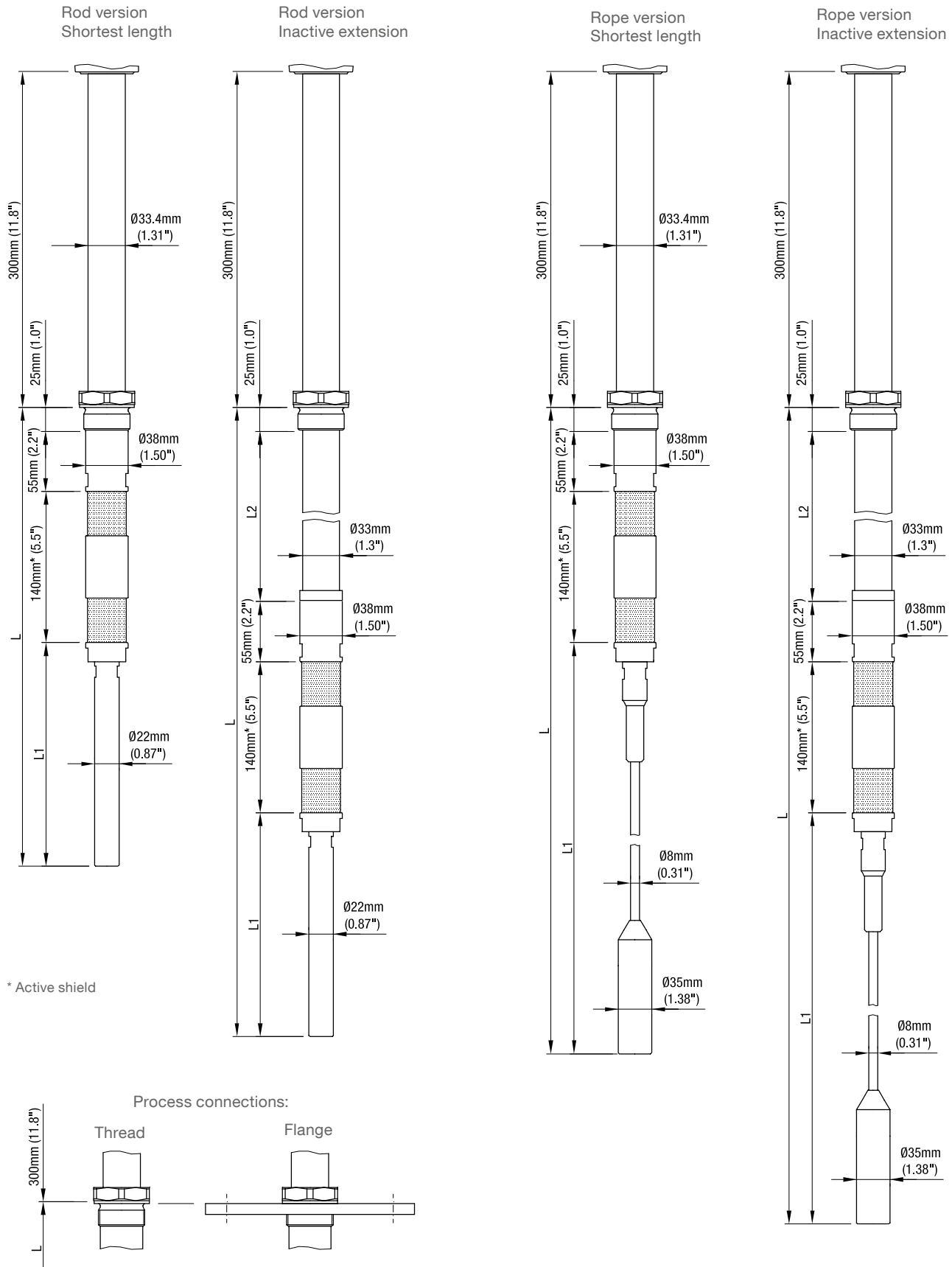
Dimensions

RF 3200 Heavy Duty version



Dimensions

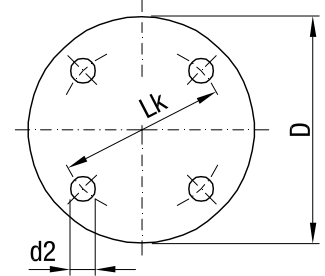
RF 3300 High temperature version



Dimensions

Flanges

Code	type	number of holes	d2	Lk	D	T (thickness)
L	Flange DN100 PN6	4	18mm (0.71")	170mm (6.69")	210mm (8.27")	16mm (0.63")
M	Flange DN100 PN16	8	18mm (0.71")	180mm (7.09")	220mm (8.66")	20mm (0.79")
S	Flange 2" 150lbs	4	19.1mm (0.75")	120.7mm (4.75")	152.4mm (6.01")	19.1mm (0.75")
T	Flange 3" 150lbs	4	19.1mm (0.75")	152.4mm (6.01")	190.5mm (7.5")	23.9mm (0.94")
U	Flange 4" 150lbs	8	19.1mm (0.75")	190.5mm (7.5")	228.6mm (9")	23.9mm (0.94")
V	Flange 40NB	4	14mm (0.55")	98mm (3.86")	133mm (5.24")	12mm (0.47")



Detailed Ex-markings

Compact version (without Pos.12x)

Pos. 2	Certificate		Housing
0	CE		Standard
W	ATEX II 1/2D	Ex ia/tb IIIC T! Da/Db	Standard
R	ATEX II 2G ATEX II 1/2D	Ex de ia IIC T! Gb and Ex ia/tb IIIC T! Da/Db	de
T	ATEX II 2G ATEX II 1/2D	Ex d ia IIC T! Gb and Ex ia/tb IIIC T! Da/Db	d
A	IEC	Ex ia/tb IIIC T! Da/Db	Standard
C	IEC	Ex de ia IIC T! Gb and Ex ia/tb IIIC T! Da/Db	de
D	IEC	Ex d ia IIC T! Gb and Ex ia/tb IIIC T! Da/Db	d
M	FM/FMc	General purpose	Standard
N	FM/FMc	Cl. II, III Div.1 Gr. E,F,G	Standard
U	FM/FMc	XP-IS Cl. I,II,III Div.1 Gr. B-G and Cl. I Zone 1 Gr. IIB+H2 and DIP-IS Cl. II; III Div.1 Gr. E,F,G	d
E	TR-CU	Ex ia/tb IIIC T! Da/Db X	Standard
K	TR-CU	Ex de ia IIC T! Gb X and Ex ia/tb IIIC T! Da/Db X	de
L	TR-CU	Ex d ia IIC T! Gb X and Ex ia/tb IIIC T! Da/Db X	d

Remote Version (with Pos.12x)

Pos. 2	Certificate electronic housing		Electronic housing	Certificate Probe/ Probe housing	
0	CE		Standard	CE/ TR-CU	
W	ATEX II 1/2D	Ex ia/tb IIIC T! Da/Db	Standard	ATEX II 1/2D	Ex ia/tb IIIC T! Da/Db
R	ATEX II 2G ATEX II 1/2D	Ex de ia IIC T! Gb and Ex ia/tb IIIC T! Da/Db	de	ATEX II 2G ATEX II 1/2D	Ex ia IIC T! Gb and Ex ia/tb IIIC T! Da/Db
T	ATEX II 2G ATEX II 1/2D	Ex d ia IIC T! Gb and Ex ia/tb IIIC T! Da/Db	d		
A	IEC	Ex ia/tb IIIC T! Da/Db	Standard	IEC	Ex ia/tb IIIC T! Da/Db
C	IEC	Ex de ia IIC T! Gb and Ex ia/tb IIIC T! Da/Db	de	IEC	Ex ia IIC T! Gb and Ex ia/tb IIIC T! Da/Db
D	IEC	Ex d ia IIC T! Gb and Ex ia/tb IIIC T! Da/Db	d		
M	FM/FMc	General purpose	Standard	-	
N	FM/FMc	Cl. II, III Div.1 Gr. E,F,G	Standard	FM/FMc	DIP-IS Cl. II, III Div.1 Gr. E,F,G
U	FM/FMc	XP-IS Cl. I,II,III Div.1 Gr. B-G and Cl. I Zone 1 Gr. IIB+H2 and DIP-IS Cl. II; III Div.1 Gr. E,F,G	d	FM/FMc	IS Cl. I Div.1 Gr. B,C,D and Cl. I Zone 1 Gr. IIB+H2 and DIP-IS Cl. II, III Div.1 Gr. E,F,G
E	TR-CU	Ex ia/tb IIIC T! Da/Db X	Standard	TR-CU	Ex ia/tb IIIC T! Da/Db X
K	TR-CU	Ex de ia IIC T! Gb X and Ex ia/tb IIIC T! Da/Db X	de	TR-CU	Ex ia IIC T! Gb X and Ex ia/tb IIIC T! Da/Db X
L	TR-CU	Ex d ia IIC T! Gb X and Ex ia/tb IIIC T! Da/Db X	d		

Electrical installation

Universal voltage

Relay DPDT

Power supply:

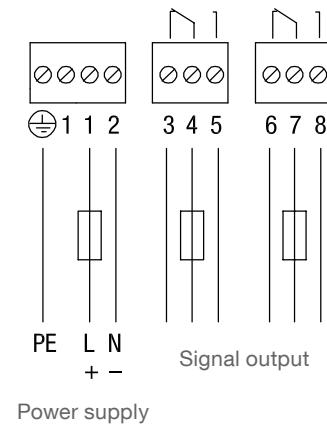
21 .. 230V 50/60Hz or DC +/-10%
 1.5VA or 1.5W

Fuse on power supply:
 max 10A, 250V, HBC, fast or slow

Signal output:

Floating relay DPDT
 AC max. 250V, 8A, non inductive
 DC max. 30V, 5A, non inductive

Fuse on signal output:
 max 10A, 250V, HBC, fast or slow



Spare parts

	Fitting to unit / model code	Description see page	Spare part Article number
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Electronics

Universal voltage, Relais DPDT	pos.3 L	7, 9, 11	pl407100
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Remote version

Remote cable (special Triaxial cable), price per 1000mm (39.4")	pos.13 x	12, 14	zu400700
Angle bracket, 1.4301 (304)	pos.14 x	12, 14	zu400701

Rod extension kit, rigid

For ø10mm (0.39") rod, length 400mm (15.7"), 1.4404 (316L)	pos.19 a	12, 14	zu400710
For ø22mm (0.87") rod, length 400mm (15.7"), 1.4404 (316L)	pos.19 b	12, 14	zu400711

Rod extension kit, flexible (pendulum rod)

For ø10mm (0.39") rod, length 1.000mm (39.4"), 1.4301/1.4305 (304/303)	pos.20 a	12, 14	zu400720
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Rope extension kit

For ø10mm (0.39") rod, rope ø4mm (0.16"), length 2000mm (78.7"), 1.4301/1.4305 (304/303)	pos.21 a	12, 14	zu400730
For ø10mm (0.39") rod, rope ø4mm (0.16"), length 2000mm (78.7"), 1.4404 (316L)/ rope 1.4401(316)	pos.21 b	12, 14	zu400731
For ø22mm (0.87") rod, rope ø8mm (0.31"), length 2000mm (78.7"), 1.4404 (316L)/ rope 1.4401(316)	pos.21 c	12, 14	zu400732

Single parts for rope version

Rope ø4mm (0.16"), 1.4401 (316), not coated, price per 1000mm (39.4")	RF 3100	18	zu400740
Rope ø4mm (0.16"), 1.4401 (316), coated, price per 1000mm (39.4")	RF 3100	18	zu400741
Rope weight ø22mm (0.87"), 1.4301/1.4305 (304/303) *	RF 3100	18	zu400742
Rope weight ø22mm (0.87"), 1.4404 (316L) *	RF 3100	18	zu400743
Rope holder ø22mm (0.87"), 1.4301/1.4305 (304/303) *	RF 3100	18	zu400744
Rope holder ø22mm (0.87"), 1.4404 (316L) *	RF 3100	18	zu400745
Rope ø8mm (0.31"), 1.4401 (316), not coated, price per 1000mm (39.4")	RF 3200, RF 3300	19, 20	zu400746
Rope weight ø35mm (1.38"), 1.4301/1.4305 (304/303) *	RF 3200, RF 3300	19, 20	zu400747
Rope weight ø35mm (1.38"), 1.4404 (316L) *	RF 3200, RF 3300	19, 20	zu400748
Rope holder ø22mm (0.87"), 1.4301/1.4305 (304/303) *	RF 3200, RF 3300	19, 20	zu400749
Rope holder ø22mm (0.87"), 1.4404 (316L) *	RF 3200, RF 3300	19, 20	zu400750

*delivery including fixing parts

Hexagon nut

G 1 1/2" 1.4305 (303)	Pos.27	13, 15	zu300180
G 1 1/4" 1.4305 (303)	Pos.27	13, 15	zu300181
G 1" 1.4305 (303)	Pos.27	13, 15	zu200160
G 3/4" 1.4305 (303)	Pos.27	13, 15	zu200140
M32x1.5 1.4305 (303)	Pos.27	13, 15	zu200130
M30x1.5 1.4305 (303)	Pos.27	13, 15	zu200180

Weather protection cover

For standard housing	pos.32 x	13, 16	zu300232
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Capanivo[®] 4000

Capacitive level limit switch

Precise and reliable capacitive limit detection, constant even with varying material properties. Certified for hazardous locations (Dust Ex).



Capanivo® 4000



- Simple setup with no further adjustment necessary
- Maintenance-free, corrosion resistant, wide application range
- Versatile extensions and high temperatures (180° C)

Application: Capanivo® 4000 is certified for all solids applications with variables such as high temperature, high pressure and material residues such as flour, grain, cement, granulate, carbon black.

CN 4020

Full, demand, empty detector
Installation vertical, horizontal and oblique, also with limited space



CN 4020 / 180° C

Full, demand, empty detector
Installation vertical, horizontal and oblique



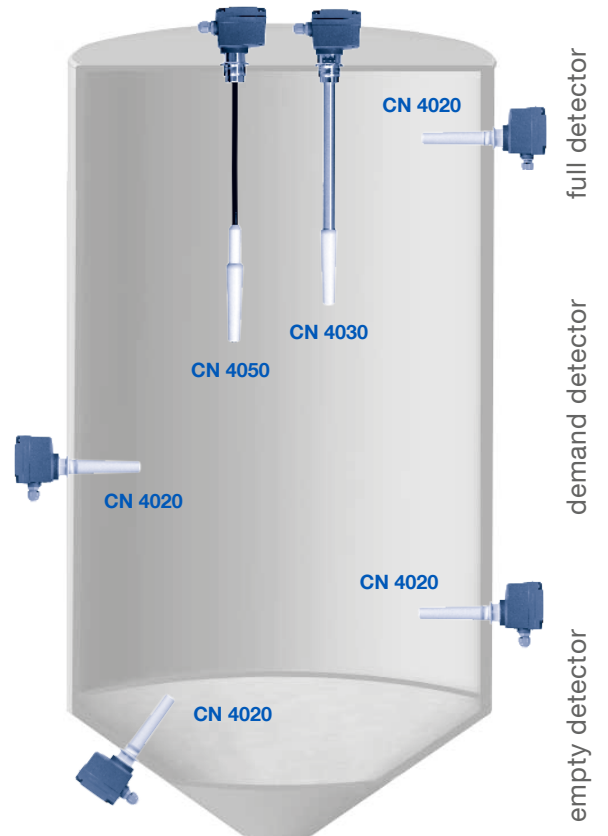
CN 4030

Full, demand, empty detector
Design with pipe extension, vertical installation, sliding sleeve option



CN 4050

Full, demand, empty detector
Design with extension cable up to 6 m, vertical installation



Technical Data

Housing	Plastics PA 6 or Aluminum IP 66
Certificates	ATEX II 1/2D, TR-CU, IEC-Ex
Process temperature	- 40°C to + 180°C (- 40°F to + 356°F)
Pressure	- 1 .. +25 bar (- 14.5 .. + 363 psi)
Sensitivity	DK value ≥ 1,6
Supply voltage	21.. 27V DC Relay SPDT 21.. 230V AC/21..45V DC Relay DPDT 20.. 40V DC PNP
Process connection	G 1", G 1½" NPT 1¼", NPT 1½"
Material probe	Plastics PPS, FDA listed, food grade material
Material process conn.	Plastics PPS, 1.4305 (SS 303), aluminium

Table of contents

	Page
Specifications	2
Applications	4
<hr/>	
CN 4020 Short extension length	5
<hr/>	
CN 4030 Pipe extension	7
<hr/>	
CN 4050 Cable extension	8
<hr/>	
Options / accessories	9
Dimensions	11
Electrical installation	12
Spare parts	13

Subject to change.

All dimensions in mm (inches).

All prices in Euro, excluding VAT.

All prices are EXW Betzigau, excluding packaging costs.

Valid: From 01.04.2017 until 31.03.2018, unless otherwise agreed.

By publishing this selection list all other lists become invalid.

We assume no liability for typing errors.

Different variations to those specified are possible.
Please contact our technical consultants.

Specifications

- Level limit detection in bulk goods / solids
- Compact unit
- Wide range of applications, no maintenance
- Full-, demand-, empty detector
- Capacitive technology with active shield
- Plastic or aluminium housing
- Sensitivity: dielectric constant $\geq 1,6$
- Precalibration allows measurement of most applications without calibration on site
- FSL/FSH switch
- Output with adjustable delay
- 1935/2004/EC food grade material
- 2011/65/EU RoHS conform

Approvals	CE	
	ATEX / IEC-Ex	Zone 20/21 (Dust Ignition Proof)
	TR-CU	Ordinary Locations Zone 20/21 (Dust Ignition Proof)

Electronics	Relay SPDT	21..27V DC $\pm 10\%$
	Relay DPDT	21..230V AC 21..45V DC $\pm 10\%$
	PNP	20..40V DC $\pm 10\%$

Housing	Material	Plastics PA6 (glass fibre reinforced) or Aluminium
	Type of protection	IP66

CN 4020 (version 120°C)	Length of extension	155mm (6.1")
	Ambient temperature	-40 .. +60°C (-40 .. +140°F) -20 .. +60°C (-4 .. +140°F) (Ex)
	Process temperature	-40 .. +120°C (-40 .. +248°F) -30 .. +120°C (-22 .. +248°F) (Ex)
	Process pressure	-1 .. +25 bar (-14.5 .. +363 psi)
	Process connection	G 1" (with flat gasket) G 1 1/2" / NPT 1 1/4" / NPT 1 1/2" (adapter)
	Material of process connection / probe	Plastics PPS (glass fibre reinforced) FDA listed, food grade



CN 4020 (version 180°C)	Length of extension	190mm (7.5") or 400mm (15.7")
	Ambient temperature	-40 .. +60°C (-40 .. +140°F)
	Process temperature	-40 .. +180°C (-40 .. +356°F) -30 .. +180°C (-22 .. +356°F) (Ex)
	Process pressure	-1 .. +16 bar (-14.5 .. +232 psi)
	Process connection	G 1 1/2" (with flat gasket)
	Material of process connection / extension	1.4305 (SS 303), food grade
	Material of probe	Plastics PPS (glass fibre reinforced) FDA listed, food grade



Specifications

CN 4030	Length of extension	210 .. 3.000mm (8.3 .. 118")
	Ambient temperature	-40 .. +60°C (-40 .. +140°F) -20 .. +60°C (-4 .. +140°F) (Ex)
	Process temperature	-40 .. +110°C (-40 .. +230°F) -30 .. +110°C (-22 .. +230°F) (Ex)
	Process pressure	-1 .. +16 bar (-14.5 .. +232 psi)
	Process connection	G 1 1/2" (with flat gasket)
	Material of process connection / extension	Aluminium or 1.4305 (SS 303), food grade
	Material of probe	Plastics PPS (glass fibre reinforced) FDA listed, food grade



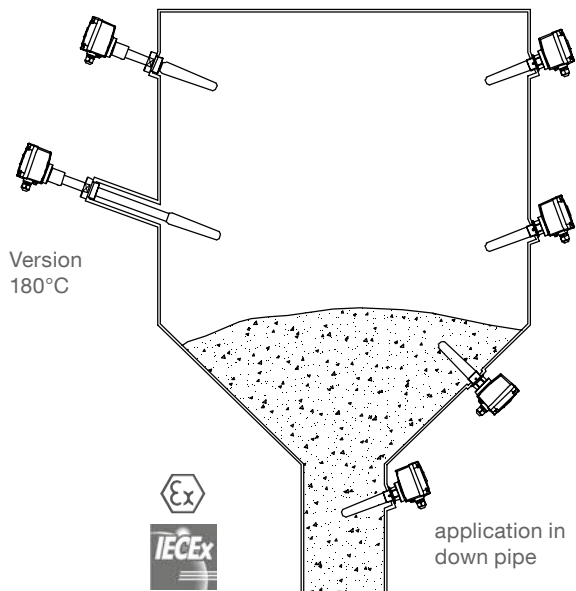
CN 4050	Length of extension	350 .. 6.000mm (13.8 .. 236")
	Ambient temperature	-20 .. +60°C (-4 .. +140°F)
	Process temperature	-30 .. +80°C (-22 .. +176°F)
	Process pressure	-1 .. +6 bar (-14.5 .. +87 psi)
	Process connection	G 1 1/2" (with flat gasket)
	Material of process connection	Aluminium or 1.4305 (SS 303)
	Material of cable isolation	PE, not food grade
	Material of probe	Plastics PPS/PBT (glass fibre reinforced)



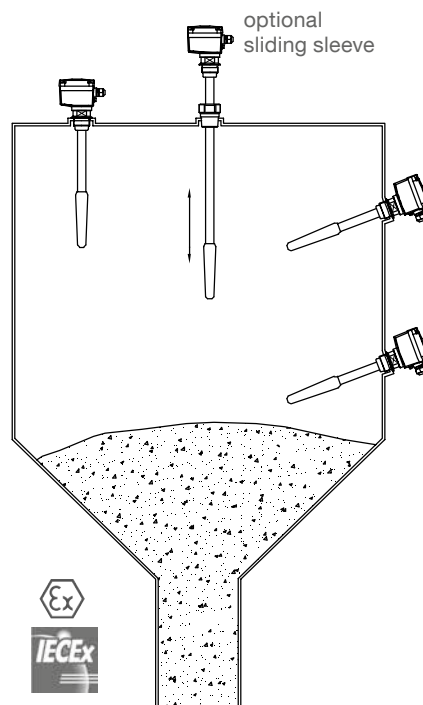
Applications

Detection of solids

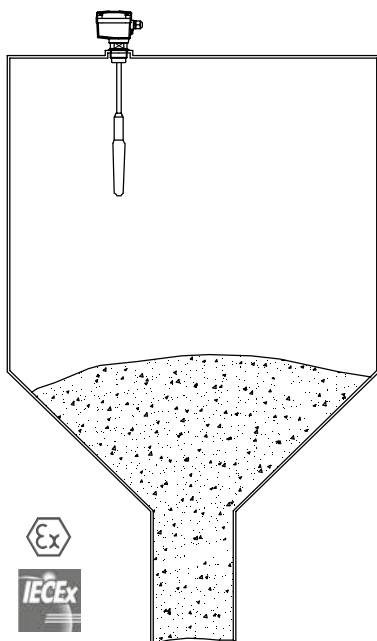
CN 4020



CN 4030



CN 4050



CN 4020 (120°C) Short extension length



Version: 120°C, G1", L=155mm, PPS (food grade)
Dimensions: see page 11
Cable entries: M20x1,5 (1x cable gland + 1x blind plug)*
Housing material: Plastics PA6*

*Options see page 9

Basic type

CN 4020 (120°C) •

pos. 2 **Certificate**

0	CE ⁽¹⁾	•
W	ATEX II 1/2D	.....	•
A	IEC-Ex ta/tb IIIC Da/Db	.....	•
E	TR-CU Ex ta/tb IIIC T! Da/Db X	.....	•

pos. 4 **Electronic module**

E	Relay SPDT 21..27V DC	.....	•
D	PNP 20..40V DC	.....	•
L	Relay DPDT 21..230V AC 21..45V DC	.....	•

Further options: see page 9

CN 4020	A		1		A	A	1	A
position	1	2	3	4	5	6	7	8

← **Order code**

All positions are available in special design (use code "Z").

⁽¹⁾ TR-CU (Ordinary Locations) included

CN 4020 (180°C) Short extension length



Version:
Dimensions:
Cable entries:
Housing material:

180°C, G1 1/2", 1.4305/PPS (food grade)
see page 11
M20x1,5 (1x cable gland + 1x blind plug)*
Plastics PA6*

*Options see page 9

Basic type			
CN 4020 (180°C)			•
pos. 2	Certificate		
	0 CE ⁽¹⁾		•
	W ATEX II 1/2D		•
	A IEC-Ex ta/tb IIIC Da/Db		•
	E TR-CU Ex ta/tb IIIC T! Da/Db X		•
pos. 4	Electronic module		
	D PNP 20..40V DC		•
	L Relay DPDT 21..230V AC 21..45V DC		•
pos. 7	Length of extension "L"		
	2 190mm (7.5")		•
	3 400mm (15.7")		•
Further options: see page 9			

CN 4020	A		2		B	3		3	← Order code
position	1	2	3	4	5	6	7	8	

All positions are available in special design (use code "Z").

⁽¹⁾ TR-CU (Ordinary Locations) included

CN 4030 Pipe extension



Version: G1 1/2", Aluminium/1.4305/PPS (food grade)
Dimensions: see page 11
Cable entries: M20x1,5 (1x cable gland + 1x blind plug)*
Housing material: Plastics PA6*

*Options see page 9

Basic type

CN 4030 •

pos. 2 **Certificate**

0	CE ⁽¹⁾	•
W	ATEX II 1/2D	•
A	IEC-Ex ta/tb IIIC Da/Db	•
E	TR-CU Ex ta/tb IIIC T! Da/Db X	•

pos. 4 **Electronic module**

D	PNP 20..40V DC	•
L	Relay DPDT 21..230V AC 21..45V DC	•

pos. 6 **Material of process connection**

1	Aluminium	•
3	Stainless steel 1.4305 (303)	•

pos. 7 **Length of extension "L"**

A	300mm (11.8")	•	•
B	500mm (19.7")	•	•
C	1.000mm (39.4")	•	•
D	1.500mm (59.1")	•	•
Z	Price per 100mm (3.94") or part thereof (starting from 0mm)	•	•
	min. 210mm (8.3"), max. 3.000mm (118")		

pos. 8 **Material of extension "L"**
 must be the same material as pos.6

1	Aluminium (probe: plastics PPS)	•
3	Stainless steel 1.4305 (303) (probe: plastics PPS)	•

Further options: see page 9

CN 4030	B	1	B				
position 1	position 2	position 3	position 4	position 5	position 6	position 7	position 8

← **Order code**

All positions are available in special design (use code "Z").

⁽¹⁾ TR-CU (Ordinary Locations) included



Options / Accessories

Options

pos. 11x	Guarantee extension to 5 years	•
pos. 21	Weather-protection cover (for Ex only approved for Zone 22)	•
	Housing material	
pos. 22a	Aluminium	•
	Cable entry Selection of the following options only necessary, if a deviation from the default cable gland is required:	
pos. 23x	M20x1,5 2x screwed cable gland	•
pos. 23a	¹ NPT ½" tapered ANSI B1.20.1 (1x conduit + 1x Ex-d blind plug)	•
	Hexagon nut	
pos. 24a	aluminium 1 pcs	•
pos. 24b	aluminium 2 pcs	•
pos. 24e	stainless steel 1.4305 (303) 1 pcs	•
pos. 24f	stainless steel 1.4305 (303) 2 pcs	•
	Sliding sleeve ² For applications without overpressure	
pos. 25a	G1½" DIN 228 material 1.4305 (303)	•
	For applications with overpressure max. 16bar (232psi):	
pos. 25e	G1½" DIN 2999 material 1.4305 (303)	•
	³ Signal lamp	
pos. 27a	Bulb, mounted in cable entry M20x1,5, 2W green	•
pos. 27c	Bulb, mounted in cable entry M20x1,5, 2W red	•
	⁴ Plug	
pos. 35x	Valve connector (incl. mating plug) 4-pole (incl. PE) max. 230V	•
pos. 35a	M12 (without mating plug) 4-pole max. 25V	•
pos. 35b	M12 (without mating plug) 5-pole (incl. PE) max. 60V	•
pos. 35c	Harting Han 4A (incl. mating plug) 5-pole (incl. PE) max. 230V	•
	⁵ Grounding	
pos. 36x	Without metal grounding pin inside the plastics process connection	•
	For applications with corrosive liquids	

¹ Available only for aluminium housing (pos.22a).

² Available only for CE (pos. 2, 0)

³ Available only for CE (pos. 2, 0), not in combination with weather protection cover (pos. 21) and cable entries pos.23 x,a,b.
For electronic module Relais DPDT (pos. 4.L) three bulbs (24V, 115V and 230V) will be delivered. For PNP (pos.4.D) a 24V bulb will be delivered.

⁴ Available only for CE (pos.2 0). Without connection of stranded wires for installation and internal terminals (standard) or according to customer specification.

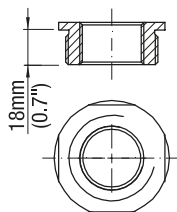
⁵ Available only for CN4020 version 120°C.

Accessories

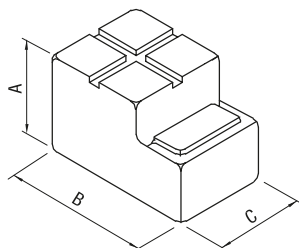
	Adapter G 1" to G 1 1/2"	
bu400606	Aluminium	•
bu400607	1.4305 (303)	•
	Adapter G 1" to NPT 1 1/4"	
bu400618	Aluminium	•
bu400619	1.4305 (303)	•
	Adapter G 1" to NPT 1 1/2"	
bu400610	Aluminium	•
bu400611	1.4305 (303)	•
zu400200	Shortening kit for CN4050 cable	•

Options / Accessories

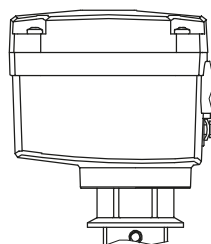
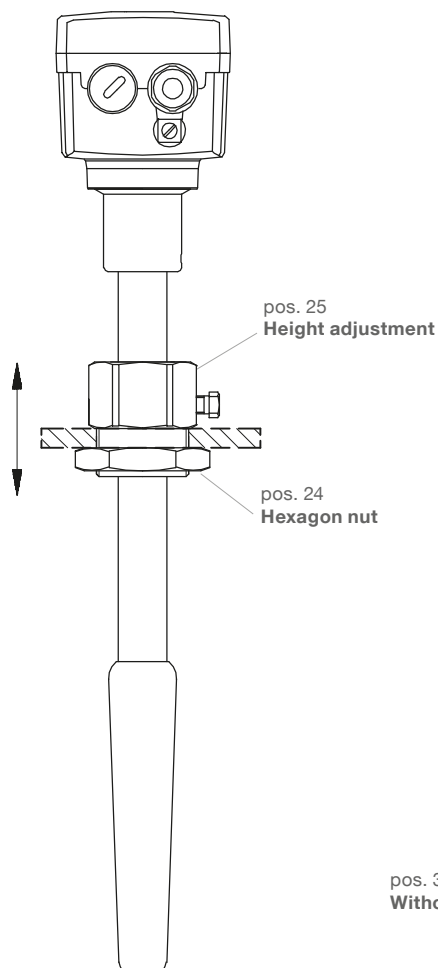
Adapter
 G 1" to G 1 1/2"



pos. 21
Weather protection cover



A	100mm (3.94")
B	165mm (6.30")
C	95mm (3.54")



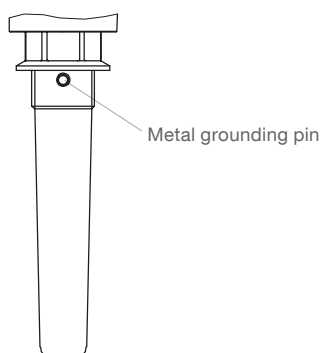
pos. 27
Bulb in cable gland

Pos. 35x
Valve connector
 Enclosure plastic
 Protection IP65

Pos. 35a,b
Plug M12
 Enclosure brass
 Protection IP67

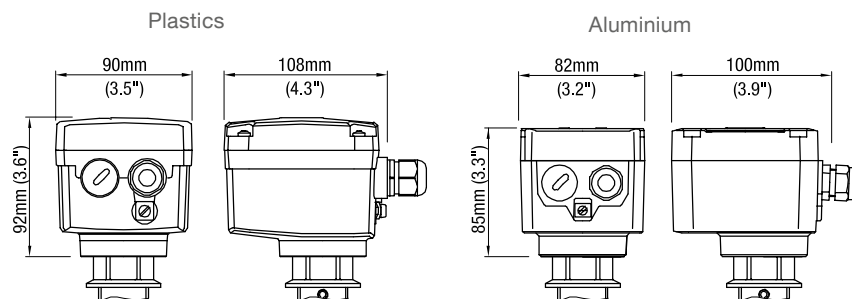
Pos. 35c
Plug Han 4A
 Enclosure zinc
 Protection IP65

pos. 36x
Without metal grounding pin

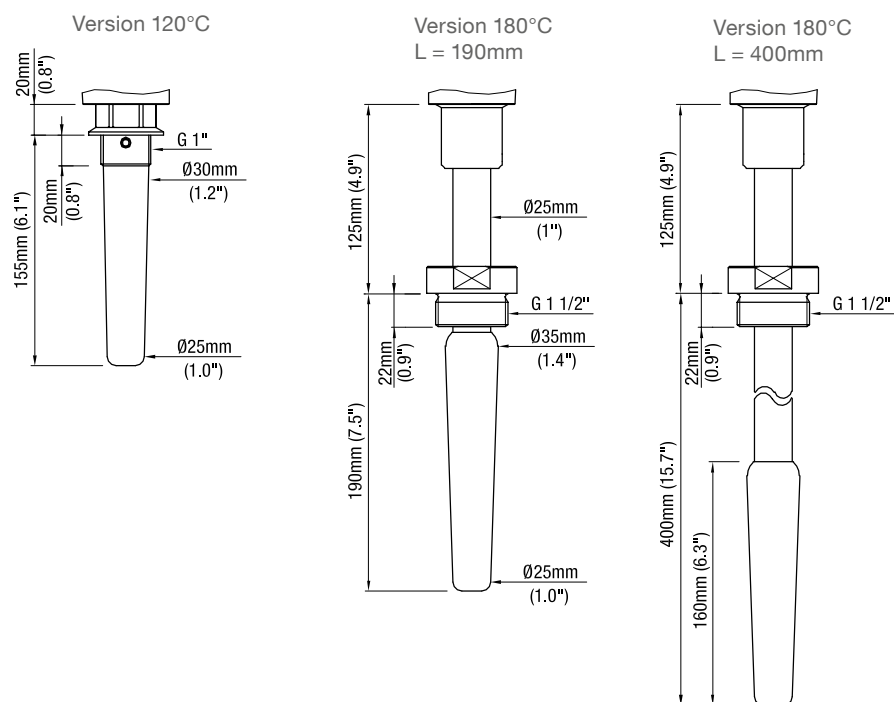


Dimensions

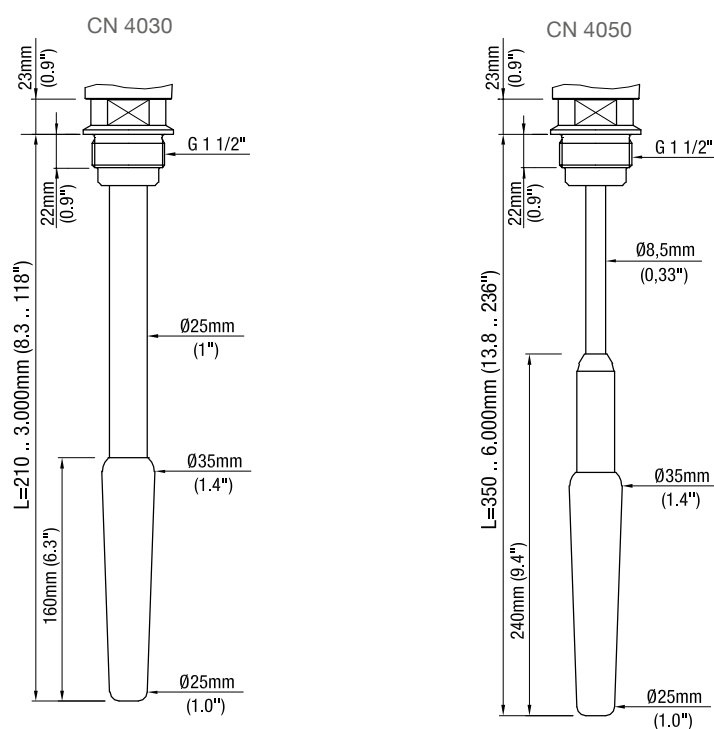
Housing versions



CN 4020



CN 4030 CN 4050



Electrical installation

Relay SPDT

Power supply:

21..27V DC $\pm 10\%^*$ 1,5W
*incl. 10% of EN 61010

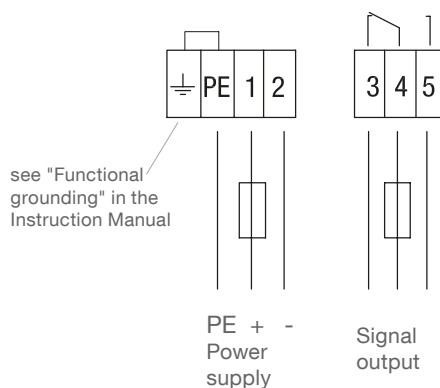
Fuse on power supply:
max. 10A, fast or slow, HBC, 250V

Signal output:

Floating relay SPDT

AC max. 250V, 3A, non inductive
DC max. 30V, 5A, non inductive

Fuse on signal output:
max 5A, fast or slow, HBC, 250V



Relay DPDT

Universal voltage

Power supply:

21..230V 50-60Hz $\pm 10\%^*$ 18VA
21..45V DC $\pm 10\%^*$ 2W
*incl. 10% of EN 61010

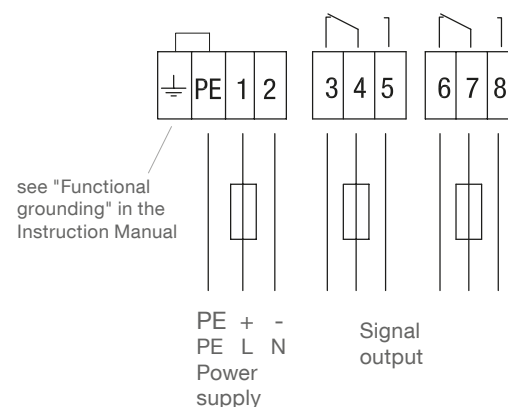
Fuse on power supply:
max. 10A, fast or slow, HBC, 250V

Signal output:

Floating relay DPDT

AC max. 250V, 8A, non inductive
DC max. 30V, 5A, non inductive

Fuse on signal output:
max 10A, fast or slow, HBC, 250V



PNP

3-wire

Power supply:

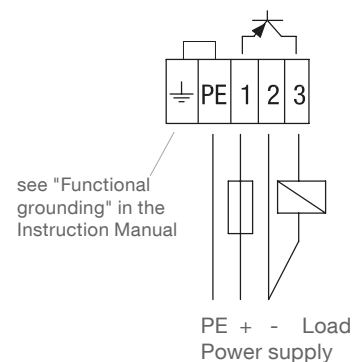
20 .. 40V DC $\pm 10\%^*$ 0.5A
*incl. 10% of EN 61010

Fuse:
max 4A, fast or slow, 250V, HBC

Signal output:

max. 0.4A

Load for example:
PLC, relay, contactor, bulb



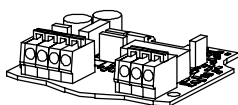
Approved power supply with reinforced insulation to mains is required

Spare parts

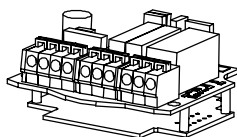
For type	Electronics	Article number
CN 4020 Version 120°C	Relay SPDT 21..27V DC	pl406100
	Relay DPDT 21..230V AC 21..45V DC	pl406110
	PNP 20..40V DC	pl406120
CN 4020 Version 180°C	Relay DPDT 21..230V AC 21..45V DC	pl406111
	PNP 20..40V DC	pl406121
CN 4030 CN 4050	For these types a non changeable electronic is located inside the probe. No spare parts are stated.	

•
•
•
•
•

Relay SPDT



Relay DPDT



PNP

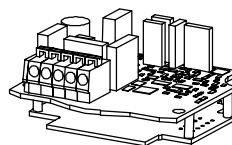




Table of contents

	Page
KN 2700	2
	

KN 2800	4
	

Options KN 2700/KN 2800	6

Process connections / Spare parts	8

Electrical installation	9

Subject to technical and price change. Prices are valid from 01.04.2017 until 31.03.2018 unless otherwise agreed.

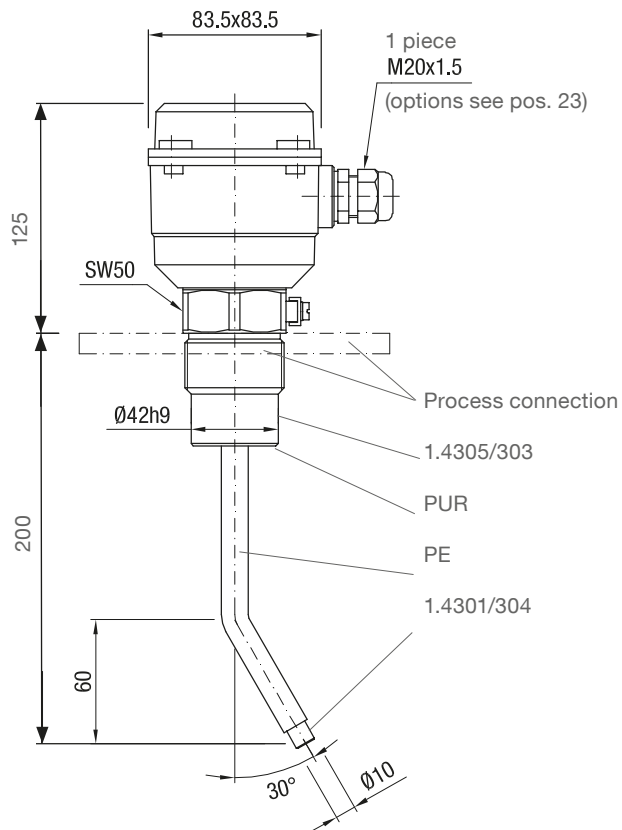
All dimensions in mm (inches). By publishing this selection list all other lists become invalid.

All prices are EXW Betzigau, excl. packaging costs and VAT. Different variations to those specified are possible. Please contact our technical consultants.

We assume no liability for typing errors.

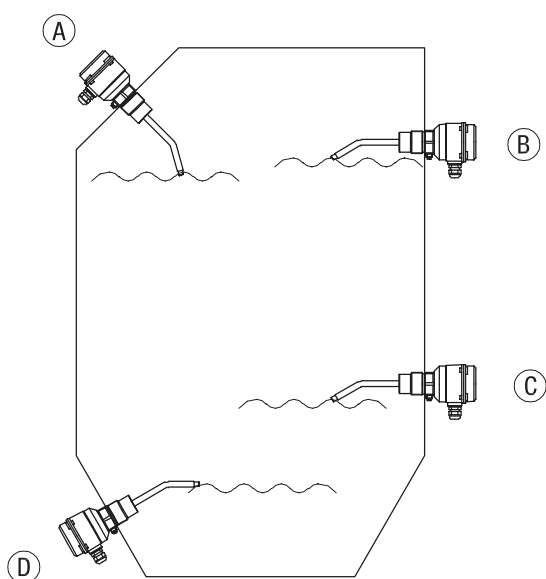
KN 2700 Dimensions / Application

Dimensions



- Conductive measurement system
- Compact unit
- 1 point level limit detection in conductive liquids and muds
- Full, demand, empty detector
- Wide range of applications
- No maintenance
- Enclosure IP66
- Die cast aluminium housing
- 2011/65/EU RoHS conform

Application



- A Full detector vertical and oblique from the top
- B Full detector horizontal
- C Empty detector horizontal
- D Empty detector oblique from the bottom

KN 2700 Selection

Selection

Basic type KN 2700

pos. 2	Power supply		
A	220..240V AC 50-60 Hz	.....	•
B	110..120V AC 50-60 Hz	.....	•
C	42V AC 50-60 Hz	.....	•
D	24V AC 50-60 Hz	.....	•
E	20-30V DC	.....	•
pos. 3	Process connection (flange dimensions see page 8)		
A	thread G1½", DIN 228	.....	•
F	thread NPT1½", conical ANSI B1.20.1	.....	•
L	flange DN100 PN6, EN 1092-1 (1.4541/321)	.....	•
M	flange DN100 PN16, EN 1092-1 (1.4541/321)	.....	•

KN 2700	A			3	A	1	3
---------	---	--	--	---	---	---	---

Position 1 2 3 4 5 6 7

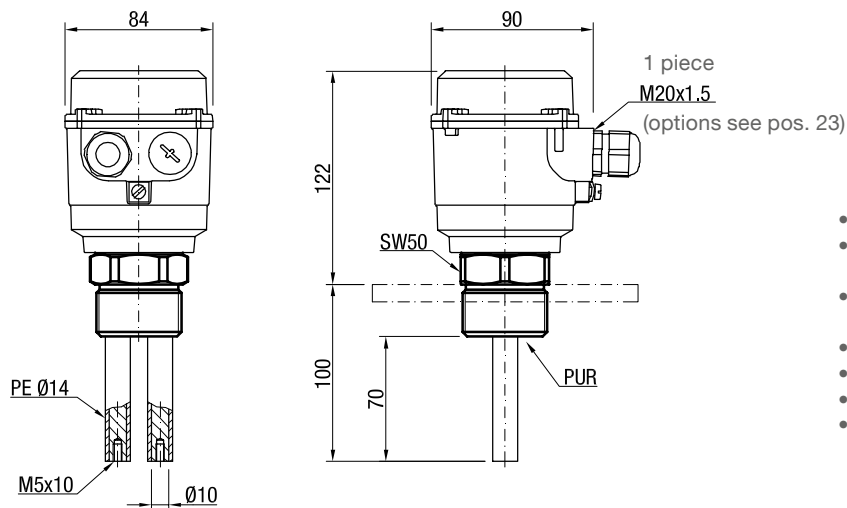
← **Order code**

All positions are available in special design (use Code "Z").

KN 2800 Dimensions

2 Electrodes

For applications with conductive vessel wall
 (pos.7, code 1)

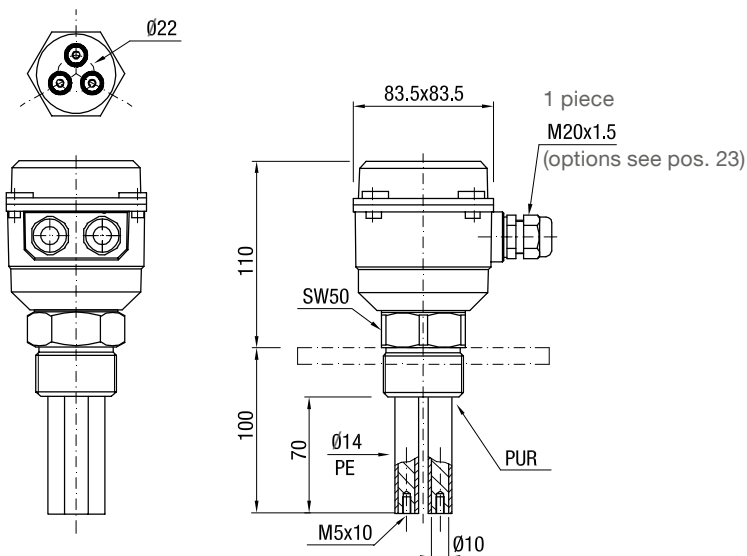


- Compact unit
- 2 point level limit detection in conductive liquids and muds
- Full, demand, empty detector

- Wide range of applications
- No maintenance
- Enclosure IP66
- Die cast aluminium housing

3 Electrodes

For applications with non conductive vessel wall
 (pos. 7, code 2)



KN 2800 Selection

Selection

Basic type KN 2800

Pos. 2	Power supply		
A	220..240V AC 50-60 Hz	.....	•
B	110..120V AC 50-60 Hz	.....	•
C	42V AC 50-60 Hz	.....	•
D	24V AC 50-60 Hz	.....	•
E	20-30V DC	.....	•
Pos. 3	Process connection (flange dimensions see page 8)		
A	thread G1½", DIN 228	.....	•
F	thread NPT1½", conical ANSI B1.20.1	.....	•
L	flange DN100 PN6, EN 1092-1 (1.4541/321)	.....	•
M	flange DN100 PN16, EN 1092-1 (1.4541/321)	.....	•
Pos. 7	Number of bars		
1	2 bars (for conductive vessel walls)	.....	•
2	3 bars (for non conductive vessel walls)	.....	•

KN 2800	C			3	A	A		← Order code
Position	1	2	3	4	5	6	7	

All positions are available in special design (use code "Z").

Options

Options

pos. 11x **Guarantee extension to 5 years** •

pos. 21 **Weather protection cover** •

Mounting set for flange mounting

	process connection flange	for counter flange with	Consist of				
			screw*	nut*	washer*	sealing (max. 125°C)	
pos. 22c	L	hole ø18	4 pieces M16x60	4 pieces M16	4 pieces	1 piece	•
pos. 22d	L	thread M16	4 pieces M16x60		4 pieces	1 piece	•
pos. 22e	M	hole ø18	8 pieces M16x60	8 pieces M16	8 pieces	1 piece	•
pos. 22f	M	thread M16	8 pieces M16x60		8 pieces	1 piece	•

* material stainless steel A2

pos. 23 **Cable entry**

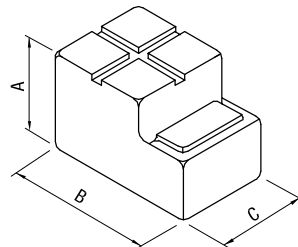
X 2x M20x1,5 screwed cable gland •

A 2x conduit connection NPT 1/2" tapered ANSI B1.20.1 •

pos. 24 **Hexagon nut for process connection thread G 1 1/2 inch**
 stainless steel •

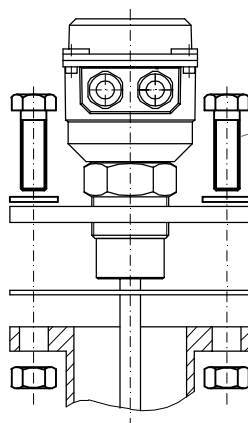
Options

pos. 21
Weather protection cover

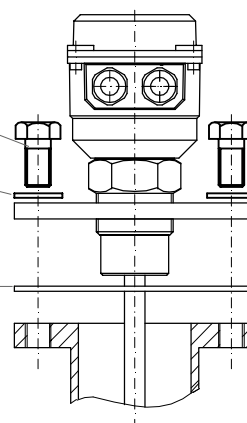


	KN 2700 / KN 2800
A	100mm (3.94")
B	165mm (6.5")
C	88mm (3.46")

pos. 22
Mounting set for flange with hole

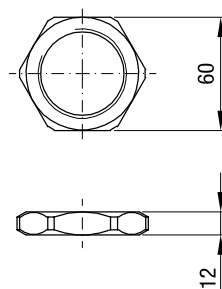


pos. 22
Mounting set for flange with thread



Screw
 Washer
 Sealing
 Nut

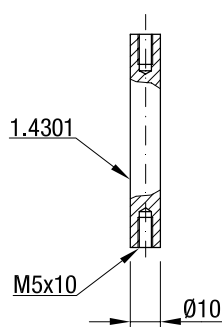
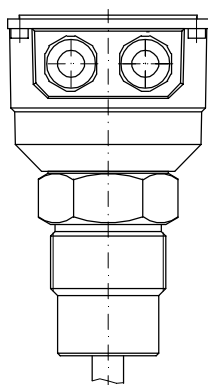
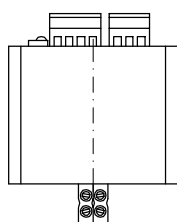
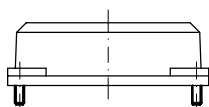
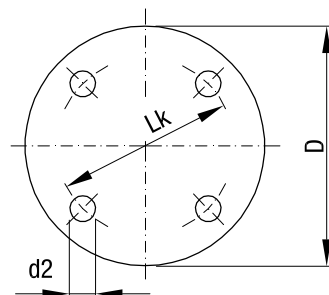
pos. 24
Hexagon nut G 1½ inch



Dimensions flanges / Spare parts

Process connections:

Code	Type	Number of holes	d2	Lk	D	T (Thickness)
L	Flange DN100 PN6	4	18	170	210	16
M	Flange DN100 PN16	8	18	180	220	20



Spare parts

KN 2700

Electronic module

pl101040	220..240V	50-60Hz	.....	•
pl101030	110..120V	50-60Hz	.....	•
pl101020	42V	50-60Hz	.....	•
pl101000	24V	50-60Hz	.....	•
pl101050	20..30V DC	.....	.....	•

KN 2800

Electronic module

pl102040	220..240V	50-60Hz	.....	•
pl102030	110..120V	50-60Hz	.....	•
pl102020	42V	50-60Hz	.....	•
pl102000	24V	50-60Hz	.....	•
pl102050	20..30V DC	.....	.....	•

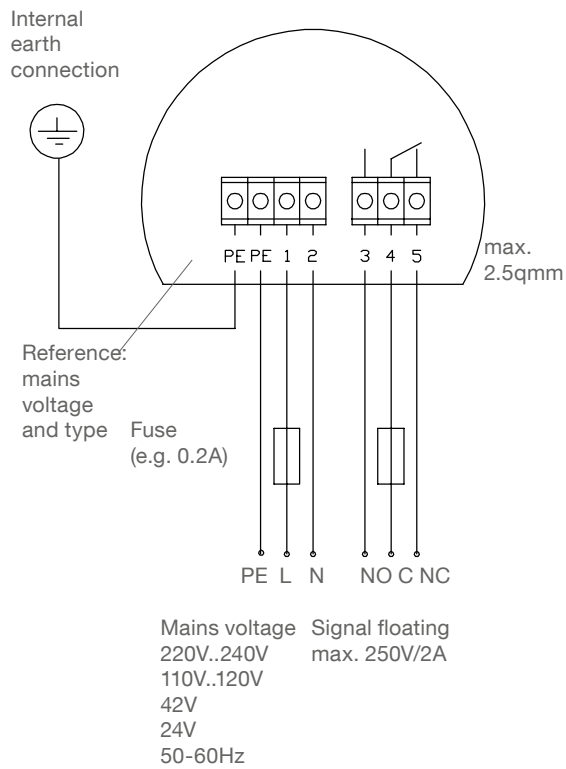
Electrode (incl. 2 grub screws)

bu400700	0,5m long	.....	•
bu400701	0,75m long	.....	•
bu400702	1,0m long	.....	•
em400131	Shrinking hose	.....price / meter	•

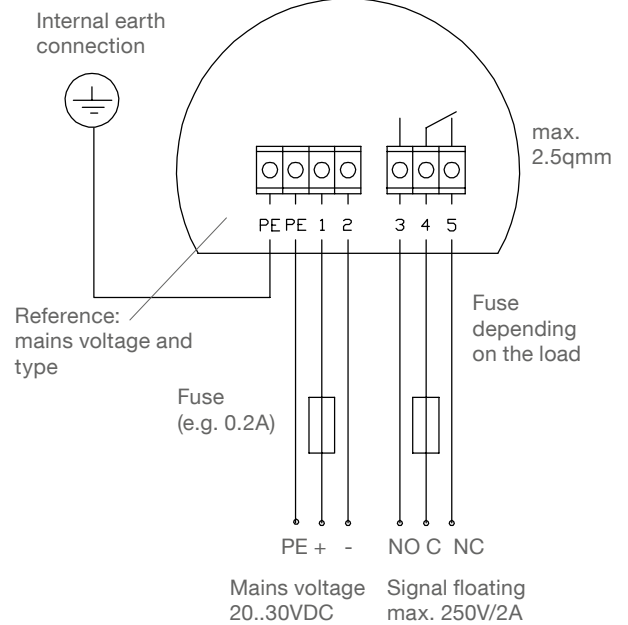
(for isolation of electrodes, material PE)

Electrical connection

AC design



DC design





Flexinivo[®] FN 6

Flexible combination of level limit switch and continuous level measurement system

The multifunctional system is especially suitable for the application of volumetric dosing of difficult bulk materials, such as perlite in product mixtures.

The principle is simple & very precise



Flexinivo® FN 6



- User defined measurement levels through flexible height adjustment
- Not affected by material properties such as conductivity, dust, dielectricity, humidity, weight
- Reduction of manual work

Application: The Flexinivo® FN 6 is used as a height-adjustable limit switch for the exact volumetric filling of containers. The height adjustment and signal analysis are carried out by an external PLC.

Speciality: Constructed with a particularly high sensitivity of 5 g/l specifically used for the exact volumetric dosing of perlite.



Flexinivo FN 6

Flexible, controllable signal

Input signal:

- Measurement position (motor controlled)
- Speed of the measurement

Output signal:

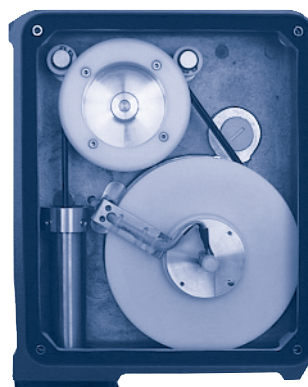
- Position indicator (movement distance)
- Detection height
- Upper stop position

Technical Data

Housing	Aluminium IP 66
Process temperature	-20°C up to +60°C (-4°F up to +140°F)
Pressure	Max. +0.3 bar (4.4 psi)
Supply voltage	115V AC 230V AC
Process connection	Flange dimensions similar to DN100 PN6
Measurement range	0.6 – 5.1m (23.6 – 201")
Sensitivity	From 5g/l (0.3lb/ft³)
Position detection	Analogue encoder 4-20mA Incremental encoder 1mm

Electromechanical functional principle

View of mechanical chamber
Solid mechanical construction



View of electronic chamber
Motion control by incremental encoder

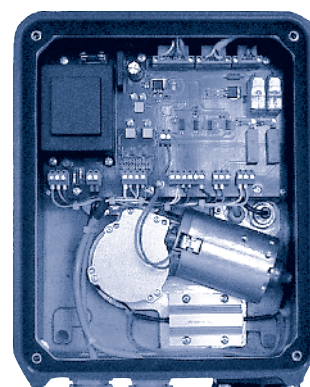
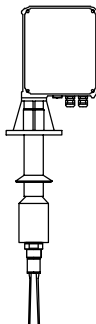


Table of contents

	page
Dimensions	2
Selection/ Options	3
Electrical installation	4



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All dimensions in mm (inches).

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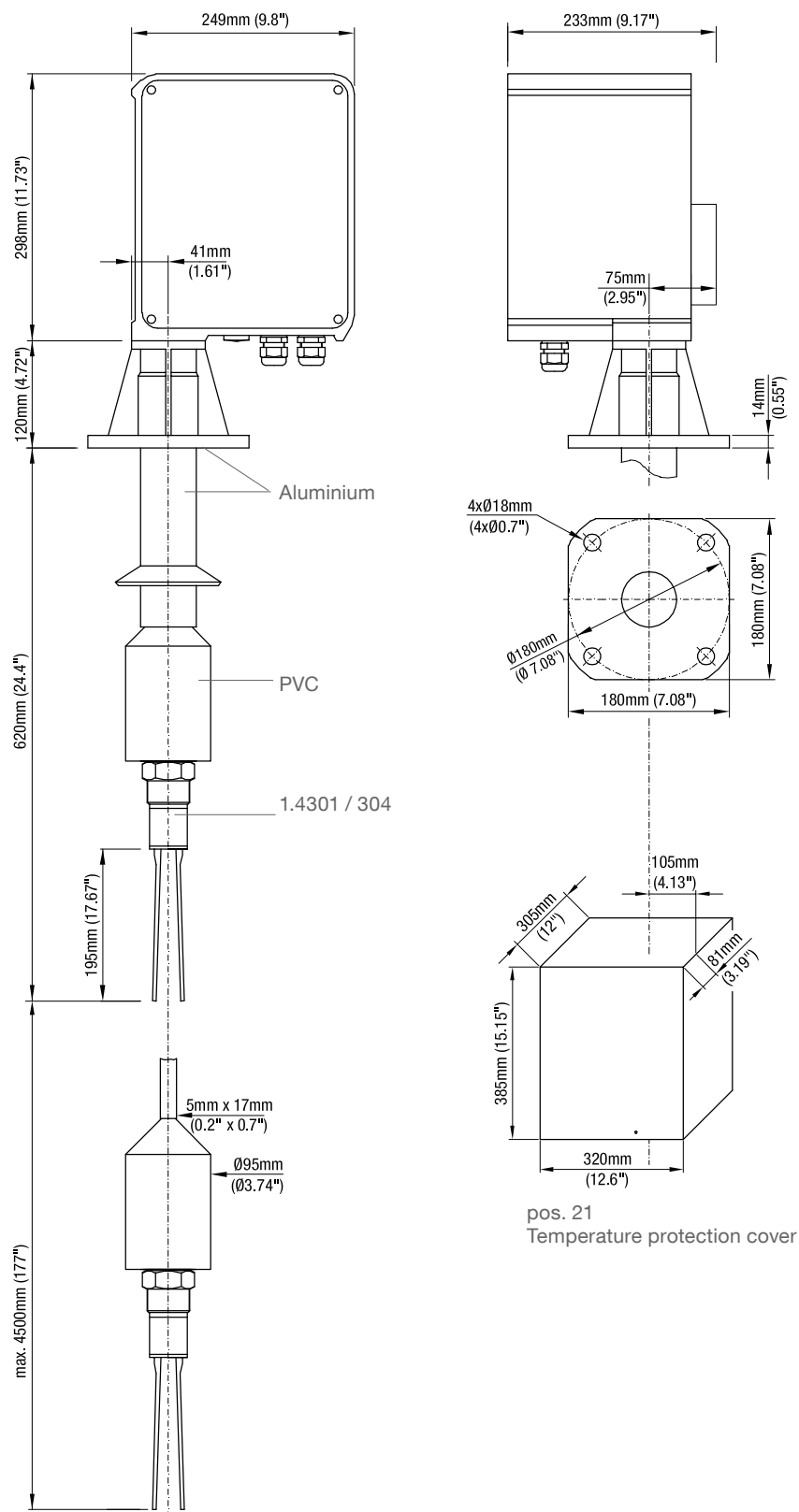
Different variations to those specified are possible. Please contact our technical consultants.

We assume no liability for typing errors.

Dimensions

Height adjustable level limit switch

- minimal maintenance
- robust design
- light weight
- compact construction



Selection / Options

Basic unit FN6

•

Ambient temperature: 0 .. 60°C

pos. 2		Sensitivity of vibration fork	
	A	5g/l	•
	B	20g/l	•
pos. 5		Power supply	
	A	230V AC	•
	B	115V AC	•
pos. 6		Signal output for vibration fork position	
	1	Incremental encoder	•
	2	Analogue 4-20mA encoder	•

Options

pos. 11	x	Warranty extension to 5 years	•
pos. 21		Temperature protection cover on request for ambient temperature up to -20°C	
pos. 22		Mounting set ø18 (for opposite flange with hole ø18) 4 screws M16x60 A2 4 nuts M16 A2 4 washers A2 1 sealing max. 125°C	•
pos. 23		Mounting set M16 (for opposite flange with thread M16) 4 screws M16x30 A2 4 washers A2 1 sealing max. 125°C	•
pos. 24		Cable entry	
	A	3x conduit connection NPT ½" tapered ANSI B1.20.1	•
	B	3x conduit connection NPT ¾" tapered ANSI B1.20.1	•
pos. 25		Pressure connection (quick coupling including counter part for internal hose diameter 9mm)	•

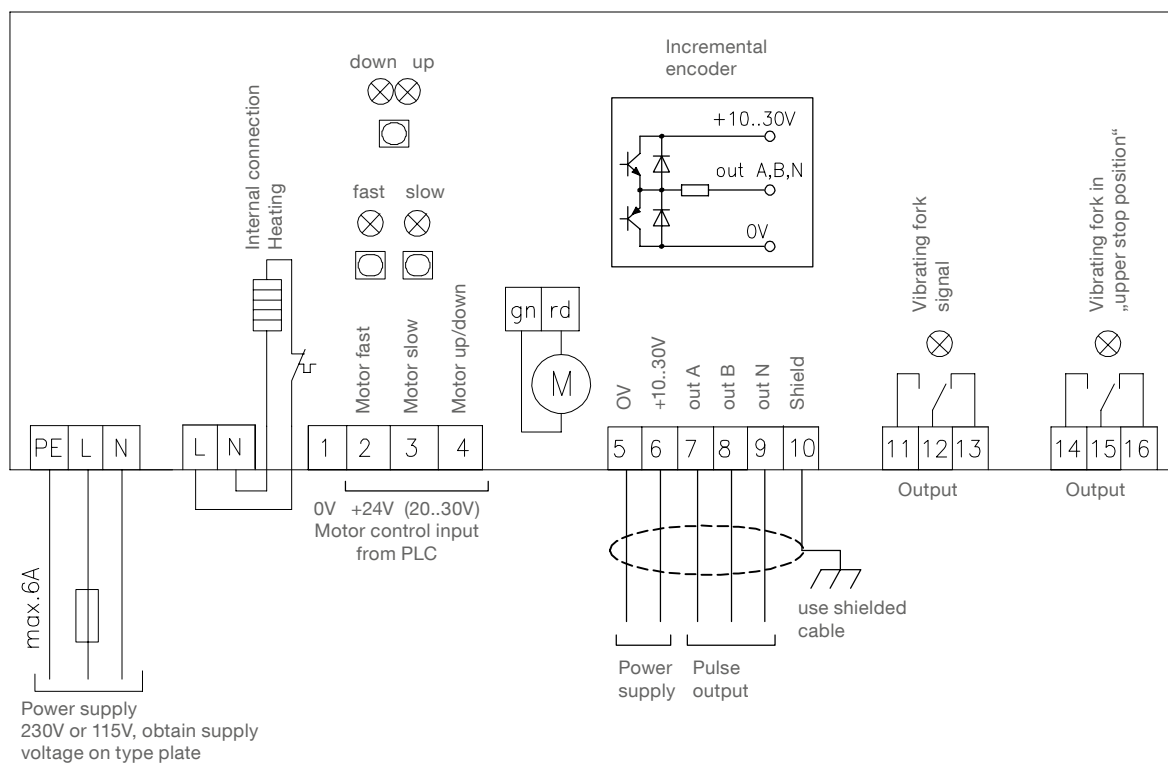
FN 6	A		1	1			A	1	A	A
Position	1	2	3	4	5	6	7	8	9	10

Other versions on request

← Order code

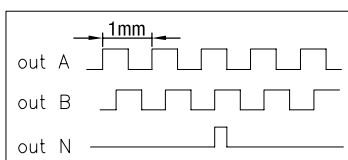
Electrical connection / Switching logic

Incremental encoder



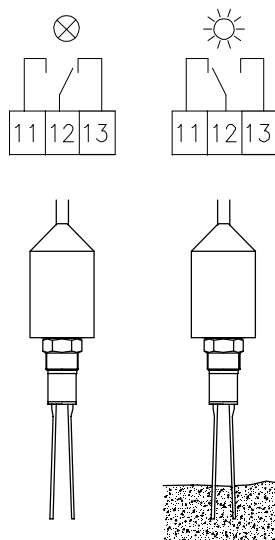
Pulse output diagram:

Shown when sensor moves upwards

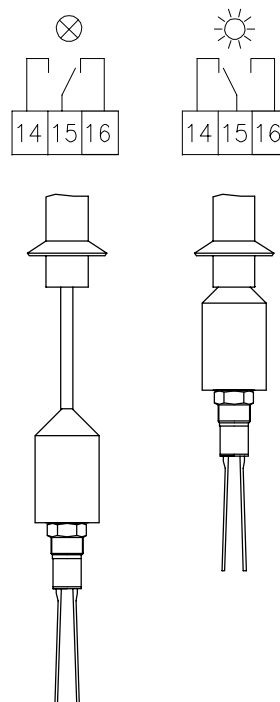


When rotation of the incremental encoder changes direction the signal of A and B is inverted.

Switching logic: Vibrating fork signal

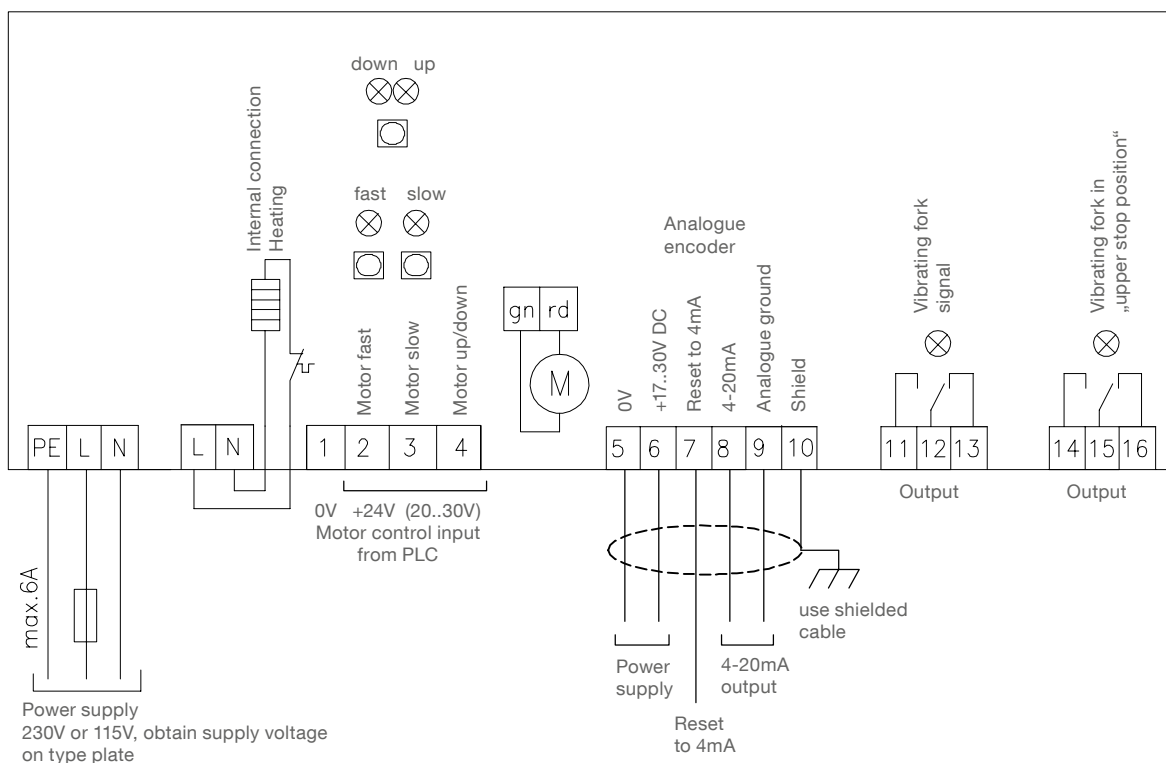


Switching logic: Vibrating fork in „upper stop position“

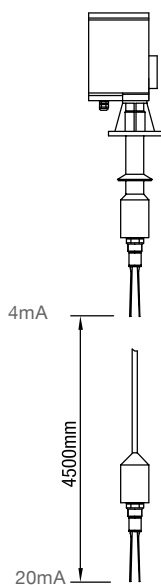


Electrical connection / Switching logic

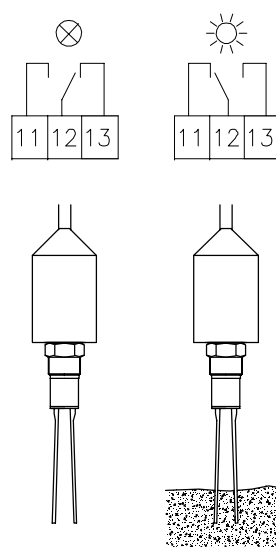
Analogue 4-20mA encoder



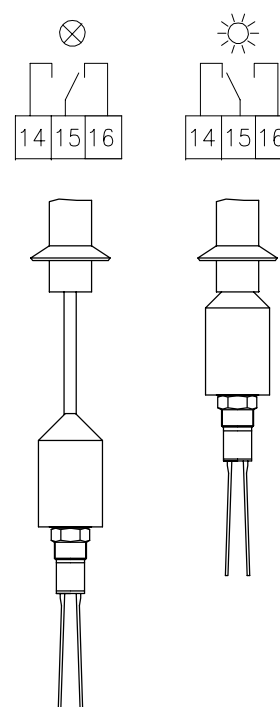
4-20mA output



Switching logic: Vibrating fork signal



Switching logic: Vibrating fork in „upper stop position“





Nivobob[®] 3000

Microprocessor controlled level measuring system

The multifunctional unit for discontinuous level monitoring in bulk goods and for interface applications – very precise, even suitable for problematic media, also for use in hazardous locations

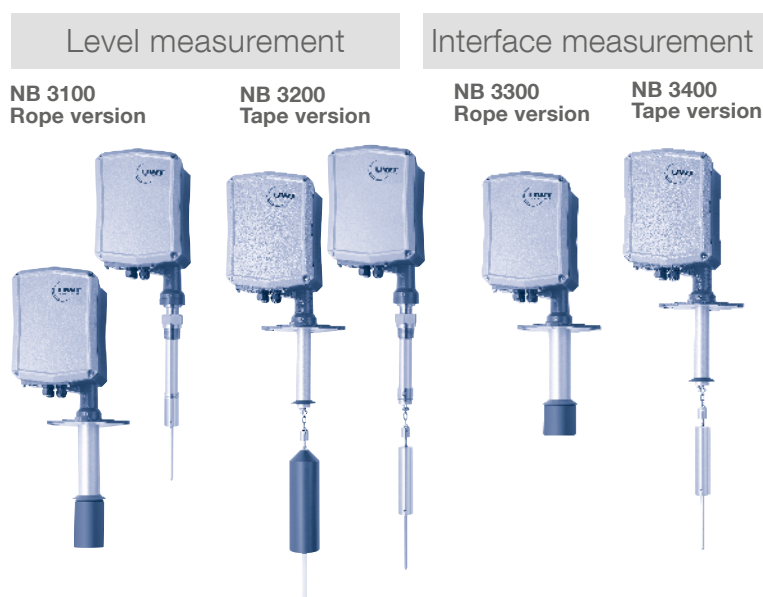


Nivobob® 3000



- Microprocessor controlled measurement, intelligent monitoring
- Easy installation; variety of process connections (flange and thread)
- Unaffected by material properties such as conductivity, dust, di-electricity

Application: Nivobob® is used for discontinuous level measurement in silos and vessels. It provides extremely reliable measuring results in solids as well as in interface applications. Nivobob® offers different output signals: 0/4-20mA or communication via Modbus or Profibus DP.

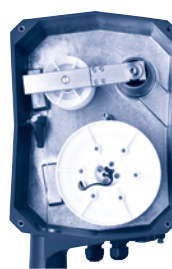


Technical Data

Model	NB 3100 / 3200	NB 3300 / 3400
Housing	Aluminium IP 66 (Type 4)	
Pressure	Max. +1.7 bar (+25 psi)	
Supply voltage	AC version: 98...253V 50-60Hz DC version: 20...28V	
Measuring range	Rope version max. 30m; tape version max. 50m	
Signal output/ Communication	0/4-20mA; relay counting pulse; Modbus; Profibus DP	
Certificates	CE; ATEX II 1/2 D FM Cl. II, III, Div. 1, TR-CU	CE; FM general purpose
Process temperature	-40°C up to +250°C (-40°F up to +482°F)	-40°C up to +80°C (-40°F up to +176°F)
Sensitivity	From 20g/l (1.2lb/ft³) depending on sensor weight	-
Process connection	Flange DN 100 PN16 Flange 4" 150lbs Flange 2" and 3" 150lbs Thread R 1 ½" Thread NPT 1 ½" Thread NPT 3"	Flange DN 100 PN16 Flange 4" 150lbs

Interior view

View rope/tape chamber



View electronic chamber



Sensor weights

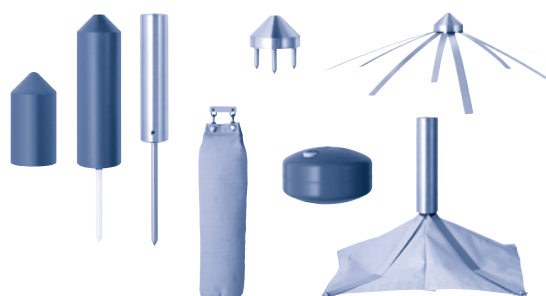


Table of contents

	Page
Overview	2

Specifications	3

Applications	4

NB 3000 Solids measurement	6

NB 3000 Interface measurement (solids in water)	8

Accessories	10

Dimensions	11

Spare parts	14

Electrical installation	16

Subject to change.

All dimensions in mm (inches).

All prices in Euro, excluding VAT.

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Please contact our technical consultants.

Overview

Features

Continuous level measurement of solids and interface applications

Process

- Independent of bulk material properties
- Very accurate measurement

Service

- Simple installation and commissioning
- Rope, tape and (optional) motor with increased service life
- Low maintenance

Approvals

- Approval for use in Hazardous Areas
- 2011/65/EU RoHS conform

Mechanics

- Measurement range up to 50m (164ft)
- 1 1/2" process connection possible
- Internal tape cleaner for difficult materials
- Window in lid and outside start button (optional)

Electronics

- Micro processor controlled measurement
- Comprehensive diagnostic possibilities
- Output 0/4-20mA / Modbus / Profibus DP / counting pulses
- Programmable Relais (can be used as level limit switch outputs)

Solids measurement



NB 3100

Rope version
(fig. with process connection thread and stainless steel weight)

NB 3200

Tape version
(fig. with process connection thread and stainless steel weight)

Interface measurement



NB 3300

Rope version

NB 3400

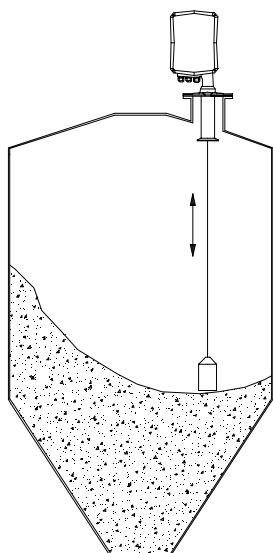
Tape version

Specifications

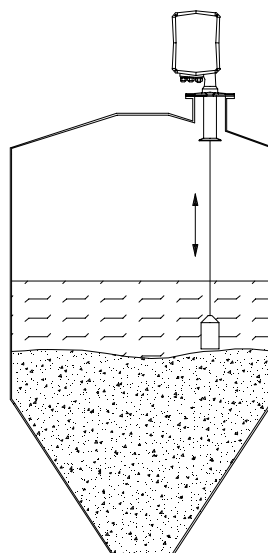
				NB 3100 / 3200 Solids measurement	NB 3300 / 3400 Interface measurement
Process	Measurement range	Rope version	30m (98.4ft)	•	•
		Tape version	40m (131ft)/50m (164ft)	•	•
	Process temperature		80°C (176°F)	•	•
			150°C (302°F)	•	
			250°C (482°F)	•	
	Process overpressure		-0,3 .. +0,3 bar (-4.35 .. + 4.35 psi)	•	•
			-0.5 .. +1.7bar (-7.3 .. +25psi)	•	•
Electronics	Power supply	AC version	98 .. 253V 50-60Hz	•	•
		DC version	20-28V	•	•
	Output		0/4-20mA	•	•
			4 relais	•	•
			Modbus RTU	•	•
			Profibus DP	•	•
Approvals	Dust Ex		ATEX 1/2D	•	•
			FM Cl. II, III Div. 1	•	•
			TR-CU	•	•
	Ordinary Locations		CE, FM, TR-CU	•	•

Applications

Solids measurement



Interface measurement
 (solids in water)

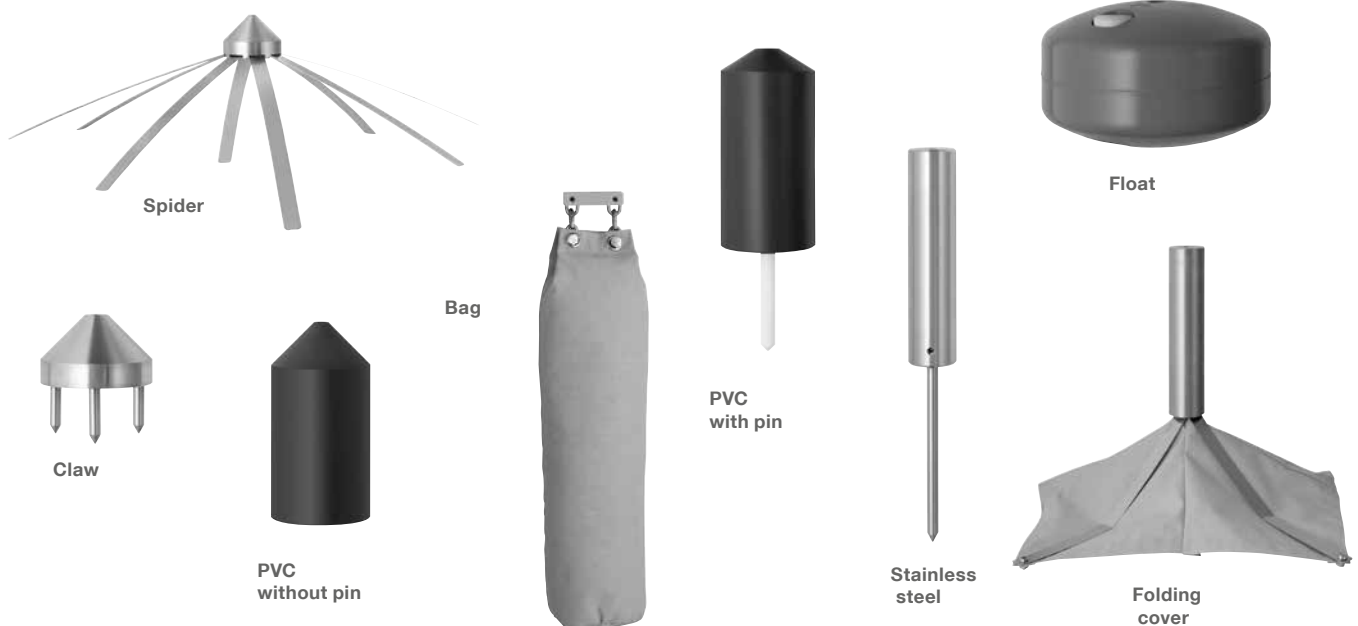


Applications

Sensor weight guide (solids measurement)

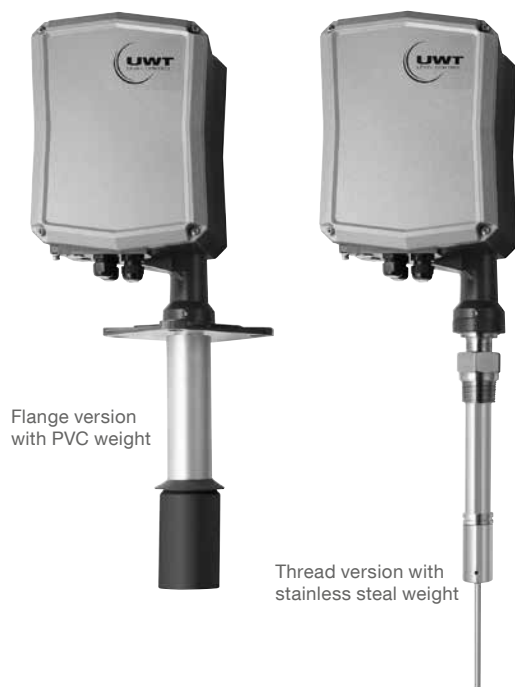
Sensor weight	Application				Note	Fits through mounting hole				
						Thread		Flange		
	* Material density g/l (lb/ft³)	Material consistence	Angle of repose	Max. process temp.		1 1/2"	3"	2"	3"	DN100 / 4"
PVC without pin	>300 (18)	granulate	flat	80°C (176°F)	Standard weight					•
PVC with pin	>300 (18)	granulate, powder	steep	80°C (176°F)	The pin penetrates into the material and avoids slipping or tilting of the sensor weight on the steep bulk surface.					•
Stainl. steel	>300 (18)	granulate, powder	flat, steep	250°C (482°F)	The pin penetrates into the material and avoids slipping or tilting of the sensor weight on the steep bulk surface.	•	•	•	•	•
Claw	>200 (12)	coarse (e.g. stones)	steep	250°C (482°F)	Avoids slipping or tilting on the steep bulk surface.					•
Folding cover	>20 (1.2)	light powder	flat, steep	80°C (176°F)	Big surface prevents the sensor weight from sinking into the material.	•	•	•	•	•
Spider	>40 (1.4)	light powder	flat, steep	250°C (482°F)	Big surface prevents the sensor weight from sinking into the material.					•
Bag	>300 (18)	granulate, powder	flat	80°C (176°F)	Prevents damage of the conveying screw. To be filled with bulk material.					•
Float	-	liquids only	-	80°C (176°F)	To be filled with material.					

* The above mentioned data is a guideline and is valid for material which has settled after filling. During the filling the bulk density can change (e. g. for fluidised material).



Solids measurement

NB 3100
Rope version



NB 3200
Tape version



Cable entries (by default)

Depending on selected version (options see pos. 31):

CE, ATEX, TR-CU	Screwed cable gland: 2x M20x1.5 and 1x M25x1.5 Blindplug: 2x M20x1.5
FM	Open conduit ANSI B1.20.1: 1x NPT 3/4" and 2x NPT 1/2" Blindplug: 2x NPT 1/2"

Dimensions see page 12

pos. 1	Basic type		
	C NB 3100 Rope version (30m)	.....	•
	D NB 3200 Tape version (40m)	.....	•
pos. 2	Certificate		
	0 CE ⁽¹⁾	•
	W ATEX II 1/2 D	.....	•
	M FM general purpose	.....	•
	N FM Class II, III Div.1 Group E-G	.....	•
	E TR-CU Ex ta/tb IIIC Tl Da/Db X	.....	•
pos. 3	Process temperature		
	A max. + 80°C (176°F)	.....	•
	S max. +150°C (302°F)	.....	•
	T max. +250°C (482°F)	.....	•
pos. 4	Power supply		
	1 98 .. 253V 50-60Hz	.....	•
	3 20 .. 28V DC	.....	•
pos. 5	Signal output		
	D 0/4-20mA Modbus Relay counting pulse (5cm 10cm 1/6ft 1/3ft)	.....	•
	B 0/4-20mA Modbus Electronic counting pulse (1cm 2.5cm 1/20ft 1/10ft)	.....	•
	E 0/4-20mA Profibus DP Relay counting pulse (5cm 10cm 1/6ft 1/3ft)	.....	•
pos. 6	Process connection		
	X Flange DN100 PN16 (EN1092-1) and flange 4" 150lbs ANSI B16.5 (unit is fitting to this flange)	.....	•
	Y Flange 2" and flange 3" 150lbs ANSI B16.5 (unit is fitting to this flange)	.....	•
	A Thread R1½" tapered DIN 2999	.....	•
	B Thread NPT1½" tapered ANSI B1.20.1	.....	•
	C Thread NPT 3" tapered ANSI B1.20.1	.....	•

Solids measurement

pos. 7	Motor for high measurement frequency ⁽¹⁾	
	1	Standard
	2	Brushless motor ⁽²⁾
pos. 8	Sensor weight ^(3,4)	
	Y	without ⁽⁵⁾
	A	PVC without pin only with rope version pos.1 C, max. 80°C
	B	PVC with pin max. 80°C
	C	Stainl. steel
	D	Claw stainless steel
	E	Folding cover max. 80°C, stainless steel, PA canvas
	F	Spider stainless steel
	G	Bag max. 80°C, PA canvas
	H	Float max. 80°C, PP

NB 3..00								← Order code
Position	1	2	3	4	5	6	7	8

All positions are available in special design (use code "Z").

- (1) TR-CU (Ordinary Locations) included
- (2) Motor with increased service life
- (3) For use in Hazardous Locations (Dust Ex): It must be ensured, that no static discharge from the material surface can occur. Sensor weights, which can be used in case of possible static discharge, on request.
- (4) See Sensor weight guide on page 5
- (5) Including mounting set for sensor weight (see page 14: Sensor weights)

Options

pos. 11	x	Guarantee extension to 5 years
		Wear and tear parts rope/tape and standard motor pos. 7 1 not included
pos. 21		Weather protection cover
		For Ex only approved for Zone 22 or Division 2
pos. 23		Measurement range 50m
		Available with tape version pos.1 D, not with sensor weight pos.8 G,H
pos. 25		Window in lid and external start button
pos. 26		Internal heater
		Needed for: ambient temp. <-20°C (-4°F) or condense water inside silo or wet process atmosphere (Note: <-20°C (-4°F) with ATEX, FM Class II or TR-CU possible on request)
pos. 27		Length of socket pipe
		A 500mm (19.7")
		B 1000mm (39.4")
pos. 28		Compressed air connector
		Quick coupling including counter part, for hose diameter 9mm (0,35")
pos. 29		Increased corrosion resistance
		All metal parts on process side coated, rope with plastic coating, use of stainless steel bearings Available with: Rope version (pos.1 C), CE or FM gen.purp. (pos.2 0,M), 80°C (pos.3 A), PVC weight (pos.8 A,B)
pos. 30		Increased process overpressure
		-0.5 to 1.7bar (-7.3 to 25psi) (for CE and ATEX, Pos.2 0,W) -0.5 to 1.1bar (-7.3 to 16psi) (for FM general purpose, pos.2 M)
pos. 31		Cable entry
		Selection of the following options only necessary, if a deviation from the default cable gland / conduit is required:
		0 Screwed cable gland 1x M25x1,5 + 2x M20x1,5 + blindplug 2x M20x1,5
		A Conduit 1x NPT¾" + 2x NPT½" + blindplug 2x NPT½"
pos. 33		Preset fieldbus address (Modbus)
		Enables easy commissioning with Nivotec Level Monitoring System Preset from address = "1" to "amount of ordered units". Address label on enclosure. Termination resistor set on unit with highest address.

Interface measurement (solids in water)

NB 3300

Rope version

For applications with soft/muddy or compact material surface



NB 3400

Tape version

For applications with compact material surface



Implemented

- Internal heater
- Rope / tape roller with rubber coating to avoid slipping
- Plastic coated steel weight (rope version)
- Adjustment possibility for applications with soft/muddy material surface (rope version)

Cable entries (by default)

Depending on selected version (options see pos. 31):

CE, ATEX, Screwed cable gland: 2x M20x1.5 and 1x M25x1.5
 TR-CU Blindplug: 2x M20x1.5

FM Open conduit ANSI B1.20.1: 1x NPT $\frac{3}{4}$ " and 2x NPT $\frac{1}{2}$ "
 Blindplug: 2x NPT $\frac{1}{2}$ "

Dimensions see page 12

Interface measurement (solids in water)

pos. 1	Basic unit	
	E	NB 3300 Rope version (30m) incl. sensor weight
	F	NB 3400 Tape version (40m) incl. sensor weight
pos. 2	Certificate	
	O	CE ⁽¹⁾
	W	ATEX II 1/2 D
	M	FM general purpose
	N	FM Class II, III Div.1 Group E-G
	E	TR-CU Ex ta/tb IIIC T! Da/Db X
pos. 4	Power supply	
	1	98 .. 253V 50-60Hz
	3	20 .. 28V DC
pos. 5	Signal output	
	D	0/4-20mA Modbus Relay counting pulse (5cm 10cm 1/6ft 1/3ft)
	B	0/4-20mA Modbus Electronic counting pulse (1cm 2.5cm 1/20ft 1/10ft)
	E	0/4-20mA Profibus DP Relay counting pulse (5cm 10cm 1/6ft 1/3ft)
pos. 6	Process connection	
	X	Flange DN100 PN16, EN1092-1 and flange 4" 150lbs ANSI B16.5 (unit is fitting to this flange)
pos. 7	Motor for high measurement frequency	
	1	Standard
	2	Brushless motor ⁽²⁾

NB 3..00			A			X		1	← Order code
Basic type	1	2	3	4	5	6	7	8	

All positions are available in special design (use code "Z").

(1) TR-CU (Ordinary Locations) included

(2) Motor with increased service life

Options

pos. 11	x	Warranty extension to 5 years
		Wear and tear parts rope/tape and standard motor pos.7 1 not included
pos. 21		Weather protection cover
		For Ex only approved for Zone 22 or Division 2
pos. 25		Window in lid and external start button
pos. 27		Length of socket pipe
	A	500mm (19.7")
	B	1000mm (39.4")
pos. 28		Compressed air connector
		Quick coupling including counter part, for hose diameter 9mm (0,35")
pos. 29		Increased corrosion resistance
		All metal parts on process side coated, rope with plastic coating, use of stainless steel bearings
		Available with rope version (pos.1 E)
pos. 30		Increased process overpressure
		-0.5 to 1.7bar (-7.3 to 25psi) (for CE, pos.2 0)
		-0.5 to 1.1bar (-7.3 to 16psi) (for FM general purpose, pos.2 M)
pos. 31		Cable entry
		Selection of the following options only necessary, if a deviation from the default cable gland / conduit is required:
	0	Screwed cable gland 1x M25x1,5 + 2x M20x1,5 + blindplug 2x M20x1,5
	A	Conduit 1x NPT 3/4"+ 2x NPT 1/2" + blindplug 2x NPT 1/2"
pos. 33		Preset fieldbus address (Modbus)
		Enables easy commissioning with Nivotec Level Monitoring System.
		Preset from address = "1" to "amount of ordered units". Address label on enclosure.
		Termination resistor set on unit with highest address.

Accessories

Mounting Kit

Bolts, washers and nuts for mounting the unit on a flange

	material	bolts	washers	nuts	
zu107000	stainless steel / A2	4 pieces M16x60	8 pieces	4 pieces •

Flange sealings

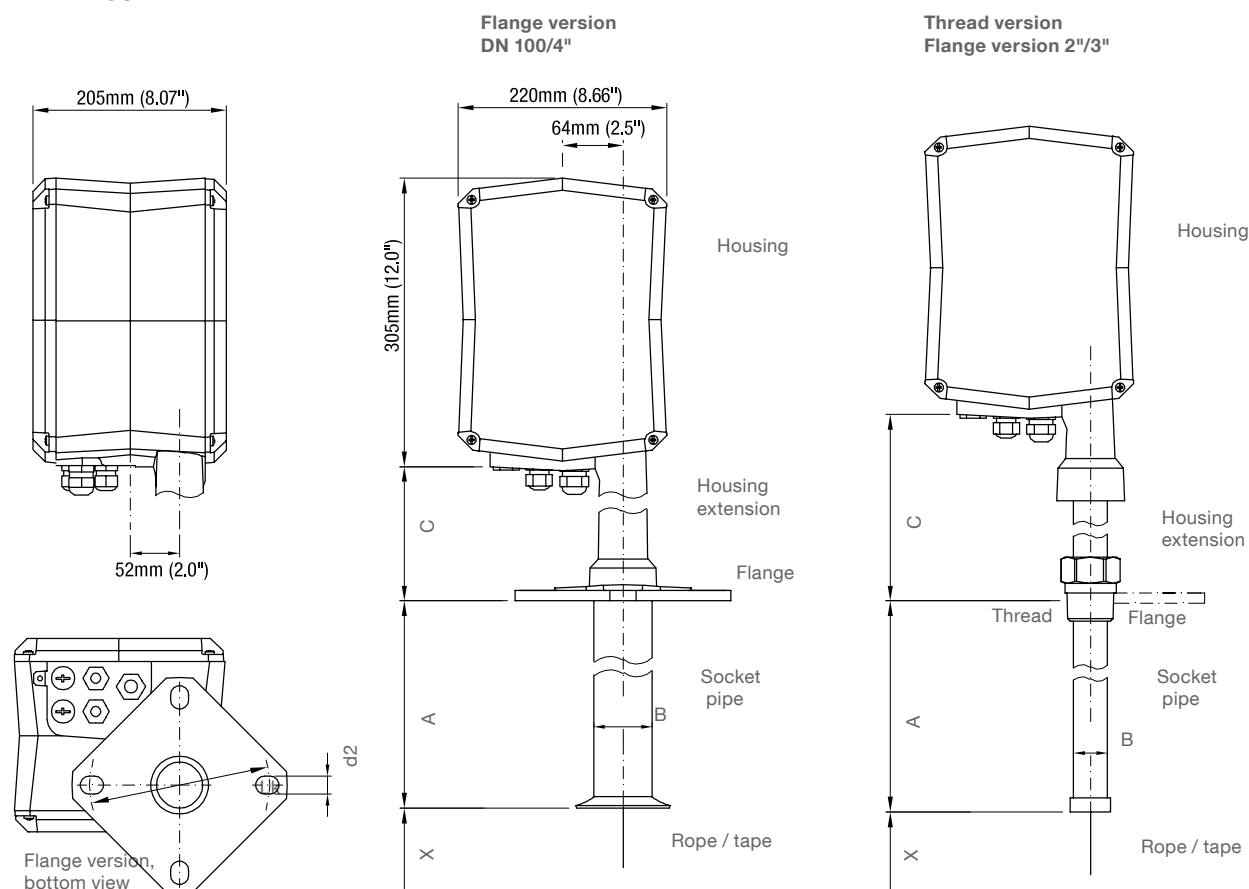
Sealings for mounting the unit on a flange.

Material: neoprene (85°C), temperature resistive plastic AFM30 (250°C)

	suitable for flanges	max. temp.	suitable mounting kit	
di300125	DN100 PN16 / 4"	+85°C (185°F)	zu107000 •
di300108	DN100 PN16 / 4"	+250°C (482°F)	zu107000 •
di300127	2" / 3" 150lbs	+85°C (185°F)	zu107000 •
di300128	2" / 3" 150lbs	+250°C (482°F)	zu107000 •

Dimensions

Basic type



Dimensions

X = Length to bottom of sensor weight
(in upper stop position): see next page

A = Length of socket pipe

200mm (7.9")
Optional 500mm (19.7") / 1000mm (39.4")

B = Diameter of socket pipe

Rope version with
Flange DN100 / 4" $\phi 60\text{mm}$ (2.36")

All other versions $\phi 40\text{mm}$ (1.57")

C = Housing extension

Flange version DN 100/4"	80°C / 150°C	95mm (3.74")
	250°C	340mm (13.4")
Other Versions	80°C / 150°C	160mm (6.3")
	250°C	340mm (13.4")

Rope $\phi 1,0\text{mm}$ (0.04")

Tape 12x0.2mm (0.47x0.008")

Flanges

fitting to:
DN100 PN16 / 4" 150lbs Lk = $\phi 180\text{-}190.5\text{mm}$ (7.1-7.5") slot
d2 = $\phi 19\text{mm}$ (0.75")

fitting to:
2" / 3" 150lbs Lk = $\phi 120.7\text{-}152.4\text{mm}$ (4.75-6.0") slot
d2 = $\phi 19\text{mm}$ (0.75")

Materials

Housing outside	Aluminium, powder coated
Housing inside	Aluminium
Housing extension	Aluminium, powder coated or 1.4305 (303)
Flange	80°C / 150°C: Aluminium, powder coated 250°C: 1.4305 (303)
Thread	1.4301 (304)
Socket pipe	Flange version DN 100/4", 80°C / 150°C: Aluminium All other versions: 1.4301 (304)
Rope	1.4401 (316)
Tape	1.4310 (301)

With option "Increased corrosion resistance":

All metal parts in contact with the process are coated.

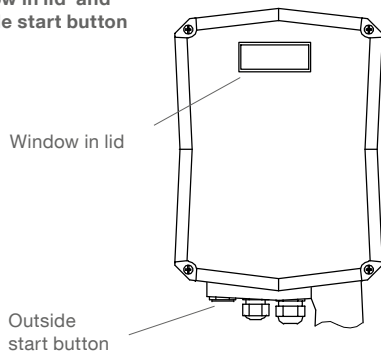
The rope is plastic coated with PA.

The internal bearings are made of stainless steel.

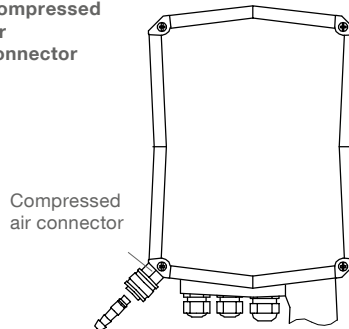
Dimensions

Options and Accessories

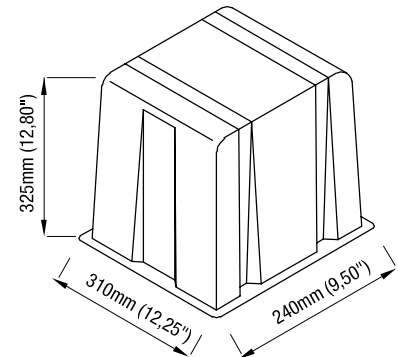
Pos. 25
Window in lid and
outside start button



Pos. 28
Compressed
air
connector



Pos. 21
Weather protection cover

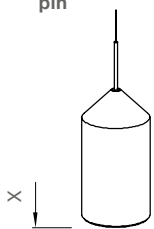


Sensor weights

Solids measurement: Rope version

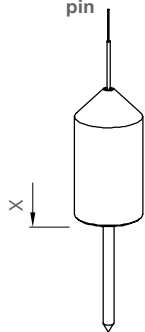
All weights ca. 1,0kg (2.2lbs)

**PVC without
pin**



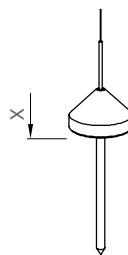
Ø81mm (3,2")
X = 137mm (5,4")
Material: PVC

**PVC with
pin**

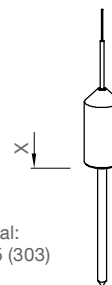


Ø81mm (3,2")
X = 137mm (5,4")
Pin: 130mm (5,1")
Material: PVC (pin POM)

Stainless steel



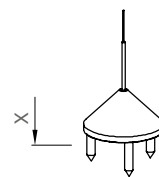
Version with
Flange DN100 / 4"
Ø75mm (3,0")
X = 25mm (1,0")
Pin: 130mm (5,1")



Material:
1.4305 (303)

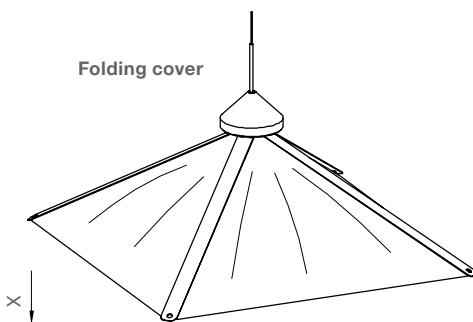
All other versions
Ø42mm (Ø 1,65")
X = 81mm (3,19")
Pin: 130mm (5,1")

Claw



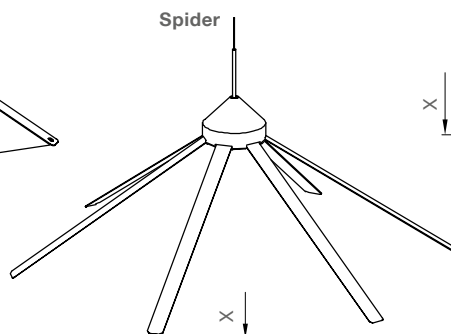
Ø95 (3,7")
X = 71mm (2,80")
Material: 1.4305 (303)

Folding cover



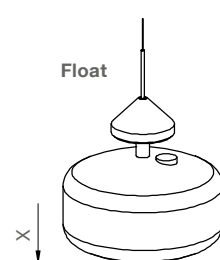
380x380mm (15x15")
X = 150mm (5,9")
Material: 1.4310 (301)/1.4305 (303)
PA canvas

Spider



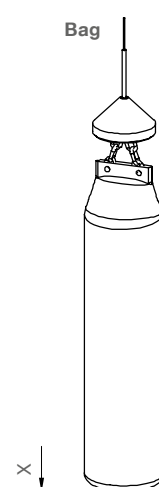
Ø600mm (23,6")
X = 160mm (6,3")
Material: 1.4301 (304)/1.4305 (303)
1.4310 (301)

Float



Ø190mm (7,5")
X = 175mm (6,9")
Material: Float PP,
Cone: aluminium

Bag

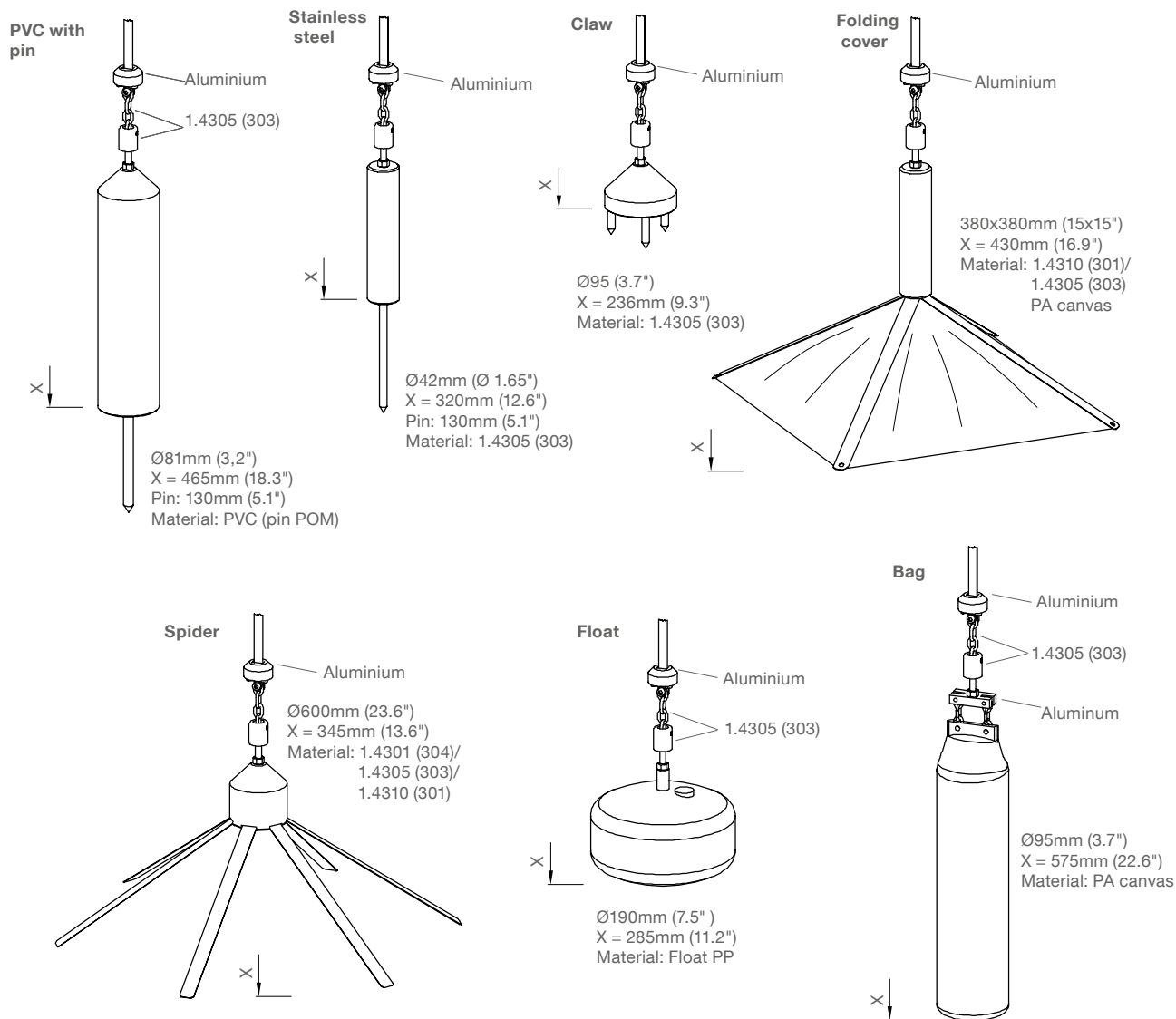


Ø95mm (3,7")
X = 460mm (18,1")
Material: PA canvas,
Chain: 1.4305 (303)
Cone: aluminium

Dimensions

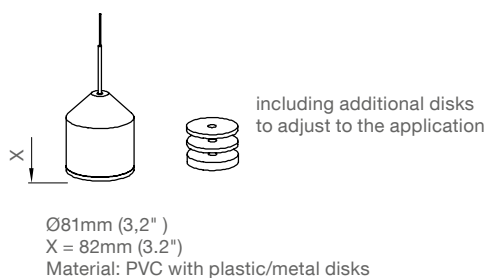
Solids measurement: Tape version

All weights ca. 2.1kg (4.6lbs)



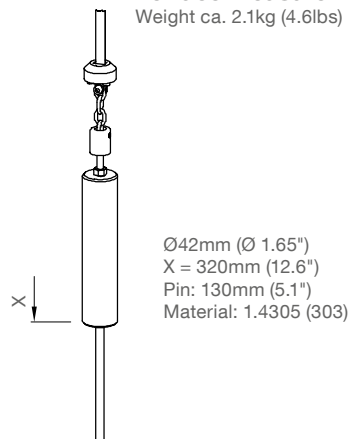
Interface measurement: Rope version

Weight ca. 1,0kg (2.2lbs)



Interface measurement: Tape version

Weight ca. 2.1kg (4.6lbs)



Spare parts

Rope roller

sl102243	Rope roller with 30m rope (13mm* rope chamber) Process temperature max. 80°C	•
sl102240	Rope roller with 30m rope (33mm* rope chamber) Process temperature max. 80°C	•
sl102242	Rope roller with 30m rope for increased corrosion resistance (plastic coated)	•

*For safe function 13mm and 33mm rope chamber must be substituted only by the same type

Tape roller

sb102240	Tape roller with 40m tape	•
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Sensor weights

All sensor weights are delivered incl. mounting set for proper fixing to the rope/tape and excl. rope/tape

Solid measurement

sl102220	Sensor weight for rope	PVC without pin	•
sl102221	Sensor weight for rope	PVC with pin	•
sl102222	Sensor weight for rope	Stainless steel Ø75mm (3,0")	•
sl102228	Sensor weight for rope	Stainless steel Ø42mm (1,65")	•
sl102223	Sensor weight for tape	Claw	•
sl102224	Sensor weight for rope	Folding cover	•
sl102225	Sensor weight for rope	Spider	•
sl102226	Sensor weight for rope	Bag	•
sl102227	Sensor weight for rope	Float	•
sb102221	Sensor weight for tape 40m	PVC with pin	•
sb102222	Sensor weight for tape 40m	Stainless steel	•
sb102223	Sensor weight for tape 40m	Claw	•
sb102224	Sensor weight for tape 40m	Folding cover	•
sb102225	Sensor weight for tape 40m	Spider	•
sb102226	Sensor weight for tape 40m	Bag	•
sb102227	Sensor weight for tape 40m	Float	•

Interface measurement

sl102230	Sensor weight for rope	PVC with metal core	•
sb102230	Sensor weight for tape	Stainless steel	•

Mounting set without sensor weights

sl100270	For rope version 80°C	•
zu108030	For tape version	•

Motor

gm102202	Motor standard version	•
gm102211	Motor brushless version	•

Electronics

pl102691	Electronics	98 .. 253V 50-60Hz	0/4-20mA	Modbus	Relay counting pulse (5cm 10cm 1/6ft 1/3ft)	•
pl102690	Electronics	98 .. 253V 50-60Hz	0/4-20mA	Modbus	Electr. counting pulse (1cm 2.5cm 1/20ft ..1/10ft)	•
pl102692	Electronics	98 .. 253V 50-60Hz	0/4-20mA	Profibus DP	Relay counting pulse (5cm 10cm 1/6ft 1/3ft)	•
pl102696	Electronics	20 .. 28V DC	0/4-20mA	Modbus	Relay counting pulse (5cm 10cm 1/6ft 1/3ft)	•
pl102695	Electronics	20 .. 28V DC	0/4-20mA	Modbus	Electr. counting pulse (1cm 2.5cm 1/20ft 1/10ft) ...	•
pl102697	Electronics	20 .. 28V DC	0/4-20mA	Profibus DP	Relay counting pulse (5cm 10cm 1/6ft 1/3ft)	•

Required information: Rope or Tape version. Evt. further menu presets.

Internal Heater

em100372	220 Ohms	For power supply 98 .. 253V 50-60Hz	•
em100371	8 Ohms	For power supply 20 .. 28V DC	•

Weather protection cover

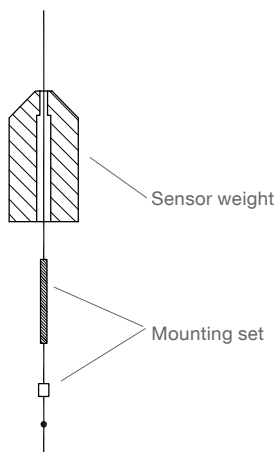
zu400215	•
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Spare parts

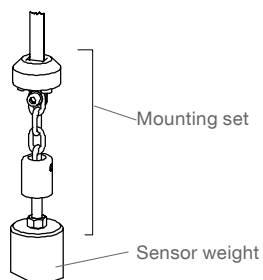
Sensor weights/ Mounting set

All sensor weights are delivered including stated parts for proper fixing to the rope / tape

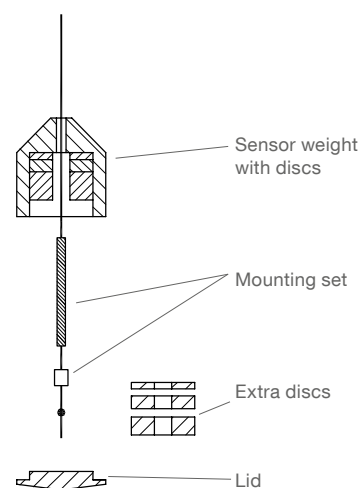
Solids measurement: rope version



Solids measurement: tape version Interface measurement: tape version

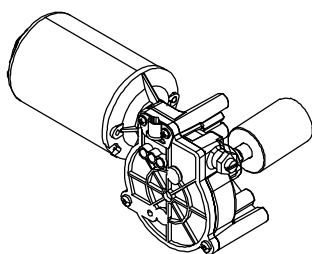


Interface measurement: rope version

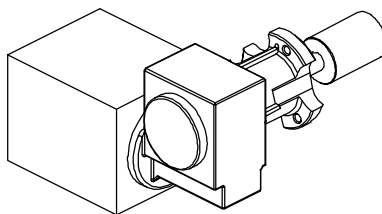


Motor

Standard

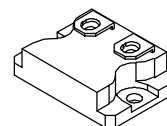


Brushless motor



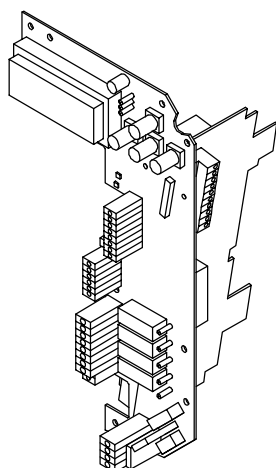
Delivery including: cable, plug, sealing, mounting tools

Heater

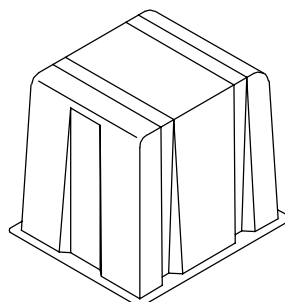


Delivery including cable and plug

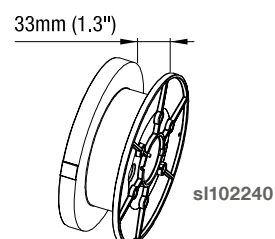
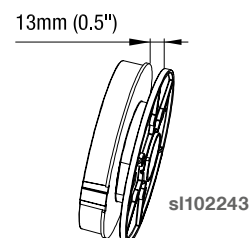
Electronics



Weather protection cover

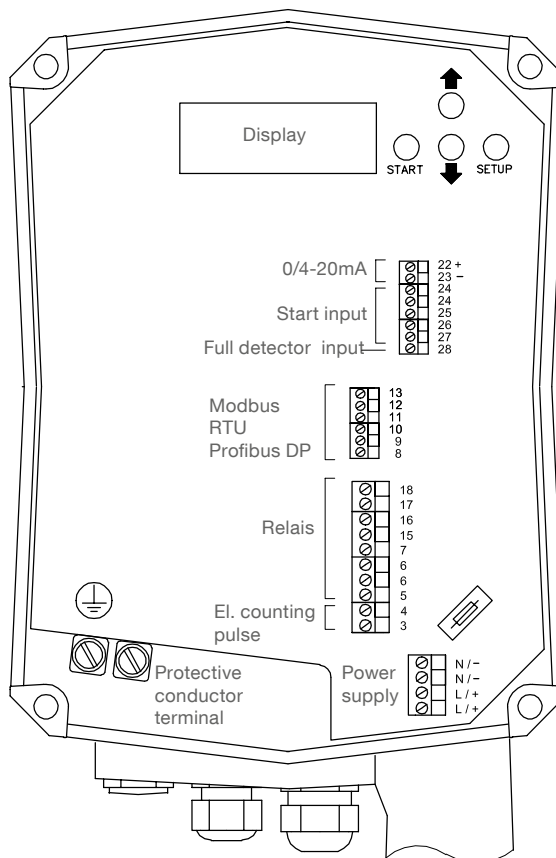


Rope roller



Electrical installation

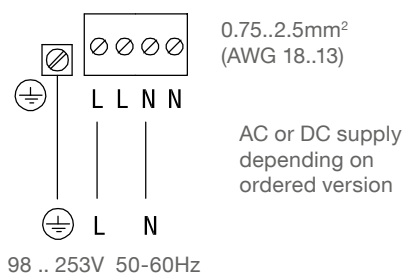
Terminal location



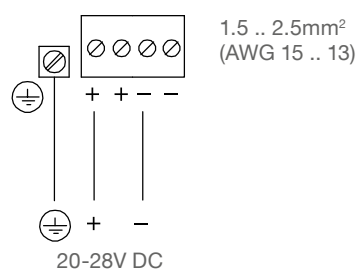
Power supply and Signal input /output

Power supply

AC version

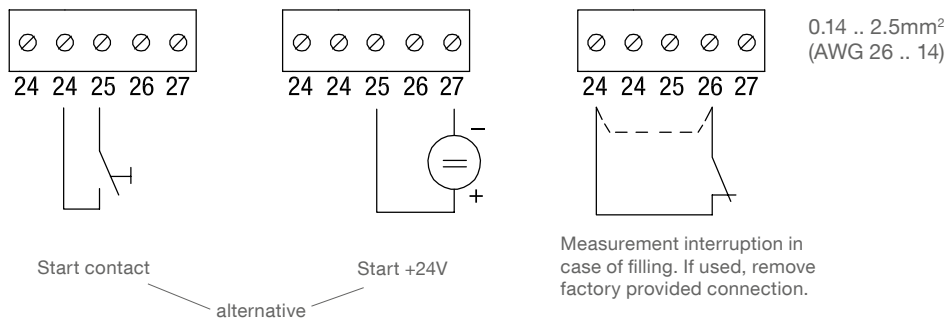


DC version



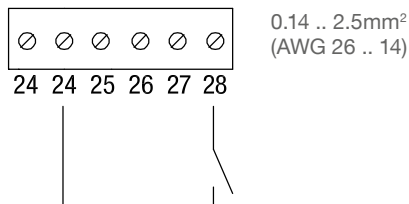
Signal input:

Start of measurement

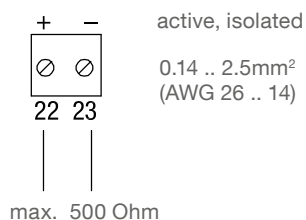


Electrical installation

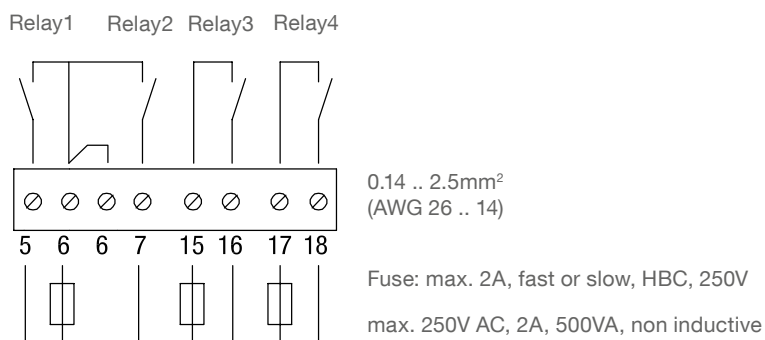
Signal input:
Full detector



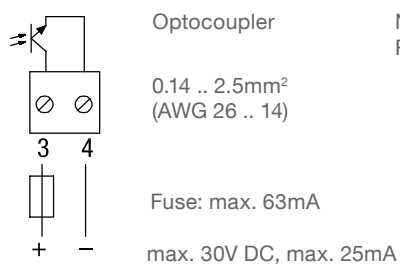
Signal output:
0/4-20mA



Signal output:
Relay



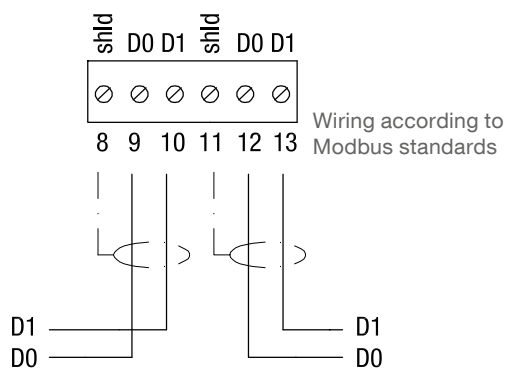
Signal output:
Electronic counting pulse



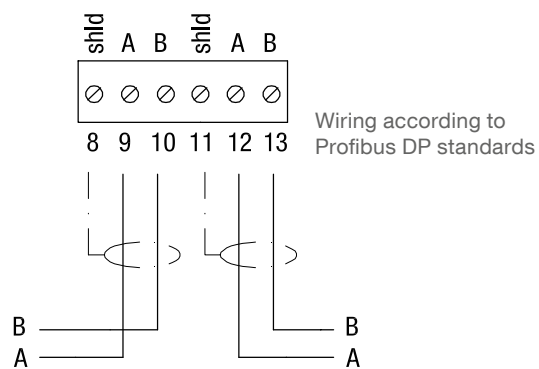
Note:
Reset pulse is done with Relay 2

Electrical installation

Modbus network



Profibus DP network





Nivobob[®] 4000

Microprocessor controlled level measuring system

Cost-effective level measurement system for reliable level monitoring in bulk goods - for different materials; also for use in hazardous locations



Nivobob® 4000



- Sensational cost/performance ratio
- Unaffected by material properties such as conductivity, dust, di-electricity
- Easy installation - also for direct mounting on an inclined silo roof
- Maintenance free

Application: Nivobob® 4000 is used in many various bulk goods. It is particularly suitable for the building, animal feed and grain industry.

Types of Nivobob® flanges for level measurement:

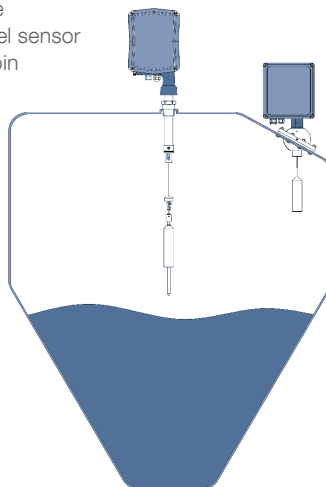
NB 4100
Rope version
DN 100 flange
PVC sensor
weight



NB 4200
Tape version
Thread connection
Stainless steel
sensor weight



NB 4100
Rope version
Aiming flange
Stainless steel sensor
weight with pin



Technical Data	
Type	NB 4100 / NB 4200 (rope / tape version)
Housing	Aluminium IP 66 (Type 4)
Pressure	Max. +0.2 bar (+3.0 psi)
Supply voltage	AC version: 230V or 115V 50-60Hz DC version: 20...28V
Measuring range	Max. 30m
Signal output/ Communication	4-20mA; relay for counting pulse; Modbus; Upper stop position, error
Approvals	CE; ATEX II 1/2 D; TR-CU; FM General Purpose and FM Cl. II, III, Div. 1
Process temperature range	-40°C up to +80°C (-40°F up to +176°F)
Sensitivity	From 20g/l (1.2lb/ft³) dep. on sensor weight
Process connection	Flange DN 100 PN16 Flange 4" 150lbs Flange 2" and 3" 150lbs Flange R 1 ½" Thread NPT 1 ½" Thread NPT 3" (adapter) Aiming flange 0° - 50°

Interior view	
Rope/tape chamber	Electronic chamber
Sensor weights	Aiming flange

Table of contents

	Page
Overview	2

Specification / application	3

NB 4000	4

Options / Accessories	6

Dimensions / materials	7

Spare parts	9

Electrical installation	11

Subject to change.

All dimensions in mm (inches).

All prices in Euro, excluding VAT.

All prices are EXW Betzigau, excluding packaging costs.

Valid: From 01.04.2017 until 31.03.2018, unless otherwise agreed.

By publishing this selection list all other lists become invalid.

We assume no liability for typing errors.

Different variations to those specified are possible.
Please contact our technical consultants.

Overview

Features

Continuous level measurement of solids applications

Process

- Independent of bulk material properties
- Accurate measurement

Service

- Simple installation and commissioning
- Rope and tape version with long service life
- Low maintenance

Approvals

- Approval for use in Hazardous Areas
- 2011/65/EU RoHS conform

Mechanics

- Measurement range up to 30m (100ft)
- 1 1/2" process connection possible
- Aiming flange to be mounted directly on a flat silo roof
- Internal tape cleaner for difficult materials

Electronics

- Micro processor controlled measurement
- Diagnostic possibilities
- Output 4-20mA/ Modbus
- Two programmable Relay
(can be used as Counting/reset pulse output
or as Failure / Upper stop position)



NB 4100

Rope version

Fig. with flange DN 100
and PVC sensor weight



NB 4200

Tape version

Fig. with thread connection
and stainless steel sensor
weight



NB 4100

Rope version

Fig. with aiming flange and
stainless steel sensor weight
with pin

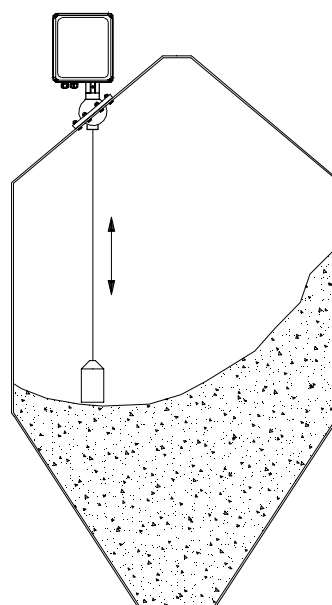
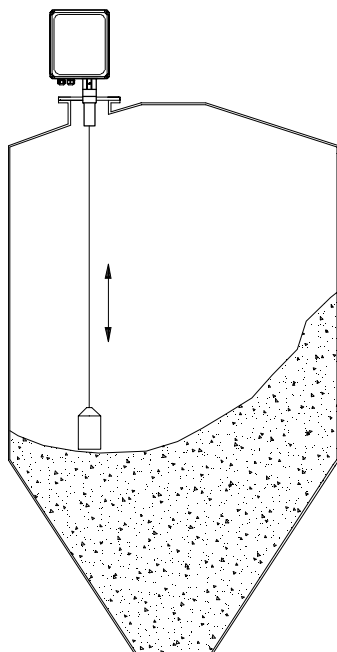
Specification / application

Specification

Process	Measurement range	15m (50ft) or 30m (100ft)
	Process temperature	80°C (176°F)
	Process overpressure	-0,2 .. +0,2 bar (-3.0 .. + 3.0 psi)
	Min. powder density	>300 g/l (18 lb/ft³)
Electronics	Power supply	AC version 115V or 230V 50-60Hz DC version 20 .. 28V
	Output	4-20mA
		2 relais (optional)
		Modbus RTU
Approvals	Dust Ex	ATEX 1/2D
		FM Cl. II, III Div. 1, TR-CU
	Ordinary Location	CE, FM, TR-CU

Application

Solids measurement



Aiming flange
screwed directly
to the silo roof

NB 4000

NB 4100

Rope version
(fig. with flange DN 100
and PVC sensor weight)



NB 4200

Tape version
(fig. with thread connection
and stainless steel sensor
weight)



Cable entries (by default)

Depending on selected version (options see pos. 26):

CE, ATEX,	Screwed cable gland:	1x M25x1.5 and 1x M20x1.5
TR-CU	Blindplug:	1x M25x1.5 and 1x M20x1.5

FM	Open conduit ANSI B1.20.1:	1x NPT 3/4" and 1x NPT 1/2"
	Blindplug:	1x NPT 3/4" and 1x NPT 1/2"

Dimensions see page 7

NB 4000

pos. 1	Basic type		
	C	NB 4100 Rope version	•
	D	NB 4200 Tape version	•
pos. 2	Certificate		
	0	CE ⁽¹⁾	•
	W	ATEX II 1/2 D	•
	M	FM general purpose	•
	N	FM Class II, III Div.1 Group E-G	•
	E	TR-CU Ex ta/tb IIIC T! Da/Db X	•
pos. 3	Measurement range		
	1	15m (50ft)	•
	2	30m (100ft)	•
pos. 4	Power supply/ Signal output		
	1	230V 50-60Hz 4-20mA	•
	4	230V 50-60Hz Modbus	•
	2	115V 50-60Hz 4-20mA	•
	5	115V 50-60Hz Modbus	•
	3	20 .. 28V DC 4-20mA	•
pos. 5	Process connection		
	A	Thread R1½" tapered DIN 2999	•
	B	Thread NPT1½" tapered ANSI B1.20.1	•
	X	Flange DN100 PN16 (EN1092-1) and flange 4" 150lbs ANSI B16.5 (unit is fitting to this flange)	•
	Y	Flange 2" and flange 3" 150lbs ANSI B16.5 (unit is fitting to this flange)	•
	W	Aiming flange (to be mounted directly to the silo roof) ⁽⁵⁾	•
pos. 6	Sensor weight ⁽²⁾		
	Y	without ⁽³⁾	•
	A	PVC ⁽⁴⁾	•
	C	Stainless steel	•
	E	Folding cover	•

Basic type

NB 4..00						
Position	1	2	3	4	5	6

← **Order code**

All positions are available in special design (use code "Z").

⁽¹⁾ TR-CU (Ordinary Locations) included

⁽²⁾ For use in Hazardous Locations (Dust Ex): It must be ensured, that no static discharge from the material surface can occur. Sensor weights, which can be used in case of possible static discharge, on request.

⁽³⁾ Only for tape version. Including mounting set for sensor weight (see page 9: Sensor weights)

⁽⁴⁾ Does not fit through a 1½" nozzle, must be mounted after fixing the unit to the silo

⁽⁵⁾ Mounting without a socket. Including fixing material (screws, sealing etc.)

Options / Accessories

Options

pos. 11	x	Guarantee extension to 5 years	•
		Wear and tear parts rope/tape and motor not included	
pos. 21		Weather protection cover	•
		For Ex only approved for Zone 22 or Division 2	
pos. 22		Internal heater	•
		Needed for: ambient temp. <-20°C (-4°F) or condense water inside silo or wet process atmosphere (Note: <-20°C (-4°F) with ATEX, FM Class II or TR-CU on request possible)	
pos. 23		Length of socket pipe	
	1	200mm (7.87")	•
	2	500mm (19.7")	•
	3	1000mm (39.4")	•
pos. 24		Pin for sensor weight	•
		POM or stainless steel (in accordance to selected sensor weight material, not for pos.6 E)	
pos. 25		Relais output	•
		Two relais (possible indication; Failure, reset pulse, counting pulse, upper stop position) Nicht für Modbus (Pos. 4 4,5)	
pos. 26		Cable entry	
		Selection of the following options only necessary, if a deviation from the default cable gland / conduit is required:	
	0	Screwed cable gland 1x M25x1,5 + 1x M20x1,5 + blindplug 1x M25x1,5 + 1x M20x1,5	•
	A	Conduit 1x NPT 3/4" + 1x NPT 1/2" + blindplug 1x NPT 3/4" + 1x NPT 1/2"	•
pos. 27		Preset fieldbus address (Modbus)	•
		Enables easy commissioning with Nivotec Level Monitoring System.	•
		Preset from address = "1" to "amount of ordered units". Address label on enclosure.	•
		Termination resistor set on unit with highest address.	•

Accessories

Fixing material for mounting the unit on a flange

zu107000	4 bolts M16x60, 8 washers, 4 nuts. Stainless steel.	•
----------	--	---

Sealings for mounting the unit on a flange

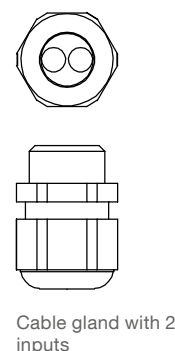
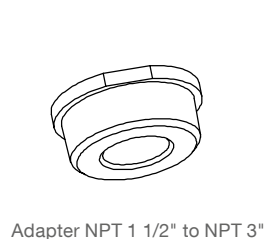
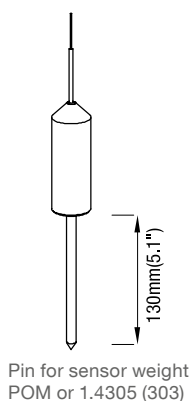
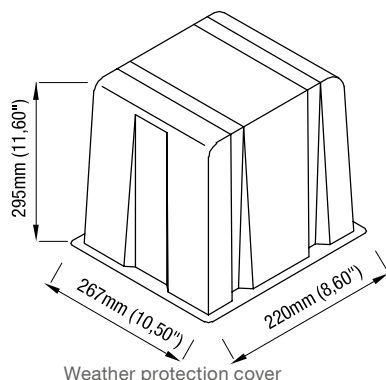
di300125	Flange sealing for DN100 PN16 / 4" (neoprene)	•
di300127	Flange sealing for 2" / 3" 150lbs (neoprene)	•

Adapter NPT 1 1/2" to NPT 3"

zu103100	Thread tapered ANSI B1.20.1, aluminium	•
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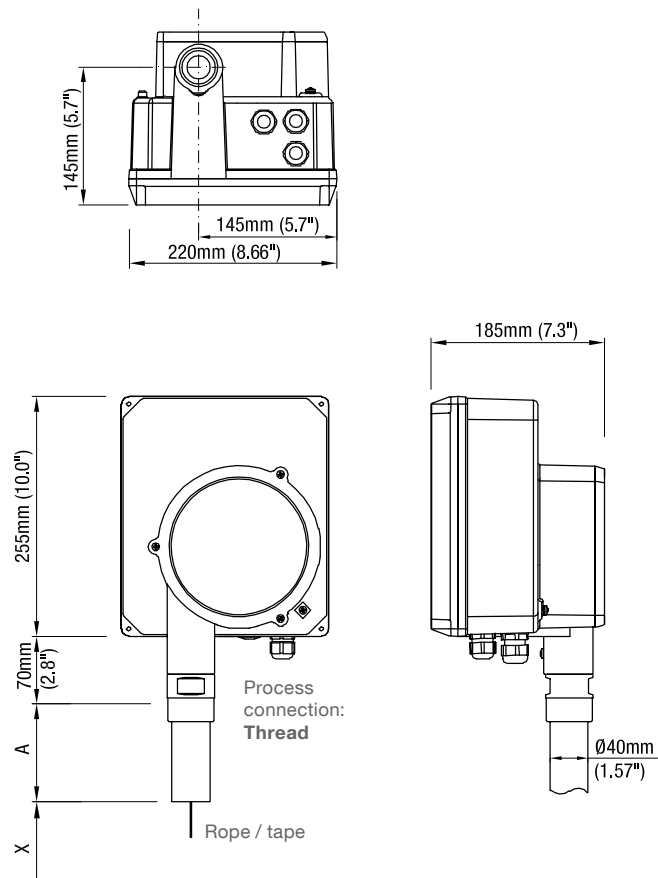
Cable gland

em400589	Cable gland with 2 inputs. M25x1,5, clamping range 2x4,5-7mm, -20 .. +70°C	•
em400573	Cable gland, M20x1,5, clamping range 6-12mm, -40 .. +70°C.	•

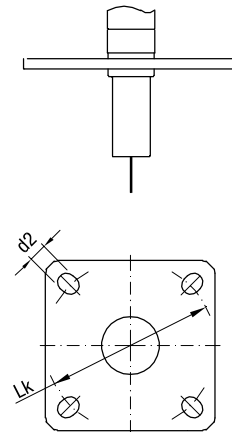


Dimensions and materials

Basic unit

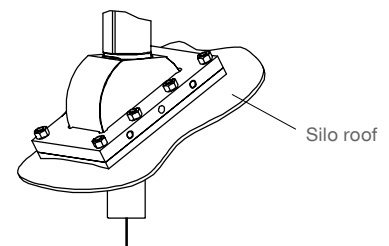


Process connection: **Flange**



Process connection: **Aiming flange**

To be screwed directly to the silo roof
0°-50° adjustable
Including screws, nuts and sealing



Flange plate outside dimensions:
Width x Height: 120mm x 180mm (4.7"x7.1")

Dimensions

X = Length to bottom of sensor weight (in upper stop position, see next page)	
A = Length of socket pipe 100mm (3.9") Optional 200mm (7.9") / 500mm (19.7") / 1000mm (39.4")	
Flanges	
fitting to: DN100 PN16 / 4" 150lbs	Lk = Ø180-190.5mm (7.1-7.5") slot d2 = Ø19mm (0.75")
fitting to: 2" / 3" 150lbs	Lk = Ø120.7-152.4mm (4.75-6.0") slot d2 = Ø19mm (0.75")
Rope	Ø1,0mm (0.04")
Tape	12x0.2mm (0.47x0.008")

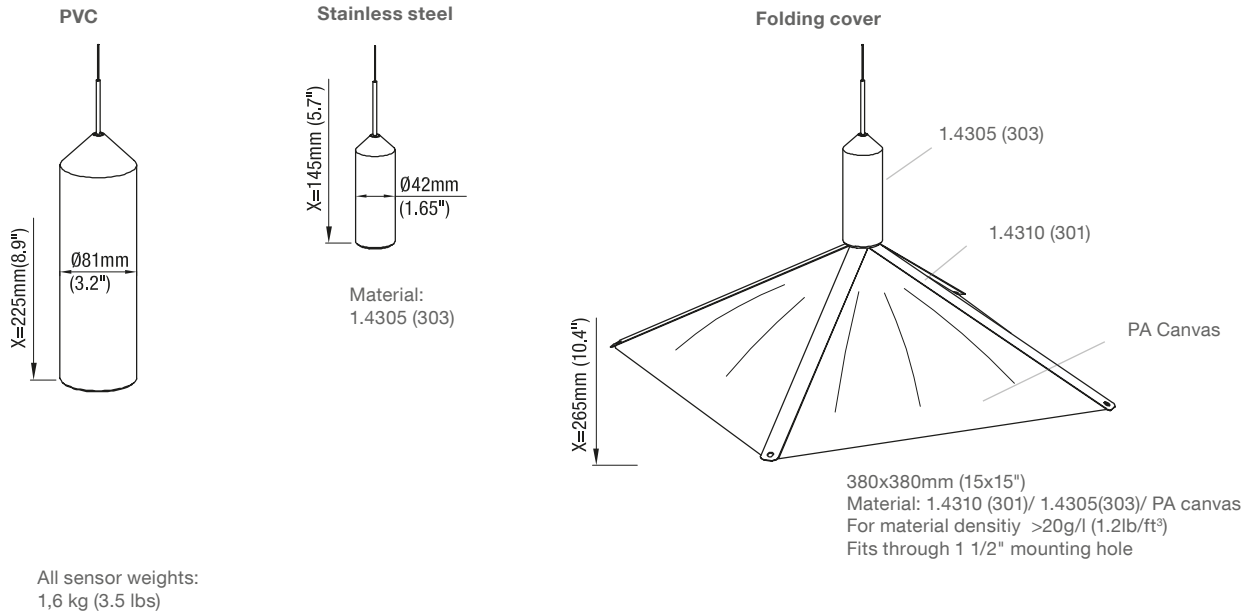
Materials

Housing outside	Aluminium, powder coated
Housing inside	Aluminium
Thread / Flange	Aluminium
Aiming flange	Aluminium / 1.4301 (301)
Rope	1.4401 (316)
Tape	1.4310 (301)

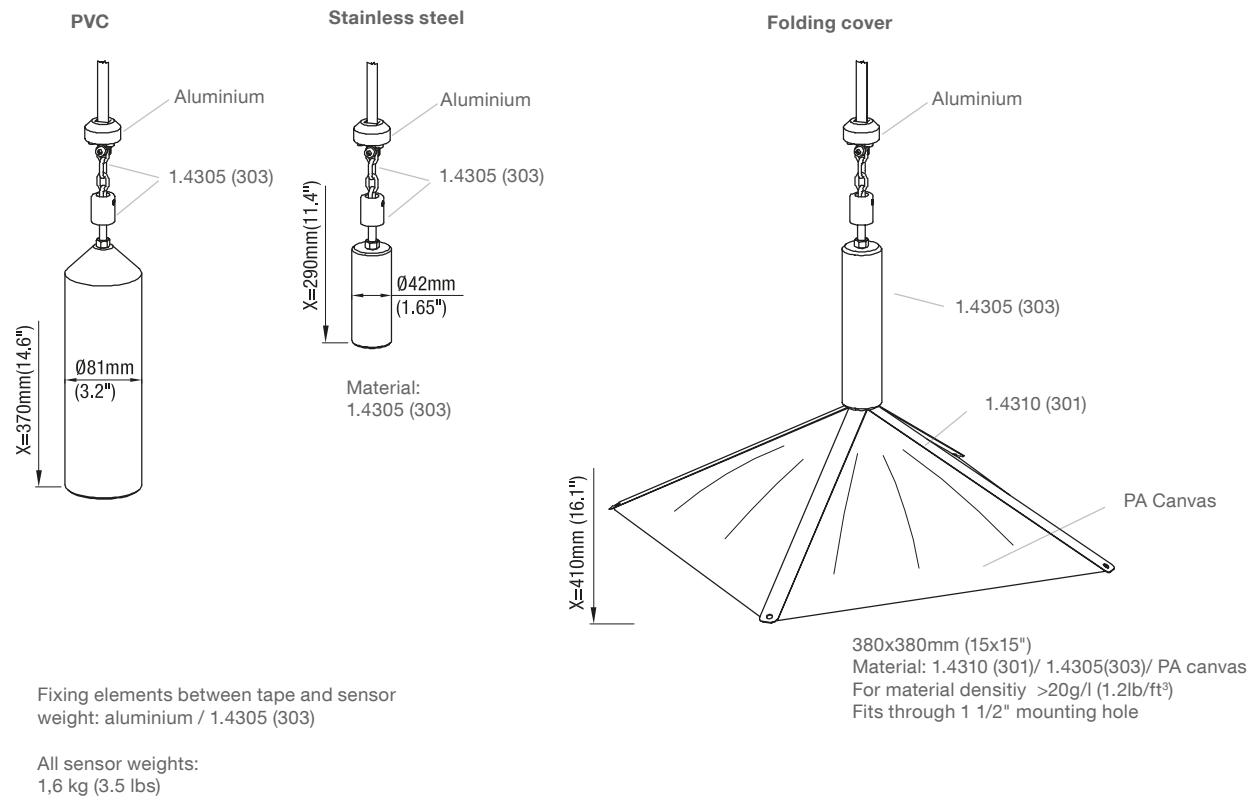
Dimensions and materials

Sensor weights

Rope version



Tape version



Spare parts

Roller

sl103239	Rope roller with 15m rope	.....	•
sl103240	Rope roller with 30m rope	.....	•
sb103239	Tape roller with 15m tape	.....	•
sb103240	Tape roller with 30m tape	.....	•

Sensor weights

All sensor weights are delivered incl. mounting parts for proper fixing to the rope/tape and excl. rope/tape

For rope version:

sl103231	PVC without pin	.....	•
sl103232	PVC with pin	.....	•
sl103233	Stainless steel without pin	.....	•
sl103234	Stainless steel with pin	.....	•
sl103235	Folding cover	.....	•

For tape version:

sb103231	PVC without pin	.....	•
sb103232	PVC with pin	.....	•
sb103233	Stainless steel without pin	.....	•
sb103234	Stainless steel with pin	.....	•
sb103235	Folding cover	.....	•

Mounting set without sensor weight

sl100280	For rope version	.....	•
zu108030	For tape version	.....	•

Motor

gm103202	Motor	•
-----------------	-------	-------	---

Electronics

pl103690	230V 50-60Hz	4-20mA	without 2 Relais ⁽¹⁾	•
pl103691	230V 50-60Hz	4-20mA	with 2 Relais ⁽¹⁾	•
pl103696	230V 50-60Hz	Modbus	without 2 Relais ⁽¹⁾	•
pl103692	115V 50-60Hz	4-20mA	without 2 Relais	.....	•
pl103693	115V 50-60Hz	4-20mA	with 2 Relais ⁽¹⁾	•
pl103697	115V 50-60Hz	Modbus	without 2 Relais ⁽¹⁾	•
pl103694	20 .. 28V DC	4-20mA	without 2 Relais ⁽¹⁾	•
pl103695	20 .. 28V DC	4-20mA	with 2 Relais ⁽¹⁾	•

Required information: Rope or Tape version; measuring range 15m or 30m; evt. further menue presetsings.

