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 the Danish Safety Technology Authority's statutory order no. 1382 of November 25, 2016 which implements the Directive 2014/32/EU of the European Parliament and Council of February 26, 2014 on measuring instruments (MID).

Issued to:	**Kamstrup A/S** **Industrivej 28, Stilling** **DK-8660 Skanderborg** **Denmark**
Type of instrument:	Heat Meter, flow sensor
Type designation:	ULTRAFLOW® 44
Valid until:	2030-03-04
Number of pages:	16, including appendix
Date of issue:	2020-03-05
Version No.:	Original

Approved by

Lars Poder
Certification Manager

Processed by

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.
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FORCE Certification references: TASK no.: 120-23015.01 and ID no.: 0200-MID-08052

Appendix to

EU-Type Examination Certificate
Measuring Instrument Directive

Number: DK-0200-MI004-044
Issued by FORCE Certification A/S, Denmark
EU-notified body number 0200

Revision	Issue date	Changes
DK-0200-MI004-044	2020-03-05	Original certificate

Applied standards and documents:

- EN 1434:2015+A1:2018
- WELMEC Guide 7.2:2019

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

Type designation:
ULTRAFLOW® 44

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 electronic's 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 built-in supply module in a separate Pulse Transmitter / Pulse Divider or a calculator e.g. MULTICAL® 603. To extend the cable length between ULTRAFLOW® 44 and MULTICAL® 603 as well as MULTICAL® 803 calculators a Cable Extender Box can be utilized.

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.:

- 120-23015.01

Technical data

Instrument type according to	: EN 1434:2015+A1:2018
Instrument type	: Combined instrument, sub-assembly flow sensor.
Temperature of medium, flow sensor	: θ_{min} - θ_{max} : 2...130°C (or narrower range)
Pressure stage	: PN16, PS16 and PN25, PS25
Nominal flow rate	: q_p 1.5, 2.5, 3.5, 6, 10, 15, 25, 40, 60 and 100 m^3/h

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	

Dynamic range q_p 1.5...25 and 100 m^3/h	q_p:q_i	: 250:1, 100:1 and 50:1
	q_s:q_p	: 2:1
Dynamic range q_p 40 and 60 m^3/h	q_p:q_i	: 100:1 and 50:1
	q_s:q_p	: 2:1
Accuracy class		: 2 and 3
Environment class		: E1 and E2, M1 and M2
Climatic class		: 5...55 °C, condensing, closed location and 5...55 °C, non-condensing, closed location
Protection class		
Flow sensor		: IP 68
Pulse Transmitter/ Pulse Divider		: IP 67
Durability specification		: Minimum 10 years (Long-life flow sensor)
Installation angle		: Horizontally, vertically or at an angle
Provision for built-in temperature sensor		: q_p 1.5...10 m^3/h (M10x1 connection)

Technical data (continued)

Power supply	: 3.6 VDC ±0.1 VDC
Power supply (Build in supply module of Pulse Transmitter or Pulse Divider)	: 230 VAC 24 VAC 3.65 VDC, Lithium battery, D-cell
Software version 5098-1571 (Flow sensors q_p 1.5...100 m^3/h)	: Revision B1, CRC sum (hex) 0xF083 Revision C1, CRC sum (hex) 0x2303
Software version 5098-1026 (Pulse Divider)	: Revision B1, CRC sum (dec) 27343

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

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

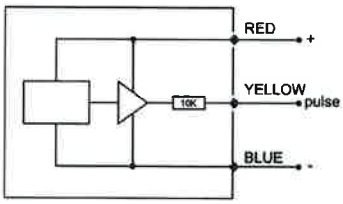
Technical data (continued)

Pulse output - Galvanic 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®:



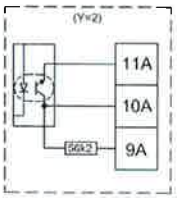
Pulse output – Galvanic isolated:

(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

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

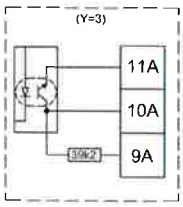
Module Y=2	OC and OD	(OB) Kam
Max input voltage	6 V	30 V
Max input current	0.1 mA	12 mA
ON condition	U ≤ 0.3 V @ 0.1 mA	U_{CE} ≤ 2.5 V @ 12 mA
OFF condition	R ≥ 6 MΩ	R ≥ 6 MΩ



