DANAK
PROD Reg. No. 7026

FORCE Certification

EU-Type Examination Certificate

Measuring Instrument Directive

Certificate number: DK-0200-MI004-048

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® 85
Valid until:	2035-05-22
Number of pages:	24, including appendix
Date of issue:	2025-05-22
Version No.:	Original

Approved by

Michael Møller Nielsen
Certification Manager

Processed by

Lars Poder
Examiner

FORCE Certification references:
TASK No.: 125-26921.01 and ID No.: 0200-MID-19534-1

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Appendix to

EU-Type Examination Certificate
Measuring Instrument Directive

Number: DK-0200-MI004-048
Issued by FORCE Certification A/S, Denmark
EU-notified body number 0200

Revision	Issue date	Changes
DK-0200-MI004-048	2025-05-22	Original certificate

Applied standards and documents:

- EN 1434:2022
- OIML R75:2002
- WELMEC 7.2:2023 (from May 2024)

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

Type designation:
ULTRAFLOW® 85

Description:

The bi-directional flow sensor measures the transit time difference of an ultrasound signal running along or against the flow direction to calculate the volume flow. The measuring unit consists of a body in stainless steel with conical in- and outlet, where two sets of transducers (= four transducers) are mounted next to each other. The ultrasound signal is in this case for each set propagating directly from one side of the meter housing diagonally across the measuring section to the opposite side of the meter housing.

The flow sensor can be connected to a separate Pulse Transmitter/ Pulse Divider or Cable Extender Box. The flow sensor is supplied by a calculator e.g. MULTICAL® 603, or a separate Pulse Transmitter/ Pulse Divider.

ULTRAFLOW® 85 can either operate in a pulse operation state, where the measuring sequence is determined by the flow sensor or a serial operation state, where the measuring sequence is determined by the connected calculator like e.g. MULTICAL® 603-S, MULTICAL® 603-U or MULTICAL® 803-A.

The PCB is integrated in a plastic cabinet, which is connected to the transducers with shielded coaxial cables. The PCB includes in each case a four-pinned plug, which is protected by a security seal. In connection with verification this plug can be used to supply the flow sensor, pick-up pulses, change to high-resolution condition, and acquire registered volume during serial verification. In addition, the flow sensor can be programmed and e.g. adjusted via this plug.

ULTRAFLOW® 85 contains an indicating device, providing different information e.g. about the actual flow, operation state, air in medium, etc. These indications are considered as outside from legal metrological control. This means that the indicating device is not considered crucial for the legitimate use of ULTRAFLOW® 85.

Technical documentation:

Reference No.:

- 125-26921.01

Technical data

Legal measuring data according to	: EN 1434:2022
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-MI004-048
- Flow sensor and calculator or	: DK-0200-MI004-048 and (-040, -042 or -047)
- Flow sensor, calculator and temp. sensor	: DK-0200-MI004-048 and (-040, -042 or -047) and (-036 or -046)
Accuracy class	: 2 and 3
Environment class	: E1 and E2
Mechanical class	: M1 and M2
Climatic class	: 5...55 °C, non-condensing, closed location and 5...55 °C, condensing, closed location.
Protection Class	
ULTRAFLOW® 85	: IP68
Cable extender box 6699-036	: IP68
Pulse Transmitter 6699-903-YZ-XXX/ Pulse Divider 6699-907-YZ-XXX	: 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...150 °C (or narrower range)

Technical data (continued)

Pressure stage
DN150 x 500 mm : PN16, PS16 or PN25, PS25 (see marking)
DN200 x 500 mm
DN250 x 600 mm

DN300 x 500 mm : PN16, PS16

Nom. flow q_p [m³/h]	Installation dimensions			
	PN25, PS25 or PN16, PS16 (see marking)			PN16, PS16
150	DN150x500 mm			
250	DN150x500 mm	DN200x500 mm		
400		DN200x500 mm	DN250x600 mm	
600			DN250x600 mm	DN300x500 mm
1000				DN300x500 mm

Dynamic range
q_p:q_i : 250:1, 100:1, 50:1 and 25:1
q_s:q_p : 2:1 and 1.8:1

Durability specification : Minimum 10 years (Long-life flow sensor)

