Yo-Yo sensing level measurement LF20

continuous level indication for bulk solids

Appliance information

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MOLLET measures filling level

ATEX option

1.B Dust II 1/2D Ex ta/tb IIIC T99 °C Da/Db

Application (intended use)

MOLOSbob typ **LF20** used for

continuous level measurement

in **silos, bunker and vessels.**

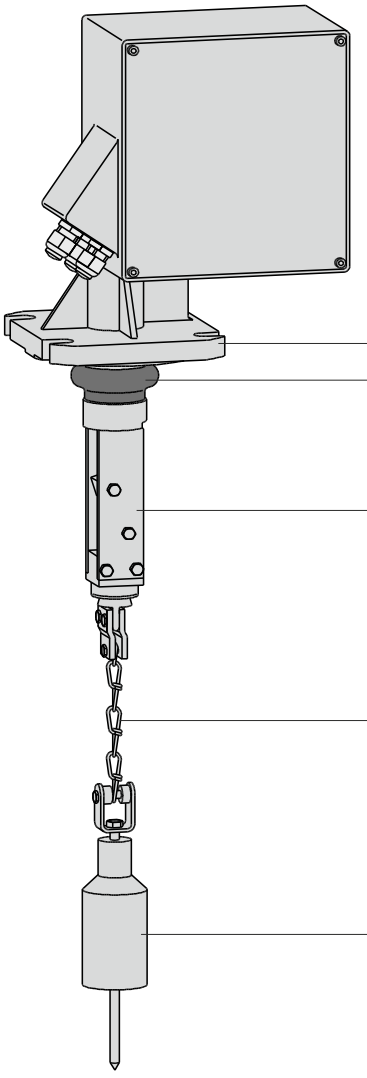
For all bulk goods with a minimum density of

0.02 t/m³.

Application in

all industry sectors processing bulk goods.

Construction



Sensing weight has to be suitable for the chemical characteristics of the bulk good and the process temperature within the bunker or silo.

Special designs for specific applications on request.

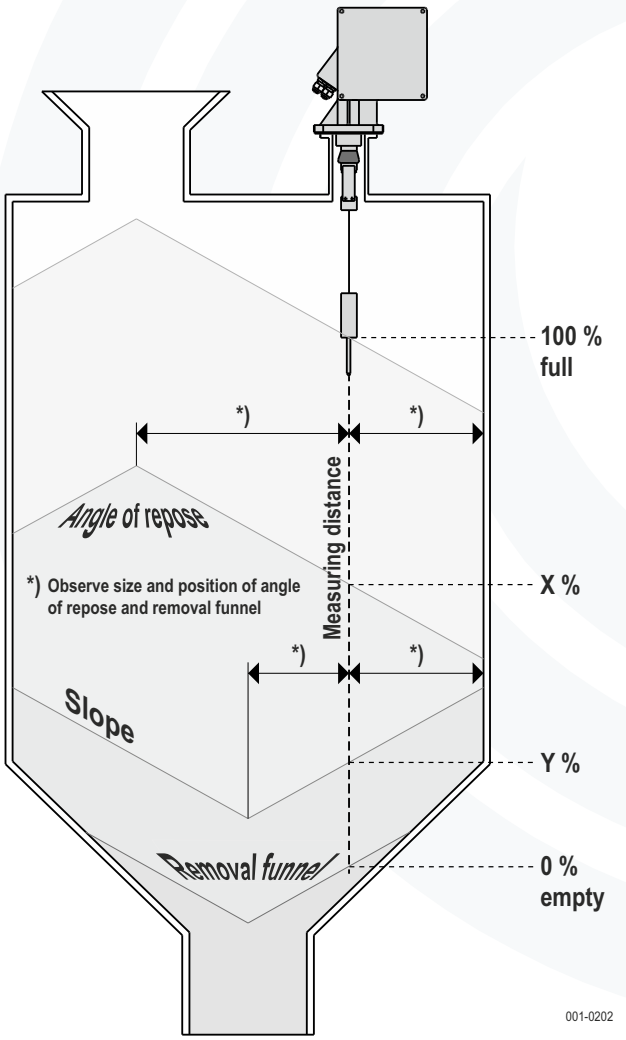
Function

A sensing weight is driven down into the silo or hopper with a stainless-steel tape. A 0/4-20 mA current output signal is given proportional to the measured distance from the top to the bulk good surface. This measured value corresponds to the filling height and is retained until the next measurement cycle starts.

