Harmonized standards applied: LST EN 1434-1:2007, LST EN 1434-2:2007/AC:2007, LST EN 1434-3:2009, LST EN 1434-4:2007/AC:2007, LST EN 1434-5:2007.
Additionally documents applied:
WELMEC 7.2 – Software guide (Issue 5).

The measuring instrument must correspond with the following specifications:

1 Design of the instrument

1.1 Construction

Heat meter SKU-03 consists of the primary flow sensor and the calculator with type approved pair of temperature sensors with Pt500 elements.
Flow sensor consists of brass housing with the installed ultrasound transducers. The flow sensor inseparably connected to the calculator via 1,2 m length screened cable. The flow sensors q_p = (0,6...2,5) m³/h has intended place for temperature sensor installation.
The calculator can be mounted directly on the flow sensor or separately.
The heat meter is operated by 3.6 V lithium battery.

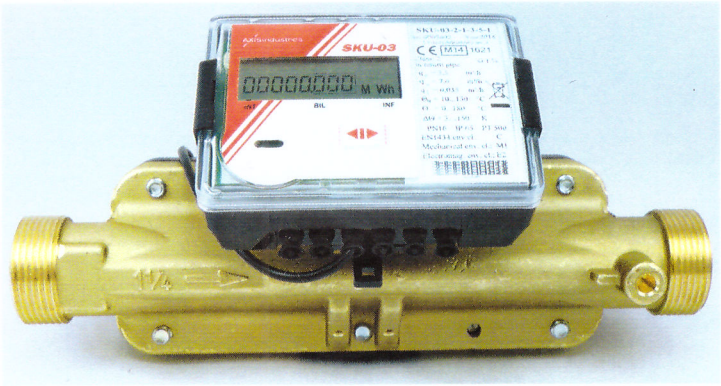


Fig.1.Heat meter SKU-03 (calculator and flow sensor)

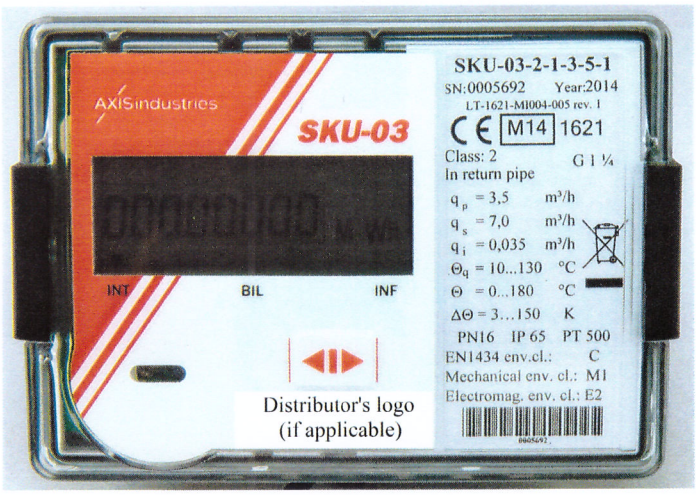


Fig.2. Calculator of the heat meter SKU-03

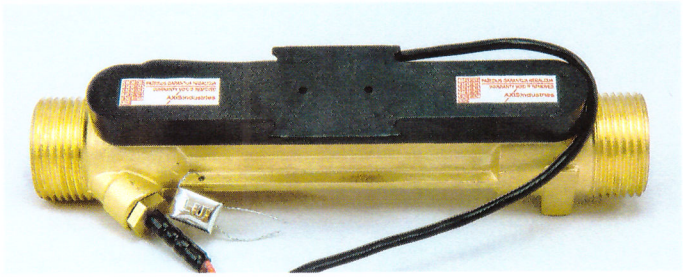


Fig.3. Flow sensor of the heat meter SKU-03 q_p = 0,6/1,0/1,5/2,5 m³/h (threaded end connections)

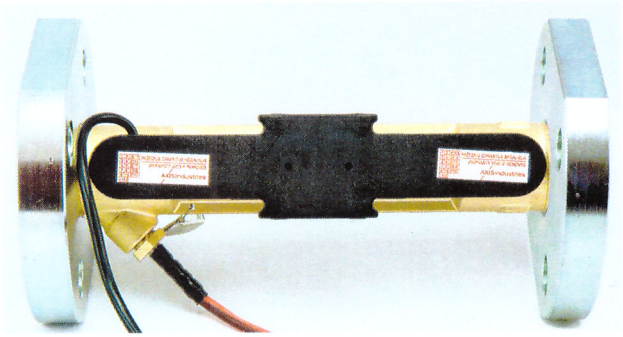


Fig.4. Flow sensor of the heat meter SKU-03 q_p = 0,6/1,0/1,5/2,5 m³/h (flanged end connections)

