

# Safety Instructions

## Prosonic S

### FDU90, FDU91, FDU91F, FDU92, FDU93, FDU95

EAC: Ex ta/tb IIC T\*\*°C Da/Db  
Ex tb IIC T\*\*°C Db  
1Ex ma IIC T6, T5 Gb



Document: XA01721F-A  
Safety instructions for electrical apparatus for explosion-hazardous areas → 3

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# Prosonic S FDU90, FDU91, FDU91F, FDU92, FDU93, FDU95

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<b>Associated documentation</b>	This document is an integral part of the following Operating Instructions: TI00396F/00										
<b>Supplementary documentation</b>	Explosion-protection brochure: CP00021Z/11 The Explosion-protection brochure is available: <ul style="list-style-type: none"> <li>■ In the download area of the Endress+Hauser website: <a href="http://www.endress.com">www.endress.com</a> -&gt; Downloads -&gt; Media Type: Documentation -&gt; Documentation Type: Brochures and catalogs -&gt; Text Search: CP00021Z</li> <li>■ On the CD for devices with CD-based documentation</li> </ul>										
<b>Manufacturer's certificates</b>	<b>Certificate of Conformity TP TC 012/2011</b>  Inspection authority: LLC NANIO CCVE (ООО «НАНИО ЦСВЭ»)  Certificate number: TC RU C-DE.AA87.B.00875  Affixing the certificate number certifies conformity with the following standards (depending on the device version): <ul style="list-style-type: none"> <li>■ GOST 31610.0-2014 (IEC 60079-0:2011)</li> <li>■ GOST R IEC 60079-18-2012</li> <li>■ GOST IEC 60079-31-2010</li> </ul>										
<b>Manufacturer address</b>	Endress+Hauser SE+Co. KG Hauptstraße 1 79689 Maulburg, Germany Address of the manufacturing plant: See nameplate.										
<b>Extended order code</b>	The extended order code is indicated on the nameplate, which is affixed to the device in such a way that it is clearly visible. Additional information about the nameplate is provided in the associated Operating Instructions.  <b>Structure of the extended order code</b>  <table border="0" style="margin-left: 40px;"> <tr> <td style="text-align: center;">FDU9x</td> <td style="text-align: center;">-</td> <td style="text-align: center;">*****</td> <td style="text-align: center;">+</td> <td style="text-align: center;">A*B*C*D*E*F*G*..</td> </tr> <tr> <td style="text-align: center;"><i>(Device type)</i></td> <td></td> <td style="text-align: center;"><i>(Basic specifications)</i></td> <td></td> <td style="text-align: center;"><i>(Optional specifications)</i></td> </tr> </table> <p>* = Placeholder At this position, an option (number or letter) selected from the specification is displayed instead of the placeholders.</p> <i>Basic specifications</i> The features that are absolutely essential for the device (mandatory features) are specified in the basic specifications. The number of positions depends on the number of features available. The selected option of a feature can consist of several positions.  <i>Optional specifications</i> The optional specifications describe additional features for the device (optional features). The number of positions depends on the number of features available. The features have a 2-digit structure to aid identification (e.g. JA). The first digit (ID) stands for the feature group and consists of a number or a letter (e.g. J = Test, Certificate). The second digit constitutes the value that stands for the feature within the group (e.g. A = 3.1 material (wetted parts), inspection certificate).	FDU9x	-	*****	+	A*B*C*D*E*F*G*..	<i>(Device type)</i>		<i>(Basic specifications)</i>		<i>(Optional specifications)</i>
FDU9x	-	*****	+	A*B*C*D*E*F*G*..							
<i>(Device type)</i>		<i>(Basic specifications)</i>		<i>(Optional specifications)</i>							

More detailed information about the device is provided in the following tables. These tables describe the individual positions and IDs in the extended order code which are relevant to hazardous locations.

#### Extended order code: Prosonic M



The following specifications reproduce an extract from the product structure and are used to assign:

- This documentation to the device (using the extended order code on the nameplate).
- The device options cited in the document.

