

Table of contents

	Page
Safety notes / Technical support	G2

Introduction	G3

Dimensions and materials	G4

Options / Accessories	G6

Technical data	G7

Mounting	G9

Mounting with aiming flange	G10

Electrical installation	G11

Signal overview	G13

Programming	G15

Rope / tape / motor lifetime	G20

Diagnostics	G21

Notes for use in Hazardous Locations	G22

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 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
ATEX II 1/2 D (zone 20/21) and FM Class. II, III Div.1 Gr. E-G

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 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

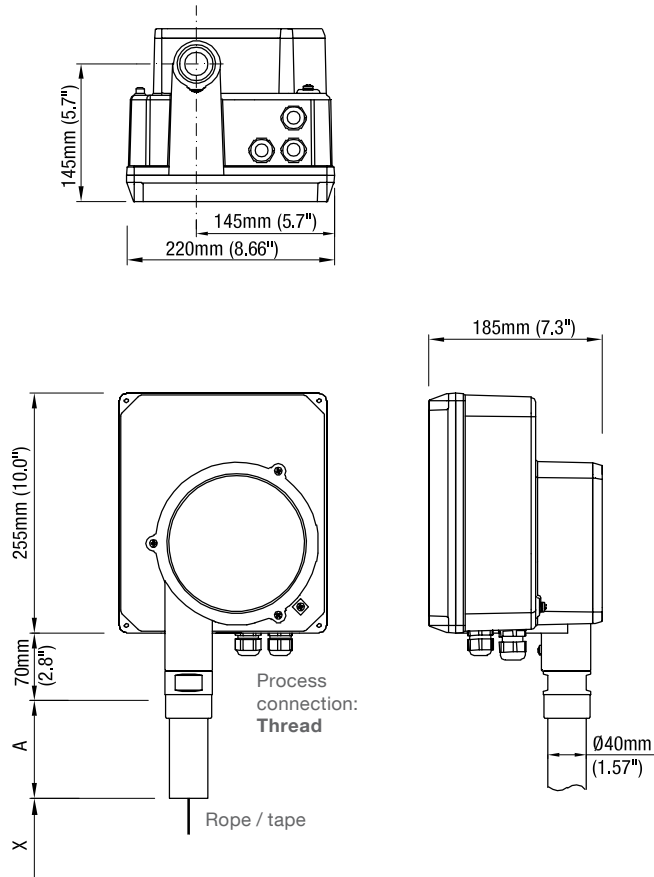
Comprehensive diagnostics possibilities are present:

- 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.

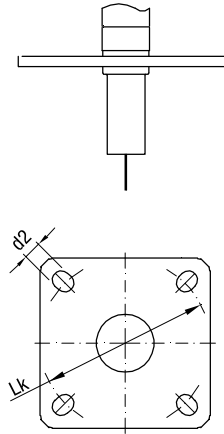
Diagnostics is in accordance with NAMUR recommendation NE107.



Dimensions and materials

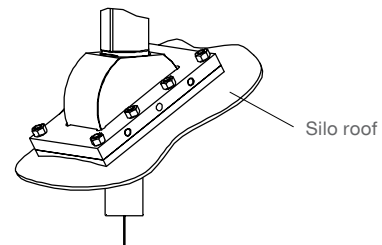


Process connection: **Flange**



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")

