DANAK
PROD Reg. No. 7026

FORCE Certification

EU-Type Examination Certificate

Measuring Instrument Directive

Certificate number: DK-0200-MI004-044

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:	**Kamstrup A/S** **Industrivej 28, Stilling** **DK-8660 Skanderborg** **Denmark**
Type of instrument:	Thermal energy meter, flow sensor
Type designation:	ULTRAFLOW® 44 (Types:65-4-XXHX-XXX, 65-4XXJX-XXX, 65-4-XXLX-XXX, 65-4-XXCX-XXX)
Valid until:	2030-03-04
Number of pages:	15, including appendix
Date of issue:	2022-06-28
Version No.:	2 This new version of DK-0200-MI004-044 is issued due to new WELMEC and EN 1434 editions and minor editorial changes. Fast response meter is added. The previous certificate is withdrawn.

Approved by

Michael Møller Nielsen
Certification Manager

Processed by

Lars Poder
Examiner

FORCE Certification references: TASK no.: 120-23015.02 and ID no.: 0200-MID-08052-2

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Appendix to

EU-Type Examination Certificate
Measuring Instrument Directive

Number: DK-0200-MI004-044
Issued by FORCE Certification A/S, Denmark
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Revision	Issue date	Changes
DK-0200-MI004-044	2020-03-05	Original certificate
DK-0200-MI004-044 ver 1	2021-02-03	Clarification of postal address, minor editorial changes
DK-0200-MI004-044 ver 2	2022-06-28	Update to new WELMEC 7.2:2021, EN 1434:2007/AC:2007 and FprEN 1434:2022 from 2022-04. Fast response meter is added and minor editorial changes have been performed.

Applied standards and documents:

- EN 1434:2007/AC:2007
- EN 1434:2015+A1:2018
- FprEN 1434:2022 from 2022-04
- WELMEC 7.2:2021

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

Type designation:

ULTRAFLOW® 44 (Types:65-4-XXHX-XXX, 65-4XXJX-XXX, 65-4-XXLX-XXX, 65-4-XXCX-XXX)

Description:

The flow sensor is measuring the transit time difference of an ultrasound signal running along or against the flow direction in order to calculate the volume flow. The measuring unit consists of a body in brass or stainless steel. Some flow sensor housings allow direct mounting of a temperature sensor in the outlet of the flow sensor. Two ultrasound transducers are mounted on the same side parallel to the meter housing. The ultrasound signal needs therefore to be guided along an U-path by 2 (q_p 1.5 and 2.5 m^3/h) or along a triangular path by 4 (q_p 3.5...100 m^3/h) reflectors through the measuring pipe.

Depending on the meter size for q_p 1.5 and 2.5 m^3/h combinations of 2 types of threaded (G¾B, G1B) housings (DN15, DN20) are used with the corresponding reflector bases as well as 2 measuring pipes with a varying inner diameter. For meter sizes q_p 3.5...100 m^3/h, 7 additional measuring pipes with varying inner diameter and 4 integrated reflectors are used, respectively.

Two different kinds of plastic cabinets including the transducers are utilized for this flow sensor. The inner part of both of the two types is filled with gel to protect the flow sensor for condensation.

The flow sensor PCB is physically separated by a 1.2 m coaxial cable from the transducers in the plastic cabinet. The coaxial cable must not be modified. The PCB is completely molded in an electronics box and thereby particularly well protected with respect to condensation. On the other side of this electronic's box including the PCB a 3-wired cable of either 2.5 m or 10 m length can be found. The 3-wired cable can be shortened depending on the installation's demand.

The flow sensor is supplied by a calculator e.g. MULTICAL® 603 or a built-in supply module in a separate Pulse Transmitter / Pulse Divider. To extend the cable length between ULTRAFLOW® 44 and MULTICAL® 603 as well as MULTICAL® 803 calculators a Cable Extender Box can be utilized as an example.

The flow sensor's PCB cannot be connected directly via any plug or similar, because it is completely molded. Communication with the flow sensor, e.g. in the course of adjusting the flow sensor, is instead facilitated by password protected communication via the 3-wired signal cable.

