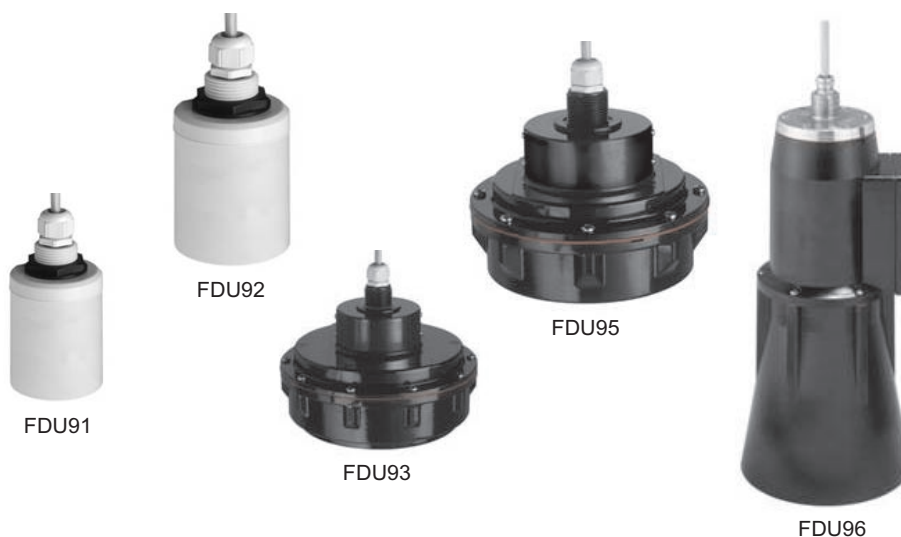


## Technical Information

# Prosonic S

## FDU91, FDU92, FDU93, FDU95, FDU96

Ultrasonic sensors for non-contact continuous level and flow measurement; for connection to the transmitter FMU90



### Application

- Continuous, non-contact level measurement of fluids, pastes, sludges and powdery to coarse bulk materials
- Flow measurement in open channels and measuring weirs
- Maximum measuring range
  - FDU91:
    - 10 m in fluids
    - 5 m in bulk materials
  - FDU92:
    - 20 m in fluids
    - 10 m in bulk materials
  - FDU93:
    - 25 m in fluids
    - 15 m in bulk materials
  - FDU95:
    - 45 m in bulk materials
  - FDU96:
    - 70 m in bulk materials
- Suited for explosion hazardous areas

### Your benefits

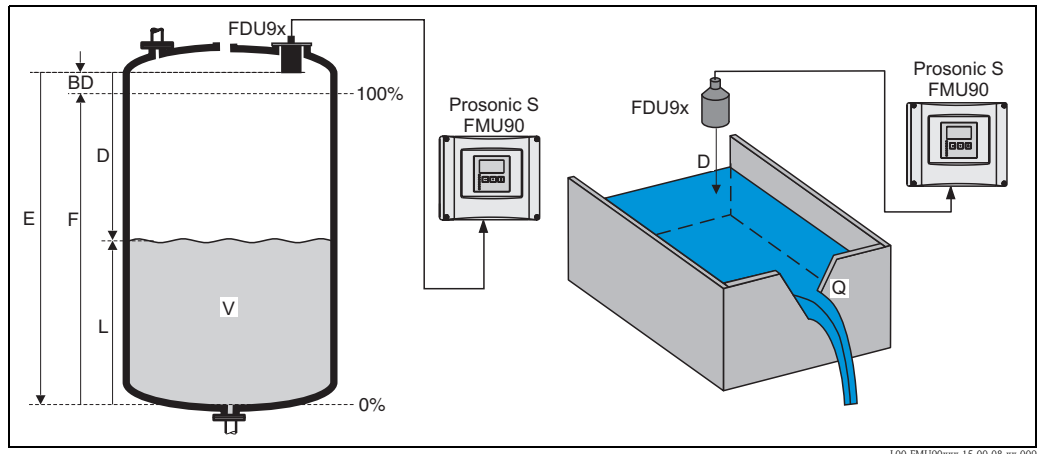
- Non-contact measurement method, therefore almost independent of product properties
- Integrated temperature sensor for time-of-flight correction. Accurate measurements are possible, even if temperature changes are present
- Hermetically welded PVDF sensors FDU91/92 for fluid measurement; for highest chemical resistance
- Integrated automatical sensor detection for transmitters FMU90; simple commissioning
- Can be installed up to 300 m from the transmitter
- Suited for rough ambient conditions thanks to separate installation from the transmitter
- Insensitive to dirt and build-up because of the self-cleaning effect
- Integrated heating against a build-up of ice at the sensor (optional)
- Weather resistant and flood-proof (IP68)
- Dust-Ex and Gas-Ex certificates available (ATEX, FM, CSA)

# Table of Contents

<b>Function and system design</b> .....	<b>3</b>	Scope of delivery .....	16
Measuring principle .....	3	<b>Accessories</b> .....	<b>16</b>
Time-of-flight correction .....	3	Extension cable for sensors .....	16
Blocking distance .....	3	Protective cover for FDU91 .....	17
Transmitter .....	3	Cantilever .....	17
<b>Input</b> .....	<b>4</b>	Mounting Frame .....	18
Measuring range .....	4	Wall Bracket .....	18
Operating frequency .....	5	Flanges .....	19
<b>Output</b> .....	<b>5</b>	Alignment unit FAU40 .....	19
Signal transmission .....	5	<b>Supplementary documentation</b> .....	<b>20</b>
<b>Auxiliary energy</b> .....	<b>5</b>	Innovation booklet .....	20
Power supply .....	5	Technical Information .....	20
<b>Electrical connection</b> .....	<b>6</b>	Operating Instructions (for transmitter FMU90) .....	20
Connection to the transmitter Prosonic S FMU90 .....	6	Description of Instrument Functions (for transmitter FMU90) ...	20
<b>Installation conditions</b> .....	<b>7</b>	Safety Instructions (XA) .....	20
Installation options (Examples) .....	7	Control Drawings (ZD) .....	20
Installation conditions for level measurements .....	8		
Nozzle installation .....	9		
Installation conditions for flow measurements .....	10		
Ultrasound guide pipe .....	11		
<b>Ambient conditions</b> .....	<b>11</b>		
Ingress protection .....	11		
Vibration resistance .....	11		
Storage temperature .....	11		
Thermal shock resistance .....	11		
Electromagnetic compatibility .....	11		
<b>Process conditions</b> .....	<b>11</b>		
Process temperature .....	11		
Process pressure .....	11		
<b>Mechanical construction</b> .....	<b>12</b>		
Dimensions .....	12		
Weight .....	12		
Materials .....	13		
Connecting cable .....	13		
<b>Certificates and Approvals</b> .....	<b>13</b>		
CE mark .....	13		
Ex approval .....	13		
External standards and guidelines .....	13		
<b>Ordering information</b> .....	<b>14</b>		
Product structure FDU91 .....	14		
Product structure FDU92 .....	14		
Product structure FDU93 .....	15		
Product structure FDU95 .....	15		
Product structure FDU96 .....	16		

## Function and system design

### Measuring principle



**BD:** blocking distance; **D:** distance from sensor membrane to fluid surface; **E:** empty distance **F:** span (full distance); **L:** level; **V:** volume (or mass); **Q:** flow

The sensor transmits ultrasonic pulses in the direction of the product surface. There, they are reflected back and received by the sensor. The transmitter Prosonic S measures the time  $t$  between pulse transmission and reception. From  $t$  (and the velocity of sound  $c$ ) it calculates the distance  $D$  from the sensor membrane to the product surface:

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

From  $D$  results the desired measuring value:

- level  $L$
- volume  $V$
- flow  $Q$  across measuring weirs or open channels

### Time-of-flight correction

In order to compensate for temperature dependent time-of-flight changes, a temperature sensor is integrated in every sensor.

