

Table of contents

	Page
Introduction	G2
-----	-----
Mode of operation	G2
-----	-----
Technical data	G3
-----	-----
View internal structure	G5
-----	-----
Electrical connection	G6
-----	-----
Signal description	G7
-----	-----
Adjustment and commissioning	G8
-----	-----
Safety notes	G9
-----	-----
Mounting	G9
-----	-----
Parameter adjustment	G12
-----	-----
Error codes	G12
-----	-----
Maintenance	G13
-----	-----
Tape change	G14

Subject to technical change.

All dimensions in mm (inches).

All units in this information are CE-certified.

We assume no liability for typing errors.

Different variations to those specified are possible.

Please contact our technical consultants.

Introduction / Function

Introduction

The **UWT-LOT SLB 300** is an electromechanic level measuring instrument for the continuous measuring of level heights or level volumes in hoppers, silos or tanks.

It is used for monitoring the level in applications such as

- powders
- small grain bulk goods
- coarse grain bulk goods

Features

- Suitable for most types of bulk goods
- Resistant to:
 - Dielectricity and conductivity of the bulk good
 - Dust in the silo
 - Changes in moisture of the product
 - Products that are prone to sticking
- No mechanical forces on the silo roof, the sensor only comes into contact with the material surface
- Easy installation and commissioning
- High-tech measurement, easy to understand
- Very accurate measurement
- Output 0/4-20mA
- Range of measurement 70m
- Micro processor controlled measurement with intelligent monitoring
- Internal tape cleaner for difficult products
- Different sensor weights, suitable for every application
- Robust diecast housing with protection class IP66

UWT - LOT level measurement systems have withstood the test of time in various industries such as:

- Chemical industry
- Building materials industry
- Food industry
- Plastics industry

Function

The UWT - LOT SLB 300 is mounted on the top of the silo. A sensor weight is wound down into the silo. It is mounted at the end of a tape which is wound on a motor driven tape roller.

Upon contact with the bulk material, the motor changes the winding direction and the sensor weight is wound back to the upper stop position.

The unit is divided into two independently sealed chambers (tape chamber and electronic chamber). Only the tape chamber is in contact with the inside of the silo during measurement.

If the sensor weight is in the upper stop position, it seals the opening between the unit and the silo.

Pulses are generated during downward movement and the number of pulses can be processed directly by

- a PLC (Programmable logic controller)

or

- a counter (see chapter 11 "Display / Evaluation").

0/4-20mA output:

The pulses are internally converted into an analogue current signal. The current signal can be adjusted according to the application which means that a volumetric signal based on the silo geometry is possible.

The current signal is updated, when the sensor weight comes into contact with the material.

The measurement results from an external signal (contact or 24V DC). For automatic starting there is an integrated timer.

The measurement is controlled by a microprocessor. A comparison between the distance the weight moves downwards, and the distance the weight moves upwards, is done. When there is a discrepancy a signal output is activated. This guarantees, that the sensor weight is always in the upper stop position.

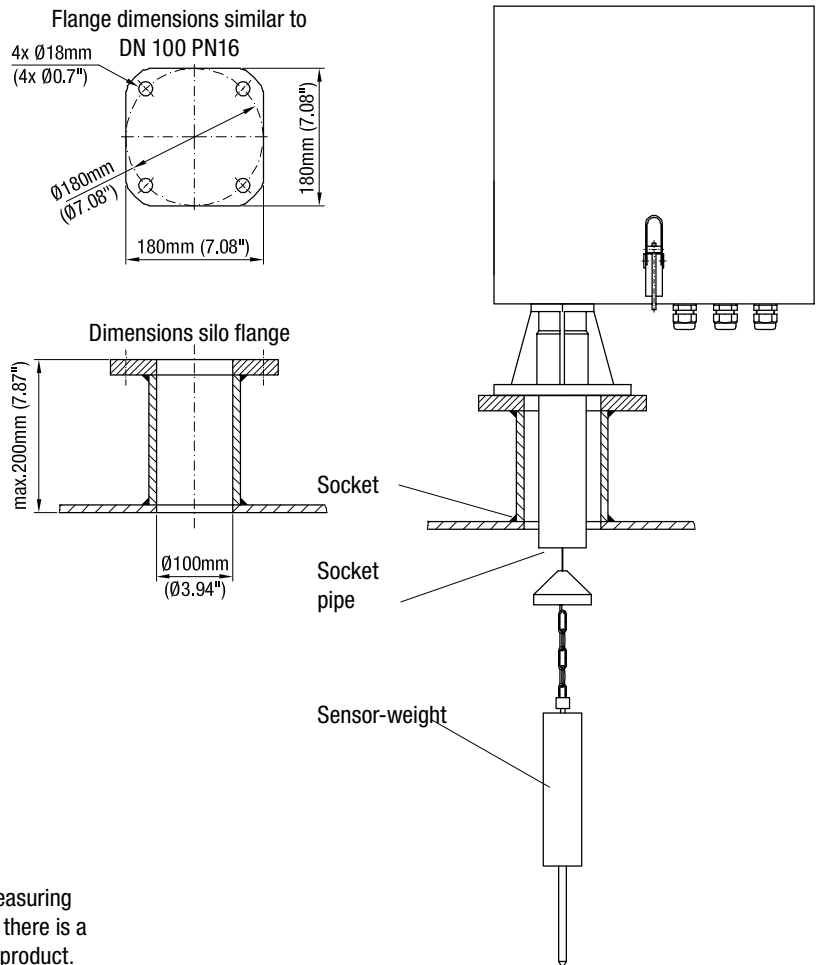
Technical data

Dimensions

For detailed dimensions of **UWT - LOT SLB 300** see price list (page P2).