Internal Heater ⁽²⁾

em100373	680 Ohms	For power supply 230V 50-60Hz	.....	•
em100374	220 Ohms	For power supply 115V 50-60Hz	.....	•
em100375	8,2 Ohms	For power supply 20 .. 28V DC	.....	•

Weather protection cover

zu400217	•
-----------------	-------	---

⁽¹⁾ Implements the electronic components needed to control the Internal Heater (needed for option pos.22)

⁽²⁾ Used for replacement for already mounted heater.

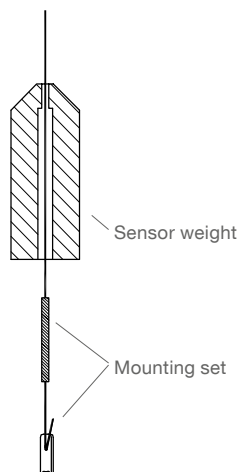
In case of re-fitting the Internal Heater, the electronics must include components for the Internal Heater Control (please contact factory).

Spare parts

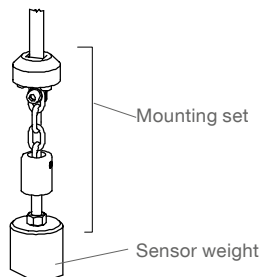
Sensor weights/ Mounting set

All sensor weights are delivered including stated parts for proper fixing to the rope / tape

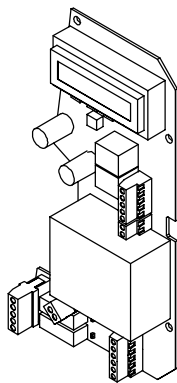
Rope version



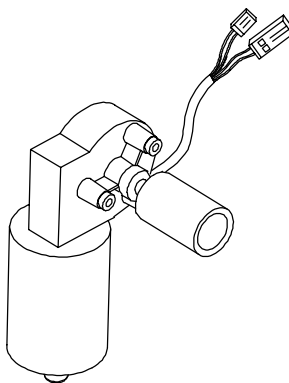
Tape version



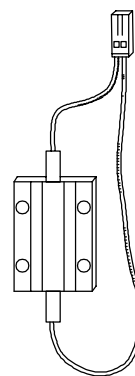
Electronics



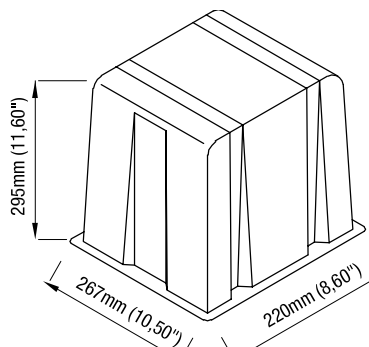
Motor



Internal heater



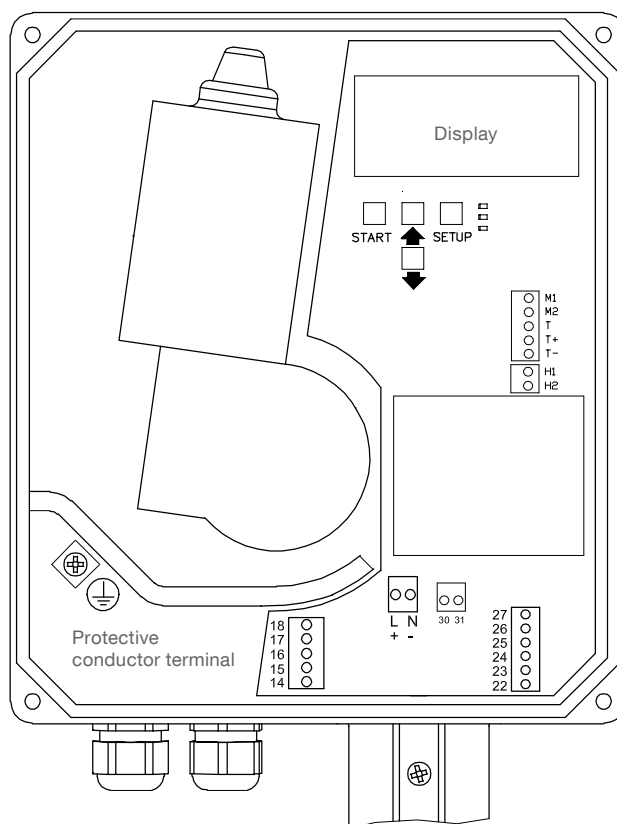
Weather protection cover



Electrical installation

Version 4-20mA

Terminal location



Internal terminals for
motor and heater

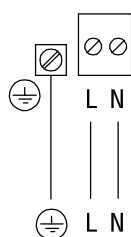
Terminals for:

- Power supply
- Signal input:
 - Start of measurement
 - Measurement interruption
- Signal output:
 - 4-20mA
 - Relais

Note: Terminal 30 and 31 not used

Power supply

AC version

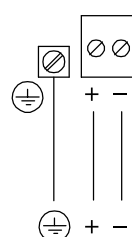


0.75 .. 2.5mm²
(AWG 18 .. 13)

AC or DC supply
depending on
ordered version

230V or 115V 50-60Hz

DC version



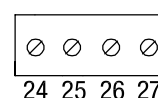
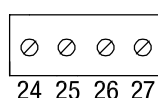
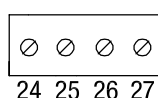
1.5 .. 2.5mm²
(AWG 15 .. 13)

20-28V DC

Signal input:

Start of measurement

Measurement inter- ruption



0.14 .. 2.5mm²
(AWG 26 .. 14)

Start contact

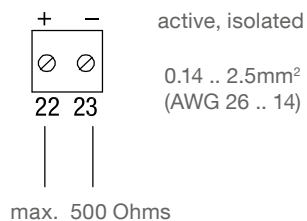
Start +24V

alternative

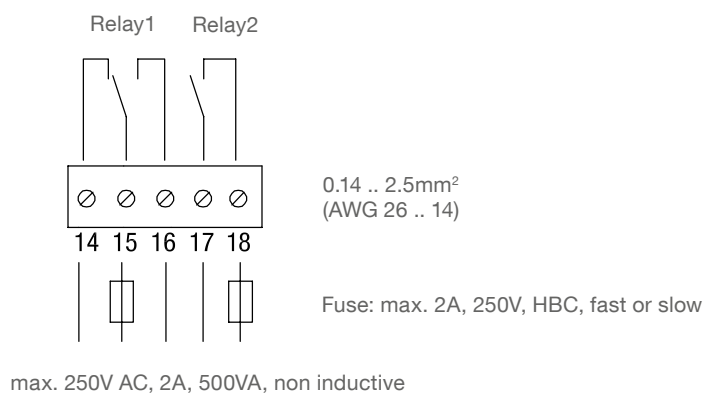
Measurement interruption in
case of filling. If used, remove
factory provided connection.

Electrical installation

Signal output:
4-20mA

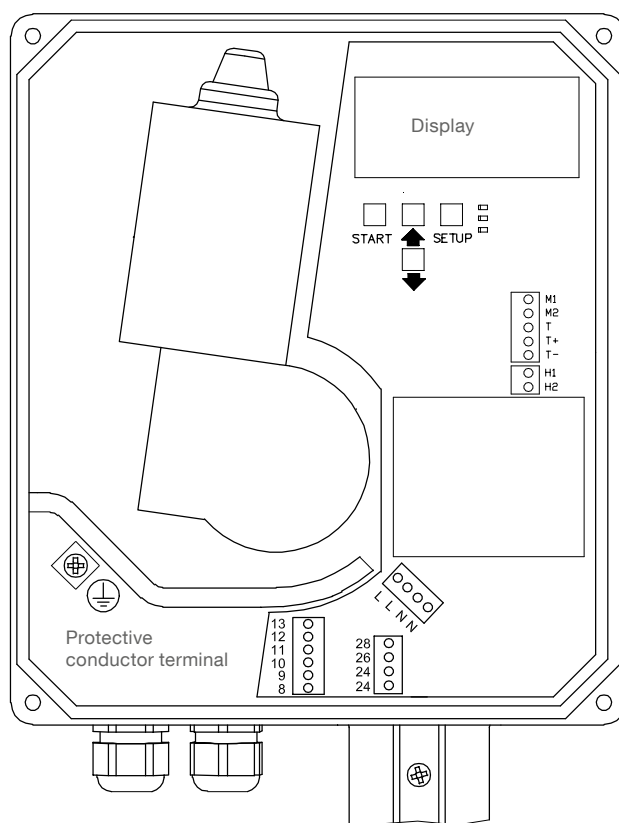


Signal output:
Relais
(optional)



Version Modbus

Terminal location



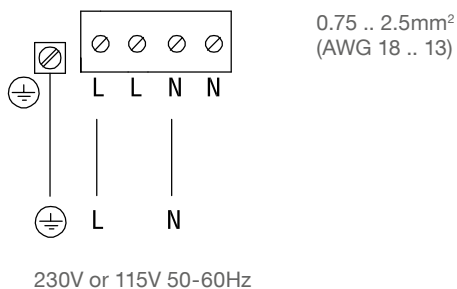
Internal terminals for
motor and heater

Terminals for:

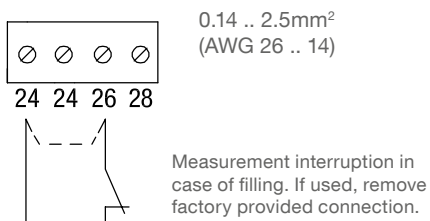
- Power supply
- Signal input:
Measurement interruption
- Signal output:
Modbus

Electrical installation

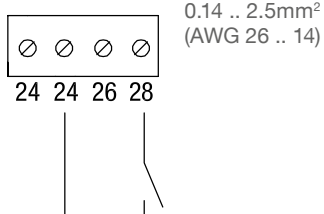
Power supply



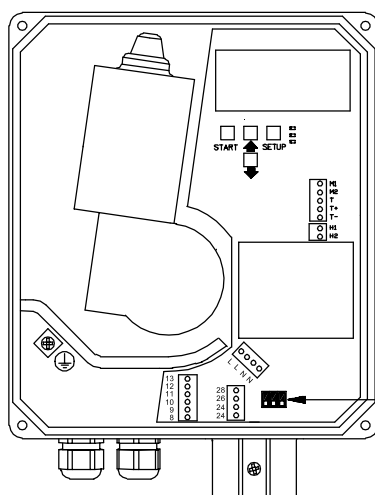
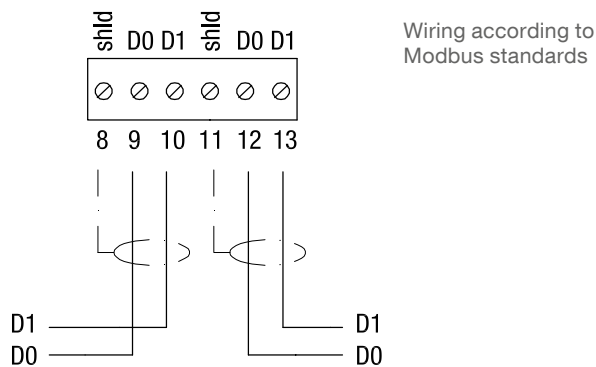
Signal input: Measurement inter- ruption



Signal input: Full detector



Modbus network



Setting Biasing and Termination Resistor

For use of NB 4000 units in a external Modbus network, it is possible to set Biasing and Termination Resistor on each unit as required.

Biasing	OFF*	OFF	ON	ON
Termination Resistor	OFF*	ON	OFF	ON



DIP Switch position:

Top view Side view



NivoRadar[®] 3000

Radar level transmitter

The multifunctional FMCW radar level transmitter for continuous monitoring of solids and liquids with two-wire technology – total reliability, even within difficult media. Certified for hazardous locations.

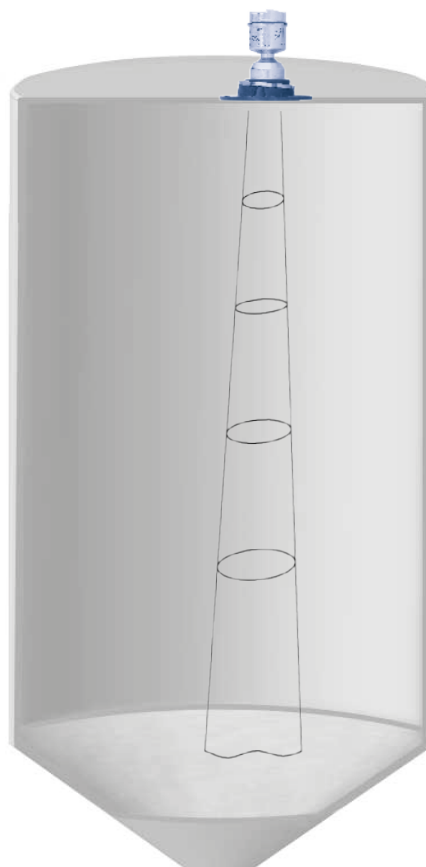


NivoRadar® 3000



- 78GHz Technology
- 4° beam angle
- Measuring range up to 100m
- High precision measurement
- Easy to install and setup
- Process temperature up to 200°C
- Lens antenna and mounting flange are flush
- Integrated lens cleaner
- Simple, six-step commissioning

Application: The robust stainless steel construction makes the NR 3000 extremely suitable for all kinds of industrial applications. The unit operates at a high frequency of 78 GHz thus achieving a very small beam angle which eliminates any signal interference at the flange but allows optimum reflection of the bulk solids material. The aiming flanges can be adjusted to ensure a perfect positioning of the NR 3000, ie the angle of the beam can be set to a specific point, for example the outlet of the silo. The lens antenna is highly resistant to material deposits and offers a self-clean function for extremely sticky solids using an air flush connection. The plug in display allows programming and diagnostics on-site making the installation and operation of the unit as easy as child's play.

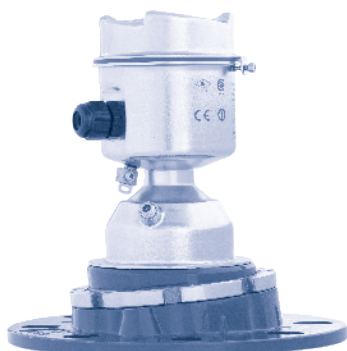


Non-contact level switch

Flat flange



Aiming flange



Technical Detail

Housing	Stainless steel 1.4404 IP 68 (316L)
Measuring range/ tolerance	40m or 100m ±0.25%
Preasure range	3bar g (40 psi g) max.
Supply voltage	24 V DC (max. DC 30 V)
Process connection	Flat flange stainless steel 316L 80-150mm (3" - 6"), aiming flange aluminium diecast 80-150mm (3" - 6")
Process temperature range	-40°C up to +200°C
Signal output	4...20mA, 2-conductor
Communication	HART
Sensitivity	From DK value 1.6
Material lens antenna	PEI, PEEK
Frequency	78-79GHz FMCW

Table of contents

	Page
Overview	2
-----	-----
Specification	3
-----	-----
NR 3100	4
-----	-----
Accessories	6
-----	-----
Dimensions	7
-----	-----
Electrical installation	9
-----	-----
Spare parts	10

Subject to change.

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Different variations to those specified are possible.
Please contact our technical consultants.

Overview

Features

Continuous level measurement of solids and liquids applications with 78GHz FMCW radar

Measurement range

- Up to 100m (329 ft)

Mechanic

- Lens antenna and flange for quick and easy positioning
- Stainless steel housing
- Plane flanges and Easy aimer flanges

Service

- Plug and play system, simple installation and commissioning
- Configuration with only 6 parameters on display with push buttons
- Alternative configuration via HART possible.

Approvals

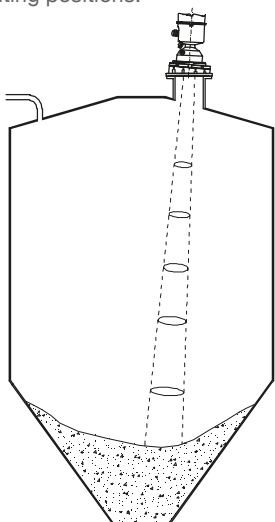
- Approval for use in Hazardous Locations
- 2011/65/EU RoHS conform



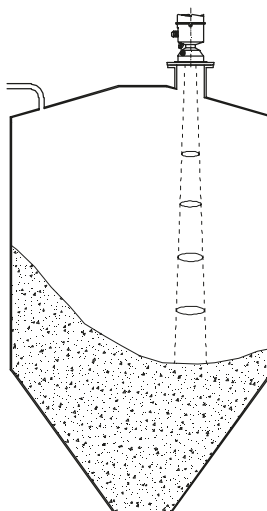
Application

Solids measurement

Aiming is strongly suggested for solid measurement. It helps to optimize the echo signal (mainly for low material level in the cone) and helps to solve not perfect mounting positions.



For proper mounting positions vertical installation without aiming is possible.



Specification

Specification

Process	Measurement range	40m (131 ft) or 100m (328 ft)
	Min. detectable distance	400 mm (15.7") from sensor reference point
	Process temperature	-40 .. +100°C (-40 .. 121°F) or -40 .. +200°C (-40 .. 392°F)
	Process overpressure	-1 .. +0,5 bar (-14.5 .. +43 psi) or -1 .. +3.0 bar (-14.5 .. +43 psi)
Performance	Frequency	78 .. 79 GHz FMCW
	Beam angle	4°
	Accuracy of measurement	5 mm (0.2")
	Update time	Maximum 10 seconds (Response Rate (2.4.1.) set to FAST)
	Dielectric constant of material measured	For ranges up to 20 m (65.6 ft): min. DK = 1.6 For ranges up to 100 m (328 ft): min. DK = 2.5
Mechanics	Ingress protection	Type 4X/NEMA 4X, Type 6/NEMA 6, IP68
	Enclosure	316L/1.4404 Lid with window (window material polycarbonate)
	Lens antenna	Material: 40 m version: PEI 100 m version: PEEK
	Air Purge Connection	Female 1/8" NPT fitting Non return valve for 6mm tube (optional)
Electronics	Power supply / Communication	4-20 mA loop power Nominal 24V DC (16.5 .. 30V DC) Protocol HART, Version 6.0
	Plug on display (inside housing)	Removeable graphic LCD, with bar graph representing level
Approvals	CE/ TR-CU	
	ATEX / IEC-Ex/ TR-CU	
	Zone 20 and Zone 20/21	Dust ignition proof
	Zone 2	Non-sparking/ Energy Limited
	FM/CSA	
	General purpose	
	Cl. II, III Div.1	Dust ignition proof
	Cl. I Div.2	Non-incendive
	Radio	
	R&TTE (Europe) FCC Conformity (US) Industry Canada	

NR 3100



Version with plane flange
Fig. states plane flange 100mm/4"



Version with Easy Aimer flange
Fig. states Easy Aimer flange 100mm/4"



Plug on Display
With push buttons.

For programming of the unit.
Once programmed, the Plug on Display can
be removed if desired and used to copy
parameters to multiple units.

Dimensions see page 7

NR 3100

Basic type

NR 3100

pos. 2

Certificate⁽¹⁾ (detailed Ex-markings: see page 8)

	Dust	Gas	Protection method
0 CE	-	-	-
FM / CSA	-	-	General purpose
G TR-CU	-	-	General purpose
F ATEX / IEC-Ex	Zone 20 and 20/21	-	Dust Ignition Proof
ATEX / IEC-Ex	-	Zone 2	Non-sparking/ Energy Limited
FM / CSA	Cl. II, III, Div.1	-	Dust Ignition Proof
FM / CSA	-	Cl. I Div.2	Non-incendive
E TR-CU	Zone 20 and 20/21	-	Dust Ignition Proof
TR-CU	-	Zone 2	Non-incendive

pos. 3

Process temperature

- 1 max. 100°C
2 max. 200°C⁽²⁾

pos. 4

Process pressure

- 1 0,5 bar
2 3 bar

pos. 5

Electronic module

- A 2-wire 4-20mA, HART

pos. 6

Process connection⁽³⁾

- A Flange 80mm/3" plane 1.4301 (304) max. 3 bar / 200°C
B Flange 80mm/3" plane 1.4404 (316L) max. 3 bar / 200°C
C Flange 80mm/3" Easy Aimer aluminium⁽⁴⁾ max. 0,5bar / 200°C
D Flange 100mm/4" plane 1.4301 (304) max. 3 bar / 200°C
E Flange 100mm/4" plane 1.4404 (316L) max. 3 bar / 200°C
F Flange 100mm/4" Easy Aimer aluminium⁽⁴⁾ max. 0,5bar / 200°C
G Flange 150mm/6" plane 1.4301 (304) max. 3 bar / 200°C
H Flange 150mm/6" plane 1.4404 (316L) max. 3 bar / 200°C
I Flange 150mm/6" Easy Aimer aluminium⁽⁴⁾ max. 0,5bar / 200°C

pos. 7

Measurement range

- 1 max. 40m
2 max. 100m⁽²⁾

pos. 8

Cable entry

- A M20x1.5 cable gland
B NPT 1/2" conduit

pos. 9

Plug on Display

- 1 Without display
2 With display

Basic type

NR 3100	A								
---------	---	--	--	--	--	--	--	--	--

← Order code

Position 1 2 3 4 5 6 7 8 9

All positions are available in special design (use code "Z").

(1) 0 and F including radio approvals R&TTE, FCC, Industry Canada
(2) Only available as combination 200°C and 100m range
(3) Fitting to ANSI/DIN/JIS standards
(4) Painted

Accessories

Accessories

zu400500	Adapter M20x1.5 to NPT 1/2" conduit	•
zu400510	Sun shield cover stainless steel 1.4301/304	•
zu400520	Non return valve For purge inlet. Stainless steel. Connection of 6mm tube diameter. Opens at ca. 0.5 bar (7.25psi).	•
zu400530	HART Modem USB HART Interface to connect a PC with the NR 3000 for commissioning and servicing.	•

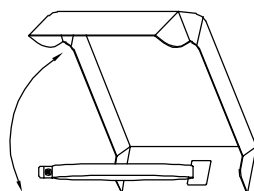
Fixing material for mounting the unit on a flange

zu107010	8 bolts M16x60, 16 washers, 8 nuts. Stainless steel. Fitting for 80mm/3" and 100mm/4" flanges	•
zu107020	8 bolts M20x60, 16 washers, 8 nuts. Stainless steel. Fitting for 150mm/6" flanges	•

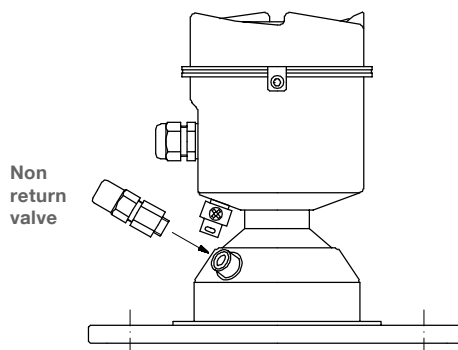
Sealings for mounting the unit on a flange

Flange sealing fitting for plane flange or Easy Aimer flange, EN 1092-1 (PN16), ASME B16.5 (150 lb), JIS 2220 (10K)
Material AFM30, max. 250°C

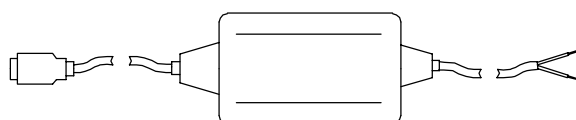
di300135	80mm/3"	•
di300136	100mm/4"	•
di300137	150mm/6"	•



Sun protection cover



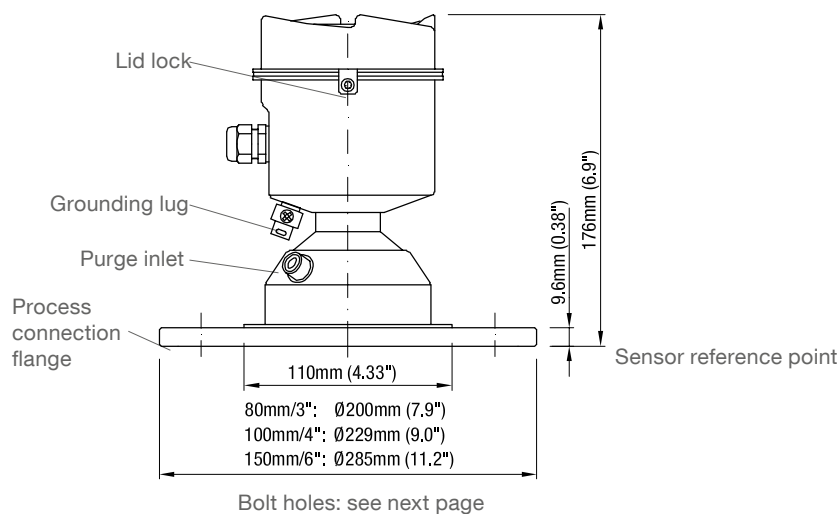
Non
return
valve



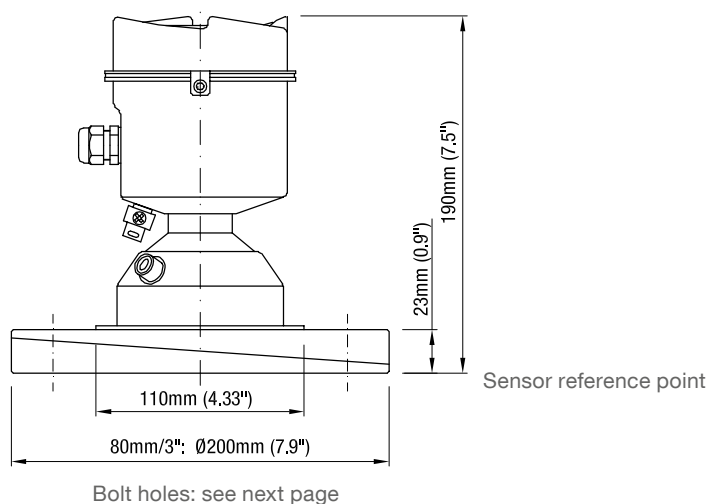
HART Modem

Dimensions

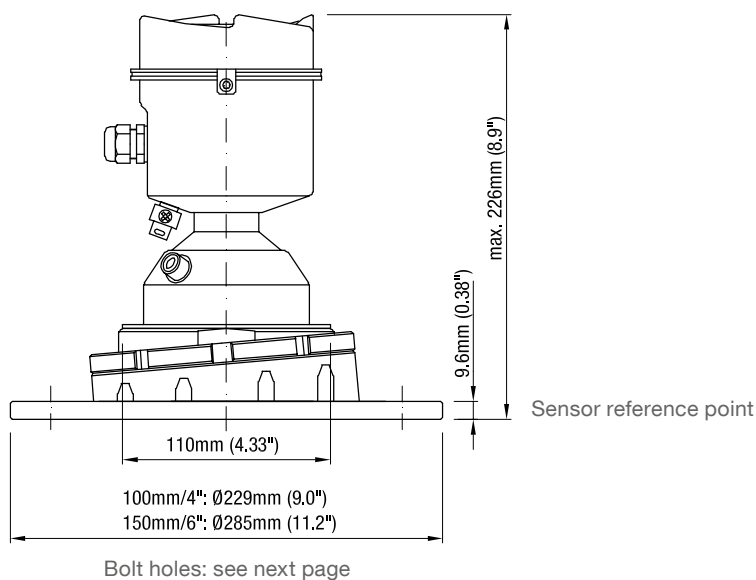
Plane flange version



Easy Aimer flange version 80mm/3"

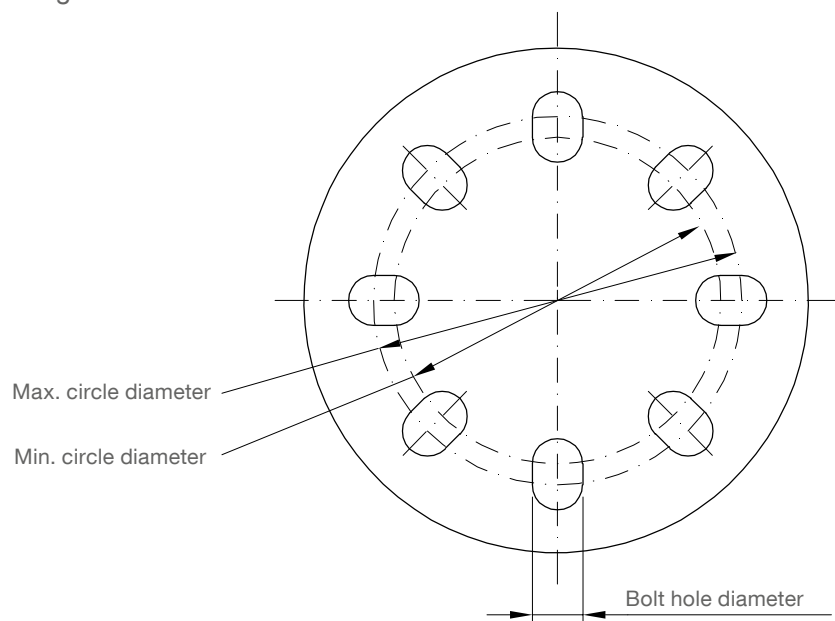


Easy Aimer flange version 100mm/4" 150mm/6"



Dimensions

Flanges



Universal flange (plane flange and Easy aimer flange) mates with bolt hole pattern of:
EN 1092-1 (PN16)
ASME B16.5 (150 lb)
JIS 2220 (10K)

Pipe size	Max. circle diameter	Min. circle diameter	Bolt hole diameter	Number of bolt holes
80mm/3"	160mm (6.30")	150mm (5.91")	19.3mm (0.76")	8
100mm/4"	191mm (7.52")	175mm (6.89")	19.3mm (0.76")	8
150mm/6"	242mm (9.53")	240mm (9.45")	23mm (0.90")	8

Detailed Ex-markings

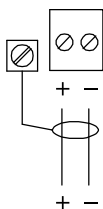
pos. 2 **Certificate**

0	CE FM / CSA	General purpose
G	TR-CU	General purpose
F	ATEX IEC-Ex ATEX IEC-Ex FM / CSA FM / CSA	ATEX II 1D, 1/2D, 2D Ex ta IIIC Ex ta IIIC T139°C Da ATEX II 3G Ex nA II T4 Gc, Ex nL IIC T4 Gc Ex nA II T4 Gc, nL IIC T4 Gc DIP Class II, Div.1, Gr. E, F, G, Class III NI Class I, Div.2, Gr. A,B,C,D
E	TR-CU TR-CU	Ex ta IIIC T! Da X Ex na IIC T4 Gc X, Ex ic IIC T4 Gc X

Electrical installation

4-20mA

The terminals are located below the display. To connect the unit, remove the display by gently turning the display a quarter turn counter-clockwise until it is free.



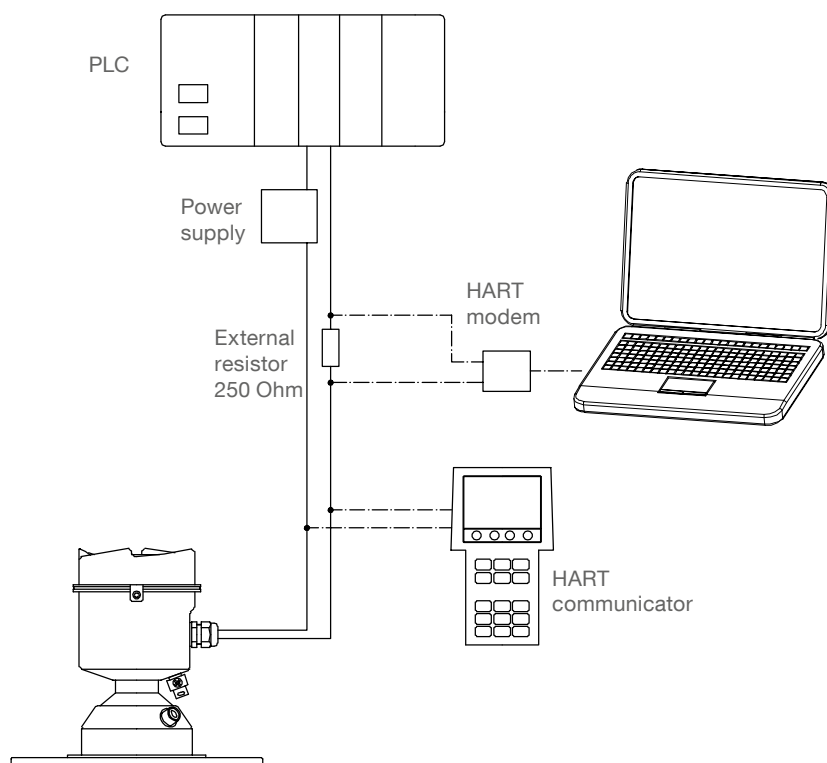
Use twisted pair cable: 0.34 mm² to 2.5 mm² (AWG 22 to 14)
Connect cable shield to ground terminal

24V DC / 4-20mA loop

4-20mA HART

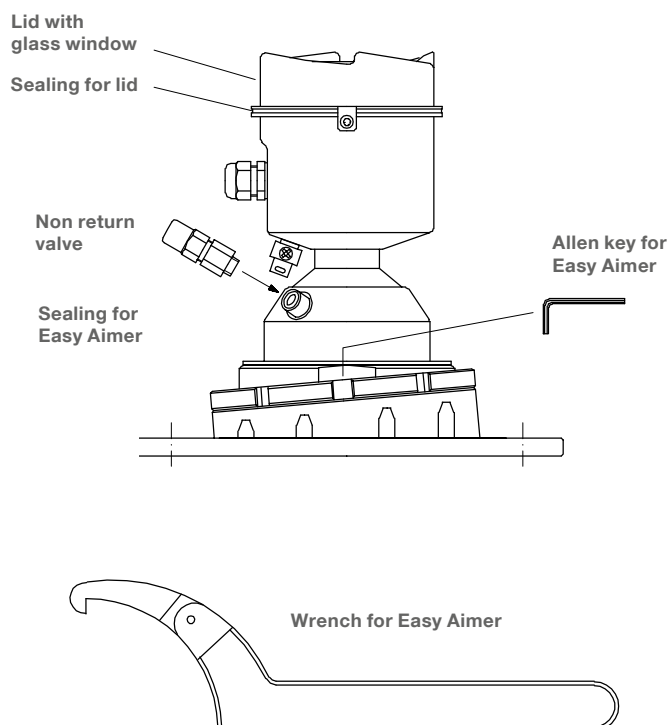
Typical PLC/mA configuration with HART:

- Depending on the system design, the power supply may be separate from the PLC, or integral to it.
- HART resistance (total loop resistance, that is, cable resistance plus 250 Ohm (external resistor) must be less than 550 Ohm @24V supply for the device to function properly.
- The external resistor is not required, if the PLC has an integral 250 Ohm resistor.

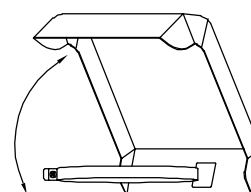


Spare parts

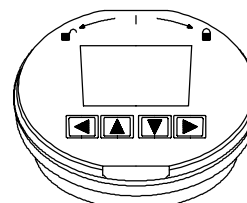
	Spare part Article number	
Electronics		
Plug on display	pl400500	•
Electronic module, measurement range max. 40m	pl400501	•
Electronic module, measurement range max. 100m	pl400502	•
Sealings		
Sealing for lid	zu400505	•
Housing		
Lid with glas window	zu400509	•
Sun protection cover (stainless steel 1.4301/304)	zu400510	•
Diverse		
Non return valve	zu400520	•
Wrench for 100mm/4" and 150mm/6" Easy Aimer	zu400521	•
Allen key 3mm for 100mm/4" and 150mm/6" Easy Aimer	zu400522	•



Sun protection cover



Plug on display





Nivotec®

Level monitoring and visualisation

Complete system for fill level display, trend display, data storage and remote level enquiries

Level monitoring and visualisation

Nivotec® NT 2000

- Display of the silo fill level on LED digital displays
- Fill monitoring via alarm signal
- Signal evaluation 4-20 mA
- Easy to use fill monitoring via lorry module
- Complete system with project specific electrical plans

Nivotec® NT 3500 / 4500

- Fill level visualisation via web server module
- Password protected access on standard browser software via Ethernet
- Data storage and download including trend data via software
- Worldwide access via remote enquiry
- Fill monitoring via alarm signal, shut off valve control and tank wagon coupling detection
- Easy to use fill monitoring via truck module
- Fill level data and alarm signal can be sent via email
- Signal evaluation of 4-20 mA analogical
- Interfaces Modbus RTU and Ethernet TCP
- Complete system with project specific electrical plans (NT 3500)

Nivotec® NT 4600

- Visualisation and operation via 7" touch panel
- Data in percentage, height, volume or weight
- Trend display, data storage
- Evaluation of 4-20 mA and Modbus RTU of the UWT systems
- Touch Panel supplied in installation housing or premounted in electrical control cabinet

Nivotec® NT 4700

- Evaluation of 4-20 mA
- LED-Display in percentage, height, volume or weight (implements NT 4900)
- Version for Nivobob NB 3000/NB 4000 implements start button and indicator lamp when sensor weight is in the upper position

Nivotec® NT 4900

- Level display in percentage, height, volume or weight, freely programmable
- LED display, 4 digits, 7 segment, yellow
- Operation via front buttons
- 4-20mA input

Example of a complete visualization system for NT 3500 / 4500:

- fill level display
- trend display
- data storage
- remote level enquiries

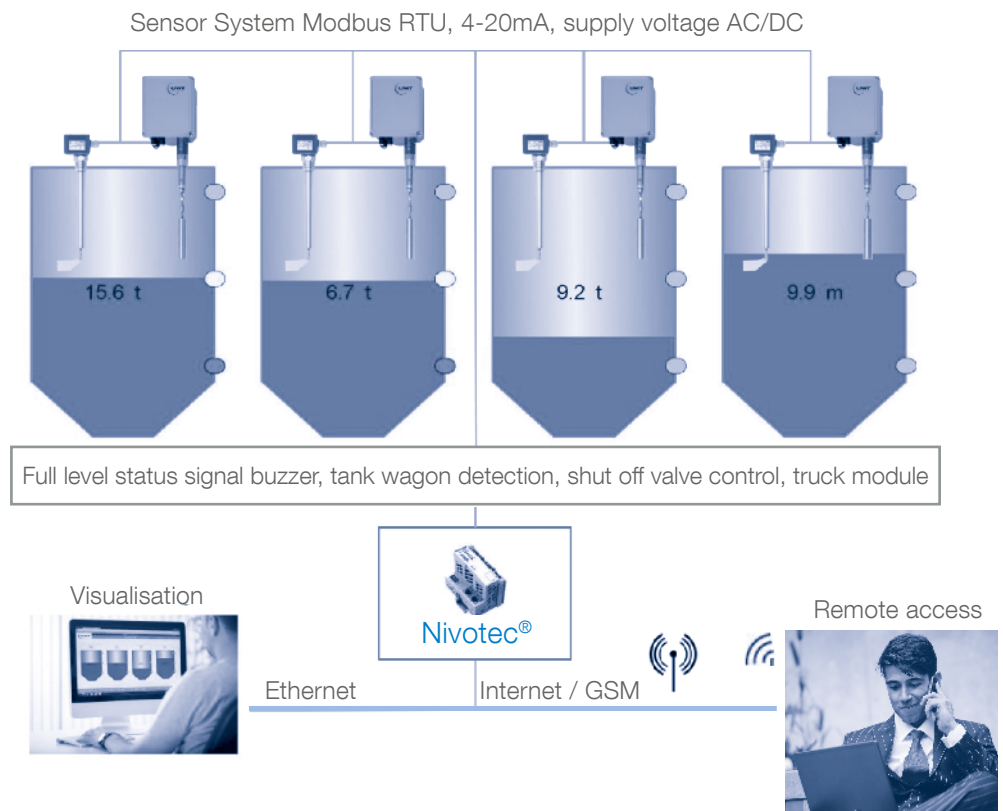


Table of contents

	Page
Overview	2

NT 2000 Level monitoring via control cabinet visualisation	4

NT 3500 Level monitoring via web server visualisation (via Ethernet)	6

Subject to change.

Valid: From 01.04.2017 until 31.03.2018, unless otherwise agreed.

All dimensions in mm (inches).

By publishing this selection list all other lists become invalid.

All prices in Euro, excluding VAT.

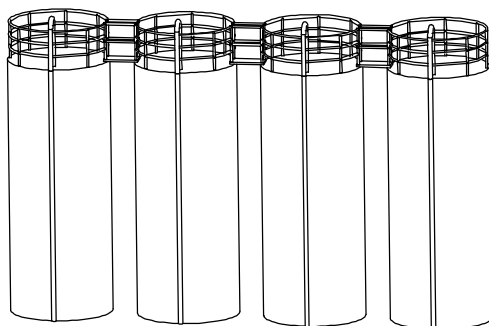
We assume no liability for typing errors.

All prices are EXW Betzigau, excluding packaging costs.

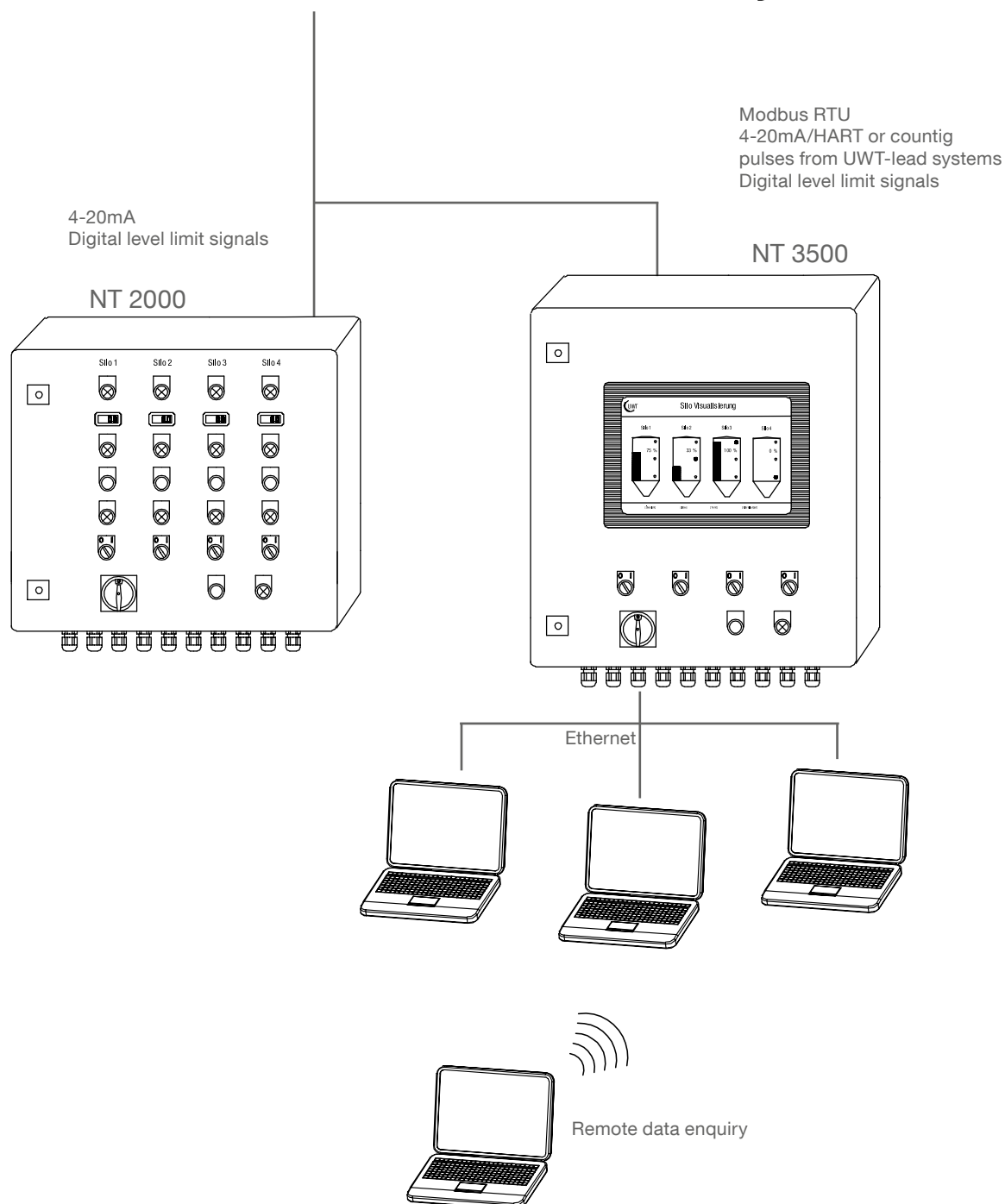
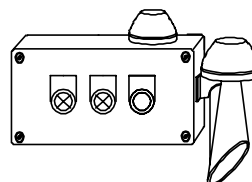
Different variations to those specified are possible.
Please contact our technical consultants.

Overview



Silo plant with continuous level measurement technology, level limit sensors and shut off valves in the filling pipes.



Truck module



Overview

	NT 2000	NT 3500
		
System	Control cabinet system for display and monitoring of contents with digital instrumentation and LEDs for level limits.	Control cabinet system for display and monitoring of contents and levels. The self contained system works with visualisation software on a web server.
Number of silos	Max. 10 (more are possible on request)	Max. 50 (more are possible on request)
Software	Not available	Licence free visualisation software in HTML form. Password-protected access on alle Ethernet PCs.
Control cabinet	Standard equipment	Standard equipment or pre-mounted on cap rail
Input signal	Analogue inputs (4-20mA)	<ul style="list-style-type: none"> - Modbus RTU of Nivobob® 3000 - Analogue inputs (4-20mA) - Counting inputs (from electromechanical lead systems) - Profibus available on request
Alarm signal Silo-„full“	Optional - Full signal available as a flashing light with buzzer	Optional - Full signal available as a buzzer
Display in the control cabinet door	<ul style="list-style-type: none"> - Digital display for silo level - LED for full and empty signal 	<ul style="list-style-type: none"> - Touch panel 10", 4" or 15" - Digital display for silo level - LED for full and empty signal
Remote data request	Not available	Via Internet (VPN tunnel) or GSM Modem
Trend data	Not available	The recording of the level data is made internal as a ring buffer. These can be exported and processed as .csv.
Truck module	Optional <ul style="list-style-type: none"> - Silo Mounting - Display Silo "full" via LED and flashing light with buzzer - Reset by push button 	Optional <ul style="list-style-type: none"> - Silo Mounting equipment - Display Silo "full" via LED and flashing light with buzzer - Reset by push button
Pinch valve control	Not available	Optional <ul style="list-style-type: none"> - Automatic in case of silo full detection - Release via key switch / PC / Touchpanel
Interfaces	Not available	<ul style="list-style-type: none"> - Modbus RTU - Ethernet - Profibus on request

Technical data

Dimensions	Depending on the number of silos
Material , degree of protection, ambient temperature	Control cabinet: steel plate, IP54, 0..50°C Truck module: steel plate, IP65, -25..+60°C Terminal box NT50: steel plate, IP65, -25..+60°C
Supply voltage	230V 50Hz
Supply power	Depending on the number of silos and connected sensors

NT 2000

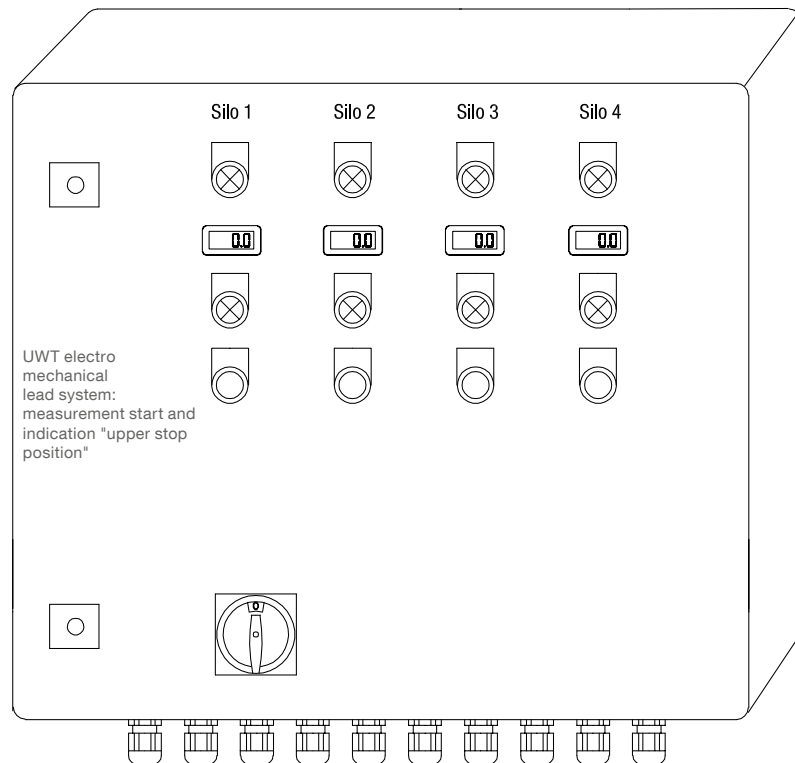
Features

- Fill level indication on an LED display in percentage, height, volume or weight
- Simple and easy handling of the various display elements
- Evaluation of the analogue 4-20 mA signals of any sensors
- Fill control via full alarm signal
- Separate truck module for comfortable monitoring during silo filling

NT 2000 control cabinet

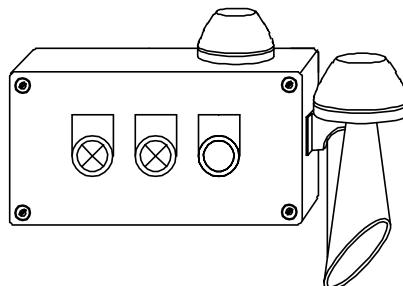
The NT 2000 offers the level indication modules and monitoring functions integrated in a control cabinet.

The fill level is displayed via the Nivotec® NT 4900 digital display, the level limits via full and empty LEDs. 4-20 mA signals are evaluated. It is possible to integrate an alarm signal with a buzzer which signals when the silo becomes full during filling. The buzzer can be mounted directly on the silo. The NT 2000 is a complete system which also provides the supply voltage for the sensors. It is delivered with project specific electrical plans.



Truck module

For use with one silo.
Mounting directly on the silo frame.
Indication of empty and full level with LEDs.
Reset of alarm "Silo full".



Example: Truck module with full/empty LEDs, push button for reset of alarm "Silo full"

NT 2000

Level monitoring system Nivotec NT 2000

		Price including monitoring of the first silo	Extra price for each additional silo monitoring
pos. 1	Basic configuration		
	NT 2000	•	•
pos. 2	Measurement technology		
	With use of electro mechanical lead systems: supply voltage lead system 230V AC		
	A 4-20mA (active or passive)	•	•
	B 4-20mA from NB 3000/4000		
	incl. start button for measurement, display "upper stop position" and "failure"	•	•
pos. 3	Integration of level limit sensors		
	LED display in control cabinet		
	Level limit sensor supply / signal output as follows:		
	0 without	•	•
	1 Full level sensor (230V AC / floating)	•	•
	2 Full and empty level sensor (230V AC / floating)	•	•
	3 Full level sensor (24V DC / floating or PNP)	•	•
	4 Full and empty level sensor (24V DC / floating or PNP)	•	•
pos. 4	Alarm "silo full"		
	1x buzzer, 1x reset button Alarm "silo full" (for outside mounting):		
	with Pos.5 0 buzzer delivery in loose parts (reset button inside a surface mounting housing)		
	with Pos.5 L buzzer delivery in loose parts (reset button mounted in the truck module)		
	0 without	•	•
	A with	•	•
pos. 5	Truck module (only with pos.4 A)		
	Delivery of one separate truck module per silo		
	0 without	•	•
	L with	•	•
pos. 7	Number of vessels / silos (max. 10, more are possible on request)		

Basic configuration		Position				
1	2	3	4	5	6	7
NT	2000				0	

← **Order code**

NT 3500

Features

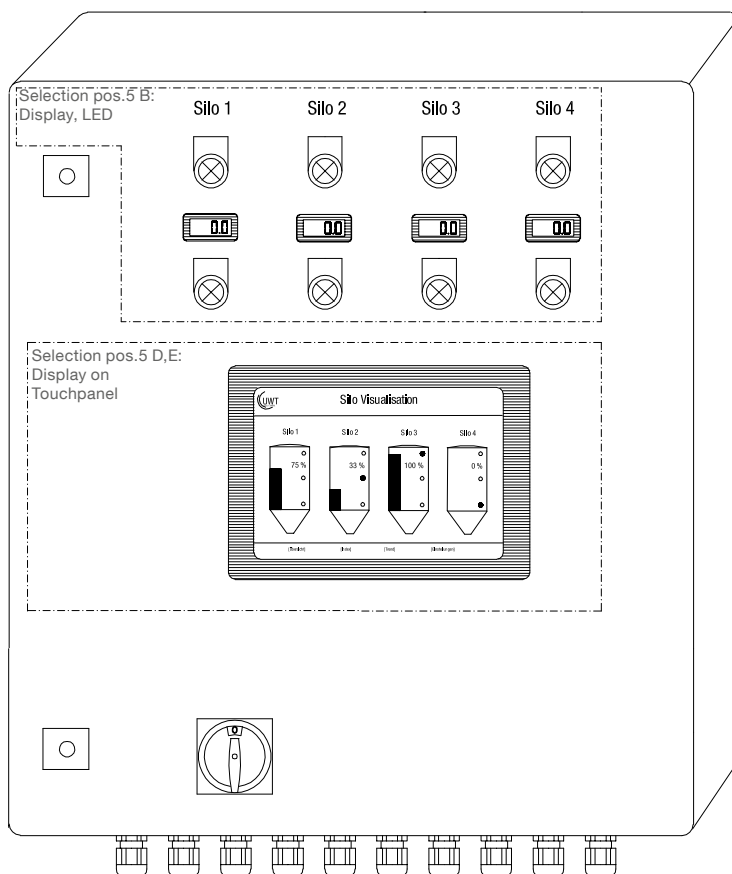
- Fill level visualisation via HTTP-web server
- Visualisation via standard Internet browser software on all Ethernet PCs
- Password protected
- Worldwide remote enquiry of the level password protected - on request
- Software operation additional via a touch panel in the control cabinet or via fill level LEDs
- Data in percentage, height, volume or weight
- Trend display, data storage, export via .csv
- Evaluation of the analogue 4-20 mA signals of any sensors, as well as Modbus RTU of the UWT-systems
- Different input signals within the same system is possible
- Fill control via full alarm signals and shut off valves
- Separate truck module for safe and comfortable monitoring during silo filling

NT 3500 control cabinet

The heart of the NT 3500 is a web server module, which the visualisation software uses. All fill level control and display functions can be operated via the visualisation on a PC or a Touch panel with backlight. An Ethernet interface ensures that the visualisation can be simultaneously operated from all PCs which are connected to the interface. Access is password protected. Additionally the control cabinet can be equipped with operating and display elements. Either the 10.4" or 15" touch panel or the digital level display with full and empty LEDs can be chosen. The electromechanical lead system can be started by the visualisation or by a push button. A buzzer for alarm "silo full" can be mounted directly on the silo. Control for pinch valves to stop the filling is available. The NT 3500 is a complete system which also provides the supply voltage for the sensors. The system is delivered with project specific electrical plans.

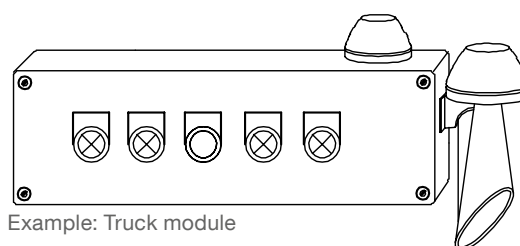
Functionality of alarm "silo full" and control of the pinch valves:

1. The filling (opening of the pinch valve) is enabled either via the hose coupling when connecting the filling hose, via a key switch on the cabinet or on the truck module or via PC/Touch panel.
2. In case of an alarm "silo full" the pinch valve closes, the LED "silo full" and the buzzer is switched on, the reset button is blinking. After reset of the alarm the pinch valve opens for ca. 5 min to enable the expulsion of the filling pipe, then it is closed again. Independent from this control the pinch valve can be opened or closed by an authorized user at any time.



Truck module

- One module for a defined number of silos (depending on the project)
- Mounting directly at the silo frame
- Display silo full/empty and pinch valve status with LEDs
- Reset of alarm "silo full"
- Key switch for pinch valve control



NT 3500

Level monitoring system Nivotec NT 3500

		Price for the first silo	Extra price for each additional silo
NT 3500		•	•
Pos. 1	Visualisation system - HTTP web server incl. 24V DC power supply (used also for supply of the level limit sensors)		
	A Completely wired in a control cabinet max. 25 silos/vessels	•	•
	B No control cabinet, pre-wired on a top hat rail max. 25 silos/vessels	•	•
	C Completely wired in a control cabinet max. 50 silos/vessels	•	•
	D No control cabinet, pre-wired on a top hat rail max. 50 silos/vessels	•	•
Pos. 2	Input signals of level sensors With use of NB 3000/ 4000: supply voltage of NB 3000/4000= 230V AC		
	1 Modbus RTU (NB 3000/ 4000)	•	•
	2 4-20mA active (NB 3000/ 4000)	•	•
	3 Counting pulses (NB 3000)	•	•
	4 4-20mA / 2-wire (NivoRadar NR 3000)	•	•
Pos. 3	Integration of level limit switches incl. alarm "silo full" 1x buzzer, 1x reset button alarm "silo full" (for outside mounting): with Pos.4 0 buzzer delivery in loose parts, reset button inside a surface mounting housing with Pos.4 1 buzzer delivery in loose parts, reset button mounted in the truck module Level limit sensor supply / signal output as follows:		
	0 without	•	•
	A Full level sensor (230V AC / floating) wired on NB / Modbus	•	•
	B Full level sensor (24V DC / floating or PNP)	•	•
	C Full and empty level sensor (24V DC / floating or PNP)	•	•
	D Full level sensor (230V AC / floating)	•	•
	E Full and empty level sensor (230V AC / floating)	•	•
Pos. 4	Truck module		
	0 without	•	•
	1 with	•	•
Pos. 5	Visualisation at control cabinet only with pos.1 A, C		
	0 without	•	•
	B Digital level display and LED full or full/empty (only with pos.2. 4)	•	•
	C Digital level display and LED full or full/empty (only with pos.2. 2) for NB 3000/4000, incl. start button, display "upper stop position" and "failure"	•	•
	D 10.4" 800x600 Touch panel	•	•
	E 15" 1024x768 Touch panel	•	•
Pos. 6	Pinch valve control (only with pos.4 1) Shut off in case of silo full detection, possibility of expulsion of the filling pipes Display and operating elements located on the truck module		
	0 without	•	•
	1 Filling enabled via mouse click on the PC and on Touch panel	•	•
	2 Filling enable by key switch on the truck module	•	•
	3 Filling enable by key switch on the cabinet	•	•
Pos. 7/8	Number of vessels / silos (max. 25/50)		
Pos. 9	Remote enquiry		
	A via Internet (with furnished VPN tunnel)	•	•
	B via GSM Modem on request		
Pos. 10	Hose coupling switch		
	0 not present	•	•
	1 connected to NB 3000/4000 (terminal 24/26)	•	•
	2 connected to Nivotec	•	•

Basic configuration Position

NT 3500									
	1	2	3	4	5	6	7/8	9	10

← Order code

NT 3500

Further options (on request)

Ethernet gateway	Connection with only one Ethernet line between silo areas which are far located from each other.
Radio-relay system	Connection by radio communication between silo areas which are far located from each other (max. 1800m).

Table of contents

	Page
Overview NT4500 / NT 4600	2

NT 4500 Level monitoring and visualisation via web server	4

NT 4600 Level monitoring and visualisation via touch panel	6

NT 4700 Level display for one silo	8

NT 4900 Digital display	9

Accessories	10

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All prices in Euro, excluding VAT.

We assume no liability for typing errors.

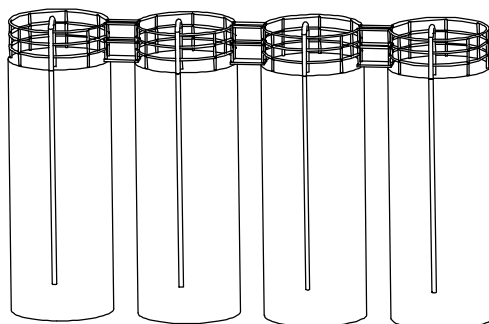
All prices are EXW Betzigau, excluding packaging costs.

Different variations to those specified are possible.
Please contact our technical consultants.

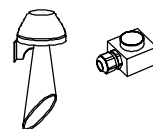
Overview NT 4500 / NT 4600

Standardized Level monitoring system up to 30 silos

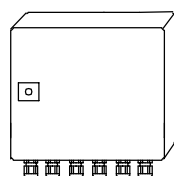
Silo plant with
continuous level
measurement
technology and full
detectors



Alarm "Silo full"



Modbus
converter

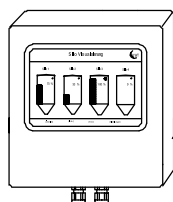


4-20mA,
full detector signal

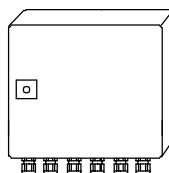
Modbus RTU

alternative*

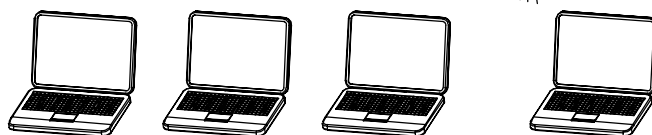
NT 4600
Visualisation
with
touch panel



NT 4500
Webserver



Ethernet



Remote data enquiry

Visualisation with PC via standard internet browser

* Mixed use of NT 4500 and NT 4600
is not possible

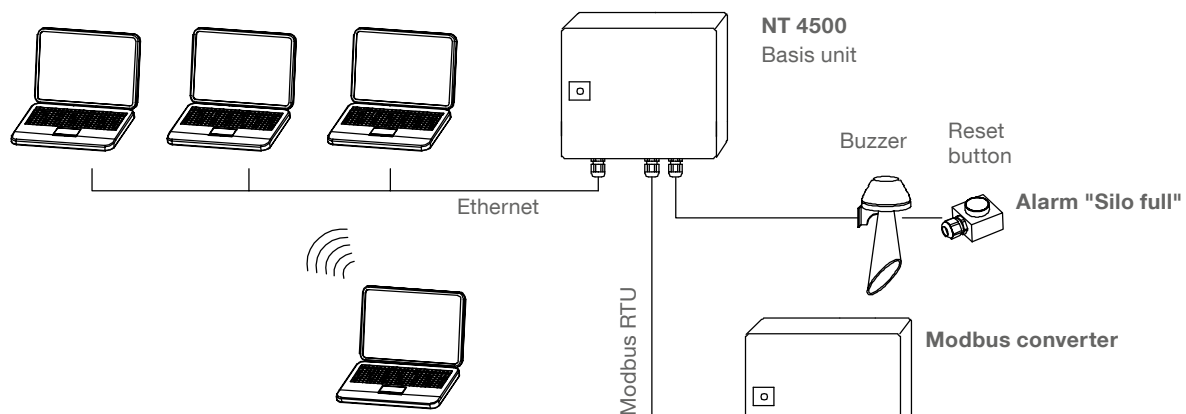
Overview NT 4500 / NT 4600

Technical data		
Dimensions	NT 4500/4600, Modbus converter:	300 x 300 x 155mm (W x H x D)
Mounting	NT 4500/4600, Modbus converter:	wall mounting
Material	NT 4500/4600, Modbus converter:	steel plate
Ingress protection	NT 4500/4600, Modbus converter:	IP65
Ambient temperature	NT 4500:	0..+55°C
	NT 4600:	0..+50°C
	Modbusumsetzer:	-25..+70°C
Power supply	NT 4500/4600, Modbus converter:	115V or 230V 50/60Hz (integrated power converter 24V DC)
	NR 3000:	supplied by Modbus converter
	NB 3000/ 4000:	15V or 230V AC, connection is made on site
	Full detector:	connection either on NB 3000/ 4000 resp. Modbus converter. In this case the supply voltage must be equal to NB 3000/ 4000 resp. Modbus converter. Alternative it is possible to connect on site.
Power consumption	NT 4500/4600, Modbus converter:	20VA
	Connected level sensors:	see documentation of the respective sensors
Signal output full detector	Floating contact is required	

NT 4500

Level monitoring and visualisation via web server

- Standardised system up to 50 silos
- Visualisation and operation via standard internet browser software
- Software language: German or English
- Password protected
- Worldwide remote enquiry of the level
- Data in percentage, height, volume or weight
- Trend display, data storage, export via .csv
- Evaluation of the analogue 4-20 mA signals of any sensors, as well as Modbus RTU of the UWT-systems
- Different input signals within the same system is possible
- Implementation of full detectors
- Fill control via full alarm signal (buzzer)



NT 4500 Base unit

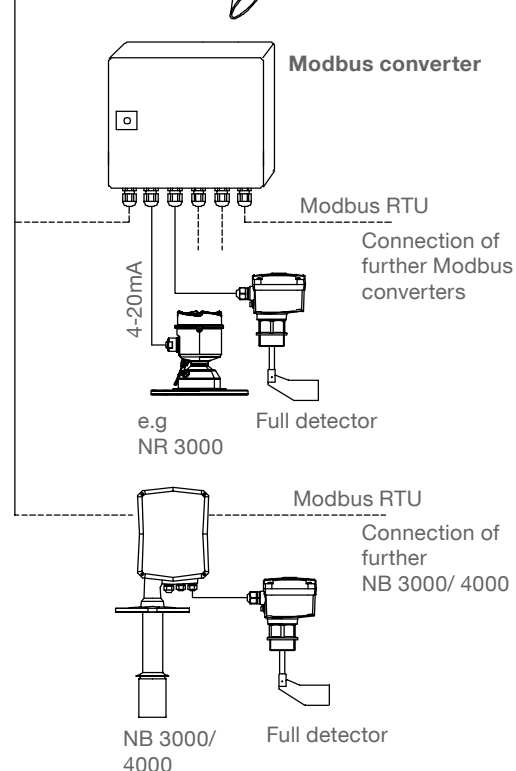
The heart of the NT 4500 is the web server module, which the visualisation software uses. All fill level control and display functions can be operated via the visualisation on a PC. An Ethernet interface ensures that the visualisation can be simultaneously operated from all PCs which are connected to the interface. Access is password protected. The electromechanical lead system can be started by the visualisation.

Modbus converter

- For connection of 4-20mA/2-wire sensors and full detectors
- On each converter up to 4 sensors and 4 full detectors can be connected
- Provided for mounting directly on the silo

**Integration of full detector
incl. alarm "silo full"**

- Buzzer with reset button (supplied loose, for outdoor mounting)
- One unit for all connected silos
- Alarm happens, if one of the silos gets full
- Reset of the alarm
- Provided for mounting directly on the silo



Technical data
see page 3

NT 4500

Basic unit		
NT 4500		•
Pos. 1	Control cabinet - max. number of silos	
	A Webserver without control cabinet, pre-wired on a top hat rail - max. 25 silos	•
	B Webserver without control cabinet, pre-wired on a top hat rail - max. 50 silos	•
	C Webserver in a control cabinet - max. 25 silos	•
	D Webserver in a control cabinet - max. 50 silos	•
Pos. 2	Input signals of level sensors	
	1 Modbus RTU (NB 3000/ 4000)	•
	2 4-20mA 2-wire (e.g. NivoRadar NR 3000), use of Modbus converter	
	Price for each 4 silos	•
	3 Mixed used: Modbus RTU/ 4-20mA 2-wire	
	Price for each 4 silos with 4-20 mA units	•
Pos. 3	Integration of full detector incl. alarm "silo full"	
	0 without	•
	A with	•
Pos. 4	Software language	
	A German	•
	B English	•
Pos. 5/6	Number of silos (max. 25/50)	•

Basic unit	Position					
NT 4500						← Order code
	1	2	3	4	5/6	



NT 4600

Level monitoring and visualisation via touch panel

- Standardised system up to 15 silos
- Visualisation and operation via 7" touch panel (coloured, 800 x 480 pixel)
- Software language: German or English
- Password protected
- Data in percentage, height, volume or weight
- Trend display, data storage
- Evaluation of the analogue 4-20 mA signals of any sensors, as well as Modbus RTU of the UWT-systems
- Different input signals within the same system is possible
- Implementation of full detectors
- Fill control via full alarm signal (Buzzer)

NT 4600 Base unit

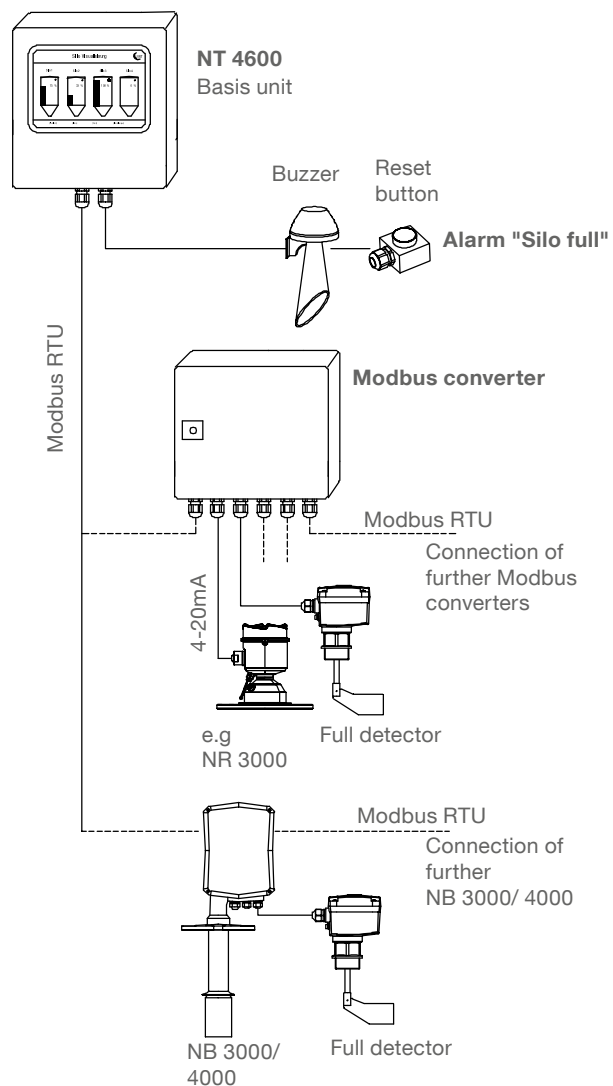
The heart of the NT 4600 is a touch panel, which runs the visualisation software. All fill level control and display functions can be operated via the touch panel. Access is password protected. The electromechanical lead system can be started by the visualisation software.

Modbus converter

- For connection of 4-20mA/2-wire sensors and full detectors
- On each converter up to 4 sensors and 4 full detectors can be connected
- Provided for mounting directly on the silo

Integration of full detector incl. alarm "silo full"

- Buzzer with reset button (supplied loose, for outdoor mounting)
- One unit for all connected silos
- Alarm happens, if one of the silos gets full
- Reset of the alarm
- Provided for mounting directly on the silo



Technical data
see page 3

NT 4600

Basic unit		
NT 4600		•
Pos. 1	Control cabinet	
	A Touch panel without control cabinet	•
	B Touch panel completely wired in a control cabinet	•
Pos. 2	Input signals of level sensors	
	1 Modbus RTU (NB 3000/ 4000)	•
	2 4-20mA 2-wire (e.g. NivoRadar NR 3000), use of Modbus converter	•
	Price for each 4 silos	•
	3 Mixed used: Modbus RTU/ 4-20mA 2-wire	•
	Price for each 4 silos with 4-20mA units	•
Pos. 3	Integration of full detector incl. alarm "silo full"	
	0 without	•
	A with	•
Pos. 4	Software language	
	A German	•
	B English	•
Pos. 5/6	Number of silos (max. 15)	•

Basic unit	Position					Order code
NT 4600						
	1	2	3	4	5/6	



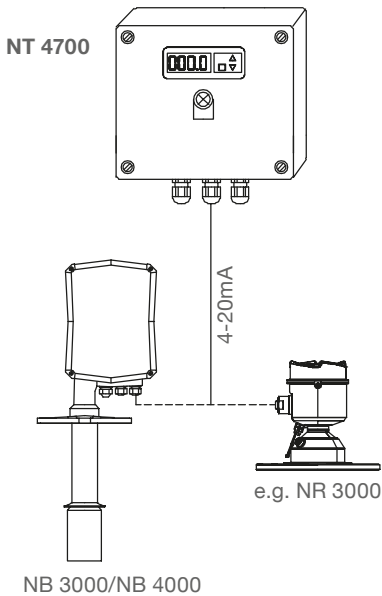
¹ Delivery touch panel fpr panel mounting as follows:
Dimensions 200 x 146 x 34mm
Panel cutout 192 x 138mm,
Required supply 24V DC +/-20%, 350mA
Sub D plug (female) 9 pole for Modbus connection

In combnation with pos.3 A a Modbus I/O module for conneting of the buzzer/reset button will will delivered as follows:
Dimensions 98 x 52 x 27mm, for mounting on top hat rail
Supply 10-30V DC, 0,5W
Terminals for Modbus connetion

NT 4700

Level display for one silo

- Evaluation of the analogue 4-20 mA signal of any sensor
- LED-Display in percentage, height, volume or weight (implements NT 4900)
- Version for Nivobob NB 3000/NB 4000 implements start button and indicator lamp when sensor weight is in the upper position
- Simple operation



Technical data

Dimensions	182 x 180 x 90mm (W x H x D)	
Mounting	Wall mounting	
Material	Polycarbonat	
Ingress protection	IP65	
Ambient temperature	0..+50°C	
Power supply	NT 4700-1 / 4700-2: NT 4700-3 / 4700-4: NB 3000/NB 4000: 2-wire 4-20mA :	230V 50/60Hz 24V DC 230V 50/60Hz or 24V DC, connection is made on site supplied by NT 4700-2 (integrated power converter 24V DC) or NT4700-4
Power consumption	NT 4700: Connected level sensor:	10VA see documentation of the respective sensor

NT 4700-1	Art.nr. zz110824	for NB 3000/NB 4000,with start button and indicator lamp "upper stop position", 230V supply	•
NT 4700-3	Art.nr. zz110828	for NB 3000/NB 4000,with start button and indicator lamp "upper stop position", 24VDC supply	•
NT 4700-2	Art.nr. zz110825	for 2-Leiter 4-20mA (e.g. NivoRadar NR 3000), 230V supply	•
NT 4700-4	Art.nr. zz110829	for 2-Leiter 4-20mA (e.g. NivoRadar NR 3000), 24V DC supply	•

NT 4900

Digital display

- Level display in percentage, height, volume or weight, freely programmable
- LED display, 4 digits, 7 segment, yellow
- Operation via front buttons
- 4-20mA input



Technical data

Dimensions	77 x 35 x 71mm (W x H x D)		
Panel cut out	71 x 29mm		
Material	Polycarbonat		
Ingress protection	IP65		
Ambient temperature	0..+50°C		
Power supply	NT 4900-1:	24V DC/AC	(9 - 30V DC, 7 - 24V 50/60Hz)
	NT 4900-2:	230V 50/60Hz	(+10% -20%) (Terminal 1 = L/+, Terminal 2 = N/-)
Power consumption	7VA		
Signal input	4-20mA aktiv (Terminal 11 = +, Terminal 12 = GND)		

Programming example:

4mA relates to a display of 0,0 tons, 20mA to 60,0 tons

Following parameters are changed from the presets (procedure see external programming manual):

d.CnF -> i.Typ = 4-20mA

U.oPt -> d.Pnt set on first digit from right side (decimal dot setting)

L.SCL -> 0 (lower scale value 0 tons at 4mA)

H.SCL -> 60.0 (upper scale value 60,0 tons at 20mA)

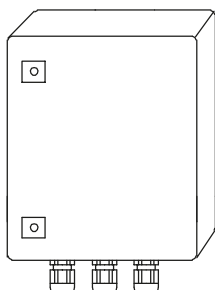
NT 4900-1 (Art.no. eb100370) 24 V DC/AC

NT 4900-2 (Art.no. eb100380) 230 V AC

Accessories

Terminal box

Intermediate terminals for the wires leading to the silo (mounting e.g. on the silo frame).
Applicable for cables of level (Modbus or 4-20mA), limit switch, buzzer, reset button



Technical data

Dimensions	200 x 300 x 120mm (W x H x D), for wall mounting
Material	steel plate
Ingress protection	IP65
Ambient temperature	-25...+60°C
Terminal blocks	15 pieces grey, 5 pieces blue, 5 pieces green/yellow; each terminal implements 3 cable inlets 2,5mm ² , mounted on top hat rail
Cable glands	6 pieces M20x1,5 2 pieces M25x1,5

zz110835

•

Cable recommendations for Modbus network

Shielded cable

Functionality up to 50m

Manufacturer: Lapp, Type UNITRONIC LiYCY 2x0.34, Art.no: 0034502

Twisted pair cable

Functionality up to 1000m

Manufacturer: Lapp, Type UNITRONIC BUS CAN 1x2x0.34, Art.no: 2170263

UV-protection hose with threaded hose coupling M20x1,5

UV protection for Modbus cable

Manufacturer: Flexa, Type Rohrflex PA6, Art.no: 0233.202.012 and Type RQG1-M, Art.no: 5020.055.018

ATEX-protection hose with threaded hose coupling M20x1,5

For installation of Modbus cable in ATEX Zone 21

Manufacturer: PMA, Type ESX, Art.no: ESXT-12B.50 and Type END, Art.no: BEND-M202GT

Technical Information

Table of contents

	Page
Safety notes / Technical support	2

Introduction	3

Function	4

Technical data	6

Approvals	14

Options	15

Mounting	16

Electrical installation	20

Signal and alarm output	25

Setting / Sensitivity	28

Maintenance	29

Notes for use in Hazardous Locations	30

Disposal	32

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:

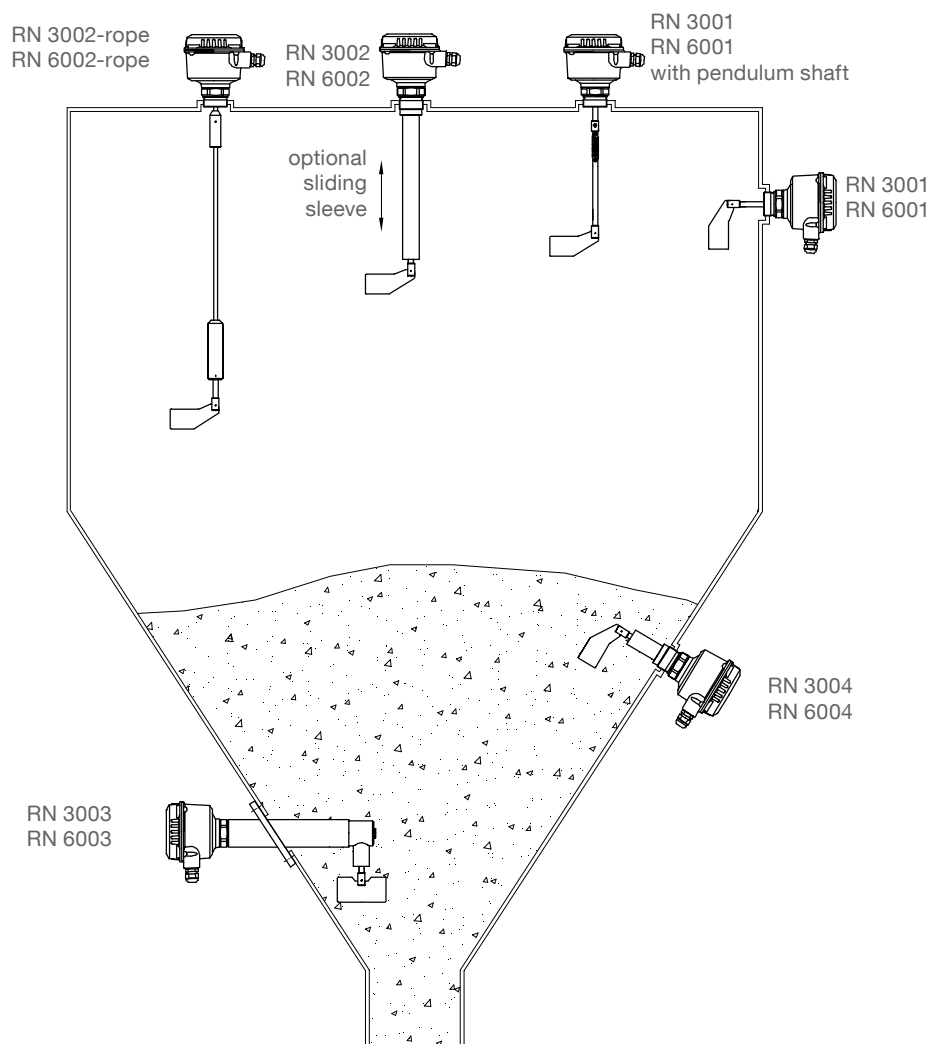
- **building materials industry**
lime, styrofoam, moulding sand, etc.
- **food industry**
milk powder, flour, salt, etc.
- **plastics industry**
plastics granules etc.
- **timber industry**
- **chemical industry**
- **mechanical engineering**

The ROTONIVO is normally screwed into the lateral container wall so that it is in 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.



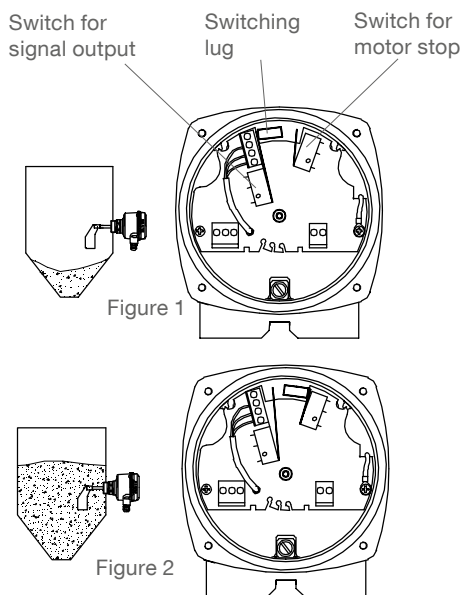
Function

A measuring vane is driven by a synchronous motor. The bearing of the motor inside the housing allows it to swing. The motor is fixed to a switching lug.

If the vane is uncovered, a spring pulls the motor and switching lug to the left position (figure 1).

When material covers the vane and thus stops the rotation, the motor and switching lug swings to the right position (figure 2). The signal output indicates "covered" and the motor is stopped.

When the vane becomes uncovered due to falling material, the spring pulls the motor and switching lug back to the left position (figure 1). The motor is started and the signal output indicates "uncovered".



Fail safe alarm

With the option 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

Functional safety SIL2 (IEC 61508)

With option Functional safety the unit observes the motor, gear and electronic. The result of this diagnostics is present on the signal output, which states the full/ empty condition.

Switchable signal output (Fail safe high /low)

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

Signal output delay:

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

Selection guide

	RN 3001 RN 6001	RN 3001 RN 6001 pendulum shaft	RN 3002 RN 6002	RN 3002-rope RN 6002-rope	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⁾ 1.4301/ SS 304	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, 8bar			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	•	-	-	-	-	-	-
DC version	24V DC	•	-	-	-	-	-	-
DC version	24V DC PNP	-	-	•	•	•	-	-
Universal voltage	24V DC / 22...230V AC	•	-	-	•	•	option	-
RN 6000								
Power supply		Output signal						
		SPST	SPDT ⁽¹⁾	DPDT	PNP	FSH/ FSL ⁽²⁾	Adjustable delay	Fail safe alarm
AC version	24V or 48V or 115V or 230V AC	-	•	-	-	-	-	-
DC version	24V DC	-	•	-	-	-	-	-
Universal voltage	24V DC / 22...230V AC	-	-	• ⁽³⁾	-	•	•	option
Universal voltage SIL2	24V DC / 22...230V AC	•	• ⁽⁴⁾	-	-	•	•	-

⁽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

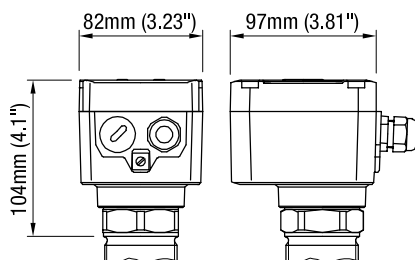
⁽⁴⁾ Additional output, not SIL conform

Technical Data

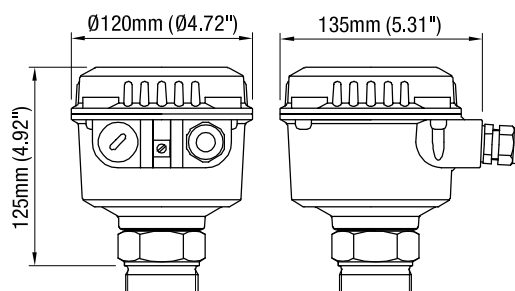
Dimensions

Housing versions

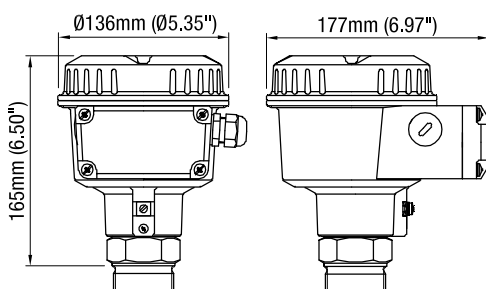
Series RN 3000
 Standard



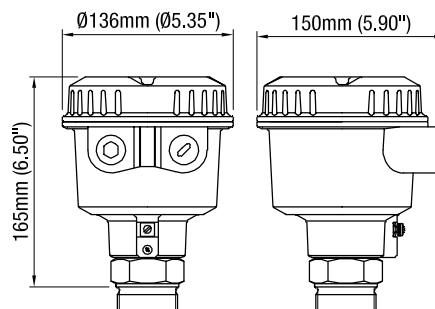
Series RN 6000
 Standard



Series RN 6000
 de explosionproof with increased
 safety terminal box

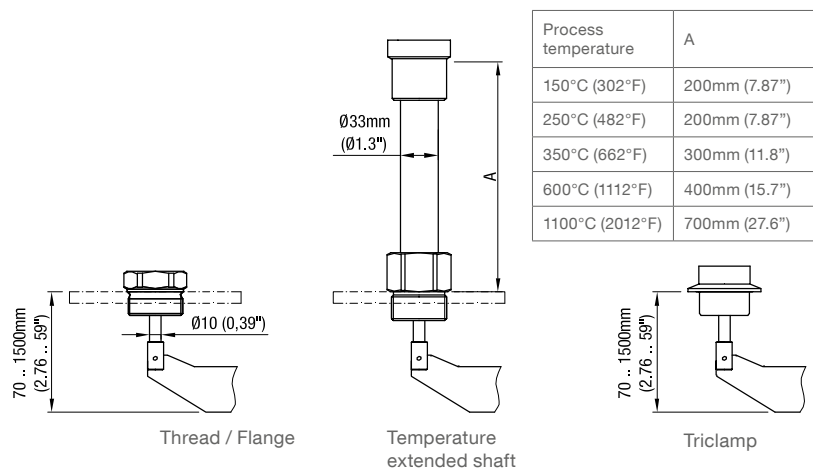


Series RN 6000
 d flameproof /explosionproof



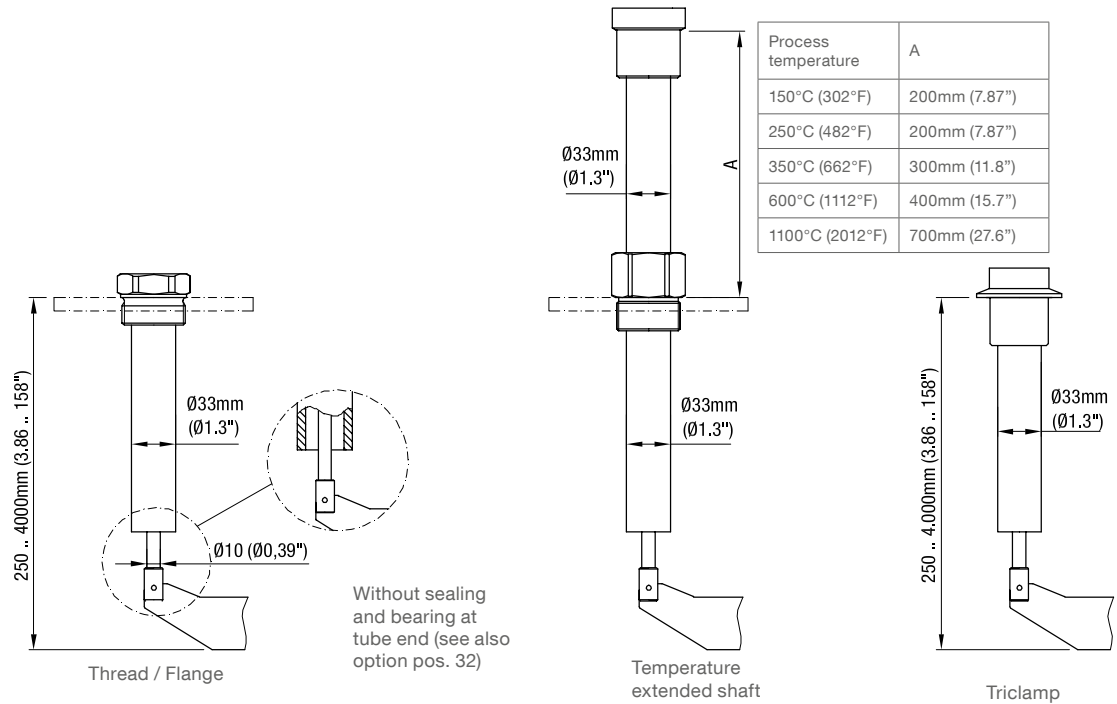
Extensions

RN ..001

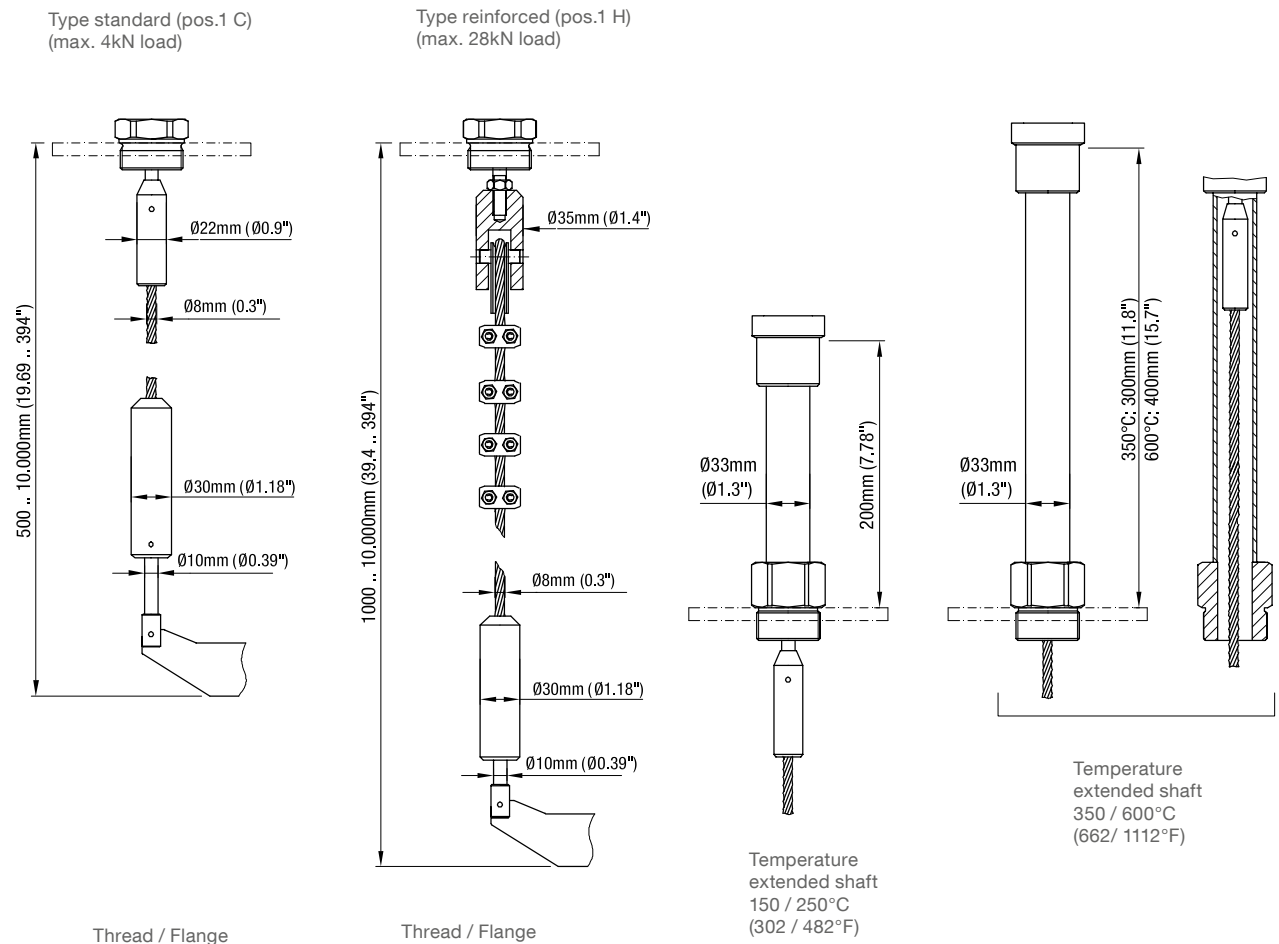


Technical Data

RN ..002

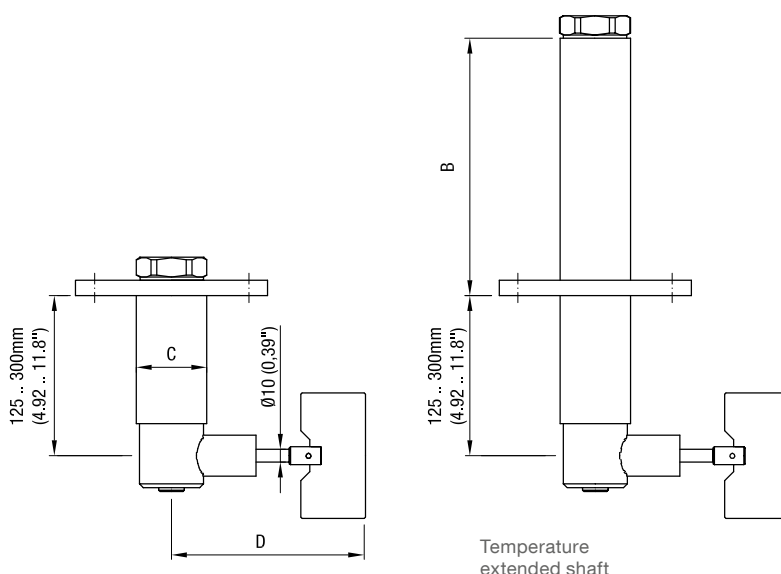


RN ..002 rope



Technical Data

RN ..003

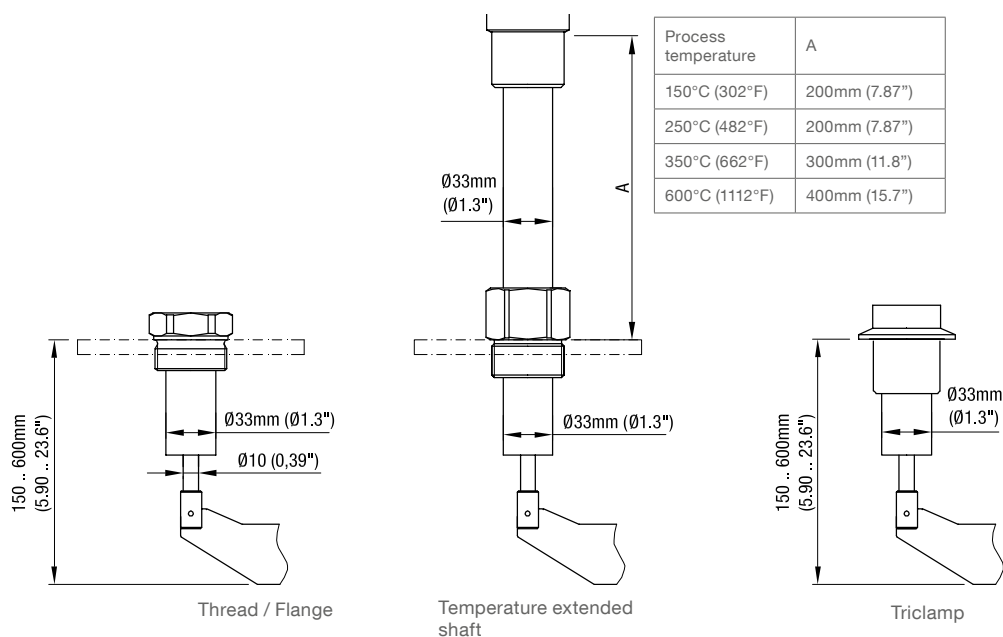


Process temperature	B
80°C (176°F) 0.8 bar (11.6psi)	10mm (0.39")
80°C (176°F) 5/ 10bar (73/ 145psi)	75mm (2.95")
150/ 250°C (302/ 482°F) 0.8/5/10 bar (11.6/73/145psi)	210mm (8.27")

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

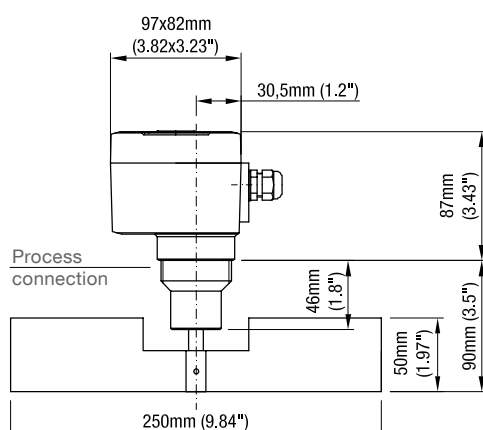
Vane	D
50mm x ..mm (1.97" x ..")	139mm (5.47")
98mm x ..mm (3.86" x ..")	187mm (7.36")

RN ..004



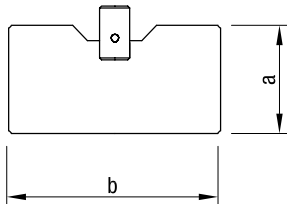
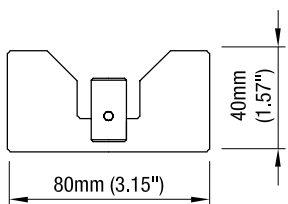
Process temperature	A
150°C (302°F)	200mm (7.87")
250°C (482°F)	200mm (7.87")
350°C (662°F)	300mm (11.8")
600°C (1112°F)	400mm (15.7")

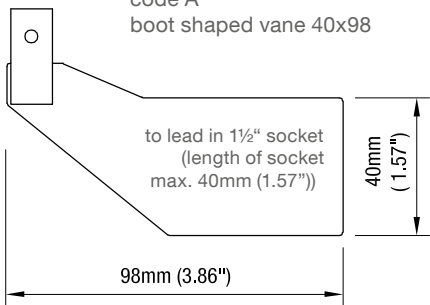
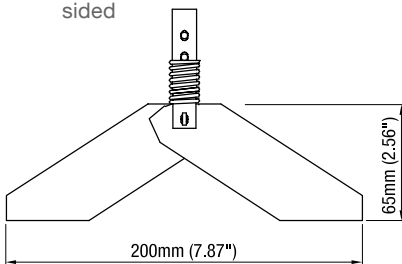
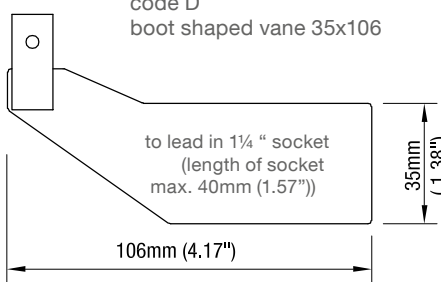
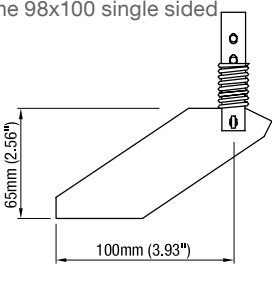
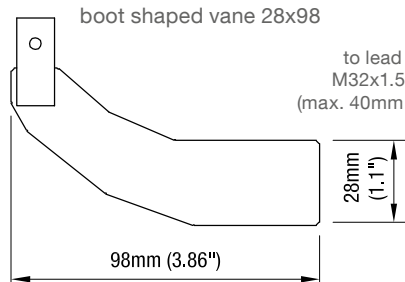
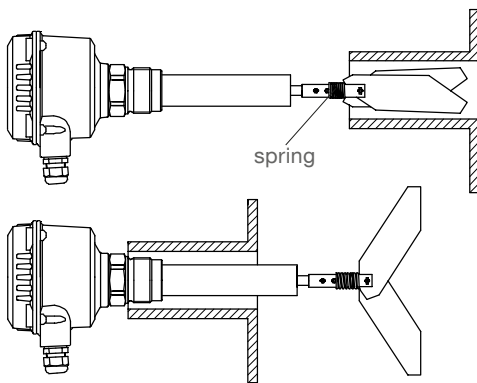
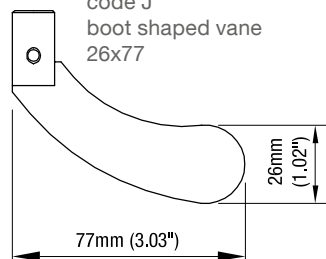
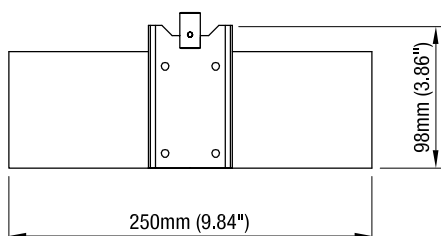
RN 3005



Technical Data

Measuring vanes

				code B,C,E,F,G,I rectangular vane	code P notched 40x80
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")		

<p>code A boot shaped vane 40x98</p>  <p>to lead in 1½" socket (length of socket max. 40mm (1.57"))</p> <p>98mm (3.86")</p> <p>40mm (1.57")</p>	<p>code K hinged vane 98x200 double sided</p>  <p>200mm (7.87")</p> <p>65mm (2.56")</p> <p>b=37mm (1,46") for 1½" / 1¼"</p> <p>b=28mm (1,1") for 1" / M32x1,5</p>
<p>code D boot shaped vane 35x106</p>  <p>to lead in 1¼" socket (length of socket max. 40mm (1.57"))</p> <p>106mm (4.17")</p> <p>35mm (1.38")</p>	<p>code S hinged vane 98x100 single sided</p>  <p>100mm (3.93")</p> <p>65mm (2.56")</p> <p>b=37mm (1,46") für 1½" / 1¼"</p> <p>b=28mm (1,1") for 1" / M32x1,5</p>
<p>code R boot shaped vane 28x98</p>  <p>to lead in 1" or M32x1.5 socket (max. 40mm (1.57"))</p> <p>98mm (3.86")</p> <p>28mm (1.1")</p>	<p>Insertion of the hinged vane through a long socket</p>  <p>spring</p>
<p>code J boot shaped vane 26x77</p>  <p>to lead in M30 socket (max. 40mm (1.57"))</p> <p>77mm (3.03")</p> <p>26mm (1.02")</p>	<p>code M rubber vane 98x250</p>  <p>250mm (9.84")</p> <p>98mm (3.86")</p>

Technical Data

Electrical data

Connection terminals	see page 23/24
Cable entry	M20 x 1,5 screwed cable gland NPT 1/2" conduit connection NPT 3/4" conduit connection (only RN 6000) Clamping range (diameter) of the factory provided cable glands: M20 x 1.5: 6 .. 12mm (0,24 .. 0,47")
Protection class	I III (Version 24V DC PNP)
Overvoltage category	II
Pollution degree	2 (inside housing)
Power supply	see page 23/24
Installed load	see page 23/24
Signal and alarm output	see page 23/24
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 Seal between housing and lid: NBR Seal between housing and process connection: NBR Nameplate: polyester film
Degree of protection	RN 3000: IP 66* RN 6000: IP 66* Types with process connection and extension in stainless steel: IP 66*, NEMA Type 4X (not for: RN 600x with process temperature $\geq 150^{\circ}\text{C}$ (302°F), RN 6002 with sliding sleeve, RN 6003) * IEC/EN/NBR 60529
Prozessanschluss Material (wählbar)	Gewinde: 1.4305 (303) oder 1.4404 (316L) oder Aluminium Triclamp: 1.4305 (303) oder 1.4404 (316L) Flansch Rechteck: 1.4301 (304) oder Aluminium Flansch DN/ ANSI: 1.4541 (321) oder 1.4404 (316L), DN32 auch in Aluminium
Ausleger Material (wählbar)	RN x001: 1.4301 (304) / 1.4305 (303) oder 1.4404 (316L) RN x002 Rohr: 1.4301 (304) / 1.4305 (303) oder 1.4404 (316L) oder Aluminium RN x002 Seil: 1.4305 (303) / 1.4401 (316) RN x003: 1.4301 (304) oder Aluminium RN x004: 1.4301 (304) / 1.4305 (303) oder 1.4404 (316L) oder Aluminium RN 3005: 1.4305 (303) oder 1.4404 (316L)
Flügelwelle Material	1.4301 (304) / 1.4305 (303) oder 1.4404 (316L)
Messflügel inkl. Flügelbolzen Material (wählbar)	Muffen- und Rechteckflügel: 1.4301 (304) oder 1.4404 (316L) Klappflügel 1.4301 (304) / 1.4305 (303) / 1.4310 (301) oder 1.4404 (316L) Gummiflügel 1.4301 (304) / Gummi SBR
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 350°C (662°F) and 600°C (1112°F))

See also selection guide on page 5.

Technical Data

Friction clutch Protects the gear unit against impacts of the measuring vane

Speed of measuring vane 1 rotation or 5 rotations per minute

Sound level max. 50dBA

Overall weight (ca.)

RN 3000	Version				Extension	
	80°C (176°F)		150/250/350/600°C (302/482/662/1112°F)	1100°C (2012°F)		
	Aluminium *	Stainl. steel *			Aluminium	Stainl. steel *
RN 3001	1.2kg (2.6 lbs)	1.5kg (3.3 lbs)	+1.2kg (+2.6 lbs)	+2,8kg (+6,2 lbs)	-	-
RN 3002	1.3kg (2.9 lbs)	1.6kg (3.5 lbs)	+1.2kg (+2.6 lbs)	+2,8kg (+6,2 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)		150/250/350/600°C (302/482/662/1112°F)	1100°C (2012°F)		
	Aluminium *	Stainl. steel *			Aluminium	Stainl. steel *
RN 6001	1.5kg (3.3 lbs)	1.8kg (4.0 lbs)	+12kg (+2.6 lbs)	+2,8kg (+6,2 lbs)	-	-
RN 6002	1.6kg (3.5 lbs)	1.9kg (4.2 lbs)	+1.2kg (+2.6 lbs)	+2,8kg (+6,2 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")

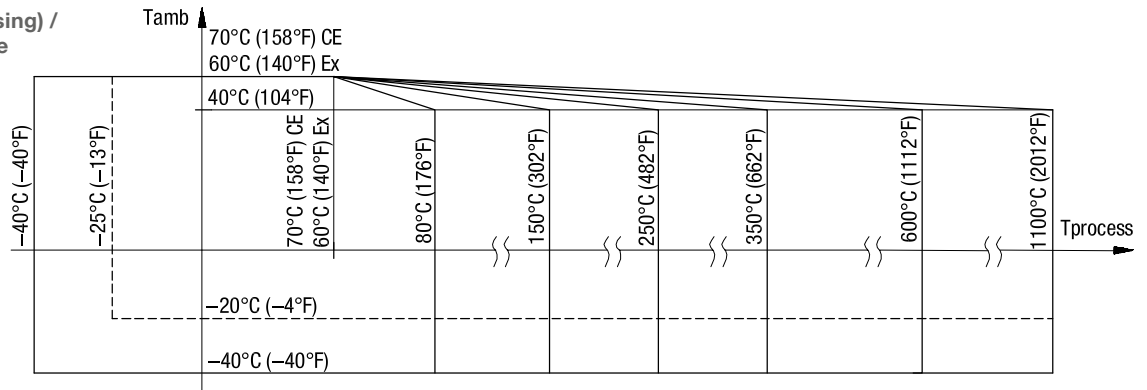
All weights are without flanges (except RN 6003) and smallest measuring vane.

Technical Data

Operating conditions

RN3000:

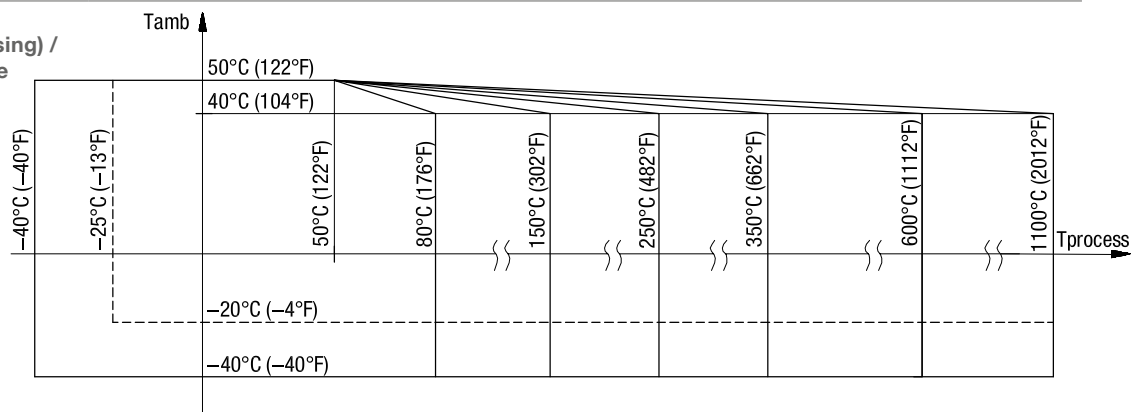
Ambient temp. (housing) /
 process temperature



-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 Ex Version
 +350/600°C (+662/1112°F) process temperature not for version RN 3003, not for Ex-approvals
 +1100°C (2012°F) process temperature for version RN3001, RN3002, not for Ex-approvals
 For versions with Ex-approvals: see remarks on page 31.

RN6000:

Ambient temp. (housing) /
 process temperature



-40°C (-40°F) ambient and process temperature for version with heating of housing (pos. 26)
 +350/600°C (+662/1112°F) process temperature not for version RN6003, not for Ex-approvals
 +1100°C (2012°F) process temperature for version RN3001, RN3002, not for Ex-approvals
 For versions with Ex-approvals: see remarks on page 31.

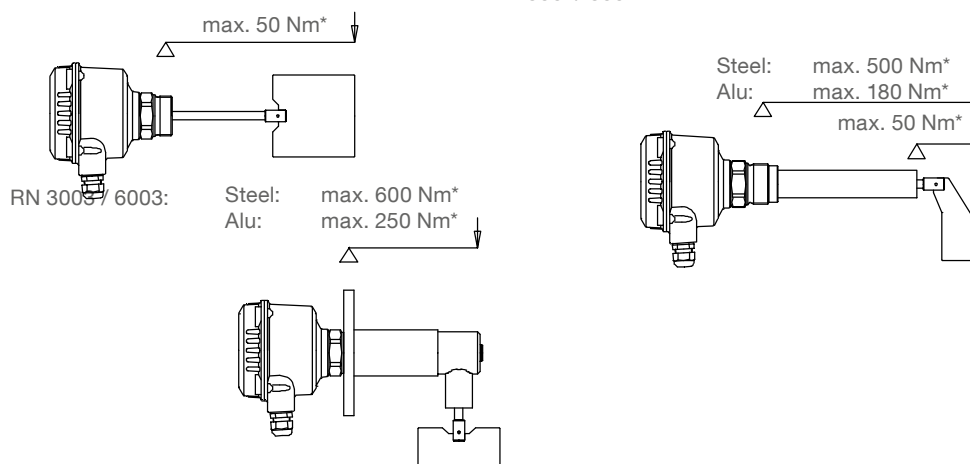
Ventilation	Ventilation is not required		
Min. powder density / sensitivity	see section "Sensitivity" on page 28		
Output signal delay	Version	AC, DC	Universal voltage
	Sensor free -> covered*	ca. 1.3 sec	ca. 1,5 sec + 0 ..20 sec adjustable
	Sensor covered -> free	ca. 0.2 sec	ca. 0,2 sec + 0 ..60 sec adjustable
	*after blocking of the masuring vane		
Features of bulk material	Hardly any limitations.		

Technische Daten

Max. permitted mechanical torque

RN 3001 / 6001:

RN 3002/ 6002
 RN 3004/ 6004:



* at 40°C

For version with reinforced rib on request

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

Max. tractive force	RN 3001 / 6001 pendulum shaft: RN 3002 / 6002-rope:	400N (only applicabel as full detector) 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) and 1100°C (2012°F) version For pressure over 0.8 bar (11.6psi) the Teflon sealing is used. For versions with Ex-approvals: see remarks on page 30.	
Vibration	1.5 (m/s ²) ² /Hz according to EN 60068-2-64	
Relative Humidity	0-100%, suitable for outdoor use	
Altitude	max. 2.000m (6.562ft)	
Expected product lifetime	Following parameters have a negative influence on the expected product lifetime: High ambient- and process temperature, corrosive environment, high vibration, high flow rate of abrasive bulk material passing the sensor element, high amount of measurement cycles..	

Transport and storage

Transport

Observe the instructions as stated on the transport packing, otherwise the products may get damaged.

Transport temperature: -40 .. +80 °C (-40 .. +176 °F)
 Transport humidity: 20 .. 85 %

Transport incoming inspections must be carried out to check for possible transport damage.

Storage

Products must be stored at a dry and clean place.
 They must be protected from influence of corrosive enviroment, vibration and exposure to direct sunlight.

Storage temperature: -40 .. +80 °C (-40 .. +176 °F)
 Storage humidity: 20 .. 85 %

Approvals

	RN 3000 RN 6000	
General Purpose * (Ordinary Locations)	<ul style="list-style-type: none"> • CE • FM • CSA • TR-CU 	EN 61010-1 (IEC/CB)
Hazardous Locations *	<ul style="list-style-type: none"> • • ATEX <ul style="list-style-type: none"> Dust explosion Gas explosion flameproof Gas explosion flameproof / increased safety • • IEC-Ex <ul style="list-style-type: none"> Dust explosion Gas explosion flameproof Gas explosion flameproof / increased safety • FM <ul style="list-style-type: none"> Dust explosion Gas explosion flameproof Gas explosion flameproof / increased safety • CSA <ul style="list-style-type: none"> Dust explosion Gas explosion flameproof Gas explosion flameproof / increased safety • • TR-CU <ul style="list-style-type: none"> Dust explosion Gas explosion flameproof Gas explosion flameproof / increased safety • • INMETRO <ul style="list-style-type: none"> Dust explosion Gas explosion flameproof Gas explosion flameproof / increased safety 	EN 61010-1 (IEC/CB) ATEX II 1/2 D Ex t IIIC T! Da/Db IP6X ATEX II 2G Ex d IIC T! Gb ATEX II 2G Ex de IIC T! Gb IEC-Ex t IIIC T! Da/Db IP6X IEC-Ex d IIC T! Gb IEC-Ex de IIC T! Gb Cl. II, III Div. 1 Gr. E,F,G XP Cl. I Div. 1 Gr. B-D Cl. I Zone 1 AEx d IIC Cl. I Zone 1 AEx de IIC Cl. II, III Div. 1 Gr. E,F,G Ex DIP A20/21 XP Cl. I Div. 1 Gr. B-D Cl. I Zone 1 Ex d IIC Cl. I Zone 1 Ex de IIC Ex ta/tb IIIC T! Da/Db X Ex d IIC T! Gb X Ex de IIC T! Gb X Ex ta/tb IIIC T! Da/Db IP6X Ex d IIC T! Gb Ex de IIC T! Gb Detailed allocation of types and electronic modules to approvals: see selection list.
Functional safety	<ul style="list-style-type: none"> • SIL 2 (IEC 61508) 	The Safety Manual RN6000 must be considered when using the units in safety systems.
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
 (2014/68/EU)

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

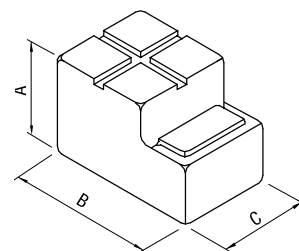
If the measuring device is used outdoors, the use of the weather protection cover is recommended. It protects the device from all atmospheric influences such as:

- 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.

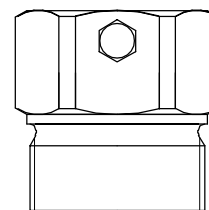


Sliding sleeve

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.



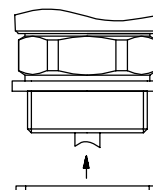
Mounting set

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.

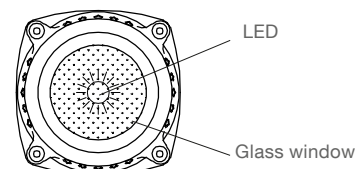
Max. 250°C



LED (Glass window in lid)

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

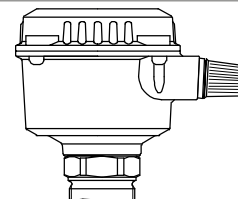
Not available for housing version d and de.



Bulb

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)

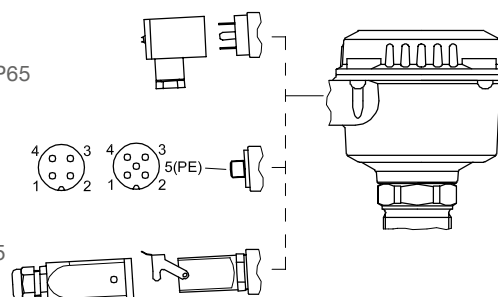
4-pole (incl. PE), max. 230V, enclosure plastic, IP65

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

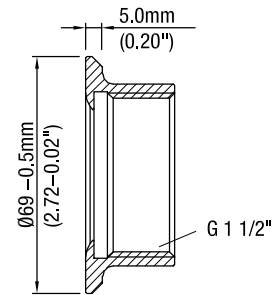


Options / Mounting

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 17).



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

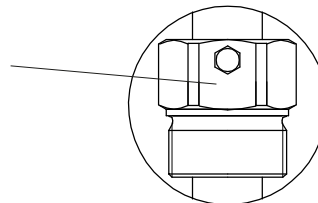
The torque at the fastening spot must not exceed the specified ratings. See page 12 for details.

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.

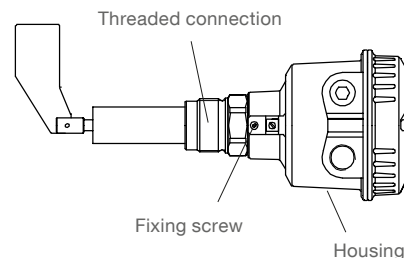
Mounting

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/ Service

- Use teflon tape to avoid seizing of aluminium process connection thread with the socket
- Grease the screws of the lid if corrosive atmosphere is present (e.g. close to sea)

EHEDG-Approval

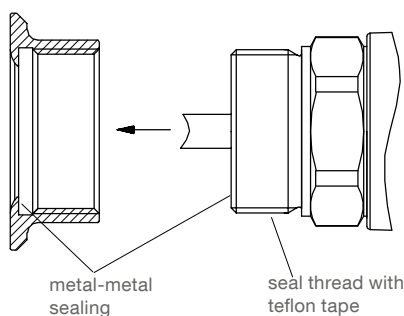
Seal the thread with teflon tape against process pressure.

Metal-metal sealing:

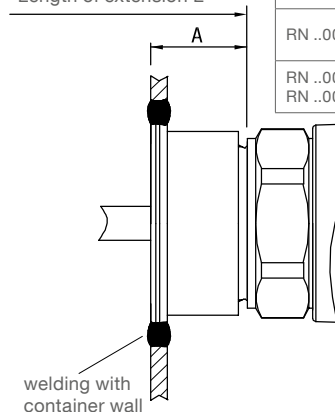
- The support muß be plane and without any gap. No teflon tape (or similar) is allowed to be in between.
- Fixing torque 100Nm

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

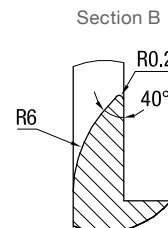
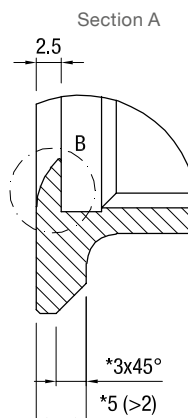
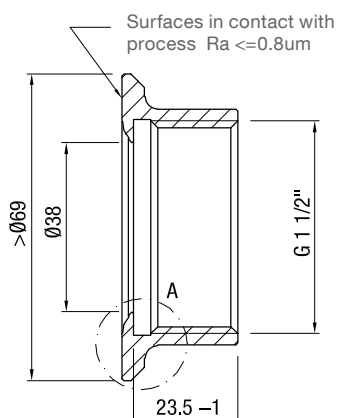


Length of extension L



	A
RN ..001	28mm (1.1")
RN ..002/ RN ..004	38mm (1.5")

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

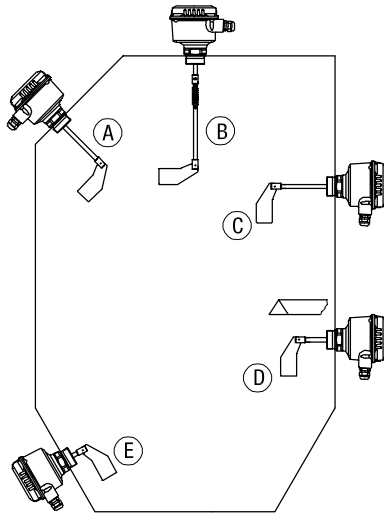


Dimensions in mm

* suggested values
 (in brackets values to be adhered bindingly)

Mounting

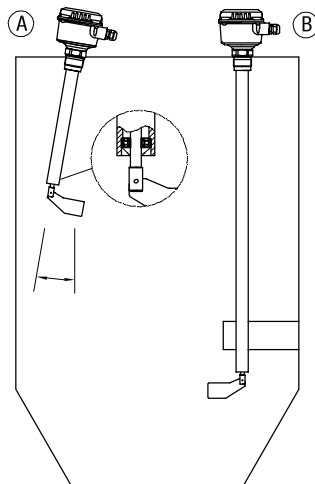
RN 3001
 RN 6001



- A Full detector vertical and oblique from the top
max. „L“ = 600 mm (23.62")
- B With pendulum shaft or rope extension: 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



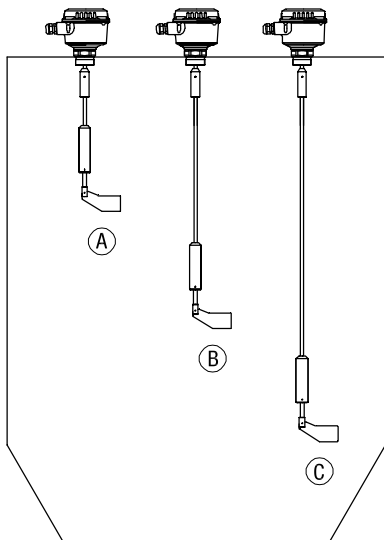
- A Full detector vertical from the top
max. „L“ = 3.000 mm (118")

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

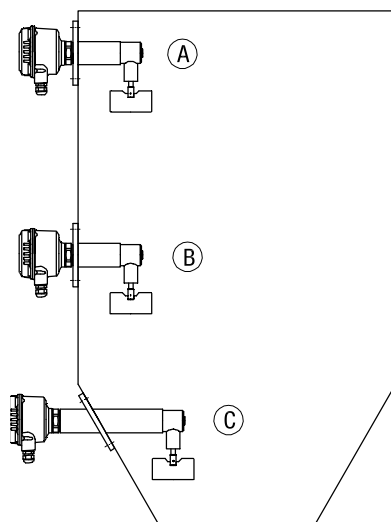


- A Full detector vertical
- B Demand detector vertical
- C Empty detector vertical

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

Mounting

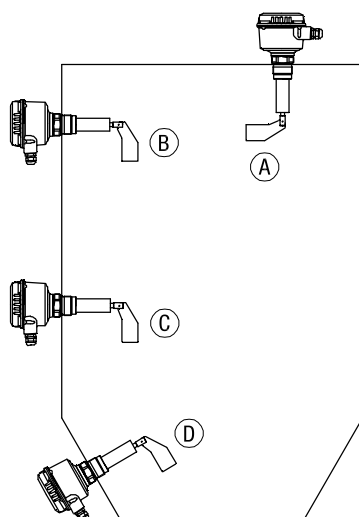
**RN 3003
 RN 6003**



- 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

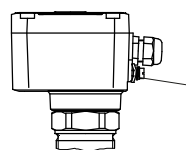
Handling	In the case of improper handling or handling malpractice, the electric safety of the device cannot be guaranteed.
Installation regulations	The local regulations or VDE 0100 (Regulations of German Electrotechnical Engineers) must be observed. With use of 24V supply voltage, an approved power supply with reinforced insulation to mains is required.
Fuse	Use a fuse as stated in the connection diagrams (see pages 23 and 24).
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 or INMETRO 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	<ul style="list-style-type: none"> • The diameter has to match to the clamping range of the used cable gland. • The cross section has to match with the clamping range of the connection terminals and consider the max. current. • All field wirings must have insulation suitable for at least 250V AC. • The temperature rating must be at least 90°C (194°F). • If higher immunity interferences as specified in the stated EMC standards are present (see chapter approval), a shielded cable is required, otherwise an unshielded instrumentation cable is satisfactory.
Guiding the cables in the terminal box	Cut the field wiring cables to appropriate length to fit properly into the terminal box.
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

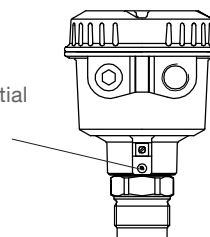
External equipotential bonding terminal

RN 3000

RN 6000



Connect to equipotential bonding of the plant



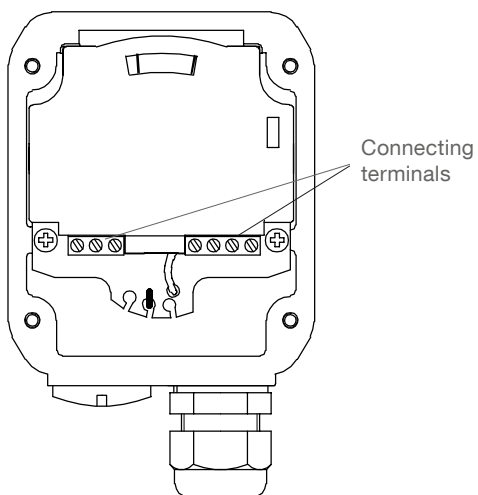
Electrical installation

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
Cable glands and conduit system for ATEX / IEC-Ex INMETRO / TR-CU (Dust and Gas Hazardous Locations)	<p>Installation according to the regulations of the country, where the product is installed.</p> <p>Not used entries have to be closed with blanking elements certified for this purpose.</p> <p>Where available the factory provided parts must be used.</p> <p>A strain relief must be provided for the field wiring cables, when the device is installed with the factory provided cable glands.</p> <p>The diameter of the field wiring cable must match to the clamping range of the cable clamp.</p> <p>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 10 Kelvin. The parts must be mounted according to the instructions of the supplier.</p> <p>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").</p>	
Conduit system for FM and CSA (Dust and Gas Hazardous Locations)	<p>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°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.</p> <p>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.</p>	
Commissioning	Commissioning only with closed lid.	
Opening the lid	<p>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.</p> <p>RN 6000:</p> <p>Units with flameproof GasExplosion approval (d-housing): To prevent ignition of hazardous atmospheres, do not remove the lid (cover) while circuits are alive.</p>	

Electrical installation

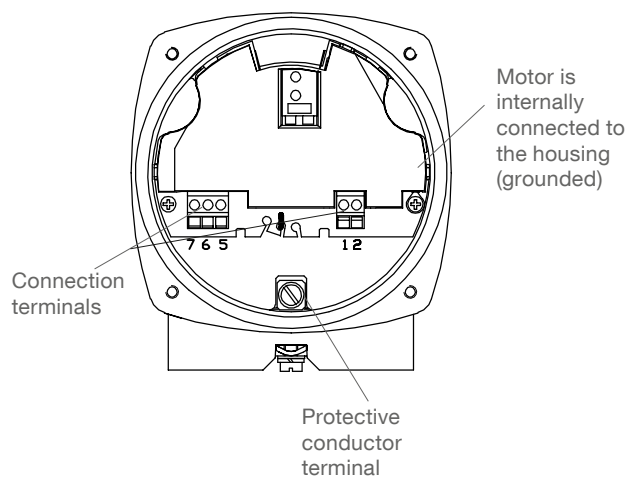
Connection

RN 3000: Standard housing



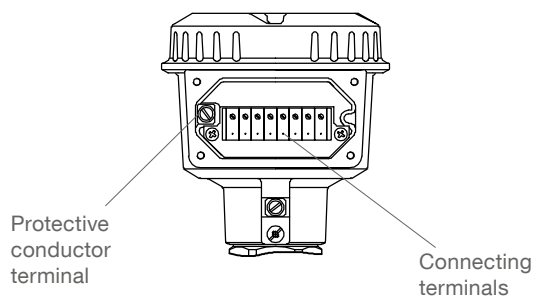
RN 6000: Standard and d-housing

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

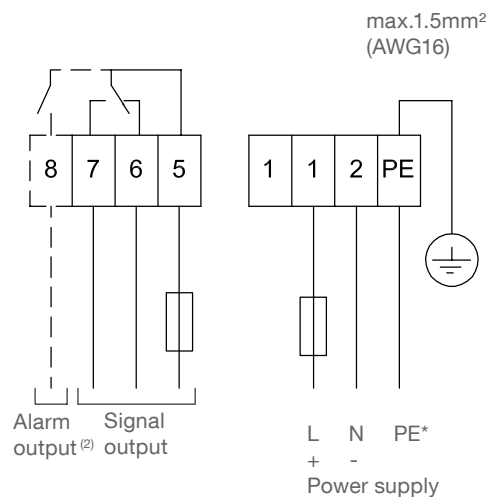
Power supply:

- **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 ($\cos\varphi = 1$)
 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:

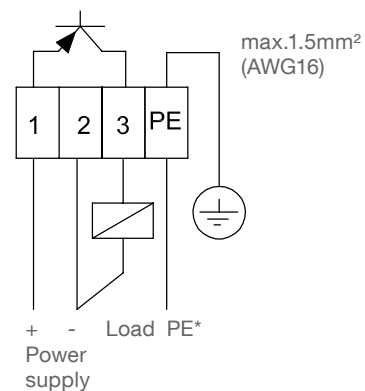
- PNP

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:

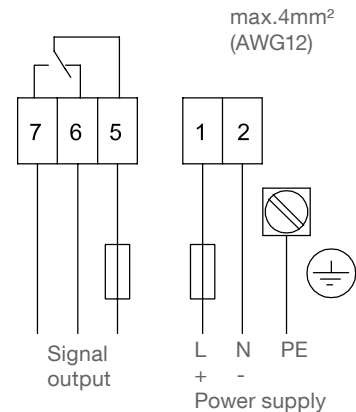
- **AC version:**
 24V or 48V or 115V or 230V 50/60Hz max. 4VA
 All voltages $\pm 10\%$ ⁽¹⁾
 Supply voltage as selected.
 External fuse: max 10A, fast or slow, HBC, 250V

- **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
 (without SIL 2)

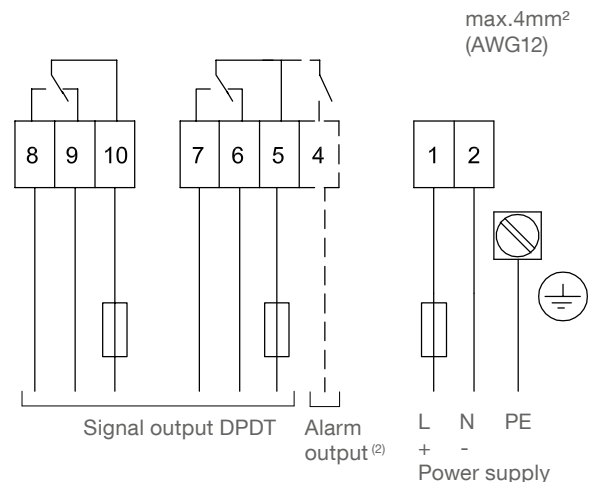
Power supply:

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

Version:

- Universal voltage
 SIL 2

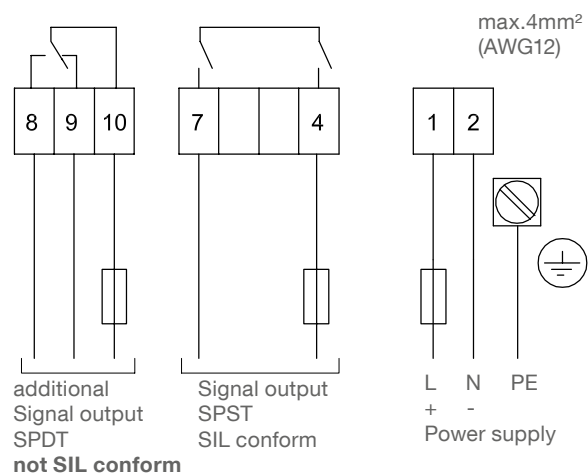
Power supply:

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

⁽¹⁾ including $\pm 10\%$ of EN 61010

Signal output:

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



* 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.