Single measurements or periodic measurement procedures are possible. The measuring cycle can be started with an external contact (e.g. manual start button or PLC) or by the programmed function at the LF20.

As soon as the weight touches the surface, the tensile force on the tape decreases. This reduced tensile force is detected by the electronic of the MOLOSbob LF20, the lowering of the weight is stopped immediately and the sensing weight returns to the end position.

The sensing weight may not sink into the bulk good and not slide at the slope of the angle of repose or of the removal funnel.



During the up and down movement of the sensing weight the relay output of the LF20 can additionally emit pulses according to the length of the rolled out measuring tape. These pulses can be recorded by a process control system or an electro mechanical counter.

Technical data

Materials	Housing	Aluminum die casting, coated RAL 7001
	Housing lid	Aluminum AlMgSi1
	Process connection	Aluminum die casting
	Tape	Stainless steel 301, modified
	Wiper or	Aluminum/Steel Stainless steel 304
	Sensing weights	
	Normal weight 9.**B**	Steel
	Normal weight 9.**C**	Stainless steel 316Ti
	Umbrella 9.**D**	Polyester and steel
	Umbrella 9.**E**	Polyester and stainless steel 316Ti
	Medium bag 9.**G**	Polyester and stainless steel 316Ti
	Plastics weight 9.**N**	Plastics and steel [1])
Weight	w/o sensing weight	10 kg
	with sensing weight	11.5 kg
Dimensions		300 x 260 x 225 (HxBxD)
Angle of inclination		max. 2°
Protection type	IP	**IP67**
Maintenance		approx. after 45,000 measuring cycles

[1]) **not available for use in potentially explosive atmospheres**

Application data

Ambient temperature	7.**D**	-20 °C ... +60 °C (Standard)
with heater	7.**E**	-40 °C ... +60 °C [1])
ATEX-device with heater	7.**E**	-35 °C ... +60 °C
Process temperature	8.**1**	-20 °C ... +70 °C (Standard)
	8.**2**	-20 °C ... +150 °C [1])
with heater	7.**E**	-40 °C ... +70 °C [1])
ATEX-device with heater	7.**E**	-35 °C ... +70 °C
Process pressure		- 0.5 bar ... 1 bar

T_{amb}

$T_{(Process)}$

$p_{(Process)}$

[1]) **not available for use in potentially explosive atmospheres**

Technical measuring data

Tape length	3.**4**	15 m
	3.**5**	32 m
	3.**8**	42 m
Tensile force		max. 150 N
Tape run-off speed		0.16 ... 0.25 m/s
Measuring accuracy		± 2.5 cm or ± 1 Impuls (independent of selected measuring distance)
Highest measurable point		Calculated from the block distance plus a minimum run-out length of 20 cm

Note The individual value of the block distance is preset when delivered and has only to be adjusted when the sensing weight is replaced.