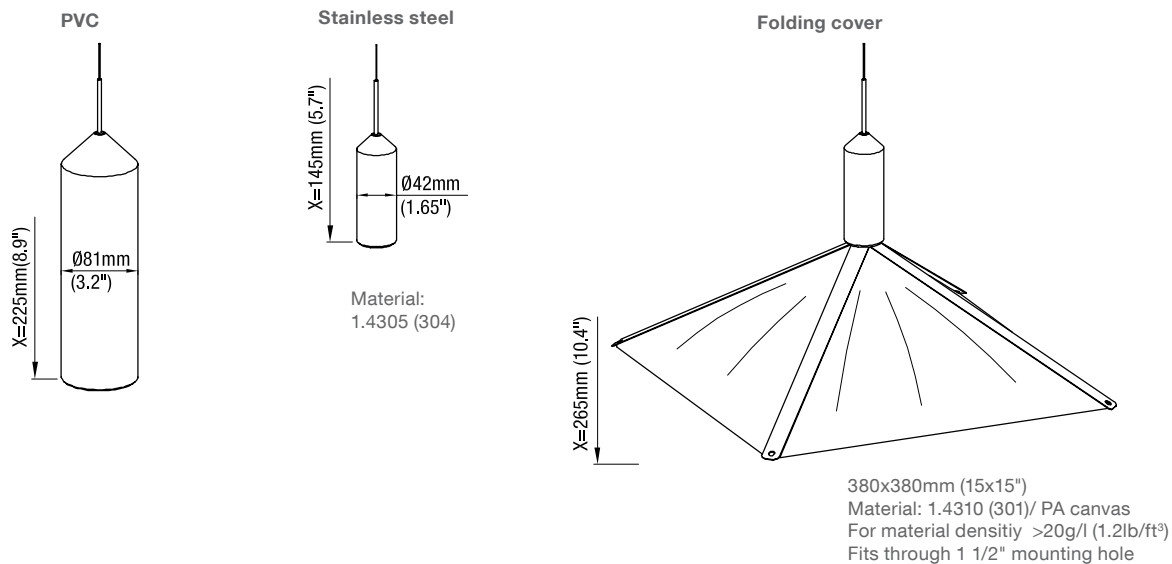
Materials

Housing outside	Aluminium, outside powder coated
Thread / Flange	Aluminium
Aiming flange	Aluminium / 1.4301 (304)
Rope	1.4301 (304)
Tape	1.4310 (301)