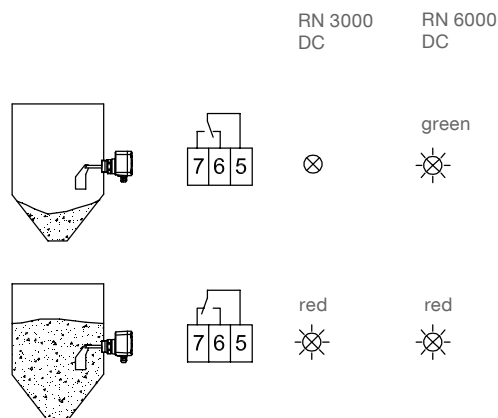
Signal and alarm output

Overview

Overview of signal and alarm output for the different electronic versions: see page 5

Signal output: Switching logic

Version • RN 3000: AC, DC
 • RN 6000: AC, DC



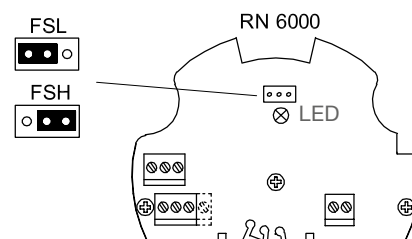
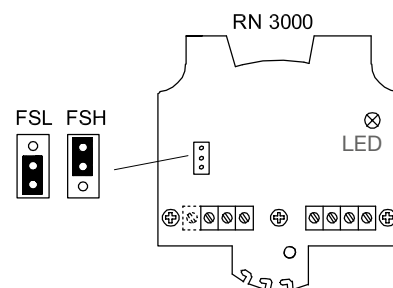
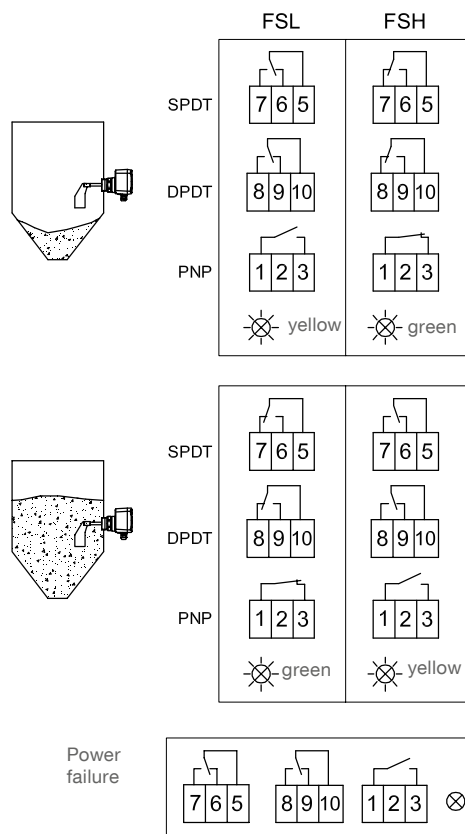
Version • RN 3000: Universal voltage, PNP
 • RN 6000: Universal voltage (without SIL 2)

FSH: Use this setting when sensor is used as a full detector.

Power failure or line break is regarded as „full“ signal (protection against overfilling).

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).



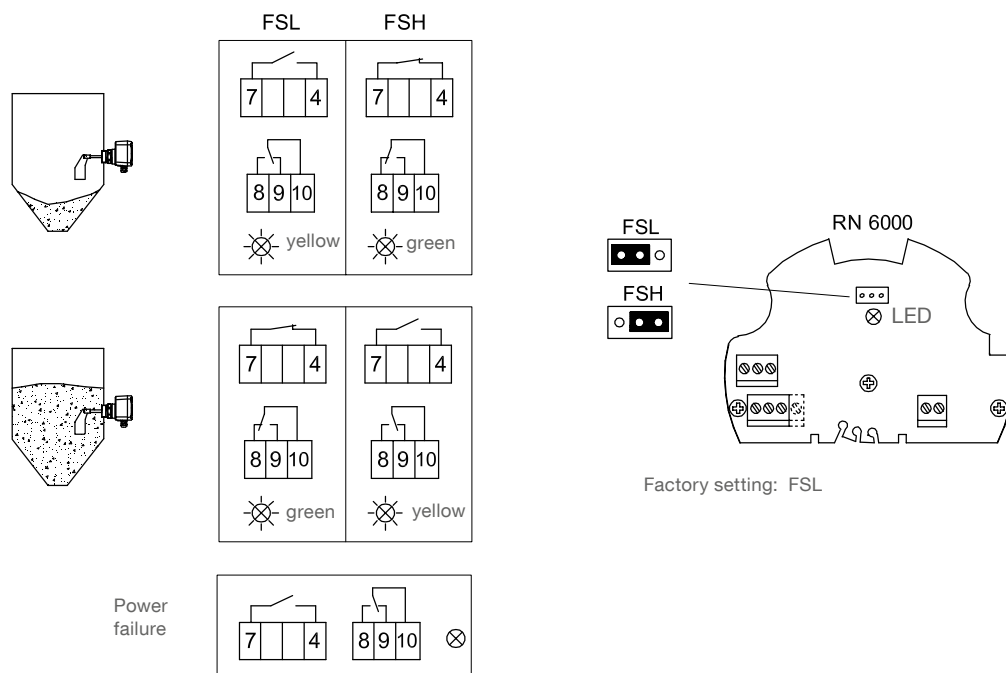
Factory setting: FSL

Signal and alarm output

Version • RN 6000: Universal voltage SIL 2

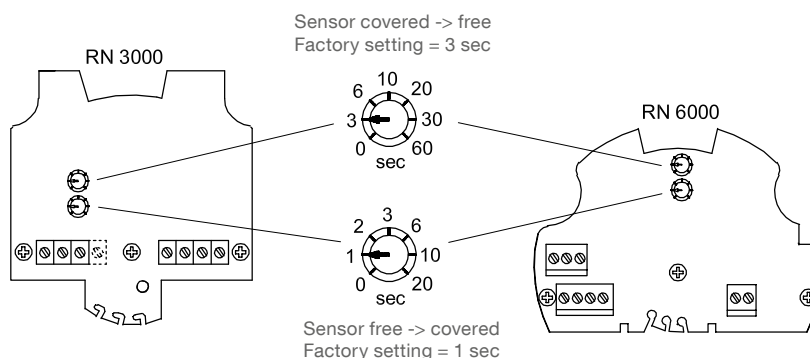
FSH: Use this setting when sensor is used as a full detector.
 Power failure or line break is regarded as „full“ signal (protection against overfilling).

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).



Signal and alarm output

Signal output: Delay

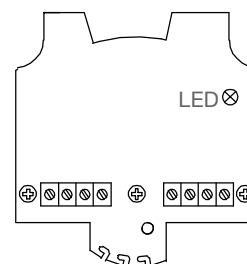
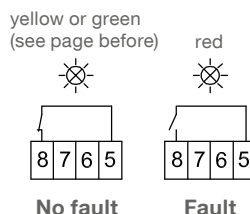


Alarm output (Fail safe alarm, Rotation control)

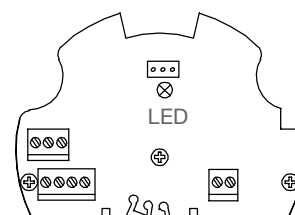
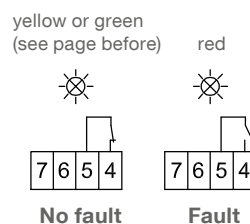
Switching and timing behaviour:

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



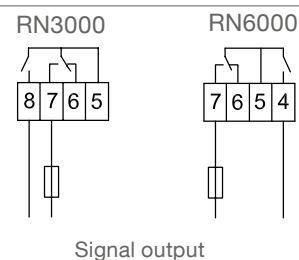
RN 6000 Universal voltage (without SIL 2)



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



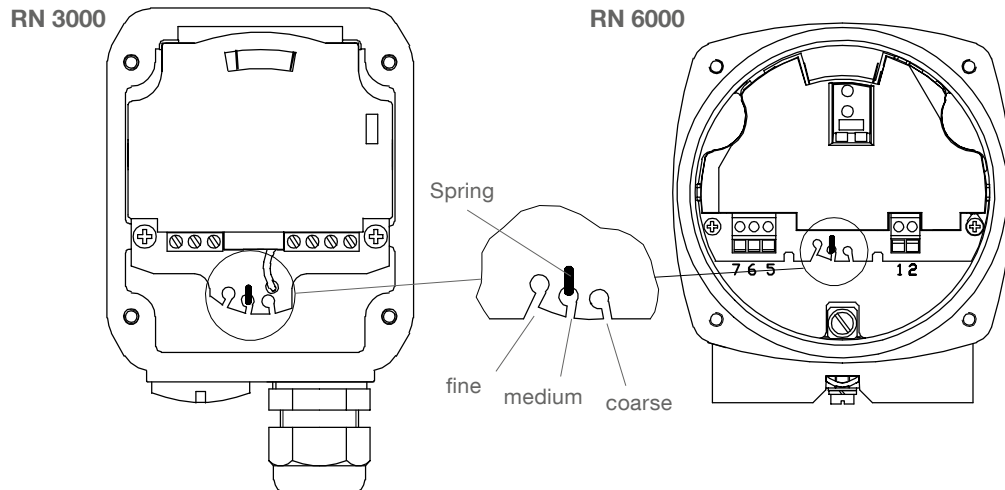
Settings: Sensitivity

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/m³ (lb/ft³) (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

Opening the lid (cover)	<p>Before opening the lid for maintenance reasons observe following items:</p> <ul style="list-style-type: none"> • Do not remove the lid while circuits are live. • No dust deposits or whirlings are present. • No rain can enter into the housing.
Frequent check of the unit	<p>To ensure durable safety in hazardous locations and with electrical safety, following items must be checked frequently depending on the application:</p> <ul style="list-style-type: none"> • Mechanical damage or corrosion of any components (housing side and sensor side) and of the field wiring cables. • Tight sealing of the process connection, cable glands and enclosure lid.. • Properly connected external PE cable (if present).
Cleaning	<p>If cleaning is required by the application, following must be observed:</p> <ul style="list-style-type: none"> • Cleaning agent must comply with the materials of the unit (chemical resistance). Mainly the shaft sealing, lid sealing, cable gland and the surface of the unit must be considered. <p>The cleaning process must be done in a way, that:</p> <ul style="list-style-type: none"> • The cleaning agent cannot enter into the unit through the shaft sealing, lid sealing or cable gland. • No mechanical damage of the shaft sealing, lid sealing, cable gland or other parts can happen. <p>Units with EHEDG certification, which are used in the respective EHEDG applications, must be cleaned dry only (Type ED). Furthermore the respective regulations must be observed.</p> <p>A possible accumulation of dust on the unit does not increase the maximum surface temperature and must therefore not be removed for purposes of maintaining the surface temperature in hazardous locations.</p>
Function test	<p>A frequent function test may be required depending on the application.</p> <p>Observe all relevant safety precautions related with a safe work depending on the application (e.g. hazardous locations, hazardous bulk material, electrical safety, process pressure).</p> <p>This test does not proof if the sensor is sensitive enough to measure the material of the application.</p> <p>Function test is done by stopping the rotating paddle with appropriate means and monitor if a correct change of the signal output from uncovered to covered happens.</p>
Production date	<p>The production date can be traced by the serial number on the typeplate. Please contact the manufacturer or your local distributor.</p>
Spare parts	<p>All available spare parts are stated in the selection list.</p>

Notes for use in Hazardous Locations

Zone classification

	Useable in zone	ATEX Category	IEC-Ex / INMETRO 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

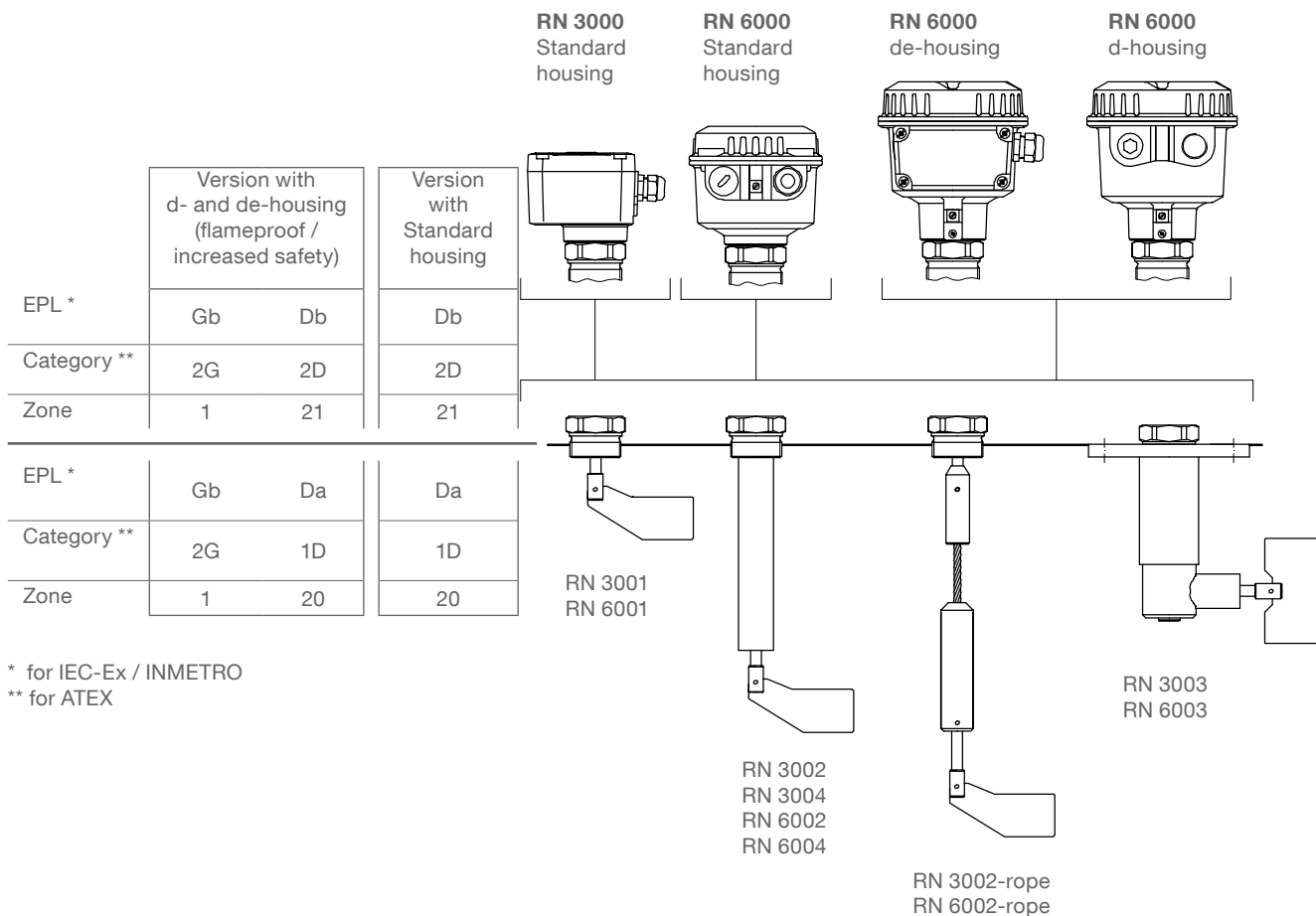


The device construction allows process over-pressure up to 0.8/5/10 bar (11.6/73/145psi) (see name plate). These pressures are allowed for test purposes. The definition of the Ex approvals are only valid for a container-over-pressure between -0.2..+0.1 bar (-2.9..+1.45psi). For higher or lower pressures 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

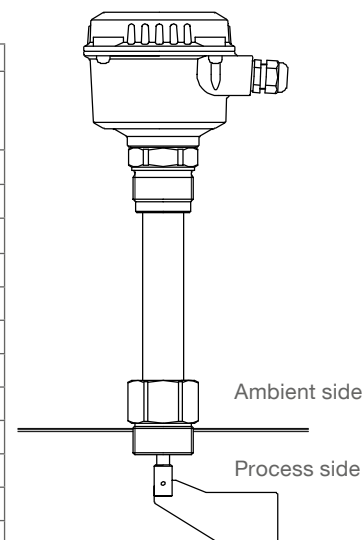
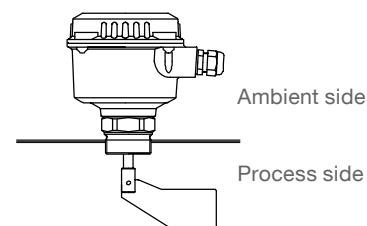
The temperature marking on the name plate  refers to the instruction manual.
 In the following tables the relevant temperature ratings are shown.

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
RN3000: 60°C (140°F) RN6000: 50°C (122°F)	80°C (176°F)	120°C (248°F)	T4A	T4

* Ambient temperature derating see page 12

Enclosure mounted offset to the process connection				
Max. ambient temperature	Max. process temperature	Max. surface temperature	Temperature class (Division system)	Temperature class (Zone system)
RN3000: 60°C (140°F) RN6000: 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"

Disposal

The product consists of materials which can be recycled, details of the used materials see chapter "Technical data - mechanical data". Recycling must be done by a specialised recycling company.
Since the product is not subject to the WEEE directive 2002/96/EG, it is not permitted to bring it to a public recycling station.

Table of contents

	Page
Safety notes / Technical support	2

Introduction	3

Function	4

Technical data	5

Approvals	8

Options	9

Mounting	10

Electrical installation	12

Signal and Alarm output	15

Settings sensitivity	17

Maintenance	18

Notes for use in Hazardous Locations	19

Disposal	20

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: 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 (address details at www.uwt.de). Otherwise please contact:

UWT GmbH
 Westendstr. 5
 87488 Betzigau
 Germany

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.

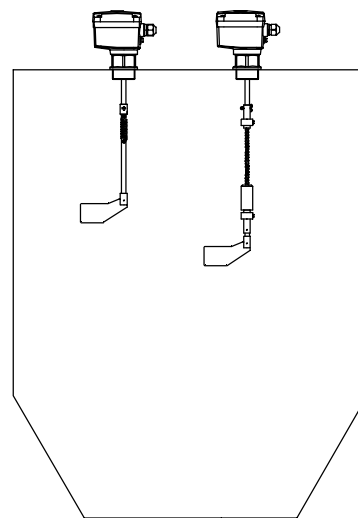
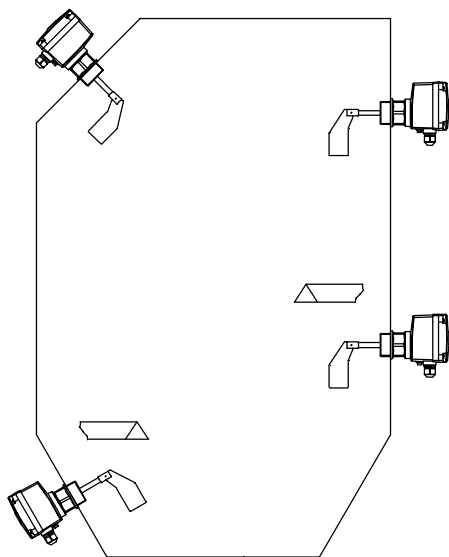
The units can be delivered with Ex-approvals for use in Hazardous Areas.

Selected applications:

- **building materials industry**
lime, styrofoam, moulding sand, 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 (full detector).



Function

A measuring vane is driven by a synchronous motor. The bearing of the motor inside the housing allows it to swing. The motor is fixed to a switching lug.

If the vane is uncovered, a spring pulls the motor and switching lug to the left position (figure 1).

When material covers the vane and thus stops the rotation, the motor and switching lug swings to the right position (figure 2). The signal output indicates "covered" and the motor is stopped.

When the vane becomes uncovered due to falling material, the spring pulls the motor and switching lug back to the left position (figure 1). The motor is started and the signal output indicates "uncovered".

Signal output delay

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

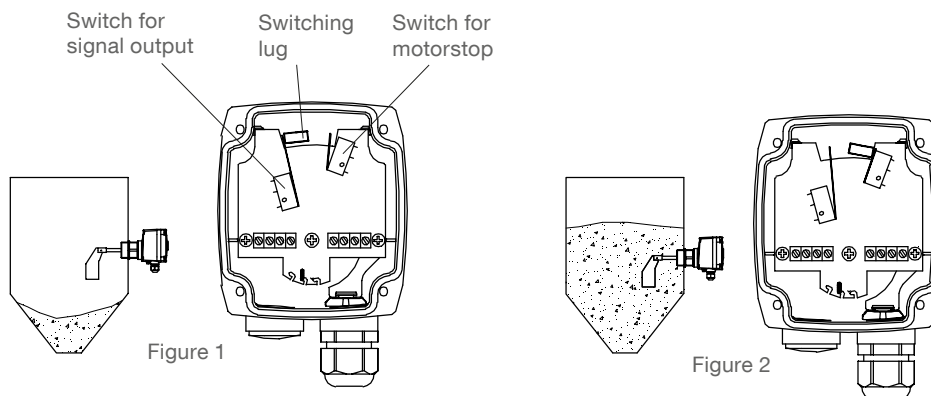
Option fail safe alarm

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" and "PNP" a switchable signal output FSH/FSL is integrated.

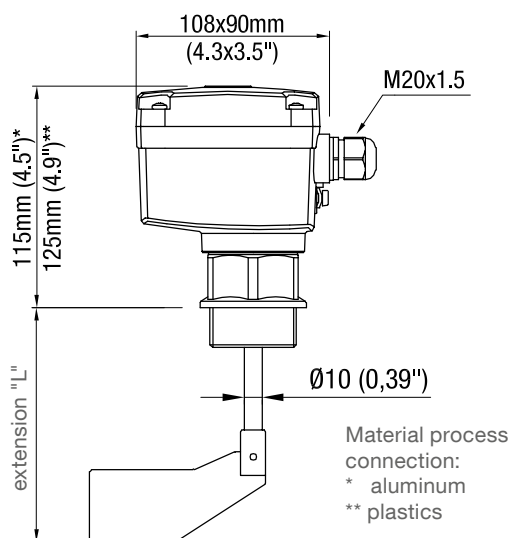


Electronics						
Supply		Signal output				
		SPDT ⁽¹⁾	PNP	FSH/FSL ⁽²⁾	Adjust. delay	Fail safe alarm
AC version	24V or 48V or 115V or 230V AC	•	-	-	-	-
DC version	24VDC	•	-	-	-	-
DC version	24VDC PNP	-	•	•	•	-
Universal voltage	24VDC /22..230V AC	•	-	•	•	option

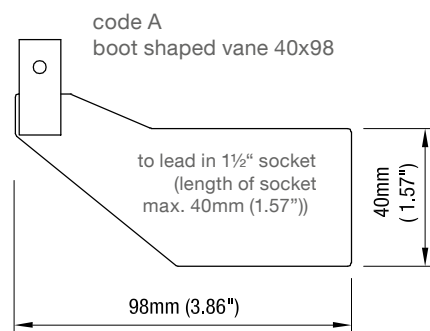
⁽¹⁾ Micro switch, Relais for universal voltage

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

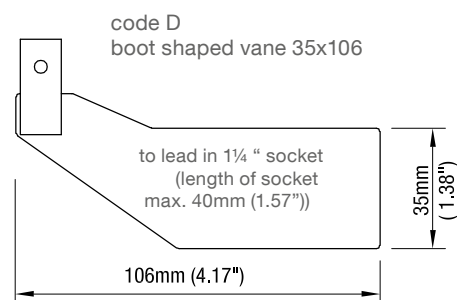
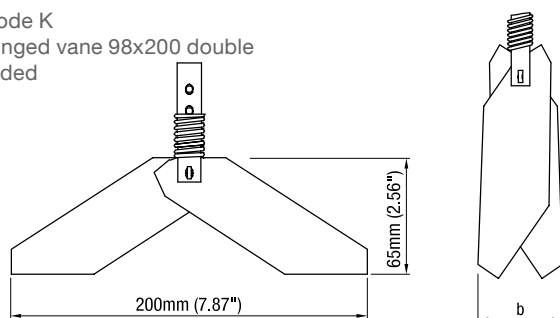
Technical Data



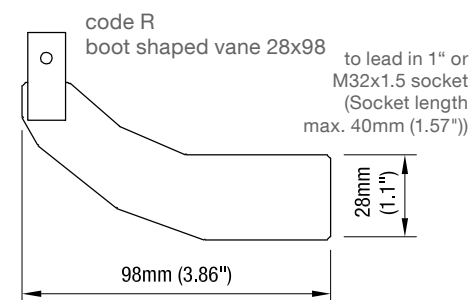
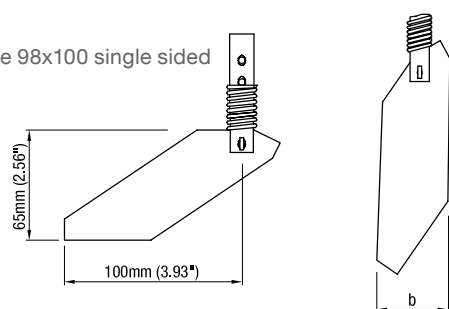
Measuring vanes



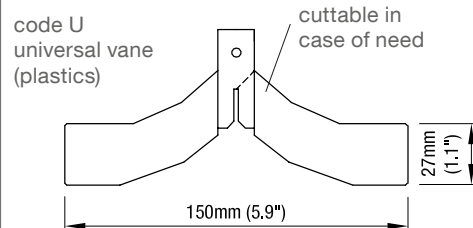
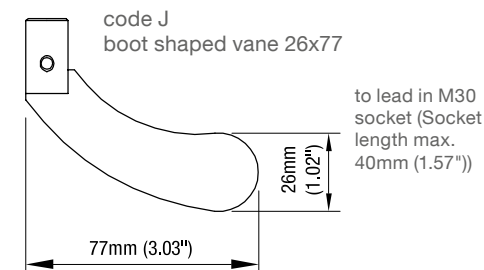
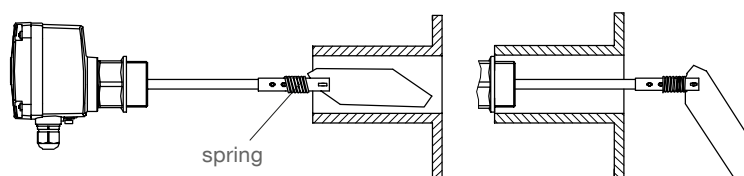
code K
hinged vane 98x200 double sided



code S
hinged vane 98x100 single sided



Insertion of the hinged vane through a long socket



Technical Data

Electrical data

Connection terminals	max. 1.5mm ² (AWG 16)
Cable entry	M20 x 1,5 screwed cable gland Clamping range (diameter) of the factory provided cable glands: M20 x 1.5: 6 .. 12mm (0.24 .. 0.47")
Protection class	I III (Version 24V DC PNP)
Overvoltage category	II
Pollution degree	2 (inside housing)
Power supply	see page 14
Installed load	see page 14
Signal and alarm output	see page 14
Isolation	Power to signal and alarm output: 2225 Vrms
Indicating light	By built-in LED (not with AC version)

Mechanical data

Housing	Plastics PA6 GF, RAL 5010 gentian blue Seal between housing and lid: NBR Seal between housing and process connection: NBR Nameplate: polyester film
Degree of protection	IP 66 (IEC/EN/NBR 60529)
Process connection	Aluminium or plastics PA6 GF Thread: Metric or G (DIN 228) according to selection
Vane shaft and measuring vane	Material: stainless steel 1.4301 (304) / 1.4305 (303), Universal vane in plastics PP
Tolerance length "L"	± 10mm (± 0.39")
Bearing	Process connection aluminium: ball bearing, dust tight Process connection plastics: slide bearing (maintenance-free, high-quality)
Sealing	Radial rotary shaft sealing. Material: NBR (Acrylnitril-Butadien-rubber)
Friction clutch	Protects the gear unit against impacts of the measuring vane
Speed of measuring vane	1 rotation or 5 rotations per minute
Sound level	max. 50dBA

Technical Data

Operating conditions

Ambient temp. (housing)	-20 .. +60°C (-4 .. +140°F) -40 .. +60°C (-40 .. +140°F) Version with heating of housing (pos. 26)		
Process temperature	-20 .. + 80°C (-4 .. +176°F) -40 .. +80°C (-40 .. +176°F) Version with heating of housing (pos. 26)		
Ventilation	Ventilation is not required		
Min. powder density / Sensitivity	see section "Sensitivity" on page 17		
Signal delay	Version Sensor free -> covered* Sensor covered -> free	AC, DC, Multivoltage ca. 1.3 sec ca. 0.2 sec	Universal voltage ca. 1,5 sec + 0 ..20 sec adjustable 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 (lateral)	Process connection aluminium: Process connection plastics:	max. 50 Nm max. 25 Nm	Protective measures in case of high loading: mounting of an protective canopy above the probe.
Max. tractive force	Pendulum shaft: Rope extension:	400N (applicable only as full detector) 1,5kN (applicable only as full detector)	
Max. process pressure	-0,9 .. +0,8bar (-13,1 .. 11.6psi) Versions with Ex-approvals: see remarks on page 19.		
Vibration	1.5 (m/s ²)/Hz according to EN 60068-2-64		
Relative Humidity	0-100%, suitable for outdoor use		
Altitude	max. 2.000m (6.562ft)		
Expected product lifetime	Following parameters have a negative influence on the expected product lifetime: High ambient- and process temperature, corrosive environment, high vibration, high flow rate of abradable bulk material passing the sensor element, high amount of measurement cycles.		

Transport and Storage

Transport	Observe the instructions as stated on the transport packaging, otherwise the products may get damaged. Transport temperature: -40 .. +80 °C (-40 .. +176 °F) Transport humidity: 20 .. 85 % Transport incoming inspections must be carried out to check for possible transport damage.
Storage	Products must be stored at a dry and clean place. They must be protected from influence of corrosive environment, vibration and exposure to direct sunlight. Storage temperature: -40 .. +80 °C (-40 .. +176 °F) Storage humidity: 20 .. 85 %

Approvals

Non-hazardous Locations	CE TR-CU	EN 61010-1 (IEC/CB)	
Hazardous Locations *	ATEX IEC-Ex TR-CU INMETRO	Dust explosion Dust explosion Dust explosion Dust explosion	ATEX II 1/2 D Ex t IIIC T! Da/Db IP6X IEC-Ex t IIIC T! Da/Db IP6X DIP A20/A21 Ex t IIIC T! Da/Db IP6X
EMC	EN 61326 -A1		
RoHS conform	According to directive 2011/65/EU		
Pressure Equipment Directive (2014/68/EU)	<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, clause 2.1.4). The units are designed and manufactured in accordance to the Pressure Equipment Directive.</p> <p>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.</p>		



* Depending on selected version

Options

Weather protection cover

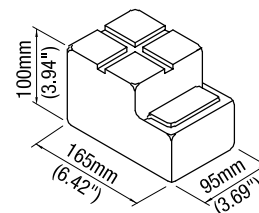
If the measuring device is used outdoors, the use of the weather-protection-cover is recommended. It protects the device from all atmospheric influences such as:

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

Material: PE, weather and temperature stable

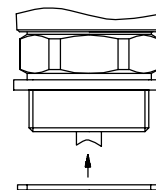


For use in Hazardous Locations:
 only permitted for zone 22



Flat gasket

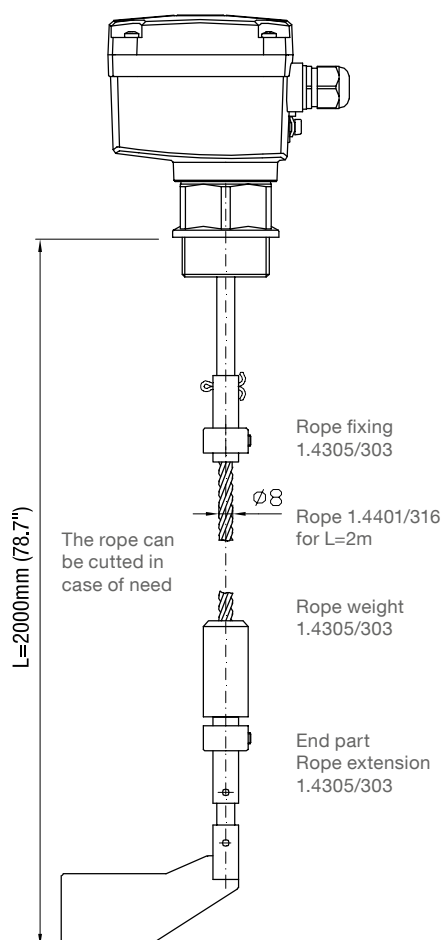
On the face sealing of the process connection thread.
 Incl. sealing face for version with process connection G 1 1/2" thread aluminium.



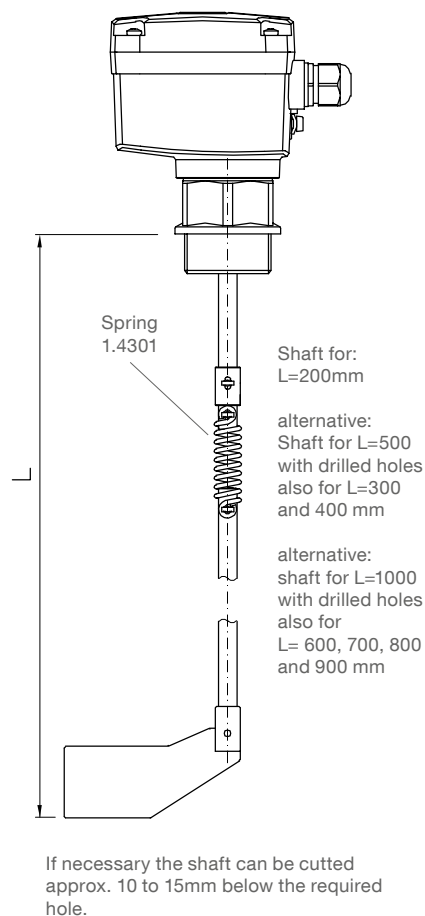
Extensions

(Kits, application only as full detector)

Rope extension



Pendulum shaft



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 7 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.

! Additional Safety Instructions for Hazardous Locations

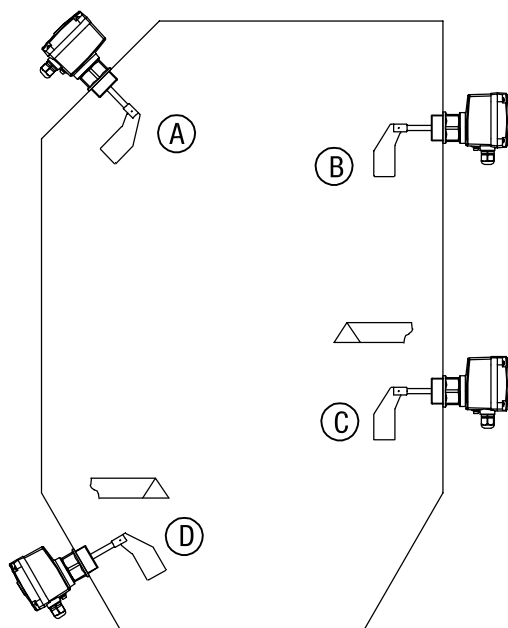
Installation regulations	For devices to be used in Hazardous Locations the respective valid installation regulations must be observed.
---------------------------------	---

Mounting instructions

Rotatable housing	The housing can be rotated against the threaded connection after mounting.
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 or a flat gasket against process pressure.
Precaution for later dismantling	Use teflon tape to avoid seizing of aluminium process connection thread with the socket

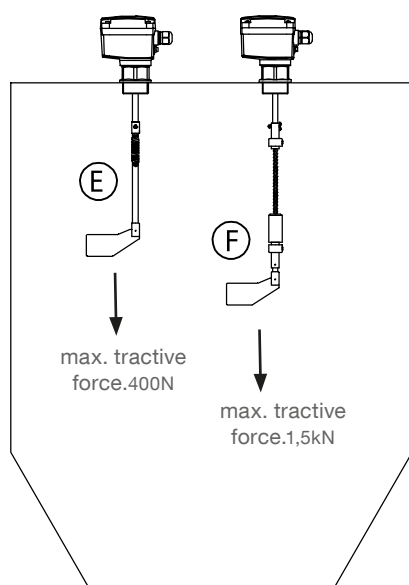
Mounting/Electrical Installation

Mounting



- 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 (except full detector) : Boot shaped vane recommended (min. mech. load, because the vane aligns to the movement of the material).



- E With pendulum shaft: Full detector vertical from the top
Observe max. tractive force.
- F With rope extension: Full detector vertical from the top
Observe max. tractive force.

Electrical Installation

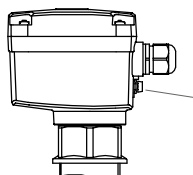
! General Safety Instructions

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. With use of 24V supply voltage, an approved power supply with reinforced isolation to mains is required
Fuse	Use a fuse as stated in the connection diagrams (see pages 14).
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 or INMETRO 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.
Field wiring cables	<ul style="list-style-type: none"> • The diameter has to match to the clamping range of the used cable gland. • The cross section has to match with the clamping range of the connection terminals and consider the max. current. • All field wirings must have insulation suitable for at least 250V AC. • The temperature rating must be at least 90°C (194°F). • If higher immunity interferences as specified in the stated EMC standards are present (see chapter approval), a shielded cable is required, otherwise an unshielded instrumentation cable is satisfactory.
Guiding the cables in the terminal box	Cut the field wiring cables to appropriate length to fit properly into the terminal box.
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.

Electrical installation

! Additional Safety Instructions for Hazardous Locations

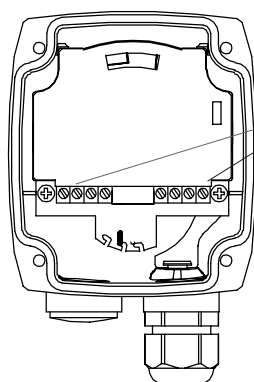
Extenal equipotential bonding terminal



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.
Cable glands for ATEX / IEC-Ex/ INMETRO / TR-CU	<p>Installation according to the regulations of the country, where the product is installed.</p> <p>Not used entries have to be closed with blanking elements certified for this purpose.</p> <p>Where applicable the factory provided parts must be used.</p> <p>A strain relief must be provided for the field wiring cables, when the device is installed with the factory provided cable glands.</p> <p>The diameter of the field wiring cable must match to the clamping range of the cable clamp.</p> <p>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.</p>
Commissioning	Commissioning only with closed lid.
Opening the lid	<p>Before opening the lid take care, that no dust deposits or whirlings are present.</p> <p>Do not remove the lid (cover) while circuits are alive.</p>

Connection



Connecting terminals

Electrical installation

Version:

- AC
- DC
- Universal voltage

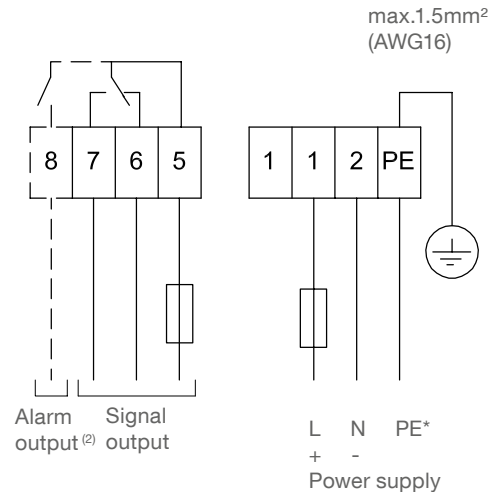
Power supply:

- **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 ($\cos\varphi = 1$)
 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:

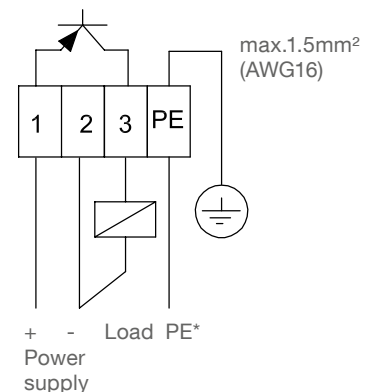
- PNP

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.

Signal and alarm output

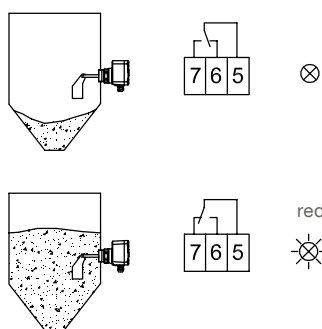
Overview

Overview of signal and alarm output for the different electronics versions: see page 4

Signal output: Switching logic

Versions

- AC
- DC



Versions

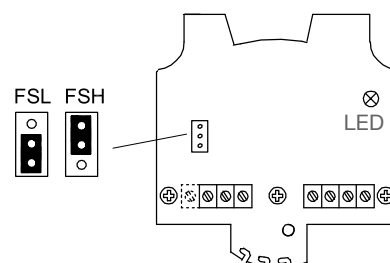
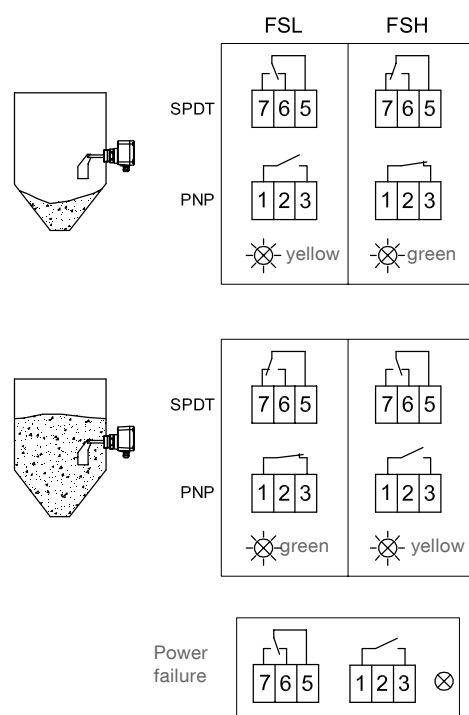
- PNP
- Universal voltage

FSH: Set in case of using the sensor as a full detector.

Power failure or line break is regarded as „full“ signal (protection against overfilling).

FSL: Set in case of using the sensor as an empty detector.

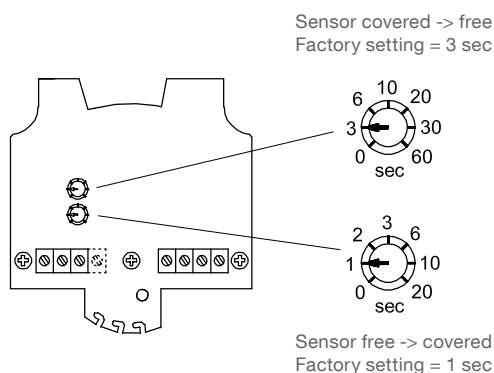
Power failure or line break is regarded as „empty“ signal (protection against running dry).



Factory setting: FSL

Signal and alarm output

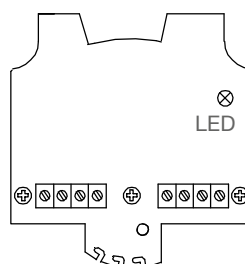
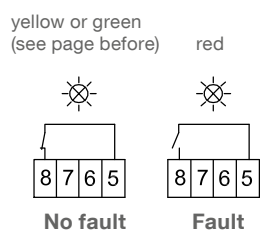
Signal output: Delay



Alarm output (Fail safe alarm)

Switching and timing behaviour:

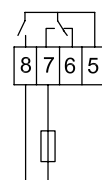
If the sensor is not covered, the rotating paddle shaft will send pulses at 20 sec intervals. In case of fault, the pulses are missed. After 30 sec the alarm relay will open.



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



Signal output

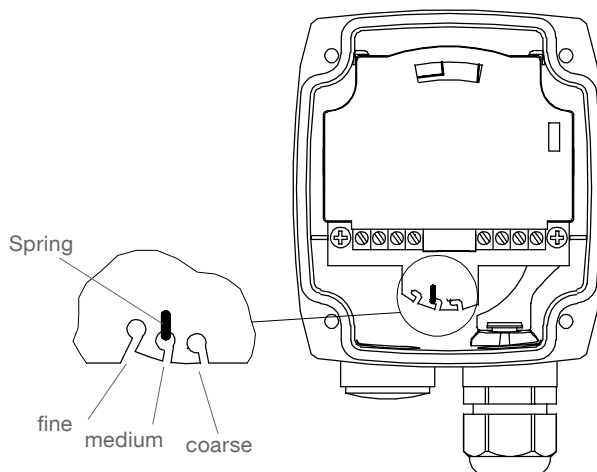
Settings: Sensitivity

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 vane 26x77	350 (21)	560 (33)	200 (12)	250 (15)
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

Opening the lid (cover)	<p>Before opening the lid for maintenance reasons observe following items:</p> <ul style="list-style-type: none"> • Do not remove the lid while circuits are alive. • No dust deposits or whirlings are present. • No rain can enter into the housing.
Frequent check of the unit	<p>To ensure durable safety in hazardous locations and with electrical safety, following items must be checked frequently depending on the application:</p> <ul style="list-style-type: none"> • Mechanical damage or corrosion of any components (housing side and sensor side) and of the field wiring cables. • Tight sealing of the process connection, cable glands and enclosure lid. • Properly connected external PE cable (if present).
Cleaning	<p>If cleaning is required by the application, following must be observed:</p> <ul style="list-style-type: none"> • Cleaning agent must comply with the materials of the unit (chemical resistance). Mainly the shaft sealing, lid sealing, cable gland and the surface of the unit must be considered. <p>The cleaning process must be done in a way, that:</p> <ul style="list-style-type: none"> • The cleaning agent cannot enter into the unit through the shaft sealing, lid sealing or cable gland. • No mechanical damage of the shaft sealing, lid sealing, cable gland or other parts can happen. <p>A possible accumulation of dust on the unit does not increase the maximum surface temperature and must therefore not be removed for purposes of maintaining the surface temperature in hazardous locations.</p>
Function test	<p>A frequent function test may be required depending on the application.</p> <p>Observe all relevant safety precautions related with a safe work depending on the application (e.g. hazardous locations, hazardous bulk material, electric safety, process pressure).</p> <p>This test does not proof if the sensor is sensitive enough to measure the material of the application.</p> <p>Function test is done by stopping the rotating paddle with appropriate means and monitor if a correct change of the signal output from uncovered to covered happens.</p>
Production date	<p>The production date can be traced by the serial number on the typeplate. Please contact the manufacturer or your local distributor.</p>
Spare parts	<p>All available spare parts are stated in the selection list</p>

Notes for use in Hazardous Locations

Zone classification

	Useable in zone	ATEX Category	IEC-Ex / INMETRO Equipement Protection Level (EPL)
Dust applications	20, 21, 22	1 D	Da
	21, 22	2 D	Db
	22	3 D *	Dc

* 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 / IEC-Ex



The device construction allows process over-pressure upto 0.8 bar (11.6 psi). These pressures are allowed for test purposes. The definition of the ATEX and IEC-Ex is only valid for a container-over-pressure between -0.2...+0.1 bar (-2.9...+1.45psi). For higher or lower pressures the approval is not valid.

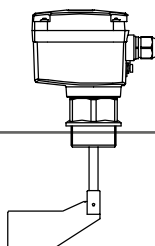
Process and ambient temperature

The permitted temperature ranges are marked on the name plate.

Permitted zones for mounting in partition wall

EPL*	Db
Category**	2D
Zone	21

EPL*	Da
Category**	1D
Zone	20



* For IEC-Ex / INMETRO

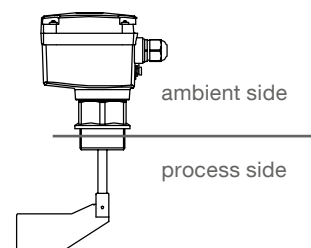
** For ATEX

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).

Max. ambient temperature	Max. process temperature	Max. surface temperature	Temperature class
40°C (104°F)	60°C (140°F)	100°C (212°F) 120°C (248°F) ⁽¹⁾	T5 T4 ⁽¹⁾
50°C (122°F)	70°C (158°F)	110°C (230°F) 120°C (248°F) ⁽¹⁾	T4
60°C (140°F)	80°C (176°F)	120°C (248°F)	T4



⁽¹⁾ With use of electronic "Universal voltage"

Disposal

The product consists of materials which can be recycled, details of the used materials see chapter "Technical data - mechanical data".

Recycling must be done by a specialised recycling company.

Since the product is not subject to the WEEE directive 2002/96/EG, it is not permitted to bring it to a public recycling station.

Table of contents

	Page
Safety notes / Technical support	2

Introduction	3

Technical data	4

Approvals	12

Options	13

Mounting	14

Electrical installation	18

Signal output / Diagnostics	24

Settings Sensitivity	29

Maintenance	30

Notes for use in Hazardous Locations	31

Assembly VN ..040	34

Assembly VN ..020 / VN ..030 with separate housing	39

Disposal	41

Subject to technical change and price change.

All dimensions in mm (inches).

We assume no liability for typing errors.

Different variations to those 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

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



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.

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 (see www.uwt.de for address). Otherwise you can contact:

UWT GmbH
 Westendstr. 5
 87488 Betzigau
 Germany

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

Introduction

Applications

The device is used for level monitoring in all types of containers and silos.

It can be used with all powdery and granulated bulk materials that do not show a strong tendency to form crusts or deposits. Detection of solids in water is also possible.

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

A selection of fields of application:

- **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 VIBRANIVO oscillating probe 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.

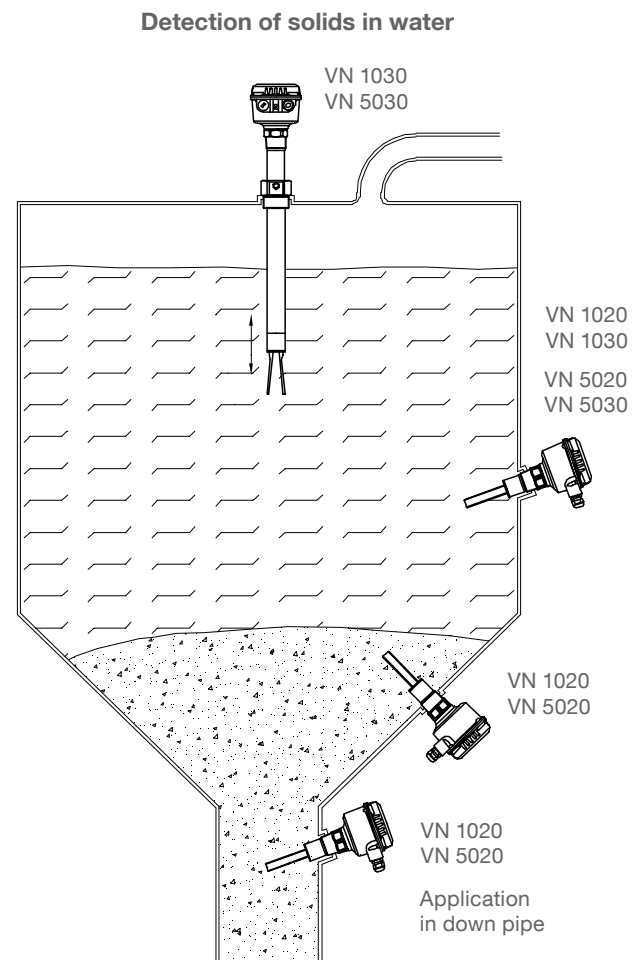
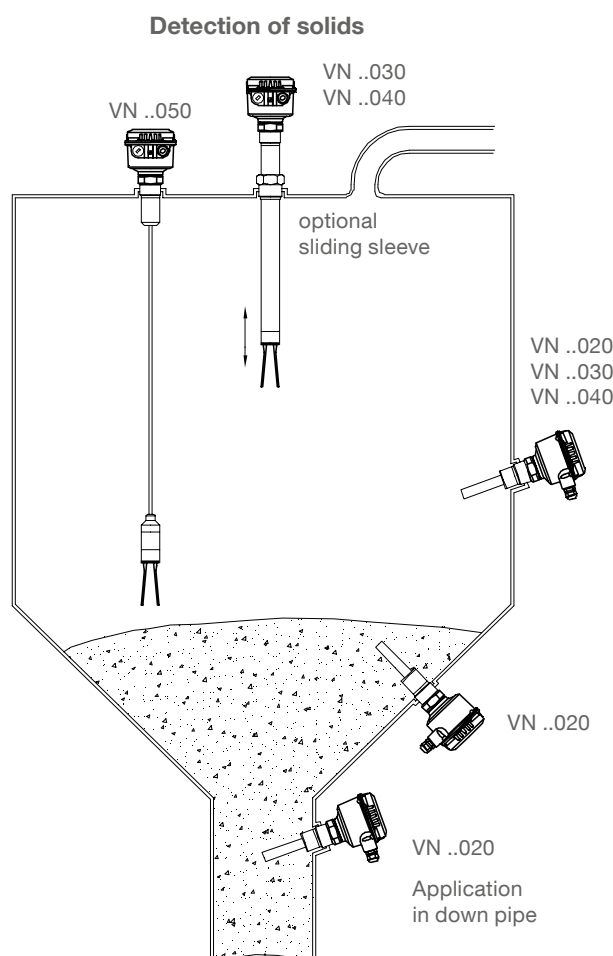
The length of the probe can be up to 4m (157") with an extension tube (VN ..030) or up to 20m (787") with an extension rope (VN 2050/ 6050).

The use of a sliding sleeve is recommended so that the switch point can be changed easily during operation of the device.

Function

The piezo-electrically stimulated oscillating fork vibrates at its mechanical resonance frequency. If the probe is covered by the bulk material, the damping thus generated is registered electronically and a corresponding signal output is actuated.

The oscillation of the fork ensures a certain self-cleaning.

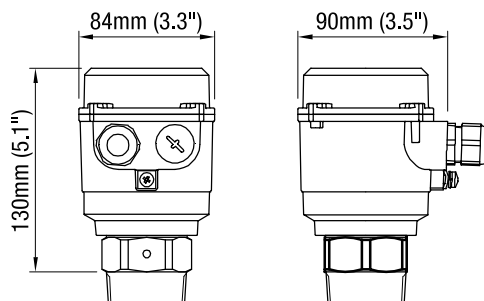


Technical data

Housing versions

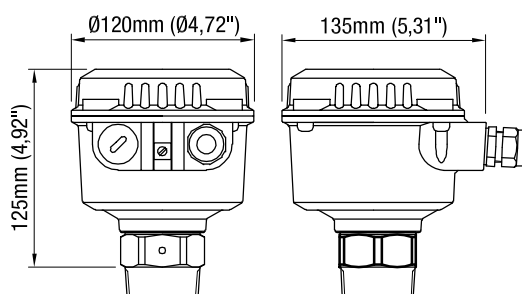
Series VN 1000 / 2000

Standard



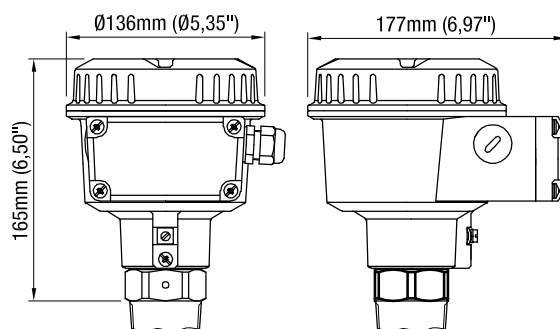
Series VN 5000 / 6000

Standard



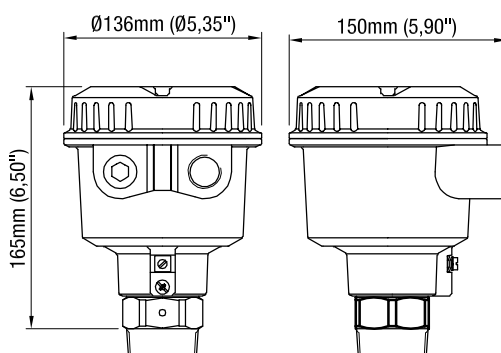
de

Explosionproof with
 increased safety
 terminal box



d

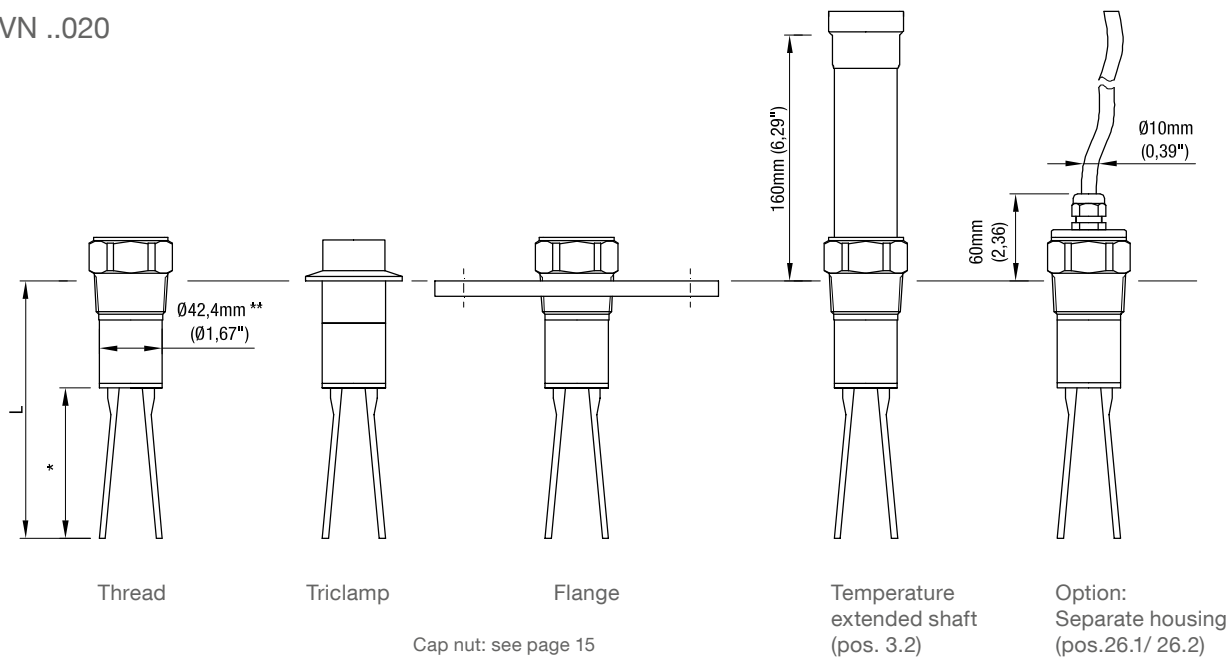
Flameproof /
 explosionproof



Technical Data

Extensions

VN ..020

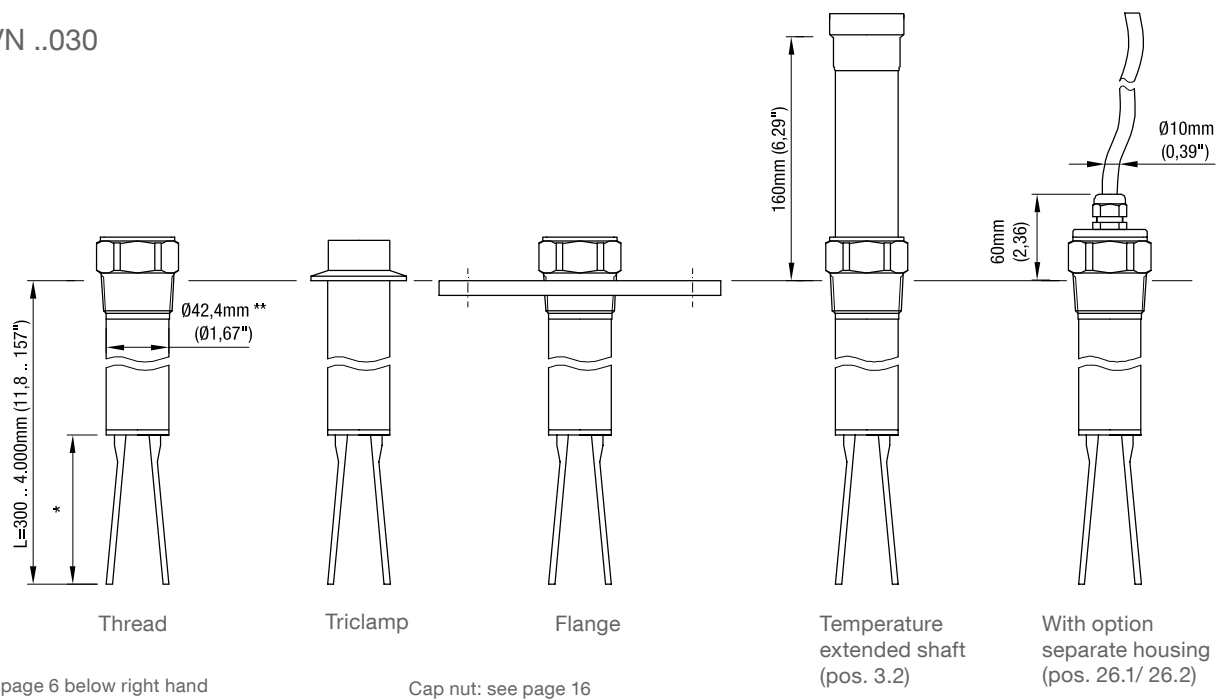


	L	
	without option	with option: enhanced sensitivity (pos. 26x) Vibrasil 70 (pos. 26a) Vibrasil 90 (pos. 26b)
VN 1020 VN 5020	165mm (6.5")	
VN 2020 VN 6020	235mm (9.25")	260mm (9.84")

* see page 6 bottom right

** Welding seam max. Ø43,8mm (1.72")

VN ..030

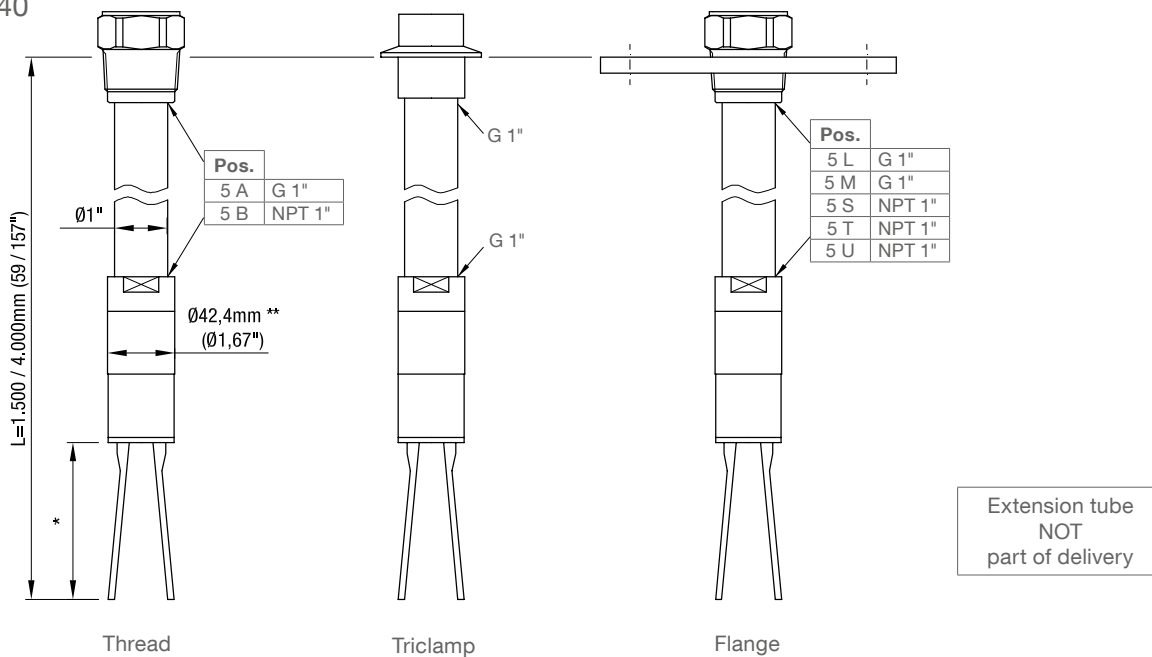


* see page 6 below right hand

** Welding seam max. Ø43,8mm (1.72")

Technical data

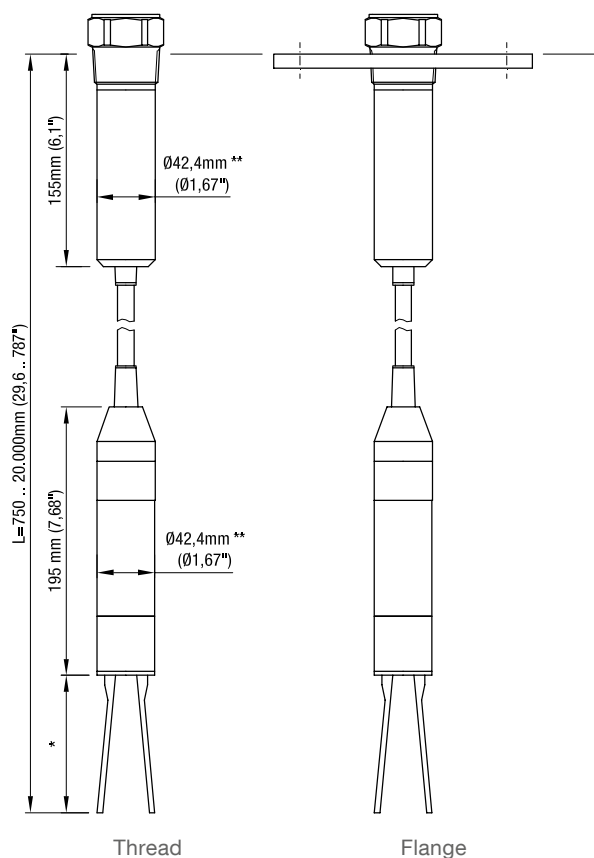
VN ..040



* see bottom right

** Welding seam max. Ø43,8mm (1.72")

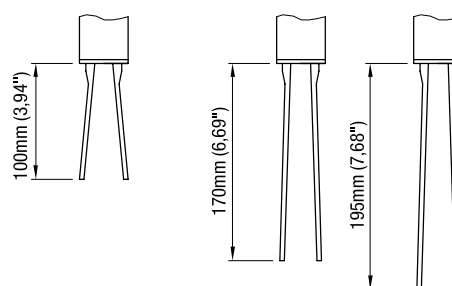
VN ..050



* Length of oscillating rods

VN 10..0
 VN 50..0

VN 20..0
 VN 60..0



with option
 Enhanced sensitivity (pos.26x)
 Vibrasil® 70 (pos.26a)
 Vibrasil® 90 (pos.26b)

* see right

** Welding seam max. Ø43,8mm (1.72")

Technical data

Electrical data

Connection terminals	max. 4mm ² (AWG 12)
Cable entry	M20 x 1.5 screwed cable gland NPT 1/2" conduit connection NPT 3/4" conduit connection (only VN 5000 / 6000) Clamping range (diameter) of the factory provided cable glands: M20 x 1.5: 6 .. 12mm (0.24 .. 0.47")
Signal delay	Sensor free -> covered ca. 1 sec Sensor covered -> free ca. 1..2 sec On the electronic module "Universal voltage Relay DPDT" is an electronic delay, adjustable up to 30sec.
Safety operation (FSL,FSH)	Switchable for minimum or maximum safety
Sensitivity	Adjustable in 2 levels (A/B)
Vibration frequency	VN 1000 / 5000: ca. 350Hz VN 2000 / 6000: ca. 125Hz ca. 90Hz (enhanced sensitivity)
Installation category	II
Pollution degree	2 (inside housing)

Electronic modules	Universal voltage Relay SPDT (VN 1000/ 2000/ 5000/ 6000)	Universal voltage Relay DPDT (VN 1000/ 2000/ 5000/ 6000)	3-wire PNP (VN 1000/ 2000/ 5000/ 6000)
Power supply	19..230V AC 50-60Hz 19..55V DC +10%	19..230V AC 50-60Hz 19..55V (36V*)DC +10% * Version with intrinsic safe connection between Electronic module and Vibrating fork (see pos.4 in the selection list)	18V..50V DC +10%
Max. ripple of power supply	7 V _{ss} at DC	7 V _{ss} at DC	7 V _{ss}
Installed load	max. 8VA / 1,5W	max. 18VA / 2W	max. 1,5W
Signal output	Floating relay SPDT VN 1000 / 2000: AC max. 253V, 4A, 500VA at cos Phi = 1 DC max. 253V, 4A, 60W VN 5000 / 6000: AC max. 250V, 8A non inductive DC max. 30V, 5A non inductive	Floating relay DPDT VN 1000 / 2000: AC max. 253V, 4A, 500VA at cos Phi = 1 DC max. 253V, 4A, 60W VN 5000 / 6000: AC max. 250V, 8A non inductive DC max. 30V, 5A non inductive	Open Collector: permanent load max. 0.4A short-circuit and overload protected turn-on voltage: max. 50V (reverse protection)
Intrinsic safe ratings	-	-	-
Indicating light	Status of signal output by built-in LED	Status of signal output by built-in LED	Status of signal output by built-in LED
Isolation	Power supply to signal output: 2225 Vrms	Power supply to signal output: 2225 Vrms Signal output to signal output (DPDT): 2225 Vrms	-
Protection class	I	I	III

Technical data

Electronic modules	2-wire without contact (VN 1000/2000/ 5000/6000)	NAMUR IEC 60947-5-6 (VN 2000/ 6000)	8/16mA or 4-20mA (VN 1000/2000/ 5000/6000)	8/16mA (VN 1000/2000/ 5000/6000)
Power supply	19..230V 50/60Hz / DC +10%	ca. 7 ..9 V DC (spec. IEC 60947-5-6)	Non intrinsic safe version: 12.5 .. 36V DC +0% Intrinsic safe version: 12.5 .. 30V DC +0%	12.5 .. 36V DC +0%
Max. ripple of power supply	7 V _{ss} at DC	-	-	-
Installed load	max. 1.5VA / 1W	max. 30mA (for non intrinsic safe application)	max. 0.8W	max. 0.8W
Signal output	<p>Load current: min. 10mA max. 500mA permanent max. 2A < 200ms max. 5A < 50ms Voltage drop on the electronic module: max 7V with closed electric circuit.</p> <p>Cutoff current with open electric circuit: max 5mA.</p> <p>To enable a safe opening of relay contacts, the cutoff current will be set for some milliseconds to 0, when opening the electric circuit.</p> <p>Short-circuit- and overload-protected.</p>	<1mA or > 2,2mA (spec. IEC 60947-5-6)	<p>Setting 8/16mA: 8mA or 16mA +- 0.5mA.</p> <p>Setting 4-20mA: Output current depends on the vibration amplitude of the fork between 6mA for damped vibration and 20mA for full vibration. Resolution is 0.1mA.</p>	8mA or 16mA +- 1mA
Intrinsic safe ratings	-	U _i 20V I _i 67mA P _i 0.17W C _i negligible small L _i negligible small	Intrinsic safe version: U _i 30V I _i 130mA P _i 0.8W C _i negligible small L _i negligible small	-
Indicating light	Status of signal output by built-in LED	Status of signal output and diagnostics of vibration by built-in LED	Status of signal output and diagnostics of vibration by built-in LED	Status of signal output by built-in LED
Protection class	I	III	III	III

Technical data

Mechanical data

Housing	Aluminium housing, powder coated RAL 5010 gentian blue Seal between housing and lid: NBR Seal between housing and process connection: NBR Nameplate: polyester film		
Cable for separate housing	Silicone elastomer, ø10mm (0.39"), surface resistance < 10 ⁹ Ohm, UV-resistant, min. bending radius 50mm (1.97")		
Degree of protection	VN 1000/ 2000:	IP 66*	
	VN 5000/ 6000:	NEMA Type 4X, IP 66*	
	* IEC/EN 60529		
Process connection / extension L	VN ..020/ ..030/ ..050: Stainless steel 1.4301 (304)* or 1.4404 (316L) VN ..40 : Stainless steel 1.4305 (303)* or 1.4404 (316L) *Flanges 1.4541 (321) Extension cable VN..050: PUR with carbon black (no food grade) Thread: R 1½" tapered DIN 2999 or NPT 1½" tapered ANSI B 1.20.1 Triclamp: Stainless steel 1.4301 (304) or 1.4404 (316L) 2" (DN 50) ISO 2852 Flanges according to selection		
Oscillator	Material: stainless steel 1.4404 / 1.4581 (316L) (food grade) Surface treatment of vibrating rods: polished, Ra ≤ 0,75µm; teflon (on request)		
Sound level	max. 50dBA		

Overall weight (ca.)

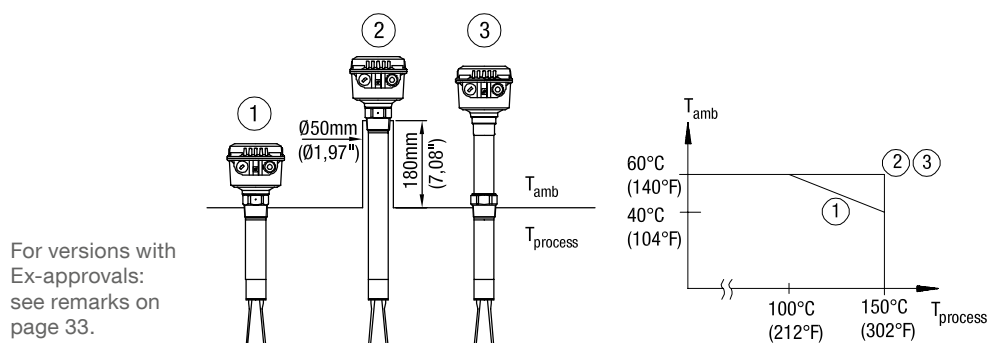
VN 1000/ 2000	Standard housing	Extension
VN 1020/ 2020:	1.6kg (3.5 lbs)	-
VN 1030/ 2030:	1.6kg (3.5 lbs)	+2.5kg/m (+5.5 lbs per 39.3")
VN 1040/ 2040:	2.0kg (4.4 lbs)	delivery without extension tube
VN 1050/ 2050:	4.0kg (8.8 lbs)	+0.5kg/m (+1.1 lbs per 39.3")

VN 5000/ 6000	Standard housing	de-housing	d-housing	Extension
VN 5020/ 6020:	2.1kg (4.6 lbs)	3.2kg (7 lbs)	2.8kg (6.2 lbs)	-
VN 5030/ 6030:	2.1kg (4.6 lbs)	3.2kg (7 lbs)	2.8kg (6.2 lbs)	+2.5kg/m (+5.5 lbs per 39.3")
VN 5040/ 6040:	2.5kg (5.5 lbs)	3.6kg (7.9 lbs)	3.2kg (7 lbs)	delivery without extension tube
VN 5050/ 6050:	4.5kg (9.9 lbs)	5.6kg (12.3 lbs)	5.2kg (11.4 lbs)	+0.5kg/m (+1.1 lbs per 39.3")

Technical data

Operating conditions

Ambient temp. (housing)	-40°C.. +60°C (-40 .. +140°F) -25°C.. +60°C (-13 .. +140°F)	VN ..020/ VN ..030 and VN ..040 VN ..050
Process temperature	-40°C.. +150°C (-40 .. +302°F) -40°C.. +110°C (-40 .. +230°F) -25°C.. +80°C (-13 .. +176°F)	VN ..020/ VN ..030 and VN ..040 Mounting for process temperature up to 150°C (302°F): see drawing VN ..020/ VN ..030 with Ex approval and separate housing (price list option 26.1, 26.2) VN ..050



Ventilation	Ventilation is not required		
Min. powder density	VN 1000/ 5000:	Setting B ca. 50 g/l (3lb/ft ³)	Setting A ca. 150 g/l (9lb/ft ³)
	VN 2000/ 6000:	ca. 20 g/l (1.2lb/ft ³) ca. 5 g/l (0.3lb/ft ³)	ca. 75 g/l (4.5lb/ft ³) ca. 20 g/l (1.2lb/ft ³)
			Standard version Enhanced sensitivity
Features of bulk material	No strong caking tendencies Max. grain size 10mm (0.39")		
Max. mechanical load	600N laterally (on oscillator rods) Recommended protection in case of high material load: mounting of a protective canopy above the probe.		
Max. mechanical torque	300 Nm 100 Nm	VN ..030 VN ..040	
Max. tractive force	2kN	VN ..050	
Max. process pressure	16bar (232psi) 16bar (232psi) 6bar (87psi)	VN ..020, VN ..030 VN ..040 (depending on the quality of the local mounted sealing of the extension tube) VN ..050	
	The max. process pressure may be reduced with use of flanges. Observe flange standards for pressure rating and pressure derating with higher temperature. For versions with Ex-approvals: see remarks on page 31.		
Vibration	1.5 (m/s ²) ² /Hz according to EN 60068-2-64		
Relative Humidity	0-100%, suitable for outdoor use		
Altitude	max. 2.000m (6.562ft)		
Expected product lifetime	Following parameters have a negative influence on the expected product lifetime: High ambient- and process temperature, corrosive environment, high vibration, high flow rate of abrasive bulk material passing the sensor element.		

Technical data

Transport and Storage

Transport	<p>Observe the instructions as stated on the transport packaging, otherwise the products may get damaged.</p> <p>Transport temperature: -40 .. +80 °C (-40 .. +176 °F)</p> <p>Transport humidity: 20 .. 85 %</p> <p>Transport incoming inspections must be carried out to check for possible transport damage</p>
Storage	<p>Products must be stored at a dry and clean place. They must be protected from influence of corrosive environment, vibration and exposure to direct sunlight.</p> <p>Storage temperature: -40 .. +80 °C (-40 .. +176 °F)</p> <p>Storage humidity: 20 .. 85 %</p>

Approvals

	VN 1000	VN 2000	VN 5000	VN 6000		
Ordinary Locations*	•	•	•	•	CE FM/ CSA TR-CU	EN 61010-1
Hazardous Locations *	•	•	•	•	ATEX	Dust explosion
	•	•	•	•		Gas explosion
			•	•		Intrinsic safe
			•	•		Flameproof Flameproof / increased safety
	•	•	•	•	IEC-Ex	Dust explosion
	•	•	•	•		Gas explosion
			•	•		Intrinsic safe
			•	•		Flameproof Flameproof / increased safety
			•	•	FM	Dust explosion
			•	•		Gas explosion
			•	•		Intrinsic safe
			•	•		Flameproof
			•	•	CSA	Dust explosion
			•	•		Gas explosion
			•	•		Intrinsic safe
			•	•		Flameproof
			•	•	TR-CU	Dust explosion
			•	•		Gas explosion
			•	•		Intrinsic safe
			•	•		Flameproof Flameproof / increased safety
	•	•	•	•	INMETRO	Dust explosion
			•	•		Gas explosion
			•	•		Intrinsic safe
			•	•		Flameproof Flameproof / increased safety

EMC • • • • EN 61326 -A1

Hygiene * • • • • EHEDG

RoHS conform • • • • According to directive 2011/65/EU

Food grade material • • • • According to directive 1935/2004/EC

Pressure Equipment Directive (2014/68/EU)

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 units are 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 in the selection list.

Options

Weather protection-cover

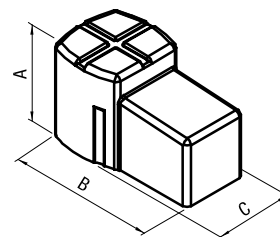
When the measuring device is used outdoor, the use of the weather protection-cover is recommended. It protects the device from all atmospheric influences such as:

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

Material: PE, weather and temperature stable



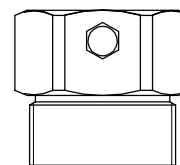
Not available for housing version d and de.
 For use in Hazardous Locations: only permitted for zone 2 and 22 or Division 2.



Sliding sleeve

VN ..030 G2" ISO 228 or 2" NPT ANSI B 1.20.1
 Material: 1.4301 (304) or 1.4404 (316L)
 Sealing material to the extension tube: viton

VN ..040 Because the outer diameters of the locally mounted 1" tube may differ, sliding sleeve on request.
 Not for Hazardous Locations.



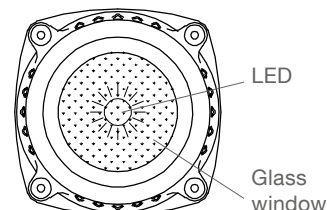
Mounting set

Screws and washers for fixing the unit on a flange.

Glass window in lid

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

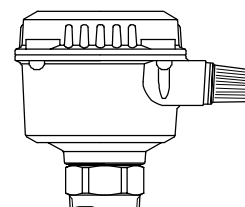
Not available for housing version d and de.



Bulb

Bright indicating light seen from outside.

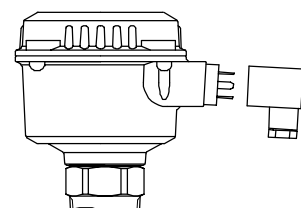
Not available for use in Hazardous Locations.



Plug 4-pole (incl. PE)

Used instead of cable gland.

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



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 16).

Mounting

! General Safety Instructions

Detection of solids in water

CAUTION:

Detection of solids in water only permitted with types VN 1020/ 1030/ 5020/ 5030.
 Other types on request.

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.

VN ..050:

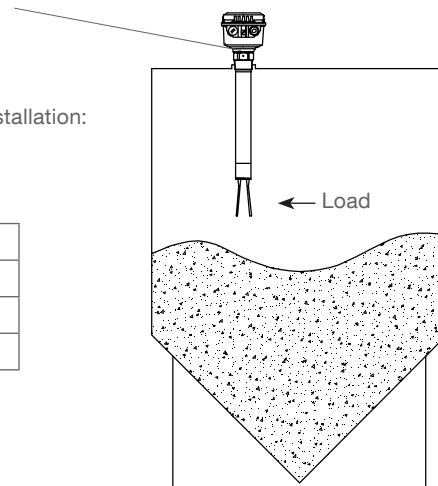
Consider the chemical compatibility of the extension cable (material PUR) and the rubber seals on both ends of the extension cable (material neoprene).

Mechanical load

The torque at the fastening spot must not exceed
 300Nm (VN ..030) or
 100Nm (VN ..040)

Maximum length „L“ in relation
 to the deviation (in degrees) from vertical installation:

Max. deviation	Max. length „L“
5°	4000 mm (157.5“)
45°	1200 mm (47.24“)
>45°	600 mm (23.62“)

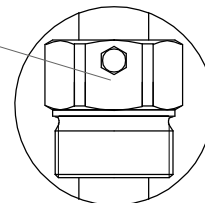


Mounting location

Comply with distance from incoming material and from the silo wall.
 The installation has to be done in a way, 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 lengths of more than 3m (118.1“).

2“ sliding sleeve

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



Flange mounting

A plastic sealing must be used to tighten the flange.

Fastening of the 1½” process connection

Mounting torque for the 1½” thread may not exceed 80Nm.
 Use a 50mm (1.97“) open-end wrench (do not turn the housing).

EHEDG-approval / food grade material

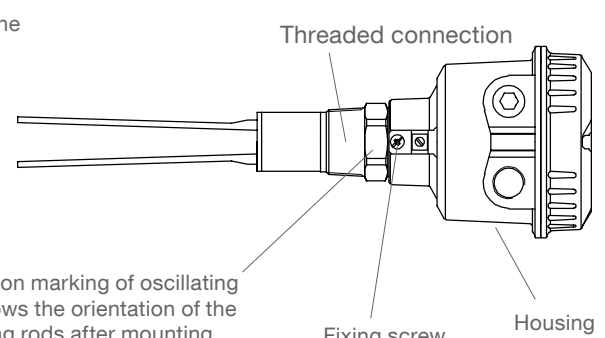
The materials are available for the use under normal and predictable applications (according to directive 1935/2004 Art.3). Other conditions can influence the safety.

Mounting

! Additional Safety Instructions for Hazardous Locations

Installation regulations	For the use of devices in Hazardous Locations the respectively valid installation regulations must be observed.
Sparks	The installation has to be carried out in a way, that mechanical friction or impact does not cause sparks between the aluminium enclosure and steel.
Mounting in application with Partition wall, that separates Zone 0 (Cat. 1G) from Zone 1 (Cat 2G).	<p>VN ..030 with sliding sleeve: The use of the sliding sleeve is not allowed.</p> <p>VN ..040 and VN ..050: The unit has no safe separation between Zone 0 and Zone 1. It must be considered, that gas can pass from Zone 0 through the unit to Zone 1.</p>

Mounting instructions

Oscillating rods	Do not bend, shorten or extend the oscillating rods since this will destroy the device.
Rotatable housing and orientation marking of oscillating rods	<p>The housing can be rotated against the threaded connection after mounting. 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.</p>  <p>Orientation marking of oscillating rods shows the orientation of the oscillating rods after mounting.</p> <p>Threaded connection</p> <p>Fixing screw</p> <p>Housing</p>
Direction of the cable glands	When the unit is mounted from the side, ensure, that the cable glands are closed and face downwards to avoid water penetrating the housing.
Sealing	Seal the 1½" thread with Teflon tape in case of process pressure
Precaution for later dismantling/ Service	Grease the screws of the lid if corrosive atmosphere is present (e.g. close to sea)
Switching point	<p>Heavy bulk material -> the signal output switches, when the oscillating rods are covered a few mm.</p> <p>Light bulk material -> the signal output switches, when the oscillating rods are covered a few cm.</p>

Mounting

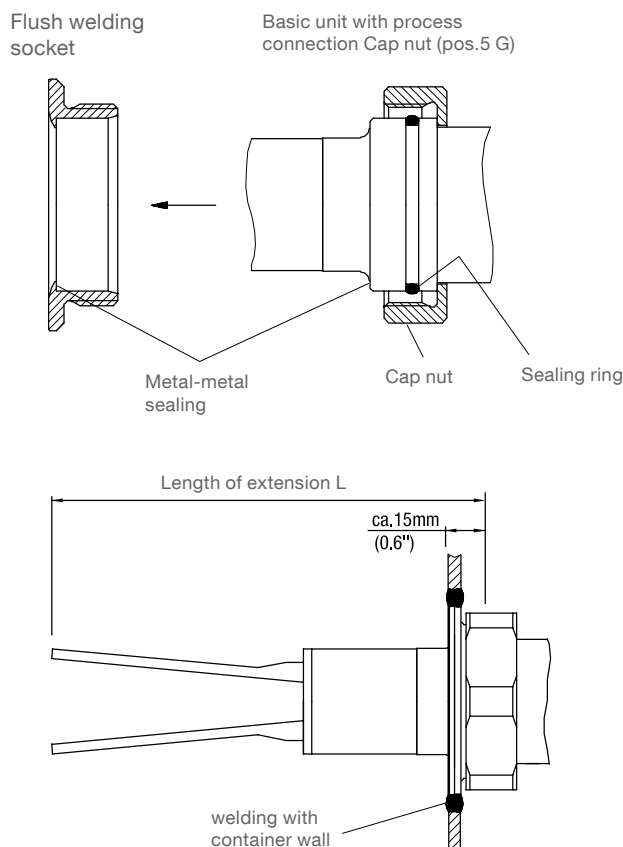
EHEDG-approval

The sealing ring ensures a pressure tight sealing of the process connection.

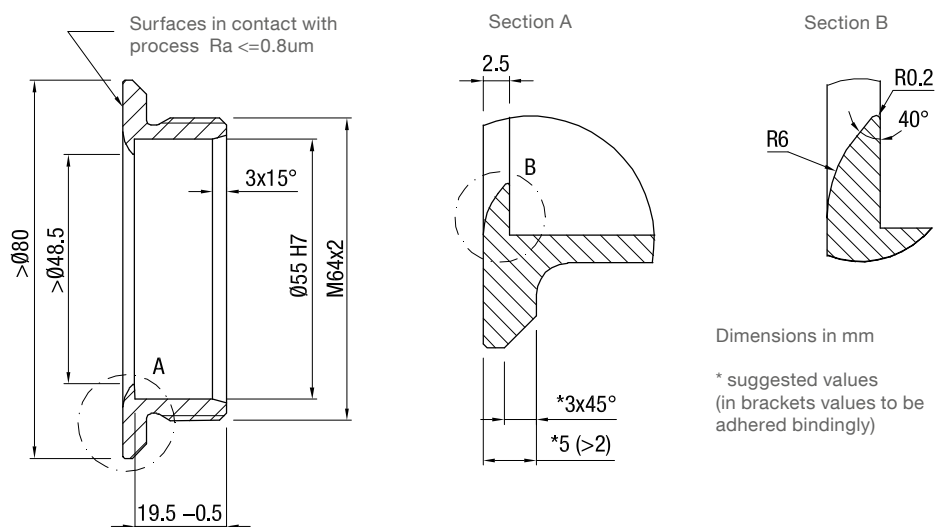
Metal-metal sealing:

- The support muß be plane and without any gap.
- Fixing torque 100Nm

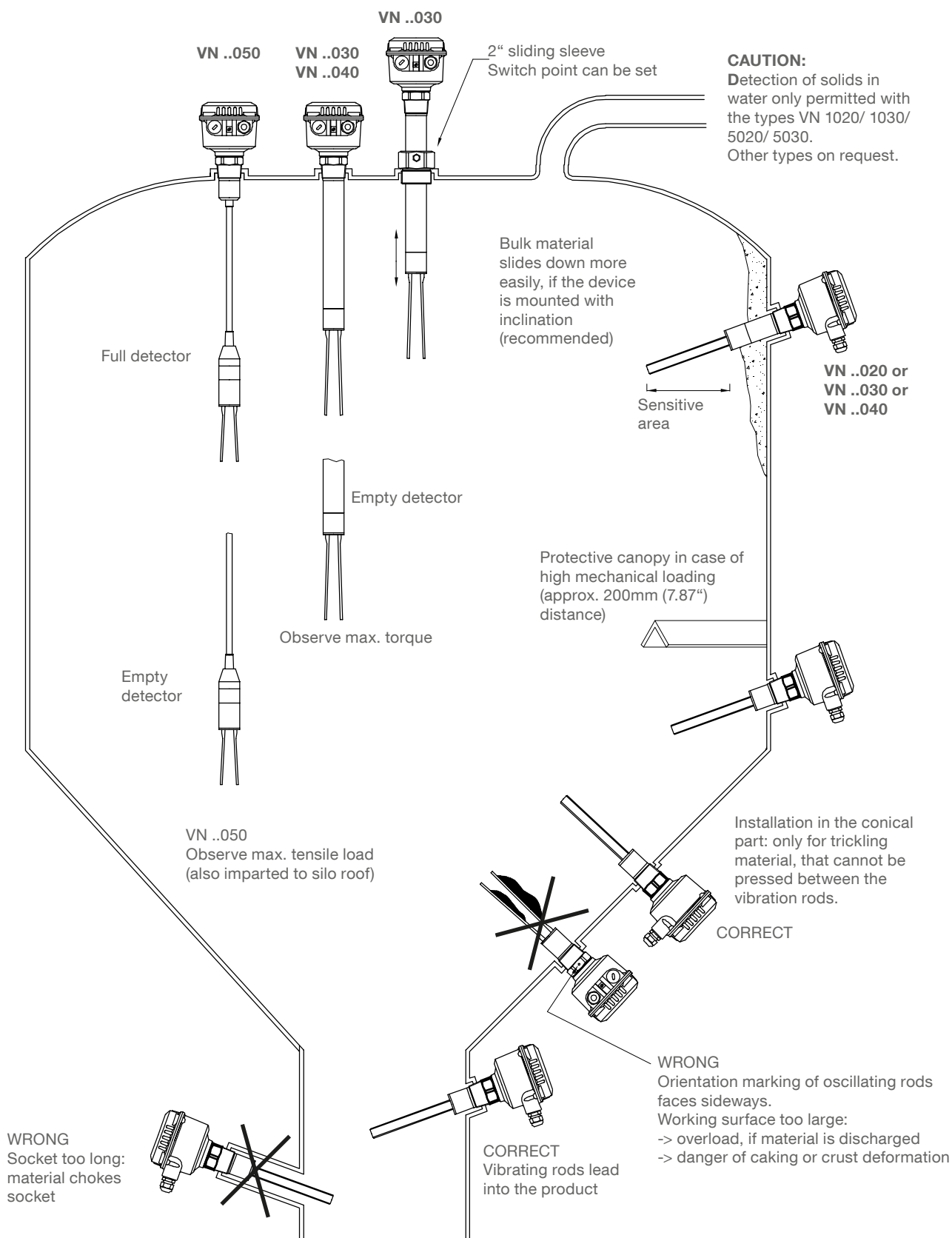
The quality of the welding with the container wall must be according to the respective regulations (e.g. gaps, transitions, surface finish).



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



Mounting



Electrical installation

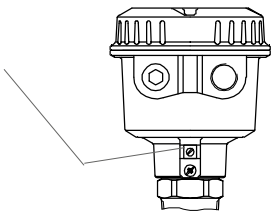
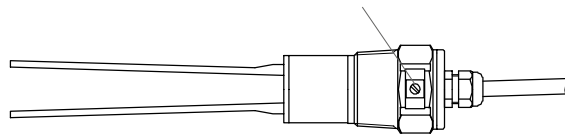
! General Safety Instructions

Handling	In case of inexpert 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. With use of 24V supply voltage, an approved power supply with reinforced insulation to mains is required.
Fuse	Use a fuse as stated in the connection diagrams (page 22 and 23).
RCCB protection	In the case of a defect, the distribution voltage must automatically be cut off by a RCCB protection switch to protect the user of the device from indirect contact with dangerous electric tensions.
Power supply switch	A voltage-disconnecting 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	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 locked with a closing element.
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 NPT 1/2" or NPT 3/4" in accordance with the unit and ANSI B 1.20.1. Not used inlets must be closed tight with a metal closing element.
Field wiring cables	<ul style="list-style-type: none"> • The diameter has to match to the clamping range of the used cable gland. • The cross section has to match with the clamping range of the connection terminals and consider the max. current. • All field wirings must have insulation suitable for at least 250V AC. • The temperature rating must be at least 90°C (194°F). • If higher immunity interferences as specified in the stated EMC standards are present (see chapter approval), a shielded cable is required, otherwise an unshielded instrumentation cable is satisfactory.
Connecting the terminals	Make sure that max. 8mm (0.31") of the pigtails are bared (danger of contact with live parts).
Guiding the cables in the terminal box	Cut the field wiring cables to appropriate length to fit properly into the terminal box.
Relay and transistor protection	Provide protection for relay contacts and output transistors to protect the device against inductive load surges.
Protection against static charging	The housing of the unit (and for the version with separate housing also the vibrating fork part) must be grounded to avoid static charging of the unit. This is particularly important for applications with pneumatic conveying and non-metallic containers.

Electrical installation



Additional Safety Instructions for Hazardous Locations

Installation in Zone 20	If installing the whole unit in zone 20, the power supply shall be rated for a prospective short circuit current of not more than 10kA. Details of EN 60079-14/ ABNT NBR IEC 60079-14 must be obeyed.	
Installation in Zone 0 (Electronics: „NAMUR“ and “8/16mA or 4-20mA”)	The intrinsic safe supply circuit must have galvanic isolation to non intrinsic safe part. Otherwise measures for protection against lightning must be taken. See EN 60079-14/ ABNT NBR IEC 60079-14.	
Power supply (Electronics: „NAMUR“ and “8/16mA or 4-20mA”)	The type of protection (intrinsic safe) is only valid when connecting to a certified intrinsic safe power supply (associated apparatus).	
Field wiring terminals for “de” housing	Fixing torque : Remove wire isolation:	0,5-0,6Nm 9mm
Field wiring	A strain relief must be provided for the field wiring cables, when the device is installed with the factory provided cable glands.	
External equipotential bonding terminal	<p>Connect with equipotential bonding to the plant</p>  <p>Version with separate housing must be grounded additionally at the vibrating fork.</p> 	
Cable glands and conduit system for ATEX / IEC-Ex/ TR-CU (Dust and Gas Hazardous Locations)	<p>Installation according to the regulations of the country, where the product is installed.</p> <p>Not used entries have to be closed with blanking elements certified for this purpose.</p> <p>Where available the factory provided parts must be used.</p> <p>A strain relief must be provided for the field wiring cables, when the device is installed with the factory provided cable glands.</p> <p>The diameter of the field wiring cable must match to the clamping range of the cable clamp.</p> <p>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 10 Kelvin. The parts must be mounted according to the instructions of the supplier.</p> <p>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”).</p>	

Electrical installation

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.

Exception: Units with protection method Intrinsic safety ("NAMUR" and "8/16mA or 4-20mA")

Opening the lid

Units with flameproof GasExplosion approval (d-housing):

To prevent ignition of hazardous atmospheres, do not remove the lid (cover) while circuits are alive.

Units with Dust Explosion approval:

Before opening the lid ensure, that no dust deposits or cloudss are present.
 Do not remove the lid (cover) when the power is live.

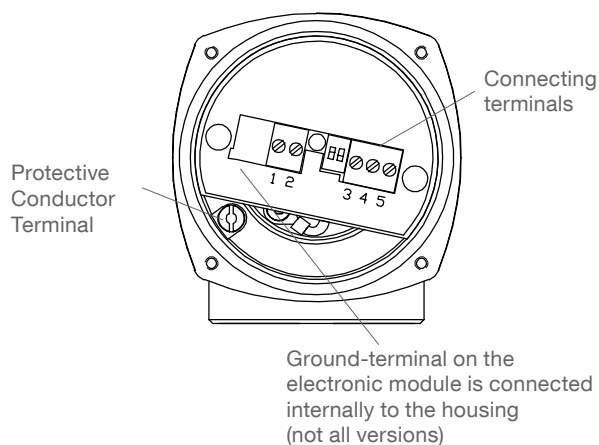
Units with protection method Intrinsic safety ("NAMUR" and "8/16mA or 4-20mA"):

The lid can be removed when the power is live.

Electrical installation

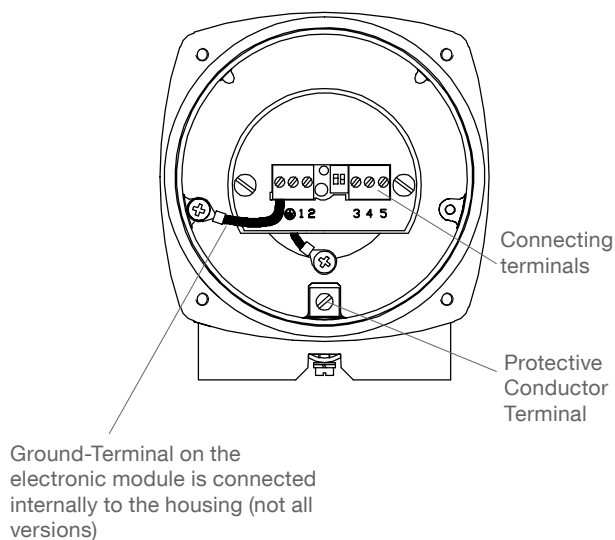
Connection

VN 1000/ 2000: Standard-housing



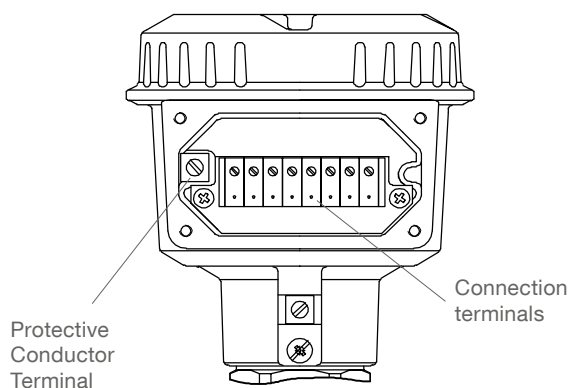
VN 5000/ 6000: Standard- and d-housing

Connection is done directly on the Electronic module



de-housing

Connection via the terminals inside the increased safety area.



Electrical installation

Universal voltage

Relay SPDT

Power supply:

19..230V 50-60Hz +10% 8VA
 19..55V DC +10% 1,5W

Signal output:

Floating relay SPDT

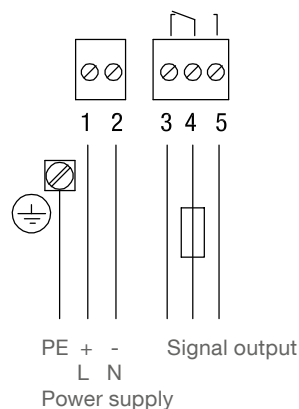
VN 1000/ 2000:

AC max. 253V, 4A, 500VA at $\cos \Phi = 1$
 DC max. 253V, 4A, 60W

VN 5000/ 6000:

AC max. 250V, 8A, non inductive
 DC max. 30V, 5A, non inductive

Fuse on signal output: max 10A,
 slow or fast, HBC, 250V



Universal voltage

Relay DPDT

Power supply:

19..230V 50-60Hz +10% 18VA
 19..55V (36V*) DC +10% 2W

Signal output:

Floating relay DPDT

VN 1000/ 2000:

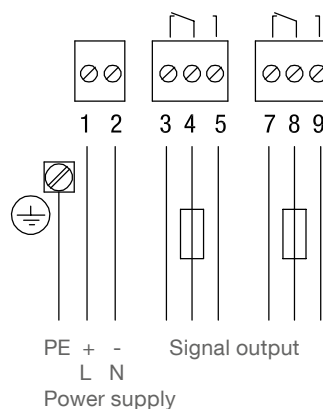
AC max. 253V, 4A, 500VA at $\cos \Phi = 1$
 DC max. 253V, 4A, 60W

VN 5000/ 6000:

AC max. 250V, 8A, non inductive
 DC max. 30V, 5A, non inductive

Fuse on signal output: max 10A,
 slow or fast, HBC, 250V

* Version with intrinsic safe connection
 between electronic module and vibration
 fork (see pos.4 in the selection list)



3-wire

PNP

Power supply:

18 .. 50V DC +10% 1,5W

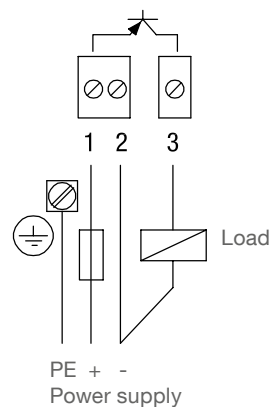
Fuse: max 4A, slow or fast, HBC, 250V

Signal output:

max. 0,4A

Load for example:

PLC, relay, contactor, bulb



Electrical installation

2-wire

without contact

Power supply:

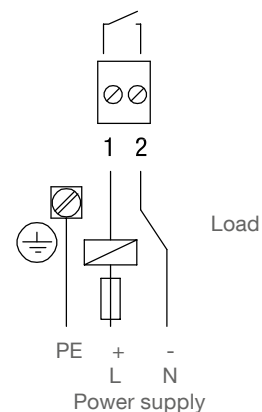
19..230V 50/60Hz +10% 1,5VA
 19..230V DC +10% 1W

Load:

min. 10mA
 max. 0,5A permanent
 (detailed ratings see
 "Technical data")

Load for example:
 relay, contactor, bulb

Fuse: max. 4A, slow or fast, HBC, 250V



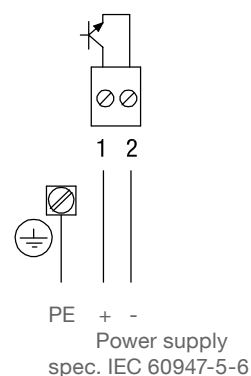
NAMUR

IEC 60947-5-6

Power supply:

ca. 7..9 V DC
 intrinsic safe
 (spec. IEC 60947-5-6)

<1mA or > 2,2mA
 (spec. IEC 60947-5-6)



8/16mA or 4-20mA

Power supply:

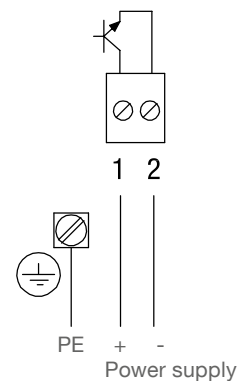
Non intrinsic safe version:
 12,5..36V DC +0%

Intrinsic safe version:
 12,5..30V DC +0%

Signal output

Setting 8/16mA:
 8mA or 16mA

Setting 4-20mA:
 Output current depends on the vibration
 amplitude of the fork: 6mA for dampened
 vibration and 20mA for full vibration.



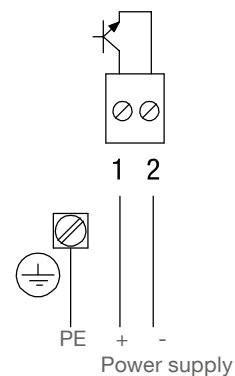
8/16mA

Power supply:

12,5..36V DC +0%

Signal output

8mA or 16mA



Signal output

Electronic modules:

Universal voltage
 (Relay SPDT and DPDT)

3-wire
 PNP

2-wire
 without contact

8/16mA

NAMUR
 (IEC 60947-5-6)

FSL / FSH or Characteristic Setting

Remark: „FSH/FSL“ is used for electronic modules:
 Universal voltage, 3-wire, 2-wire
 "Characteristic" is used for electronic module:
 NAMUR

FSH



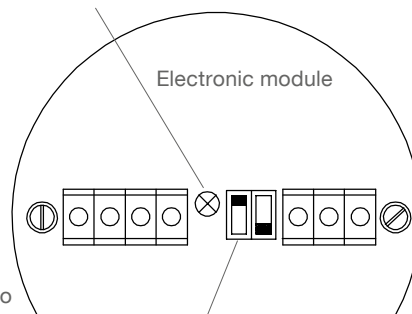
If the sensor is used to indicate full load, set to Fail Safe High or Falling Characteristic. Power failure or line break is regarded as „full“ signal (protection against overcharging).

FSL



If the sensor is used to indicate empty load, set to Fail Safe Low or Rising Characteristic. Power failure or line break is regarded as „empty“ signal (protection against running dry).

LED „Signal output“



Setting FSL / FSH or Characteristic

Signal output

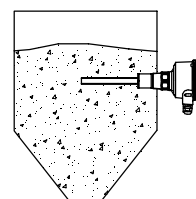
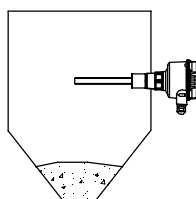
Setting	FSL	FSH
Relay SPDT		
Relay DPDT		
3-wire PNP		
2-wire without contact		
8/16mA	I = 16mA	I = 8mA
LED „Signal output“		

Signal output

Setting	FSL	FSH
Relay SPDT		
Relay DPDT		
3-wire PNP		
2-wire without contact		
8/16mA	I = 8mA	I = 16mA
LED „Signal output“		

Setting	FSL	FSH
NAMUR IEC 60947-5-6		
LED „Signal output“		

Setting	FSL	FSH
NAMUR IEC 60947-5-6		
LED „Signal output“		



Signal output delay / Diagnosis

Signal output delay

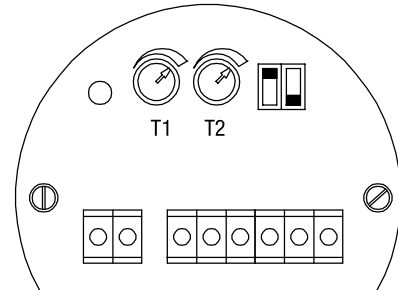
Electronic module
Universal voltage
 (Relay DPDT)

Signal output delay

The signal output can be delayed, adjustable from 0 up to ca. 30 seconds. Clockwise turning of the potentiometer increases the delay time.

Potentiometer T1:
 Delay when output switches from sensor covered -> free

Potentiometer T2:
 Delay when output switches from sensor free -> covered



Diagnostics

Electronic module
NAMUR
 (IEC 60947-5-6)

“TEST” Button

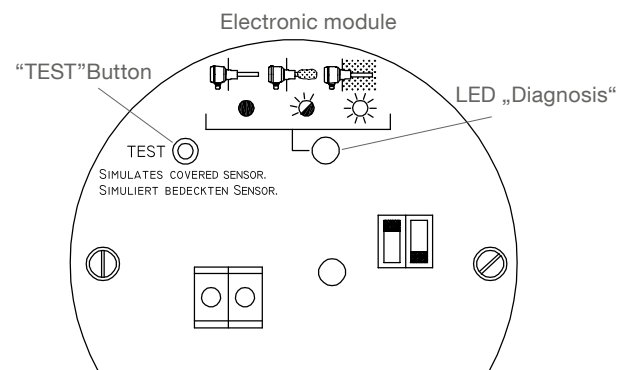
If the sensor is not covered with material:

By pressing this button, the vibration will stop and the signal output will switch to indicate “covered sensor”. This allows to test the vibration and the electronics for function without removing the sensor from the silo.

Remark: By pressing the button, the internal signal from the piezo-element, that indicates the vibration of the fork, is shortened. The electronics miss the vibration signal and indicates “covered sensor”.

If the sensor is covered with material:

Pressing of this button has no effect.



Weak vibration Diagnosis: LED “Diagnosis”

The quality of the measurement is related to the vibration amplitude of the sensor and can be evaluated by the internal LED „Diagnostics“ as follows:

- **Safe measurement, clean fork (LED is off):**
 The vibration amplitude is strong. There is enough safety to the switching point.
- **Weak vibration amplitude (LED is blinking):**
 The sensor is still working but it can happen that gradually the amplitude decreases further (maybe by increasing material build up) and the measurement fails. If low vibration amplitude is indicated the sensitivity setting should be changed from „20g/l“ to „75 g/l“ (or from „5g/l“ to „20g/l“ on version with enhanced sensitivity) if material density is not too low and the fork should be cleaned from material.
 Remark: By shifting the setting to “75g/l” (or to „20g/l“ on version with enhanced sensitivity), the internal amplification of the vibration signal in the electronic is increased. This allows more build up of material.
- **Fork fully covered (LED is on):**
 The sensor is fully covered with material. The vibration has stopped.

Signal output and Diagnosis

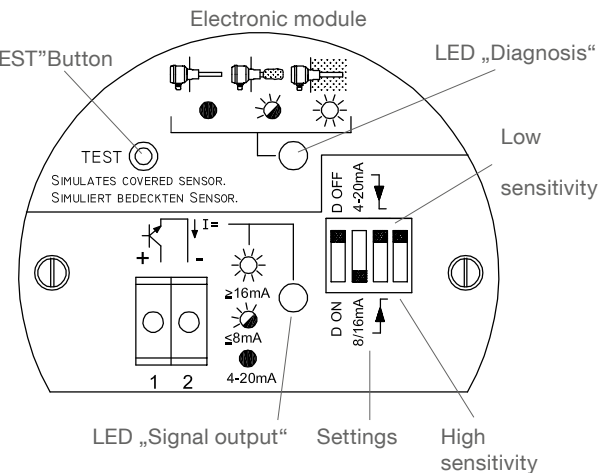
Electronic module
8/16mA or 4-20mA

The output can either be set to give 8/16mA or to give 4-20mA. On setting 4-20mA the output depends on the amplitude of the vibration of the fork.

Characteristic setting

▼ If the sensor is used to indicate full load, set to Falling Characteristic. Power failure or line break is regarded as „full“ signal (protection against overcharging).

▲ If the sensor is used to indicate empty load, set to Rising Characteristic. Power failure or line break is regarded as „empty“ signal (protection against running dry).



	Low sensitivity	High sensitivity
VN 1000/ 5000	150g/l (9lb/ft³)	50g/l (3lb/ft³)
VN 2000/ 6000	75g/l (4,5lb/ft³)	20g/l (1.2lb/ft³)
VN 2000/ 6000 with enhanced sensitivity	20g/l (1.2lb/ft³)	5g/l (0.3lb/ft³)

Weak vibration diagnosis

The quality of the measurement is related to the vibration amplitude of the sensor and can be evaluated by the output current and by the internal LED „Diagnosis“ as follows:

- **Safe measurement (clean fork):**

The vibration amplitude is strong. There is enough safety to the switching point.

- **Weak vibration amplitude:**

A fork with so much material build up, that a weak vibration amplitude is indicated. The sensor is still working, but it can happen, that gradually the amplitude decreases further (maybe by increasing material build up) and the measurement fails. If low vibration amplitude is indicated, the sensitivity setting should be changed from „High sensitivity“ to „Low sensitivity“, if material density is not too low, and the fork should be cleaned from material. Remark: By shifting the setting to „Low sensitivity“, the internal amplification of the vibration signal in the electronic is increased. This allows more build up of material.

- **Fork fully covered:**

The sensor is fully covered with material. The vibration has stopped.

“TEST” Button

If the sensor is not covered with material:

By pressing this button, the vibration will stop and the signal output will switch to indicate “covered sensor”. This allows to test the vibration and the electronic for function without removing the sensor from the silo.

Remark: By pressing the button, the internal signal from the piezo-element, that indicates the vibration of the fork, is shortened. The electronic misses the vibration signal and indicates “covered sensor”.

If the sensor is covered with material:

Pressing of this button has no effect.

Factory provided settings

- D OFF
- 8/16mA
-
- High sensitivity

page 27

Signal output and Diagnosis

Electronic module Output setting: 4-20mA

**8/16mA or
 4-20mA**

The output states the quality of the vibration signal (amplitude) of the sensor. With the 4-20mA setting it is possible, to recognize material build up on the vibrating fork by evaluation with a PLC. Furthermore it is possible to evaluate the vibration behaviour for critical applications by using a 4-20mA Data logger or PLC.

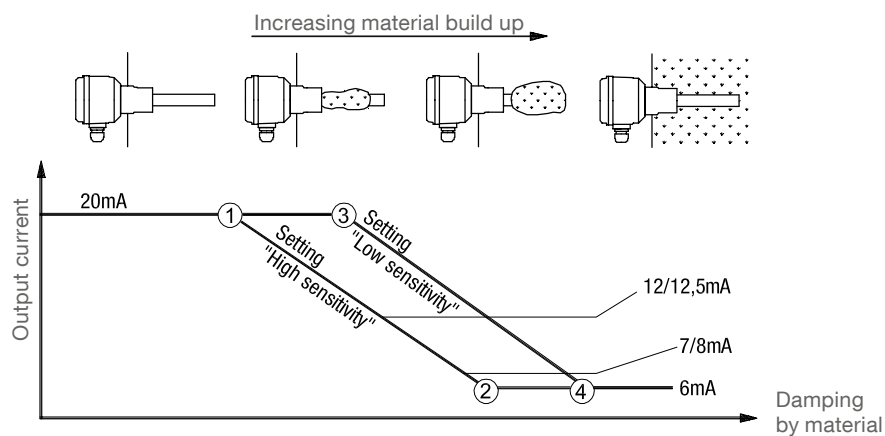
Remark

In this mode:

- The switch „D ON“ or „D OFF“ has no influence.
- The LED „Signal output“ is off.

Output current:

- **20mA:**
 The vibration amplitude is strong (safe measurement, clean fork). With interface measurement (VN10..0 und VN50..0) a max. vibration amplitude of approx. 15mA occurs.
- **< 20mA and >12/12.5mA:**
 The vibration amplitude is decreased by material build up or mechanical influence. On setting „Low sensitivity“ the material build up must be more to decrease the output current compared to setting „High sensitivity“.
- **<12/12.5mA and >7/8mA:**
 The recommended range indicate a weak vibration. This is also the range, where the internal LED „Diagnosis“ starts blinking to indicate a weak vibration. Depending on the application this value can be changed in the PLC.
 The evaluation in the PLC should be done so, that a window between 12/12.5mA and 7/8mA is set.
 The reaction to indicate „weak vibration“ should be delayed for approx. 10 seconds, so that the indicator does not happen when the vibration is stopped and is started during normal and safe measurement operation.
 A lag of 0.5mA (between 12mA and 12,5mA) should be considered to avoid jittering of the output.
- **7/8mA:**
 The recommended point to indicate a covered sensor. The point is close to the stop of the vibration at 6mA. Depending on the application this point can be changed in the PLC.
 A delay of 1mA (between 7mA and 8mA) should be considered to avoid jittering of output.
- **6mA:**
 The vibration has fully stopped.



With setting „High sensitivity“:

- ① Amplitude is 100%
- ② Amplitude is 0%

With setting „Low sensitivity“:

- ③ Amplitude is 100%
- ④ Amplitude is 0%

Setting: Sensitivity

All Electronic modules

Sensitivity

All sensors are factory preset. Normally it is not necessary to change the settings. If the bulk material has a strong tendency to cake or deposit the setting switch can be set to position „A“ to decrease the sensitivity of the probe (factory presetting = position „B“).

Approximate min. bulk density on setting:

	A Low sensitivity	B High sensitivity
VN 1000/ 5000	150g/l (9lb/ft³)	50g/l (3lb/ft³)
VN 2000/ 6000	75g/l (4.5lb/ft³)	20g/l (1.2lb/ft³)
VN 2000/ 6000 with enhanced sensitivity	20g/l (1.2lb/ft³)	5g/l (0.3lb/ft³)

VN 1000/ 5000:

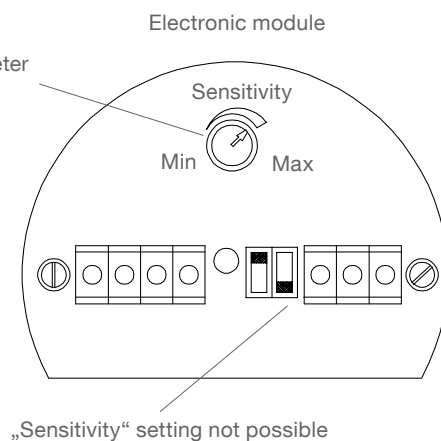
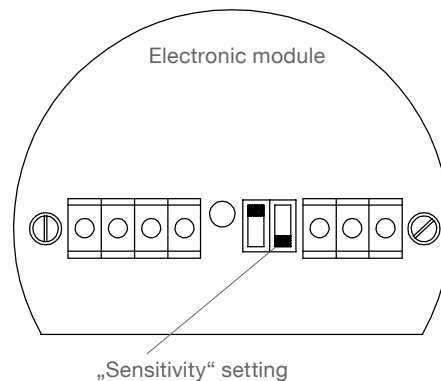
For measurement of solids in water setting „A“ is recommended or to take the electronic with potentiometer.

Option interface measurement

(Sensitivity adjustable with potentiometer)

Turn to Min: Vibrating fork gets less sensitive

Turn to Max: Vibrating fork gets more sensitive



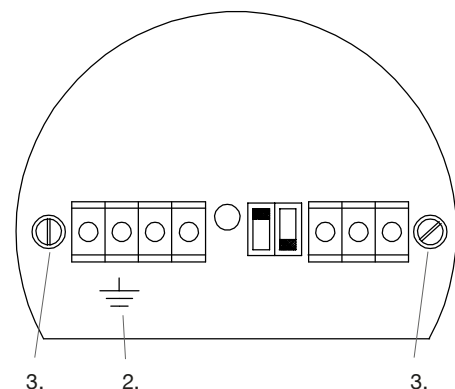
Maintenance

Opening the lid (cover)	<p>Before opening the lid for maintenance reasons observe following items:</p> <ul style="list-style-type: none"> • Do not remove the lid while circuits are alive. • No dust deposits or whirlings are present. • No rain can enter into the housing.
Frequent check of the unit	<p>Frequent check of the unit</p> <p>To ensure durable safety in hazardous locations and with electrical safety, following items must be checked frequently depending on the application:</p> <ul style="list-style-type: none"> • Mechanical damage or corrosion of any components (housing side and sensor side) and of the field wiring cables. • Tight sealing of the process connection, cable glands and enclosure lid. • Properly connected external PE cable (if present).
Cleaning	<p>Cleaning</p> <p>If cleaning is required by the application, following must be observed:</p> <ul style="list-style-type: none"> • Cleaning agent must comply with the materials of the unit (chemical resistance). Mainly the lid sealing, cable gland and the surface of the unit must be considered. <p>The cleaning process must be done in a way, that:</p> <ul style="list-style-type: none"> • The cleaning agent cannot enter into the unit through the lid sealing or cable gland. • No mechanical damage of the lid sealing, cable gland or other parts can happen. <p>Units with EHEDG certification, which are used in the respective EHEDG applications, must be cleaned dry only (Type ED). Furthermore the respective regulations must be observed.</p> <p>A possible accumulation of dust on the unit does not increase the maximum surface temperature and must therefore not be removed for purposes of maintaining the surface temperature in hazardous locations.</p>
Function test	<p>A frequent function test may be required depending on the application.</p> <p>Observe all relevant safety precautions related with a safe work depending on the application (e.g. hazardous locations, hazardous bulk material, electric safety, process pressure).</p> <p>This test does not proof if the sensor is sensitive enough to measure the material of the application.</p> <p>Function test is done by stopping the vibration of the vibrating rods with appropriate means and monitor if a correct change of the signal output from uncovered to covered happens.</p>
Production date	<p>The production date can be traced by the serial number on the typeplate. Please contact the manufacturer or your local distributor.</p>
Spare parts	<p>All available spare parts are stated in the selection list</p>

Changing the Electronic module

- ⚠ Intrinsic safe marked Electronic modules are not allowed to be exchanged with Electronic modules without Intrinsic safe marking. Observe warning labels inside the housing and Ex marking on the name plate.**

1. Open the housing lid, remove the pigtails from the device.
2. Disconnect internal wire for earth connection (not on all versions).
3. Unscrew two fastening screws of the electronic module.
4. Pull out the Electronic module.
5. Insert a new Electronic module (until it locks into place) and tighten fastening screws.
6. Connect internal wire for earth connection (not on all versions).
7. Connect the pigtails to the device.



Notes for use in Hazardous Locations

Zone classification

	usable in zone	ATEX category	IEC-Ex Equipment Protection Level (EPL)
Dust applications	20, 21, 22	1 D	Da
	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

* in case of conductive dust additional requirements for the installation may be necessary

General Notes

Marking

Devices with Ex approval are marked on the name plate.

Process pressure



The device construction allows process over-pressure up to 6/16 bar (87/232psi) (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.

Notes for use in Hazardous Locations

Permitted zones (categories) for mounting in partition wall

Version with standard-housing

(VN 1000 / 2000 / 5000 / 6000)

With use of Electronic module:

Universal voltage Relay SPDT
 Universal voltage Relay DPDT
 3-wire PNP
 2-wire without contact
 8/16mA or 4-20mA
 (non intrinsic safe)

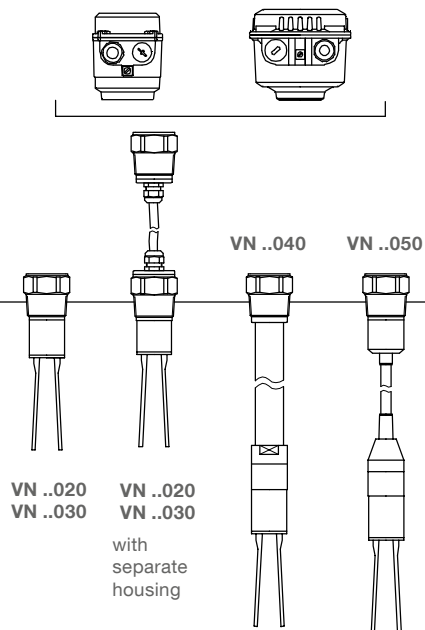
NAMUR IEC 60947-5-6
 (intrinsic safe) *
 8/16mA or 4-20mA
 (intrinsic safe) *

EPL (IEC-Ex)	Da	Db	Da	Db	Ga	Gb **
Category (ATEX)	1D	2D	1D	2D	1G	2G **
Zone	20	21	20	21	0	1

EPL (IEC-Ex)	Da	Da	Da	Da	Ga	Ga
Category (ATEX)	1D	1D	1D	1D	1G	1G
Zone	20	20	20	20	0	0

* The units are marked on the name plate with "1G" and "1D" (ATEX) resp. "Ga" and "Da" (IEC-Ex). They can be also be mounted in a partition wall with specification zone 0/1 and zone 20/21.

- ❗ ** VN ..040 and VN ..050:
 When mounting the units in a partition wall, that separates Zone 0 from Zone 1: The units have no safe separation between Zone 0 and Zone 1. It must be considered, that gas can pass from Zone 0 through the unit to Zone 1.



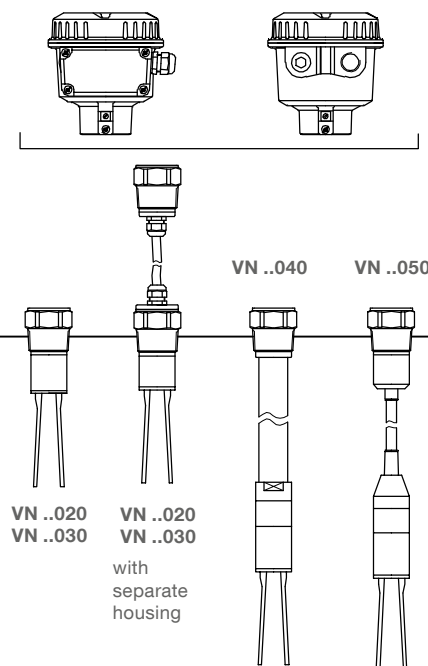
Version with d- and de-housing

(VN 5000 / 6000 ; flameproof/increased safety)

With use of all Electronic modules:

EPL (IEC-Ex)	Gb	Db
Category (ATEX)	2G	2D
Zone	1	21

EPL (IEC-Ex)	Gb	Da
Category (ATEX)	2G	1D
Zone	1	20



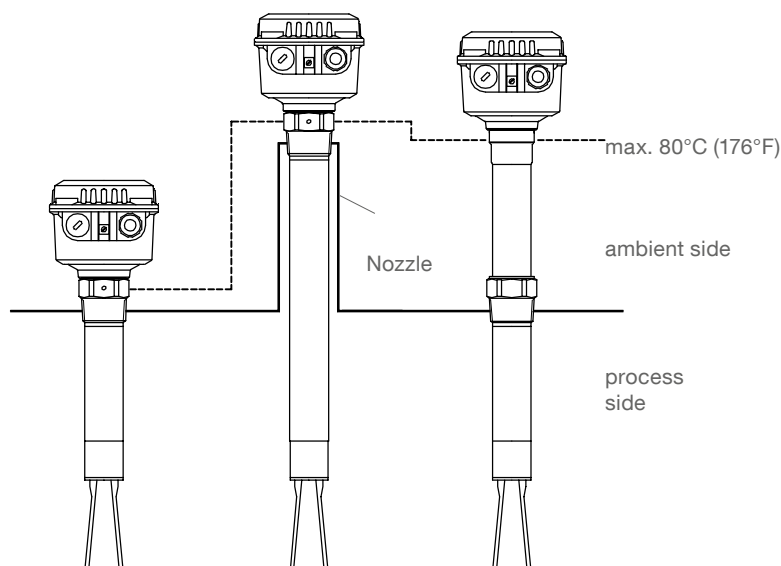
Notes for use in Hazardous Locations

Max. Surface Temperature and Temperature Class

The temperature marking on the name plate  refers to the instruction manual.
 On 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).

The data tables are valid, when it can be guaranteed during installation that the screwed connection has a maximum temperature of 80°C (176°F) during normal use.



Versions with intrinsic safe electronic modules:

NAMUR IEC 60947-5-6
 8/16mA or 4-20mA

Max. ambient temperature	Max. process-temperature	Max. surface temperature	Temperature class (Division System)	Temperature class (Zone System)
50°C (122°F)	70°C (158°F)	80°C (176°F)	T6	T6
60°C (140°F)	80°C (176°F)	85°C (185°F)	T6	T5
	90°C (194°F)	90°C (194°F)	T5	T5
	100°C (212°F)	100°C (212°F)	T5	T4
	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

Versions with non intrinsic safe electronic modules:

Universal voltage Relay SPDT
 Universal voltage Relay DPDT
 3-wire PNP
 2-wire without contact
 8/16mA or 4-20mA

Max. ambient temperature	Max. process-temperature	Max. surface temperature	Temperature class (Division System)	Temperature class (Zone System)
60°C (140°F)	80°C (176°F)	120°C (248°F)	T4A	T4
	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

Assembly VN ..040

Manufacturing of the Extension tube

! Obtain instruction manual for proper manufacturing of the extension tube. In case of deviation from the instruction manual the unit is not safe for use in Hazardous Locations.

Demands on the Extension tube

Material: Stainless steel 1.4301 (SS304) or 1.4305 (SS301) or 1.4571 (SS316Ti) or 1.4404 (SS316L)

The tube must be manufactured from one single piece. It is not allowed to weld two or more pieces together.

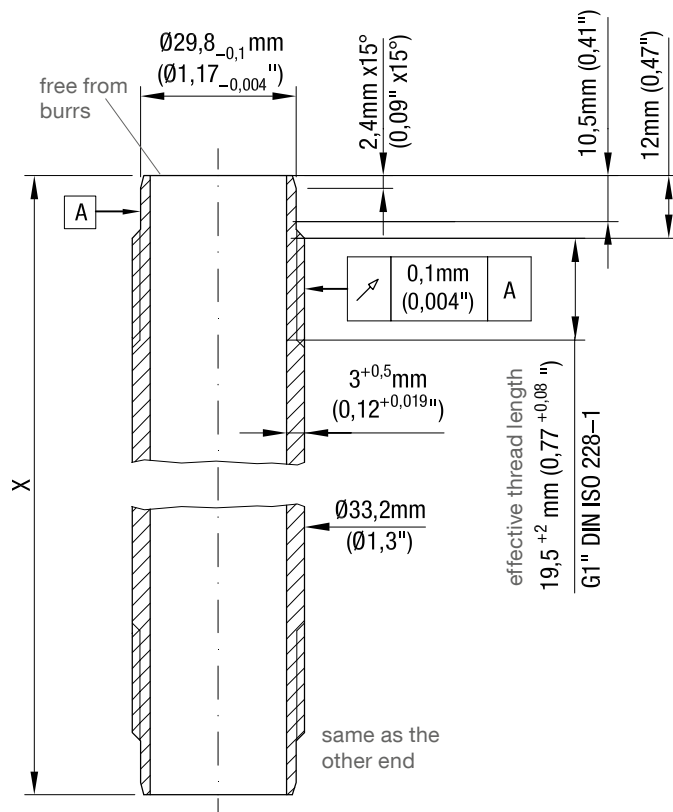
Carefully observe max. length, diameter, wall thickness, thread, tolerances as specified in the drawing.

All sharp edges must be removed to protect the cable and sealing rings.

Thread testing

Each thread must be tested with no-go ring gauge according to standard DIN ISO 228-1 (G1") (G-version) or ANSI B 1.20.1 (NPT 1") (NPT version)

Version with G1" (DIN ISO 228-1) thread (selection price list pos.5 A,L,M)



Pipe length X:

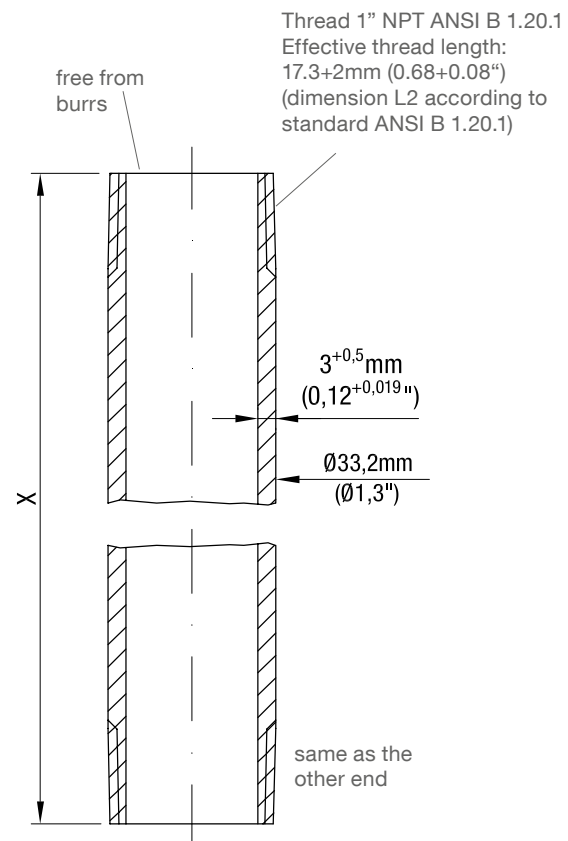
VN 1040: $X = L - 180\text{mm}$ ($X = L - 7.1"$)

VN 2040: $X = L - 250\text{mm}$ ($X = L - 9.8"$)

VN 2040 with pos.26 x,a,b: $X = L - 275\text{mm}$ ($X = L - 10.8"$)

Note: L is the total extension length

Version with 1" (ANSI B 1.20.1) NPT thread (selection price list pos.5 B,S,T,U)



Pipe length X:

VN 1040: $X = L - 190\text{mm}$ ($X = L - 7.5"$)

VN 2040: $X = L - 260\text{mm}$ ($X = L - 10.2"$)

VN 2040 with pos.26 x,a,b: $X = L - 285\text{mm}$ ($X = L - 11.2"$)

Note: L is the total extension length

Assembly VN ..040 with standard housing

Assembly of the unit

1. Mounting of the Extension tube

- ! The tube must be assembled very carefully to ensure permanent sealing and mechanical stability.
- Observe the follow mounting instructions.

- ! Make sure that the thread of the extension tube and the thread of the screwed piece/oscillating piece is the same type (do not mix G and NPT thread).

1.1. Feed the connecting wire through the 1" Extension tube and the screwed piece. Use a separate taut wire for easy working.

1.2. Screw the 1" Extension tube into the oscillating piece and the screwed piece.
 Tightening torque 50Nm.
 Use a 36mm (1.42") open-end wrench to attach the fork piece (do not use the forks).

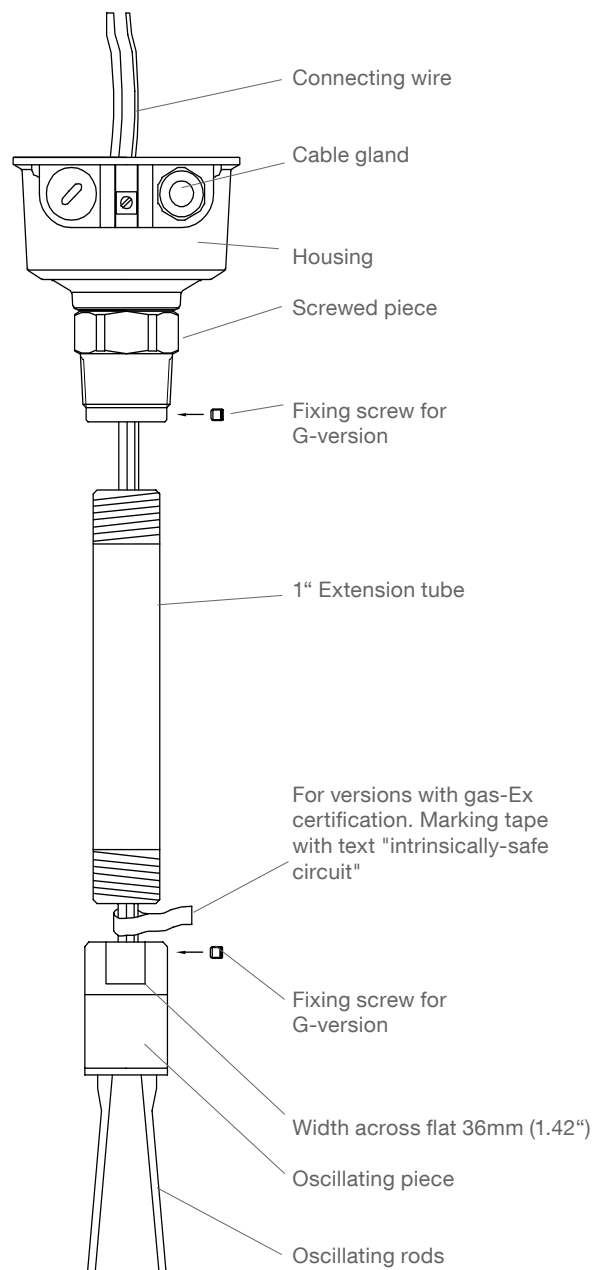
G version: Tighten the 2 fixing screws.

Requirements for sealing:

There must be tight connections at both ends of the extension tube (IP67 or NEMA 4).

G version: An O-ring is required at both ends to ensure proper sealing and must not be damaged. Only original O-rings from the manufacturer are allowed to be used.

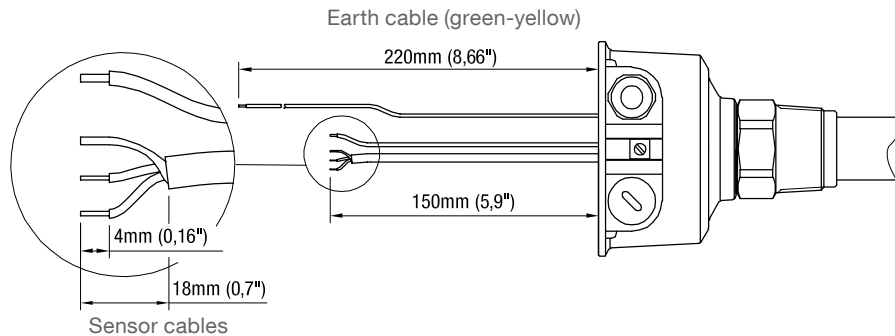
NPT version: The threads must be sealed with temperature resistant sealing for 150°C (302°F). Max. thickness of the sealing is 0.2mm (0.008").



Assembly VN ..040 with standard housing

2. Preparing the cables

Shorten the earth cable to 220mm (8,66") and sensor cables to 150mm (5,9"). Prepare cables as shown.

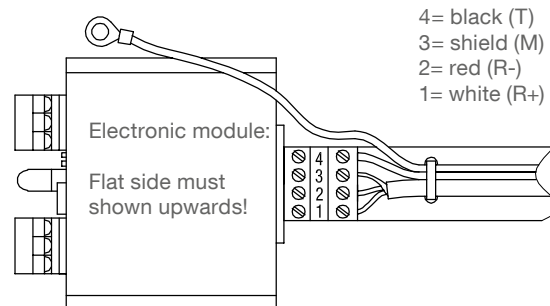
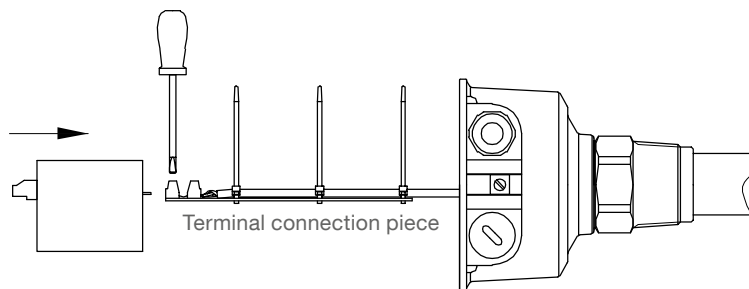


3. Connecting the cables

Connect sensor cables to the terminal connection piece. Fix the cables with cable clamps. Connect electronic module and terminal connection piece. Be sure that all terminals are tightly screwed in.

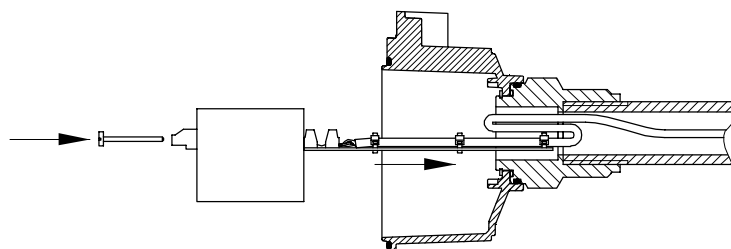
Take care that the non isolated shield wire (M) does not touch other metal parts (keep wire short or isolate with a hose)

Connect the earth cable from the vibrating fork to the housing (see figure at the bottom of this page).

