



Level



Pressure



Flow



Temperature



Liquid
Analysis



Registration



Systems
Components



Services



Solutions

Technical Information

Prosonic T FMU30

Ultrasonic Level Measurement

Compact transmitters for non-contact level measurement of fluids, pastes and coarse bulk materials



Application

- Continuous, non-contact level measurement in fluids, pastes, sullages and coarse bulk materials
- System integration via 4 to 20mA
- Maximum measuring range:
 - 1½" sensor: 5 m (16 ft) in fluids
2 m (6 ft) in bulk materials
 - 2" sensor: 8 m (26 ft) in fluids
3.5 m (11 ft) in bulk materials

Features and benefits

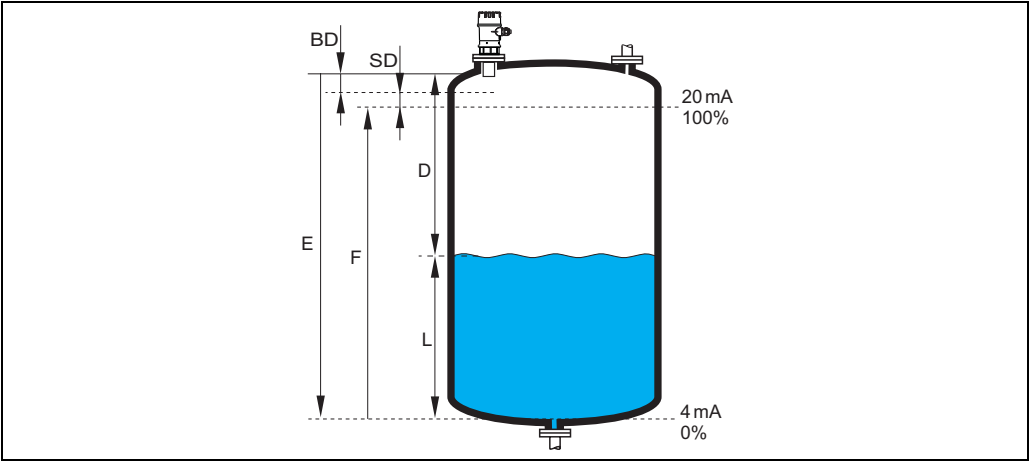
- Quick and simple commissioning via menu-guided on-site operation with four-line plain text display
- Envelope curves on the on-site display for simple diagnosis
- Linearisation function (up to 32 points) for conversion of the measured value into any unit of length, volume or flow rate
- Non-contact measurement method minimizes service requirements
- Installation possible from thread G 1½" or 1½ NPT upwards
- Integrated temperature sensor for automatic correction of the temperature dependent sound velocity

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Function and system design

Measuring principle



E: Empty distance
F: Span (full distance)
D: Distance from sensor membrane - product surface
L: Level
BD: Blocking distance
SD: Safety distance

Sensor	BD	Max. range fluids	Max. range bulk materials
1 1/2"	0.25 m (0.8 ft)	5 m (16 ft)	2 m (6.6 ft)
2"	0.35 m (1.1 ft)	8 m (26 ft)	3.5 m (11 ft)

Time-of-flight method

The sensor of the instrument transmits ultrasonic pulses in the direction of the product surface. There, they are reflected back and received by the sensor. The instrument measures the time t between pulse transmission and reception. The instrument uses the time t (and the velocity of sound c) to calculate the distance D between the sensor membrane and the product surface:

$$D = c \cdot t / 2$$

As the device knows the empty distance E from a user entry, it can calculate the level as follows:

$$L = E - D$$

An integrated temperature sensor compensates for changes in the velocity of sound caused by temperature changes.

Interference echo suppression

The interference echo suppression feature on the instrument ensures that interference echos (e.g. from edges, welded joints and installations) are not interpreted as a level echo.

Calibration

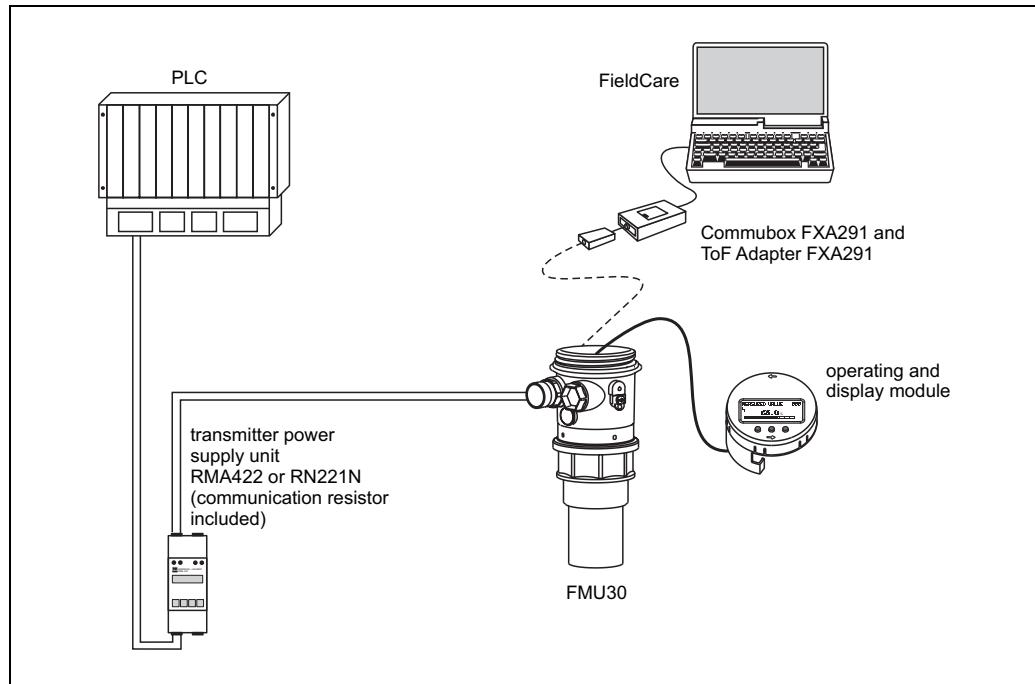
Enter the empty distance E and the span F to calibrate the device.

Blocking distance

Span F may not extend into the blocking distance BD . Level echos from the blocking distance cannot be evaluated due to the transient characteristics of the sensor.

Equipment architecture

The complete measuring system consists of:

**On-site operation**

- with display and operating module
- with a PC, Commubox FXA291 + ToF Adapter FXA291 and the operating software FieldCare

Input

Measured variable

The distance D between the sensor membrane and the product surface is measured, see also figure →  3.

Using the linearisation function, the device uses D to calculate:

- level L in any units
- volume V in any units
- flow Q across measuring weirs or open channels in any units

Measuring range

The measuring range is limited by the range of a sensor. The sensor range is, in turn, dependent on the operating conditions. To estimate the actual range, proceed as follows (see also the calculation example in the diagram):

1. Determine which of the influences shown in the following table are appropriate for your process.
2. Add the corresponding attenuation values.
3. From the total attenuation, use the diagram to calculate the range.

