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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

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

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

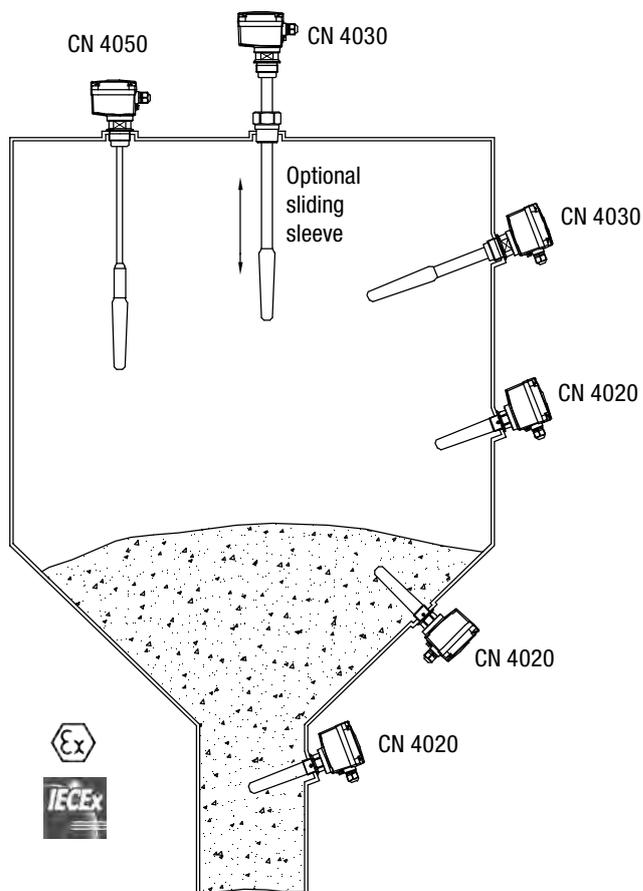
The Capanivo detects the capacitance around its probe. Due to the active shield technology it has an increased insensitivity to material buildup on the probe.

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).

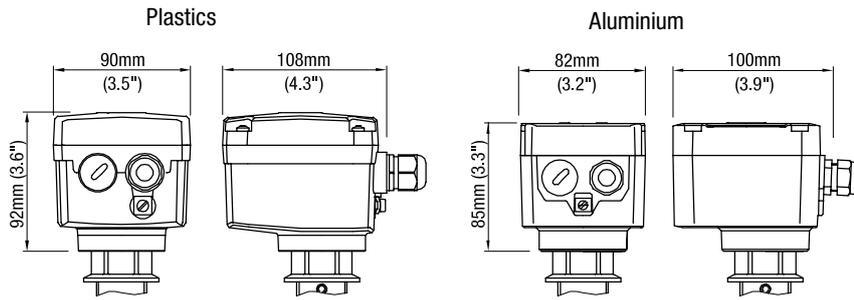
The use of a sliding sleeve is recommended so that the switch point can be changed easily during operation of the device.