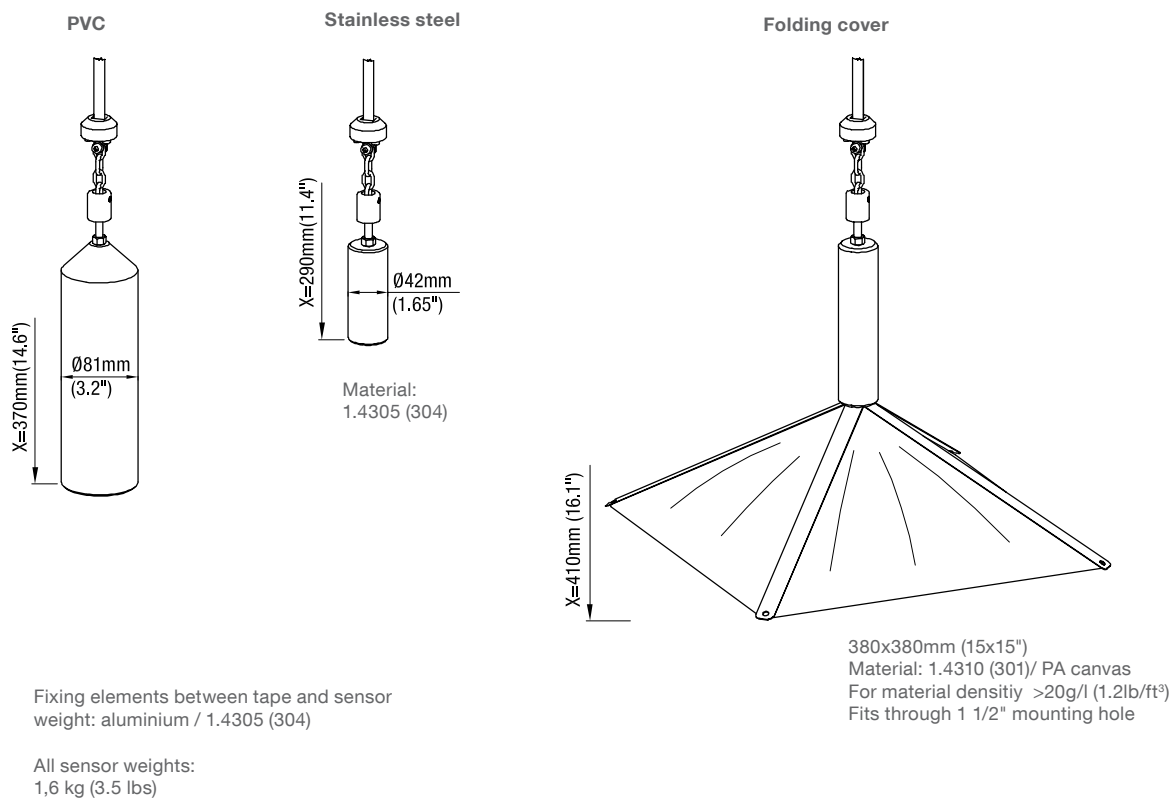
Dimensions and materials

Sensor weights

Rope version



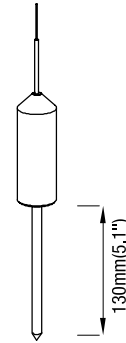
Tape version



Options and Accessories

Options

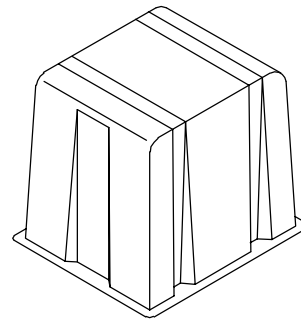
Pin for sensor weight Recommended for powder
 The pin penetrates into the material and avoids slipping or tilting of the sensor weight on the steep bulk surface.



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

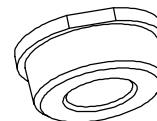
For use in Hazardous Locations only permitted for Zone 22 or Division 2



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		
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	< 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 .. 2.5mm ² (AWG 26 .. 14)			
Cable entry	According to selection: Screwed cable gland: 1x M20x1.5 and 1x M25x1.5 Blindplug: 1x M20x1.5 or Conduit ANSI B1.20.1: 1x NPT 3/4"+ 1x NPT 1/2" Blindplug: 1x NPT 1/2"			
Isolation	Power supply to all other outputs / inputs:	AC version 2210 Vrms DC version: 1000 VDC		
	Relay to relay:	2210 Vrms		
Protection class	I			

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	

Technical data

Colour	Housing Lid	RAL 5010 (gentian blue) RAL 9006 (aluminium silver)
Material	See detail specifications on page G4/G5	
Measuring range	Max. 15m (50ft) or max. 30m (100ft)	
Measuring speed	Sensor weight speed in average: ca. 0,2 m/s (0.6ft/sec)	
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
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).	
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 G19	
Max. permitted tractive force	ca. 800N	
Relative humidity	0-100%, suitable for outdoor	
Altitude	max. 2000m (6.562ft)	

Approvals

Hazardous Locations*	ATEX II 1/2 D (zone 20/21) FM Class. II, III Div.1 Gr. E-G	
General purpose *	CE FM	EN 61010-1 General purpose
EMC	EN 61326 -A1 (industrial standard)	

* Depending on selected version in price list

Mounting

! General Safety Instructions

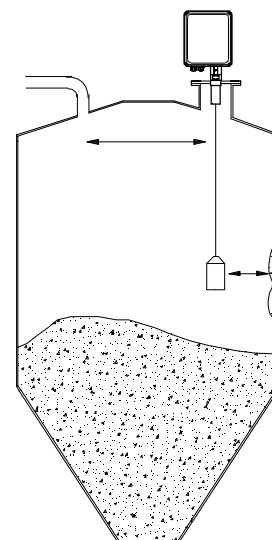
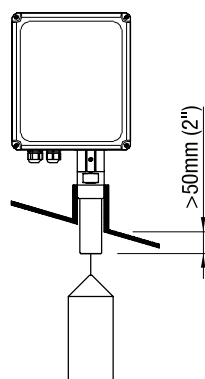
Process pressure	Improper installation may result in loss of process pressure.
Chemical resistance against the medium	Materials of construction are chosen based on their chemical compatibility (or inertness) for general purposes. For exposure to specific environments, check with chemical compatibility 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 G4).
 - 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"