### Blocking distance

The level  $L$  may not extend into the blocking distance  $BD$ . Level echoes from the blocking distance can not be evaluated due to the transient characteristics of the sensor and thus a reliable measurement is not possible. The blocking distance  $BD$  is dependent on the type of sensor:

Type of sensor	Blocking distance (BD)
FDU91	0,3 m
FDU92	0,5 m
FDU93	0,6 m
FDU95 - *1*** (low temperature version)	0,7 m
FDU95 - *2*** (high temperature version)	0,9 m
FDU96	1,6 m

### Transmitter

The sensors can be connected to the transmitter FMU90. The transmitter recognizes the type of sensor automatically.

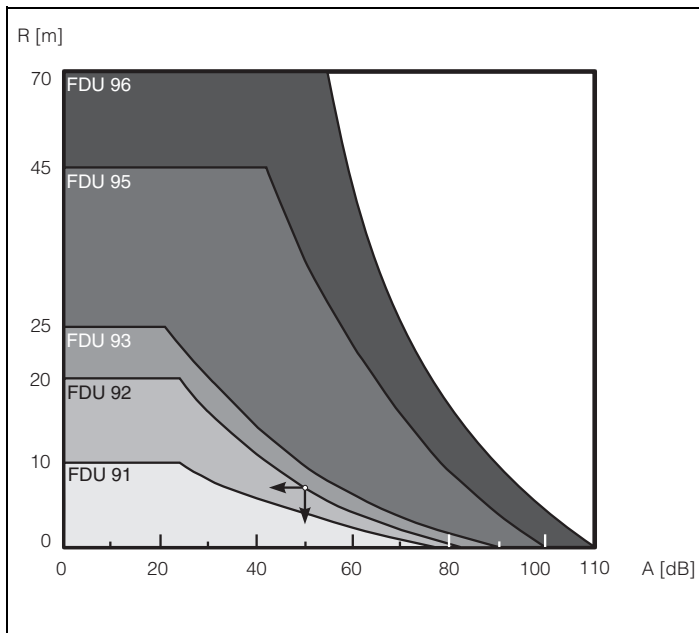
## Input

### Measuring range

The effective range of the sensors is dependent on the operating conditions. To estimate the range, proceed as follows (see also the example):

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 ... 10 dB
strong turbulence (e.g. stirrers)	10 ... 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 ... 60 dB
Dust	Attenuation
no dust formation	0 dB
little dust formation	5 dB
heavy dust formation	5 ... 20 dB
Filling curtain in detection range	Attenuation
none	0 dB
small quantities	5 dB
large quantities	5 ... 20 dB
Temperature difference between sensor and product surface	Attenuation
to 20 °C	0 dB
to 40 °C	5 ... 10 dB
to 80 °C	10 ... 20 dB



### Example

- Silo with rubble: ~ 40dB
- small quantities of filling curtain: ~ 5dB
- little dust: ~ 5dB

total: ~ 50dB

=> Range approx. 8 m  
for FDU92

A: Attenuation (dB); R: Range (m)

100-FDU9xxxx-05-00-00-xx-001

**Operating frequency**

Sensor	Operating frequency
FDU91	43 kHz
FDU92	30 kHz
FDU93	27 kHz
FDU95 - *1*** (low temperature version)	17 kHz
FDU95 - *2*** (high temperature version)	18 kHz
FDU96	11 kHz

## Output

---

**Signal transmission** analogue voltages

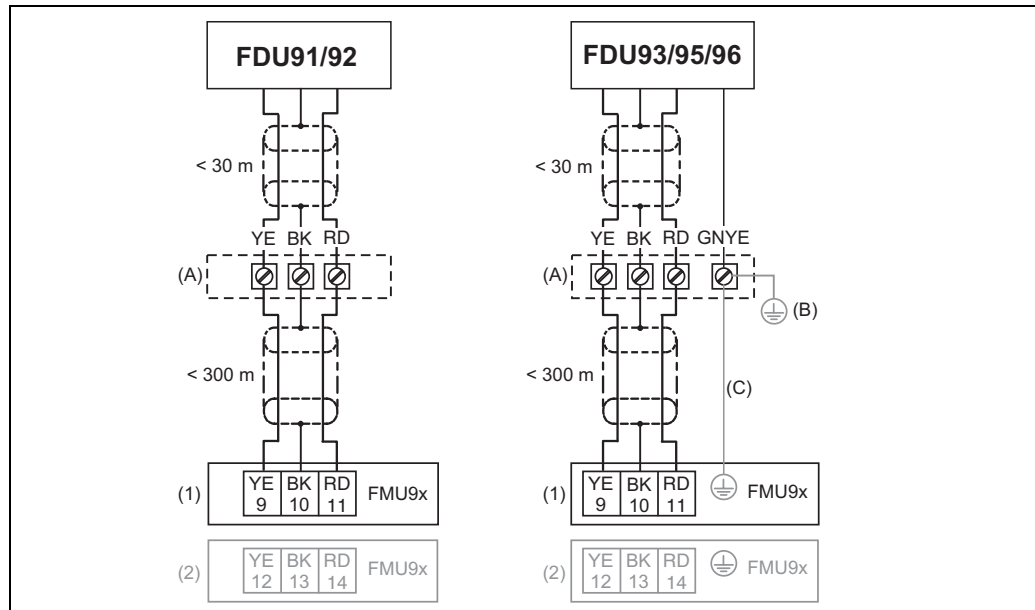
## Auxiliary energy

---

**Power supply** via transmitter FMU90

## Electrical connection

### Connection to the transmitter Prosonic S FMU90



**(A):** Terminal box (recommended or cable lengths > 30 m); **(B):** Grounding at the terminal box; **(C):** Grounding at the transmitter or in the control room; **(1):** Terminals for sensor input 1 at the FMU9x; **(2):** Terminals for sensor input at the FMU9x (optional)

### Terminal assignment

The strand-colour of the sensor cable must correspond to the terminal designation at the FMU90:

- RD: red
- BK: black (after shortening of the cable: braided wire screen)
- YE: yellow
- GNYE: green-yellow (for FDU93/95/96 and FDU83/84/85/86)

### Connecting options

- up to 30 m: direct connection via the sensor cable
- 30 ... 300 m: extension cable recommended; connection via a terminal box (A)



Note!