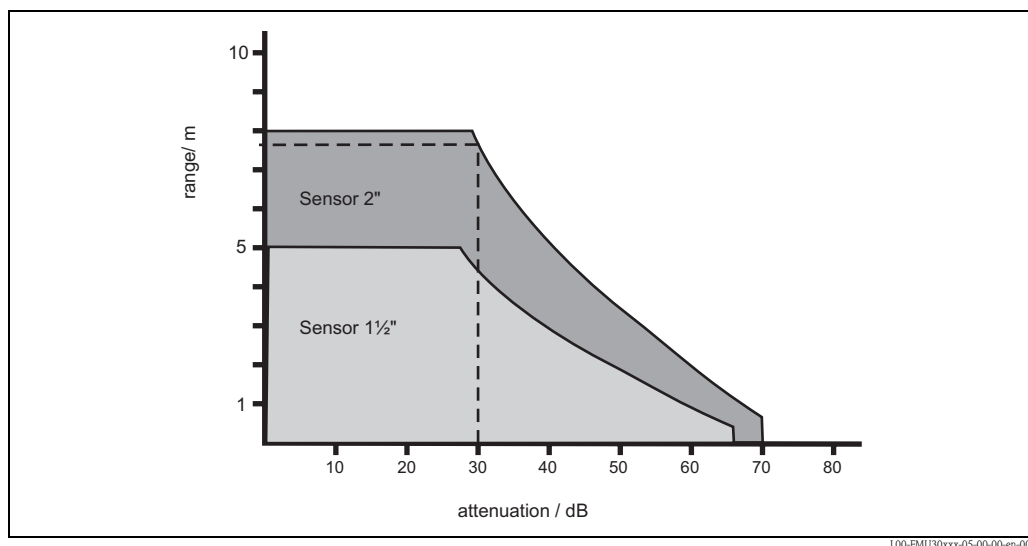
Fluid surface	Attenuation
Calm	0 dB
Waves	5 to 10 dB
Strong turbulence (e.g. stirrers)	10 to 20 dB
Foaming	Ask Endress+Hauser

Bulk material surface	Attenuation
Hard, rough (e.g. rubble)	40 dB
Soft (e.g. peat, dust-covered clinker)	40 to 60 dB

Dust	Attenuation
No dust formation	0 dB
Little dust formation	5 dB
Heavy dust formation	5 to 20 dB

Filling curtain in detection range	Attenuation
None	0 dB
Small quantities	5 to 10 dB
Large quantities	10 to 40 dB

Temperature difference between sensor and product surface	Attenuation
to 20 °C (68 °F)	0 dB
to 40 °C (104 °F)	5 to 10 dB
to 60 °C (140 °F)	10 to 15 dB

**Example**

- strong turbulence surface approx. 20 dB
 - no dust formation 0 dB
 - Filling curtain in detection range 10 dB
 - Temperature diff. < 20°C 0 dB
- approx. 30 dB => range approx. 7.8 m (26 ft) for FMU30 2" sensor

Operating frequency

1½" sensor	2" sensor
approx. 70 kHz	approx. 50 kHz

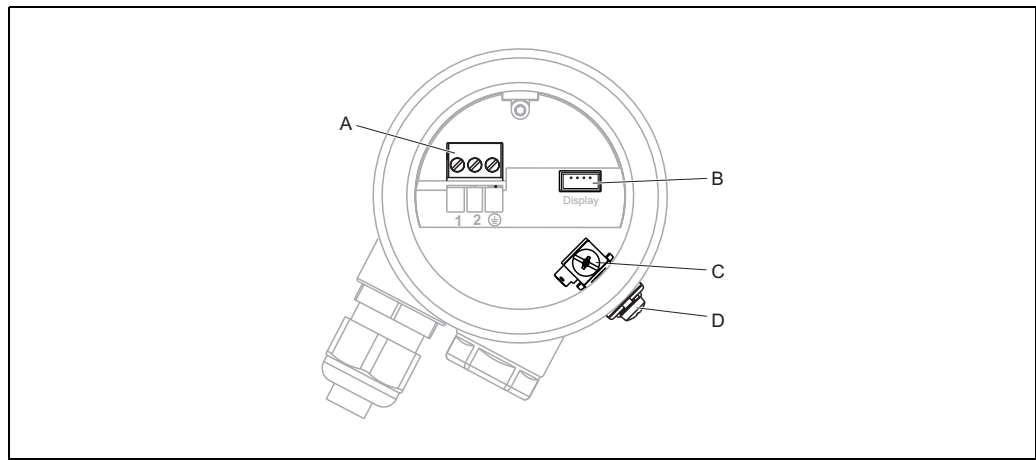
Output

Output signal	4 to 20 mA
Signal on alarm	Error information can be accessed via the following interfaces: ■ On-site display (error symbol, error code and plain text description) ■ Current output (error current configurable)
Output damping	Freely selectable, 0 to 255 s
Linearisation	The linearisation function of the instrument allows conversion of the measured value into any unit of length or volume. In open channels or measuring weirs, also a flow linearisation is possible (calculation of the flow from the measured level). The linearisation table for calculating the volume in an horizontal cylindrical tank is preprogrammed. You can also enter any number of other tables containing up to 32 value pairs either manually or semi-automatically (by filling the vessel under controlled conditions).

Auxiliary energy

Terminal compartment

The terminals are located underneath the housing cover.



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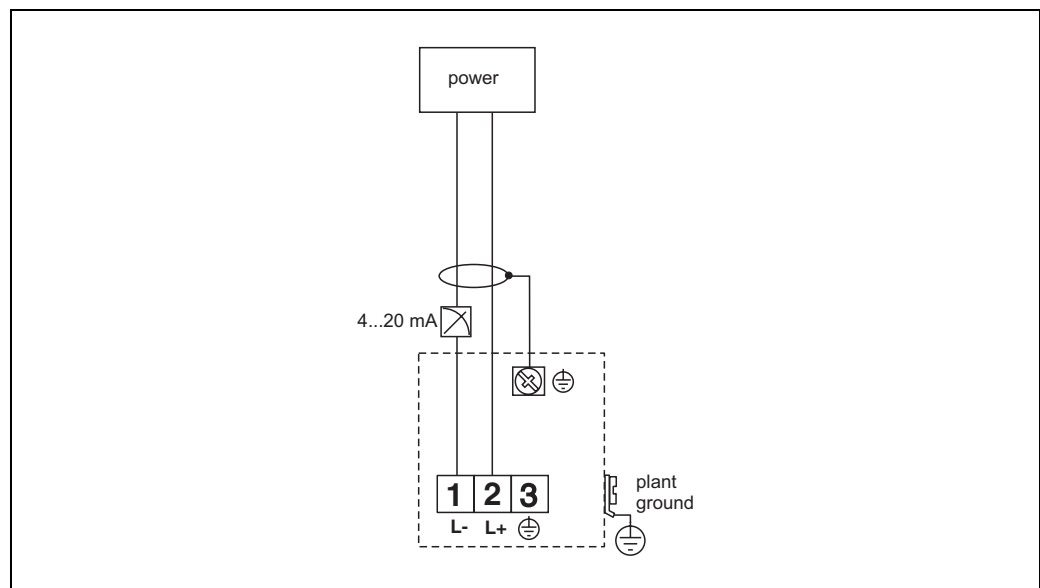
A: terminals

B: optional: display

C: internal earth terminal

D: external earth terminal

Terminal assignment



L00-FMU30xxx-04-00-00-en-015

- Connect the connecting line to the screw terminals (line cross-sections of 0.25 to 2.5 mm (0.01 to 0.1 in)) in the terminal compartment.
- A standard installation cable is sufficient for the connection.
- Protective circuitry against reverse polarity, RFI and over-voltage peaks is built into the device (see also Technical Information TI241F/00/EN "EMC Test Procedures")

Supply voltage

The following values are the voltages across the terminals directly at the instrument:

Current consumption	Terminal voltage minimum	Terminal voltage maximum
4 mA	14 V	35 V
20 mA	8 V	35 V

Terminals

Cable cross-section: 0.25 to 2.5 mm² (20 to 14 AWG)

Cable entry

G ½ or ½ NPT

Cable gland

M20x1.5 (recommended cable diameter 6 to 10 mm (0.24 to 0.39 in))

