

EU-Type Examination Certificate

Measuring Instrument Directive

Certificate number: DK-0200-MI004-032

Issued by FORCE Certification A/S Denmark
EU-notified body number 0200

In accordance with Annex II Module B of the Directive 2014/32/EU of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of measuring instruments (MID).

Issued to: **Danfoss A/S**
 Nordborgvej 81
 6430 Nordborg
 Denmark

Type of instrument: Ultrasonic flow meter

Type designation: SONO 3500 CT

Valid until: 2029-01-01

Number of pages: 9, including appendix

Date of issue: 2022-11-16

Version: 9
This new version of DK-0200-MI004-032 is issued due to changes to the meter and a new sealing specification. The previous certificate is withdrawn.

Approved by

Processed by

Lars Poder
Certification Manager

Nikki Christoffersen
Examiner

The conformity markings may only be affixed to the above type approved equipment. The manufacturer's Declaration of Conformity may only be issued and the notified body identification number may only be affixed on the instrument when the production/product assessment module (D or F) of the Directive is fully complied with and controlled by a written inspection agreement with a notified body. This EU-type examination certificate may not be reproduced except in full, without written permission by FORCE Certification A/S.

FORCE Certification references:
TASK No.: 122-32128.02 and ID. No.: 0200-MID-06307-9

Appendix to

EU-Type Examination Certificate

Measuring Instrument Directive

Number: DK-0200-MI004-032

Issued by FORCE Certification A/S, Denmark
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Version	Issue date	Changes
DK-0200-MI004-032	2014-06-20	Original certificate
DK-0200-MI004-032 ver 1	2017-11-27	Administrative extension of the validity period
DK-0200-MI004-032 ver 2	2018-02-22	Administrative extension of the validity period
DK-0200-MI004-032 ver 3	2018-06-01	Administrative extension of the validity period
DK-0200-MI004-032 ver 4	2018-09-01	Administrative extension of the validity period
DK-0200-MI004-032 ver 5	2018-12-01	Administrative extension of the validity period
DK-0200-MI004-032 ver 6	2019-01-01	Meter re-tested according to EN 1434:2015 and now valid for a new 10-year period
DK-0200-MI004-032 ver 7	2019-01-30	Minor editorial correction on page 4
DK-0200-MI004-032 ver 8	2020-01-06	Various editorial corrections and clarifications
DK-0200-MI004-032 ver 9	2022-11-16	New hardware bundle 002 added, new sealing specification added

Applied standards and documents:

EN 1434:2015

The instruments/measuring systems shall correspond with the following specifications:

Type designation:

SONO 3500 CT

Description:

The Volume meter SONO 3500 CT is an ultrasonic flow meter working after the transmission time difference principle.

The meter consists of a flow sensor with two sound tracks and a transmitter.

Technical documentation:

Reference numbers:

- 122-32128.02
- 118-36492.10
- 118-36492.07
- 118-36492.04
- 117-29536.11.04
- 117-29536.10.04
- 117-29536.09.04
- 117-29536.07.04
- 117-29536.06.04
- 114-21345.01

FORCE Certification A/S – File numbers:

- 80.976-226/11
- 80.976-213/11
- 80.976-190/10
- 80.976-172/10
- 80.976-116/09
- 80.970.6-0048/06

Technical data

Instrument tested according to: EN 1434:2015

Hardware bundle: 001, 002

Firmware version:

Version	Checksum for metrological part
1.02	Not available
1.04	Not available
1.05	Not available
2.01	Not available
2.03	Not available
2.04	9E32443E39FA9416A711C0EEE755C387

 Verification tolerance: $\pm (2+0,02 q_p/q) \%$, max. $\pm 5 \%$

 Media temperature: $\theta_{\min} - \theta_{\max} 5 \text{ }^\circ\text{C} \dots 200 \text{ }^\circ\text{C}$

Pressure class: PN10, PN16, PN25 & PN40 (bar)

Power supply: 115 – 230 VAC or 3.6 V battery

Environmental class: E2, M1

Accuracy class: 2

 Climatic class: -10...55 $^\circ\text{C}$, condensing, closed

Durability specification: 10 years

Approved sensor variants

SIZE	DN50 (2")	DN65 (2½")	DN80 (3")	DN100 (4")	DN125 (5")	DN150 (6")	DN200 (8")
"R" q_p/q_i	100	100	100	100	100	100	100
q_i [m ³ /h]	0.3	0.5	0.8	1.2	2	3	5
q_p [m ³ /h]	30	50	80	120	200	300	500
q_s [m ³ /h]	45	72	120	180	280	420	700