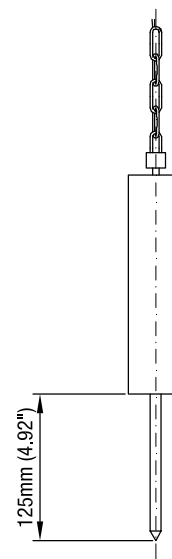
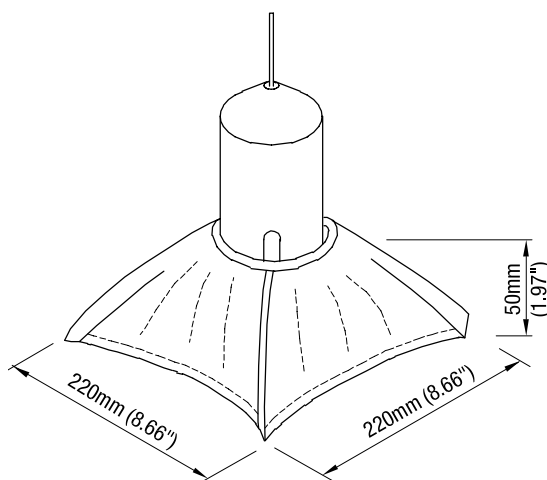
Sensor weight must not go into the socket!

The socket pipe prevents the sensor weight from colliding with the socket edges during upward movement of the weight. The lifetime of the tape is increased, due to less loading.



Folding cover sensor weight

If the sensor weight is used for measuring very light and loose bulk material, there is a risk that it could descend into the product. This can be prevented by using the folding cover which has a large surface. The folding cover can be folded to fit through the mounting socket DN100.



Pin for sensor weight

The sensor weight can be equipped with a pin Ø10mm (Ø0,39"), which prevents the sensor weight from sliding on the bulk material.

Technical data

Mechanical data

Housing:	Aluminium/cover stainless steel
Protection cover	Aluminium
Enclosure	IP 54 based on EN 60529
Process connection:	Flange DN 100 PN16 DIN 2633
Overall weight:	approx. 30kg (66.1lbs)
Measuring weight:	Stainless steel 12x0.2mm 1.4310/301
Measuring range:	Standard 30m (100ft), optional up to 70m (230ft)
Measuring speed:	approx. 0.3 m/s (0.98ft/sec) average (upward and downward movement)
Sensor weight:	approx. 3.5kg (7.7lbs)
Sensor weight material:	Stainless steel Folding cover made of canvas
Deviation of vertical mounting:	max. 2° off the vertical

Electrical data

Supply voltage:	3 x 400V 50-60Hz + N, +10% / -15%, other voltages on request
Installed load:	Motor: 0.25kW (cosφ = 0.8) 3 x 0.7A (type 400V and 500V) 3 x 1.2A (type 230V) with heating 120W
Connection terminal:	max. 2.5mm ²
Screwed cable gland:	3 x M25x1.5t for cable diameter 9 -14 mm
Signal output:	„counting pulse“ and „reset pulse“ floating relay contact max. 250V AC, 2A, 500VA floating current output 0/4 - 20mA, ±0.1mA max. load 500Ω
Measuring interval:	0.1m/pulse

Accuracy of measurement:	output pulse; 1 pulse (version with 10cm/pulse) Current output: 1%
Counting pulse:	Count: 0.2s ON; 0.2s OFF; Reset: 0.6s
Connection diagram:	Inside of the lid, datasheet
Protection class:	I
Heating (optional):	Thermostat controlled 230V, 80W; for temperatures down to -35°C or in case of condensation of water inside the housing
Signal output:	„Upper stop position“ / „Malfunction“ Floating relay contact max. 250V AC, 2A, 500VA

