Technical Information

Silopilot FMM50

Electromechanical Level Measuring System

The simple and easy-to-understand level meter for all bulk solids and fluids

Application

- Measuring principle independent of physical properties like mass density
- Measuring of level in bunkers and silos with powdered, fine or coarse grain bulk solids or in vessels containing liquids

Device properties
- Level measurements up to 90 m
- Process temperatures up to +230 °C (+446 °F)
- Process pressure up to 300 kPa (3 bar) absolute
- Use in aggressive atmospheres, for example acidic or caustic vapours possible
- Separation layer detection in fluids possible with suitable sensing weights

Your benefits

- Suitable for process conditions where typical ultrasonic or radar level meter fail to work dependably
- Precise detection of the level (accuracy of ±5 cm or ±1 pulse)
- Compact transmitter with 0/4 - 20 mA current output as well as further free programmable signal outputs (for example 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

Endress+Hauser

People for Process Automation

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Document information

Document conventions

Safety symbols

Symbol	Meaning
⚠ DANGER	**DANGER!** This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
⚠ WARNING	**WARNING!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
⚠ CAUTION	**CAUTION!** This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
NOTICE	**NOTICE!** This symbol contains information on procedures and other facts which do not result in personal injury.

Electrical symbols

Symbol	Meaning	Symbol	Meaning
⎓	Direct current	∼	Alternating current
⏚	**Protective ground connection** A terminal which must be connected to ground prior to establishing any other connections.	⏚	**Ground connection** A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.

Symbols for certain types of information

Symbol	Meaning
✔	**Allowed** Indicates procedures, processes or actions that are allowed.
✔✔	**Preferred** Indicates procedures, processes or actions that are preferred.
✘	**Forbidden** Indicates procedures, processes or actions that are forbidden.
ℹ	**Tip** Indicates additional information.
📖	**Reference to documentation** Refers to the corresponding device documentation.
📄	**Reference to page** Refers to the corresponding page number.
🖼	**Reference to graphic** Refers to the corresponding graphic number and page number.
👁	Visual inspection

Symbols in graphics

Symbol	Meaning	Symbol	Meaning
1, 2, 3 ...	Item numbers	1. , 2. , 3. ...	Series of steps
A, B, C ...	Views	A-A, B-B, C-C ...	Sections
⚠ EX	Hazardous area	⚠	Safe area (non-hazardous area)

Function and system design

Measuring principle

A measuring tape, loaded with a sensing weight, is lowered into the bunker or silo (2). When the weight meets the surface of the product the tension on the measuring tape is relaxed (3) and this is detected by the device electronics.
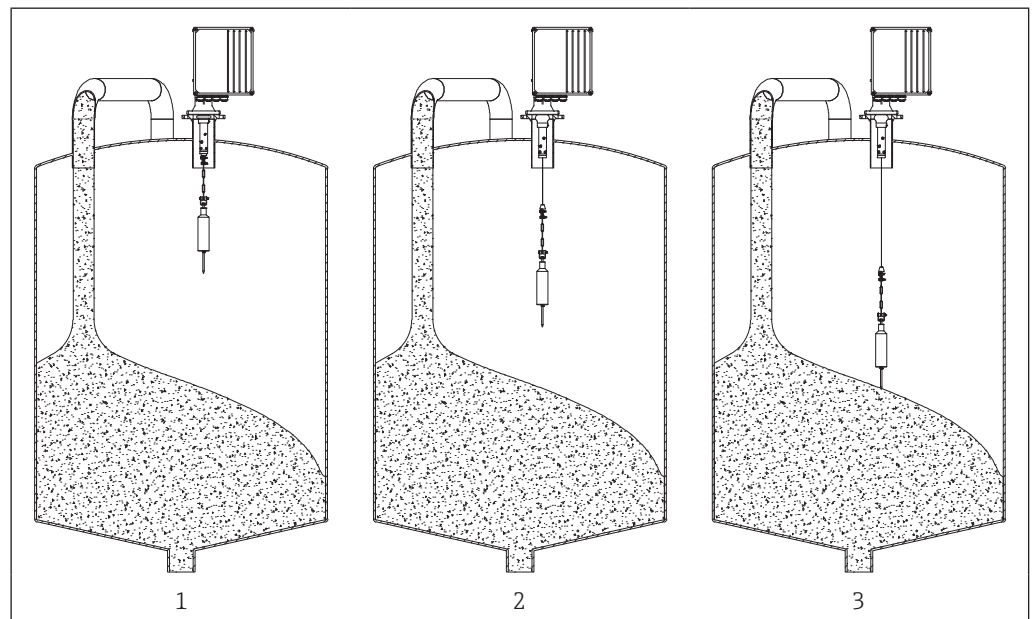
🖻 *1   Measuring principle*

The measured value is transmitted to the 0/4 - 20 mA current output. The sensing weight now runs back up to the start position (1) and the measured value is retained until the next measurement is performed.

During the entire measuring process (lowering and hoisting of the sensing weight) the device 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 (for example external start button) or periodically (for example programmed function of the device).

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.

Measuring system

The FMM50 is a compact transmitter with integrated microprocessor-controlled electronics, various in- and outputs (→ 🖺7, 8) are provided. The device can be adapted to different applications by choosing one of the suitable sensing weights (→ 🖺14).
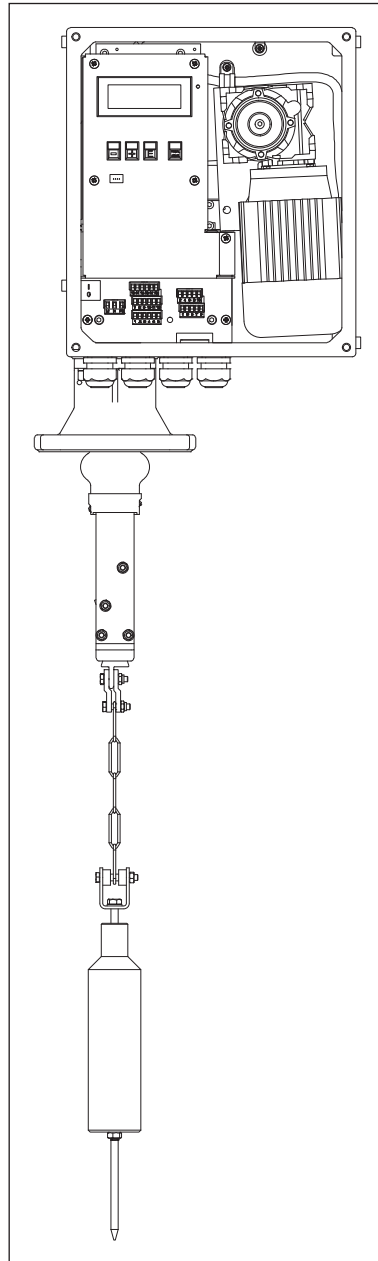
2   FMM50 with open electronic side

Type of housing and materials
Compact, Aluminium, optional coated

Sensing weights (→ 🖿14) and materials
- Steel, optional with umbrella Polyester
- Stainless steel 316TI, optional with umbrella Polyester
- Plastic PVC

Configuration
Operation via 4-line local display with plain and help texts

Safety

We only provide a warranty if the device is installed and used as described in the Operating Instructions. The device is equipped with security mechanisms to protect it against any inadvertent changes to the device settings.

Security measures in line with operators' security standards and designed to provide additional protection for the device and device data transfer must be implemented by the operators themselves.

Input

Measured variable

Measured process variables

The measured value is the distance between the flange of the Silopilot minus a blocking distance and the surface of the product.

Calculated process variables

The filling level is computed taking into account the fixed given calibration values, for example the empty calibration (height of the silo). The filling level can be converted to other values as desired, for example volume or mass, by the application of linearization.
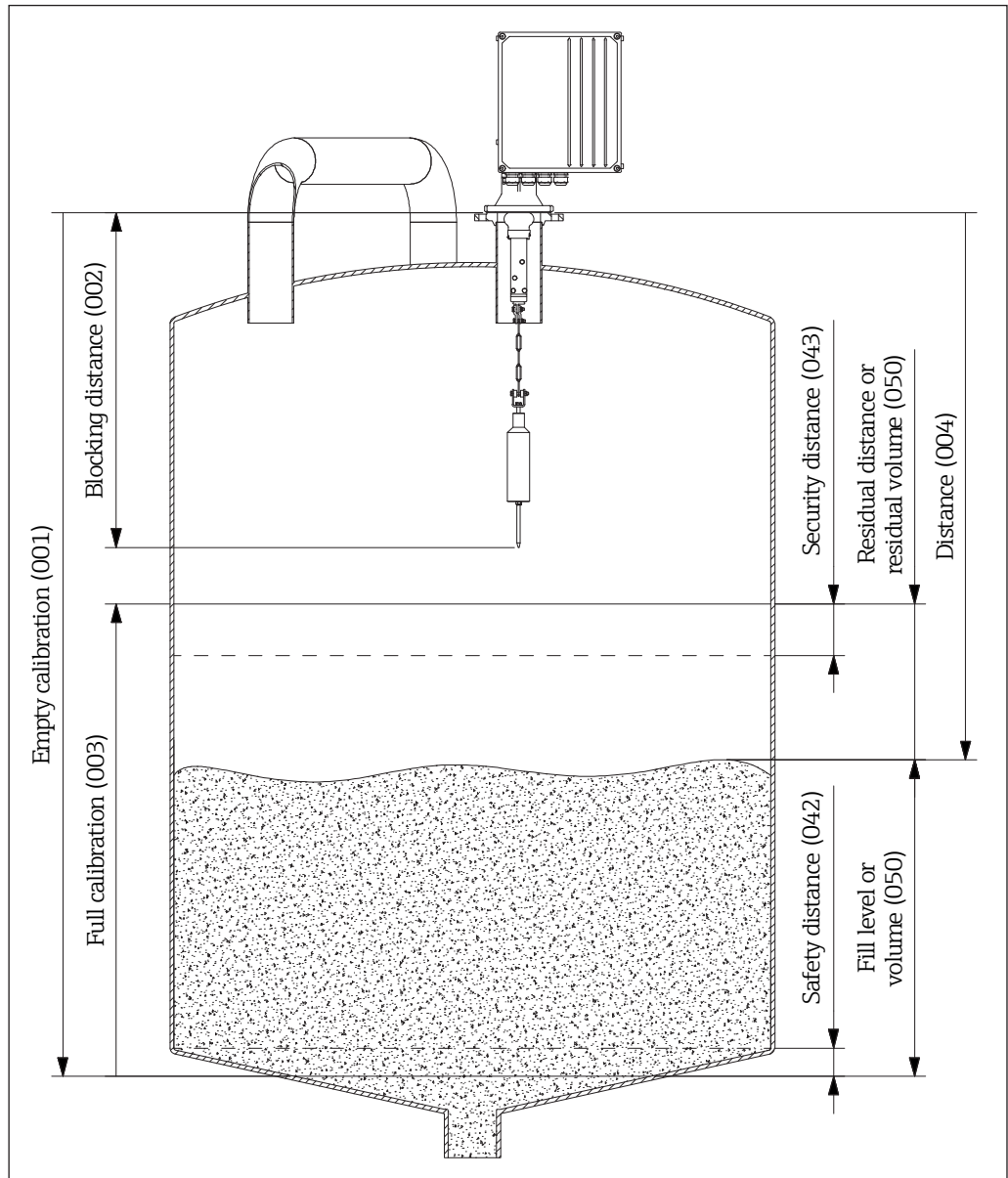
3 Adjustment values of the FMM50

Measuring range

Max. 90 m

The highest measurable point is given by the blocking distance (see figure "Measuring principle") plus a minimum descent length of 20 cm. This maximum length must be considered on input of the maximum measuring range (full calibration).

| **Blocking distance** | The blocking distance (BD) depends on the wiper length and the selected 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, N	0.65 m	0.95 m	1.45 m

NOTICE

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.

