



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



Solutions

Technical Information

Silopilot M FMM50

Electromechanical Level Measuring System



Applications

The Silopilot M FMM50 is an 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 Silopilot 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.

The advantages at a glance

- Measurement of levels up to 70 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 pulse
- 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 design 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.

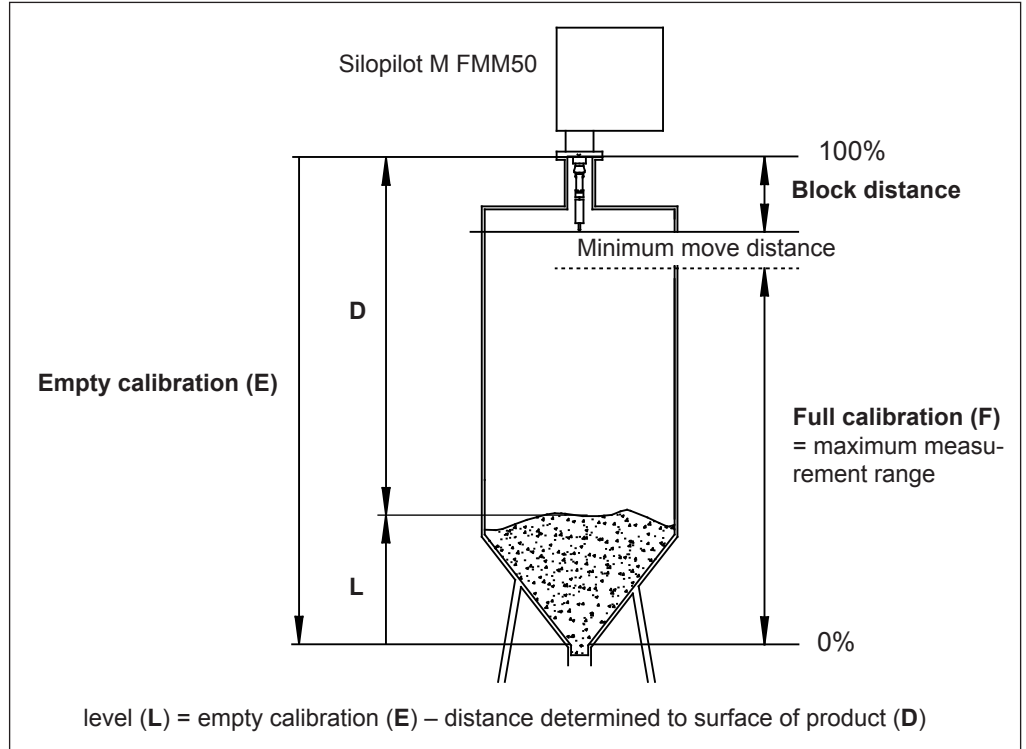
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Function and system design

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 Silopilot electronics.



Determination of the measured value

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.

During the entire measuring process (lowering and hoisting of the sensing weight) the Silopilot 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 Silopilot).

Measuring device

The Silopilot M FMM50 is a compact transmitter. In contrast to the measuring device Silopilot FMM760 (Z) with control unit ZAD423, the entire microprocessor-controlled electronic system is integrated into the Silopilot. The measuring unit offers comprehensive input and output facilities. For details please refer to the ordering information.

To ensure compatibility with older installations using the control unit ZAD423, an appropriate pulse output is provided for connection to the control unit.

Device variants

Ex version

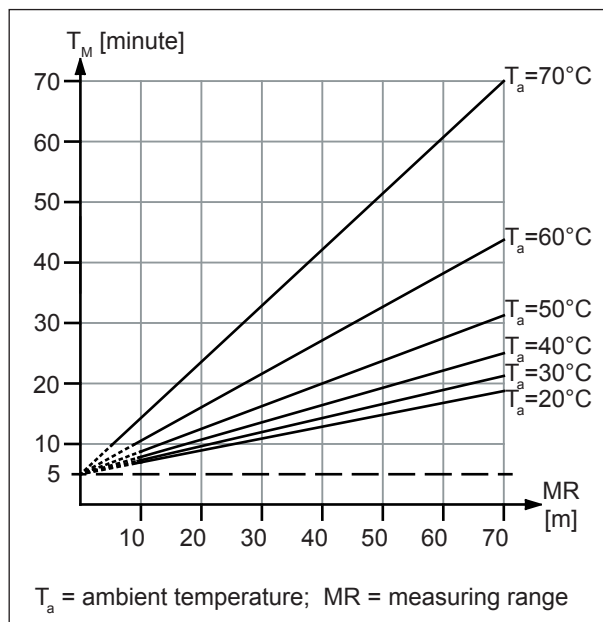
For application in areas subject to explosion hazards due to flammable dusts, Zones 20, 21 and 22 (measuring zone) or Zones 21 and 22 (device zone), category 1/2D

Mechanical and electrical options

- Ambient temperature:
 - 20°C to +70°C or
 - 40°C to +70°C by using the self-control housing heater (Ex version down to -35°C)
 - Also recommended in case of moisture in vessels and for ambient temperatures below 0°C.
- Process pressure:
 - 0.8 to 1.1 bar absolute or
 - 0.8 to 3 bar absolute
- Process temperature:
 - 20°C to +70°C (also Ex version) or
 - 20°C to +150°C or
 - 20°C to +230°C
- Standard for two power supply ranges:
 - 90 - 127 VAC, 50/60 Hz or
 - 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 Silopilot 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.
Measuring range	■ max. 70 m
Measuring cycle	Please observe the minimum time (T_M) for one measuring cycle with the Silopilot M 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.