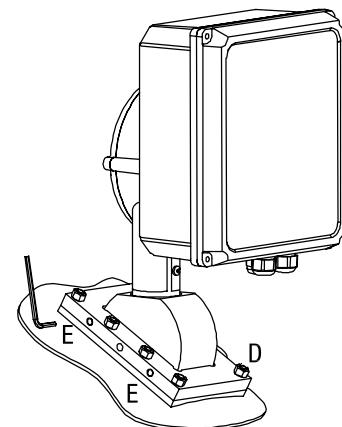
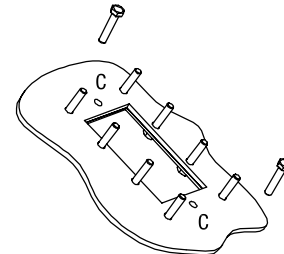
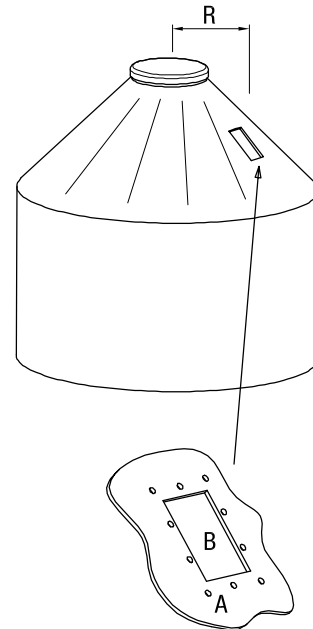
5. Apply the rubber sealing from outside over the shafts. Take care that the shaped side faces to the (shaped) silo roof and the knobs faces upwards..



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.



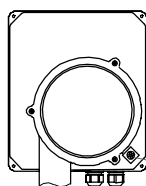
Electrical installation

! 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	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.
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	All field wirings must have insulation suitable for at least 250V AC. The temperature rating must be at least 80°C (176°F).
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

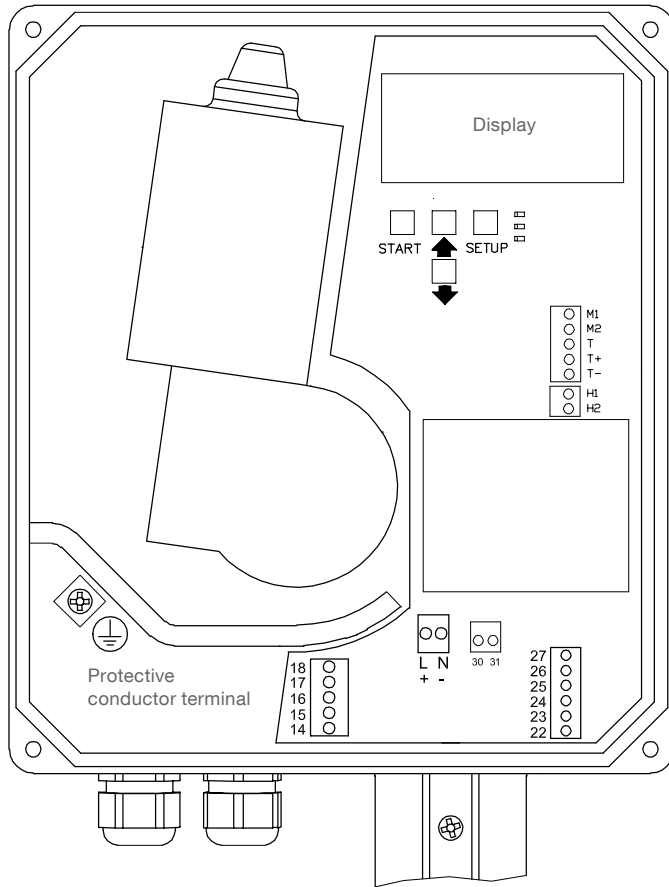


Connect to equipotential bonding of the plant

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 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 ATEX and 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