Technical documentation:

Reference No.:

- 120-23015.02
- 120-23015.01

Technical data

Legal measuring data according to	: EN 1434:2007/AC:2007 : EN 1434:2015+A1:2018 : FprEN 1434:2022 from 2022-04
Instrument type	: Sub-assembly to be used as a part of a Complete instrument or a Combined instrument or a Hybrid instrument
Parts:	
- Flow sensor or	: DK-0200-MI004-044
- Flow sensor and calculator or	: DK-0200-MI004-044 and (-040 or -042)
- Flow sensor, calculator and temp. sensor	: DK-0200-MI004-044 and (-040 or -042) and (-036 or -046)
Accuracy class	: 2 and 3
Environment class	: E1 and E2, M1 and M2
Climatic class	: 5…55 °C, non-condensing, closed location and 5...55 °C, condensing, closed location
Protection class	
Flow sensor	: IP68
Pulse Transmitter/ Pulse Divider	: IP67
Straight inlet requirement	: 0D (No requirements for straight inlet)
Installation angle	: Horizontally, vertically or at an angle
Temperature of medium, flow sensor θ_q	: 2...130 °C (or narrower range)
Pressure stage q_p 1.5…40 m^3/h	: PN16, PS16 and PN25, PS25 and PN16/PN25, PS25
Pressure stage q_p 60 and 100 m^3/h	: PN25, PS25

Nom. flow q_p [m^3/h]	**Installation dimensions**		
1.5	G¾Bx110 mm	G1Bx130 mm	
2.5	G1Bx190 mm		
3.5	G5/4Bx260 mm		
6	G5/4Bx260 mm	G1½Bx260 mm	DN25x260 mm
10	G2Bx300 mm	DN40x300 mm	
15	DN50x270 mm		
25	DN65x300 mm		
40	DN80x300 mm		
60	DN100x360 mm		
100	DN100x360 mm	DN125x350 mm	

Technical data (continued)

Dynamic range q_p 1.5...100 m³/h	q_p:q_i q_s:q_p	: 100:1, 50:1 and 25:1 : 2:1
Dynamic range q_p 1.5...25 and 100 m³/h	q_p:q_i q_s:q_p	: 250:1, 100:1, 50:1 and 25:1 : 2:1
Durability specification		: Minimum 10 years (Long-life flow sensor)
Fast response meter (sub-assembly flow sensor)		: Volume sampling interval ≤ 2 s
Provision for built-in temperature sensor		: q_p 1.5...10 m³/h (M10x1 connection)
Internal supply voltage		: 3.6 VDC ±0.1 VDC
Power supply (Built-in supply module of Pulse Transmitter or Pulse Divider)		: 230 VAC 24 VAC 3.65 VDC, Lithium battery, D-cell

Software version	Revision	Date	Checksum (hex/dec)
5098-1571	: B1	2019-08	N: 0xF083/61571
(Flow sensor)	C1	2019-10	N: 0x2303/8963
5098-1026	: B1	2013-11	N: 0x6ACF/27343
(Pulse Divider)			

N: Non-legally Relevant Software change
L: Legally Relevant Software change

Note: The software version (Checksum) can be shown via the PC-software METERTOOL, which can be acquired from Kamstrup A/S.

Communication to the flow sensor is facilitated e. g. by a connected calculator MULTICAL® 603 or MULTICAL® 803 in test mode and an optical eye with USB connector to the PC.

Communication to the Pulse Divider is facilitated e. g. by a cable with USB connector to the PC and a connector to the Pulse Divider PCB.

Technical data (continued)

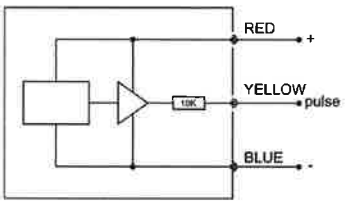
Meter factor	: 0.004...100 pulses/l (depending on programming)
Pulse output	
Pulse duration	: 2...100 ms (depending on programming)
Pause	: Depending on current pulse frequency

Pulse output - Galvanically connected:

(ULTRAFLOW®)

Type	Push-Pull
Output impedance	~10 kΩ
Meter factor	1.5...100 pulses/l
Pulse duration	2...6 ms
Pause time	Depending on current pulse frequency

Block diagram pulse output on ULTRAFLOW®:



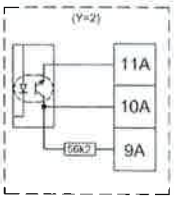
Pulse output – Galvanically separated:

(Pulse Transmitter type 66-99-903-YZ-XXX and Pulse Divider type 66-99-907-YZ-XXX)