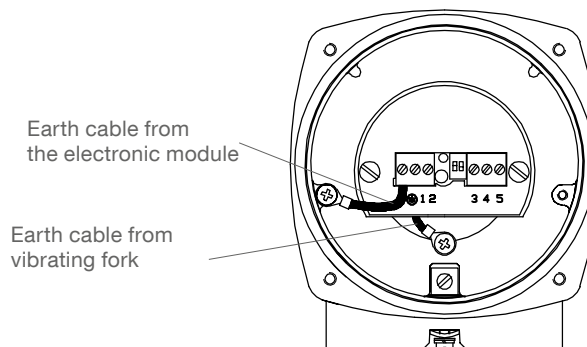


4. Fixing the electronic module

Insert electronic module into housing. The terminal connection piece is used to guide the cables. Fold connection cables as shown. Use cylinder head screws to fix the electronic module.



Connect the earth cable from the electronic module to the housing (not on all versions).



Assembly VN 5040/ 6040 with d or de-housing

Assembly of the unit

1. Mounting of the Extension tube to oscillating piece and preparing cables

! The tube must be assembled very carefully to ensure permanent sealing and mechanical stability. Observe the follow mounting instruction.

! Make sure, that the thread of the extension tube and the thread of the screwed piece/oscillating piece is the same type (do not mix G and NPT thread).

1.1. Feed the connecting wire through the 1" Extension tube.
 Use a separate taut wire for easy working.

1.2. Screw the 1" Extension tube into the oscillating piece.
 Tightening torque 50Nm.
 Use a 36 mm (1.42") open-end wrench, do not turn the oscillating rods.

G version: Tighten the Fixing screw

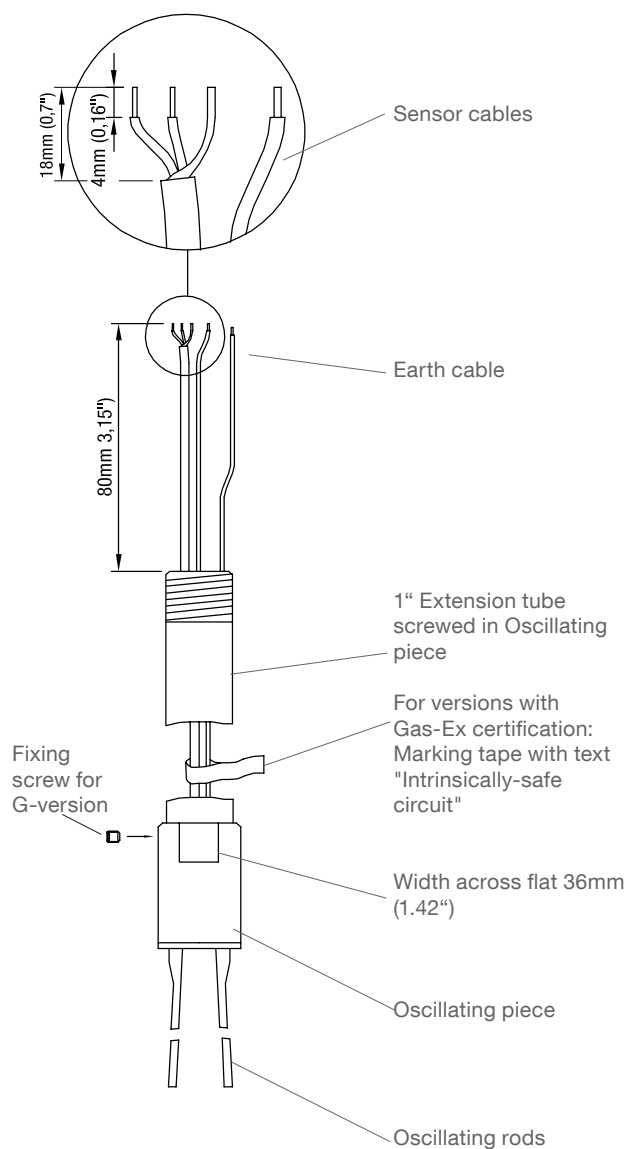
Requirements for sealing:

There must be a seal connection between the 1" tube and the screwed piece and the oscillating piece (IP67 or NEMA 4).

G version: An O-ring is required at both ends to ensure proper sealing and must not be damaged. Only original O-rings from the manufacturer are allowed to be used.

NPT version: The thread must be sealed with temperature resistant sealing for 150°C (302°F). Max. thickness of the sealing is 0.2mm (0.008").

1.3. Shorten all cables to 80 mm (3.15"). Prepare cables as shown.



Assembly VN 5040 / 6040 with d or de-housing

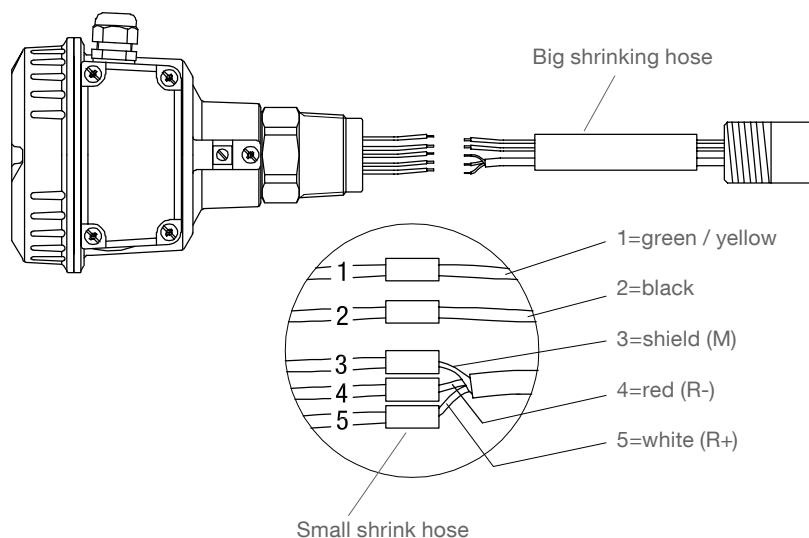
2. Soldering the cables

Guide the big shrink hose over all cables.

Guide the small shrink hose over each cable.

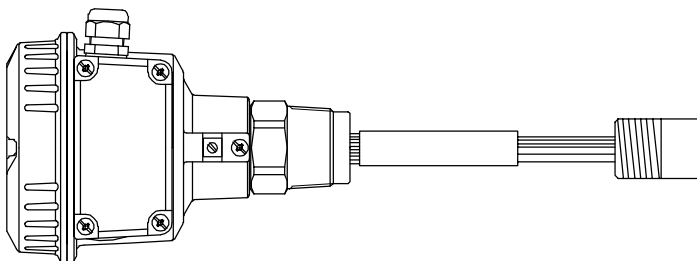
Solder the cables as shown.

Shrink the small shrink hose with a hot air blower. Ensure that the exposed wires are all covered with shrink hose



3. Shrinking all cables

Push the big shrink hose over the small shrink hoses and shrink with a hot air blower.



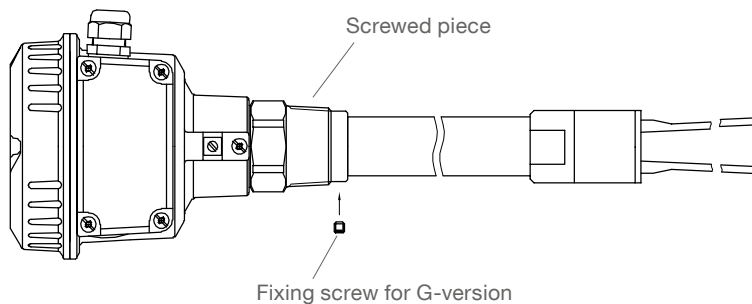
4. Mounting of the extension tube to housing side

Push the cables carefully into the extension tube.

Screw the 1" Extension tube into the screwed piece. Use a 36 mm (1.42") open-end wrench, do not turn the oscillating rods.

G version: Tighten the fixing screw

Sealing: see 1.2



Assembly: VN ..020 / ..030 with separate housing

Remove and reassemble of the connection cable

The units with separate housing are factory delivered completely assembled.

Should it be required to remove the connection cable from the housing due to shortening the cable or leading the cable through a pipe or wall, observe following items.

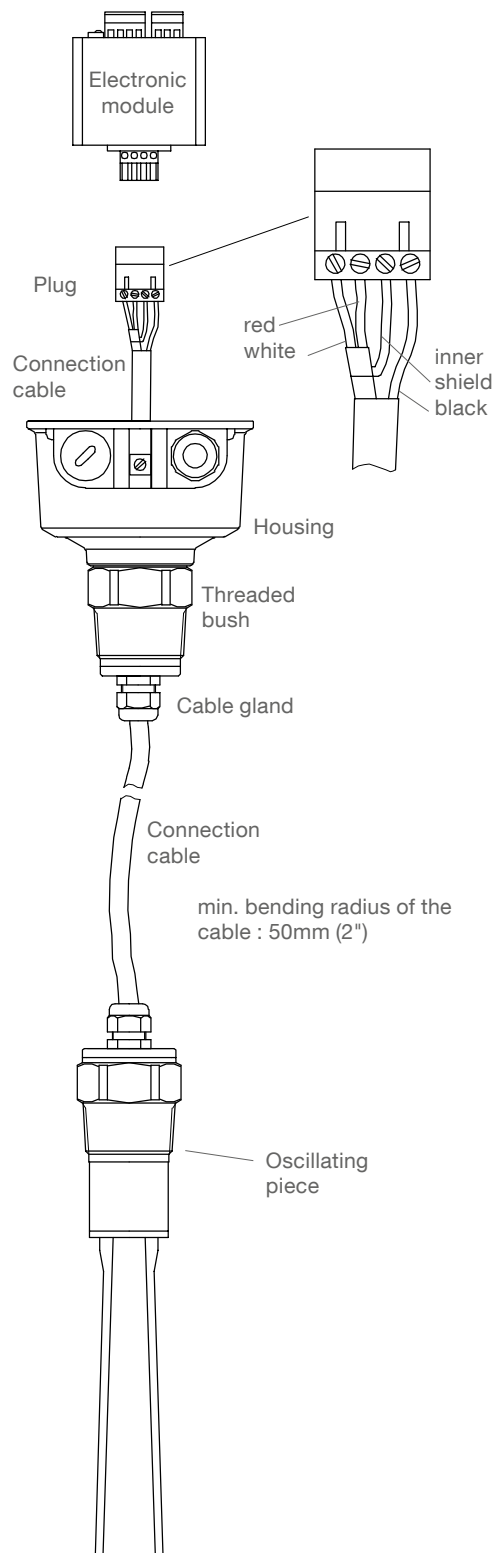
Before planning to shorten the cable, check if it is possible to loop the cable between housing and oscillating piece (preferred solution).

! Remove the cable only on the housing side, never on the oscillating piece side.

! For reassembling observe following items:

- After cutting the cable, use the factory provided cable situation as a sample.
- Connect the outer shield of the connection cable to the cable gland.
- Obtain right connecting sequence on the plug (see drawing).
- Cut present cables, which are not required.
- Isolate the inner shield with an isolation hose to avoid that it may touch any other metal parts.
- Fix the electronic module into the housing with 2 screws. To do this, guide the connecting cable that it rests in the threaded bush and is not clamped between electronic module and housing. Take care, that the plug is not removing from the electronic module.

! The cable gland cable must be closed tightly to reach ingress protection IP67 or NEMA 4.



Assembly: VN ..020 / ..030 with separate d- or de- housing

Remove and reassemble of the connection cable

The units with separate housing are factory delivered completely assembled.

Should it be required to remove the connection cable from the housing due to shortening the cable or leading the cable through a pipe or wall, observe following items.

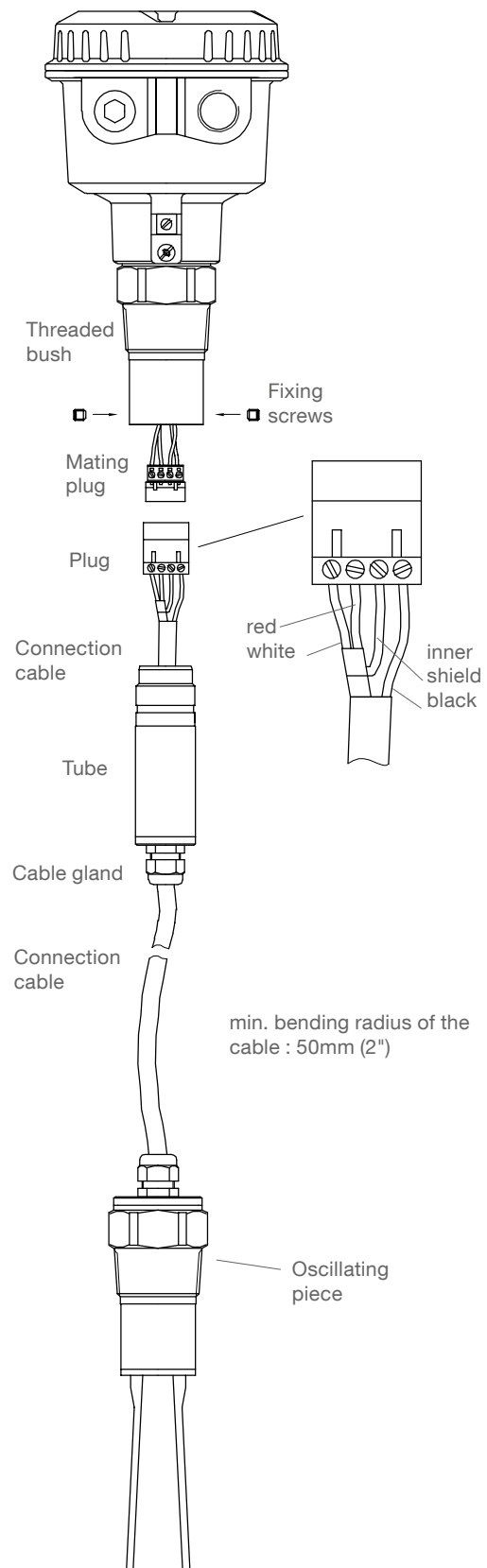
Before planning to shorten the cable, check if it is possible to loop the cable between housing and oscillating piece (preferred solution).

Remove the cable only on the housing side, never on the oscillating piece side.

For reassembling observe following items:

- After cutting the cable, use the factory provided cable situation as a sample.
- Connect the outer shield of the connection cable to the cable gland.
- Obtain right connecting sequence on the plug (see drawing).
- Cut present cables, which are not required.
- Isolate the inner shield with an isolation hose to avoid that it may touch any other metal parts.
- Connect plug and mating plug.
- Screw the tube into the threaded bush.
- Before screwing check that inside the threaded bush a seal ring is present which seals the tube to the threaded bush.
- While screwing, the cable gland must be open to avoid, that the connection cable is being twisted. Take care, that the plug is not removing from the mating plug.
- Fasten the two fixing screws.

The cable gland cable must be closed tightly to reach ingress protection IP67 or NEMA 4.



Disposal

The product consists of materials which can be recycled, details of the used materials see chapter "Technical data - mechanical data".

Recycling must be done by a specialised recycling company. Since the product is not subject to the WEEE directive 2002/96/EG, it is not permitted to bring it to a public recycling station.

Table of contents

	Page
Safety notes / Technical support	2

Introduction	3

Technical data	4

Approvals	8

Options	9

Mounting	10

Electrical installation	13

Signal output	16

Sensitivity setting	16

Maintenance	17

Notes for use in Hazardous Locations	18

Assembly VN 4040	20

Disposal	23

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

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 device is used for level monitoring in all types of containers and silos.

It can be used with all powdery and granulated bulk materials with a density greater than 30 g/l (1.9lb/ft³) that do not show a strong tendency to form crusts or deposits.

The units can be delivered with Ex-approvals for use in Dust Hazardous Areas.

A selection of fields of application:

- **Building materials industry**
lime, moulding sand, etc.
- **Food industry**
milk powder, flour, salt, etc.
- **Plastics industry**
plastics granules etc.
- **Timber industry**
- **Chemical industry**
- **Mechanical engineering**

The VIBRANIVO oscillating probe 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.

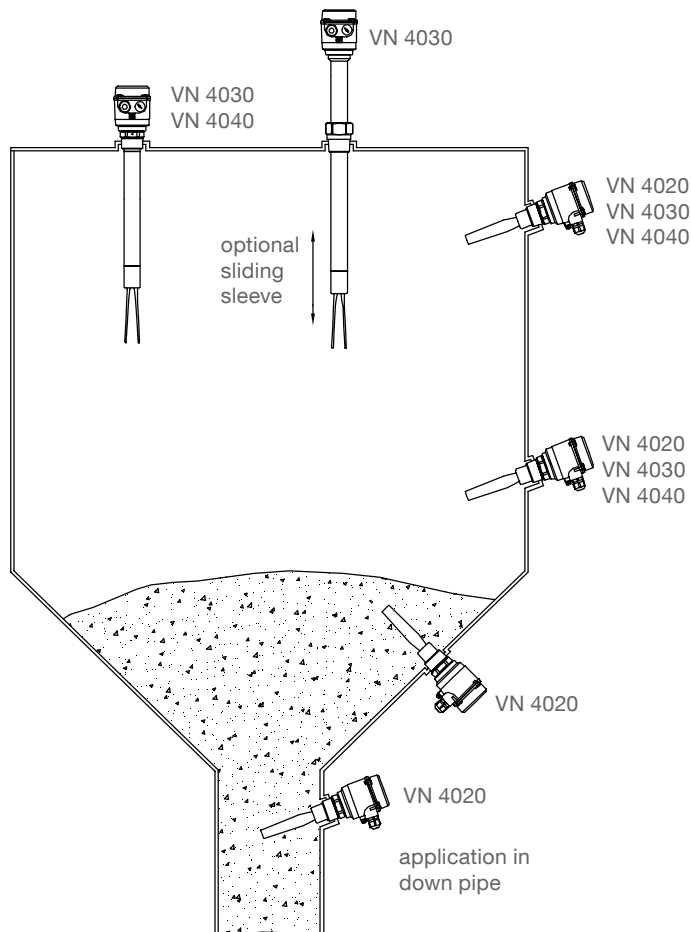
The length of the probe can be up to 4m (157") with an extension tube (VN 4030, VN 4040) .

The use of a sliding sleeve is recommended so that the switch point can be changed continuously during operation of the device.

Function

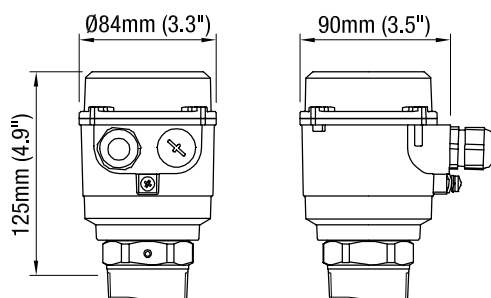
The piezo-electrically stimulated oscillating fork vibrates at its mechanical resonance frequency. If the probe is covered by the bulk material, the damping thus generated is registered electronically and a corresponding signal output is actuated.

The oscillation of the fork ensures a certain self-cleaning effect..

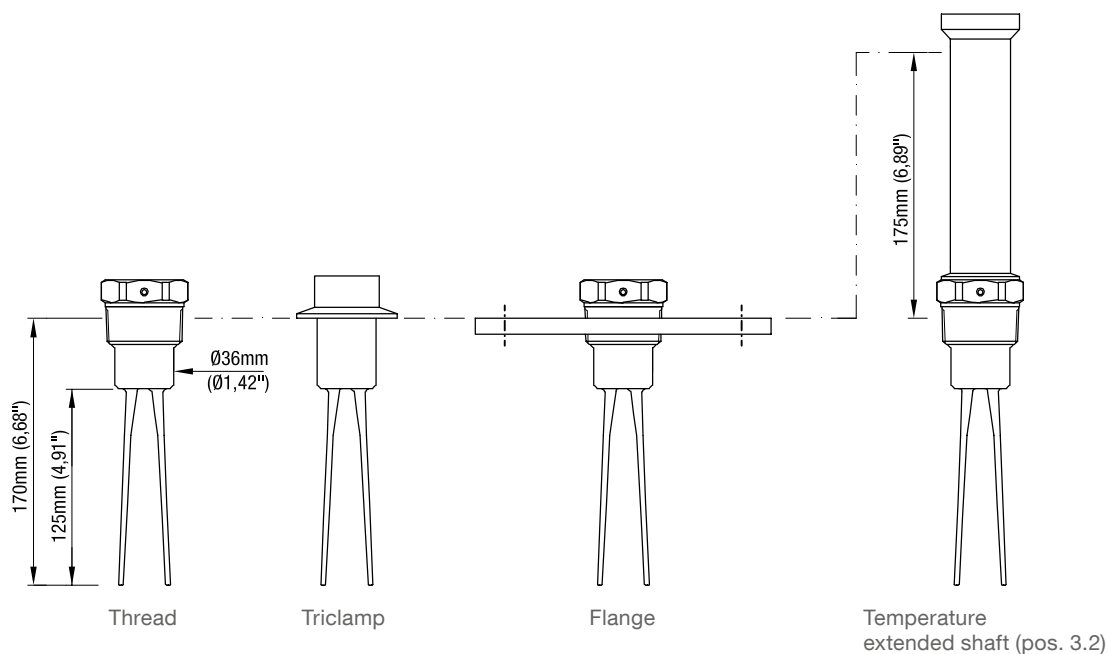


Technical data

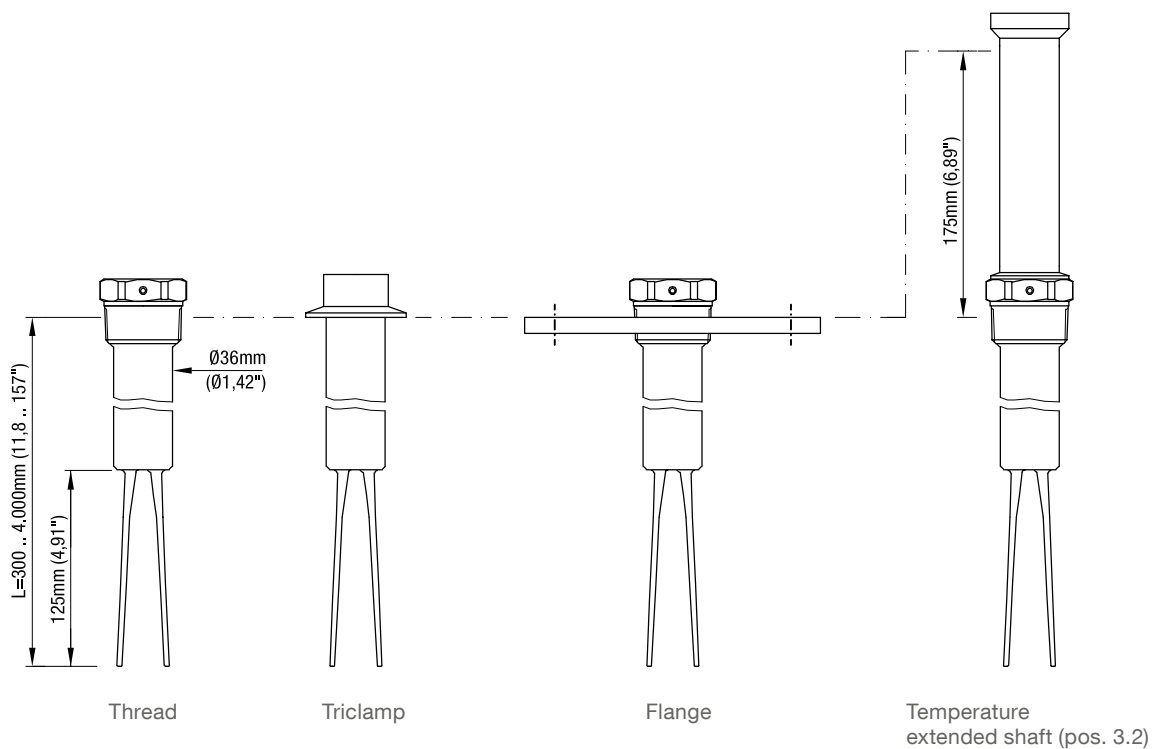
Dimensions



VN 4020

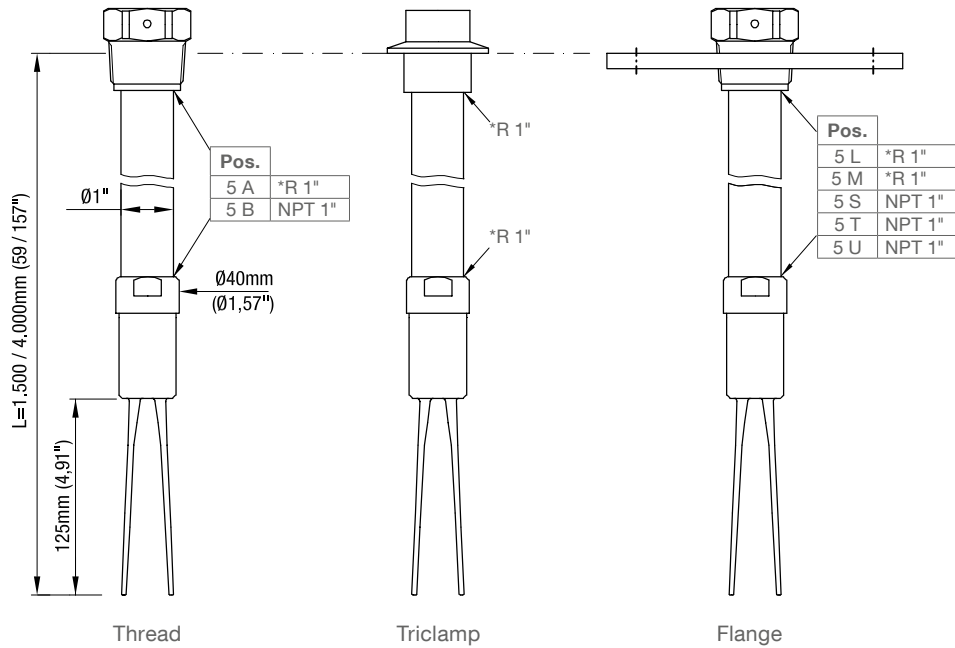


VN 4030



Technical data

VN 4040



Technical data

Electrical data

Connection terminals	0.14 - 2.5mm ² (AWG 26-14)
Cable entry	M20 x 1.5 screwed cable gland NPT 1/2" conduit connection NPT 3/4" conduit connection Clamping range (diameter) of the factory provided cable glands: M20 x 1.5: 6 .. 12mm (0.24 .. 0.47")
Signal delay	Sensor free -> covered ca. 1 sec Sensor covered -> free ca. 1..2 sec
Safety operation (FSL,FSH)	Switchable for minimum or maximum safety
Vibration frequency	ca. 200 Hz
Overvoltage category	II
Pollution degree	2 (inside housing)

Electronics

Universal voltage Relay DPDT

3-wire PNP

Power supply	19 .. 230V 50-60Hz ±10%* 19 .. 40V DC ±10%* *incl. ±10% of EN 61010	18V .. 50V DC ±10%* *incl. ±10% of EN 61010
Max. ripple of power supply	7 V _{ss} at DC	7 V _{ss}
Installed load / input current	max. 22VA / 2W	max. 0.5A
Signal output	Floating relay DPDT AC max. 250V, 8A non inductive DC max. 30V, 5A non inductive	Open Collector: Permanent load max. 0.4A Short-circuit, overload and reverse polarity protected Output voltage equal to input voltage, drop <2.5V
Indicating light	Status of signal output by built-in LED	Status of signal output by built-in LED
Isolation	Power supply to signal output: 2225Vrms Signal output to signal output: 2225Vrms	-
Protection class	I	III

Mechanical data

Housing	Aluminium housing, powder coated RAL 5010 gentian blue Seal between housig and lid: NBR Seal between housing and process connection: NBR Nameplate: polyester film
Degree of protection	IP 67 (EN 60529), NEMA Type 4X
Process connection	Material: VN 4020: stainless steel 1.4581 (316) VN 4030/4040: stainless steel 1.4305 (303) or 1.4571 (316Ti) (process connection and tube extension) Thread: R 1½" tapered DIN 2999 or NPT 1½" or NPT 1¼" tapered ANSI B 1.20.1 Flanges: according to selection 1.4541 (321) or 1.4404 (316L) Triclamp: stainless steel 1.4301 (304) or 1.4404 (316L) 2" (DN 50) ISO 2852 All material food grade

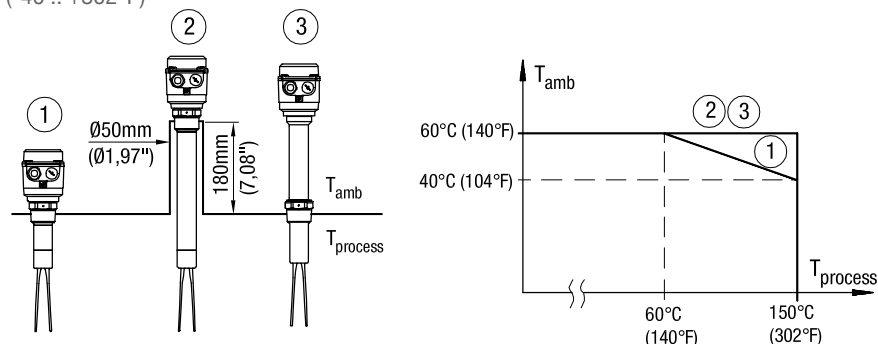
Technical data

Oscillator	Material: stainless steel 1.4581 (316) (food grade)
Sound level	max. 50dBA
Overall weight (ca.)	VN 4020: 1.7kg (3.7lbs) VN 4030: 1.7kg (3.7lbs) +1.9kg/m (+4.2lbs per 39.3") extension VN 4040: 2.1kg (4.6lbs) +1.9kg/m (+4.2lbs per 39.3") extension

Operating conditions

Ambient temp. (housing) -40°C.. +60°C (-40 .. +140°F)

Process temperature -40°C.. +150°C (-40 .. +302°F)



For versions with Ex-approvals: see remarks on page 19.

Ventilation	Ventilation is not required	
Min. powder density	Setting A ca. 150 g/l (9.5lb/ft ³)	Setting B ca. 30 g/l (1.9lb/ft ³)
Features of bulk material	No strong tendency to cake or deposit Max. grain size 8mm (0.31")	
Max. mechanical load	500N laterally (on oscillator rods) Recommended protection in case of high material load: mounting of an protective angle above the probe	
Max. mechanical torque	VN 4030: 250 Nm VN 4040: 100 Nm	
Max. process pressure	16bar (232psi) For versions with "sliding sleeve without process overpressure" (option pos 25 a, b): unpressurized. The max. process pressure may be reduced with use of flanges. Observe flange standards for pressure rating and pressure derating with higher temperature. For versions with Ex-approvals: see remarks on page 18.	
Vibration	1.5 (m/s ²)/Hz according to EN 60068-2-64	
Relative Humidity	0-100%, suitable for outdoor use	
Altitude	max. 2.000m (6.562ft)	
Expected product lifetime	Following parameters have a negative influence on the expected product lifetime: High ambient- and process temperature, corrosive environment, high vibration, high flow rate of abrasive bulk material passing the sensor element.	

Technical data / Approvals

Transport and Storage

Transport	<p>Observe the instructions as stated on the transport packaging, otherwise the products may get damaged.</p> <p>Transport temperature: -40 .. +80 °C (-40 .. +176 °F) Transport humidity: 20 .. 85 %</p> <p>Transport incoming inspections must be carried out to check for possible transport damage.</p>
Storage	<p>Products must be stored at a dry and clean place. They must be protected from influence of corrosive environment, vibration and exposure to direct sunlight.</p> <p>Storage temperature: -40 .. +80 °C (-40 .. +176 °F) Storage humidity: 20 .. 85 %</p>

Approvals

General Purpose (Ordinary Locations) Depending on selected version in price list.	CE FM CSA TR-CU	EN 61010-1 (IEC/CB)	
Hazardous Locations Depending on selected version in price list.	ATEX IEC-Ex FM CSA TR-CU Detailed allocation of types and electronics to approvals: see selection list.	Dust explosion Dust explosion Dust explosion Dust explosion Dust explosion	ATEX II 1/2 D Ex ta/tb IIIC T! Da/Db IP6X IEC-Ex ta/tb IIIC T! Da/Db IP6X Cl. II, III Div. 1 Gr. E,F,G Cl. II, III Div. 1 Gr. E,F,G Ex DIP A20/21 Ex ta/tb IIIC T! Da/Db X
EMC	EN 61326 -A1		
Food grade material	According to directive 1935/2004/EC		
RoHS conform	According to directive 2011/65/EU		
Pressure Equipment Directive (2014/68/EU)	<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).</p> <p>The units are designed and manufactured in accordance to the Pressure Equipment Directive.</p> <p>The unit is NOT intended for use as an “equipment part with safety function (Art.1, Abs. 2.1.3).</p> <p>If the units should be used as „equipment part with safety function“ please contact the manufacturer.</p>		

Options

Weather protection cover

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

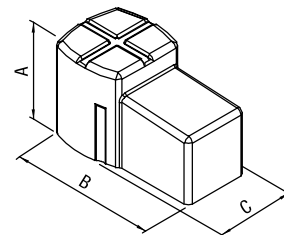
- rain water
- condensation of water
- excessively high temperatures due to insulation
- excessively low temperatures in winter

Material: PE, weathering and temperature stable

Not available for housing version d and de.



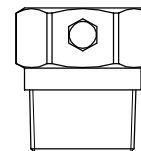
For use in Hazardous Locations: only permitted for Category 3 (zone 22) or Division 2.



A	100mm (3.94")
B	165mm (6.5")
C	88mm (3.46")

Sliding sleeve

VN 4030 G1½" ISO 228 or
 1½" NPT ANSI B 1.20.1
 or flanges
 Material: 1.4301 (304) or 1.4571 (316Ti)
 Sealing material to the extension tube:
 viton or NBR

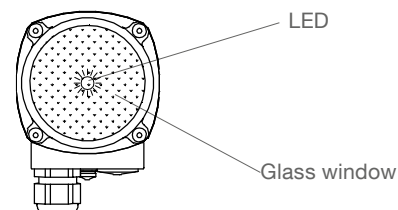


Mounting set

Screws and washers for fixing the unit on a flange.

Glass window in lid

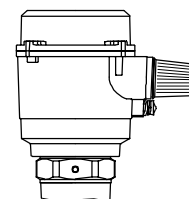
To see the indicating light on the electronic from outside.



Bulb

Bright indicating light seen from outside.

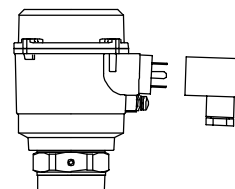
Not available for use in Hazardous Locations and FM/CSA general purpose.



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

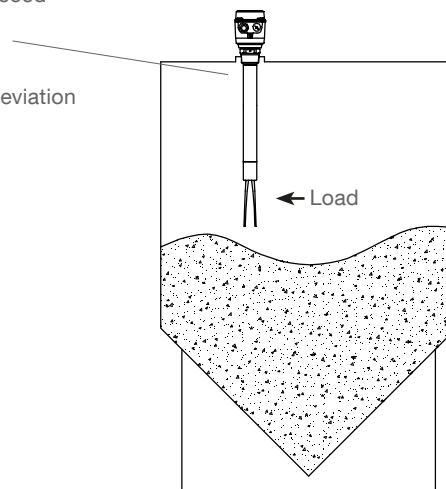
Process pressure ! Improper installation may result in loss of process pressure.

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.

Temperature range ! The range of the ambient and process temperature of the device must be observed (see page 6 and for Ex-approvals page 17)

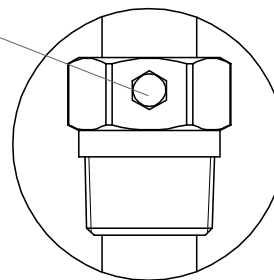
Mechanical load ! The torque at the fastening spot must not exceed 300Nm (VN 4030 / 100Nm VN 4040).
 Maximum length „L“ in dependence on the deviation (in degrees) from vertical installation:

Max. deviation	Max. length „L“
5°	4000 mm (157.5“)
45°	1200 mm (47.24“)
>45°	600 mm (23.62“)



Mounting location Keep distance to incoming material and to the silo wall. The installation has to be done in a way, 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 more than 3m (118.1“).

Sliding sleeve “Pressure tight” version (pos. 25 e, f): Tighten both straining screws M8 with 20 Nm to obtain resistance against pressure.



Flange mounting A plastic sealing must be used to tighten the flange.

Fastening of the threaded process connection Mounting torque for the thread may not exceed 80Nm. Use a 50mm (1.97“), for units with sliding sleeve use a 55mm (2.17“), open-end wrench. Do not fasten by turning the housing .

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.

Mounting



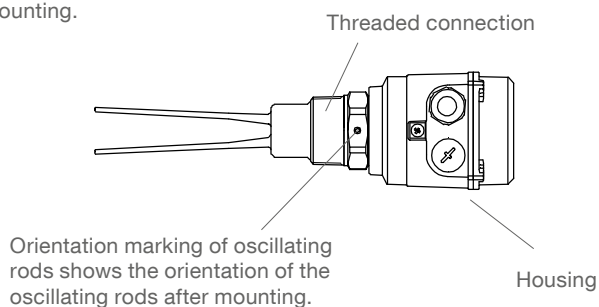
Additional Safety Instructions for Hazardous Locations

Installation regulations	For devices to use in hazardous locations the respectively valid installation regulations must be observed.
Sparks	The installation has to be done in a way mechanical friction or impact can not cause sparks between the aluminium enclosure and steel.

Mounting instructions

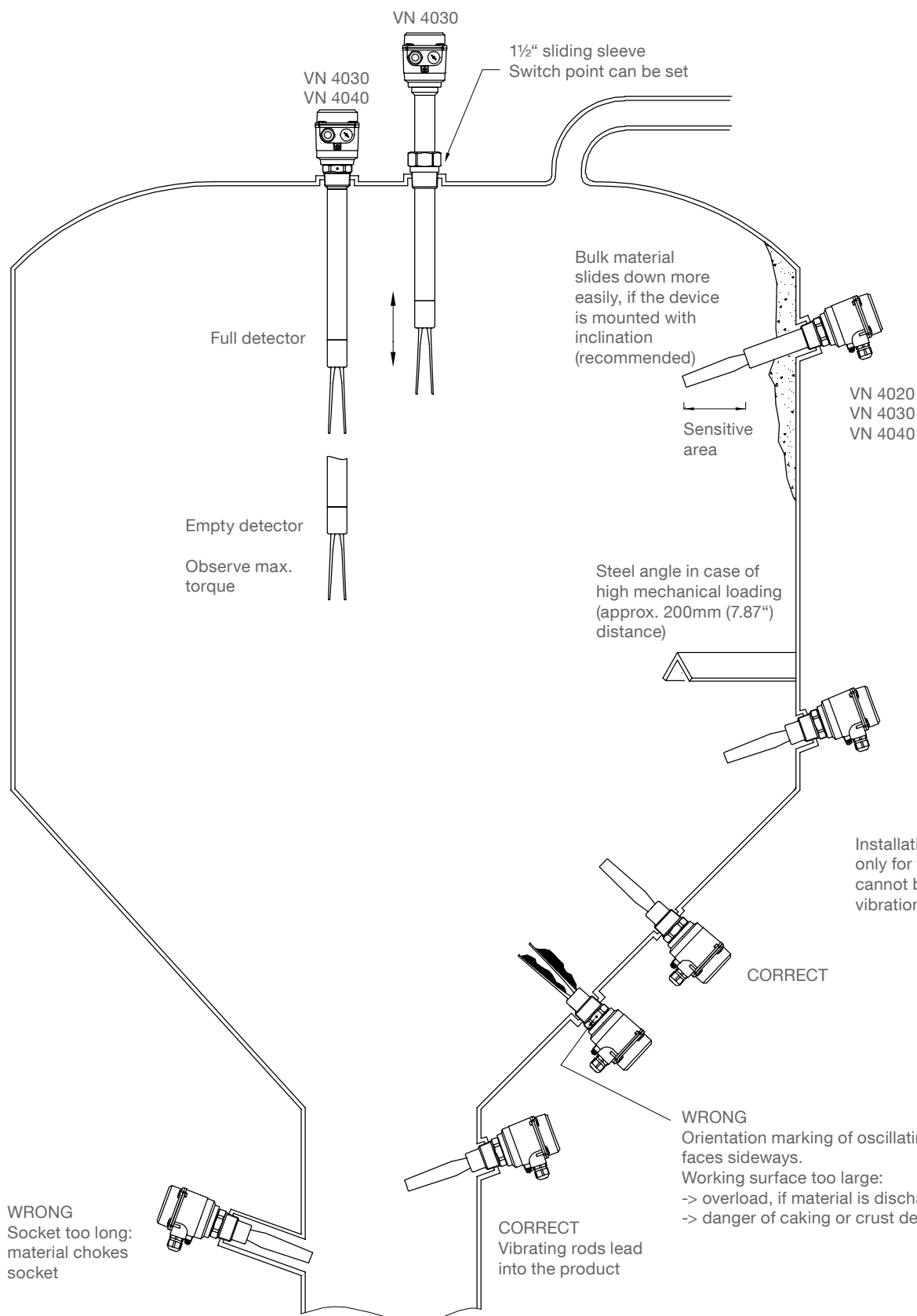
Oscillating rods	Do not bend, shorten or extend the oscillating rods since this will destroy the device.
-------------------------	---

Rotatable housing and orientation marking of oscillating rods	The housing can be rotated against the threaded connection after mounting.
--	--



Direction of the cable glands	When the unit is mounted from the side, ensure, that the cable glands faces downwards and are closed to avoid water penetration into the housing.
Sealing	Seal the process thread with Teflon tape in case of process pressure
Precaution for later dismantling/ Service	Grease the screws of the lid if corrosive atmosphere is present (e.g. close to sea)
Switching point	Heavy bulk material -> the signal output switches when the oscillating rods are covered a few mm Light bulk material -> the signal output switches, when the oscillating rods are covered a few cm

Mounting



Electrical installation

General Safety Instructions

Handling



In the case of inexpert handling or handling malpractice the electric safety of the device cannot be guaranteed.

Protective earthing

Before any electrical installation, the device must be connected to the protective earthing terminal inside the housing.

Installation regulations

The local regulations or VDE 0100 (Regulations of German Electro technical Engineers) must be observed.
 With use of 24V supply voltage, an approved power supply with reinforced insulation to mains is required.

Fuse

Use a fuse as stated in the connection diagrams (page 15).

RCCB protection

In the case of a defect, the distribution voltage must automatically be cut off by a RCCB protection switch so as to protect the user of the device from indirect contact with dangerous electric tensions.

Power supply switch

A Power-supply-disconnecting switch must be provided and marked near the device.

Wiring diagram

The electrical connections have to be made according to the wiring diagram.

Supply voltage

Compare the supply voltage applied with the specifications given on the electronic and name plate before switching the device on.

Cable gland / closing element

The screwed cable gland and closing element must have following specifications:
 Ingress protection IP67, 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 locked with a closing element.

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 NPT 1/2" or NPT 3/4" in accordance with the unit and ANSI B 1.20.1. Not used inlets must be closed tight with a metal closing element.

Field wiring cables

- The diameter has to match to the clamping range of the used cable gland.
- The cross section has to match with the clamping range of the connection terminals and consider the max. current.
- All field wirings must have insulation suitable for at least 250V AC.
- The temperature rating must be at least 90°C (194°F).
- If higher immunity interferences as specified in the stated EMC standards are present (see chapter approval), a shielded cable is required, otherwise an unshielded instrumentation cable is satisfactory.

Connecting the terminals

Make sure that max. 8mm (0.31") of the pigtails are bared (danger of contact with live parts).

Guiding the cables in the terminal box

Cut the field wiring cables to appropriate length to fit properly into the terminal box.

Relay and transistor protection

Provide protection for relay contacts and output transistors to protect the device against spikes with inductive loads.

Protection against static charging

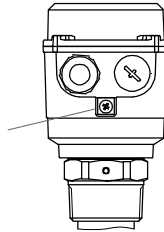
The housing of the unit must be grounded in any case to avoid static charging of the unit on applications with pneumatic conveying and non-metallic containers .

Electrical installation

! Additional Safety Instructions for Hazardous Locations

External equipotential bonding terminal

Connect with equipotential bonding of the plant



Field wiring

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

Cable glands and conduit system for ATEX / IEC-Ex / TR-CU

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.

Conduit system for FM and CSA

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.

Commissioning

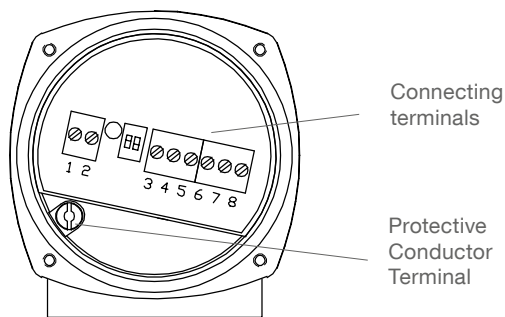
Commissioning only with closed lid.

Opening the lid

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

Electrical installation

Connection



Universal voltage Relay DPDT

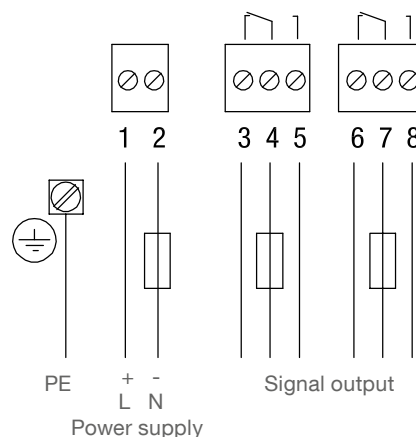
Power supply:
 19..230V 50-60Hz $\pm 10\%^*$ 22VA
 19..40V DC $\pm 10\%^*$ 2W
 *incl. $\pm 10\%$ of EN 61010

Fuse on power supply:
 max. 10A, fast or slow, HBC, 250V

Signal output:
 Floating relay DPDT

AC max. 250V, 8A, non inductive
 DC max. 30V, 5A, non inductive

Fuse on signal output:
 max 10A, fast or slow, HBC, 250V



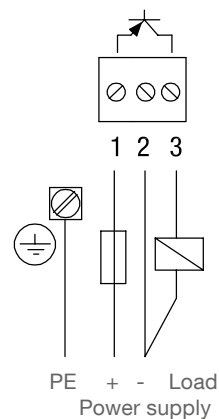
3-wire PNP

Power supply:
 18 .. 50V DC $\pm 10\%^*$
 *incl. $\pm 10\%$ of EN 61010
 Input current: max. 0.5A

Fuse:
 max. 4A, fast or slow, 250V

Signal output:
 max. 0.4A
 Output voltage equal to input
 voltage, drop $< 2.5V$

Load for example:
 PLC, relay, contactor, bulb



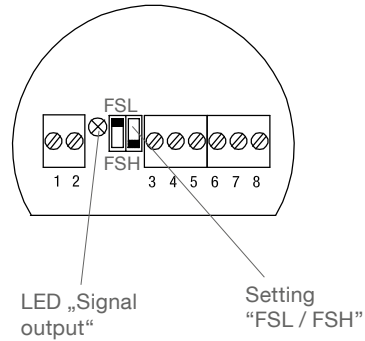
Signal output / Sensitivity setting

Signal output

FSL / FSH Setting

FSH If the sensor is used to indicate full load, set to Fail Safe High. Power failure or line break is regarded as „full“ signal (protection against overcharging).

FSL If the sensor is used to indicate empty load, set to Fail Safe Low. Power failure or line break is regarded as „empty“ signal (protection against running dry).



	Signal output		Signal output	
Setting	FSL	FSH	FSL	FSH
Relay DTPT				
3-wire PNP				
LED „Signal output“				

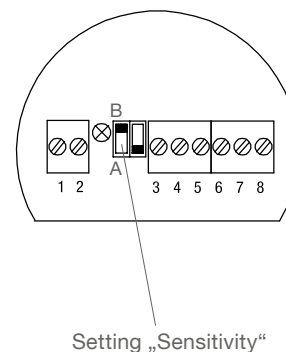
Sensitivity setting

All sensors are factory setted. Therefore, they usually do not have to be re-setted. If the bulk material has a strong tendency to cake or deposit, the setting switch can be set to position „A“ so as to decrease the sensitivity of the probe (Factory presetting = position „B“).

Approximate min. bulk density on setting:

A	B
Low sensitivity	High sensitivity
150g/l (9.5lb/ft³)	30g/l (1.9lb/ft³)

Please contact manufacturer if you intend to use the device for special purposes.



Maintenance

Opening the lid (cover)

- Before opening the lid for maintenance reasons observe following items:
- Do not remove the lid while circuits are alive.
 - No dust deposits or whirlings are present.
 - No rain can enter into the housing.

Frequent check of the unit

- To ensure durable safety in hazardous locations and with electrical safety, following items must be checked frequently depending on the application:
- Mechanical damage or corrosion of any components (housing side and sensor side) and of the field wiring cables.
 - Tight sealing of the process connection, cable glands and enclosure lid.
 - Properly connected external PE cable (if present).

Cleaning

If cleaning is required by the application, following must be observed:

- Cleaning agent must comply with the materials of the unit (chemical resistance). Mainly the lid sealing, cable gland and the surface of the unit must be considered.

The cleaning process must be done in a way, that:

- The cleaning agent cannot enter into the unit through the lid sealing or cable gland.
- No mechanical damage of the lid sealing, cable gland or other parts can happen.

A possible accumulation of dust on the unit does not increase the maximum surface temperature and must therefore not be removed for purposes of maintaining the surface temperature in hazardous locations.

Function test

A frequent function test may be required depending on the application.

- Observe all relevant safety precautions related with a safe work depending on the application (e.g. hazardous locations, hazardous bulk material, electric safety, process pressure).
- This test does not proof if the sensor is sensitive enough to measure the material of the application.

Function test is done by stopping the vibration of the vibrating rods with appropriate means and monitor if a correct change of the signal output from uncovered to covered happens.

Production date

The production date can be traced by the serial number on the typeplate. Please contact the manufacturer or your local distributor.

Spare parts

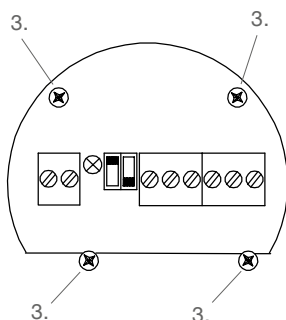
All available spare parts are stated in the selection list.

Change of the electronic board:

Deenergise device and secure against being switched on again.

Version small housing:

1. Open the housing lid
2. Remove the field wiring cables / plug
3. Unscrew the cover plate
4. Take out the electronic board and remove internal plug
5. Insert a new electronic board in reverse sequence
6. Connect the field wiring cables

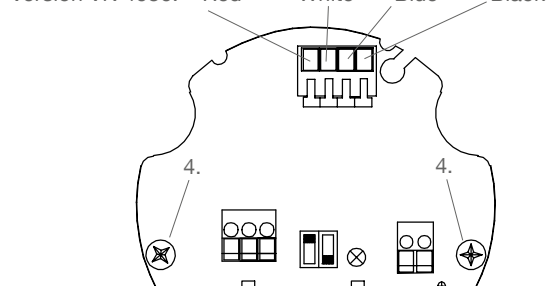


Version big housing:

1. Open the housing lid
2. Remove the field wiring cables
3. Remove the sensor cables
4. Unscrew the two fastening screws of the electronic board
5. Take out the electronic board
6. Insert a new electronic board and tighten fastening screws
7. Connect the sensor cables and field wire cable (see drawing)

Sensor cables

Version VN 4020: Red Red Yellow White Blue Blue Black Black



Notes for use in Hazardous Locations

Zone classification

	Usable in zone	ATEX category	IEC-Ex Equipement Protection Level (EPL)
Dust applications	20, 21, 22	1 D	Da
	21, 22	2 D	Db
	22	3 D*	Dc

* in case of conductive dust additional demands for the installation are possible.

General Notes

Marking

Devices with EX approval are marked on the name plate.

Process pressure

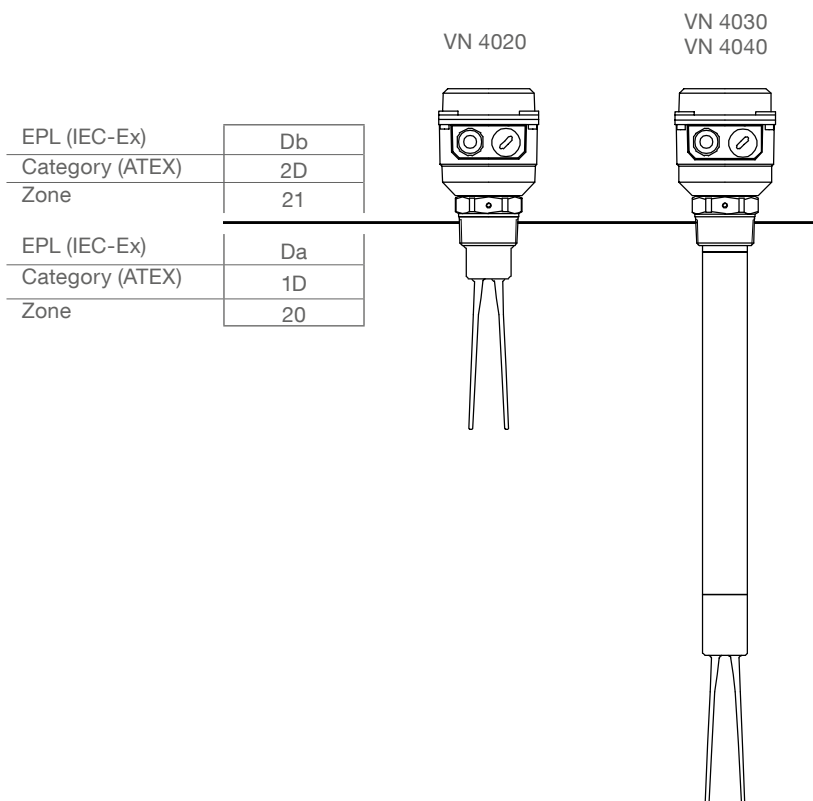


The device construction allows process over-pressure up to 16 bar (232psi). These pressures are allowed for test purposes. The definition of the Ex approval are only valid for a container-over-pressure between -0.2..+0.1 bar (-2.9..+1.45psi). For higher or lower pressures the approvals are not valid.

Process and ambient temperature

The permitted temperature ranges are marked on the name plate.
 The max. permitted ambient and process temperatures (including temperature derating) stated in this manual must be observed.

Permitted zones for mounting in partition wall

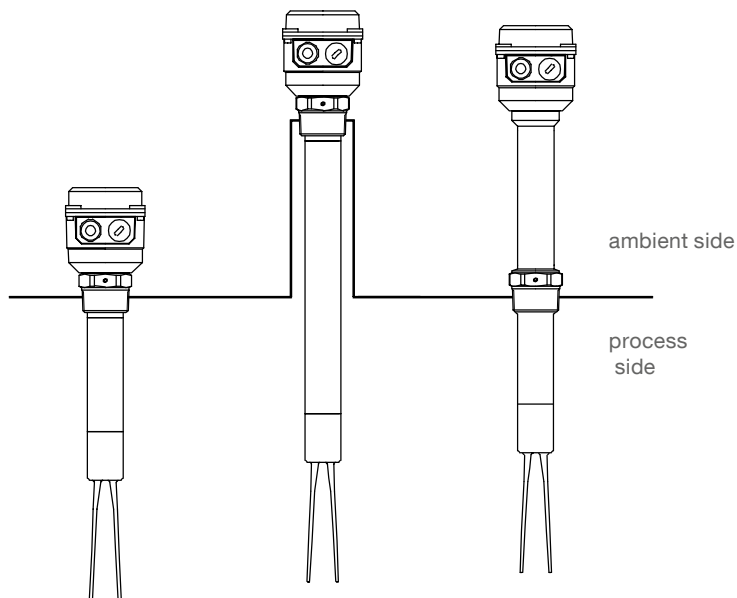


Notes for use in Hazardous Locations

Max. Surface Temperature and Temperature Class

The temperature marking on the type plate  refers to the instruction manual.
 In the following table 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)..



Max. ambient temperature	Max. process temperature	Max. surface temperature	Temperature class (Division System)	Temperature class (Zone System)
60°C (140°F)	110°C (230°F)	115°C (239°F)	T4A	T4
	120°C (248°F)	120°C (248°F)	T4	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

Assembly VN 4040

Manufacturing of the Extension tube

! Obtain instruction manual for proper manufacturing of the extension tube. In case of deviation from the instruction manual the unit is not safe for use in Hazardous Locations.

Demands on the Extension tube

Material: Stainless steel 1.4301 (SS304) or 1.4305 (SS301) or 1.4571 (SS316Ti) or 1.4404 (SS316L)

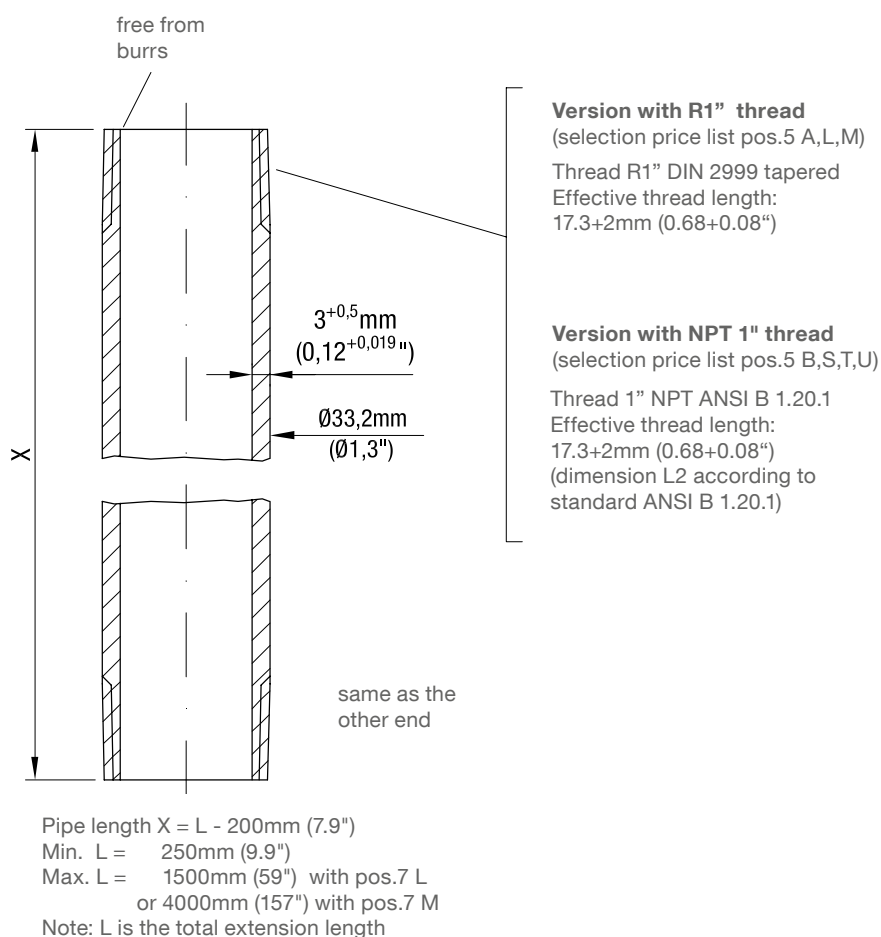
The tube must be manufactured from one single piece. It is not allowed to weld two or more pieces together.

Carefully observe max. length, diameter, wall thickness, thread, tolerances as specified in the drawing.

All sharp edges must be removed to protect the cable.

Thread testing

Each thread must be tested with go and no-go ring gauge according to standard DIN 2999 (R1" version) or ANSI B 1.20.1 (NPT 1" version)



Assembly VN 4040

Assembly of the unit

1. Mounting of the Extension tube

! The tube must be assembled very carefully to ensure permanent sealing, electrical grounding and mechanical stability. Observe the follow mounting instructions.

! Make sure that the thread of the extension tube and the thread of the screwed piece/ oscillating piece is the same type (do not mix R and NPT thread).

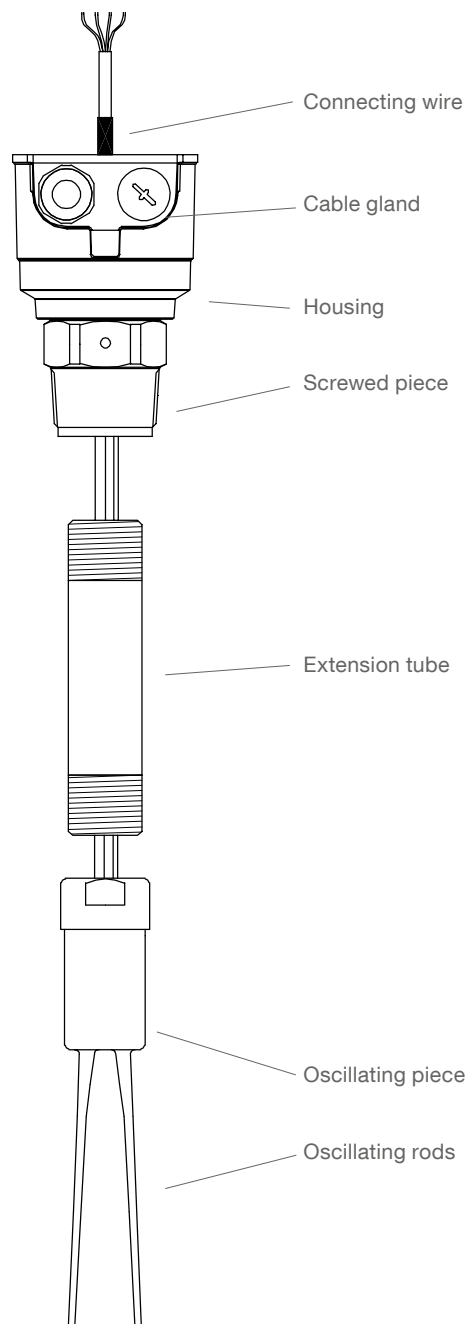
1.1. Feed the connecting wire through the 1" Extension tube and the screwed piece. Use a separate taut wire for easy working.

1.2. Screw the 1" Extension tube into the oscillating piece and the screwed piece.

Requirements for proper sealing and electrical grounding:

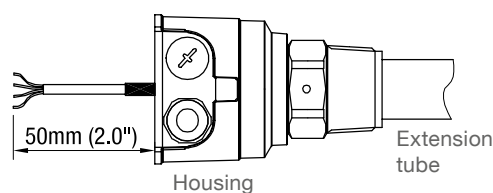
Sealing must satisfy IP67 or NEMA Type 4 at both sides of the extension tube. To reach this, the threads must be sealed with temperature resistant sealing for 150°C (302°F). Max. thickness of the sealing is 0.2mm (0.008").

The threads must be fixed with 50Nm.
 Use a open-end wrench to attach the oscillating piece (do not use the oscillating rods).



2. Checking the cable length

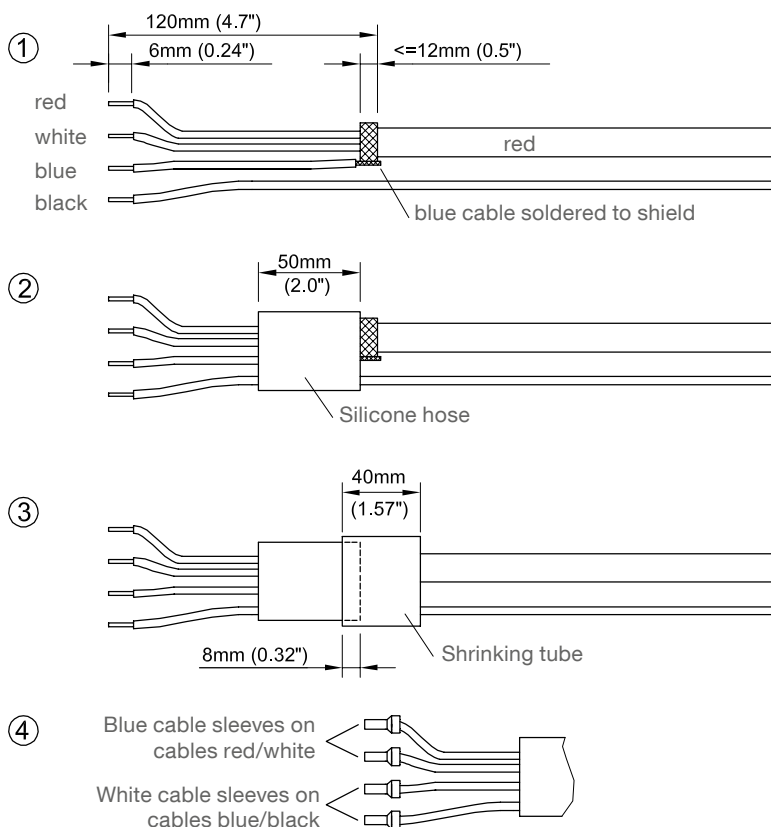
Push back the cable into the extension tube until the stated length is present. Take care that no cable is wound up inside the housing.
 If the cables are too long to be pushed back, goto step 3, otherwise goto step 4.



Assembly VN 4040

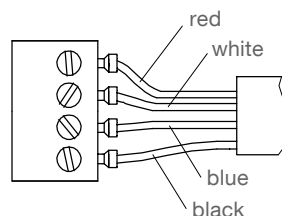
3. Cutting the cables (if required)

If the cables are too long to be pushed back into the extension tube, shorten the cable to the length as stated in step 2. Prepare the cables as shown. Use the attached hoses and cable sleeves for proper mounting.



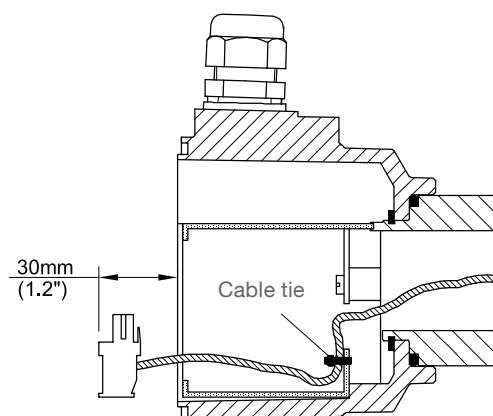
4. Connecting the plug

Observe correct sequence



5. Fixing the cable tie

Before fixing the cable tie observe correct cable length as stated and that no cable is wound up inside the housing.



6. Insert electronics

Insert the plug into the electronic, insert the electronic into the housing and fix the electronic plastic cover with 4 screws.

Disposal

The product consists of materials which can be recycled, details of the used materials see chapter "Technical data - mechanical data".

Recycling must be done by a specialised recycling company. Since the product is not subject to the WEEE directive 2002/96/EG, it is not permitted to bring it to a public recycling station.

Table of contents

	Page
Safety notes / Technical support	2

Introduction	3

Technical data	4

Approvals	8

Options	9

Mounting	10

Electrical installation	13

Signal output	16

Sensitivity setting	16

Maintenance	17

Notes for use in Hazardous Locations	18

Assembly MN 4040	20

Disposal	23

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

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 device is used for level monitoring in all types of containers and silos.

It can be used with all powdery and granulated bulk materials with a density greater than 20 g/l (1.25lb/ft³) that do not show a strong tendency to form crusts or deposits.

The units can be delivered with Ex-approvals for use in Dust Hazardous Areas.

A selection of fields of application:

- **Building materials industry**
lime, moulding sand, etc.
- **Food industry**
milk powder, flour, salt, etc.
- **Plastics industry**
plastics granules etc.
- **Timber industry**
- **Chemical industry**
- **Mechanical engineering**

The Mononivo oscillating probe 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.

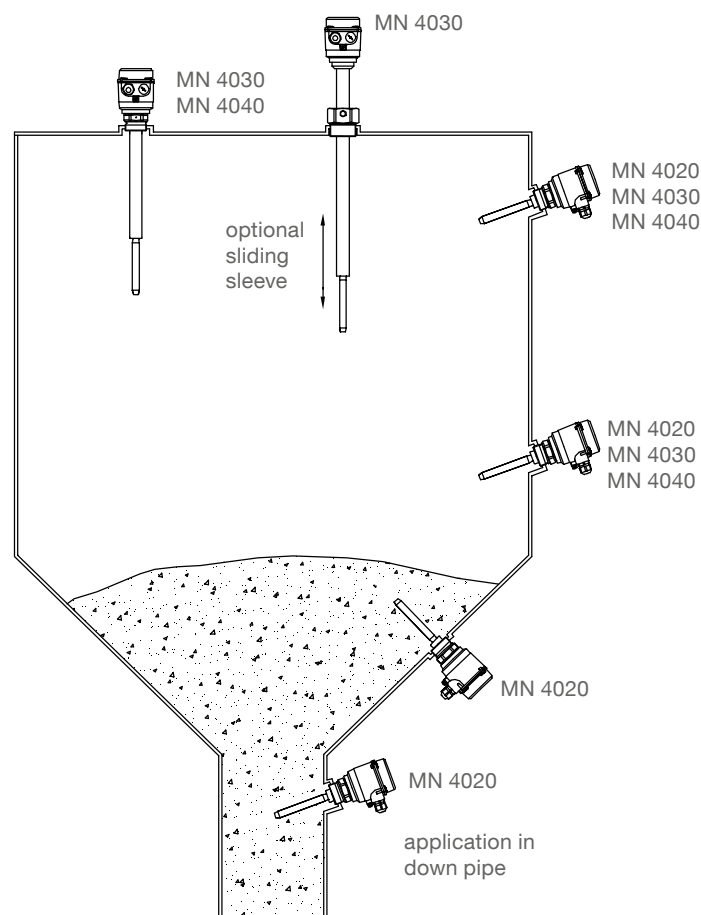
The length of the probe can be up to 4m (157") with an extension tube (MN 4030, MN 4040).

The use of a sliding sleeve is recommended so that the switch point can be changed continuously during operation of the device.

Function

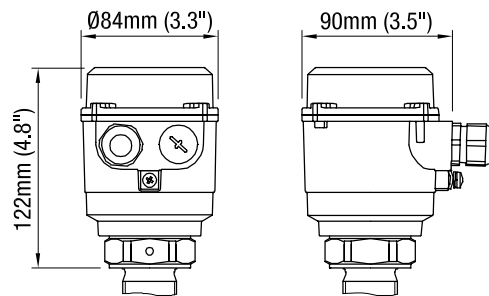
The piezo-electrically stimulated oscillating rod vibrates at its mechanical resonance frequency. If the probe is covered by the bulk material, the damping thus generated is registered electronically and a corresponding signal output is actuated.

The oscillation of the rod ensures a certain self-cleaning effect.

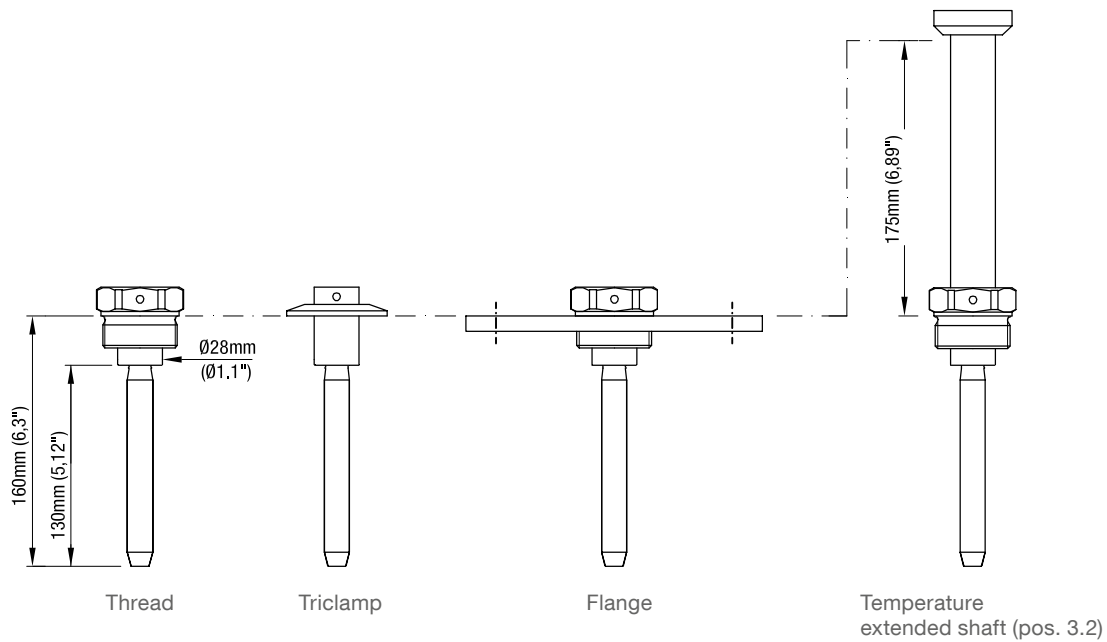


Technical data

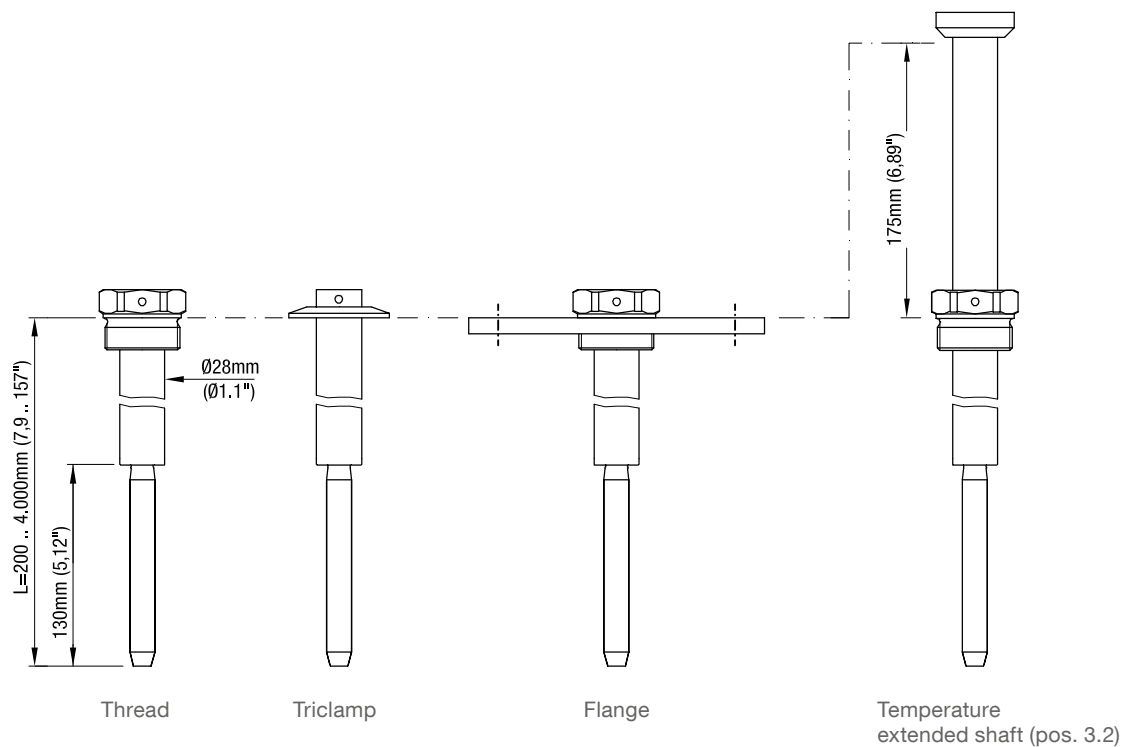
Dimensions



MN 4020

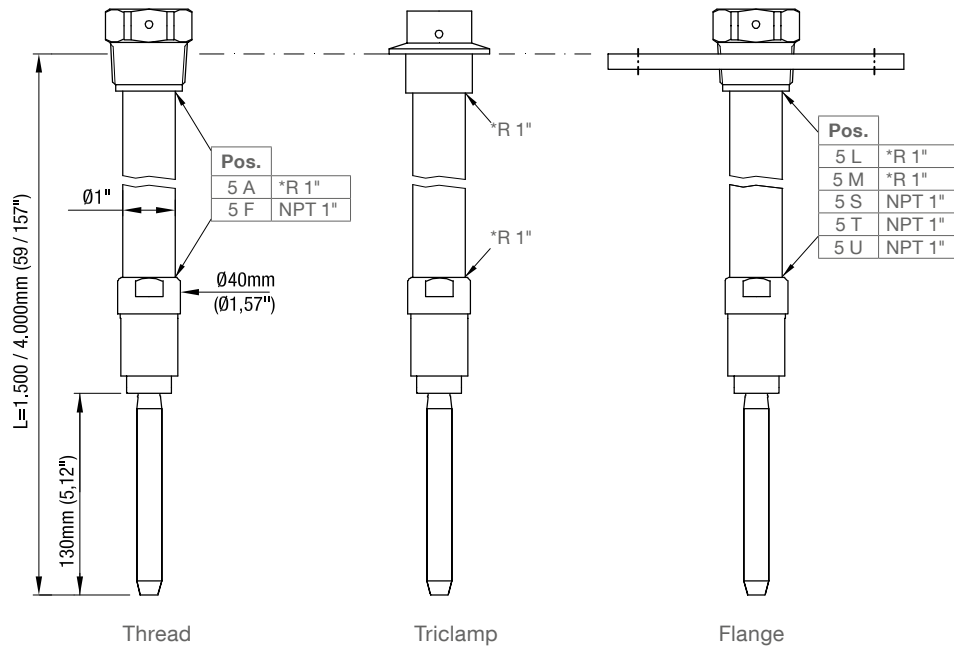


MN 4030



Technical data

MN 4040



Extension tube
 NOT part of
 delivery

* Thread on
 extension tube

Technical data

Electrical data

Connection terminals	0.14 - 2.5mm ² (AWG 26-14)
Cable entry	M20 x 1.5 screwed cable gland NPT 1/2" conduit connection NPT 3/4" conduit connection Clamping range (diameter) of the factory provided cable glands: M20 x 1.5: 6 .. 12mm (0.24 .. 0.47")
Signal delay	Sensor free -> covered ca. 1 sec Sensor covered -> free ca. 1..2 sec
Safety operation (FSL,FSH)	Switchable for minimum or maximum safety
Vibration frequency	ca. 330 Hz
Overvoltage category	II
Pollution degree	2 (inside housing)

Electronics

Universal voltage Relay DPDT

3-wire PNP

Power supply	21V .. 230V 50-60Hz ±10%* 22V .. 45V DC ±10%* *incl. ±10% of EN 61010	20V .. 40V DC ±10%* *incl. ±10% of EN 61010
Max. ripple of power supply	7 V _{ss} at DC	7 V _{ss}
Installed load / input current	max. 22VA / 2W	max. 0.5A
Signal output	Floating relay DPDT AC max. 250V, 8A non inductive DC max. 30V, 5A non inductive	Open Collector: Permanent load max. 0.4A Short-circuit, overload and reverse polarity protected Output voltage equal to input voltage, drop <2.5V
Indicating light	Status of signal output by built-in LED	Status of signal output by built-in LED
Isolation	Power supply to signal output: 2225Vrms Signal output to signal output: 2225Vrms	-
Protection class	I	III

Mechanical data

Housing	Aluminium housing, powder coated RAL 5010 gentian blue Seal between housig and lid: NBR Seal between housing and process connection: NBR Nameplate: polyester film
Degree of protection	IP 67 (EN 60529), NEMA Type 4X
Process connection	Material: MN 4020: stainless steel 1.4301 (304)/1.4541 (321) or 1.4404 (316L) MN 4030/4040: stainless steel 1.4301 (304)/1.4541 (321) or 1.4404 (316L) (process connection and tube extension) Thread: G 1", G 1 1/4", G 1 1/2" DIN 228; NPT 1", NPT 1 1/4", NPT 1 1/2" ANSI B 1.20.1 Flange: according to selection 1.4541 (321) or 1.4404 (316L) Triclamp: stainless steel 1.4301 (304) or 1.4404 (316L) 2" (DN 50) ISO 2852 All material food grade

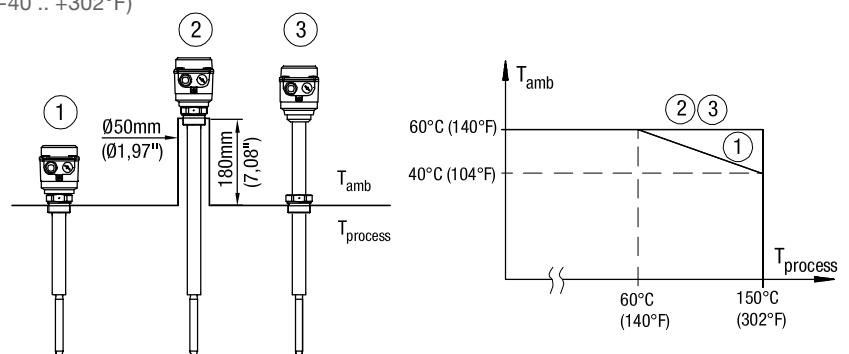
Technical data

Oscillator	Material: stainless steel 1.4404 (316L) (food grade)
Sound level	max. 50dBA
Overall weight (ca.)	MN 4020: 1.3kg (2.9lbs) MN 4030: 1.3kg (2.9lbs) +1.3kg/m (+2.9lbs per 39.3") extension MN 4040: 1.8kg (4.0lbs) +1.3kg/m (+2.9lbs per 39.3") extension

Operating conditions

Ambient temp. (housing) -40°C.. +60°C (-40 .. +140°F)

Process temperature -40°C.. +150°C (-40 .. +302°F)



For versions with Ex-approvals: see remarks on page 19.

Ventilation	Ventilation is not required	
Min. powder density	Setting	Min. powder density (ca.)
	I	20 g/l (1.25 lb/ft³)
	II	80 g/l (5 lb/ft³)
	III	150 g/l (94 lb/ft³)
	IV	300 g/l (187 lb/ft³)
Features of bulk material	No strong tendency to cake or deposit	
Max. mechanical load	400N (@40°C, 104°F) laterally (on oscillator rod) Recommended protection in case of high material load: mounting of a protective angle above the probe	
Max. mechanical torque	MN 4030: 180 Nm (@40°C, 104°F) MN 4040: 100 Nm (@40°C, 104°F)	
Max. process pressure	16bar (232psi) For versions with "sliding sleeve without process overpressure" (option pos 25 a, b, c): unpressurized. The max. process pressure may be reduced with use of flanges. Observe flange standards for pressure rating and pressure derating with higher temperature. For versions with Ex-approvals: see remarks on page 18.	
Vibration	1.5 (m/s²)²/Hz according to EN 60068-2-64	
Relative Humidity	0-100%, suitable for outdoor use	
Altitude	max. 2.000m (6.562ft)	
Expected product lifetime	Following parameters have a negative influence on the expected product lifetime: High ambient- and process temperature, corrosive environment, high vibration, high flow rate of abrasive bulk material passing the sensor element.	

Technical data / Approvals

Transport and Storage

Transport	<p>Observe the instructions as stated on the transport packaging, otherwise the products may get damaged.</p> <p>Transport temperature: -40 .. +80 °C (-40 .. +176 °F) Transport humidity: 20 .. 85 %</p> <p>Transport incoming inspections must be carried out to check for possible transport damage.</p>
Storage	<p>Products must be stored at a dry and clean place. They must be protected from influence of corrosive environment, vibration and exposure to direct sunlight.</p> <p>Storage temperature: -40 .. +80 °C (-40 .. +176 °F) Storage humidity: 20 .. 85 %</p>

Approvals

General Purpose (Ordinary Locations) Depending on selected version in price list.	CE FM TR-CU	EN 61010-1 (IEC/CB)	
Hazardous Locations Depending on selected version in price list.	ATEX IEC-Ex FM TR-CU	Dust explosion Dust explosion Dust explosion Dust explosion	ATEX II 1/2 D Ex ta/tb IIIC T! Da/Db IP6X IEC-Ex ta/tb IIIC T! Da/Db IP6X Cl. II, III Div. 1 Gr. E,F,G Ex ta/tb IIIC T! Da/Db X Detailed allocation of types and electronics to approvals: see selection list.
EMC	EN 61326 -A1		
Food grade material	According to directive 1935/2004/EC		
RoHS conform	According to directive 2011/65/EU		
Pressure Equipment Directive (2014/68/EU)	<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). The units are designed and manufactured in accordance to the Pressure Equipment Directive. The unit is NOT intended for use as an “equipment part with safety function (Art.1, Abs. 2.1.3). If the units should be used as „equipment part with safety function“ please contact the manufacturer.</p>		

Options

Weather protection cover

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

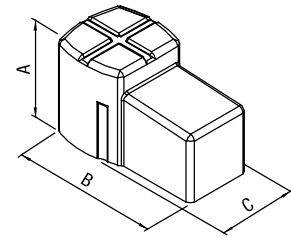
- rain water
- condensation of water
- excessively high temperatures due to insulation
- excessively low temperatures in winter

Material: PE, weathering and temperature stable

Not available for housing version d and de.



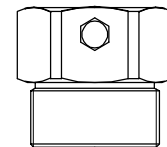
For use in Hazardous Locations: only permitted for Category 3 (zone 22) or Division 2.



A	100mm (3.94")
B	165mm (6.5")
C	88mm (3.46")

Sliding sleeve

MN 4030 G1½" ISO 228 or 1½" NPT ANSI B 1.20.1 or flanges
 Material: 1.4301 (304) or 1.4404 (316L)
 Sealing material to the extension tube: FKM or NBR

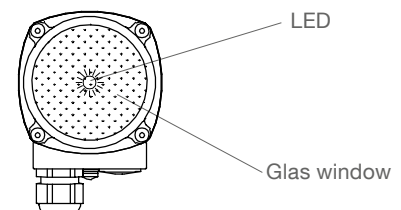


Mounting set

Screws and washers for fixing the unit on a flange.

Glass window in lid

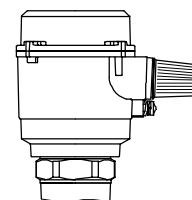
To see the indicating light on the electronic from outside.



Bulb

Bright indicating light seen from outside.

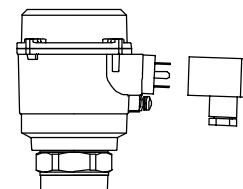
Not available for use in Hazardous Locations and FM general purpose.



Plug 4-pole (incl. PE)

Used instead of cable gland.

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



Mounting

General Safety Instructions

Process pressure ! Improper installation may result in loss of process pressure.

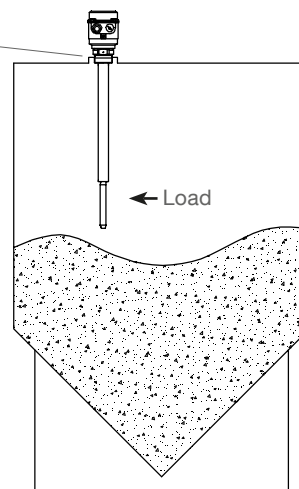
Chemical resistance against the medium ! Materials of construction are chosen based on their chemical compatibility (or inertness) for general purposes. For exposure to specific environments, check with chemical compatibility charts before installing.

Temperature range ! The range of the ambient and process temperature of the device must be observed (see page 6 and for Ex-approvals page 17)

Mechanical load ! The torque at the fastening spot must not exceed 180Nm MN 4030 / 100Nm MN 4040

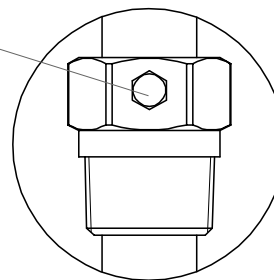
Maximum length „L“ in dependence on the deviation (in degrees) from vertical installation:

Max. deviation	Max. length „L“
5°	4000 mm (157.5“)
45°	1200 mm (47.24“)
>45°	600 mm (23.62“)



Mounting location Keep distance to incoming material and to the silo wall. The installation has to be done in a way, 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 more than 3m (118.1“).

Sliding sleeve “Pressure tight” version (pos. 25 e, f, g): Tighten both straining screws M8 with 20 Nm to obtain resistance against pressure.



Flange mounting A plastic sealing must be used to tighten the flange.

Fastening of the threaded process connection Mounting torque for the thread may not exceed 80Nm. Use a 50mm (1.97“), for units with sliding sleeve use a 55mm (2.17“), open-end wrench. Do not fasten by turning the housing .

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.

Mounting



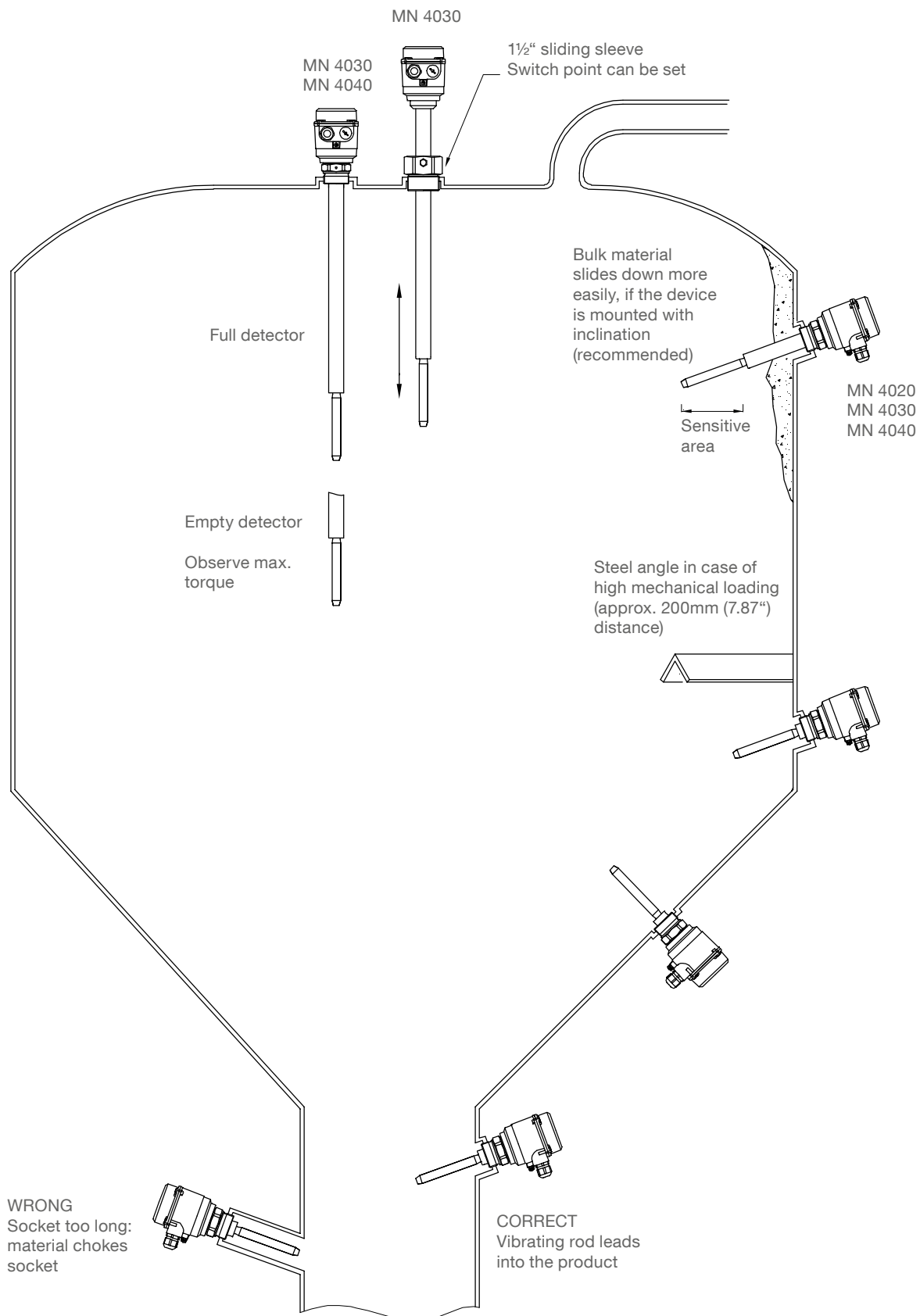
Additional Safety Instructions for Hazardous Locations

Installation regulations	For devices to use in hazardous locations the respectively valid installation regulations must be observed.
Sparks	The installation has to be done in a way mechanical friction or impact can not cause sparks between the aluminium enclosure and steel.

Mounting instructions

Oscillating rod	Do not bend, shorten or extend the oscillating rod since this will destroy the device.
Direction of the cable glands	When the unit is mounted from the side, ensure, that the cable glands faces downwards and are closed to avoid water penetration into the housing. The housing can be rotated against the threaded connection after mounting.
Sealing	Seal the process thread with Teflon tape in case of process pressure
Precaution for later dismantling/ Service	Grease the screws of the lid if corrosive atmosphere is present (e.g. close to sea)
Switching point	Heavy bulk material -> the signal output switches when the oscillating rod is covered a few mm Light bulk material -> the signal output switches, when the oscillating rod is covered a few cm

Mounting



Electrical installation

General Safety Instructions

Handling



In the case of inexpert handling or handling malpractice the electric safety of the device cannot be guaranteed.

Protective earthing

Before any electrical installation, the device must be connected to the protective earthing terminal inside the housing.

Installation regulations

The local regulations or VDE 0100 (Regulations of German Electro technical Engineers) must be observed.
 With use of 24V supply voltage, an approved power supply with reinforced insulation to mains is required.

Fuse

Use a fuse as stated in the connection diagrams (page 15).

RCCB protection

In the case of a defect, the distribution voltage must automatically be cut off by a RCCB protection switch so as to protect the user of the device from indirect contact with dangerous electric tensions.

Power supply switch

A Power-supply-disconnecting switch must be provided and marked near the device.

Wiring diagram

The electrical connections have to be made according to the wiring diagram.

Supply voltage

Compare the supply voltage applied with the specifications given on the electronic and name plate before switching the device on.

Cable gland / closing element

The screwed cable gland and closing element must have following specifications:
 Ingress protection IP67, 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 locked with a closing element.

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 NPT 1/2" or NPT 3/4" in accordance with the unit and ANSI B 1.20.1. Not used inlets must be closed tight with a metal closing element.

Field wiring cables

- The diameter has to match to the clamping range of the used cable gland.
- The cross section has to match with the clamping range of the connection terminals and consider the max. current.
- All field wirings must have insulation suitable for at least 250V AC.
- The temperature rating must be at least 90°C (194°F).
- If higher immunity interferences as specified in the stated EMC standards are present (see chapter approval), a shielded cable is required, otherwise an unshielded instrumentation cable is satisfactory.

Connecting the terminals

Make sure that max. 8mm (0.31") of the pigtails are bared (danger of contact with live parts).

Guiding the cables in the terminal box

Cut the field wiring cables to appropriate length to fit properly into the terminal box.

Relay and transistor protection

Provide protection for relay contacts and output transistors to protect the device against spikes with inductive loads.

Protection against static charging

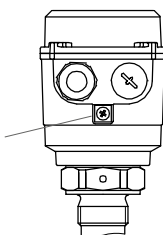
The housing of the unit must be grounded in any case to avoid static charging of the unit on applications with pneumatic conveying and non-metallic containers .

Electrical installation

! Additional Safety Instructions for Hazardous Locations

External equipotential bonding terminal

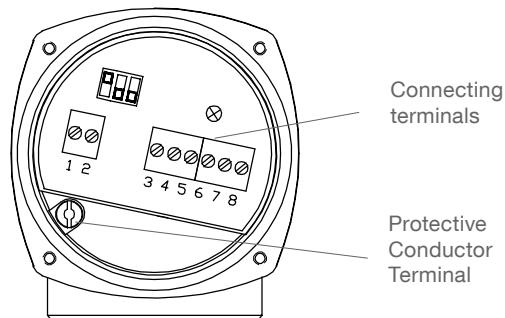
Connect with equipotential bonding of the plant



Field wiring	A pull relief must be provided for the field wiring cables, when the device is installed with the factory provided cable glands.
Cable glands and conduit system for ATEX / IEC-Ex / TR-CU	<p>Installation according to the regulations of the country, where the product is installed.</p> <p>Not used entries have to be closed with blanking elements certified for this purpose.</p> <p>Where available the factory provided parts must be used.</p> <p>A strain relief must be provided for the field wiring cables, when the device is installed with the factory provided cable glands.</p> <p>The diameter of the field wiring cable must match to the clamping range of the cable clamp.</p> <p>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 10 Kelvin. The parts must be mounted according to the instructions of the supplier.</p>
Conduit system for FM	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.
Commissioning	Commissioning only with closed lid.
Opening the lid	Before opening the lid take care, that no dust deposits or whirlings are present. Do not remove the lid (cover) while circuits are alive.

Electrical installation

Connection



Universal voltage Relay DPDT

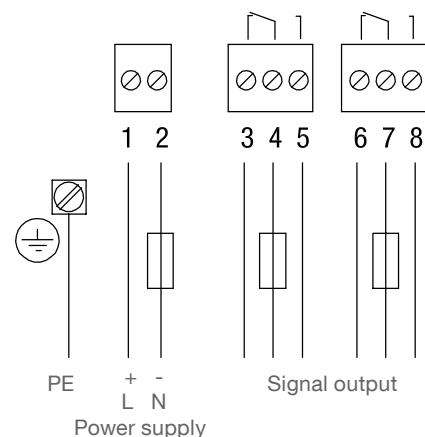
Power supply:
 21V..230V 50-60Hz $\pm 10\%^*$ 22VA
 22V..45V DC $\pm 10\%^*$ 2W
 *incl. $\pm 10\%$ of EN 61010

Fuse on power supply:
 max. 10A, fast or slow, HBC, 250V

Signal output:
 Floating relay DPDT

AC max. 250V, 8A, non inductive
 DC max. 30V, 5A, non inductive

Fuse on signal output:
 max 10A, fast or slow, HBC, 250V



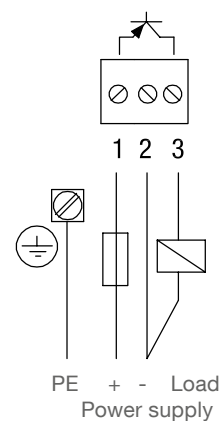
3-wire PNP

Power supply:
 20 .. 40V DC $\pm 10\%^*$
 *incl. $\pm 10\%$ of EN 61010
 Input current: max. 0.5A

Fuse:
 max. 4A, fast or slow, 250V

Signal output:
 max. 0.4A
 Output voltage equal to input
 voltage, drop <2.5V

Load for example:
 PLC, relay, contactor, bulb



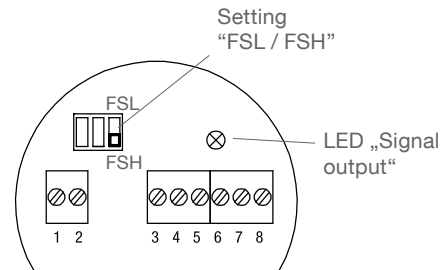
Signal output / Sensitivity setting

Signal output

FSL / FSH Setting

FSH If the sensor is used to indicate full load, set to Fail Safe High. Power failure or line break is regarded as „full“ signal (protection against overcharging).

FSL If the sensor is used to indicate empty load, set to Fail Safe Low. Power failure or line break is regarded as „empty“ signal (protection against running dry).



	Signal output		Signal output	
Setting	FSL	FSH	FSL	FSH
Relay DTPT				
3-wire PNP				
LED „Signal output“				

Sensitivity setting

All sensors are factory set to position "III" to cover the majority of applications.

If the bulk material is heavy and has a strong tendency to cake or deposit, the setting can be set to position „IV“ so as to decrease the sensitivity of the probe.

If the bulk material is light and has few or no tendency to cake or deposit, the setting can be set to position „II“ or „I“ so as to increase the sensitivity of the probe.

The table indicates the approximate min. bulk density depending on the settings.

Please contact manufacturer if you intend to use the device for special purposes.

Setting	Sensitivity / Powder density (ca.)	
I	High >20g/l (1.25lb/ft³)	
II	Medium high >80 g/l (5 lb/ft³)	
III *	Medium low >150 g/l (94 lb/ft³)	
IV	Low >300 g/l (187 lb/ft³)	

* factory preset

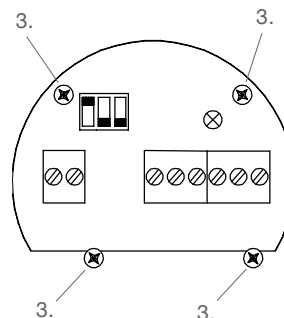
Maintenance

Opening the lid (cover)	<p>Before opening the lid for maintenance reasons observe following items:</p> <ul style="list-style-type: none"> • Do not remove the lid while circuits are alive. • No dust deposits or whirlings are present. • No rain can enter into the housing.
Frequent check of the unit	<p>To ensure durable safety in hazardous locations and with electrical safety, following items must be checked frequently depending on the application:</p> <ul style="list-style-type: none"> • Mechanical damage or corrosion of any components (housing side and sensor side) and of the field wiring cables. • Tight sealing of the process connection, cable glands and enclosure lid. • Properly connected external PE cable (if present).
Cleaning	<p>If cleaning is required by the application, following must be observed:</p> <ul style="list-style-type: none"> • Cleaning agent must comply with the materials of the unit (chemical resistance). Mainly the lid sealing, cable gland and the surface of the unit must be considered. <p>The cleaning process must be done in a way, that:</p> <ul style="list-style-type: none"> • The cleaning agent cannot enter into the unit through the lid sealing or cable gland. • No mechanical damage of the lid sealing, cable gland or other parts can happen. <p>A possible accumulation of dust on the unit does not increase the maximum surface temperature and must therefore not be removed for purposes of maintaining the surface temperature in hazardous locations.</p>
Function test	<p>A frequent function test may be required depending on the application.</p> <p>Observe all relevant safety precautions related with a safe work depending on the application (e.g. hazardous locations, hazardous bulk material, electric safety, process pressure).</p> <ul style="list-style-type: none"> • This test does not proof if the sensor is sensitive enough to measure the material of the application. <p>Function test is done by stopping the vibration of the vibrating rod with appropriate means and monitor if a correct change of the signal output from uncovered to covered happens.</p>
Production date	<p>The production date can be traced by the serial number on the typeplate. Please contact the manufacturer or your local distributor.</p>
Spare parts	<p>All available spare parts are stated in the selection list.</p>

Change of the electronic board:

Deenergise device and secure against being switched on again.

1. Open the housing lid
2. Remove the field wiring cables / plug
3. Unscrew the cover plate
4. Take out the electronic board and remove internal plug
5. Insert a new electronic board in reverse sequence
6. Connect the field wiring cables



Notes for use in Hazardous Locations

Zone classification

	Usable in zone	ATEX category	IEC-Ex Equipement Protection Level (EPL)
Dust applications	20, 21, 22	1 D	Da
	21, 22	2 D	Db
	22	3 D*	Dc

* in case of conductive dust additional demands for the installation are possible.

General Notes

Marking

Devices with EX approval are marked on the name plate.

Process pressure

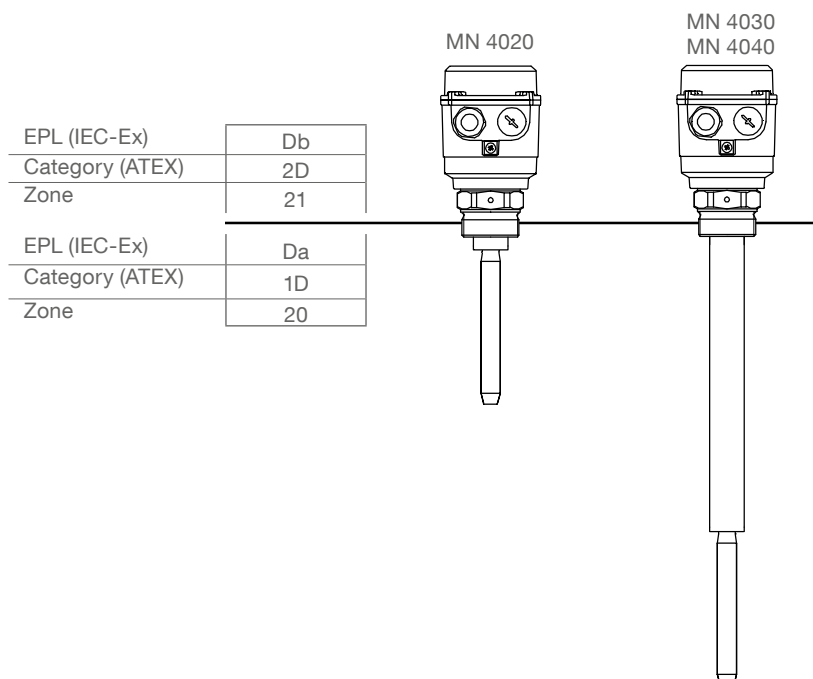


The device construction allows process over-pressure up to 16 bar (232psi). These pressures are allowed for test purposes. The definition of the Ex approval are only valid for a container-over-pressure between -0.2..+0.1 bar (-2.9..+1.45psi). For higher or lower pressures the approvals are not valid.

Process and ambient temperature

The permitted temperature ranges are marked on the name plate.
 The max. permitted ambient and process temperatures (including temperature derating) stated in this manual must be observed.

Permitted zones for mounting in partition wall

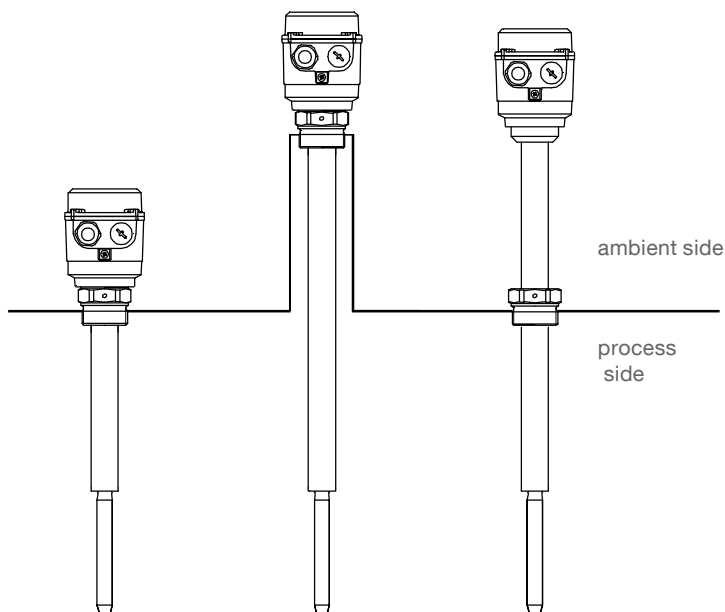


Notes for use in Hazardous Locations

Max. Surface Temperature and Temperature Class

The temperature marking on the type plate  refers to the instruction manual.
 In the following table 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).



Max. ambient temperature	Max. process temperature	Max. surface temperature	Temperature class (Division System)	Temperature class (Zone System)
60°C (140°F)	120°C (248°F)	120°C (248°F)	T4	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

Assembly MN 4040

Manufacturing of the Extension tube

! Obtain instruction manual for proper manufacturing of the extension tube. In case of deviation from the instruction manual the unit is not safe for use in Hazardous Locations.

Demands on the Extension tube

Material: Stainless steel 1.4301 (SS304) or 1.4305 (SS301) or 1.4571 (SS316Ti) or 1.4404 (SS316L)

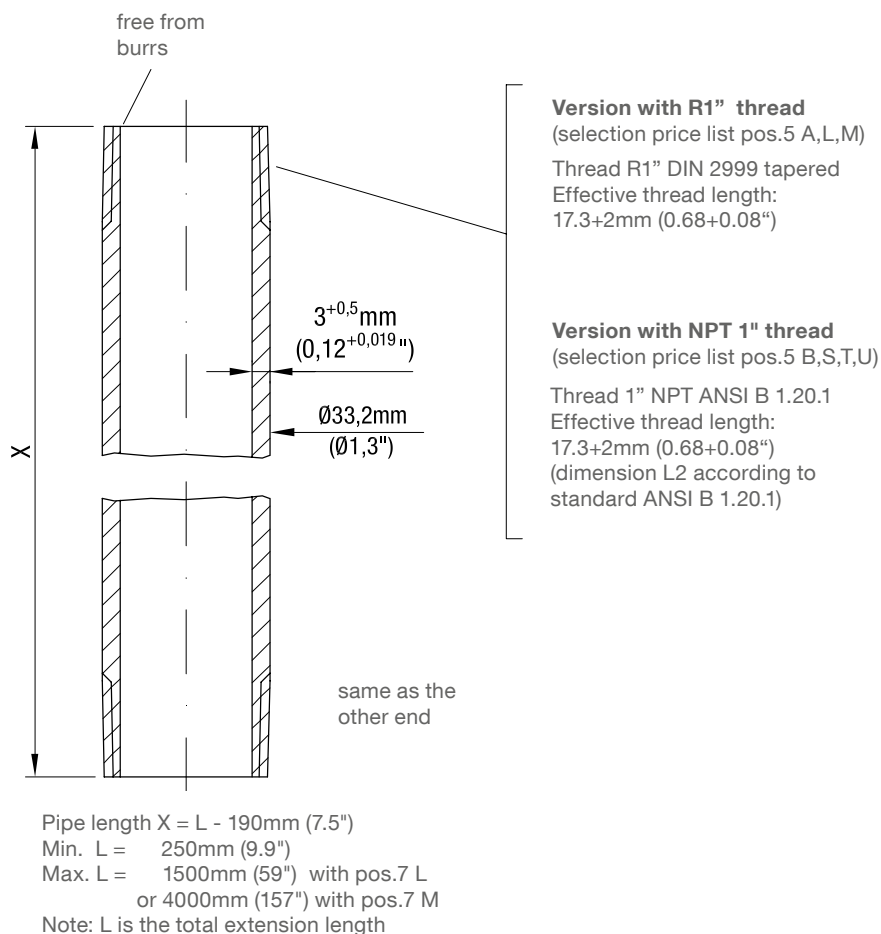
The tube must be manufactured from one single piece. It is not allowed to weld two or more pieces together.

Carefully observe max. length, diameter, wall thickness, thread, tolerances as specified in the drawing.

All sharp edges must be removed to protect the cable.

Thread testing

Each thread must be tested with go and no-go ring gauge according to standard DIN 2999 (R1" version) or ANSI B 1.20.1 (NPT 1" version)



Assembly MN 4040

Assembly of the unit

1. Mounting of the Extension tube

! The tube must be assembled very carefully to ensure permanent sealing, electrical grounding and mechanical stability. Observe the follow mounting instructions.

! Make sure that the thread of the extension tube and the thread of the screwed piece/ oscillating piece is the same type (do not mix R and NPT thread).

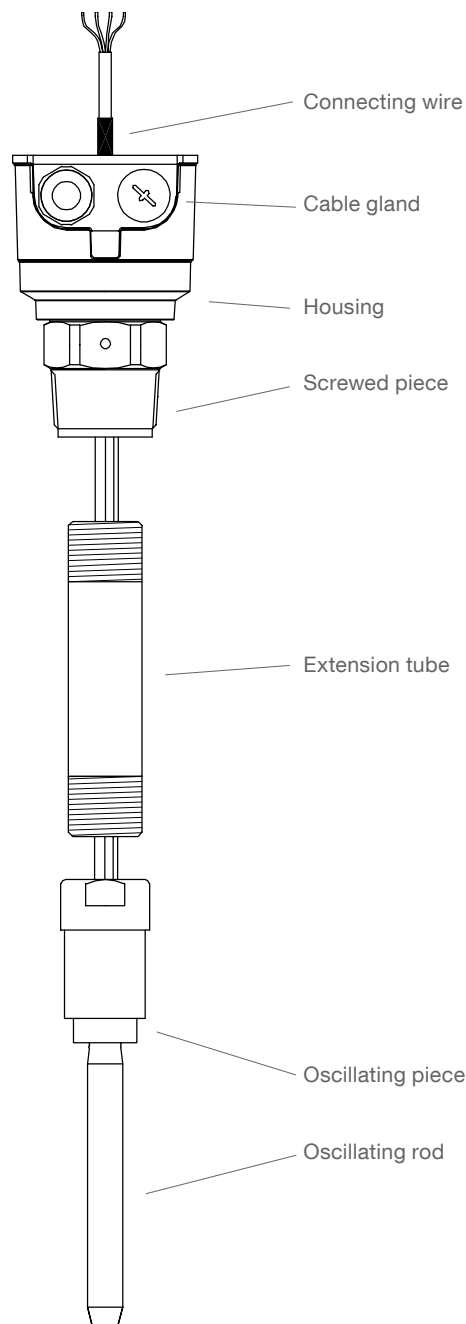
1.1. Feed the connecting wire through the 1" Extension tube and the screwed piece. Use a separate taut wire for easy working.

1.2. Screw the 1" Extension tube into the oscillating piece and the screwed piece.

Requirements for proper sealing and electrical grounding:

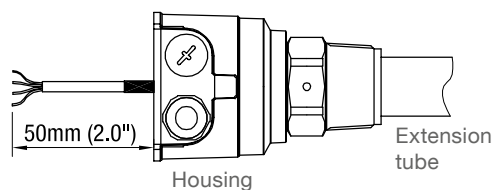
Sealing must satisfy IP67 or NEMA Type 4 at both sides of the extension tube. To reach this, the threads must be sealed with temperature resistant sealing for 150°C (302°F). Max. thickness of the sealing is 0.2mm (0.008").

The threads must be fixed with 50Nm.
 Use a open-end wrench to attach the oscillating piece (do not use the oscillating rods).



2. Checking the cable length

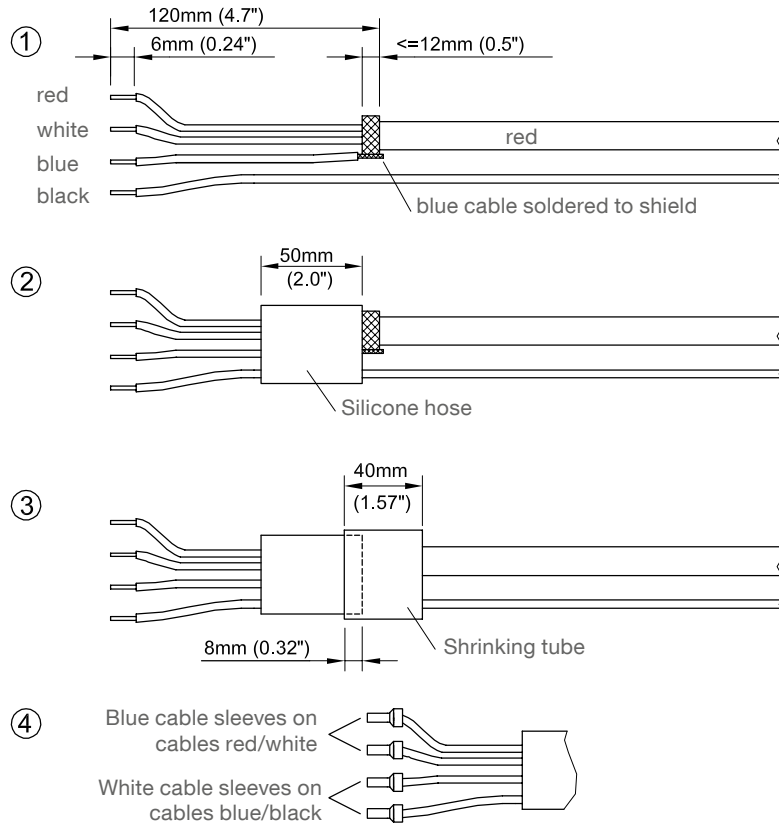
Push back the cable into the extension tube until the stated length is present. Take care that no cable is wound up inside the housing.
 If the cables are too long to be pushed back, goto step 3, otherwise goto step 4.



Assembly MN 4040

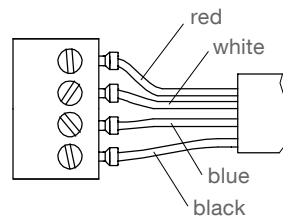
3. Cutting the cables (if required)

If the cables are too long to be pushed back into the extension tube, shorten the cable to the length as stated in step 2. Prepare the cables as shown. Use the attached hoses and cable sleeves for proper mounting.



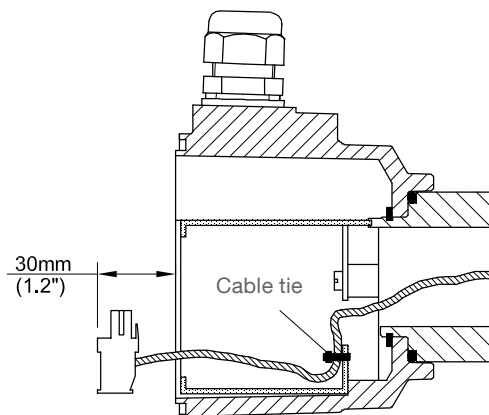
4. Connecting the plug

Observe correct sequence



5. Fixing the cable tie

Before fixing the cable tie observe correct cable length as stated and that no cable is wound up inside the housing.



6. Insert electronics

Insert the plug into the electronic, insert the electronic into the housing and fix the electronic plastic cover with 4 screws.

Disposal

The product consists of materials which can be recycled, details of the used materials see chapter "Technical data - mechanical data".

Recycling must be done by a specialised recycling company. Since the product is not subject to the WEEE directive 2002/96/EG, it is not permitted to bring it to a public recycling station.

Table of contents

	Page
Safety notes / Technical support	2

Introduction	3

Applications	4

Technical data:	
Dimensions	5
Electrical data	9
Mechanical data	10
Operating conditions	11
Transport and Storage	12

Approvals	13

Options	13

Mounting	14

Electrical installation	20

Quickstart	22

Advanced programming	29

Probe modifications	35

Assembly - Remote version / FM, FMc Control Drawing	36

Troubleshooting	37

Maintenance	39

Notes for use in Hazardous Locations	41

Disposal	43

Subject to technical change. All dimensions in mm (inch).	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 device is used for level monitoring in all types of containers and silos.

It can be used with all powdery and granulated bulk materials, slurry and liquids.

The units can be delivered with Ex-approvals for use in Dust and Gas Hazardous Areas.

A selection of fields of application:

- **Building materials industry**
lime, moulding sand, etc.
- **Food industry**
sugar, flour, salt, etc.
- **Plastics industry**
plastics granules etc.
- **Chemical industry**
pigments
- **Mechanical engineering**

The RFnivo is normally screwed into the lateral container wall at a position, where the material shall be measured.

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 measured.

The length of the probe can be up to 2.5m (98.4") with rod extension or 20m (787") with rope extension.

The use of a sliding sleeve is recommended so that the switch point can be changed continuously during operation of the device.

Function

The unit detects the capacitance between the probe and the container wall.

The performance allows to use the unit in a wide range of even difficult applications combined with simple handling:

- **Active shield technology**
The powerful active shield technology allows to ignore material build up on the probe. Even the influence of conductive build up on the probe is electronically compensated and thus ignored. This allows to measure with high sensitivity in combination with material build up.

- **Self diagnostics**
The unit is able to check the internal electronic for proper functionality. This can be done by setting a frequent auto test or by pressing a manual test button.

- **Auto calibration**
The unit will auto calibrate to uncovered state after first time power up.

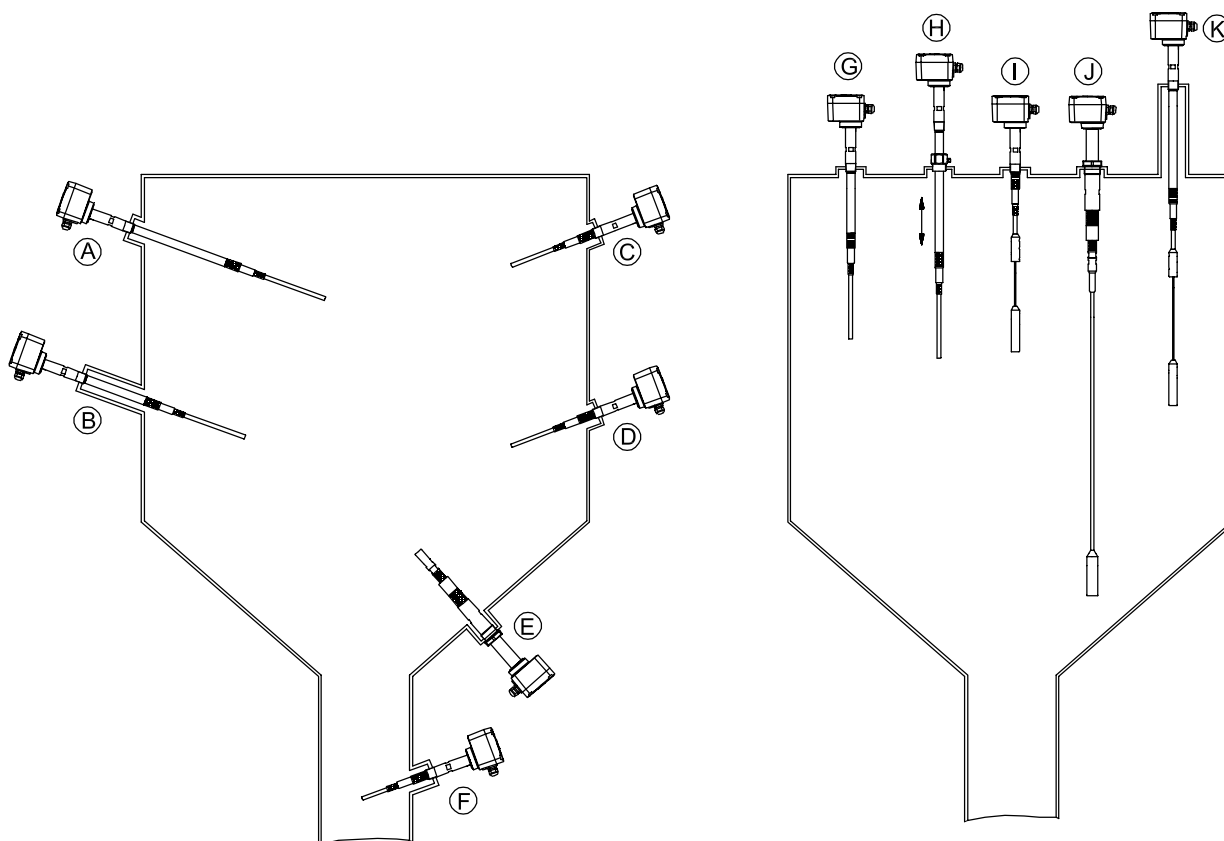
It allows to set for auto recalibration to uncovered state. This is useful in case of a covered probe during power up. An auto recalibration is done when the probe becomes uncovered.

- **Manual recalibration to uncovered state** can be done by simply pressing a push button.

- **Full manual calibration** can be selected as well.

The sensitivity is preselected to work in most applications and can be changed if required.

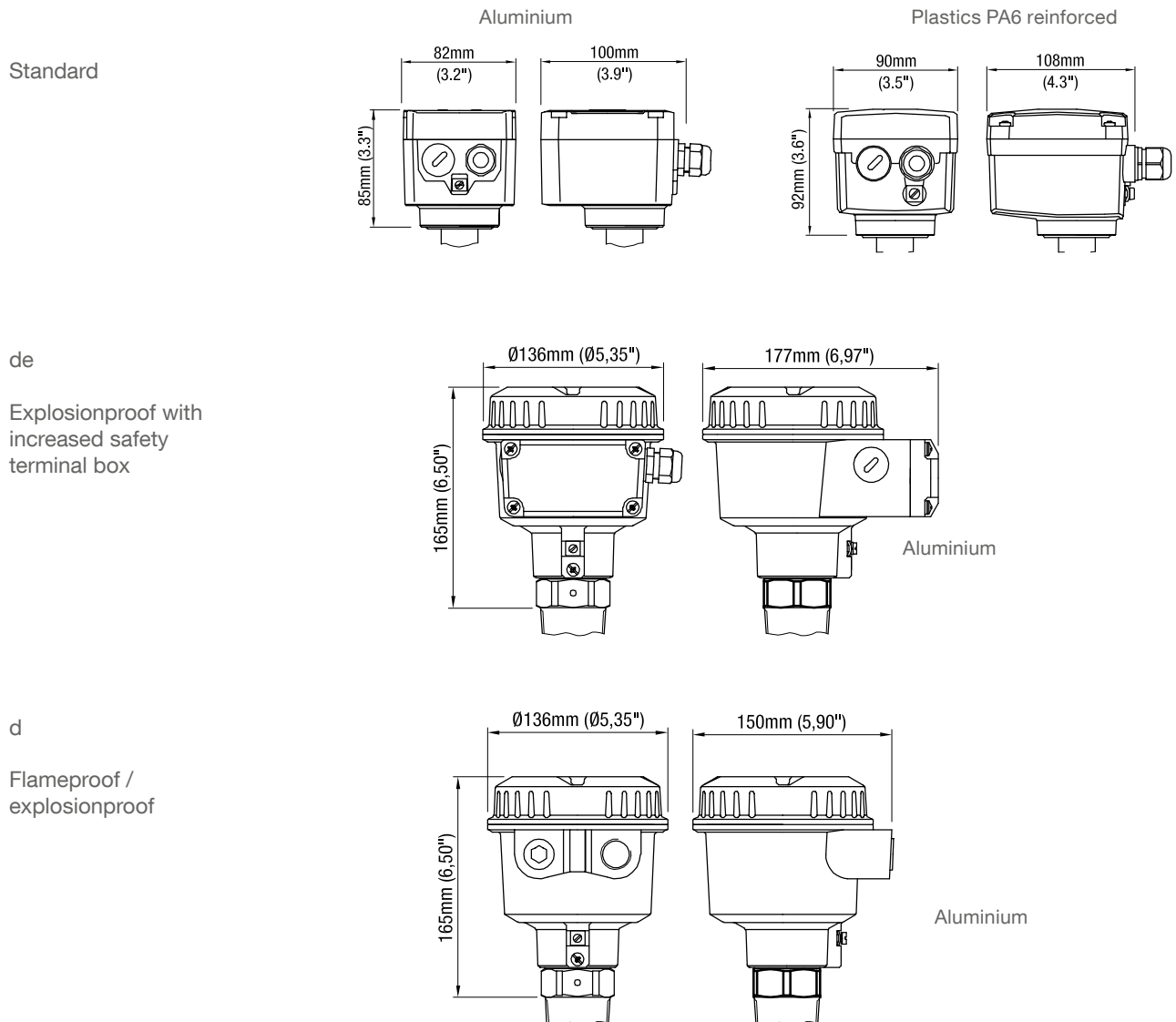
Applications



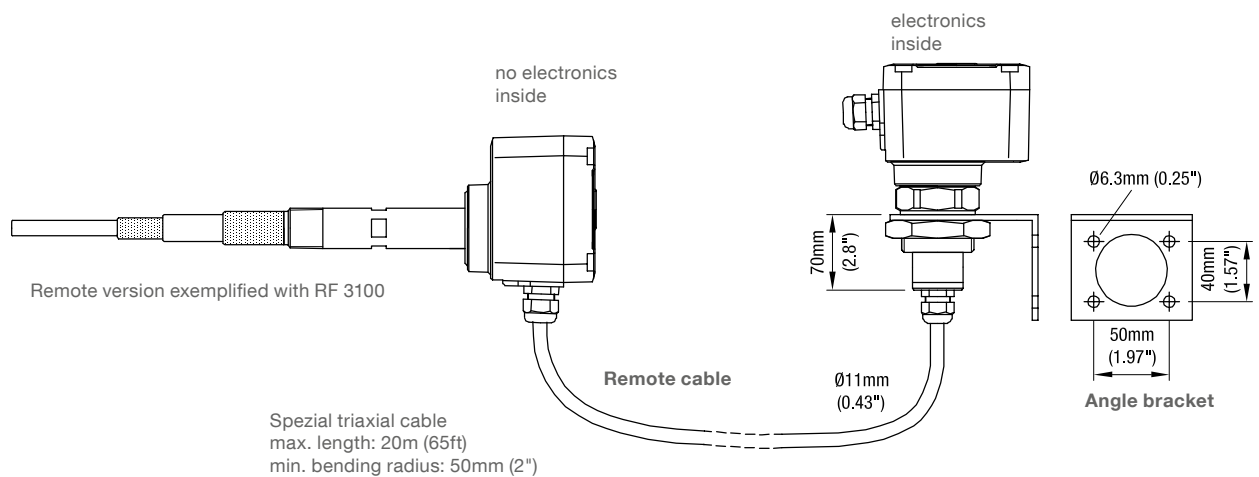
		RF 3100	RF 3200	RF 3300
(A)	Inactive length to reach distance from silo wall	•	•	•
(B)	Inactive length due to long mounting nozzle	•	•	•
(C)	Full detector with short length	•	•	•
(D)	Demand detector with short length, observe max. load	•	•	•
(E)	Empty detector with short length, observe max. load	•	•	•
(F)	Application in down pipe, observe max. load	•	•	•
(G)	Inactive length to bring active probe to required level	•	•	•
(H)	Inactive length and sliding sleeve for adjustable height	•	•	
(I)	Full detector, rope version	•	•	•
(J)	Empty detector, rope version, observe max. load	•	•	•
(K)	Inactive length due to long mounting nozzle	•	•	•

Technical data - Dimensions

Housing versions



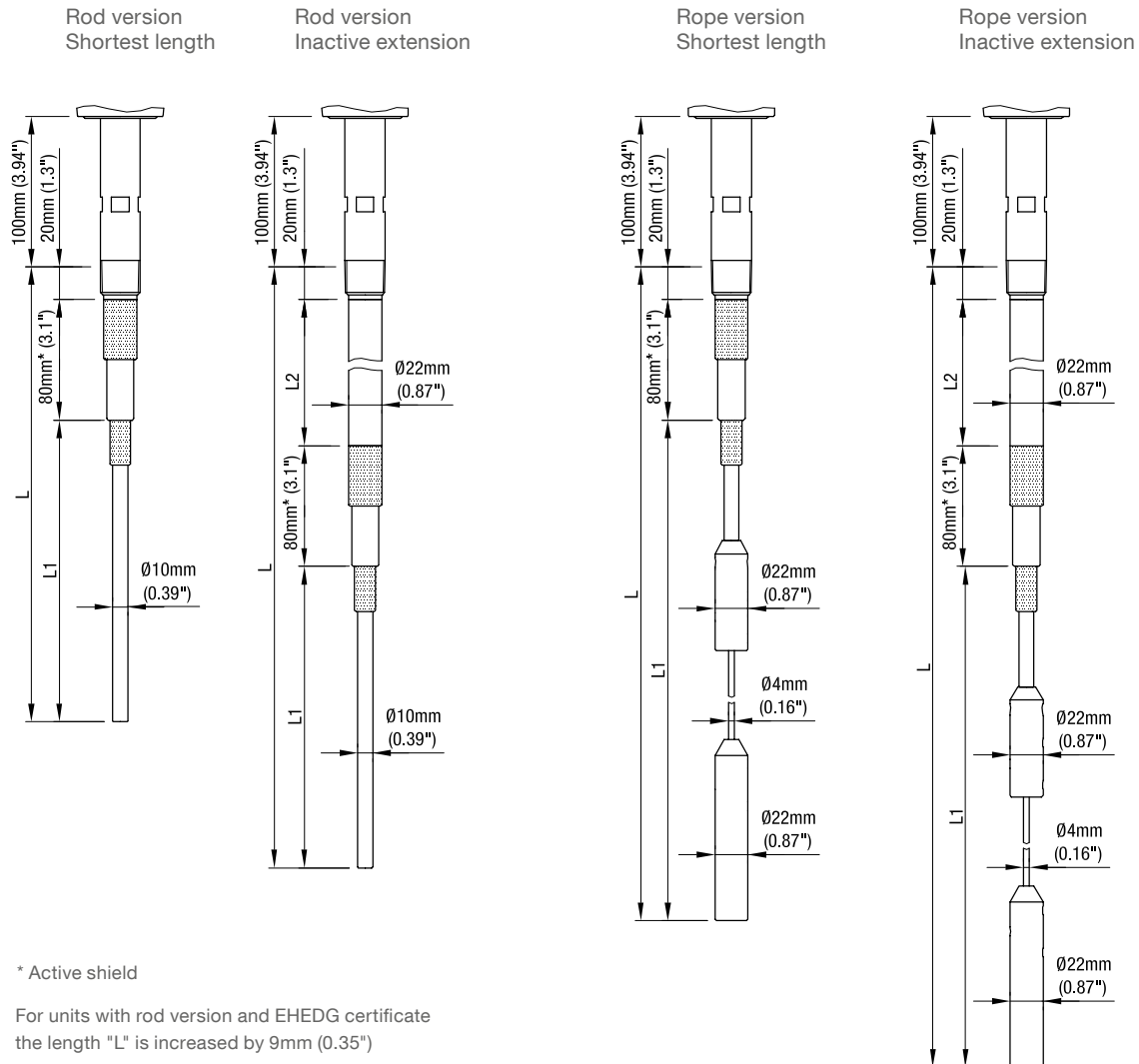
Remote version



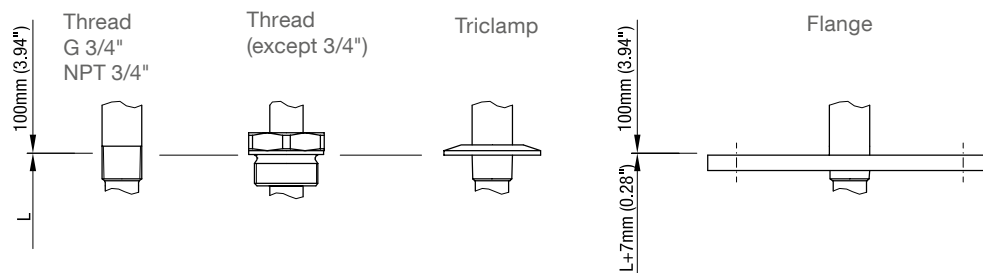
Technical data - Dimensions

Probes

RF 3100 Standard version

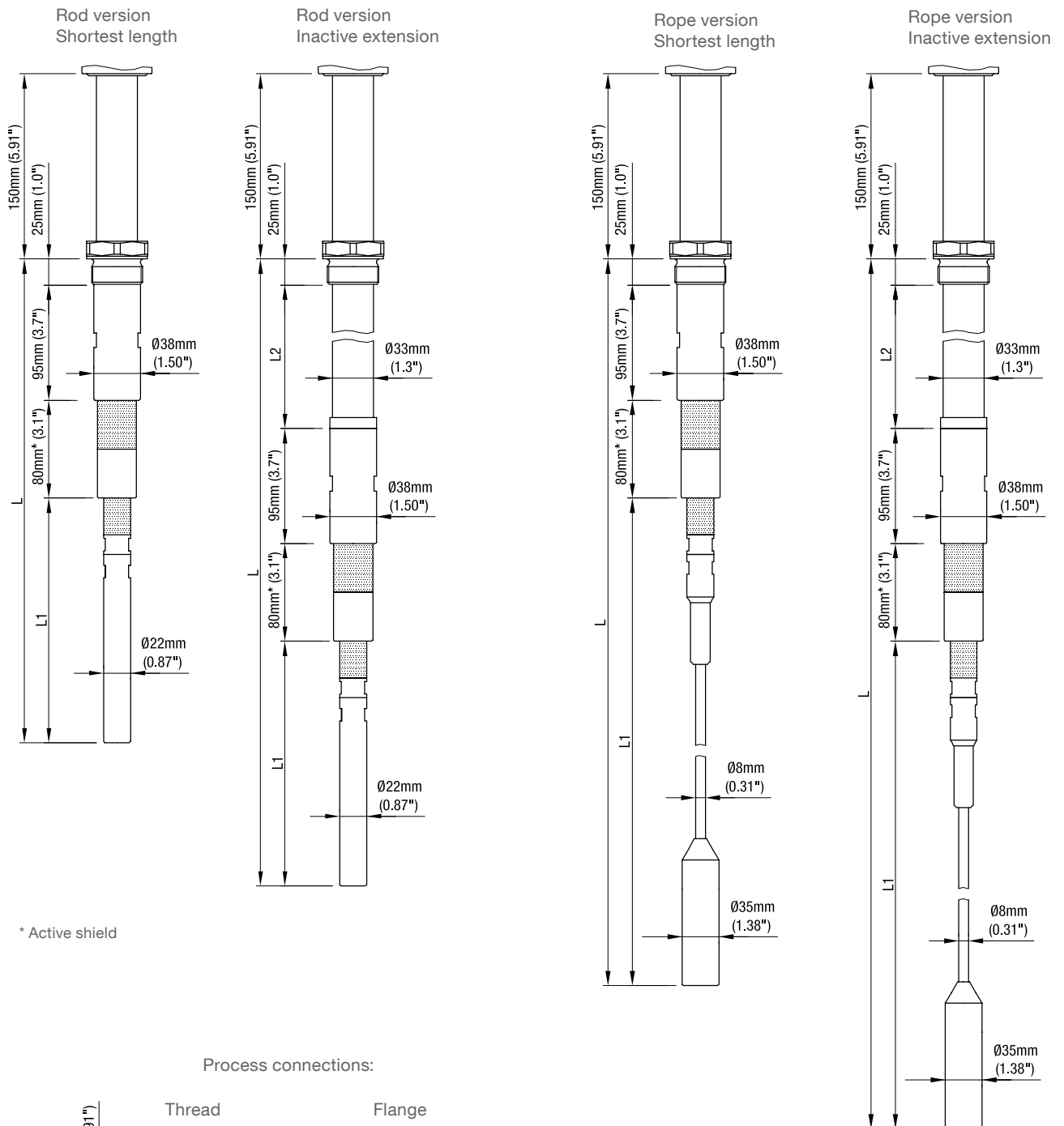


Process connections:



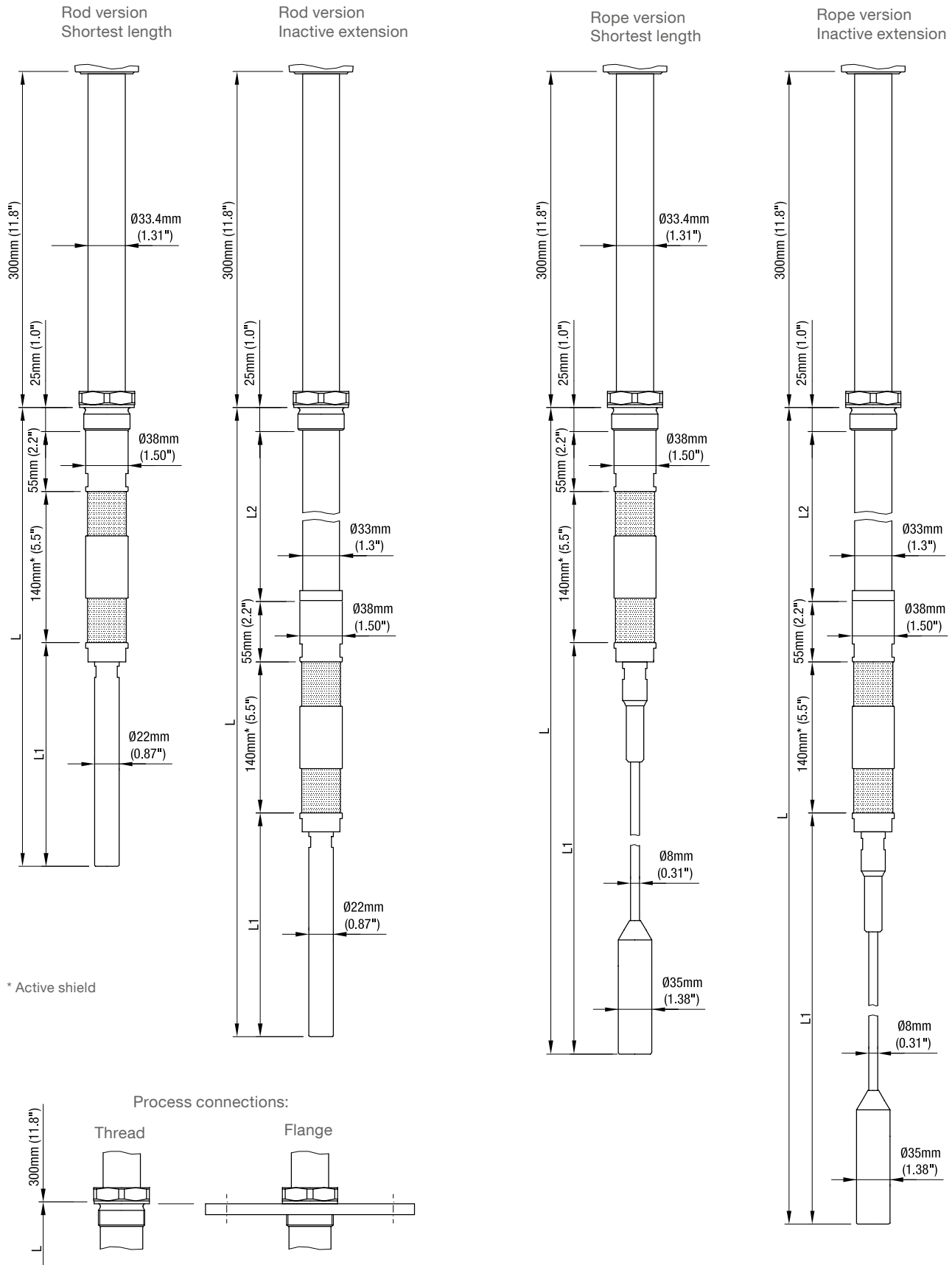
Technical data - Dimensions

RF 3200 Heavy Duty version



Technical data - Dimensions

RF 3300 High temperature version



Technical data - Electrical data

Electrical data

Connection terminals	0.14 - 2.5mm ² (AWG 26-14)
Cable entry	M20 x 1.5 screwed cable gland NPT 1/2" conduit connection NPT 3/4" conduit connection Clamping range (diameter) of the factory provided cable glands: M20 x 1.5: 6 .. 12mm (0.24 .. 0.47")
Signal delay	Sensor uncovered -> covered or covered -> uncovered or covered <-> uncovered: adjustable ca. 0.5 to 60 sec
Safety operation (FSL,FSH)	Switchable for minimum or maximum safety
Operation frequency	ca. 100kHz
Overvoltage category	II
Pollution degree	2 (inside housing)

Electronics

Universal voltage Relay DPDT

Power supply	21 .. 230V 50-60Hz or DC ±10%* *incl. ±10% of EN 61010
Max. ripple of power supply	7 V _{ss} at DC supply
Installed load	max. 1.5VA or 1.5W
Signal output	Floating relay DPDT AC max. 250V, 8A non inductive DC max. 30V, 5A non inductive
Display	4 digit LCD Display of actual measured capacitance, signal output state and self diagnostics Min. operating temperature: -30°C (-22°F)
Indicating light	Status by 3 colour built-in LED (according to NE44): Power on, signal output, failure /maintenance
Data storage	Nonvolatile EPROM for Menu settings and calibration data
Isolation	Power supply to signal output: 2225Vrms Signal output to signal output: 2225Vrms
Protection class	I

Technical data - Mechanical Data

Mechanical data

Housing	Aluminium, powder coated RAL 5010 gentian blue Optional: Plastics PA6 reinforced Seal between housing and lid: NBR Seal between housing and process connection: NBR Nameplate: polyester film
Degree of protection	IP 67 (EN 60529), NEMA Type 4X
Process connection / probes	<p>RF 3100:</p> <p>Material: Stainless steel 1.4301 (304)/1.4305 (303) or 1.4404 (316L)/1.4401(316) for rope Probe isolation PPS reinforced Probe gaskets FKM Coating of probe/rope (optional) PFA</p> <p>Thread: G 3/4", 1", 1 1/4", 1 1/2" DIN 228, M30x1.5, M32x1.5, NPT 3/4", 1", 1 1/4", 1 1/2" tapered ANSI B 1.20.1 Triclamp: 1" (DN25), 1 1/2" (DN40), 2" (DN 50) ISO 2852</p> <p>RF 3200:</p> <p>Material: Stainless steel 1.4301 (304)/1.4305 (303) or 1.4404 (316L)/1.4401(316) for rope Probe isolation PPS reinforced Probe gaskets FKM or FFKM</p> <p>Thread: G 1 1/4, 1 1/2" DIN 228, NPT 1 1/4", 1 1/2" tapered ANSI B 1.20.1</p> <p>RF 3300:</p> <p>Material: Stainless steel 1.4301 (304)/1.4305 (303) or 1.4404 (316L)/1.4401(316) for rope Probe isolation ceramic Probe gaskets graphite</p> <p>Thread: G 1 1/4, 1 1/2" DIN 228, NPT 1 1/4", 1 1/2" tapered ANSI B 1.20.1</p> <p>Flanges according to selection 1.4541 (321) or 1.4404 (316L) All material food grade</p>

Sound level	max. 40dBA
--------------------	------------

Overall weight (ca.)