Input signal

Remote operation possible via two inputs, each input can be assigned as either active or passive and is therfore usable.

The device is available with an optional external start button (→ 🕮21), which is connected to the passive signal input 1.

Active inputs

- Connection of an external voltage
- Input voltage range: 12...24 VDC
- Input polarity: Normally open or normally closed
- Start pulse length: min. 200 ms

Passive inputs

- Connection of an external command device, for example switch/button, relay contact
- Contact rating: max. 0.3 W / 30 VDC
- Input polarity: Normally opened or normally closed
- Start pulse length: min. 200 ms

Operating frequency

Measuring cycle

Min. 1 minute

NOTICE

- Please observe the minimum time (TM) for one measuring cycle with the device according to the measuring range and the ambient temperature (→ 🕮12).
- This minimum time must be taken into account in all types of measuring.
- We recommend not to go below a time of 5 minutes for one measuring cycle.

Tape run speed

The speed of the tape is between 0.21 m/s and 0.35 m/s.

Output
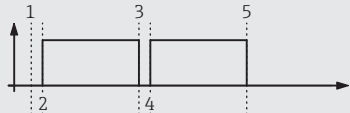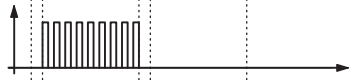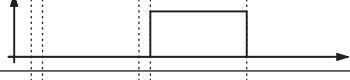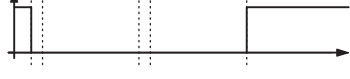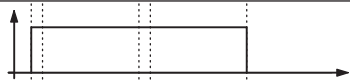
Output signal	**Current output**

Current output
- 0/4-20 mA (active, 0-20 mA / 4-20 mA programmable)
- max. 22 mA

Relay output
- Number: 2 (optional 6)
- Contact rating: 250 VAC, 6 A
- Contact material: silver-cadmium-oxide, gold-flashed

Programmable relais functions		
Measuring cycle		1 Start of measuring cycle (time or event triggered) 2 Sensing weight moves down 3 Medium surface detected (measurand generated) 4 Sensing weight moves up 5 End of measuring cycle
Counter pulse		emits pulses equivalent to the length of the rolled-out tape
Reset pulse		pulse before new measurement, for example reset of an external counter
Tape reverse		indication of the lower tape direction reversal
Ascent of sensing weight		indication of ascent of the tape, for example fade-out the counter pulses
Upper end position of sensing weight		indication of upper end position, for example end of measurement
Measurement active		indication of an active measurement, for example lock of filling equipment
Alarm	output alarm states	
Maintenance interval	notice to maintain the device	
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.)	

Signal on alarm	Malfunction signal can be called up via the following interfaces.

Local indication
- Error symbol
- Error code with text indication

Current output
- Minimum: minimum current value <= 3.6 mA (4-20 mA) or 0 mA (0-20 mA)
- Maximum: maximum current value + 10% (≈22 mA)
- Programmable: current value 0-22 mA
- Hold: last valid current value

Relay output
- Alarm function

Load	Load of the current output: max. 600 Ω

Linearisation

The linearisation function of the device 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.
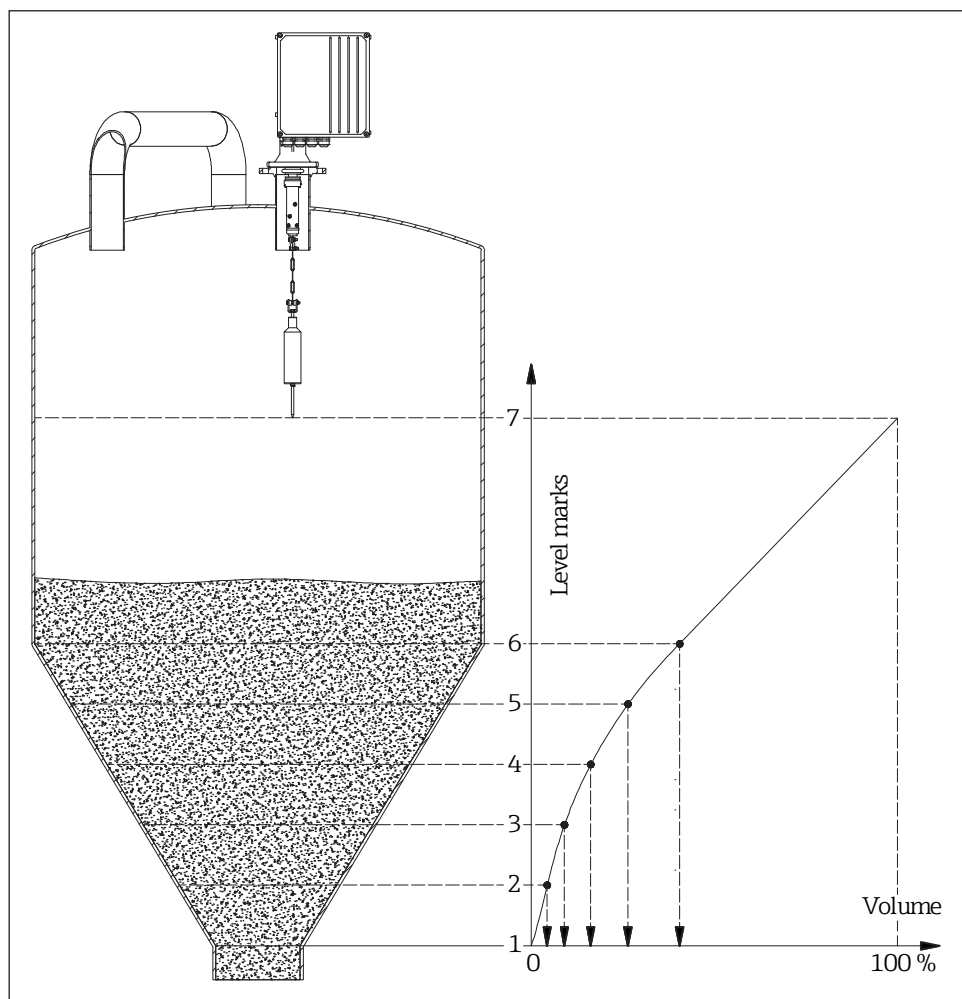
🖼4   *Linearisation*

Power supply

Terminal assignment
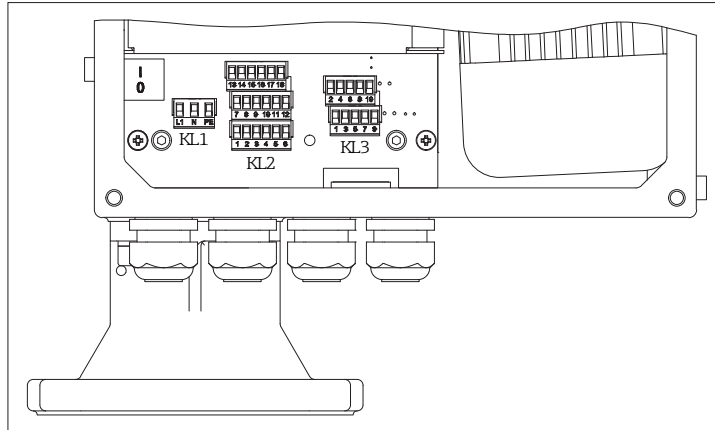
⊞5   *Terminals of the FMM50*

Ordering code	Terminal assignment		
Power supply - option **1**, **2**	1.1	L1 (~)	Power supply
	1.2	N (~)	
	1.3	PE (⊥)	
Output - option **A**, **B**	2.1		Relay 1
	2.2		
	2.3		
	2.4		Relay 2
	2.5		
	2.6		
Output - option **B**	2.7		Relay 3
	2.8		
	2.9		
	2.10		Relay 4
	2.11		
	2.12		
	2.13		Relay 5
	2.14		
	2.15		
	2.16		Relay 6
	2.17		
	2.18		
without	3.1	(+)	Input 1, active
	3.2	(−)	
	3.3	(+)	Input 2, active
	3.4	(−)	
	3.5		Input 1, passive
	3.6		
	3.7		Input 2, passive
	3.8		
	3.9	(+)	Current output
	3.10	(−)	

🛈 The rest position matches with the position of the relays without power supply, this represents the alarm condition if the function "alarm" is selected.