Terminal location



Internal terminals for motor and heater

- Terminals for:
- Power supply
 - 4-20mA output
 - Relay output
 - Start input

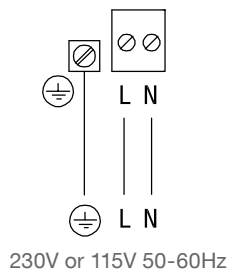
All terminals 0.14 .. 2.5mm²
 (AWG 26 .. 14)

Note: Terminal 30 and 31 not used

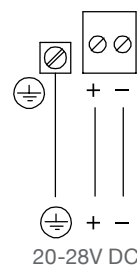
Power supply and Signal input /output

Power supply

AC version



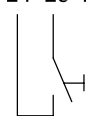
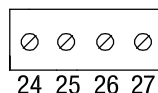
DC version



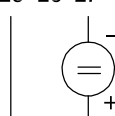
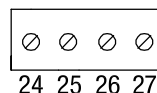
AC or DC supply depending on ordered version

Signal input:

Start of measurement

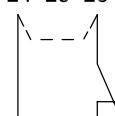
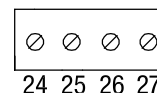


Start contact



Start +24V

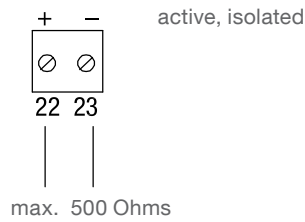
alternative



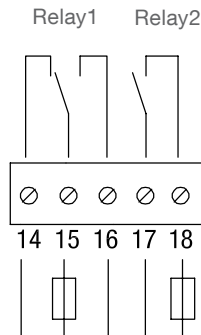
Measurement interruption in case of filling. If used, remove factory provided connection.

Signal overview

Signal output:
 0/4-20mA



Signal output:
Relais
 (optional)



Fuse: max. 2A
 max. 250V AC, 2A, 500VA, non inductive

Signal input / output

Signal input:
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 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 G20)

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.

Signal overview

	Relay 1	Relay 2
	Failure	Upper stop position
Present		
Not present		

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):

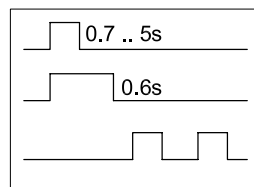
After start of measurement, a reset pulse is given. It is used to reset the connected evaluation device (counter/ PLC, ...).

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	Internal heater is on
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.