#### Device type

FDU90, FDU91, FDU91F, FDU92

#### Basic specifications

Position 1 (Approval)		
Selected option		Description
FDU9x	F	EAC Ex ta/tb IIIC T***C Da/Db EAC Ex tb IIIC T***C Db EAC 1Ex ma IIC T6, T5 Gb

Position 2 (Process Connection)		
Selected option		Description
FDU90	W	Ceiling mounting front side G1-1/2
	G	Thread ISO228 G1, PVDF
	N	Thread ANSI NPT1, PVDF
FDU91 FDU92	G	Thread ISO228 G1, PVDF
	N	Thread ANSI NPT1, PVDF
FDU91F	F	For slip on flange, 316L accessory FAU80
	G	Thread ISO228 G1, PVDF
	N	Thread ANSI NPT1, PVDF
	S	Tri-Clamp ISO2852 DN101.6(4"), 316L, 3A
	T	Tri-Clamp ISO2852 DN88.9(3-1/2"), 316L, 3A

Position 4 (Heater)		
Selected option		Description
FDU90 FDU91	A	W/o
	B	Connection to 24VDC Note Technical Information FMU90! (Temperature compensation)

#### Optional specifications

No options specific to hazardous locations are available.

*Device type*

FDU93, FDU95

*Basic specifications*

Position 1 (Approval)		
Selected option		Description
FDU9x	K	EAC Ex ta/tb IIIC T**°C Da/Db EAC Ex tb IIIC T**°C Db EAC 1Ex ma IIC T6, T5 Gb

Position 2 (Temperature; Blocking Distance; Material)		
Selected option		Description
FDU95	1	-40...+80°C/176°F; 70cm/2.3ft; membrane 316L, PE coated

*Optional specifications*

No options specific to hazardous locations are available.

**Safety instructions: General**

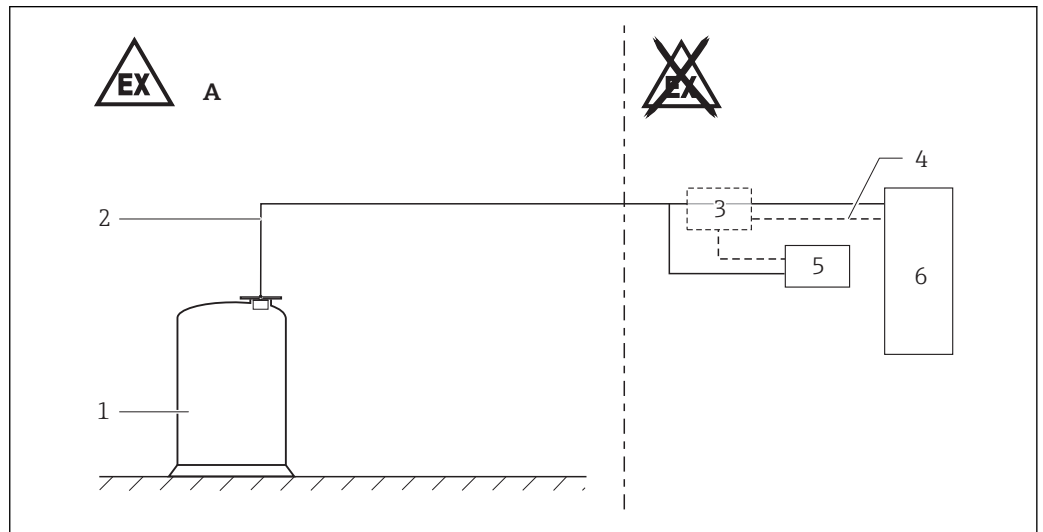
- Comply with the installation and safety instructions in the Operating Instructions.
- Staff must meet the following conditions for mounting, electrical installation, commissioning and maintenance of the device:
  - Be suitably qualified for their role and the tasks they perform
  - Be trained in explosion protection
  - Be familiar with national regulations
- Install the device according to the manufacturer's instructions and national regulations.
- Do not operate the device outside the specified electrical, thermal and mechanical parameters.
- Only use the device in media to which the wetted materials have sufficient durability.
- Avoid electrostatic charging:
  - Of plastic surfaces (e.g. housing, sensor element, special varnishing, attached additional plates, ..)
  - Of isolated capacities (e.g. isolated metallic plates)

**Safety instructions:  
Special conditions**

- In the event of additional or alternative special varnishing on the housing or other metal parts:
- Observe the danger of electrostatic charging and discharge.
  - Do not rub surfaces with a dry cloth.