Fast response meter
(sub-assembly flow sensor)
ULTRAFLOW® 85
Pulse operation state : Volume sampling interval ≤ 1 s
Serial operation state : Volume sampling interval depending on calculator. Down to ≤ 0.5 s

Internal supply voltage : 3.6 VDC ±0.1 V

Power supply : 230 VAC
(Built-in supply module of Pulse Transmitter or Pulse Divider) 24 VAC
3.65 VDC, Lithium battery, D-cell

Technical data (continued)

Software Identification

Flow sensor ULTRAFLOW® 85

Software revision	C1(0301)	0 3 0 1
Kamstrup Internal Item No.	50981861	1 8 6 1
Software Identification		1 8 6 1 0 3 0 1

Software Identification	Date	CRC-32 sum	Description
18610301 (C1)	2025-01-23	1168802115 (dec) 45AA8143 (hex)	Initial release for mass production

Pulse Divider 66-99-907-YZ-XXX

Software revision	B1(0201)	0 2 0 1
Kamstrup Internal Item No.	50981026	1 0 2 6
Software Identification		1 0 2 6 0 2 0 1

Software Identification	Date	CRC-16 sum	Description
10260201 (B1)	2013-11	27343 (dec) 0x6ACF (hex)	Initial release for mass production

Note: The software version (Checksum) can be shown via the PC-software METERTOOL HCW (66-99-724), which can be acquired from Kamstrup A/S.

Communication is facilitated e.g. by a cable with USB connector to the PC and a connector to the flow sensor/ Pulse Divider PCB. As an example, cable 66-99-024 can be used.

Technical data (continued)

Meter factor

ULTRAFLOW® 85 (& Pulse Transmitter) : 0.15...1 pulses/litre (depending on q_p)

ULTRAFLOW® 85 & Pulse Divider : 0.0004...1 pulses/litre (depending on q_p and programming)

Pulse output

Pulse duration

ULTRAFLOW® 85 (& Pulse Transmitter) : 2...6 ms

ULTRAFLOW® 85 & Pulse Divider : 2...100 ms (depending on programming)

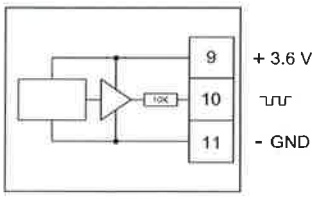
Pause : Depending on current pulse frequency

Pulse output – Galvanically connected:

(ULTRAFLOW® 85)

Type	Push-Pull
Output impedance	~10 kΩ
Meter factor	0.15...1 pulses/litre
Pulse duration	2...6 ms
Pause time	Depending on current pulse frequency

Block diagram pulse output on ULTRAFLOW®:



Technical data (continued)

Pulse output – Galvanically separated:

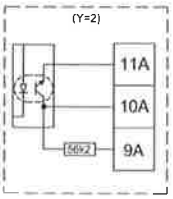
(Pulse output modules Y = 2 and Y = 3 in Pulse Transmitter type 66-99-903-YZ-XXX, and Pulse Divider type 66-99-907-YZ-XXX)

Type	Optocoupler
Meter factor	0.0004...1 pulses/litre
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

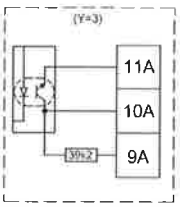
Module Y=2	OC and OD	(OB) Kam
Max input voltage	6 V	30 V
Max input current	0.1 mA	12 mA
ON condition	U ≤ 0.3 V @ 0.1 mA	U_{CE} ≤ 2.5 V @ 12 mA
OFF condition	R ≥ 6 MΩ	R ≥ 6 MΩ



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



Technical data (continued)

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
	From galvanically separated output module (Y = 2 or Y = 3) in Pulse Transmitter/ Pulse Divider in 3-wire connection to galvanically separated calculator input.	: Max 10 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 (Z = 2)
5550-1051	24 VAC supply module (Z = 8)
5550-1052	230 VAC supply module (Z = 7)

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 measure flow in 2 directions (forward and reverse flow), which can be verified separately. Forward flow direction is indicated with arrows on the outside of the meter housing.