	Standard housing	de-housing	d-housing		
	Basic weight*			Active probe length: L1**	Inactive length: L2**
RF 3100 rod version	1.7 kg (3.7 lbs)	2.7 kg (6.0 lbs)	3.0 kg (6.6 lbs)	+0.62 kg/m (1.37 lbs/39.3")	+1.2 kg/m (2.65 lbs/39.3")
RF 3100 rope version	2.3 kg (5.1 lbs)	3.3 kg (7.3 lbs)	3.6 kg (8.0 lbs)	+0.06 kg/m (0.13 lbs/39.3")	+1.2 kg/m (2.65 lbs/39.3")
RF 3200 rod version	2.8 kg (6.2 lbs)	3.8 kg (8.4 lbs)	4.1 kg (9.0 lbs)	+3.0 kg/m (6.61 lbs/39.3")	+3.26 kg/m (7.19 lbs/39.3")
RF 3200 rope version	4.0 kg (8.8 lbs)	5.0 kg (11 lbs)	5.3 kg (12 lbs)	+0.26 kg/m (0.57 lbs/39.3")	+3.26 kg/m (7.19 lbs/39.3")
RF 3300 rod version	3.6 kg (8.0 lbs)	4.6 kg (10 lbs)	4.9 kg (11 lbs)	+3.0 kg/m (6.61 lbs/39.3")	+3.26 kg/m (7.19 lbs/39.3")
RF 3300 rope version	4.8 kg (11 lbs)	5.8 kg (13 lbs)	6.1 kg (13 lbs)	+0.26 kg/m (0.57 lbs/39.3")	+3.26 kg/m (7.19 lbs/39.3")

Total weight = Basic weight + active probe length L1 + inactive length L2

All weights with 1 1/4" NPT process connection and without flanges

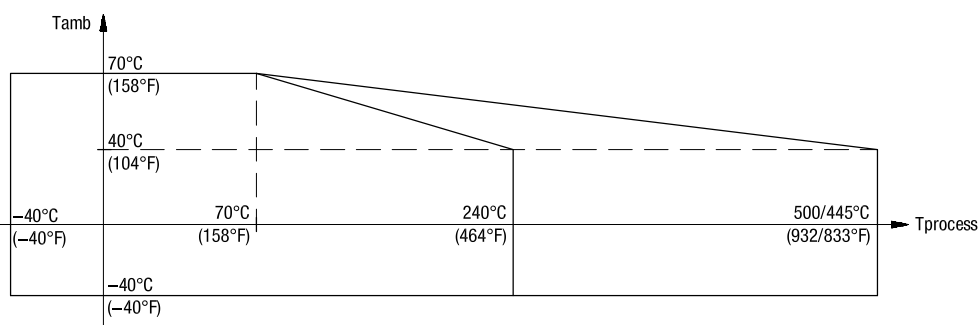
* Rode version with shortest length L1=100mm (3.9"), rope version without rope

**Refer to dimension drawings on page 6-8

Technical data - Operating conditions

Operating conditions

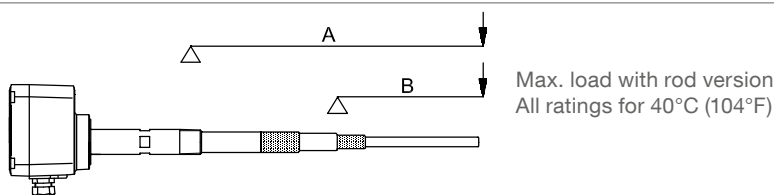
Ambient temp. (housing)	-40°C.. +70°C (-40 .. +158°F)	Standard housing. Plastics housing without Ex approvals
	-20°C.. +70°C (-4 .. +158°F)	Plastics housing with Ex approvals
	-40°C.. +60°C (-40 .. +140°F)	de- and d-housing
Process temperature	RF 3100 / 3200:	-40°C.. +240°C (-40 .. +464°F)
	RF 3300:	-40°C.. +500°C (-40 .. +932°F), versions with Ex-approvals: +445°C (+833°F)



For versions with Ex-approvals: see remarks on page 42.

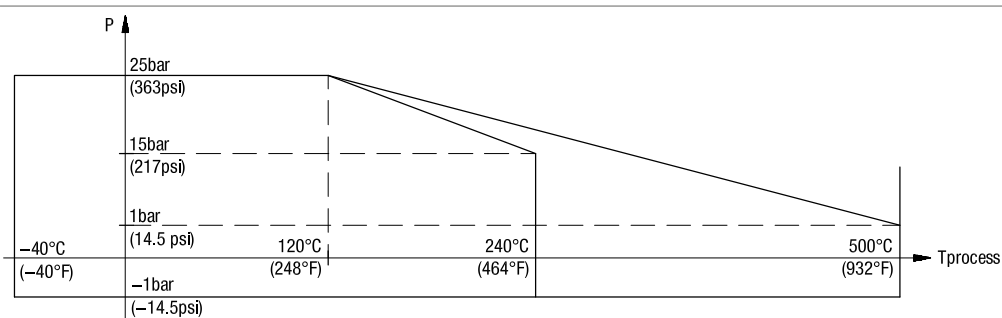
Ventilation	Ventilation is not required
Max. range / max sensitivity	3 .. 100pF / 0.5pF 3 .. 400pF / 2pF
Spark protection	Robust build in protection against static discharge of the bulk material.
Features of bulk material	Min. DK depending on selected probe length L1 and probe diameter. See tables on page 25 and 32.

Max. mechanical load



RF 3100	Rod version:	A: 125 Nm	B: 20 Nm
	Rope version:	4 kN tensile load	
RF 3200	Rod version:	A: 525 Nm	B: 90 Nm
	Rope version:	40 kN tensile load	
RF 3300	Rod version:	A: 525 Nm	B: 20 Nm
	Rope version:	10 kN tensile load	

Max. process pressure



The max. process pressure may be reduced with use of flanges. Observe flange standards for pressure rating and pressure derating with higher temperature.

For versions with Ex-approvals: Further see remarks on page 41.

Technical data - Operating conditions

Vibration	1.5 (m/s ²)/Hz according to EN 60068-2-64
Relative Humidity	0-100%, suitable for outdoor use
Altitude	max. 2.000m (6.562ft)
Expected product lifetime	Following parameters have a negative influence on the expected product lifetime: High ambient- and process temperature, corrosive environment, high vibration, high flow rate of abrasive bulk material passing the sensor element.

Transport and Storage

Transport	<p>Observe the instructions as stated on the transport packaging, otherwise the products may get damaged.</p> <p>Transport temperature: -40 .. +80 °C (-40 .. +176 °F) Transport humidity: 20 .. 85 %</p> <p>Transport incoming inspections must be carried out to check for possible transport damage.</p>
Storage	<p>Products must be stored at a dry and clean place. They must be protected from influence of corrosive environment, vibration and exposure to direct sunlight.</p> <p>Storage temperature: -40 .. +80 °C (-40 .. +176 °F) Storage humidity: 20 .. 85 %</p>

Approvals / Options

Approvals

General Purpose * (Ordinary Locations)	CE FM / FMc TR-CU	EN 61010-1		
Hazardous Locations *	ATEX	Dust explosion	Protection by enclosure	II 1/2D Ex ia/tb IIIC T! Da/Db
		Gas explosion	Flameproof Flameproof / increased safety	II 2G Ex d ia IIC T! Gb II 2G Ex de ia IIC T! Gb
	IEC-Ex	Dust explosion	Protection by enclosure	Ex ia/tb IIIC T! Da/Db
		Gas explosion	Flameproof Flameproof / increased safety	Ex d ia IIC T! Gb Ex de ia IIC T! Gb
	FM / FMc	Dust explosion	Protection by enclosure	DIP-IS Cl. II, III Div.1 Gr. E,F,G
		Gas explosion	Flameproof	XP-IS Cl. I Div.1 Gr. B,C,D Cl. I Zone 1 Gr. IIB+H2
	TR-CU	Dust explosion	Protection by enclosure	Ex ia/tb IIIC T! Da/Db X
		Gas explosion	Flameproof Flameproof / increased safety	Ex d ia IIC T! Gb X Ex de ia IIC T! Gb X
	Detailed allocation of types and electronic modules to approvals: see selection list.			
EMC	EN 61326 -A1			
Hygiene *	EHEDG (Type ED)			
Food grade material	According to directive 1935/2004/EC			
Pressure Equipment Directive (2014/68/EU)	<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, clause 2.1.4). The units are designed and manufactured in accordance to the Pressure Equipment Directive.</p> <p>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.</p>			

* depending on selected version in the selection list.

Options

Various options are available, see pricelist for more details:

Remote version	<ul style="list-style-type: none"> Probe and electronic housing separated (cable length up to 20m (65ft))
Electronics	<ul style="list-style-type: none"> Preselected sensitivity (factory setting of switching sensitivity)
Probes	<ul style="list-style-type: none"> Coating rod version Coating rope version (rope) Extension kits (rigid or flexible rod extension, rope extension)
Mounting	<ul style="list-style-type: none"> Sliding sleeve (flexible height adjustment of the probe) EHEDG approval (Type ED) Mounting sets: Screws, washers, sealings for fixing the unit on a flange.
Housing	<ul style="list-style-type: none"> Housing material plastics PA6 Weather protection cover (PE, weathering and temperature stable) Cable entry (metric or NPT with different size) Signal lamp (indication of signal output state from outside) Plugs (valve connector, M12 plug, Harting)

Mounting

! General Safety Instructions

Process pressure	Improper installation may result in loss of process pressure. Seal the process thread with Teflon tape in case of process pressure A plastic sealing must be used to tighten the flange.
Fastening of the threaded process connection	Mounting torque for the thread may not exceed 80Nm. Use a fitting open-end wrench. Do not fasten by turning the housing. Sliding sleeve: Tighten both straining screws M8 with 20 Nm to obtain resistance against pressure.
Precaution for later dismantling/ Service	Grease the screws of the lid if corrosive atmosphere is present (e.g. close to sea)
Direction of the cable glands	When the unit is mounted from the side, ensure, that the cable glands faces downwards and are closed to avoid water penetration into the housing. The housing can be rotated against the process connection after mounting.
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.
Temperature range	The range of the ambient and process temperature of the device must be observed.
Mechanical load	The rated values must not be exceeded.
EHEDG / 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 use in hazardous locations the respectively valid installation regulations must be observed.
Sparks	The installation has to be done in a way mechanical friction or impact can not cause sparks between the aluminium enclosure and steel.
Weather protection cover	The weather protection cover is approved for Zone 2, 22 and Div.2

Mounting

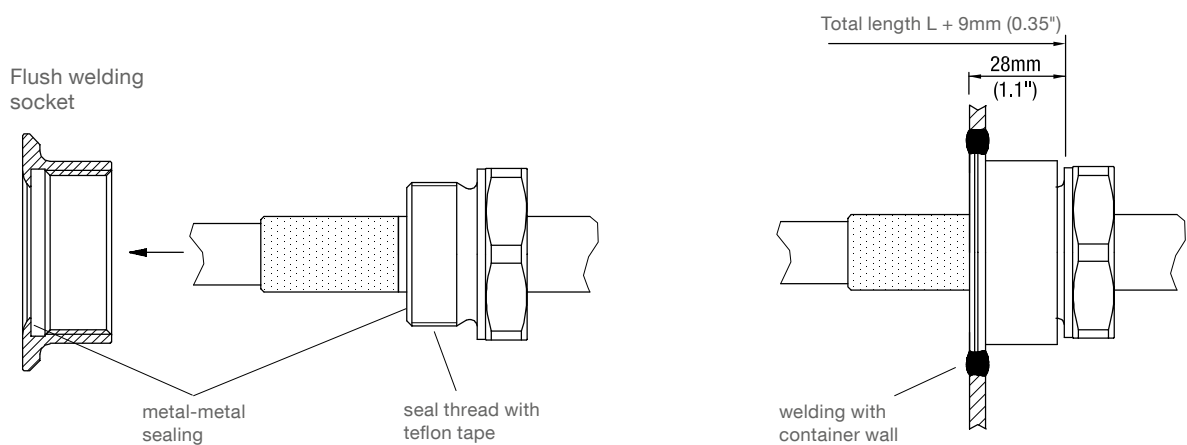
EHEDG Approval

Seal the thread with teflon tape against process pressure.

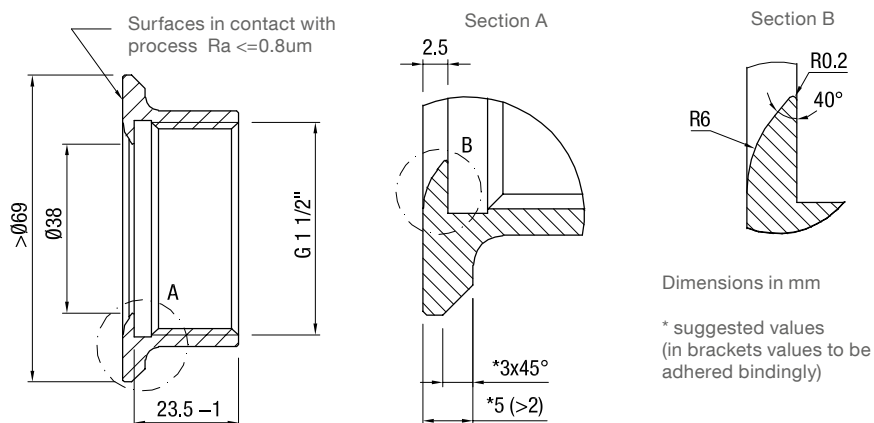
Metal-metal sealing:

- 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).



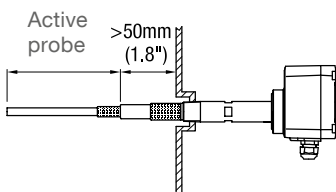
Dimension of flush welding socket (for optional on site manufacturing):



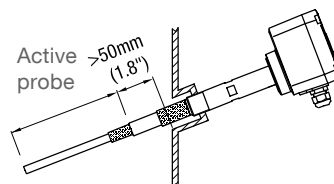
Mounting

Mounting: Rod version

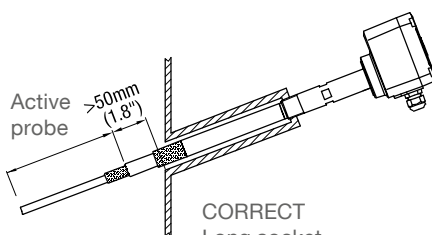
Observe distance to active probe



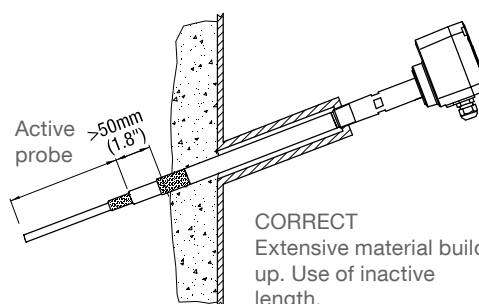
CORRECT
 Horizontal mounting



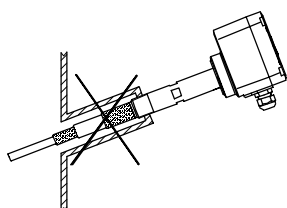
CORRECT
 Oblique mounting
 Helps remaining material to fall off



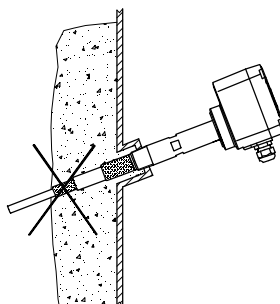
CORRECT
 Long socket.
 Use of inactive length.



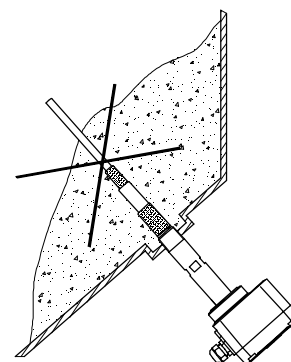
CORRECT
 Extensive material build up.
 Use of inactive length.



WRONG
 Active probe inside socket.



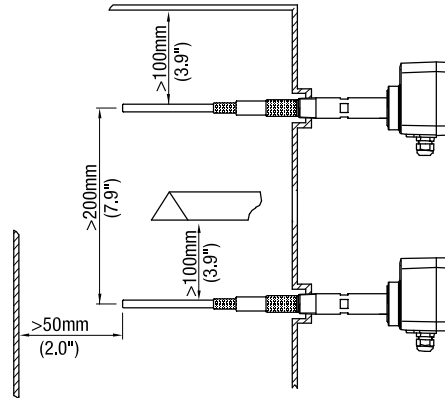
WRONG
 Active probe inside material build up.



WRONG:
 Active probe inside intersection between cylindric and conical part of the silo (material may stay when silo is empty)

Mounting

Observe min. distance between two sensors, to metal silo wall and to protective angle.



Grounding reference with non metal silos

The inner or outer PE terminal must be connected to reach a grounding reference.

Further mounting requirements

- Observe distance to material flow (filling).
- Protective angle recommended depending on mechanical load and abrasion of the material.

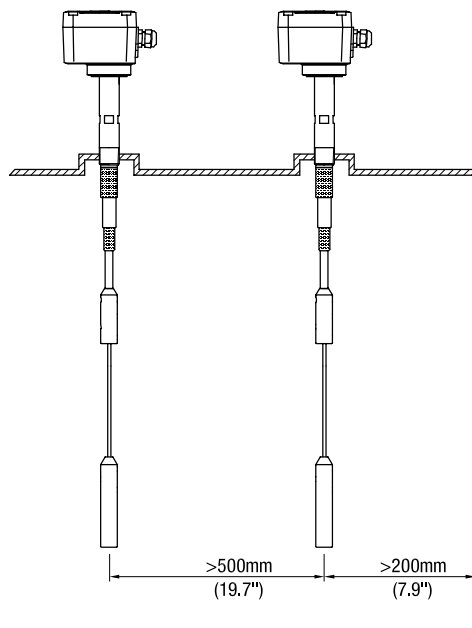
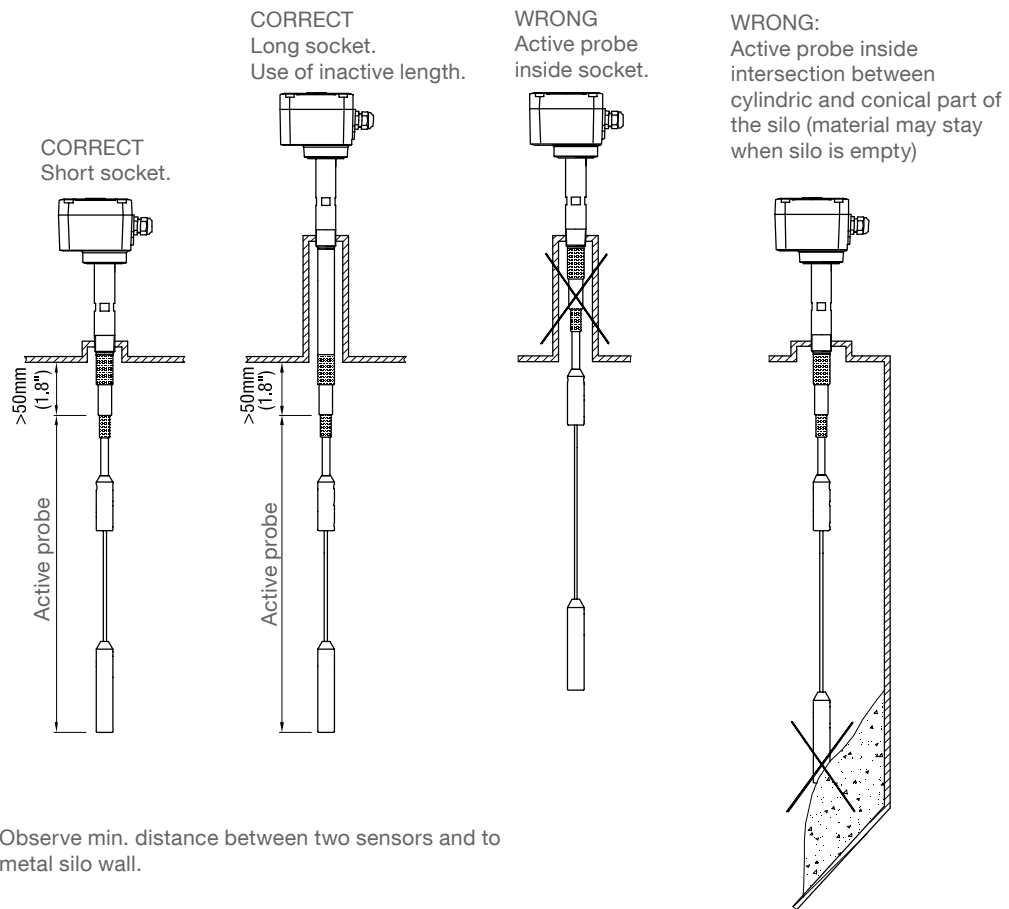
Switching point

With proper calibration the signal output switches when the active probe is covered by material.

Mounting

Mounting: Rope version

Observe distance to active probe



Grounding reference with non metal silos

The inner or outer PE terminal must be connected to reach a grounding reference.

Further mounting requirements

- Observe distance to material flow (filling).
- Empty detector: Do not mount above the center of the silo outlet due to high traction force.
- Unit must be installed vertical.

Electrical installation

! General Safety Instructions

Handling	In the case of inexpert handling or handling malpractice the electric safety of the device cannot be guaranteed.
Protective earthing	Before any electrical installation, the terminal inside the housing must be connected to the protective earth.
Installation regulations	The local regulations or VDE 0100 (Regulations of German Electro technical Engineers) must be observed. With use of 24V supply voltage, an approved power supply with reinforced insulation to mains is required.
Fuse	Use a fuse as stated in the connection diagrams.
RCCB protection	In the case of a defect, the distribution voltage must automatically be cut off by a RCCB protection switch so as to protect the user of the device from indirect contact with dangerous electric tensions.
Power supply switch	A Power-supply-disconnecting switch must be provided and marked near the device.
Wiring diagram	The electrical connections have to be made according to the wiring diagram.
Supply voltage	Compare the supply voltage applied with the specifications given on the electronic and name plate before switching the device on.
Cable gland / closing element	<p>The screwed cable gland and closing element must have following specifications:</p> <p>Ingress protection IP67, temperature range from -40°C to +80°C, UL or VDE certified (depending on the country where the unit is installed), pull relief.</p> <p>Make sure that the screwed cable gland safely seals the cable and that it is tight (danger of water intrusion).</p> <p>Cable glands that are not used have to be locked with a closing element.</p> <p>A strain relief must be provided for the field wiring cables, when the device is installed with the factory provided cable glands.</p>
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 NPT 1/2" or NPT 3/4" in accordance with the unit and ANSI B 1.20.1. Not used inlets must be closed tight with a metal closing element.
Field wiring cables	<ul style="list-style-type: none"> • The diameter has to match to the clamping range of the used cable gland. • The cross section has to match with the clamping range of the connection terminals and consider the max. current. • All field wirings must have insulation suitable for at least 250V AC. • The temperature rating must be at least 90°C (194°F). • If higher immunity interferences as specified in the stated EMC standards are present (see chapter approval), a shielded cable is required, otherwise an unshielded instrumentation cable is satisfactory.
Connecting the terminals	Make sure that max. 8mm (0.31") of the pigtails are bared (danger of contact with live parts).
Guiding the cables in the terminal box	Cut the field wiring cables to appropriate length to fit properly into the terminal box.
Remote housing	The remote cable must be installed sepatated from power supply lines to avoid immunity interferences The min. bending radius of 50mm must be observed.

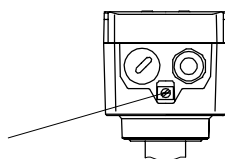
Electrical installation

Relay protection	Provide protection for relay contacts to protect the device against spikes with inductive loads.
Protection against static charging	The housing of the unit must be grounded in any case to avoid static charging of the unit on applications with pneumatic conveying and non-metallic containers .
Opening the lid	Before opening the lid take care, that the unit is clean and no water or dirt can enter into the housing.

! Additional Safety Instructions for Hazardous Locations

External equipotential bonding terminal

Connect with equipotential bonding of the plant



Field wiring	A pull relief must be provided for the field wiring cables, when the device is installed with the factory provided cable glands.
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Field wiring terminals for "de" housing	Fixing torque : 0,5-0,6Nm Remove wire isolation: 9mm
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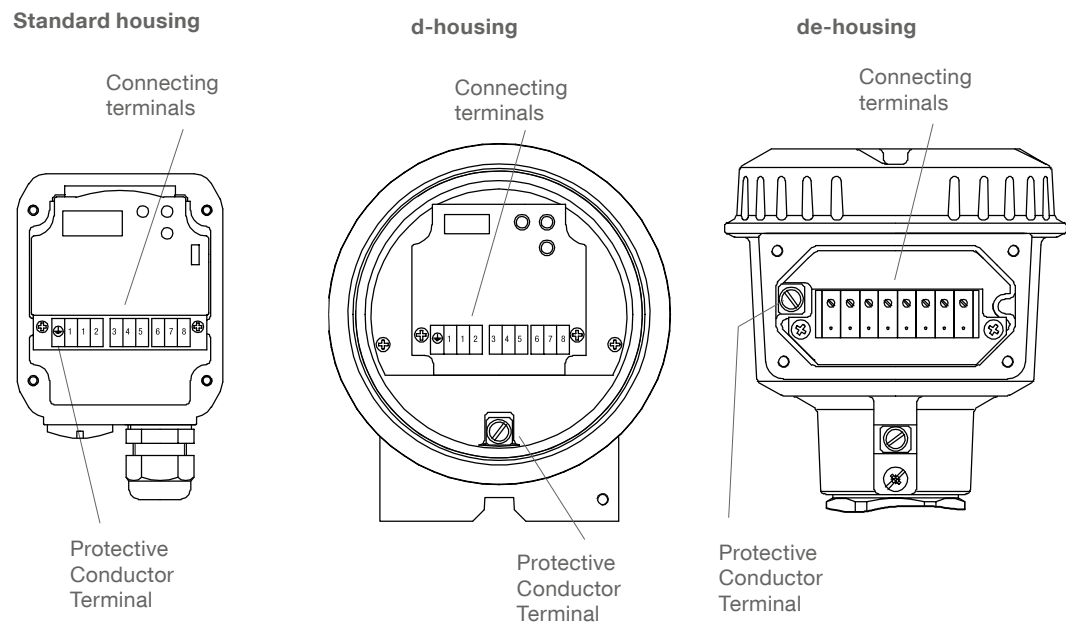
Cable glands and conduit system for ATEX / IEC-Ex/ TR-CU (Dust and Gas Hazardous Locations)	<p>Installation according to the regulations of the country, where the product is installed.</p> <p>Not used entries have to be closed with blanking elements certified for this purpose.</p> <p>Where available the factory provided parts must be used.</p> <p>A strain relief must be provided for the field wiring cables, when the device is installed with the factory provided cable glands.</p> <p>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 10 Kelvin. The parts must be mounted according to the instructions of the supplier.</p>
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Conduit system for FM (Dust and Gas Hazardous Locations)	<p>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°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.</p> <p>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 Cl.1 Div.1 A.</p>
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Opening the lid	<p>Units with Dust Explosion approval: Before opening the lid take care, that no dust deposits or whirlings and no hazardous atmosphere is present.</p> <p>Units with flameproof GasExplosion approval (d-housing): To prevent ignition of hazardous atmospheres, do not remove the lid (cover) while circuits are alive.</p>
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Electrical installation

Connection



Universal voltage Relay DPDT

Power supply:

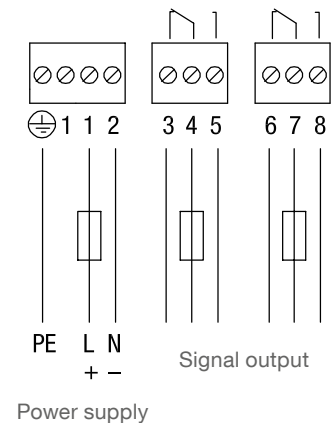
21 .. 230V 50/60Hz or DC +/-10%
 1.5VA or 1.5W

Fuse on power supply:
 max 10A, 250V, HBC, fast or slow

Signal output:

Floating relay DPDT
 AC max. 250V, 8A, non inductive
 DC max. 30V, 5A, non inductive

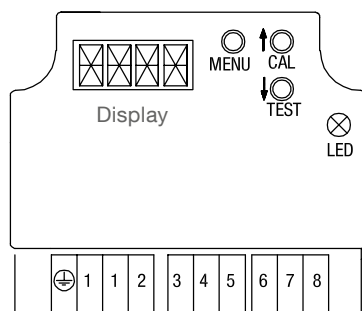
Fuse on signal output:
 max 10A, 250V, HBC, fast or slow



Quickstart

Quickstart

User interface



LEDs:

Green = relay activated
 Yellow = relay idle
 Red = maintenance (blinking), error (on)

Power up calibration at first time operation

Behaviour after first time power up (factory setting).

If unit is switched OFF and then again ON, this calibration will NOT be repeated.

1. Ensure material level is well below the probe.	<p>Ensure that the unit is properly mounted and the material level is well below the probe, since the unit will calibrate to an uncovered probe.</p>
2. Power up calibration	<p>After first time power up, the unit will automatically calibrate. During calibration (ca. 45 seconds) display states "CAL", red LED is blinking. After calibration display states the actual measured capacitance followed by "u" for "Signal output states uncovered".</p> <p>If other statements on the display are present, see Trouble shooting, page 37.</p>
3. Checking Quickstart settings	<p>If required to change the factory settings for Fail Safe High/Low, Signal output delay or Sensitivity, use Quickstart menu (see page 24).</p>
Unit is ready to work	

Measurement mode

The unit states the actual measured capacitance and the state of the signal output

Display	LED	Explanation
XXX u XXX c	green/yellow*	<p>Actual measured capacitance in pF. Actual signal output: states uncovered probe "u" or covered probe "c"</p> <p>Resolution is 0.1pF (<100pF) or 0.5pF (>100pF). If values are >100pF, a dot behind the number means 0.5 pF (e.g. 100. means 100.5pF)</p> <p>Note: If the actual measured capacitance is higher than electronic can measure (>400pF with sensitivity setting >=2pF or >100pF with sensitivity setting <=1pF), the unit will state "400c" or "100c". The measurement is valid, since the actual capacitance is well above the calibrated switchpoint. Signal output states covered probe "c" in any case.</p>

* Green or yellow depending on FSH/FSL setting, see page 24.

If other statements on the display are present, see Trouble shooting, page 37.

Quickstart

Quickstart menu

Note: Red LED is blinking during Menu setting



- When the unit is in Measurement mode, press MENU button for 3 sec to enter in Quickstart menu.
 Note: If "Code" is displayed, a Lock Code is required. Set the code number with the arrow buttons and confirm with the Menu button. Then press again the Menu button for 3 sec to enter in Quickstart menu.
- Press for 3 sec to return to Measurement mode.
- Press for <1 sec to store setted value and jump to next menu item.



- Arrow buttons increase / decrease the value to be setted

Display	Explanation	Menu item
A. FSH * FSL	Fail Safe High Fail Safe Low	Signal output, Fail safe setting
B. ALL * C-U U-C	Covered probe <-> Uncovered probe Covered probe -> Uncovered probe Uncovered probe -> Covered probe	Signal output , Delay direction
C. 0,5 * 2 5 to 60	seconds	Signal output , Delay time Adjustable in steps (increment is 5 seconds)
D. 0,5 1 2 ** 4 10 15 25 35	pF	Sensitivity Required capacitance increase between uncovered probe (after calibration) and switch to output "covered probe". Change presetted value only if required by the application, see calibration guide on page 25. Note: Menu item D is not valid and will not be shown on the display, if Manual calibration (Menu item G) is set to ON.

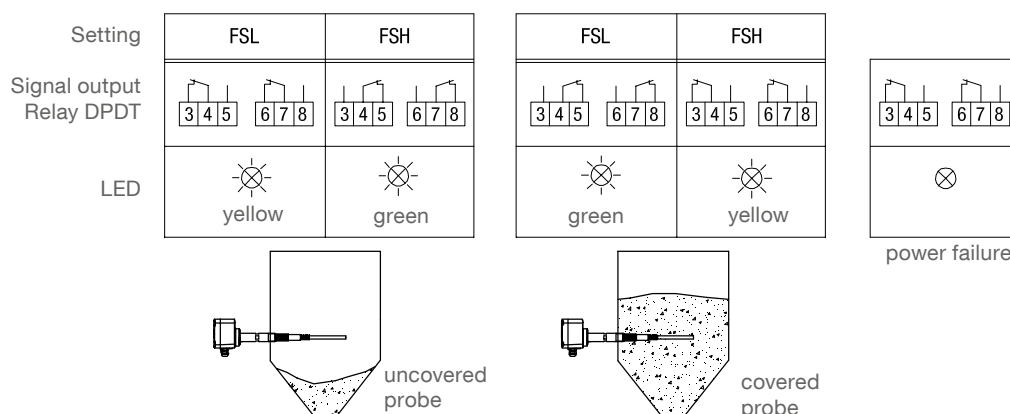
* Factory setting

** Standard Factory setting is 2pF. Optional other setting is present (depending on order)

FSH / FSL Setting

FSH: Set as full detector. Power failure or line break is stated as "full" signal (protection against overcharging).

FSL: Set as empty detector. Power failure or line break is stated as "empty" signal (protection against dry running).



Quickstart

Push button calibration - Calibration guide

Push button calibration needs to be done, if "Power up calibration at first time operation" was not successful or unit was changed to another location or a significant change of DK was present after changing of material.

• Calibration with uncovered probe only:

This method is most simple and thus recommended to be done if ever possible.

A proper selection of the active probe length is necessary to reach a satisfactory change of capacitance between uncovered and covered probe (see recommendations in the external selection list). If these recommendations are observed, the standard sensitivity of 2pF can be used in most cases.

If a too small change of capacitance between uncovered and covered probe is present, a higher sensitivity can be selected (1pF or 0.5pF). This is not possible if remote version with remote cable length >10m (33ft) is installed outdoors (temperature drift).

For higher change of capacitance and evt. excessive buildup, the sensitivity can be reduced (4pF or more).

Calibration procedure see page 26.

• Calibration with uncovered and covered probe:

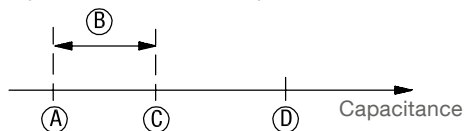
This method is most safe, since it sets the switchpoint in the middle between uncovered and covered probe capacitance. This ensures the max. switching distance to both uncovered and covered probe capacitance and thus ensures the max. tolerance against e.g. material buildup. The method is required for lower DK values which give a lower change of capacitance. The DK value of the material is not required to be known.

Calibration procedure see page 27.

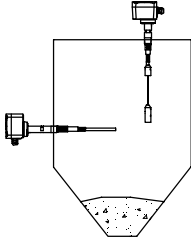

Quickstart

Push button calibration - Calibration procedure - Uncovered probe only

Explanation of calibration procedure:



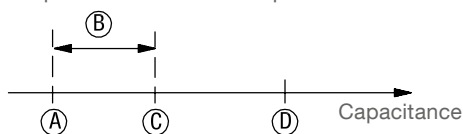
- A Capacitance Uncovered probe
- B Sensitivity
- C Switchpoint
- D Capacitance Covered probe

1. Ensure material level is well below the probe.	<p>Ensure that the unit is properly mounted and the material level is well below the probe, since the unit will calibrate to an uncovered probe.</p> 
2. Set Sensitivity	<p>Only if required (see page 25)</p> <p>Set the Sensitivity in the Quickstart Menu, item "D", see page 24.</p>
3. Press CAL button for 3 seconds 	<p>During calibration the display states "CAL", the red LED is blinking. Wait until calibration is finished (ca. 10 seconds). Then display states the actual measured capacitance followed by "u" for "Probe uncovered".</p> <p>Note: If "Code" is displayed, a Lock Code is required. Set the code number with the arrow buttons and confirm with the Menu button. Then press again the CAL button for 3sec to start calibration.</p> <p>If other statements on the display are present, see Troubleshooting, page 37.</p>
Unit is ready to work.	

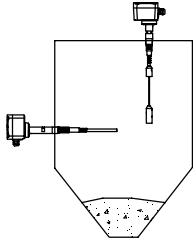

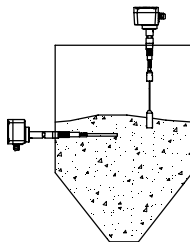
Quickstart

Push button calibration - Calibration procedure - Uncovered and covered probe

Explanation of calibration procedure:



- A Capacitance Uncovered probe
- B Sensitivity
- C Switchpoint
- D Capacitance Covered probe

1. Ensure material level is well below the probe.		<p>Ensure that the unit is properly mounted and the material level is well below the probe, since the unit will calibrate to an uncovered probe.</p> 																																								
2. Press CAL button for 3 seconds		<p>Display states "CAL", the red LED is blinking. Wait until calibration is finished (ca. 10 seconds). Then display states the actual measured capacitance followed by "u" for "Probe uncovered".</p> <p>Note: If "Code" is displayed, a Lock Code is required. Set the code number with the arrow buttons and confirm with the Menu button. Then press again the CAL button for 3sec to start calibration.</p> <p>If other statements on the display are present, see Trouble shooting, page 37.</p>																																								
3. Note actual measured capacitance (uncovered probe)		<p>Note the actual measured capacitance as stated in the display for uncovered probe.</p>																																								
4. Note actual measured capacitance (covered probe)		<p>For vertical mounting (rope version) the material level shall cover the probe weight by 10-20cm (4-8").</p> <p>Note the actual measured capacitance as stated in the display for covered probe.</p> 																																								
4. Set Sensitivity		<p>Calculate the capacitance difference between uncovered and covered probe. Set sensitivity as follows (Quickstart Menu item "D"):</p> <table><thead><tr><th colspan="2">Horizontal mounting</th><th colspan="2">Vertical mounting (rope version)</th></tr><tr><th>Capacitance difference uncovered-covered</th><th>Sensitivity*</th><th>Capacitance difference uncovered-covered</th><th>Sensitivity**</th></tr></thead><tbody><tr><td>0.8 .. 1.5 pF</td><td>0,5 pF***</td><td>0.5 .. 1.0 pF</td><td>0.5 pF***</td></tr><tr><td>1.5 .. 3 pF</td><td>1 pF***</td><td>1.0 .. 2 pF</td><td>1 pF***</td></tr><tr><td>3 .. 6 pF</td><td>2 pF</td><td>2 .. 4 pF</td><td>2 pF</td></tr><tr><td>6 .. 15 pF</td><td>4 pF</td><td>4 .. 10 pF</td><td>4 pF</td></tr><tr><td>15 .. 23 pF</td><td>10 pF</td><td>10 .. 15 pF</td><td>10 pF</td></tr><tr><td>23 .. 38 pF</td><td>15 pF</td><td>15 .. 25 pF</td><td>15 pF</td></tr><tr><td>38 .. 53 pF</td><td>25 pF</td><td>25 .. 35 pF</td><td>25 pF</td></tr><tr><td>> 53 pF</td><td>35 pF</td><td>> 35 pF</td><td>35 pF</td></tr></tbody></table> <p>* The difference uncovered to covered should be well above the setted sensitivity (ca. >50%). ** The difference uncovered to covered does not need to be above the setted sensitivity, since with raising material the capacitance will increase and thus lead to a save switching. *** Not possible with remote version with remote cable length >10m (33ft) and outdoor installation (temperature drift).</p> <p>Note: If different materials needs to be measured in the same bin without recalibration, the Sensitivity must be set for the material with the lowest DK.</p>	Horizontal mounting		Vertical mounting (rope version)		Capacitance difference uncovered-covered	Sensitivity*	Capacitance difference uncovered-covered	Sensitivity**	0.8 .. 1.5 pF	0,5 pF***	0.5 .. 1.0 pF	0.5 pF***	1.5 .. 3 pF	1 pF***	1.0 .. 2 pF	1 pF***	3 .. 6 pF	2 pF	2 .. 4 pF	2 pF	6 .. 15 pF	4 pF	4 .. 10 pF	4 pF	15 .. 23 pF	10 pF	10 .. 15 pF	10 pF	23 .. 38 pF	15 pF	15 .. 25 pF	15 pF	38 .. 53 pF	25 pF	25 .. 35 pF	25 pF	> 53 pF	35 pF	> 35 pF	35 pF
Horizontal mounting		Vertical mounting (rope version)																																								
Capacitance difference uncovered-covered	Sensitivity*	Capacitance difference uncovered-covered	Sensitivity**																																							
0.8 .. 1.5 pF	0,5 pF***	0.5 .. 1.0 pF	0.5 pF***																																							
1.5 .. 3 pF	1 pF***	1.0 .. 2 pF	1 pF***																																							
3 .. 6 pF	2 pF	2 .. 4 pF	2 pF																																							
6 .. 15 pF	4 pF	4 .. 10 pF	4 pF																																							
15 .. 23 pF	10 pF	10 .. 15 pF	10 pF																																							
23 .. 38 pF	15 pF	15 .. 25 pF	15 pF																																							
38 .. 53 pF	25 pF	25 .. 35 pF	25 pF																																							
> 53 pF	35 pF	> 35 pF	35 pF																																							
Unit is ready to work.																																										

Quickstart

Calibration - general items

Reset to "Power up calibration at first time operation"

It may be required, that an already calibrated unit shall do a new Power up calibration when the supply voltage is switched on (e.g. if the unit shall be installed in a different bin or shall be pesetted and afterwards send to the end user).

To do this, press the CAL button for 3 seconds to initiate a Push button calibration. While the calibration is running ("CAL" is displayed), switch off the supply voltage. Since the calibration was startet, but not sucessfully finished, it will automatically start again when power is back.

Note: Only the calibration is affected, the settings in the menus will not change.

Data storage of last valid calibration values

If power supply is switched off, the last valid calibration values are stored and are still valid when power is switched on again.

Manual Function Test (proof test)

General items

The unit allows to test the internal electronics and the external connected signal evaluation.

Test procedure



In Measurement mode:

Start the test by pressing the TEST button for 3 seconds.

Note: If "Code" is displayed, a Lock Code is required. Set the code number with the arrow buttons and confirm with the Menu button. Then press again the TEST button for 3sec to start test procedure.

Test runs for ca. 20 seconds. Display states "TST". Signal output and yellow status LED will change state for ca. 10 sec and then return to former state (relais on-off-on or off-on-off).

If test result is not o.k., the display states "ERR", red LED is on, Relais is set to de-energized. Electronic is defect and must be changed.

Advanced programming

Advanced programming - Advanced menu

Advanced menu

Note: Red LED is blinking during Menu setting



- When the unit is in Measurement mode, press MENU button for 10 sec to enter in Advanced menu (keep pressed, ignore when unit goes after 3 sec to Quickstart Menu and A.FSx is displayed).
 Note: If "Code" is displayed, a Lock Code is required. Set the code number with the arrow buttons and confirm with the Menu button. Then press again the Menu button for 10 sec to enter in Advanced menu.
- Press for 3 sec to return to Measurement mode.
- Press for <1 sec to store setted value and jump to next menu item.



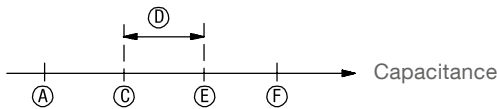
- Arrow buttons increase / decrease the value to be setted

Display	Explanation	Menu item
Auto recalibration		
F. OFF * ON		<p>Auto recalibration to uncovered probe. If may be required to do comissioning in an already filled silo (covered probe). With covered probe a proper calibration is not possible. A solution can be to cause the unit to do a auto calibration when the silo becomes empty (uncovered probe).</p> <p>To do this, set Auto recalibration to "ON" and do a push button calibration with a covered probe (press the CAL button for 3 seconds).</p> <p>The unit will recalibrate to uncovered probe automatically after 2 minutes, if the measured capacitance becomes 50% of the setted sensitivity (Menu item D) lower than the calibrated capacitance. During calibration "CAL" is displayed.</p> <p>Do not set to "ON" if excessive material build up is present, since this build up may decrease the measured capacitance and causes a wrong calibration.</p> <p>Note: Menu item F is not valid and will not be shown on the display, if Manual calibration (Menu item G) is set to "ON".</p>
Manual calibration The unit allows Manual calibration similar to conventional potentiometer calibration, but using a comfortable display and menu. Procedure for Manual calibration see page 32 to 34.		
G. OFF * ON		<p>Manual calibration ON/OFF If set to ON:</p> <ul style="list-style-type: none"> - Menu items H-P appear. - Menu items D (Sensitivity in Quicksart Menu) and F (Auto recalibration) are no more valid and will be hidden. - Push button calibration is no more possible (if CAL button is pressed, the display states G.ON)
H. LO * HI	Low High	<p>Sensitivity range Low sensitivity range allows to detect a capacitance change of $\geq 2\text{pF}$ High sensitivity range allows to detect a capacitance change of $\geq 0.5\text{pF}$ See also calibration guide on page 32</p>

* Factory setting

Continuation next page

Advanced programming - Advanced menu

K.	xxx	pF	<p>Switchpoint covered -> uncovered</p> <p>Explanation of switchpoints:</p>  <p>A Capacitance uncovered probe C Switchpoint covered -> uncovered (Menu item K) D Hysteresis (Menu item L) E Switchpoint uncovered -> covered F Capacitance covered probe</p> <p>Factory setting is lowest pF value (3pF).</p> <p>Resolution is 0.1pF (<100pF) or 0.5pF (>100pF). If values are >100pF, a dot behind the number means 0.5 pF (e.g. 100. means 100.5pF)</p>
L.	xxx	pF	<p>Hysteresis</p> <p>Hysteresis can be adjusted if unstable capacitance is present with covered probe (e.g. moving liquid surface with vertical mounting) to avoid nervous switching of signal output.</p> <p>Minimum value (=factory setting) is 0.5 / 0.2pF (for Low/ High sensitivity) . Maximum value is limited by the max. measurable capacitance.</p> <p>Resolution see "Switchpoint covered -> uncovered".</p>
Diagnostics			
M.	ON * OFF		<p>Auto Function Test</p> <p>The unit allows to permanently auto test the internal electronics. The test runs in the background and does not influence the functionality of the measurement.</p> <p>If a failure is detected, the display states "ERR", the red LED is on and the relais is set to de-energized. Electronic is defect and must be changed.</p>
N.	xxx	pF	<p>Actual calibrated Switchpoint covered -> uncovered</p> <p>If "OR" or UR" is stated, there is no valid calibration (see Troubleshooting page 37)</p>
P.	xxx	pF	<p>Actual calibrated Switchpoint uncovered -> covered</p> <p>If "OR" or UR" is stated, there is no valid calibration (see Troubleshooting page 37)</p>
Q.	xxx	°C	Min. stored electronics temperature
R.	xxx	°C	Max. stored electronics temperature
S.	xxx		Software version
T.	xxx		<p>Service values</p> <p>The values are manufacturer internal and not be stated in detail with this user manual</p>
Divers			
V.	xxx		<p>Lock code</p> <p>The Lock code can be set to protect entering in any Menu or doing a Push Button Calibration or a Manual Function Test. Any number from 1 to 999 can be set. With setting "000" the Lock Code is not active (factory setting). If a Lock code was set and forgotten, call manufacturer to get the release code.</p>
W.	NO* YES		<p>Factory reset</p> <p>First all parameters will be reset to factory settings (as stated with an "u"). Second the unit will automatically start a new calibration.</p>

* Factory setting

Advanced programming - Manual calibration

Manual calibration - Calibration guide

Manual calibration is recommended for special purposes.

The numbers in the table below are applicable for most applications. Some critical applications (e.g. excessive buildup, special mounting) may be considered different.

A proper selection of the active probe length is necessary in any case to reach a satisfactory change of capacitance between uncovered and covered probe, see recommendations in the selection list (pricelist). The table below is based on a proper active probe length.

- Calibration with uncovered probe only:

This method is more easy to realise than calibration with uncovered and covered probe and thus recommended to be done if ever possible. It is applicable for higher DK values which give a higher change of capacitance between uncovered and covered probe. The DK value of the material is required to be known to be able to set the sensitivity range and the increase to switchpoint. See external list for dielectric constant (DK) of different materials.

- Calibration with uncovered and covered probe:

This method is most safe, since it sets the switchpoint in the middle between uncovered and covered probe. This ensures the max. distance to both uncovered and covered probe and thus ensures the max. tolerance against e.g. material buildup. It is required for lower DK values which give a lower change of capacitance. The DK value of the material is roughly required to be known to be able to set the sensitivity range. See external list for dielectric constant (DK) of different materials.

Manual Calibration - Calibration guide

DK	Sensitivity range	Calibration: Uncovered probe only	Increase to Switchpoint	Calibration: Uncovered and covered probe
< 1.5	-	-	-	-
1.5 ... 1.6	High	-	-	A
1.7 ... 1.9	High	B	+1 pF*	C
2.0 ... 2.9	Low	B	+2 pF	C
3.0 ... 4.9	Low	B	+4 pF	C
5.0 ... 10	Low	B	+10 pF	C
> 10	Low	B	+15 pF	C
		Calibration procedure see page 33		Calibration procedure see page 34

A = Required

B = Recommended (most simple calibration method)

C = Possible as an alternative

- = Not applicable

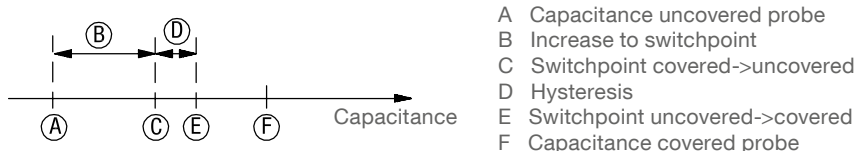
* Not possible with remote version with remote cable length >10m (33ft) and outdoor installation (temperature drift).

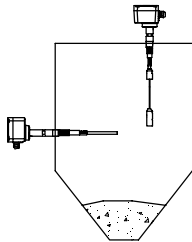
Advanced programming - Manual calibration

Manual calibration - Calibration procedure - Uncovered probe only

Note: Manual calibration must be set to ON (Advanced menu, item G)

Explanation of calibration procedure:



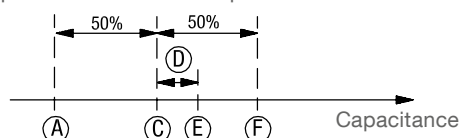
1. Ensure material level is well below the probe.	<p>Ensure that the unit is properly mounted and the material level is well below the probe, since the unit will calibrate to an uncovered probe.</p> 
2. Set Sensitivity range	<p>Check for the required Sensitivity range (low or high) depending on the material to be measured, use calibration guide on page 32.</p> <p>Set the Sensitivity range in the Advanced Menu item "H", see page 30.</p>
3. Find capacitance of uncovered probe	<p>Goto Advanced Menu item "K". Start with lowest capacitance (factory setting is ca. 3pF). Unit states covered. Increase the displayed capacitance, until the output just changes from covered to uncovered.</p> <p>Notes:</p> <ul style="list-style-type: none"> - The signal output delay should be set to 0,5sec. - In measurement mode the actual measured capacitance is displayed. This gives an indication, at which capacitance the output will change from covered to uncovered. - If the output has once changed to uncovered and shall change back to covered, the value must be decreased by the setted Hysteresis (Menu item "L"). <p>If the actual measured capacitance is close to the limits of what the electronic can measure (400pF with sensitivity setting "Low" or 100pF with sensitivity setting "High"), see Trouble shooting, page 37.</p>
4. Set switchpoint covered -> uncovered	<p>In Advanced Menu item "K". Set the Switchpoint covered->uncovered as follows: Capacitance of uncovered probe (see step 3 above) + Increase to switchpoint (see table on page 32)</p>
5. Hysteresis	<p>Advanced Menu item "L". Factory setting is normally not required to be changed.</p>
Unit is ready to work.	<p>Return to measurement mode.</p>

Advanced programming - Manual calibration

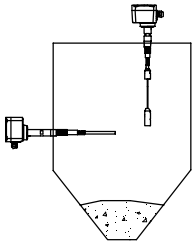
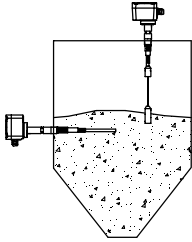
Manual calibration - Calibration procedure - Uncovered and covered probe

Note: Manual calibration must be set to ON (Advanced menu, item K)

Explanation of calibration procedure:



- A Capacitance uncovered probe
- C Switchpoint covered->uncovered
- D Hysteresis
- E Switchpoint uncovered->covered
- F Capacitance covered probe

1. Set Sensitivity range	<p>Check for the required Sensitivity range (low or high) depending on the material to be measured, use calibration guide on page 32.</p> <p>Set the Sensitivity range in the Advanced Menu item "H", see page 30.</p>
2. Note actual measured capacitance (uncovered probe)	<p>Ensure that the unit is properly mounted and the material level is well below the probe.</p> <p>In Measurement mode: Note the actual measured capacitance as stated in the display.</p> <p>If the actual measured capacitance is close to the limits of what the electronic can measure (400pF with sensitivity setting "Low" or 100pF with sensitivity setting "High"), see Trouble shooting, page 37.</p> 
3. Note actual measured capacitance (covered probe)	<p>Ensure that the material level is above the probe.</p> <p>For vertical mounting (rope version): The material level shall cover the probe weight by 10-20cm (4-8").</p> <p>In Measurement mode: Note the actual measured capacitance as stated in the display.</p> 
4. Set Switchpoint covered -> uncovered	<p>Goto Advanced Menu item "K". Set to the middle between capacitance of uncovered and covered probe as follows:</p> $\text{Switchpoint covered} \rightarrow \text{uncovered} = \text{uncovered}^{(1)} + 0.5 \times (\text{covered}^{(2)} - \text{uncovered}^{(1)})$ <p>⁽¹⁾ Capacitance uncovered probe (see step 2 above) ⁽²⁾ Capacitance covered probe (see step 3 above)</p> <p>With Low sensitivity range (Advanced Menu item "H"): If the difference between uncovered and covered probe is smaller than 4pF, set either to High sensitivity or use a more sensitive probe (longer active probe). For rope version only a setting to High sensitivity range is possible.</p> <p>With High sensitivity range (Advanced Menu item "H"): If the difference between uncovered and covered probe is smaller than 1pF, use a more sensitive probe (longer active probe). For rope version call factory.</p> <p>* For remote version with remote cable length >10m (33ft) and outdoor installation the difference between uncovered and covered probe must be at least 4pF (temperature drift).</p>
6. Hysteresis	<p>Advanced Menu item "L". Factory setting is normally not required to be changed.</p>
Unit is ready to work.	<p>Return to measurement mode.</p>

Probe modifications



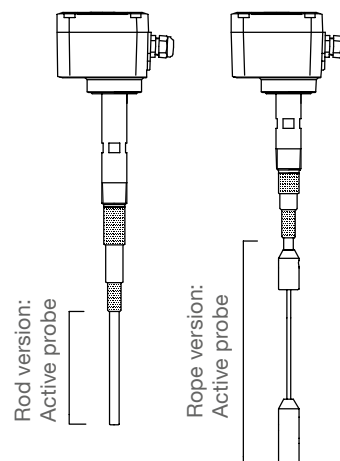
- Modifications on units with explosion approvals (Hazardous Locations) are not permitted. Consult factory.
- Modifications may change the technical data (mechanical stability).

CAUTION:

- Never do modifications on other than the active part of the probe. This will destroy the probe.
- Electronics must be removed in any case (see page 39)
- Take care not to overheat the plastic parts of the probe during welding or cutting.
- Use same material as the probe when welding to the probe.

- Recalibration is required after any modification on the probe.

Probe	Modification	Note
Rod version	Shortening	This will reduce the sensitivity (critical for material with low DK)
	Extending	Consider high mechanical load (rod bending) from bulk material
Rope version	Shortening	Proper fixing of the rope weight after rope cutting is required
	Extending	Consider high mechanical load (traction) from bulk material and reduced stability of a rope, if it is not made from one piece



Assembly - Remote version / FM Control drawing

- All cable glands used for the remote cable must be closed tightly to reach ingress protection.
- The cable glands must be protected against mechanical damage.
- Original remote cable from the supplier must be used.

For Hazardous Locations:
 Remote cable has intrinsically safe circuit.
 Substitution of components may impair intrinsic safety.

Assembly instruction:

Probe side:

Connect remote cable.
 Obtain right connecting sequence.
 The inner conductor and both shield conductors of the remote cable must not touch other metal parts. The delivered isolation hoses must be assembled according to the delivered instruction.

Electronic side:

1. Feed remote cable through the cable gland at the tube.

2. Connect remote cable to the plug.
 See notes above.

3. Check wiring electrically:
 No short circuit must be present between terminal 10 and 11, 10 and 12, 11 and 12.

4. Connect plug and mating plug.

5. Screw the tube into the threaded bush. While doing this, move the remote cable downwards. Take care, that the plug is not getting loose. While screwing, the cable gland must be open to avoid, that the wires are being twisted.
 Note: Inside the threaded bush is a seal ring which seals the tube to the threaded bush.

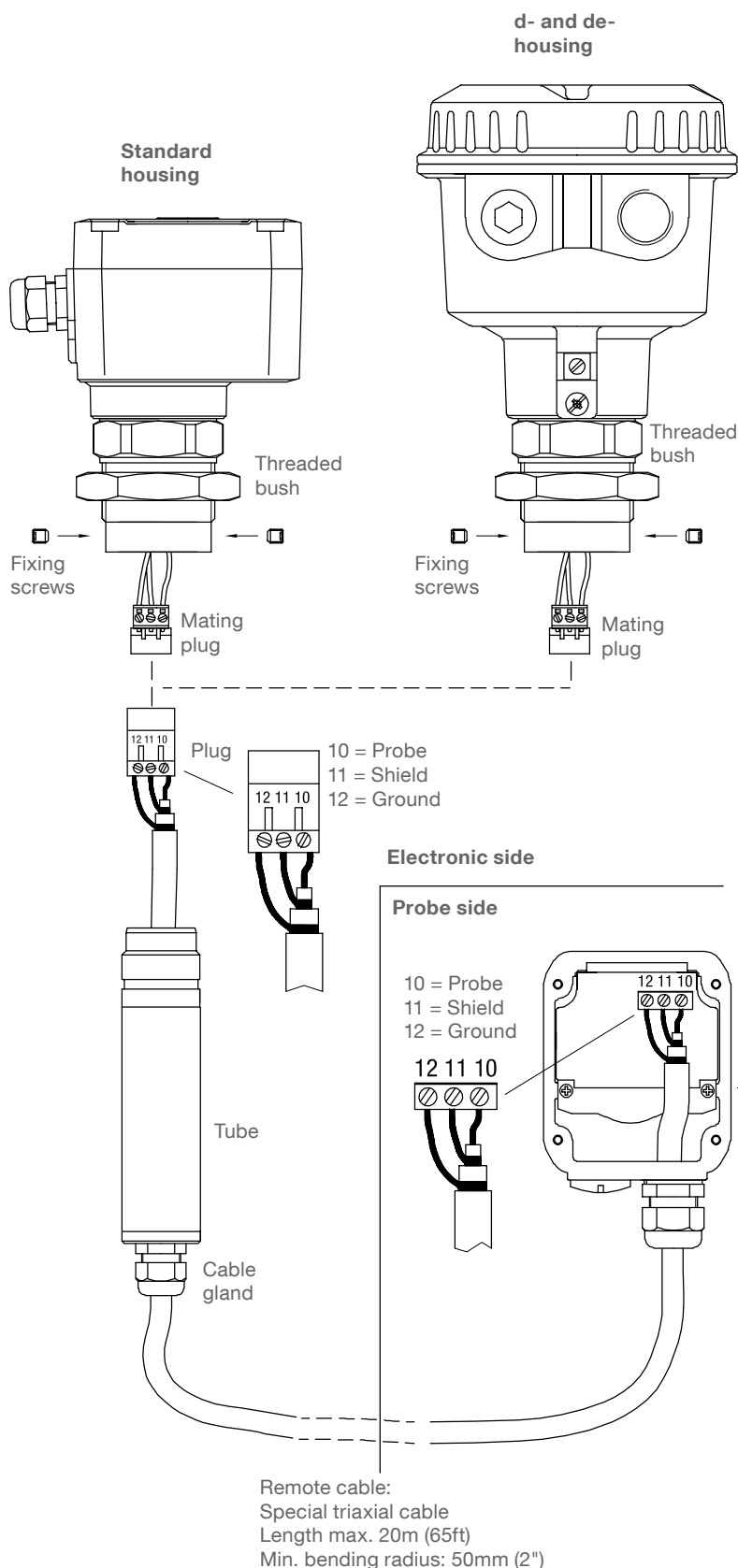
6. Tighten the cable gland on the tube.

7. Fasten the two fixing screws.

Versions (for FM, FMc):

Standard housing:
 Model RF 3*00 * N with option pos.12x
 Cl. II, III Div.1 Gr. E,F,G

"d" housing:
 Model RF 3*00 * U with option pos.12x
 XP-IS Cl. I,II,III Div.1 Gr. B-G and
 Cl. I Zone 1 Gr. IIB+H2



Troubleshooting

Maintenance and error messages

Display	LED	Explanation	Possible Reason / Solution
---------	-----	-------------	----------------------------

In Measurement Mode:

UR	red blinking	Under Range. Actual measured capacitance is lower than 3pF.	<ul style="list-style-type: none"> Excessive buildup is present on uncovered probe. This is o.k. if a proper calibration was done. Check, if rope active probe (e.g. rope) is touching the bin Check if Probe is defect or defect/incorrect probe wiring.
OR	rot blinkend	Over Range. After changing the Sensitivity from $\geq 2\text{pF}$ to $\leq 1\text{pF}$.	<ul style="list-style-type: none"> Actual calibrated capacitance is higher than 100pF and can not be measured with Sensitivity setting $\leq 1\text{pF}$. Change to Sensitivity 2pF if DK of the material is high enough or recalibrate.
ERR	red on	Auto or Manual Function Test error.	<ul style="list-style-type: none"> Electronic is defect. Change of electronic.

During Power up calibration at first time operation or during Push button calibration:

OR	red blinking	Over Range. Actual measured capacitance is higher than 400pF (Sensitivity set to $\geq 2\text{pF}$) or 100pF (Sensitivity set to $\leq 1\text{pF}$). Calibration not possible.	<ul style="list-style-type: none"> A long rope version in an empty silo may exceed 100pF capacitance. Change to Sensitivity 2pF if DK of the material is high enough. Probe may be covered with material. Ensure that probe is uncovered. Check if Probe is defect or defect/incorrect probe wiring.
UR	red blinking	Under Range. Actual measured capacitance is lower than 3pF. Calibration not possible.	<ul style="list-style-type: none"> Excessive buildup is present on the probe. Remove buildup. Probe is defect or defect/incorrect probe wiring.
G.ON	red blinking	CAL button pressed with Manual calibration setted to "ON". Push button calibration is not possible.	<ul style="list-style-type: none"> If Push button calibration is required, set Manual calibration to "OFF".

During Manual calibration (when probe is uncovered):

Close to 100 or 100	yellow/green	With sensitivity range setting "High" Actual measured capacitance is close to or higher than 100pF (what the electronic can measure). Calibration not possible.	<ul style="list-style-type: none"> A long rope version in an empty silo may exceed 100pF capacitance. Change to Sensitivity range "Low" if DK of the material is high enough. Probe may be covered with material. Ensure that probe is uncovered. Check if Probe is defect or defect/incorrect probe wiring.
Close to 400 or 400	yellow/green	With sensitivity range setting "Low" Actual measured capacitance is close to or higher than 400pF (what the electronic can measure). Calibration not possible.	<ul style="list-style-type: none"> Probe may be covered with material. Ensure that probe is uncovered. Check if Probe is defect or defect/incorrect probe wiring.

Troubleshooting

General items

Situation	Behaviour of the electronic	Possible Reason	Possible Solution
Signal output states covered while material is below the probe	The actual measured capacitance (1) is more than the actual calibrated Switchpoint uncovered -> covered (2)	Unit not properly calibrated	• Recalibrate (4)
		Excessive material build up on active probe	<ul style="list-style-type: none"> • Increase distance to wall (longer inactive length) • Change position • Recalibrate with less sensitivity (4)
		Defect or incorrect probe wiring.	• Check probe wiring (see below)
Signal output states uncovered while material is above the probe	The actual measured capacitance (1) is less than the actual calibrated Switchpoint covered -> uncovered (3)	Calibration was done with covered probe	• Recalibrate with uncovered probe (4)
		Calibrated was done with too less sensitivity	<ul style="list-style-type: none"> • Recalibrate with higher sensitivity (4) • Increase active probe length and recalibrate (4)
		Defect or incorrect probe wiring.	• Check probe wiring (see below)

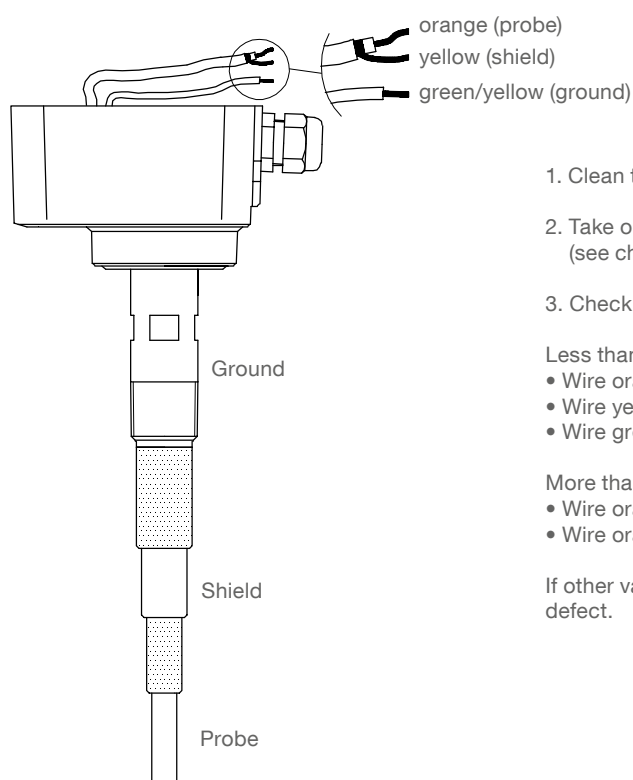
(1) Value can be seen in the display in Measurement mode (see page 23)

(2) Value can be seen in Advanced Menu, item P (see page 31)

(3) Value can be seen in Advanced Menu, item N (see page 31)

(4) See calibration guide, page 25 or 32

Checking probe wiring



1. Clean the probe from material
2. Take out the electronic board and remove internal wires (see chapter "Maintenance")
3. Check with Multimeter as follows (see drawing):

Less than 5 Ohm must be present between:

- Wire orange and Probe
- Wire yellow and Shield
- Wire green/yellow and Ground

More than 1 MOhm resistance must be present between:

- Wire orange and wire yellow
- Wire orange and wire green/yellow

If other values are present, the probe or probe wiring is defect.

Maintenance

General items

Opening the lid (cover)	<p>Before opening the lid for maintenance reasons observe following items:</p> <ul style="list-style-type: none"> • Do not remove the lid while circuits are alive. • No dust deposits or whirlings are present. • No rain can enter into the housing.
Frequent check of the unit	<p>To ensure durable safety in hazardous locations and with electrical safety, following items must be checked frequently depending on the application:</p> <ul style="list-style-type: none"> • Mechanical damage or corrosion of any components (housing side and sensor side) and of the field wiring cables. • Tight sealing of the process connection, cable glands and enclosure lid. • Properly connected external PE cable (if present). • 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.
Cleaning	<p>If cleaning is required by the application, following must be observed:</p> <ul style="list-style-type: none"> • Cleaning agent must comply with the materials of the unit (chemical resistance). Mainly the lid sealing, cable gland and the surface of the unit must be considered. <p>The cleaning process must be done in a way, that:</p> <ul style="list-style-type: none"> • The cleaning agent cannot enter into the unit through the lid sealing or cable gland. • No mechanical damage of the lid sealing, cable gland or other parts can happen. <p>Units with EHEDG certification, which are used in the respective EHEDG applications, must be cleaned dry only (Type ED). Furthermore the respective regulations must be observed.</p> <p>A possible accumulation of dust on the unit does not increase the maximum surface temperature and must therefore not be removed for purposes of maintaining the surface temperature in hazardous locations.</p>
Function test	<p>A frequent function test may be required depending on the application. Execution of function test see page 29</p>
Production date	<p>The production date can be traced by the serial number on the typeplate. Please contact the manufacturer or your local distributor.</p>
Spare parts	<p>All available spare parts are stated in the selection list.</p>

Maintenance

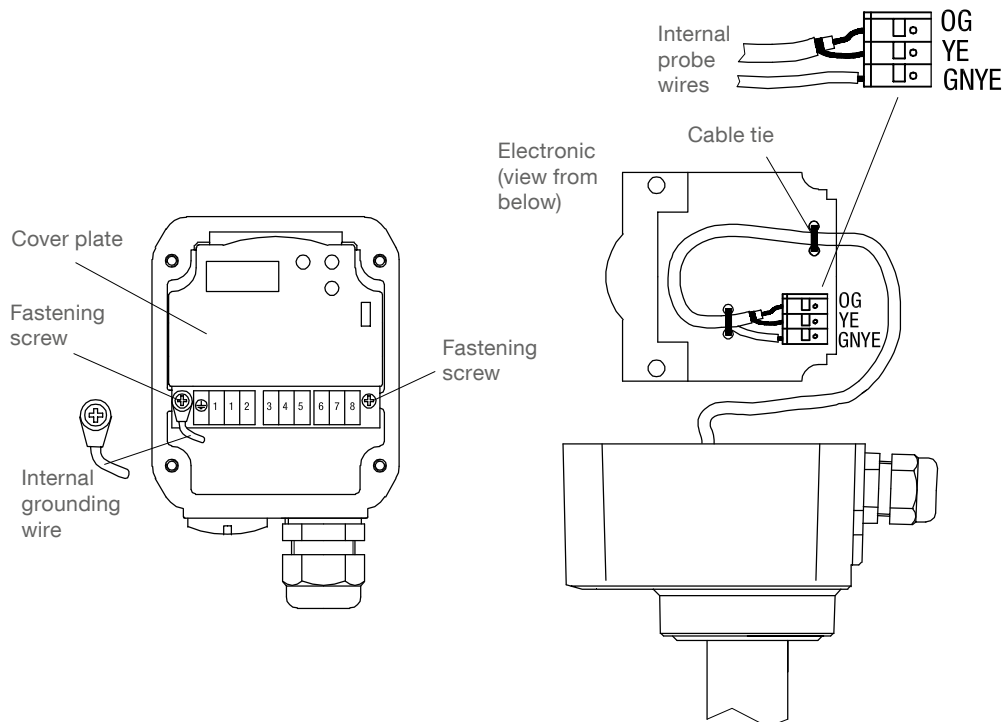
Change of electronic board

- ! • Opening the lid (cover): see safety notes on page before
- Hazardous Locations: The unit must have always an electronic board inserted and connected to the probe. If the electronic board is not connected to the probe, the probe acts as an isolated capacitance. The risk of static charge and thus possible explosion is present.

1. Open the housing lid
2. Remove the field wiring cables
3. Remove the two fastening screws
4. Take out the electronic board, remove cable ties and internal wires
5. Mount a new electronic board in reverse sequence

CAUTION:

- Observe right sequence of internal probe wires
- Observe to reconnect the internal grounding wire



Notes for use in Hazardous Locations

Zone classification

	usable in zone	ATEX category	IEC-Ex Equipment Protection Level (EPL)
Dust applications	20, 21, 22	1 D	Da
	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

* in case of conductive dust additional requirements for the installation may be necessary

General Notes

Marking

Devices with Ex approval are marked on the name plate.

Process pressure



The device construction allows process over-pressure up to 25 bar (363 psi). These pressure is 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 (categories) for mounting in partition wall

	With Standard housing	With d- and de-housing	
EPL (IEC-Ex)	Db	Gb	Db
Category (ATEX)	2D	2G	2D
Zone	21	1	21
EPL (IEC-Ex)	Da	Gb	Da
Category (ATEX)	1D	2G	1D
Zone	20	1	20

Standard housing

d-housing

de-housing

Rod

Rope

Rod, Remote version

Rope, Remote version

RF 3100
 RF 3200
 RF 3300

Notes for use in Hazardous Locations

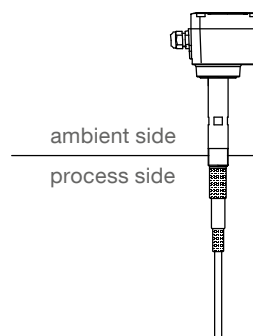
Max. Surface Temperature and Temperature Class

The temperature marking on the name plate  refers to the instruction manual.

On 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).

Max. ambient temperature	Max. process-temperature	Max. Surface temperature	Temperature class
70°C (158°F)	≤ 120°C (248°F)	120°C (248°F)	T4
	≤ 130°C (266°F)	(1)	T4
	≤ 195°C (383°F)	(1)	T3
	≤ 240°C (464°F)	(1)	T2
	≤ 295°C (563°F) (2)	(1)	T2
	≤ 445°C (833°F) (2)	(1)	T1
(1) The max. surface temperature is the same as the max. process temperature (2) Only with RF 3300			



Disposal

The product consists of materials which can be recycled, details of the used materials see chapter "Technical data - Mechanical data".

Recycling must be done by a specialised recycling company. Since the product is not subject to the WEEE directive 2002/96/EG, it is not permitted to bring it to a public recycling station.

Table of contents

	Page
Safety notes / Technical support	2

Introduction	3

Technical data	4

Approvals	9

Options / accessories	10

Mounting	11

Electrical installation	13

Settings	17

Signal output logic	18

Maintenance	19

Notes for use in Hazardous Locations	20

Disposal	21

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

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
 Germany

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

Introduction

Applications

Capacitive level limit switch for level monitoring in all types of containers and silos.

It can be used with powdery and granulated bulk materials with a dielectric constant of min. 1.6

A selection of fields of application:

- **Building materials industry**
lime, moulding sand, cement, etc.
- **Food industry**
milk powder, flour, salt, etc.
- **Plastics industry**
plastics granules etc.
- **Animal feed industry**
- **Chemical industry**
- **Mechanical engineering**

Function

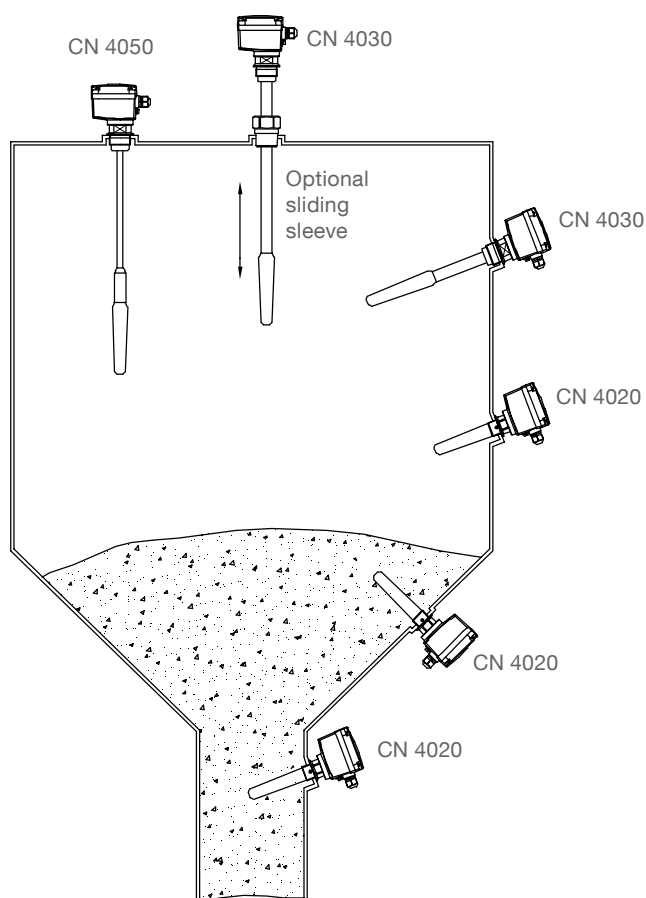
The Capanivo detects the capacitance around its probe. Due to the active shield technology it has an increased insensitivity to material buildup on the probe.

The measurement is nearly independent from the influence of the silo wall. Therefore factory provided precalibration allows measurement of most applications without calibration on site.

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

The length of the probe can be up to 3m (118") with an extension tube (CN 4030) or up to 6m (236") with an extension rope (CN 4050).

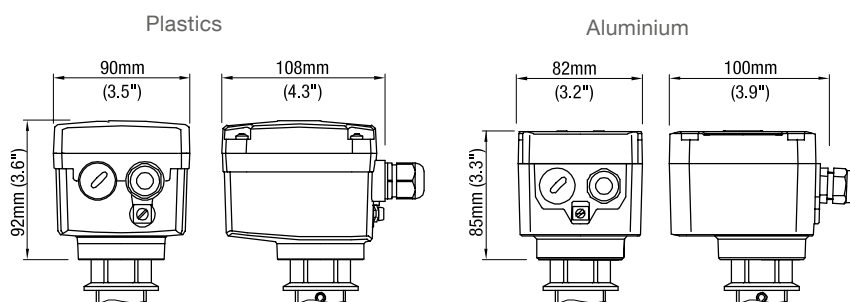
The use of a sliding sleeve is recommended so that the switch point can be changed easily during operation of the device.



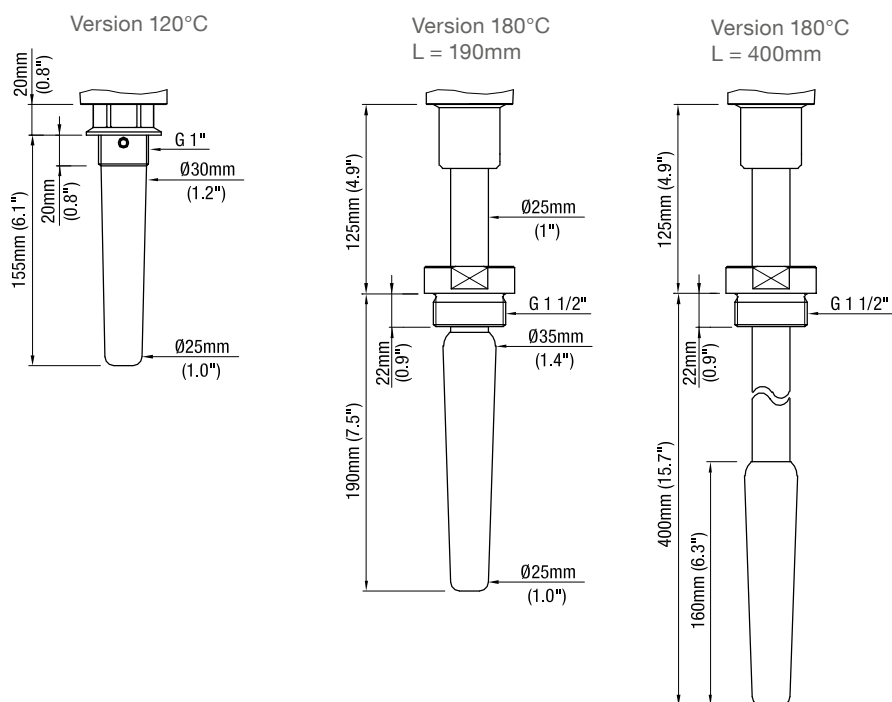
Technical data

Dimensions

Housing versions

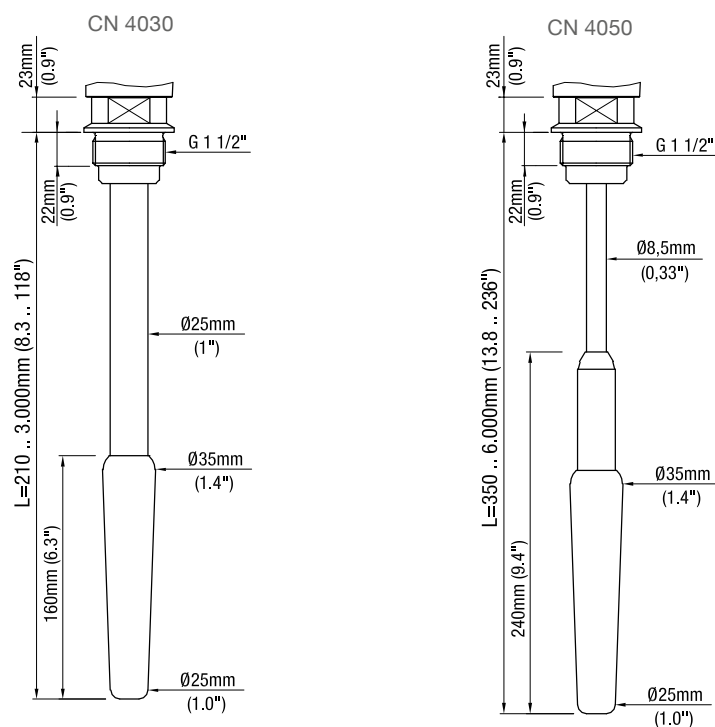


CN 4020



CN 4030

CN 4050



Technical data

Electrical data

Connection terminals	0.14 - 2.5mm ² (AWG 26-14)
Cable entry	M20 x 1.5 screwed cable gland NPT 1/2" or NPT 3/4" conduit connection Clamping range (diameter) of the factory provided cable glands: M20 x 1.5: 6 .. 12mm (0.24 .. 0.47")
Signal delay	Sensor free -> covered adjustable ca. 0,5 to 20 sec Sensor covered -> free adjustable ca. 0,5 to 20 sec
Safety operation (FSL,FSH)	Switchable for minimum or maximum safety
Sensitivity	Adjustable in 4 ranges
Overvoltage category	II
Pollution degree	2 (inside housing)

Electronics	Relay SPDT	Relay DPDT Universal voltage	PNP 3-wire
Power supply	21..27V DC ±10% (incl. 10% of EN 61010)	21..230V AC 50-60Hz 21..45V DC ±10% (incl. 10% of EN 61010)	20V..40V DC ±10% (incl. 10% of EN 61010)
Max. ripple of power supply	7 V _{ss}	7 V _{ss} at DC	7 V _{ss}
Installed load	max. 1.5W	max. 18VA / 2W	max. 0.5A
Signal output	Floating relay SPDT AC max. 250V, 3A non inductive DC max. 30V, 5A non inductive	Floating relay DPDT AC max. 250V, 8A non inductive DC max. 30V, 5A non inductive	Open Collector: permanent load max. 0.4A short-circuit and overload protected turn-on voltage: max. 44V (reverse protection)
Indicating light	Status of signal output by built-in LED	Status of signal output by built-in LED	Status of signal output by built-in LED
Isolation	Power supply to signal output: 2225 Vrms	Power supply to signal output: 2225 Vrms Signal output to signal output (DPDT): 2225 Vrms	-
Protection class	I	I	III

Technical data

Mechanical data

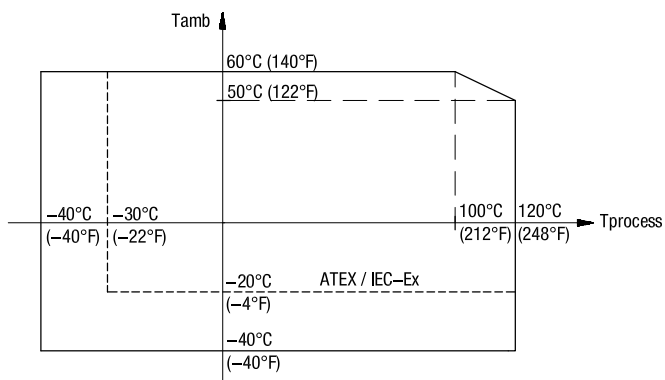
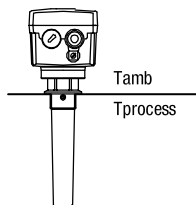
Housing	Plastics PA6 GF, RAL 5010 gentian blue or aluminium, powder coated, RAL 5010 gentian blue	
	Seal between housing and lid: NBR Seal between housing and process connection: NBR Nameplate: polyester film	
Degree of protection	IP 66 (EN 60529)	
Process connection and extension	CN 4020 version 120°C:	
	Material process connection / probe:	Plastics PPS (glass fibre reinforced) ⁽¹⁾ , FDA listed ⁽²⁾
	Thread:	G 1"
	Adapter (optional):	G1" to G 1½" in aluminium or 1.4305 (SS305) ⁽²⁾
	CN 4020 version 180°C:	
	Material process connection / extension:	1.4305 (SS303) ⁽²⁾
	Material probe:	Plastics PPS (glass fibre reinforced) ⁽¹⁾ , FDA listed ⁽²⁾
	Thread:	G 1½"
	CN 4030:	
	Material process connection / extension:	Aluminium or 1.4305 (SS303) ⁽²⁾
	Material probe:	Plastics PBT (glass fibre reinforced) ⁽¹⁾ , FDA listed ⁽²⁾
	Thread:	G 1½"
	CN 4050:	
	Material process connection:	Aluminium or 1.4305 (SS303)
	Material extension cable:	PE with black carbon
	Material probe:	Plastics PPS/PBT (glass fibre reinforced) ⁽¹⁾
	Thread:	G 1½"
	Flat gasket (included):	Material AFM30
⁽¹⁾ Discolouration is possible due to influence of UV and temperature. This has no negative effect to the material properties.		
⁽²⁾ Food grade		
Sound level	max. 40dBA	
Overall weight (ca.)	CN 4020 version 120°C:	
	CN 4020 version 180°C:	
	CN 4030 (aluminium extension):	0.5kg (1.1lbs) 1.8kg (4.0lbs)
	CN 4030 (stainless steel extension):	0.8kg (1.8lbs) + 0.8kg/m (1.8 lbs per 39.3") 1.5kg (3.3lbs) + 1.6kg/m (3.5 lbs per 39.3")
	CN 4050 (aluminium extension):	0.9kg (2.0lbs) + 0.25kg/m (0.55 lbs per 39.3")
	CN 4050 (stainless steel extension):	1.4kg (3.1lbs) + 0.25kg/m (0.55 lbs per 39.3")
Tolerance length "L"	CN 4020 version 120°C:	
	CN 4020 version 180°C :	
	CN 4030:	± 5mm (± 0.2") ± 10mm (± 0.4")
	CN 4050:	± 10mm (± 0.4") ± 15mm (± 0.6")

Technical data

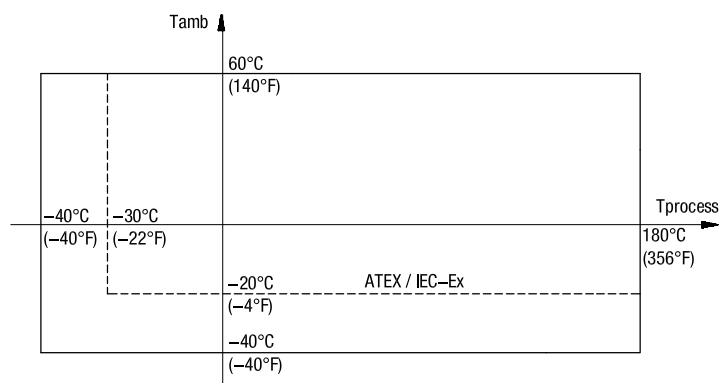
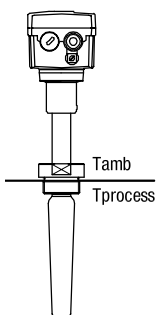
Operating conditions

Ambient and process temperature

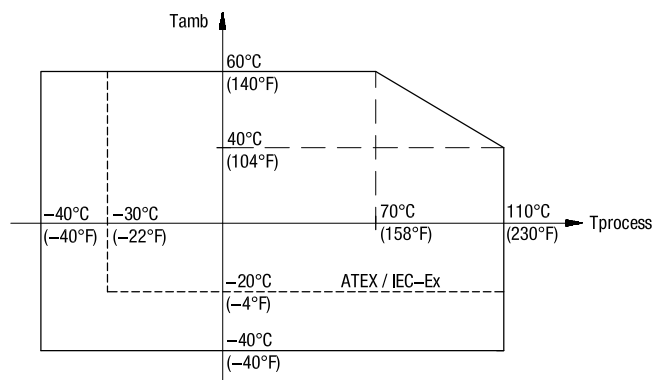
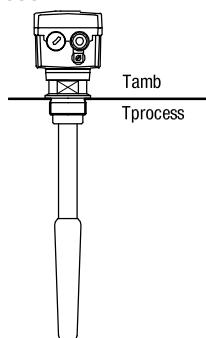
CN 4020
 version 120°C



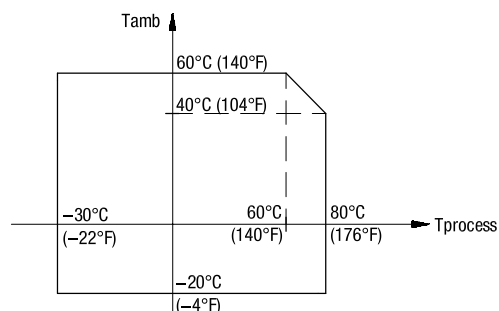
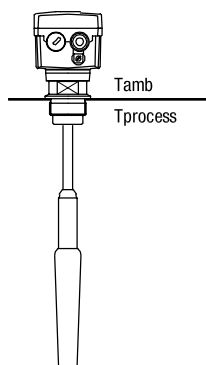
CN 4020
 version 180°C



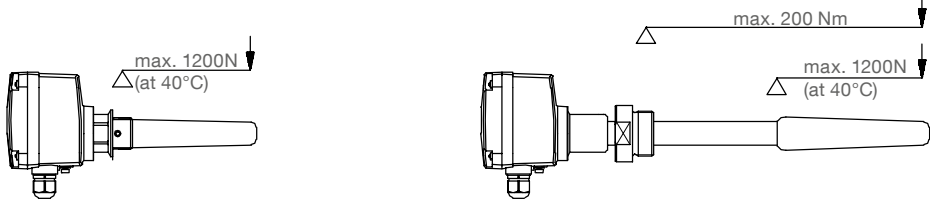
CN 4030



CN 4050



Technical data

Ventilation	Ventilation is not required	
Max. permitted mechanical torque	CN 4020 version 120°C	CN 4020 version 180°C CN 4030
		
	Recommended protection in case of high material load: mounting of a protective angle above the probe	
Max. tractive force	CN 4050	4kN
Max. process pressure	CN 4020 (Ausführung 120°C) CN 4020 (Ausführung 180°C) / CN 4030 CN 4050	25 bar (363psi) 16 bar (232psi) 6 bar (87 psi)
Vibration	1.5 (m/s ²) ² /Hz according to EN 60068-2-64	
Features of bulk material	Min. DK: 1.6 (dielectric constant, see external DK tables) Max. grain size: ca. 30mm	
Switching point	Material with high DK value -> the signal output switches when the probe is covered a few mm Material with low DK value -> the signal output switches, when the probe is covered a few cm	
Relative Humidity	0-100%, suitable for outdoor use	
Altitude	max. 2.000m (6.562ft)	
Expected product lifetime	Following parameters have a negative influence on the expected product lifetime: High ambient- and process temperature, corrosive environment, high vibration, high flow rate of abrasive bulk material passing the sensor element.	

Transport and Storage

Transport	Observe the instructions as stated on the transport packaging, otherwise the products may get damaged. Transport temperature: -40 .. +80 °C (-40 .. +176 °F) Transport humidity: 20 .. 85 % Transport incoming inspections must be carried out to check for possible transport damage.
Storage	Products must be stored at a dry and clean place. They must be protected from influence of corrosive environment, vibration and exposure to direct sunlight. Storage temperature: -40 .. +80 °C (-40 .. +176 °F) Storage humidity: 20 .. 85 %

Approvals

General Purpose (Ordinary Locations)	CE TR-CU	EN 61010-1	
Hazardous Locations *	CN 4020 / CN 4030:	ATEX: IEC-Ex: TR-CU:	II 1/2D Ex ta/tb IIIC T! Da/Db IP6x Ex ta/tb IIIC T! Da/Db Ex ta/tb IIIC T! Da/Db X
	CN 4050:	ATEX: IEC-Ex: TR-CU:	II 1/2D Ex ia/tb IIIC T! Da/Db IP6x Ex ia/tb IIIC T! Da/Db Ex ia/tb IIIC T135°C Da/Db X
EMC	EN 61326 -A1		
RoHS conform	According to directive 2011/65/EU		
Food grade material	According to directive 1935/2004/EC		
Pressure Equipment Directive (2014/68/EU)	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). The units are designed and manufactured in accordance to the Pressure Equipment Directive. The unit is NOT intended for use as an “equipment part with safety function (Art.1, Abs. 2.1.3). If the units should be used as „equipment part with safety function“ please contact the manufacturer.		

* Depending on selected version

Options / Accessories

Weather-protection-cover

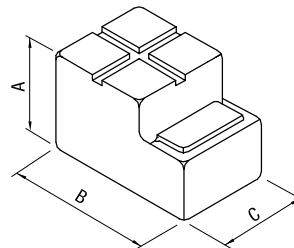
When the measuring device is used outdoor, the use of the weather-protection-cover is recommended. It protects the device from all atmospheric influences such as:

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

Material: PE, weathering and temperature stable

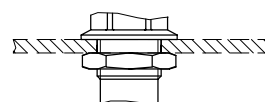


For use in Hazardous Locations: only permitted for Zone 22.



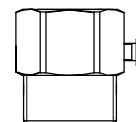
Hexagon nut

For mounting on a wall without a socket.
 Material: Aluminium or 1.4305 (303)



Sliding sleeve

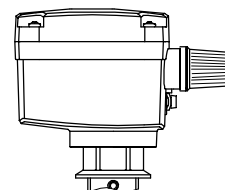
CN 4030 G1½" ISO 228
 Material: 1.4305 (303)
 Sealing material to the extension tube: FKM



Bulb

Bright indicating light seen from outside.

Not available for use in Hazardous Locations.

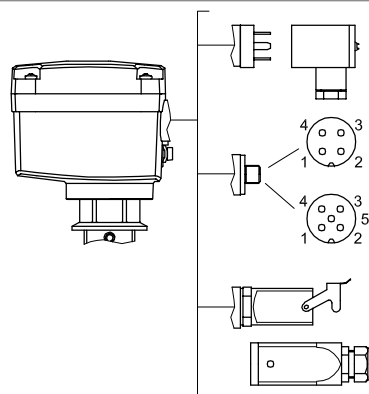


Plug

Used instead of cable gland.

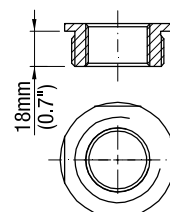
- Valve connector or
- M12 or
- Harting Han 4A

Not available for use in Hazardous Locations.



Adapter

G 1" to G 1 1/2" / NPT 1 1/4" / NPT 1 1/2"
 Material: Aluminium or 1.4305 (303)



Shortening kit

For CN4050 cable

Mounting

! General Safety Instructions

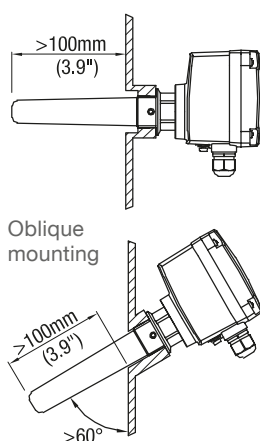
Process pressure	Improper installation may result in loss of process pressure.
Chemical resistance against the medium	Materials of construction are chosen based on their chemical compatibility (or inertness) for general purposes. For exposure to specific environments, check with chemical compatibility charts before installing.
Fastening of the threaded process connection	Mounting torque for the thread may not exceed 40Nm (metal thread) / 20Nm (plastic thread). Use a open-end wrench. Do not fasten by turning the housing, for this will destroy the unit.
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.

Mounting instructions

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. The housing can be rotated after installation.
Sealing	Ensure proper seal of the process thread in case of process pressure.

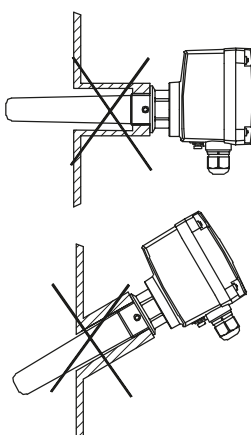
Distances of the probe

CORRECT
 Probe leads into the product

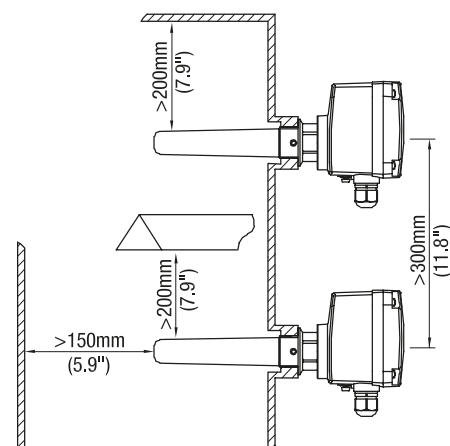


Observe mounting angle to ensure, that the active tip of the probe has enough distance to the metal silo wall

WRONG
 Socket too long

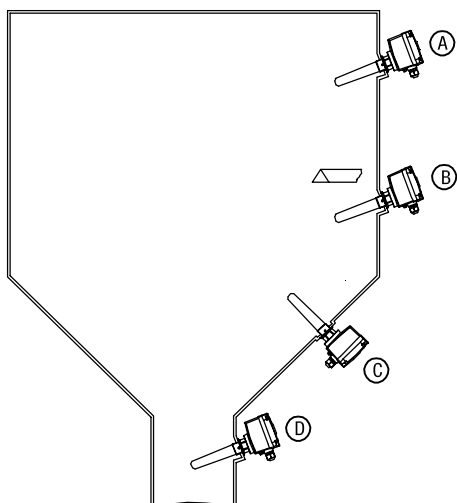


Observe min. distance between two sensors, to metal silo wall and to protective angle.



Mounting

CN 4020



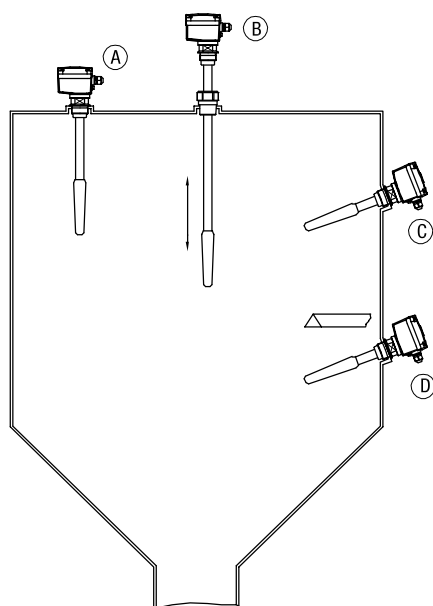
CAUTION

Observe:

- General distances of the probe (see page 11).
- Distance to material flow (filling).
- Max. permitted mechanical load (see page 8).
- Wearing due to abrasive bulk material.

- A** Full detector horizontal or oblique. Slight incline mounting helps remaining material to fall off more easily.
- B** Demand or empty detector horizontal or oblique. Slight incline mounting helps remaining material to fall off more easily. Protective angle recommended depending on load and abrasion of the material.
- C** Empty detector oblique from the bottom.
- D** Empty detector in the silo outlet.

CN 4030



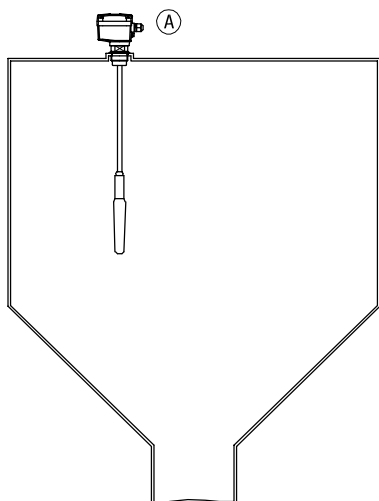
CAUTION

Observe:

- General distances of the probe (see page 11).
- Distance to material flow (filling).
- Max. permitted mechanical load (see page 8).
- Wearing due to abrasive bulk material.

- A** Full detector vertical.
- B** Full detector with sliding sleeve.
- C** Full detector horizontal or oblique. Slight incline mounting helps remaining material to fall off more easily.
- D** Demand or empty detector horizontal or oblique. Slight incline mounting helps remaining material to fall off more easily. Protective angle recommended depending on load and abrasion of the material.

CN 4050



CAUTION

Observe:

- Distance of the probe to the silo wall (see page 11). Consider that the hanging probe can move sideways with material.
- Distance to material flow (filling).
- Max. permitted mechanical traction (see page 8). Empty detector: Do not install in the center of the silo due to high traction with moving material.
- Wearing due to abrasive bulk material.

- A** Full, demand or empty detector vertical.

Electrical installation



General Safety Instructions

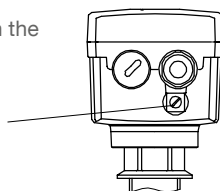
Handling	In the case of inexpert handling or handling malpractice the electric safety of the device cannot be guaranteed.
Protective earthing	Before any electrical installation, the device must be connected to the protective earthing terminal inside the housing.
Installation regulations	The local regulations or VDE 0100 (Regulations of German Electro technical Engineers) must be observed. With use of 24V supply voltage, an approved power supply with reinforced isolation to mains is required
Fuse	Use a fuse as stated in the connection diagram.
RCCB protection	In the case of a defect, the distribution voltage must automatically be cut off by a RCCB protection switch so as to protect the user of the device from indirect contact with dangerous electric tensions.
Power supply switch	A power-supply-disconnecting switch must be provided and marked near the device.
Wiring diagram	The electrical connections have to be made according to the wiring diagram.
Supply voltage	Compare the supply voltage applied with the specifications given on the electronic and name plate before switching the device on.
Cable gland / closing element	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 locked with a closing element.
Field wiring cables	<ul style="list-style-type: none"> • The diameter has to match to the clamping range of the used cable gland. • The cross section has to match with the clamping range of the connection terminals and consider the max. current. • All field wirings must have insulation suitable for at least 250V AC. • The temperature rating must be at least 90°C (194°F). • If higher immunity interferences as specified in the stated EMC standards are present (see chapter approval), a shielded cable is required, otherwise an unshielded instrumentation cable is satisfactory.
Connecting the terminals	Make sure that max. 8mm (0.31") of the pigtails are bared (danger of contact with live parts).
Guiding the cables in the terminal box	Cut the field wiring cables to appropriate length to fit properly into the terminal box.
Relay and transistor protection	Provide protection for relay contacts and output transistors to protect the device against spikes with inductive loads.
Protection against static charging	The unit must be grounded in any case to avoid static charging of the unit, especially on applications with pneumatic conveying.

Electrical installation

! Additional Safety Instructions for Hazardous Locations

External equipotential bonding terminal

Connect external terminal on the housing with equipotential bonding of the plant.



Cable glands and conduit system

- 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 applicable 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.

Commissioning

Commissioning only with closed lid.

Opening the lid

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

Electrical installation

Relay SPDT

Power supply:

21..27V DC $\pm 10\%^*$ 1,5W
 *incl. 10% of EN 61010

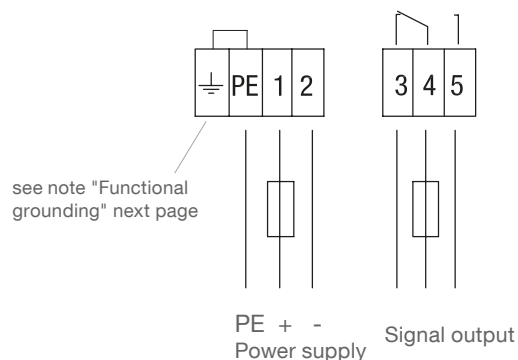
Fuse on power supply:
 max. 10A, fast or slow, HBC, 250V

Signal output:

Floating relay SPDT

AC max. 250V, 3A, non inductive
 DC max. 30V, 5A, non inductive

Fuse on signal output:
 max 5A, fast or slow, HBC, 250V



Relay DPDT

Universal voltage

Power supply:

21..230V 50-60Hz $\pm 10\%^*$ 18VA
 21..45V DC $\pm 10\%^*$ 2W
 *incl. 10% of EN 61010

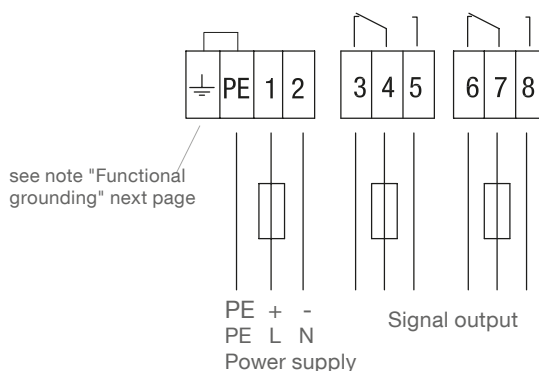
Fuse on power supply:
 max. 10A, fast or slow, HBC, 250V

Signal output:

Floating relay DPDT

AC max. 250V, 8A, non inductive
 DC max. 30V, 5A, non inductive

Fuse on signal output:
 max 10A, fast or slow, HBC, 250V



PNP

3-wire

Power supply:

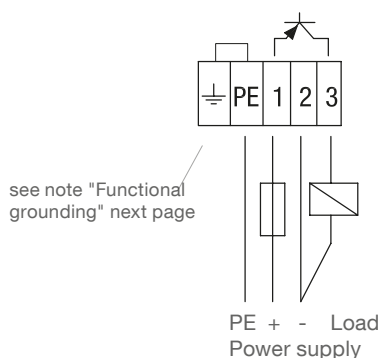
20 .. 40V DC $\pm 10\%^*$ 0.5A
 *incl. 10% of EN 61010

Fuse:
 max 4A, fast or slow, 250V, HBC

Signal output:

max. 0.4A

Load for example:
 PLC, relay, contactor, bulb



Approved power supply with reinforced insulation to mains is required

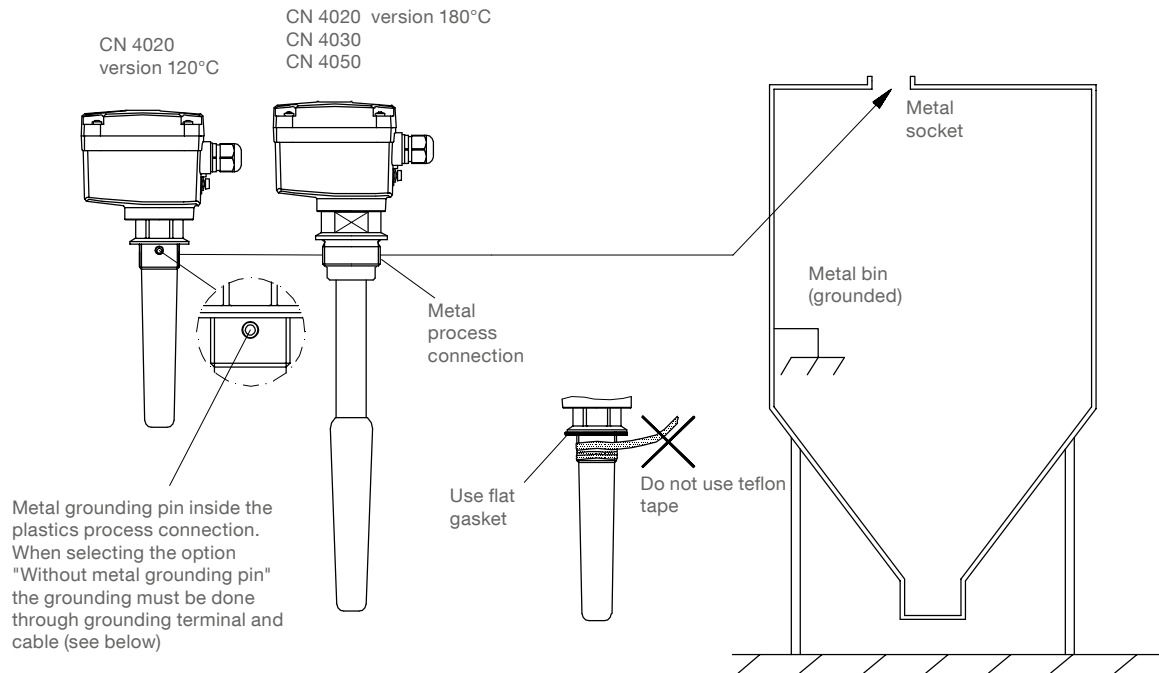
Electrical installation

Functional grounding

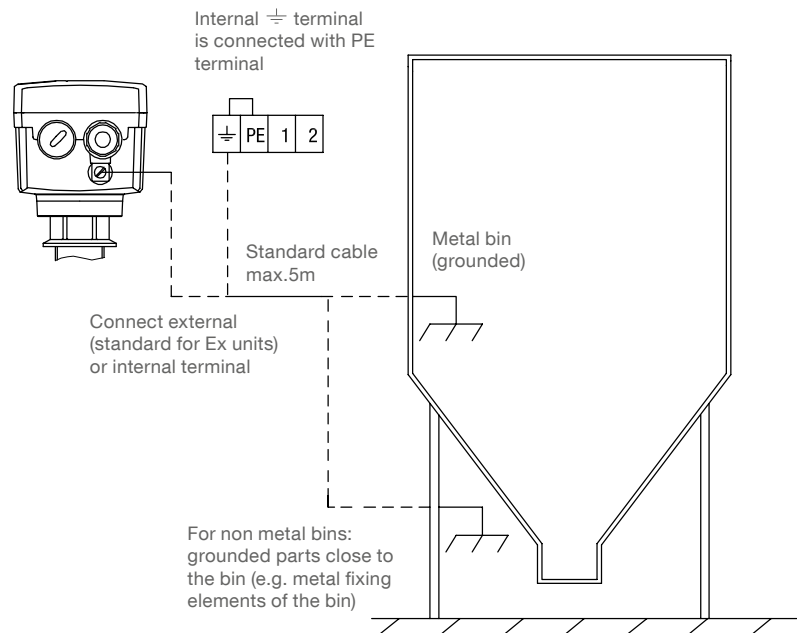
The unit must have connection to earth for proper functioning. This can be done by one of the following possibilities:

Grounding through process connection

CAUTION: This grounding alone is not enough for Ex applications.



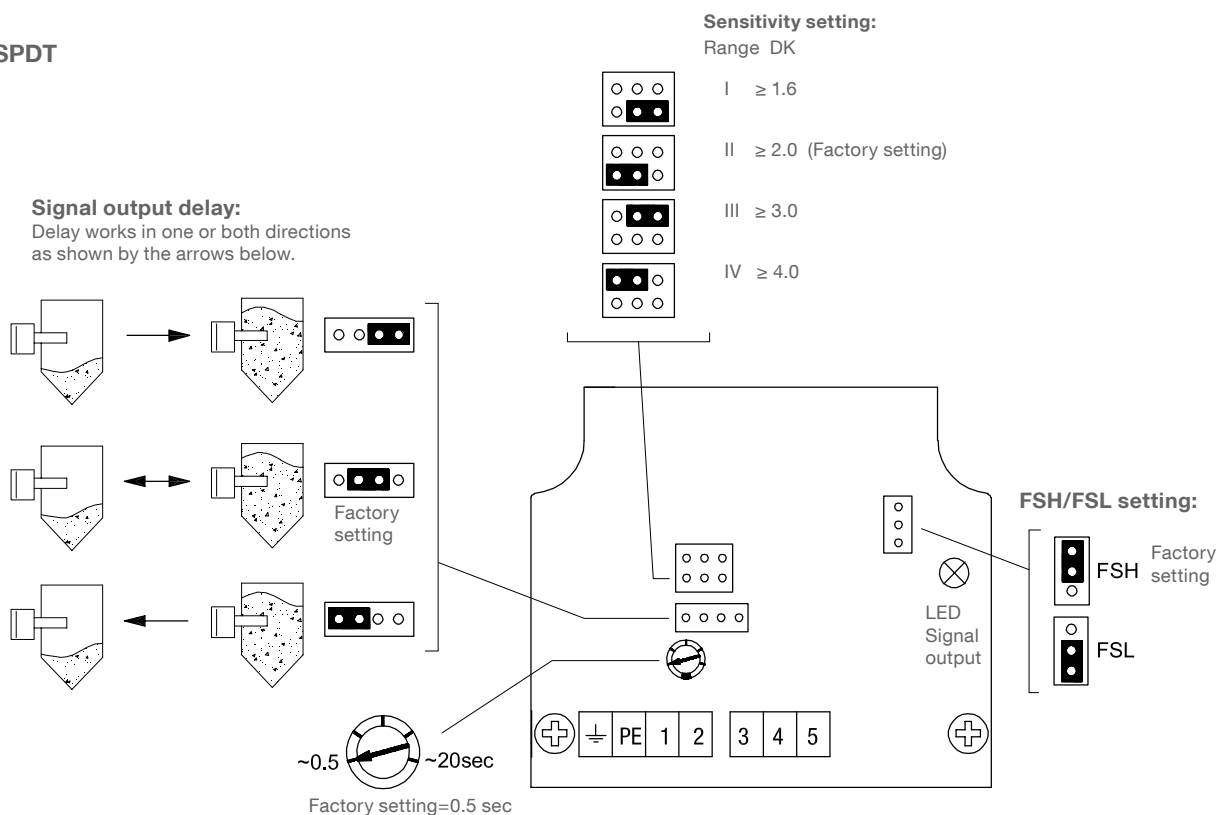
Grounding through grounding terminal and cable



Settings

Control elements

Relay SPDT

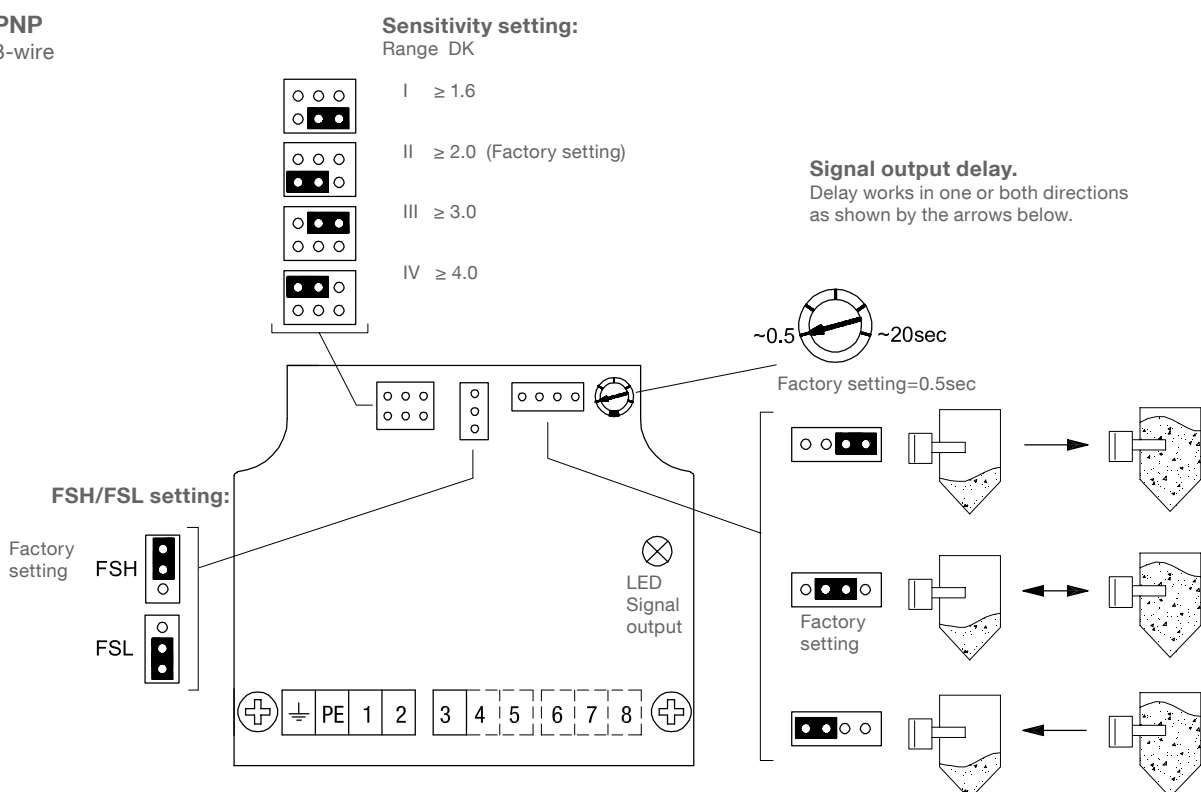


Relay DPDT

Universal voltage

PNP

3-wire



Settings / Signal output logic

Sensitivity setting

The units are factory set to Range II and do normally not need to be resetted on site.
 If required, the setting can be changed:

	Description	Required DK value	Possible material buildup
Range I	Max. sensitivity for low DK value	≥ 1.6	Low
Range II	Standard setting for most applications	≥ 2.0	Medium
Range III	Low sensitivity for high material buildup on the probe	≥ 3.0	High
Range IV	Min. sensitivity for very high material buildup on the probe	≥ 4.0	Very high

Signal output logic

FSH: Set in case of using the sensor as a full detector: Power failure or line break is regarded as "full" signal (protection against overcharging).

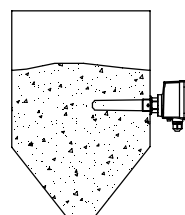
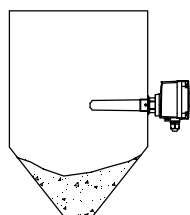
FSL: Set in case of using the sensor as an empty detector: Power failure or line break is regarded as "empty" signal (protection against running dry).

Signal output

Signal output

Setting	FSL	FSH
Relay SPDT		
Relay DPDT		
PNP		
LED „Signal output“		

FSL	FSH



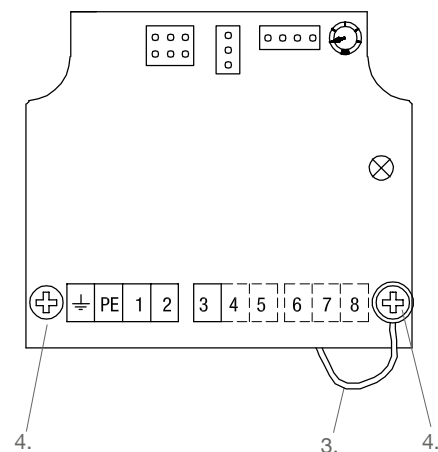
Maintenance

Opening the lid (cover)	<p>Before opening the lid for maintenance reasons observe following items:</p> <ul style="list-style-type: none"> • Do not remove the lid while circuits are alive. • No dust deposits or whirlings are present. • No rain can enter into the housing.
Frequent check of the unit	<p>To ensure durable safety in hazardous locations and with electrical safety, following items must be checked frequently depending on the application:</p> <ul style="list-style-type: none"> • Mechanical damage or corrosion of any components (housing side and sensor side) and of the field wiring cables. • Tight sealing of the process connection, cable glands and enclosure lid. • Properly connected external PE cable (if present).
Cleaning	<p>If cleaning is required by the application, following must be observed:</p> <ul style="list-style-type: none"> • Cleaning agent must comply with the materials of the unit (chemical resistance). Mainly the lid sealing, cable gland and the surface of the unit must be considered. <p>The cleaning process must be done in a way, that:</p> <ul style="list-style-type: none"> • The cleaning agent cannot enter into the unit through the lid sealing or cable gland. • No mechanical damage of the lid sealing, cable gland or other parts can happen. <p>A possible accumulation of dust on the unit does not increase the maximum surface temperature and must therefore not be removed for purposes of maintaining the surface temperature in hazardous locations.</p>
Function test	<p>A frequent function test may be required depending on the application.</p> <p>Observe all relevant safety precautions related with a safe work depending on the application (e.g. hazardous locations, hazardous bulk material, electric safety, process pressure).</p> <p>This test does not proof if the sensor is sensitive enough to measure the material of the application.</p> <p>Function test is done by touching the sensor part with appropriate means (e.g. grounded metal plate or hand) and monitor if a correct change of the signal output from uncovered to covered happens.</p>
Production date	<p>The production date can be traced by the serial number on the typeplate. Please contact the manufacturer or your local distributor.</p>
Spare parts	<p>All available spare parts are stated in the selection list</p>

Change of the electronic board:

- CN 4020** Deenergise device and secure against being switched on again.
 Before opening the lid take care, that the unit is clean and no water or dirt can enter into the housing.
1. Open the housing lid.
 2. Remove the field wiring cables.
 3. Remove the internal functional ground cable.
 4. Unscrew the two fastening screws of the electronic board.
 5. Take out the electronic board.
 6. Remove the plug to the probe.
 7. Connect the plug to a new electronic board.
 8. Insert the new electronic board and tighten fastening screws.
 9. Connect the functional ground cable and the field wire cables.
- Calibration is not required.

- CN 4030** For these types a non changeable electronic is located inside the probe. Please return defective units to the manufacturer.
- CN 4050**



Notes for use in Hazardous Locations

Zone classification

	Usable in zone	ATEX category	IEC-Ex Equipement Protection Level (EPL)
Dust applications	20, 21, 22	1 D	Da
	21, 22	2 D	Db
	22	3 D*	Dc

* in case of conductive dust additional demands for the installation are possible.

General Notes

Marking

Devices with Ex approval are marked on the name plate.

Process pressure

The device construction allows process over-pressure upto 6/16 bar (87/232psi) (see name plate). These pressures are allowed for test purposes. The definition of the ATEX / IEC-Ex is only valid for a container-over-pressure between -0.2..+0.1 bar (-2.9..+1.45psi). For higher or lower pressures the approval is not valid.

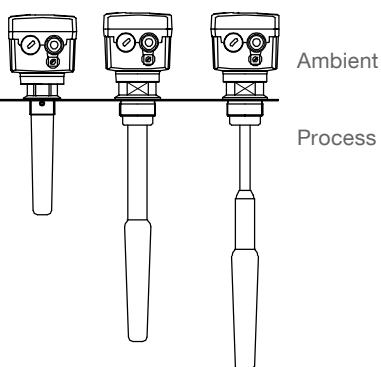
Process and ambient temperature

The permitted temperature ranges are marked on the name plate. Observe derating curves.


Permitted zones (categories) for mounting in partition wall

EPL (IEC-Ex)	Db
Category (ATEX)	2D
Zone	21

EPL (IEC-Ex)	Da
Category (ATEX)	1D
Zone	20



Max. Surface Temperature

The temperature marking on the name plate  refers to the instruction manual. On the following tables the relevant temperature ratings are shown. The maximum surface temperature is the hottest temperature of the unit which could occur during malfunction (according to Ex-definition).

Version CN 4020 120°C / CN 4030 / CN 4050:

Max. ambient temperature*	Max. process temperature*	Max. surface temperature
60°C (140°F)	CN 4020: 120°C (248°F) CN 4030: 110°C (230°F)	120°C (248°F)
	CN 4050: 80°C (176°F)	135°C (275°F)

* Observe derating (see page 7)

Version CN 4020 180°C:

Max. ambient temperature	Max. process temperature	Max. surface temperature
60°C (140°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)

Disposal

The product consists of materials which can be recycled, details of the used materials see chapter "Technical data - mechanical data".

Recycling must be done by a specialised recycling company. Since the product is not subject to the WEEE directive 2002/96/EG, it is not permitted to bring it to a public recycling station.

Table of contents

	Page
Introduction	2

Technical data	3

Mounting	4

Electrical connection	5

Adjustment	6

Switching logic	6

Maintenance	8

Error search	8

Subject to technical change and price change.

All dimensions in mm (inches).

We assume no liability for typing errors.

Different variations to those specified are possible.
 Please contact our technical consultants.

Introduction / Function

Introduction

Fields of application

The unit is used for level monitoring of electrical conductive liquids, muds etc. in all kinds of containers.

Type KN 2700: 1 point level limit switch
 Type KN 2800: 2 point level limit switch

Due to the robust design of the measuring bar, the unit may resist strong mechanical loads.

Use in oily and greasy liquids is not recommended, for this may cause an isolating coat on the measuring bar.

Due to the use of alternate current in the electrical measuring circuit, corrosion and electrochemical reaction is avoided.

Applications

Building materials industry

mortar, mud, concret etc.

Chemical industry

asic, alkaline solution etc.
 (as far as 1.4301, PE, PUR is resistant)

Enviromental technologie

water level , sewage etc.

Approvals

CE	EMC	EN 61326 / A1
	Electrical Safety	EN 61010-1

Function KN 2700

The conductive probe is screwed into the lateral container wall, so that it is level with the filling height to be registered and monitored. Due to the incline measuring bar, the sliding of material from the bar will be increased.

The probe is detecting a liquid by measuring its conductivity. The conductivity between the front of the measuring bar and the container wall will be measured.

Standard in every unit is a signal output delay, which can be adjusted. This causes a secure measurement in moving liquid surfaces.

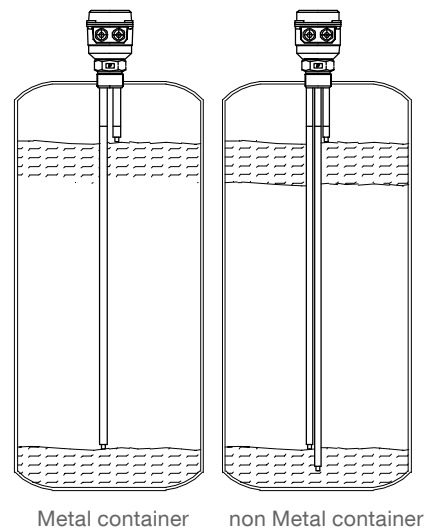
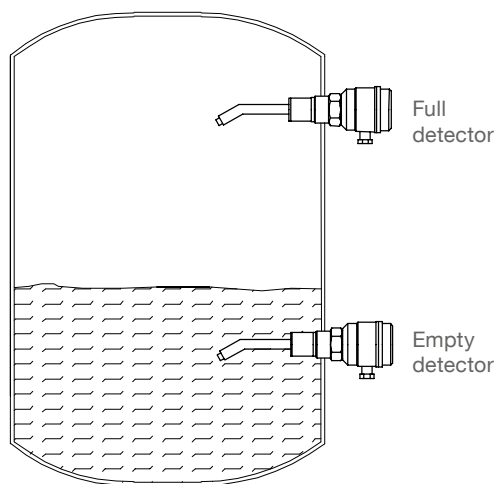
Function KN 2800

The conductive probe is screwed into the upper container wall. The ends of the measuring bars are level with the filling heights to be registered and monitored.

The probe is detecting a liquid by measuring its conductivity.

The conductivity between the end of the measuring bars and the container wall (2 bar unit) or the ground-bar (3 bar unit) will be measured.

If the liquid level is higher than the maximum-bar, the output signal signs „full“, if it is lower than the minimum-bar, it signs „empty“.
 If the level is between the bars, the output signal remains on the last state.



Technical data

Dimensions

For detailed dimensions see price list

Mechanical data

Housing:	Aluminium diecast housing RAL 5010 gentian blue
Enclosure:	IP 66 to EN 60529
Screwed piece: Material:	Stainless steel 1.4301/304; 1.4305/303 Isolation PE / PUR
Width across:	50mm
Thread:	G 1 1/2" ISO 228 NPT 1 1/2" conical ANSI B1.20.1
Overall weight:	approx. 1.2 kg
Options:	Weather protection cover

Operating conditions

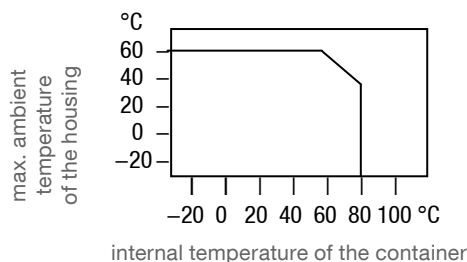
Operating temperatures:	see drawing below
-------------------------	-------------------

Features of material: Conductive material, which has no strong propensity to cake or deposit and leave no coat of oil or grease on the measuring bar

max. Probe load: KN 2700: max. 500N laterally (at the front of the bar)
 KN 2800: max. 100Nm laterally

max. Container pressure: 0.8 bar

in case of high mech. loading: Mounting of an protective angle above the probe



Electrical data

Mains voltage:	alternative 220-240V / 110-120V / 42V / 24V +10% -15% 50/60 Hz
	20V - 30V DC max. ripple: 7 VSS
Installed load:	max. 2 VA AC max. 2W DC
Connection terminal:	max. 2.5mm ²
Screwed cable gland:	M20x1.5 cable gland NPT 1/2" conduit
Signal output:	potential-free relay point: AC max. 250V, 2A, 500VA at cosφ = 1 DC max 300V, 2A, 60W
Switch status display:	by built-in LED
Signal delay:	probe free -> covered approx. 0.5 sec. probe covered -> free adjustable approx. 0.5..6 sec. (only KN 2700) (other times on request)
Safety operation:	to be switched over for (FSL, FSH) minimum / maximum security
Sensitivity:	continuously variable setting range I (5k) approx. 500 - 4500W range II (50k) approx. 0.5 - 50kW range I and II switchable
Measuring voltage:	approx. 6V / 60 Hz potential-free to mains voltage Isolating 3kV DC
Isolating:	Mains voltage to signal output: 3kV~
Protection class:	I

Mounting

Mounting KN 2700

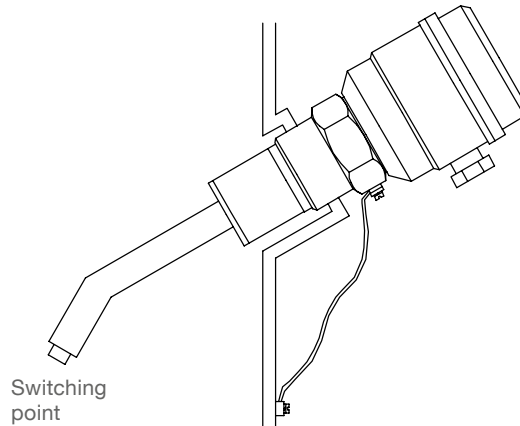
For optimal function, connect the external terminal of the probe with a wire to the container wall. This is especially recommended, if there is no lasting electrical connection between the thread of the probe and the container wall.

To screw the device in, use a 50mm open-end wrench (do not turn the housing).

The screwed cable gland must face downwards. This ensures that,

- a.) no water enters into the housing through the screwed cable gland
- b.) the front of the measuring bar faces downwards, to improve the sliding of material from the bar

To improve furthermore the sliding of material from the bar, it is possible to mount the probe in an oblique position (upto 30°).



Mounting KN 2800

Extend the measuring bars to the desired length.

Make sure, that ground bar, maximum bar and minimum bar are not interchanged (see picture).

To screw the device in, use a 50mm open-end wrench (do not turn the housing).

Make sure that the screwed cable gland safely seals the cable and that it is tight (danger of water intrusion).

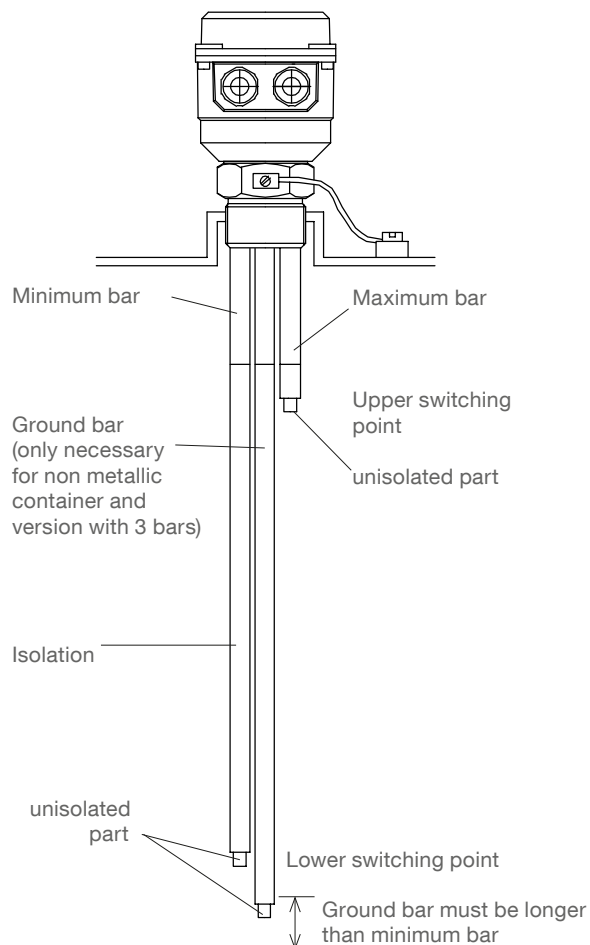
- Make sure, that no conductive material can rest between
- the unisolated parts of the measuring-bars and the container wall
 - between the unisolated parts of the measuring-bars.
- This may cause malfunction.

For metal container wall:

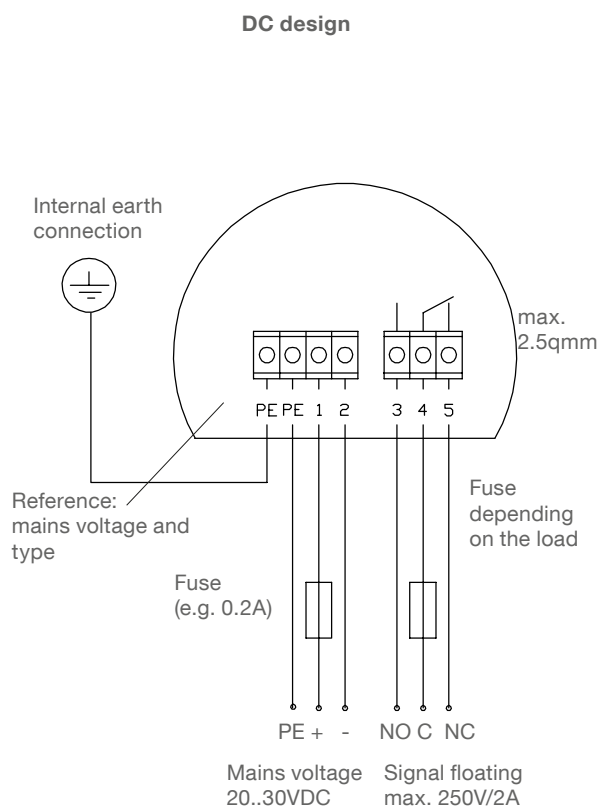
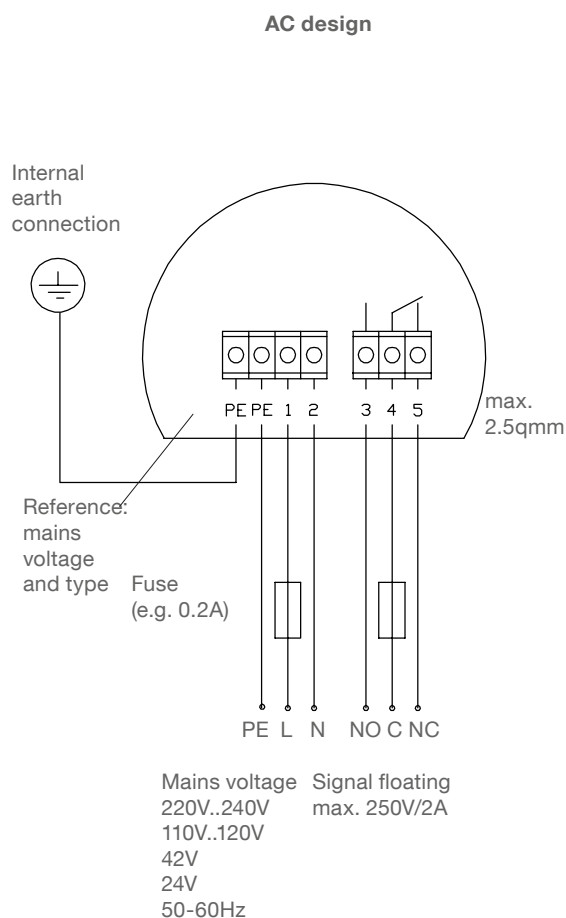
Ground bar is not necessary (version with 2 bars). For optimal function connect the external terminal of the probe with a wire to the container wall. This is especially recommended if there is no lasting electrical connection between the thread of the probe and the container wall.