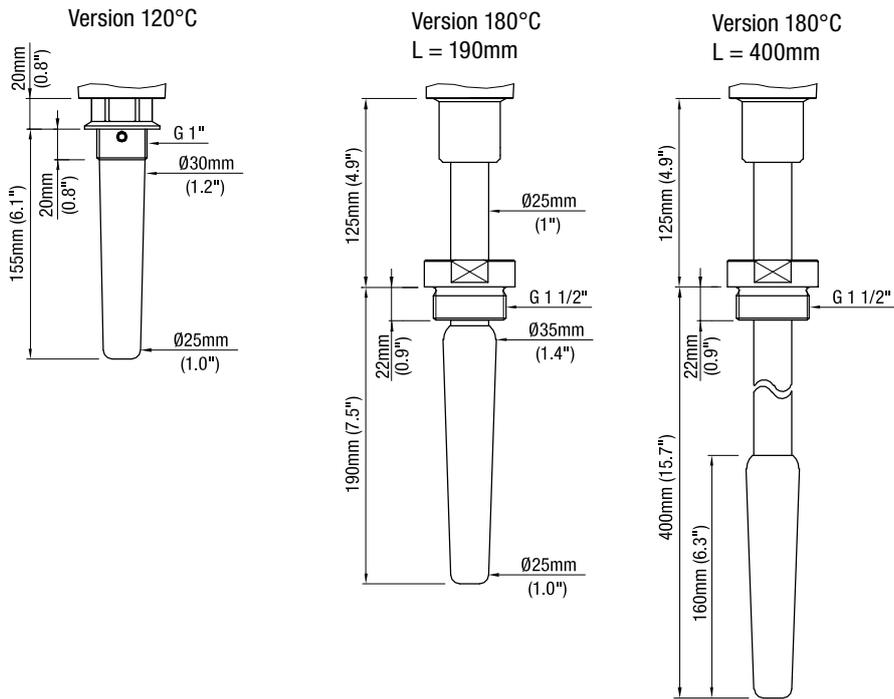
Technical data

Dimensions

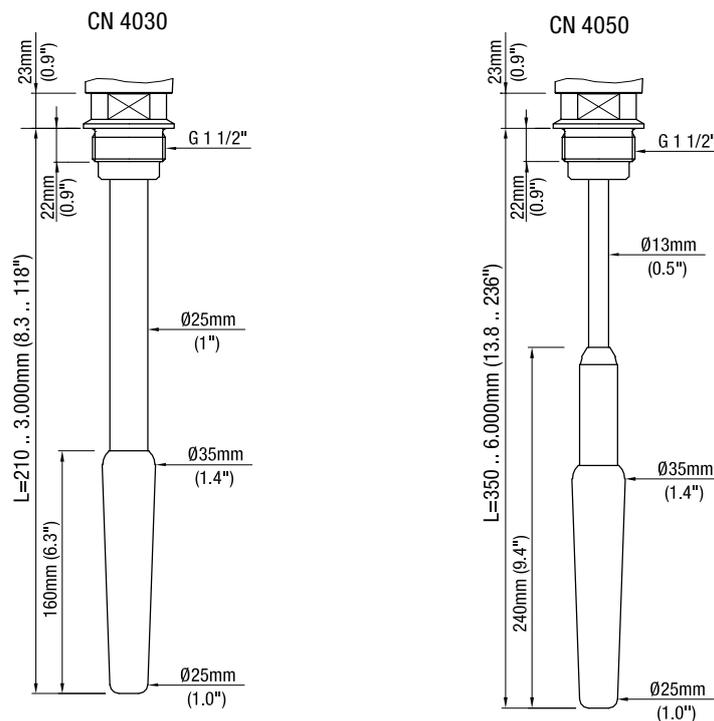
Housing versions



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
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

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	
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: PUR with black carbon Material probe: Plastics PPS/PBT (glass fibre reinforced) ⁽¹⁾ Thread: G 1½"	
	Flat gasket (included): Material AFM30	
Overall weight (ca.)	CN 4020 version 120°C: 0.5kg (1.1lbs) CN 4020 version 180°C: 1.8kg (4.0lbs) CN 4030 (aluminium extension): 0.8kg (1.8lbs) + 0.8kg/m (1.8 lbs per 39.3") CN 4030 (stainless steel extension): 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: ± 5mm (± 0.2") CN 4020 version 180°C : ± 10mm (± 0.4") CN 4030: ± 10mm (± 0.4") CN 4050: ± 15mm (± 0.6")	

(1) Discolouration is possible due to influence of UV and temperature.
 This has no negative effect to the material properties.

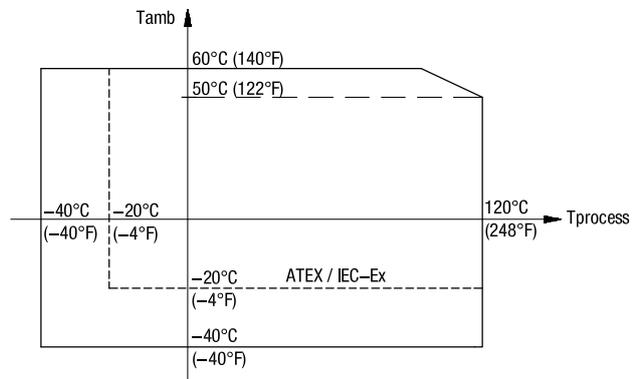
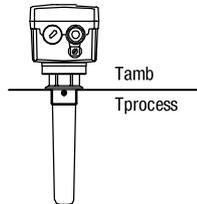
(2) Food grade