After verification before sealing, Meter factor and Pulse duration can be configured. (Applies for ULTRAFLOW® 85 in connection with Pulse Divider 66-99-907-YZ-XX.)

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 ± 10) °C can be used as an alternative.

For verification of the flow sensor in reverse flow direction, verification in forward flow direction can be used as an alternative.
For verification of the flow sensor in forward flow direction, verification in reverse flow direction can be used as an alternative.

Initial verification of the separate flow sensor can be carried out via the four-pin plug of the measuring electronics, which is protected by a security seal, or via the three-wired signal cable coming from the measuring electronics.

The flow sensor can be verified by counting volume proportional pulses sent out by the flow sensor or by reading out the respective volume registers in the flow sensor with serial data telegrams.

Initial verification of the flow sensor connected to a separate MULTICAL®-calculator, e.g. MULTICAL® 603 or MULTICAL® 803, and in forward flow direction, can be carried via pulse interface 66-99-143.

To verify ULTRAFLOW® 85 the flow sensor can operate in different operation states as outlined in the table below. To toggle between different pulse operation states, e.g. the PC-software LabTool HCW 66-99-726 can be used, which can be acquired from Kamstrup A/S. When the control pin is set to ground, the pulse output is disabled.

Verification (continued)

Symbol (shown in indicating device)	Name	Description
Pulse operation states (control pin NOT set to ground)		
	Normal	Pulse operation mode for pulse emission during forward flow – indicated with arrows on the flow sensor – and normal volume sampling rate defined by the flow sensor.
	Normal reverse	Pulse operation mode for pulse emission during reverse flow – opposite to the arrows on the flow sensor – and normal volume sampling rate defined by the flow sensor. Used for testing reverse flow with pulses in laboratories. Set e.g. with LabTool HCW 66-99-726, which can be required from Kamstrup A/S.
	Verification	Pulse operation mode for pulse emission during forward flow – indicated with arrows on the flow sensor – and high volume sampling rate defined by the flow sensor. Used for testing forward flow in high resolution with pulses in laboratories. Set e.g. with LabTool HCW 66-99-726, which can be required from Kamstrup A/S.
	Verification reverse	Pulse operation mode for pulse emission during reverse flow – opposite to the arrows on the flow sensor – and high volume sampling rate defined by the flow sensor. Used for testing reverse flow in high resolution with pulses in laboratories. Set e.g. with LabTool HCW 66-99-726, which can be required from Kamstrup A/S.
Pulse operation states (control pin set to ground)		
	Unlock and enable serial	When the control pin is set to ground, the pulse output is disabled. The flow sensor is also unlocked and ready for serial communication. Can be used for testing in Normal, Normal reverse, Verification and Verification reverse state without pulse emission. Instead of collecting pulses the volume register in the flow sensor for forward or reverse flow is read-out via serial data telegrams, respectively.

Verification (continued)

Symbol (shown in indicating device)	Name	Description
Serial operation state		
PULSE **01001 SERIAL**	Serial	Serial mode, where each flow measurement is requested by the calculator like e.g. MULTICAL® 603-S/603-U and MULTICAL® 803-A. Can be used to verify forward flow direction of the flow sensor in combination with the connected calculator and Pulse Interface 66-99-143.

ULTRAFLOW® 85 can be verified both with standing start/stop and flying start/stop with suitable start/stop synchronization. In general, standing start/stop requires larger test volume than flying start/stop.

Seals and markings

D	Module D/F marking (depending on type label) as integrated part of the type label
S	Security seals[1]. Void label covering screws or anti-tamper seal, which must be destroyed to be unlocked
T	Type label (void label)
I	Installation seals (void labels)
A	Alternative approval marking as integrated part of the type label
R	Re-verification marking, if required; suggested position

The following illustrations specify the place(s) where a security seal "S" must be applied.

For installation sealing "I" see footnote [2].