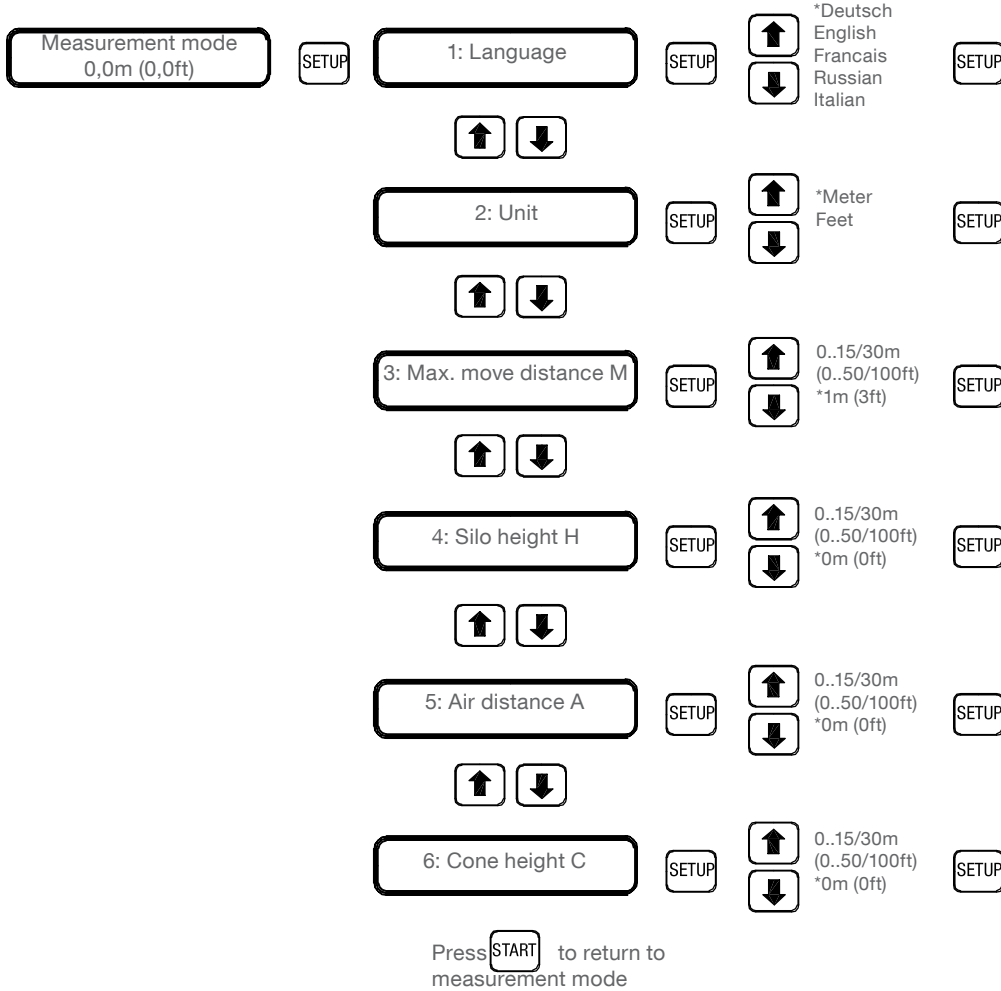
Failure codes description see page G20.

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.



* Factory-provided

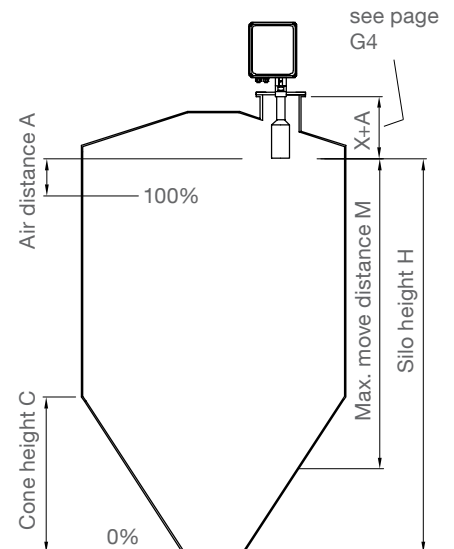
Max. move distance M Ensures that the weight does not enter into the silo outlet.

⁽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

⁽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

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)

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 G12)