Power consumption

51 mW to 800 mW

Current consumption

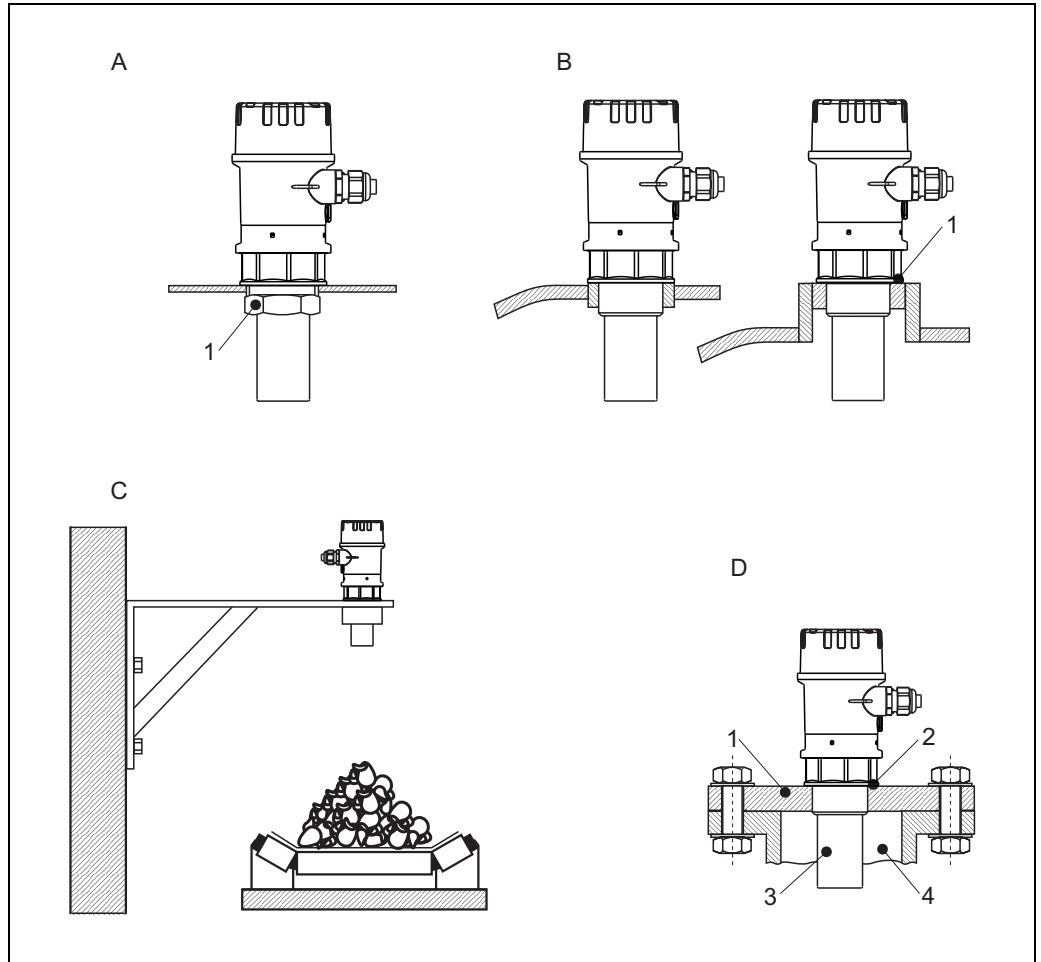
3.6 to 22 mA

Performance characteristics

Reaction time	The reaction time depends on the parameter settings. The minimum value is: min. 2 s
Reference operating conditions	■ Temperature = +20 °C (68 °F) ■ Pressure = 1013 mbar abs. (15 psi abs.) ■ Humidity = 50 % ■ Ideal reflective surface (e.g. calm, smooth fluid surface) ■ No interference reflections within signal beam ■ Set application parameters: – Tank shape = flat ceiling – Medium property = liquid – process conditions = calm surface
Measured value resolution	1 mm (0.04 in)
Pulse frequency	max. 0.5Hz The exact values are dependent on the type of device and the parameter settings.
Measuring error	Typical specifications for reference operating conditions (include linearity, repeatability, and hysteresis): ±3 mm (±0.12 in) or 0.2% of set measuring distance (empty calibration) ¹ ¹ whichever is greater
Influence of the vapor pressure	The vapor pressure at 20 °C (68 °F) gives a hint on the accuracy of the ultrasonic level measurement. If the vapor pressure at 20 °C (68 °F) is below 50 mbar (1 psi), ultrasonic level measurement is possible with a very high accuracy. This is valid for water, aqueous solutions, water-solid-solutions, dilute acids (hydrochloric acid, sulfuric acid, ...), dilute bases (caustic soda, ...), oils, greases, slurries, pastes, ... High vapor pressures or outgassing media (ethanol, acetone, ammonia, ...) can influence the accuracy. If conditions like these are present, please contact the Endress+Hauser support.

Installation conditions

Installation variants



L00-FMU30xxx-17-00-00-xx-002

A: Installation with counter nut (1: counter nut (PC) supplied for G1½ and G2 instruments)

B: Installation with sleeve (1: sealing ring (EPDM) supplied)

C: Installation with installation bracket

D: Installation with screw in flange

1: screw in flange

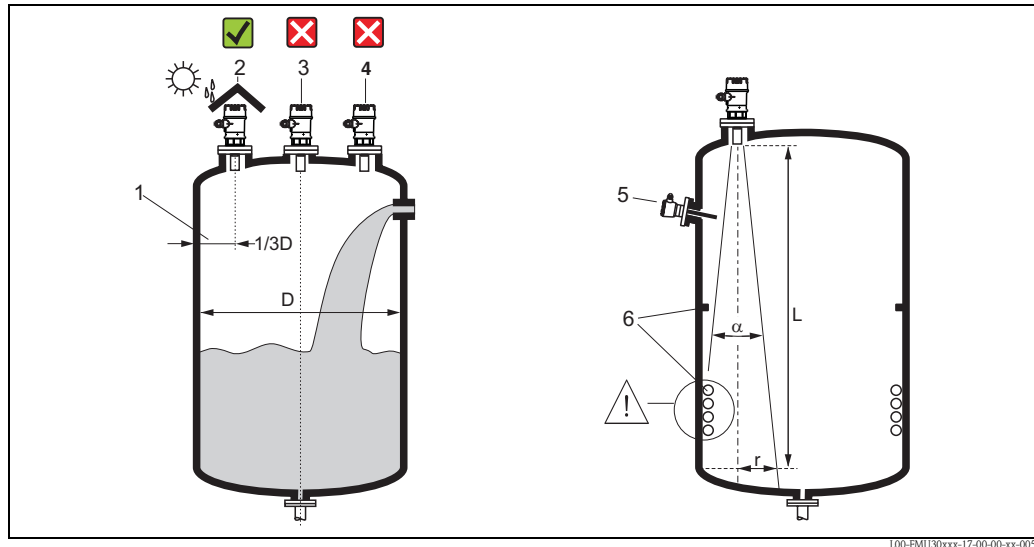
2: sealing ring (EPDM) supplied

3: sensor

4: nozzle

For installation bracket or screw in flange → 23, "Accessories".

Installation conditions for level measurements



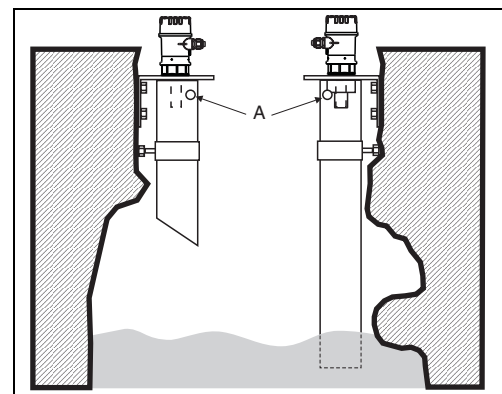
- Do not install the sensor in the middle of the tank (3). We recommend leaving a distance between the sensor and the tank wall (1) measuring 1/3 of the tank diameter.
- Protect the device against direct sun or rain (2).
- Avoid measurements through the filling curtain (4).
- For solid application where bulk solid cones appear, align the sensor membrane perpendicular to the surface.
- Make sure that equipment (5) such as limit switches, temperature sensors, etc. are not located within the emitting angle α . In particular, symmetrical equipment (6) such as heating coils, baffles etc. can influence measurement.
- Never install two ultrasonic measuring devices in a tank, as the two signals may affect each other.
- To estimate the detection range, use the 3 dB emitting angle α .