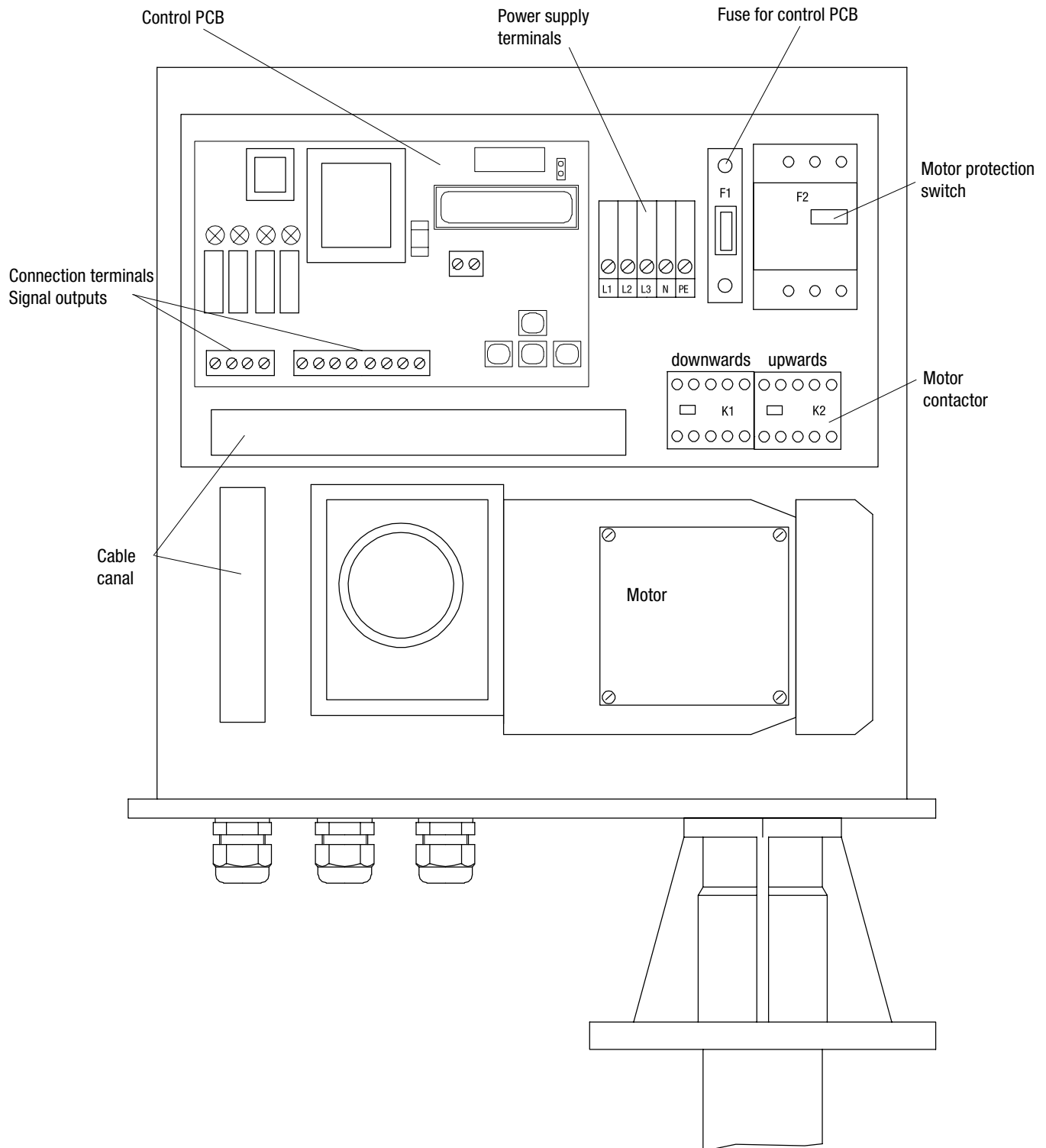
Operating conditions

Silo pressure:	max. 0.2bar (2.9psi)
Process temperature:	max. 80°C higher on request
Ambient temperature:	-20°C.. +50°C -35°C.. +50°C with heating
Tape operating time:	see page G13