Terminal box and extension cable are not supplied.



Caution!

If the terminal box is installed in explosion hazardous areas, then all national guidelines applicable must be observed.



Caution!

The cable screen serves as a return cable and must be connected to the transmitter without any electrical break. This must be taken into account especially if the cable is shortened.

In the unshortened state, the cables are pre-assembled and the cable screen ends in a black strand (BK).

### Cable specifications

Required properties of the extension cable<sup>1</sup>:

- Two core cable, with braided wire screen per core (no foil screen)
- Length: up to 300 m (sensor cable + extension cable)
- Cross section: 0,75 mm<sup>2</sup> to 2,5 mm<sup>2</sup>
- up to 6 Ω per core
- max. 60 nF
- for FDU93/95/96 and FDU83/84/85/86:

The earth lead must not be within the screening

1) for appropriate cable see chapter "Accessories"

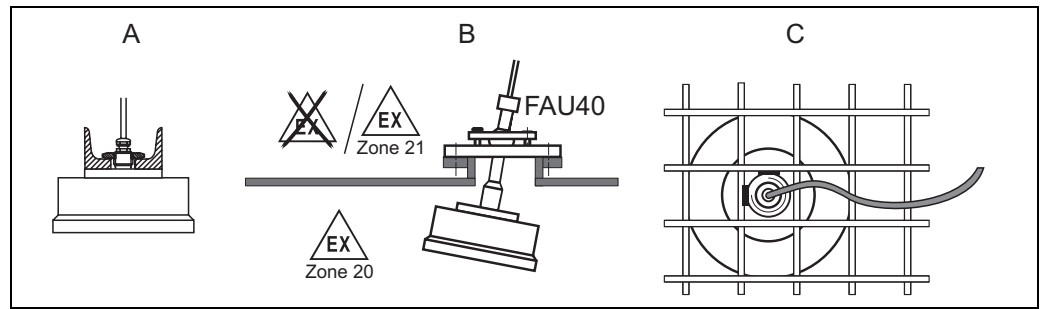
**Potential equalisation  
(for FDU93/95/96 and FDU83/84/85/86)**

The ground lead (GNYE) must be connected to the local potential equalisation. This can be done

- at the terminal box (B)
- at the transmitter FMU90 or in the cabinet (C)

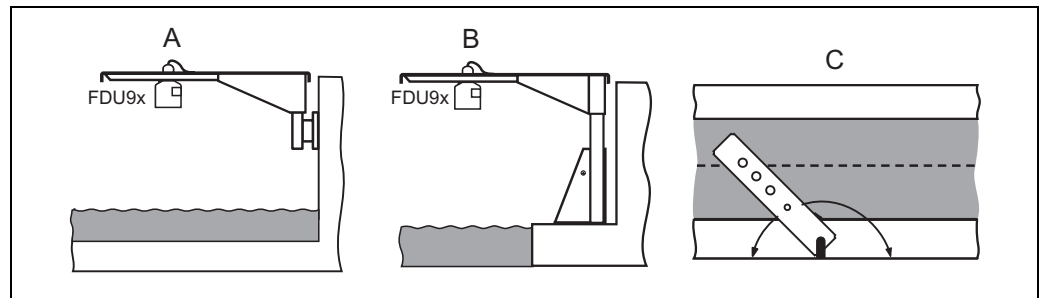
**Installation conditions**

**Installation options  
(Examples)**



L00-FDU9xxxx-17-00-00-xx-001

**A:** at girder or angle bracket; **B:** with alignment unit FAU40; in ATEX Zone 20 the alignment unit can be used for zone separation; **C:** with a 1" sleeve welded to a grating



L00-FDU9xxxx-17-00-00-xx-007

**A:** Installation with cantilever and wall bracket; **B:** Installation with cantilever and mounting frame; **C:** The cantilever can be swivelled in order to position the sensor over the centre of the flume. Cantilever, wall bracket and mounting frame are available as accessories (see chapter "Accessories").



Caution!

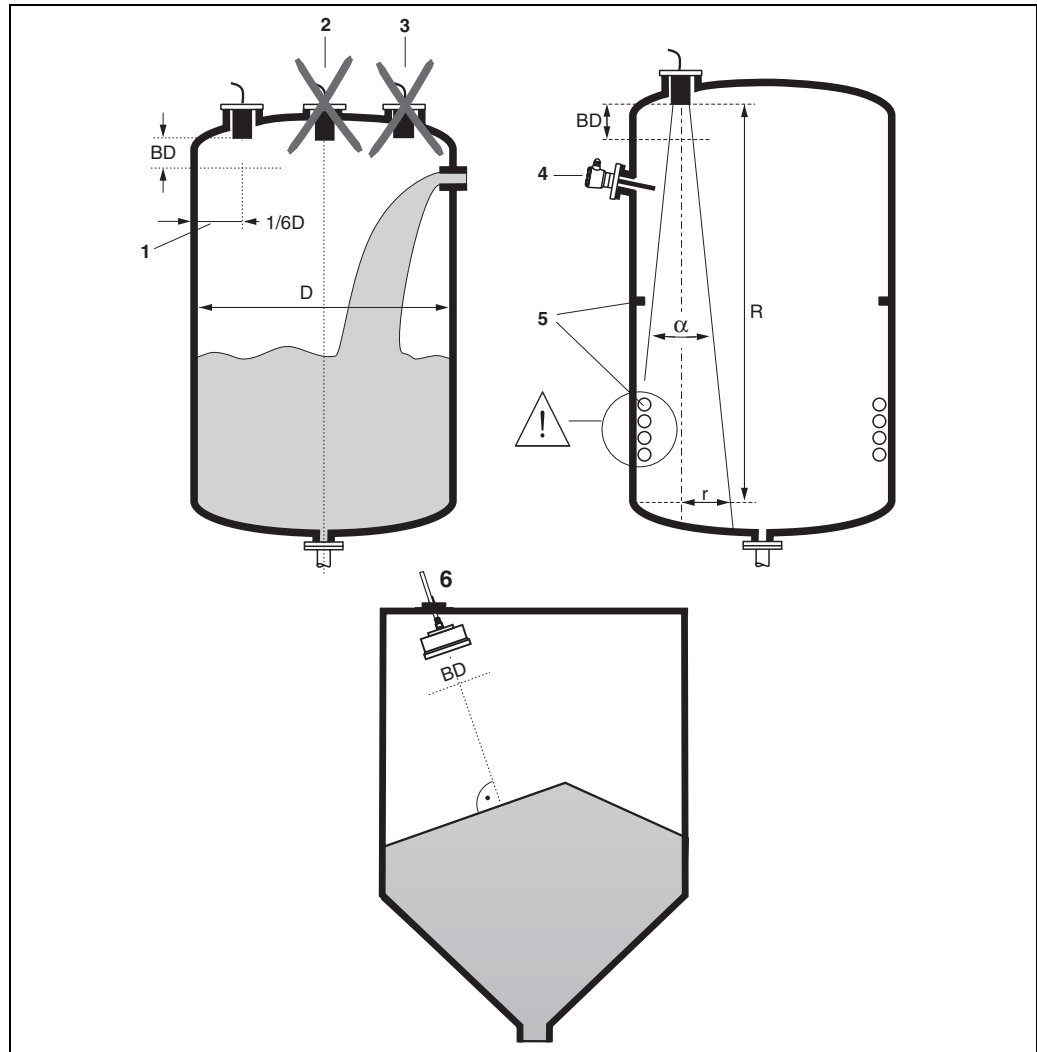
The cable of the sensors is not designed as a supporting cable. Do not use it as a suspension wire.