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 tolerance	■ ± 5 cm (irrespective of the selected measuring range)
----------------------------	-------------------------------------------------------------

Inputs	<p>Two inputs (active/passive) are available for external operation of the Silopilot:</p> <ul style="list-style-type: none"> ■ Active input: <ul style="list-style-type: none"> - Connection of an external voltage - Input voltage range: 12 ... 24 VDC ■ Passive input: <ul style="list-style-type: none"> - Connection of an external command device, e.g. switch/button, relay contact - Contact rating: max. 5 mW ■ Input polarity: <ul style="list-style-type: none"> - Normally open or normally closed ■ Start pulse length: <ul style="list-style-type: none"> - min. 200 ms ■ Optional: <ul style="list-style-type: none"> - External start button
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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 Silopilot
 - 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

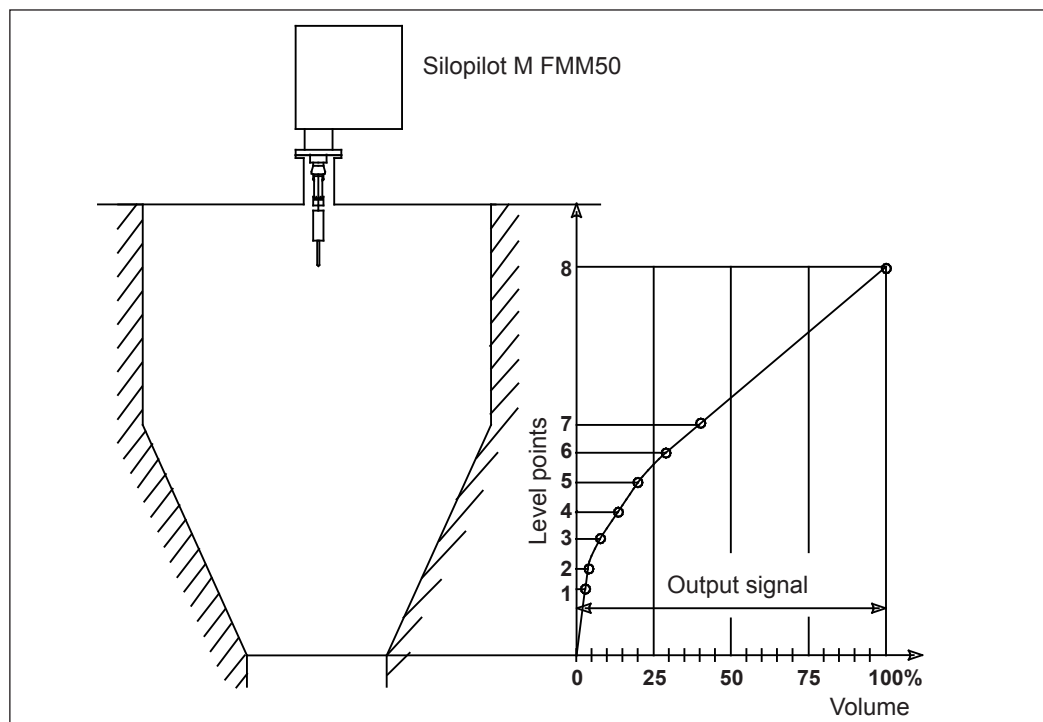
Malfunction signal can be called up via the following interfaces:

- 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)

Linearization

The linearization function of the Silopilot 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.



Example of linearization using 8 reference values

Highest measurable point

The highest measurable point is given by the blocking distance (see figure "Determination of the measured value" on page 3) plus a minimum descent length of 20 cm. This maximum length must be considered on input of the maximum measuring range (Full calibration, see page 3).

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.

When using the normal weight in connection with the 230 mm tape wiper, the blocking distance amounts to 0.8 m and the highest measurable point is 1 m under the flange of the Silopilot.

Auxiliary energy

Supply voltage

- 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

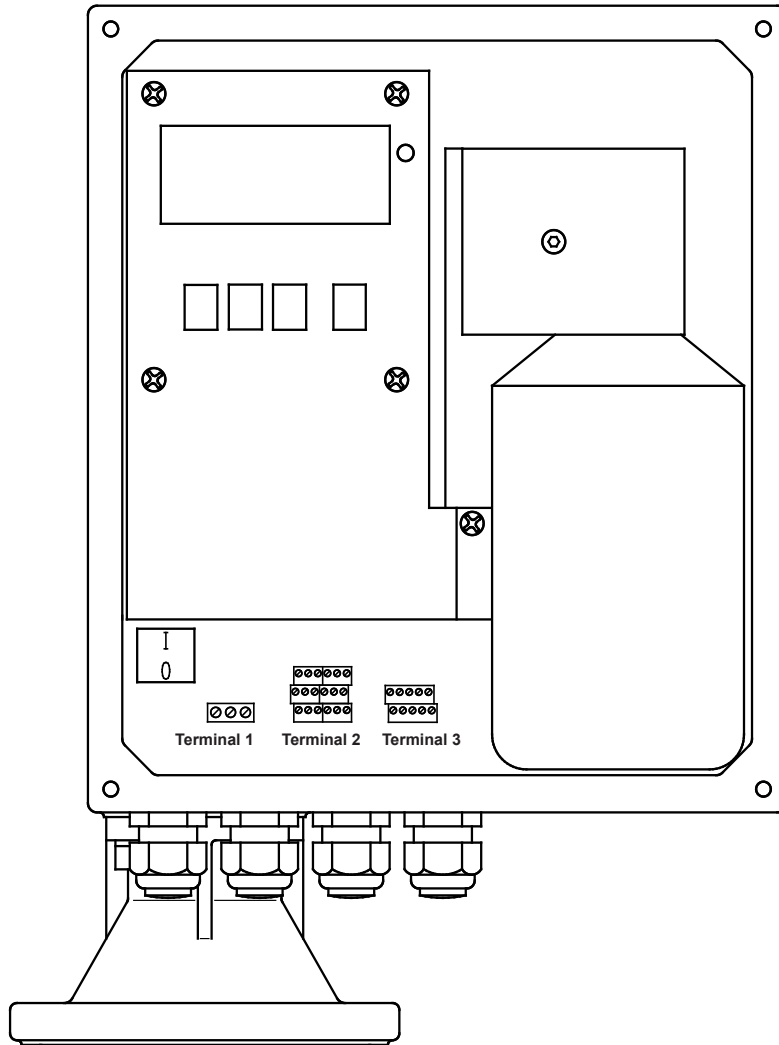
- M25 x 1.5
- Cable gland non-hazardous area:
 - Material: plastic
 - Colour: grey
 - Clamping range: 9 ... 17 mm
- Cable gland ATEX:
 - Material: plastic
 - Colour: black
 - Clamping range: 9 ... 13 mm
- Number:
 - 4 cable glands (without additional option external start button)
 - 3 cable glands (with additional option external start button)

Note:

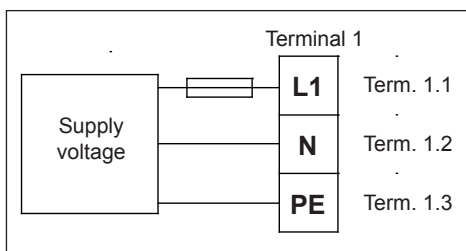
Please refer to the Operation Instructions and the Safety Instructions (ATEX) for further details.