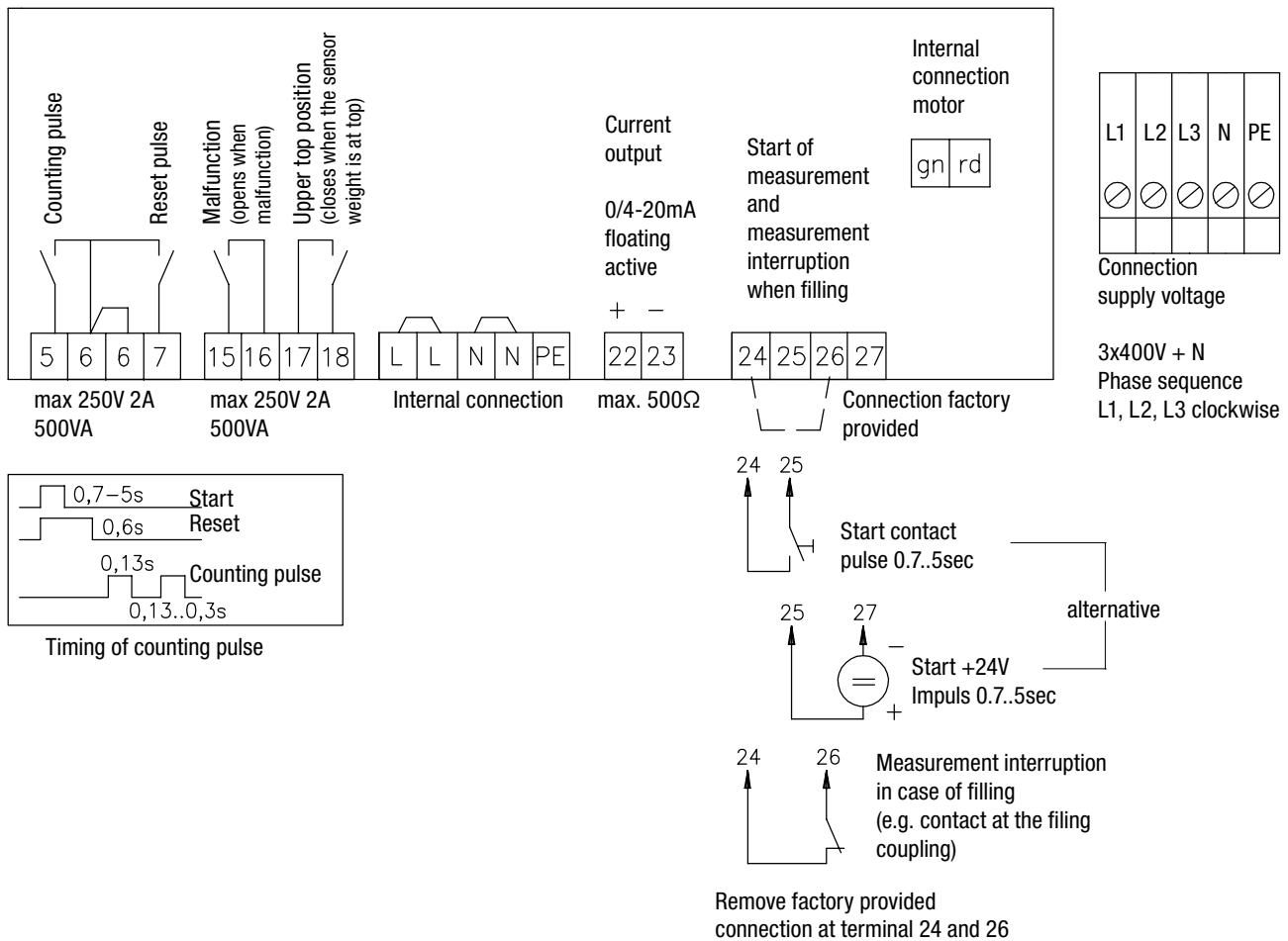
Approvals

CE	EMC	EN 50081-1 EN 50082-2
	General purpose	EN 61010-1

View internal structure



Electrical connection



Signal description

Terminal connections

The following supply lines are required:

Power supply	5 x 1.5mm ² (max. 2.5mm ²)	Evaluation current	2 x 1.5mm ² (max. 2.5mm ²)
Start of measurement	2 x 1.5mm ² (max. 2.5mm ²)	Relay output ,Upper stop position' and ,malfunction'	max 2.5mm ²
Measurement interruption in case of filling:	2 x 1.5mm ² (max. 2.5mm ²)		
Evaluation counting and reset pulse:	3 x 1.5mm ² (max. 2.5mm ²)		

Signal description

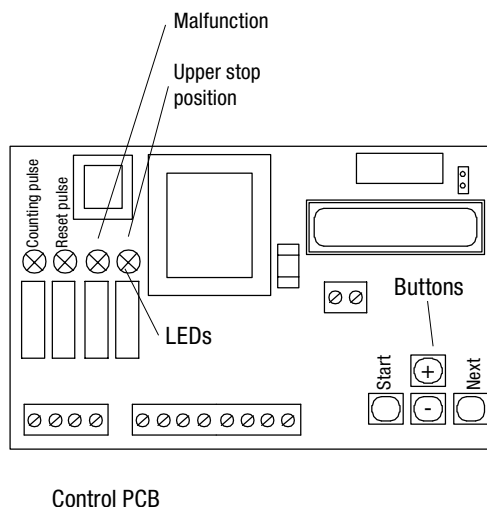
Measurement start:	Terminal 24 and 25 via floating contact. or Terminals 25 and 27 via 24 V DC voltage (current consumption approx. 25mA, observe the polarity) Duration of starting signal: 0.7 to 5s	Current output:	Terminal 22 (+) and 23 (-). The current signal is a measure for the level (application adjustable). The current signal is updated when the sensor weight touches the bulk good and is updated.
Measurement interruption in case of filling:	Terminal 24 and 26 via floating opening contact. When the terminals 24 and 26 are opened, the sensor weight returns to the upper stop position. By connection to the end switch, the filling coupling prevents the burying of the sensor weight.	Upper stop position: (Option)	Terminal 17 and 18 This 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, terminals 17 and 18 are linked.
Counting pulse:	Terminal 5 and 6 The counting pulse communicates the measured value to the evaluation device connected. During the downward movement of the sensor weight this pulse is generated every 10cm (0.33ft).	Malfunction: (Option)	Terminal 15 and 16 In case of a recognized failure (or lack of supply voltage) the contact will be opened. Description of the error reports, see page G10. The malfunction signal output can prevent a torn-off sensor weight from falling into the material.
Reset pulse:	Terminal 6 and 7 After start of measurement a reset pulse is given about 0.6s later. It resets the connected evaluation device (counter/ PLC, ...).		When the signal "Malfunction" is given, the device must always be checked onsite.

Adjustment and commissioning

Warning:

Safety is not guaranteed in the case of improper handling. Work on the device must be carried out by qualified technical personnel. Commissioning must be carried out after mounting of the device on the silo!

1. Compare supply voltage and frequency with the specifications on the type plate.
2. Connect the unit with supply voltage, evaluation units and starting unit (see page G6)
3. Switch OFF the motor protection switch F2. Turn on supply voltage.
4. Adjust the parameters (see page G10 and G11).



Check phase sequence of L1 L2 L3:

Phase sequence L1 L2 L3 must be clockwise. By wrong phase sequence the motor turns the wrong way and the tape can tear!



5. Before continuing, read the following steps to ensure full understanding of the instrumentation!
6. Switch ON the motor protection switch F2.
7. Push start button (motor contact K1 is actuated, motor starts).