Sensor	α	$L_{\max}$	$r_{\max}$
1½"	11°	5 m (16 ft)	0.48 m (1.6 ft)
2"	11°	8 m (26 ft)	0.77 m (2.5 ft)

Installation in narrow shafts

In narrow shafts with strong interference echoes, we recommend using an ultrasound guide pipe (e.g. PE or PVC wastewater pipe) with a minimum diameter of 100 mm (3.94 in).

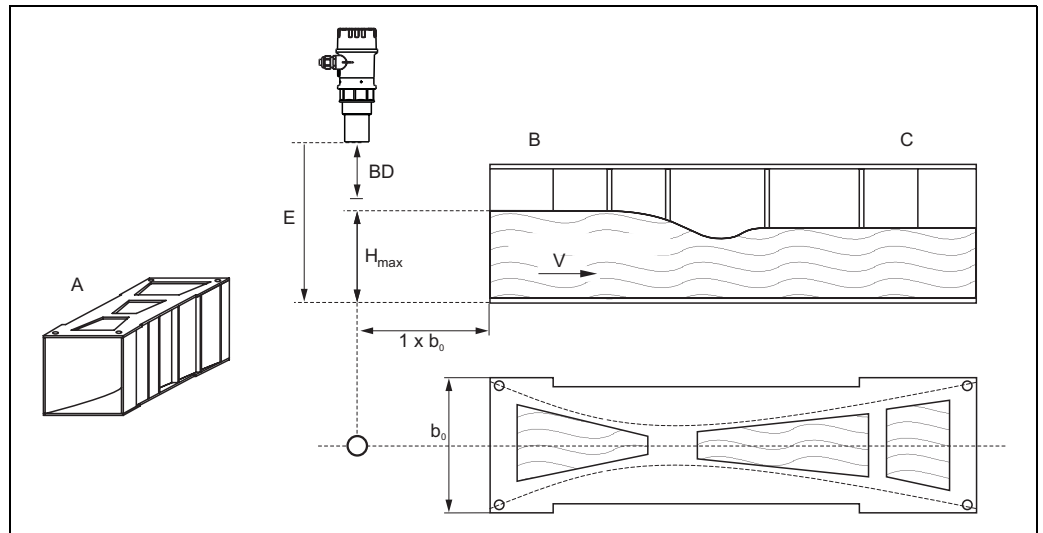
Make sure that the pipe is not soiled by accumulated dirt. If necessary, clean the pipe at regular intervals.



A: venting hole

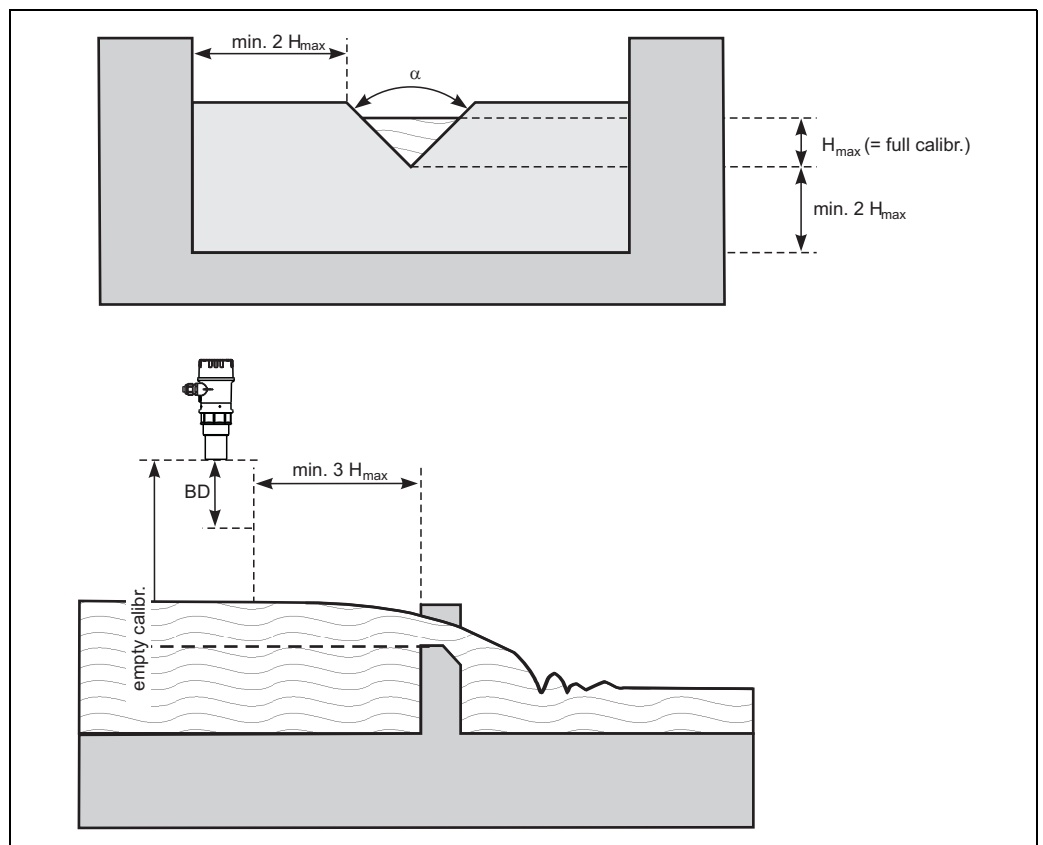
Installation conditions for flow measurements

- Install the instrument at the inflow side (B), as close above the maximum water level $H_{\max}$ as possible (take into account the blocking distance BD).
- Position the instrument in the middle of the channel or weir.
- Align the sensor membrane parallel to the water surface.
- Keep to the installation distance of the channel or weir.

Example: Khafagi-Venturi flume

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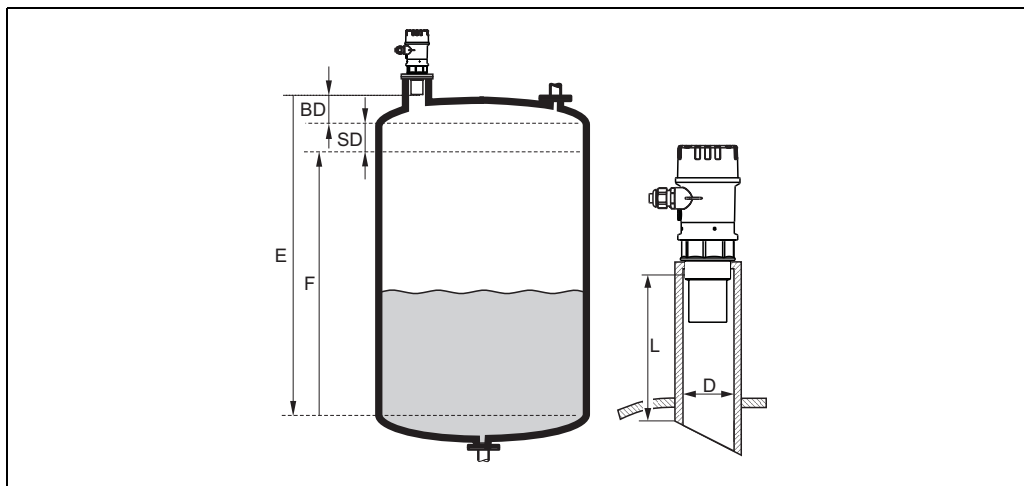
A: Khafagi-Venturi flume; B: inflow; C: outflow; E: empty calibration; V: direction of flow

Example: Triangular weir

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Blocking distance, nozzle installation

Install the instrument at a height so that the blocking distance BD is not undershot, even at maximum fill level. Use a pipe nozzle if you cannot maintain the blocking distance in any other way. The interior of the nozzle must be smooth and may not contain any edges or welded joints. In particular, there should be no burr on the inside of the tank side nozzle end. Note the specified limits for nozzle diameter and length. To minimise disturbing factors, we recommend an angled socket edge (ideally 45°).