Supply voltage	• 180-253 VAC, 50/60 Hz (ordering code "**power supply**", option **1**) • 90-127 VAC, 50/60 Hz (ordering code "**power supply**", option **2**) **NOTICE** • When using the public powers supply, install an easily accessible power switch in the proximity of the instrument. Mark the power switch as a disconnector for the instrument (EN/IEC 61010). • You should use a fuse to protect the power supply against short-circuit.
Power consumption	• Max. 230 VA (ordering code "**ambient temperature**", option **A** or **C**) • Max. 250 VA (ordering code "**ambient temperature**", option **B** or **D**)
Power supply failure	• Configuration is retained in the device memory. • The current error is shifted into the last error function.
Potential equalization	**Requirements** • The potential matching should be connected up to the outer grounding terminal of the device. • For an optimum electromagnetic compatibility, the potential matching line should be as short as possible. • The recommended minimum cable cross-section is 2.5 mm^2. • The device's potential matching should be included in the local potential matching. For devices intended for use in hazardous locations, please observe the guidelines in the Ex documentation (XA).
Terminals	• Max. 2.5 mm^2 (power supply) • Max. 1.5 mm^2 (signal inputs, relay outputs, current output)

Cable entries	• M25 x 1.5
	• Cable gland non-hazardous area:
	  - Material: plastic
	  - Color: grey
	  - Clamping range: 9...17 mm
	• Cable gland ATEX:
	  - Material: plastic
	  - Color: black
	  - Clamping range: 9...13 mm
	• Number:
	  - 4 pieces (ordering code "**additional equipment**", option **1**)
	  - 3 pieces (ordering code "**additional equipment**", option **2**)

Cable specification	• Minimum requirement: cable temperature range ≥ ambient temperature • Standard installation cable is sufficient for signal inputs, relay outputs and current output.

Performance characteristics

Measured value resolution	• ± 5 cm or ± 1 pulse (irrespective of the selected measuring range)
Maximum measured error	The maximum measured error is identical with the measured value resolution (± 5 cm or ± 1 pulse, irrespective of the selected measuring range).
Influence of ambient temperature	• Please observe the minimum time (T_M) for one measuring cycle with the device 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.
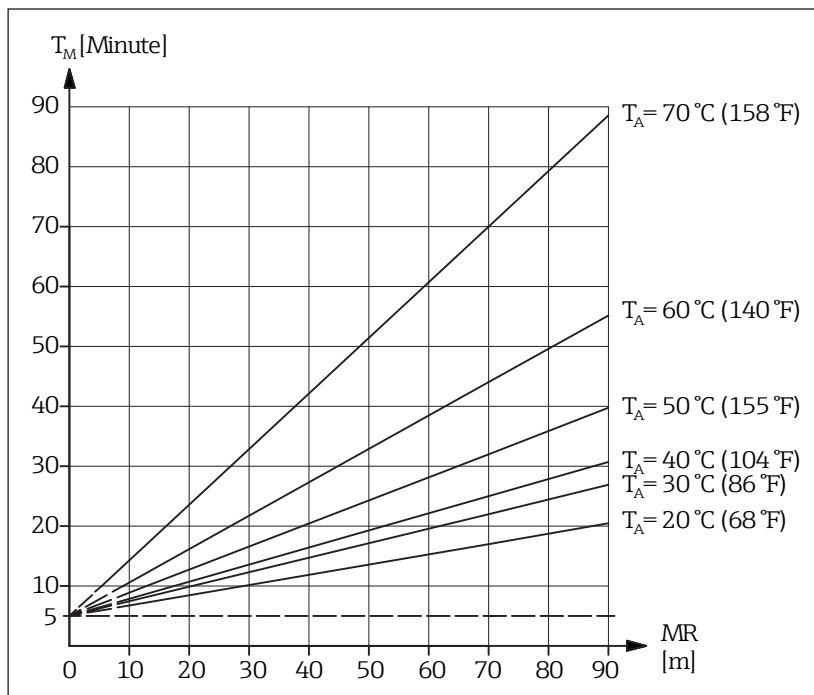
 6   *Influence of ambient temperature*

> **NOTICE**
> We recommend not to go below a time of 5 minutes for one measuring cycle.

Installation

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.
- 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.
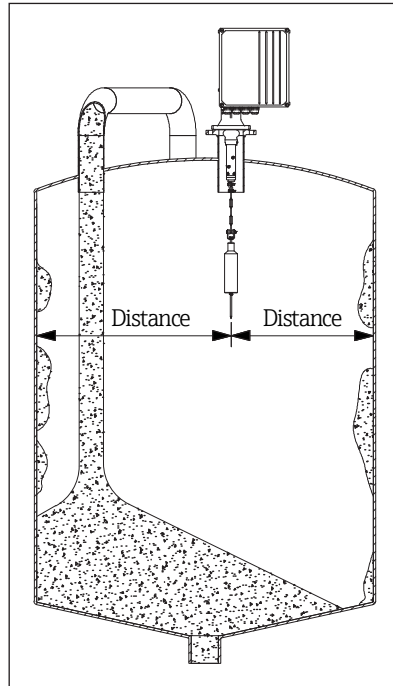
🖼7   Mounting location - Distances

NOTICE

Take due account of the shape and location of the product inflow cone and the outflow funnel within the vessel.
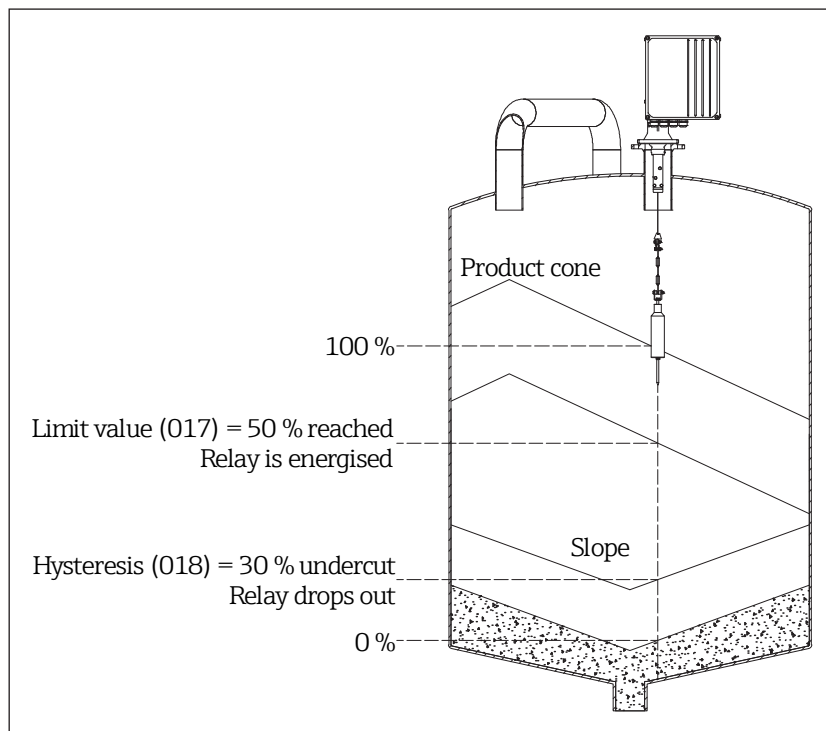
🖼8   Mounting location - Measurement processing

Orientation	The device 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 device can also be mounted horizontally onto it (maximum angle of inclination 2 °). There are suitable process adapters for the device available (→ 🕮25).

ℹ️ 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.

Installation instructions	• When installing outside, fit the protection hood (available as spare part) or install a weather protection roof. • Normal weights, umbrella weights and bag weights (→ 🕮18) can be passed through the DN100 mounting flange into the bunker/silo. 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. • When installing in bunkers/silos with heavy dust loadings, a slight positive pressure can be generated at the device 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 at the device flange.

Selection sensing weights	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. • Special types for your individual applications are available on request. • Dimensions → 🕮18

Normal weight (ordering code "**sensing weight**", option **B** or **C**)

• Application: For coarse bulk solids, for example coals, ores or stones and granulates.
• Material: Steel or stainless steel
• Weight: 3.5 kg
• The spike can be taken off.

Umbrella weight (ordering code "**sensing weight**", option **D** or **E**)

• Application: For very light and loose bulk solids, for example 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: 3.9 kg (option D) / 3.8 kg (option E)
• Maximum permissible temperature: +150 ℃ (+302 ℉)
• When folded closed, the weight can be passed through the DN100 mounting flange into the bunker.
• The umbrella has a large, square area, preventing it from being immersed in the bulk solids.
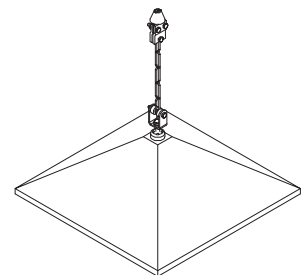
Bag weight (ordering code "**sensing weight**", option **G**)

• Application: In bunkers to which for example 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 ℃ (+302 ℉)
• 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 (ordering code "**sensing 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.
- Material: 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 (for example cellar wheel feeder or screw conveyor), no damage can result.
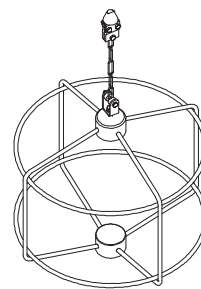
Bell weight (ordering code "**sensing weight**", option **L**)

- Application: For light and loose bulk solids; especially where higher temperatures and particular characteristics preclude the use of an umbrella weight.
- Material: Stainless steel 316Ti
- Weight: 4.3 kg

Oval float (ordering code "**sensing weight**", option **M** or **N**)

- Application: For liquids, for example fuel oil, also for granulates.
- Material: Hard PVC (maximum permissible temperature: 0...+60 °C (+32...+140 °F)) or stainless steel 316Ti
- Weight: The float must be filled with product to a total weight of 3.5 kg.
- Use of the oval float made of hard PVC in the "Dust ignition-proof" version is not permitted!
- Utilization of the oval float is permissible for process pressures 0.8...1.1 bar absolute.
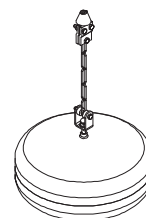
> 🛈 If the bunker/silo has a downstream crushing or milling system, we recommend using the electrical signal function "tape breakage" or the use of a cage weight to avoid damaging the system in the event of the sensing weight breaking free.

Special installation	**Protection hood**

A minimum space of 400 mm above the unit is necessary to remove the protection hood (→ 🗎25).

Environment

Ambient temperature range	**Measuring device** Ambient temperature at the measuring device: • -20...+70 ℃ (-4...+158 ℉) • -40...+70 ℃ (-40...+158 ℉) using the self-regulating device heater **Local display** • −20...+70 ℃ (−4...+158 ℉) • The readability of the display may be impaired at temperatures outside the temperature range. If operating outdoors: Avoid direct sunlight, particularly in warm climatic regions. ℹ️ Weather protection covers can be ordered from Endress+Hauser: see "Accessories" section → 🕮25
Storage temperature	-40...+80 ℃ (-40...+176 ℉)
Degree of protection	• IP 67 (with closed housing) • IP 65 (with closed housing and when using the external start button) • IP 20 (with open housing)
Electromagnetic compatibility (EMC)	• Interference emission in accordance with EN 61326, class B operating equipment • Interference immunity in accordance with EN 61326, Appendix A (industrial sector) • Normal installation cable is sufficient for the wiring.