Technical data

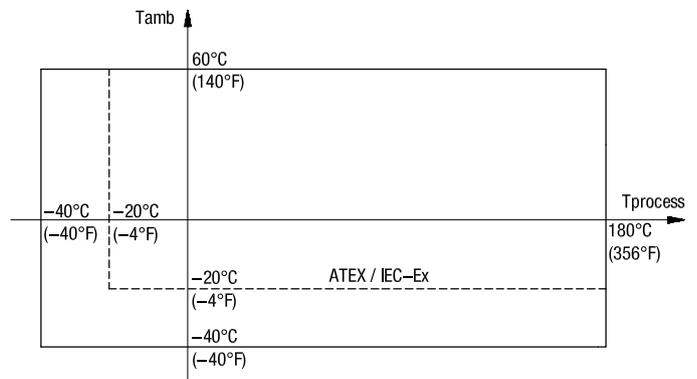
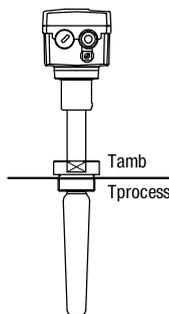
Operating conditions

Ambient and process temperature

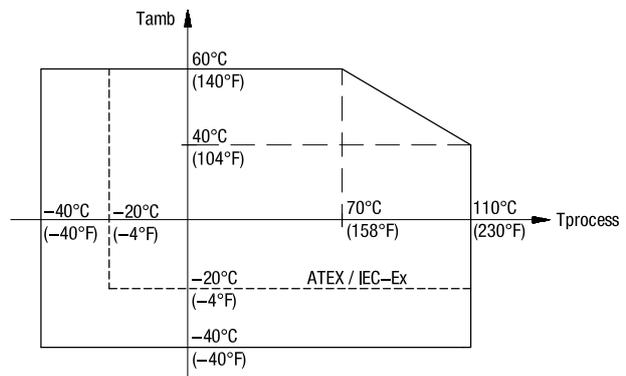
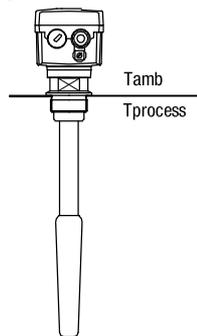
CN 4020
 version 120°C



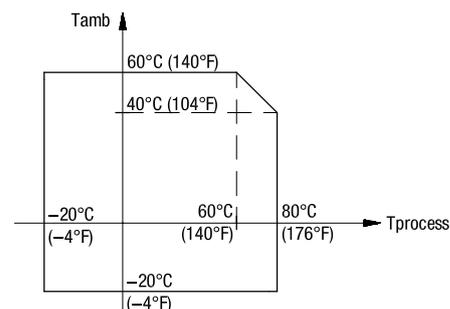
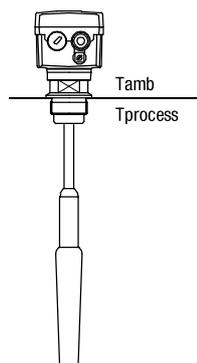
CN 4020
 version 180°C



CN 4030

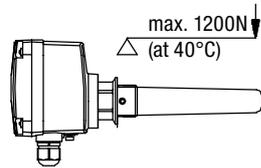


CN 4050

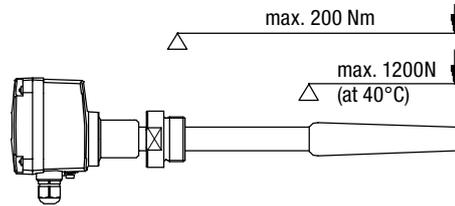


Technical data / Approvals

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 / CN 4030 CN 4050	16 bar (232psi) (at 40°C) 6 bar (87 psi) (at 40°C)
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)	

Approvals

General Purpose (Ordinary Locations)	CE	EN 61010-1
Hazardous Locations *	CN 4020 / CN 4030:	ATEX: IEC-Ex: GOST-R II 1/2D Ex ta/tb IIIC T! Da/Db IP6x Ex ta/tb IIIC T! Da/Db
	CN 4050:	ATEX: IEC-Ex: GOST-R II 1/2D Ex ia/tb IIIC T! Da/Db IP6x Ex ia/tb IIIC T! Da/Db
EMC	EN 61326 -A1	
Food grade material	According to directive 1935/2004/EC	
Pressure Equipment Directive (97/23/EC)	The units are not subject to this directive, because they are classified as „pressure-keeping equipment“ and do not have a pressurized housing (see Art.1, 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