ULTRAFLOW® 85

S for transducers (1-2 per transducer depending on size – covering screws), extension tube (anti-tamper seal or label), base part (1x – label covering screw) and verification lid/cover (2x – label covering screws)

I for top cover (2x label)

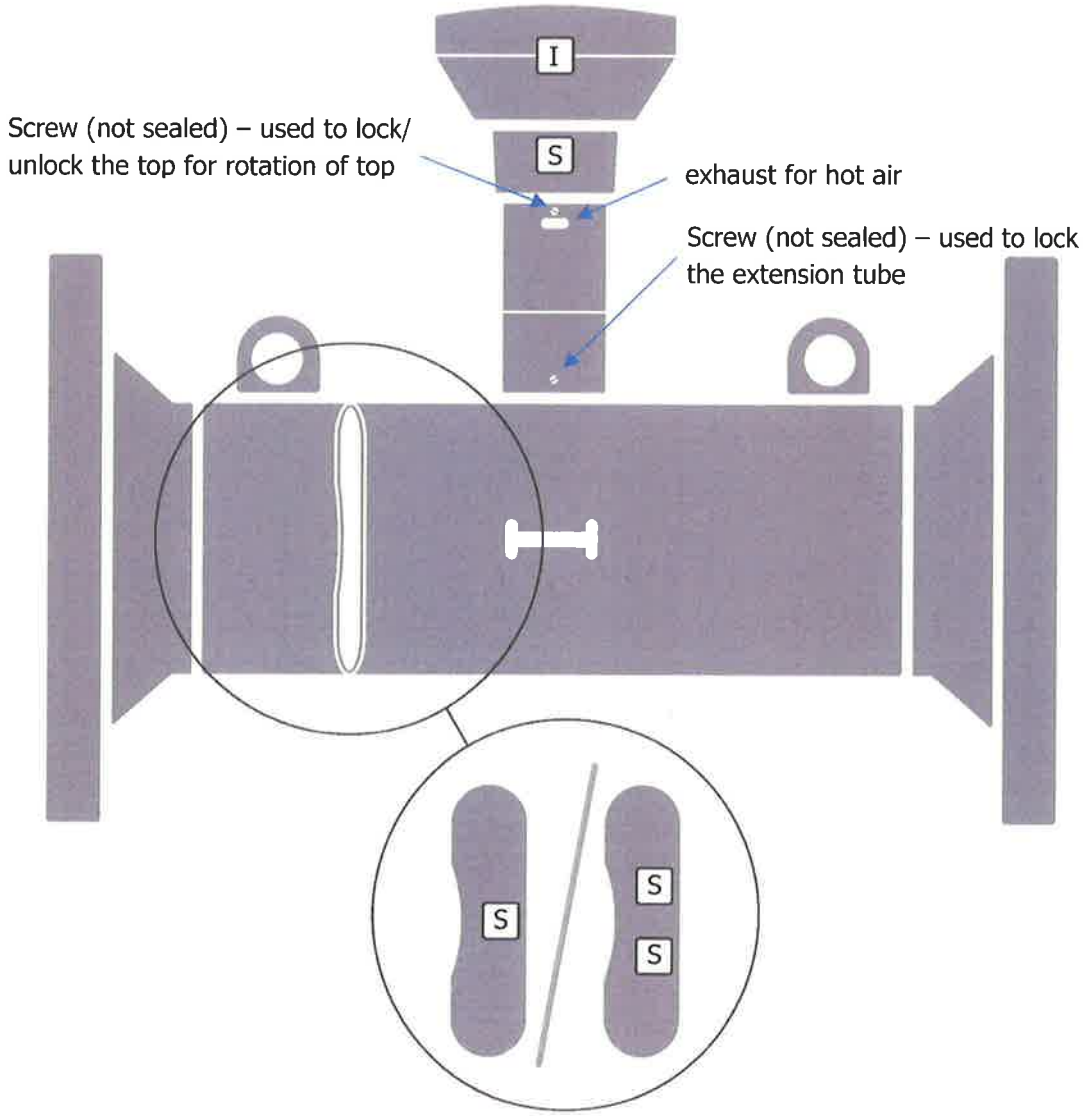
[1] Security seals are identical to metrological seals defined in WELMEC 13.3:2021.
[2] According to WELMEC 13.3:2021 installation sealing is advisable. The shown methods for installation sealing are examples, but other securing measures for the installation may equally be suitable. National requirements concerning installation sealing shall be taken into account.