Electrical connection

Arrangement of the terminals



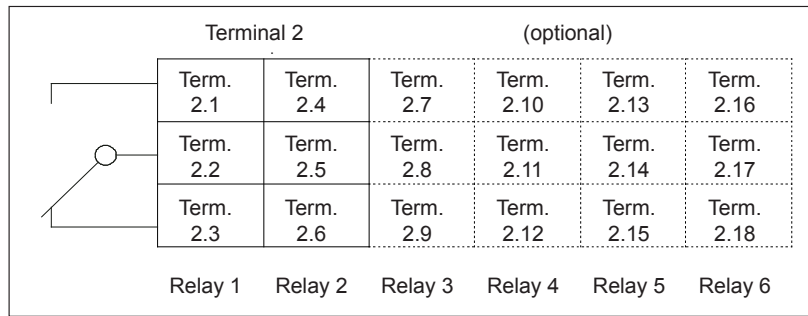
Supply voltage (terminal 1)



Connecting the supply voltage

The supply voltage (mains voltage) is connected to the plug-in terminals on terminal block 1. The maximum cable cross-section is 2.5 mm². You should use a fuse to protect the power supply against short-circuit.

Relays (terminal 2)



Connecting the relay outputs (rest position)

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 1.5 mm².

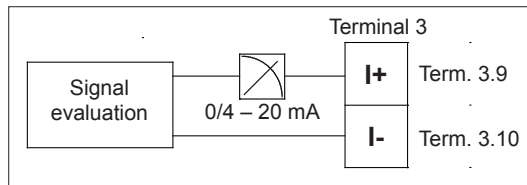
Normal installation cables are sufficient for making the connections.

The individual circuits must have a maximum of 6 A fuse protection.

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)



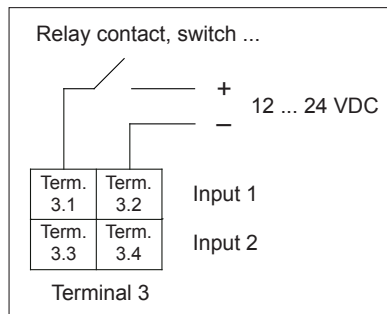
Connecting the current output

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 1.5 mm².

Normal installation cables are sufficient for making the connections.

Input, active (terminal 3)



Connecting the active signal input

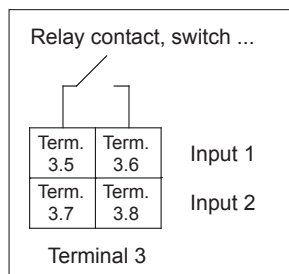
The active input signal is connected to the plug-in terminals on terminal block 3.

The maximum cable cross-section is 1.5 mm².

Normal installation cables are sufficient for making the connections.

Input voltage range: 12 ... 24 VDC

Input, passive (terminal 3)



Connecting the passive signal input

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

The maximum cable cross-section is 1.5 mm².

Normal installation cables are sufficient for making the connections.

Contact rating: max. 5 mW

Notice about the inputs:

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.

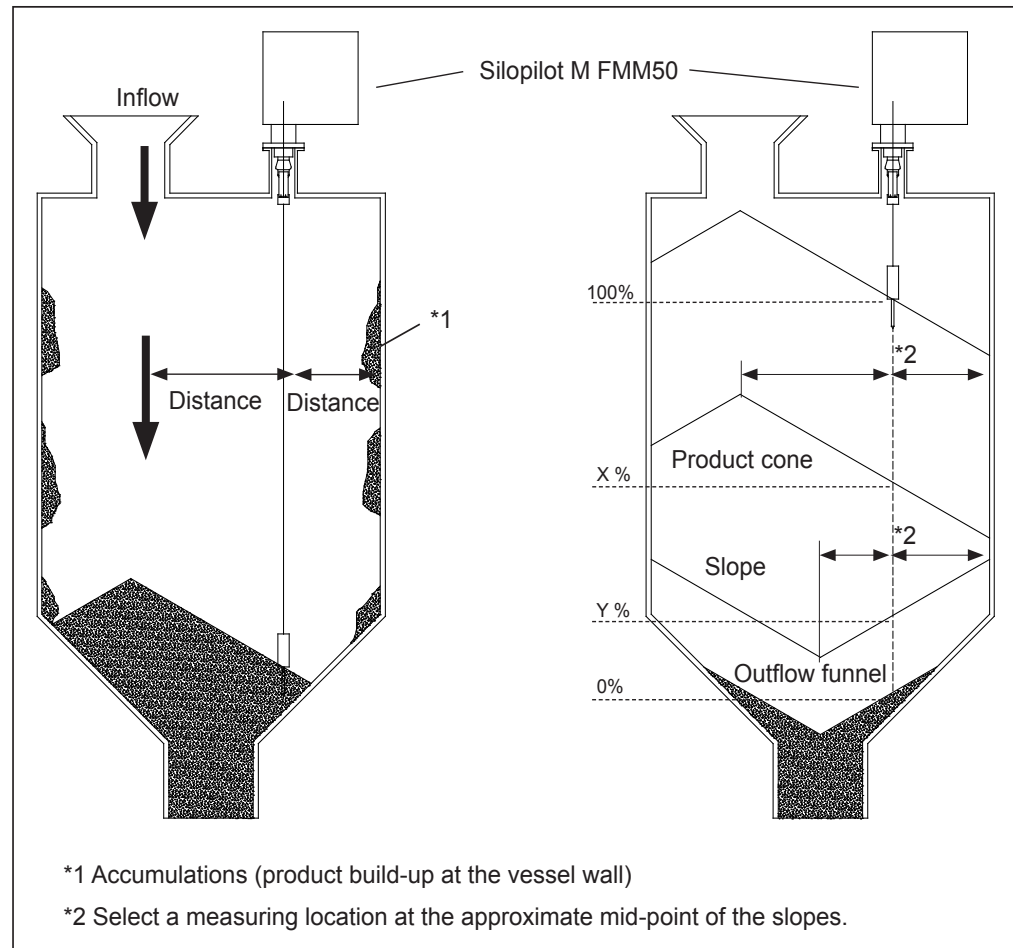
Mounting location

Planning the 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.