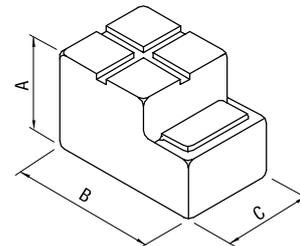
When the measuring device is used outdoor, the use of the weather-protection-cover is recommended. It protects the device from all atmospheric influences such as:

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

Material: PE, weathering and temperature stable

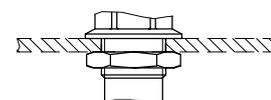


For use in Hazardous Locations: only permitted for Zone 22



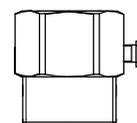
Hexagon nut

For mounting on a wall without a socket.
 Material: Aluminium or 1.4305 (303)



Sliding sleeve

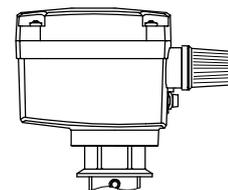
CN 4030 G1½" ISO 228
 Material: 1.4305 (303)
 Sealing material to the extension tube: FKM



Bulb in cable gland

Bright indicating light seen from outside.

Not available for use in Hazardous Locations.

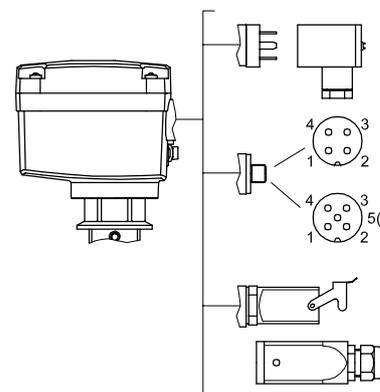


Plug

Used instead of cable gland.

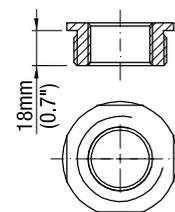
- Valve connector or
- M12 or
- Harting Han 4A

Not available for use in Hazardous Locations.



Adapter

G 1" to G 1 1/2"
 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 an 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.

! Additional safety instructions for hazardous areas

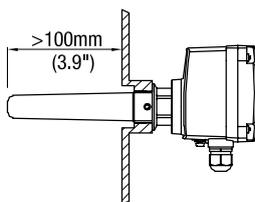
Impact energy	Max. permitted impact energy is 4 J
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Mounting instructions

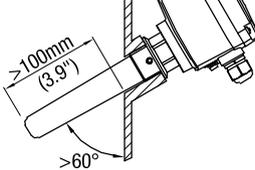
Direction of the cable glands	When the unit is mounted from the side, ensure that the cable glands face downwards and are closed to avoid water penetration into the housing. The housing can be rotated after installation.
Sealing	Ensure proper seal of the process thread in case of process pressure.

Distances of the probe

CORRECT
 Probe leads into the product

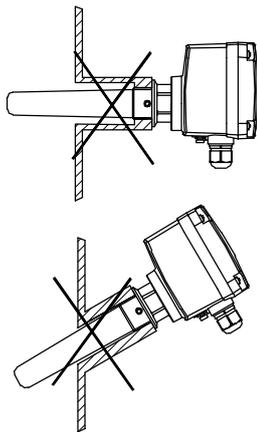


Oblique mounting

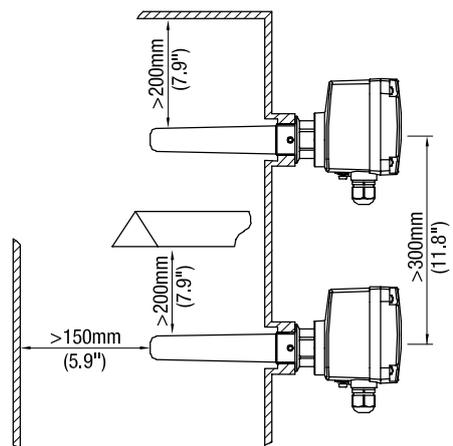


Observe mounting angle to ensure that the active tip of the probe has enough distance to the metal silo wall