For non metal container wall:

Ground bar is necessary. It should be longer than the minimum bar. An electrical connection between the external terminal of the probe and the container wall is not necessary.



Electrical connection



Safety instructions

For terminal connection of the device the local regulations or VDE 0100 (Regulations of German Electrotechnical Engineers) must be observed

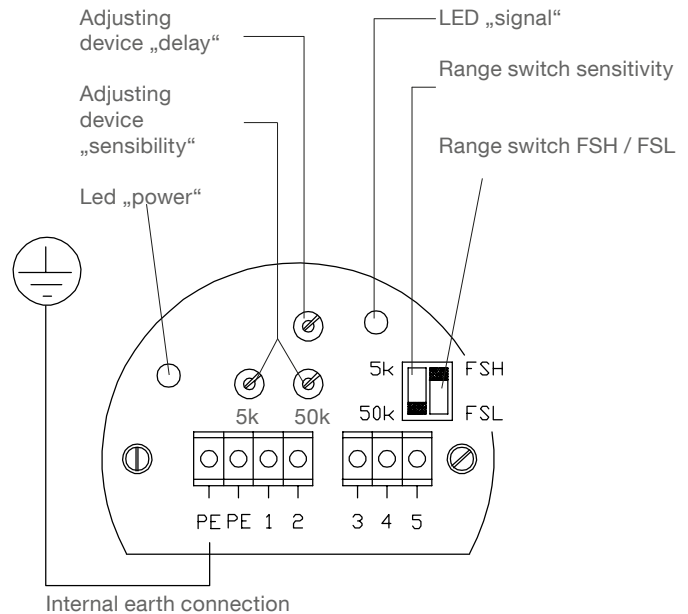
- Provide protection for relay contacts and output transistors to protect the device against spikes with inductive loads.
- Compare the mains voltage applied with the specifications given on the electronic module before switching the device on.
- Make sure that max. 8mm of the pigtailed are bared (danger of contact with live parts).
- Make sure that the boots for protecting cable terminations are not longer than 8mm (danger of contact with live parts).
- Make sure that the screwed cable gland safely seals the cable and that it is tight (danger of water intrusion).
- A voltage-disconnecting switch must be provided near the device.
- In the case of inexpert handling or handling malpractice, the electric safety of the device cannot be guaranteed.
- In the case of a defect, the distribution voltage must automatically be cut off by a RCCB protection switch to protect the user of the device from indirect contact with dangerous electric tensions.

Adjustment / Switching logic

Adjustment

- LED „power“: permanent „on“ with mains voltage
- LED „signal“: „on“ if relaiscoil is idle
- Adjusting device „delay“: adjustment of signal output delay if the probe gets free (covered -> free). (only KN 2700) (delaytime approx. 0.5 .. 6 sec.)
- Range switch and adjusting device „sensitivity“: adjustment to the conductivity of the measured liquid
- strong conductivity liquid:
 range switch 5k -> adj. device 5k
- less conductivity liquid:
 range switch 50k -> adj. device 50k
- adjustment device:
 left stop position -> less sensitivity
 right stop position -> more sensitivity

Adjust the sensitivity in the way that a secure switching by covering and getting free of the probe is guaranteed. If a deposit of the liquid on the measuring bar of the probe is expected, adjust the probe more in the direction „less sensitivity“.



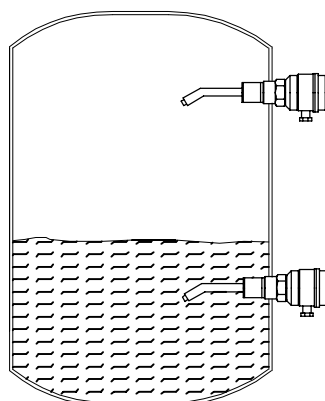
Switching logic KN 2700

Switch FSL / FSH:

Switch between maximum- and minimum-safety level.

If the probe is used to indicate full load:
 -> set to maximum safety level FSH
 Power failure or line break is regarded as „full“ signal (protection against overcharging).

If the probe is used to indicate empty load:
 -> set to minimum safety level FSL
 Power failure or line break is regarded as „empty“ signal (protection against running dry).



FSL	FSH	
		Relay output
		LED „signal“

FSL	FSH	
		Relay output
		LED „signal“

Switching logic

Switching logic KN 2800

Range switch FSL / FSH: see remarks at „switching logic KN 2700“

	= Relais output
	= LED „signal“

FSH									
FSL									
	Level is rising			Level is falling			State after „power on“		
							power failure		

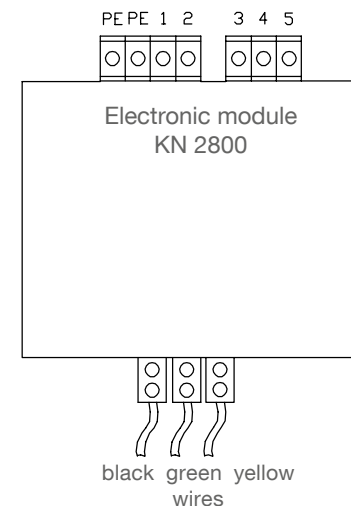
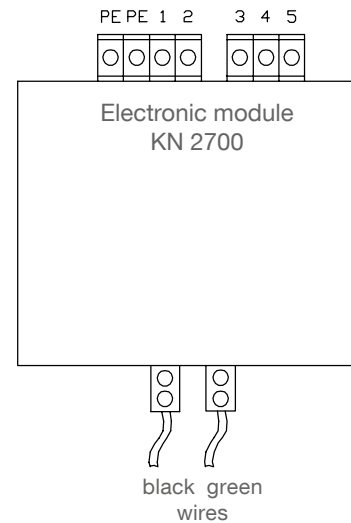
Maintenance / Error search

Maintenance

Normally the device requires no maintenance. However, in extreme fields of application like the industry of building materials occasional cleaning of the probe is recommended.

Changing the electronic module

1. Open the housing lid and remove the pigtails from the device.
2. Disconnect internal wire for earth connection from terminal PE.
3. Unscrew the two fastening screws of the electronic module.
4. Pull out electronic module.
5. Remove wires from the electronic module.
6. Connect wires to the new electronic module (see figure right hand).
7. Insert new electronic module.
8. Fix internal wire for earth connection to terminal and screw down the fastening screws. Connect the pigtails to the device.
9. Adjust the probe.



Error search

If the probe does not work satisfactory check following items:

1. Is there a conductive coat between the front of the measuring bar and the container wall?
if yes, clean the probe or decrease the sensitivity
2. Is there a non conductive coat at the front of the measuring bar (oil, grease)?
if yes, clean the probe or increase the sensitivity
3. Is the sensitivity adjusted so the probe switches if it gets free and covered?
if not, adjust the sensitivity

If point 1 to 3 are failing:

4. Remove the probe from the container and clean it. Cause a short circuit between the front of the measuring bar and the thread. Does the signal output switch?
if no, probe is defect
if yes, contact manufacturer

Table of contents

	Page
Function / Dimensions	2

Technical data	3

Electrical connection, switching logic	4

Measurement procedure	6

Manual motor operation	10

Commissioning, mounting, safety instructions	11

Subject to technical change and price change.

We assume no liability for typing errors.

All dimensions in mm (inches).

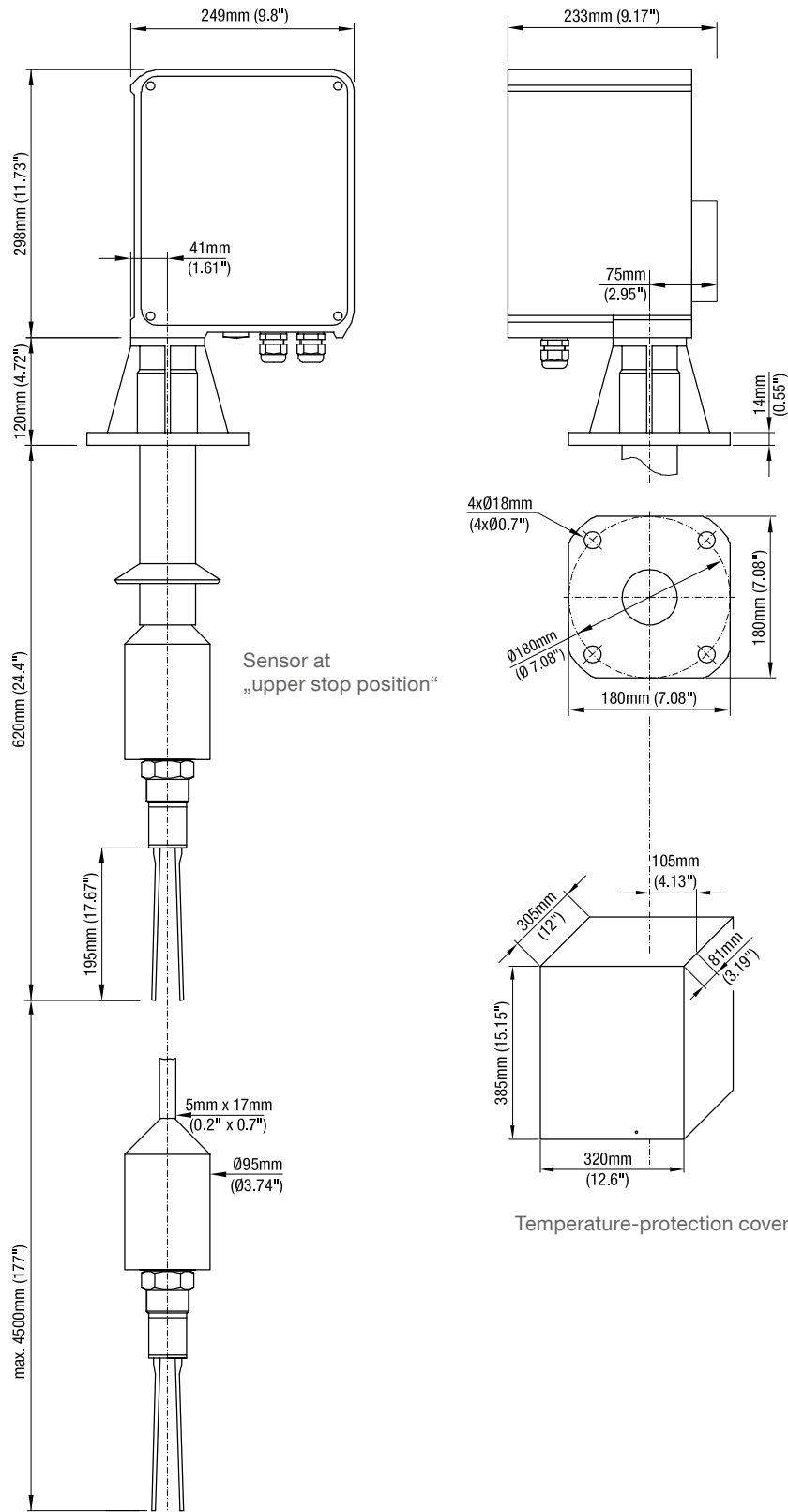
Different variations to those specified are possible.
Please contact our technical consultants.

Function / Dimensions

The unit can be used to measure the presence or absence of bulk material on a variable level. It is designed to be connected to a PLC, which is not part of the delivery.

Measurement principle:

A motor drives the sensor down to a desired level. An incremental or analogue encoder states the height of the sensor. When the bulk material reaches the sensor, an output signal is actuated.



Technical data

Mechanical data

Housing:	Aluminium RAL 5010 gentian blue
Enclosure:	IP 66 to EN 60529
Process connection:	Flange similar to DN 100 PN16 Aluminium, black
Overall weight:	approx. 17kg
Material in process:	Ribbon cable: PVC, high resistance Vibrating fork: 1.4571 / 314 Vibrating fork cover: PVC
Deviation of vertical mounting:	max. 2° out of the vertical
Pressure connection:	Quick coupling including opposite part, for hose diameter 9mm; max. operation pressure: 0.2bar

Operating conditions

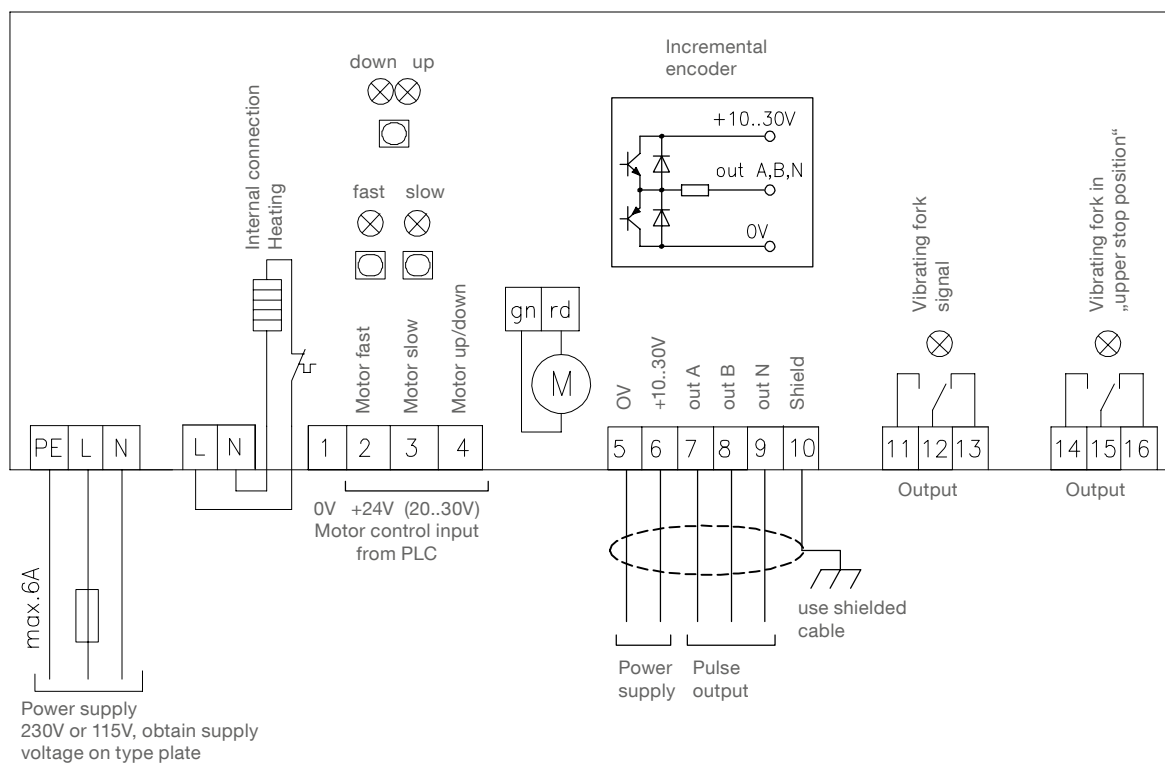
Incremental encoder:	Resolution: 1 pulse per mm sensor movement Overall accuracy of measurement ca. 5mm
Analogue 4-20mA encoder:	Resolution: 12 bit over 4500mm sensor movement Overall accuracy of measurement ca. 10mm
Accuracy of sensor:	Vibrating fork ca. 5 .. 20mm (depending on the application and the bulk material)
Measuring range:	620 .. max. 5120mm (see drawing)
Sensor speed (motor):	Motor fast (up and downwards): ca. 80-180mm/s Motor slow (downwards): ca. 20-40mm/s
Process pressure:	-0.3..+0.3 bar
Process and ambient temperature:	0°C .. 60°C -20°C .. 60°C with optional temperature-protection cover

Electrical data

Supply voltage:	230V 50-60Hz or 115V 50-60Hz both voltages +10% / -15%
Installed load:	130 VA (incl. heating)
Connection terminal:	max. 2.5mm.
Cable entry:	2 x M25 x 1.5 + 1 closing element for cable diameter 9-14 mm 3x NPT 1/2" conduit connection 3x NPT 3/4" conduit connection
Incremental encoder:	Power supply: 10-30V DC, max. 70mA Pulse output: A, B, N push-pull, max. 40mA load H-Level: > Supply voltage -2.5V L-Level: < 2.5V Cable length: max. 100m
Analogue 4-20mA encoder:	Power supply: 17-30V DC, max. 50mA 4-20mA output, active Cable length: max. 50m
Signal outputs:	„Vibrating fork signal" and "Vibrating fork in upper stop position": Floating relais contact max. 250V AC, 2A, 500VA
Control Inputs:	"Motor up", "Motor down" and "Motor fast/slow": Optocoupler 20-30V DC, max. 10mA each
Protection class:	I
Heating:	Included, thermostat controlled

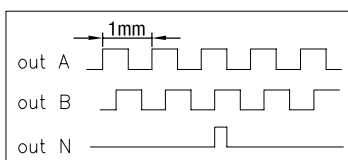
Electrical connection / Switching logic

Incremental encoder



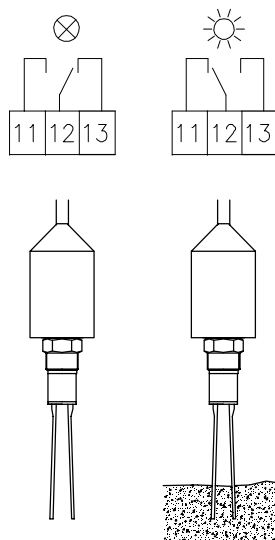
Pulse output diagram:

Shown when sensor moves upwards

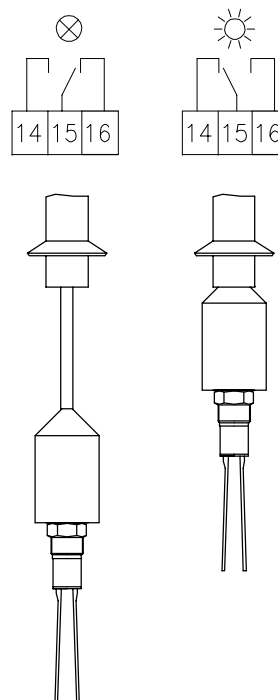


When rotation of the incremental encoder changes direction the signal of A and B is inverted.

Switching logic: Vibrating fork signal

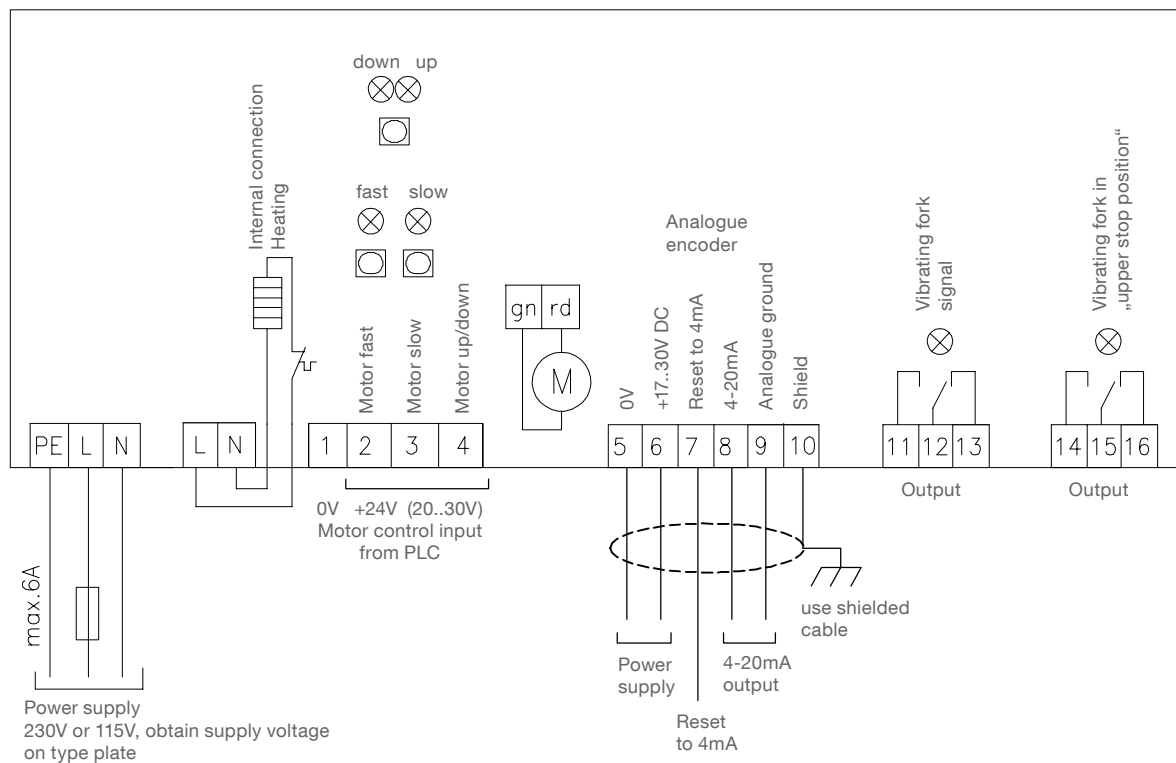


Switching logic: Vibrating fork in „upper stop position“

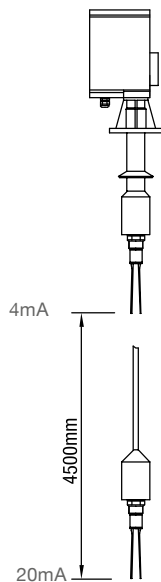


Electrical connection / Switching logic

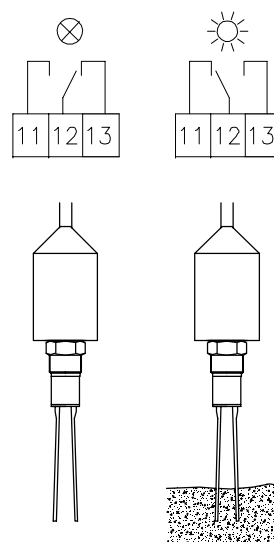
Analogue 4-20mA encoder



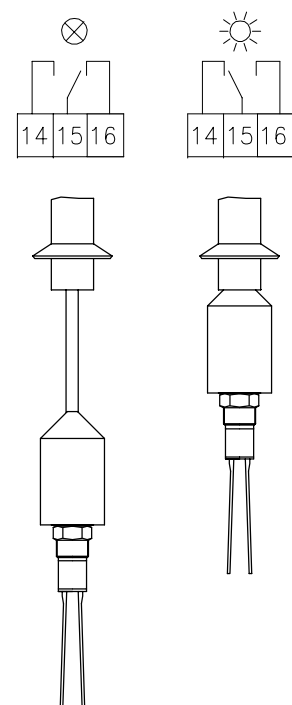
4-20mA output



Switching logic: Vibrating fork signal

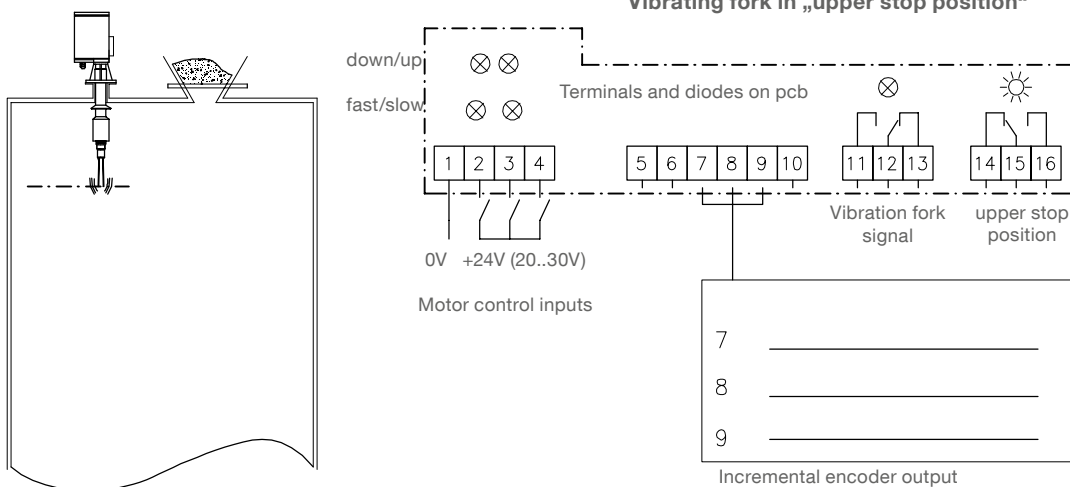


Switching logic: Vibrating fork in „upper stop position“

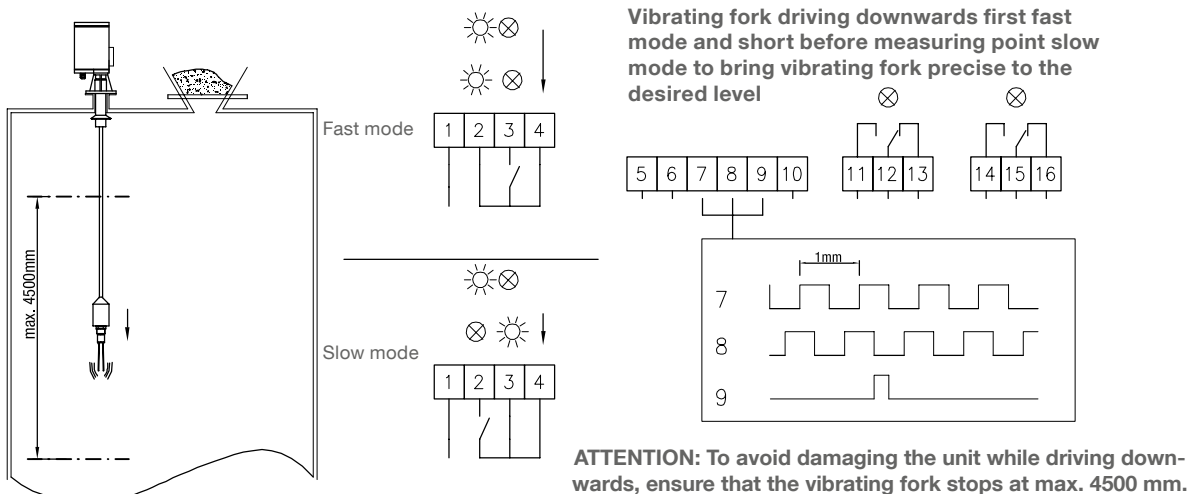


Measurement procedure - Incremental encoder

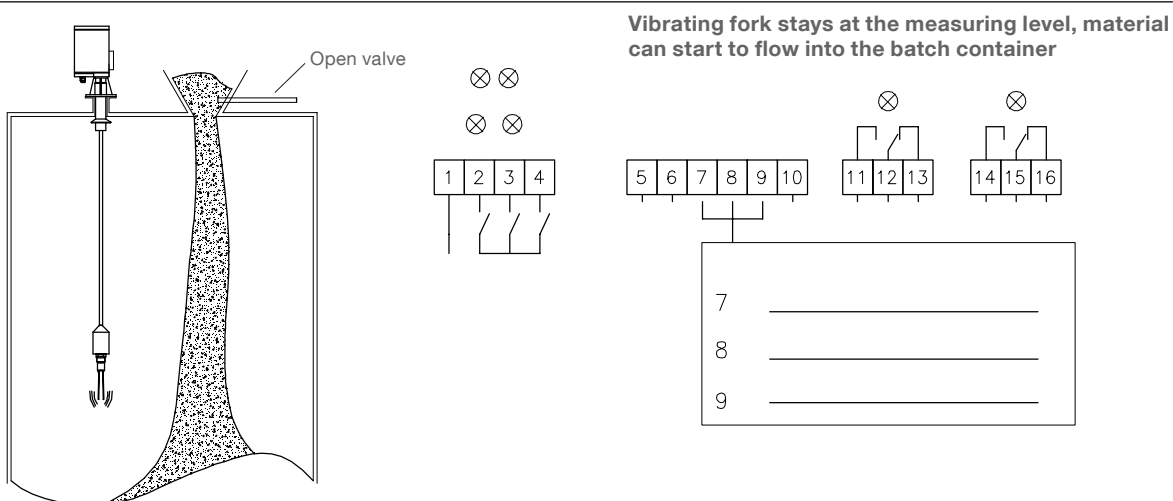
1.



2.

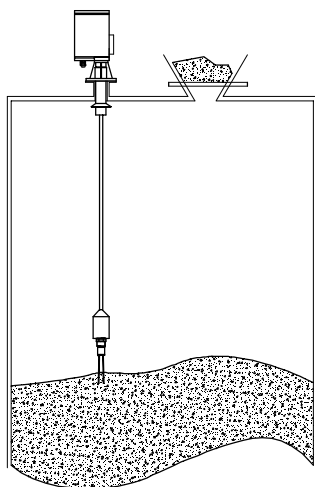


3.

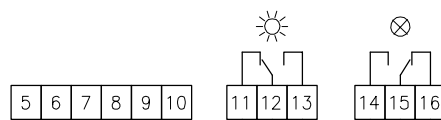
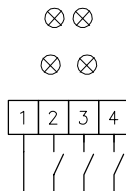


Measurement procedure - Incremental encoder

4.

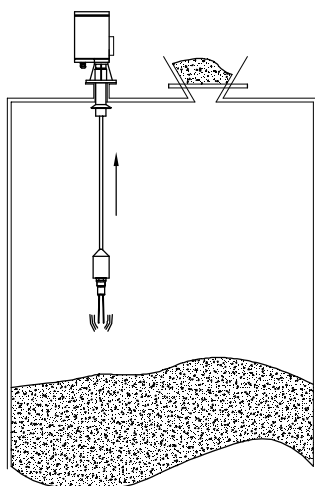


Vibrating fork detecting material

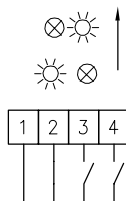


7	_____
8	_____
9	_____

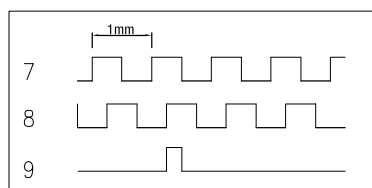
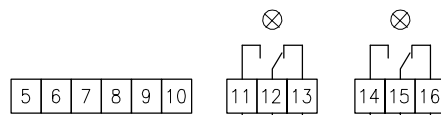
5.



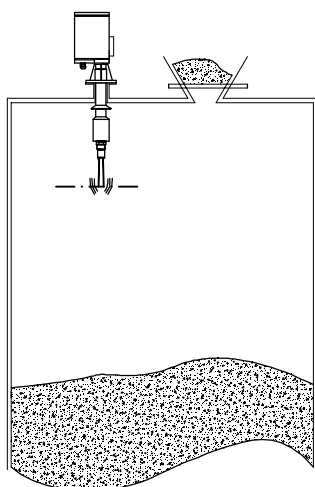
Fast mode



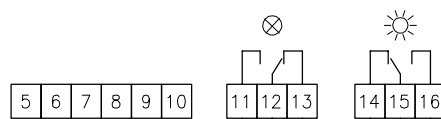
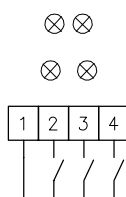
Vibrating fork goes back up after completing the measurement



6.



Vibrating fork has reached the „upper stop position“

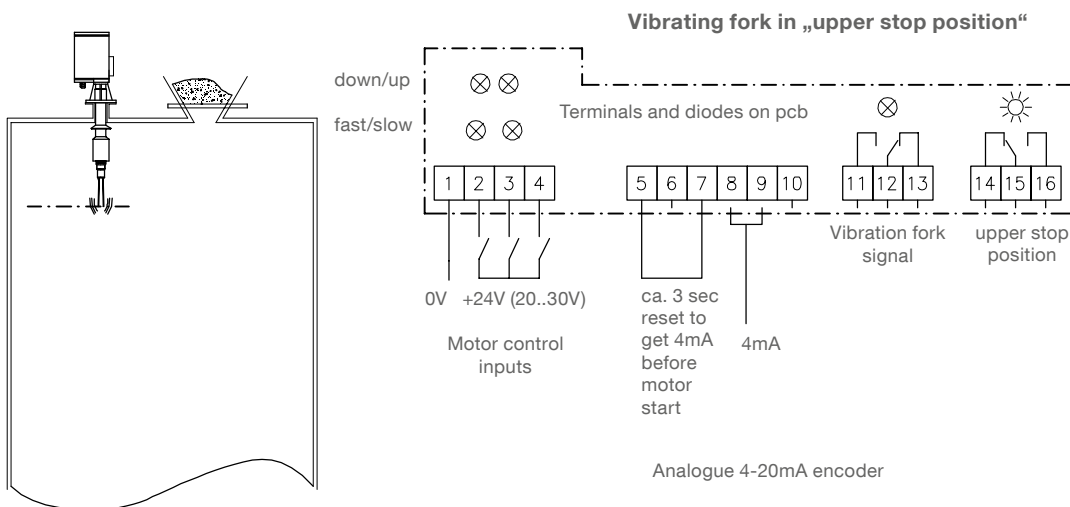


7	_____
8	_____
9	_____

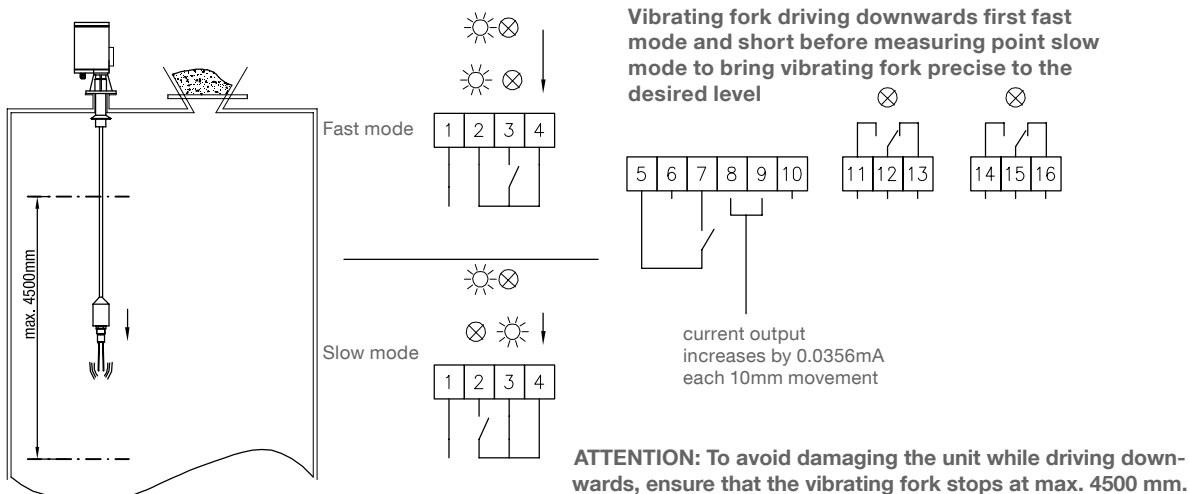
ATTENTION: Before starting next measurement, ensure that PLC counter is set to zero for reference

Measurement procedure - Analogue 4-20mA encoder

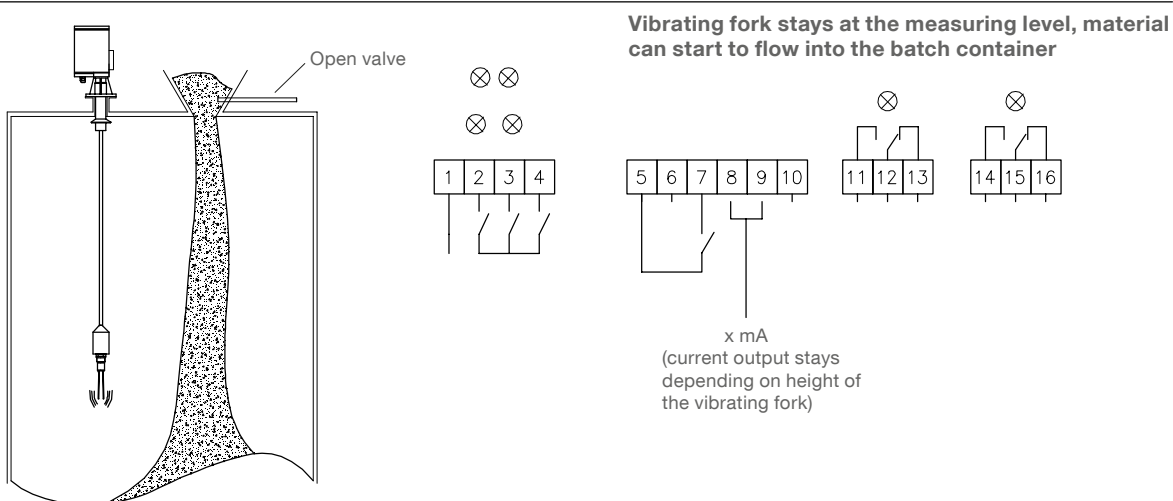
1.



2.

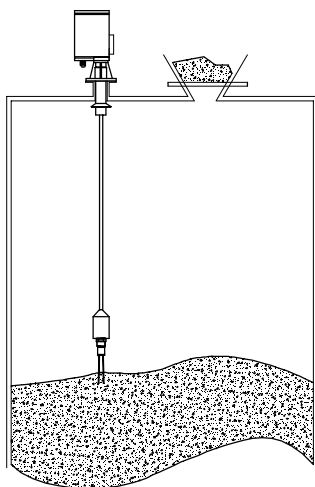


3.

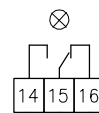
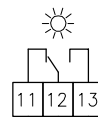
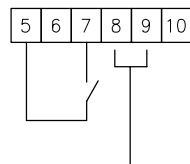
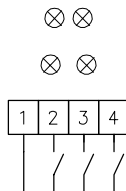


Measurement procedure - Analogue 4-20mA encoder

4.

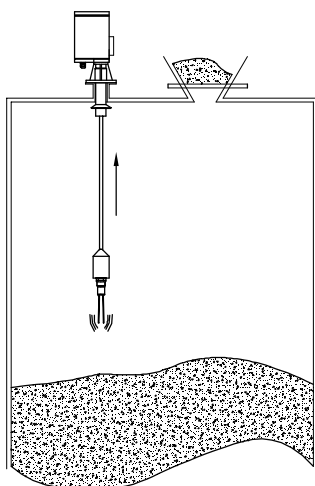


Vibrating fork detecting material

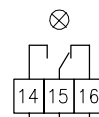
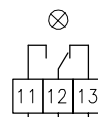
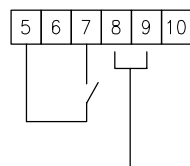
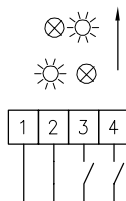


x mA
(current output stays
depending on height of
the vibrating fork)

5.



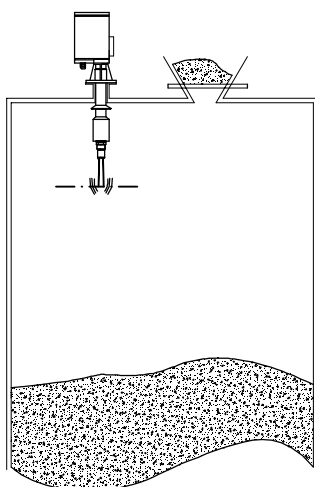
Fast mode



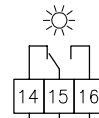
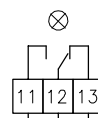
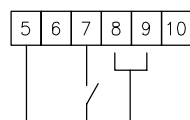
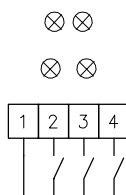
**Vibrating fork goes back up after
completing the measurement**

current output
decreases by 0.0356mA
each 10mm movement

6.



**Vibrating fork has reached the „upper stop
position“**

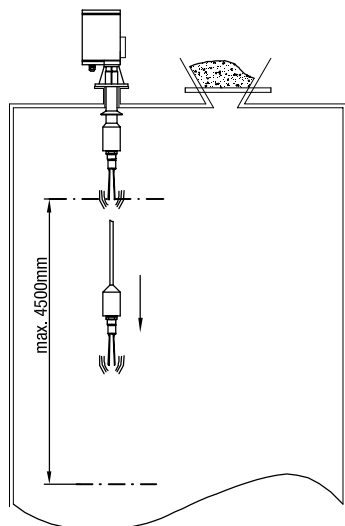


ca. 4mA

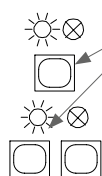
Manual motor operation

**Vibrating fork driving downwards
while pushing the buttons**

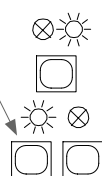
**Vibrating fork driving upwards
while pushing the button**



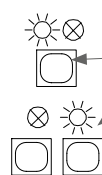
fast mode down



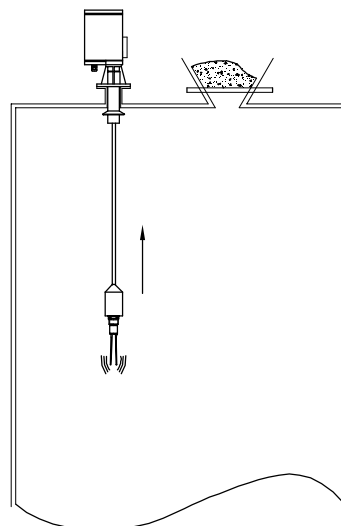
fast mode up



slow mode down



push button



Safety instructions / Mounting

Safety instructions

- Installation, maintenance and commissioning may be accomplished only by qualified technical personnel.
- The respectively valid installation instructions must be observed.
- For terminal connection of the device, the local regulations or VDE0100 (Regulations of German electrotechnical Engineers) must be observed.
- Use a fuse for the supply voltage (max. 6A).
- Provide protection for relay contacts and output transistors to protect the device against spikes with inductive loads.
- Compare the supply voltage applied with the specifications given on the name plate before switching the device on.
- Make sure that max. 8mm of the pigtails are bared (danger of contact with live parts).
- Make sure that the boots for protecting cable terminations are not longer than 8mm (danger of contact with live parts).
- Make sure that the screwed cable gland safely seals the cable and that it is tight (danger of water intrusion).
- A voltage-disconnecting switch must be provided near the device.
- In the case of a defect, the distribution voltage must automatically be cut off by a RCCB protection switch so as to protect the user of the device from indirect contact with dangerous electric tensions.
- In the case of inexpert handling or handling malpractice, the electric safety of the device cannot be guaranteed.
- Switch off the supply voltage before opening the device.
- Before opening the lid take care, that no dust deposits or whirlings are present.

Mounting

The unit is mounted vertically with the flange on the silo. Avoid the point level switch to graze the socket (this causes wear of the cable).

The mounting position must be chosen carefully:

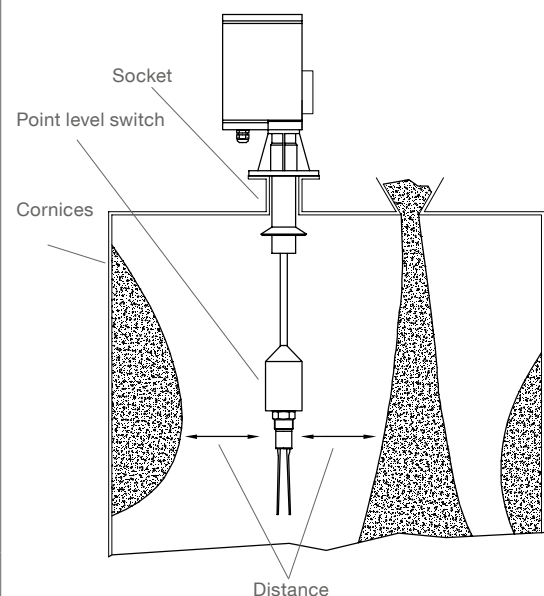
- cornices that might fall down may damage the point level switch or the rope. Observe proper distance from silo wall.
- filling of the silo might cover the point level switch with material (prevent measuring during filling or observe proper distance to infeed).
- upward and downward movement of the point level switch must not be obstructed, even if the point level switch oscillates; observe proper distance to stanchions and built-in fittings.

The electrical connections are made in accordance with the connection diagram. Make sure, that the cable in the screwed cable gland is seated tightly without fail.

Close both lids of the housing, to prevent entrance of water into the housing.

When the unit is used in the open, we recommend to use the temperature protection cover. It protects the unit against moisture, heat and cold. If the ambient temperature can drop to less than 0°C the use of a temperature-protection-cover is obligatory.

Take care that the sensor never drives through the socket into the „upper stop position“ to avoid damage to the unit (see relevant dimensions page 2).



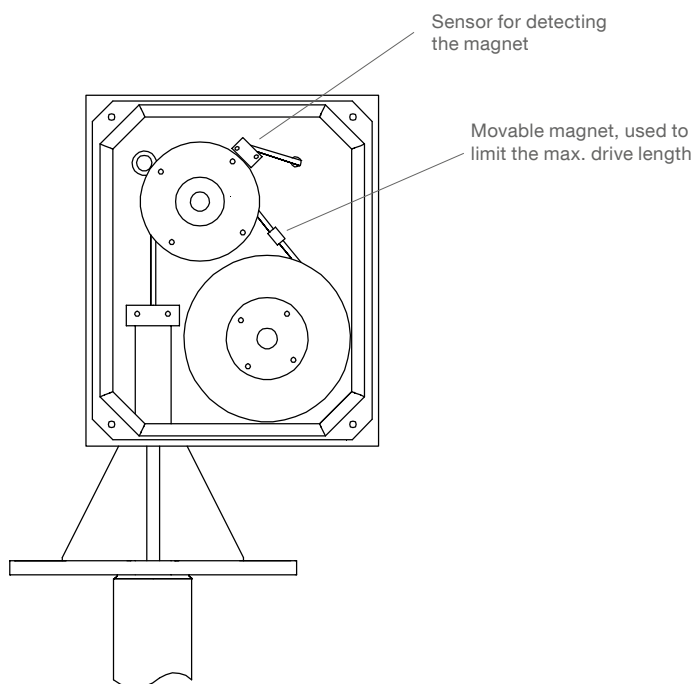
Commissioning

Commissioning

Warning:

In case of inexpert handling or handling malpractice the safety of the device cannot be guaranteed.

1. Connect the unit with supply voltage and evaluation units
2. Cable conduit fittings, which are not used, must be locked with a closing element.
3. Compare supply voltage and frequency with the type plate.
4. Switch on supply voltage and PLC.
5. Setting the max. drive length



The movable magnet avoids, that the probe may drive too far and causes the unit to be damaged. When the magnet reaches the sensor, the motor stops driving downwards. Remove the magnet and drive the probe to the max. required length by using the manual motor operation (see page 11) . Then fix the magnet close to the sensor. It must be ensured, that the probe moves max. 4500mm downwards.

6. Test the function of the unit, the PLC and the measurement functions.
7. The unit is now ready for work. Measurements can be started.

Table of contents

	Page
Safety notes / Technical support	2

Introduction	3

Dimensions	4

Technical data	<div>Electrical Data 7</div> <div>Mechanical Data 8</div> <div>Operating conditions 9</div> <div>Transport and Storage 9</div> <div>Approvals 10</div> <div>Sensor weight guide 11</div>

Options	12

Mounting	13

Electrical installation	15

Signal overview	20

Programming	<div>Quickset menu 22</div> <div>Output adjustment menu 25</div> <div>Diagnostics menu 28</div> <div>Communication menu 30</div> <div>Modbus register 31</div>

Commissioning	Interface measurement 33

Maintenance	<div>General items 34</div> <div>Diagnostics Maintenance 35</div> <div>Diagnostics Failure 37</div>

Notes for use in Hazardous Locations	38

Disposal	40

Subject to technical change. All dimensions in mm (inches).	<div>We assume no liability for typing errors.</div> <div>Different variations to those specified are possible.</div> <div>Please contact our technical consultants.</div>

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



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

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.

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 related documents (manual) for details.
	Earth (ground) Terminal
	Protective Conductor Terminal

Technical support

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

UWT GmbH
 Westendstr. 5
 87488 Betzigau
 Germany

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

Introduction

The Nivobob® NB 3000 is an electromechanic level measuring instrument for continuous measuring of level or volumes in silos, hoppers or tanks.

Applications

- Powder, granulate, small or coarse bulk goods
- Interface measurement (solids in water)

Available for industries such as

- Chemistry
- Food
- Cement
- Mining
- Plastics
- others

Features

Process

- Suitable for most types of bulk goods
- Independent of bulk material properties, such as:
 - Dielectricity and conductivity of the bulk good
 - Dusty atmosphere in the silo
 - Changing humidity inside the product
 - Products that tend to stick
- No mechanical load on the silo roof, the sensor weight just touches the surface of the material
- Very accurate measurement

Service

- Simple installation and commissioning
- Measurement principle easy to understand
- Rope, tape and (optional) motor with increased service life
- Low maintenance

Approvals

- Approval for use in Hazardous Locations

Mechanic

- Measurement range up to 50m (164ft)
- 1 1/2" process connection possible
- Different sensor weights, suitable for every application
- Internal tape cleaner for difficult materials
- Window in lid and external start button (optional)
- Robust cast housing, ingress protection IP66

Electronic

- Micro processor controlled measurement
- Comprehensive diagnostics possibilities
- Output 0/4-20mA / Modbus / Profibus DP / counting pulses
- Programmable relais (can be used as level limit switch outputs)
- Measurement start with external signal or integrated timer

Function

The Nivobob® NB 3000 is mounted on the top of the silo. A sensor weight is driven down into the silo. It is mounted at the end of a rope or tape which is wound on a motor driven roller. Upon contact with bulk material, the motor changes the winding direction and the sensor weight is driven back to the upper stop position.

During downwards movement of the sensor weight the distance is electronically measured by the rotations of the internal rope / tape roller. The microcontroller converts the measured distance into an output signal, which is a volumetric signal based on the silo geometry. The output signal is updated, when the sensor weight touches the bulk material.

Diagnostics

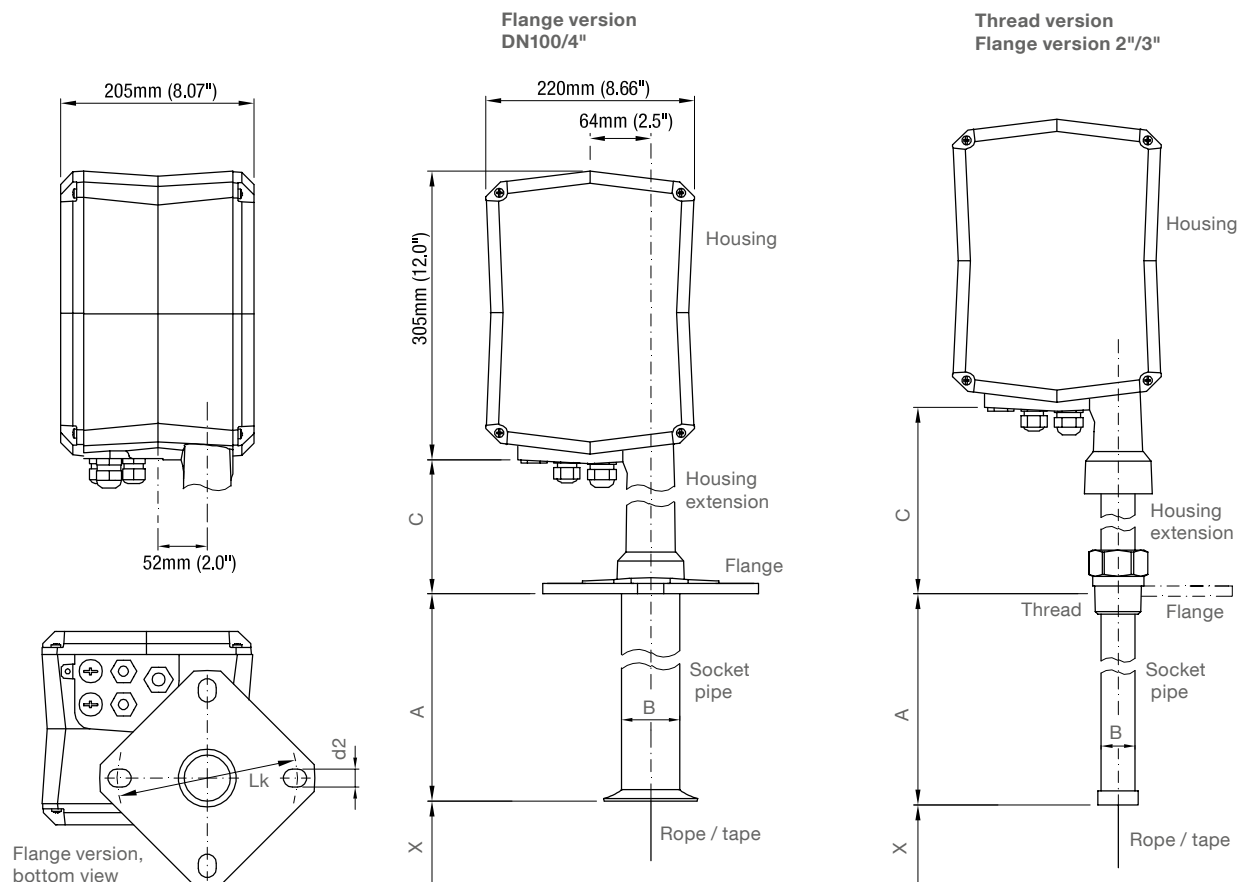
Comprehensive diagnostics possibilities are present:

- Measurement control is done by comparing the moved distance between up and downward movement and checking for discrepancy. In case of discrepancy, the sensor weight is pulled to the upper stop position to ensure, that the sensor weight is not inside the silo.
- Service interval after a certain amount of measurements and running time.
- Internal control of motor, motor driver electronic and smooth movement of rope / tape rollers.

Diagnostics is in accordance with NAMUR recommendation NE107.

Dimensions

Basic type



Dimensions

X = Length to bottom of sensor weight
(in upper stop position): see next page

A = Length of socket pipe

200mm (7.9")
Optional 500mm (19.7") / 1000mm (39.4")

B = Diameter of socket pipe

Rope version with
Flange DN100 / 4" $\phi 60\text{mm}$ (2.36")

All other versions $\phi 40\text{mm}$ (1.57")

C = Housing extension

Flange version DN100/4"	80°C / 150°C	95mm (3.74")
	250°C	340mm (13.4")
All other versions	80°C / 150°C	160mm (6.3")
	250°C	340mm (13.4")

Rope $\phi 1,0\text{mm}$ (0.04")

Tape 12x0.2mm (0.47x0.008")

Flanges

fitting to: DN100 PN16 / 4" 150lbs	Lk = $\phi 180\text{-}190.5\text{mm}$ (7.1-7.5") slot d2 = $\phi 19\text{mm}$ (0.75")
fitting to: 2" / 3" 150lbs	Lk = $\phi 120.7\text{-}152.4\text{mm}$ (4.75-6.0") slot d2 = $\phi 19\text{mm}$ (0.75")

Materials

Housing outside	Aluminium, powder coated
Housing inside	Aluminium
Housing extension	Aluminium, powder coated or 1.4305 (303)
Flange	80°C / 150°C: Aluminium, powder coated 250°C: 1.4305 (303)
Thread	1.4301 (304)
Socket pipe	Flange version DN100/4", 80°C / 150°C: Aluminium All other versions: 1.4301 (304)
Rope	1.4401 (316)
Tape	1.4310 (301)

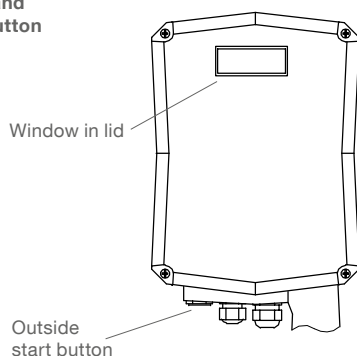
With option "Increased corrosion resistance":

All metal parts in contact with the process are coated.
The rope is plastic coated with PA.
The internal bearings are made of stainless steel.

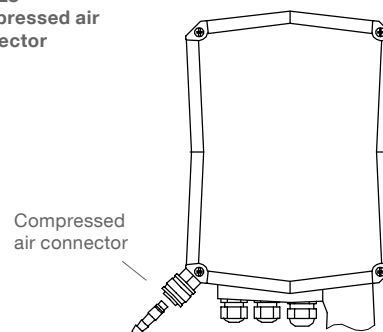
Dimensions

Options and Accessories

Pos. 25
Window in lid and
outside start button



Pos. 28
Compressed air
connector

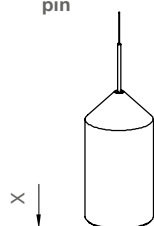


Sensor weights

Solids measurement: Rope version

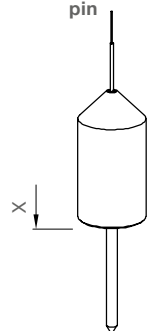
All weights ca. 1,0kg (2.2lbs)

PVC without
pin



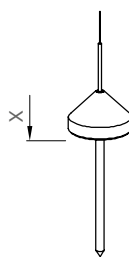
Ø81mm (3.2")
X = 137mm (5.4")
Material: PVC

PVC with
pin

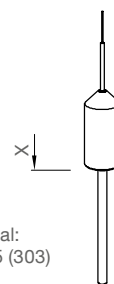


Ø81mm (3.2")
X = 137mm (5.4")
Pin: 130mm (5.1")
Material: PVC (pin POM)

Stainless steel



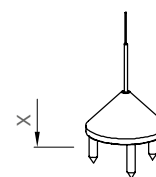
Version with
Flange DN100 / 4"
Ø75mm (3.0")
X = 25mm (1.0")
Pin: 130mm (5.1")



Material:
1.4305 (303)

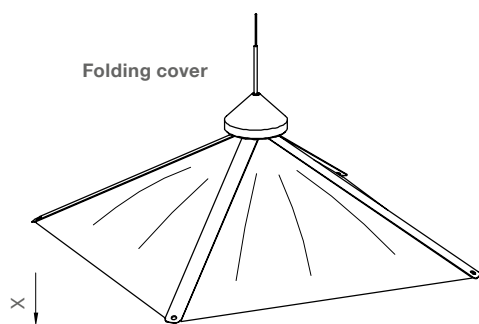
All other versions
Ø42mm (Ø 1.65")
X = 81mm (3.19")
Pin: 130mm (5.1")

Claw



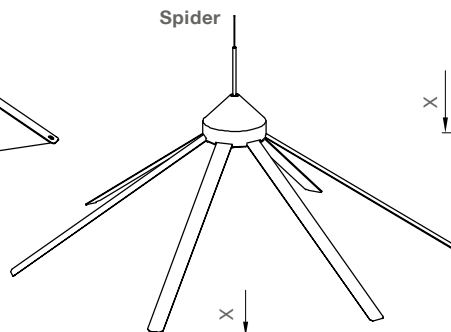
Ø95 (3.7")
X = 71mm (2.80")
Material: 1.4305 (303)

Folding cover



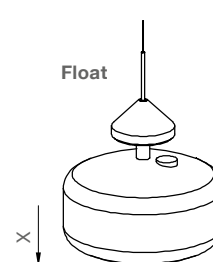
380x380mm (15x15")
X = 150mm (5.9")
Material: 1.4310 (301)/1.4305 (303)
PA canvas

Spider



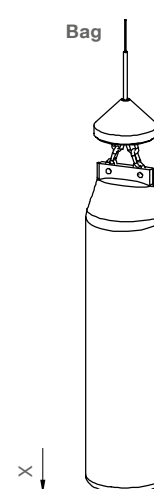
Ø600mm (23.6")
X = 160mm (6.3")
Material: 1.4301 (304)/1.4305 (303)
1.4310 (301)

Float



Ø190mm (7.5")
X = 175mm (6.9")
Material: Float PP,
Cone: aluminium

Bag

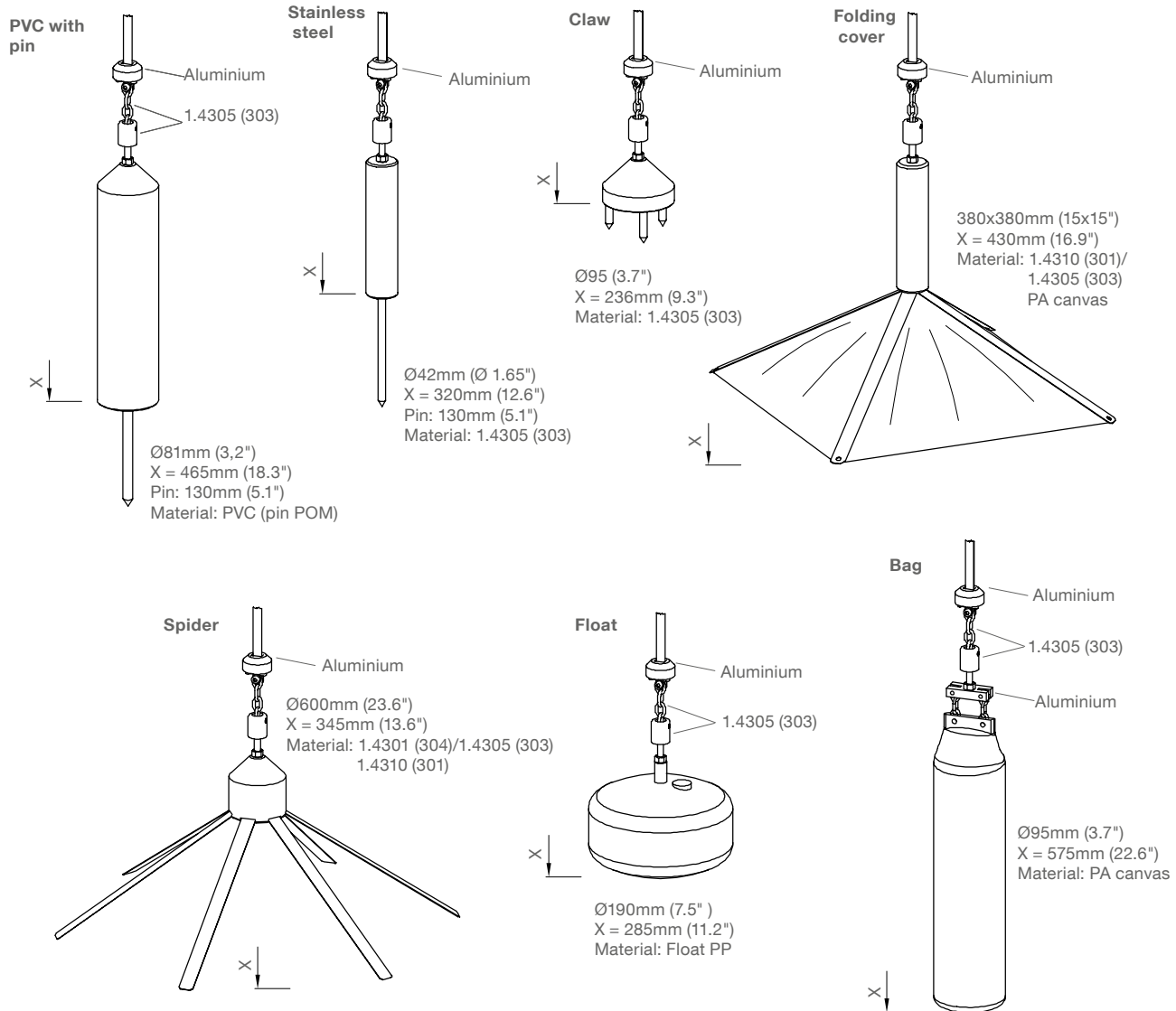


Ø95mm (3.7")
X = 460mm (18.1")
Material: PA canvas,
Chain: 1.4305 (303)
Cone: aluminium

Dimensions

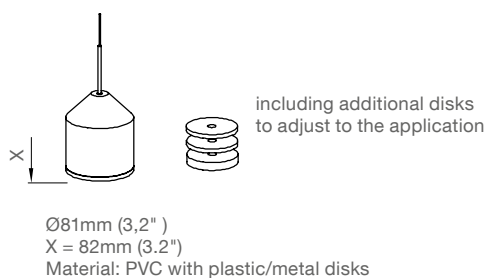
Solids measurement: Tape version

All weights ca. 2.1kg (4.6lbs)



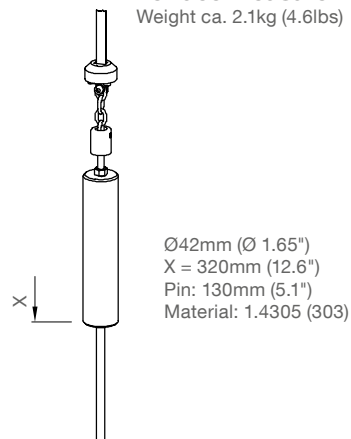
Interface measurement: Rope version

Weight ca. 1,0kg (2.2lbs)



Interface measurement: Tape version

Weight ca. 2.1kg (4.6lbs)



Technical data

Electrical data

Power supply	AC version 98 .. 253V 50-60Hz DC version 20 .. 28V (voltages incl. 10% of EN 61010)		
Installed load	AC version:	150 VA (including internal heater (80W))	
	DC version:	One unit: 150W (with or without internal heater) * Further units which are connected to the same power supply: 25W per unit (without internal heater, motor off) ** 50W per unit (without internal heater, motor running) 80W per unit (with internal heater, supply voltage 20V DC) 100W per unit (with internal heater, supply voltage 24V DC) 120W per unit (with internal heater, supply voltage 28V DC)	
	*Considers the max. motor traction which is needed in a failure condition. A failure condition is assumed for max. one unit at the same time. ** This value can be considered, if the controlling PLC starts the measurement for max. one unit at the same time.		
Signal output: 0/4-20mA	Max. 500 Ohms (active, isolated)	Linearity +/- 0,1mA	
Signal output: Relay	4x Relay SPST: max. 250V AC, 2A, 500VA non inductive		
Signal output: Electronic counting pulse	Optocoupler max. 30V DC, max. 25mA		
Communication: Modbus RTU	Physical layer: RS 485 and Ground, isolated Mode: RTU, Type: Slave Device number range: 1 - 247 (selectable in menu), Baudrate: 1200 to 57600 Baud, Data bits: 8, Stop Bits: 1 Parity: None Multi-drop configuration possible. Factory setting of adress is 31. Each unit which is connected to the network must be set to an individual address. Supported commands Reading: All diagnostics and parameters using command 03 _{HEX} : Read Holding Register Writing: All parameters using command 06 _{HEX} : Write Single Register (not supported is command 10 _{HEX} : Write Multiple Register).		
Communication: Profibus DP	Physical layer: RS 485, isolated Type: Slave Device number range: 0 - 126 (selectable in menue), Baudrate: 9.6 kbps to 12 Mbps Available communication by GSD file, Read only (Sensor weight bottom to material (in mm))		
Accuracy of measurement	Output	Setting	Accuracy
	Counting pulse	10cm (1/3ft) / pulse	1 pulse
		5cm (1/6 ft) / pulse	1 pulse
		2,5cm (1/10ft) / pulse	2 pulses
		1cm (1/20ft) / pulse	4 pulses
	0/4-20mA	1% of max. range	
	Modbus RTU / Profibus	0.5% of max. range	
Display	LCD display: 2 line x 16 digit		
Indication light	Status by build in LED: Power On, Relais, Maintenance and Failure		

Technical data

Memory	Non-volatile (no backup battery required) > 10 years data retention		
Connection terminals	0.14 .. 2.5mm² (AWG 26 .. 14)		
Cable entry	<p>According to selection:</p> <p>Screwed cable gland: 2x M20x1.5 and 1x M25x1.5 Blindplug: 2x M20x1.5 or</p> <p>Conduit ANSI B1.20.1: 1x NPT 3/4"and 2x NPT 1/2" Blindplug: 2x NPT 1/2"</p> <p>Clamping range (diameter) of the factory provided cable glands:</p> <p>M20 x 1.5: 6 .. 12mm (0.24 .. 0.47""")</p> <p>M25 x 1.5: 8 .. 17mm (0.31 .. 0.67""")</p>		
Extension cables for Profibus DP/ Modbus	Use common recommended cables		
Isolation	Power supply to all other outputs / inputs:	AC version 2210 Vrms	
	Relay to relay: 2210 Vrms	DC version: 1000 VDC	
Protection class	I		
Overvoltage category	II		
Pollution degree	2 (inside housing)		
Mechanical data			
Ingress protection	IP 66, Type 4		
Process connection	Threads:	R 1 1/2" DIN 2999 tapered,	
		NPT 1 1/2" or 3" ANSI B1.20.1 tapered	
	Flanges:	DN100 PN16 EN1092-1 (unit fits to this flange)	
		2" or 3" or 4" 150lbs ANSI B16.5 (unit fits to this flange)	
Colour	Housing, Flange	RAL 5010 (gentian blue)	
	Lid	RAL 9006 (aluminium silver)	
Material	See detail specifications on page 4 - 6		
Measuring range	Rope version max. 30m (100ft)		
	Tape version max. 50m (164ft)		
Measuring speed	Sensor weight speed in average:		
	Standard version: ca. 0.25m/s (0.8ft/sec)		
	Version with brushless motor: ca. 0.33m/s (1.0ft/sec)		
Sound level	max. 50dBA		
Weight	Rope version	with flange: ca. 11kg (24.2lbs)	
		with thread: ca. 12kg (26.4lbs)	
	Tape version	with flange: ca. 12kg (26.4lbs)	
		with thread: ca. 13kg (28.6lbs)	
Deviation of vertical mounting	max. 2°		
	max. 1° for tape version with extended socket pipe (see page 4)		
Compressed air connector (Option)	Quick coupling incl. opposite part, for hose diameter 9mm (0.35"), female at housing		
	Max. operating pressure 0.2bar (2.9psi)		

Mechanical data

Ingress protection	IP 66, Type 4	
Process connection	Threads:	R 1 1/2" DIN 2999 tapered, NPT 1 1/2" or 3" ANSI B1.20.1 tapered
	Flanges:	DN100 PN16 EN1092-1 (unit fits to this flange) 2" or 3" or 4" 150lbs ANSI B16.5 (unit fits to this flange)
Colour	Housing, Flange	RAL 5010 (gentian blue)
	Lid	RAL 9006 (aluminium silver)
Material	See detail specifications on page 4 - 6	
Measuring range	Rope version max. 30m (100ft) Tape version max. 50m (164ft)	
Measuring speed	Sensor weight speed in average: Standard version: ca. 0.25m/s (0.8ft/sec) Version with brushless motor: ca. 0.33m/s (1.0ft/sec)	
Sound level	max. 50dBA	
Weight	Rope version	with flange: ca. 11kg (24.2lbs) with thread: ca. 12kg (26.4lbs)
	Tape version	with flange: ca. 12kg (26.4lbs) with thread: ca. 13kg (28.6lbs)
Deviation of vertical mounting	max. 2° max. 1° for tape version with extended socket pipe (see page 4)	
Compressed air connector (Option)	Quick coupling incl. opposite part, for hose diameter 9mm (0.35"), female at housing Max. operating pressure 0.2bar (2.9psi)	

Technical data

Operating conditions

Process overpressure	-0.3 ..+0.3bar (-4.4 ..+4.4psi) -0.5 .. + 1.7 bar (-7.3 .. +25psi) optional for CE + ATEX -0.5 .. + 1.1 bar (-7.3 .. +16psi) optional for FM general purpose		
Process temperature	-40°C ..+80 /150 / 250°C (-40 ..+176 / 302 / 482°F)		
Ambient temperature	<div>-20°C .. +60°C (-4 .. +140°F) -40°C .. +60°C (-40 .. +140°F) -40°C .. +60°C (-40 .. +140°F) max. +40°C (104°F)</div> <div>CE, FM General Purpose with internal heater ATEX, FM Class II on request possible Version with Process temp. 150°C (302°F)</div>		
Ventilation	Ventilation is not required		
Min. powder density	see "Sensor weight guide" on next page		
Minimum time between measuring starts	measuring height 5m (16ft)-> 3min measuring height 10m (33ft) -> 6min measuring height 20m (66ft) -> 12min measuring height 30m (98ft) -> 18min measuring height 40m (131ft) -> 24min measuring height 50m (164ft) -> 30min		
Rope/tape operating time	see page 36		
Max. permitted tractive force	Tape version:	with brushless motor: standard motor:	ca. 3000N ca. 800N
	Rope version:	with brushless motor: standard motor: with increased corrosion resistance:	ca. 1000N ca. 800N ca. 700N
Relative humidity	0-100%, suitable for outdoor		
Altitude	max. 2000m (6.562ft)		
Expected product lifetime	Following parameters have a negative influence on the expected product lifetime: High ambient- and process temperature, corrosive environment, high vibration, high flow rate of abrasive bulk material passing the sensor element, high amount of measurement cycles.		

Transport and Storage

Transport	Observe the instructions as stated on the transport packaging, otherwise the products may get damaged. Transport temperature: -40 .. +80 °C (-40 .. +176 °F) Transport humidity: 20 .. 85 % Transport incoming inspections must be carried out to check for possible transport damage.
Storage	Products must be stored at a dry and clean place. They must be protected from influence of corrosive environment, vibration and exposure to direct sunlight. Storage temperature: -40 .. +80 °C (-40 .. +176 °F) Storage humidity: 20 .. 85 %

Technical data

Approvals

Hazardous Locations*	ATEX II 1/2 D FM Class. II, III Div.1 Gr. E-G TR-CU Ex ta/tb IIIC T! Da/Db X	
General purpose *	CE FM TR-CU	EN 61010-1 General purpose
EMC	EN 61326 -A1 (industrial standard)	
RoHS conform	According to directive 2011/65/EU	

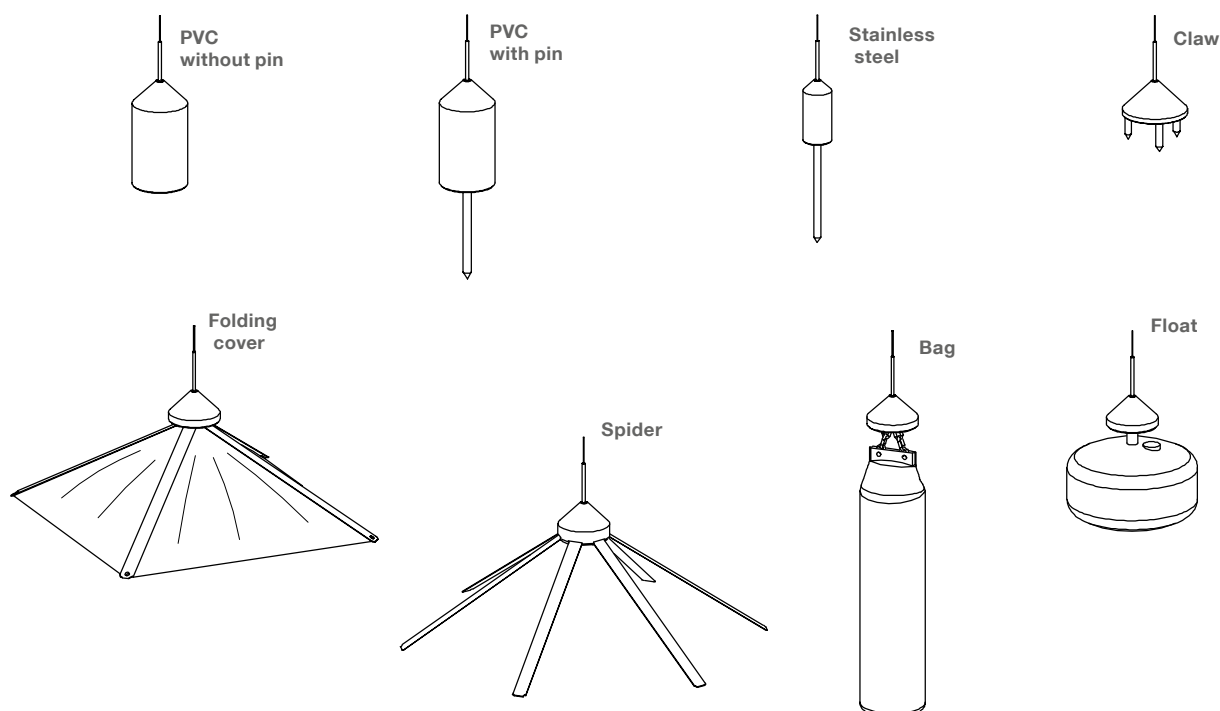
* Depending on selected version in selection list

Technical data

Sensor weight guide (solids measurement)

Sensor weight	Application				Note	Fits through mounting hole				
	* Material density g/l (lb/ft³)	Material consistence	Angle of repose	Max. process temp.		Thread		Flange		
						1 1/2"	3"	2"	3"	DN100 / 4"
PVC without pin	>300 (18)	granulate	flat	80°C (176°F)	Standard weight					•
PVC with pin	>300 (18)	granulate, powder	steep	80°C (176°F)	The pin penetrates into the material and avoids slipping or tilting of the sensor weight on the steep bulk surface.					•
Stainl. steel	>300 (18)	granulate, powder	flat, steep	250°C (482°F)	The pin penetrates into the material and avoids slipping or tilting of the sensor weight on the steep bulk surface.	•	•	•	•	•
Claw	>200 (12)	coarse (e.g. stones)	steep	250°C (482°F)	Avoids slipping or tilting on the steep bulk surface.					•
Folding cover	>20 (1.2)	light powder	flat, steep	80°C (176°F)	Big surface prevents the sensor weight from sinking into the material.	•	•	•	•	•
Spider	>40 (1.4)	light powder	flat, steep	250°C (482°F)	Big surface prevents the sensor weight from sinking into the material.					•
Bag	>300 (18)	granulate, powder	flat	80°C (176°F)	Prevents damage of the conveying screw. To be filled with bulk material.					•
Float	-	liquids only	-	80°C (176°F)	To be filled with material.					

* The above mentioned data is a guideline and is valid for material which has settled after filling. During the filling the bulk density can change (e. g. for fluidised material).



Options

Window in lid and external start button

Enables to see the display through the closed lid and to start a measurement without opening the lid.

Material of the window: break-proof glass.

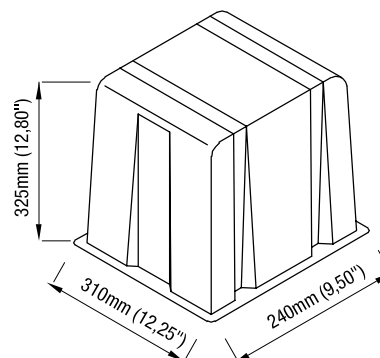
Drawing see page 5

Weather protection cover

If the unit 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
 - excessively low temperatures in winter
- Material: PE, weather and temperature stable

For use in Hazardous Locations only permitted for Zone 22 or Division 2.



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.
Mounting location	The right mounting place is significant for a proper function. Observe mounting instructions.
Vibrations	Avoid mounting in applications with strong vibration. Use rubber mounts for absorption in case of light vibrations.

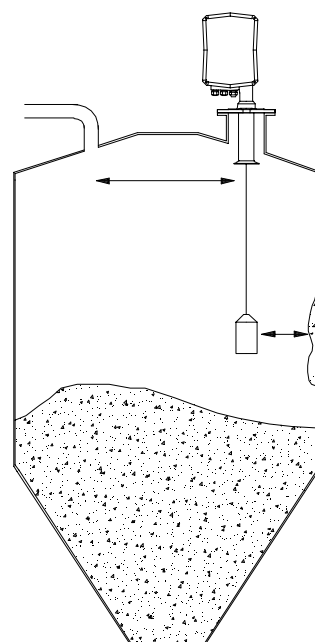
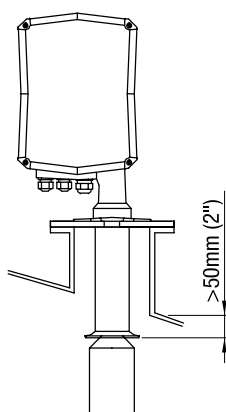
! Additional Safety Instructions for Hazardous Locations

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.

Mounting instructions

Mounting position

- The unit is mounted vertically on the silo. Max. deviation is 2°.
- There must be at least 200mm (7.87") space for the sensor weight to move down in case of a full silo. Observe the bottom of the sensor weight at "upper stop position" (dimensions see page 4 - 6). With overfilling the rope/tube may break.
- The socket pipe of the unit must protude at least 50mm (2") into the silo. A version with longer socket pipe is available.
- Proper movement of the sensor weight must be guaranteed, even if the sensor weight oscillates. Observe enough distance to the silo wall, stanchions and built-in fittings.



Mounting

Measurement during filling of the silo Filling of the silo while measuring might cover the sensor weight with bulk material. Measurements during filling are possible, if there is enough distance to the infeed, so that no material can fall on the sensor weight.

Sensor weight "Bag" and "Float"

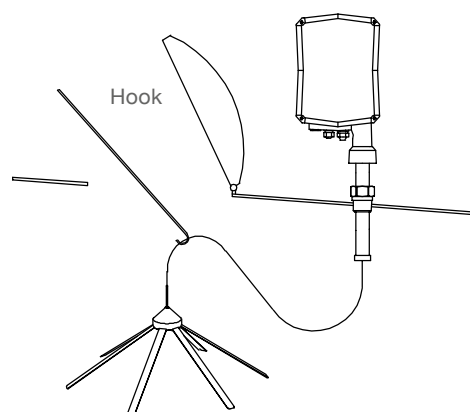
- The weights are filled with plastic granulate or sand. They shall be filled on site with bulk material or liquid, which is not critical if mixed with the material stored in the silo. Consider ageing of the material.
- When filling, observe the total weight of the sensor: rope version 1.0kg (2.2lbs), tape version 2.1kg (4.6lbs)

Sealing

- A rubber seal must be used to tighten the flange.
- Close both lids of the enclosure tightly.

Sensor weight which does not fit through the mounting hole The sensor weight must be removed before placing the unit on the silo. An inlet close to the fixing location and a hook is needed.

See installation manual for more details.



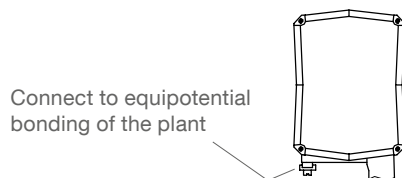
Electrical installation

! General Safety Instructions

Handling	In 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.
Fuse	Use a fuse as stated in the connection diagrams.
RCCB protection	In 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 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 or INMETRO 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 NPT 1/2" or NPT 3/4" 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	<ul style="list-style-type: none"> • The diameter has to match to the clamping range of the used cable gland. • The cross section has to match with the clamping range of the connection terminals and consider the max. current. • All field wirings must have insulation suitable for at least 250V AC. • The temperature rating must be at least 90°C (194°F). • If higher immunity interferences as specified in the stated EMC standards are present (see chapter approval), a shielded cable is required, otherwise an unshielded instrumentation cable is satisfactory.
Guiding the cables in the terminal box	Cut the field wiring cables to appropriate length to fit properly into the terminal box.
Relay protection	Provide protection for relay 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

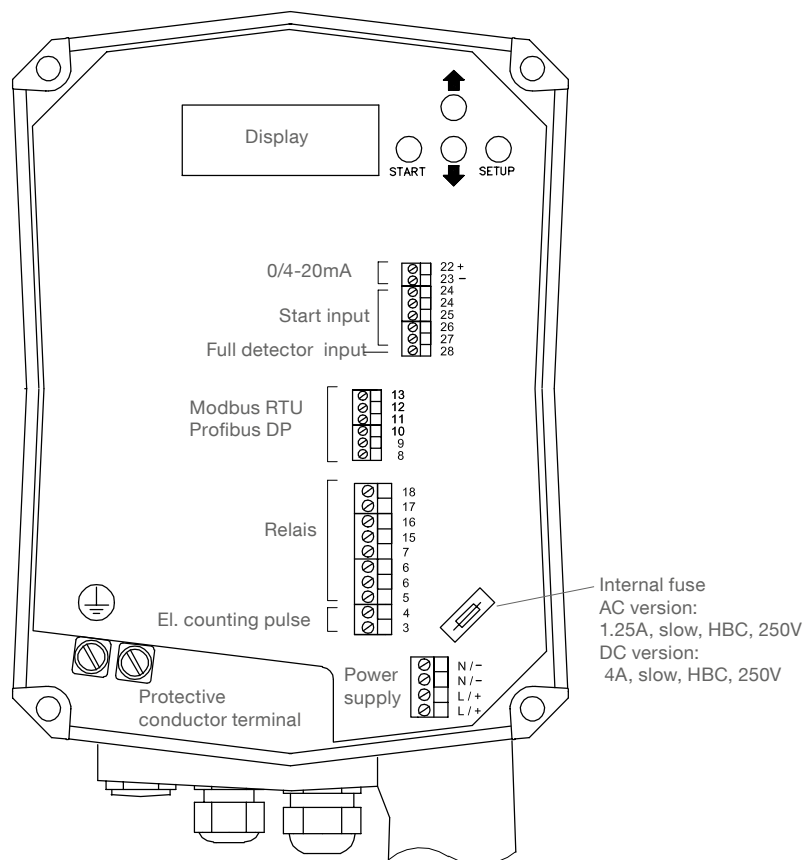
External equipotential bonding terminal



Field wiring	A strain relief must be provided for the field wiring cables, if the device is installed with the factory provided cable glands.
Cable glands for ATEX / TR-CU Hazardous Locations	The used entry devices and blanking elements must have an adequate type approval and a temperature range as defined in the technical data of the unit. In addition they shall be suitable for the conditions and correctly installed. Where available the provided original parts of the manufacturer must be used.
Conduit system for FM Hazardous Locations	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 as defined in the technical data of the unit. In addition they shall be suitable for the conditions and correctly installed. Where available the provided original parts of the manufacturer must be used.
Comissioning / opening the lid	Comissioning only, when there are no dust deposits or swirls present.

Electrical installation

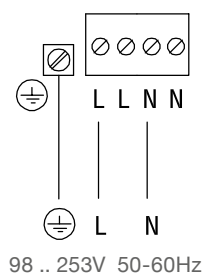
Terminal location



Power supply and Signal input /output

Power supply

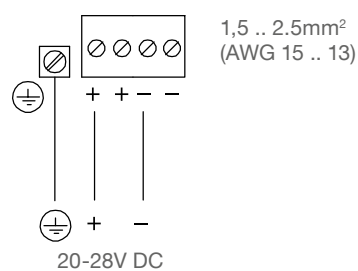
AC version



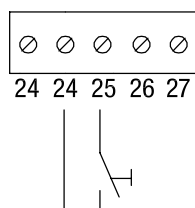
0.75 .. 2.5mm²
(AWG 18 .. 13)

AC or DC supply
depending on
ordered version

DC version

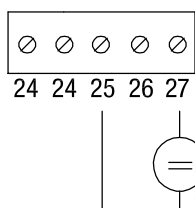


Signal input: Start of measurement

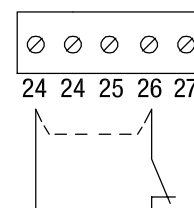


Start contact

alternative



Start +24V



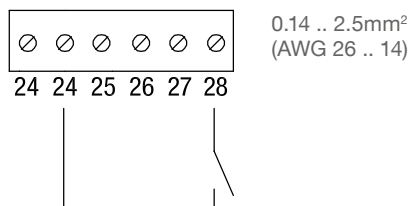
Measurement interruption in
case of filling. If used, remove
factory provided connection.

0.14 .. 2.5mm²
(AWG 26 .. 14)

**Signal
description:**
See page 20

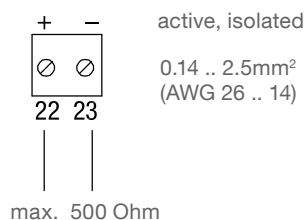
Electrical installation

Signal input: Full detector



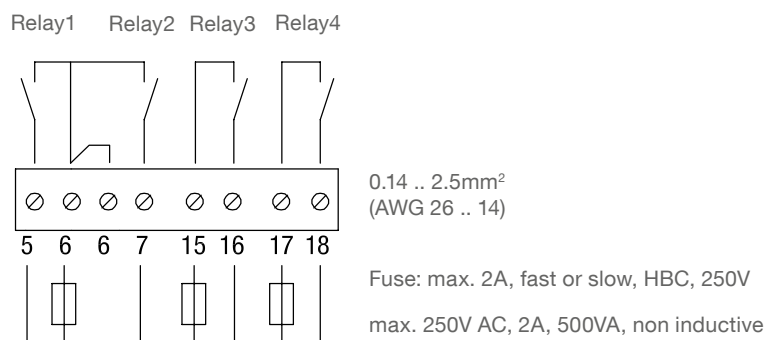
Signal description:
See page 20

Signal output: 0/4-20mA



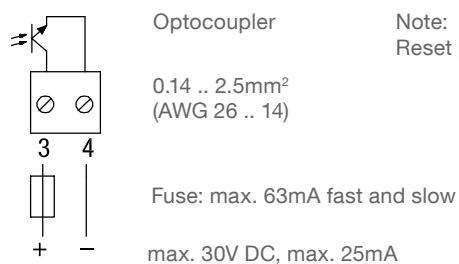
Signal description:
See page 20

Signal output: Relay



Signal description:
See page 20

Signal output: Electronic counting pulse

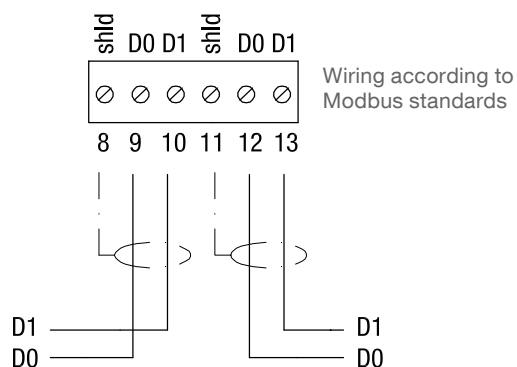


Note:
Reset pulse is done with Relay 2

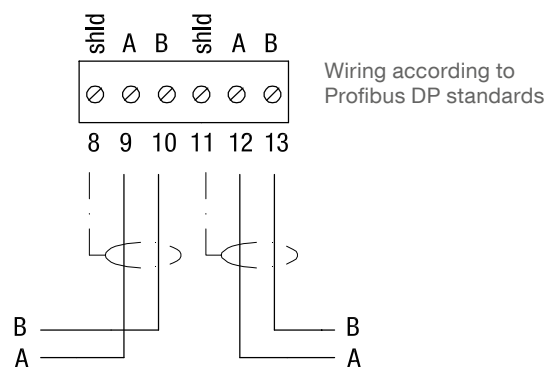
Signal description:
See page 21

Electrical installation

Modbus network

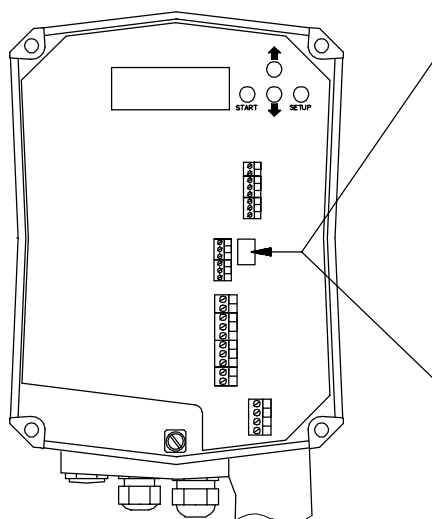


Profibus DP network



Setting Biasing and Termination Resistor

For use of NB 3000 units in a external Modbus or Profibus network, it is possible to set Biasing and Termination Resistor on each unit as required.



Version with Jumper

Biasing	OFF*	OFF	ON
Termination Resistor	OFF*	ON	ON

Version with DIP switch

Biasing	OFF*	OFF	ON	ON
Termination Resistor	OFF*	ON	OFF	ON

*factory provided

DIP Switch position:

Top view Side view

Signal overview

Signal input / output

- Signal input:**
- Floating contact (terminal 24, 25) or
 - 24 V DC voltage (terminal 25, 27), current consumption approx. 25mA, observe the polarity.

Start of measurement

Duration of starting signal: 0.7 to 5s
The contact must be closed or the 24V signal must be present to start.

Measurement interruption

Used to avoid a measurement in case of filling and to interrupt a running measurement when filling starts. When the terminal 24 und 26 are opened, the sensor weight returns to the upper stop position. If required, remove factory provided wire between terminal 24 and 26 and connect to the filling coupling. The contact must be closed to enable a measurement.

Signal input:
Full detector

Enables to implement a full detector signal in the Modbus or Profibus.
When the signal is present (terminal 24-28 closed) the yellow LED next to the display is on.

Signal output:
0/4-20mA

Programmable to indicate a level or a volume signal. The output is updated, when the sensor weight touches the surface of the bulk good. It stays until the next measurement is done.

Signal output:
Relay

Relais can be setted as shown in the following table:

	Relay 1	Relay 2	Relay 3	Relay 4
Factory settings	Counting pulse	Reset pulse	Failure	Upper stop position
Programmable	Limit switch 1	Limit switch 2	Maintenance	Maintenance

Relais 1/2 set to Counting/Reset pulse:

The counting pulse output is used to connect an external digital counter or a PLC with counting input.

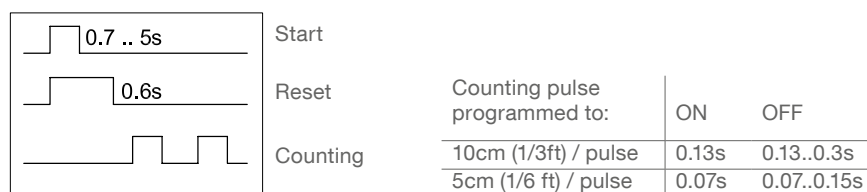
Reset pulse (terminal 6 and 7):

After start of measurement, a reset pulse is given. It is used to reset the connected evaluation device (counter/ PLC, ...).

Counting pulse (terminal 5 and 6):

The counting pulse communicates the measured value to the connected evaluation device. During the downward movement of the sensor weight, this pulse is generated according to the following table:

Timing



Relais 1/2 set to Limit switch:

It is possible to indicate two independent level limit switches. The limit switch signal is derivated from the analogue measurement signal (details see Programming page 26)

Relay 3 - set to "Failure"

The relay indicates a failure (see also programming on page 27 and diagnostics "Failure" on page 37)

Relay 3 - set to "Maintenance"

The relay indicates a necessary maintenance (see also programming on page 27 and diagnostics "Maintenance" on page 35)

Signal overview

Relay 4 - set to "Upper stop position"

The signal allows the user to determine whether the measurement has come to its end. In this case the sensor weight is in its upper stop position, relay contacts are closed.

Relay 4 - set to "Maintenance"

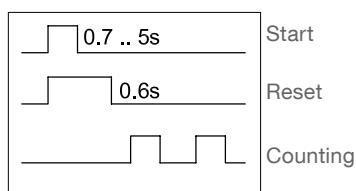
The relay indicates a necessary maintenance (see also programming on G27 and diagnostics "Maintenance" on G35)

Signal output: Electronic counting pulse

Counting pulse (terminal 3 and 4):

The electronic counting pulse enables a high amount of pulses to receive a high resolution of the measurement signal.

Timing



Note:

The reset pulse is done with relay 2.

Counting pulse programmed to:	ON	OFF
2,5cm (1/10ft) / pulse	25ms	25..70ms
1cm (1/20ft) / pulse	10ms	10..30ms

LED status

LED		Status
LED's next to the Display	Green is on	Power On
	Red is on	Failure
	Red is blinking	Maintenance
	Yellow in on	Full detector input present
LEDs next to relais terminals	Yellow is on	Relay is energised

Diagnostics signals

Failure

Result is a non valid measurement.

Red LED is on. Relay 3 indicates Failure.

The signal indicates critical situations. Evaluation can help to avoid losing the sensor weight inside the silo.

If Failure is indicated, the unit must be checked on site.

Failure codes description see page 37.

Maintenance

Result is an indication for the user with still valid measurement.

Red LED is blinking. Relay 4 indicates Maintenance (programmable).

The signal enables a preventive maintenance. Evaluating can help to avoid losing the sensor weight inside the silo.

If Maintenance is indicated, the measurement process can be continued.

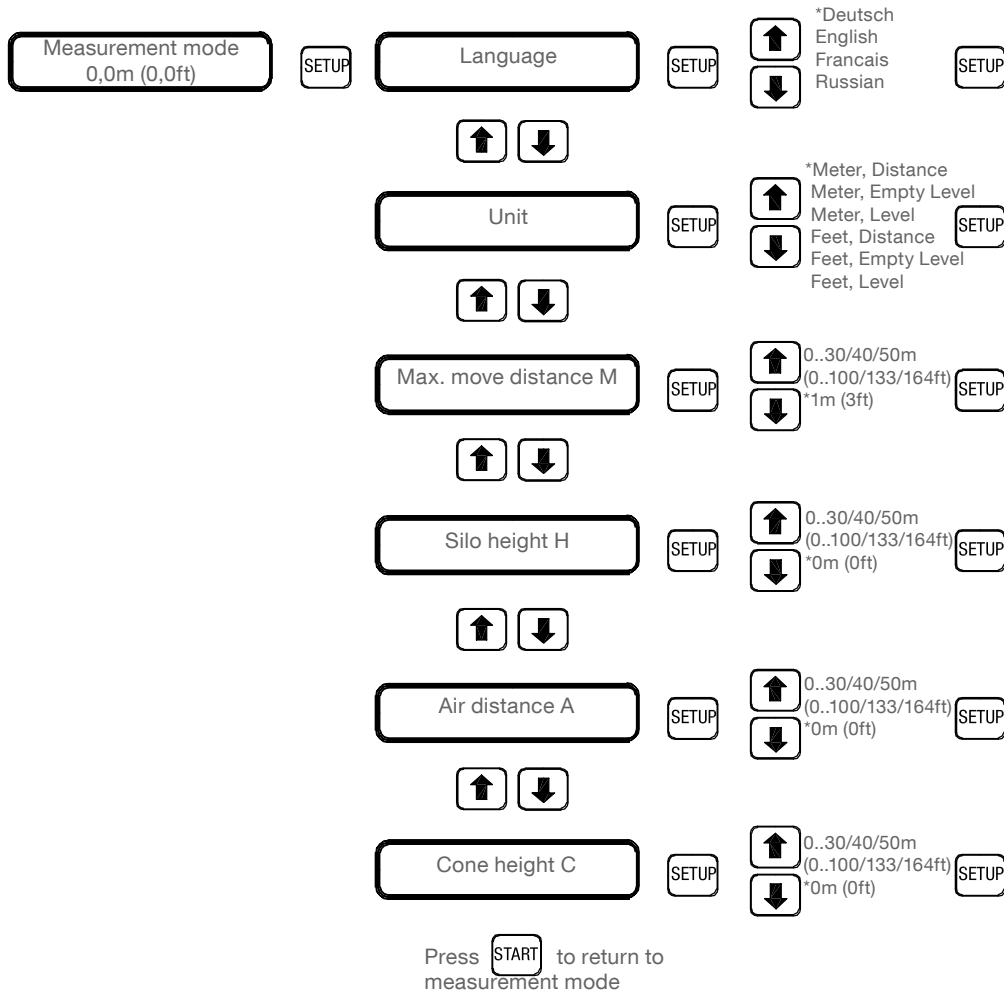
Maintenance codes description see page 35.

Programming

Quickset menu

The Quickset menu is used for fast and easy start-up of the system.

If the unit is working in normal operation (measurement mode), the SETUP button brings up the Quickset menu.

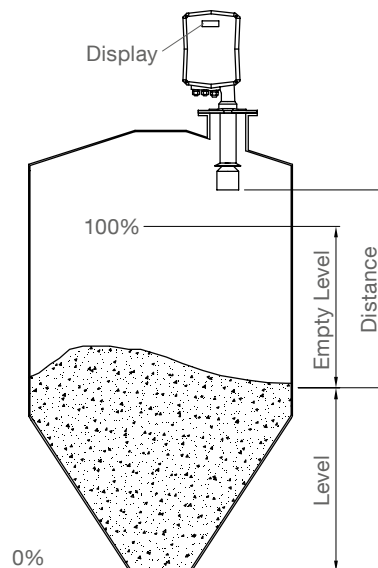


Max. adjustable length of 30/50m depending on ordered version.

* Factory-provided

Unit

- Defines if units are meter or feet.
- Defines what shall be stated on the display of the unit.
This is not related to the signal output.

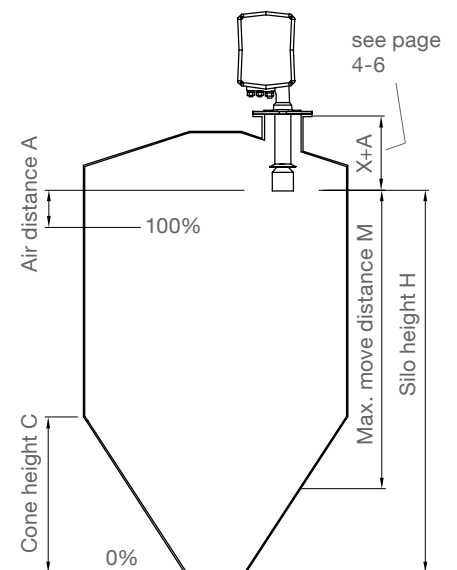


Programming

Max. move distance M	Ensures that the weight does not enter into the silo outlet.
Silo height H	Definition of 0% level output. Note: If the maximum move distance M is smaller than the silo height H, the measured value will always be more than 0%.
Air distance A	Definition of 100% level output.
Cone height C	Enables to set the current output as volume. C = 0 Current output indicates material level C > 0 Current output indicates material volume





Note:

When using the digital pulse output (terminal 5/6/7, see page 18/21) the parameters silo height H, air distance A and cone height C have no influence on the measurement value.






Programming

Programming buttons

-  Continues with next adjustment item
-  Continues with measurement display after parameter adjustment
Starts measurement
Cancels a Failure or Maintenance message
-  Increases the value to be adjusted
-  Decreases the value to be adjusted

Runtime messages

During measurement mode, following runtime indications are given:

-  Upper Stop Position is reached
-  Motor is moving the sensor weight downwards resp. upwards (fast mode)
-  Motor is moving in slow mode (shortly after motor start and before Upper Stop Position is reached)

Note:
Pressing the ARROW DOWN button in measurement mode brings up more service information (not described in this manual)

Blocked 24-26 open Measurement interruption is active (terminal 24-26 not connected, see page 20)

Blocked Modbus Measurement interruption is active (signal is set via Modbus)

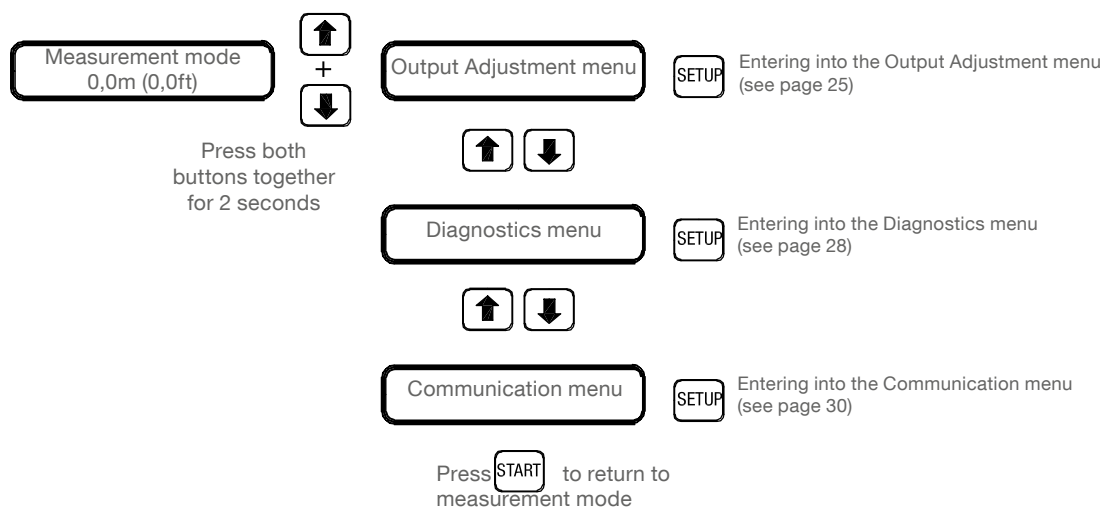
Advanced menus

(use only if necessary)

With the advanced menus it is possible to set the outputs and to display the actual state of the unit.

Entering the advanced menus:

If the unit is working in normal operation (measurement mode), press both "arrow" buttons together for approx. 2 seconds.



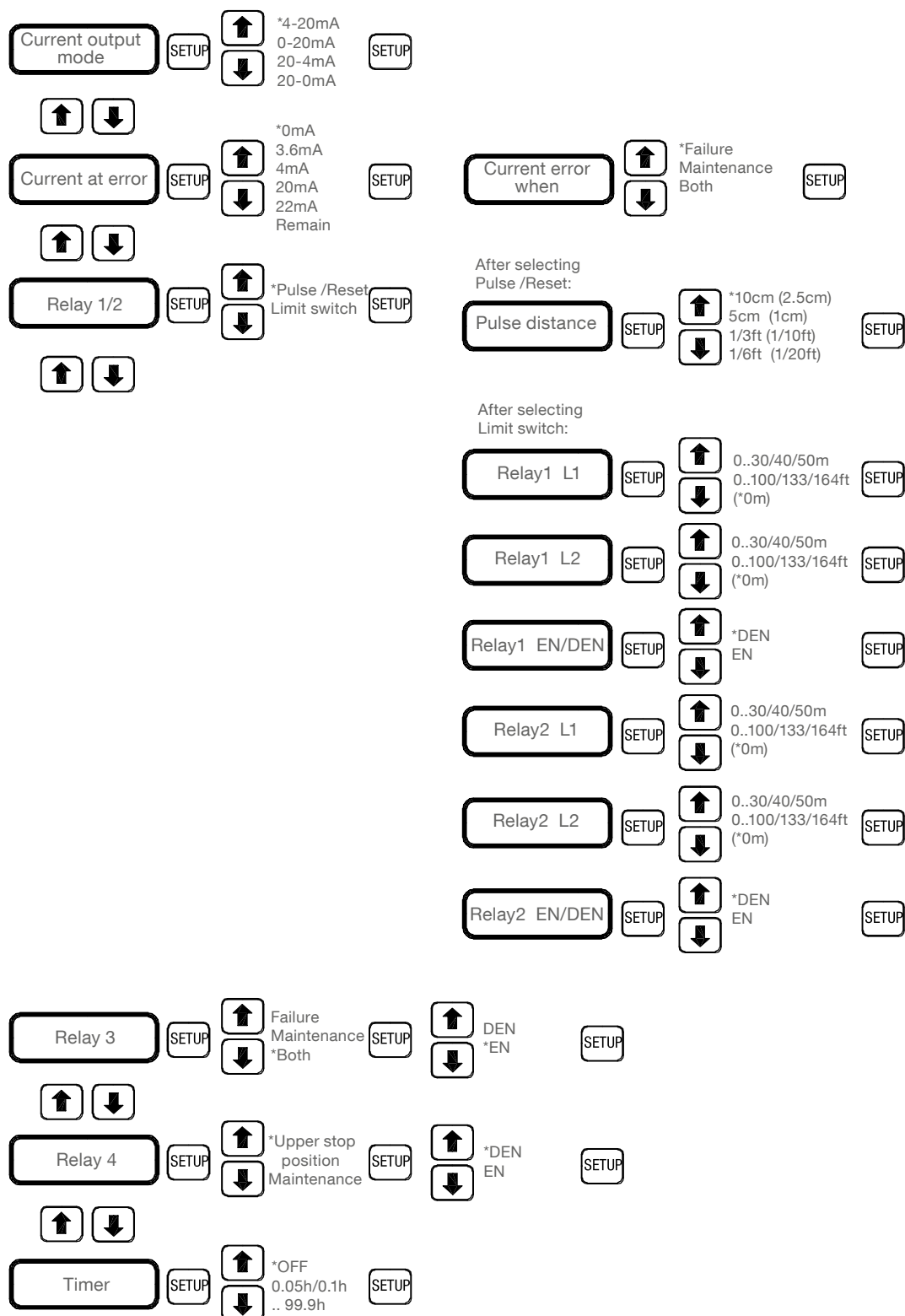
Factory settings

To reset all programmed parameters to factory setting (default values), press the buttons ARROW UP, ARROW DOWN and SETUP together for approx. 10 seconds.

Programming

Output Adjustment menu

The Output Adjustment menu is used for setting the 0/4-20mA, relays and internal timer

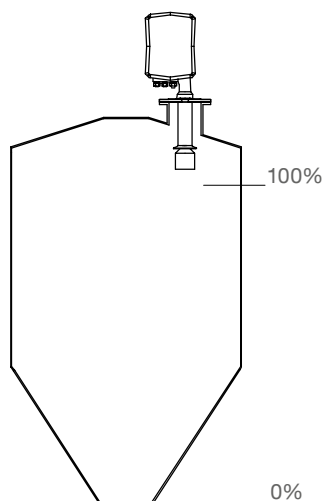


Press 2x **START** to return to measurement mode

* Factory provided

Programming

Current output mode



Setting	Current output at level	
	0%	100%
4-20 mA	4 mA	20 mA
0-20 mA	0 mA	20 mA
20-4 mA	20 mA	4 mA
20-0 mA	20 mA	0 mA

Current at error

In case of error (Failure, Maintenance) the current output shows the adjusted value. It can also be adjusted, whether the current output shall indicate Failure or Maintenance or both situations.

Relay 1/2

Selects, if Relay 1 and 2 shall work as Counting / Reset pulse output or as two independently programmable limit switches.

Selecting Pulse / Reset:

Relay 1 works as Counting pulse output with selected pulse rate (the values in brackets are valid for the version with Electronic counting pulse). Relay 2 works as Reset pulse. Details see Signal Overview on page 20.

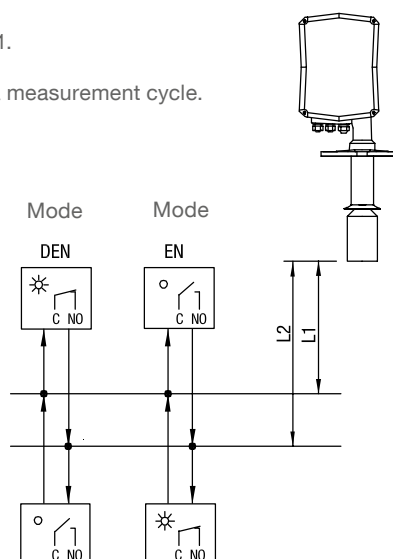
Selecting Limit switch:

The relays are programmed with the distance from the sensor weight bottom to the required material surface switching point. The relays can be set to energise or de-energise. The relay logic is as follows:

- DEN** The relay is normally de-energised and is energised when the product rises above the L1 level. It remains energised until the product falls below the L2 level.
- EN** The relay is normally energised and is deenergised when the product rises above the L1 level. It remains deenergised until the product falls below the L2 level.
- L1** L1 is the upper switching point.
- L2** L2 is the lower switching point.
Note: L2 must always be greater than L1.

Note: The limit switch outputs are updated after a measurement cycle.





LED at relay	Relay
○ OFF	De-energised
☀ ON	Energised



Programming

Relay 3





Selects, if relay 3 shall indicate Failure, Maintenance or both situations.

Failure / Maintenance	Mode DEN	Mode EN *
Present	 15 16	 15 16
Not present	 15 16	 15 16

* factory provided

Relay 4

Selects, if relay 4 shall indicate "Upper stop position" or Maintenance.

Upper stop position / Maintenance	Mode DEN *	Mode EN
Present	 17 18	 17 18
Not present	 17 18	 17 18

* factory provided

Timer

Automatic start of measurement with timer function.

The timing interval between two measurements can be adjusted between 0.05h (3 minutes) for the version with brushless motor (otherwise 0,1h (6 minutes)) and 99.9 hours. Position „off“ causes no automatic measurement start.

The timer will be reset:

- after finishing a measurement
- after linking the terminals 24/26 (measurement interruption during filling)

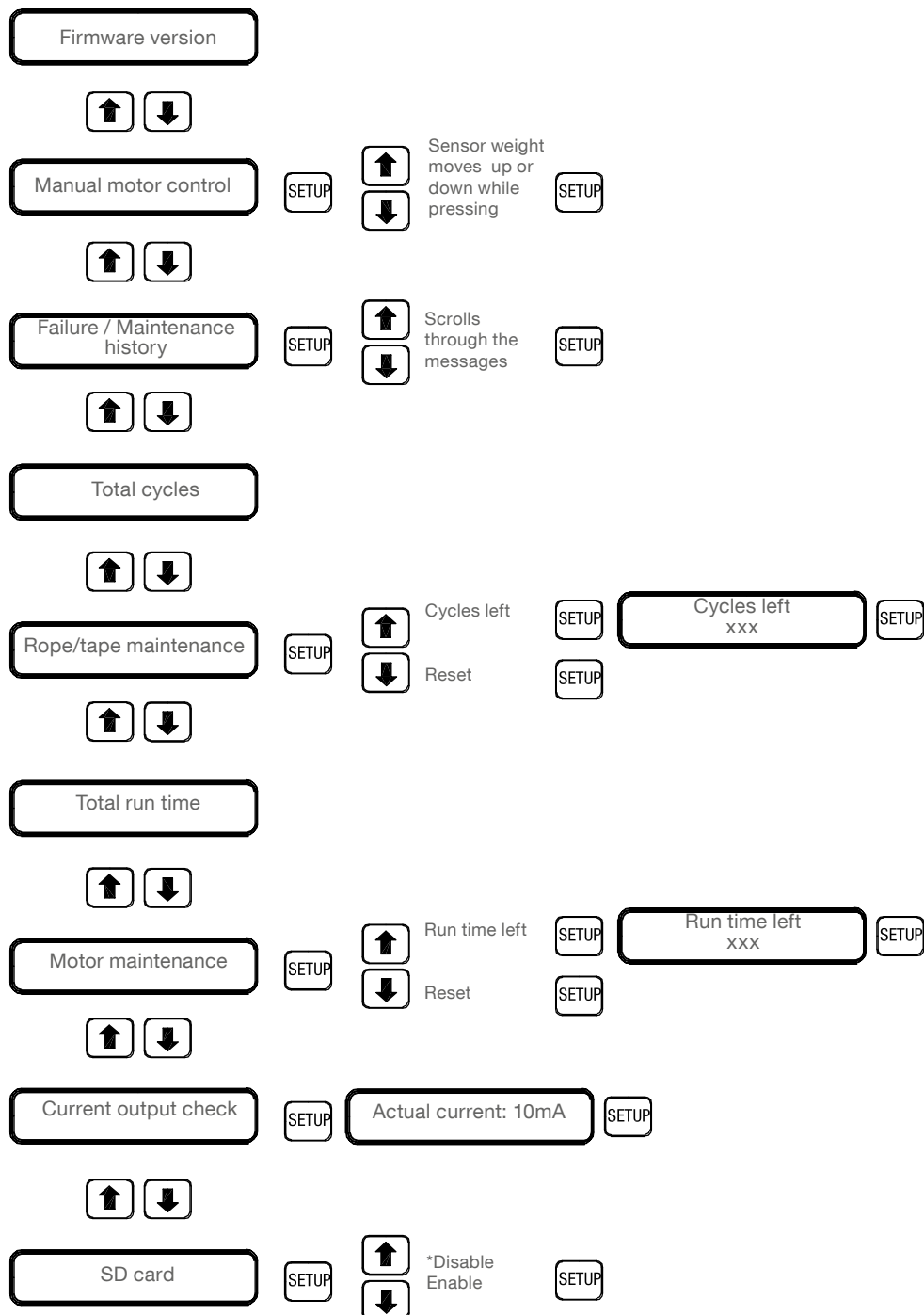
For automatic measurement at a predetermined time of day, an external start unit connected to terminals 24/25/27 is necessary.

To avoid needless wear and tear, the unit should not be started more often than necessary.

Programming

Diagnostics menu

The Diagnostics menu is used to diagnostics the unit status and for manual motor driving mode



Press 2x **START** to return to measurement mode

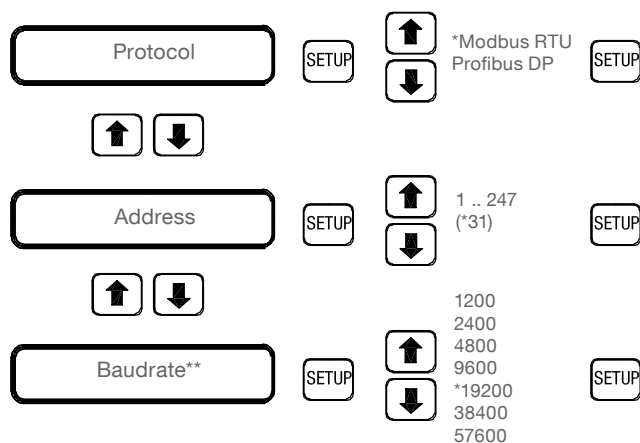
Programming

Firmware version	States the firmware version of the unit.
Manual motor control	<p>The motor moves the sensor weight upwards while the "ARROW UP" button is being pushed. The motor moves the sensor weight downwards while the "ARROW DOWN" button is being pushed.</p> <p>Note: If the sensor weight is in the upper stop position or touching the bulk material surface or after the max. move distance, the motor is automatically stopped.</p> <p>CAUTION: Avoid the sensor weight reaching the outlet position of the silo.</p>
Failure / Maintenance history	<p>Indicates the last 93 error messages related to the motor run time after switching on the power supply for the first time. Messages can be scrolled up and down with the "ARROW" buttons. If "None" is indicated, there is no message filed. The messages and the time information are permanently filed even when the power supply is switched off. Details of the messages see page 35-37</p> <p>Examples of indicating a Failure:</p> <p>Hist. 0512h 1350s 0348h 2400s +F11 Meaning: Actual motor run time is 512 hours and 1350 seconds after first power on. At 348 hours and 2400 seconds the Failure F11 came up</p> <p>Hist. 0512h 1350s 0356h 1920s -F11 Meaning: Actual motor run time is 512 hours and 1350 seconds after first power on. At 356 hours and 1920 seconds the Failure F11 was resetted</p>
Total cycles	Indicates how many measurement cycles have been performed up to now.
Rope/tape maintenance	<p>Cycles left: Indicates how many measurement cycles are left until the next rope/tape failure message F16 will appear and the unit will stop working.</p> <p>Reset: Can be done after a rope/tape change, if the Maintenance message was not yet present. It sets the internal counter to zero to have the full amount of measurement cycles until the next maintenance message will appear.</p> <p>Note 1: After a Maintenance message is reset with the "START" button, the rope/tape maintenance counter is automatically set to zero.</p> <p>Note 2: The number of preset cycles to the next maintenance message depends on the use of rope or tape version.</p>
Total run time	Indicates, how long the motor has been running up to now (in hours).
Motor maintenance	<p>Run time left: Indicates, how much motor run time (in hours) is left, until the motor failure message F17 will appear and the unit will stop working.</p> <p>Reset: Can be done after a motor change, if the Maintenance message was not yet present. It sets the internal counter to zero to have the full amount of motor run time until the next maintenance message will appear.</p> <p>Note 1: After a Maintenance message is reset with the "START" button, the motor maintenance counter is automatically set to zero.</p>
Current output check	Enables to check, if the current output is working proper. The current output is forced to 10mA. This can be evaluated by an external connected multimeter.
SD card	<p>Optional use for service aspects (not explained in this manual).</p> <p>After connecting a SD card to the electronics, this parameter shall be set to "Enable". Before removing the SD card, it shall be set back to "Disable".</p>

Programming

Communication menu

The Communication menu is used for setting parameters of Modbus RTU and Profibus DP



Press 2x **START** to return to measurement mode

* Factory provided

** Displayed only with Modbus. With Profibus Baudrate is set automatically.

Protocol Selects if Modbus RTU or Profibus DP protocol is used.

Adress Selects the used communication adress.

Baudrate Selects the used baudrate.

Programming

Modbus Register

The following registers describe the communication via Modbus.

CAUTION

Writing to the registers different from what is stated will cause a miss function of the unit

Register address	Register name	Register description	Register use	Default value
------------------	---------------	----------------------	--------------	---------------

Setup

40001	M_LANGUAGE	Language on the menu DEUTSCH 0 ENGLISH 1 FRANCAIS 2 RUSSIAN 3	R/W	0
40002	M_UNIT	Unit used for distance visualisation METER 0 FEET 1	R/W	0
40003	M_MAX_MOVE_DIST	Max. move distance mm	R/W	1000
40004	M_SILO_HEIGHT	Silo height mm	R/W	0
40005	M_AIR_DIST	Air distance mm	R/W	0
40006	M_CONE_HEIGHT	Cone height mm	R/W	0
40022	M_TIMER	Timer interval (for automatic start of measurements) , in 1/100 hours (Off = 0) Notes: 1/100 hour = 36 sec Minimum time for standard motor: 0,10 hours (value =10) Minimum time for brushless motor: 0,05 hours (value = 5)	R/W	0

Measurement

40051	M_START	Start of a measurement Start 1	W	
40046	M_DISTANCE	Actual measured distance, in mm Note: After the unit has finished the measurement, the M_STATUS register states "Ready, measurement valid" (the Modbus master must read the M_STATUS register). Then the data on the register M_DISTANCE is valid.	R	
40055	M_VOLUME	Actual measured volume (considering the programmed cone height, air distance and silo height), in % See note on register M_DISTANCE	R	
40052	M_INHIBIT	Block command (allows to block the unit, so that no measurement can be started) No block 0 Block 1 The unit will remain blocked as long as the register has the value "Block". Note: Unit states the blocked status through the M_STATUS register.	W	0
40045	M_STATUS	States the functional status of the unit Blocked 1 Ready, measurement not valid 2 Ready, measurement valid 6 Busy 8 Failure present 16 Temporary not ready 32 -> Explanation see next page	R	

Programming

		Explanation: Blocked: No measurement can be started. Ready: A new measurement can be started. Measurement valid: Indicates a valid measurement. Measurement not valid: Indicates a maintenance condition (details see M_MAINTENANCE) Busy: A measurement is actually running. Failure present: No new measurement can be started (details see M_FAILURE) Temporary not ready: No measurement can be started due to internal actions (usually during upwards movement of the sensor weight).	R	
40057	M_FULL_DETECTOR	States the full detector input status Contact open (24-28) 0 Contact close (24-28) 1	R	

Diagnostics

		Total measured cycles up to now = "M_TOTAL_CYCLES" + 65536 * "M_TOTAL_CYCLES_H"		
40026	M_TOTAL_CYCLES	Total measured cycles up to now, in cycles	R	
40044	M_TOTAL_CYCLES_H	Total measured cycles up to now, in 65536 cycles	R	
		Measurement cycles left until failure message F16 will appear = "M_CYCLES_LEFT" + 65536 * "M_CYCLES_LEFT_H"		
40028	M_CYCLES_LEFT	Measurement cycles left until F16 will appear, in cycles	R	
40050	M_CYCLES_LEFT_H	Measurement cycles left until F16 will appear, in 65536 cycles	R	
		Total motor run time up to now = "M_TOTAL_RUN_TIME" hours + "M_TOTAL_RUN_TIME_S" seconds		
40029	M_TOTAL_RUN_TIME	Total motor run time up to now, in hours	R	
40048	M_TOTAL_RUN_TIME_S	Total motor run time up to now, in seconds	R	
40031	M_RUN_TIME_LEFT	Motor run time left until F17 will appear, in hours	R	
40053	M_FAILURE	Failure status of the unit (stated on a bit basis) F10 – Motor or motor-driver-electronic defect b0 = 1 F11 – Sensor weight is buried b1 = 1 F12 – Rope/tape broken b2 = 1 F13 – Rope/tape too short or jammed in the rope roller b3 = 1 F15 – Not enough current from power supply b4 = 1 F16 – Service interval rope/tape b5 = 1 F17 – Service interval motor b6 = 1	R	
40054	M_MAINTENANCE	Maintenance status of the unit (stated on a bit basis) M10 – Deflection pulley moves not smooth b0 = 1 M11 – Sensor weight blocked in upper position b1 = 1 M16 – Service interval rope/tape b3 = 1 M17 – Service interval motor b4 = 1	R	

Communication

40034	M_PROTOCOL	Bus protocol used for communication Modbus 0	R/W	0
40035	M_ADDRESS	Device address 1 to 247	R/W	31
40036	M_BAUDRATE	Communication speed 1200 baud 0 2400 baud 1 4800 baud 2 9600 baud 3 19200 baud 4 38400 baud 5 57600 baud 6	R/W	4

R/W: read/write R: read only W: write only

Commissioning: Interface measurement

General items

Applications

Measurement of solids in water like mud, sand, bed ash, sediment, stones etc.

Rope version: The material surface can be soft / muddy or compact. Sensitivity adjustment possible.

Tape version: The material surface must be compact (the sensor weight cannot sink in). No sensitivity adjustment possible.

Principle

The sensor weight penetrates into the water and stops when touching the solid surface.

Sensitivity adjustment (rope version)

General

The sensitivity (needed release force for the sensor weight when touching the solid surface) can be set to the requirements of the application.

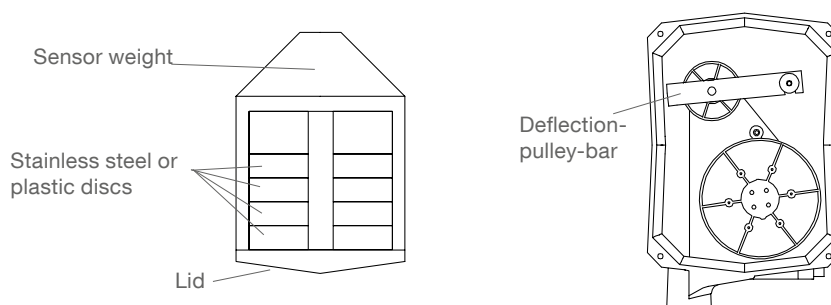
Sensitivity adjustment is done by lowering the sensor weight into the water by using the "Manual motor control" (see page 28).

1. Coarse adjustment

Coarse adjustment is done to avoid the detection of the water surface.

When penetrating into the water, the weight must not float. This can be checked by watching the deflection-pulley-bar. If the deflection-pulley-bar will move briefly upwards while penetrating into the water, the sensor weight floats and needs to be heavier. This is achieved by unscrewing the lid of the sensor weight and replacing one or more plastic discs by stainless steel discs. For soft/muddy surfaces the sensor weight shall be as light as possible to keep it from sinking into the bulk material surface (see step 2).

Note: It is important that the sensor weight is completely filled with discs to avoid intrusion of air.

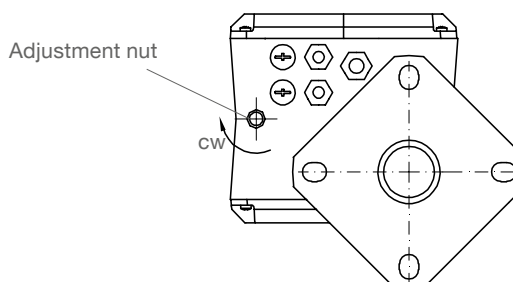


2. Fine adjustment

Fine adjustment is done to keep the sensor weight from sinking into a soft/muddy material surface.

- Turn adjustment nut anti clockwise: measurement becomes more sensitive (for soft/muddy surface)
- Turn adjustment nut clockwise: measurement becomes less sensitive (for more compact surface)
- Fix the adjustment nut with the counter nut

The adjustment was successful if the sensor weight penetrates the water surface easily and detects the material surface without sinking in.



Maintenance

General items

Opening the lid (cover)	<p>⚠ Before opening the lid for maintenance reasons observe following items:</p> <ul style="list-style-type: none"> • Do not remove the lid while circuits are alive. • No dust deposits or whirlings are present. • No rain can enter into the housing
Frequent check of the unit	<p>⚠ To ensure durable safety in hazardous locations and with electrical safety, following items must be checked frequently depending on the application:</p> <ul style="list-style-type: none"> • Mechanical damage or corrosion of any components (housing side and sensor side) and of the field wiring cables. • Tight sealing of the process connection, cable glands and enclosure lid. • Properly connected external PE cable (if present).
Cleaning	<p>⚠ If cleaning is required by the application, following must be observed:</p> <ul style="list-style-type: none"> • Cleaning agent must comply with the materials of the unit (chemical resistance). Mainly the lid sealing, cable gland and the surface of the unit must be considered. <p>⚠ The cleaning process must be done in a way, that:</p> <ul style="list-style-type: none"> • The cleaning agent cannot enter into the unit through the lid sealing or cable gland. • No mechanical damage of the lid sealing, cable gland or other parts can happen. <p>A possible accumulation of dust on the unit does not increase the maximum surface temperature and must therefore not be removed for purposes of maintaining the surface temperature in hazardous locations.</p>
Production date	<p>The production date can be traced by the serial number on the typeplate. Please contact the manufacturer or your local distributor.</p>
Spare parts	<p>All available spare parts are stated in the selection list</p>

Maintenance

Diagnostics: Maintenance

Result is an indication for the user with still valid measurement.

Red LED is blinking. Relay 4 indicates Maintenance (programmable).

The signal enables a preventive maintenance. Evaluating the signal can help to avoid losing the sensor weight inside the silo.

If Maintenance was indicated, the measurement process can be continued.

Maintenance code	Description	Performance of the device	Solution
M10	Deflection pulley moves not smooth / regular	Message is shown, measurement can be continued. If the following 5 measurement cycles after indication are o.k., the message will automatically disappear.	Check for proper movement of the pulley. Check for possible slipping of the rope/tape on the pulley.
M11	Sensor weight blocked in "upper stop position" or block distance of sensor weight to short	The unit tries to start 5 times. If the sensor weight is not released during this time, the message is shown. If after a new measurement start the sensor weight is released, the message will automatically disappear.	Release sensor weight. Ensure, that the min. moving distance (block distance) is > 200mm (7.87")
M12	SD card not working properly	In the diagnostics menu the setting "SD card Enable" is done but SD card is not present or not working properly	Set the menu to "SD card Disable" or change SD card
M16	Service interval: rope / tape	The amount of measurement cycles has reached 70% of the rope/tape lifetime. To further guarantee faultless performance, it is strongly recommended to change the rope/tape. After resetting the message, the internal counter for the rope/tape cycles is reset to zero. If the message is not reset, the unit will continue measuring, until 90% of the rope/tape lifetime is reached. Then Failure F16 will come up.	Change rope /tape.
M17	Service interval: motor	The actual run time has reached 70% of the motor lifetime. To further guarantee faultless performance, it is strongly recommended to change the motor. After resetting the message, the internal counter for the motor run time is reset to zero. If the message is not reset, the unit will continue measuring, until 90% of the motor lifetime is reached. Then Failure F17 will come up.	Change motor

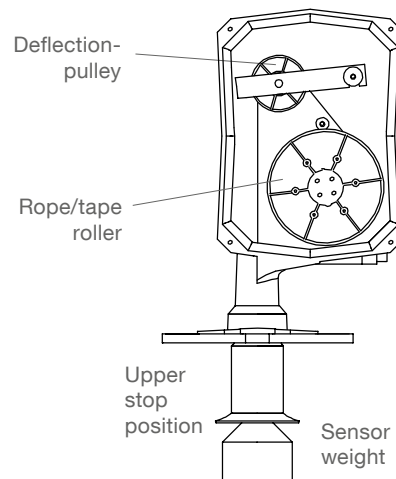
By pushing the START button the actual stated messages shown on the display can be reset.

If more than one message is present, the one with a lower code is shown on the display. After reset with the START button, the next one will be stated.

Possibilities to see a maintenance history: see page G28.

CAUTION

Before removing the rope/tape roller, remount the unit from the silo to avoid, that the sensor weight can fall into the silo.



Maintenance

Rope/Tape lifetime

The expected life time (measurement cycles) for the rope/tape is:

Rope version: approx. 200.000

Tape version: approx. 500.000

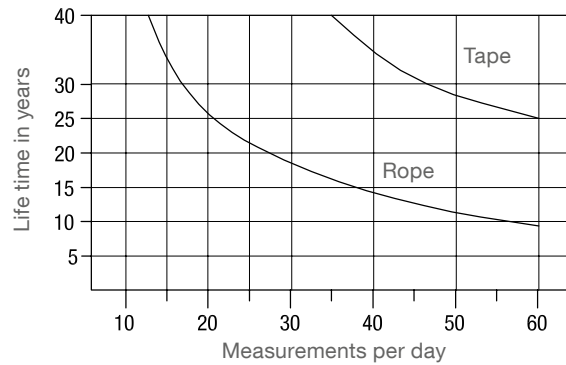
Note: These values refer to lifetime tests under the following conditions:

No excessive material influence. The sensor weight meets an inclined surface, so that an oscillating movement of the sensor weight during upwards movement is caused.

The maintenance message is displayed at 70%, the failure message at 90% of the expected lifetime to provide some safety. For further information see message M16 and F16.

See figure on right hand for the operating time depending on the measurement cycles per day.

For applications with adverse conditions it is recommended to change the rope/tape more frequently.



Motor lifetime

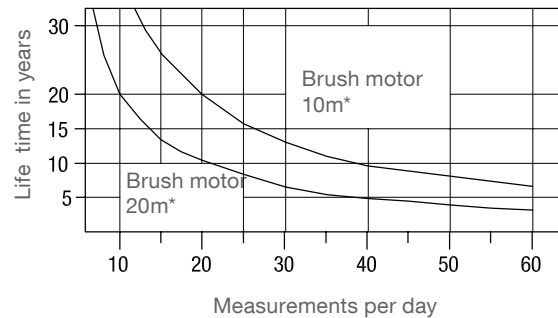
The expected life time (run time) for the motor is:

Version for high measurement frequency (brushless motor):
approx. 60000 hours

Version with standard motor (brush motor):
approx. 3500 hours

The maintenance message is displayed at 70%, the failure message at 90% of the expected lifetime to consider some safety. For further informations see message M17 and F17.

See figure on right hand for the operating time depending on the measurement cycles per day.



*average measurement distance

Maintenance

Diagnostics: Failure

Result is an invalid measurement.

Red LED is on. Relay 3 indicates Failure.

The signal indicates critical situations. Evaluating the signal can help to avoid losing the sensor weight inside the silo.

If Failure is indicated, the unit must be checked on site.

Failure code	Description	Indication	Performance of the device	Solution
F10	Motor or motor-driver-electronic defect	Motor does not rotate when it is actuated. Evaluation by the hallsensor on the rope/tape roller.	If possible, the sensor weight will be moved up to the "Upper stop position".	Check motor connection. Motor or electronic change.
F11	Sensor weight is buried or jammed	Difference of distance between down and up movement too big. Evaluation by the hallsensor on the rope/tape roller.	Motor moves 4 seconds upwards, then waits 10 seconds. After that motor moves shortly downwards and then upwards again. If the sensor weight is still jammed, this cycle is repeated 5 times. After that the cycle goes on with a delaytime of one hour.	Release the sensor weight. Make sure, that the sensor weight can move freely.
F12	Rope / tape broken	Motor is running but the upper stop position is not reached. Evaluation by the hallsensor on the rope/tape roller on the deflection pulley bar.	Motor moves upwards. If after a certain time the upper stop position is not reached, the motor stops.	Repair of rope/tape break. Check, if rope/tape maintenance was properly done. Check possibility of buried sensor weight.
F13	Rope / tape too short or rope jammed in the rope roller	The deflection pulley and the rope/tape roller move in different directions. Evaluation by the Hall sensors on the pulley and the rope/tape roller.	Motor direction is selected so the sensor weight moves upwards until upper stop position is reached.	Check if the rope/tape is too short compared to the adjusted minimum safety setting. Check if the rope is jammed in the rope roller and wound in the wrong direction.
F15	Not enough current available from DC power supply (DC version only)	Supply voltage drops during function.	Sensor weight is moved to the upper stop position.	Enable enough supply current according to the technical data specification.
F16	Service interval: rope/tape	The amount of measurement cycles is 90% of the rope/tape lifetime. See also maintenance message M16.	The measurement cannot be restarted.	Change rope or tape.
F17	Service interval: motor	The actual run time is 90% of the motor lifetime. See also maintenance message M17.	The measurement cannot be restarted.	Change motor.

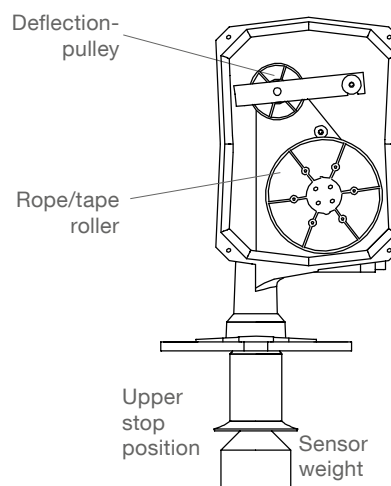
By pushing the **START** and **SETUP** button together for 2 seconds, the message shown on the display can be reset.

Possibilities to see a failure history: see page G28.

CAUTION

Resetting F16 or F17 without changing the rope/tape respective the motor will cause material damage by a broken rope/tape.

Before removing the rope/tape roller, remount the unit from the silo to avoid, that the sensor weight can fall into the silo.

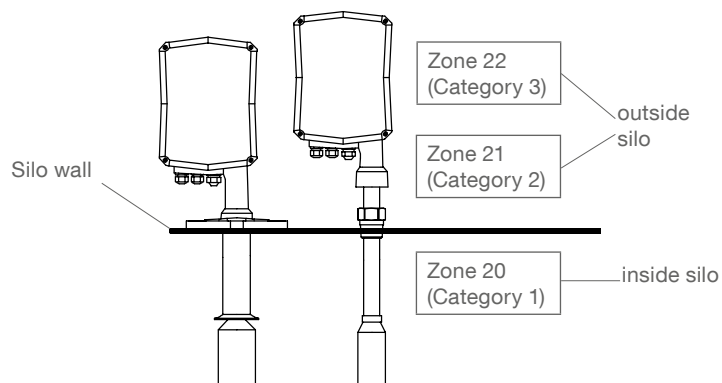


Notes for use in Hazardous Locations

Zone classification

Category	useable in zone	
1 D	20, 21, 22	* in case of conductive dust, additional requirements for installation are necessary.
2 D	21, 22	
3 D*	22	

! Permitted zones (categories) for mounting in partition wall



! General notes

Marking

Devices with Ex-approval are marked on the type plate.

Process pressure

The device construction allows process over-pressure up to 0.3bar (4.4psi) (option 1.7bar (25psi)). These pressures are allowed for test purposes. The definition of the Ex approvals are only valid for a silo-over-pressure between -0.2..+0.1 bar (-2.9..+1.45psi). Out of these pressures the approvals are not valid.

Process and ambient temperature

The permitted temperature ranges are marked on the type plate.

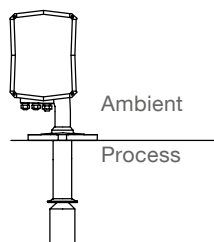
Notes for use in Hazardous Locations

! Maximum Surface Temperature

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

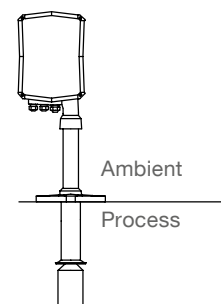
The maximum surface temperature and the temperature class refer to the warmest area outside on the unit which can occur in failure case (according to EX definition).