Technical data (continued)

Galvanic isolated 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 electronic's box to galvanic connected calculator	Max 10 m
	From flow sensor's electronic's box to galvanic connected calculator using Cable Extender Box no. 66-99-036	Max 30 m
	From flow sensor's electronic's box to Pulse Transmitter/ Pulse Divider input	Max 10 m
	From galvanic isolated output module (Pulse Transmitter/ Pulse Divider output)	Max 100 m

Verification procedure

According to: EN 1434-5 and EN 1434-1

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

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

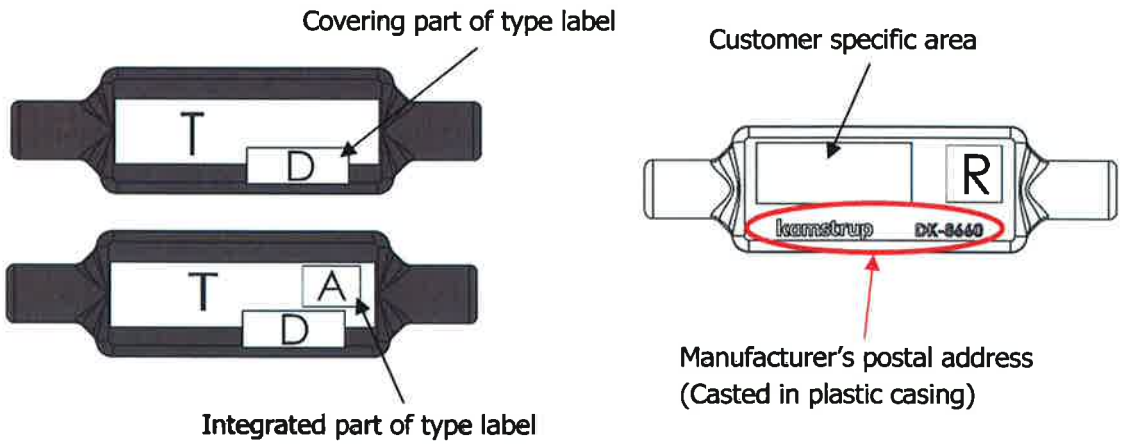
For dynamic ranges q_p:q_i 50:1 and 100:1, 100:1 can be used as an alternative.
For dynamic ranges q_p:q_i 50:1, 100:1 and 250:1, 250:1 can be used as an alternative.

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
T	Type label
I	Installation seals (wire and seal or void labels)
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 electronic's box



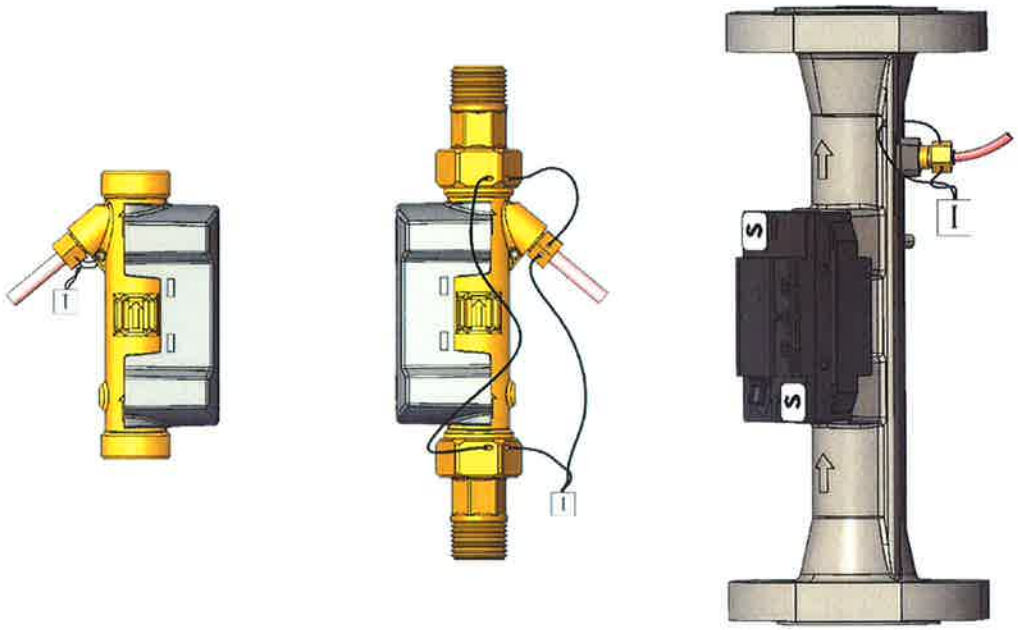
Seals and markings (continued)