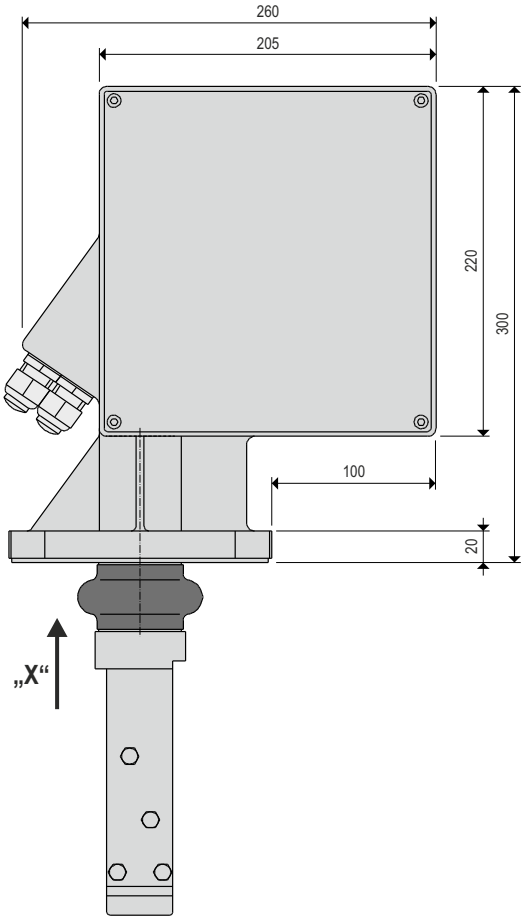
Elektrical data

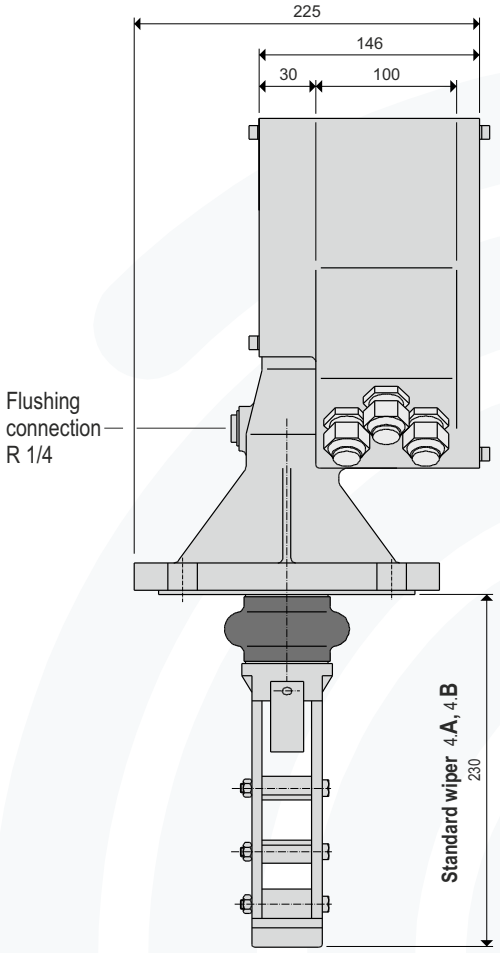
Supply voltage	5.**1**	90 ... 253 V (AC) 50-60 Hz
	or 5.**3**	20 ... 28 V (DC)
Power consumption		**AC** = 150 VA **DC** = 150 W
with heater	7.**E**	**AC** = 170 VA **DC** = 170 W
Terminal clamps		max. 2.5 mm²
Cable entry		3x screwing M20x1.5 (6 ... 13 mm)

Supply

Signal inputs		2 available for external start or lock measurement
	active	Input voltage range of an external control 12 ... 24 V DC
	passive	Connection of an external command unit, e.g. switch, key, relay contact (Start pulse length: min. 200 ms)
Signal output	**active**	0/4 ... 20 mA current output, working resistance max. 600 Ω
Relay outputs		2 relay outputs (Standard)
	optional 6.**C**	2 additional relay outputs
Selectable relay functions		
	Counting pulse	Pulses according tape length rolled out
	Reset pulse	Pulse before every new measurement e.g. to reset an external counter
	Gating of counting pulse	Pulse during running up the sensing weight, e.g. to hide counting pulses
	Measurement active	Pulse during active measuring cycle, e.g. to lock a filling device in order to protect the sensing weight from being covered by medium
	End of measurement	Pulse when sensing weight reached upper end position
	Alarm	Output of fault states
	Service interval	Information on required maintenance
Contact load		250 VAC, 6 A Silver-cadmium-oxid contacts, gold plated
Optocoupler output		for counting pulse (optional when 4 relay are selected)
	Loading capacity	U max. 30 V DC, I max. 10 mA
Break down information		recallable via following interfaces
	Local display	Error symbol Error code with plain text dispaly
	Current output	State programmable: **Minimum** Current value <= 3.6 mA (4 - 20 mA) or Current value 0 mA (0 - 20 mA) **Maximum** max. current value +10% (=22 mA)
	Relay output	Alarm function

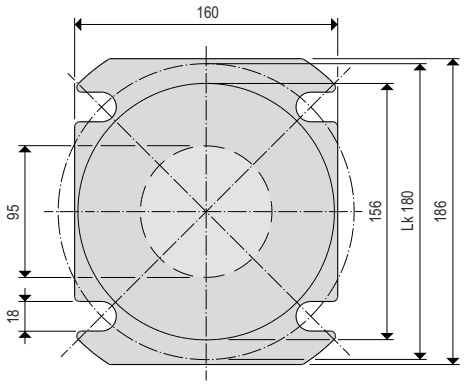
Dimensions

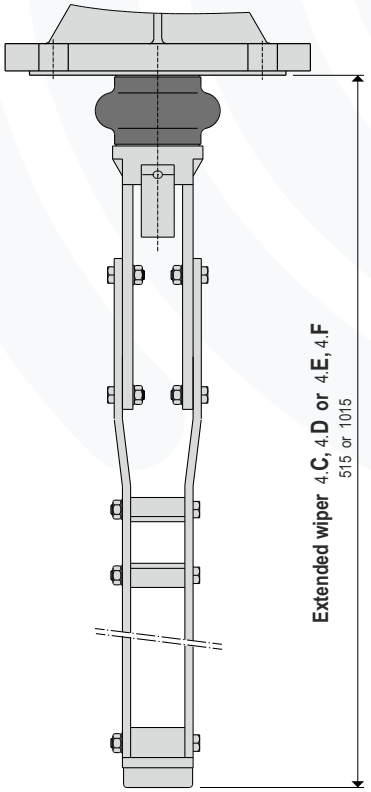




Process connection flange

View „X“





Sensing weights

9.B/9.C Normal sensing weight Steel/stainless steel
for temperatures up to +150 °C