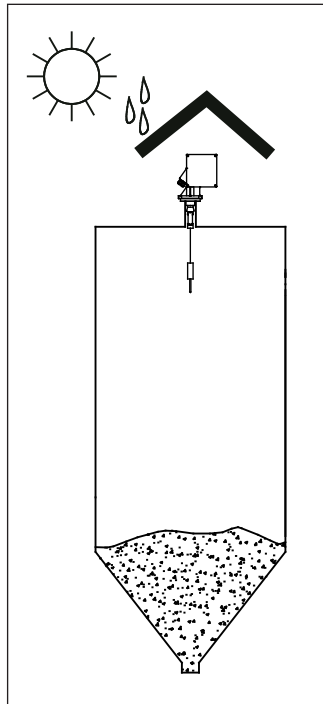
Select the length of the tape wiper such that the sensing weight is outside of the mounting flange.



Selection of the mounting location

Preparation for mounting

The Silopilot 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 Silopilot 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.

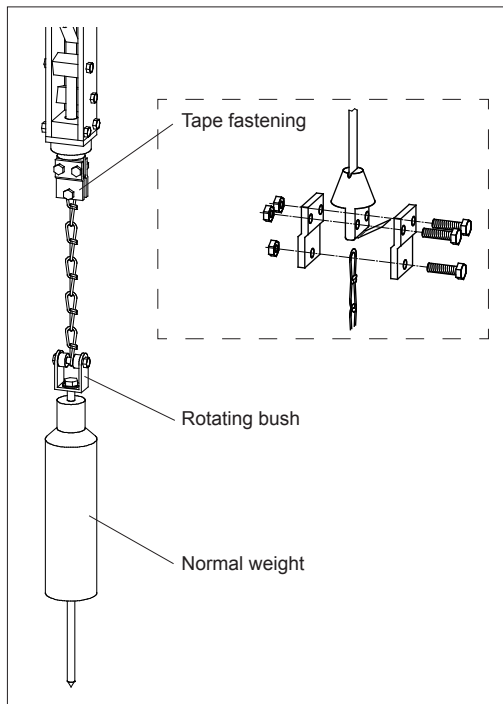


When installing outside, fit a protection hood or install a weather protection roof.

Weather protection

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.

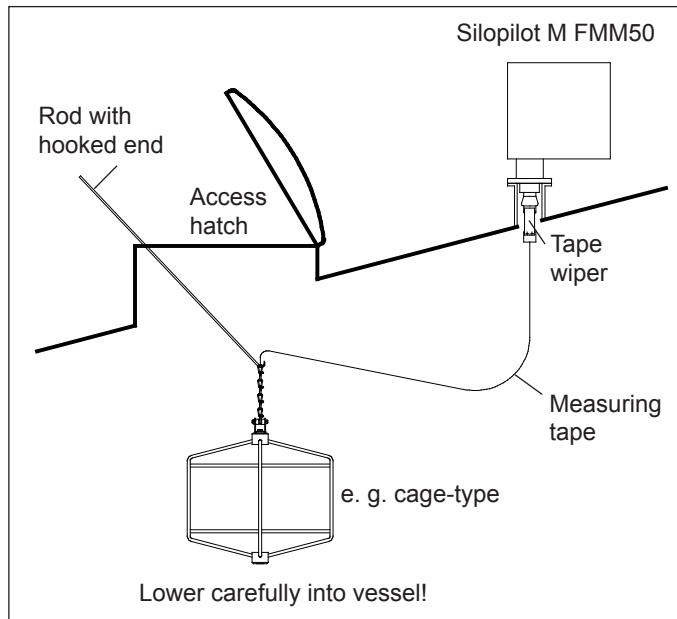


The measuring tape is pressed into the tape fastening by two screws. A third screw secures the chain. A rotating bush is mounted at the lowest extent of the chain, to accommodate any turning motion of the sensing weight.

The weight fixings (tape fastening, chain and rotating bush) are made from galvanized steel or stainless steel.

Mounting of the sensing 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 larger sensing weights

Mounting of the Silopilot

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 Silopilot onto the flange and secure it using four M16 bolts of suitable length. Please note the following:

- Mount the Silopilot 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 Silopilot by connecting a compressed air line to its mounting flange (airflow quantity as required). There is a G1/4 female connection provided for this purpose (see dimensions of the standard version).

Ambient conditions

Ambient temperature at the Silopilot:

- -20 ... +70°C
- -40 ... +70°C by using the self-control housing heater (Ex version down to -35°C)

Process conditions

Process temperature:

- -20 ... +70°C (standard and Ex version)
- -20 ... +150°C
- -20 ... +230°C

Process pressure (in the vessel):

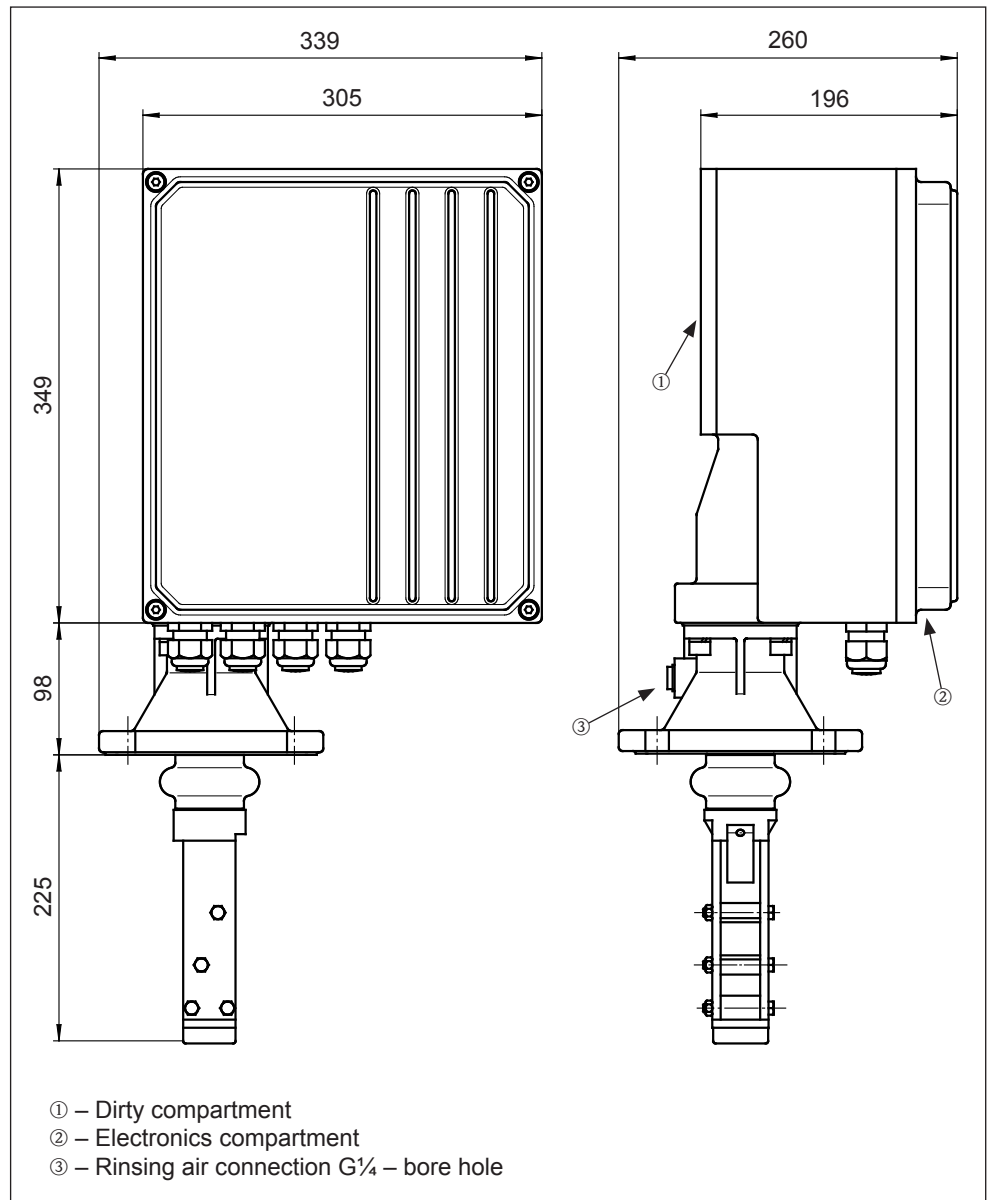
- 0.8 ... 1.1 bar absolute (standard and Ex version)
- 0.8 ... 3.0 bar absolute (high pressure version)

