Level meter FMM50

► Electromechanical level measurement system

► Depending on the sensing weight, the level in bunkers or silos can be measured - whether for dusty, fine or coarse - grained bulk products, or in tanks containing liquids.

► According to the mechanical design of the FMM50 and the fittings, measurement in silos or tanks can be performed at operating temperatures up to +230°C and at operating pressures up to 3 bar absolute, or in aggressive atmospheres, e.g. acidic or caustic vapours.

► Measurement of levels up to 90 m irrespective of the product characteristics.

► Accuracy of ± 5 cm or ± 1 pulse, therefore precise detection of the level

► Compact transmitter with 0/4 - 20 mA current output as well as further free programmable signal outputs, e.g. counter pulses or alarm

► Quick menu-guided local operation using a 4-line text display

► Fully electronic digital minimum fail-safe control, therefore no running down of the sensor weight into the silo outlet and no risk to the conveying systems

► High performance three-phase engine (traction power up to 500N) using a single-phase supply voltage by employment of a converter, therefore simple electric supply

► Optional version with certification for application in areas subject to dust explosion hazard zones 20, 21 and 22 (measuring zone) or zones 21 and 22 (device zone), category 1/2D.
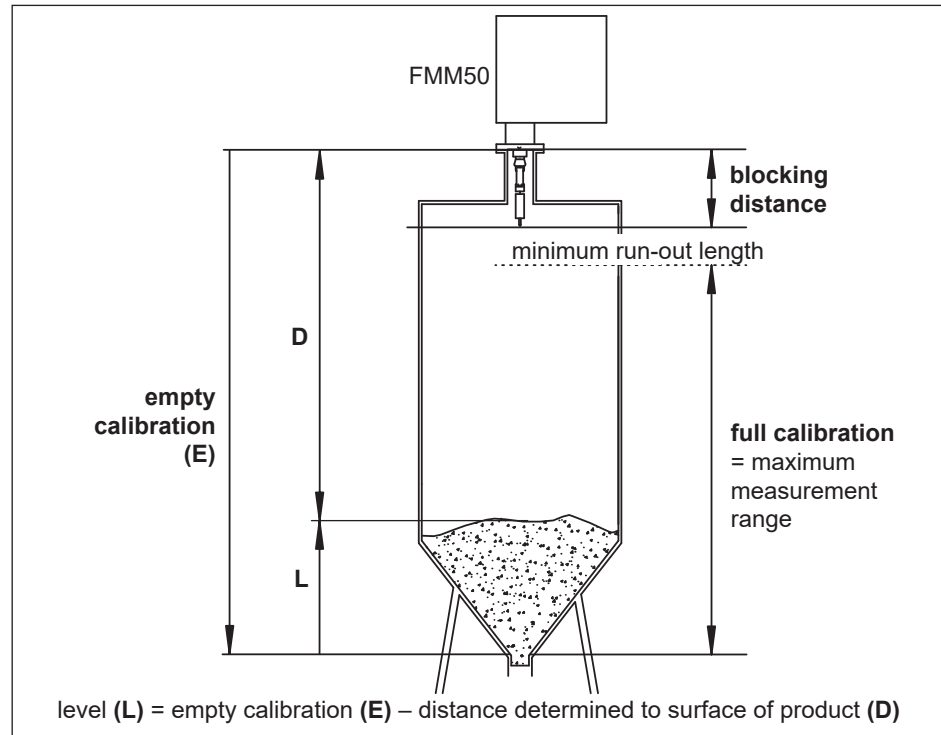
Kirchgaesser
Industrieelektronik GmbH

Table of contents

Function and system design

Measuring principle

A measuring tape, loaded with a sensing weight, is lowered into the bunker or silo. When the weight meets the surface of the product the tension on the measuring tape is relaxed and this is detected by the FMM50 electronics.

FMM50

blocking distance

minimum run-out length

D

empty calibration (E)

full calibration = maximum measurement range

L

level **(L)** = empty calibration **(E)** – distance determined to surface of product **(D)**

The measured value is transmitted to the 0/4 - 20 mA current output. The sensing weight now runs back up to the start position and the measured value is retained until the next measurement is performed.

The current output signal represents the level (L). The unit is delivered with default values for the maximum measuring range according to the unit configuration (see ordering information). The menu-guided programming using the 4-line text display assures easy and fast adjustment to the bunker or silo geometry.

Note:
This adjustment must be made before the first time the instrument is started to avoid damage to the conveyor elements.

During the entire measuring process (lowering and hoisting of the sensing weight) the FMM50 can also transmit pulses (relay output) corresponding to the length of the measuring tape, which can be recorded by a control unit or by an electromechanical counter.

Both individual measurements and periodic measurement sequences can be performed. The measurement can then be initiated manually (e.g. external start button) or periodically (e.g. programmed function of the FMM50).

Measuring device	The FMM50 is a compact transmitter. The measuring unit offers comprehensive input and output facilities. For details please refer to the ordering information.

Device variants

Ex version
For application in areas subject to explosion hazards due to flammable dusts, Zones 20, 21 and 22 (measuring zone) or Zones 21 and 22 (device zone), category 1/2D

Mechanical and electrical options

• Ambient temperature:
-20°C to +70°C
-40°C to +70°C by using the self-control housing heater
Also recommended in case of moisture in vessels and for ambient temperatures below 0°C.

• Process pressure:
0.8 to 1.1 bar absolute
0.8 to 3 bar absolute

• Process temperature:
-20°C to +70°C
-20°C to +150°C
-20°C to +230°C

• Standard for two power supply ranges:
90 - 127 VAC, 50/60 Hz
180 - 253 VAC, 50/60 Hz

• Traction power:
250 N for light bulk solids like powder, granulate or grain
500 N for heavy bulk solids like gravel, sand or cement

• Tape wiper:
- Length: 230 mm, 500 mm or 1000 mm
- Material: Alu/steel or stainless steel

• Optional:
- Four supplementary relay outputs
- External start button and gauge-glass in the device cover
- Enhanced climate resistance (at ambient temperature range -20°C to +70°C)
- Housing coated (RAL 5012, cover RAL 7035), bubble level for mechanical arrangement

• Sensing weight:
A diverse range of sensing weights is available according to the application. For details please refer to the relevant section heading.

Input

Measured value

The measured value is the distance between the flange of the FMM50 minus a blocking distance and the surface of the product. The filling level is computed taking into account the fixed given calibration values, e.g. the empty calibration (height of the silo).
The filling level can be converted to other values as desired, e.g. volume or mass, by the application of linearization.

Blocking distance

The block distance depends on the wiper used and the sensing weight:

Sensing weight	Wiper 230 mm	Wiper 500 mm	Wiper 1000 mm
B, C, D, E, L	0.80 m	1.10 m	1.60 m
G	1.20 m	1.50 m	2.00 m
J	0.86 m	1.16 m	1.66 m
M	0.65 m	0.95 m	1.45 m
N	0.63 m	0.93 m	1.43 m

Measuring range

Max. 90 m

Measuring cycle

Please observe the minimum time (T_M) for one measuring cycle with the FMM50 according to the measuring range (MR) and the ambient temperature (T_a). This minimum time must be taken into account in all types of measuring.
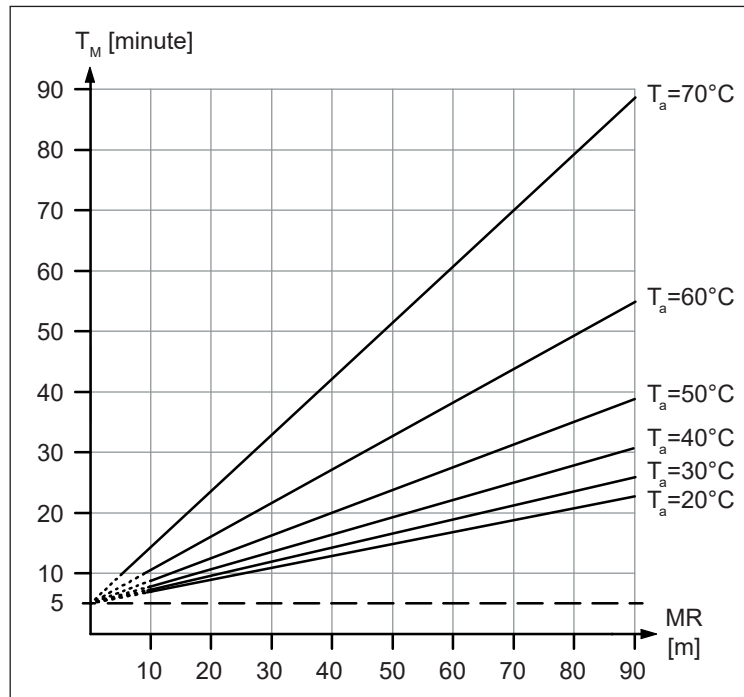
Note:
Disregarding this can lead to undue warming and result in failure. We recommend not to go below a time of 5 minutes for one measuring cycle.