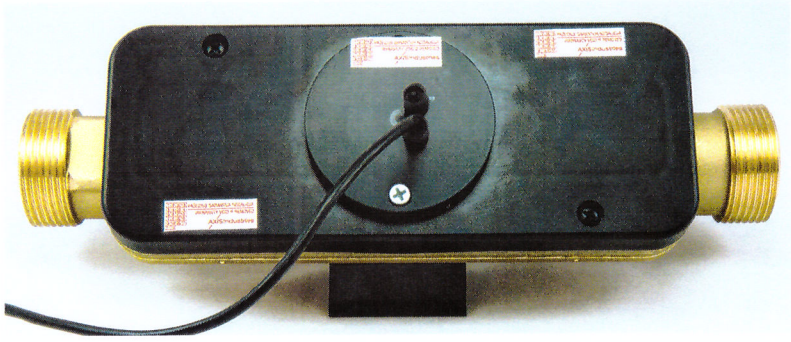


Fig.5. Flow sensor of the heat meter SKU-03 q_p = 3,5/6,0 m³/h (threaded end connections)

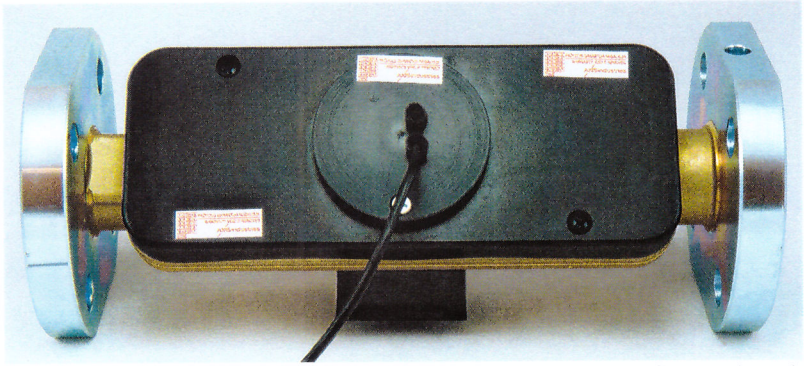


Fig.6. Flow sensor of the heat meter SKU-03 q_p = 3,5/6,0 m³/h (flanged end connections)

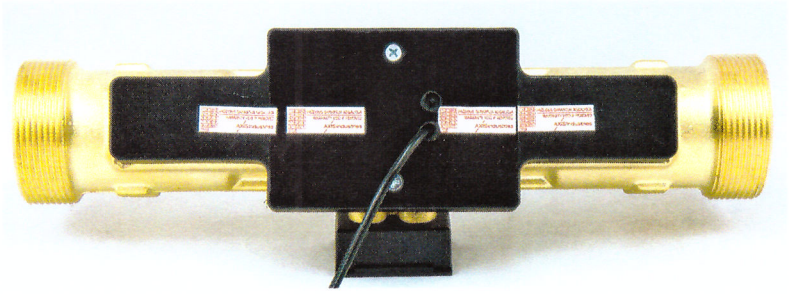


Fig.7. Flow sensor of the heat meter SKU-03 q_p= 10,0 m³/h (threaded end connections)

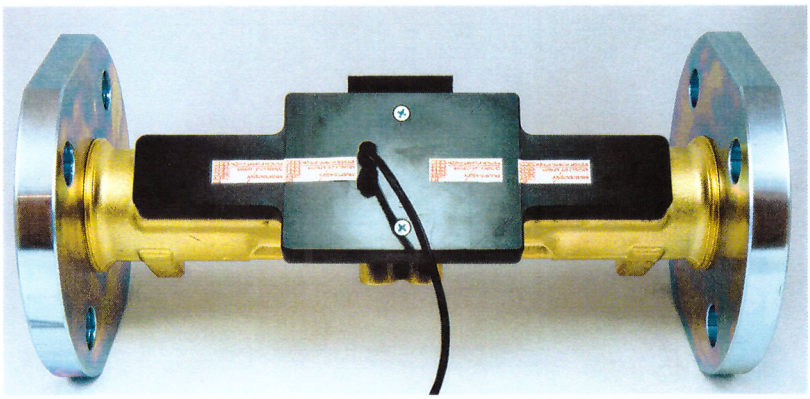


Fig.8. Flow sensor of the heat meter SKU-03 q_p= 10,0 m³/h (flanged end connections)