Note!

Use a nozzle of 400 - 500 mm height with process temperatures from +70°C up to 150°C (**Silopilot M 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 (**Silopilot M FMM50-*****3*****) for a temperature reduction. In this case a wiper length of 1000 mm must be used.

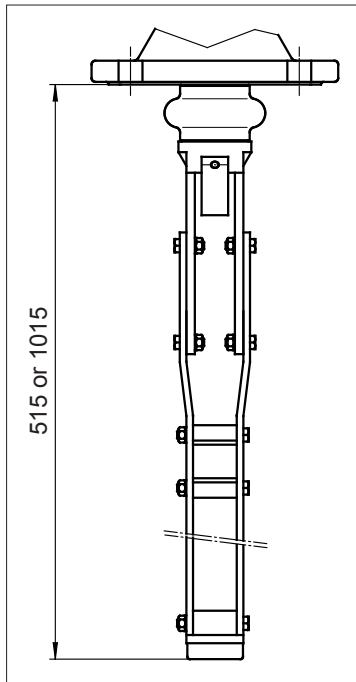
Dimensions

Housing dimensions
(with standard wiper 230 mm)



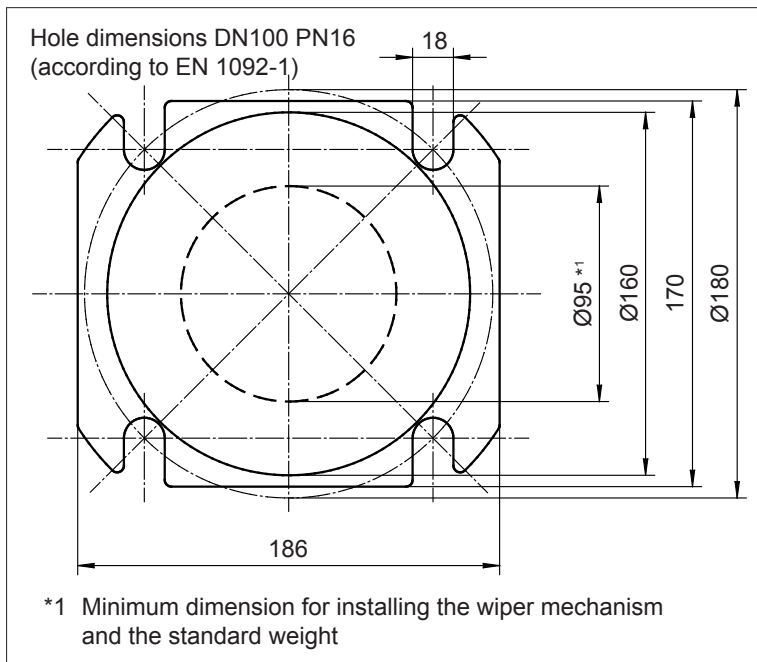
Housing dimensions

**Dimensions of the extended
tape wiper**



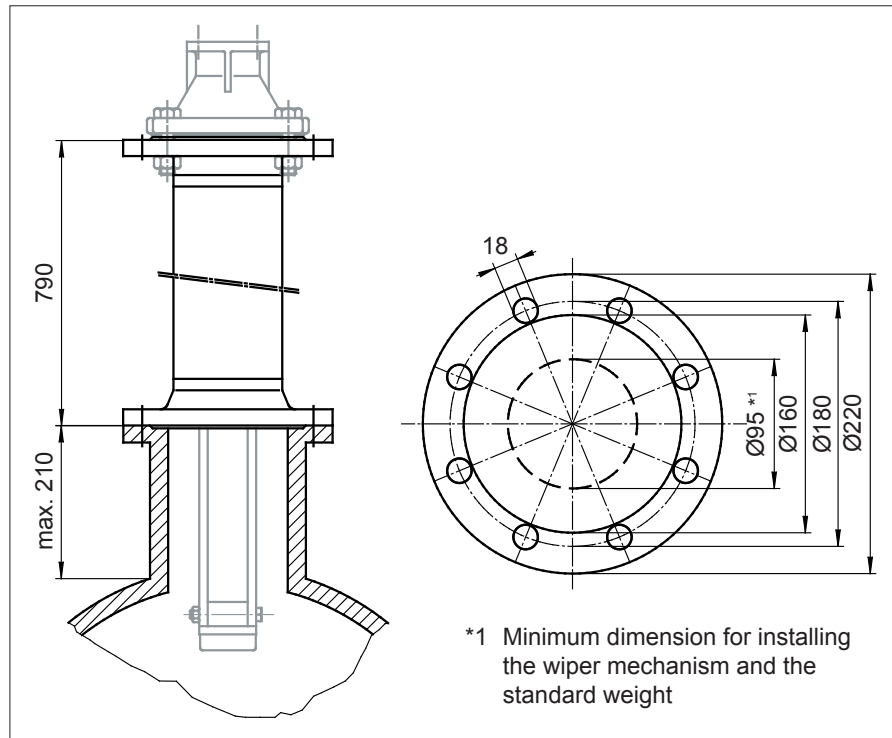
Dimensions of the wiper extension

**Dimensions of the process
connection (standard version)**



Dimensions of the standard process connection

Dimensions of the process adapter extension (accessory)