Process

Process temperature range

- -20...+70 ℃ (-4...+158 ℉), ordering code "**process temperature**", option **1**
- -20...+150 ℃ (-4...+302 ℉), ordering code "**process temperature**", option **2**
- -20...+230 ℃ (-4...+446 ℉), ordering code "**process temperature**", option **3**

The maximum process temperature at the unit from the bottom of the adaptor flange upwards is +70 ℃ (+158 ℉). In the presence of higher process temperatures in the vicinity of the mounting location, suitable installation provisions must be utilized to assure these temperature guidelines.

$T_{P, max} (= T_{A, max}) \leq +70 \,℃ \, (+158 \,℉)$

$-20 \,℃ \leq T_{P, max} \leq +230 \,℃$
$(-4 \,℉ \leq T_{P, max} \leq +446 \,℉)$

⊡ *9   Permissible ambient temperatures at the FMM50*

An extension for the process connection can be used to separate the device from the higher process temperatures. The maximum allowed temperature of +70 ℃ (+158 ℉) can be met through this. The required length of the connection nozzle is dependant on the actual process and ambient conditions.
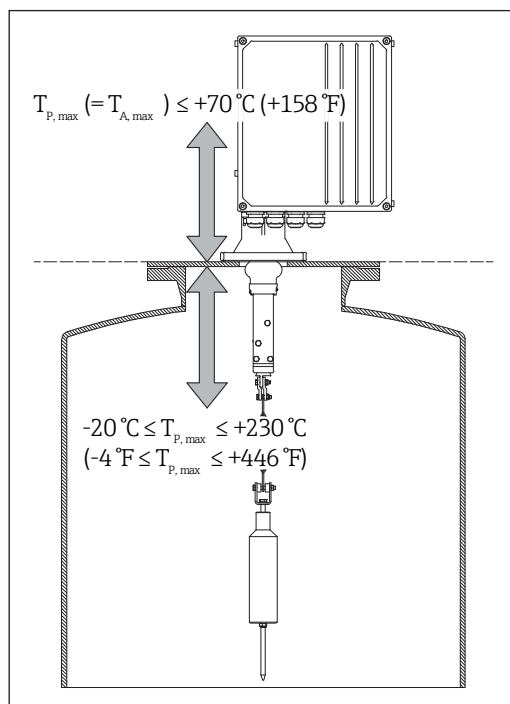
> We recommend the following minimum length of the process connection nozzle:
> - Min. 500 mm at process temperatures up to 150 ℃ (+302 ℉)
> - Min. 1000 mm at process temperatures up to 230 ℃ (+446 ℉)

> Suitable process adapter extensions with a length of 790 mm for use with 1000 mm wiper are available as accessory (→ 🗎25).

> - When using process nozzles longer than 230 mm (length of the standard wiper), optional larger wipers should be considered (see order code).
> - Alternatively, the length of the chain between tape border and sensing weight can be increased, corresponding parts are available as an accessory (→ 🗎25).

Process pressure range

- 80...110 kPa (0.8...1.1 bar) absolute (ordering code "**process pressure**", option **1**)
- 80...300 kPa (0.8...3.0 bar) absolute (ordering code "**process pressure**", option **2**)

Heating

It is recommended that at ambient temperatures below 0 ℃ (+32 ℉) a device with integrated heater is choosen (ordering code "**Ambient temperature**", option **B** and **D**).

Vibrations

Due to the layout, the device should not be exposed to vibration. The pendular motion of the motor combined with vibrations can lead to erratic triggering of the tape switch and therefore to faulty measurements.

Mechanical construction

Dimensions   Housing
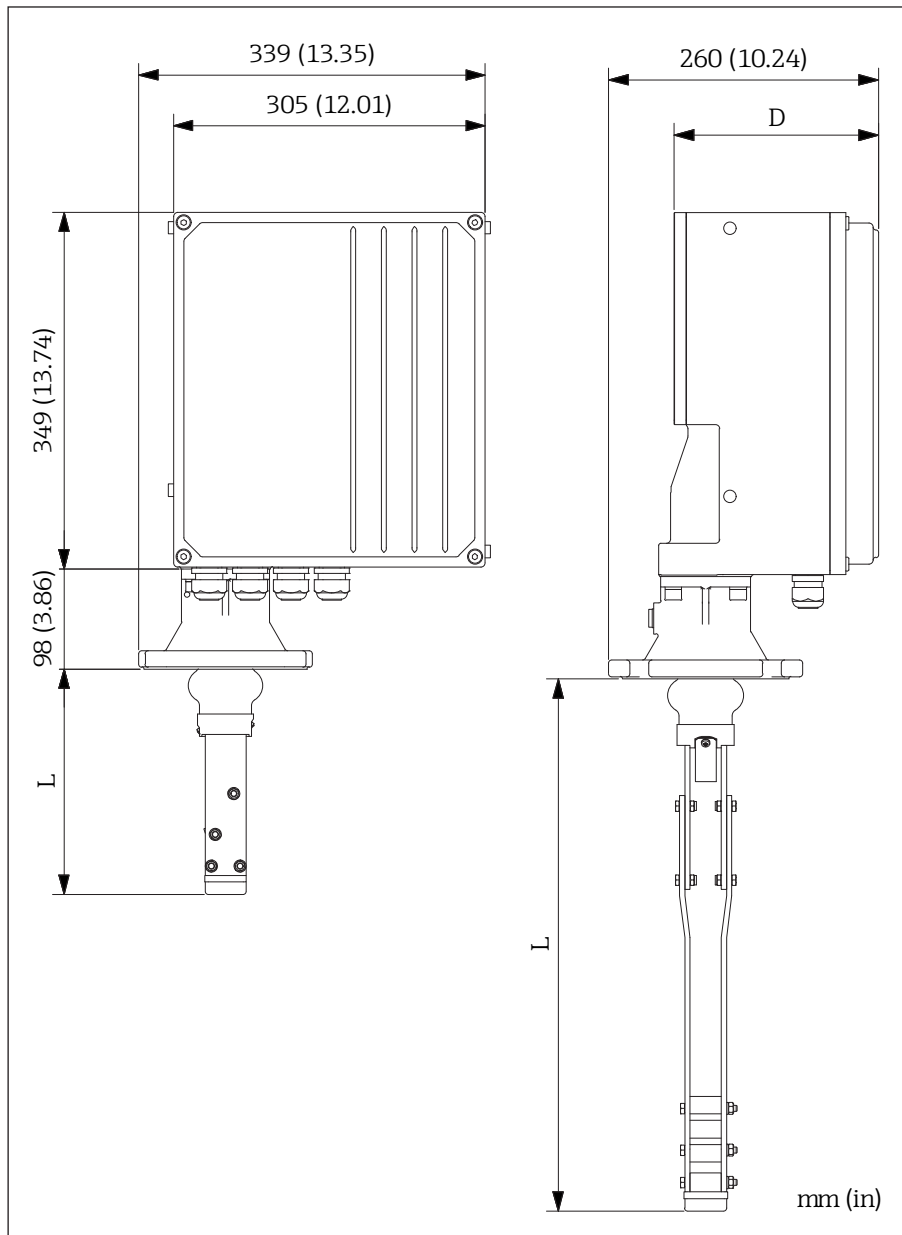
⊠10   Housing dimensions

The wiper length (L) depends on the selected maximum nozzle height:

Ordering code "**maximum connection height; wiper**"	L
A, B	225 mm (8.86 in)
C, D	515 mm (20.28 in)
E, F	1015 mm (39.96 in)

The housing depth (D) depends on the selected process pressure:
- Ordering code "**process pressure**", option **1:** 196 mm (7.72 in)
- Ordering code "**process pressure**", option **2:** 211 mm (8.31 in)

Process connection

*1 Minimum dimension for installing the wiper mechanism and the standard weight
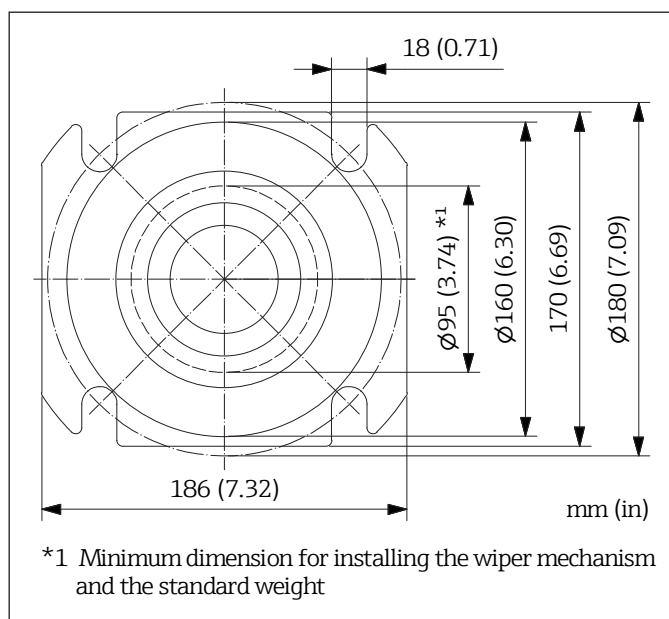
🖾 *11 Dimensions of the process connection*