ULTRAFLOW® 44 – Meter housings

(a) Type 65-4-XX**H**X-XXX; q_p 1,5 and 2,5 m^3/h

and

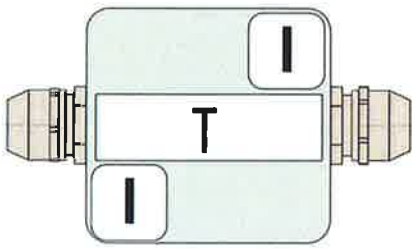
(b) Types 65-4-XX**J**X-XXX, 65-4-XX**L**X-XXX and 65-4-XX**C**X-XXX; q_p 3,5...100 m^3/h



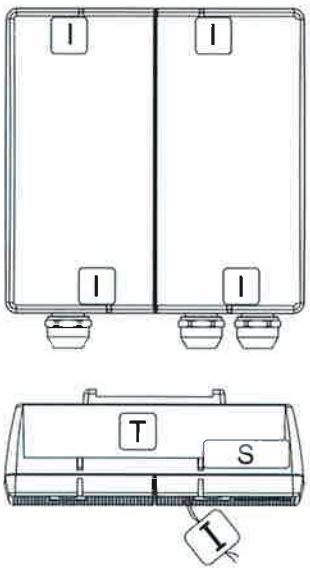
(a) (b)

Seals and markings (continued)

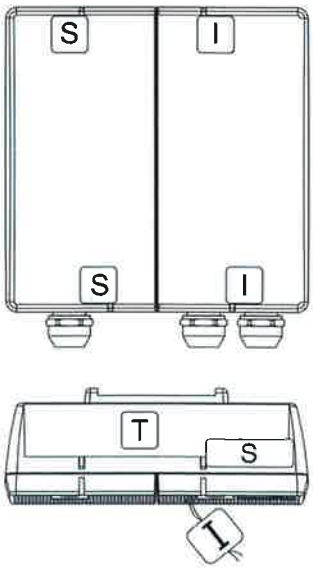
Cable Extender Box (Type 66-99-036)



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



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



Labelling and inscriptions

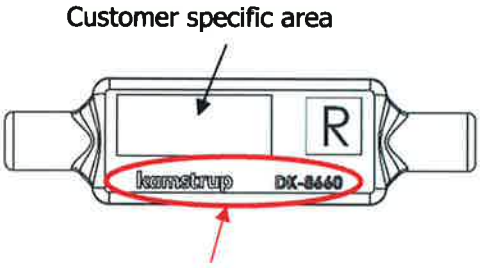
Inscriptions on ULTRAFLOW® 44

Manufacturer's postal address
Arrow for flow direction

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

System designation
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_{min} - θ_{max})
Nominal pressure (PN)
Maximum admissible working pressure (PS)
Meter Factor
Software Version
Manufacturer or distributor logo

Rear side of flow sensor's electronic's box:



Manufacturer's postal address
(Casted in plastic casing)

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

Modules

Output and supply modules for Pulse Transmitter and Pulse Divider:

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

Examples of type labels

ULTRAFLOW® 44 (Types: 65-4-XX**H**X-XXX, 65-4-XX**J**X-XXX, 65-4-XX**L**X-XXX and 65-4-XX**C**X-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.

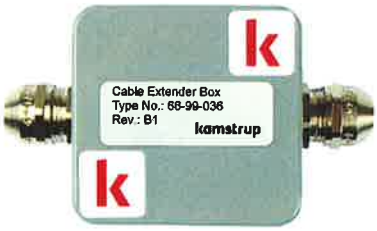
Photos

ULTRAFLOW® 44

Note: All flow sensor variants are delivered with the electronic's box as well as the coaxial cable and a 3-wired signal cable as shown exemplarily 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.

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

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

[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.