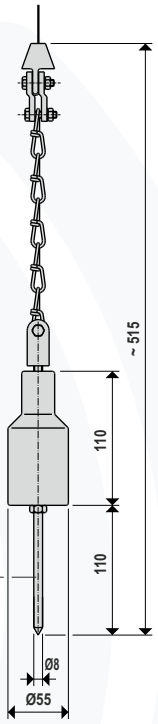
For granulates and compacted bulk solids.

Bulk density >0.3 t/m³

Angle of repose steep with spike
flat w/o spike

The spike avoids slipping or tilting of the sensor weight on a steep bulk surface.

Spike (screw-off)



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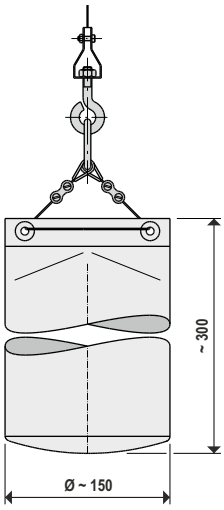
9.G Bag sensing weight Polyester and stainless steel
for temperatures up to +150 °C

For granulates and compacted bulk solids.

Bulk density >0.2 t/m³

Angle of repose flat

Avoids damage of outlet devices.



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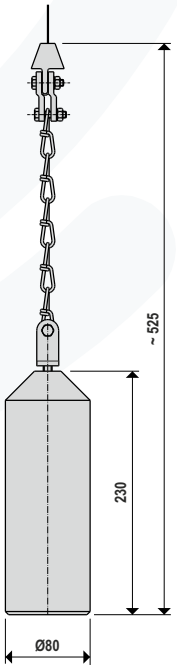
The bag is filled with the respective medium stored in the bunker or silo.

9.N Plastic sensing weight PVC and steel
for temperatures up to +70 °C

For granulates and compacted bulk solids.

Bulk density >0.3 t/m³

Angle of repose flat



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▶ **Not available for use in potentially explosive atmospheres.**

9.D/9.E Polyester umbrella with steel or stainless steel weight
for temperatures up to +150 °C

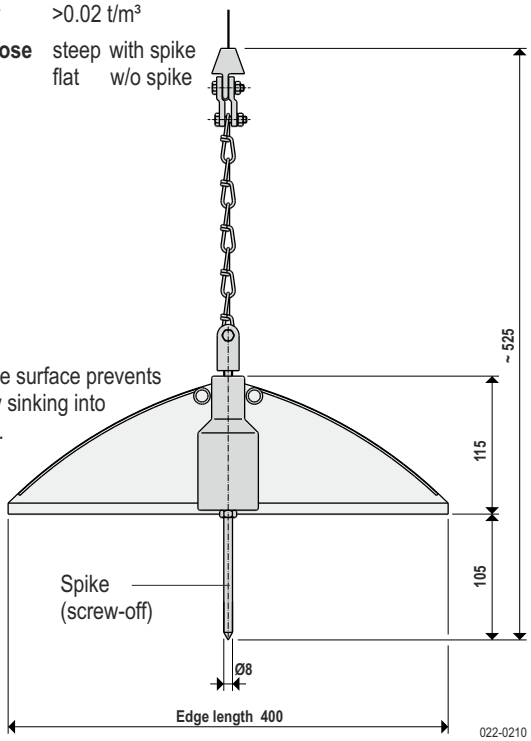
For very light and loose bulk solids.

Bulk density >0.02 t/m³

Angle of repose steep with spike
flat w/o spike

A large square surface prevents it from deeply sinking into the bulk solid.