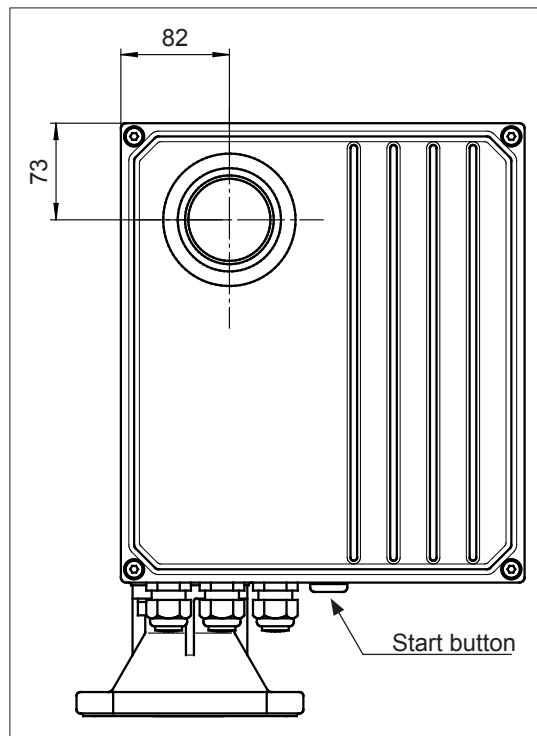


Dimensions of the process adapter extension

Note!

Use a nozzle of 400 - 500 mm height with process temperatures from +70°C up to 150°C (**Silopilot M 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 (**Silopilot M FMM50-*****3*****) for a temperature reduction. In this case a wiper length of 1000 mm must be used.

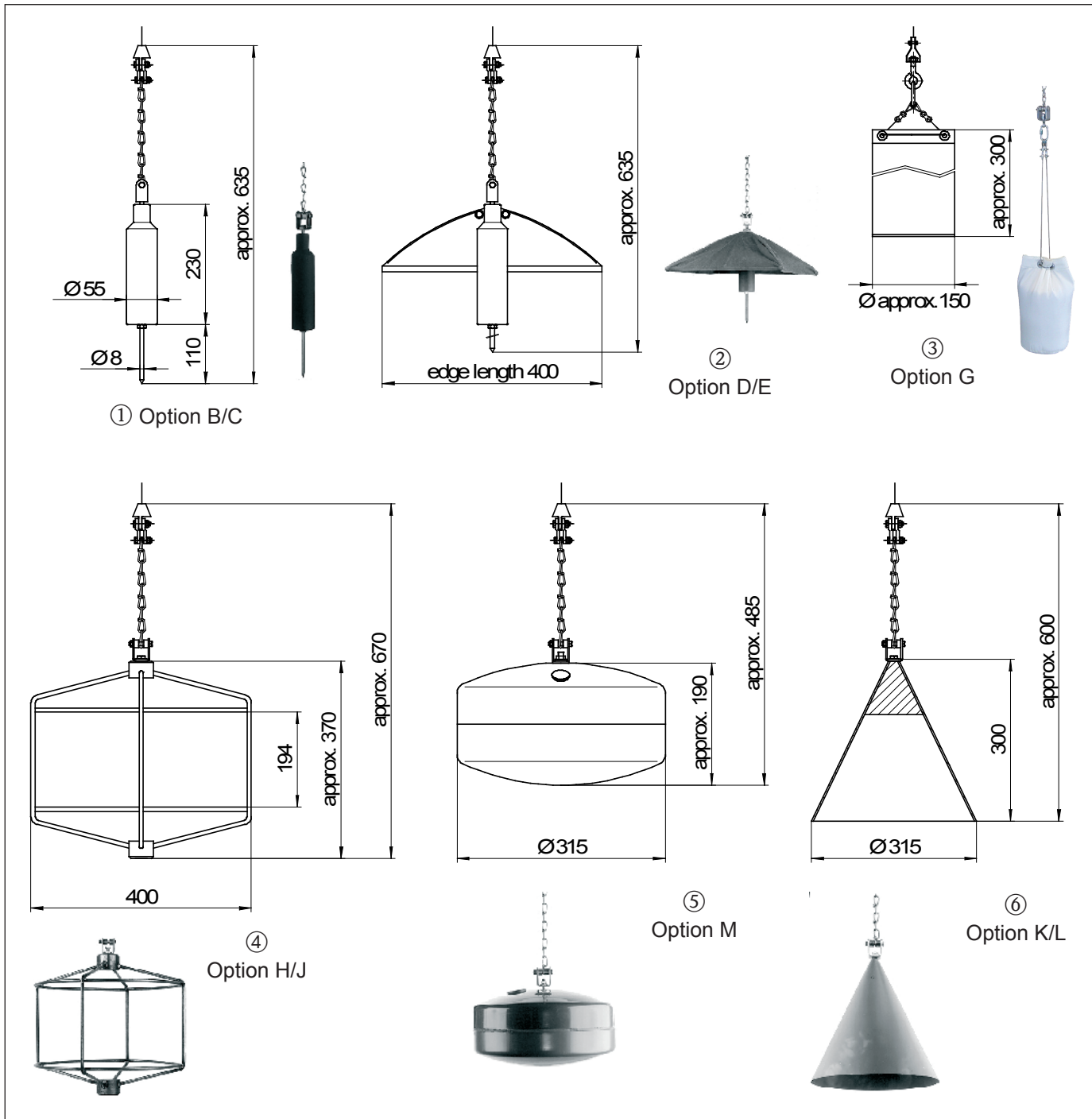
Dimensions of the optional window and external start button



Dimensions of the optional window

Dimensions of sensing weights (see relevant section headings)

Sensing weights



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 "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 H/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:
Steel or stainless steel
- 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.

**Oval float
(Option M)**

- Application:
For liquids, e.g. fuel oil, also for granulates.
- Material:
Hard PVC
- Weight:
The float must be filled with product to a total weight of 3.5 kg (empty weight 1.3 kg).
- Maximum permissible temperature:
+70°C
- Use of the oval float in the "Dust ignition-proof" version is not permitted!