Sensing weights
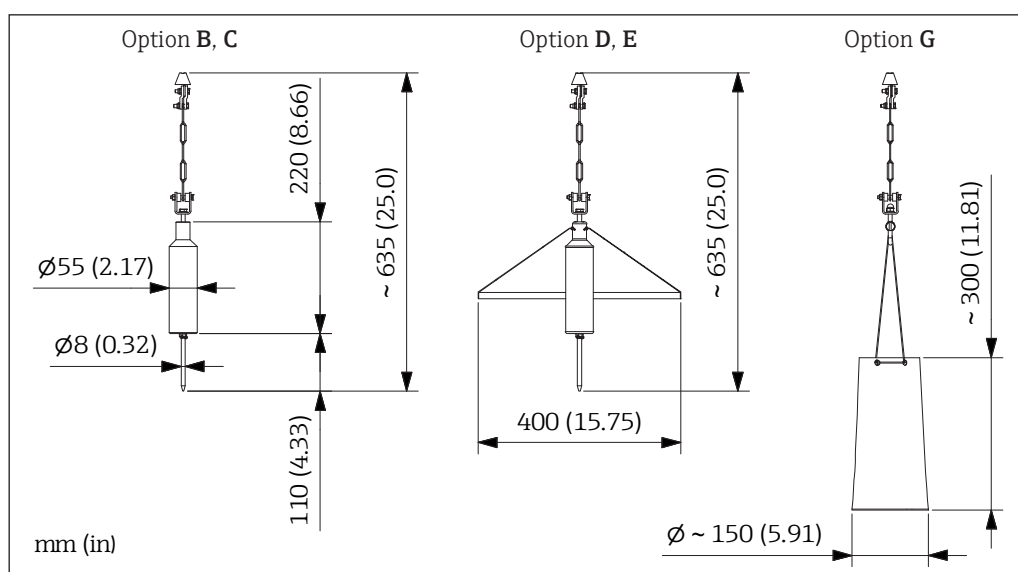
🖾 *12 Dimensions of sensing weights - Standard (with umbrella) and medium bag*
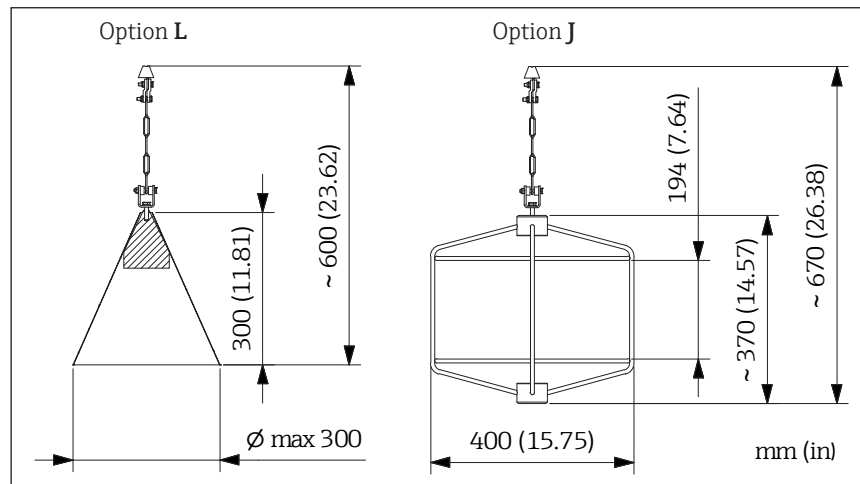
13 Dimensions of sensing weights - Bell and cage
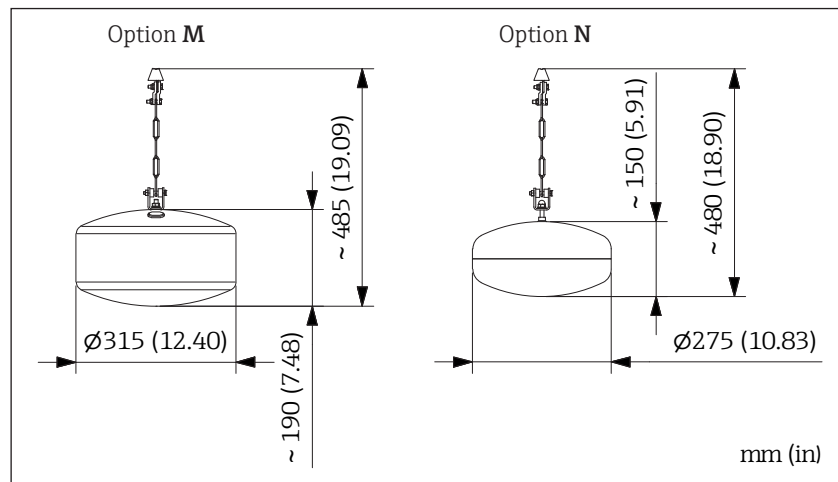
14 Dimensions of sensing weights - Oval float

Weight	• 22...28 kg (depends on the selected type of device, without sensing weight) • Sensing weights → 🖹14

Materials	• Housing: Aluminum (optional coated, RAL 5012 and RAL 7035)
	• Wiper:
	  - Alu/Steel or
	  - Stainless steel
	• Tape: Stainless steel
	• Sensing weights → 🖹14

Process connection	• Flange • Hole dimensions DN100 PN16 according to EN 1092-1

Operability

| Operating concept | **Operator-oriented menu structure for user-specific tasks** |

Operator-oriented menu structure for user-specific tasks
• Commissioning
• Operation
• Diagnostics
• Expert level

Quick and safe commissioning
• Menu guidance with brief explanations of the individual parameter functions

Reliable operation
• Operation in the following languages: English, German, French, Japanese
• Help texts in the selected language

Efficient diagnostics increase measurement availability
• Display of the current and the last error
• Help texts for every occuring error
• Various simulation options

Local operation

Operating elements
• Local operation (parameterization) with 3 push buttons: ⊟, ⊞, Ⓔ
• Local operation (start measuring) with one push button (1), optional with external start button (2), ordering code "**additional equipment**", option **2**
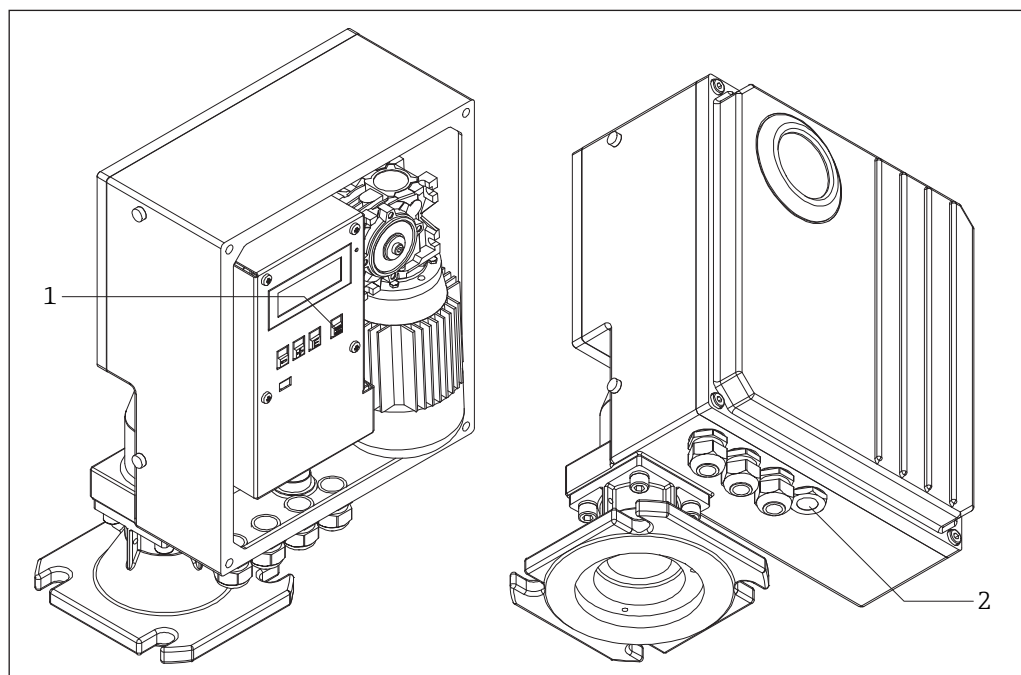
 15   Manual start of measurement

1   Internal start push button
2   External start push button (optional)

Display elements
• 4-line display
• 20 characters per line
• Display contrast adjustable by using a key combination
• Display of measurand numeric and graphic
• Permitted ambient temperature for the display: –20...+60 °C (–4...+140 °F), the readability of the display may be impaired at temperatures outside the temperature range.
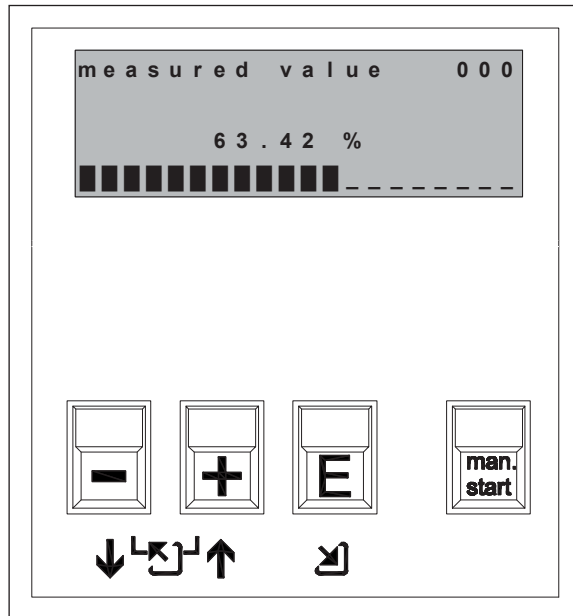
🖾16 Display and operation elements

Languages	• English • German • French • Japanese

Certificates and approvals

CE approval	The measuring system is in conformity with the statutory requirements of the applicable EU Directives. These are listed in the corresponding EU Declaration of Conformity along with the standards applied. Endress+Hauser confirms successful testing of the device by affixing to it the CE mark.

Ex approval	The measuring device is certified for use in hazardous areas and the relevant safety instructions are provided in the separate "Safety Instructions" (XA) document. Reference is made to this document on the nameplate. The separate Ex documentation (XA) containing all the relevant explosion protection data is available from your Endress+Hauser sales center and as a download from www.endress.com.

Other standards and guidelines	• EN 60529
	  Degrees of protection by housing (IP code)
	• EN 61010-1
	  Protection Measures for Electrical Equipment for Measurement, Control, Regulation and Laboratory Procedures.
	• IEC/EN 61326
	  Interference emissions (Equipment class B) and interference resistance (Attachment A - industrial systems)
	• IEC/EN 60079-0
	  Explosive atmospheres - Part 0: Equipment - General requirements
	• IEC/EN 60079-31
	  Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t"

Ordering information

Product structure	Detailed ordering information is available from the following sources:

- In the Product Configurator on the Endress+Hauser website: www.endress.com → Select your country → Products → Select measuring technology, software or components → Select the product (picklists: measurement method, product family etc.) → Device support (right-hand column): Configure the selected product → The Product Configurator for the selected product opens.
- From your Endress+Hauser Sales Center: www.addresses.endress.com

> **Product Configurator - the tool for individual product configuration**
> - Up-to-the-minute configuration data
> - Depending on the device: Direct input of measuring point-specific information such as measuring range or operating language
> - Automatic verification of exclusion criteria
> - Automatic creation of the order code and its breakdown in PDF or Excel output format

Scope of delivery	The scope of delivery includes a minimum of the FMM50 in one cardboard box. Depending on the ordering code the following additional parts are supplied:

- Sensing weight (option **J**, **L** and **M** in one separate cardboard box)
- Wiper extension 500/1000 mm in one separate cardboard box

User-specific settings	As a service, the device can be programmed according to the customers specification during assembly, in this case the following form must be completed and added to the order.