If phase sequence is wrong:

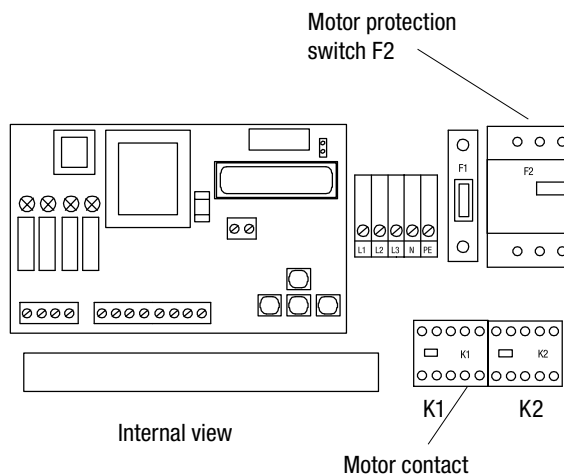
The motor tries to pull the sensor weight upwards. Due to the fact that the sensor weight is at the upper position, the electronic stops after approx. 4 seconds and the LED "Error 4" lights.

- (8.) --> Switch OFF F2 at once.
- (9.) Disconnect supply voltage
- (10.) Swap connection cables L1 and L2.
- (11.) Connect mains voltage.
- (12.) Switch ON F2.
- (13.) Push start button. Sensor weight must move downwards, LED "counting pulse" must flash during downwards movement. The run length is shown in the display. After downwards- and upwards movement of the sensor weight, LED "upper stop position" lights. Measurement is complete.

If phase sequence is correct:

Sensor weight moves upwards, LED "counting pulse" flashes during downwards movement. The run length is shown in the display. After downwards and upwards movement of the sensor weight, LED "upper stop position" lights. Measurement has finished.

14. Do up the lid of the device. The device is now ready for use.



Safety instructions / Mounting

Safety instructions

- Line electric parts are protected against accidental contacts when the lid is opened. Switch off supply voltage, before any parts of the unit are removed.
- In the case of a defect, the distribution voltage must automatically be cut off by a RCCB protective switch to protect the user of the device from indirect contact with dangerous electric tensions.
- For terminal connection of the device, the local regulations or VDE 0100 (Regulations of German electrotechnical Engineers) must be observed.
- The device may be operated only at the silo in the inserted status. A contact with the moving tape must be impossible thereby.
- When the lid is removed, the device may not be operated.
- In case of inexpert handling or handling malpractice, the safety of the device is not guaranteed.
- Isolating supply voltage to signal output: 3kV~
- Provide protection for relay contacts to protect the device against inductive load surges.

Mounting

The unit is mounted vertically with the flange on the container.

The mounting position must be chosen so:

- build ups that might fall down do not damage the sensor weight or the tape. Ensure proper distance from silo wall.
- filling of the container might cover the sensor weight with material (prevent measuring during filling or observe proper distance to charging hole).
- upward and downward movement of the sensor weight can not be obstructed even if the weight oscillates; ensure proper distance to stanchions and built-in fittings.

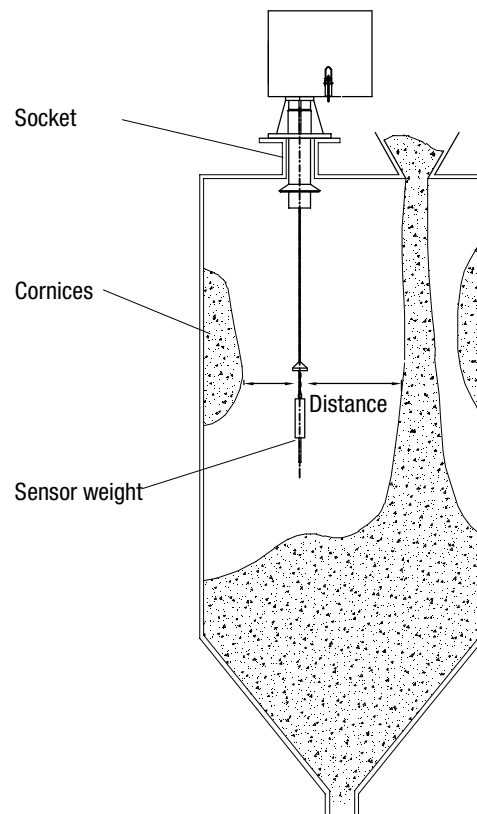
The electrical connections are made in accordance to the connection diagram. Make sure, that the cable in the screwed cable gland is sealed tightly.

Do up the lid of the housing, to prevent water entering the housing.

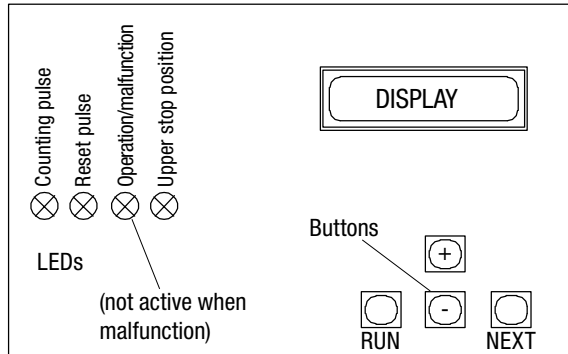
When the unit is used in the open, we recommend to use the weather protection cover. It protects the unit against moisture and temperature extremes.