**Version for
process temperature
max. 80°C (176°F) /
max. 150°C (302°F)**



Max. ambient temperature	Max. process temperature	Max. surface temperature	Temp. class
60°C (140°F)	80°C (176°F)	130°C (266°F)	T4
40°C (104°F)	90°C (194°F)	130°C (266°F)	T4
	100°C (212°F)	130°C (266°F)	T4
	110°C (230°F)	130°C (266°F)	T4
	120°C (248°F)	130°C (266°F)	T4
	130°C (266°F)	130°C (266°F)	T4
	135°C (275°F)	135°C (275°F)	T4
	140°C (284°F)	140°C (284°F)	T3C
	150°C (302°F)	150°C (302°F)	T3C

**Version for
process temperature
max. 250°C (482°F)**



Max. ambient temperature	Max. process temperature	Max. surface temperature	Temp. class
60°C (140°F)	80°C (176°F)	130°C (266°F)	T4
	130°C (266°F)	130°C (266°F)	T4
	135°C (275°F)	135°C (275°F)	T4
	140°C (284°F)	140°C (284°F)	T3C
	150°C (302°F)	150°C (302°F)	T3C
	160°C (320°F)	160°C (320°F)	T3C
	165°C (329°F)	165°C (329°F)	T3B
	170°C (338°F)	170°C (338°F)	T3A
	180°C (356°F)	180°C (356°F)	T3A
	190°C (374°F)	190°C (374°F)	T3
	200°C (392°F)	200°C (392°F)	T3
	210°C (410°F)	210°C (410°F)	T2D
	215°C (419°F)	215°C (419°F)	T2D
	220°C (428°F)	220°C (428°F)	T2C
	230°C (446°F)	230°C (446°F)	T2C
	240°C (464°F)	240°C (464°F)	T2B
	250°C (482°F)	250°C (482°F)	T2B

! Static discharge of the material surface

It must be ensured that no static discharge can occur when the grounded metal sensor weight or rope /tape touches the surface of the bulk material. If this can not be ensured, the safe use of the unit is NOT guaranteed. The responsibility for this rests with the user. In case of inclarity an assessment from a notified body is necessary.

From the manufacturer side a version with a plastic sensor weight and additional plastic rope insulation part is available on request. This keeps a 500mm (19.7") distance from the material surface to the grounded rope/tape.

Disposal

The product consists of materials which can be recycled, details of the used materials see chapter "Technical data - mechanical data". Recycling must be done by a specialised recycling company. Since the product is not subject to the WEEE directive 2002/96/EG, it is not permitted to bring it to a public recycling station.

Table of contents

	Page
Safety notes / Technical support	2

Introduction	3

Dimensions and materials	4

Options / Accessories	6

Technical data	7

Mounting	10

Mounting with aiming flange	11

Electrical installation	12

Signal overview	17

Programming	19

Maintenance	26
General items	26
Diagnostics Maintenance	28
Diagnostics Failure	28

Notes for use in Hazardous Locations	29

Disposal	30

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

We assume no liability for typing errors.
 Different variations to those 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

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



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.

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 related documents (manual) for details.



Earth (ground) Terminal



Protective Conductor Terminal

Technical support

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

UWT GmbH
 Westendstr. 5
 87488 Betzigau
 Germany

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

Introduction

The Nivobob® NB 4000 is an electromechanic level measuring instrument for continuous measuring of level or volumes in silos, hoppers or tanks.

Applications

- Powder, granulate, small or coarse bulk goods

Available for industries such as

- Food
- Grain
- Cement
- Plastics
- others

Features

Process

- Suitable for most types of bulk goods
- Independent of bulk material properties, such as:
 - Dielectricity and conductivity of the bulk good
 - Dusty atmosphere in the silo
 - Changing humidity inside the product
 - Products that tend to stick
- No mechanical load on the silo roof, the sensor weight just touches the surface of the material
- Accurate measurement

Service

- Simple installation and commissioning
- Measurement principle easy to understand
- Rope, tape with increased service life
- Low maintenance

Approvals

- Approval for use in Hazardous Locations

Mechanic

- Measurement range up to 30m (100ft)
- 1 1/2" process connection possible
- Aiming flange to be mounted directly on a flat silo roof
- Internal tape cleaner for difficult materials
- Robust cast housing, ingress protection IP66

Electronics

- Micro processor controlled measurement
- Diagnostics possibilities
- Output 4-20mA
- Two programmable Relais (can be used as Counting / Reset pulse output or as Failure / Upper stop position)
- Measurement start with external signal or integrated timer

Function

The Nivobob® NB 4000 is mounted on the top of the silo. A sensor weight is driven down into the silo. It is mounted at the end of a rope or tape which is wound on a motor driven roller. Upon contact with bulk material, the motor changes the winding direction and the sensor weight is driven back to the upper stop position.

During downwards movement of the sensor weight the distance is electronically measured by the rotations of the internal rope / tape roller. The microcontroller converts the measured distance into an output signal, which is a volumetric signal based on the silo geometry. The output signal is updated, when the sensor weight touches the bulk material.

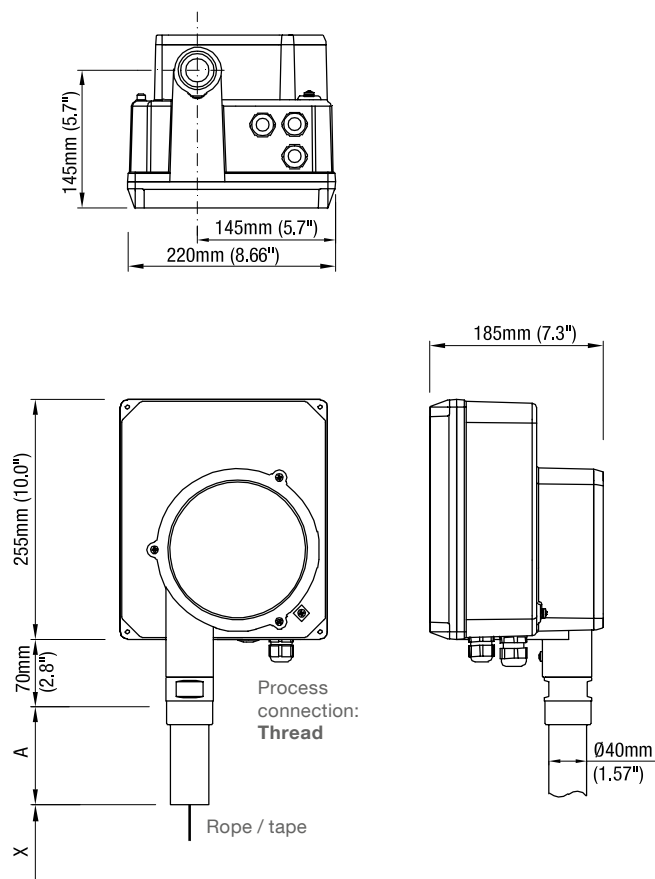
Diagnostics

Comprehensive diagnostics possibilities are present:

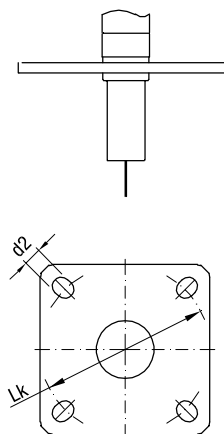
- Measurement control is done by comparing the moved distance between up and downward movement and checking for discrepancy. In case of discrepancy, the sensor weight is pulled to the upper stop position to ensure, that the sensor weight is not inside the silo.
- Service interval after a certain amount of measurements and run time.
- Internal control of motor and motor driver electronic.

Diagnostics is in accordance with NAMUR recommendation NE107.

Dimensions and materials

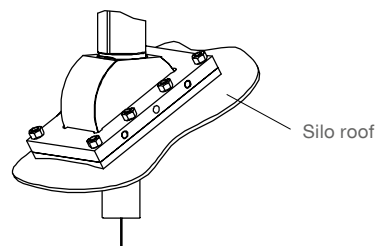


Process connection: **Flange**



Process connection: **Aiming flange**

To be screwed directly to the silo roof
0°-50° adjustable
Including screws, nuts and sealing



Flange plate outside dimensions:
Width x Height: 120mm x 180mm (4.7"x7.1")

Dimensions

X = Length to bottom of sensor weight (in upper stop position, see next page)	
A = Length of socket pipe 100mm (3.9") Optional 200mm (7.9") / 500mm (19.7") / 1000mm (39.4")	
Flanges	
fitting to: DN100 PN16 / 4" 150lbs	Lk = ϕ 180-190.5mm (7.1-7.5") slot d2 = ϕ 19mm (0.75")
fitting to: 2" / 3" 150lbs	Lk = ϕ 120.7-152.4mm (4.75-6.0") slot d2 = ϕ 19mm (0.75")
Rope	ϕ 1,25mm (0.49")
Tape	12x0.2mm (0.47x0.008")

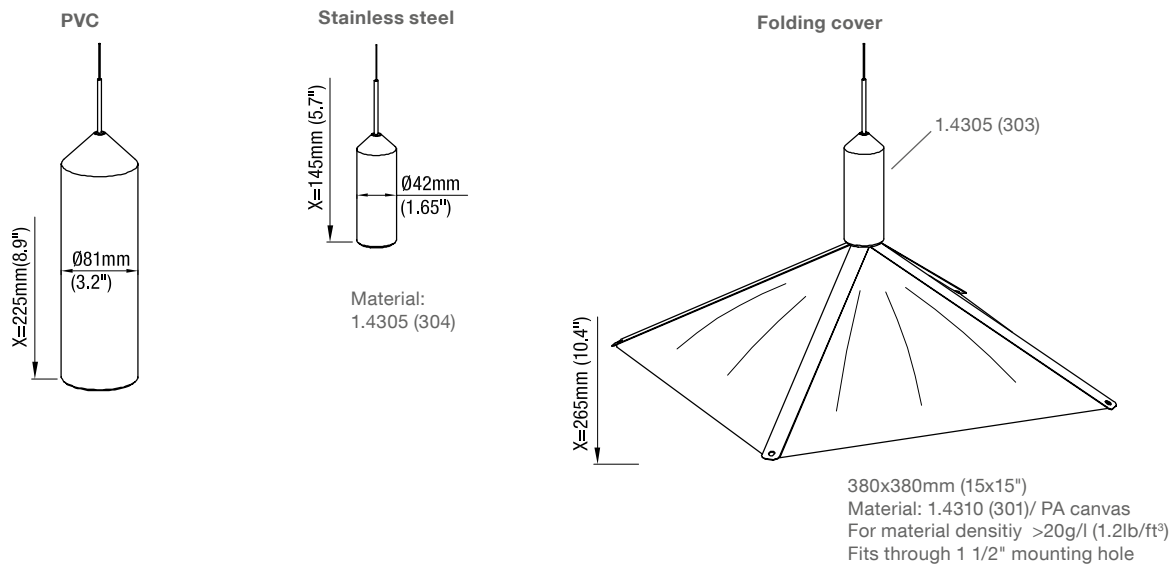
Materials

Housing outside	Aluminium, outside powder coated
Thread / Flange	Aluminium
Aiming flange	Aluminium / 1.4301 (304)
Rope	1.4301 (304)
Tape	1.4310 (301)

Dimensions and materials

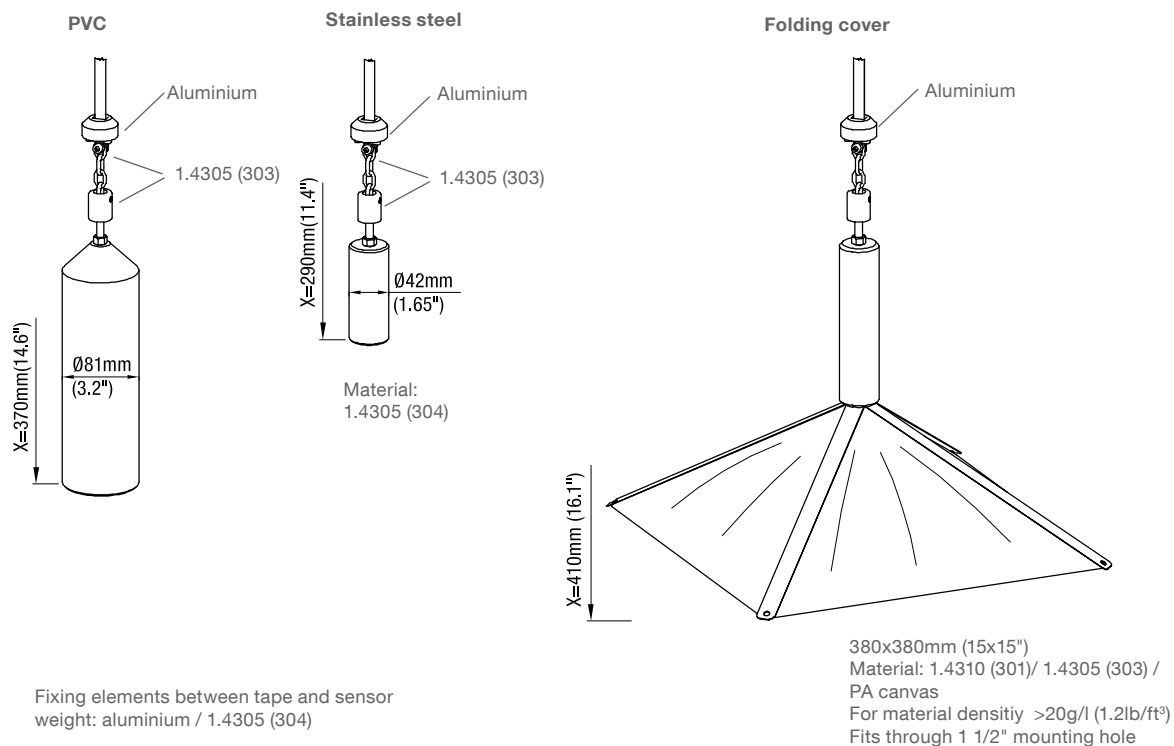
Sensor weights

Rope version



All sensor weights:
1,6 kg (3.5 lbs)

Tape version



Fixing elements between tape and sensor
weight: aluminium / 1.4305 (304)

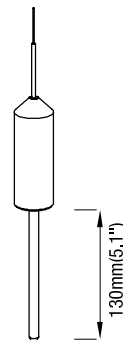
All sensor weights:
1,6 kg (3.5 lbs)

Options and Accessories

Options

Pin for sensor weight

Recommended for powder
 The pin penetrates into the material and avoids slipping or tilting of the sensor weight on the steep bulk surface.

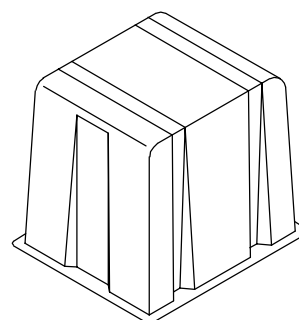


Weather protection cover

If the unit 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
 - excessively low temperatures in winter
- Material: PE, weather and temperature stable

For use in Hazardous Locations only permitted for Zone 22 or Division 2



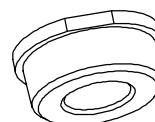
Accessories

Mounting kits

Material for mounting the unit on a flange
 Sealings, screws and washers

Adapter NPT 1 1/2" to NPT 3"

Aluminium
 For mounting the unit on a 3" ferrule
 Thread tapered ANSI B1.20.1



Technical data

Electrical data

Power supply	AC version 230V or 115V 50-60Hz +10% / -15% (incl. 10% of EN 61010) DC version 20 .. 28V (incl. 10% of EN 61010)			
Installed load	AC version:	150 VA (including internal heater (80W))		
	DC version:			
	One unit:	150W (with or without internal heater) *		
	Further units which are connected to the same power supply:			
		25W per unit (without internal heater, motor off) **		
		50W per unit (without internal heater, motor running)		
		80W per unit (with internal heater, supply voltage 20V DC)		
		100W per unit (with internal heater, supply voltage 24V DC)		
		120W per unit (with internal heater, supply voltage 28V DC)		
	*Considers the max. motor traction which is needed in a failure condition. A failure condition is assumed for max. one unit at the same time.			
	** This value can be considered, if the controlling PLC starts the measurement for max. one unit at the same time.			
Signal output: 4-20mA	Max. 500 Ohms (active, isolated)	Linearity +/- 0.1mA		
Signal output: Relais	Optional: 1x Relais SPST and 1x Relais DPDT	max. 250V AC, 2A, 500VA non inductive		
Communication: Modbus RTU	Physical layer: RS 485 and Ground, isolated Mode: RTU, Type: Slave Device number range: 1 - 247 (selectable in menu), Baudrate: 1200 to 57600 Baud, Data bits: 8, Stop Bits: 1 Parity: None Multi-drop configuration possible. Factory setting of address is 31. Each unit which is connected to the network must be set to an individual address. Supported commands Reading: All diagnostics and parameters using command 03 _{HEX} : Read Holding Register Writing: All parameters using command 06 _{HEX} : Write Single Register (not supported is command 10 _{HEX} : Write Multiple Register).			
Accuracy of measurement	Output	Measuring range	Accuracy Rope version	Accuracy Tape version
	Counting pulse	< 10m (33ft)	2 pulses	1 pulse
		< 20m (66ft)	3 pulses	2 pulses
		< 30m (100ft)	5 pulses	3 pulses
	4-20mA / Modbus RTU	< 30m (100ft)	1,5% of measured length	1% of measured length
Display	LCD			
Indication light	Status by built in LED: Power On, Relay, Failure			
Memory	Non-volatile (no backup battery required) > 10 years data retention			
Connection terminals	0.14 .. 2.5mm² (AWG 26 .. 14) 0.14 .. 1.5mm² (AWG 26 .. 16) Modbus terminals			
Cable entry	According to selection: Screwed cable gland 1x M25x1.5 + 1x M20x1.5 Blind plug 1x M25x1.5 + 1x M20x1.5 or Conduit ANSI B1.20.1 1x NPT 3/4" + 1x NPT 1/2" Blind plug 1x NPT 3/4" + 1x NPT 1/2" Clamping range (diameter) of the factory provided cable glands: M20 x 1.5: 6 .. 12mm (0.24 .. 0.47") M25 x 1.5: 8 .. 17mm (0.31 .. 0.67")			

Technical data

Extension cables for Modbus	Use common recommended cables	
Isolation	Power supply to all other outputs / inputs:	AC version 2210 Vrms DC version: 1000 VDC
	Relay to relay: 2210 Vrms	
Protection class	I	
Overvoltage category	II	
Pollution degree	2 (inside housing)	

Mechanical data

Ingress protection	IP 66, Type 4	
Process connection	Threads:	R 1 1/2" DIN 2999 tapered, NPT 1 1/2" ANSI B1.20.1 tapered (Adapter for NPT 3" available)
	Flanges:	DN100 PN16 EN1092-1 (unit fits to this flange) 2" or 3" or 4" 150lbs ANSI B16.5 (unit fits to this flange)
	Aiming flange:	To be mounted directly on a flat silo roof
Colour	Housing	RAL 5010 (gentian blue)
	Lid	RAL 9006 (aluminium silver)
Material	See detail specifications on page 4/5	
Measuring range	Max. 15m (50ft) or max. 30m (100ft)	
Measuring speed	Sensor weight speed in average: ca. 0,2 m/s (0.6ft/sec)	
Sound level	max. 50dBA	
Weight	With thread: ca. 9kg (20lbs) With flange: ca. 11kg (24lbs)	
Deviation of vertical mounting	max. 2°	

Operating conditions

Process overpressure	-0.2 ...+0.2bar (-3.0 ...+3.0psi)	
Process temperature	-40°C ...+80°C (-40 ...+176°F)	
Ambient temperature	-20°C ... +60°C (-4 ... +140°F) -40°C ... +60°C (-40 ... +140°F) -40°C ... +60°C (-40 ... +140°F)	CE, FM General Purpose with internal heater ATEX, FM Class II on request possible
Ventilation	Ventilation is not required	
Min. powder density	>300 g/l (18 lb/ft³) >20 g/l (1.2 lb/ft³) with folding cover The data is a guideline and is valid for material which has settled after filling. During the filling the bulk density can change (e. g. for fluidised material).	

Technical data

Minimum time between measuring starts	measuring height 5m (16ft) -> 3min measuring height 10m (33ft) -> 6min measuring height 20m (66ft) -> 12min measuring height 30m (98ft) -> 18min
Rope/tape operating time	see page 27
Max. permitted tractive force	ca. 800N
Relative humidity	0-100%, suitable for outdoor
Altitude	max. 2000m (6.562ft)
Expected product lifetime	Following parameters have a negative influence on the expected product lifetime: High ambient- and process temperature, corrosive environment, high vibration, high flow rate of abrasive bulk material passing the sensor element, high amount of measurement cycles.

Transport and Storage

Transport	Observe the instructions as stated on the transport packaging, otherwise the products may get damaged. Transport temperature: -40 .. +80 °C (-40 .. +176 °F) Transport humidity: 20 .. 85 % Transport incoming inspections must be carried out to check for possible transport damage.
Storage	Products must be stored at a dry and clean place. They must be protected from influence of corrosive environment, vibration and exposure to direct sunlight. Storage temperature: -40 .. +80 °C (-40 .. +176 °F) Storage humidity: 20 .. 85 %

Approvals

Hazardous Locations*	ATEX II 1/2 D (zone 20/21) FM Class. II, III Div.1 Gr. E-G TR-CU Ex ta/tb IIIC T! Da/Db X
Ordinary Locations *	CE EN 61010-1 FM General purpose TR-CU
EMC	EN 61326 -A1 (industrial standard)
RoHS conform	According to directive 2011/65/EU

* Depending on selected version in selection list

Mounting

! General Safety Instructions

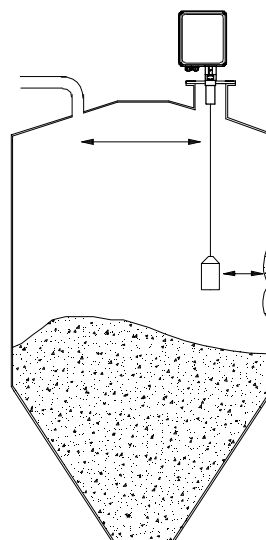
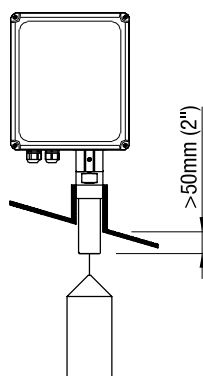
Process pressure	Improper installation may result in loss of process pressure.
Chemical resistance against the medium	Materials of construction are chosen based on their chemical compatibility (or inertness) for general purposes. For exposure to specific environments, check with chemical compatibility charts before installing.
Mounting location	The right mounting place is significant for a proper function. Observe mounting instructions.
Vibrations	Avoid mounting in applications with strong vibration. Use rubber mounts for absorption in case of light vibrations.

! 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.

Mounting instructions

- Mounting position**
- The unit is mounted vertically on the silo. Max. deviation is 2°.
 - ! • There must be at least 200mm (7.87") space for the sensor weight to move down in case of a full silo. Observe the bottom of the sensor weight at "upper stop position" (dimensions see page 4). With overfilling the rope/tape may break.
 - The socket pipe of the unit must protude at least 50mm (2") into the silo. A version with longer socket pipe is available.
 - Proper movement of the sensor weight must be guaranteed, even if the sensor weight oscillates. Observe enough distance to the silo wall, stanchions and built-in fittings.



- Measurement during filling of the silo**
- Filling of the silo while measuring might cover the sensor weight with bulk material. Measurements during filling are possible, if there is enough distance to the infeed, so that no material can fall on the sensor weight.

- Sealing**
- A rubber seal must be used to tighten the thread or flange.
 - Close both lids of the enclosure tightly.

Mounting with aiming flange

Mounting with aiming flange

The aiming flange allows to mount the unit directly on the roof of a silo without the need of a socket.



When working on a silo roof, take precautions according to the valid safety regulations to avoid, that persons can fall down.

1. Find the right mounting position (see page before). To ensure a proper sealing of the rubber on a shaped silo roof, the distance "R" from the center of the silo to the mounting position must be >500mm (19.7").

2. Mark ten drilling holes "A" and the cutaway "B" with a marker on the silo roof. Use the attached template.



While doing the next steps 3. and 4., ensure that swarfs or any parts can not fall into the silo.

3. Drill ten holes "A" with a 9,5mm driller. Use a cut-off grinder to grind out the shape "B". Before doing this, drill a bigger hole in the middle of "B", where you can hold the cutted plate to avoid that it falls into the silo when it gets loose.

4. Insert the clamping plate from inside the silo and fix with two screws "C"

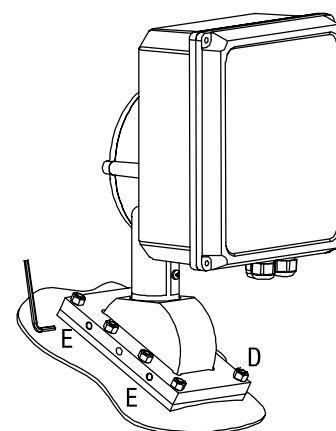
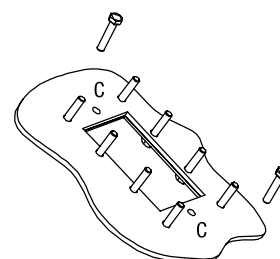
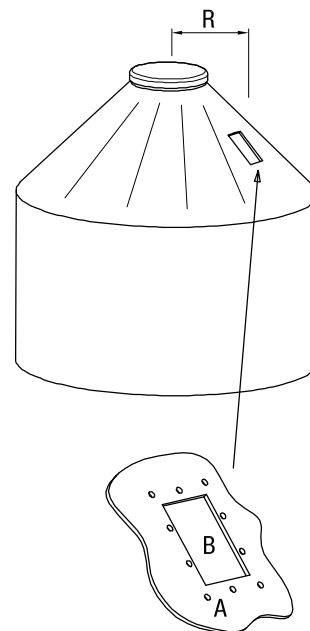
5. Apply the rubber sealing from outside over the shafts. Take care that the shaped side faces to the (shaped) silo roof and the knobs faces upwards..



If the sealing is fixed in the wrong direction, the sealing may not be water and dust tight.

6. Mount the NB 4000 unit. Fix equally and crosswise all the eight nuts "D", first with a low torque, increase up to a torque of 2Nm

7. Adjust the unit to a vertical position (deviation of max. 2°) by using a water level. Fix two screws "E" with a torque of 15Nm.



Electrical installation

! General Safety Instructions

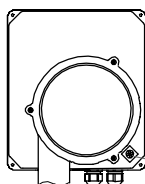
Handling	In case of improper handling or handling malpractice, the electric safety of the device cannot be guaranteed.
Installation regulations	The local regulations or VDE 0100 (Regulations of German Electrotechnical Engineers) must be observed.
Fuse	Use a fuse as stated in the connection diagrams.
RCCB protection	In 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 name plate before switching the device on.
Cable gland	<p>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.</p> <p>The diameter of the field wiring cable has to match to the clamping range of the used cable gland.</p>
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 NPT 1/2" or NPT 3/4" 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	<ul style="list-style-type: none"> • The diameter has to match to the clamping range of the used cable gland. • The cross section has to match with the clamping range of the connection terminals and consider the max. current. • All field wirings must have insulation suitable for at least 250V AC. • The temperature rating must be at least 90°C (194°F). • If higher immunity interferences as specified in the stated EMC standards are present (see chapter approval), a shielded cable is required, otherwise an unshielded instrumentation cable is satisfactory.
Guiding the cables in the terminal box	Cut the field wiring cables to appropriate length to fit properly into the terminal box.
Relay protection	Provide protection for relay 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.

Electrical installation



Additional Safety Instructions for Hazardous Locations

External equipotential bonding terminal



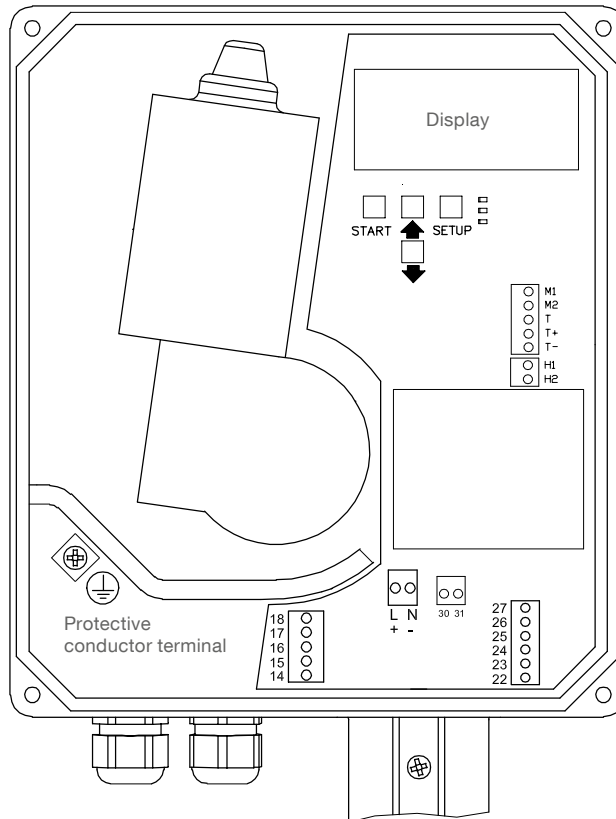
Connect to equipotential bonding of the plant

Field wiring	A strain relief must be provided for the field wiring cables, if the device is installed with the factory provided cable glands.
Cable glands for ATEX / TR-CU Hazardous Locations	The used entry devices and blanking elements must have an adequate type approval and a temperature range as defined in the technical data of the unit. In addition they shall be suitable for the conditions and correctly installed. Where available the provided original parts of the manufacturer must be used.
Conduit system for FM Hazardous Locations	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 as defined in the technical data of the unit. In addition they shall be suitable for the conditions and correctly installed. Where available the provided original parts of the manufacturer must be used.
Commissioning / opening the lid	Commissioning only, when there are no dust deposits or swirls present.

Electrical installation

Version 4-20mA

Terminal location



Internal terminals for motor and heater

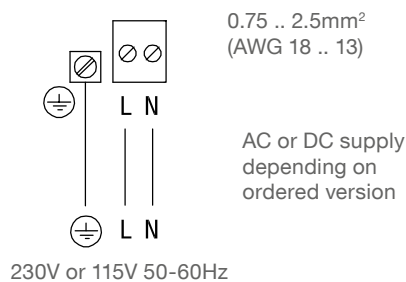
Terminals for:

- Power supply
- Signal input:
 - Start of measurement
 - Measurement interruption
- Signal output:
 - 4-20mA
 - Relais

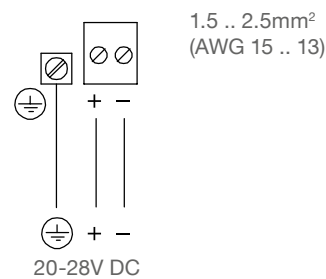
Note: Terminal 30 and 31 not used

Power supply

AC version



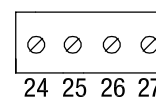
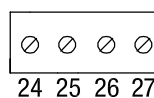
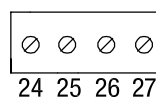
DC version



Signal input:

Start of measurement

Measurement interruption



0.14 .. 2.5mm²
(AWG 26 .. 14)

Start contact

Start +24V

alternative

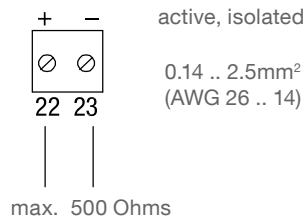
Measurement interruption in case of filling. If used, remove factory provided connection.

Signal description:
See page 17

Electrical installation

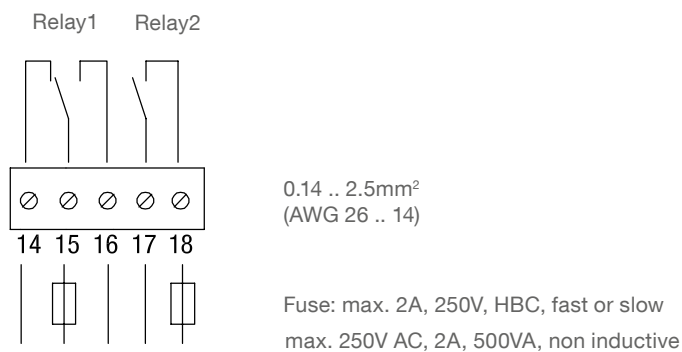
Signal output:
4-20mA

Signal description:
See page 17



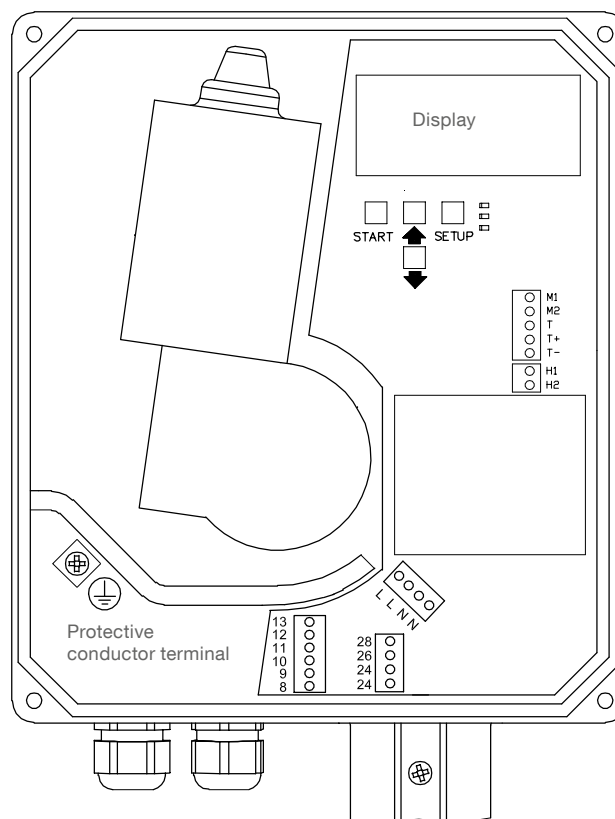
Signal output:
Relais
(optional)

Signal description:
See page 17



Version Modbus

Terminal location

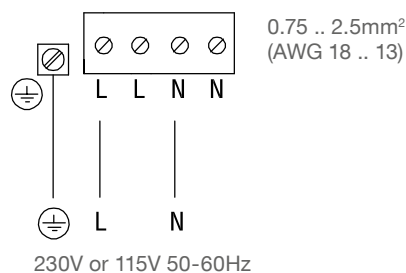


Internal terminals for
motor and heater

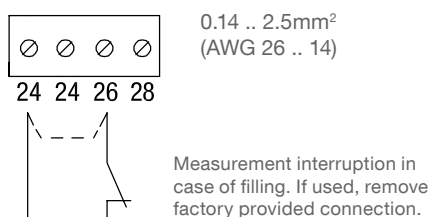
- Terminals for:
 - Power supply
 - Signal input:
Measurement interruption
 - Signal output:
Modbus

Electrical installation

Power supply

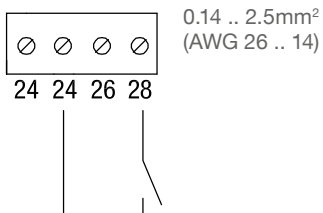


Signal input: Measurement inter- ruption



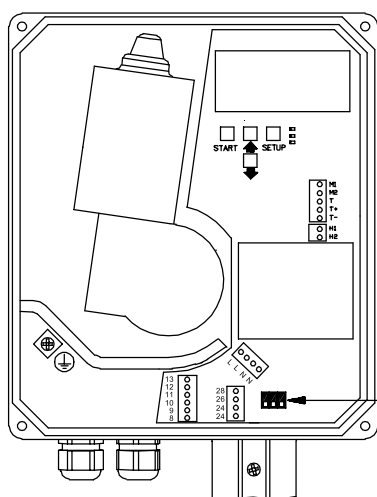
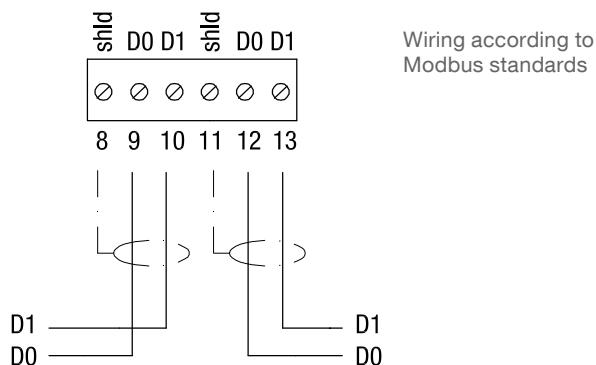
Signal description:
See page 17

Signal input: Full detector



Signal description:
See page 17

Modbus network



Setting Biasing and Termination Resistor

For use of NB 4000 units in a external Modbus network, it is possible to set Biasing and Termination Resistor on each unit as required.

Biasing	OFF*	OFF	ON	ON
Termination Resistor	OFF*	ON	OFF	ON

*factory provided

DIP Switch position:

Top view Side view

Signal overview

Signal input / output

Signal input:
Start of measurement
Measurement interruption

Start of measurement

- Floating contact (terminal 24, 25) or
- 24 V DC voltage (terminal 25, 27), current consumption approx. 25mA, observe the polarity.

Duration of starting signal: 0.7 to 5s

The contact must be closed or the 24V signal must be present to start.

Measurement interruption

Used to avoid a measurement in case of filling and to interrupt a running measurement when filling starts.

When the terminal 24 und 26 are opened, the sensor weight returns to the upper stop position. If required, remove factory provided wire between terminal 24 and 26 and connect to the filling coupling.

The contact must be closed to enable a measurement.

Signal input:
Full detector

Enables to implement a full detector signal in the Modbus.
When the signal is present (terminal 24-28 closed) the yellow LED next to the display is on.

Signal output:
4-20mA

Programmable to indicate a level or a volume signal. The output is updated, when the sensor weight touches the surface of the bulk good. It stays until the next measurement is done.

Signal output:
Relais
(optional)





Relais can be setted as shown in the following table:

	Relay 1	Relay 2
Factory settings	Failure	Upper stop position
Programmable	Reset pulse	Counting pulse

Relais set to "Upper stop position / Failure"

Relay 1: indicates a Failure (see also diagnostics "Failure" on page 28)

Relay 2: indicates "Upper stop position". The signal allows the user to determine whether the measurement has come to its end. In this case the sensor weight is in its upper stop position, relay contacts are closed.

	Relay 1	Relay 2
	Failure	Upper stop position
Present		
Not present		

Signal overview

Relais set to Counting/Reset pulse:

The counting pulse output is used to connect an external digital counter or a PLC with counting input.

Reset pulse (terminal 15 and 16, Relay 1):

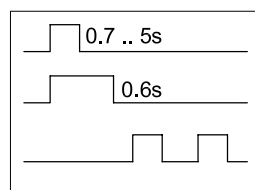
After start of measurement, a reset pulse is given. It is used to reset the connected evaluation device (counter/ PLC, ...).

Counting pulse (terminal 17 and 18, Relay 2):

The counting pulse communicates the measured value to the connected evaluation device. During the downward movement of the sensor weight, this pulse is generated according to the following table:

Note: If the used digital counter or PLC requires a common ground for reset and counting pulse, the terminals 15 and 17 can be connected together.

Timing



Start

Reset pulse

Counting pulse

Pulse length 10cm (1/3ft) /
ON= 0.13s, OFF=0.13 ..0.3s

LED status

LED	Status	
LEDs next to display	Green is on	Power On
	Red is on	Failure
	Red is blinking	Maintenance
	Yellow is on	Full detector is present (only Modbus version)
LEDs next to relais terminals	Yellow is on	Relay is energised

Diagnostics signals

Failure

Result is a non valid measurement.

Red LED is on. Relay indicates Failure (if selected).

The signal indicates critical situations. Evaluation can help to avoid losing the sensor weight inside the silo.

If Failure is indicated, the unit must be checked on site.

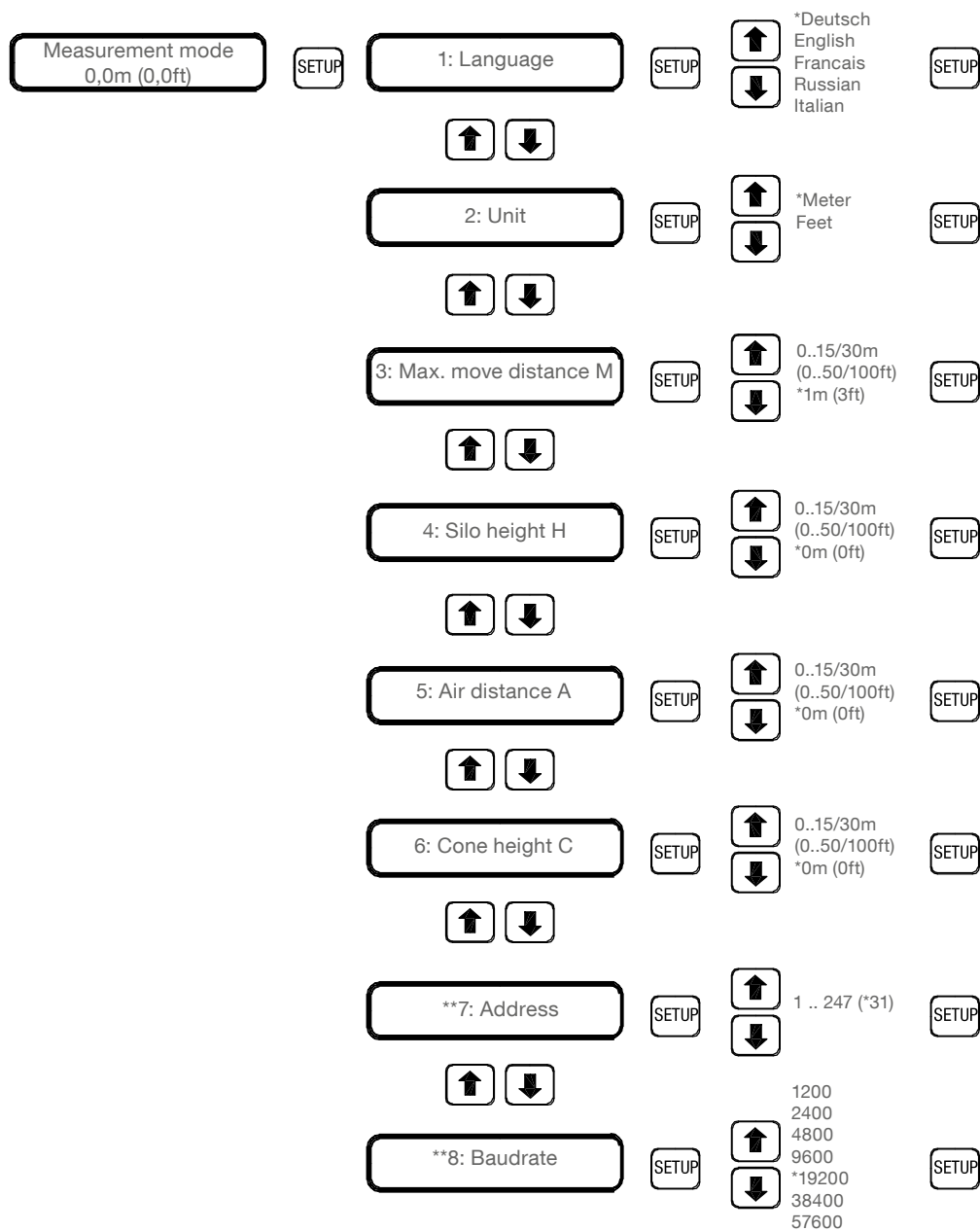
Failure codes description see page 28.

Programming

Quickset menu

The Quickset menu is used for fast and easy start-up of the system.

If the unit is working in normal operation (measurement mode), the SETUP button brings up the Quickset menu.



Press **START** to return to
measurement mode

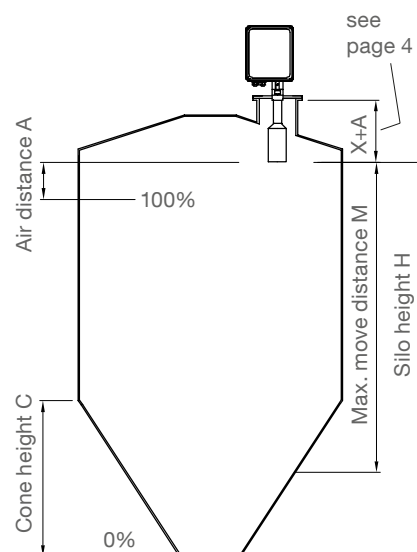
* Factory-provided

** Present only with Modbus version

Programming

Max. move distance M	Ensures that the weight does not enter into the silo outlet.
⁽¹⁾ Silo height H	Definition of 0% level output. Note: If the maximum move distance M is smaller than the silo height H, the measured value will always be more than 0%.
^{(1) (2)} Air distance A	Definition of 100% level output.
⁽¹⁾ Cone height C	Enables to set the current output as volume. C = 0 Current output indicates material level C > 0 Current output indicates material volume
Address	Selects the used communication address for Modbus.
Baudrate	Selects the used baudrate for Modbus.

⁽¹⁾ These values are not relevant, if the "Counting pulse output" is used.
⁽²⁾ If needed the 100% level can be set higher than the level of the sensor weight.
 See advanced menu, item "Inverted air distance".



Programming buttons



Continues with next adjustment item



Continues with measurement display after parameter adjustment
 Starts measurement
 Cancels a Failure message (when pressed 2 sec together with SETUP button)



Increases the value to be adjusted



Decreases the value to be adjusted

Runtime messages

During measurement mode, following runtime indications are given:

*

Upper Stop Position is reached



Motor is moving the sensor weight downwards resp. upwards (fast mode)



Motor is moving in slow mode (shortly after motor start and before Upper Stop Position is reached)

Blocked 24-26 open Measurement interruption is active (terminal 24-26 not connected, see page 14)

Note:
 Pressing the ARROW DOWN button in measurement mode brings up more service information (not described in this manual)

Factory settings

To reset all programmed parameters to factory setting (default values), press the buttons ARROW UP, ARROW DOWN and SETUP together for approx. 10 seconds.

Programming

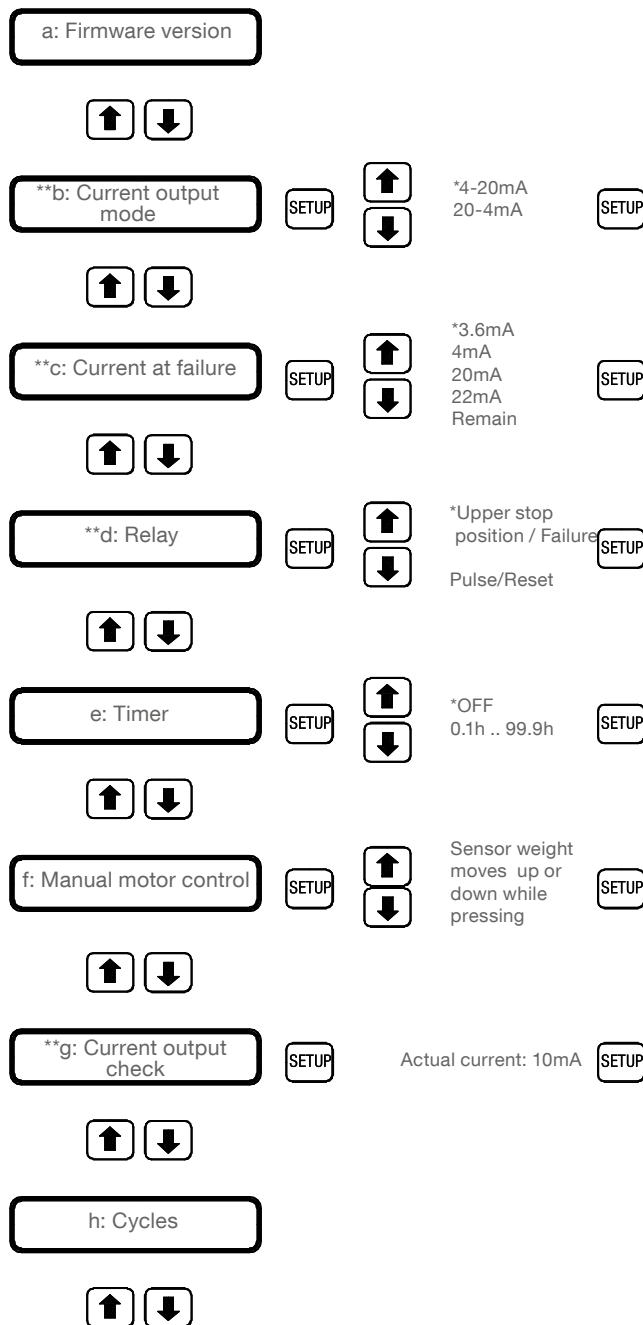
Advanced menu

(use only if necessary)

With the advanced menu it is possible to set the outputs and to display the actual state of the unit.

Entering the advanced menu:

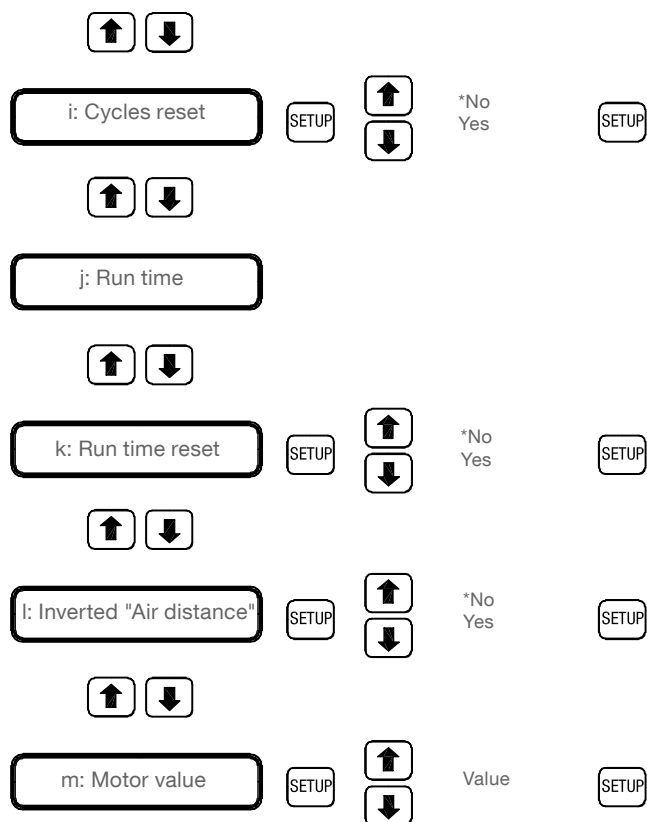
If the unit is working in normal operation (measurement mode), press both "arrow" buttons together for approx. 2 seconds.



continuation next page

Programming

continuation



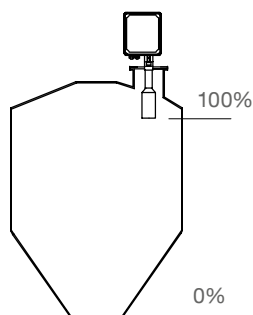
Press **START** to return to measurement mode

* Factory-provided
** Present only with 4-20mA version

Firmware version

States the firmware version of the unit.

Current output mode



Setting	Current output at level	
	0%	100%
4-20 mA	4 mA	20 mA
20-4 mA	20 mA	4 mA

Current at failure

In case of failure the current output shows the adjusted value.

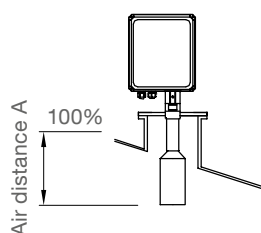
Relay

Selects, if Relais shall indicate "Upper stop position" and "Failure" or work as Counting / Reset pulse output
Details see Signal Overview on page 17/18

Programming

Timer	<p>Automatic start of measurement with timer function.</p> <p>The timing interval between two measurements can be adjusted between 0.1h (6 minutes) and 99.9 hours. Position „off“ causes no automatic measurement start.</p> <p>The timer will be reset after finishing a measurement or after connecting the terminals 24 and 26 (measurement interruption).</p> <p>If the timer is set, a measurement will start immediately after power on.</p> <p>For automatic measurement at a predetermined time of day, an external start unit connected to terminals 24/25/27 is necessary.</p> <p>To avoid needless wear and tear, the unit should not be started more often than necessary.</p>
Manual motor control	<p>The motor moves the sensor weight upwards while the "ARROW UP" button is being pushed. The motor moves the sensor weight downwards while the "ARROW DOWN" button is being pushed.</p> <p>Note: If the sensor weight is in the upper stop position or touching the bulk material surface or after the max. move distance, the motor is automatically stopped.</p> <p>CAUTION: Avoid the sensor weight reaching the outlet position of the silo.</p>
Current output check	<p>Enables to check, if the current output is working proper. The current output is forced to 10mA. This can be evaluated by an external connected multimeter.</p>
Cycles	<p>Indicates how many measurement cycles have been performed up to now.</p>
Cycles reset	<p>Can be done after a rope/tape change, if the service interval message F16 was not yet present. It sets the internal counter to zero to have the full amount of measurement cycles until the next service interval message will appear.</p> <p>Note: After a F16 message is reset with the "START" + "RESET" button, the rope/tape counter is automatically set to zero.</p>
Run time	<p>Indicates, how long the motor has been running up to now (in hours).</p>
Run time reset	<p>Can be done after a motor change, if the service interval message F17 was not yet present. It sets the internal counter to zero to have the full amount of motor run time until the next service interval message will appear.</p> <p>Note: After a F17 message is reset with the "START" + "RESET" button, the motor counter is automatically set to zero.</p>

Inverted "Air Distance"



Enables to set the 100% reference of the 4-20mA output to a level which is over the level of the sensor weight.

To do this the value must be set to "Yes".
The "Air distance A", which is adjusted in the Quickset Menu (see page 19/20), is now over the level of the sensor weight.
The display in the Quickset menu indicates this with a minus as follows: Air distance: - 1.5m .

Note: In this case the output will never reach 100%.

Motor value	Internal value only to be used in case of replacement of the motor (see instruction manual of motor replacement).
--------------------	---

Programming

Modbus Register

The following registers describe the communication via Modbus.

CAUTION

Writing to the registers different from what is stated will cause a miss function of the unit

Register address	Register name	Register description	Register use	Default value
------------------	---------------	----------------------	--------------	---------------

Setup

40001	M_LANGUAGE	Language on the menu DEUTSCH 0 ENGLISH 1 FRANCAIS 2 RUSSIAN 3 ITALIAN 4	R/W	0
40002	M_UNIT	Unit used for distance visualisation METER 0 FEET 1	R/W	0
40003	M_MAX_MOVE_DIST	Max. move distance mm	R/W	1000
40004	M_SILO_HEIGHT	Silo height mm	R/W	0
40005	M_AIR_DIST	Air distance mm	R/W	0
40006	M_CONE_HEIGHT	Cone height mm	R/W	0
40022	M_TIMER	Timer interval (for automatic start of measurements) , in 1/100 hours (Off = 0) Notes: 1/100 hour = 36 sec Minimum time: 0,10 hours (value =10)	R/W	0

Measurement

40051	M_START	Start of a measurement Start 1	W	
40046	M_DISTANCE	Actual measured distance, in mm Note: After the unit has finished the measurement, the M_STATUS register states "Ready, measurement valid" (the Modbus master must read the M_STATUS register). Then the data on the register M_DISTANCE is valid.	R	
40055	M_VOLUME	Actual measured volume (considering the programmed cone height, air distance and silo height), in %. See note on register M_DISTANCE	R	
40052	M_INHIBIT	Block command (allows to block the unit, so that no measurement can be started) No block 0 Block 1 The unit will remain blocked as long as the register has the value "Block". Note: Unit states the blocked status through the M_STATUS register.	W	0
40045	M_STATUS	States the functional status of the unit Blocked 1 Ready, measurement not valid 2 Ready, measurement valid 6 Busy 8 Failure present 16 Temporary not ready 32 Explanation: Blocked: No measurement can be started. Ready: A new measurement can be started. Measurement valid: Indicates a valid measurement. Measurement not valid: Indicates a maintenance condition (details see M_MAINTENANCE)	R	
40057	M_FULL_DETECTOR	States the full detector input status Contact open (24-28) 0 Contact close (24-28) 1	R	

Programming

Diagnostics

		Total measured cycles up to now = "M_TOTAL_CYCLES" + 65536 * "M_TOTAL_CYCLES_H"		
40026	M_TOTAL_CYCLES	Total measured cycles up to now, in cycles	R	
40044	M_TOTAL_CYCLES_H	Total measured cycles up to now, in 65536 cycles	R	
		Measurement cycles left until failure message F16 will appear = "M_CYCLES_LEFT" + 65536 * "M_CYCLES_LEFT_H"		
40028	M_CYCLES_LEFT	Measurement cycles left until F16 will appear, in cycles	R	
40050	M_CYCLES_LEFT_H	Measurement cycles left until F16 will appear, in 65536 cycles	R	
		Total motor run time up to now = "M_TOTAL_RUN_TIME" hours + "M_TOTAL_RUN_TIME_S" seconds		
40029	M_TOTAL_RUN_TIME	Total motor run time up to now, in hours	R	
40048	M_TOTAL_RUN_TIME_S	Total motor run time up to now, in seconds	R	
40031	M_RUN_TIME_LEFT	Motor run time left until F17 will appear, in hours	R	
40053	M_FAILURE	Failure status of the unit (stated on a bit basis) F10 – Motor or motor-driver-electronic defect b0 = 1 F11 – Sensor weight is buried b1 = 1 F12 – Rope/tape broken b2 = 1 F13 – Spring broken b3 = 1 F16 – Service interval rope/tape b5 = 1 F17 – Service interval motor b6 = 1	R	
40054	M_MAINTENANCE	Maintenance status of the unit (stated on a bit basis) M11 – Sensor weight blocked in upper position b1 = 1	R	

Communication

40035	M_ADDRESS	Device address 1 to 247	R/W	31
40036	M_BAUDRATE	Communication speed 1200 baud 0 2400 baud 1 4800 baud 2 9600 baud 3 19200 baud 4 38400 baud 5 57600 baud 6	R/W	4

R/W: read/write R: read only W: write only

Maintenance

General items

Opening the lid (cover)	<p>⚠ Before opening the lid for maintenance reasons observe following items:</p> <ul style="list-style-type: none"> • Do not remove the lid while circuits are alive. • No dust deposits or whirlings are present. • No rain can enter into the housing
Frequent check of the unit	<p>⚠ To ensure durable safety in hazardous locations and with electrical safety, following items must be checked frequently depending on the application:</p> <ul style="list-style-type: none"> • Mechanical damage or corrosion of any components (housing side and sensor side) and of the field wiring cables. • Tight sealing of the process connection, cable glands and enclosure lid. • Properly connected external PE cable (if present).
Cleaning	<p>If cleaning is required by the application, following must be observed:</p> <p>⚠</p> <ul style="list-style-type: none"> • Cleaning agent must comply with the materials of the unit (chemical resistance). Mainly the lid sealing, cable gland and the surface of the unit must be considered. <p>⚠</p> <ul style="list-style-type: none"> • The cleaning process must be done in a way, that: • The cleaning agent cannot enter into the unit through the lid sealing or cable gland. • No mechanical damage of the lid sealing, cable gland or other parts can happen. <p>A possible accumulation of dust on the unit does not increase the maximum surface temperature and must therefore not be removed for purposes of maintaining the surface temperature in hazardous locations.</p>
Production date	<p>The production date can be traced by the serial number on the typeplate. Please contact the manufacturer or your local distributor.</p>
Spare parts	<p>All available spare parts are stated in the selection list</p>

Maintenance

Rope/Tape lifetime

The expected life time (measurement cycles) for the rope/tape is:

Rope version: approx. 200.000

Tape version: approx. 500.000

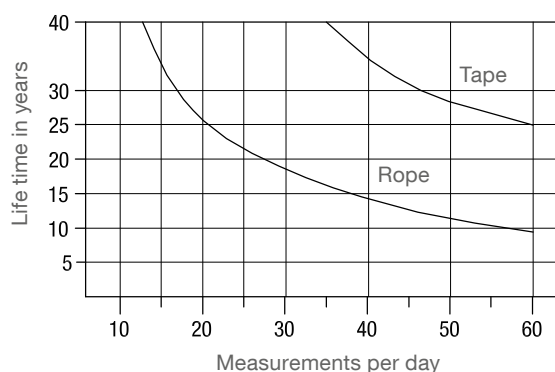
Note: These values refer to lifetime tests under the following conditions:

No excessive material influence. The sensor weight meets an inclined surface, so that an oscillating movement of the sensor weight during upwards movement is caused.

The failure message is displayed at 90% of the expected lifetime to provide some safety. For further information see message F16.

See figure on right hand for the operating time depending on the measurement cycles per day.

For applications with adverse conditions it is recommended to change the rope/tape more frequently.

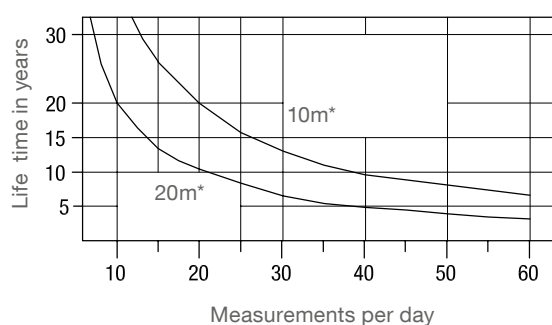


Motor lifetime

The expected life time (run time) for the motor is approx. 3.500 hours.

The failure message is displayed at 90% of the expected lifetime to consider some safety. For further informations see message F17.

See figure on right hand for the operating time depending on the measurement cycles per day.



*average measurement distance

Maintenance

Diagnostics Failure:

Result is an invalid measurement.

Red LED is on. Relay 1 indicates Failure (if selected).

The signal indicates critical situations. Evaluating the signal can help to avoid losing the sensor weight inside the silo.

If Failure is indicated, the unit must be checked on site.

Failure code	Description	Indication	Performance of the device	Solution
F10	a) Rope/tape too short or rope jammed in the rope roller. b) Motor or motor-driver-electronic defect.	Motor does not rotate when it is actuated.	If possible, the sensor weight will be moved up to the "Upper stop position".	a) Check rope/tape. b) Check motor connection. Motor or electronic change.
F11	Sensor weight is buried or jammed.	Difference of distance between down and up movement too big.	Motor moves 4 seconds upwards, then waits 10 seconds. After that motor moves shortly downwards and then upwards again. If the sensor weight is still jammed, this cycle is repeated 5 times. After that the cycle goes on with a delaytime of one hour.	Release the sensor weight. Make sure, that the sensor weight can move freely.
F12	Rope / tape broken.	Motor is running but the upper stop position is not reached.	Motor moves upwards. If after a certain time the upper stop position is not reached, the motor stops.	Repair of rope/tape break. Check, if rope/tape maintenance was properly done. Check possibility of buried sensor weight.
F13	Spring broken.	Motor moves downwards and upper stop position is sensed	Motor stop.	Check internal spring.
F15	Not enough current available from DC power supply (DC version only).	Supply voltage drops during function.	Sensor weight is moved to the upper stop position.	Enable enough supply current according to the technical data specification.
F16	Service interval: rope/ tape.	The amount of measurement cycles is 90% of the rope/tape lifetime.	The measurement cannot be restarted.	Change rope- or tape roller (do not just cut the rope or tape*).
F17	Service interval: motor.	The actual run time is 90% of the motor lifetime.	The measurement cannot be restarted.	Change motor.

By pushing the START and SETUP button together for 2 seconds, the failure message shown on the display can be reset.

* Cutting of the rope or tape shall not be done. This leads to an inaccurate measurement result, because it changes the diameter of the rope- or tape roller and therefore leads to a different tape length related to the number of turns of the tape roller.

CAUTION

Resetting F16 or F17 without changing the rope/tape respective the motor will cause material damage by a broken rope/ tape.

Before removing the rope/tape roller, remove the unit from the silo to avoid, that the sensor weight can fall into the silo.

Diagnostics - Maintenance:

Red LED is blinking.

The following message is indicated on the display, but will NOT lead to a failure state and is not indicated by the failure relays or the 4-20mA output:

Code	Description	Performance of the device	Solution
M11	Sensor weight blocked in "upper stop position" or block distance of sensor weight to short	The unit tries to start 5 times. If the sensor weight is not released during this time, the message is shown. If after a new measurement start the sensor weight is released, the message will automatically disappear.	Release sensor weight. Ensure, that the min. moving distance (block distance) is >200mm (7.87")

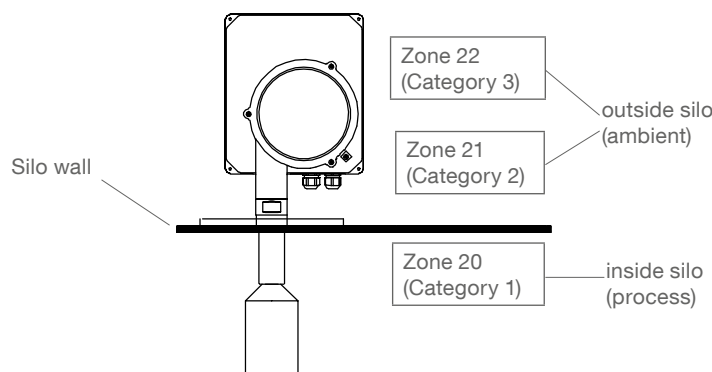
Notes for use in Hazardous Locations

ATEX Zone classification

Category	useable in zone	
1 D	20, 21, 22	* in case of conductive dust, additional requirements for installation are necessary.
2 D	21, 22	
3 D*	22	



Permitted zones (categories) for mounting in partition wall



General notes

Marking

Devices with Ex-approval are marked on the type plate.

Process pressure

The device construction allows process over-pressure up to +0.2bar (2.9psi). This pressure is allowed for test purposes. The definition of the Ex approvals are only valid for a silo-over-pressure between -0.2..+0.1 bar (-2.9..+1.45psi). Outside of these pressure the approvals are not valid.

Process and ambient temperature

The permitted temperature range is marked on the type plate.



Maximum Surface Temperature

The maximum surface temperature refer to the warmest area outside on the unit which can occur in failure case (according to Ex definition).

Max. Ambient temperature	Max. Process temperature	Max. Surface temperature	Temperature Code
60°C (140°F)	80°C (176°F)	117°C (243°F)	T4A
50°C (122°F)	90°C (194°F)	117°C (243°F)	T4A
40°C (104°F)	100°C (212°F)	117°C (243°F)	T4A
	110°C (230°F)	117°C (243°F)	T4A
	120°C (248°F)	120°C (248°F)	T4A
	130°C (266°F)	130°C (266°F)	T4
	135°C (275°F)	135°C (275°F)	T4
	140°C (284°F)	140°C (284°F)	T3C
	150°C (302°F)	150°C (302°F)	T3C



Static discharge of the material surface

It must be ensured that no static discharge can occur when the grounded metal sensor weight or rope /tape touches the surface of the bulk material. If this can not be ensured, the safe use of the unit is NOT guaranteed. The responsibility for this rests with the user. In case of in clarity an assessment from a notified body is necessary.

From the manufacturer side a version with a plastic sensor weight and additional plastic rope insulation part is available on request. This keeps a 500mm (19.7") distance from the material surface to the grounded rope/tape.

Disposal

The product consists of materials which can be recycled, details of the used materials see chapter "Technical data - mechanical data".

Recycling must be done by a specialised recycling company. Since the product is not subject to the WEEE directive 2002/96/EG, it is not permitted to bring it to a public recycling station.

Table of contents

	Page
Safety notes / Technical support	2

Introduction	3

Dimensions	4

Options	5

Technical data	6

Mounting	9

Electrical installation	12

Programming	14

Trouble shooting	18

Menu structure	19

Maintenance	22

Notes for use in Hazardous Locations	23

Disposal	25

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

We assume no liability for typing errors.
 Different variations to those 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

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



WARNING

Used when there is no corresponding caution symbol on the product, means that failure to observe the necessary precautions can result in death, serious injury, and/or considerable material damage.

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 related documents (manual) for details.



Earth (ground) Terminal



Protective Conductor Terminal

Technical support

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

UWT GmbH
 Westendstr. 5
 87488 Betzigau
 Germany

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

Introduction

NivoRadar® is a 2-wire, 78 GHz FMCW radar level transmitter for continuous monitoring of solids and liquids in silos and vessels.

Applications

Ideal system for all solids applications, including those with extreme dust and high temperatures to +200 °C (+392 °F).

- Powder, granulate, small or coarse bulk goods

Available for industries such as

- Food
- Grain
- Cement
- Plastics
- others

Function

The main benefits of using 78 GHz over devices using lower frequency are:

- Very narrow beam, so device is insensitive to mounting nozzle interference and vessel obstructions.
- Short wavelength yields very good reflection properties on sloped solids, thus a safe measurement is ensured.

The technology is very tolerant to buildup on the lens antenna, however an air purge inlet is provided for periodic cleaning if required. Signals are processed using Process Intelligence which has been field-proven in over 1,000,000 applications worldwide (ultrasonic and radar).

Features

Measurement range

- Up to 100m (329 ft)

Approvals

- Approval for use in both General and Hazardous Locations.

Mechanic

- Lens antenna and flange for quick and easy positioning.
- Stainless steel housing.
- Plane flanges and Aiming flanges.

Service

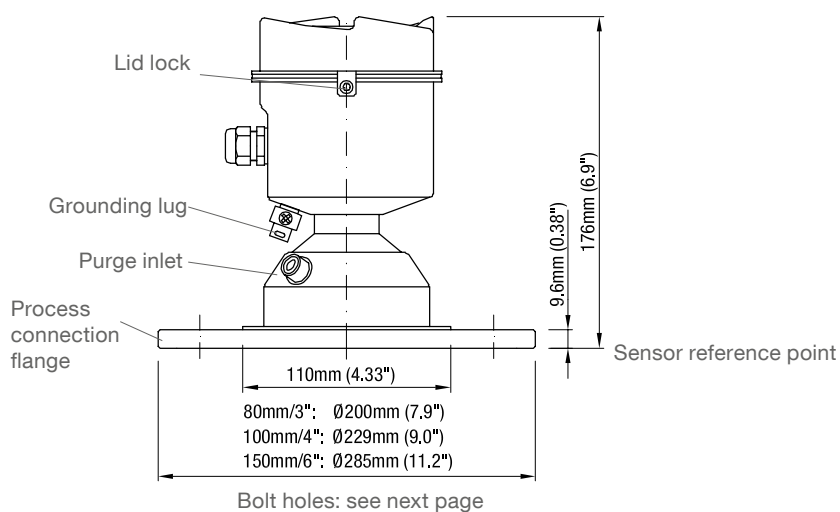
- Plug and play system, simple installation and commissioning.

Programming

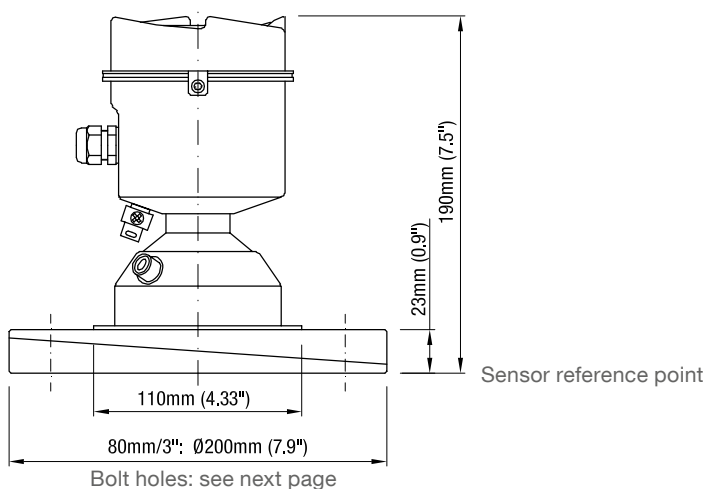
- Configure via optional Plug on Display with push buttons.
Configuration with only 6 parameters.
Once programmed, the Plug on Display can be removed if desired and used to copy parameters to multiple units.
- Alternative configuration via HART possible.

Dimensions

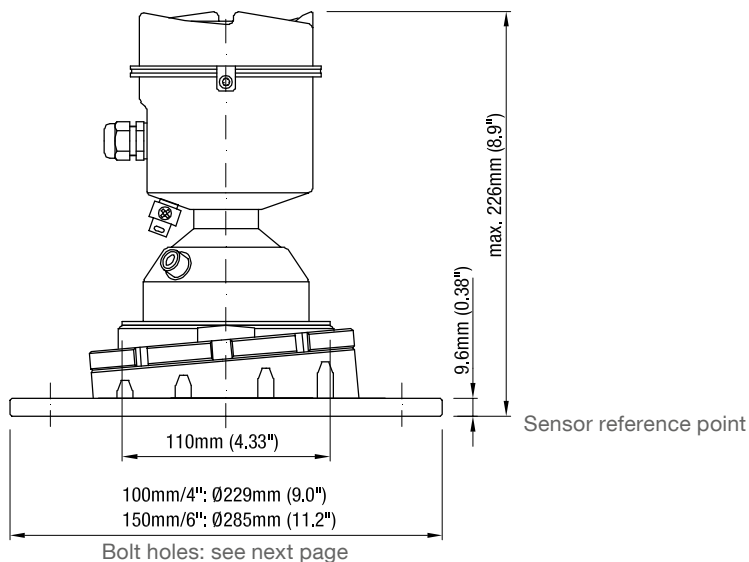
Plane flange version



Easy Aimer flange version 80mm/3"

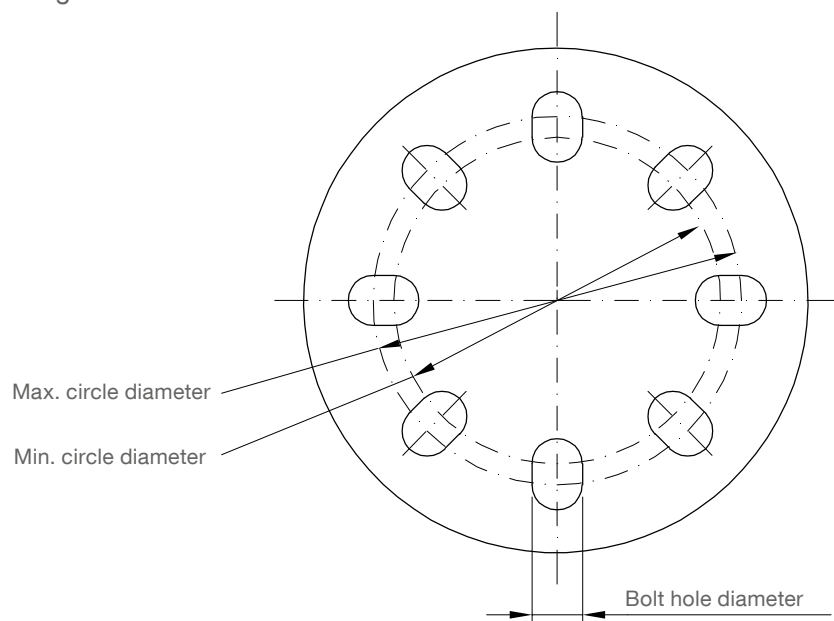


Easy Aimer flange version 100mm/4" 150mm/6"



Dimensions / Options

Flanges



Universal flange (plane flange and Easy Aimer flange) mates with bolt hole pattern of:
 EN 1092-1 (PN16)
 ASME B16.5 (150 lb)
 JIS 2220 (10K)

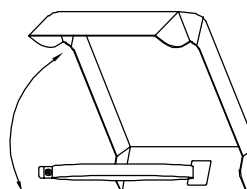
Pipe size	Max. circle diameter	Min. circle diameter	Bolt hole diameter	Number of bolt holes
80mm/3"	160mm (6.30")	150mm (5.91")	19.3mm (0.76")	8
100mm/4"	191mm (7.52")	175mm (6.89")	19.3mm (0.76")	8
150mm/6"	242mm (9.53")	240mm (9.45")	23mm (0.90")	8

Options

Sun protection cover

If the unit is used outdoors, the use of the sun protection cover is recommended. It protects the device from excessively high temperatures.

Material: Stainless steel 1.4301 (304)



Mounting kits

Sealings, screws and washers for mounting the unit on a flange

Technical data

Electrical data

Power supply	4-20 mA loop power Nominal 24V DC (16.5 .. 30V DC)								
4-20mA output	Accuracy ± 0.02 mA Upper limit 20 to 22.6 mA adjustable Lower limit 3.56 to 4 mA adjustable Fail signal 3.56 mA to 22.6 mA; or last value								
Max. loop resistance	<table border="1"> <thead> <tr> <th>Loop voltage</th><th>Max. loop resistance</th></tr> </thead> <tbody> <tr> <td>16.5V</td><td>250 Ohm</td></tr> <tr> <td>24V</td><td>550 Ohm</td></tr> <tr> <td>30V</td><td>800 Ohm</td></tr> </tbody> </table>	Loop voltage	Max. loop resistance	16.5V	250 Ohm	24V	550 Ohm	30V	800 Ohm
Loop voltage	Max. loop resistance								
16.5V	250 Ohm								
24V	550 Ohm								
30V	800 Ohm								
Communication HART	Max. line length: multi-wire: ≤ 1500 m (4921 ft) (depending on wire type. See www.hartcomm.org for more details) Protocol HART, Version 6.0								
Memory	Non-volatile EEPROM (no battery required)								
Connection terminals	0.34 .. 2.5 mm ² (AWG 22 .. 14)								
Cable entry	1 piece M20x1.5 or 1/2" NPT								
Plug on display (inside housing)	Removeable graphic LCD, with bar graph representing level. Display quality will be degraded in temperatures below -20 °C (-4 °F) and above +65 °C (+149 °F).								

Mechanical data

Ingress protection	Type 4X/NEMA 4X, Type 6/NEMA 6, IP68
Process connection	Plane flanges: EN 1092-1 (PN16)/ASME B16.5 (150 lb)/JIS 2220 (10K) bolt hole pattern 3"/80 mm, 4"/100 mm, 6"/150 mm Stainless steel 316L (1.4404 or 1.4435), or 304 Easy Aimer flanges: EN 1092-1 (PN16)/ASME B16.5 (150 lb)/JIS 2220 (10K) bolt hole pattern 3"/80 mm, 4"/100 mm, 6"/150 mm Polyurethane powder-coated cast aluminum
Enclosure	316L/1.4404 stainless steel Lid with window (window material polycarbonate)
Lens antenna	Material: 40 m version: PEI 100 m version: PEEK
Air Purge Connection	Female 1/8" NPT fitting Non return valve (option, stainless steel, connection of 6mm tube diameter, opens at ca. 0.5 bar (7.25psi))
Weight	3" stainless steel flange model: 3.15 kg (6.94 lb)

Technical data

Operating conditions

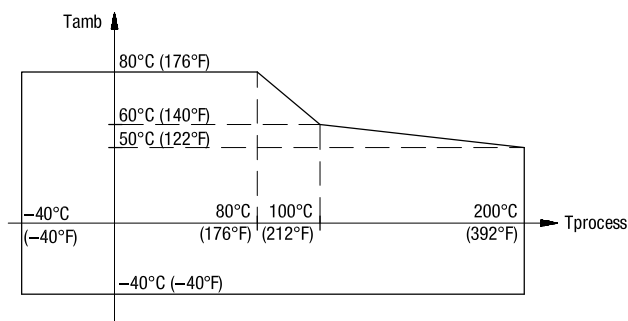
Ambient temperature -40 .. +80 °C (-40 .. +176 °F)

Process temperature

40m version:
-40°C .. +100°C
(-40 .. +212°F)

100m version:
-40°C .. +200 °C
(-40 .. +392 °F)

Observe derating curve



Process overpressure Depending on ordered version:
-1 ..+0.5bar (-14.5 ..+7.2psi)
-1 ..+3.0bar (-14.5 ..+43psi)

Ventilation Ventilation is not required

Pollution degree 4

Installation category I

Relative humidity 0-100%, suitable for outdoor

Altitude max. 5000m (16.404ft)

Performance

Accuracy of measurement Maximum measured error:
5mm (0.2") including hysteresis and non-repeability. Under severe EMC environments per IEC 61326-1 or NAMUR NE21 the device error may increase to max. 25mm (1").

Reference conditions:
Position Detect (2.7.3.3.) set to Center and Algorithm (2.7.3.1.) set to True First Echo.
Measured in accordance with IEC 60770-1:

- ambient temperature +15 to +25 °C (+59 to +77 °F)
- humidity 45% to 75% relative humidity
- ambient pressure 860 to 1060 mbar g (86 000 to 106 000 N/m² g)

Frequency / Beam angle 78 ..79 GHz FMCW / Beam angle 4°

Max. measurement range 40 m version: 40 m (131 ft)
100 m version: 100 m (328 ft)
From sensor reference point

Min. detectable distance 400 mm (15.7") from sensor reference point

Dielectric constant of material measured For ranges up to 20 m (65.6 ft): min. DK = 1.6
For ranges up to 100 m (328 ft): min. DK = 2.5

Update time Maximum 10 seconds (Response Rate (2.4.1.) set to FAST)

Influence of ambient temperature < 0.003%/K (average over full temperature range, referenced to maximum range)

Technical data

Transport and Storage

Transport	Observe the instructions as stated on the transport packaging, otherwise the products may get damaged. Transport temperature: -40 .. +80 °C (-40 .. +176 °F) Transport humidity: 20 .. 85 % Transport incoming inspections must be carried out to check for possible transport damage.
Storage	Products must be stored at a dry and clean place. They must be protected from influence of corrosive environment, vibration and exposure to direct sunlight. Storage temperature: -40 .. +80 °C (-40 .. +176 °F) Storage humidity: 20 .. 85 %

Approvals

Hazardous Locations*	Dust Ignition Proof: ATEX II 1D, 1/2D, 2D Ex ta IIIC IEC-Ex Ex ta IIIC T139°C Da FM/CSA DIP Class II, Div.1, Gr. E, F, G Class III TR-CU Ex ta IIIC T! Da X Non-sparking/ Energy Limited: ATEX II 3G Ex nA II T4 Gc, Ex nL IIC T4 Gc IEC-Ex nA II T4 Gc, nL IIC T4 Gc, ta IIIC TR-CU Ex na IIC T4 Gc X, Ex ic IIC T4 Gc X Non-incendive: FM/CSA NI Class I, Div.2, Gr. A,B,C,D
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Ordinary Locations*	CE FM / CSA General purpose TR-CU General purpose
EMC	EN 61326 -1 (industrial standard)
RoHS conformity	According to directive 2011/65/EU
Radio	R&TTE Compliance (Europe) FCC Conformity (US) Industry Canada

R&TTE Compliance (Europe)

Hereby, UWT GmbH, declares that the NR 3000 is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

The NR 3000 complies with EN 302 372 for use in closed storage vessels, when installed according to the installation requirements of EN 302 372, and may be used in all EU countries.

The NR 3000 complies with EN 302 729 for use outside of closed tanks in EU countries. For open air installations, the following conditions must be observed:

- Installation and maintenance is performed by suitably qualified and trained personnel.
- The NR 3000 shall be installed only in a permanent fixed position pointing downwards. Its location shall comply with the following two restrictions:
 - 1) It shall be installed with a minimum separation distance of 4 km from Radio Astronomy sites listed at www.craf.eu/raobs.htm unless special authorization has been provided by the responsible national regulatory authority.
 - 2) If it is installed at a location between 4 and 40 km from any Radio Astronomy site listed at www.craf.eu/raobs.htm, the NR 3000 shall be installed at a height not exceeding 15m from the ground.

FCC Conformity (US)

US Installations only: Federal Communications Commission (FCC) rules:
WARNING: Changes or modifications not expressly approved by UWT GmbH could void the user's authority to operate the equipment.

Notes:

- This device has been tested and found to comply with the limits Class B digital device part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

* Depending on selected version in selection list

Technical data / Mounting

- This device has also been tested and found to comply with the limits §15.256, Subpart C-Intentional radiators, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.
- This device generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications, in which case the user will be required to correct the interference at his/her own expense.
- This device may be used to measure levels in fixed or mobile enclosed tanks.
- This device may be used to measure levels in open air environments or outside enclosed tanks, subject to the following conditions:
 - o Devices shall be installed and maintained to ensure a vertically downward orientation of the transmit antenna's main beam.
 - o Devices shall be installed only at fixed locations. Devices shall not operate while being moved or while inside a moving container.
 - o Hand-held applications and residential use are prohibited.

Industry Canada

The NR 3000 complies with Industry Canada standard RSS211 (March 2015).

- The installation of the NR 3000 shall be done by trained installers, in strict compliance with the manufacturer's instructions.
- The use of this device is on a "no-interference, no-protection" basis. That is, the user shall accept operations of high-powered radar in the same frequency band which may interfere with or damage this device. However, devices found to interfere with primary licensing operations will be required to be removed at the user's expense.
- The installer/user of this device shall ensure that it is at least 10 km from the Dominion Astrophysical Radio Observatory (DRAO) near Penticton, British Columbia. The coordinates of the DRAO are latitude 49°19'15" N and longitude 119°37'12" W. For devices not meeting this 10 km separation (e.g., those in the Okanagan Valley, British Columbia,) the installer/user must coordinate with, and obtain the written concurrence of, the Director of the DRAO before the equipment can be installed or operated. The Director of the DRAO may be contacted at 250-497-2300 (tel.) or 250-497-2355 (fax). (Alternatively, the Manager, Regulatory Standards, Industry Canada, may be contacted.)

Mounting

! General Safety Instructions

Process pressure	Improper installation may result in loss of process pressure. Never attempt to loosen, remove, or disassemble process connection or instrument housing while vessel contents are under 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.
Mounting location	The right mounting place is significant for a proper function. Observe mounting instructions.
Sealings	The user is responsible for the selection of bolting and gasket materials which will fall within the limits of the flange and its intended use and which are suitable for the service conditions.

! Additional Safety Instructions for Hazardous Locations

Installation regulations	For devices to be used in Hazardous Locations the respective valid installation regulations must be observed.
Electrostatic charge	Parts of the enclosure may be non-conducting and may generate an ignitioncapable level of electrostatic charge under certain extreme conditions. The user should ensure that the equipment is not installed in a location where it may be subjected to external conditions (such as high-pressure steam), which might cause a build-up of electrostatic charge on non-conducting surfaces.

Mounting

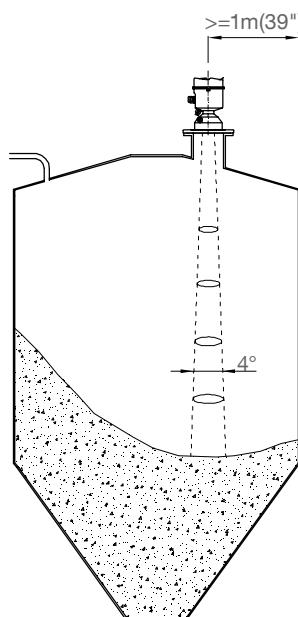
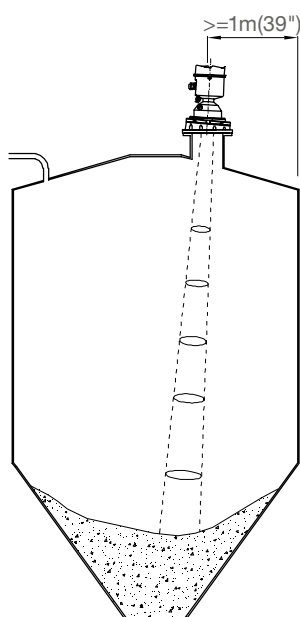
Mounting instructions

Mounting position and aiming

- The unit is mounted vertically on top of the silo.
- Observe enough distance to the wall.
- Avoid central locations on tall, narrow vessels.
- A clear line of sight from the sensor to the product being monitored is required.
- Keep the sensor away from fill pipes, ladders, beams etc.

Aiming is strongly suggested for solid measurement. It helps to optimize the echo signal (mainly for low material level in the cone) and helps to solve not perfect mounting positions.

For proper mounting positions vertical installation without aiming is possible.

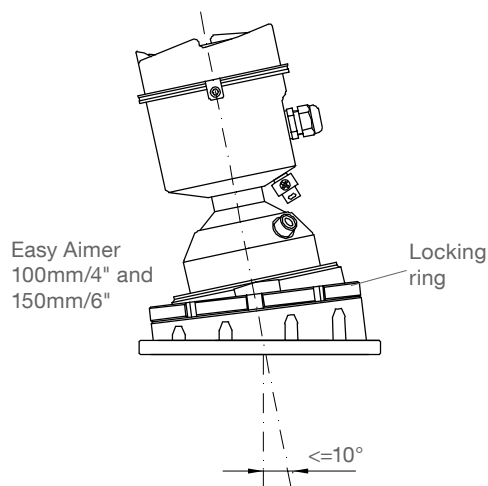
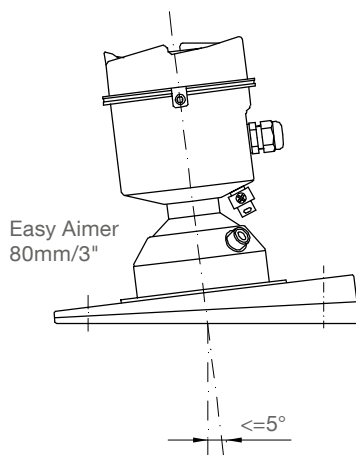


Easy Aimer adjustment

1. For the 80mm/3" Easy Aimer flange, tapered split washers with pressure rated versions are provided to keep nuts and bolts perpendicular to the flange surface.

For 100mm/4" and 150mm/6" Easy Aimer flange: Loosen the set screws in the locking ring. Holding the electronics enclosure firmly, loosen the Aimer locking ring using the supplied C spanner, until the unit drops down slightly. The enclosure can then be turned freely.

2. Direct the unit in the desired position and re-tighten the screws.



Mounting

Air Purging System

Use of air purging system

- The purge airflow is designed to create a strong vortex of air that rapidly cleans the face of the lens.
- The air purge system can clean both dust and moisture off the lens.
- It can be used for periodic cleaning.

Purge airflow

- The customer will supply the purging air by a manual or automatic valve system.
- Clean, dry air must be provided.
- Recommended 6.2 .. 7.6bar (90 ..110 psi) for effective cleaning.
- Air pressure in vessel can affect purge operation.

Notes:

- Purge duration, pressure, and interval, will vary with each application. It is the user's responsibility to determine the requirements depending on the application and cleaning required.
- Short duration bursts of high pressure provide more effective cleaning than continuous low pressure air.
- It is the customer's responsibility to ensure that any vacuum or pressure in the measured vessel is maintained, considering the hole that passes through the process connection and the antenna system.

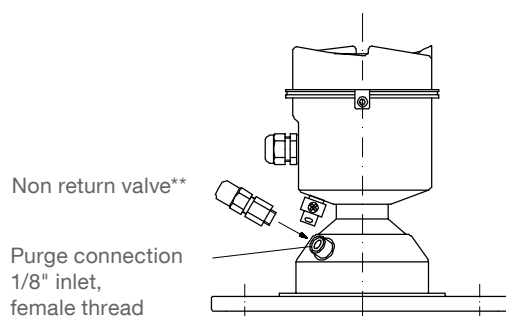
Flow rate versus applied pressure:

Air Pressure	Approx. inlet volume flow rate
1.4bar (20 psi)	54 Nm ³ /h (5 SCFM*)
2.8bar (40 psi)	107 Nm ³ /h (10 SCFM*)
3.4 bar (50 psi)	161 Nm ³ /h (15 SCFM*)
5.5 bar (80 psi)	214 Nm ³ /h (20 SCFM*)
6.9 bar (100 psi)	268 Nm ³ /h (25 SCFM*)
7.6 bar (110 psi)	322 Nm ³ /h (30 SCFM*)

*standard cubic feet per minute

Purge Connection

- The purge connection is closed by the manufacturer.
- When the plug is removed to connect a purging system, the operator is responsible for ensuring that the purging circuit conforms to "Ex" requirements, for example, by fitting an NRV valve (non return valve). If applicable use the Non return valve offered by the manufacturer.



** Non return valve offered by the manufacturer:

- Stainless steel
- Connection of 6mm tube diameter
- Opens at ca. 0.5 bar (7.25psi)

Electrical installation

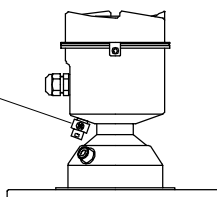
! General Safety Instructions

Handling	In 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.
Type plate	Check the type plate on your instrument to verify the approval rating.
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 name plate before switching the device on. The DC input terminals shall be supplied from a source providing electrical isolation between the input and output, in order to meet the applicable safety requirements of IEC 61010-1.
Cable gland	The screwed cable gland and closing element must have following specifications: Ingress protection IP68, temperature range from -40°C to +80°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). 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 NPT 1/2" in accordance with the unit and ANSI B 1.20.1.
Field wiring cables	Use twisted pair cable. The cross section has to match with the clamping range of the connection terminals. The temperature rating must be in accordance to the ambient temperature.
Guiding and connecting the cable in the terminal box	Cut the field wiring cables to appropriate length to fit properly into the terminal box. Strip the cable jacket for approximately 70 mm (2.75") from the end of the cable, and thread the wires through the gland.

! Additional Safety Instructions for Hazardous Locations

External equipotential bonding terminal

Connect to equipotential bonding of the plant

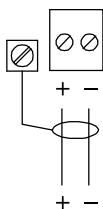


Field wiring	The equipment shall be installed such that the supply cable is protected from mechanical damage. The cable shall not be subjected to tension or torque. The equipment manufacturer is not responsible for providing the supply cable.
Cable glands for ATEX/ TR-CU Hazardous Locations	The used entry devices and blanking elements must have an adequate type approval (protection concepts type 'n' or increased safety 'e' or flameproof 'd') and a temperature range as defined in the technical data of the unit. In addition they shall be suitable for the conditions and correctly installed. Where available the provided original parts of the manufacturer must be used.
Conduit system for FM Hazardous Locations	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 as defined in the technical data of the unit. In addition they shall be suitable for the conditions and correctly installed. Where available the provided original parts of the manufacturer must be used.
Supply rating	The supply to the equipment shall be rated for a prospective short-circuit current of not more than 10 kA and shall be protected by a suitably-rated fuse.
Further safety notes	See page 23.

Electrical installation

4-20mA

The terminals are located below the display. To connect the unit, remove the display by gently turning the display a quarter turn counter-clockwise until it is free.



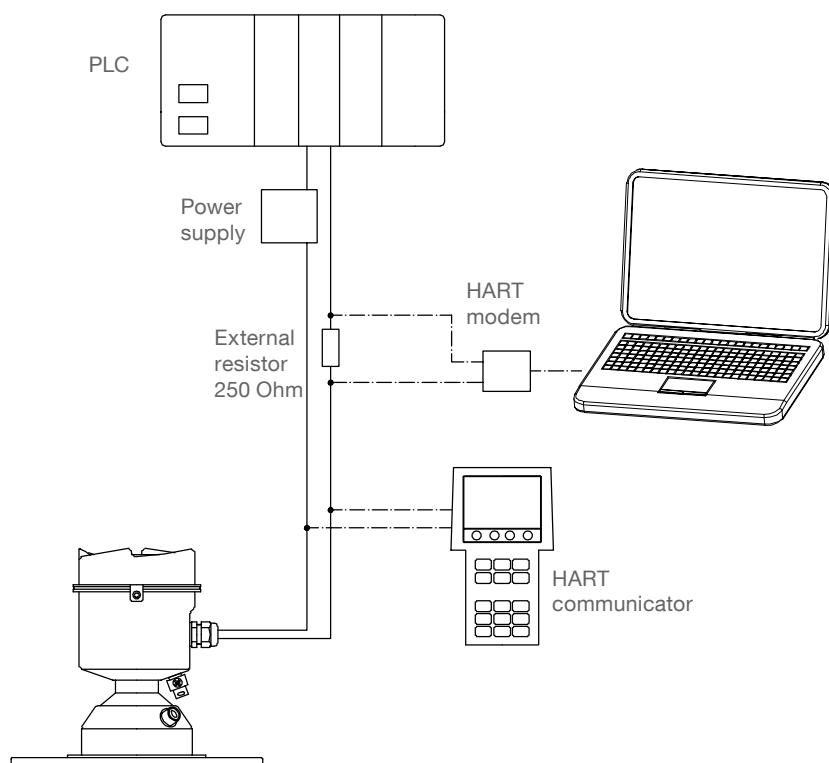
Use twisted pair cable: 0.34 mm² to 2.5 mm² (AWG 22 to 14)
 Connect cable shield to ground terminal

24V DC / 4-20mA loop

4-20mA HART

Typical PLC/mA configuration with HART:

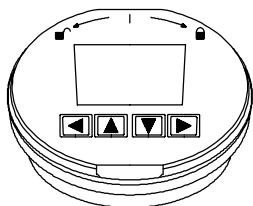
- Depending on the system design, the power supply may be separate from the PLC, or integral to it.
- HART resistance (total loop resistance, that is, cable resistance plus 250 Ohm (external resistor) must be less than 550 Ohm @24V supply for the device to function properly.
- The external resistor is not required, if the PLC has an integral 250 Ohm resistor.



Programming

Overview

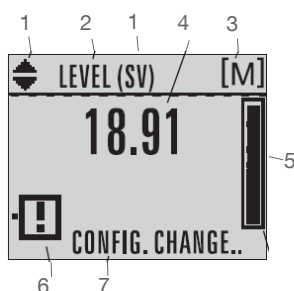
Plug on display



Programming is done with the "Plug on display".

The first time the device is configured, you will be prompted to select a language (English, German, French, Spanish or Chinese). Select language with and confirm by pressing .

Measurement mode



Normal operation:

- 1 Not relevant*
- 2 Selected operation: level, space, or distance.
- 3 Selected units: m, cm, mm, ft, in.
- 4 Actual measured value (according to selected items 2 and 3).
- 5 Bar graph indicates level.
- 6 Device status indicator.
- 7 Device status text messages.

* Relevant with advanced programming. Toggle indicator for PV or SV (primary or secondary values). PV values represent the 4-20mA output (considering a programmed linearisation), SV values represent the pure measured values (without linearisation). Press to switch.

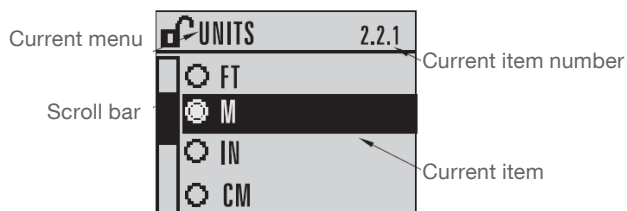


In case of fault:

- 6 Service required icon appears.
- 7 Text area displays a fault code and an error message.

Program mode

Display view



General procedure modify digits

Note: When the Enter icon is highlighted, press to insert a digit on the right, to delete the right-most digit, to accept the value, or to cancel.

1. Navigate to the parameter you wish to modify and press to edit it. The value will be highlighted.
2. Press or to delete the highlighted value, or to modify the value from the left-most digit, starting with the plus/minus sign.
3. With the plus or minus sign highlighted, press or to change it. Press to highlight the next digit to the right.
4. Use or to modify the highlighted digit. Scroll past 9 to reach the decimal point.
5. When the value is complete, press until the Enter icon is highlighted, then press to accept the value.

To modify a text string

1. Navigate to the parameter you wish to modify and press to edit it. The string will be highlighted.
2. Follow the same steps as above, to add, delete, or modify characters.

Programming

Quick Start

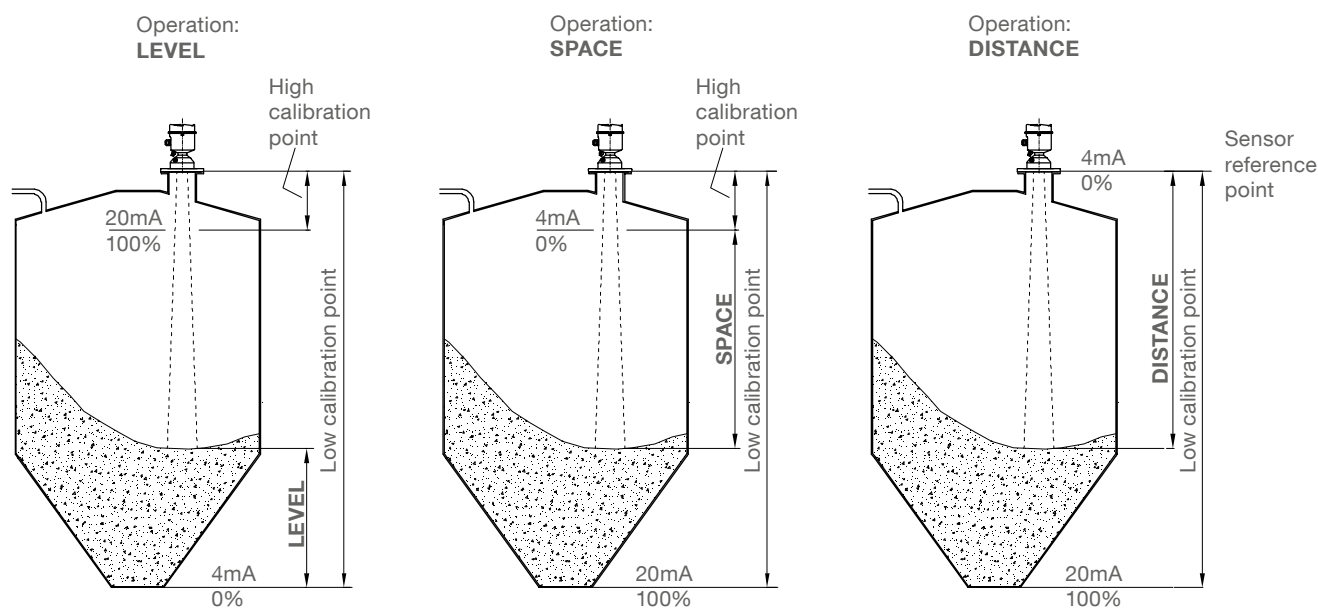
In Measurement mode press **▶** to enter Program mode.
Choose Quick Start (1.), and then press **▶** to enter Quick Start Wizard (1.1.).
Press **▼** to jump to first Quick Start item "Vessel".

Vessel	<div><div>QUICK START WIZ</div><div>VESSEL</div><div><div><div>STEEL</div></div><div><div>BACK</div><div>CANCEL</div><div>EDIT</div><div>NEXT</div></div></div></div>	<div><div>VESSEL</div><div><div>STEEL</div><div>CONCRETE</div></div></div>	<p>Select vessel construction material.</p> <p>Options:</p> <p>Steel *</p> <p>Concrete</p>								
Response Rate	<div><div>QUICK START WIZ</div><div>RESPONSE RATE</div><div><div><div>FAST</div></div><div><div>BACK</div><div>CANCEL</div><div>EDIT</div><div>NEXT</div></div></div></div>	<div><div>RESPONSE RATE</div><div><div>SLOW</div><div>MED</div><div>FAST</div></div></div>	<p>Sets the reaction speed of the device to measurement changes in the target range.</p> <table><tr><td>Response Rate</td><td>Vessel Fill Rate or Empty Rate</td></tr><tr><td>SLOW</td><td>0.1 m/min (0.32 ft/min)</td></tr><tr><td>MED *</td><td>1.0 m/min (3.28 ft/min)</td></tr><tr><td>FAST</td><td>10.0 m/min (32.8 ft/min)</td></tr></table> <p>Use a setting just faster than the maximum vessel filling or vessel emptying rate (whichever is greater).</p>	Response Rate	Vessel Fill Rate or Empty Rate	SLOW	0.1 m/min (0.32 ft/min)	MED *	1.0 m/min (3.28 ft/min)	FAST	10.0 m/min (32.8 ft/min)
Response Rate	Vessel Fill Rate or Empty Rate										
SLOW	0.1 m/min (0.32 ft/min)										
MED *	1.0 m/min (3.28 ft/min)										
FAST	10.0 m/min (32.8 ft/min)										
Units	<div><div>QUICK START WIZ</div><div>UNITS</div><div><div><div>m</div><div>cm</div><div>mm</div><div>ft</div><div>in</div></div><div>M</div><div><div>BACK</div><div>CANCEL</div><div>EDIT</div><div>NEXT</div></div></div></div>	<div><div>UNITS</div><div><div>M</div><div>CM</div><div>MM</div><div>FT</div></div></div>	<p>Sensor measurement units shown on the display.</p> <p>Options:</p> <p>m *, cm, mm, ft, in</p>								
Operation	<div><div>QUICK START WIZ</div><div>OPERATION</div><div><div><div>LEVEL (1)</div></div><div><div>BACK</div><div>CANCEL</div><div>EDIT</div><div>NEXT</div></div></div></div>	<div><div>OPERATION</div><div><div>LEVEL (1)</div><div>SPACE (2)</div><div>DISTANCE (3)</div></div></div>	<table><tr><td>Operation</td><td>Description</td></tr><tr><td>LEVEL (1) *</td><td>Distance from Low Calibration Point to material surface</td></tr><tr><td>SPACE (2)</td><td>Distance from High Calibration Point to material surface</td></tr><tr><td>DISTANCE(3)</td><td>Distance from Sensor Reference Point to material surface</td></tr></table> <p>The 4-20mA output will be set accordingly, see drawing on next page.</p>	Operation	Description	LEVEL (1) *	Distance from Low Calibration Point to material surface	SPACE (2)	Distance from High Calibration Point to material surface	DISTANCE(3)	Distance from Sensor Reference Point to material surface
Operation	Description										
LEVEL (1) *	Distance from Low Calibration Point to material surface										
SPACE (2)	Distance from High Calibration Point to material surface										
DISTANCE(3)	Distance from Sensor Reference Point to material surface										
Low calibration point	<div><div>QUICK START WIZ</div><div>LOW CALIB. PT.</div><div><div><div>100.000</div></div><div><div>BACK</div><div>CANCEL</div><div>EDIT</div><div>NEXT</div></div></div></div>	<div><div>LOW CALIB. PT.</div><div><div>100.000</div><div>+100.000</div></div></div>	<p>Distance from Sensor Reference Point to Low Calibration Point: usually process empty level.</p> <p>Values Range: 0 to 40m/100m.</p> <p>See drawing on next page.</p>								
High calibration point	<div><div>QUICK START WIZ</div><div>HIGH CALIB. PT.</div><div><div><div>0.000</div></div><div><div>BACK</div><div>CANCEL</div><div>EDIT</div><div>NEXT</div></div></div></div>	<div><div>HIGH CALIB. PT.</div><div><div>0.000</div><div>+0.000</div></div></div>	<p>Distance from Sensor Reference Point to High Calibration Point: usually process full level.</p> <p>Values Range: 0 to 40m/100m.</p> <p>See drawing on next page.</p>								

To transfer Quick Start values to the device and return to Program menu, press **▼** (Finish).
To ensure a safe measurement, go to page 17, "Check for safe measurement using echo profile"

* Factory setted values

Programming

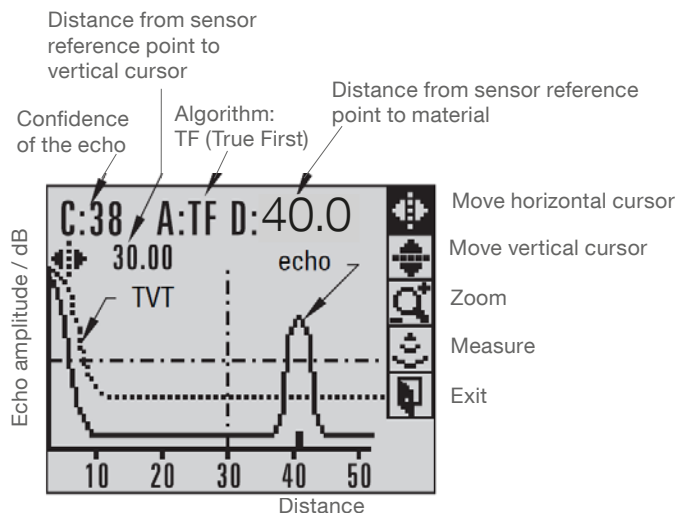


Programming

Check for safe measurement using echo profile

In Measurement mode press **▶** to enter Program mode.
 Choose Diagnostics (3.), and then Echo Profile (3.2.).
 Press **▶** to request a profile.

Displayed echo profile



- Distance from sensor reference point to vertical cursor:
Allows to measure the exact distance of an echo.
- Algorithm TF (True First):
Standard setting. The first echo which is bigger than the TVT curve is considered as material level.
- Distance from sensor reference point to material:
Distance of the echo considered as material level.

To navigate in the echo profile

Use **▲** or **▼** to scroll to an icon. When an icon is highlighted, that feature becomes active.

To move a cursor, press **▶** to increase the value, **◀** to decrease.

To Zoom into an area, position the intersection of the cursor at the center of that area, select Zoom, and press **▶**. Press **◀** to Zoom out.

To update the profile, select Measure and press **▶**.

Checking the echo profile

Following items can easily be checked:

- Confidence of the echo needs to be ≥ 5 . If the value is smaller, the echo is too weak.
- Echoes in front of the material level echo need to be significant below the TVT curve. If an echo is present which is bigger than the TVT curve, it is considered as material level and causes a wrong measurement.

Possible improvements:

Check for proper mounting position (see chapter Mounting).

Check if sensor aiming helps to decrease such an echo (see chapter Mounting).

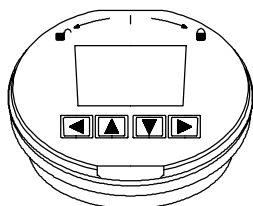
If no improvement is possible, contact manufacturer.

Return to Measurement mode

To return to the previous menu, select Exit, then press **▶**, then press **◀** to return to Measurement mode.

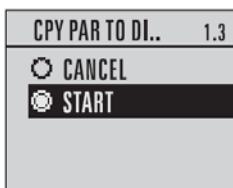
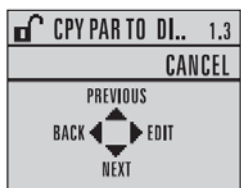
Programming / Trouble shooting

Copy of programmed parameters to other devices



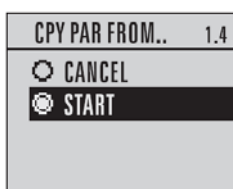
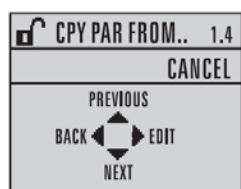
After a device is programmed, the parameters can be copied to other devices by loading the parameters into the "Plug on display", then remove the display from the device, insert it on another device and load the parameters into this device.

Copy parameters to "Plug on display"



In Measurement mode press **▶** to enter Program mode.
Choose Quick Start (1.), then CPY PAR TO DI (1.3). Press **▶**, then select START and press **▶**. PARAM UPLOAD is displayed, then the device returns to Measurement mode.

Copy parameters from "Plug on display" to a unit



In Measurement mode press **▶** to enter Program mode.
Choose Quick Start (1.), then CPY PAR FROM (1.4). Press **▶**, then select START and press **▶**. PARAM DOWNLOAD is displayed, then the device returns to Measurement mode.

Advanced programming and FDT (Pactware)

This is not part of this manual. Please refer to manufacturer for more information.

Trouble shooting

Failure description	Possible reason	Solution
Value jumps during measurement to 100% (indicating full vessel).	Reflections from mounting (e.g. socket)	<p>Ensure that at least 1,5m distance from sensor reference point to material level is present.</p> <p>In Measurement mode press ▶ to enter Program mode.</p> <p>Select SETUP (2.), TVT SETUP (2.8), AUTO ECHO SUPP (2.8.1) Go to LEARN and press ▶.</p> <p>The unit states LEARN for some seconds. During this time echoes up to 1.0m distance are measured and as wrong echoes ignored.</p> <p>When the unit states ON, you can go back to measurement mode by pressing several times ◀.</p>

Description of further diagnostics is not part of this manual. Please refer to manufacturer for more information.

Menu structure

Menu structure

1. WIZARDS

- 1.1 QUICK START WIZ
 - VESSEL
 - RESPONSE RATE
 - UNITS
 - OPERATION
 - LOW CALIB. PT.
 - HIGH CALIB. PT.
- 1.2 AFES WIZ
- 1.3 COPY PARAMETERS TO DISPLAY
- 1.4 COPY PARAMETERS FROM DISPLAY
- 1.5 COPY FIRMWARE TO DISPLAY
- 1.6 COPY FIRMWARE FROM DISPLAY

2. SETUP

- 2.1 DEVICE
 - 2.1.1 LONG TAG
 - 2.1.2 TAG
 - 2.1.3 DESCRIPTOR
 - 2.1.4 MESSAGE
 - 2.1.5 INSTAL DATE
 - 2.1.6 HARDWARE REV
 - 2.1.7 FIRMWARE REV
 - 2.1.8 LOADER REV
 - 2.1.9 MENU TIMEOUT
 - 2.1.10 MANUF. DATE
- 2.2 SENSOR
 - 2.2.1 UNITS
 - 2.2.2 SENSOR MODE
 - 2.2.3 DAMPING FILTER
 - 2.2.4 TEMP. UNITS
 - 2.2.5 UNIT
- 2.3 CALIBRATION
 - 2.3.1 LOW CALIB. PT.
 - 2.3.2 HIGH CALIB. PT.
 - 2.3.3 SENSOR OFFSET
- 2.4 RATE
 - 2.4.1 RESPONSE RATE
 - 2.4.2 FILL RATE/MIN
 - 2.4.3 EMPTY RATE/MIN
- 2.5 FAIL-SAFE
 - 2.5.1 MAT. LEV
 - 2.5.2 TIMER
 - 2.5.3 LEVEL
- 2.6 ANALOG OUTPUT SCALE
 - 2.6.1 CURRENT OUTPUT FUNCTION
 - 2.6.2 4 MA SETPOINT
 - 2.6.3 20 MA SETPOINT
 - 2.6.4 MIN MA LIMIT
 - 2.6.5 MAX MA LIMIT
 - 2.6.6 MA OUTPUT MODE
 - 2.6.7 MANUAL VALUE
 - 2.6.8 MA OUTPUT VALUE
- 2.7 SIGNAL PROCESSING
 - 2.7.1 NEAR RANGE
 - 2.7.2 FAR RANGE

- 2.7.3 ECHO SELECT
 - 2.7.3.1 ALGORITHM
 - 2.7.3.2 ECHO THRESHOLD
 - 2.7.3.3 POSITION DETECT
 - 2.7.3.4 CLEF RANGE
 - 2.7.3.5 ECHO MARKER
- 2.7.4 SAMPLING
 - 2.7.4.1 ECHO LOCK
 - 2.7.4.2 UP SAMP.
 - 2.7.4.3 DOWN SAMP.
 - 2.7.4.4 ECHO LOCK WINDOW
- 2.7.5 FILTERING
 - 2.7.5.1 NARROW ECHO FILTER
 - 2.7.5.2 REFORM ECHO
 - 2.7.5.3 AVG AMOUNT
- 2.7.6 ECHO QUALITY
 - 2.7.6.1 CONFIDENCE
 - 2.7.6.2 ECHO STRENGTH

2.8 TVT SETUP

- 2.8.1 AUTO ECHO SUPP
- 2.8.2 AUTO SUPP RANGE
- 2.8.3 HOVER LEVEL
- 2.8.4 SHAPER MODE

2.9 TVT SHAPER

- 2.9.1 BREAKPOINT 1-9
- 2.9.2 BREAKPOINT 10-18
- 2.9.3 BREAKPOINT 19-27
- 2.9.4 BREAKPOINT 28-36
- 2.9.5 BREAKPOINT 37-45
- 2.9.6 BREAKPOINT 46-54
- 2.9.7 BREAKPOINT 55-63
- 2.9.8 BREAKPOINT 64-72
- 2.9.9 BREAKPOINT 73-81
- 2.9.10 BREAKPOINT 82-90
- 2.9.11 BREAKPOINT 91-99
- 2.9.12 BREAKPOINT 100-108
- 2.9.13 BREAKPOINT 109-117
- 2.9.14 BREAKPOINT 118-120

2.10 MEASURED VALUES

- 2.10.1 MAIN OUTPUT
- 2.10.2 O/P NO LINEAR
- 2.10.3 O/P NO OFFSETS

3. DIAGNOSTICS

- 3.1 FAULT RESET
- 3.2 ECHO PROFILE
- 3.3 TREND
- 3.4 PEAK VALUES
 - 3.4.1 MIN MEAS. VALUE
 - 3.4.2 MAX. MEAS. VALUE
 - 3.4.3 MINIMUM PV
 - 3.4.4 MAXIMUM PV
 - 3.4.5 MINIMUM SV
 - 3.4.6 MAXIMUM SV
- 3.5 ELECT TEMP
 - 3.5.1 MIN. VALUE
 - 3.5.2 MAX. VALUE
 - 3.5.3 INTERN. TEMP

Menu structure

3.6 REMAIN. DEV. LIFE

- 3.6.1 TIME IN OPER
- 3.6.2 REMAIN LIFETIME
- 3.6.3 REMIND. 1 (REQ.)
- 3.6.4 REMIND. 2 (DEM.)
- 3.6.5 REMINDER ACTIVATION
- 3.6.6 LIFETIME EXPECTED
- 3.6.7 MAINT STAT
- 3.6.8 ACK STATUS
- 3.6.9 ACK

3.7 REMAIN. SENS LIFE

- 3.7.1 TIME IN OPER
- 3.7.2 REMAIN LIFETIME
- 3.7.3 REMIND. 1 (REQ.)
- 3.7.4 REMIND. 2 (DEM.)
- 3.7.5 REMINDER ACTIVATION
- 3.7.6 LIFETIME EXPECTED
- 3.7.7 MAINT STAT
- 3.7.8 ACK STATUS
- 3.7.9 ACK

4. SERVICE

4.1 DEMO MODE

4.2 MASTER RESET

4.3 POWERED HOURS

4.4 POWERON RESETS

4.5 LCD BACKLIGHT

4.6 LCD CONTRAST

4.7 SERVICE SCHEDULE

- 4.7.1 TIME LAST SERV
- 4.7.2 TIME NEXT SERV
- 4.7.3 REMINDER 1 (REQ)
- 4.7.4 REMINDER 2 (DEM)
- 4.7.5 REMINDER ACTIVATION
- 4.7.6 SERVICE INTERVAL
- 4.7.7 MAINT STAT
- 4.7.8 ACK STATUS
- 4.7.9 ACK

4.8 CALIB. SCHEDULE

- 4.8.1 TIME LAST CALIB
- 4.8.2 TIME NEXT CALIB
- 4.8.3 REMINDER 1 (REQ)
- 4.8.4 REMINDER 2 (DEM)
- 4.8.5 REMINDER ACTIVATION
- 4.8.6 CALIB INTERVAL
- 4.8.7 MAINT STATUS
- 4.8.8 ACK STATUS
- 4.8.9 ACK

5. COMMUNICATION

5.1 DEVICE ADDRESS

5.2 REMOTE LOCKOUT

6. SECURITY

6.1 WRITE PROTECTION

7. LANGUAGE

Maintenance

General items

Opening the lid (cover)	<p>! Before opening the lid for maintenance reasons observe following items:</p> <ul style="list-style-type: none">• No dust deposits or whirlings are present.• No rain can enter into the housing
Frequent check of the unit	<p>! To ensure durable safety in hazardous locations and with electrical safety, following items must be checked frequently depending on the application:</p> <ul style="list-style-type: none">• Mechanical damage or corrosion of any components (housing side and sensor side) and of the field wiring cables.• Tight sealing of the process connection, cable glands and enclosure lid.• Properly connected external PE cable (if present).
Cleaning	<p>The unit requires no cleaning under normal operating conditions. Under severe operating conditions, the antenna may require periodic cleaning. If cleaning is required by the application, following must be observed:</p> <p>! • Cleaning agent must comply with the materials of the unit (chemical resistance). Mainly the lid, antenna material, sealing, cable gland and the surface of the unit must be considered.</p> <p>! The cleaning process must be done in a way, that:</p> <ul style="list-style-type: none">• The cleaning agent cannot enter into the unit through the lid sealing or cable gland.• No mechanical damage of the lid sealing, cable gland or other parts can happen.• Remove the instrument from service and wipe the antenna clean using a cloth and suitable cleaning solution. <p>A possible accumulation of dust on the unit does not increase the maximum surface temperature and must therefore not be removed for purposes of maintaining the surface temperature in hazardous locations.</p>
Production date	<p>The production date can be traced by the serial number on the typeplate. Please contact the manufacturer or your local distributor.</p>
Spare parts	<p>All available spare parts are stated in the selection list</p>

Notes for use in Hazardous Locations

ATEX Zone classification

Category	Useable in zone	
1 D	20, 21, 22	* In case of conductive dust, additional requirements for installation are necessary.
2 D	21, 22	
3 D*	22	
3 G	2	

! Permitted zones (categories) for mounting in partition wall

EPL (IEC-Ex)	Db	Gc
Category (ATEX)	2D	3G
Zone	21	2

EPL (IEC-Ex)	Da	Gc
Category (ATEX)	1D	3G
Zone	20	2

! General notes

Marking / assembly

Devices with Ex-approval are marked on the type plate. For use and assembly and details of marking/coding, refer to the main part of this Instruction manual.

<p>POTENTIAL ELECTROSTATIC CHARGING HAZARD DO NOT CLEAN WITH DRY CLOTH</p> <p>DO NOT INSTALL WHERE BUILD-UP OF CHARGE IS LIKELY</p> <p>USE SUITABLY RATED CABLE</p> <p>DE-ENERGIZE BEFORE REMOVING COVER</p>	<p>SIRA 15ATEX4353X Ex nA II T4 Gc Un = 32 V Ex nL IIC T4 Gc U_i = 32 V I_i = 22.63 mA C_i ≤ 5 nF L_i ≤ 20 µH</p>	<p>Ex ta IIIC T139 °C Da SIRA 15ATEX9352X IECEx SIR 150128X Ex ta IIIC T139 °C Da</p>	<p>NivoRadar NR 3000 NR 3100 xxxxxxxx SERIAL NO.: GYZ / A1034567 ENCLOSURE: NEMA / TYPE 4X, 6; IP68 AMB. TEMP.: -40°C to 80°C INPUT: 24 V = NOM., 30 V = MAX., 4 - 20 mA HART</p>		<p>CLASS II, DIV. 1, GR. E, F, G CLASS III, T4 CLASS I, DIV. 2 GR. A, B, C, D TEMP CODE: T4 REFER TO INSTALLATION DWG. A5E3696501</p>	<p>IC: 20874-NR3000 FCC ID: 2AF80-NR3000 THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: 1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE AND 2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRE OPERATION</p>
	<p>0158</p>	<p>UWT LEVEL CONTROL, BETZIGAU, GERMANY Assembled in Canada with domestic and imported parts</p>				

Process pressure	The device construction allows process over-pressure up to +0.5bar or 3bar (7.5 or 40psi). This pressure is allowed for test purposes. The definition of the Ex approvals are only valid for a silo-over-pressure between -0.2 .. +0.1 bar (-2.9 .. +1.45psi). Outside of these pressure the approvals are not valid.
Process and ambient temperature	The equipment is certified for use in an ambient temperature range of -40 °C to 80 °C. The permitted temperature range is as well marked on the type plate.
Safety related device	The equipment has not been assessed as a safety related device (as referred to by Directive 94/9/EC Annex II, clause 1.5).
Repair	Repair of this equipment shall be carried out by suitably trained and authorized personnel in accordance with the applicable code of practice.

Notes for use in Hazardous Locations

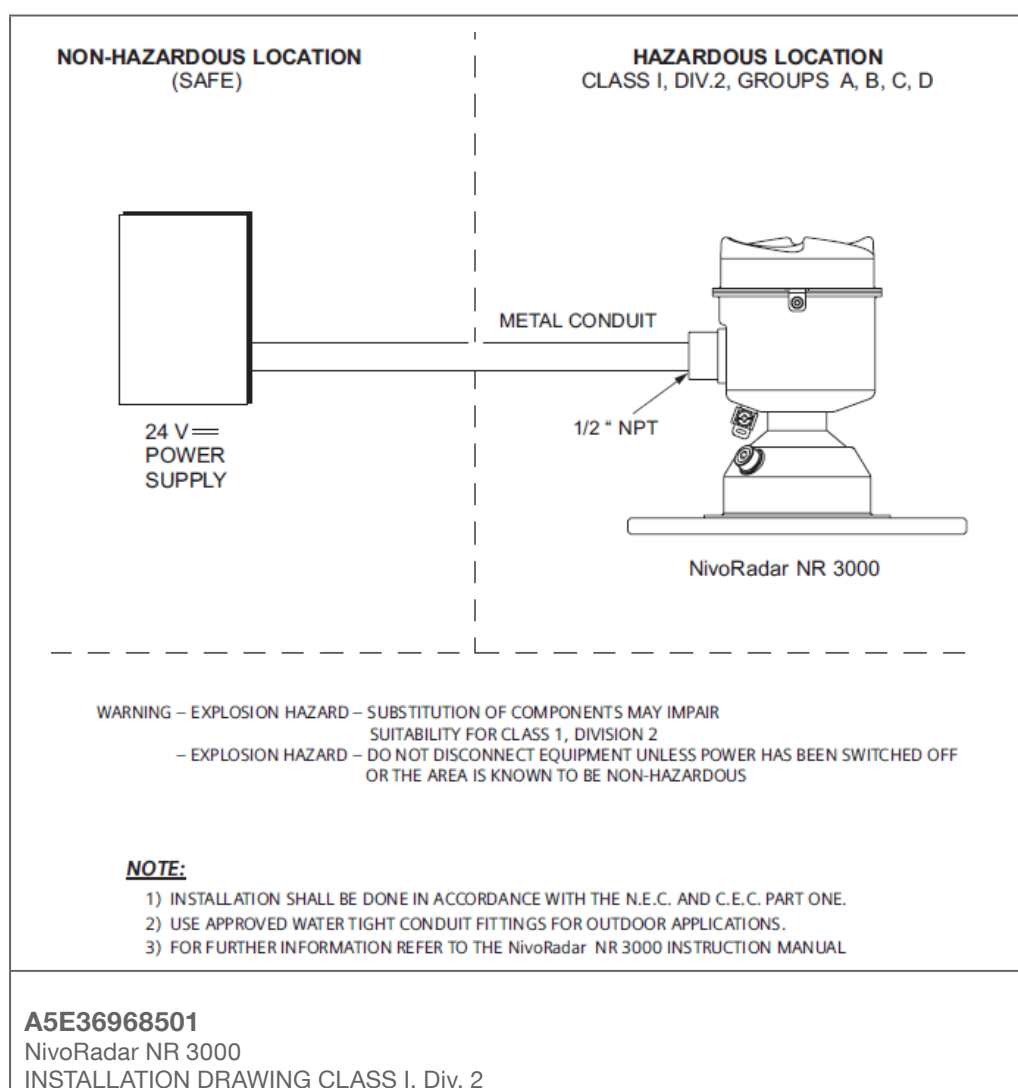
! Maximum Surface Temperature

The maximum surface temperature refer to the warmest area outside on the unit which can occur in failure case (according to Ex definition).

Refer to the applicable code of practice for selection of this equipment with respect to specific dust ignition temperatures.

Max. Ambient temperature	Max. Surface temperature
80°C (176°F)	139°C (282°F)

! Installation Drawing Class I Div.2



Disposal

The product consists of materials which can be recycled, details of the used materials see chapter "Technical data - mechanical data".

Recycling must be done by a specialised recycling company. Since the product is not subject to the WEEE directive 2002/96/EG, it is not permitted to bring it to a public recycling station.

Table of contents

	Page
Safety notes / Technical support	2

Overview	3

Technical Data	4

Electrical installation	4

Commissioning	6

Visualisation - Operation	8

Subject to technical change.

We assume no liability for typing errors.

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




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.

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 related documents (manual) for details.
	Earth (ground) Terminal
	Protective Conductor Terminal

Technical support

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

UWT GmbH
 Westendstr. 5
 87488 Betzigau
 Germany

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

Overview

Features

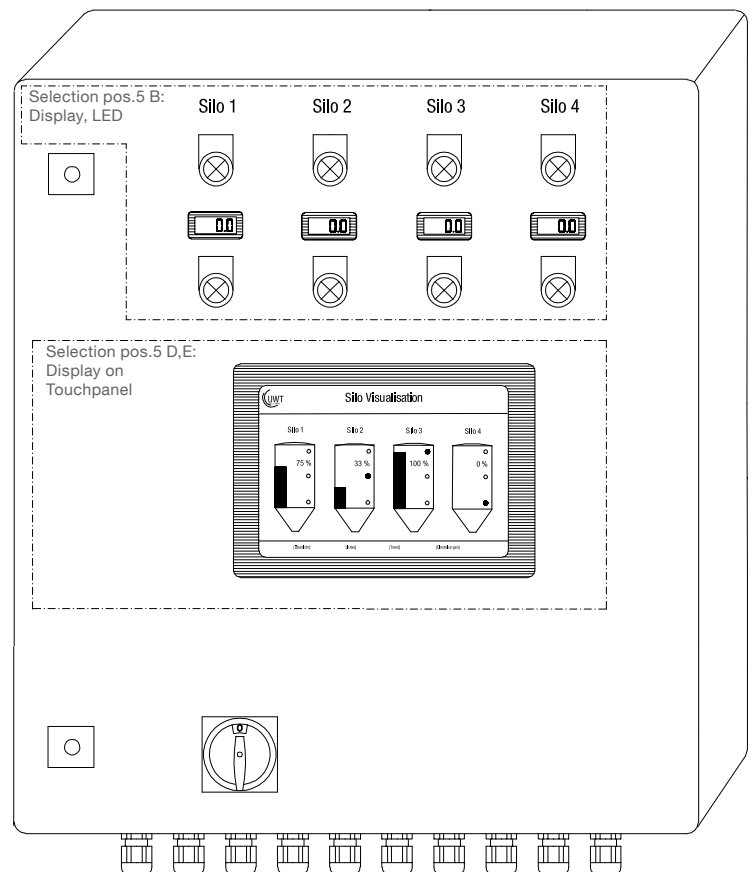
- Fill level visualisation via HTTP-web server
- Visualisation via standard Internet browser software on all Ethernet PCs
- Password protected
- Worldwide remote enquiry of the level password protected - on request
- Software operation additional via a touch panel in the control cabinet or via fill level LEDs
- Data in percentage, height, volume or weight
- Trend display, data storage, export via .csv
- Evaluation of the analogue 4-20 mA signals of any sensors, as well as Modbus RTU of the UWT-systems
- Different input signals within the same system is possible
- Fill control via full alarm signals and shut off valves
- Separate truck module for safe and comfortable monitoring during silo filling

NT 3500 control cabinet

The heart of the NT 3500 is a web server module, which the visualisation software uses. All fill level control and display functions can be operated via the visualisation on a PC or a Touch panel with backlight. An Ethernet interface ensures that the visualisation can be simultaneously operated from all PCs which are connected to the interface. Access is password protected. Additionally the control cabinet can be equipped with operating and display elements. Either the 10.4" or 15" touch panel or the digital level display with full and empty LEDs can be chosen. The electromechanical lead system can be started by the visualisation or by a push button. A buzzer for alarm "silo full" can be mounted directly on the silo. Control for pinch valves to stop the filling is available. The NT 3500 is a complete system which also provides the supply voltage for the sensors. The system is delivered with project specific electrical plans.

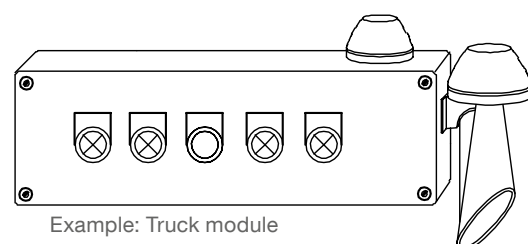
Functionality of alarm "silo full" and control of the pinch valves:

1. The filling (opening of the pinch valve) is enabled either via the hose coupling when connecting the filling hose, via a key switch on the cabinet or on the truck module or via PC/Touch panel.
2. In case of an alarm "silo full" the pinch valve closes, the LED "silo full" and the buzzer is switched on, the reset button is blinking. After reset of the alarm the pinch valve opens for ca. 5 min to enable the expulsion of the filling pipe, then it is closed again. Independent from this control the pinch valve can be opened or closed by an authorized user at any time.



Truck module

- One module for a defined number of silos (depending on the project)
- Mounting directly at the silo frame
- Display silo full/empty and pinch valve status with LEDs
- Reset of alarm "silo full"
- Key switch for pinch valve control



Technical Data / Electrical installation

Technical data

Dimensions	Depending on project
Mounting	Control cabinet Wall mounting Truck module Mounting on silo filler pipe
Material	Steel plate
Ingress protection	Control cabinet IP54 Truck module IP65
Ambient temperature	Control cabinet 0...+55°C Truck module IP65
Power supply	115V or 230V 50/60Hz
Power consumption	Depending on project

Technical data of the used Wago Controllers:

see www.wago.com, search for 750-881

Electrical installation



Safety Instructions

Handling	In 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.
RCCB protection	In 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.
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 name plate before switching the device on.
Cable gland	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.
Field wiring cables	All field wirings must have insulation suitable for at least 250V AC. The temperature rating must be at least 80°C (176°F).
Installation in Hazardous Locations	The NT 3500 is not permitted for installation in Hazardous Areas. Observe the valid regulations for wiring in Hazardous Areas, if the NB 3000/ 4000 is installed in Hazardous Areas.

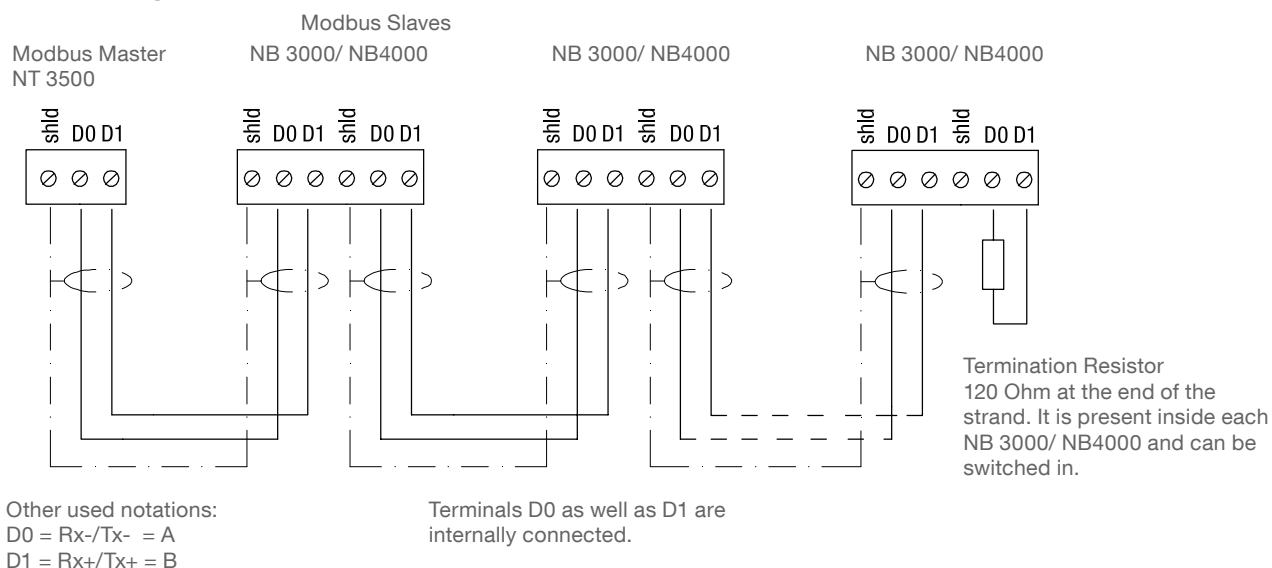
Wiring diagram

The NT 3500 will be delivered with detail wiring diagram depending on the project.

Electrical installation

Modbus network

General wiring of a Modbus network



Cable recommendations for Modbus network

Shielded cable

Functionality up to 50m

Manufacturer: Lapp, Type UNITRONIC LiYCY 2x0.34, Art.no: 0034502

Twisted pair cable

Functionality up to 1000m

Manufacturer: Lapp, Type UNITRONIC BUS CAN 1x2x0.34, Art.no: 2170263

UV-protection hose with threaded hose coupling M20x1,5

UV protection for Modbus cable

Manufacturer: Flexa, Type Rohrflex PA6, Art.no: 0233.202.012 and Type RQG1-M, Art.no: 5020.055.018

ATEX-protection hose with threaded hose coupling M20x1,5

For installation of Modbus cable in ATEX Zone 21

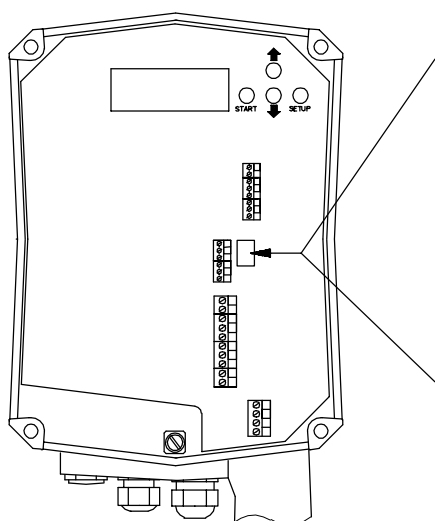
Manufacturer: PMA, Type ESX, Art.no: ESXT-12B.50 and Type END, Art.no: BEND-M202GT

Electrical installation

Setting: Biasing and Termination Resistor

For use of NB 4000 units in a external Modbus network, it is possible to set Biasing and Termination Resistor on each unit as required.

NB 3000



Version with Jumper

Biasing	OFF*	OFF	ON
Termination Resistor	OFF*	ON	ON

Version with DIP switch

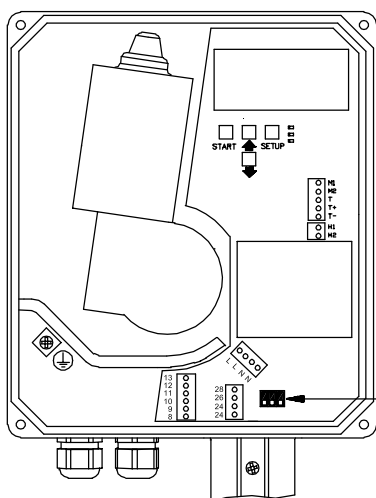
Biasing	OFF*	OFF	ON	ON
Termination Resistor	OFF*	ON	OFF	ON

*factory provided

DIP Switch position:

Top view Side view

NB 4000



Biasing	OFF*	OFF	ON	ON
Termination Resistor	OFF*	ON	OFF	ON



*factory provided

DIP Switch position:

Top view Side view

Commissioning

1. Web server configuration

CAUTION: The configuration should be done by the network administrator only.

The web server is preset to the IP address 192.168.10.70. It must be changed to a company's own IP address as follows:

- Use a PC, which is connected via Ethernet to the Web server. Set in the system control the TCP / IP to address 192.168.10.xx, whereas xx can be any two digit number (the access to the Web server requires the number 192.168.10., the last two digits are not relevant).
- An up to date version of Internet browser must be installed.
- Open the Internet browser and type the IP address 192.168.10.70 of the web server in the command bar. The overview page "Home" of the visualisation opens (see page 8).
- Click the "User" button and set the User Level to 5. The "Config" button will appear in the menu bar.
- Click on this button. The configuration page of the web server will open (see page 10).
- Enter your IP address, sub net mask and gateway, the current date and time
- Then reset to your TCP / IP address in the system control of your PC.