User-specific settings

Endress+Hauser

People for Process Automation

The order option for Silopilot 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 meas. type	021 time interval	022 time unit	023 normal/short	024 service 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. decimals	080 tag no.	083 distance unit	
_____ m/ft/in	☐ **English** ☐ Deutsch ☐ Français ☐ ニホソゴ	_____ 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.

ad042000en/07.17

Accessories

Various accessories, which can be ordered with the device or subsequently from Endress+Hauser, are available. Detailed information on the order code in question is available from your local Endress+Hauser sales center or on the product page of the Endress+Hauser website: www.endress.com.

Devcie-specific accessories

Protection hood

A protective hood is available for mounting the measuring device outdoors.

• Order code: 52027964
• Material: Stainless steel 304
• Weight: 7.5 kg
• The delivery contains suitable mounting bolts.
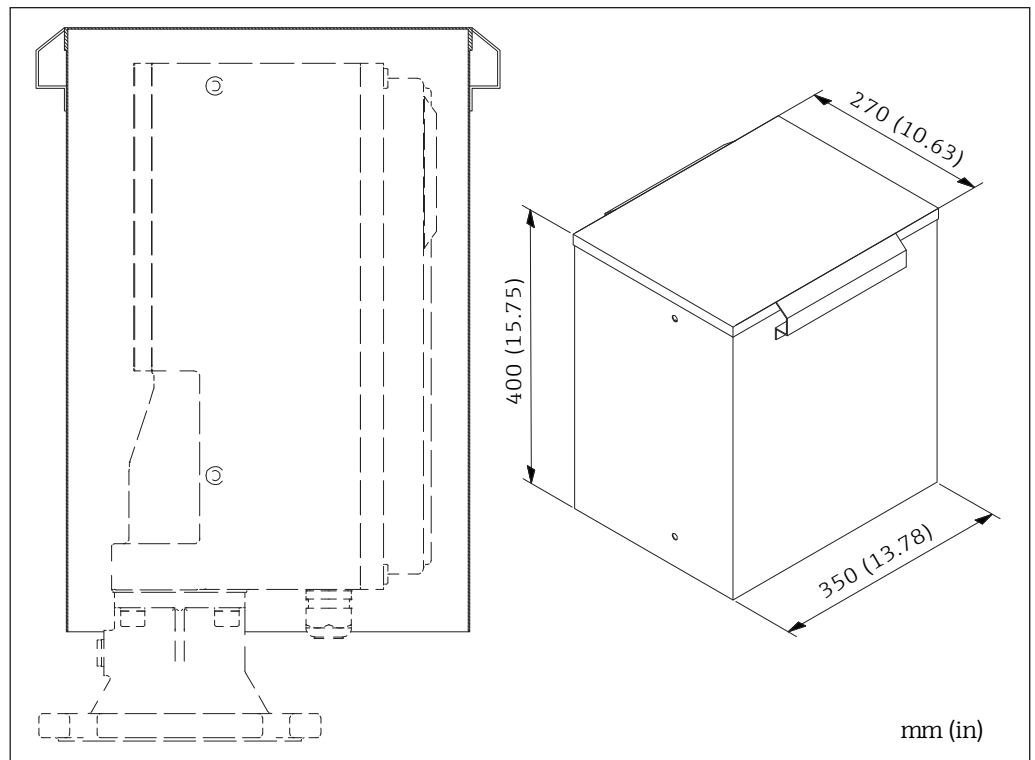
🖾 17 Protection hood

ℹ️ The protective hood is simply fitted over the device once installed and fastened with four screws.

Process adapter extension

If process temperatures are between +150 °C (+302 °F) and +230 °C (+446 °F), the following process adapter extensions can be used to reduce the temperature when using the 1000 mm wiper extension:

• Order code: 52028083

• Material: Stainless steel 316Ti

• Weight: 16 kg

• The delivery contains four suitable bolts and nuts to secure the measuring device to the process adapter extension.
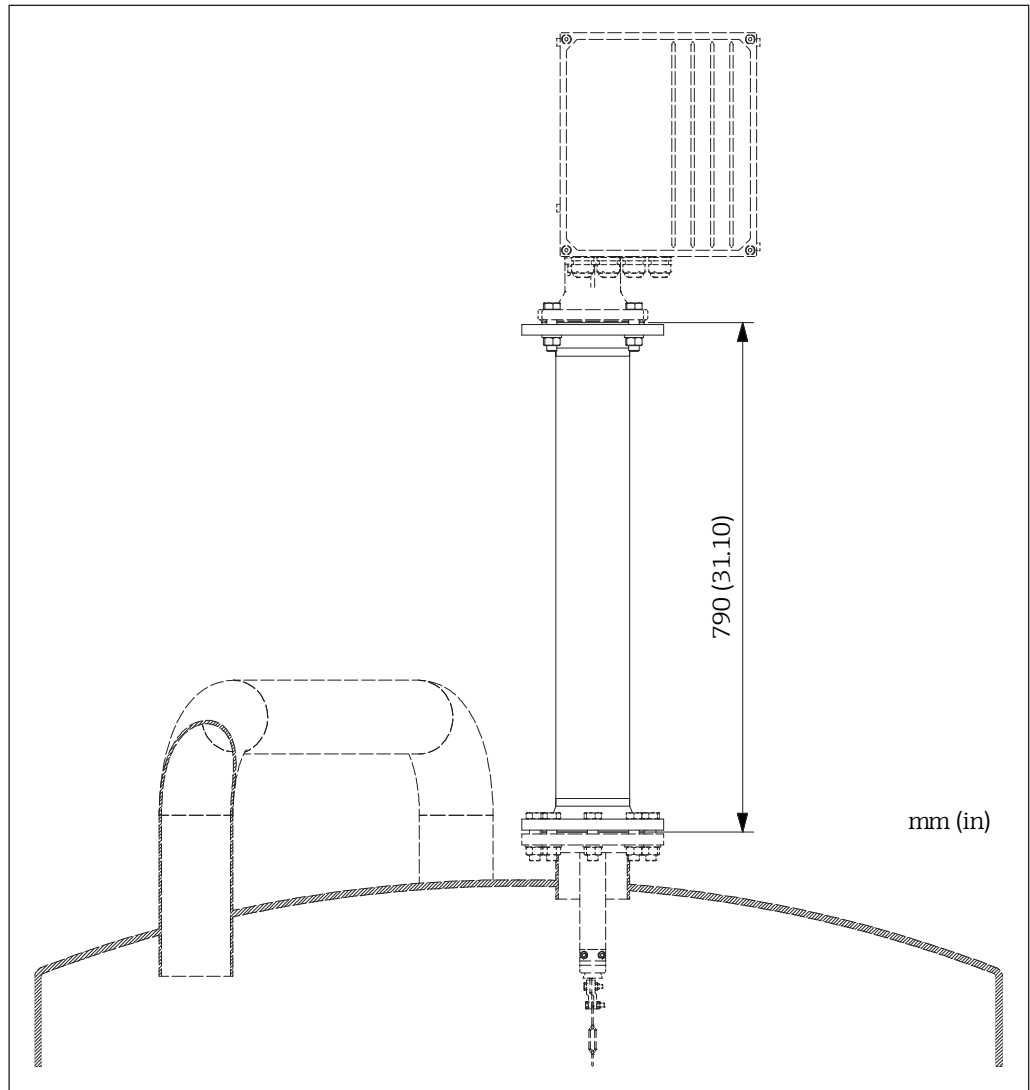
☒ *18   Process adapter extension*

Adapter flange

The following adapter flanges can be used to adapt to existing process connections:

- Order code:

71301820	DN150, PN16, EN1092-1, stainless steel 316Ti
71301821	DN150, PN16, EN1092-1, steel
71301822	DN200, PN16, EN1092-1, stainless steel 316Ti
71301824	DN200, PN16, EN1092-1, steel
71301811	6", 150lbs, ASME B16.5, stainless steel 316Ti
71301815	6", 150lbs, ASME B16.5, steel
71301816	8", 150lbs, ASME B16.5, stainless steel 316Ti
71301817	8", 150lbs, ASME B16.5, steel

- Dimensions (mm/in) and weights:

	A	B	C	D	Weight
71301820	8x 22/0.87	M16	22/0.87	285/11.22	9 kg
71301821					
71301822	12x 22/0.87	M16	24/0.94	340/13.4	15 kg
71301824					
71301811	8x 22.4/0.88	UNC 5/8"	25.4/1	279.4/11	10 kg
71301815					
71301816	8x 22.4/0.88	UNC 5/8"	28.6/1.13	342.9/13.5	18 kg
71301817					

- The delivery contains four suitable nuts to secure the measuring device to the adapter flange.

Example: ASME B16.5 6" 150lbs

⌀100 (3.94)   ⌀180 (7.09)

A   B   C   D   mm (in)
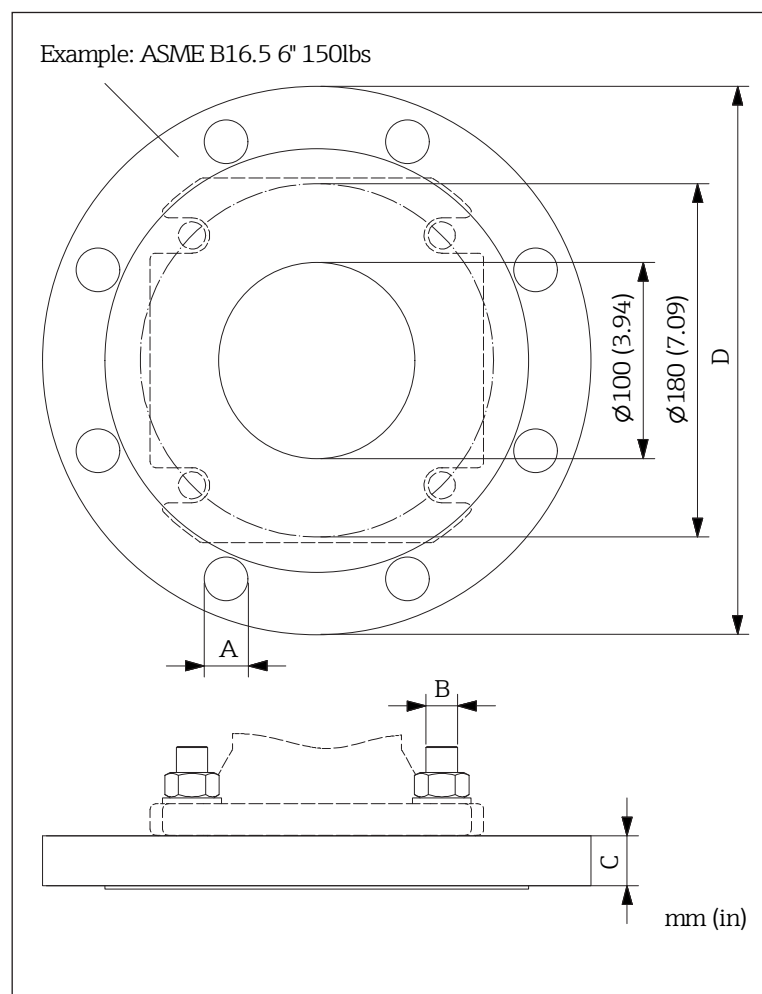
☒ *19 Adapter flange

ℹ The adapter flange is mounted between the process connection of the device and the application. As the flange is not very high, the clearance needed for the device is only marginally increased.

