



## Translation

# EC-Type Examination Certificate

(1)

# EC-Type Examination Certificate

(2)

**- Directive 94/9/EC -  
Equipment and protective systems intended for use  
in potentially explosive atmospheres**

(3)

**DMT 99 ATEX E 068**

(4)

**Equipment: Prosonic Ultrasonic Sensor Type FDU 86-\*\*\***

(5)

**Manufacturer: Endress + Hauser GmbH + Co.**

(6)

**Address: D 79690 Maulburg**

(7)

The design and construction of this equipment and any acceptable variation thereto are specified in the schedule to this type examination certificate.

(8)

The certification body of Deutsche Montan Technologie GmbH, notified body no. 0158 in accordance with Article 9 of the Directive 94/9/EC of the European Parliament and the Council of 23 March 1994, certifies that this equipment has been found to comply with the Essential Health and Safety Requirements relating to the design and construction of equipment and protective systems intended for use in potentially explosive atmospheres, given in Annex II to the Directive.

The examination and test results are recorded in confidential test and assessment report BVS PP 99.2006 EC.

(9)

The Essential Health and Safety Requirements are assured by compliance with:

EN 50014:1992 (VDE 0170/0171 part 1/3.94) General requirements

EN 50028:1987 (VDE 0170/0171 part 9/7.88) Encapsulation „m“

EN 50281-1-1:1998 Dust explosion protection

(10)

If the sign "X" is placed after the certificate number, it indicates that the equipment is subject to special conditions for safe use specified in the schedule to this certificate.

(11)

This EC-Type Examination Certificate relates only to the design and construction of the specified equipment. Further requirements of Directive 94/9/EC apply to the manufacture and placing on the market of this equipment.

(12)

The marking of the equipment shall include the following:



**II** completed by the marking of the category and the marking according to the standards listed in 15.1

**Deutsche Montan Technologie GmbH**

Essen, dated 29.07.99

Signed: Dr. Jockers

Signed: Dr. Dill

DMT-Certification body

Head of special services unit



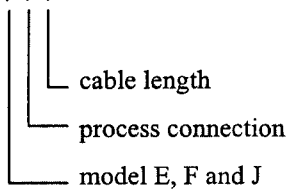
(13) Appendix to

(14) **EC-Type Examination Certificate**

**DMT 99 ATEX E 068**

(15) 15.1 Prosonic Ultrasonic Sensor Type FDU 86-\*\*\*

Ultrasonic sensor Prosonic  
type FDU 86-\*\*\*



	used cable entry type	category marking	marking according to standard	ambient temperature
E	HSK-M-PVDF	1 / 3 D	IP 68 T168 °C	- 35 °C...+ 140 °C
	U 2.UNI EEx-e	1 / 2 D	IP 68 T168 °C	- 40 °C...+ 140 °C
F	HSK-M-PVDF	1 / 3 D	IP 68 T105 °C	- 35 °C...+ 80 °C
	U 2.UNI EEx-e	1 / 2 D	IP 68 T105 °C	- 40 °C...+ 80 °C
J	HSK-M-PVDF	2G	EEx m II T3	- 35 °C...+ 140 °C
			EEx m II T4	- 35 °C...+ 125 °C
			EEx m II T5	- 35 °C...+ 90 °C
			EEx m II T6	- 35 °C...+ 75 °C
	U 2.UNI EEx-e		EEx m II T3	- 40 °C...+ 140 °C
			EEx m II T4	- 40 °C...+ 125 °C
			EEx m II T5	- 40 °C...+ 90 °C
			EEx m II T6	- 40 °C...+ 75 °C

Instead of the cable entry type U 2.UNI EEx-e another cable entry having an EC-Type Examination Certificate in type of protection „increased safety“ may be used if it is suitable for the above mentioned temperature range and has as a minimum the degree of protection IP68.

15.2 Description

The Prosonic FDU86-\*\*\* ultrasonic sensor is a level measurement device based on ultrasonics and is used for non-contact level measurement in vessels of all types containing powdery or grainy bulk solids. The complete measurement system consists of the Prosonic FDU86-\*\*\* ultrasonic sensor and an evaluation and trigger unit Prosonic FMU 86\* installed outside the hazardous area. The sensor and the evaluation and trigger unit are connected to each other by three-wire cabling.

### 15.3 Electrical, mechanical and thermal parameters

#### 15.3.1 Electrical data

##### 15.3.1.1 Emitting and signal circuit (FMU 86\* for FDU 86-\*\*\*)

emitting voltage	≤	65	V <sub>eff</sub>
power consumption of probe	≤	1	VA
NTC supply voltage	≤	DC 5,5	V
NTC measuring current	≤	1	mA

##### 15.3.1.2 Piezo circuit

ultrasonic frequency (emitting frequency)	ca.	10,9	kHz
eff. emitting voltage	≤	750	V <sub>eff</sub>
pulse sequence frequency		1...2	Hz
pulse duration	≤	1,47	ms
pulse pause	≥	0,5	s
eff. pulse power (apparent output)	≤	132	VA
eff. continuous power output (apparent output)	≤	0,4	VA