Type	Optocoupler
Meter factor	0.004...100 pulses/l
Pulse duration	2...100 ms
Pause	Depending on current pulse frequency

Galvanically separated output module (**Y = 2**):
Open collector.
2-wire connection or 3-wire connection via the integrated pull-up resistor of 56.2 kΩ

Module Y=2	OC and OD	(OB) Kam
Max input voltage	6 V	30 V
Max input current	0.1 mA	12 mA
ON condition	U ≤ 0.3 V @ 0.1 mA	U_{CE} ≤ 2.5 V @ 12 mA
OFF condition	R ≥ 6 MΩ	R ≥ 6 MΩ



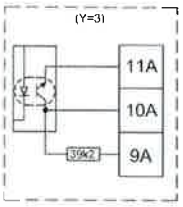
Technical data (continued)

Galvanically separated output module "Low power" (**Y = 3**):

Open collector.

2-wire connection or 3-wire connection via the integrated pull-up resistor of 39.2 kΩ

Module Y=3	OC and OD
Max input voltage	6 V
Max input current	0.1 mA
ON condition	U ≤ 0.3 V @ 0.1 mA
OFF condition	R ≥ 6 MΩ



Cable length:	From flow sensor's electronics box to galvanically connected calculator	Max 10 m
	From flow sensor's electronics box to galvanically connected calculator using Cable Extender Box no. 66-99-036	Max 30 m
	From flow sensor's electronics box to galvanically connected Pulse Transmitter/ Pulse Divider input	Max 10 m
	From galvanically separated output module (Y = 2) in Pulse Transmitter/ Pulse Divider in 2-wire connection to galvanically separated calculator input, e. g. MULTICAL® 603-G with external 24 VDC supply or MULTICAL® 803-XXXX-P with built-in 24 VDC supply.	Max 100 m

Modules:

Output and supply modules for Pulse Transmitter type 66-99-903-YZ-XXX and Pulse Divider type 66-99-907-YZ-XXX:

5550-1062	Galvanically separated output module (Y=2)
5550-1219	Galvanically separated output module "Low power" (Y=3)
1606-064	Battery, 3.65 VDC, D-cell with 2-pin connector
5550-1051	24 VAC supply module
5550-1052	230 VAC supply module

Verification

Errors	:	[Maximum permissible errors according to Directive 2014/32/EU of the European Parliament and Council of February 26th, 2014 on measurement instruments (MID), Annex VI MI-004]
Procedure	:	(Test points and verification requirements according to EN 1434-5)
Complete meter acc. to	:	[3.] (6.7)
Hybrid and combined meter acc. to	:	(6.6), i.e. [7.1] (6.2), [7.2] (6.3), [7.3] (6.4) and (6.5)

The flow sensor can be verified by counting the volume proportional pulses in either standard mode or high-resolution mode. Furthermore, verification can be carried out using the serial data output.

Initial verification can be carried out via the three-wired signal cable coming from the measuring electronics.

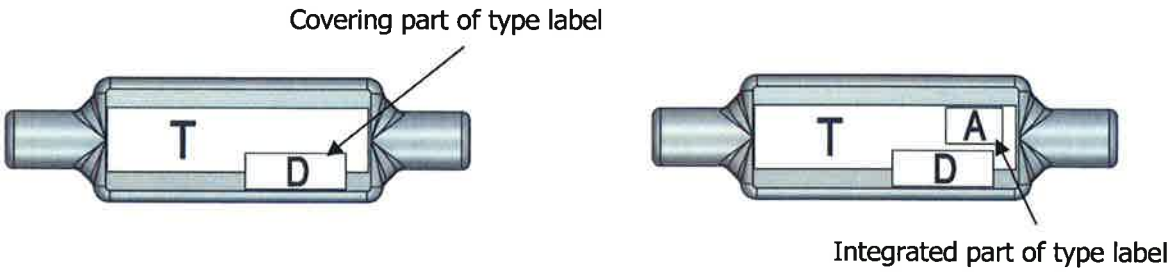
For dynamic ranges q_p:q_i 25:1 and 50:1, 100:1 can be used as an alternative.
For dynamic ranges q_p:q_i 25:1, 50:1 and 100:1, 250:1 can be used as an alternative.

During verification a water temperature of (20 ± 5) °C can be used as an alternative.