If temperature is lower than -20°C or condensation could occur in the housing, a heating (option) must be used.

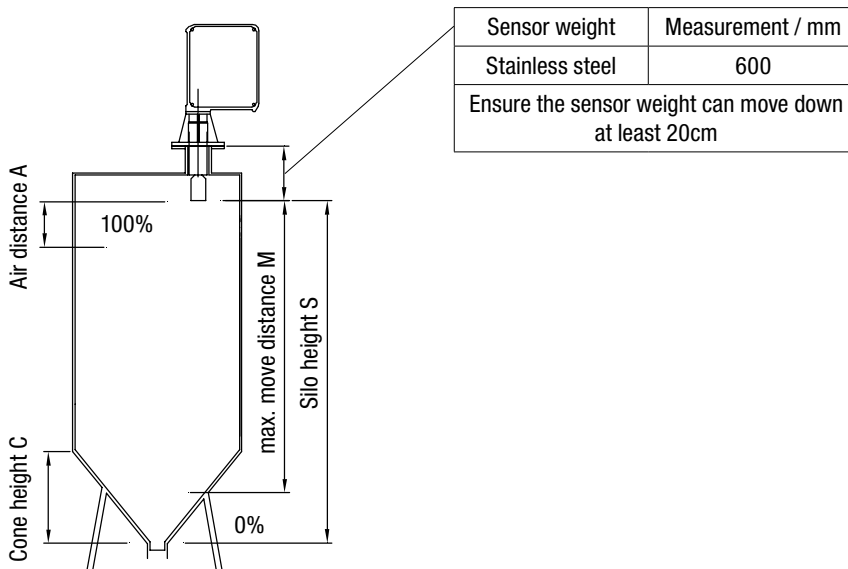
There must be at least 20cm space for the sensor weight to move down in case of a full silo. Observe the lower edge of the sensor weight at the "upper stop position" (measure see page G10).



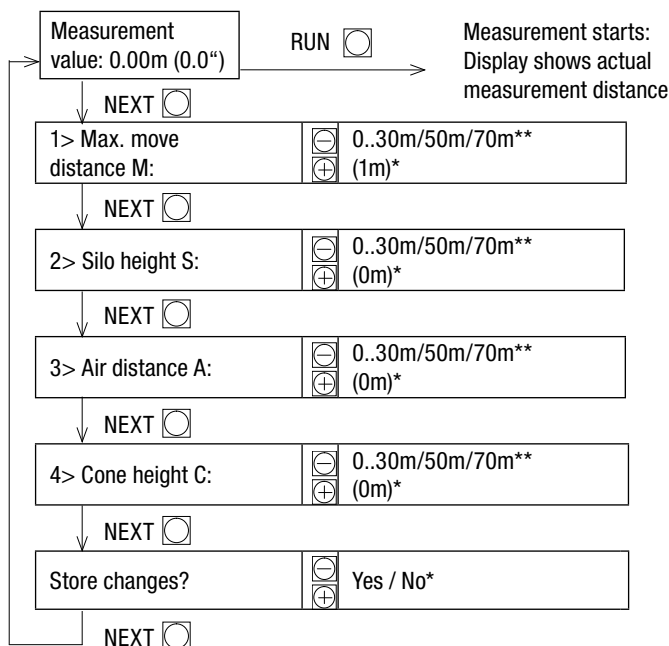
Parameter adjustment



- NEXT button jumps to the next adjustment item
- RUN button
 - jumps to measurement display during parameter adjustment
 - starts measurement
 - cancels an error code on the display
- + button increases the value to be adjusted
- button decreases the value to be adjusted



The maximum measurement distance ensures that the weight does not enter for example agitators.



Note:

If the maximum move distance M is adjusted smaller than the silo height S, the measure value is always more than 0%.

When using the digital pulse output (terminal 5/6/7, see page G6) the parameters silo height S, air distance A and cone height C have no influence on the measurement value.

Adjustment of the cone height C:

- C = 0 current signal output refers to the material level
- C > 0 current signal output refers to the material volume

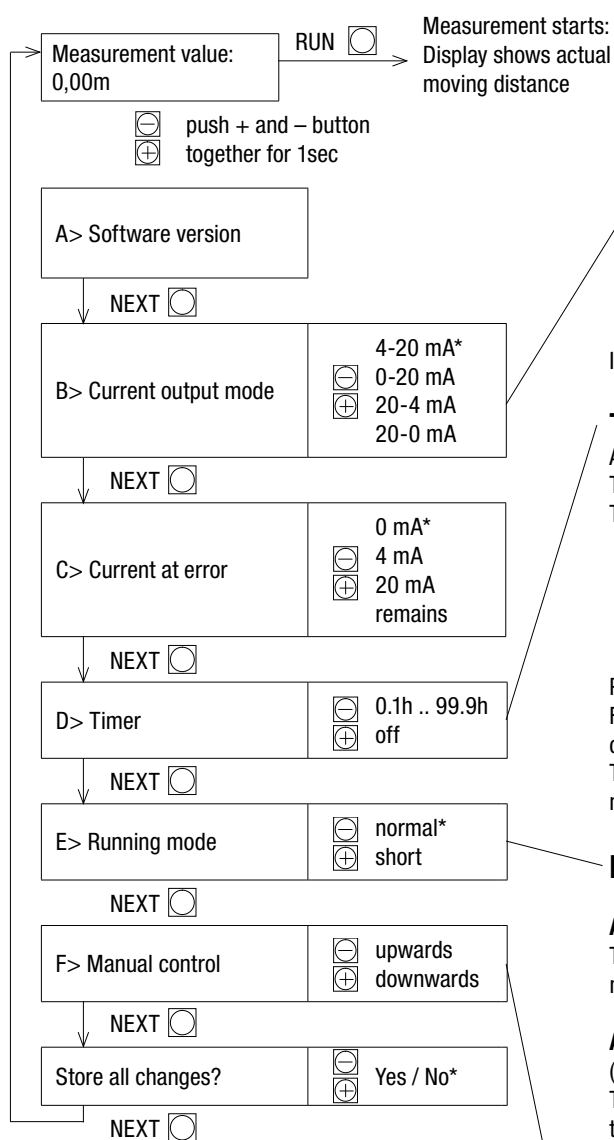
- * factory-provided
- **depending on ordered type