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BD: blocking distance; **SD:** safety distance; **E:** empty calibration; **F:** full calibration (span); **D:** nozzle diameter; **L:** nozzle length

Nozzle diameter	Maximum nozzle length mm (in)	
	1½" sensor	2" sensor
DN50/2"	80 (3.15)	
DN80/3"	240 (9.45)	240 (9.45)
DN100/4"	300 (11.8)	300 (11.8)
DN150/6"	400 (15.7)	400 (15.7)
DN200/8"	400 (15.7)	400 (15.7)
DN250/10"	400 (15.7)	400 (15.7)
DN300/12"	400 (15.7)	400 (15.7)
Emitting angle α	11°	11°
Blocking distance m (ft)	0.25 (0.8)	0.35 (1.1)
Max. range m (ft) in liquids	5 (16)	8 (26)
Max. range m (ft) in solids	2 (6.6)	3.5 (11)



Caution!

If the blocking distance is undershot, it may cause device malfunction.



Note!

In order to notice if the level approaches the blocking distance, you can specify a safety distance (SD). If the level is within this safety distance, the instrument outputs a warning or alarm message.

Ambient conditions

Ambient temperature	-20 °C to +60 °C (-4 °F to 140 °F) If the device is operated outdoors, protect the device against direct sun or rain.
Storage temperature	-40 °C to +80 °C (-40 °F to 176 °F)
Resistance to alternating temperature cycles	to DIN EN 60068-2-14; Nb test : +60°C/-20°C (140 °F/-4 °F), 0.5K/min, 100cycles
Climate class	DIN EN 60068-2-38 (Test Z/AD) DIN/IEC 68 T2-30Db
Ingress protection	■ With closed housing, tested according to – IP 68 – IP 66 ■ With open housing: IP 20 (also ingress protection of the display)
Vibration resistance	DIN EN 60068-2-64 / IEC 68-2-64: 20 to 2000 Hz, 1 (m/s ²) ² /Hz; 3 x 100 min
Electromagnetic compatibility (EMC)	Electromagnetic compatibility to EN 61326. For details refer to the declaration of conformity. Influence of EMC < 1 % FS

Process conditions

Process temperature	-20°C to +60°C (-4 °F to 140 °F) A temperature sensor is integrated in the sensor for correction of the temperature-dependent time-of-flight.
Process pressure	0.7 bar to 3 bar abs. (10.15 psi to 43.5 psi)

Design; dimensions

Weight

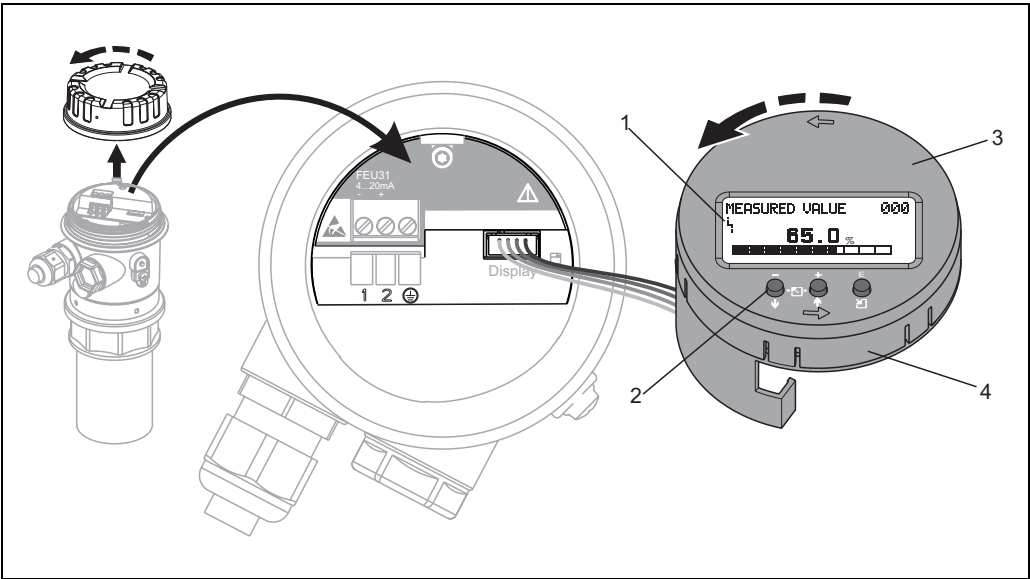
Housing design

Process connection,
sensor material,
matching layer

Human interface

Display and operating elements

The LCD module for display and operation is located beneath the housing cover. Open the cover to operate the device.

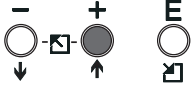
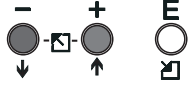
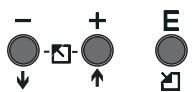


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1: Display symbol; 2: Function keys; 3: Display (rotatable); 4: Plug-in module

Symbol in display			
	continuous	flashing	
Meaning	Alarm	Warning	Security Locking

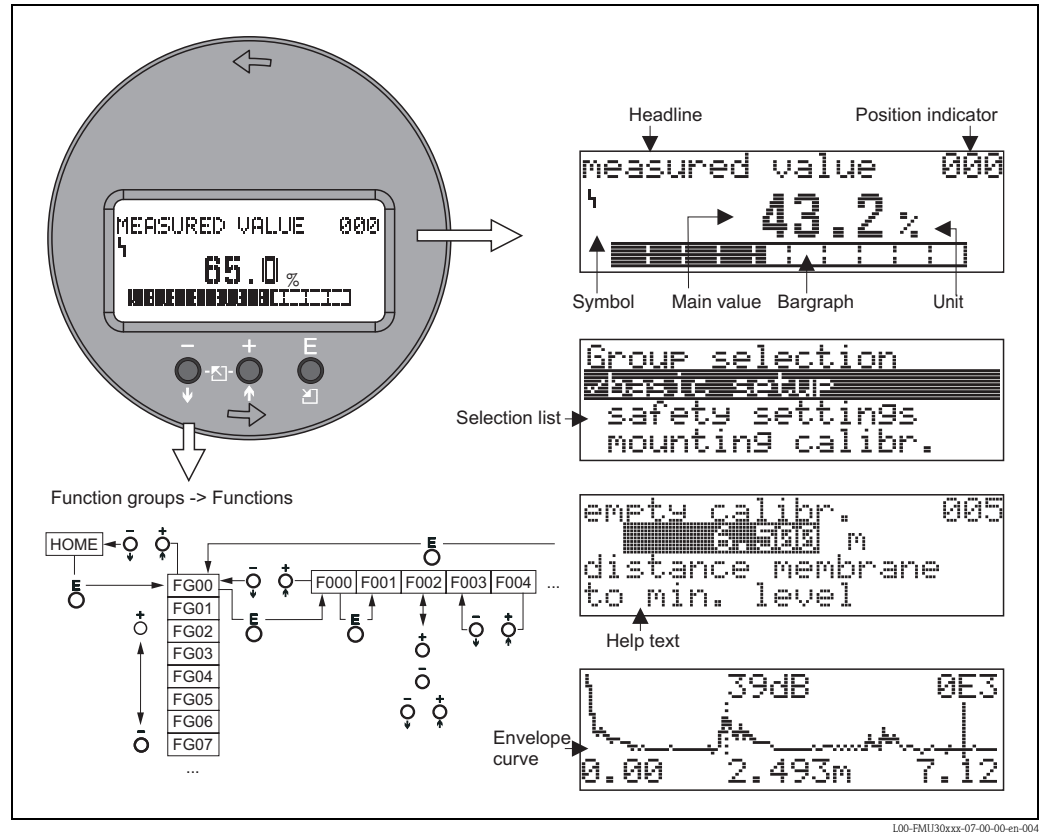
Function of the keys

Key(s) (The keys to press are displayed in grey.)	Meaning
	Navigate upwards in the selection list Edit numeric value within a function
	Navigate downwards in the selection list Edit numeric value within a function
	Navigate to the left within a function group
	Navigate to the right within a function group, confirmation.
	Contrast settings of the LCD
	Hardware lock / unlock After a hardware lock, an operation of the instrument via display or communication is not possible! The hardware can only be unlocked via the display. An unlock parameter must be entered to do so.