Caution!

The sensor membrane is part of the measuring system and must not be damaged during installation.

### Installation conditions for level measurements



L00-FDU9xxxx-17-00-00-xx-003

- If possible, install the sensor so that its lower edge projects into the vessel.
- Make sure, that the maximum level does not reach into the blocking distance (BD).
- Do not install the sensor in the middle of the tank (2). We recommend leaving a distance between the sensor and the tank wall (1) measuring  $1/6$  of the tank diameter.
- Avoid measurements through the filling curtain (3).
- Make sure that equipment (4) such as limit switches, temperature sensors, baffles etc. are not located within the emitting angle  $\alpha$ . Emitting angles of the individual sensors are given in the table below. In particular, symmetrical equipment (5) such as heating coils etc. can influence the measurement.
- Align the sensor vertically to the product surface (6). An alignment unit (FAU40) is available as an accessory (see chapter "Accessories").
- If the multiple-channel version of the transmitter FMU90 is used, multiple sensors can be mounted in one vessel.
- To estimate the detection range, use the 3 dB emitting angle  $\alpha$ :



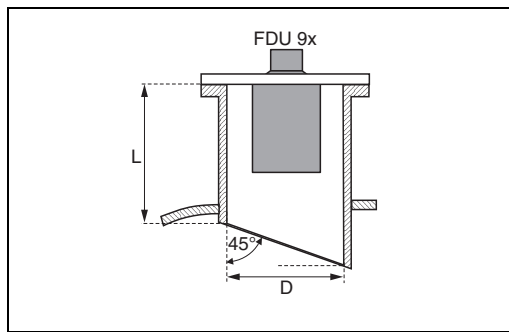
Sensor	$\alpha$	Application	R (max)	r (max)
FDU91	11°	fluids	10 m	0,96 m
		bulk materials	5 m	0,48 m
FDU92	11°	fluids	20 m	1,92 m
		bulk materials	10 m	0,96 m
FDU93	4°	fluids	25 m	0,87 m
		bulk materials	15 m	0,52 m
FDU95	5°	bulk materials	45 m	1,96 m
FDU96	6°	bulk materials	70 m	3,6 m



Warning!  
All national guidelines applicable must be observed in explosion hazardous areas.

**Nozzle installation**

Install the sensor at a height  $\alpha$  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°).



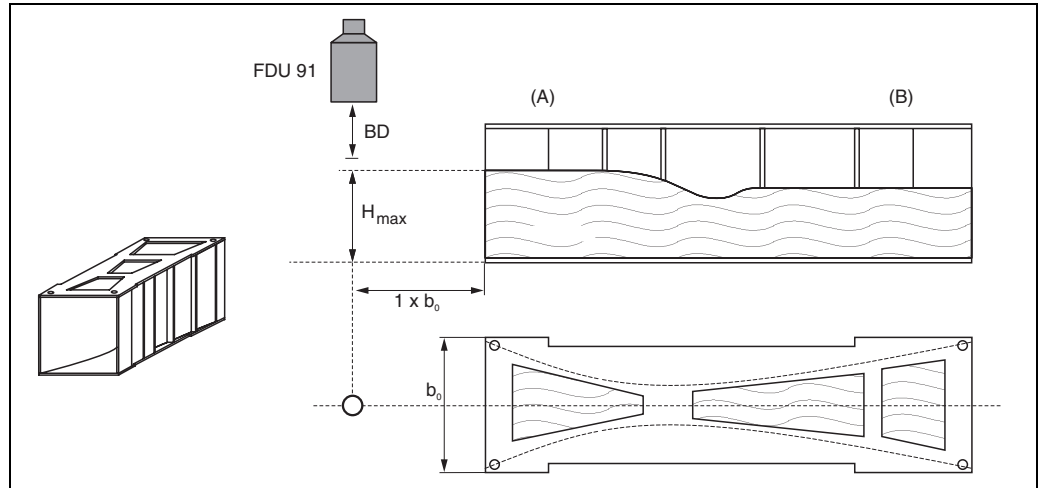
L00-FDU9xxxx-17-00-00-xx-006

Sensor	D [mm]	L [mm]
FDU91	80	< 340
	100	< 390
FDU92	150	< 400
FDU93	200	< 520
FDU95	250	< 630
FDU96	300	< 800

**Installation conditions for flow measurements**

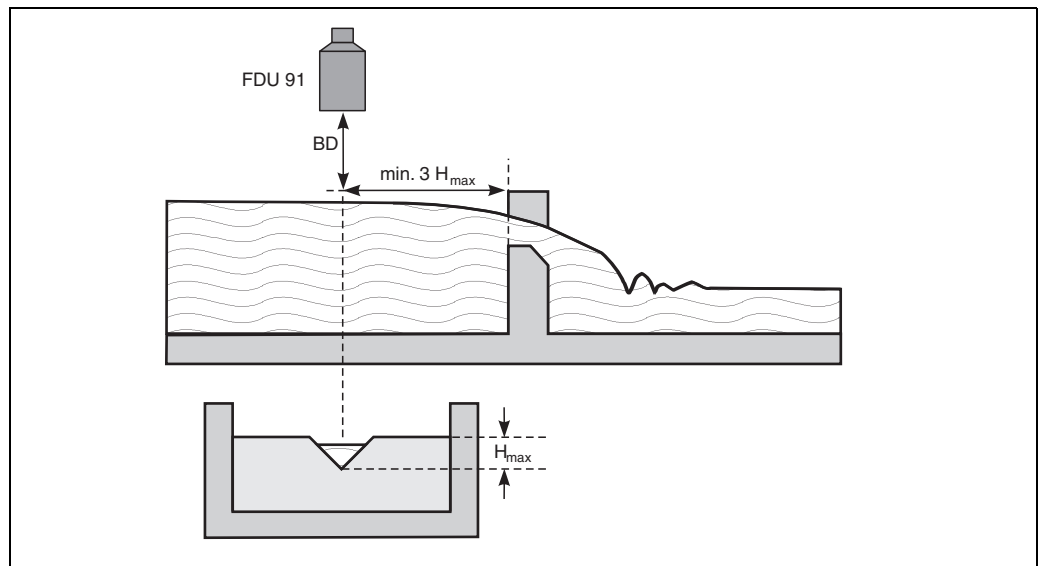
- Install the sensor at the inflow side (A), above the maximum water level  $H_{max}$  plus the blocking distance BD.
- Position the sensor in the middle of the channel or weir.
- Align the sensor vertically to the water surface.
- Comply to the installation distance of the channel or weir.<sup>1</sup>
- Use a protective cover, in order to protect the sensor from direct sun or rain. A protective cover is available for the sensor FDU91 (see chapter "Accessories").