Measuring uncertainty

± 5 cm or ± 1 pulse (independent of the measuring range selected)

Inputs

Two inputs (active/passive) are available for external operation of the FMM50:

- Active input:
  - Connection of an external voltage
  - Input voltage range: 12 ... 24 VDC

- Passive input:
  - Connection of an external command device, e.g. switch/button, relay contact
  - Contact rating: max. 0.3 W / 30 VDC

- Input polarity:
  - Normally open or normally closed

- Start pulse length:
  - min. 200 ms

- Optional:
  - External start button

Output

Output signal

- 0/4 - 20 mA current output, active

- 2 relay outputs (optional 6 relay outputs)
  - Contact load capability: 250 VAC, 6 A
  - Contact material: silver-cadmium-oxide, gold-flashed

- Selectable relay functions:
  - Counter pulse: emits pulses equivalent to the length of the rolled-out tape
  - Reset pulse: pulse before new measurement, e.g. reset of an external counter
  - Tape reverse: indication of the lower tape direction reversal
  - Ascent of sensing weight: indication of ascent of the tape, e.g. fade-out the counter pulses
  - Upper park position of sensing weight: indication of upper park position, e.g. end of measurement
  - Measurement active: indication of an active measurement, e.g. lock of filling equipment
  - Alarm: output alarm states
  - Maintenance interval: notice to maintain the FMM50
  - Limit value: output level limit value

Note:
A selected threshold with associated hysteresis applies for all relays, individual settings for each relay are not possible.

Malfunction signal

Malfunction signal can be called up via the following interfaces:

- Local indication:
  - Error symbol
  - Error code with text indication

- Current output, programmable status:
  - Minimum: minimum current value <=3.6 mA (4 - 20 mA) or 0 mA (0 - 20 mA)
  - Maximum: maximum current value + 10% (≈22 mA)

- Relay outputs (alarm function)

Highest measurable point

The highest measurable point is given by the blocking distance (see figure "Determination of the measured value" in chapter "Function and system design") plus a minimum descent length of 20 cm. This maximum length must be considered on input of the maximum measuring range ("**Full calibration (003)**").

Note:
The individual value for the blocking distance is preset on delivery and only needs to be adjusted when changing the sensing weight for example, the relevant input option can be found in the menu.

Linearization

The linearization function of the FMM50 facilitates conversion of the measured value into engineering units such as cubic metres or hectolitres.
If the filling level is not uniformly proportional to the volume within the set measuring range, then a linearization curve can be entered using a maximum of 32 reference values.
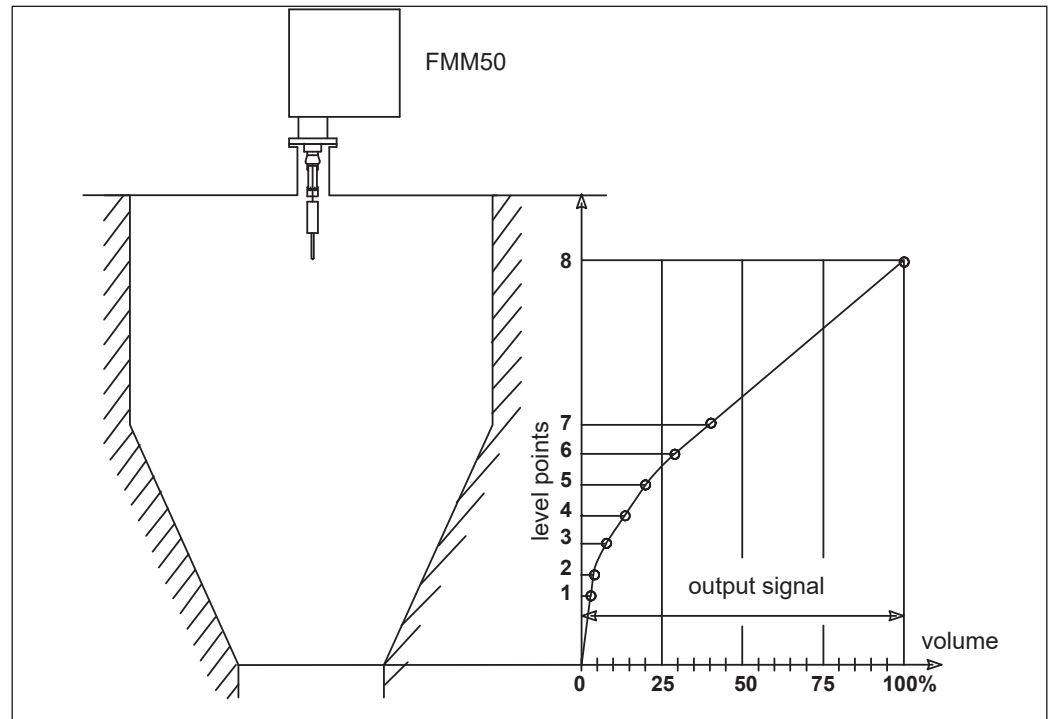
Auxiliary energy

Power supply

• 90 - 127 VAC, 50/60 Hz or
  180 - 253 VAC, 50/60 Hz

• Power consumption:
  - without optional heater: max. 230 VA
 - with optional heater: max. 250 VA

Cable entry

• M25 x 1.5

• Cable gland non-hazardous area:
  - Material: plastic
  - Colour: grey
  - Clamping range: 9 ... 17 mm

• Cable gland ATEX:
  - Material: plastic
  - Colour: black
  - Clamping range: 9 ... 13 mm

• Number:
  - 4 cable glands (without additional option external start button)
  - 3 cable glands (with additional option external start button)

Note:
- The cable gland is only suitable for "fixed" installation because no tensile load may be applied to the screw joint.
- Seal unused entry glands with approved sealing plugs that correspond to the type of protection. The plastic transport sealing plug does not meet this requirement and must therefore be replaced during installation.

Electrical connection
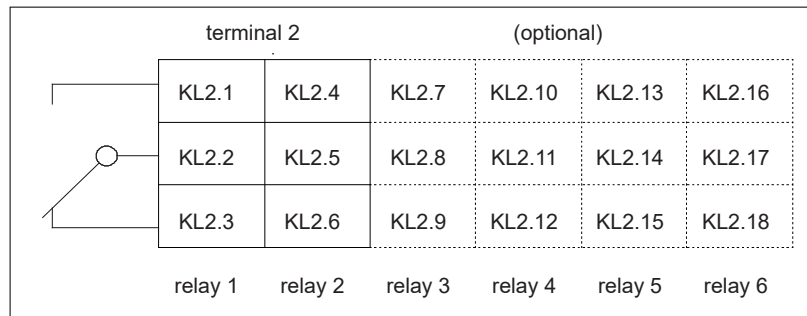
Arrangement of the terminals

terminal 1   terminal 2   terminal 3
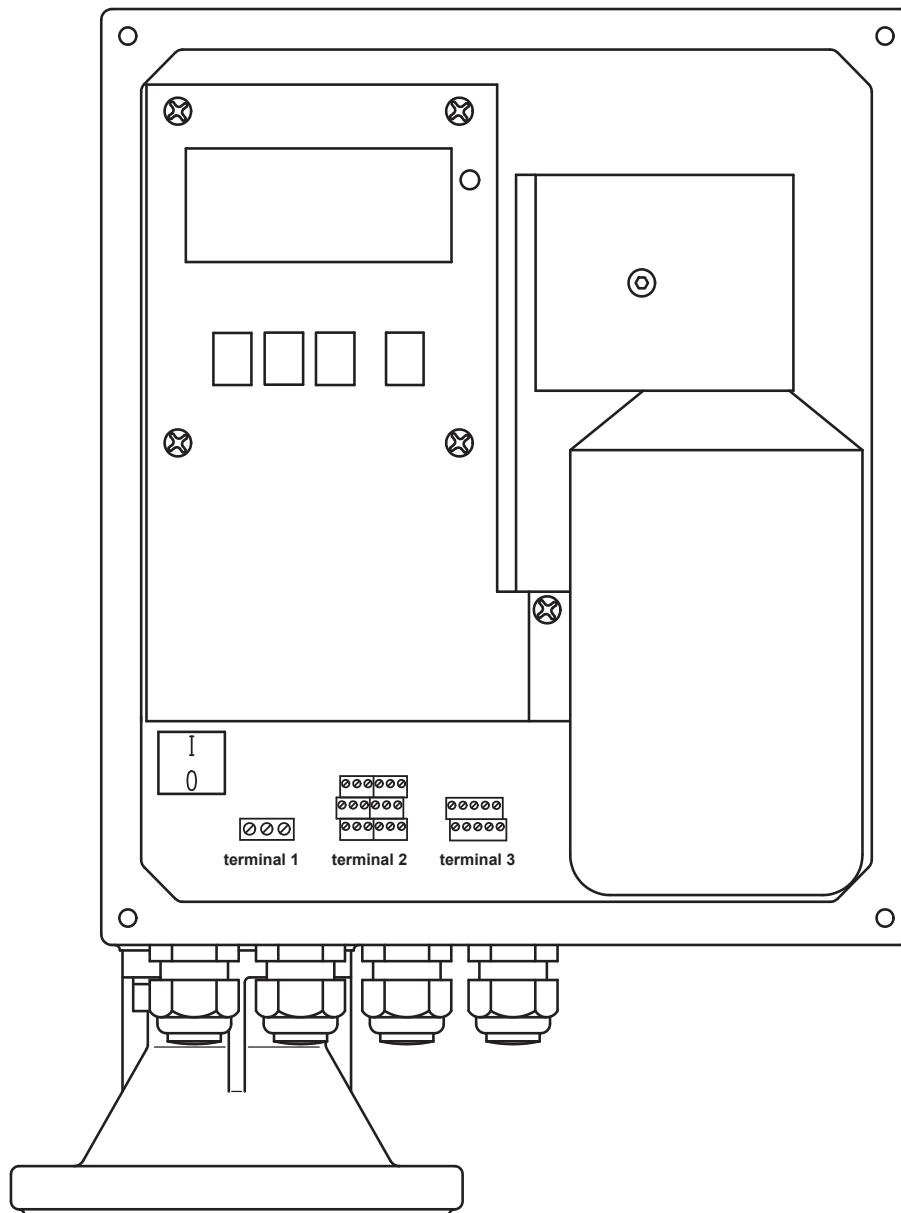
Power supply (terminal 1)