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

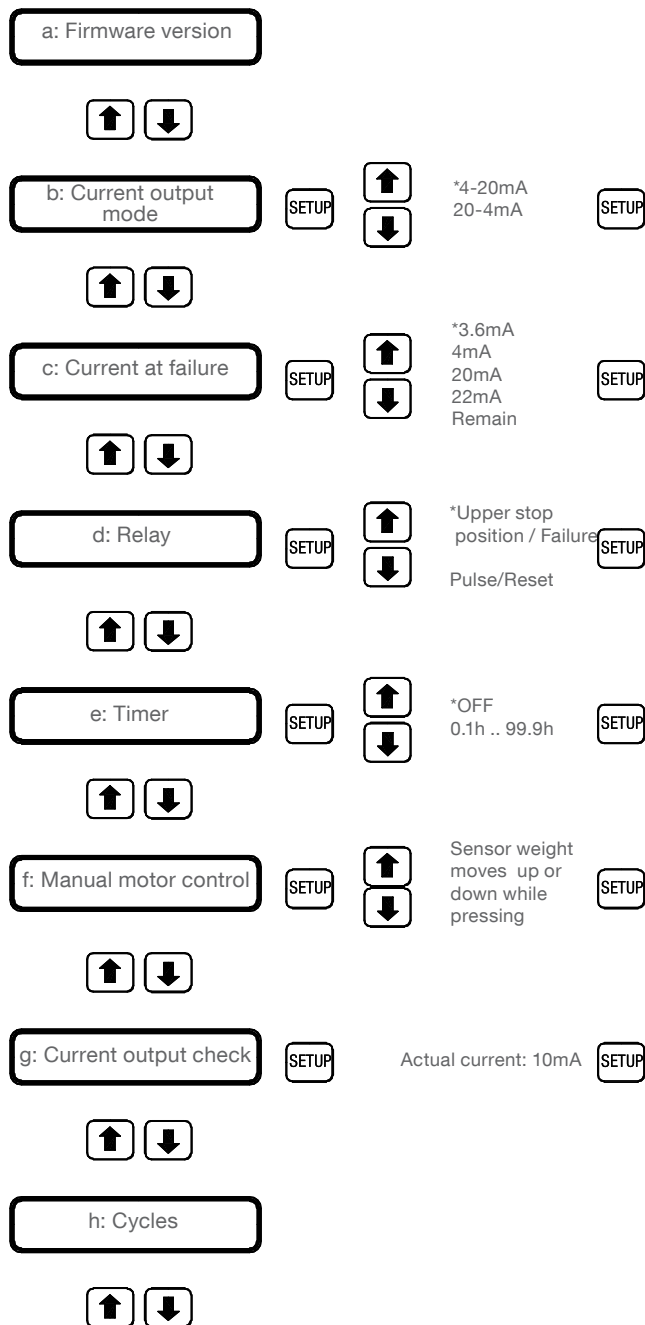
Advanced menu

(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:

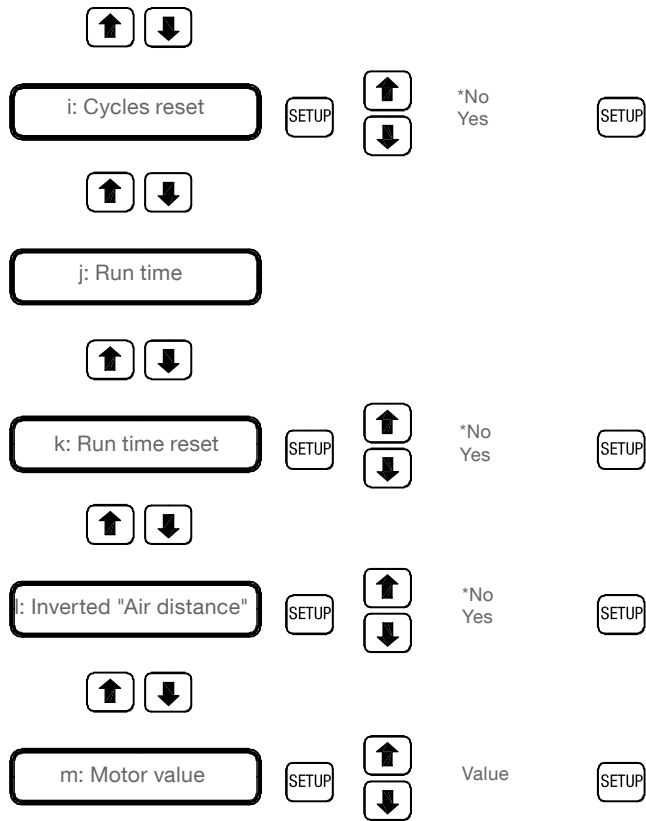
If the unit is working in normal operation (measurement mode), press both "arrow" buttons together for approx. 2 seconds.