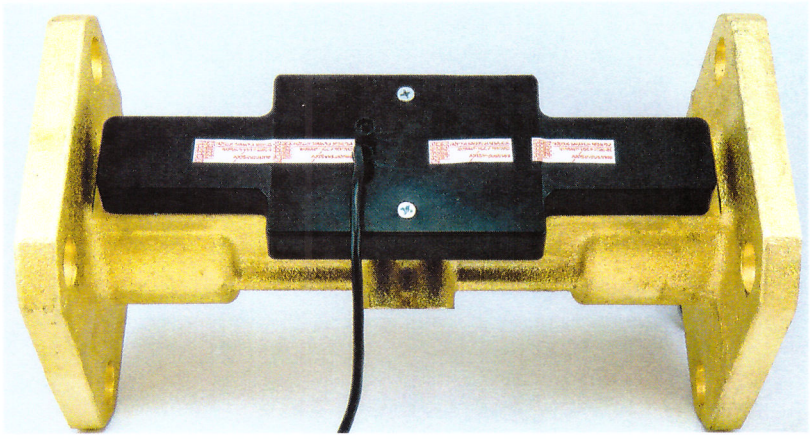


Fig.9. Flow sensor of the heat meter SKU-03 q_p = 15,0 m³/h

Not an Authorized Translation

Type number combination of the heat meter SKU-03

Type SKU-03 - □ - □ - □ - □ - □ - □ -□*- 15*

Instalation of the flow sensor:	Code
In supply pipe	1
In return pipe	2

Destination of the heat meter:	Code
Meter for heating (for measuring heating energy only)	1
Meter for heating and cooling (for measuring heating and cooling energy)	2

Ratio of the flow rates $(q_p/q)_i$:	Limits of temperature differences	Code
100	2 K...150 K	1
250**	2 K...150 K	2
100	3 K...150 K	3
250**	3 K...150 K	4

Flow sensor:

Permanent flow-rate, m^3/h	Overall length, mm	End connections	Code
0,6	110	G¾	1
1,0	110	G¾	2
1,5	110	G¾	3
2,5	130	G1	4
3,5	260	G1 ¼	5
6,0	260	G1 ¼	6
10,0	300	G2	7
10,0	300	DN40	8
15,0	270	DN50	9
3,5	260	DN25	A
6,0	260	DN25	B
0,6	190	G1	C
1,0	190	G1	D
1,5	190	G1	E
2,5	190	G1	F
0,6	190	DN20	G
1,0	190	DN20	H
1,5	190	DN20	K
2,5	190	DN20	L

Communication module:	Code
None	0
M-Bus module	1
CL module	2
RF 868 MHz module	4

Temperature sensor pair:	Code
None	0
DS, Pt500	1
PL, Pt500	2

The length of the temperature sensors signal lead, m (within 5 m), example 1,5 m

Remarks:
1. * - marked numbers are used only for order numbering.
2. ** - for meters q_p = 1,5 m³/h; q_p = 2,5 m³/h; q_p = 6,0 m³/h; q_p = 10,0 m³/h; q_p = 15,0 m³/h only.

1.2 Measurand sensor

The heat meter hardware consists of an ultrasonic flow sensor and heat meter calculator with the connected temperature sensors.
The calculator measures the resistance of type approved pair of temperature sensors with Pt500 elements and converts it to temperature according to formulas of LST EN 60751:2008. The calculator also measures the volume of the heat-conveying liquid by processing signals, received from the ultrasound transducers of the flow sensor.

1.3 Measurand processing

The energy, consumed for heating (cooling), is calculated by integrating the temperature difference and the volume of the heat-conveying liquid over time. The temperature difference is calculated from the resistance of the temperature sensors pair, connected to the calculator.

1.4 Indication of the measurement results

The accumulated quantity of thermal energy is presented on the display in the MWh. Other units (Gcal, GJ) can be chosen too.

1.5 Optional equipment and functions subject to MID requirements

Not applicable.

1.6 Technical documentation

Ultrasonic meter for heating and cooling SKU-03 - Technical description & User manual: PLSKU03V03, 02-2014.
Other reference documents on which basis this certificate is issued, are stored in a file Nr.LEI-12-MP-023.14.

1.7 Integrated equipment and functions not subject to MID

The heat meter can be without communication module or equipped with one of the following modules:
- M-Bus module;
- CL module;
- RF 868 MHz module.

2 Technical data

2.1 Rated operating conditions

2.1.1 Measurand

Thermal (cooling) energy, calculated from the measured volume of water and the measured difference of water temperature in flow and return pipes.

2.1.2 Measurement range

For calculator:
- limits of the temperature Θ: 0 °C...180 °C;

- limits of temperature differences : $\Delta\Theta$ = 2 K...150 K, or 3 K...150 K – depending on the lower limit of the temperature difference of the connected pair of temperature sensors.

For flow sensor:
Temperature limits of heat conveying liquid:
- for meters $q_p \leq 2{,}5$ m^3/h Θ_q = 5 °C...130 °C;
- for meters $q_p \geq 3{,}5$ m^3/h Θ_q = 10 K...130 °C.