terminal 1

L1	KL1.1
N	KL1.2
PE	KL1.3
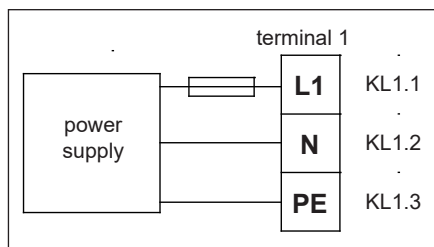
power supply

- The supply voltage (mains voltage) is connected to the plug-in terminals on terminal block 1.

- The maximum cable cross-section is 2.5 mm^2.

- A fuse should be fitted to protect the power supply against short-circuits.

Caution:
When using the public powers supply, install an easy accessible power switch in the proximity of the instrument. Mark the power switch as a disconnector for the instrument (EN 61010).

Relay (terminal 2)

| terminal 2		(optional)			
KL2.1	KL2.4	KL2.7	KL2.10	KL2.13	KL2.16
KL2.2	KL2.5	KL2.8	KL2.11	KL2.14	KL2.17
KL2.3	KL2.6	KL2.9	KL2.12	KL2.15	KL2.18
relay 1	relay 2	relay 3	relay 4	relay 5	relay 6

- The connection cables are terminated on the plug-in terminal block 2, to relay 1 and relay 2, and optionally up to relay 6.

- The maximum cable cross-section is 2.5 mm^2.

- Normal installation cables are sufficient for making the connections.

- The individual circuits must have a maximum of 6 A fuse protection (see technical data of relay outputs).
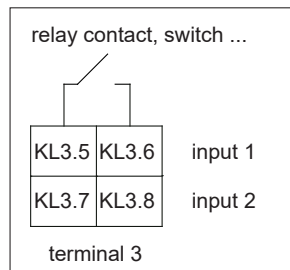
Note:
The rest position matches with the position of the relays without power supply, this represents the alarm condition if the function „**alarm**" is selected.

0/4 - 20 mA current output (terminal 3)

	terminal 3	
signal evaluation	0/4 – 20 mA	I+ KL3.9
		I- KL3.10
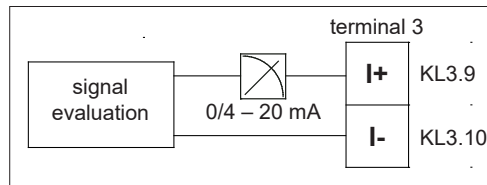
- The active 0/4 - 20 mA current output is connected to the plug-in terminals on terminal block 3.

- The maximum cable cross-section is 2.5 mm^2.

- Normal installation cables are sufficient for making the connections.

Input, active (terminal 3)

relay contact, switch ...

+ 12 ... 24 VDC
−

KL3.1	KL3.2	input 1
KL3.3	KL3.4	input 2
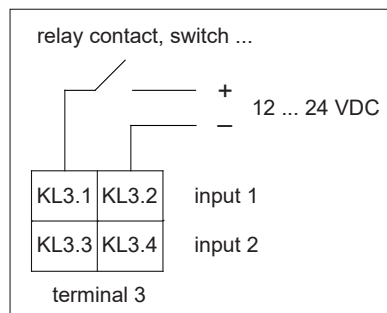
terminal 3

- The active input signal is connected to the plug-in terminals on terminal block 3.

- The maximum cable cross-section is 2.5 mm^2.

- Normal installation cables are sufficient for making the connections.

- Input voltage range: 12 ... 24 VDC

Input, passive (terminal 3)

relay contact, switch ...

KL3.5	KL3.6	input 1
KL3.7	KL3.8	input 2

terminal 3

- The passive input signal is connected to the plug-in terminals on terminal block 3.

- The maximum cable cross-section is 2.5 mm^2.

- Normal installation cables are sufficient for making the connections.

- Contact rating: max. 30 VDC / 0.3 W

Note:
- The signal inputs (active/passive) can only be used alternatively. A double connection from input x active and passive can not be used.
- The minimum start pulse length is 200 ms.

Operating conditions

Sensing weight

Sensing weights (see relevant section heading)

When selecting the sensing weight, the following points should be taken into consideration:
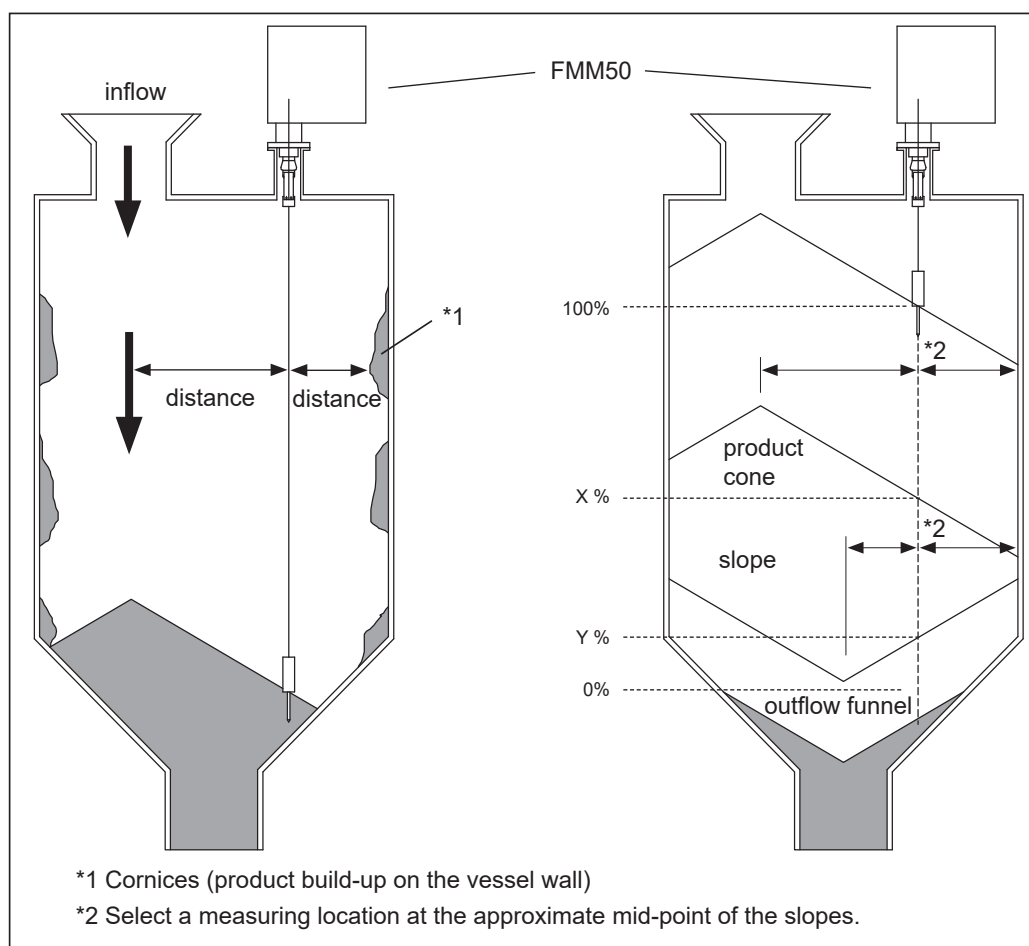- The sensing weight must not sink into the product during measuring, nor should it be diverted by the product inflow cone.
- The sensing weight must be suitable for the chemical properties of the product and for the temperature inside the bunker/silo.