**Bell weight
(Option K/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

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.

Controls and instrumentation

Control concept

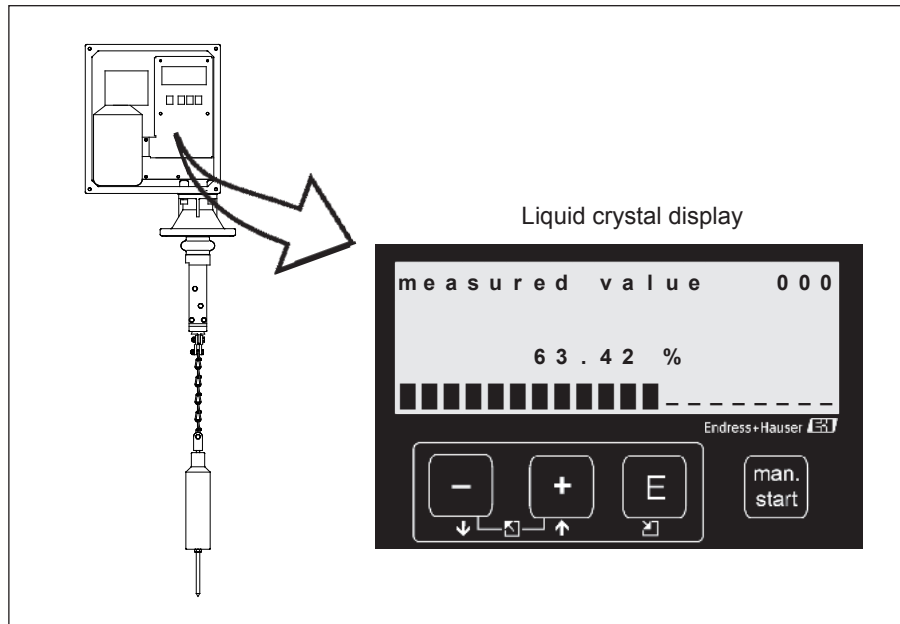
Parameters for the Silopilot are set locally using a large 4-line text display, which can also display the existing measured values.

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



Controls and instrumentation

Controls

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



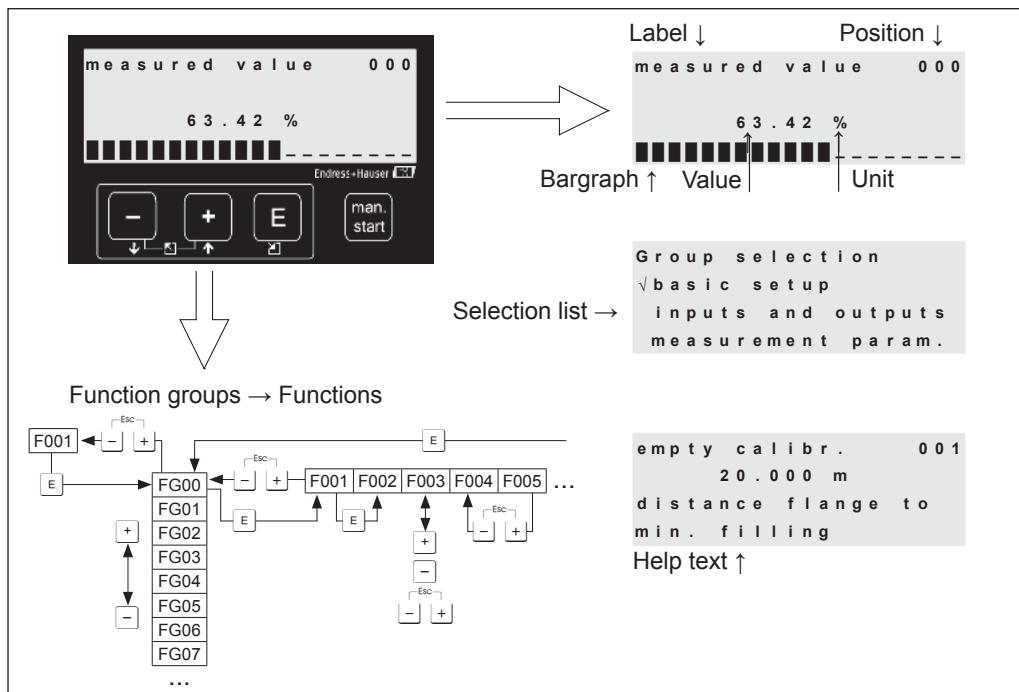
The Silopilot may only be operated with closed cover in areas subject to explosion hazards!

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
or	- Navigation to the left within a function group
	- Navigation to the right within a function group - Enter
and or and	Contrast settings of the LCD - and increase the contrast - and decrease the contrast
	- Start measuring (only in function 000)

Local control

The LC-display can be used for configuration direct to the Silopilot 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.



Local control

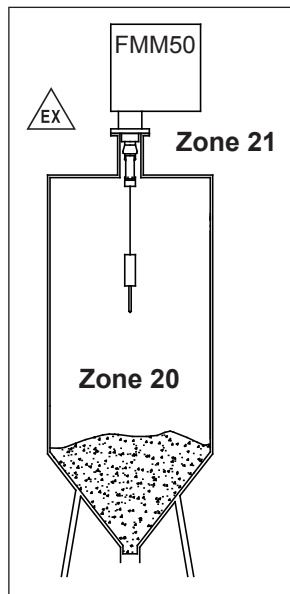
Safety instructions

- Features of the ATEX version**
- Designation:
⊕ II 1/2D IP67 T99°C
 - Certification number:
BVS 05 ATEX E 049
-

Use in accordance with directives

- Operation of the Silopilot in areas subject to explosion hazards is only permissible with the housing closed.
 - The Silopilot with "Ex" design may only be repaired by the manufacturer.
 - The requirements of EN 50281-1-2, 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



Assembly instructions (ATEX)

For details please refer to the XA425F-A/97/a3.

Ordering information

Ordering information for Silopilot M FMM50

10	Approval:			
	A	Non-hazardous area		
	B	ATEX II 1/2D IP67 T99°C		
	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		
	2	35 m		
	3	50 m		
	4	70 m		
	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		

Comments regarding the product structure

The following limitations apply to devices with an ATEX license:

- **Ambient temperature (80), option B:** min. -35°C
- **Process temperature (90):** only (1)
- **Process pressure (100):** only (1)
- **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:

- **Max. connection height; wiper (50):** only (F)
- **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 (**Silopilot M 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 (**Silopilot M 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 Silopilot M 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**" (ad042000en, preprint see next page), which has to accompany the order.