On-site operation

Operation

The LC-Display allows configuration via 3 keys directly at the instrument. All device functions can be set through a menu system. The menu consists of function groups and functions. Within a function, application parameters can be read or adjusted. The user is guided through a complete configuration procedure.



L00-FMU30xxx-07-00-00-en-004

Remote operation

Operation with FieldCare

FieldCare is Endress+Hauser's FDT based Plant Asset Management Tool. It can configure all intelligent field devices in your plant and supports you in managing them. By using status information, it also provides a simple but effective means of checking their health.

- Supports Ethernet, HART, PROFIBUS PA, FOUNDATION Fieldbus etc.
- Operates all Endress+Hauser devices
- Operates all third-party actuators, I/O systems and sensors supporting the FDT standard
- Ensures full functionality for all devices with DTMs
- Offers generic profile operation for any third-party fieldbus device that does not have a vendor DTM

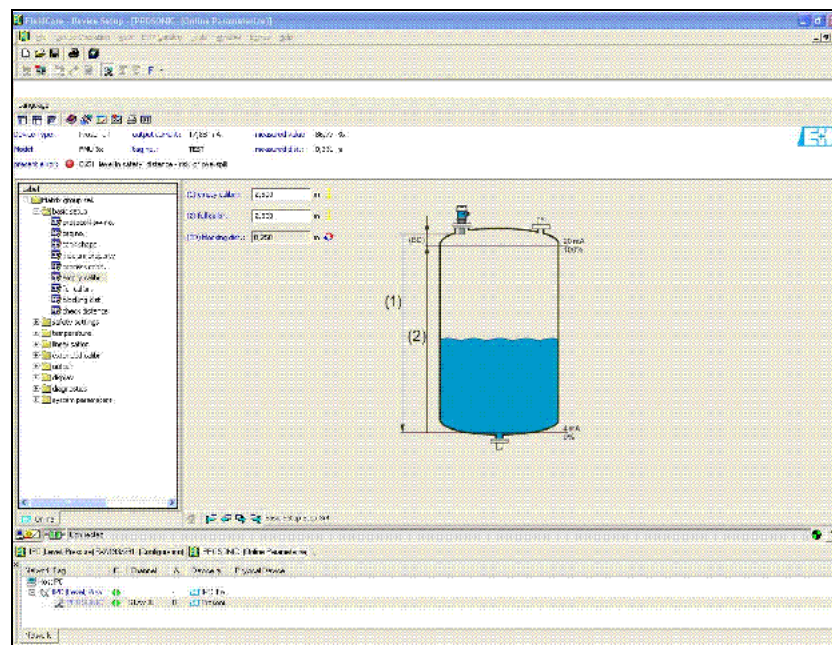
Connection for FMU30:

- Commubox FXA291 and ToF adapter FXA291 (available as accessory)

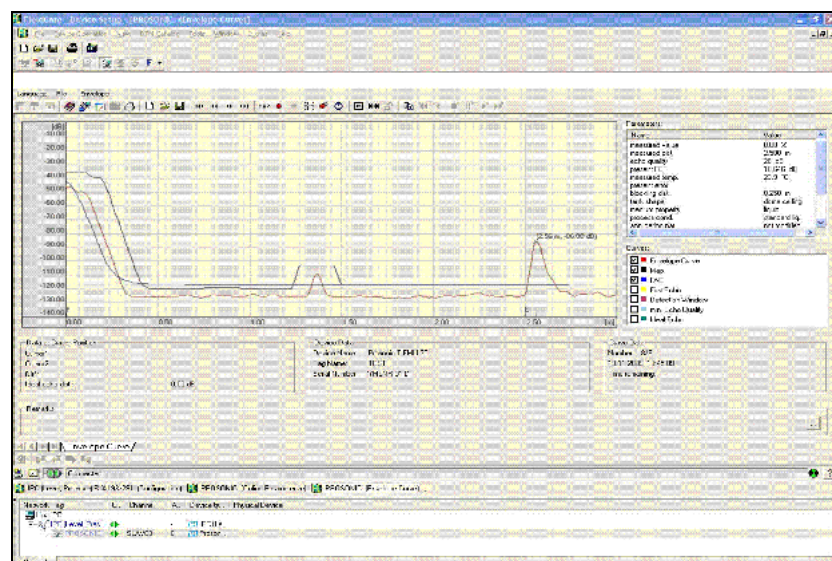
Using the following functions:

- Signal analysis via envelope curve
- Linearisation table (graphically supported creation, editing, importing and exporting)
- Loading and saving of instrument data (Upload/Download)
- Documentation of measuring point

Menu-guided commissioning:



Signal analysis via envelope curve:



Certificates and Approvals

CE mark	The measuring system meets the legal requirements of the EC-guidelines. Endress+Hauser confirms the instrument passing the required tests by attaching the CE-mark.
Ex approval	The available certificates are listed in the ordering information. Note the associated safety instructions (XA) and control or installation drawings (ZD).
External standards and guidelines	EN 60529 Protection class of housing (IP-code) EN 61326 series EMC product family standard for electrical equipment for measurement, control and laboratory use. NAMUR Standards committee for measurement and control in the chemical industry

Ordering information

FMU30

Versions that mutually exclude one another are not marked.

10	Approval:	
	AA	Non-hazardous area
	BB	ATEX II 1/2G Ex ia IIC T6
	IB	IEC Ex zone 0/1, Ex ia IIC T6 Ga/Gb
	NB	NEPSI zone 0/1, Ex ia IIC T6 Ga/Gb
	TA	TIIS Ex ia IIC T4
	8A	CEC/NEC General Purpose
	8C	CEC/NEC IS Cl.I Div.1 Gr.A-D
	99	Special version
20	Display; Operating:	
	G	W/o; only via Commubox+ToF Adapter FXA291
	H	Envelope curve display on site; push button
	Y	Special version
30	Electrical Connection:	
	E	Gland M20, IP68
	F	Thread G1/2, IP68
	G	Thread NPT1/2, IP68
	Y	Special version
40	Sensor; Max Range; Blocking Distance:	
	AA	1-1/2"; 5m liquid/2m solid; 0.25m
	AB	2"; 8m liquid/3.5m solid; 0.35m
	YY	Special version
50	Process Connection:	
	GGF	Thread ISO228 G1-1/2, PP
	GHF	Thread ISO228 G2, PP
	RGF	Thread ANSI MNPT1-1/2, PP
	RHF	Thread ANSI MNPT2, PP
	YYY	Special version
620	Accessory Enclosed:	
	RA	UNI flange 2"/DN50/50, PP max 3bar abs/44psia, suitable for 2" 150lbs/DN50 PN16/10K 50
	RB	UNI flange 2"/DN50/50, PVDF max 3bar abs/44psia, suitable for 2" 150lbs/DN50 PN16/10K 50
	RC	UNI flange 2"/DN50/50, 316L max 3bar abs/44psia, suitable for 2" 150lbs/DN50 PN16/10K 50
	RD	UNI flange 3"/DN80/80, PP max 3bar abs/44psia, suitable for 3" 150lbs/DN80 PN16/10K 80
	RE	UNI flange 3"/DN80/80, PVDF max 3bar abs/44psia, suitable for 3" 150lbs/DN80 PN16/10K 80
	RF	UNI flange 3"/DN80/80, 316L max 3bar abs/44psia, suitable for 3" 150lbs/DN80 PN16/10K 80
	RG	UNI flange 4"/DN100/100, PP max 3bar abs/44psia, suitable for 4" 150lbs/DN100 PN16/10K 100
	RH	UNI flange 4"/DN100/100, PVDF max 3bar abs/44psia, suitable for 4" 150lbs/DN100 PN16/10K 100
	RI	UNI flange 4"/DN100/100, 316L max 3bar abs/44psia, suitable for 4" 150lbs/DN100 PN16/10K 100
	R9	Special version
895	Marking:	
	Z1	Tagging (TAG), see additional spec.