**Safety instructions:**  
**Installation**

Electric connection of the sensor Prosonic FDU9x to the analysing unit Prosonic S

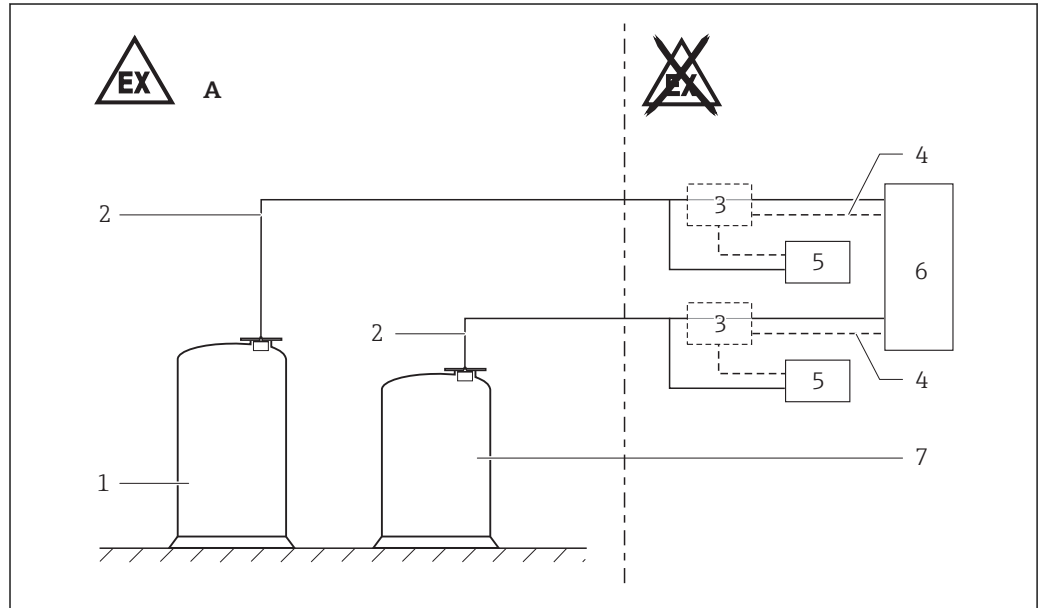


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1

- A Zone 1
- 1 Tank, hazardous area Zone 1
- 2 Electric connection
- 3 Optional: Terminal box (applied by user)
- 4 connected directly or via terminal box
- 5 Only Device type FDU90, FDU91 with Basic specification, Position 4 (Heater) = B:  
External power supply
- 6 Analysing and controlling unit

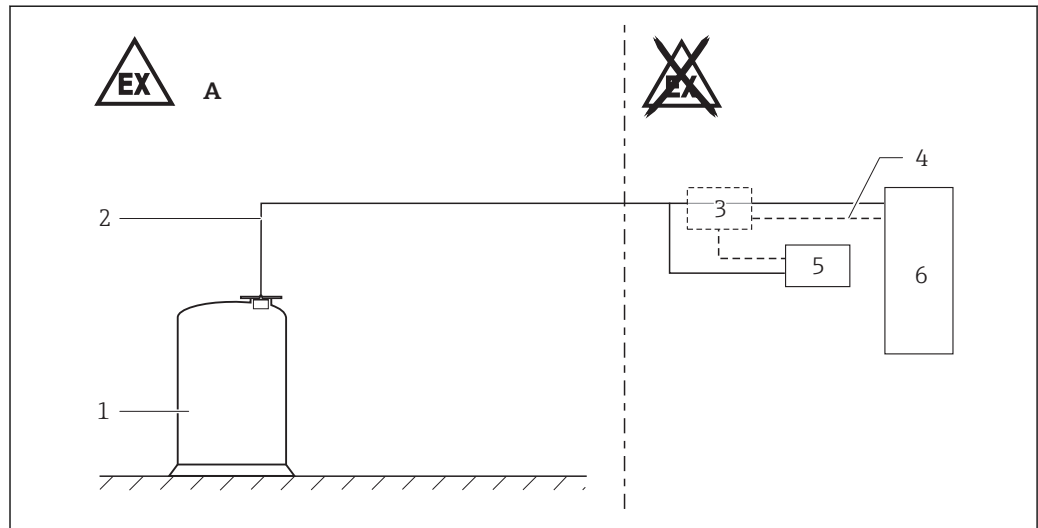
Electric connection of two sensors Prosonic FDU9x to the analysing unit Prosonic S