User-specific settings



People for Process Automation

The order option for Silopilot M FMM50 with user-specific settings requires that all necessary parameters and options are mentioned. Wherever 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. _____ m/ft/in	003 full calibration _____ m/ft/in	020 measurem. type <input type="checkbox"/> single cycle <input type="checkbox"/> periodical	021 time interval _____ [022]	022 time unit <input type="checkbox"/> h <input type="checkbox"/> min.	023 normal or short <input type="checkbox"/> normal <input type="checkbox"/> short
024 service interval _____	060 language <input type="checkbox"/> English <input type="checkbox"/> Deutsch <input type="checkbox"/> Français <input type="checkbox"/> ニホソゴ	061 back to home _____ s (default: 100)	062 no. of decimals <input type="checkbox"/> X <input type="checkbox"/> X.X <input type="checkbox"/> X.XX <input type="checkbox"/> X.XXX	080 tag no. _____ (max. 16 digits)	083 distance unit <input type="checkbox"/> m <input type="checkbox"/> ft <input type="checkbox"/> in

Settings inputs and current output

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

Settings relay outputs

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

Safety settings and linearization

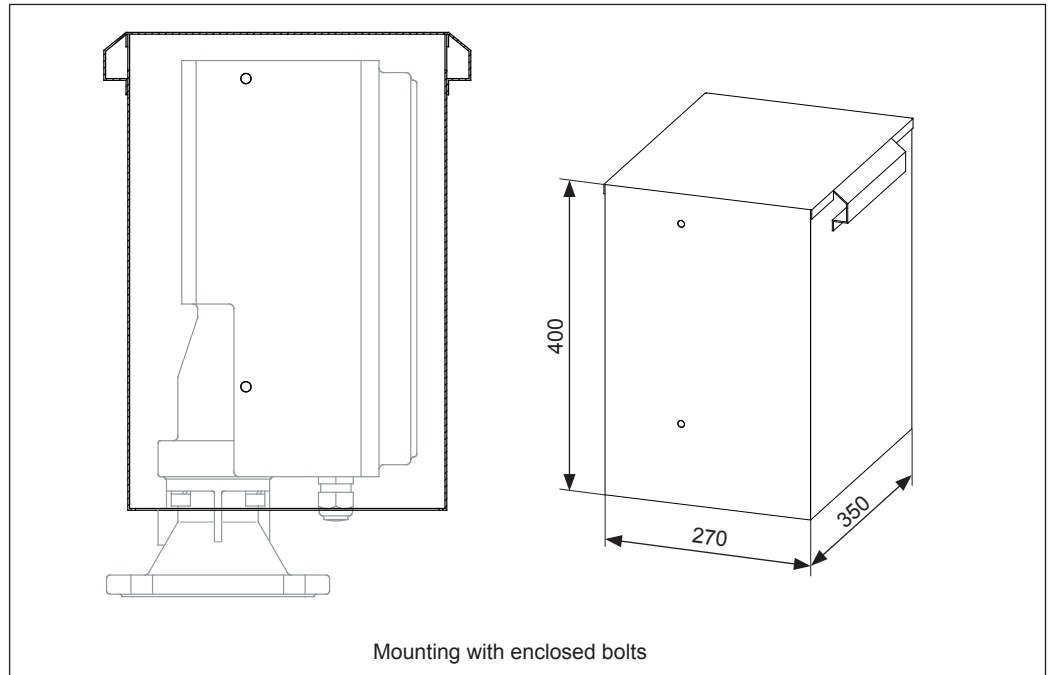
040 output on alarm <input type="checkbox"/> MIN (0/3.6mA) <input type="checkbox"/> MAX (22mA) <input type="checkbox"/> hold <input type="checkbox"/> user-specific	041 output on alarm _____ mA	042 safety distance _____ [083]	043 security distance _____ [083]	044 in security distance <input type="checkbox"/> warning <input type="checkbox"/> alarm
045 in safety distance <input type="checkbox"/> warning <input type="checkbox"/> alarm	050 level/volume <input type="checkbox"/> level CU <input type="checkbox"/> ullage CU <input type="checkbox"/> level DU <input type="checkbox"/> ullage DU	051 linearization <input type="checkbox"/> linear <input type="checkbox"/> manually *1 *1 you need to enter manually a linearization curve	056 customer unit <input type="checkbox"/> % <input type="checkbox"/> ft ³ <input type="checkbox"/> kg <input type="checkbox"/> m <input type="checkbox"/> t <input type="checkbox"/> ft <input type="checkbox"/> m ³ <input type="checkbox"/> in	057 max. scale _____ [056]

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

Accessories

The following accessories can be delivered for the Silopilot:

- Protection hood FMM50
 - Order code: 52027964
 - Material: Stainless steel 1.4301
 - Weight: 7.5 kg
 - The delivery contains the mounting bolts.



Protective hood

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

- Process adapter extension (see chapter "Dimensions" for details)
 - Order code:
 - a) 52028082 (Material: Steel) or
 - b) 52028083 (Material: Stainless steel)
 - 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
(Ex version down to -35°C)
- Dimensions of standard version [mm]:
447 x 339 x 260 [HxBxD]
- Measuring tape:
- Material: Stainless steel
- Length: max. 70 m
- Tape speed:
- Minimum 0.21 m/s
- Maximum 0.35 m/s
- Protection type:
IP67 according to EN 60529
- Angle of inclination:
max. 2°

Electrical

- Supply voltage:
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. 5 mW
start pulse length: min. 200 ms
- Outputs:
0/4 - 20 mA current output, active
Relay output: 250 VAC, 6 A
- Terminals:
Power supply: max. 2.5 mm²
Inputs/outputs: max. 1.5 mm²

Certificates and approvals

CE symbol	The Silopilot measuring unit complies with the legislative requirements of EC guidelines. By applying the CE symbol Endress+Hauser declares that the unit was successfully tested.
Ex approvals	See "Safety instructions"
External standards and guidelines	<ul style="list-style-type: none"> ■ 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 50281-1-1 Electrical equipment for use in areas containing flammable dust ■ RL 89/336/EEG EMC guidelines ■ RL 94/9/EEG ATEX guidelines

Supplementary documentation

Operating instructions	Silopilot M FMM50 Operating instruction for Silopilot M FMM50, BA286F/97/en
Safety instructions	Silopilot M FMM50 Safety instruction for electrical apparatus for explosion-hazardous areas, XA425F-A/97/a3

Subject to modification

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