WRONG
 Socket too long

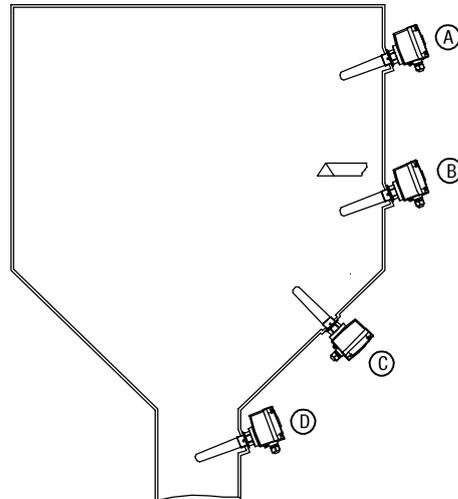


Observe min. distance between two sensors, to metal silo wall and to protective angle.



Mounting

CN 4020



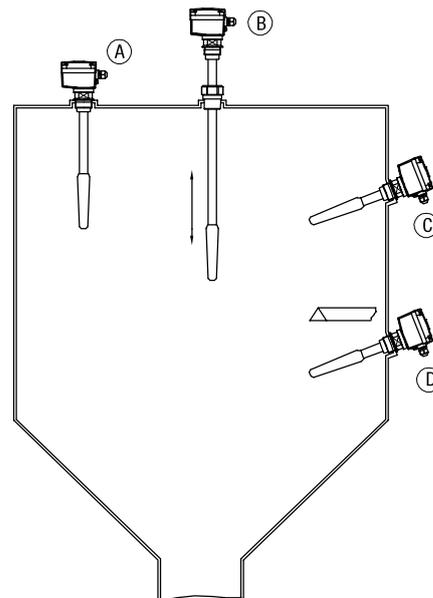
CAUTION

Observe:

- General distances of the probe (see page G10).
- Distance to material flow (filling).
- Max. permitted mechanical load (see page G8).
- 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



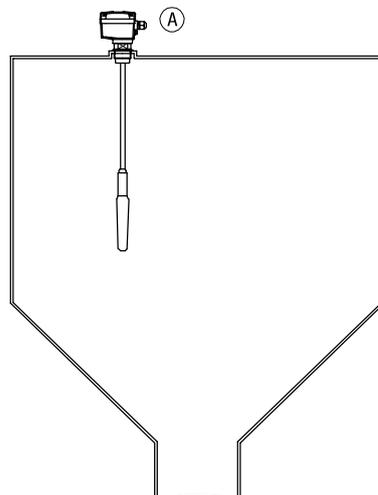
CAUTION

Observe:

- General distances of the probe (see page G10).
- Distance to material flow (filling).
- Max. permitted mechanical load (see page G8).
- 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 G10).
Consider that the hanging probe can move sideways with material.
- Distance to material flow (filling).
- Max. permitted mechanical traction (see page G8).
Empty detector: Do not install in the center of the silo due to high traction with moving material.
- Wearing due to abrasive bulk material.

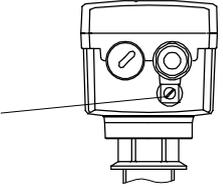
- A** Full, demand or empty detector vertical.

Electrical installation

! General Safety Instructions

Handling	In the case of inexpert handling or handling malpractice the electric safety of the device cannot be guaranteed.
Installation regulations	The local regulations or VDE 0100 (Regulations of German Electro technical Engineers) must be observed.
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	The cable gland shall reach ingress protection IP66. 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	The diameter of the field wiring cable has to match to the clamping range of the used cable gland. All field wirings must have insulation suitable for at least 250V AC (if 230V connection is used). The temperature rating must be at least 90°C (194°F).
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.

! 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	<ul style="list-style-type: none"> • 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

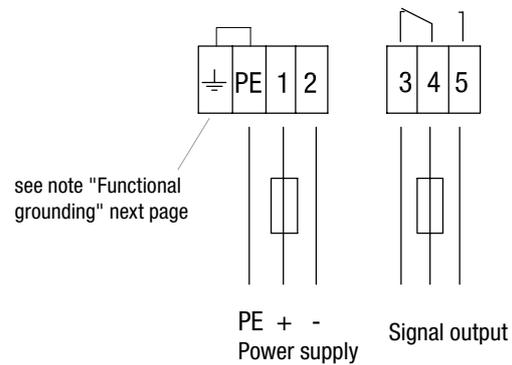
Power supply:
 21..27V DC $\pm 10\%^*$ 1,5W
 *incl. 10% of EN 61010