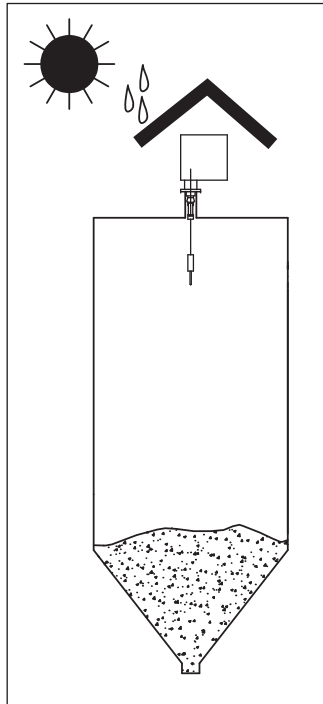Special designs for individual applications can be offered on request.

Mounting location

Select a mounting location on the bunker or silo such that product falling inside during filling, or accumulations of product collapsing inward, cannot cover the sensing weight nor damage the measuring tape. Take due account of the shape and location of the product inflow cone and the outflow funnel within the vessel.
The measuring path should not pass too close to any internal fixtures or struts, so that the measuring tape will not brush against them if the sensing weight swings around. Select the length of the tape wiper such that the sensing weight is outside of the mounting connection.

*1 Cornices (product build-up on the vessel wall)
*2 Select a measuring location at the approximate mid-point of the slopes.

Preparation for mounting

The FMM50 is best mounted on a counter flange DN100 PN16 (connection dimensions according to EN 1092-1) or a flange having the same connection dimensions.
The counter flange must be mounted exactly horizontal so that the FMM50 can also be mounted horizontally onto it (maximum angle of inclination 2°). A suitable installation aid (Bubble level) can be found inside the devices with coated housing which, with the electronics cover opened, can be used for alignment.

Note:
When installing outside, fit a protection hood or install a weather protection roof.
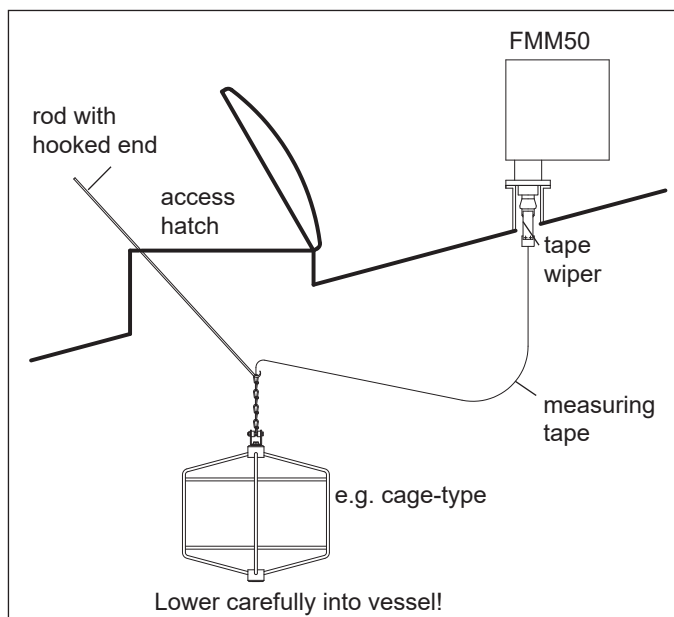
Mounting of the sensing weight

Normal weights, umbrella weights and bag weights (see overview of sensing weights under the relevant section heading) can be passed through the DN100 mounting flange into the bunker/silo.

The measuring tape is pressed into the tape fastening by two screws. A third screw secures the chain. A rotating bush is mounted at the lowest extent of the chain, to accommodate any turning motion of the sensing weight.
The weight fixings (tape fastening, chain and rotating bush) are made from galvanized steel or stainless steel.

tape fastening

rotating bush

normal weight
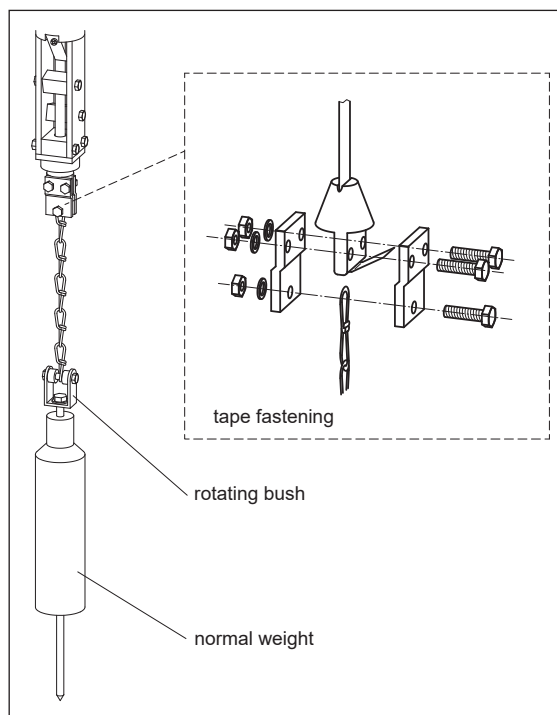
When using larger sensing weights, such as cage weights, bell weights, floats and some bag-type weights, access provision must be present in the construction of the bunker/silo for installation of these weights (see illustration). For details of these installations please refer to the operating instructions!

Mounting of the FMM50

Fit a sealing gasket on the flange (particularly in case of pressurised bunker/silo). Carefully guide the sensing weight into the bunker/silo. When using larger sensing weights, please refer to the section heading "Mounting of the sensing weight".

Now place the FMM50 onto the flange and secure it using four M16 bolts of suitable length. Please note the following:
• Mount the device horizontally (see under section heading "Preparation for mounting").
• Take the position of cable entries for electrical connections into consideration.

When installing in bunkers/silos with heavy dust loadings, a slight positive pressure can be generated at the FMM50 by connecting a compressed air line to its mounting flange (airflow quantity as required). There is a G¼ female connection provided for this purpose (see dimensions of the standard version).

Ambient conditions

Ambient temperature at the FMM50:
• -20 ... +70°C
• -40 ... +70°C when using the self-regulating device heater
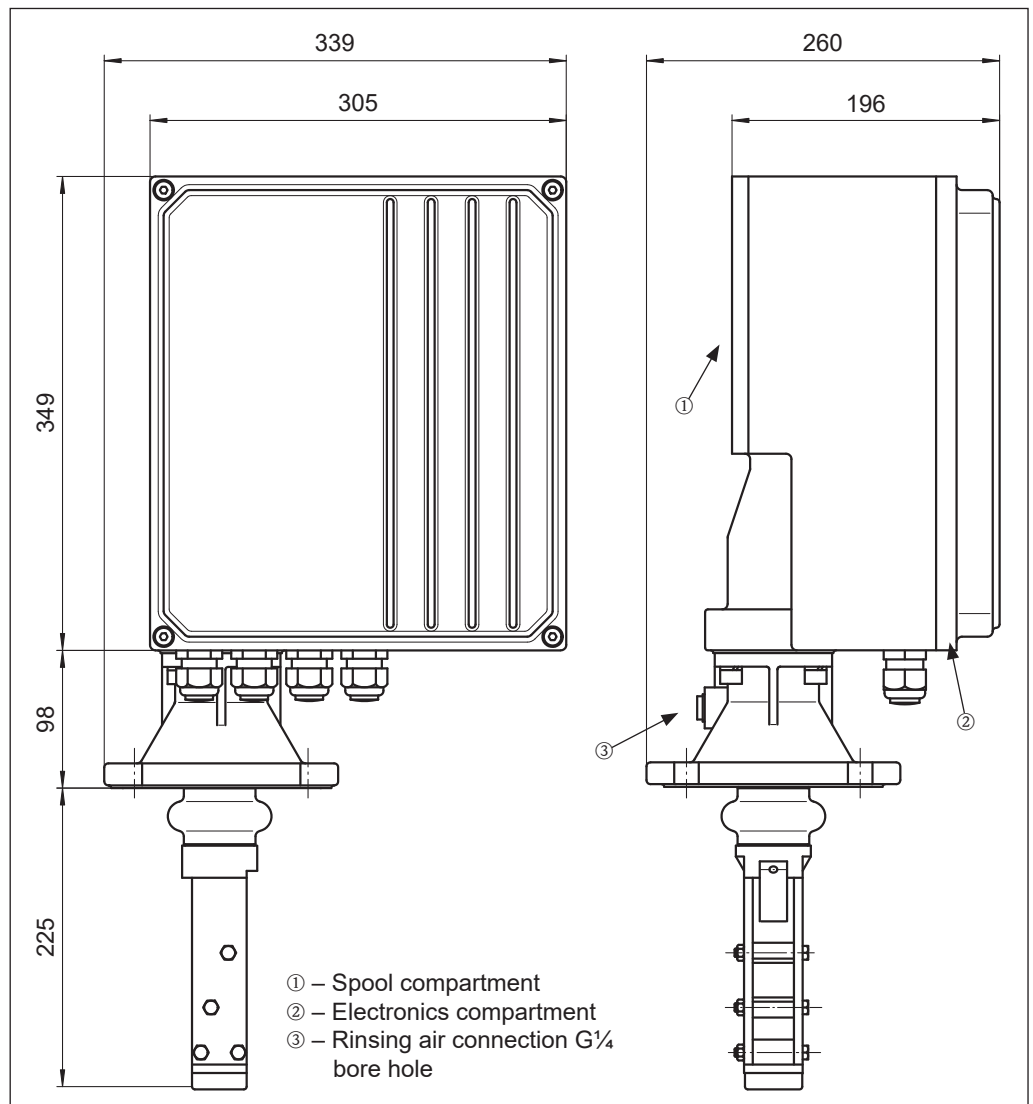
Process conditions