continuation next page

Programming

continuation

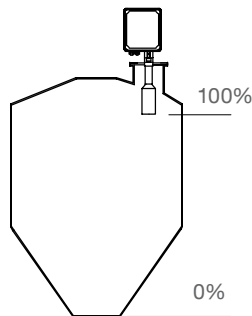


Press **START** to return to measurement mode

* Factory provided

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

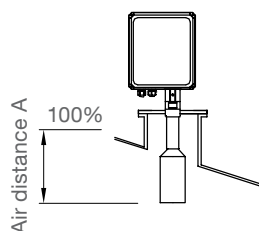
Current at failure In case of failure the current output shows the adjusted value.

Relay Selects, if Relais shall indicate "Upper stop position" and "Failure" or work as Counting / Reset pulse output
 Details see Signal Overview on page G12/13.

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 G14), 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	<p>Internal value only to be used in case of replacement of the motor (see instruction manual of motor replacement).</p>
--------------------	--

Rope / Tape / Motor lifetime

Rope/Tape lifetime

The expected life time (measurement cycles) for the rope/tape is:

Rope version: approx. 200.000
 Tape version: approx. 500.000

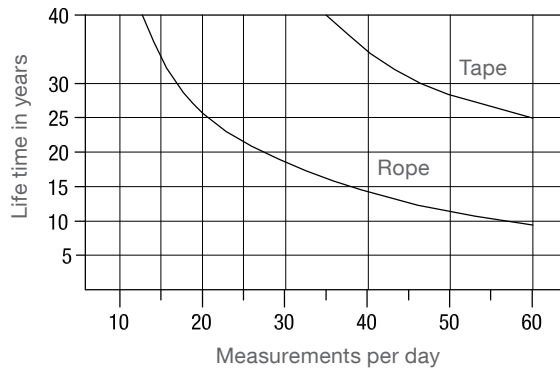
Note: These values refer to lifetime tests under the following conditions:

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.

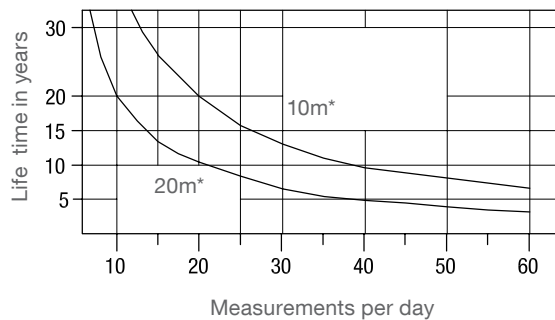


Motor lifetime

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

Diagnostics

Failure:

Result is an invalid measurement.

Red LED is on. Relay 2 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.

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:

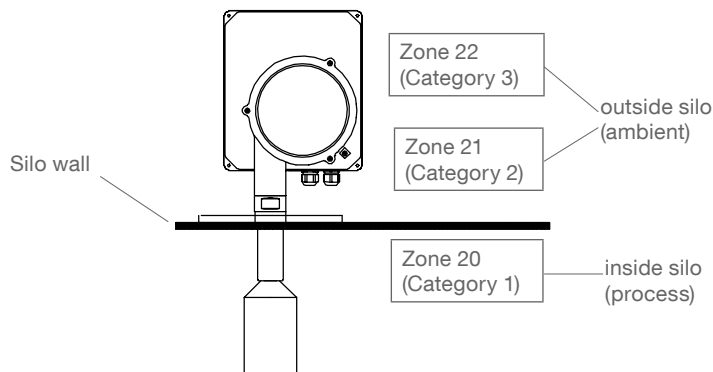
Code	Description	Performance of the device	Solution
M11	Sensor weight blocked in "upper stop position" or block distance of sensor weight to short	The unit tries to start 5 times. If the sensor weight is not released during this time, the message is shown. If after a new measurement start the sensor 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
60°C (140°F)	80°C (176°F)	130°C (266°F)

! 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.