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2

- A Zone 1
- 1 Tank, hazardous area Zone 1
- 2 Electric connection
- 3 Optional: Terminal box (applied by user)
- 4 connected directly or via terminal box
- 5 Only Device type FDU90, FDU91 with Basic specification, Position 4 (Heater) = B: External power supply
- 6 Analysing and controlling unit
- 7 Tank, hazardous area Zone 1



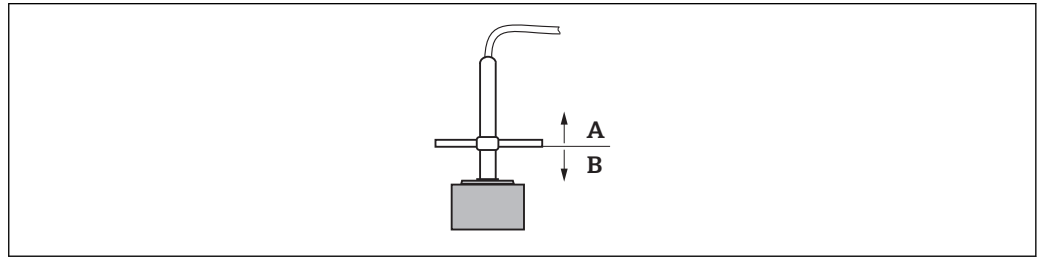
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3

- A Zone 21 or Zone 22
- 1 Tank, hazardous area Zone 20
- 2 Electric connection
- 3 Optional: Terminal box (applied by user)
- 4 connected directly or via terminal box
- 5 Only Device type FDU90, FDU91 with Basic specification, Position 4 (Heater) = B: External power supply
- 6 Analysing and controlling unit



## Installation with alignment unit



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 4

A Zone 21 or Zone 22  
 B Zone 20

- The sensor can be mounted using the alignment device FAU40.
- When using plastic accessories check the suitability for explosion hazardous areas. Observe the instructions concerning electrostatic charging.
- Versions with NPT adapter are intended for connection to a conduit which is suited for the type of protection. The adapter has to be connected to the local grounding system either directly via the metallic conduit or by other measures.

## FDU90

Category IIC and IIB:

For usage of the sensor in explosion hazardous areas due to combustible gases, mists or vapours:  
 Avoid electrostatic charging of the sensor.

## FDU91

The sensor must be mounted in a protected position, if mechanical stress is to be expected.

## FDU91F

Sensor housing consists of conductive material and is connected as well as the membrane and the mounting connection to the earth lead of the sensor cable, which must be connected to the local grounding system of the plant.

## FDU92

- The sensor must be mounted in a protected position, if mechanical stress is to be expected.
- Category IIC:  
 For usage of the sensor in explosion hazardous areas due to combustible gases, mists or vapours:  
 Avoid electrostatic charging of the sensor.