Parameter adjustment

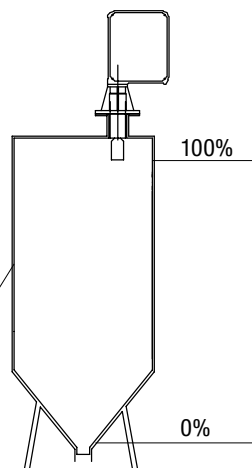
Advanced parameter adjustment

(Only when necessary)

The following parameters can be adjusted when required:



* Factory provided



Adjustment	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

In case of malfunction the current output returns to the adjusted value.

Timer

Automatic start of measurement with timer function.
 Timing interval between two measurements can be adjusted.

The timer will be started:

- if the sensor weight is at the upper stop position after a measurement.
- after external measurement start terminal 24/25/27
- after linking of the terminals 24/26 (measurement interrupting when filling)

Position „off“ causes no automatic measurement start.

For automatic measurement at a predetermined time of day, a start unit connected to terminals 24/25/27 is necessary.

To avoid needless wear and tear, the unit should not be started more than necessary.

Running mode

Adjustment „normal“

The sensor weight returns back to the upper stop position after every measurement.

Adjustment „short“

(Only possible in case of use of the 0/4-20mA output).

The sensor weight stops one meter above material level after it has touched the material. This reduces the wear and the measurement time.

Every 20 measurements the sensor weight moves back to the upper stop position to adjust the measurement value. Then it moves back to the position it was before.

ATTENTION - running mode „short“

1. To avoid the burying of the sensor weight during the filling of the silo, the function „measurement interrupt in case of filling“ (terminals 24/26, see page G6) must be used. Before the filling starts, the sensor weight must be in the upper stop position.
2. The sensor weight must not hang in the flow of incoming material.

Manual control

Push „+“ button: The motor moves the sensor weight upwards whilst the button is pushed.

Push „-“ button: The motor moves the sensor weight downwards whilst the button is pushed.

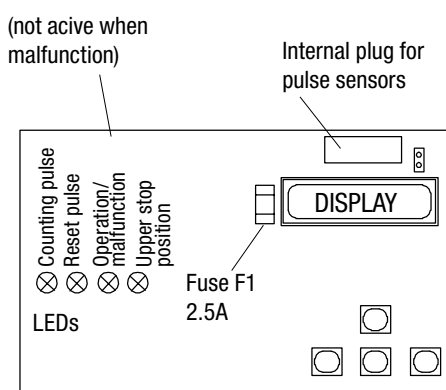
CAUTION: Avoid the sensor weight reaching the outlet position of the silo.

Error codes

Switch off the supply voltage and ensure, that it can not be switched on again, before repairs are completed.

Error code	Possible reason	Performance of the device	Solutions
Error code 2	Internal pulse sensors are not identified by the software	The motor stops. When the pulse sensors can be identified again the sensor weight moves to the upper stop position.	Connect the internal plug for the pulse sensor.
Error code 3	Tape break. Motor blocked or broken.	The motor stops. This code is displayed when error 4 occurs. 4 minutes have elapsed and the sensor weight has not reached the upper stop position.	Repair the tape break (see page G14). Look for the reason of motor blocking.
Error code 4	No pulses come from the return pulley. Return pulley moves too stiffly. Phase sequence L1 L2 L3 is not clockwise.	The motor moves the sensor weight upwards, until it reaches the upper stop position.	Repair the stiff movement of the return pulley. Change the phase sequence.
Error code 6	Sensor weight buried or jammed.	The motor moves 2 seconds upwards, then it waits for 10 seconds. After that the motor moves shortly downwards and then upwards again. If the sensor weight is still jammed, this cycle repeats 5 times. After that the delay time will be increased to one hour.	Release the sensor weight. Take care that the sensor weight can move without obstacle.
Error code 7	Supply voltage too low.		Adjust to correct mains voltage.
Error code 8	Sensor weight blocked in "upper stop position" or distance sensor weight < 200mm (7.87")	The unit tries to start 5 times. If the sensor weight is not able to be released, the error code is displayed. (The signal output indicates no error.)	Release sensor weight. Increase the min. moving distance to > 200mm (7.87")
Error code 9	Service interval	See chapter "service interval" page G13	

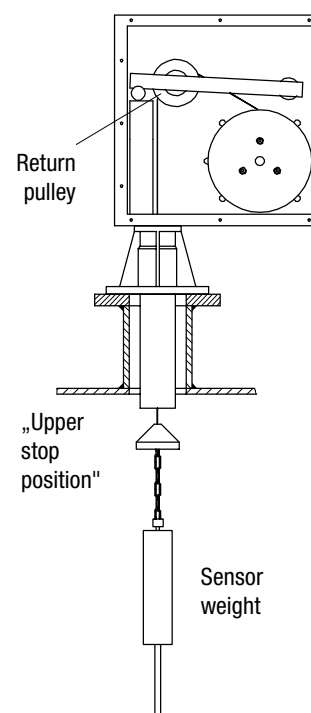
By pushing the RUN button an error code shown on the display can be canceled.