Process temperature:
• -20 ... +70°C (standard version)
• -20 ... +150°C
• -20 ... +230°C
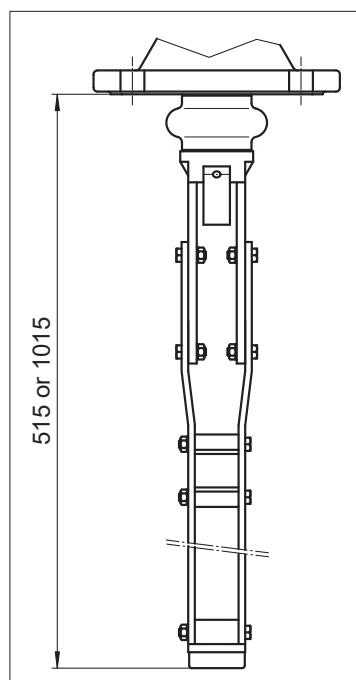
Process pressure (in the vessel):
• 0.8 ... 1.1 bar absolute (standard version)
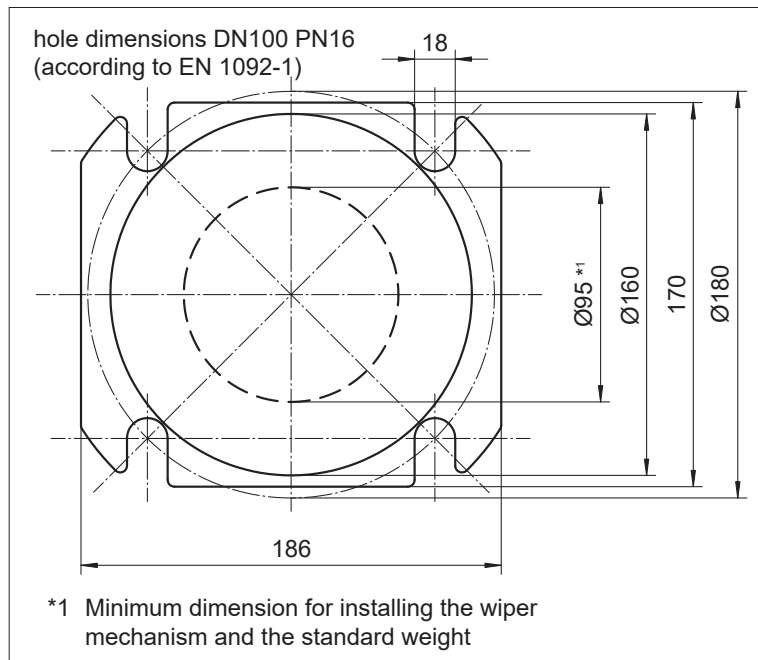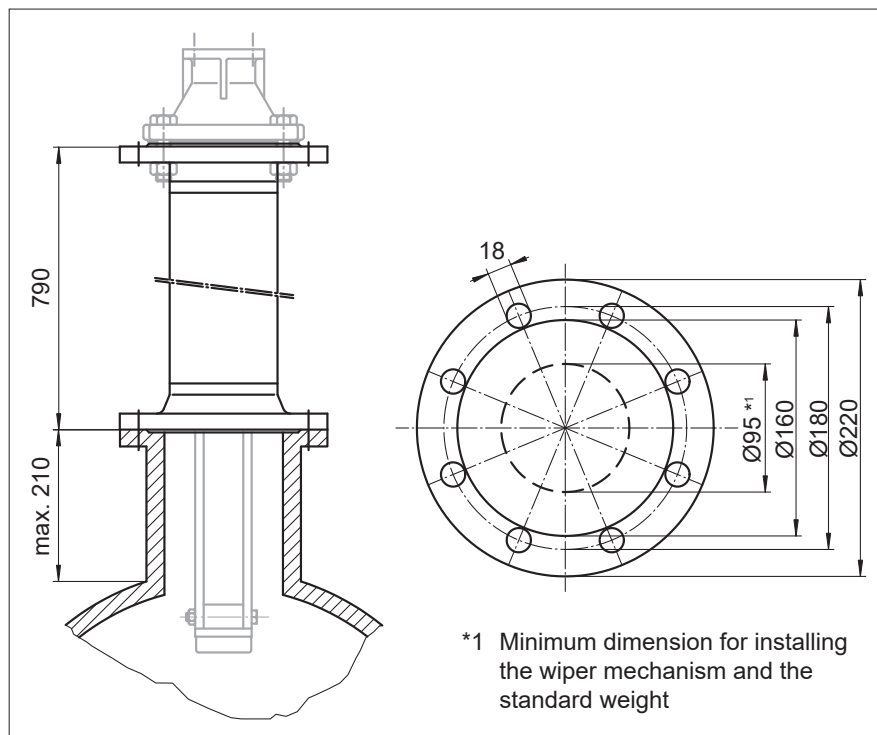• 0.8 ... 3.0 bar absolute (high pressure version)

Dimensions

**Housing dimensions (standard version with 230 mm wiper)**

339
305
349
98
225
260
196

① – Spool compartment
② – Electronics compartment
③ – Rinsing air connection G¼ bore hole

Dimensions of the extended tape wiper

515 or 1015

Dimensions of the process connection (standard version)

hole dimensions DN100 PN16 (according to EN 1092-1)

18

Ø95 *1
Ø160
170
Ø180

186

*1 Minimum dimension for installing the wiper mechanism and the standard weight

Dimensions of the process adapter extension (accessory)

790

max. 210

18

Ø95 *1
Ø160
Ø180
Ø220

*1 Minimum dimension for installing the wiper mechanism and the standard weight

Note:
- The total height of the nozzle should be at least 900 mm to reduce the maximum process temperature of +230°C.
- A suitable process adapter extension is available as an accessory.

**Dimensions of the optional window and external start button**

82

73

start button
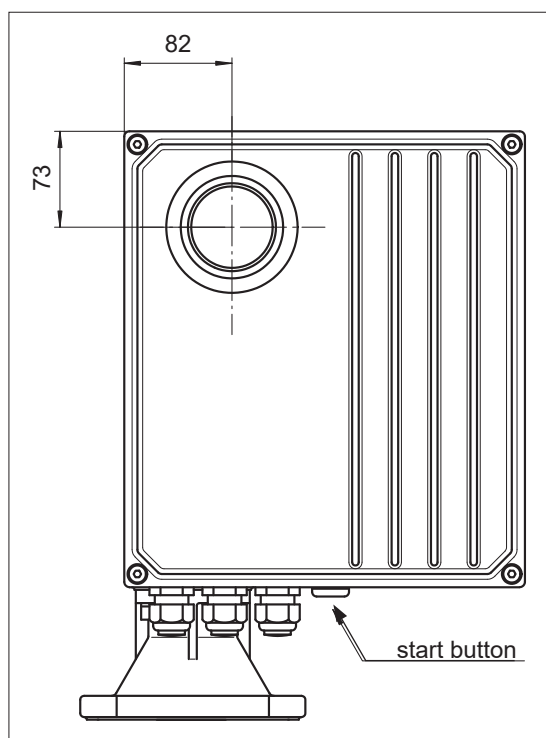
Sensing weights

Selection recommendations

When selecting the sensing weight the following points should be considered:

- The sensing weight may not sink into the product nor be diverted by contact with the product cone during the measuring procedure.