SIZE	DN250 (10")	DN300 (12")	DN350 (14")	DN400 (16")	DN500 (20")	DN600 (24")	DN700 (28")
"R" q_p/q_i	100	100	100	100	100	100	100
q_i [m ³ /h]	8	11.2	15	19	29.5	43	58
q_p [m ³ /h]	800	1120	1500	1900	2950	4300	5800
q_s [m ³ /h]	1120	1560	2100	2660	4130	6020	8120

SIZE	DN800 (32")	DN900 (36")	DN1000 (40")	DN1200 (48")
"R" q_p/q_i	100	100	100	50
q_i [m ³ /h]	76	100	100	200
q_p [m ³ /h]	7600	10000	10000	10000
q_s [m ³ /h]	10640	14000	14000	14000

Tables above describe the maximum specification of flow ranges.

Other dynamic ranges are allowed if "R" is 50, 25 or 10.

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Verification

Errors: Maximum permissible errors according to Directive 2014/32/EU of the European Parliament and Council of February 26, 2014 on measuring instruments (MID), Annex VI (MI-004).

Procedure: Test points and verification requirements according to EN 1434:2015

The verification is done with water.

At least the following three flow rates shall be used for verification:

$$q_i \leq q \leq 1.1 q_i$$
$$0.1 q_p \leq q \leq 0.11 q_p$$
$$0.9 q_p \leq q \leq 1.0 q_p$$

The meter shall be verified before becoming operational (initial verification).

Temperature according to EN 1434-5 Initial verification tests:

Initial verification at temperatures between 15 °C and 50 °C is approved provided a verification tolerance of max ±1,5 % regardless of flow rate is applied.

Verification tolerance, according to DS/EN 1434-5:

$$\pm (2+0,02 q_p/q) \%, \text{ max. } \pm 5 \%$$

When the verification is done the meter is sealed as described under sealing.

Sealing

Verification sealing

Verification sealings are done as shown in Figure 1. These sealings avoid anyone to access to the settings of the product or to modify the markings. The HW key is located behind the display and is thereby protected by the display sealing.

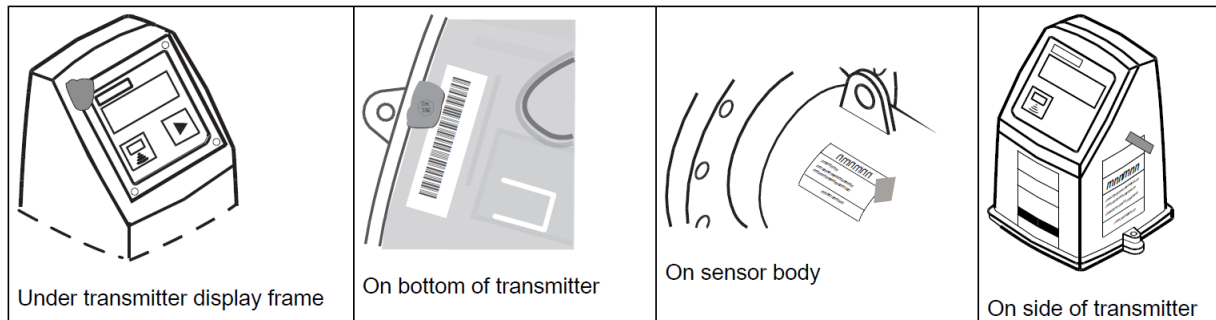


Figure 1: Verification sealing of the SONO 3500 system after verification.

Installation sealing

After finishing the installation and electrical connection of SONO 3500 types, the user can seal the flowmeter as shown in Figure 2.