2. Perform the basic settings of the connected sensors

With the following settings, the connected sensors are addressed via the visualisation and give a real measurement result. For this settings the above mentioned synoptical table is helpful:

- Enter in page "Settings" (see page 12), the data under "Hardware", "Signal Input" and, if full detectors are connected, "Full Level Indicator".
- Enter in page "Volume Calculation" (see page 14) the data under "Signal Input", "Silo Profile" and "Silo Data".

3. Perform further user settings

Enter the required user specific settings according to the "Visualisation - Operation" from page 8 onwards.

Visualisation - Operation

Start of the Visualisation

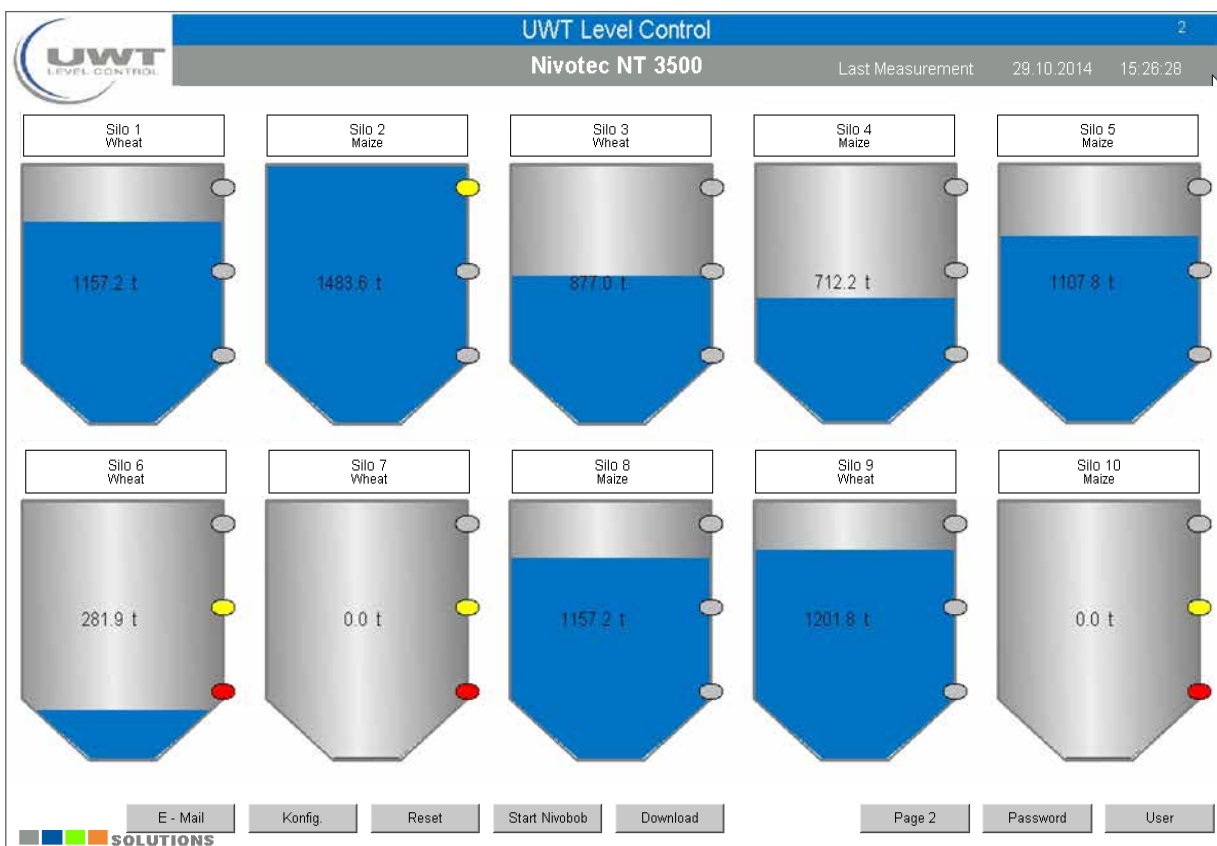
By entering the IP address in the browser (according to the web server configuration) the visualisation starts.
After successful start the overview page "Home" appears.

Overview page (Home)

Display of level, level switches, information regarding silo and error messages

User Level 0 or higher

The selected number of silos (see page "Config") is presented. If more than 10 silos are defined, a button appears for progression to the next page.



Note: If a distorted image on the PC is present, it should not be viewed in full screen mode, thus the window can be drawn in an undistorted view.

Visualisation - Operation

The following selections appear depending on the setted User Level:

Silo Single View (click on a silo)

The single view for the respective silo will open (see page 11).

E-Mail

Sends an E-mail if a level switch is activated or if an error message of the NB 3000/ 4000 is present.

Config

See page 10.

Reset

Reset of the full signal (buzzer) and of error messages.

Start Nivobob

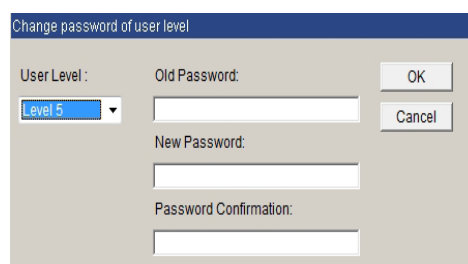
Starts the measurement of all connected Nivobobs. If more than 10 silos are defined, the measurements of the silos not displayed on the screen are started as well. As long as the measurement is running, a green arrow appears in each silo.

Download

Issue of trend data for all silos in .csv format. The level values are stated in the unit as defined under "Volume Calculation" (see page 14).

Password

Used for password assignment. Each User Level can change its own password. The higher level can change the password of the lower levels. No password is presetted apart from Level 7.



Change password of user level

User Level: Level 5 Old Password: OK Cancel

New Password:

Password Confirmation:

User

Selecting the User Level with different permissions:

Level 0

- Overview page (Home)

Level 1

Similar to Level 0, additional:

- Silo Single View
- Start Nivobob
- View of Event List
- Reset of the full signal (buzzer) and of error messages
- Download of trend data

Level 2

Similar to Level 1, additional:

- Page "Settings"
- Page "Volume calculation"

Level 3

Similar to Level 1, additional:

- On Page "Settings": change of "Silo Data" possible
- On Page "Volume calculation": change of "Density" possible.

Level 4

Blocked

Level 5

Similar to Level 2, additional:

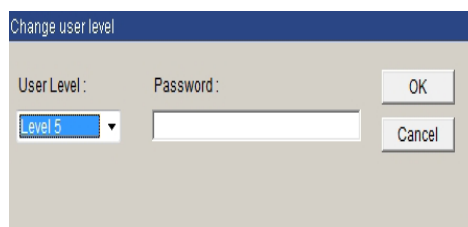
- Page "Setup Nivobob"
- Page "Config"
- Page "E-Mail"

Level 6

Blocked

Level 7

UWT Service-Level



Change user level

User Level: Level 5 Password: OK Cancel

Visualisation - Operation

Page "Config"

Setting of date, time, software language, country-specific units, number of displayed silos as well as network settings

User Level 5 or higher



Config. Controller

Nivotec NT 3500

Date - Time	
Time	18:16:42
Date	29.10.2014
New Time	00:00:00
New Date	01.01.1970
Set	

Settings	
Meter	Feet
Tonnen	US Tonnen
Deutsch	Englisch

Network				
IP Adress	192.168.10.72			
Sub Net Mask	255.255.255.0			
Gateway	192.168.10.20			
New IP Adress	0	0	0	0
New Sub Net Mask	0	0	0	0
New Gateway	0	0	0	0
Set				

Number of Silos
10



Visualisation - Operation

Page "Silo Single View"

View of details and settings of the sensors for a silo.
Open/close the pinch valve.

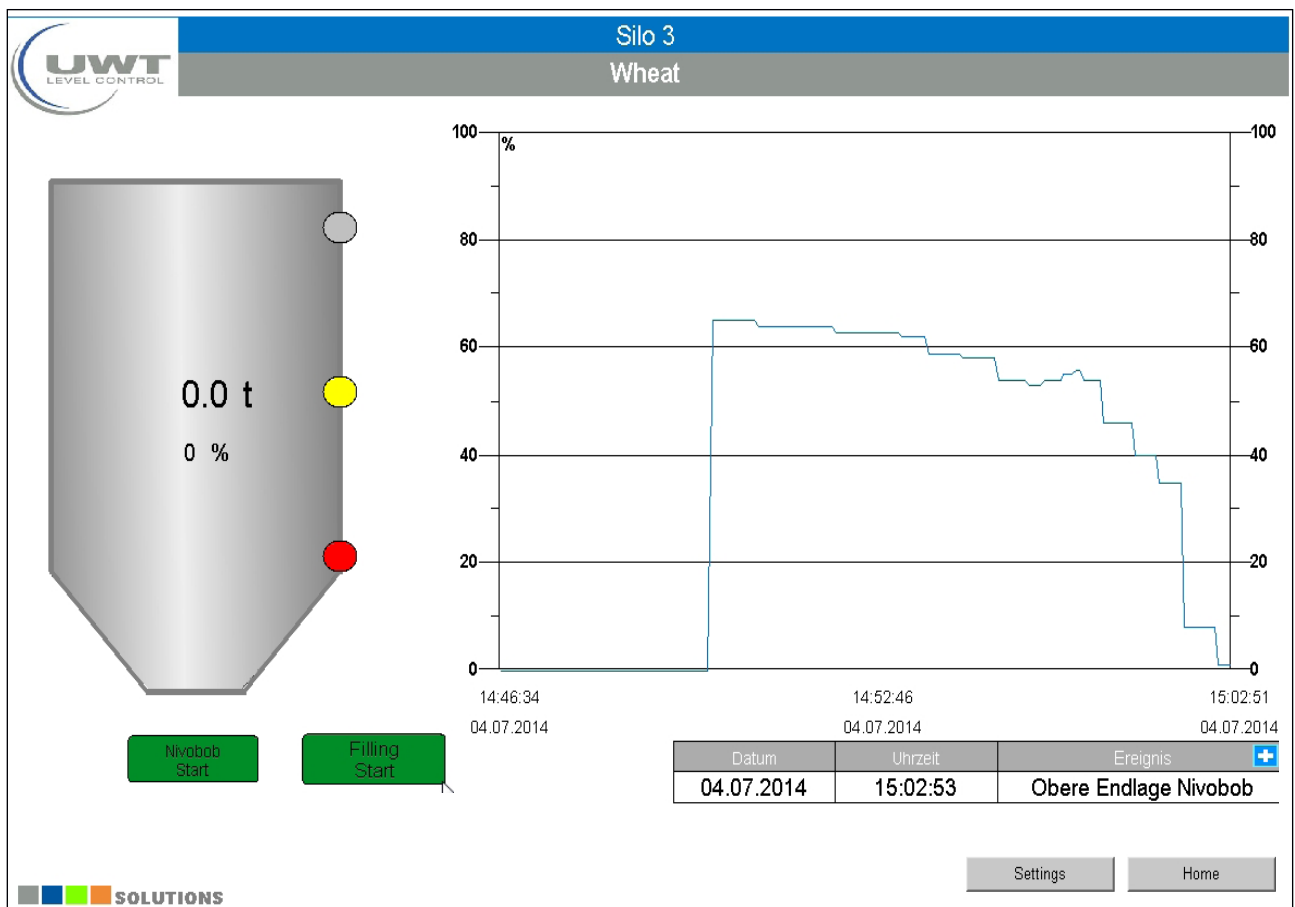
User Level 1 or higher

Clicking on a silo in the Overview page (Home) opens the Silo Single View.

The level is displayed in the unit as defined under "Volume Calculation" (see page 14), in addition as a percentage.
The colored points display the full, demand and empty detection.

The trend stores a total of 200 data points per silo. The oldest point is deleted when a new value is stored.

Events are displayed in a table. The selection "+" opens the list of the last 17 events.



Nivobob Start

Starts the measurement of the Nivobob for this silo. During the measurement, the button appears gray. When the measurement is completed, the color changes back to green.

The button appears only if on page "Settings" under "Hardware" the selection "Nivobob" has taken place.

Filling Start / Stop

Control of the pinch valve.

The control of the valve during the filling of the silo is done in combination with the Truck module (see description on page 3).

Via the visualisation software the valve can be opened and closed independently by pressing the button "Filling Start/Stop".

The button appears only if on page "Settings" the selection "Pinch valve - Yes" is done.

Settings

Leads to the page "Volume Calculation" of this silo (see page 12).

Visualisation - Operation


Page "Settings"

Detail settings for the respective measurement point

User Level 2 or higher

The page opens with cklick on "Settings" in the page "Silo Single View".

View with selection "Hardware - Nivobob":



Settings Silo 1

Maize

Silo Data	
Name	Silo 1
Content	Maize
Art. Nr.	

Signal Input	
Analog	4-20mA
Modbus	ID 1
Impuls	10 cm / Impuls
Modem	ID 0

Trend	
Trend Intervall	00:01:00

Enable Nivobob	
Yes	No

Hardware
4-20mA
Nivobob

Level Indicator		
Full Level Indicator		
Digital Input	Modbus	Value
		90
Demand Level Indicator		
Digital Input		Value
		30
Low Level Indicator		
Digital Input		Value
		10

Automatic Power Measurement Start	
Yes	No


Measure Interval	
Yes	No
Intervall Time	00:00:00
Start Time	00:00:00

Volume Calculation

Setup Nivobob

Pinch Valve	
Yes	No

View with selection "Hardware 4-20mA":



Settings Silo 1

Maize

Silo Data	
Name	Silo 1
Content	Maize
Art. Nr.	

Hardware	
4-20mA	
Nivobob	

Volume Calculation

Signal Input	
Analog	4-20mA
Modbus	ID 1
Impuls	10 cm / Impuls
Modem	ID 0

Level Indicator	
Full Level Indicator	
Digital Input	Value
	90
Demand Level Indicator	
Digital Input	Value
	30
Low Level Indicator	
Digital Input	Value
	10

Trend	
Trend Intervall	00:01:00

Pinch Valve	
Yes	No

Visualisation - Operation

Silo Data

The silo shown can be labeled with any text for silo name, content and article number.

Hardware

Indication of the sensor used.

Signal Input

- If a Nivobob is connected (with selections "Hardware - Nivobob") :

Selection of the signal output, which is used with the connected Nivobob.

With selection "Modbus" the Modbus address, which is present on the Nivobob, must be entered.

The Modbus address of the Nivobob is setted in the Nivobob communication menu (see manual Nivobob). It is reasonable to use the address 1 for the first device, then ascending to 2, 3, etc. Optional (with selection code 33) the Nivobob devices are delivered with already preset address.

Setting "Modem" is used if a GSM module for remote maintenance is installed at the silos.

- If NR3000 (or another 4-20mA sensor) is connected (with selection "Hardware 4-20mA"):

Setting "Analogue 4-20mA" is setted as standard.

Setting "Modbus" and "Pulse" is not active.

Setting "Modem" is used if a GSM module for remote maintenance is installed at the silos.

Level Indicator

- If level indicators are connected, the setting is done as follows:

Setting "Digital input", if the level indicator is connected directly to the control cabinet (via I/O module).

Setting "Modbus", if the level indicator is connected to the Nivobob and thus is read by the Modbus connection of the Nivobob (only possible for full detector).

- With setting "Value" no level indicators are connected. The message for full and demand is activated, when the entered value (in percent) is exceeded by the material level. The message for empty is activated, when the material level is below the entered value (in percent).

Trend

The trend stores the level values according to the setted interval (hours : minutes : seconds).

A total of 200 data points per silo are stored. The oldest point is deleted when a new value is stored.

Enable Nivobob

Measurement start can be blocked by setting to "No", e.g. while a silo is beeing filled.

Automatic Power Measurement Start

After power up or after power failure of the web server, the Nivobob will start automatically if "Yes" is selected. The level measurement is then immediately updated (the Nivobob gives no actual signal output until a new measurement is started).

Measure Interval

Activation of automatic measurement start of Nivobobs, if setted to "Yes". The start takes place automatically, the first time at the setted start time (time of day), then regularly repeated with the setted interval (hours : minutes : seconds).

Pinch Valve

With use of a pinch valve the selection must be set to "Yes". Explanation of the pinch valve functionality see page 11.

Volume Calculation

see page 14

Setup Nivobob

see page 15

Visualisation - Operation

Page "Volume Calculation"

Settings for volume related measurement display and setting of the silo dimensions

User Level 2 or higher

The page opens with click on "Volume Calculation" in the page "Settings".



Volume Calculation Silo 1

Maize

Signal Input	
Linear	Volume

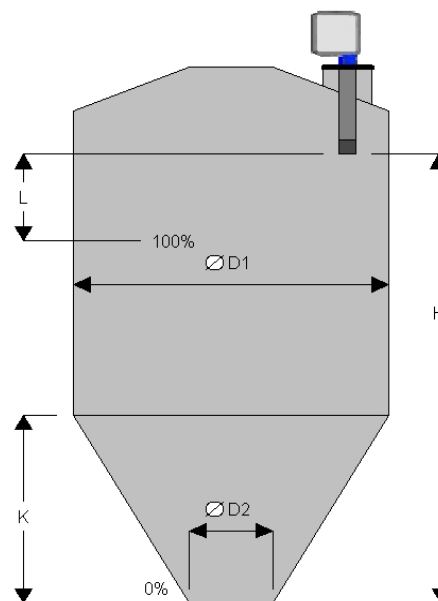
Silo Profile	
Cylindrical	Rectangular

Silo Data	
H (m)	15.4
K (m)	3.2
L (m)	1.2
D1 (m)	3.5
D2 (m)	0.5

Unit	
Meter (m)	
Cubicmeter (m³)	
Ton (t)	
Kilogram (kg)	
Liter (l)	
Percent (%)	

Volume	
Max. Volume	117.71
Density g/l	650

Calculated	
Max. Value	Current Value
76.51 t	0.00 t



Signal input

Selection "Linear", if the level signal output of the connected sensor is linear (relation between the signal output and the level in the silo). Thus the volume-based calculation is performed not in the sensor, but in the visualisation.

Selection "Volume", if the level signal output of the connected sensor is volume based (relation between the signal output and the level in the silo). Thus the volume-based calculation is performed in the sensor and not in the visualisation.

Silo Profile and Silo Data

With the setted data the software calculates the max. volume and (with selection "Signal input - Linear") the volume based display.

For the correct measurement display the connected sensors must be set as follows:

• Nivobob NB 3000/ 4000:

- Value "Cone Height"
 - with selection "Signal input - Linear": must be set to 0
 - with selection "Signal input - Volume": must correspond to the value K given above

Value "Silo Height" must correspond to the value H given above

Value "Air Dist" must correspond to the value L given above
(H and L are related to the lower edge of the sensor-weight)

• 4-20mA sensors

- 4mA must correspond to the value 0% given above
- 20mA must correspond to the value 100% given above
(H and L are related to the fixing flange if using NR3000)

Unit

The selected unit is used in the visualisation.

Volume

Display of the max. volume (in cubic meters) and input of bulk density to calculate the weight.

Calculated values

Display of the calculated maximum content (according to the entered Silo Profile and Data) and the actual content. Both values are shown in the above selected unit.

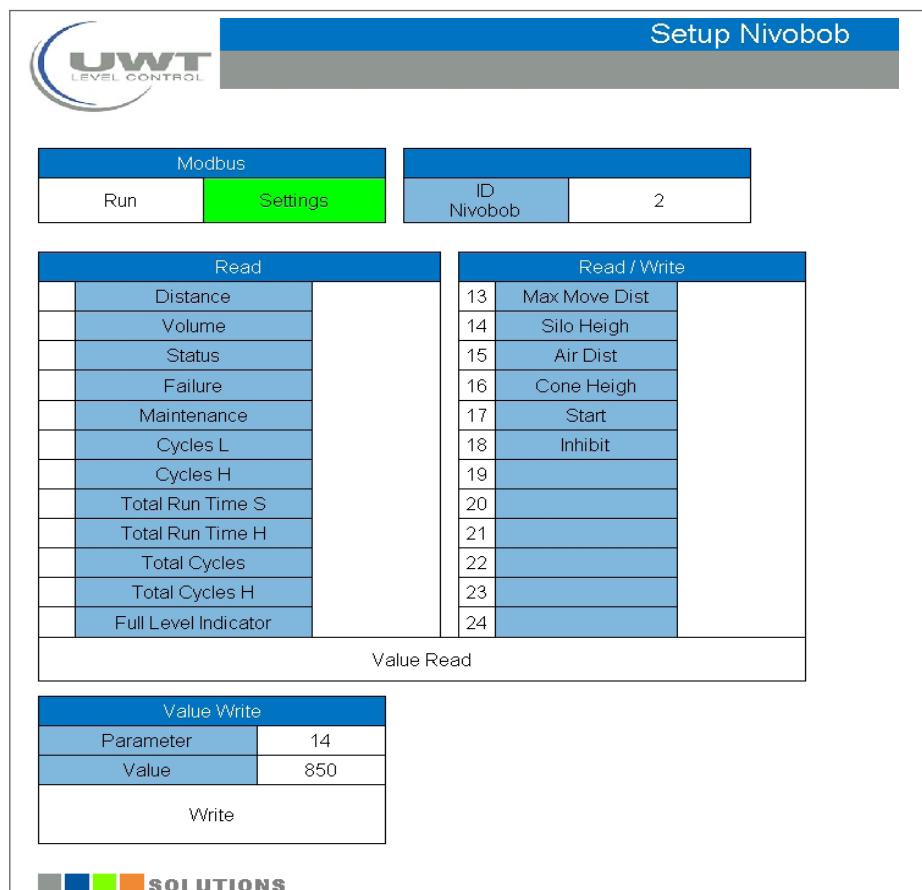
Visualisation - Operation

Page "Setup Nivobob"

Parameterization and reading diagnostic data from the Nivobob

User Level 5 or higher

The page opens with click on "Setup Nivobob" in the page "Settings", if the selection "Signal input - Modbus" is set.




Modbus		ID Nivobob	
Run	Settings	ID Nivobob	2

Read		Read / Write	
	Distance	13	Max Move Dist
	Volume	14	Silo Heigh
	Status	15	Air Dist
	Failure	16	Cone Heigh
	Maintenance	17	Start
	Cycles L	18	Inhibit
	Cycles H	19	
	Total Run Time S	20	
	Total Run Time H	21	
	Total Cycles	22	
	Total Cycles H	23	
	Full Level Indicator	24	

Value Read

Value Write	
Parameter	14
Value	850
Write	



Modbus

Activation of parameter setting and value reading with click on "Settings". A list with parameters of Nivobob NB 3000/ 4000 appears. For details of the displayed parameters, see manual of the NB 3000/ 4000.

Selecting "Run" will close again.

ID Nivobob

Enter the ID number (Modbus address) of the Nivobob which is related to this silo.

Read and Read/Write

The parameters which are read only, or which are read and write, are displayed. Update the values by clicking the "Value Read" button. After a few seconds, the values are shown. The values 13-16 are always displayed and written in millimeters.

Value write

Enter the number (13-18) of the value, which shall be written, in the "Parameter" box. This value is transferred to the Nivobob by clicking the "Write" button

With parameter 17 "Start" set to 1 the Nivobob can be started. Set back to 0 afterwards.

With parameter 18 "Inhibit" set to 1 a running measurement of the Nivobob is stopped. Set back to 0 afterwards.

Table of contents

	Page
Safety notes / Technical support	2

Overview	3

Technical Data	4

Accessories	4

Electrical installation	5

Commissioning	10

Visualisation - Operation	11

Subject to technical change.

We assume no liability for typing errors.

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.



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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 related documents (manual) for details.
	Earth (ground) Terminal
	Protective Conductor Terminal

Technical support

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

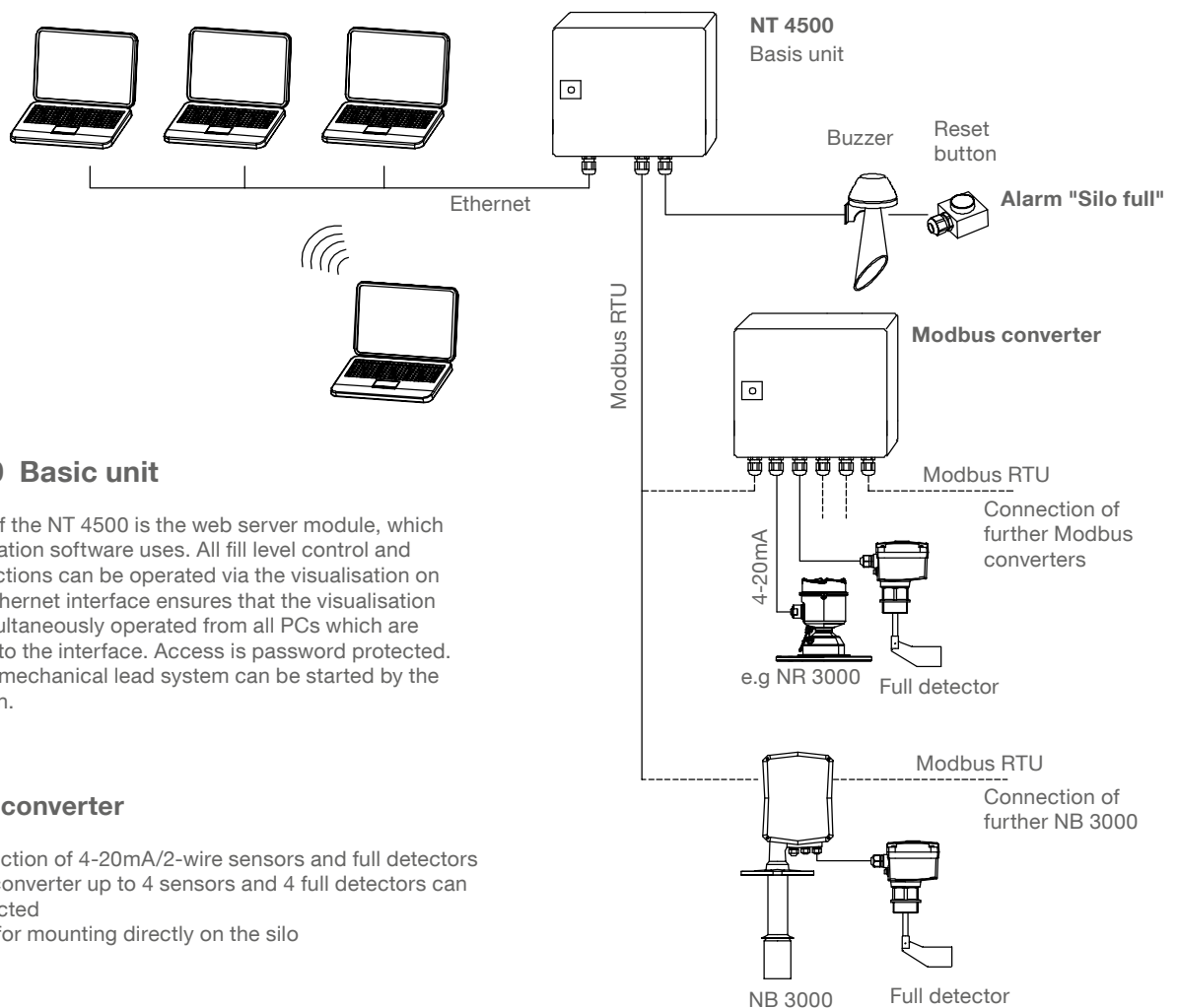
UWT GmbH
Westendstr. 5
87488 Betzigau
Germany

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

Overview

Level monitoring and visualisation via web server

- Standardized system up to 30 silos
- Visualisation and operation via standard internet browser software
- Software language german or english
- Password protected
- Worldwide remote enquiry of the level
- Data in percentage, height, volume or weight
- Trend display, data storage, export via .csv
- Evaluation of the analogue 4-20 mA signals of any sensors, as well as Modbus RTU of the UWT-systems
- Different input signals within the same system is possible
- Implementation of full detectors
- Fill control via full alarm signal (buzzer)



NT 4500 Basic unit

The heart of the NT 4500 is the web server module, which the visualisation software uses. All fill level control and display functions can be operated via the visualisation on a PC. An Ethernet interface ensures that the visualisation can be simultaneously operated from all PCs which are connected to the interface. Access is password protected. The electromechanical lead system can be started by the visualisation.

Modbus converter

- For connection of 4-20mA/2-wire sensors and full detectors
- On each converter up to 4 sensors and 4 full detectors can be connected
- Provided for mounting directly on the silo

Integration of full detector incl. alarm "silo full"

- Flashlight-buzzer with reset button (supplied loose, for outdoor mounting)
- One unit for all connected silos
- Alarm happens, if one of the silos gets full
- Reset of the alarm
- Provided for mounting directly on the silo

Technical Data / Accessories

Technical data

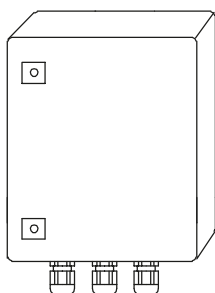
Dimensions	NT 4500, Modbus converter:	300 x 300 x 155mm (W x H x D)
Mounting	NT 4500, Modbus converter:	wall mounting
Material	NT 4500, Modbus converter:	steel plate
Ingress protection	NT 4500, Modbus converter:	IP65
Ambient temperature	NT 4500:	0...+55°C
	Modbusumsetzer:	-25...+70°C
Power supply	NT 4500, Modbus converter:	115V or 230V 50/60Hz (integrated power converter 24V DC)
	NR 3000:	supplied by Modbus converter
	NB 3000/ 4000:	115V or 230V AC, connection is made on site
	Full detector:	Connection either on NB 3000/ 4000 resp. Modbus converter. In this case the supply voltage must be equal to NB 3000/ 4000 resp. Modbus converter. Alternative it is possible to connect on site.
Power consumption	NT 4500, Modbus converter:	20VA
	Connected level sensors:	see documentation of the respective sensors
Signal output full detector	Floating contact is required	

Technical data of the used Wago Controllers:

see www.wago.com, search for 750-881

Terminal box

Intermediate terminals for the wires leading to the silo (mounting e.g. on the silo frame).
Applicable for cables of level (Modbus or 4-20mA), limit switch, buzzer, reset button



Technical data

Dimensions	200 x 300 x 120mm (W x H x D), for wall mounting
Material	steel plate
Ingress protection	IP65
Ambient temperature	-25...+60°C
Terminal blocks	15 pieces grey, 5 pieces blue, 5 pieces green/yellow; each terminal implements 3 cable inlets 2,5mm², mounted on top hat rail
Cable glands	6 pieces M20x1,5 2 pieces M25x1,5

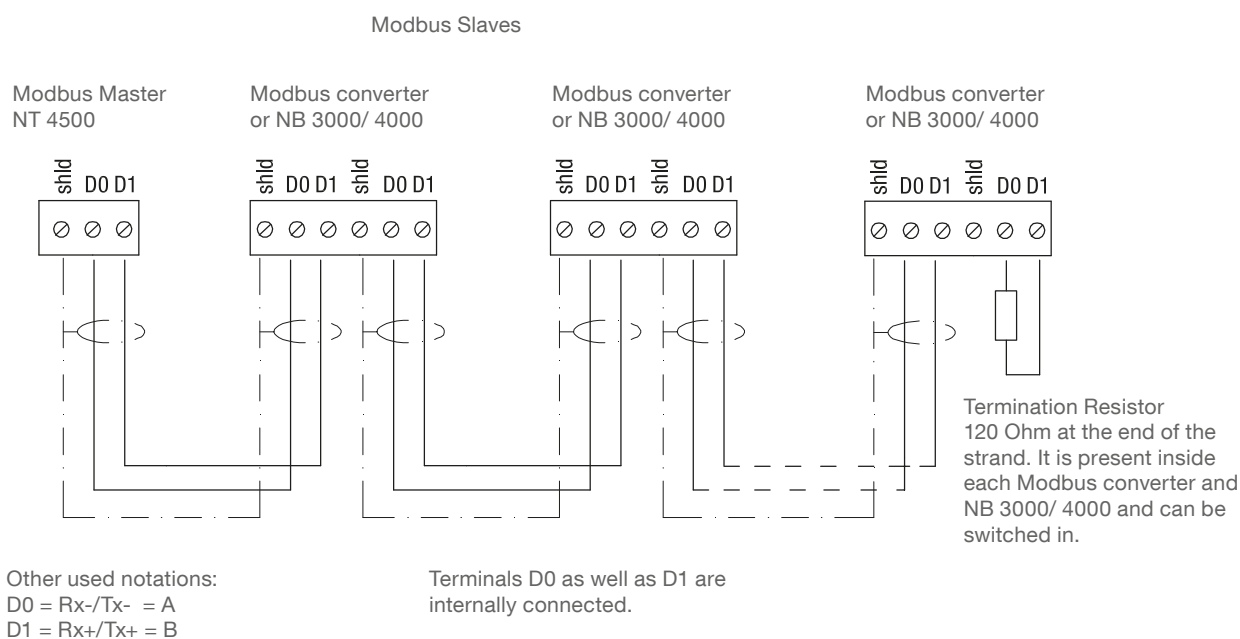
Electrical installation

Safety Instructions

Handling	In 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.
Fuse	Use a fuse as stated in the connection diagrams.
RCCB protection	In 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 name plate before switching the device on.
Cable gland	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.
Field wiring cables	All field wirings must have insulation suitable for at least 250V AC. The temperature rating must be at least 80°C (176°F).
Installation in Hazardous Locations	The NT 4500 and the Modbus converter are not permitted for installation in Hazardous Areas. Observe the valid regulations for wiring in Hazardous Areas, if the NB 3000/ 4000 is installed in Hazardous Areas.

Modbus network

General wiring of a Modbus network



Note:

If required it is possible to split the Modbus network into two strands. Both strands are wired in parallel at the Modbus Master. A termination resistor must be present at the end of each strand.

Electrical installation

Cable recommendations for Modbus network

Shielded cable

Functionality up to 50m

Manufacturer: Lapp, Type UNITRONIC LiYCY 2x0.34, Art.no: 0034502

Twisted pair cable

Functionality up to 1000m

Manufacturer: Lapp, Type UNITRONIC BUS CAN 1x2x0.34, Art.no: 2170263

UV-protection hose with threaded hose coupling M20x1,5

UV protection for Modbus cable

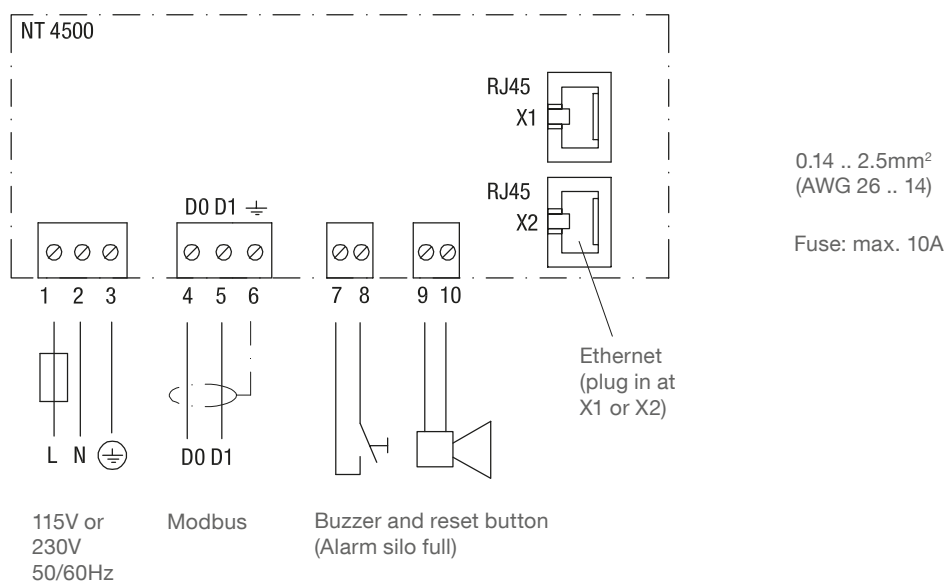
Manufacturer: Flexa, Type Rohrflex PA6, Art.no: 0233.202.012 and Type RQG1-M, Art.no: 5020.055.018

ATEX-protection hose with threaded hose coupling M20x1,5

For installation of Modbus cable in ATEX Zone 21

Manufacturer: PMA, Type ESX, Art.no: ESXT-12B.50 and Type END, Art.no: BEND-M202GT

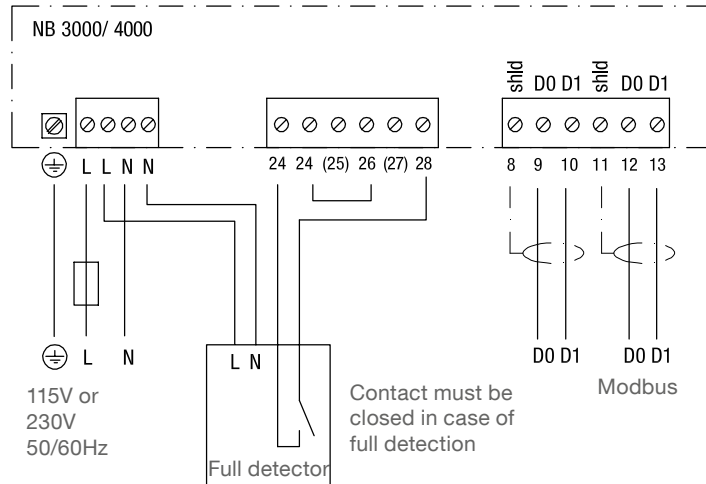
NT 4500



Note: All DIP switches on the controller are set to OFF and must not be changed.

Electrical installation

NB 3000 /4000



0.14 .. 2.5mm²
 (AWG 26 .. 14)

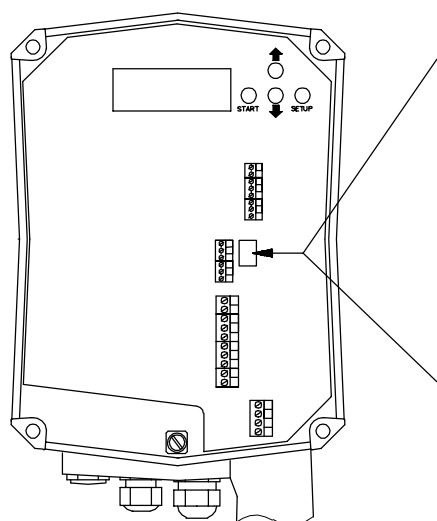
Fuse: max. 10A

Electrical installation

Setting: Biasing and Termination Resistor

For use of NB 4000 units in a external Modbus network, it is possible to set Biasing and Termination Resistor on each unit as required.

NB 3000



Version with Jumper

Biasing	OFF*	OFF	ON
Termination Resistor	OFF*	ON	ON

Version with DIP switch

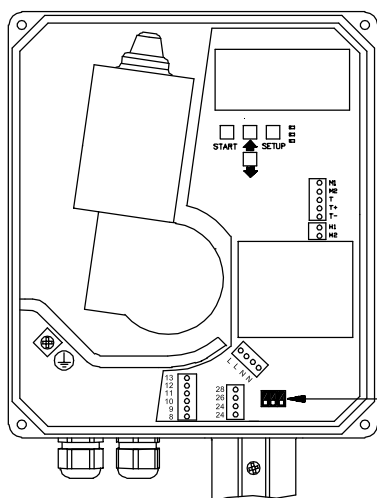
Biasing	OFF*	OFF	ON	ON
Termination Resistor	OFF*	ON	OFF	ON

*factory provided

DIP Switch position:

Top view Side view

NB 4000



Biasing	OFF*	OFF	ON	ON
Termination Resistor	OFF*	ON	OFF	ON



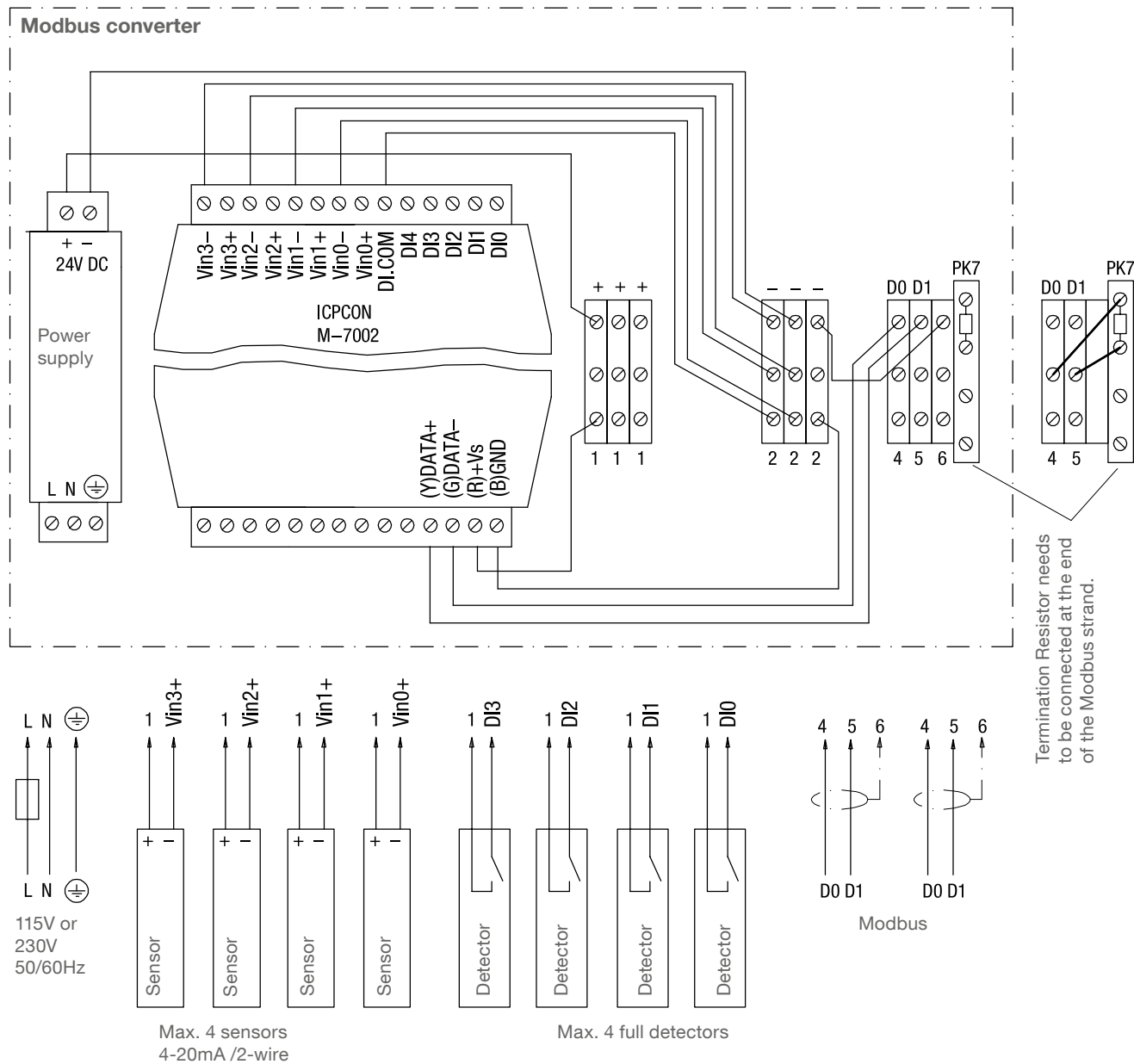
*factory provided

DIP Switch position:

Top view Side view

Electrical installation

Modbus converter



Fuse: max. 10A

Terminals M-7002: 0.14 .. 1.5mm² (AWG 26 .. 16)

Other terminals: 0.14 .. 2.5mm² (AWG 26 .. 14)

The stated wiring inside the Modbus converter is factory provided.

Commissioning

1. Generation of a synoptical table

Commissioning is facilitated if an overview of the connected sensors is made in advance.

The table shows an example of a project with 10 silos and mixed configuration of Nivobob NB 3000 and NR 3000 radar as well as implementation of full detectors:

Silo	Sensor	Modbus ID	Modbus converter Channel*	Modbus converter Terminal of sensor	Modbus converter Terminal of full detector
1	NB 3000	3	n/a	n/a	n/a
2	NB 3000	4	n/a	n/a	n/a
3	NB 3000	5	n/a	n/a	n/a
4	NB 3000	6	n/a	n/a	n/a
5	NR 3000	1	0	Vin0+	DI0
6	NR 3000	1	1	Vin1+	DI1
7	NR 3000	1	2	Vin2+	DI2
8	NR 3000	1	3	Vin3+	DI3
9	NR 3000	2	0	Vin0+	DI0
10	NR 3000	2	1	Vin1+	DI1

* see page 15 under "Input Signal"

2. Check the wiring

Make sure that the Modbus network is wired, set the Modbus Termination Resistor (and for NB 3000/ 4000 the Biasing), check that the Ethernet connection is available (see "Electrical installation" from page 5 onwards).

Note: All units are preset to 19200 Baud. Thus no setting is required.

3. Web server configuration

CAUTION: The configuration should be done by the network administrator only.

The web server is preset to the IP address 192.168.10.70. It must be changed to a company's own IP address as follows:

- Use a PC, which is connected via Ethernet to the Web server. Set in the system control the TCP / IP to address 192.168.10.xx, whereas xx can be any two digit number (the access to the Web server requires the number 192.168.10., the last two digits are not relevant).
- An up to date version of Internet browser must be installed.
- Open the Internet browser and type the IP address 192.168.10.70 of the web server in the command bar. The overview page "Home" of the visualisation opens (see page 11).
- Click the "User" button and set the User Level to 5. The "Config" button will appear in the menu bar.
- Click on this button. The configuration page of the web server will open (see page 13).
- Enter your IP address, sub net mask and gateway, the current date and time
- Then reset to your TCP / IP address in the system control of your PC.

4. Perform the basic settings of the connected sensors

With the following settings, the connected sensors are addressed via the visualisation and give a real measurement result. For this settings the above mentioned synoptical table is helpful:

- Enter in page "Settings" (see page 15), the data under "Hardware", "Signal Input" and, if full detectors are connected, "Full Level Indicator".
- Enter in page "Volume Calculation" (see page 17) the data under "Silo Profile" and "Silo Data".

5. Perform further user settings

Enter the required user specific settings according to the "Visualisation - Operation" from page 11 onwards.

Visualisation - Operation

Start of the Visualisation

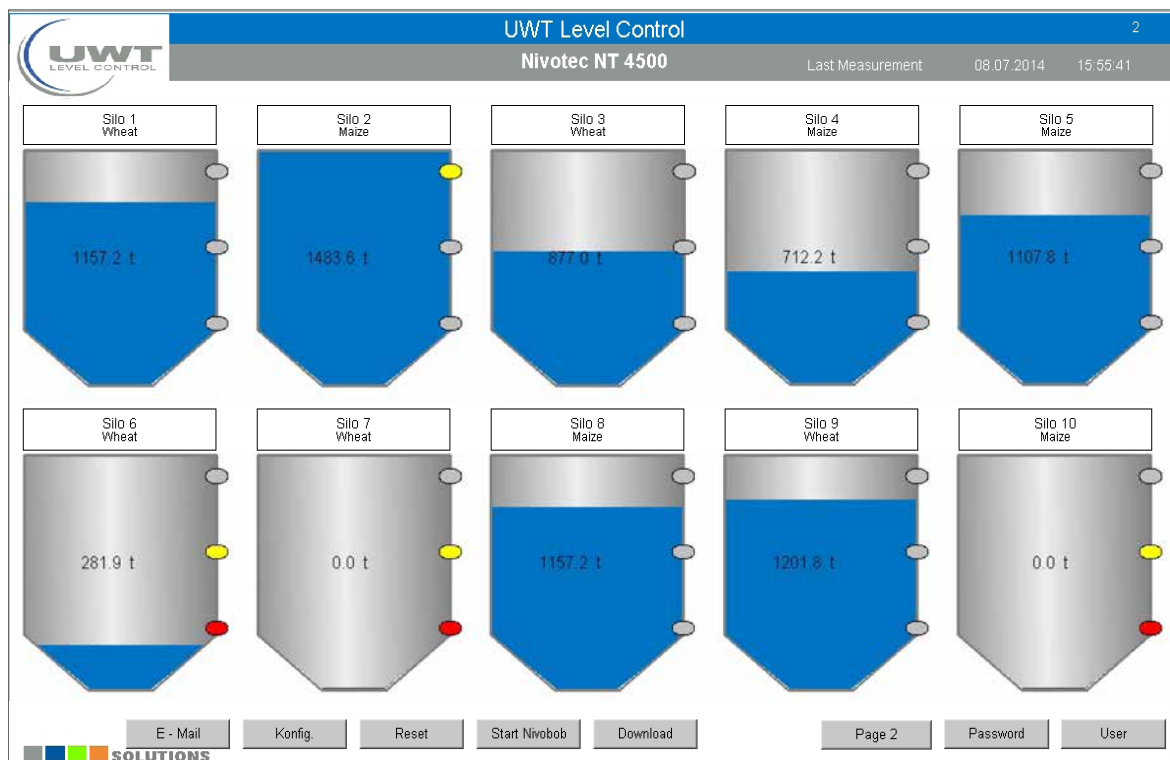
By entering the IP address in the browser (according to the web server configuration) the visualisation starts.
After successful start the overview page "Home" appears.

Overview page (Home)

Display of level, level switches, information regarding silo and error messages

User Level 0 or higher

The selected number of silos (see page "Config") is presented. If more than 10 silos are defined, a button appears for progression to the next page.



Note: If a distorted image on the PC is present, it should not be viewed in full screen mode, thus the window can be drawn in an undistorted view.

Visualisation - Operation

The following selections appear depending on the setted User Level:

Silo Single View (click on a silo)

The single view for the respective silo will open (see page 14).

E-Mail

Sends an E-mail if a level switch is activated (see page 16) or if an error message of the NB 3000/ 4000 is present.

Config

See page 13.

Reset

Reset of the full signal (buzzer) and of error messages.

Start Nivobob

Starts the measurement of all connected Nivobobs. If more than 10 silos are defined, the measurements of the silos not displayed on the screen are started as well. As long as the measurement is running, a green arrow appears in each silo.

Download

Issue of trend data for all silos in .csv format. The level values are stated in the unit as defined under "Volume Calculation" (see page 16).

Password

Used for password assignment. Each User Level can change its own password. The higher level can change the password of the lower levels. No password is presetted apart from Level 7.

User

Selecting the User Level with different permissions:

Level 0

- Overview page (Home)

Level 1

Similar to Level 0, additional:

- Silo Single View
- Start Nivobob
- View of Event List
- Reset of the full signal (buzzer) and of error messages
- Download of trend data

Level 2

Similar to Level 1, additional:

- Page "Settings"
- Page "Volume calculation"

Level 3

Similar to Level 1, additional:

- On Page "Settings": change of "Silo Data" possible
- On Page "Volume calculation": change of "Density" possible.

Level 4

Blocked

Level 5

Similar to Level 2, additional:

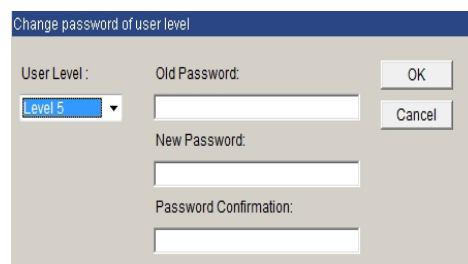
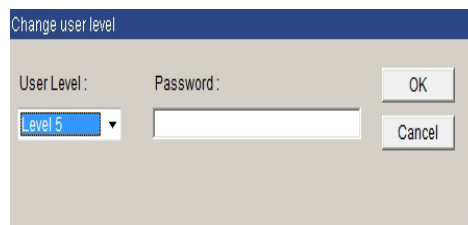
- Page "Setup Nivobob"
- Page "Config"
- Page "E-Mail"

Level 6

Blocked

Level 7

UWT Service-Level





Visualisation - Operation

Page "Config"

Setting of date, time, software language, country-specific units, number of displayed silos as well as network settings

User Level 5 or higher



Konfiguration Controller


Nivotec NT 4500

Date - Time	
Time	13:28:21
Date	03.07.2014
New Time	00:00:00
New Date	01.01.1970
Set	

Einstellungen	
Meter	Feet
Tonnen	US Tonnen
Deutsch	Englisch

Network				
IP Adress	192.168.10.70			
Sub Net Mask	255.255.255.0			
Gateway	192.168.10.250			
New IP Adress	0	0	0	0
New Sub Net Mask	0	0	0	0
New Gateway	0	0	0	0
Set				

Silo Anzahl Number of Silos
10



Home

Visualisation - Operation

Page "Silo Single View"

View of details and settings of the sensors for a silo

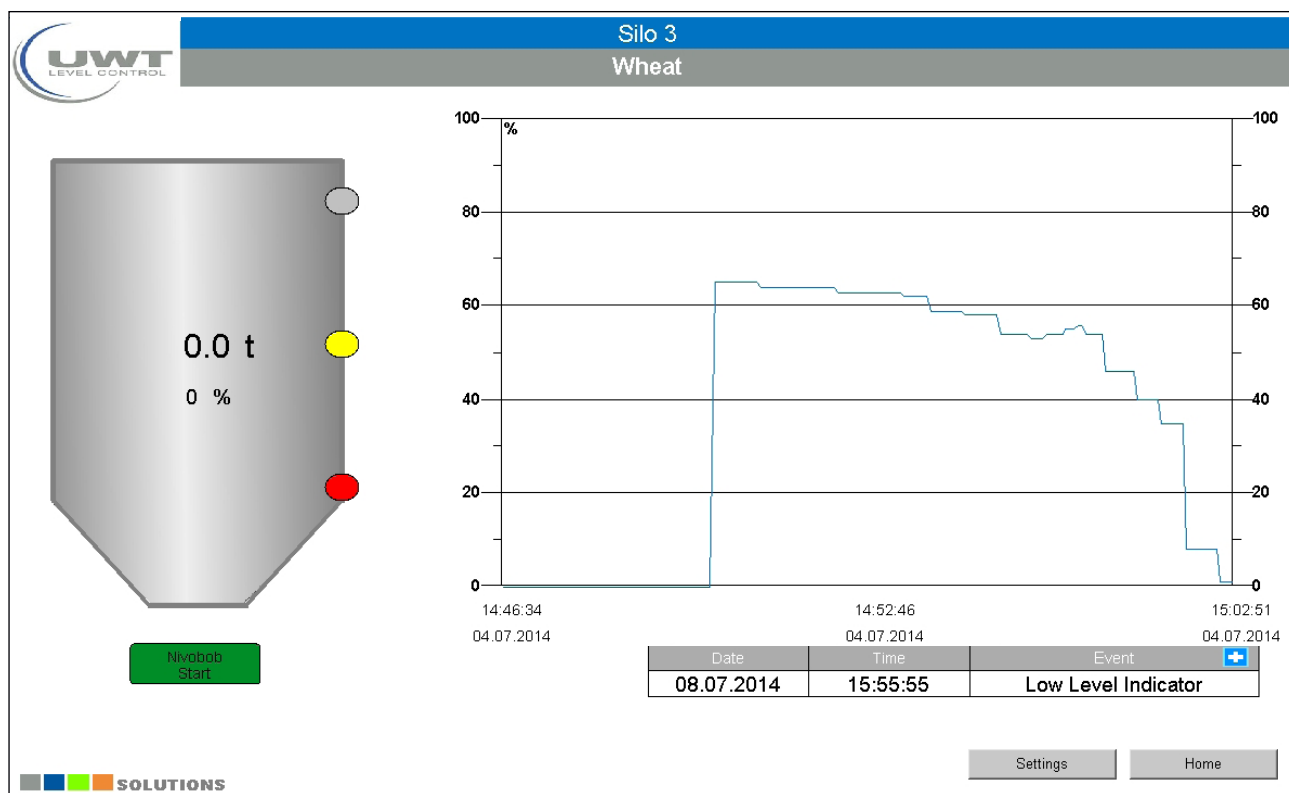
User Level 1 or higher

Clicking on a silo in the Overview page (Home) opens the Silo Single View.

The level is displayed in the unit as defined under "Volume Calculation" (see page 16), in addition as a percentage.
The colored points display the full, demand and empty detection.

The trend stores a total of 200 data points per silo. The oldest point is deleted when a new value is stored.

Events are displayed in a table. The selection "+" opens the list of the last 17 events.



Nivobob Start

Starts the measurement of the Nivobob for this silo. During the measurement, the button appears gray. When the measurement is completed, the color changes back to green.

The button appears only if on page "Settings" under "Hardware" the selection "Nivobob" has taken place.

Settings

Leads to the page "Settings" of this silo (see page 15).

Visualisation - Operation

Page "Settings"

Detail settings for the respective measurement point

User Level 2 or higher

The page opens with click on "Settings" in the page "Silo Single View".

View with selection "Hardware - Nivobob":

Settings Silo 2		Software ID: 4500																								
Maize		V6.2.3 M. Nigst																								
<table border="1"> <tr><th colspan="2">Silo Data</th></tr> <tr><td>Name</td><td>Silo 2</td></tr> <tr><td>Content</td><td>Maize</td></tr> <tr><td>Art. Nr.</td><td></td></tr> </table>	Silo Data		Name	Silo 2	Content	Maize	Art. Nr.		<table border="1"> <tr><th colspan="2">Signal Input</th></tr> <tr><td>Modbus</td><td>ID 2</td></tr> </table>	Signal Input		Modbus	ID 2	<table border="1"> <tr><th colspan="2">Trend</th></tr> <tr><td>Trend Intervall</td><td>00:01:00</td></tr> </table>	Trend		Trend Intervall	00:01:00								
Silo Data																										
Name	Silo 2																									
Content	Maize																									
Art. Nr.																										
Signal Input																										
Modbus	ID 2																									
Trend																										
Trend Intervall	00:01:00																									
<table border="1"> <tr><th colspan="2">Hardware</th></tr> <tr><td>4-20mA</td></tr> <tr><td>Nivobob</td></tr> </table>	Hardware		4-20mA	Nivobob	<table border="1"> <tr><th colspan="2">Level Indicator</th></tr> <tr><th colspan="2">Full Level Indicator</th></tr> <tr><td>Modbus</td><td>Value</td></tr> <tr><td></td><td>90</td></tr> <tr><th colspan="2">Demand Level Indicator</th></tr> <tr><td>Value</td><td>30</td></tr> <tr><th colspan="2">Low Level Indicator</th></tr> <tr><td>Value</td><td>10</td></tr> </table>	Level Indicator		Full Level Indicator		Modbus	Value		90	Demand Level Indicator		Value	30	Low Level Indicator		Value	10	<table border="1"> <tr><th colspan="2">Enable Nivobob</th></tr> <tr><td>Yes</td><td>No</td></tr> </table>	Enable Nivobob		Yes	No
Hardware																										
4-20mA																										
Nivobob																										
Level Indicator																										
Full Level Indicator																										
Modbus	Value																									
	90																									
Demand Level Indicator																										
Value	30																									
Low Level Indicator																										
Value	10																									
Enable Nivobob																										
Yes	No																									
<table border="1"> <tr><td>Volume Calculation</td></tr> <tr><td>Setup Nivobob</td></tr> </table>	Volume Calculation	Setup Nivobob		<table border="1"> <tr><th colspan="2">Automatic Power Measurement Start</th></tr> <tr><td>Yes</td><td>No</td></tr> </table>	Automatic Power Measurement Start		Yes	No																		
Volume Calculation																										
Setup Nivobob																										
Automatic Power Measurement Start																										
Yes	No																									
		<table border="1"> <tr><th colspan="2">Measure Interval</th></tr> <tr><td>Yes</td><td>No</td></tr> <tr><td>Intervall Time</td><td>00:00:30</td></tr> <tr><td>Start Time</td><td>14:53:00</td></tr> </table>	Measure Interval		Yes	No	Intervall Time	00:00:30	Start Time	14:53:00																
Measure Interval																										
Yes	No																									
Intervall Time	00:00:30																									
Start Time	14:53:00																									
		Back Home																								

View with selection "Hardware 4-20mA":

Settings Silo 2		Software ID: 4500																					
Maize		V6.2.3 M. Nigst																					
<table border="1"> <tr><th colspan="2">Silo Data</th></tr> <tr><td>Name</td><td>Silo 2</td></tr> <tr><td>Content</td><td>Maize</td></tr> <tr><td>Art. Nr.</td><td></td></tr> </table>	Silo Data		Name	Silo 2	Content	Maize	Art. Nr.		<table border="1"> <tr><th colspan="2">Signal Input</th></tr> <tr><td>Modbus</td><td>ID 2</td></tr> <tr><td rowspan="4">Channel</td><td>0</td></tr> <tr><td>1</td></tr> <tr><td>2</td></tr> <tr><td>3</td></tr> </table>	Signal Input		Modbus	ID 2	Channel	0	1	2	3	<table border="1"> <tr><th colspan="2">Trend</th></tr> <tr><td>Trend Intervall</td><td>00:01:00</td></tr> </table>	Trend		Trend Intervall	00:01:00
Silo Data																							
Name	Silo 2																						
Content	Maize																						
Art. Nr.																							
Signal Input																							
Modbus	ID 2																						
Channel	0																						
	1																						
	2																						
	3																						
Trend																							
Trend Intervall	00:01:00																						
<table border="1"> <tr><th colspan="2">Hardware</th></tr> <tr><td>4-20mA</td></tr> <tr><td>Nivobob</td></tr> </table>	Hardware		4-20mA	Nivobob	<table border="1"> <tr><th colspan="2">Level Indicator</th></tr> <tr><th colspan="2">Full Level Indicator</th></tr> <tr><td>Modbus</td><td>Value</td></tr> <tr><td></td><td>90</td></tr> <tr><th colspan="2">Demand Level Indicator</th></tr> <tr><td>Value</td><td>30</td></tr> <tr><th colspan="2">Low Level Indicator</th></tr> <tr><td>Value</td><td>10</td></tr> </table>	Level Indicator		Full Level Indicator		Modbus	Value		90	Demand Level Indicator		Value	30	Low Level Indicator		Value	10		
Hardware																							
4-20mA																							
Nivobob																							
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	90																						
Demand Level Indicator																							
Value	30																						
Low Level Indicator																							
Value	10																						
<table border="1"> <tr><td>Volume Calculation</td></tr> </table>	Volume Calculation																						
Volume Calculation																							
		Back Home																					

Visualisation - Operation

Silo Data

The silo shown can be labeled with any text for silo name, content and article number.

Hardware

Indication of the sensor used.

Signal Input

- If a Nivobob is connected (with selections "Hardware - Nivobob") :
 Set here the Modbus address which is present on the Nivobob. The Modbus address of the Nivobob is setted in the Nivobob communication menu (see manual Nivobob). It is reasonable to use the address 1 for the first device, then ascending to 2, 3, etc. With mixed use of Modbus converters the first addresses of the Modbus converters are already preset (see below), the Nivobob addresses must then be allocated above these. Optional (with selection code 33) the Nivobob devices are delivered with already preset address.
- If a Modbus converter is connected (with selection "Hardware 4-20mA"):
 Setting of the Modbus ID number (Modbus address) of the Modbus converter.
 The Modbus converters are factory presetted to address 1 for the first Modbus converter, then ascending to 2, 3, etc. The settings can not be changed. A label with the Modbus address is present inside the Modbus converters on the implemented module M-7002.

 Setting of the Channel for 4-20mA sensors and full detectors:
 Channel 0 is allocated to the terminal Vin0+ and DI0 (see Electrical installation on page 9)
 Channel 1 is allocated to the terminal Vin1+ and DI1
 Channel 2 is allocated to the terminal Vin2+ and DI2
 Channel 3 is allocated to the terminal Vin3+ and DI3

Level Indicator

If a full detector is connected, it is read with setting to "Modbus".
 If "value" is selected, the message for full and demand is activated, when the entered value (in percent) is exceeded by the material level.
 The message for empty is activated, when the material level is below the entered value (in percent).
 The demand and empty message can only be activated via the input "value".

Trend

The trend stores the level values according to the setted interval (hours : minutes : seconds).
 A total of 200 data points per silo are stored. The oldest point is deleted when a new value is stored.

Enable Nivobob

Measurement start can be blocked by setting to "No", e.g. while a silo is beeing filled.

Automatic Power Measurement Start

After power up or after power failure of the web server, the Nivobobs will start automatically if "Yes" is selected. The level measurement is then immediately updated (the Nivobob gives no actual signal output until a new measurement is started).

Measure Interval

Activation of automatic measurement start of Nivobob, if setted to "Yes". The start takes place automatically, the first time at the setted start time (time of day), then regularly repeated with the setted interval (hours : minutes : seconds).

Volume Calculation

see page 17

Setup Nivobob

see page 18

Visualisation - Operation

Page "Volume Calculation"

Settings for volume related measurement display and setting of the silo dimensions

User Level 2 or higher

The page opens with click on "Volume Calculation" in the page "Settings".

Volume Calculation Silo 1

Maize

Signal Input	
Linear	Volume

Silo Profile	
Cylindrical	Rectangular

Silo Data	
H (m)	15.4
K (m)	3.2
L (m)	1.2
D1 (m)	3.5
D2 (m)	0.5

Unit	
Meter (m)	
Cubicmeter (m³)	
Ton (t)	
Kilogram (kg)	
Liter (l)	
Percent (%)	

Volume	
Max. Volume	117.71
Density g/l	650

Calculated	
Max. Value	Current Value
76.51 t	0.00 t

Silo Profile and Silo Data

With the setted data the software calculates the max. volume:

Programming of the sensors

For the correct measurement display the connected sensors must be set as follows:

• Nivobob NB 3000/ 4000:

Value "Cone Height" must be set to 0 (see page 18):

Value "Silo Height" must correspond to the value H given above

Value "Air Dist" must correspond to the value L given above
(H and L are related to the lower edge of the sensor-weight)

• 4-20mA sensors (connected via Modbus converter):

4mA must correspond to the value 0% given above

20mA must correspond to the value 100% given above

(H and L are related to the fixing flange if using NR 3000)

Note: All sensors needs to have a linear level signal (relation between the signal output and level in the silo).
The volume-based calculation is performed in the visualisation only.

Unit

The selected unit is used in the visualisation.

Volume

Display of the max. volume (in cubic meters) and input of bulk density to calculate the weight.

Calculated values

Display of the calculated maximum content (according to the entered Silo Profile and Data) and the actual content.
Both values are shown in the above selected unit.

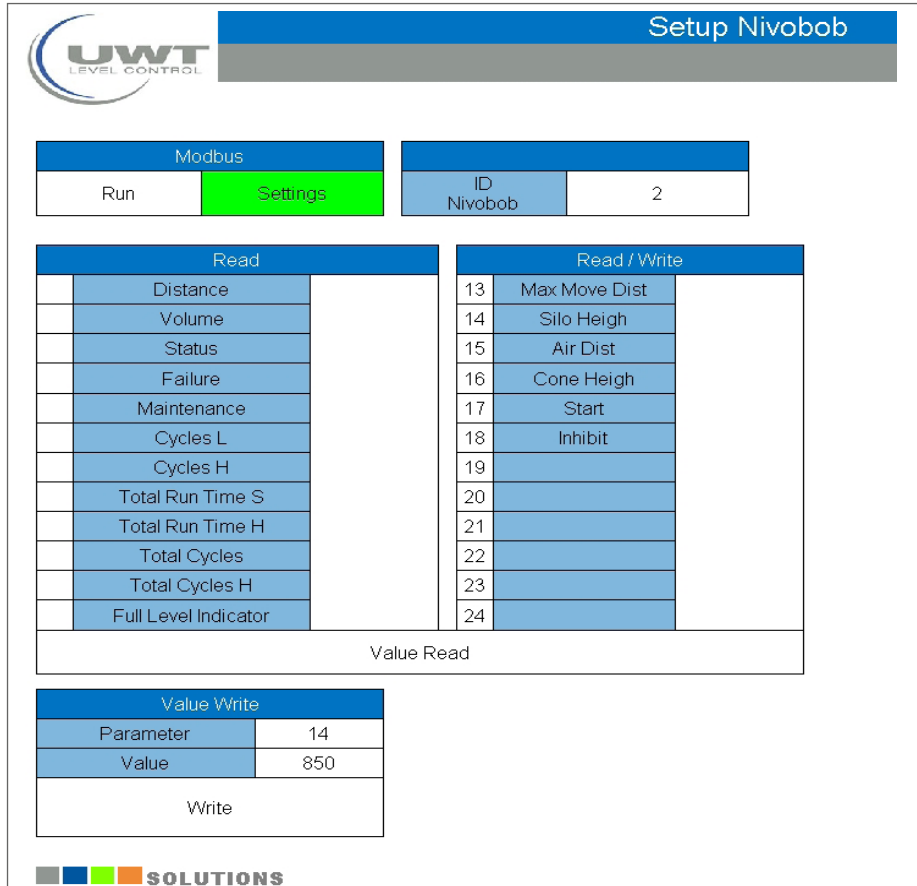
Visualisation - Operation

Page "Setup Nivobob"

Parameterization and reading diagnostic data from the Nivobob

User Level 5 or higher

The page opens with click on "Setup Nivobob" in the page "Settings".




Modbus		ID Nivobob	
Run	Settings	ID Nivobob	2

Read		Read / Write	
	Distance	13	Max Move Dist
	Volume	14	Silo Heigh
	Status	15	Air Dist
	Failure	16	Cone Heigh
	Maintenance	17	Start
	Cycles L	18	Inhibit
	Cycles H	19	
	Total Run Time S	20	
	Total Run Time H	21	
	Total Cycles	22	
	Total Cycles H	23	
	Full Level Indicator	24	

Value Read

Value Write	
Parameter	14
Value	850
Write	



Modbus

Activation of parameter setting and value reading with click on "Settings". A list with parameters of Nivobob NB 3000/ 4000 appears. For details of the displayed parameters, see manual of the NB 3000/ 4000.

Selecting "Run" will close again.

ID Nivobob

Enter the ID number (Modbus address) of the Nivobob which is related to this silo.

Read and Read/Write

The parameters which are read only, or which are read and write, are displayed. Update the values by clicking the "Value Read" button. After a few seconds, the values are shown. The values 13-16 are always displayed and written in millimeters.

Value write

Enter the number (13-18) of the value, which shall be written, in the "Parameter" box. This value is transferred to the Nivobob by clicking the "Write" button

With parameter 17 "Start" set to 1 the Nivobob can be started. Set back to 0 afterwards.

With parameter 18 "Inhibit" set to 1 a running measurement of the Nivobob is stopped. Set back to 0 afterwards.

Table of contents

	Page
Safety notes / Technical support	2

Overview	3

Technical Data	4

Accessories	4

Electrical installation	5

Commissioning	10

Visualisation - Operation	11

Subject to technical change.

We assume no liability for typing errors.

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




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.

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 related documents (manual) for details.
	Earth (ground) Terminal
	Protective Conductor Terminal

Technical support

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

UWT GmbH
 Westendstr. 5
 87488 Betzigau
 Germany

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

Overview

Level monitoring and visualisation via touch panel

- Standardized system up to 15 silos
- Visualisation and operation via 7" touch panel (coloured, 800 x 480 pixel)
- Software language german or english
- Password protected
- Data in percentage, height, volume or weight
- Trend display, data storage
- Evaluation of the analogue 4-20 mA signals of any sensors, as well as Modbus RTU of the UWT-systems
- Different input signals within the same system is possible
- Implementation of full detectors
- Fill control via full alarm signal (Buzzer)

NT 4600 Basis unit

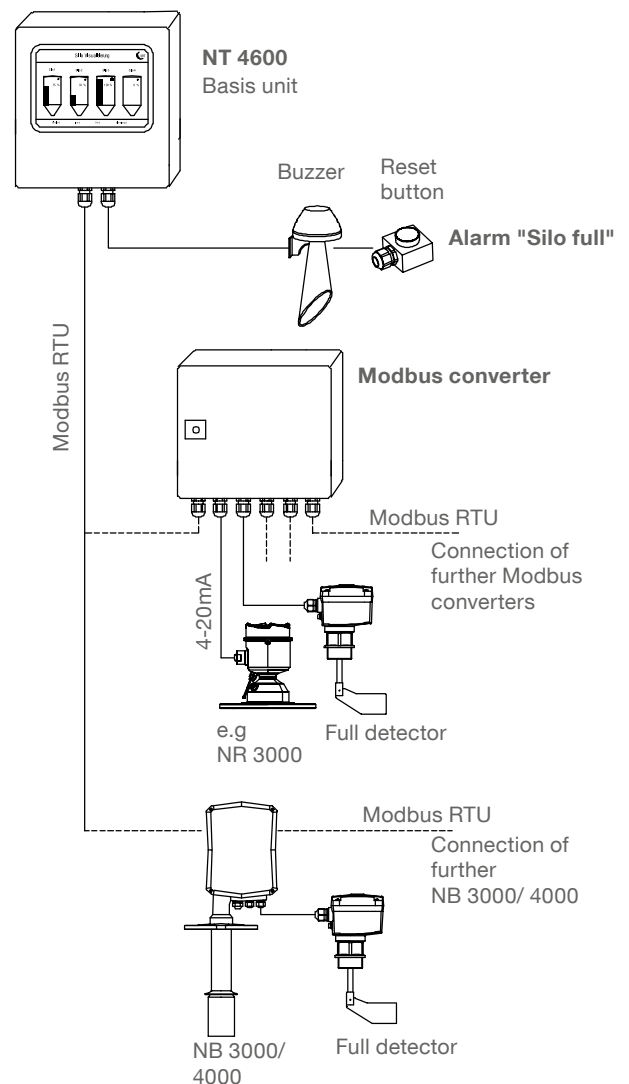
The heart of the NT 4600 is a touch panel, which runs the visualisation software. All fill level control and display functions can be operated via the touch panel. Access is password protected. The electromechanical lead system can be started by the visualisation software.

Modbus converter

- For connection of 4-20mA/2-wire sensors and full detectors
- On each converter up to 4 sensors and 4 full detectors can be connected
- Provided for mounting directly on the silo

Integration of full detector incl. alarm "silo full"

- Buzzer with reset button (supplied loose, for outdoor mounting)
- One unit for all connected silos
- Alarm happens, if one of the silos gets full
- Reset of the alarm
- Provided for mounting directly on the silo



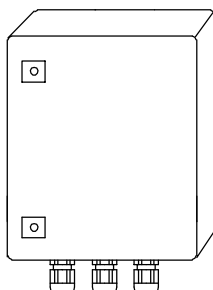
Technical Data / Accessories

Technical data

Dimensions	NT 4600, Modbus converter:	300 x 300 x 155mm (W x H x D)
Dimensions (Touch panel without cabinet)	Touch panel Panel cutout	200 x 146 x 34mm 192 x 138mm
Mounting	NT 4600, Modbus converter:	wall mounting
Material	NT 4600, Modbus converter:	steel plate
Ingress protection	NT 4600, Modbus converter:	IP65
Ambient temperature	NT 4600:	0..+50°C
	Modbusumsetzer:	-25..+70°C
Power supply	NT 4600, Modbus converter:	115V or 230V 50/60Hz (integrated power converter 24V DC)
	NR 3000:	supplied by Modbus converter
	NB 3000/ 4000:	115V or 230V AC, connection is made on site
	Full detector:	Connection either on NB 3000/ 4000 resp. Modbus converter. In this case the supply voltage must be equal to NB 3000/ 4000 resp. Modbus converter. Alternative it is possible to connect on site.
Power consumption	NT 4600, Modbus converter:	20VA
	Connected level sensors:	see documentation of the respective sensors
Signal output full detector	Floating contact is required	

Terminal box

Intermediate terminals for the wires leading to the silo (mounting e.g. on the silo frame).
Applicable for cables of level (Modbus or 4-20mA), limit switch, buzzer, reset button



Technical data

Dimensions	200 x 300 x 120mm (W x H x D), for wall mounting	
Material	steel plate	
Ingress protection	IP65	
Ambient temperature	-25..+60°C	
Terminal blocks	15 pieces grey, 5 pieces blue, 5 pieces green/yellow; each terminal implements 3 cable inlets 2,5mm ² , mounted on top hat rail	
Cable glands	6 pieces M20x1,5	2 pieces M25x1,5

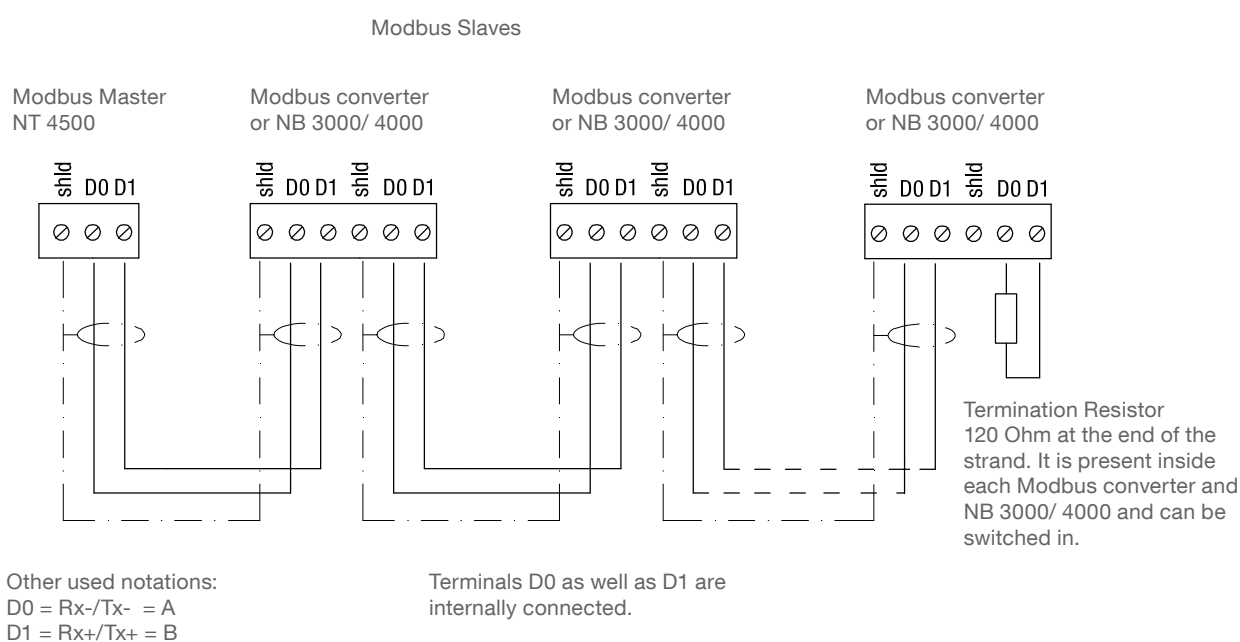
Electrical installation

! Safety Instructions

Handling	In 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.
Fuse	Use a fuse as stated in the connection diagrams.
RCCB protection	In 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 name plate before switching the device on.
Cable gland	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.
Field wiring cables	All field wirings must have insulation suitable for at least 250V AC. The temperature rating must be at least 80°C (176°F).
Installation in Hazardous Locations	The NT 4500 and the Mobus converter are not permitted for installation in Hazardous Areas. Observe the valid regulations for wiring in Hazardous Areas, if the NB 3000/ 4000 is installed in Hazardous Areas.

Modbus network

General wiring of a Modbus network



Note:

If required it is possible to split the Modbus network into two strands. Both strands are wired in parallel at the Modbus Master. A termination resistor must be present at the end of each strand.

Electrical installation

Cable recommendations for Modbus network

Shielded cable

Functionality up to 50m

Manufacturer: Lapp, Type UNITRONIC LiYCY 2x0.34, Art.no: 0034502

Twisted pair cable

Functionality up to 1000m

Manufacturer: Lapp, Type UNITRONIC BUS CAN 1x2x0.34, Art.no: 2170263

UV-protection hose with threaded hose coupling M20x1,5

UV protection for Modbus cable

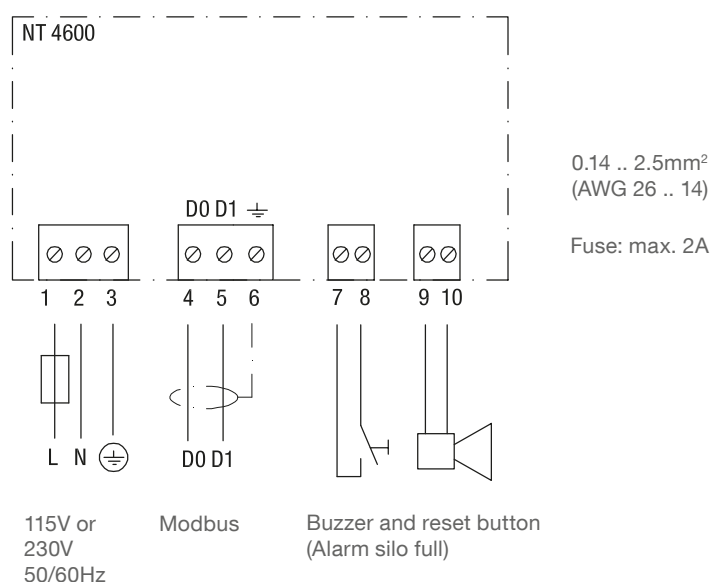
Manufacturer: Flexa, Type Rohrflex PA6, Art.no: 0233.202.012 and Type RQG1-M, Art.no: 5020.055.018

ATEX-protection hose with threaded hose coupling M20x1,5

For installation of Modbus cable in ATEX Zone 21

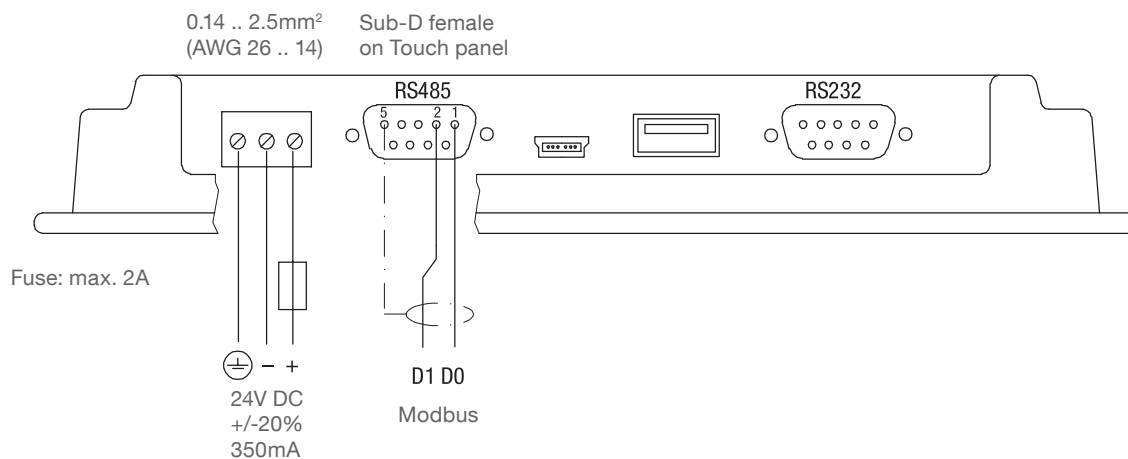
Manufacturer: PMA, Type ESX, Art.no: ESXT-12B.50 and Type END, Art.no: BEND-M202GT

NT 4600



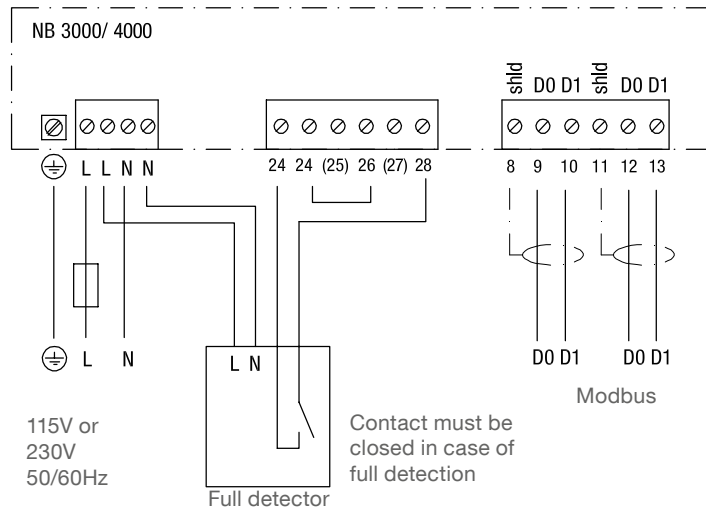
Wiring of Touch panel

Only relevant if pos.1 A "Touch panel without control cabinet" was ordered



Electrical installation

NB 3000/ 4000



0.14 .. 2.5mm²
 (AWG 26 .. 14)

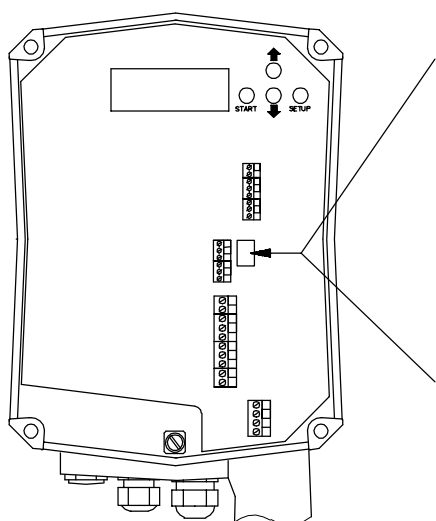
Fuse: max. 10A

Electrical installation

Setting: Biasing and Termination Resistor

For use of NB 3000/ 4000 units in a external Modbus network, it is possible to set Biasing and Termination Resistor on each unit as required.

NB 3000



Version with Jumper

Biasing	OFF*	OFF	ON
Termination Resistor	OFF*	ON	ON

Version with DIP switch

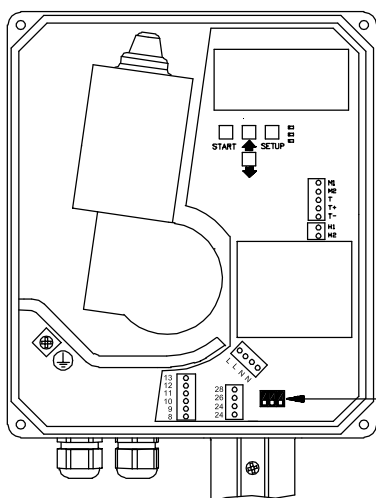
Biasing	OFF*	OFF	ON	ON
Termination Resistor	OFF*	ON	OFF	ON

*factory provided

DIP Switch position:

Top view Side view

NB 4000



Biasing	OFF*	OFF	ON	ON
Termination Resistor	OFF*	ON	OFF	ON



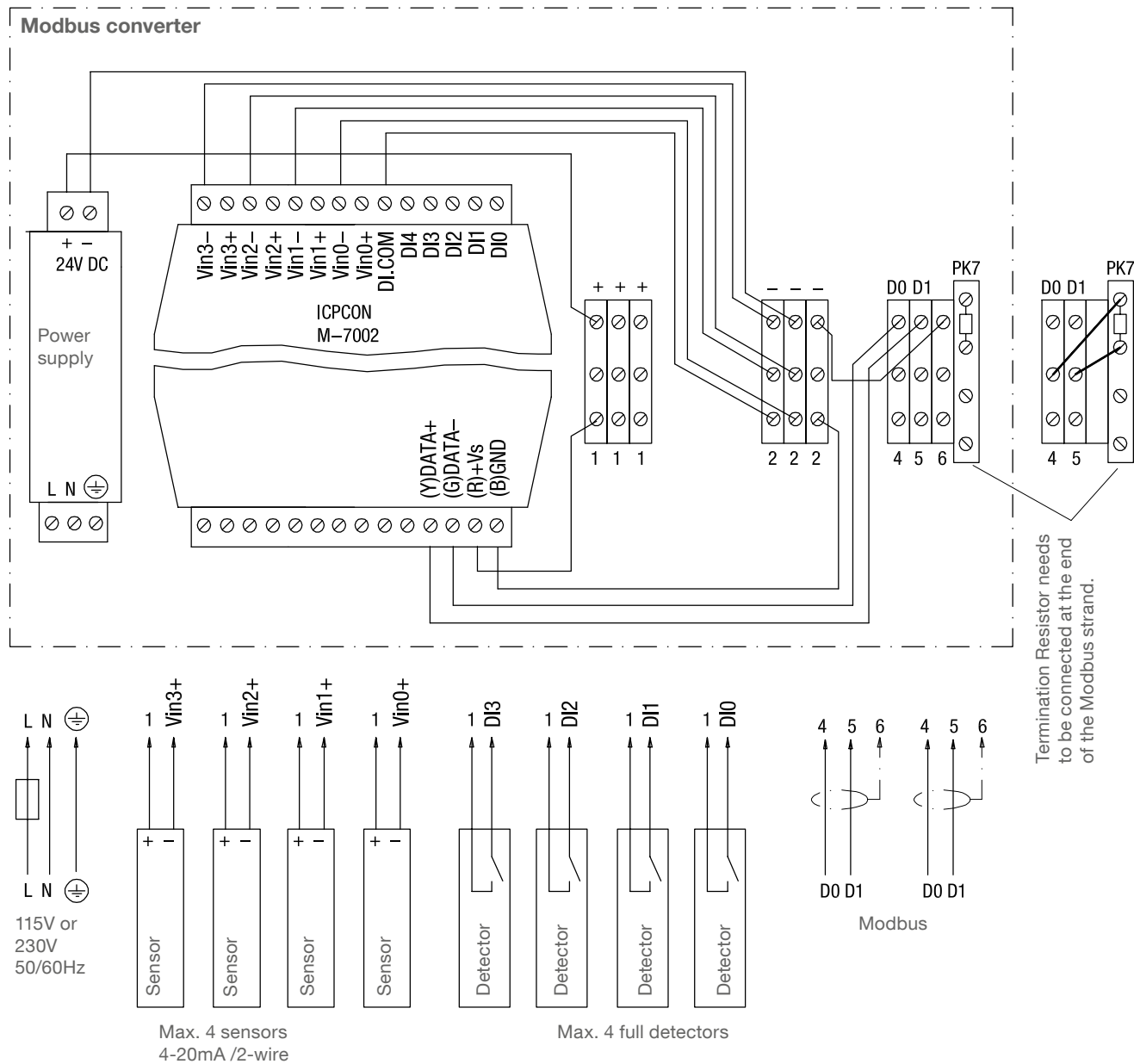
*factory provided

DIP Switch position:

Top view Side view

Electrical installation

Modbus converter



Fuse: max. 10A

Terminals M-7002: 0.14 .. 1.5mm² (AWG 26 .. 16)

Other terminals: 0.14 .. 2.5mm² (AWG 26 .. 14)

The stated wiring inside the Modbus converter is factory provided.

Commissioning

1. Generation of a synoptical table

Commissioning is facilitated if an overview of the connected sensors is made in advance.
 The table shows an example of a project with 10 silos and mixed configuration of Nivobob NB 3000 and NR 3000 radar as well as implementation of full detectors:

Silo	Sensor	Modbus ID	Modbus converter*		
			Channel	Terminal of 4-20mA sensor	Terminal of full detector
1	NB 3000	3	n/a	n/a	n/a
2	NB 3000	4	n/a	n/a	n/a
3	NB 3000	5	n/a	n/a	n/a
4	NB 3000	6	n/a	n/a	n/a
5	NR 3000 4-20mA sensor	1	0	Vin0+	DI0
6	NR 3000 4-20mA sensor	1	1	Vin1+	DI1
7	NR 3000 4-20mA sensor	1	2	Vin2+	DI2
8	NR 3000 4-20mA sensor	1	3	Vin3+	DI3
9	NR 3000 4-20mA sensor	2	0	Vin0+	DI0
10	NR 3000 4-20mA sensor	2	1	Vin1+	DI1

* see page 9 as well as 17-18 under "Input Signal"

2. Check the wiring

Make sure that the Modbus network is wired, set the Modbus Termination Resistor (and for NB 3000 the Biasing), check that the Ethernet connection is available (see "Electrical installation" from page 5 onwards).

3. Perform the basic settings for the visualisation

- Basic Settings - User (see page 13).
To do further settings, the userlevel must be set to Level 2.
- Basic Settings - System (see page 14).

4. Perform the settings of the silo data and of the connected sensors

With the following settings, the connected sensors are addressed via the visualisation and give a real measurement result. For this settings the above mentioned synoptical table is helpful:

- Silo Settings (see page 16).
- Sensor Settings (see page 17-18).
Note: All units are presetted to 19200 Baud. Thus no setting is required.

Visualisation - Operation

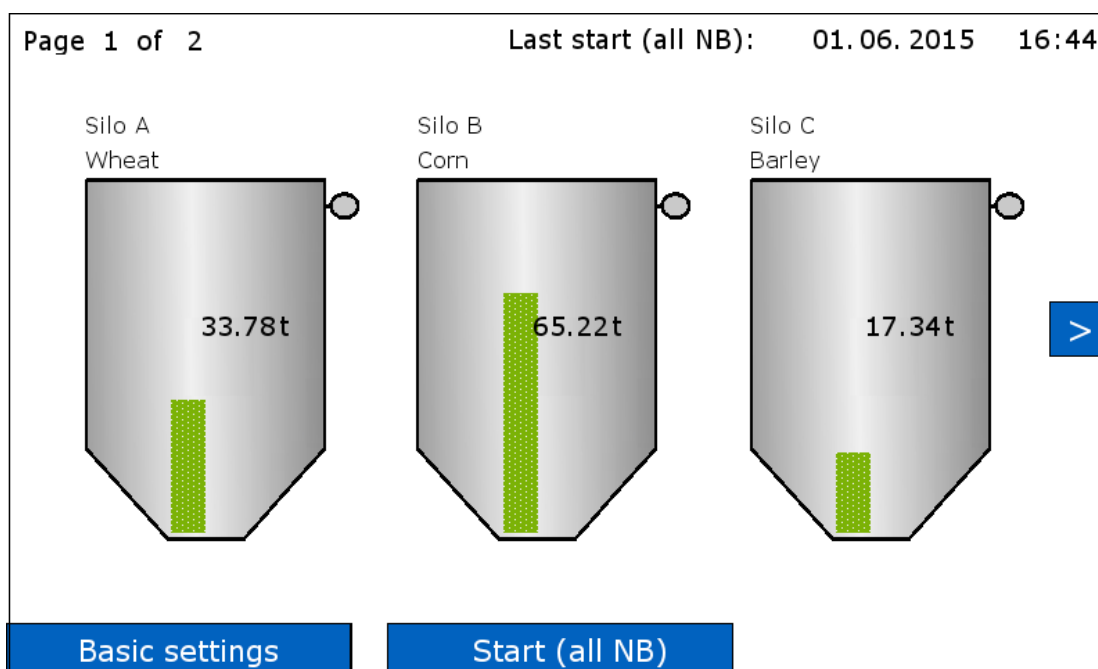
Overview page (Silo overview)

Display of level, full detector, information regarding silo and error messages

User Level 0 or higher

The selected number of silos (as defined on page 14) is presented. If more than 3 silos are defined, a button appears for progression to the next or previous page.

The level is stated according to the unit as selected under "unit level" (see page 16)
The colored points display the full detection as defined under "Full detector" (see page 17-18).



Silo Single View (pressing on a silo)

The single view for the respective silo will open (see page 12).

Basic settings

see page 13 to 15

START (all NB)

User Level 1 or 2.

Starts the measurement of all connected Nivobobs. If more than 3 silos are defined, the measurements of the silos not displayed on the screen are started as well.

While the measurement is running, a green arrow appears in each silo.

In the top line the date and time of the last measurement is displayed.

Measurement start is not possible due to one of the following reasons:

Under "Sensor-settings" the selection "Sensor Nivobob" is not present (see page 17).

The "Modbus for silo" is set to "inactiv" (see page 17).

Display "Blocked Start": The Nivobob Measurement Start is set to "no" (see page 17).

Display "Blocked 24-26": The bridge between terminal 24-26 at the Nivobob ist open. See Nivobob user manual.

Horn reset

Reset of the full signal (horn). The button appears only, if the horn is activated.

Possible other messages:

"Offline": The "Modbus for silo" is set to "inactiv", thus the respective silo has no valid measurement (see page 17).

"Modbus": The Modbus network is not working. See items under commissioning (page 10).

Further diagnostic messages may appear. If so, the messages implement comments for reason and possible measures.

Visualisation - Operation

Page "Silo Single View"

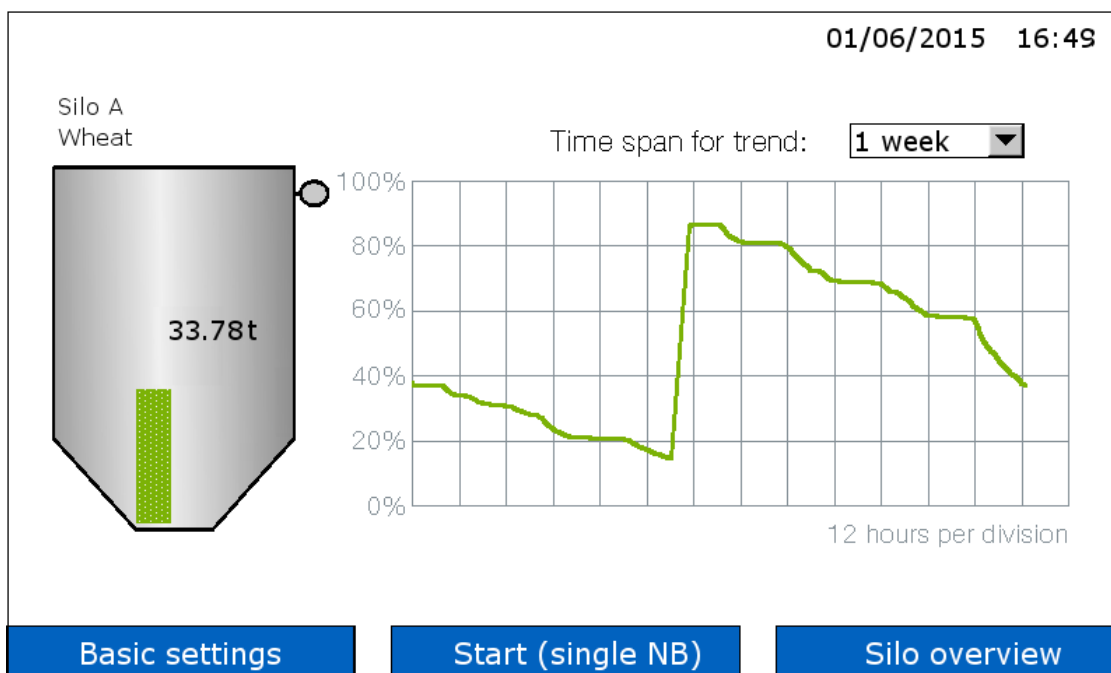
Display of trend and forward to the settings of silo and sensor

User Level 0 or higher

The page opens by pressing on a silo in the Overview page (Silo overview).

The level is displayed similar to the Overview page (Silo overview).

The selected "Time span for trend" defines the time which is displayed in the diagram. Previous data are not stored. After a power failure the trend starts from the beginning. With use of a USB stick the data can be readout from the stick.



START (single NB)

Starts the measurement of the Nivobob only for this silo.
While the measurement is running, a green arrow appears in the silo.

If no START button appears, the measurement start is not possible due to one of the following reasons:

Under "Sensor-settings" the selection "Sensor Nivobob" is not present (see page 17).

The "Modbus for silo" is set to "inactiv" (see page 17).

Display "Blocked Start": The Nivobob Measurement Start is set to "no" (see page 17).

Display "Blocked 24-26": The bridge between terminal 24-26 at the Nivobob ist open. See Nivobob user manual.

Pressing on the silo

Leads to the page "Silo Settings" (see page 16) and "Sensor Settings" (see page 17-18) for this silo.

Possible other messages:

"Offline": The "Modbus Enable" is set to "inactiv", thus the respective silo has no valid measurement (see page 17).

"Modbus": The Modbus network is not working. See items under commissioning (page 10).

Further diagnostic messages may appear. The messages implement comments for reason and possible measures.

Visualisation - Operation

Page "Basic settings - User"

Selection of user rights and password

User rights overview

Depending on the selected userlevel the following features are available:

Feature	Level 0	Level 1	Level 2
Overview page (Silo overview)	x	x	x
Silo single view	x	x	x
Horn reset (full detection)	x	x	x
Measurement start Nivobob		x	x
Page "Basic settings"			x
Page "Silo settings"			x
Page "Sensor settings"			x
Password change for Level 1 and 2			x

Change of user rights

Select the userlevel to be changed to, enter the password and press "Change".

Factory provided the password for all levels is set to "0".

If the change was successful, the box changes its colour to green, otherwise to red.

If the password is forgotten, please contact the supplier.

Note: Level 3 und 4 are used for service reasons (not available).

Actual userlevel: Level 2

Change to:

Password:

Password change

Factory provided the password for all levels is set to "0".

To change a password requires to be logged in Level 2, where the button "Edit password" appears. Press this button and select the level for which the password shall be changed.

For Level 0 the password can not be changed, it remains "0".

For Level 1 and 2 the new password may be one-digit to six-digit.

If the password change was successful, the box changes its colour to green, otherwise to red.

Editing for:

Old password:

New password:

Password confirmation:

Visualisation - Operation

Page "Basic settings - System"

Setting of date, time, country-specific units, number of displayed silos , measuring interval of Nivobob, horn, USB data storage

User Level 2

System Settings		Firmware v1.0	01/06/2015 16:27
Date - time Day <input type="text" value="1"/> Month <input type="text" value="6"/> Year <input type="text" value="2015"/> Hour <input type="text" value="16"/> Minute <input type="text" value="27"/> Second <input type="text" value="56"/> Language <input type="text" value="english"/> Units <input type="text" value="feet"/>	Amount of silos <input type="text" value="5"/> Measuring interval Starttime [hh:mm] <input type="text" value="5:00"/> Interval [hh:mm] <input type="text" value="14:00"/> Horn connected no <input type="checkbox"/> yes <input checked="" type="checkbox"/>	USB Data storage no <input type="checkbox"/> yes <input checked="" type="checkbox"/> Interval [hh:mm] <input type="text" value="0:30"/> Storage [MB/year] <input type="text" value="2.05"/>	
Basic settings		Silo overview	

Date - time

Setting of the actual date and time.

Language

Setting of the software language.

Units

Setting of the unit for the silo dimensions in page "Silo settings" (see page 16).

Amount of silos

Definition of the total number of silos for the visualisation.

Measuring interval

Activation of automatic measurement starts of the Nivobobs. The measurement starts happens daily, the first time at the setted Starttime (time of day), then regularly repeated with the setted Interval (hours : minutes).

If the Interval is set to 0, no measurement starts will happen.

Horn connected

Setting, if a horn (which is activated with a full detection) is connected. This setting is required to adjust the internal data processing to the horn functionality.

USB data storage

A USB stick can be plugged in at the bottom side of the panel. The data storage starts automatically after the switch is set to "yes".

Trend data for all silos are stored to the USB stick in .csv format.

The stored level values are volume related (considering the silo cone), in per mil (0-1000 per mil). Storage in absolute values like tons, cubic meter or meter is not possible.

A new file is created for every month.

The transfer of data to the USB stick is done automatically every 10 minutes.

Interval:

The Interval defines the time until the next measurement value is stored (hours : minutes). Minimum Interval is one minute. With setting 00:00 no storage will happen.

Storage:

States the required storage space of the USB stick (depending on the selected Interval).

Visualisation - Operation

Page "Basic settings - Diagnostics Nivobob"

Readout of diagnostics data from Nivobob

User Level 2

The data are used for diagnostic reasons.

Modbus ID	31	Read	01/06/2015 16:11
<div>Setup</div> <div> 40001 - M_LANGUAGE00000 40002 - M_UNIT00000 40003 - M_MAX_MOVE_DIST00000 40004 - M_SILO_HEIGHT00000 40005 - M_AIR_DIST00000 40006 - M_CONE_HEIGHT00000 40022 - M_TIMER00000 </div> <div>Measurement</div> <div> 40051 - M_START00000 40046 - M_DISTANCE00000 40055 - M_VOLUME00000 40052 - M_INHIBIT00000 40045 - M_STATUS00000 40057 - M_FULL_DETECTOR00000 </div>		<div>Diagnostics</div> <div> 40026 - M_TOTAL_CYCLES00000 40044 - M_TOTAL_CYCLES_H00000 40028 - M_CYCLES_LEFT00000 40050 - M_CYCLES_LEFT_H00000 40029 - M_TOTAL_RUN_TIME00000 40048 - M_TOTAL_RUN_TIME_S00000 40031 - M_RUN_TIME_LEFT00000 40053 - M_FAILURE00000 40054 - M_MAINTENANCE00000 </div> <div>Communication</div> <div> 40034 - M_PROTOCOL00000 40035 - M_ADDRESS00000 40036 - M_BAUDRATE00000 </div>	
Basic settings		Silo overview	

Modbus ID

Enter the ID number (Modbus address) of the Nivobob which shall be readout.

After pressing "READ" all Modbus registers of the related Nivobob are readout and displayed.

Please see user manual of Nivobob for further explanation of the registers.

To write data into the Nivobob registers is not possible.

Visualisation - Operation

Page "Silo settings"

Settings for silo related data

User Level 2

The page opens by pressing on the silo in the page "Silo single view".

Silo settings

Sensor settings

01/06/2015 16:26

Silo description

Name

Content

Article no.

Silo data

H ft

K ft

L ft

D1 ft

D2 ft

Silo shape

round ☒ angular

Unit level

Bulk density

lb/ft3

Max. value: 74.41 tnsh

Basic settings

Back

Silo overview

Silo description

The silo can be labeled with any text for silo name, content and article number.

Silo data and Silo shape

With the setted data the software calculates the volume related measurement.

Unit level

The selected unit is stated inside the silos, see page 11 and 12.

Bulk density

If a weight is selected in "Unit level", it is required to enter the density of the bulk material to enable the weight calculation.

Max. value

Display of the max. calculated content according to above setted data.

Visualisation - Operation

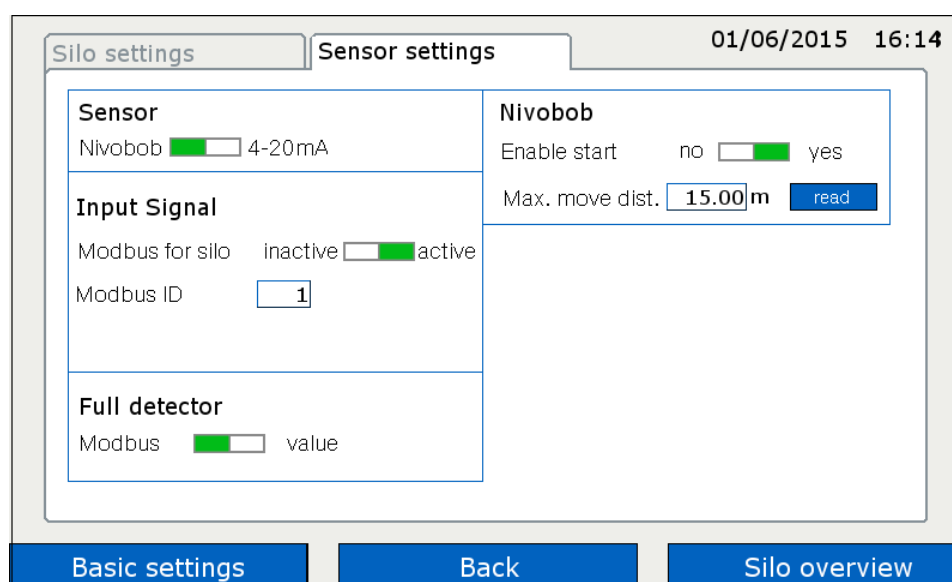
Page "Sensor settings"

Settings for sensor related data

User Level 2

The page opens by pressing on the silo in the page "Silo single view".

a) With use of Nivobob



The screenshot shows the 'Sensor settings' page with the following fields and options:

- Silo settings** (tab) | **Sensor settings** (tab) | 01/06/2015 16:14
- Sensor**: Nivobob ☒ 4-20mA
- Input Signal**:
 - Modbus for silo: inactive ☐ active ☒
 - Modbus ID:
- Full detector**:
 - Modbus ☒ value ☐
- Nivobob**:
 - Enable start: no ☐ yes ☒
 - Max. move dist.: m
- Navigation buttons: Basic settings, Back, Silo overview

Sensor

Setting to "Nivobob".

Input Signal

Modbus for silo:

It is possible to switch off single silos from the Modbus network (e.g. for revision) by setting the related Modbus ID inactive. If so, the other silos stay active. Inside the related silo it will be stated "Offline".

Modbus ID:

Input of the Modbus ID (Modbus address) of the Nivobob.

The Modbus address of the Nivobob is setted in the Nivobob communication menu (see user manual of Nivobob). It is reasonable to use the address 1 for the first device, then ascending to 2, 3, etc. With mixed use of Modbus converters the first addresses of the Modbus converters are already preset (see next page), the Nivobob addresses must then be allocated above these. Optional (with selection code 33) the Nivobob devices are delivered with already preset address.

Full detector

If a full detector is connected, it is read with setting to "Modbus" (see electrical installation page 7 for connection to NB 3000/ 4000). If "value" is selected, the message for full detection is activated, if the entered value (in percent) is exceeded by the material level.

Nivobob

Enable start:

Measurement start can be blocked by setting to "no", for example while a silo is beeing filled. Inside the related silo it will be stated "Blocked Start".

Max. move distance:

Setting of the max. move distance of the sensor weight.

By pressing "read" the value is readout from the Nivobob and displayed.

By setting a value and pressing "write" the setted value is written into the Nivobob.

Note: The setting of the max. move distance can also be done directly at the Nivobob.

Note: Further settings inside the Nivobob menue are not relevant, since the visualisation requires only the measured distance from the Nivobob and calculates to a volume based display.

b) With use of 4-20mA sensor (connected via Modbus converter)

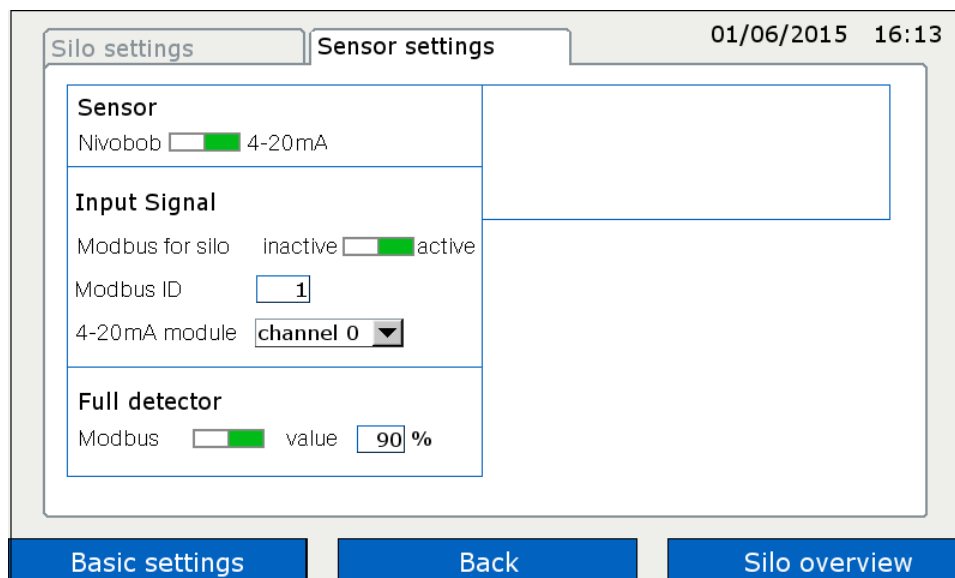
Programming of the 4-20mA sensor:

The connected sensor must be set as follows:

- 4mA must correspond to the level value 0% (see "Silo settings", page 16).
- 20mA must correspond to the level value 100%.

Note to NR 3000: H and L are related to the fixing flange.

- The sensors needs to have a linear level signal (relation between the signal output and level in the silo). The volume-based calculation is performed in the visualisation only.



Silo settings | **Sensor settings** | 01/06/2015 16:13

Sensor
Nivobob ☒ 4-20mA

Input Signal
Modbus for silo ☐ inactive ☒ active
Modbus ID
4-20mA module

Full detector
Modbus ☒ value %

Basic settings | **Back** | **Silo overview**

Sensor

Setting to "4-20mA".

Input Signal

Modbus for this silo:

It is possible to switch off single silos from the Modbus network (e.g. for revision) by setting the related Modbus ID inactive. If so, the other silos stay active. Inside the related silo it will be stated "Offline".

Modbus ID:

Input of the Modbus ID (Modbus adress) of the Modbus converter.

The Modbus converters are factory presetted to address 1 for the first Modbus converter, then ascending to 2, 3, etc. The settings can not be changed. A label with the Modbus address is present inside the Modbus converters on the implemented module M-7002.

4-20mA Modul:

Setting of the Channel for 4-20mA sensors and full detectors:

Channel 0 is allocated to the terminal Vin0+ and DI0 (see electrical installation on page 9)

Channel 1 is allocated to the terminal Vin1+ and DI1

Channel 2 is allocated to the terminal Vin2+ and DI2

Channel 3 is allocated to the terminal Vin3+ and DI3

Full detector

If a full detector is connected, it is read with setting to "Modbus" (see electrical installation page 9 for connection to Modbus converter).

If "value" is selected, the message for full detection is activated, if the entered value (in percent) is exceeded by the material level.

Table of contents

	Page
Safety notes / Technical support	2

Overview / Technical Data	3

Electrical installation	4

Commissioning	7

Subject to technical change.

We assume no liability for typing errors.

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




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.

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 related documents (manual) for details.
	Earth (ground) Terminal
	Protective Conductor Terminal

Technical support

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

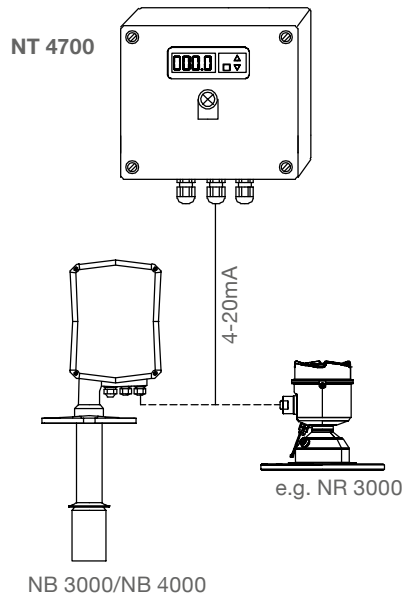
UWT GmbH
 Westendstr. 5
 87488 Betzigau
 Germany

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

Overview / Technical Data

Level display for one silo

- Evaluation of the analogue 4-20 mA signal of any sensor
- LED-Display in percentage, height, volume or weight (implements NT 4900)
- Version for Nivobob NB 3000/NB 4000 implements start button and indicator lamp when sensor weight is in the upper position
- Simple operation



Technical data

Dimensions	182 x 180 x 90mm (W x H x D)	
Mounting	Wall mounting	
Material	Polycarbonat	
Ingress protection	IP65	
Ambient temperature	0..+50°C	
Power supply	NT 4700-1 / 4700-2:	230V 50/60Hz
	NT 4700-3 / 4700-4:	24V DC
	NB 3000/NB 4000:	230V 50/60Hz or 24V DC, connection is made on site
Power consumption	2-wire 4-20mA :	supplied by NT 4700-2 (integrated power converter 24V DC) or by NT 4700-4
	NT 4700:	10VA
	Connected level sensor:	see documentation of the respective sensor

Electrical installation

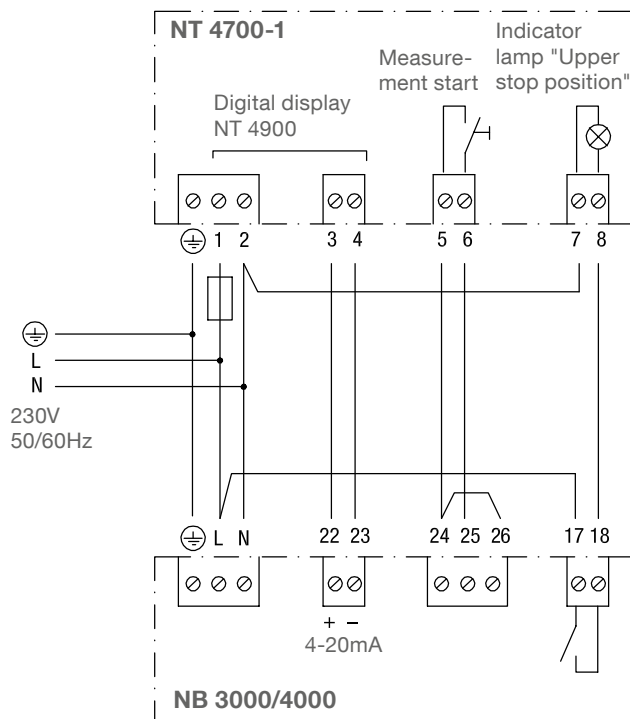
! Safety Instructions

Handling	In 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.
Fuse	Use a fuse as stated in the connection diagrams.
RCCB protection	In 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 name plate before switching the device on.
Cable gland	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.
Field wiring cables	All field wirings must have insulation suitable for at least 250V AC. The temperature rating must be at least 80°C (176°F).
Installation in Hazardous Locations	The NT 4700 is not permitted for installation in Hazardous Areas. Observe the valid regulations for wiring in Hazardous Areas, if the NB 3000/400 is installed in Hazardous Areas.

Electrical installation

NT 4700-1

230V version for connecting a Nivobob NB 3000/4000



0.14 .. 2.5mm²
(AWG 26 .. 14)

Fuse: max. 2A

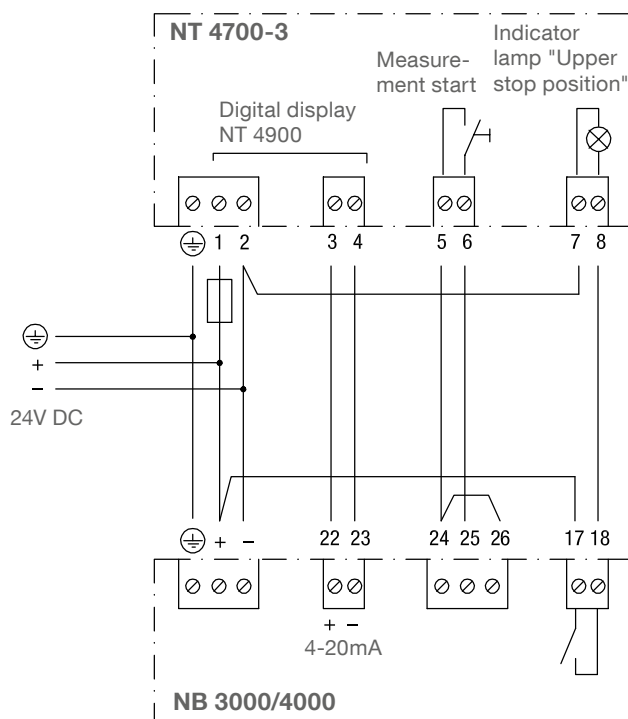
Indicator lamp "Upper stop position": for NB 4000 only possible if the option pos. 25 "Relais output" was selected with NB 4000.

If measurement interruption during filling is required:
Remove the wire from terminal 24-26 and connect to filling nozzle (see manual NB 3000/4000).

Relais on terminal 17-18 is factory provided to state "Upper stop position". Thus no change is required to be done.

NT 4700-3

24V DC version for connecting a Nivobob NB 3000/4000



0.14 .. 2.5mm²
(AWG 26 .. 14)

Fuse: max. 2A

Indicator lamp "Upper stop position": for NB 4000 only possible if the option pos. 25 "Relais output" was selected with NB 4000.

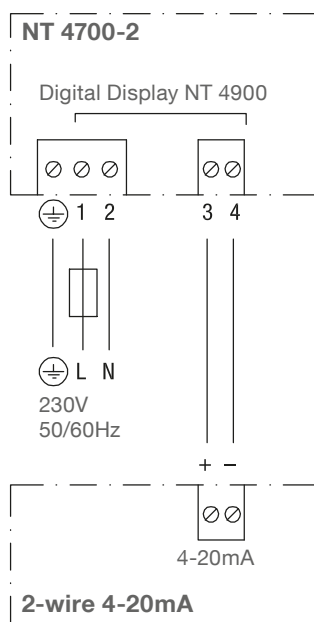
If measurement interruption during filling is required:
Remove the wire from terminal 24-26 and connect to filling nozzle (see manual NB 3000/4000).

Relais on terminal 17-18 is factory provided to state "Upper stop position". Thus no change is required to be done.

Electrical installation

NT 4700-2

230V version for connecting a 2-wire 4-20mA (e.g. NR 3000)

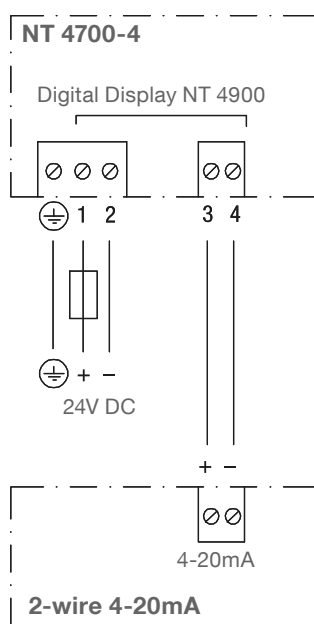


0.14 .. 2.5mm²
(AWG 26 .. 14)

Fuse: max. 2A

NT 4700-4

24V DC version for connecting a 2-wire 4-20mA (e.g. NR 3000)



0.14 .. 2.5mm²
(AWG 26 .. 14)

Fuse: max. 2A

Commissioning

Commissioning

Programming:

- NB3000/4000: see respective Instruction Manual. Only the parameters of the Quickstart Menu need to be programmed
- 2-wire 4-20mA: see respective Instruction Manual
- Digital Display NT 4900: see respective Instruction Manual

Note:

An error or a required maintenance can be seen on the Digital Display NT 4900 by a untypical negative measurement value. This requires that the NT 4900 is programmed to 4-20mA and the connected sensor provides less than 4mA in case of error/maintenance (NB3000/4000 are factory preset to give 0mA).

Overview / Technical Data

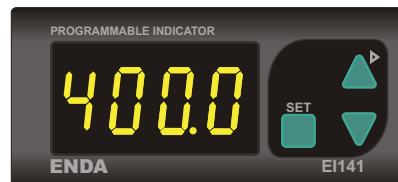


Read this document carefully before using this device. The guarantee will be expired by damaging of the device if you don't attend to the directions in the user manual. Also we don't accept any compensations for personal injury, material damage or capital disadvantages.

ENDA EI141 PROGRAMMABLE INDICATOR

Thank you for choosing ENDA EI141 INDICATOR.

- * 35x77mm sized.
- * 4 digits display.
- * Easy to use by front panel keypad.
- * Display scale can be adjusted between -1999 and 4000.
- * Decimal point can be adjusted between 1. ile 3. digits.
- * Measurement unit can be displayed.
- * Selectable four different standard input types (0-20mA, 4-20mA, 0-1V, 0-10V)
- * User can calibrate the device according to his/her own specified input type.
- * Sampling time can be adjusted in four steps.
- * Maximum and minimum measurement values are registered.
- * The maximum or the minimum values can be hold on the display.
- * Current and voltage calibration can be made..
- * Parameter access protection on 3 levels.
- * Easy connection by removable screw terminal.




**RoHS
Compliant**

Order Code : EI141-
1


1 - Supply Voltage
 230VAC...230V AC
 24VAC.....24V AC
 SM.....9-30V DC / 7-24V AC

TECHNICAL SPECIFICATIONS

ENVIRONMENTAL CONDITIONS	
Ambient/storage temperature	0 ... +50°C/-25 ... +70°C (with no icing)
Max. relative humidity	80% up to 31°C decreasing linearly 50% at 40°C.
Rated pollution degree	According to EN 60529 Front panel : IP65 Rare panel : IP20
Height	Max. 2000m

 Do not use the device in locations subject to corrosive and flammable gases.

ELECTRICAL CHARACTERISTICS

Supply	230VAC +10%/-20%, 50/60Hz, 24VAC±10%,50/60Hz or 24Vac/dc (9-30Vdc or 7-24Vac)
Power consumption	Max. 7VA
Wiring	2.5mm ² screw-terminal connections
Date retention	EEPROM (Min. 10 years)
EMC	EN 61326-1: 1997, A1: 1998, A2: 2001 (Performance criterion B for the EMC standard)
Safety requirements	EN 61010-1: 2001 (pollution degree 2, overvoltage category II, measurement category I)
	 EI141 must not be used in location where measurement category is II, III or IV.

Input type	Measurement range		Measurement accuracy	Input impedance
	Min.	Max.		
0-1V DC voltage	0V	1.1V	±0,5% (of full scale)	Approx. 11kΩ (terminal voltage limits: min. = -2V, max. = 30V)
0-10V DC voltage	0V	14V	±0,5% (of full scale)	Approx. 11kΩ (terminal voltage limits: min. = -2V, max. = 30V)
0-20mA DC current	0mA	25mA	±0,5% (of full scale)	Approx. 5Ω (applicable terminal voltage is max. 50mA.)
4-20mA DC current	0mA	25mA	±0,5% (of full scale)	Approx. 5Ω (applicable terminal voltage is max. 50mA.)



In the current measurement mode input impedance is 5Ω . Therefore, in the current measurement mode, any voltage input should not be connected to the input terminals. Otherwise, the device will be broken down. To change the input type from voltage to a current measurement mode while the device is operating, first, leave out the voltage inputs. Then, change input type to one of the current measurement modes.

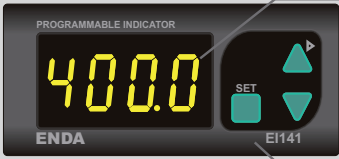
HOUSING

Housing type	Suitable for flush-panel mounting according to DIN 43 700.
Dimensions	W77xH35xD71mm
Weight	Approx. 250g (after packing)
Enclosure material	Self extinguishing plastics

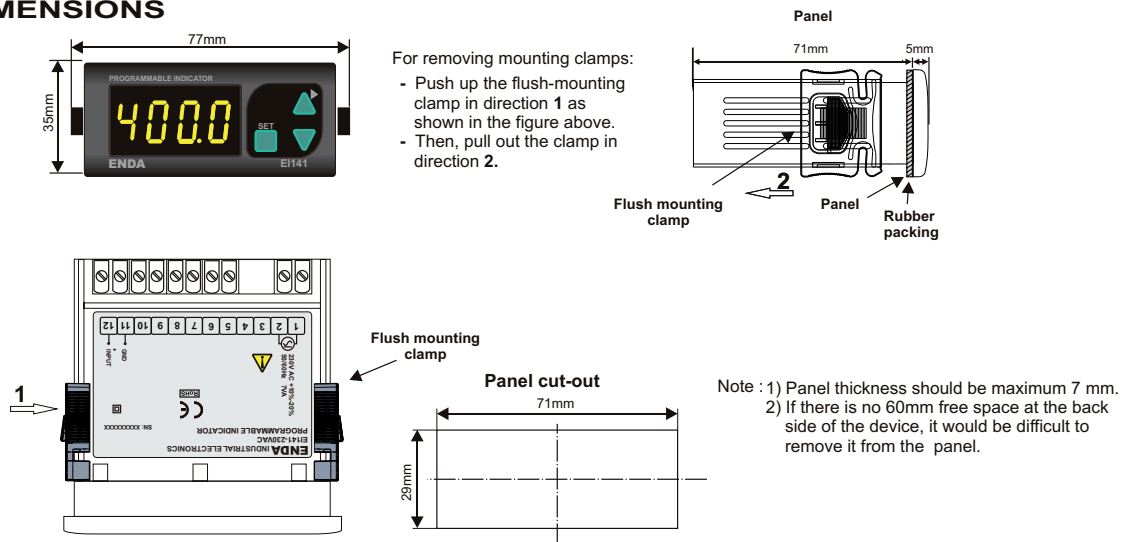


While cleaning the device, solvents (thinner, benzine, acid etc.) or corrosive materials must not be used.

Technical Data

		<p>1) Measurement value, measurement unit, the minimum or the maximum measured values are displayed in the run mode. Parameter name, parameter value or a user defined unit is displayed in the programming mode.</p> <p>2) Increment or parameter selection key in the programming mode. Used for displaying measurement unit or the max. measured value in the run mode.</p> <p>3) Decrement or parameter selection key in the programming mode. Used for making the minimum and the maximum measured values equal in the run mode.</p> <p>4) Used for selecting run and programming modes, adjusting parameters, displaying measurement unit or making the minimum and the maximum measured values equal.</p>
(1) Digital display	4 digits 7 segment yellow LED display	
Character height	9.1mm	
(2), (3), (4), (5) Keypad	Micro switch	

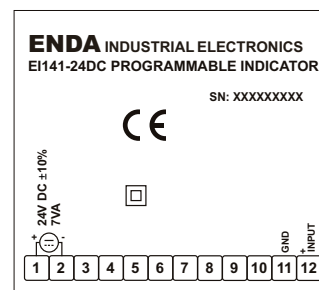
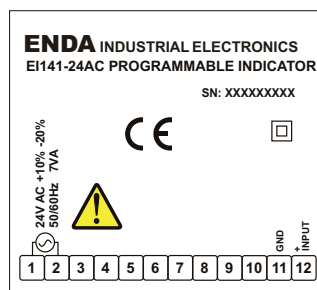
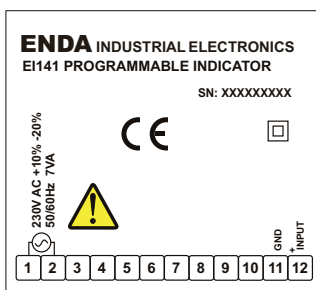
DIMENSIONS



CONNECTION DIAGRAM

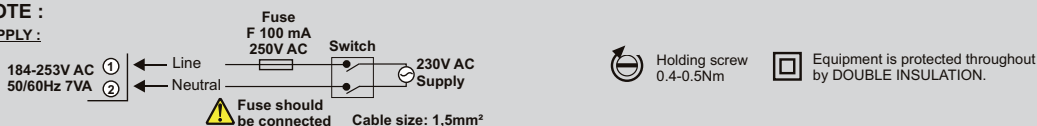


ENDA EI141 is intended for installation in control panels. Make sure that the device is used only for intended purpose. The shielding must be grounded on the instrument side. During an installation, all of the cables that are connected to the device must be free of energy. The device must be protected against inadmissible humidity, vibrations, severe soiling and make sure that the operation temperature is not exceeded. All input and output lines that are not connected to the supply network must be laid out as shielded and twisted cables. These cables should not be close to the power cables or components. The installation and electrical connections must be carried on by a qualified staff and must be according to the relevant locally applicable regulations.



NOTE :

SUPPLY :



Note : 1) Mains supply cords shall meet the requirements of IEC 60227 or IEC 60245.
2) In accordance with the safety regulations, the power supply switch shall bring the identification of the relevant instrument and it should be easily accessible by the operator.

Programming example

Setting the display

The following example sets the display to indicate 4mA = 0 tons and 20mA = 60.0 tons.

After connecting the supply voltage, the display indicates a test value [1999].

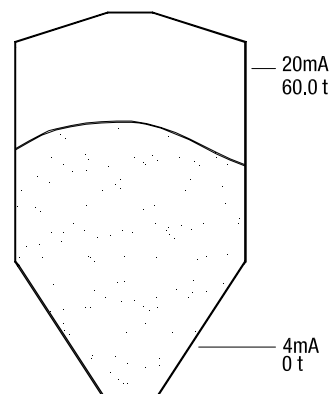
To configure the display, press the **[SET]-button** ca. 5 sec.

The display changes to the main menu with the first main menu item **[d.CnF]**.

Attend:

If the keys are not activated for ca. 20 sec, the device automatically switches back to the standard display "measure value".

Main menu	Submenu	Description	Setting
d.CnF	i.Type	<ul style="list-style-type: none"> - Press arrow key ↓ - The first sub menu item [i.Type] is indicated - Press and hold the [SET]-key, then select "4-20mA" with the arrow key ↓ - After release of the [SET]-key, the setting is stored 	4-20mA
U.oPt	d.Pnt	<ul style="list-style-type: none"> - Change to main menu with arrow key ↑, the main menu item [U.oPt] is indicated - Press arrow key ↓, the sub menu item [CAL.E.] is indicated - Search menu item [d.Pnt] with arrow key ↓ - Press and hold the [SET]-key, then set the decimal dot position with the arrow key ↑ to the first digit from right side - Indication is [000.0] - After release of the [SET]-key, the setting is stored 	Decimal dot on first digit from right side 000.0
U.oPt	L.SCL	<ul style="list-style-type: none"> - Change from sub menu item [d.Pnt] to sub menu [L.SCL] with arrow key ↓ - Press and hold the [SET]-key, then set the lower scale value to 0 with arrow key ↓* - After release of the [SET]-key, the setting is stored 	Lower scale value 0 tons at 4mA
U.oPt	H.SCL	<ul style="list-style-type: none"> - Change from sub menu item [L.SCL] to sub menu item [H.SCL] with arrow key ↓ - Press and hold the [SET]-key, then set the upper scale value to 60.0 with arrow key ↓* - After release of the [SET]-key, the setting is stored - Wait 20 sec until the indication changes to the measure value (indication is now depending on the actual current; if no current is present, the device indicates -15.0) - The programming is finished 	Upper scale value 60.0 tons at 20mA



*Note: By pressing the arrow keys for a longer time, the speed of the value change increases.
 The arrow key ↑ increases the value, the arrow key ↓ decreases the value.



Service Offers

Installation / Set-up / Operator training

High-class service for high-tech products

High-class service for high-tech products

The competent UWT sales and service team helps our clients in consulting and engineering, with professional installation, precise parameterization and an universal service support. Our products are designed individually according to the needs of our customers. It can be taken advantage of single features as well as a suitable service package at a fixed price can be put in order. However, a service of UWT have in common: Our specialists are not satisfied before our customers are.



Project

- Our experts offer individual advice for tailored measurement technology for your system
- We support you throughout the whole project and are always there for you, to support you within technical questions
- At UWT you get complete packages from a single source - easy, professional and efficient
- The UWT team supports you reliable, flexible and of the highest quality



Installation and Set-up

- Our experienced specialists will install all matched components professionally and give you a frictionless start
- To our professional wiring it goes without saying to use just high-quality materials, e.g. outdoor cables are installed UV protected
- Concerning the logged commissioning UWT service technicians nothing left to chance and thus prevent subsequent error from the beginning



Operator training

- Operator instructions and user training ensure effective implementation and a high trouble-free operating
- After commissioning we furthermore support your plant

Table of contents

	Page
Complete service package Installation, cabling & wiring, initial setup, user training	2

Initial setup service package Initial setup, user training	3

Pro rata service charges / cancellation charges	4

Subject to technical and price change.

Prices are valid from 01.04.2017 until 31.03.2018 unless otherwise agreed.

By publishing this selection list all other lists become invalid.

We assume no liability for typing errors.

All prices in Euro excl. VAT

Complete service package

This service package includes the installation, cabling & wiring and initial set up of the level measurement instrumentation on the vessel / silo and the Nivotec system in the plant. The flat rate ensures a set price which can be calculated for each project and also includes the training of personnel on how to use the level measurement instrumentation and the Nivotec system. The material required for mounting will be invoiced separately. The travel costs can either be charged according to a flat rate system or according to the travel method and time, whichever the customer wishes.

Installation, wiring, initial setup, user training

Measurement instrumentation on the vessel / silo sp300100 per vessel / silo •

- complete installation of the continuous measurement instrumentation, including full and empty detectors
- Cabling & wiring of instrumentation up to the terminal box on the silo
- Parameter setting, tuning and setting of the measurement instrumentation
- Issue of the initial setup documentation
- User training

Nivotec-system sp300110 per vessel / silo •

- Complete installation of the Nivotec Systems
- Cabling & wiring of instrumentation up to the terminal box on the silo
- Parameter setting, tuning and setting of the measurement instrumentation
- Issue of the initial setup documentation
- User training

Travel costs - flat distance rates for the complete service package (two people)

The rates include the travel time and all other costs, such as accommodation, food, train, flights etc.

Start from Betzigau (Location of UWT GmbH).

- | | | |
|------------------------|----------|------------|
| - up to 100 km | sp300120 | • |
| - from 100 to 200 km | sp300121 | • |
| - from 200 to 500 km | sp300122 | • |
| - from 500 to 750 km | sp300123 | • |
| - from 750 to 1000 km | sp300124 | • |
| - from 1000 to 1500 km | sp300125 | • |
| - over 1500 km | sp300126 | on request |

Conditions for installation and wiring

The required power, ethernet, internet or telephone connections for the Nivotec systems and the measurement instrumentation must be provided on site close to the installation of the control cabinet UWT will not carry out any digging or ground work for cable laying. Cable laying will be carried out over a maximum of 500m in cable ducts or tubes. All cables and wires provided for outdoor use by UWT are UV resistant or are protected from UV rays by protective tubing. The installation of the cable ducts and tubes will be carried out to a maximum height of 4 meters. A hoist or lifting ramp must be provided on site.

Initial setup service package

This service package includes the initial set up of the level measurement instrumentation on the vessel / silo and the Nivotec system in the plant, as well as the training of personnel on how to use the level measurement instrumentation and the Nivotec system. The installation, cabling & wiring of the level measurement instrumentation and the Nivotec system is the responsibility of the customer. The preparation and cabling of the ethernet and telephone connections, as well as the IP addresses for the NT 3000 are also the responsibility of the customer. The travel costs can either be charged according to a flat rate distance system or according to the travel method and time, whichever the customer wishes.

Initial setup, user training

Measurement instrumentation on the vessel / silo sp300200 per vessel / silo •

- Parameter setting, tuning and setting of the measurement instrumentation
- Issue of the initial setup documentation
- User training

Nivotec-system sp300210 per vessel / silo •

- Parameter setting, tuning and setting of the visualisation and the measurement level displays
- Issue of the initial setup documentation
- User training

Travel costs - flat distance rates for the initial setup service package (one person)

The rates include the travel time and all other costs, such as accommodation, food, train, flights etc.

Start from Betzigau (Location of UWT GmbH).

- up to 100 km	sp300220	•
- from 100 to 200 km	sp300221	•
- from 200 to 500 km	sp300222	•
- from 500 to 750 km	sp300223	•
- from 750 to 1000 km	sp300224	•
- from 1000 to 1500 km	sp300225	•
- over 1500 km	sp300226	on request

Pro rata service charges

The charge rates apply for the initial set up, servicing, repair work and other similar work, which will be charged pro rata.

Pos. 1	Engineer		
	Working time, cost per hour	sp300010	•
	Travel, waiting and preparation time per hour	sp300011	•
	Service technician		
	Working time, cost per hour	sp300015	•
	Travel, waiting and preparation time per hour	sp300016	•
Pos. 2	Additional charges (on top of the hourly charges in position 1)		
	For the first 2 additional hours (after 8 hours of work)	sp300020	•
	From the 3rd additional hour (after 8 hours of work)	sp300021	•
	For work on Sundays and German public holidays	sp300022	•
Pos. 3	Allowances		
	The allowance will be charged in full, when travel begins before 12 noon.		
	When travel begins after 12 noon or the journey is completed before 12 noon, then half of the allowance will be charged.		
	Allowance per day	sp300030	•
	Overnight costs	sp300031	•
Pos. 4	Travel costs		
	Travel by car per kilometre	sp300040	•
	For all other travel costs such as flights or train, the actual costs are to be paid.		

Cancellation and modification charges

Pos. 1	Modification costs		
	Flat rate charges		•
	Additional costs for the already completed work		according to the work
Pos. 2	Cancellation costs		
	For standard instrumentation up to one week before the confirmed delivery date		•
	For standard instrumentation with customer requested modifications		•
	For custom made instrumentation up to one week before the confirmed delivery date		•
	¹⁾ of the order value		

Please note that our general
terms and conditions apply.
For details see our website
www.uwt.de



Ingeniously simple and reliable level measurement



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