Adapter flange with studs for higher pressure ratings

The following adapter flanges can be used to adapt to existing process connections:
- Order code:

71301826	DN100, PN25/40, EN1092-1, stainless steel 316Ti
71301829	DN100, PN25/40, EN1092-1, steel
71301831	4", 300lbs, ASME B16.5, stainless steel 316Ti
71301833	4", 300lbs, ASME B16.5, steel
71301834	4", 600lbs, ASME B16.5, stainless steel 316Ti
71301835	4", 600lbs, ASME B16.5, stainless steel

- Dimensions (mm/in) and weights:

	A	B	C	D	Weight
71301826	8x M22	M16	25/0.98	235/9.25	7 kg
71301829					
71301831	8x UNC 3/4"	UNC 5/8"	31.8/1.25	254/10	11 kg
71301833					
71301834	8x UNC 7/8"	UNC 5/8"	38.1/1.5	273.1/10.75	16 kg
71301835					

- The delivery contains four suitable nuts to secure the measuring device to the adapter flange.
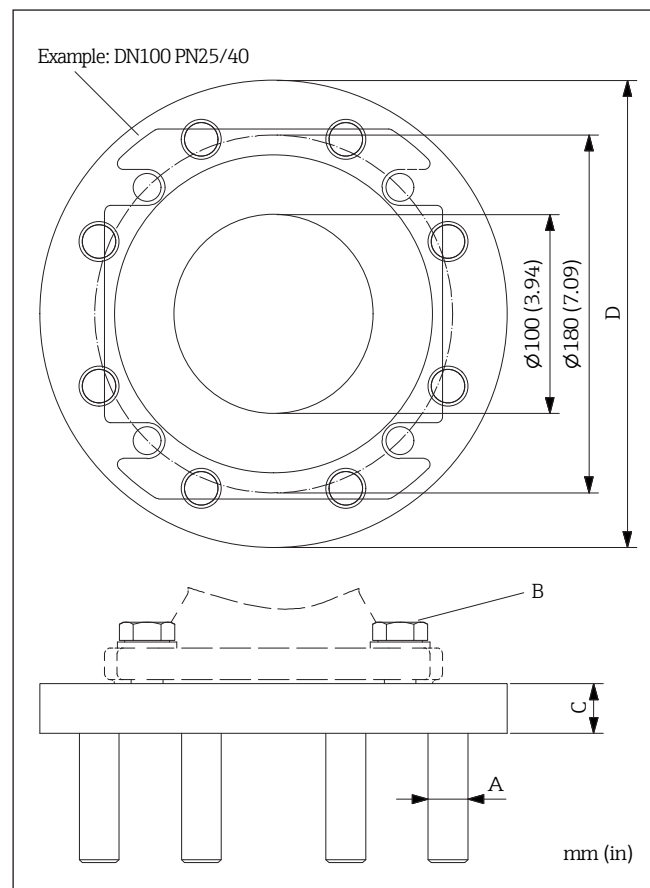
20 Adapter flange with studs for higher pressure ratings

The adapter flange is mounted between the process connection of the measuring device and the application.

Process adapter as replacement for the standard adapter

The standard process adapter can be replaced by one of the following to adapt to existing process connections:

- Order code:
  71301870   150lbs, RF 4", ASME, Aluminium
  71301872   150lbs, RF 4", ASME, Aluminium coated
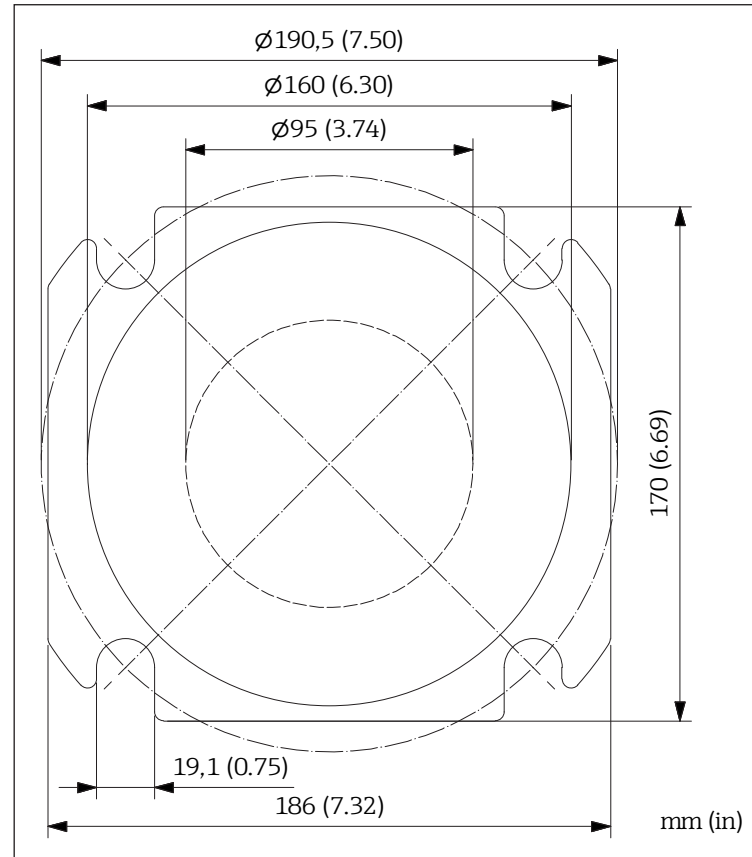
21 Process adapter as replacement for the standard adapter

The standard process adapter (→ 🔖18) can be easily replaced by releasing four screws.

Process adapters for smaller nominal diameters

The following process adapters can be used to adapt to existing process connections with smaller nominal diameters (< DN100):

- Order code:
71301837	DN50, PN16, EN1092-1, stainless steel 316Ti
71301839	DN50, PN16, EN1092-1, steel
71301841	DN65, PN16, EN1092-1, stainless steel 316Ti
71301843	DN65, PN16, EN1092-1, steel
71301844	DN80, PN16, EN1092-1, stainless steel 316Ti
71301857	DN80, PN16, EN1092-1, steel
71301858	2", 150lbs, ASME B16.5, stainless steel 316Ti
71301859	2", 150lbs, ASME B16.5, steel
71301861	3", 150lbs, ASME B16.5, stainless steel 316Ti
71301864	3", 150lbs, ASME B16.5, steel
71301867	4", 150lbs, ASME B16.5, stainless steel 316Ti
71301868	4", 150lbs, ASME B16.5, steel

- Dimensions (mm/in) and weights:

	A	B	C	D	E	Weight
71301837	400/	54,5/	125/	165/	18/	
71301839	15.75	2.15	4.92	6.50	0.71	10.5 kg
71301841	400/	70,3/	145/	185/	18/	
71301843	15.75	2.77	5.71	7.28	0.71	11 kg
71301844	200/	82,5/	160/	200/	20/	
71301857	7.87	3.25	6.30	7.87	0.79	10 kg
71301858	420/	52,6/	120,7/	152,4/	19,1/	
71301859	16.54	2.07	4.75	6.00	0.75	11 kg
71301861	220/	78/	152,4/	190,5/	23,9/	
71301864	8.66	3.07	6.00	7.50	0.94	11.5 kg
71301867	128/	102,4/	190,5/	228,6/	23,9/	
71301868	5.04	4.03	7.50	9.00	0.94	12.5 kg

- The delivery contains four suitable screws with nuts to secure the measuring device to the process adapter.

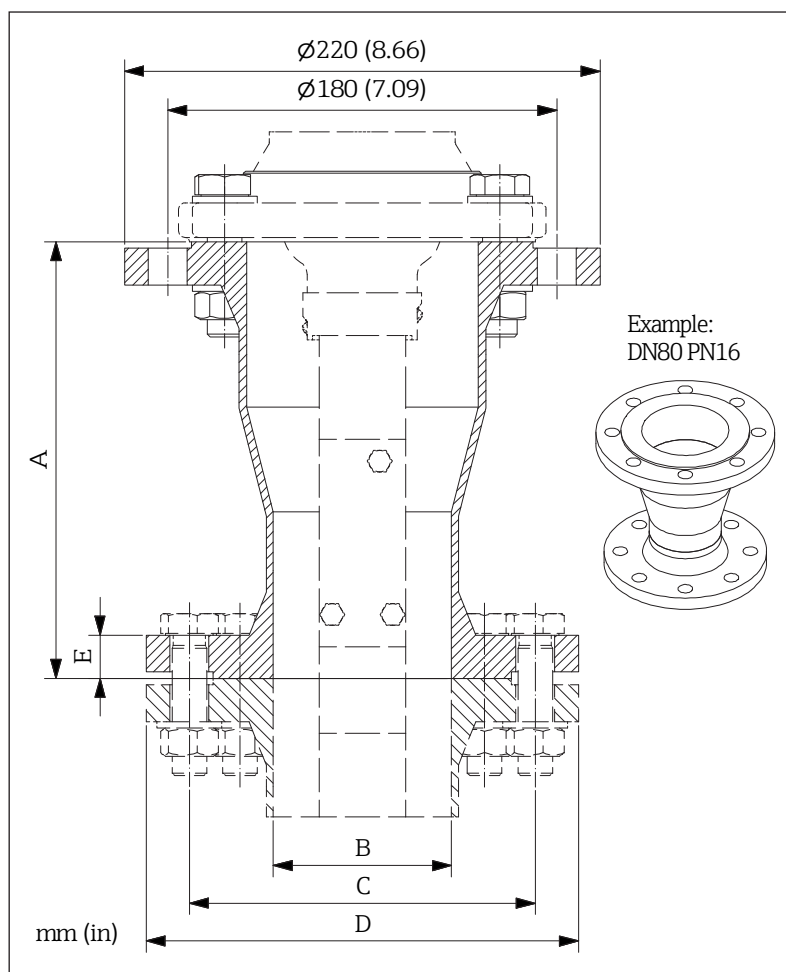*🖻22 Process adapters for smaller nominal diameters*

NOTICE

To prevent incorrect measurements if the sensing weight swings, the lower edge of the wiper should protrude out of the reduced area (diameter **B**).