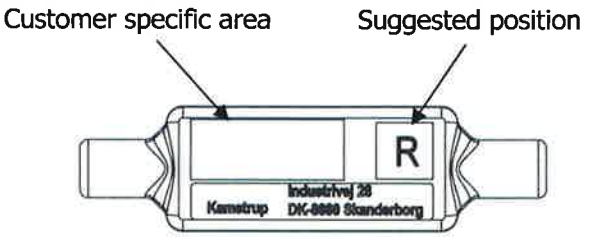
Seals and markings

D	Security seal or module D/F label (Depending on type label)
S	Security seals. Covering screws or parts of type label
T	Type label (as void label or with security seal D)
I	Installation seals (wire and seal or void label)
A	Alternative approval marking as integrated part of the type label
R	Re-verification marking - suggested position

ULTRAFLOW® 44 (q_p 1.5...100 m^3/h) – The electronics box



Front side



Rear side

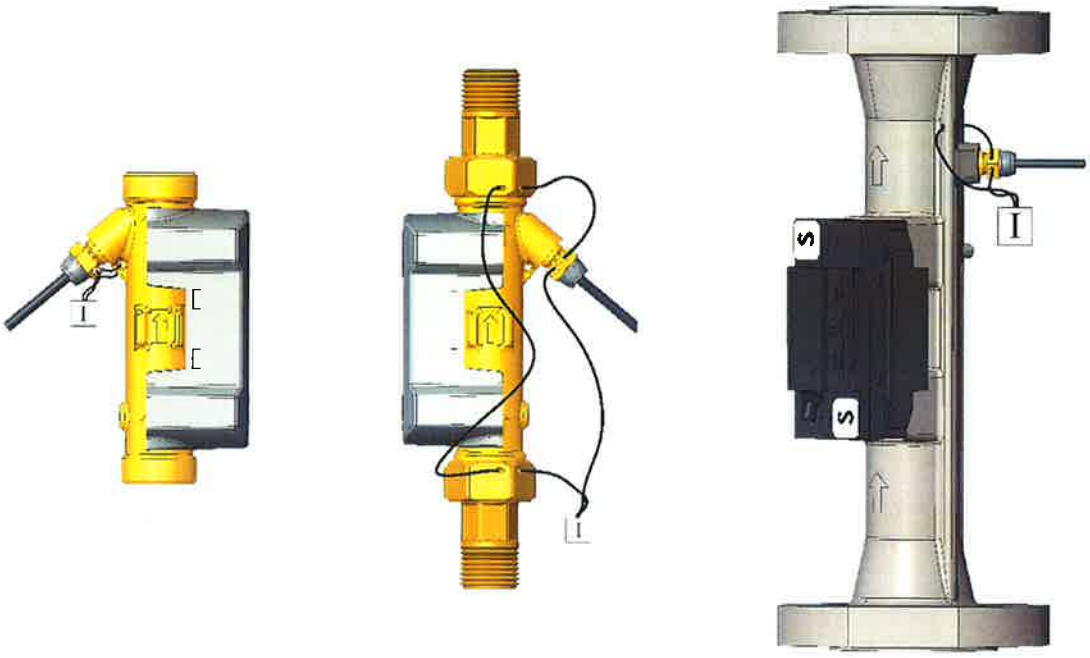
Seals and markings (continued)

ULTRAFLOW® 44 – Meter housings

(a) Type 65-4-XXHX-XXX; q_p 1.5 and 2.5 m^3/h

and

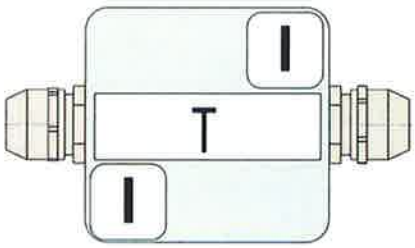
(b) Types 65-4-XXJX-XXX, 65-4-XXLX-XXX and 65-4-XXCX-XXX; q_p 3.5...100 m^3/h



(a) (b)

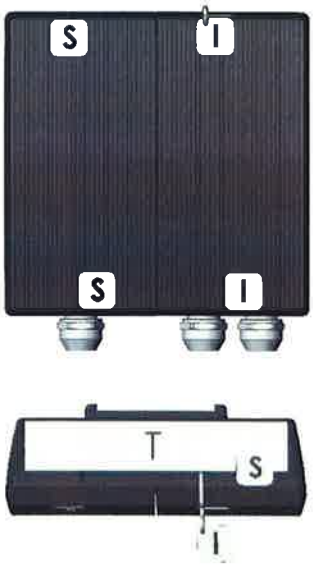
Seals and markings (continued)