Seals and markings (continued)

ULTRAFLOW® 85 – side view A

I – Sealing label for top cover

S – Sealing label (covering screw, which is locking the base part, or transducer lid)

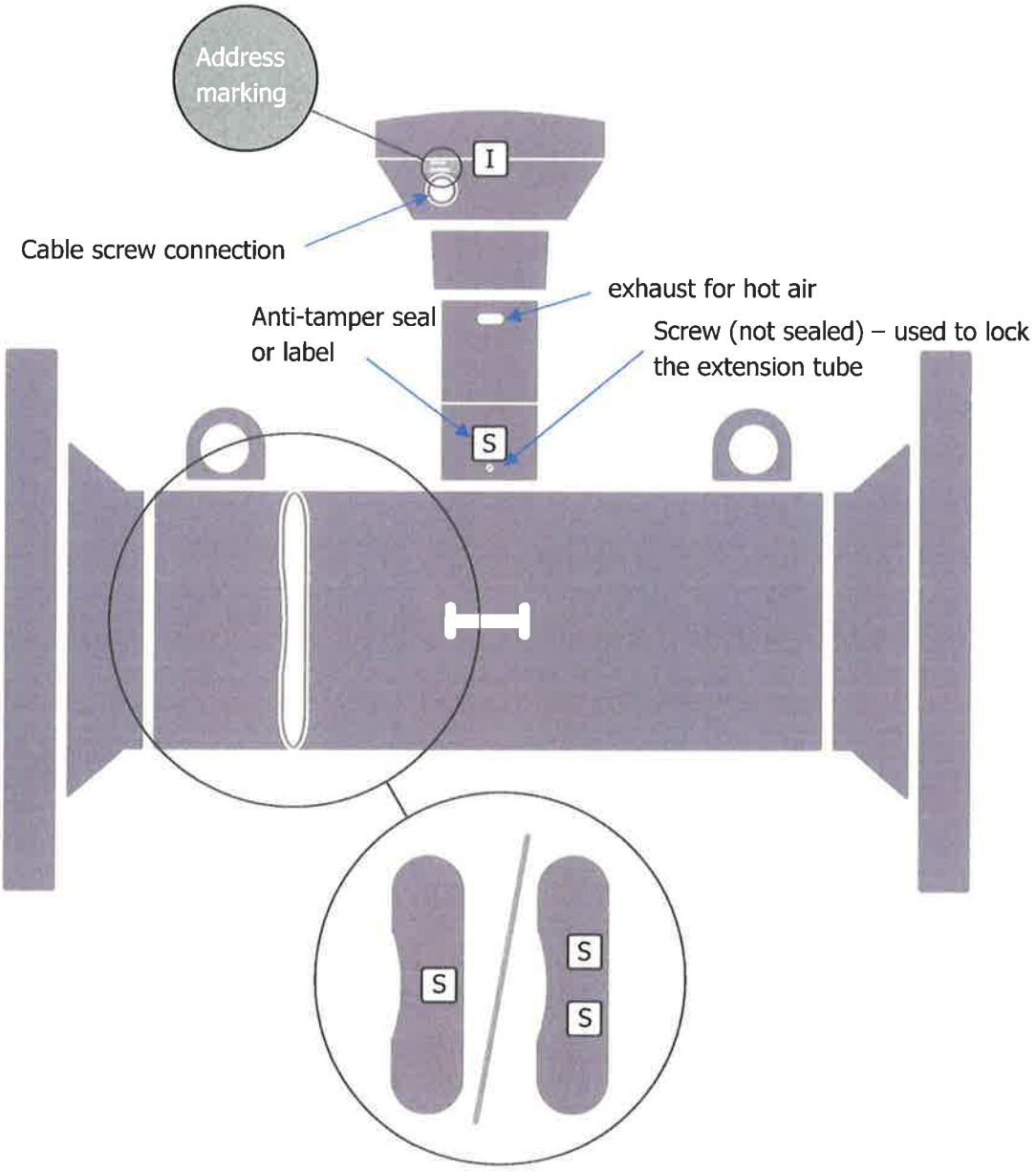


(A)

Seals and markings (continued)

ULTRAFLOW® 85 – side view B

I – Sealing label for top cover



(B)