Fuse on power supply: max. 10A

Signal output:
 Floating relay SPDT

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

Fuse on signal output: max 5A



Relay DPDT

Universal voltage

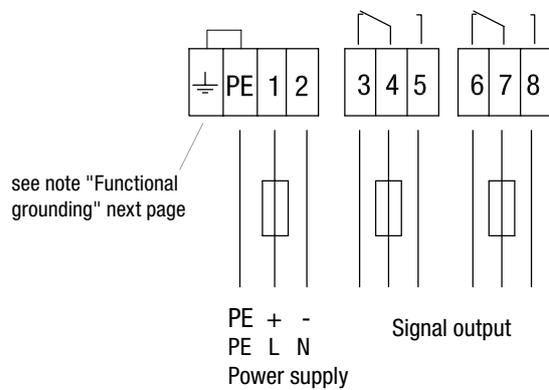
Power supply:
 21..230V 50-60Hz $\pm 10\%^*$ 18VA
 21..45V DC $\pm 10\%^*$ 2W
 *incl. 10% of EN 61010

Fuse on power supply: max. 10A

Signal output:
 Floating relay DPDT

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

Fuse on signal output: max 5A



PNP

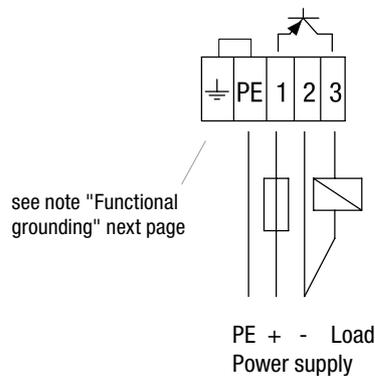
3-wire

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

Fuse: max 4A

Signal output:
 max. 0.4A

Load for example:
 PLC, relay, contactor, bulb