- The sensing weight must be suited for the chemical characteristics of the product and the temperature within the bunker/silo.
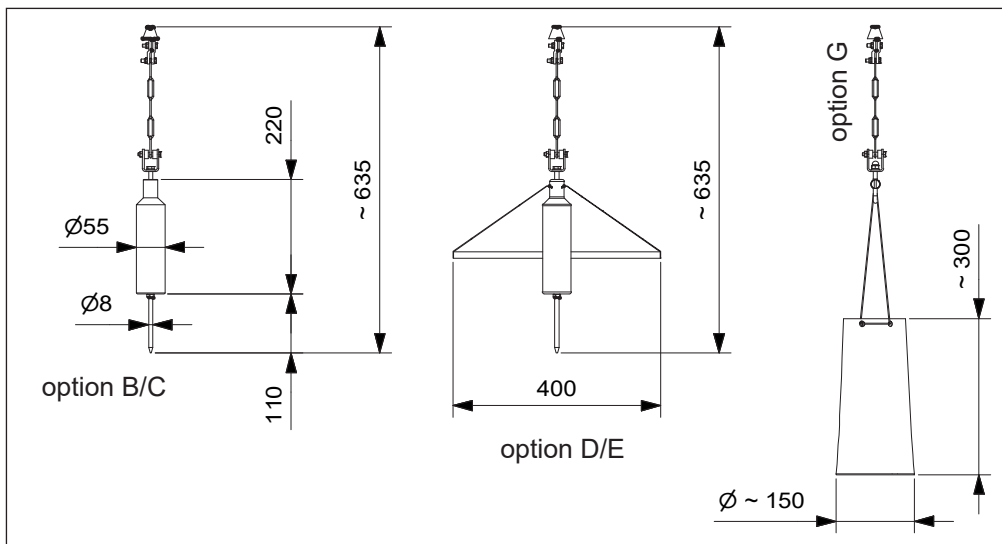

Normal weight (option B/C)

- Application: For coarse bulk solids, e.g. coals, ores or stones and granulates.

- Materials: Steel or stainless steel

- Weight: 3.5 kg

- The spike can be screwed off.

- If the bunker/silo has a downstream crushing or milling system, we recommend using the electrical signal function "tape breakage" or the use of a cage weight to avoid damaging the system in the event of the sensing weight breaking free.

Umbrella weight (option D/E)

- Application: For very light and loose bulk solids, e g. flour or coal-dust. The umbrella weight has a large square surface area which prevents it from sinking deeply into the product.

- Materials: Steel or stainless steel, polyester

- Weight: 3.5 kg

- Maximum permissible temperature: +150°C

- When folded closed, the weight can be passed through the DN100 mounting flange into the bunker.
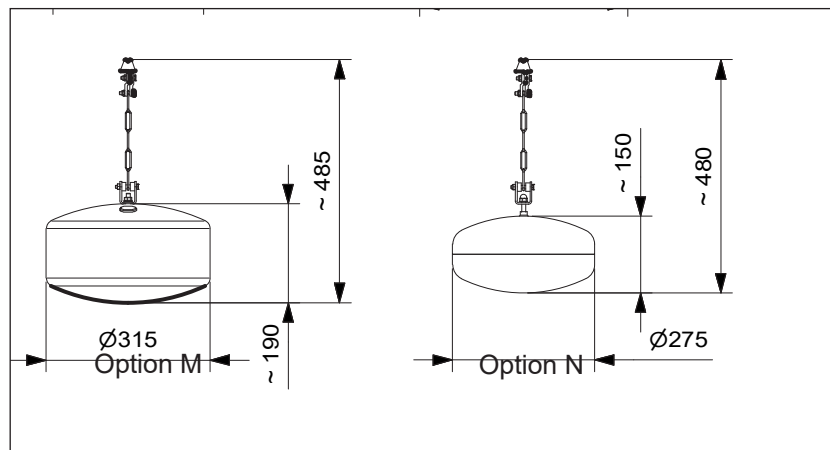
Bag weight (option G)

- Application: In bunkers to which e.g. mills are connected down-stream. The bag contains whichever product is contained within the bunker.

- Materials: Bag made of polyester, all metal parts made from stainless steel.

- Weight: 0.25 kg (empty) / 3.5 kg (filled)

- Maximum permissible temperature: +150°C

- Bind the bag closed at the top so that the contents cannot fall out if the bag tips over on the slope of a product cone.
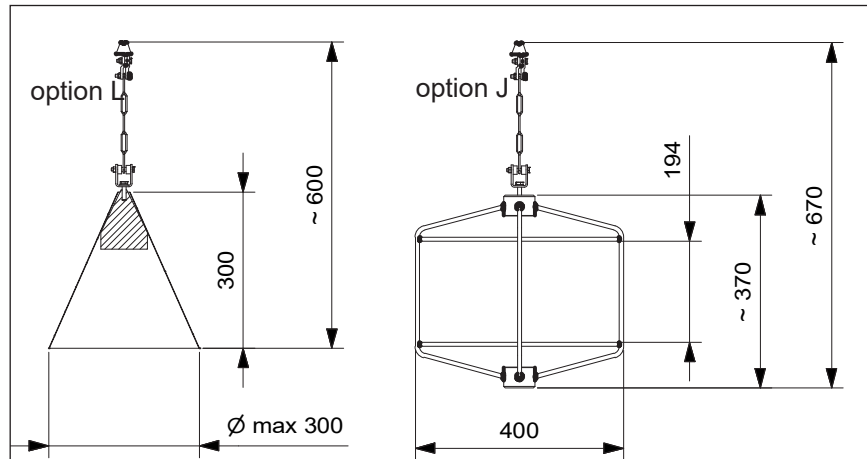
Cage weight (option J)

- Application: For fine bulk solids in silos with relatively small outlet openings that must not be blocked by a sensing weight which has broken free. Also suitable for high temperatures for which a bag may not be used.

- Materials: Stainless steel 316Ti

- Weight: 3.5 kg

- The weight could become lodged over the product outlet – but would allow the bulk solid to pass through. Since the cage weight cannot enter a conveyor system (e.g. cellar wheel feeder or screw conveyor), no damage can result.

Bell weight (option L)

- Application: For light and loose bulk solids; especially where higher temperatures and particular characteristics preclude the use of an umbrella weight.

- Materials: Steel or stainless steel

- Weight: 4.3 kg

Oval float (option M/N)

- Application: For liquids, e.g. fuel oil, also for granulates.

- Material: Hard PVC or stainless steel 316Ti

- The float (option M) must be filled with product to a total weight of 3.5 kg.

- Maximum permissible temperature (option M): 0 ... +60°C

- Use of the oval float (option M) in the "Dust ignition-proof" version is not permitted!

Controls and instrumentation

Control concept

Parameters for the FMM50 are set locally using a large 4-line text display, which can also display the existing measured values.

The menu guidance and integrated help texts ensure quick and safe commissioning.

Display

Liquid crystal display (LC-display)
- Four lines
- 20 characters per line
- Display contrast adjustable by using a key combination

liquid crystal display

    m e a s u r e d   v a l u e   0 0 0

                6 3 . 4 2   %
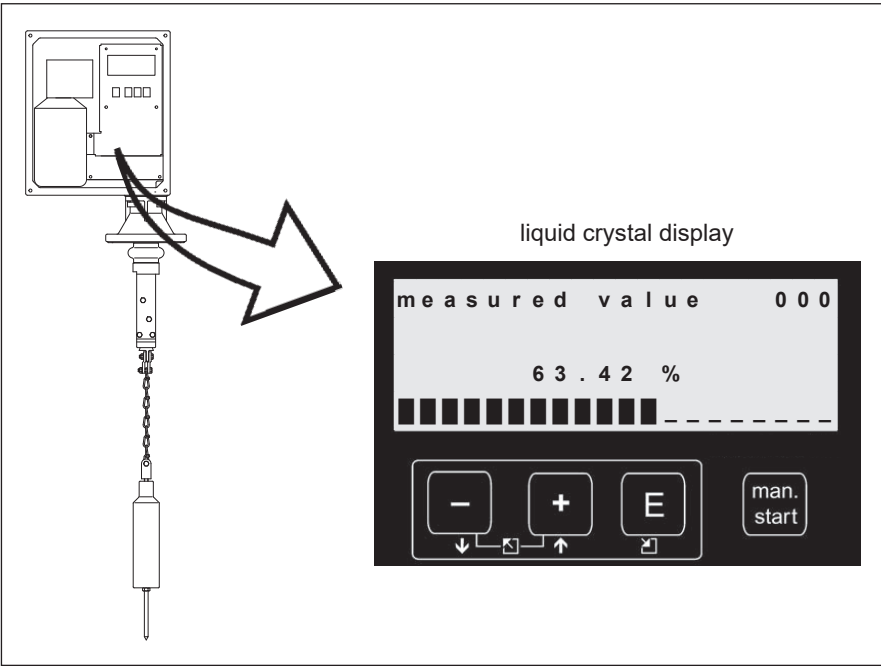
Controls

The control elements are located within the housing (exception: external start button) and can be operated after opening the electronics cover.

Note:
The FMM50 may only be operated with closed cover in areas subject to explosion hazards!