Seals and markings (continued)

ULTRAFLOW® 85 – top view (top cover and transparent lid are removed)

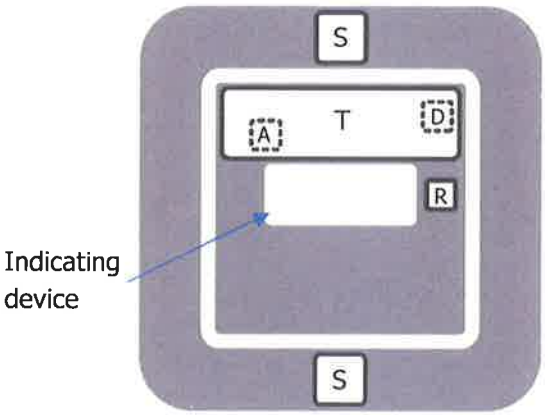
S – Sealing label covering screws of verification lid/cover

T – Type label (void)

A – Alternative approval marking as integrated part of the type label

D – Module D/F marking (depending on type label) as integrated part of the type label

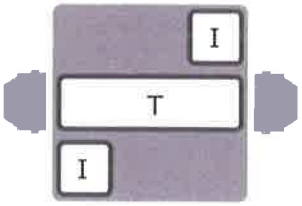
R – Re-verification marking; suggested position



(C)

Seals and markings (continued)

Cable extender box (Type 66-99-036)
Type label does not need to be a void label.



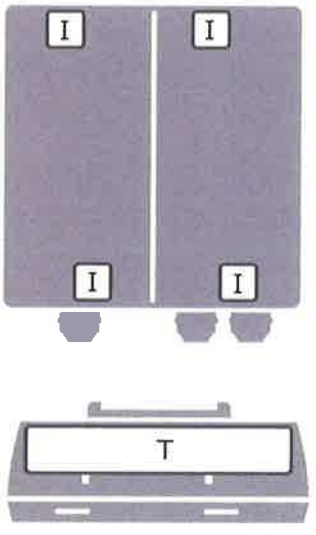
Pulse Transmitter (Type 66-99-903-YZ-XXX)

Type label does not need to be a void label.

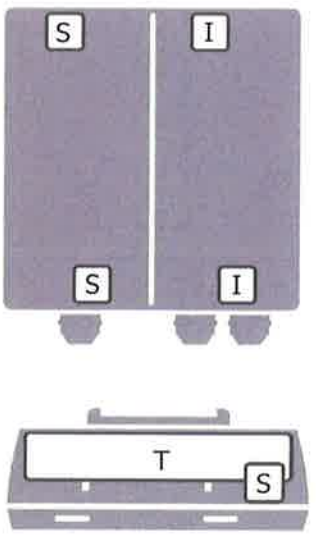
Marking of output (Y)/supply (Z) module can be adapted, when changing the output/supply module.

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

Marking of output (Y)/supply (Z) module can be adapted, when changing the output/supply module.



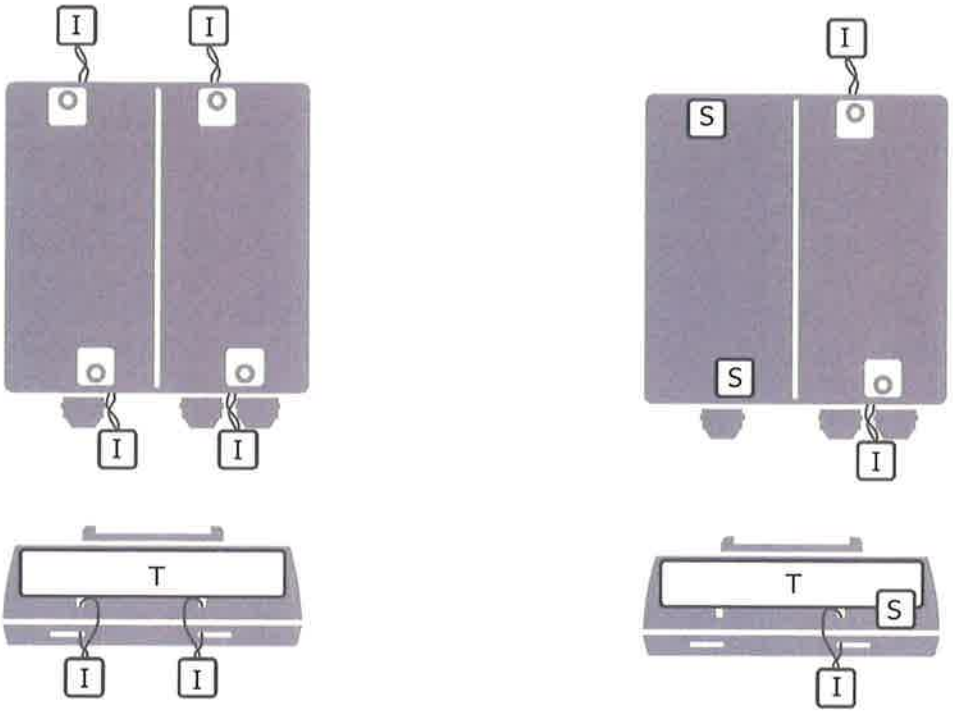
(a)