**Example: Khafagi-Venturi flume**



(A): inflow side; (B): outflow side

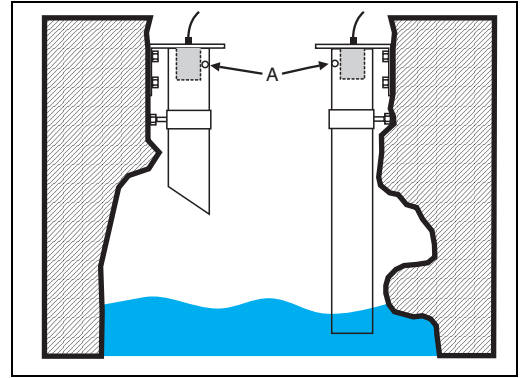
**Example: V-notch weir**



1) The installation distances of important flumes and weirs are specified in the Operating Instructions BA 289F (FMU90 with HART) and BA 293F (FMU90 with PROFIBUS).

**Ultrasound guide pipe**

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 (for FDU91). Make sure that the pipe is not soiled by accumulated dirt. If necessary, clean the pipe at regular intervals.



A: venting hole

**Ambient conditions**

<b>Ingress protection</b>	tested according to IP68/NEMA6P (24 h at 1.83 m under water surface)
<b>Vibration resistance</b>	DIN EN 600068-2-64; 20 ... 20000 Hz; 1 (m/s <sup>2</sup> ) <sup>2</sup> /Hz; 3x100 min.
<b>Storage temperature</b>	identical to process temperature, see below
<b>Thermal shock resistance</b>	according to DIN EN 60068-2-14; examination to min/max process temperature; 0,5 K/min; 1000 h
<b>Electromagnetic compatibility</b>	<ul style="list-style-type: none"> <li>■ Interference emission to EN 61326; Equipment class A</li> <li>■ Interference immunity to EN 61326; Appendix A (Industrial)</li> </ul>

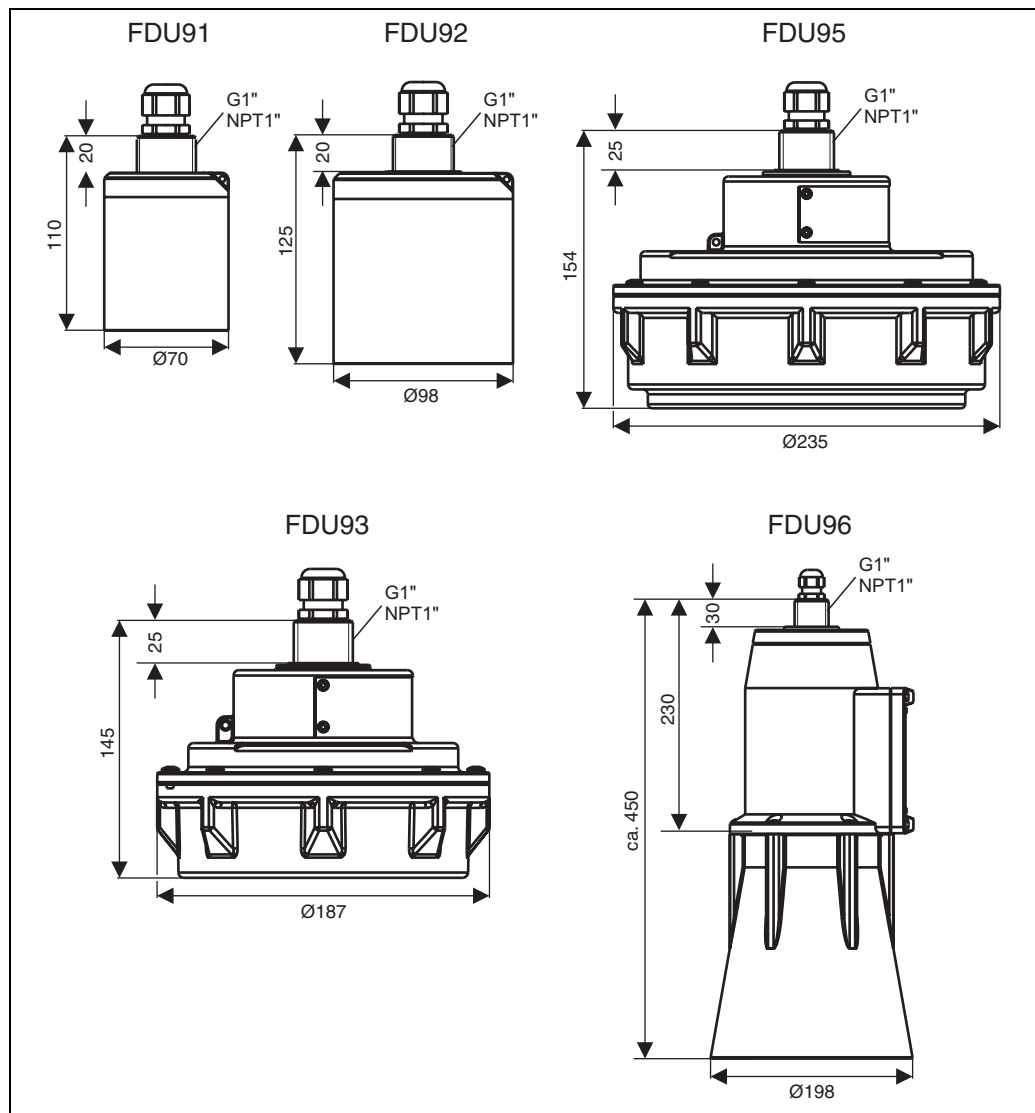
**Process conditions**

Process temperature  
Process pressure

Sensor	Process temperature	Process pressure (abs.)
FDU91	-40 ... +80 °C	0,7 ... 4 bar
FDU92	-40 ... +95 °C	0,7 ... 4 bar
FDU93	-40 ... +95 °C	0,7 ... 3 bar
FDU95 - *1*** (low temperature version)	-40 ... +80 °C	0,7 ... 1,5 bar
FDU95 - *2*** (high temperature version)	-40 ... +150 °C for Dust-Ex versions: -40 ... 130 °C	0,7 ... 1,5 bar
FDU96	-40 ... +150 °C for Dust-Ex versions: -40 ... 140 °C	0,7 ... 3 bar

## Mechanical construction

### Dimensions



L00-FDU90xxx-06-00-00-xx-001

Dimensions in mm

### Weight

Sensor	Weight
FDU91	approx. 1.1 kg
FDU92	approx. 2 kg
FDU93	approx. 2.9 kg
FDU95	approx. 4.5 kg
FDU96	approx. 5 kg