Spike (screw-off)



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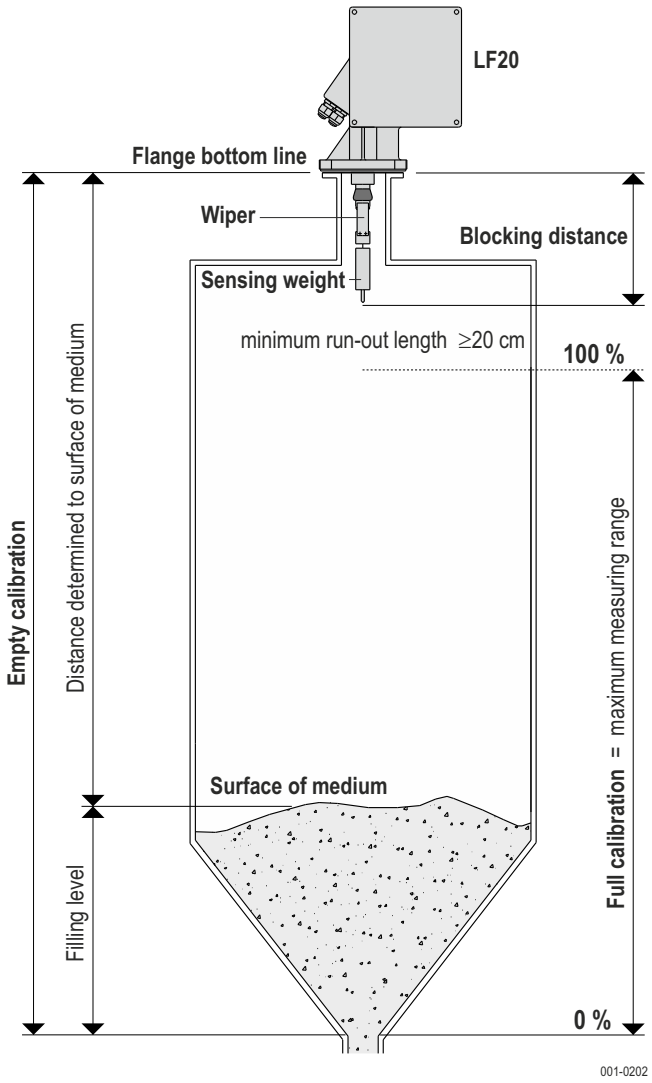
Measuring categories



The measured value is the distance between the flange bottom line and the surface of the medium minus the block distance.
(see figure „measuring categories“) The filling level is calculated taking in account the calibration values entered, e.g. silo height.

Please select the minimum length of the wiper so that the sensing weight jut out of the mounting pipe.

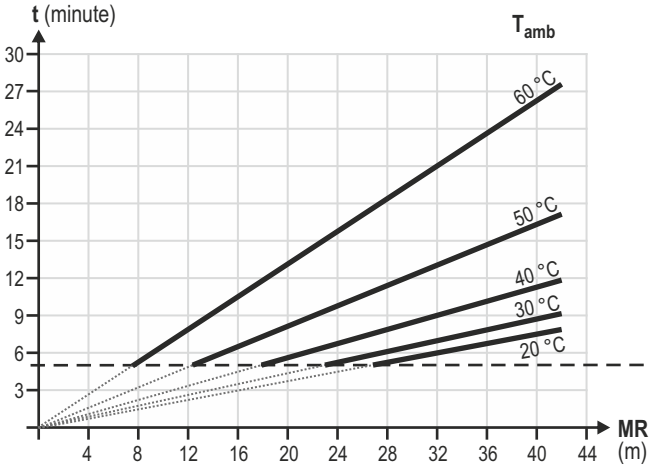
The block distance depends on the selected wiper and sensing weight.

Sensing weight	Wiper 230mm	Wiper 500mm	Wiper 1000mm
9.**B**, 9.**C**, 9.**D**, 9.**E**	**0,72 m**	**1,02 m**	**1,52 m**
9.**G**	**1,22 m**	**1,52 m**	**2,02 m**
9.**N**	**0,72 m**	**1,02 m**	**1,52 m**

Different outputs can be selected:

- **Filling level in distance**
- **Distance determined to surface of medium**
- **Filling level in volume**
- **Filling level in mass**