Function of the keys

Key(s)	Function
+ or ↑	- Navigation upward within the menu list - Editing of numerical values within a function
− or ↑	- Navigation downward within the menu list - Editing of numerical values within a function
− + (Esc) or ◹	- Navigation to the left within a function group
E	- Navigation to the right within a function group - Enter
+ and E or − and E	Contrast settings of the LCD - + and E increase the contrast - − and E decrease the contrast
E	- Start measuring (only in function 000)

Local control

The LC-display can be used for configuration direct to the FMM50 using 3 keys. A menu control is used to set all unit functions. The menu comprises function groups and functions. Application parameters can be displayed and set within the functions. The user is guided through the complex start-up procedure.
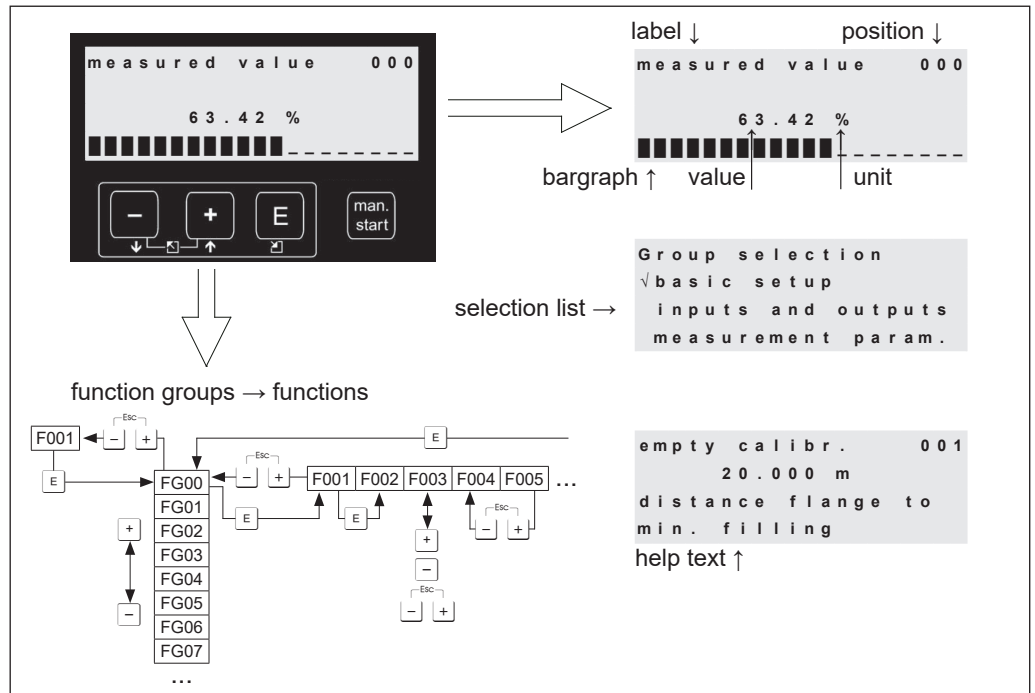
Safety instructions

Features of the ATEX version

- Marking:
  ⟨Ex⟩ **II 1/2D Ex ta/tb IIIC T99°C Da/Db IP6X**
  II 2D Ex tb IIIC T99°C Db IP6X

- Certification number:
  BVS 05 ATEX E 001

Use in accordance with directives

- Operation of the FMM50 in areas subject to explosion hazards is only permissible with the housing closed.
- The FMM50 with "Ex" design may only be repaired by the manufacturer.
- The requirements of the EN 60079, e.g. with respect to dust deposits and temperatures must be adhered to under all circumstances.
- Please take care that the ambient temperature will not be greater than +70°C, even if the process temperature range is between +70°C and +230°C. Use special equipment (e.g. process adapter extension) or select possible mounting position to keep this condition.

Assembly instructions
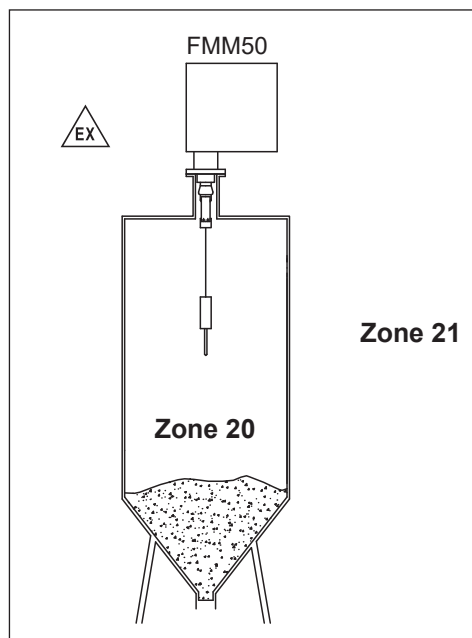
Ordering information

Ordering information FMM50

10							Approval:	
	A						Non-hazardous area	
	B						ATEX II 1/2D Ex ta/tb IIIC T99°C Da/Db IP6X	
							ATEX II 2D Ex tb IIIC T99°C Db IP6X	
	Y						Special version, to be specified	

20							Housing:	
		1					Aluminium	
		2					Aluminium, coated	
		9					Special version, to be specified	

30							Motor traction power:	
			A				max. 250 N, bulk density low	
			B				max. 500 N, bulk density high	
			Y				Special version, to be specified	

40							Measuring range:	
				1			25 m stainless steel (301, modified)	
				2			35 m stainless steel (301, modified)	
				3			50 m stainless steel (301, modified)	
				4			70 m stainless steel (301, modified)	
				5			90 m stainless steel (301, modified)	
				6			15 m plastic (PE, PP coated)	
				9			Special version, to be specified	

50							Max. nozzle height; tape wiper	
					A		230 mm, alu/steel	
					B		230 mm, stainless steel	
					C		500 mm, alu/steel	
					D		500 mm, stainless steel	
					E		1000 mm, alu/steel	
					F		1000 mm, stainless steel	
					Y		Special version, to be specified	

60							Power supply:	
						1	180 - 253 VAC, 50/60 Hz	
						2	90 - 127 VAC, 50/60 Hz	
						9	Special version, to be specified	

70								Output:
							A	0/4 - 20 mA + 2x relay, adjustable: counting / reverse / upwards / max. position / alarm / limit / measuring active
							B	0/4 - 20 mA + 6x relay, adjustable: counting / reverse / upwards / max. position / alarm / limit / measuring active
							Y	Special version, to be specified

Continuation ordering information FMM50

80									**Ambient temperature:**
								A	Range -20 ... +70°C
								B	Range -40 ... +70°C + heater
								C	Range -20 ... +70°C + enhanced climate resistance
								D	Range -40 ... +70°C + enh. clim. resist. + heater
								Y	Special version, to be specified

90									**Process temperature:**
								1	Range -20 ... +70°C
								2	Range -20 ... +150°C
								3	Range -20 ... +230°C
								9	Special version, to be specified

100									**Process pressure:**
								1	0.8 ... 1.1 bar absolute
								2	0.8 ... 3.0 bar absolute
								9	Special version, to be specified

110									**Sensing weight:**
								A	Without
								B	Steel
								C	Stainless steel
								D	Steel + umbrella
								E	Stainless steel + umbrella
								G	Medium bag
								J	Stainless steel cage
								L	Stainless steel bell
								M	Oval float (PVC)
								N	Oval float (Stainless steel)
								Y	Special version, to be specified

120									**Additional option:**
								1	Basic version
								2	Window + external start button
								9	Special version, to be specified

FMM50-									Order code

Comments regarding the product structure

The following limitations apply to devices with an ATEX license:
- **Sensing weights (110)**: (**M**) not permitted
- **Additional equipment (120)**: (**2**) not permitted

The following limitations apply to devices with a process temperature range of up to +150°C:
- **Sensing weights (110)**: (**M**) not permissible

The following limitations apply to devices with a process temperature range of up to +230°C:
- **Sensing weights (110)**: (**D**), (**E**), (**G**) and (**M**) not permissible

Note:
- Use a nozzle of 400 - 500 mm height with process temperatures from +70°C up to +150°C (**FMM50-********2*****) for a temperature reduction. In this case a wiper length of 500 mm must be used.
- Use a nozzle of 900 - 1000 mm height with process temperatures from +70°C up to +230°C (**FMM50-********3*****) for a temperature reduction. In this case a wiper length of mm must be used. You can order a special process adapter extension for this version (see accessories).

Other limitations:
- **Ambient temperature (80)**, **option C**: only in conjunction with coated housing

User-specific settings

All settings of the FMM50 can optionally be preset at the factory according to the customers requirements. When ordering, chose the relevant unit type (**FMM50-***********9**) and complete the form "**User-specific settings**" (ad042010en, preprint see next page), which has to accompany the order.