Control of the measurement

The device compares the distance of downwards movement of the sensor weight (until it reaches the surface of the bulk good) with the distance of upwards movement, until it reaches the upper stop position. When the values are different, this is an indication of a buried or jammed sensor weight.

Furthermore, the pulses generated by the return pulley during the measurement are monitored. When there are missing or too irregular pulses this indicates that the return pulley moves too heavily or that the motor is blocked.



Maintenance / Service interval

Maintenance

The **UWT- LOT SLB 300** measuring device features a high degree of functional reliability and it requires virtually no maintenance during normal operation. However, it is recommended that the following checks are regularly carried out.

Open the tape chamber lid.

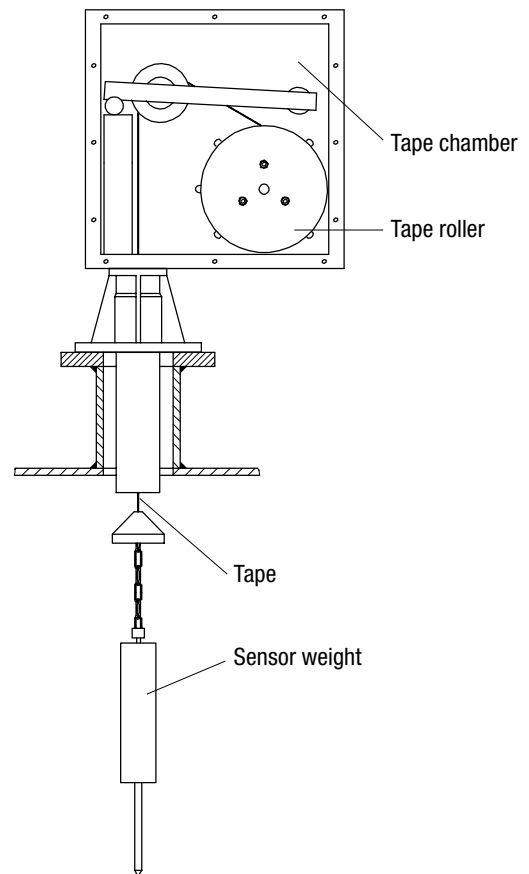
Remove any excess material in the rope-/tape chamber.

Check the tape for wear and tear.

Do up the tape chamber lid tightly.

If the tape is worn or torn, it must be changed (possibly shortened). Available spare parts are:

- loose tape
- tape roller (with 30m/ 50m/ 70m)
- sensor weights



Service interval

(Error code 9)

Error code 9 is created automatically after 40.000 measurements.

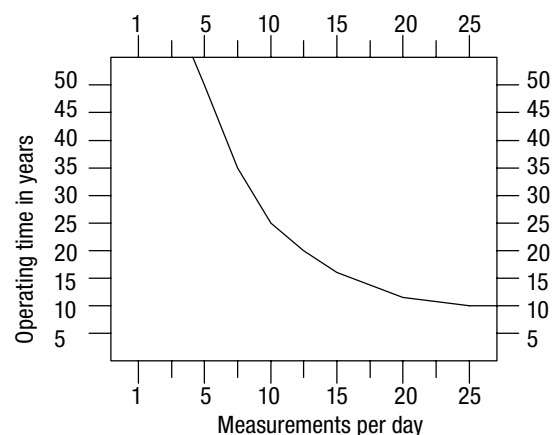
To further guarantee faultless performance it is strongly recommended to change the tape (see page G14).

Cancel the error message by pushing the 'RUN'-button. The next message will appear after further 40.000 measurements.

Tape operating time

approx. 90 000 measurements

These values refer to lifetime tests without material influence. The sensor weight meets an incline surface, so that an oscillating movement of the sensor weight is caused. Based on these values, the following graph has been produced.



Tape change

Take care when working with the tape.
Danger of injury caused by sharp edges.
Do not kink the tape

Switch off power supply, ensure that power cannot be accidentally restored/switched back on.

Remove the device from the silo.

Open the lid to the tape chamber.

Remove the tape roller (3 screws).

Mount a new tape roller (observe the direction of winding), leave about 1.5 m (59.05") of tape unwound. Ensure that the tape feeds inside the tape feeding bolts.

Mount the sensor weight in accordance with the drawing.

Feed sensor weight into the socket, mount the device at the flange again.

Check the feeding of the tape inside the tape chamber.

Do up the lid to the tape chamber tightly.

Switch on power supply. The sensor weight moves automatically in the „upper stop position“.

The device is now ready for use. Measuring can begin.

A new software adjustment is not necessary.