Measuring cycle

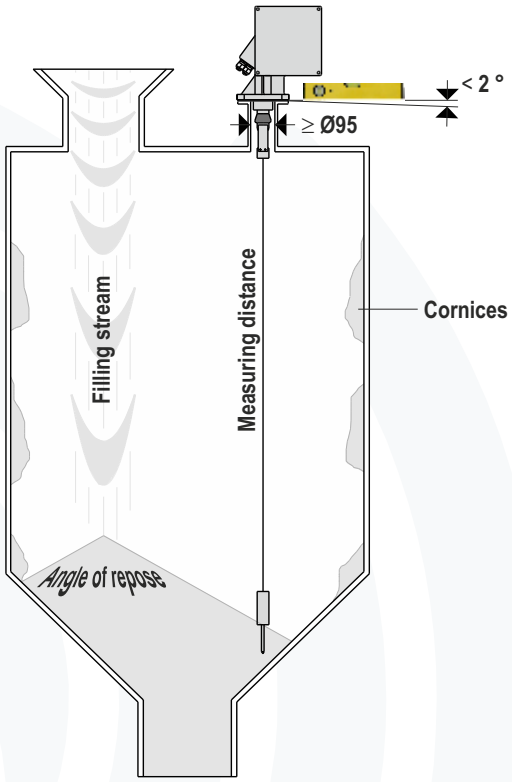


The minimum time (t_{minute}) for one measuring cycle (time between two measurements) is dependent on the ambient temperature (T_{amb}) and the measuring range (MR_{meter}) and must not be undershoot in all types of measuring.

▶ **Non-observance of these instructions may lead to system malfunctions!**

minimum time (time interval) 5 minutes

Installation



Select the mounting location on the bunker or silo roof in such a way that falling product during filling or collapsing cornices cannot spill the sensing weight and cannot damage the measuring tape.
If necessary the measuring procedure should be locked during filling process.

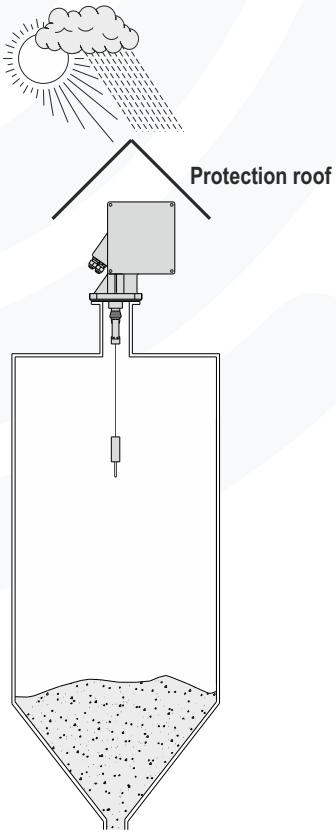
Install the device on a horizontal flange

DN100, Ø220, Lk180, 4x18.

Normal weights, plastic weights and umbrella weights can be passed into the bunker or silo via the DN100 flange. In case of using larger weights like a filled medium bag a constructional possibility at the bunker or silo (e.g. access hatch) has to be available in order to install these ones.

The measurement section should not run too close to internals and struts, so that the measuring tape does not touch them when sensing weight is swinging.

For use in bunkers/silos with severe dust emission a pressure air connector with an internal thread ¼ is available in order to generate a slight over pressure at the tape roll chamber.



For use in external areas being exposed to climatic conditions we recommend the weather protection hood or an additional protection roof.

For ambient- and process temperatures from -20 °C ... -40 °C

use **option** 7.**E** **„self-adjusting heating“**

For tropical environments

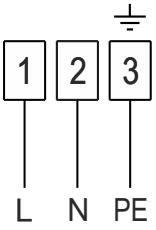
use **option** 7.**F** **„extended climate resistance“**

Electrical connection

For connection a basic installation cable is sufficient.

Supply voltage ⊖ AC

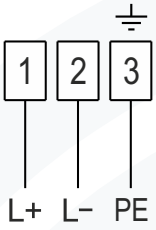
Circuit diagram - **Terminal 1**



5.**1** 90 ... 253 V (AC) 50-60 Hz

Supply voltage ⊖ DC

Circuit diagram - **Terminal 1**

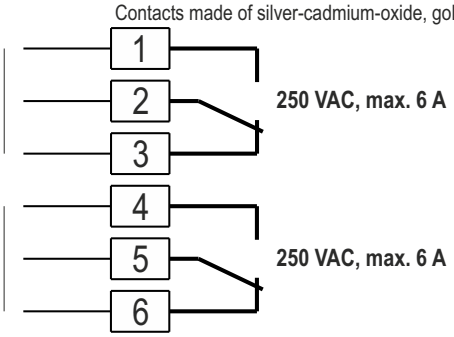


5.**3** 20 ... 28 V (DC)