You can enter the versions for the specific feature in the following table. The versions entered make up the complete order code. Options which are mutually exclusive are not marked.

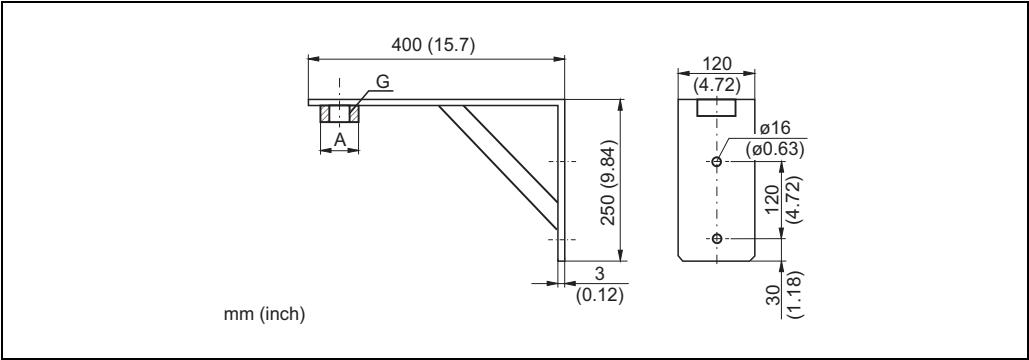
	10	20	30	40	50	620	895
FMU30 -							

Scope of delivery

- Instrument according to the version ordered
- Short instructions KA1054F; additional documentations on the supplied CD-ROM
- For certified instrument versions: Safety Instructions, Control- or Installation drawings
- Counter nut (PC): option 50, versions GGF/GHF, → 22 "Ordering information"
- Sealing ring (EPDM): option 50 → 22 "Ordering information"
- For gland M20x1.5: 1 cable gland for 2-wire instruments
The cable gland is mounted on delivery.

Accessories

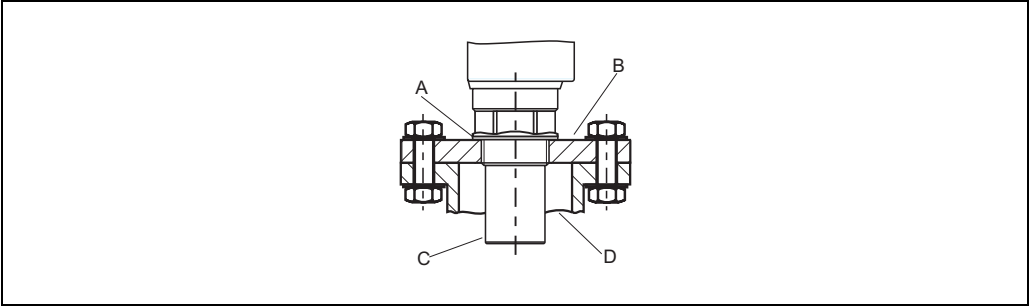
Installation bracket



- G1½: Order No. 942669-0000
- G2: Order No. 942669-0001

suited for NPT 1½" and 2" as well

Screw in flange



A: sealing ring EPDM (supplied); **B:** screw in flange; **C:** sensor; **D:** nozzle

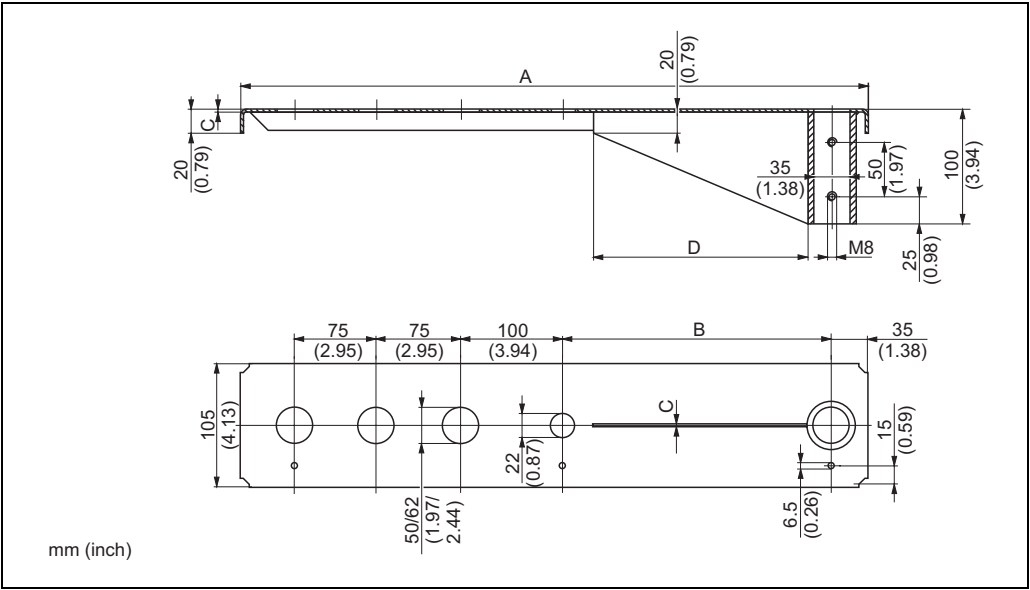
Screw in flange FAX50

15	Material:
BR1	DN50 PN10/16 A, steel flange EN1092-1
BS1	DN80 PN10/16 A, steel flange EN1092-1
BT1	DN100 PN10/16 A, steel flange EN1092-1
JF1	2" 150lbs FF, steel flange ANSI B16.5
JG1	3" 150lbs FF, steel flange ANSI B16.5
JH1	4" 150lbs FF, steel flange ANSI B16.5
JK2	8" 150lbs FF, PP max 3bar abs/44psia flange ANSI B16.5
XIF	UNI flange 2"/DN50/50, PVDF max 3bar abs/44psia, suitable for 2" 150lbs/DN50 PN16/10K 50
XIG	UNI flange 2"/DN50/50, PP max 3bar abs/44psia, suitable for 2" 150lbs/DN50 PN16/10K 50
XIJ	UNI flange 2"/DN50/50, 316L max 3bar abs/44psia, suitable for 2" 150lbs/DN50 PN16/10K 50
XJF	UNI flange 3"/DN80/80, PVDF max 3bar abs/44psia, suitable for 3" 150lbs/DN80 PN16/10K 80
XJG	UNI flange 3"/DN80/80, PP max 3bar abs/44psia, suitable for 3" 150lbs/DN80 PN16/10K 80
XJJ	UNI flange 3"/DN80/80, 316L max 3bar abs/44psia, suitable for 3" 150lbs/DN80 PN16/10K 80
XKF	UNI flange 4"/DN100/100, PVDF max 3bar abs/44psia, suitable for 4" 150lbs/DN100 PN16/10K 100
XKG	UNI flange 4"/DN100/100, PP max 3bar abs/44psia, suitable for 4" 150lbs/DN100 PN16/10K 100
XKJ	UNI flange 4"/DN100/100, 316L max 3bar abs/44psia, suitable for 4" 150lbs/DN100 PN16/10K 100
XLF	UNI flange 6"/DN150/150, PVDF max 3bar abs/44psia, suitable for 6" 150lbs/DN150 PN16/10K 150
XLG	UNI flange 6"/DN150/150, PP max 3bar abs/44psia, suitable for 6" 150lbs/DN150 PN16/10K 150
XLJ	UNI flange 6"/DN150/150, 316L max 3bar abs/44psia, suitable for 6" 150lbs/DN150 PN16/10K 150
XMG	UNI flange DN200/200, PP max 3bar abs/44psia, suitable for DN200 PN16/10K 200
XNG	UNI flange DN250/250, PP max 3bar abs/44psia, suitable for DN250 PN16/10K 250
YYY	Special version
20	Sensor Connection:
A	Thread ISO228 G3/4
B	Thread ISO228 G1
C	Thread ISO228 G1-1/2
D	Thread ISO228 G2
E	Thread ANSI NPT3/4
F	Thread ANSI NPT1
G	Thread ANSI NPT1-1/2
H	Thread ANSI NPT2
Y	Special version