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User-specific settings

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The order option for FMM50 with user-specific settings requires that all necessary parameters and options are mentioned. Whereever informations are missing, default values will be used. This completed form must be supplied with every order.

Order code: **FMM50 -** [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

Settings basic setup, display and system parameters

001 empty calibr.	003 full calibration	020 measurem. type	021 time interval	022 time unit	023 normal or short	024 serv. interv.
_____ m/ft/in	_____ m/ft/in	❏ **single cycle** ❏ periodical	_____ [022]	❏ **h** ❏ min.	❏ **normal** ❏ short	_____
028 run up length	**060 language**	**061 back to home**	**062 no. of decimals**	**080 tag no.**	**083 distance unit**	
_____ m/ft/in	❏ **English** ❏ Deutsch ❏ Français ❏ ニホンゴ	_____ s (default: 100)	❏ X ❏ X.X ❏ **X.XX** ❏ X.XXX	_____ (max. 16 digits)	❏ **m** ❏ ft ❏ in	

Settings inputs and current output

010 input 1	011 Polarity input 1	012 input 2	013 polarity input 2
❏ **not used** ❏ bolting ❏ start measurement	❏ NC contact ❏ **NO contact**	❏ **not used** ❏ bolting ❏ start measurement	❏ NC contact ❏ **NO contact**
030 current mode	031 0/4 mA value	032 20 mA value	033 current range
❏ **normal** ❏ magnify	_____ [056]	_____ [056]	❏ **4-20 mA** ❏ 0-20 mA

Settings relay outputs

014 relay 1	01A relay 2	01B relay 3	01C relay 4	01D relay 5	01E relay 6
❏ **alarm** ❏ service interval ❏ counter pulses ❏ reset pulse ❏ running up ❏ top position ❏ measuring ❏ threshold ❏ band return	❏ alarm ❏ **service interval** ❏ counter pulses ❏ reset pulse ❏ running up ❏ top position ❏ measuring ❏ threshold ❏ band return	❏ alarm ❏ service interval ❏ counter pulses ❏ reset pulse ❏ running up ❏ top position ❏ **measuring** ❏ threshold ❏ band return	❏ alarm ❏ service interval ❏ counter pulses ❏ reset pulse ❏ running up ❏ top position ❏ measuring ❏ **threshold** ❏ band return	❏ alarm ❏ service interval ❏ counter pulses ❏ **reset pulse** ❏ running up ❏ top position ❏ measuring ❏ threshold ❏ band return	❏ alarm ❏ service interval ❏ counter pulses ❏ reset pulse ❏ running up ❏ top position ❏ measuring ❏ threshold ❏ **band return**
015 pulse value	016 pulse length	017 limit value	018 hysteresis	019 reset pulse	
_____ (default: 1)	_____ ms (default: 50)	_____ % (default: 60)	_____ % (default: 3)	_____ ms (default: 300)	

Safety settings and linearization

040 output on alarm	041 output on alarm	042 safety distance	043 security distance	044 in security distance
❏ **MIN (0/3.6mA)** ❏ MAX (22mA) ❏ hold ❏ user-specific	_____ mA	_____ [083]	_____ [083]	❏ **warning** ❏ alarm
045 in safety distance	050 level/volume	051 linearization	056 customer unit	057 max. scale
❏ **warning** ❏ alarm	❏ **level CU** ❏ ullage CU ❏ level DU ❏ ullage DU	❏ **linear** ❏ manually *1 *1 you need to enter manually a linearization curve	❏ **%** ❏ ft³ ❏ kg ❏ m ❏ t ❏ ft ❏ m³ ❏ in	_____ [056]

Note:
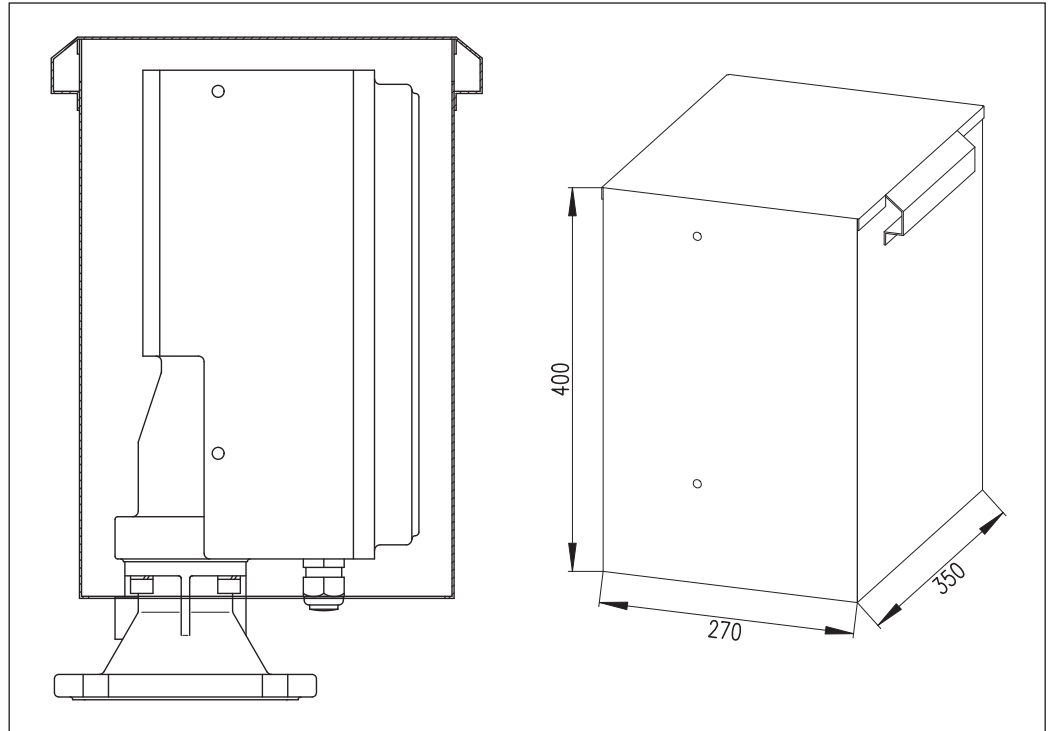• The bold marked options are the default values.
• Settings like "_____ [123]" relate to the option you select in function 123.

Accessories

Protection hood

- Protection hood
  - Order code: 52027964
  - Material: Stainless steel 1.4301
  - Weight: 7.5 kg
  - The delivery contains the mounting bolts.

Note:
A minimum space of 400 mm above the unit is necessary to remove the protection hood.

Process adapter extension

- Process adapter extension (see chapter "Dimensions" for details)
  - Order code: 52028083
  - Material: Stainless steel 316Ti
  - Weight: 16 kg

Technical data

Mechanical

- Weight:
  Max. 23 kg (without sensing weight)

- Housing:
  - Material: Aluminium
  - Coating optional (RAL 5012, cover RAL 7035)

- Tape wiper:
  Material: Aluminium/steel or stainless steel

- Ambient temperature range:
  -20 ... +70°C standard version
  -40 ... +70°C with self-control housing heater

- Dimensions of standard version [mm]:
  447 x 339 x 260 [HxBxT]

- Measuring tape:
  - Material: Stainless steel
  - Length: max. 90 m

- Band execution speed:
  - Minimum 0.21 m/s
  - Maximum 0.35 m/s

- Protection type:
  IP67 according to EN 60529

- Angle of inclination:
  Max. 2°

Electrical

- Power supply:
  90 - 127 VAC, 50/60 Hz or
  180 - 253 VAC, 50/60 Hz

- Power consumption:
  - Without housing heater: max. 230 VA
  - With housing heater: max. 250 VA

- Inputs:
  - Active: Input voltage range 12 ... 24 VDC
  - Passive: Contact loading max. 0.3 W / 30 VDC
  - Start pulse length: min. 200 ms

- Outputs:
  - 0/4 - 20 mA current output, active
  - Relay output: 250 VAC, 6 A

- Terminals:
  Max. 2.5 mm^2

Subject to change without notice!

Certificates and approvals

CE symbol The FMM50 measuring unit complies with the legislative requirements of EU guidelines.
By applying the CE symbol we declares that the unit was successfully tested.

Ex approvals See "Safety instructions"

External standards and directives

- **EN 60529**
  Types of protection housings (IP code)

- **EN 61010-1**
  Safety directives for electrical measuring, control, regulating and laboratory devices

- **EN 61326**
  Interference emissions (Equipment class B) and interference resistance (Attachment A - industrial systems)

- **EN 60079-31**
  Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"

- **2014/30/EU**
  EMC directive

- **2014/34/EU**
  ATEX directive

- **2014/35/EU**
  Low-voltage directive

Kirchgaesser

Industrieelektronik GmbH

Am Rosenbaum 6
D-40882 Ratingen

Tel.: +49 (0)2102 / 955 - 6
Fax: +49 (0)2102 / 955-720

www.kirchgaesser.com

info@kirchgaesser.com