#### 15.3.2 Thermal data

##### 15.3.2.1 Type FDU 86-E\* \* and type FDU 86-F\* \*

	permitted ambient temperature at the sensor (category 1 D)	maximum surface temperature T of the sensor (category 1D) at maximum ambient temperature
FDU 86-E** with cable entry type HSK-M-PVDF	-35 °C... +140 °C	168 °C
FDU 86-E** with cable entry type U 2.UNI EEx-e	-40 °C... +140 °C	168 °C
FDU 86-F** with cable entry type HSK-M-PVDF	-35 °C... + 80 °C	105 °C
FDU 86-F** with cable entry type U 2.UNI EEx-e	-40 °C... + 80 °C	105 °C

##### 15.3.2.2 Type FDU 86-J\* \*

	permitted ambient temperature at the sensor (category 2 G)	temperature class
FDU 86-J** with cable entry type HSK-M-PVDF	-35 °C...+140 °C bzw. -35 °C...+125 °C bzw. -35 °C...+ 90 °C bzw. -35 °C...+ 75 °C bzw.	T3 T4 T5 T6
FDU 86-J** with cable entry type U 2.UNI EEx-	-40 °C...+140 °C bzw. -40 °C...+125 °C bzw. -40 °C...+ 90 °C bzw. -40 °C...+ 75 °C bzw.	T3 T4 T5 T6

#### 15.3.3 Degree of protection according to EN 60529

IP 68



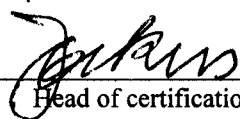
- (16) Test report  
Nr. BVS PP 99.2006 EG  
22 pages
- (17) Special conditions for safe use  
Inapplicable

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We confirm the correctness of the translation from the German original.  
In the case of arbitration only the German wording shall be valid and binding.

44329 Essen, 11.08.99  
BVS-HK/Loh A 9900098

**Deutsche Montan Technologie GmbH**



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Head of certification body



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Head of special services unit



**Translation**  
**1<sup>st</sup> Supplement**

(Supplement in accordance with Directive 94/9/EC Annex III number 6)

**to the EC-Type Examination Certificate**  
**DMT 99 ATEX E 068**

**Equipment:** Ultraschallsensor type PROSONIC FDU 86

**Manufacturer:** Endress + Hauser GmbH + Co. KG

**Address:** 79689 Maulburg

Description

The Ultrasonic sensor Prosonic type FDU 86-\*\*\* can also be manufactured according to the documentation below.

Due to the different standards taken as a basis for type of protection "Encapsulation" the marking changed.

Type PROSONIC S FDU 86-abcde

a – certificate

E – ATEX II 1/2 D or II 2 D IP65 T...

F – ATEX II 1/2 D or II 2 D IP65 T...

J – ATEX II 1/2 D or II 2 D IP65 T..., ATEX II 2 G Ex ma II T6

b – process connection

c – cable length

d – additional options, without relevance for the explosion protection

Alignment unit type FAU40-ab

a – process connection

b – sensor connection

Parameters

Electrical data

Emitting and signal circuit

for connection to Prosonic S FMU90/95

operation voltage	≤	55	V <sub>eff</sub>
operation frequency		10,9	kHz
power consumption of probe	≤	0,7	W

for connection to Prosonic FMU 86\*

operation voltage	≤	65	V <sub>eff</sub>
operation frequency		10,9	kHz
power consumption of probe	≤	1,0	W

NTC/sensor identification circuit

if connected to Prosonic S FMU90/95

supply voltage	≤	12	V
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if connected to Prosonic FMU 86

supply voltage	≤	5,5	V
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Thermal data

Ambient temperature/temperature class

Sensor type PROSONIC S	Temperature class			
	T6	T5	T4	T3
	Permissible ambient temperature			
FDU 86-J*	-40 °C...+75 °C	-40 °C...+90 °C	-40 °C...+125 °C	-40 °C...+140 °C

Maximum surface temperature

Sensor type PROSONIC S	Permissible ambient temperature	Max. surface temperature <sup>2)</sup> sensor category 1D	Max. surface temperature <sup>2)</sup> sensor category 2D
FDU 86-J*	-40 °C...+140 °C	168 °C <sup>1)</sup>	168 °C
FDU 86-E			
FDU 86-F	-40 °C... +80 °C	105 °C <sup>1)</sup>	105 °C

<sup>1)</sup> thermal fuse

<sup>2)</sup> at maximum permissible ambient temperature


Degrees of protection according to EN 60529 IP65

The Essential Health and Safety Requirements of the modified equipment are assured by compliance with:


EN 60079-0:2004 General requirements  
 EN 60079-18:2004 Encapsulation 'm'  
 EN 50281-1-1:1998 +A1 Dust explosion protection

The marking of the equipment shall include the following:

Type FDU86-J\*:

 II 1/2 D IP65 T see manual or  
 II 2 D IP65 T see manual  
 II 2 G Ex ma II T6/T5

Type FDU86-E\*, FDU86-F\*:

 II 1/2 D IP65 T see manual or  
 II 2 D IP65 T see manual

Special conditions for safe use

none

Test and assessment report

BVS PP 99.2006 EG as of 25.07.2006

**EXAM BBG Prüf- und Zertifizier GmbH**

Bochum, dated 25. July 2006

Signed: Migenda

\_\_\_\_\_  
Certification body

Signed: Dr. Wittler

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Special services unit

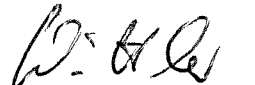
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44809 Bochum, 25.07.2006  
BVS-Hk/Mi A 20050217

**EXAM BBG Prüf- und Zertifizier GmbH**

  
\_\_\_\_\_  
Certification body

  
\_\_\_\_\_  
Special services unit