**Materials**

Sensor	Material of sensor	Material of process connection	Material of process seal	Material of cable
FDU91	PVDF counter nut: PA	PVDF	w/o sealing	PVC
FDU92	PVDF counter nut: PA	PVDF	w/o sealing	PVC
FDU93	<ul style="list-style-type: none"> <li>■ housing: UP</li> <li>■ membrane: Alu/PTFE</li> </ul>	UP	silicone	PVC
FDU95 - *1*** (low temperature version)	<ul style="list-style-type: none"> <li>■ housing: UP</li> <li>■ membrane coating: 316L/PE</li> </ul>	UP	silicone	PVC
FDU95 - *2*** (high temperature version)	<ul style="list-style-type: none"> <li>■ housing: UP</li> <li>■ membrane coating: 316L</li> </ul>	UP	silicone	silicone
FDU96	<ul style="list-style-type: none"> <li>■ housing: UP</li> <li>■ membrane coating: Alu/PTFE</li> </ul>	selectable: <ul style="list-style-type: none"> <li>■ UP</li> <li>■ 304</li> </ul>	silicone	silicone

**Connecting cable**

5 ... 300 m  
 for cable length > 30 m, an extension cable is recommended.  
 In this case, the total length (sensor cable + extension cable) must not exceed 300 m.

## 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**

Electromagnetic compatibility (EMC requirements)

**NAMUR**

Standards committee for measurement and control in the chemical industry

## Ordering information

### Product structure FDU91

<b>010</b>	<b>Approval</b>		
	R	Non-hazardous area	
	J	ATEX II 2G EEx m II T5	
	G	ATEX II 3G EEx nA II T6	
	E	ATEX II 1/2 D	
	H	ATEX II 3D	
	U	CSA General Purpose (in preparation)	
	S	CSA Cl.I,II,III Div.1+2 Gr.A-G (in preparation)	
	Q	FM Cl.I,II,III Div. 1+2 Gr.A-G (in preparation)	
	V	TIS Ex is IIC T6 (in preparation)	
<b>020</b>	<b>Process connection (threaded boss)</b>		
	G	Thread ISO228 G1, PVDF	
	N	Thread ANSI NPT1, PVDF	
<b>030</b>	<b>Cable length</b>		
	1	5 m	
	2	10 m	
	3	15 m	
	4	20 m	
	5	25 m	
	6	30 m	
	8	... m (variable length, up to 300 m)	
	A	... ft (variable length, up to 985 ft)	
<b>035</b>	<b>Heater</b>		
	A	w/o heater	
	B	Connection to 24 VDC (in preparation)	
<b>040</b>	<b>Additional option</b>		
	A	Basic version	
FDU91 -			product designation

### Product structure FDU92

<b>010</b>	<b>Approval</b>		
	R	Non-hazardous area	
	J	ATEX II 2G EEx m II T5	
	G	ATEX II 3G EEx nA II T6	
	E	ATEX II 1/2 D	
	H	ATEX II 3D	
	U	CSA General Purpose (in preparation)	
	S	CSA Cl.I,II,III Div.1+2 Gr.A-G (in preparation)	
	Q	FM Cl.I,II,III Div. 1+2 Gr.A-G (in preparation)	
	V	TIS Ex is IIC T6 (in preparation)	
<b>020</b>	<b>Process connection (threaded boss)</b>		
	G	Thread ISO228 G1, PVDF	
	N	Thread ANSI NPT1, PVDF	
<b>030</b>	<b>Cable length</b>		
	1	5 m	
	2	10 m	
	3	15 m	
	4	20 m	
	5	25 m	
	6	30 m	
	8	... m (variable length, up to 300 m)	
	A	... ft (variable length, up to 985 ft)	
<b>040</b>	<b>Additional option</b>		
	A	Basic version	
FDU92 -			product designation

**Product structure FDU93**

<b>010</b>	<b>Approval</b>	R	Non-hazardous area
		J	ATEX II 2G EEx m II T5
		G	ATEX II 3G EEx nA II T6
		E	ATEX II 1/2 D
		H	ATEX II 3D
		U	CSA General Purpose (in preparation)
		T	CSA Cl.I,II,III Div.1 Gr.E-G (in preparation)
		P	FM Cl.I,II,III Div. 1+2 Gr.A-G (in preparation)
		W	TIIS dust-Ex DP12 (in preparation)
<b>020</b>	<b>Process connection (threaded boss)</b>	G	Thread ISO228 G1, UP
		N	Thread ANSI NPT1, UP
<b>030</b>	<b>Cable length</b>	1	5 m
		2	10 m
		3	15 m
		4	20 m
		5	25 m
		6	30 m
		8	... m (variable length, up to 300 m)
		A	... ft (variable length, up to 985 ft)
<b>040</b>	<b>Additional option</b>	A	Basic version
FDU93 -			product designation

**Product structure FDU95**

<b>010</b>	<b>Approval</b>	R	Non-hazardous area
		E	ATEX II 1/2 D
		H	ATEX II 3D
		P	FM Cl.II Div.1 Gr.E-G (in preparation)
		U	CSA General Purpose (in preparation)
		T	CSA Cl.I,II,III Div.1+2 Gr.A-G (in preparation)
		W	TIIS dust-Ex DP12 (in preparation)
<b>015</b>	<b>Temperature; blocking distance; material</b>	1	-40 ... +80 °C; 70 cm; membrane: 316L; surface: PE
		2	-40 ... 150 °C; 90 cm; membrane: 316L
<b>020</b>	<b>Process connection (threaded boss)</b>	G	Thread ISO228 G1, UP
		N	Thread ANSI NPT1, UP
<b>030</b>	<b>Cable length</b>	1	5 m
		2	10 m
		3	15 m
		4	20 m
		5	25 m
		6	30 m
		8	... m (variable length, up to 300 m)
		A	... ft (variable length, up to 985 ft)
<b>040</b>	<b>Additional option</b>	A	Basic version
FDU95 -			product designation

## Product structure FDU96

<b>010</b>	<b>Approval</b>
R	Non-hazardous area
J	ATEX II 2G EEx m II T5
E	ATEX II 1/2 D, -40 ... +140 °C
F	ATEX II 1/2 D, -40 ... +80 °C
H	ATEX II 3D
U	CSA General Purpose (in preparation)
L	CSA Cl.I,II,III Div.1 Gr.E-G; NT; Ambient temperature: -40 ... +80 °C (176 °F) (in preparation)
T	CSA Cl.I,II,III Div.1 Gr.E-G; HT; Ambient temperature: -40 ... +140 °C (284 °F) (in preparation)
P	FM Cl.I,II,III Div. 1+2 Gr.A-G; HT; Ambient temperature: -40 ... +140 °C (284 °F) (in preparation)
K	FM Cl.I,II,III Div. 1+2 Gr.A-G; LT; Ambient temperature: -40 ... +80 °C (176 °F) (in preparation)
W	TIIS dust-Ex DP12 (in preparation)
<b>020</b>	<b>Process connection (threaded boss)</b>
G	Thread ISO228 G1, UP
S	Thread ISO228 G1, 304
N	Thread ANSI NPT1, UP
V	Thread ANSI NPT1, 304
<b>030</b>	<b>Cable length</b>
1	5 m
2	10 m
3	15 m
4	20 m
5	25 m
6	30 m
8	... m (variable length, up to 300 m)
A	... ft (variable length, up to 985 ft)
<b>040</b>	<b>Additional options</b>
A	Basic version
FDU96 -	product designation