## FDU93, FDU95

- Sensor housing consists of conductive material and is connected as well as the membrane and the mounting connection to the earth lead of the sensor cable, which must be connected to the local grounding system of the plant.
- The ultrasonic sensor can be screwed into a durable plastic flange with conductive cladding, a durable unclad plastic flange with a surface resistance  $\leq 10^9 \Omega$  or a metal flange. When using a clad plastic flange, the free plastic surface may not be within the filling curtain. The cladding must be connected to the plant local grounding system. Conducting or metal flanges are preferred.

## Temperature tables

	Device type					
	FDU90	FDU91	FDU91F	FDU92	FDU93	FDU95
Process temperature $T_p$ (process)	max. +60 °C	max. +80 °C	max. +80 °C	max. +80 °C	max. +80 °C	max. +80 °C

## Zone 1 - Application

Temperature class	Permitted ambient temperature range				
	Device type				
	FDU90	FDU91 with Basic specification, Position 4 (Heater) =		FDU91F FDU92	FDU93 FDU95
		A	B		
T6	-	-40 to +60 °C	-40 to +40 °C	-40 to +60 °C	-40 to +60 °C
T5	-40 to +60 °C	-40 to +80 °C	-40 to +60 °C	-40 to +80 °C	-40 to +80 °C
T4	-40 to +80 °C	-40 to +80 °C	-40 to +80 °C	-40 to +80 °C	-40 to +80 °C
T3	-40 to +80 °C	-40 to +80 °C	-40 to +80 °C	-40 to +80 °C	-40 to +80 °C

## Zone 20/21 - Application

	Sensor in Zone 20		Sensor in Zone 21		Permitted ambient temperature range
	Max. surface temperature at ambient temperature				
	$T_a = 40\text{ °C}$	$T_a = T_{max}$	$T_a = 40\text{ °C}$	$T_a = T_{max}$	
Device type FDU90, FDU91 with Basic specification, Position 4 (Heater) = A	100 °C	100 °C	80 °C	100 °C	-40 to +80 °C
Device type FDU90, FDU91 with Basic specification, Position 4 (Heater) = B	110 °C	110 °C	80 °C	100 °C	-40 to +80 °C
Device type FDU91F, FDU92	100 °C	100 °C	80 °C	100 °C	-40 to +80 °C
Device type FDU93, FDU95	100 °C	100 °C	80 °C	100 °C	-40 to +80 °C

## Connection data

## Performance limits

	Device type					
	FDU90	FDU91	FDU91F	FDU92	FDU93	FDU95
Max. working pressure <sup>1)</sup>	0.4 MPa	0.4 MPa	0.4 MPa	0.4 MPa	0.3 MPa	0.15 MPa

1) outside explosion hazard atmospheres at 20 °C

## Emission/signal circuit (FMU90, FMU95 to FDU9x)

	Device type					
	FDU90	FDU91	FDU91F	FDU92	FDU93	FDU95
Transmission voltage	$\leq 55 V_{eff}$	$\leq 55 V_{eff}$	$\leq 55 V_{eff}$	$\leq 55 V_{eff}$	$\leq 55 V_{eff}$	$\leq 55 V_{eff}$
Sending frequency (20 °C)	90.0 kHz	43.0 kHz	42.0 kHz	30.5 kHz	27.3 kHz	17.1 kHz
Max. power consumption (eff. long-term power)	0.9 W	0.4 W	0.9 W	0.9 W	0.7 W	0.7 W

## NTC power supply (FMU90, FMU95 to FDU9x)

	<i>Device type</i>					
	<i>FDU90</i>	<i>FDU91</i>	<i>FDU91F</i>	<i>FDU92</i>	<i>FDU93</i>	<i>FDU95</i>
Power supply	≤ 12 V	≤ 12 V	≤ 12 V	≤ 12 V	≤ 12 V	≤ 12 V
Max. power consumption (eff. long-term power)	≤ 0.4 mW	≤ 0.4 mW	≤ 0.4 mW	≤ 0.4 mW	≤ 0.4 mW	≤ 0.4 mW
External power supply for heating circuit	≤ 26.4 V <sub>AC</sub> or V <sub>DC</sub>	≤ 26.4 V <sub>AC</sub> or V <sub>DC</sub>	-	-	-	-



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