The filled in options result in the complete order code.

	15	20
FAX50 -		

Cantilever



L00-FMU30xxx-00-00-00-xx-005

A	B	C	D	Sensor	Material	Order Code
585 (23)	250 (9.84)	2 (0.08)	200 (7.87)	1½"	316Ti/1.4571	52014132
					galv. steel	52014131
				2"	316Ti/1.4571	52014136
					galv. steel	52014135
1085 (42.7)	750 (29.5)	3 (0.12)	300 (11.8)	1½"	316Ti/1.4571	52014134
					galv. steel	52014133
				2"	316Ti/1.4571	52014138
					galv. steel	52014137

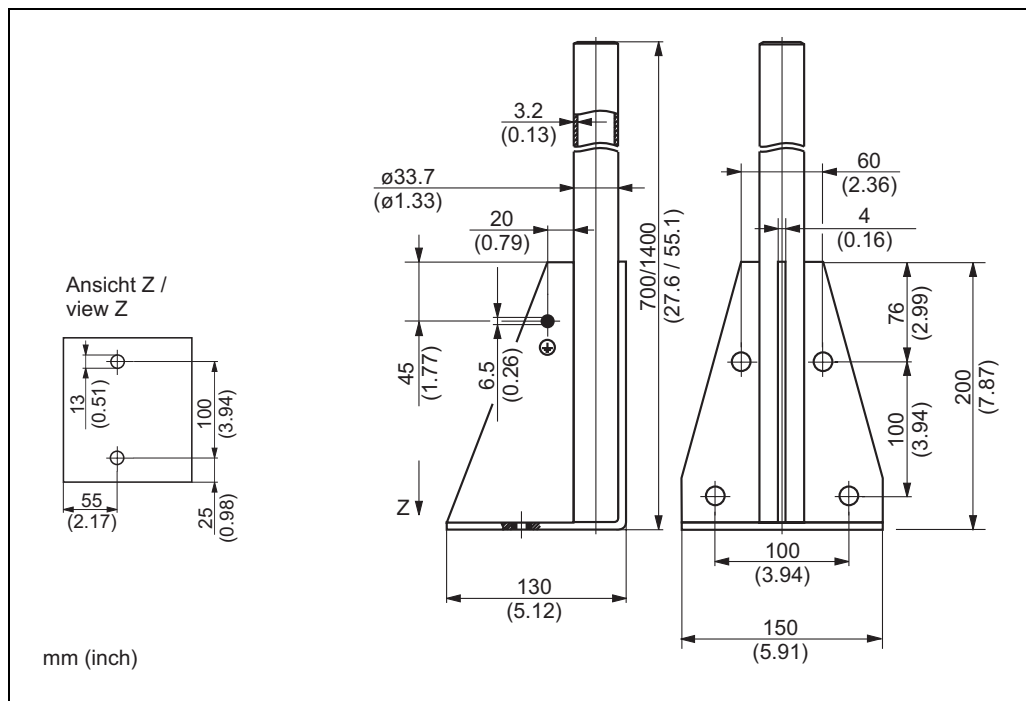
mm (in)

- The 50 mm (2.17 in) or 62 mm (2.44 in) orifices serve for the mounting of the 1½" or 2" sensor, respectively.
- The 22 mm (0.87 in) orifice may be used for an additional sensor.

For the mounting of the cantilever can be used:

- mounting frame, → 26
- wall bracket, → 26

Mounting Frame

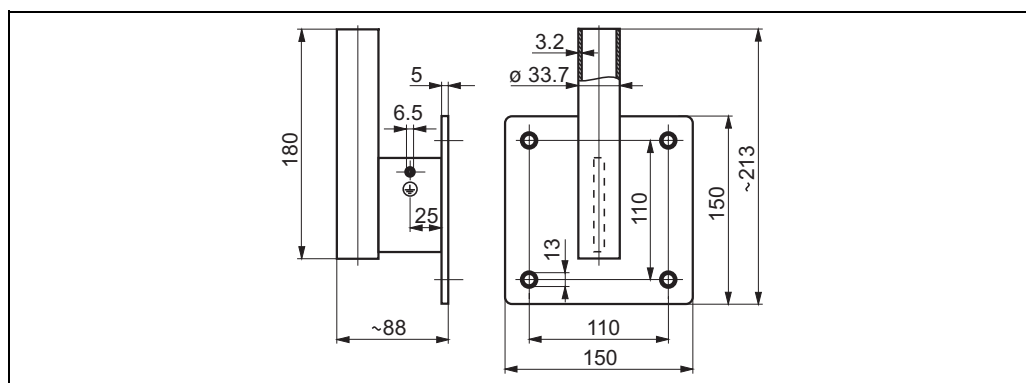


L00-FMU30-00-00-00-xx-005

Height	Material	Order Code
700 (27.6)	galv. steel	919791-0000
700 (27.6)	1.4301 (AISI 304)	919791-0001
1400 (55.1)	galv. steel	919791-0002
1400 (55.1)	1.4301 (AISI 304)	919791-0003

mm (in)

Wall Bracket



L00-FMU3x-00-00-00-xx-006

Material	Order Code
galv. steel	919792-0000
316Ti/1.4571	919792-0001

Commubox FXA291	The Commubox FXA291 connects Endress+Hauser field instruments with CDI interface (= Endress+Hauser Common Data Interface) to the USB interface of a personal computer or a notebook. For details refer to TI405C/07/EN. Note! For the FMU30 you need the "ToF Adapter FXA291" as an additional accessory.
ToF Adapter FXA291	The ToF Adapter FXA291 connects the Commubox FXA291 via the USB interface of a personal computer or a notebook to the FMU30. For details refer to KA271F/00/A2.

Supplementary documentation

Operating manual	BA387F This instruction describe the installation and first commissioning of the instrument. From the operating menu, all functions are included, which are required for standard measurement tasks. Additional functions are not contained in the manual. The documentation can be found on the supplied documentation CD. The documentation is also available via the Internet → siehe: www.endress.com → Download.
Description of device functions	BA388F This contains a detailed description of all the functions of the instrument and is valid for all communication variants. The documentation can be found on the supplied documentation CD. The documentation is also available via the Internet → www.endress.com → Download.
Short instructions	KA1054F is for rapid commissioning of the device. The instructions are attached to the device. The documentation can be found on the supplied documentation CD. The documentation is also available via the Internet → www.endress.com → Download. KA290F can be found under the device housing cover. The most important menu functions are summarised on this sheet. It is intended primarily as a memory jogger for users who are familiar with the operating concept of Endress+Hauser time-of-flight instruments.

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