Relay output ⊖

Circuit diagram - **Terminal 2.1**

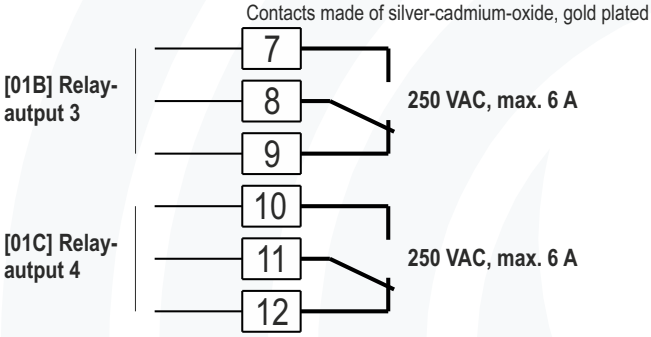
Contacts made of silver-cadmium-oxide, gold plated



Relay output ⊖ optional 6.C

Circuit diagram - **Terminal 2.2**

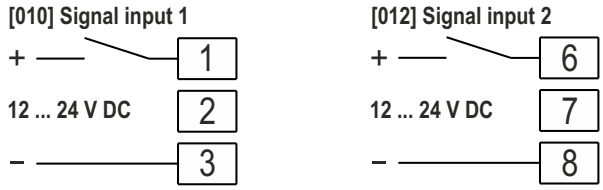
Contacts made of silver-cadmium-oxide, gold plated



The rest position matches with the position of the relays without power supply.
This represents the alert condition in case the function “alarm” is selected.

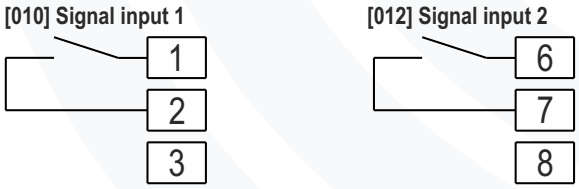
Signal inputs ⊖ active Pulse lenght ≥ 200 ms

Circuit diagram - **Terminal 3.1 and 3.2**



Signal inputs ⊖ passive Pulse lenght ≥ 200 ms

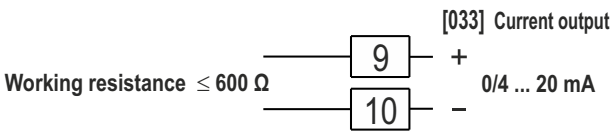
Circuit diagram - **Terminal 3.1 and 3.2**



The **signal inputs active** or **passive** can only be used alternatively.
A double connection from active and passive can not be used!

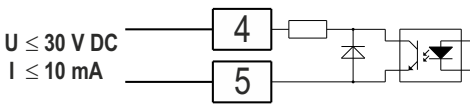
Current output ⊖

Circuit diagram - **Terminal 3.2**



Optocoupler output ⊖ optional 6.C

Circuit diagram - **Terminal 3.1**



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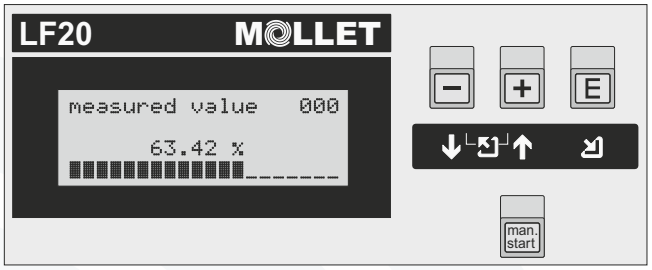
Display - Programming - Operation

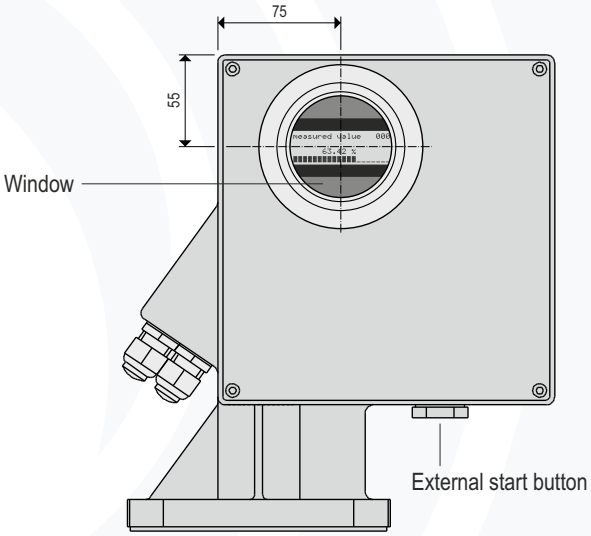


Display

During operation the actual measuring values are shown on the display.