## Scope of delivery

- Instrument according to the version ordered
- This Technical Information TI396F (serves as installation and operating instruction)
- for certified instrument versions: Safety Instructions (XA) or Control Drawings (ZD)
- for FDU91/92 with G1" process connection: counter nut (PA)
- for FDU 93/95/96 with Ex-certificate: process seal (silicone)

## Accessories

## Extension cable for sensors

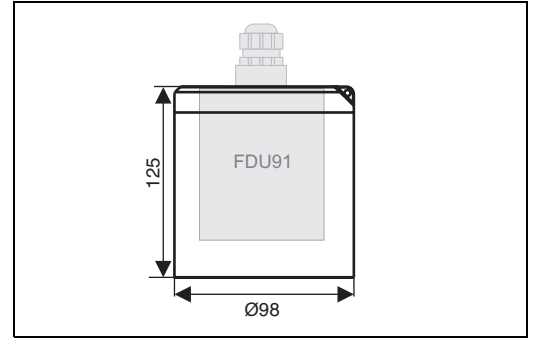
for Sensor	Material	Cable type	Order code
<ul style="list-style-type: none"> <li>■ FDU91</li> <li>■ FDU92</li> </ul>	PVC	LiYCY/CUL 3x(0,75)	52024479
<ul style="list-style-type: none"> <li>■ FDU93</li> <li>■ FDU95</li> </ul>	PVC (-40 ... +95 °C)	LIYY/CUL 3x(0,75)D+1x0,75	52024480
<ul style="list-style-type: none"> <li>■ FDU95</li> <li>■ FDU96</li> </ul>	Silicone (-40 ... +150 °C)	Li2G2G 3x(0,75)D+1x0,75	52024481

Total length (sensor cable + extension cable): up to 300 m



**Protective cover for FDU91**

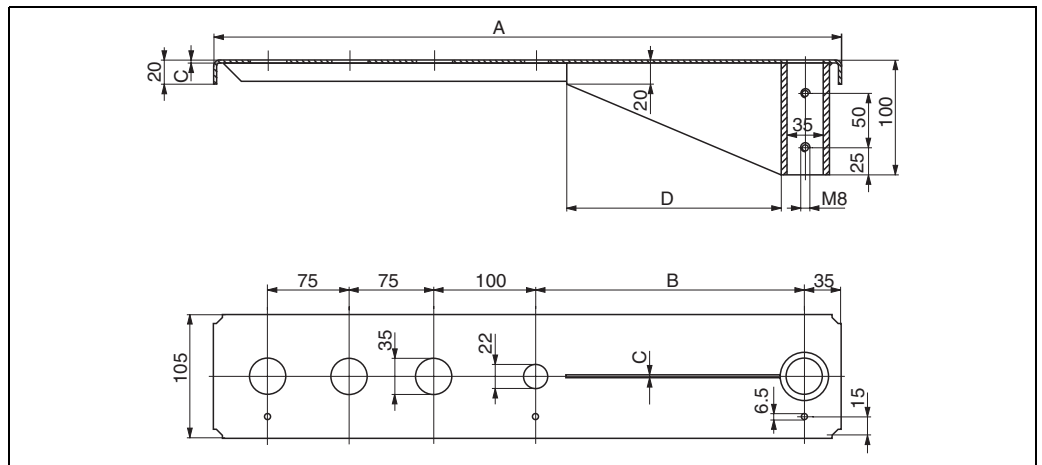
- Material: PVDF
- Order code: 52025686



L00-FDU9xxxx-06-00-00-xx-003

**Cantilever**

The cantilever is used to mount the sensor FDU91 above open channels for example.



L00-FMU4xxxx-06-00-00-yy-005

A	B	C	D	Material	Order code
585 mm	250 mm	2 mm	200 mm	galvanised steel	919790-0000
				316Ti/1.4571	919790-0001
1085 mm	750 mm	3 mm	300 mm	galvanised steel	919790-0002
				316Ti/1.4571	919790-0003

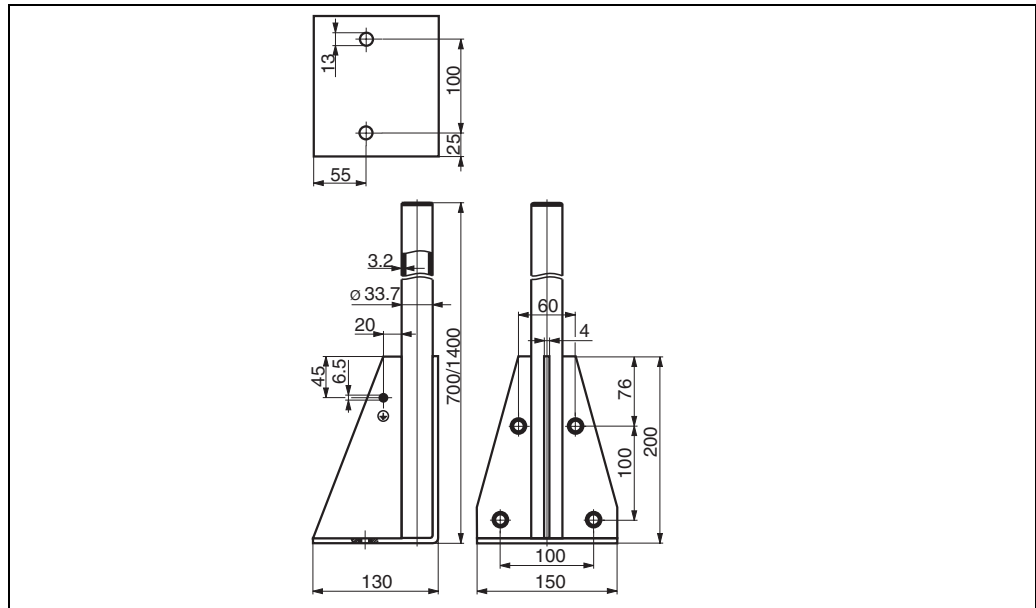
- The 35 mm orifices are for the sensors FDU9x.
- The 22 mm orifice may be used for an external temperature sensor (e.g. FMT131).

The cantilever can be mounted in the following ways:

- by a mounting frame (see below)
- by a wall bracket (see below)

Fixing screws are supplied.