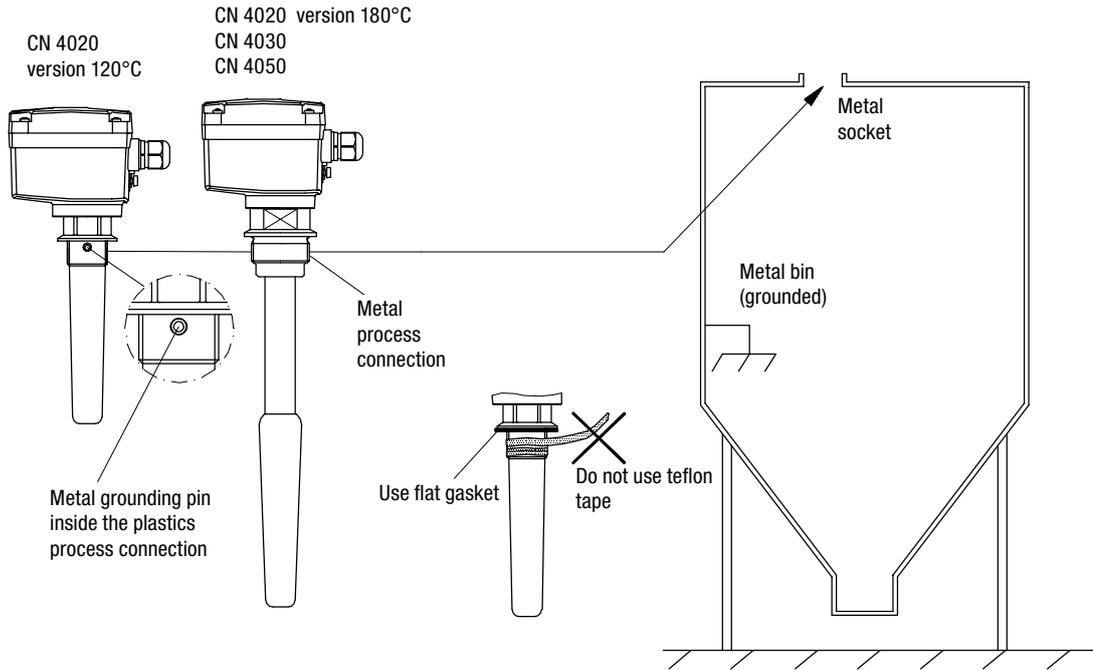
Electrical installation

Functional grounding

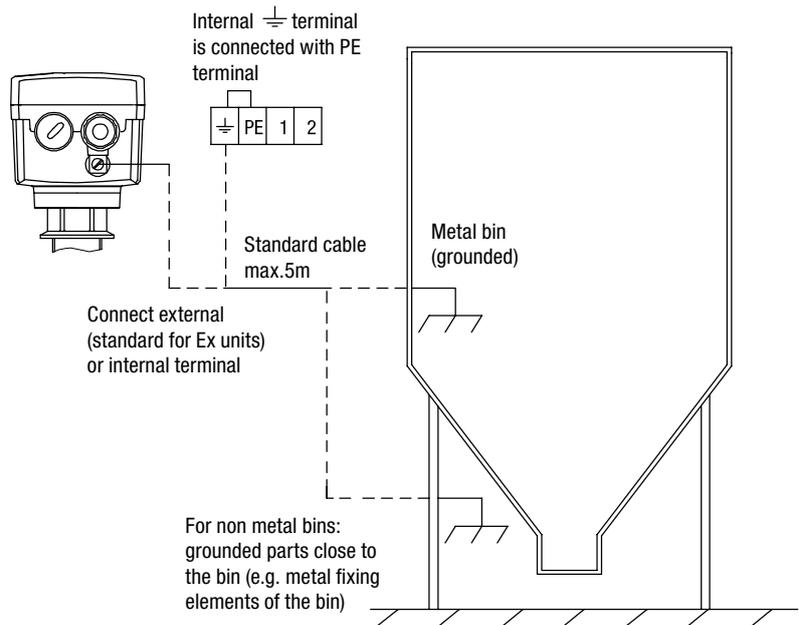
The unit must have connection to earth for proper functioning. This can be done by one of the following possibilities:

Grounding through process connection

CAUTION: This grounding alone is not enough for Ex applications.



Grounding through grounding terminal and cable



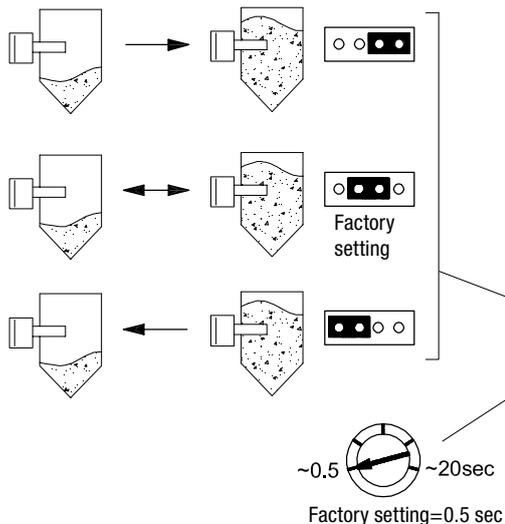
Settings

Control elements

Relay SPDT

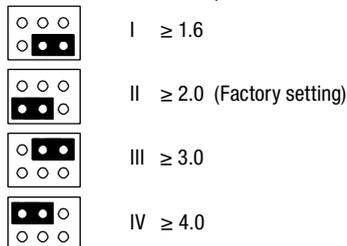
Signal output delay:

Delay works in one or both directions as shown by the arrows below.

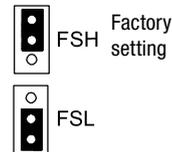


Sensitivity setting:

Range DK (ϵ_r)



FSH/FSL setting:



Relay DPDT

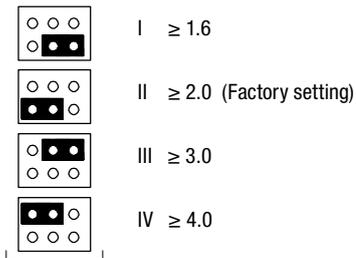
Universal voltage

PNP

3-wire

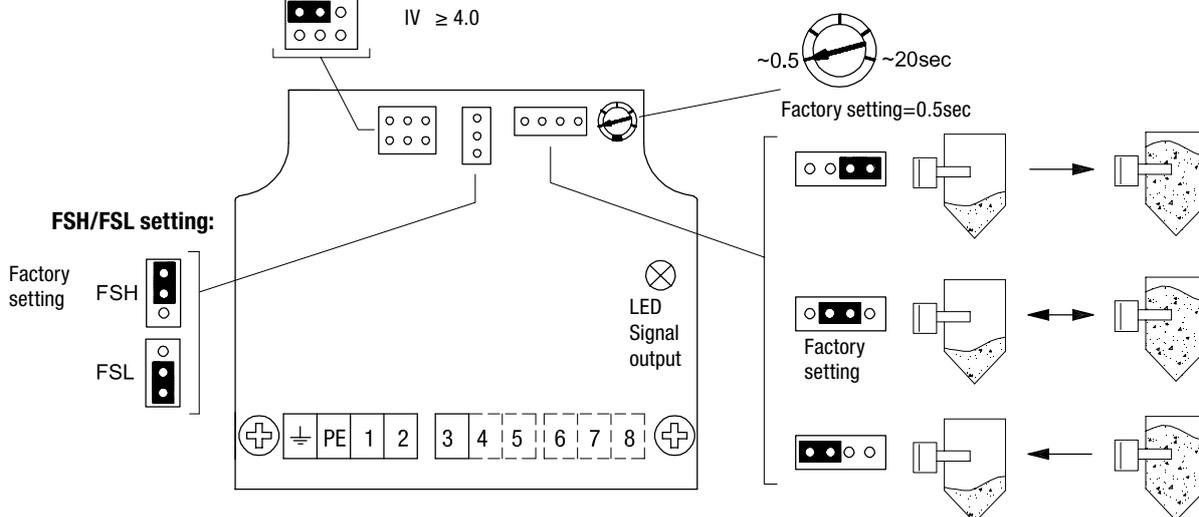
Sensitivity setting:

Range DK (ϵ_r)



Signal output delay:

Delay works in one or both directions as shown by the arrows below.



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

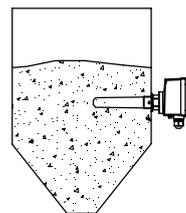
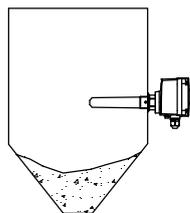
FSH: Set in case of using the sensor as a full detector: Power failure or line break is regarded as "full" signal (protection against overcharging).

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	FSL	FSH	
Relay SPDT					
Relay DPDT					
PNP					
LED „Signal output“					



Maintenance

Normally the device requires no maintenance. However, depending on the application, the following should be observed and inspected:

- Mechanically damaged probe.
- Coarse cleaning of the probe.

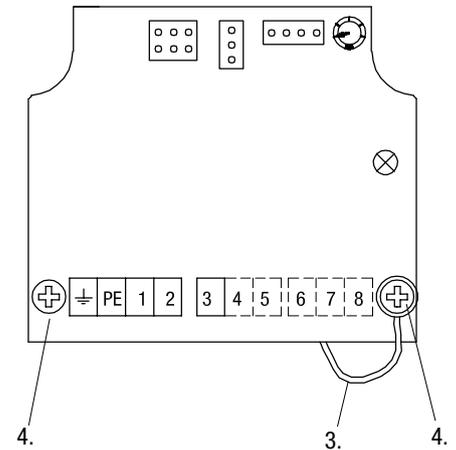
Change of the electronic board:

CN 4020 Deenergise device and secure against being switched on again.

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.
CN 4050 Please return defective units to the manufacturer.



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.

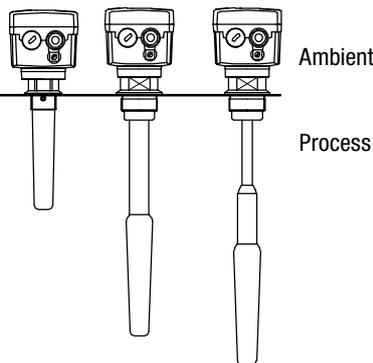
Process pressure The device construction allows process over-pressure upto 6/16 bar (87/232psi) (see name plate). These pressures are allowed for test purposes. The definition of the ATEX / IEC-Ex is only valid for a container-over-pressure between -0.2..+0.1 bar (-2.9..+1.45psi). For higher or lower 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)

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)

* Observe derating (see page 7)



ING. ROLF HEUN | Meß- Prüf- Regeltechnik GmbH | Hufeisen 16 | 21218 Seevetal/Hittfeld
 Tel: 04105-5723-0 | Fax: 04105-5723-66 | info@heun-messtechnik.com | www.heun-messtechnik.com