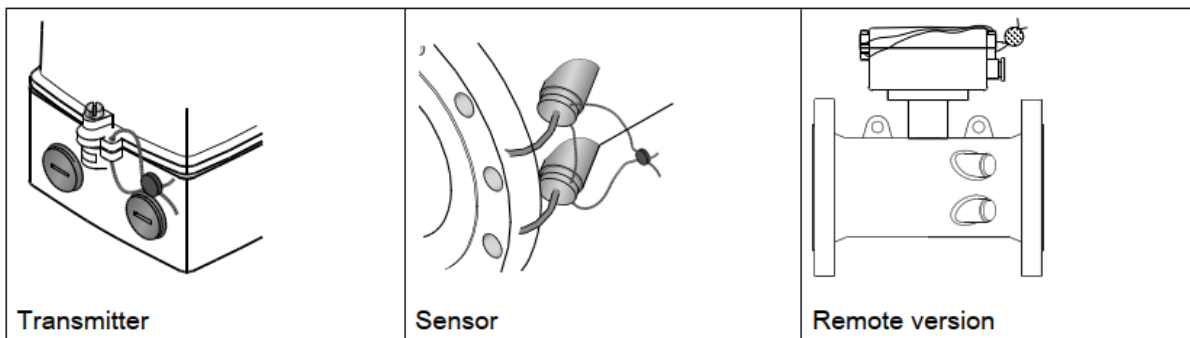


Figure 2: User sealing of the SONO 3500 system after installation.

From left to right:

- **Compact & remote DN50-DN800 sealing version on transmitter**
- **Sensor sealing**
- **Remote DN900-DN1200 sealing version.**

Installation

The flow sensor can be mounted horizontal or vertical.

The signal transmitter can be fitted compact on the sensor or remotely.

Minimum straight inlet pipe: 10 x pipe diameter, minimum 1 m.

See further recommendations in the manufacturers Operating Instructions.

Labelling and inscriptions

Manufacturer, type, year

Serial no.

EU-Type examination certificate number

T_{max} and P_{max}

Application temperature range

Power supply

Accuracy class

Software version

Direction of flow

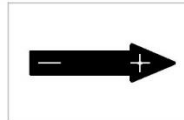
Mechanical and electromagnetic environment classes.

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
Label examples

System transmitter label :





<i>Danfoss</i>	
SONO 3500 CT Code No.: 187F3501	
System No.:	7ME34111UC013ER2
Serial No.:	000000H000
Transmitter:	7ME3451-0AA40-2A80
Serial No.:	111111H111
Sensor:	FDK:000H0000 SN: 222222H222
qp / qj:	100 / 2m ³ /h qs: 280m ³ /h
Pulse value:	2.5lp Pulse width: 5ms
Cal. factor:	8.88888888
T.amb.:	-10°C to +55°C
SW/HW V.:	2.04/001 Prod. year.: 2019
Checksum No.:	9E32443E39FA9416A711COEEE755C387
Certification No.:	DK-0200-MI004-032
Accuracy Class:	2
Power supply:	115-230V AC
Environmental Class:	E2, M1
 	0200 0200
 	
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Additional Transmitter label :

<i>Danfoss</i>	
SONO 3500 CT	
Order No.:	7ME34510AA402A80
Serial No.:	111111H111
Supply:	115-230V AC 50/60Hz, 2.5VA
IP67	
T.amb.:	-10°C to +55°C
NO DIRECT SUNLIGHT EXPOSURE	
Firmware version:	2.04
Battery backup 3.6V DC	
Lithium battery inside	
	 
Danfoss AIS, 6430 Nordborg Denmark	
Made in France	

System sensor label :

<i>Danfoss</i>	
SONO 3500 CT Code No.: 187F3501	
Sensor:	FDK:000H0000
Serial No.:	222222H222
Dimension:	DN125 / 5 inch
Process conn.:	EN 1092-1, PN16
qp / qj:	100 / 2m ³ /h
qs:	280m ³ /h
θmin to θmax:	+5°C to +120°C
Cal. factor:	8.88888888
T.amb.:	-10°C to +55°C
MAWP (PS) at +5°C (TS):	16bar
MAWP (PS) at +120°C (TS):	16bar
Fluid group:	PED/G2
System No.:	7ME34111UC013ER2
Serial No.:	000000H000
Prod. year.:	2019
Meter orientation:	Horizontal
Certification No.:	DK-0200-MI004-032
Accuracy Class:	2
Environmental Class:	E2, M1
 	0200 0200
 	
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Informative Annex

Integrated functions not subject to the Measuring Instruments Directive:

Integrated bi-functional Heat/Cooling function

The SONO 3500 CT is type tested as Heating, Cooling and as bi-functional Heating/Cooling energy meter according to EN 1434-4:2015.

The integrated bi-functional Heating/Cooling function can therefore be utilized under the operating conditions as described in this certificate.

Analog output module

The analog output module (4-20 mA) is not subject to the MID.