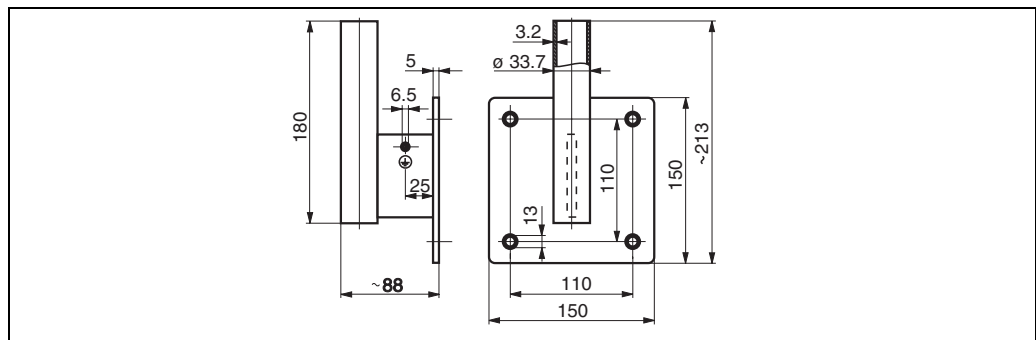
Mounting Frame



100-FMU4x-00-00-00-yy-005

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

Wall Bracket



100-FMU4x-00-00-00-yy-006

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

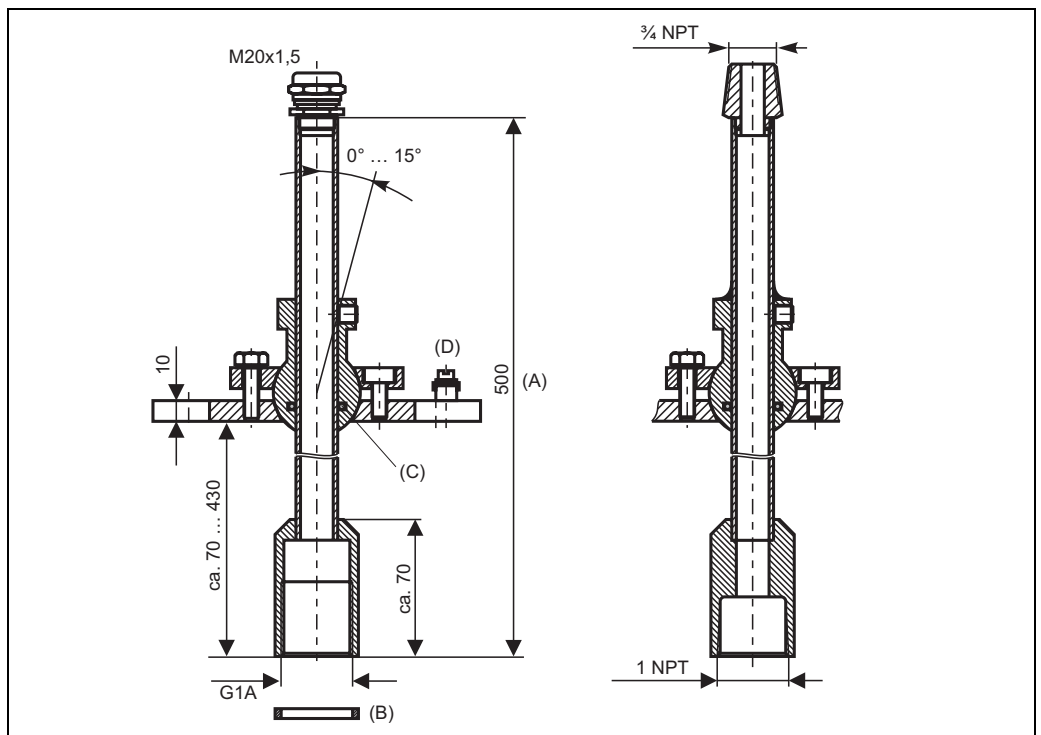
**Flanges**

Version	Material	Order code
DIN B DN80/PN16	PP-FR	919789-0000
DIN B DN100/PN16	PP-FR	919789-0002
DIN B DN150/PN16	PP-FR	919789-0004
DIN B DN200/PN16	PP-FR	919789-0006
DIN B DN250/PN16	PP-FR	919789-0008

All flanges have a central G1" thread (also suited for NPT 1"). The maximum operating pressure of the sensor is always valid.  
Other flanges on request.

**Alignment unit FAU40**

For measurements in solids, usage of the alignment unit FAU40 is recommended. It is designed for simple mounting and alignment of a FDU sensor on the product surface and can be used for zone separation.



**(A):** Total length 500 mm; adjustable 360 mm; **(B):** for use in ATEX Zone 20 : insert the seal which is supplied with the sensor here; **(C):** An O-ring in the spherical joint seals from the process. **(D):** Grounding can be performed directly at the grounding screw (D).

The alignment unit can be rotated up to 15°. For further information see Technical Information TI 179F.

**Product structure**

<b>010</b>	<b>Process connection (Flange)</b>	
	1	Welding flange, 304/1.4301
	2	Universal flange, 304/1.4301
<b>020</b>	<b>Sensor connection</b>	
	S	Thread G1, cable gland M20, 304/1.4301
	G	Thread G1, cable gland M20, galvanised steel
	N	Thread NPT1, cable entry 3/4, galvanised steel
FAU40 -		product designation

## Supplementary documentation

**Innovation booklet** **IN 003**  
Ultrasonic measurement - the solution for your application

**Technical Information** **TI 397F**  
Technical Information for the transmitter Prosonic S FMU90

**TI 179F**  
Technical Information for the alignment unit FAU40

**Operating Instructions (for transmitter FMU90)** Depending on the instrument version, the following Operating Instructions are supplied together with the instrument:

Instrument version	Application	Output	Operating Instructions
FMU90 - *1*****1**** FMU90 - *1*****2****	Level + pump control, alternating	HART	BA 288F
FMU90 - *1*****3****		FOUNDATION Fieldbus	BA 292F
FMU90 - *2*****1**** FMU90 - *2*****2****	Flow + totaliser + level + sample control + preprogrammed OCM flow curves	HART	BA 288F BA 289F
FMU90 - *2*****3****		PROFIBUS DP	BA 292F BA 293F

These Operating Instructions describe installation and commissioning of the respective version of the Prosonic S. It contains those functions from the operating menu, which are required for a standard measuring task. Additional functions are contained in the "Description of Instrument Functions" (BA 290F).

**Description of Instrument Functions (for transmitter FMU90)** **BA290F**  
contains a detailed description of **all** functions of the Prosonic S and is valid for all instrument versions. A PDF file of this document can be found

- on the CD-ROM of the "ToF-Tool - FieldTool Package", which is supplied together with the FMU90
- in the Internet at "www.endress.com"

**Safety Instructions (XA)** in preparation

**Control Drawings (ZD)** in preparation



## International Head Quarter

Endress+Hauser  
GmbH+Co. KG  
Instruments International  
Colmarer Str. 6  
79576 Weil am Rhein  
Deutschland

Tel. +49 76 21 9 75 02  
Fax +49 76 21 9 75 34 5  
[www.endress.com](http://www.endress.com)  
[info@ii.endress.com](mailto:info@ii.endress.com)

**Endress+Hauser** 

People for Process Automation