Display LCD 4-line dispaly
20 characters per line
Contrast adjustable

optional 10.**2** Window in housing lid enables external reading of measured values



Programming

Using the menu-guided display all factory set parameters can be adjusted with the three programming keys.

The menu comprises parameter groups and parameters.

Application parameters can be displayed and set in the different parameter groups.

The setting of all parameters is possible.

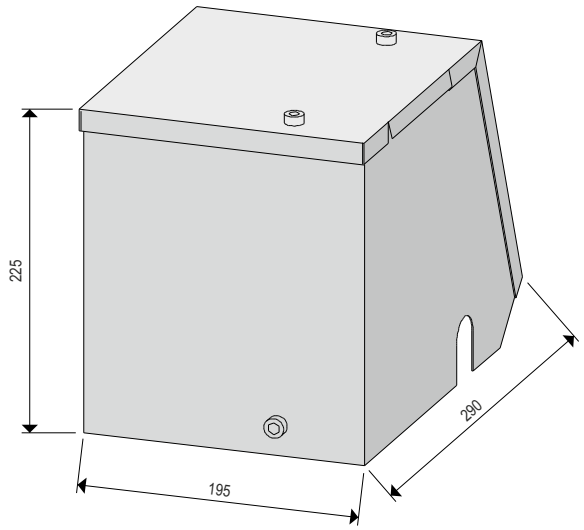
Programming keys − + E

Operation

Start-button Manuel start man. start

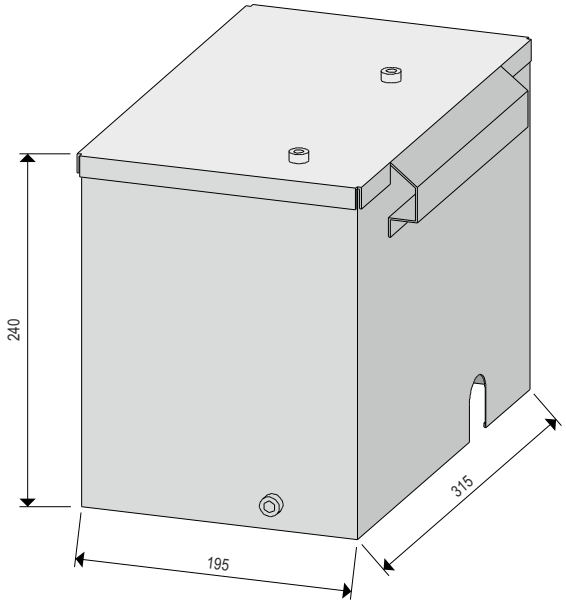
optional 10.**2** external start button at the housing

Aluminum weather protection hood



Material	Aluminum AlMgSi1, eloxadized
Weight	0,7 kg
Shipment	incl. installation screws

Stainless steel weather protection hood



Material	Stainless steel 1.4301 (304)
Weight	4,2 kg
Shipment	incl. installation screws

Special sensing weights

9.T Interface measurement weight **Stainless steel 1.4571**
for process temperatures up to +150 °C

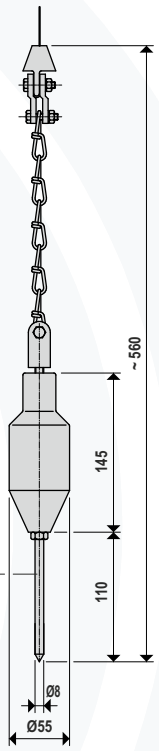
For interface measurement of bulk solids and liquids.

Bulk density >0.3 t/m³

Angle of repose steep with spike
flat w/o spike

The spike avoids slipping or tilting of the sensor weight on a steep bulk surface.

Spike (screw-off)



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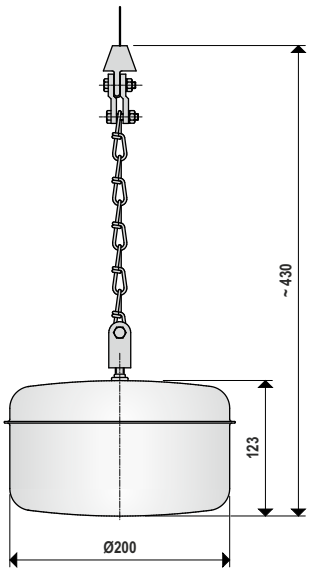
9.X Float made of stainless steel 1.4571
for process temperatures up to +150 °C

For liquids.

Weight ~1,5 kg



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