(b)

Sealing examples of (a) Pulse Transmitter and (b) Pulse Divider with void labels covering screws (and type label).

Seals and markings (continued)



(c) (d)

Sealing examples of (c) Pulse Transmitter with seal and wire and (d) Pulse Divider with void labels covering screws (and type label) and seal and wire.

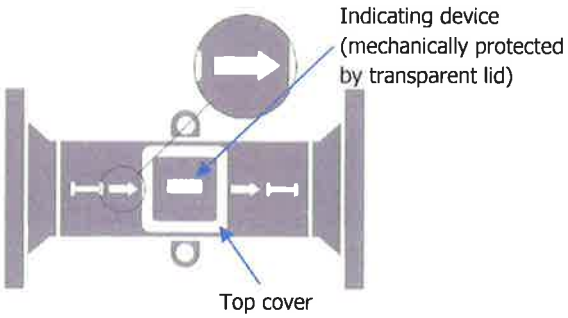
Labeling and inscriptions

Inscriptions on ULTRAFLOW® 85

CE marking and the supplementary metrology marking

Manufacturer's postal address
(on plastic casing)

Arrow for forward flow direction
(on meter housing body)



Type label placed on the flow sensor 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
Manufacturers or distributor logo

Additional inscriptions for Pulse Transmitter:

Supply

Additional inscriptions for Pulse Divider:

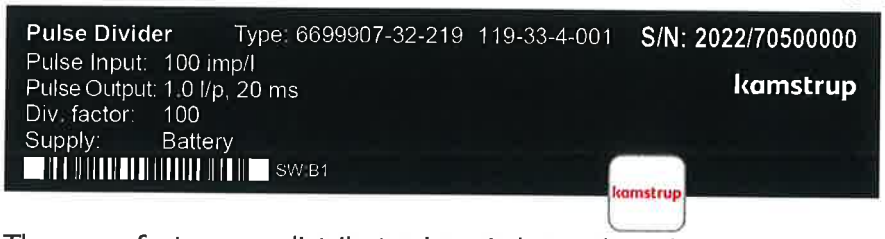
"Meter factor input and Meter factor output" or "Division factor"
Duration of output pulse
Supply
Software version

Examples of type label

ULTRAFLOW® 85 inclusive CE marking and supplementary metrology marking

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

Pulse Divider type 66-99-907-YZ-XXX including void label covering type label with security seal "S"



The manufacturer or distributor logo is located on the respective type label.

Photos

ULTRAFLOW® 85

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 sensors ULTRAFLOW® 85 q_p 150...1000 m^3/h are type tested as Heat, Cooling and as bi-functional Heat/Cooling flow sensors according to EN 1434:2022.

On this basis, the flow sensors are national type approved for Cooling according to the Danish law [3], System designation TS 27.02 019.

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® 85 may be performed according to EN 1434-5 under the same conditions as stated in this certificate for verification of ULTRAFLOW® 85, under consideration of national law.

During re-verification of the flow sensor a water temperature of (20 ± 10) °C can be used as an alternative, under consideration of national law.

[3] 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.