Cable Extender Box (Type 66-99-036)



Pulse Transmitter (Type 66-99-903-YZ-XXX)

Pulse Divider (Type 66-99-907-YZ-XXX)



Labelling and inscriptions

Inscriptions on ULTRAFLOW® 44

CE marking and the supplementary metrology marking

Manufacturer's postal address:
(casted in plastic casing or as a label)

Kamstrup
Industrivej 28
DK-8660 Skanderborg

Arrow for flow direction

Type label placed on the front side of the flow sensor's electronics box with the following imprint:

System designation (No. of the EU-type examination certificate)
Type, production year and serial number
Accuracy class
Mechanical and electromagnetic environment classes
Flow limits q_i, q_p, q_s
Temperature of medium θ_q (θ_{min} - θ_{max})
Nominal pressure (PN)
Maximum admissible working pressure (PS)
Meter Factor
Software Version
Manufacturer or distributor logo

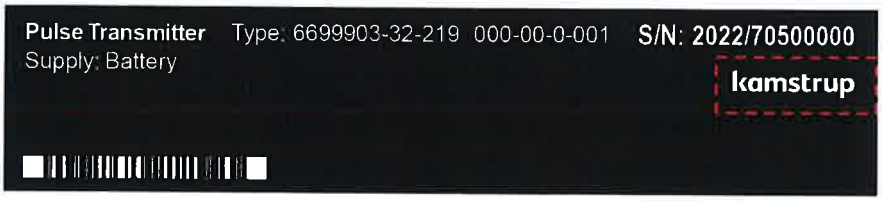
Additional inscriptions for Pulse Transmitter
Supply

Additional inscriptions for Pulse Divider
"Meter factor input and Meter factor output" or "Division factor"
Duration of output pulse
Supply
Software Version

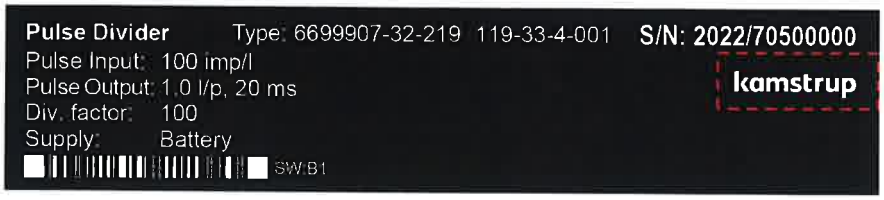
Examples of type label

ULTRAFLOW® 44
(Types: 65-4-XXHX-XXX, 65-4-XXJX-XXX, 65-4-XXLX-XXX and 65-4-XXCX-XXX; q_p 1.5...100 m³/h)

Pulse Transmitter type 66-99-903-YZ-XXX



Pulse Divider type 66-99-907-YZ-XXX



The manufacturer or distributor logo is located on the respective type label, shown in the dashed red marking.

Example of CE marking and supplementary metrology marking

Photos

ULTRAFLOW® 44

Note: All flow sensor variants are delivered with the electronics box as well as the coaxial cable and a 3-wired signal cable as shown exemplarily on the smallest size on the photo above.

Pulse Divider / (Pulse Transmitter)

Cable Extender Box

Informative Annex

Integrated functions not subject to the Measuring Instruments Directive:

Integrated bi-functional Heat/Cooling function

The flow sensor ULTRAFLOW® 44 is type tested as a flow sensor for Heating, Cooling and bi-functional Heating/Cooling energy meters according to EN 1434-4:2015 + A1:2018 and FprEN 1434:2022 from 2022-04.

On this basis the energy meter is national type approved for Cooling according to the Danish law[1], System designation is TS 27.02 014.

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

Re-verification

Re-verification of ULTRAFLOW® 44 may be performed according to EN 1434-5 under the same conditions as stated in this certificate for verification of ULTRAFLOW® 44, under consideration of national law.

During re-verification of the flow sensor a water temperature of (20 ± 5) °C can be used as an alternative.

[1] BEK No. 1178 of 06/11/2014, Ordinance on metrological control of meters used for measuring consumption of cooling energy in district cooling systems and central cooling systems as amended by BEK No. 549 of 01/06/2016.