Process adapter with spray water cleaning

The following process adapter can be used with spray water cleaning to prevent any damage from chemical substances that can enter the measuring device via the measuring tape:

- Order code: 71301886
- Material: Stainless steel 316Ti
- Weight: 15 kg
- The delivery includes four suitable screws with nut to secure the measuring device to the process adapter.
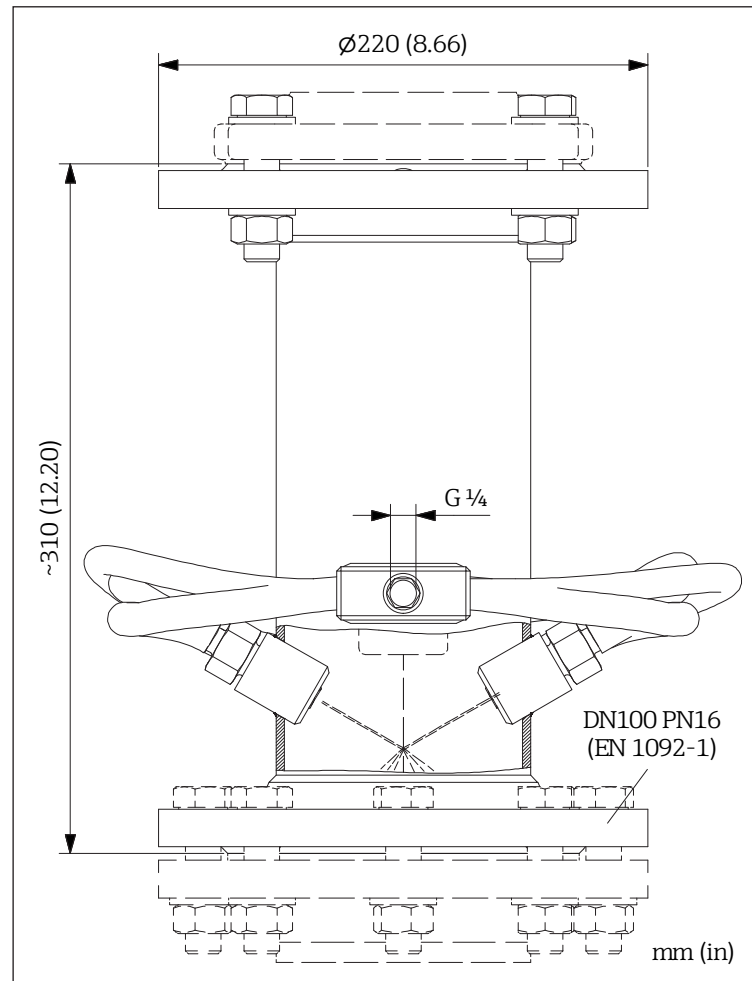

23   Process adapter with spray water cleaning

- The process adapter is mounted between the process connection of the measuring device and the application.
- Filtered water only should be used for spray water cleaning as otherwise the nozzles could clog.
- The amount of water needed is between 1 l/min (1 bar) and 3 l/min (6 bar).

Sensing weight for interface measurement in liquids with a significant difference in density

One of the following sensing weights can be used for interface measurement in liquids with a significant difference in density:

- Order code:
  71301873   Stainless steel 316Ti
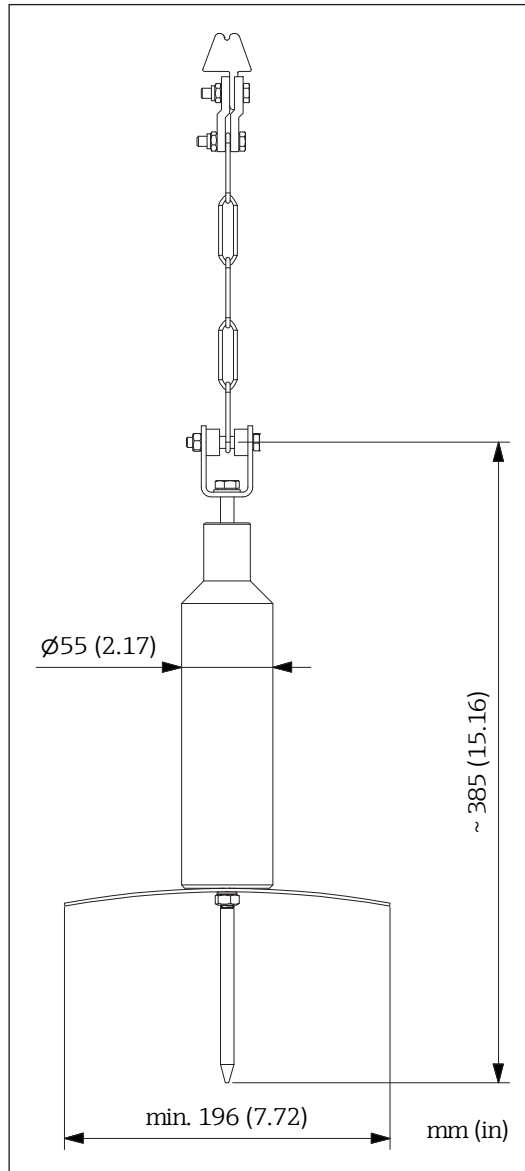 71301875   Stainless steel 316Ti, coated
- Weight: 4 kg
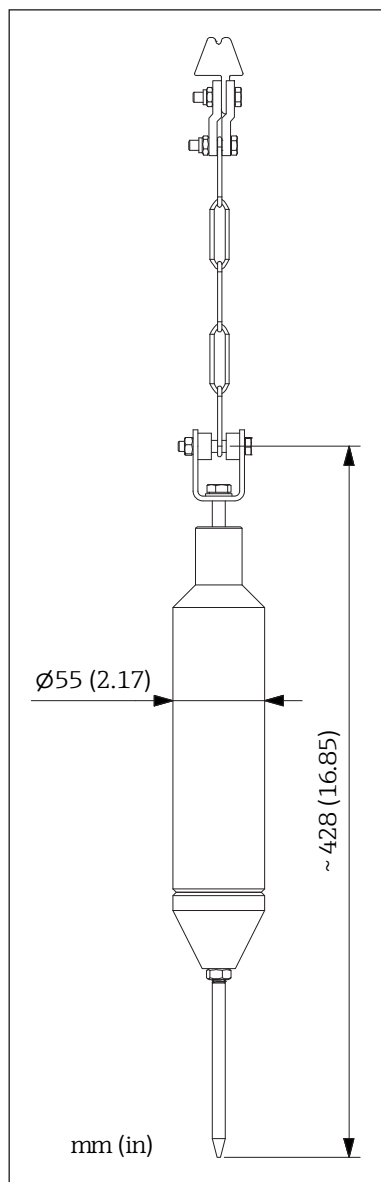
24 Sensing weight for HD interface measurement

The sensing weight can be easily replaced by releasing a screw.

Sensing weight for interface measurement in liquids with a minor difference in density

One of the following sensing weights can be used for interface measurement in liquids with a minor difference in density:

- Order code:
  71301876   Stainless steel 316Ti
  71301877   Stainless steel 316Ti, coated
- Weight: 4 kg

⌀55 (2.17)

~ 385 (15.16)

min. 196 (7.72)

mm (in)

☒25 *Sensing weight for LD interface measurement*

ℹ️ The sensing weight can be easily replaced by releasing a screw.

Chain to increase the block distance

The following chain can increase the block distance by a maximum distance of 2 m in the event of longer connections which the sensing weight should not enter into:
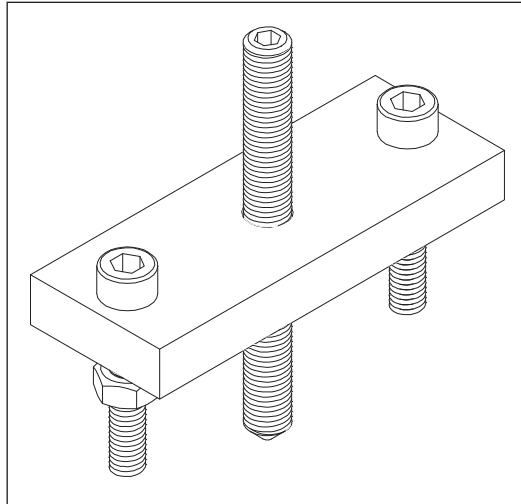
- Order code: 71301880
- Material: Stainless steel 316
- Length: 2 m
- Weight: 0.3 kg
- The chain can be shortened as required.

Devcie-specific tools	**Removal tool**

Using this puller tool and a 5 mm Allen key, the motor-gearbox-unit and tape spool can be removed easily for replacement.
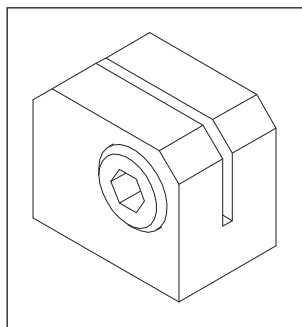- Order code: 71001353
- Weight: 0.25 kg

26   Removal tool

Tape stopper

Using the tape stopper and a 6 mm Allen key, the measuring tape can be secured inside the spool compartment, safeguarding against accidental roll-off when replacing the motor-gearbox-unit.
- Order code: 71001352
- Weight: 0.1 kg

27   Tape stopper

Documentation

For an overview of the scope of the associated Technical Documentation, refer to the W@M Device Viewer : Enter the serial number from the nameplate (www.endress.com/deviceviewer)

Standard documentation	Operating Instructions for Silopilot FMM50 Documentation code: BA00286F

Supplementary device-dependent documentation	Safety Instructions ATEX Documentation code: XA00425F

中国E+H技术销售 www.ainstru.com
电话：18923830905
邮箱：sales@ainstru.com

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