Technical data of heat meter flow sensor are presented in Table 1:

Table 1

End connections	Flow-rate, m³/h			Overall lenght, mm
	Permanent q_p	Maximum q_s	Minimum q_i	
G¾	0,6	1,2	0,006	110
G1 or DN20	0,6	1,2	0,006	190
G¾	1,0	2,0	0,010	110
G1 or DN20	1,0	2,0	0,010	190
G¾	1,5	3,0	0,006	110
G1 or DN20	1,5	3,0	0,006	190
G¾	1,5	3,0	0,015	110
G1 or DN20	1,5	3,0	0,015	190
G1	2,5	5,0	0,010	130
G1 or DN20	2,5	5,0	0,010	190
G1	2,5	5,0	0,025	130
G1 or DN20	2,5	5,0	0,025	190
G1 ¼ or DN25	3,5	7,0	0,035	260
G1 ¼ or DN25	6,0	12,0	0,024	260
G1 ¼ or DN25	6,0	12,0	0,060	260
G2 or DN40	10,0	20,0	0,040	300
G2 or DN40	10,0	20,0	0,100	300
DN50	15,0	30,0	0,060	270
DN50	15,0	30,0	0,150	270

2.1.3 Accuracy class

Accuracy class - 2 according to LST EN 1434-1:2007.

2.1.4 Environmental conditions / Influence quantities

Ambient temperature : +5 °C to +55 °C;
Humidity : non-condensing;
Location : closed;
Mechanical environment : class M1;
Electromagnetic environment : class E2.

2.2 Other operating conditions

2.2.1 Maximum admissible working pressure

The maximum admissible working pressure of heat meter is 16 bar (PN16).

2.2.2 Mounting position of the flow sensor of the heat meter

Flow sensor can be mounted either vertically or horizontally.

3 Interfaces and compatibility conditions

3.1 Compatibility conditions

2 pulse inputs with programmable pulse value, class of pulse input device –IB according to LST EN 1434-2:2007/AC:2007.
2 temperature measurement channels for connecting temperature sensors with Pt500 sensing elements. Connection of the temperature sensors according to the two-wire scheme.

3.2 Interfaces

Integrated optical communication interface according to LST EN 62056-21:2003 requirements.
2 pulse outputs. Class of pulse output device - OB in operating mode, OD in test mode according to LST EN 1434-2:2007/AC:2007.

4 Requirements on production, putting into use and utilization

4.1 Requirements on production

At the end of the manufacturing and adjustment process the heat meters shall be tested according to the requirements of the LST EN 1434-5:2007. Errors of indication shall not exceed the maximum permissible errors, described in Annex MI-004 of Directive 2004/22/EC section 3.

The flow sensor of the heat meter can be tested with cold water (25 ± 5) °C.

4.2 Requirements on putting into use

The heat meter SKU-03 must be installed and used in accordance with the requirements of document, listed in section 1.6.
Necessary straight line length for flow sensor installation in pipeline:

$q_p \leq 6$ m^3/h	no requirements for straight pipeline length in upstream and downstream
$q_p > 6$ m3/h	upstream straight pipeline length ≥ 5×DN and downstream ≥ 3×DN

4.3 Requirements for utilization

The heat meter SKU-03 must be utilized in accordance with the requirements of document listed in section 1.6.

5 Control of the measuring process after tasks of the instrument in use

5.1 Documentation of the procedure

No special requirements identified.

5.2 Special equipment or software
No special requirements identified.

5.3 Identification of hardware and software
Identification of hardware:
- see Fig.1 - 9 of this certificate;
- identification mark on the meter electronics wiring plate is SKU3-v12R4.

Identification of software: version number of the software is "Soft 0.06". This number on demand can be shown on the display.

5.4 Calibration-adjustment procedure
Heat meter flow sensor and calculator errors determination test shall be carried out when TEST mode is activated as indicated in section 6.4 of the document noted in section 1.6 of the present certificate.
Determination of the error of the flow sensor shall be carried out using pulse output within each of the flow rate ranges appointed in section 5.2 of LST EN 1434-5:2007.
Determination of the heat energy error shall be carried out using internal volume simulation in TEST mode, while value of energy measured shall be read directly from display or by counting energy pulses from pulse output. Supply and return flow temperatures should be simulated using precise resistors. Test should be carried out in accordance with section 5.4 of LST EN 1434-5:2007.
Errors of indication shall not exceed the maximum permissible errors, described in Annex MI-004 of Directive 2004/22/EC section 3.

6 Security measures

6.1 Sealing
The following heat meter calculator sealing is provided:
- manufacturer adhesive seal - sticker on the access to the adjustment activation jumper (Fig.10, pos.1) and on the fixer of the cover protecting electronic module (Fig.10, pos.2);
- after installation the case and cover of the calculator (Fig.10, pos.3) are sealed with 2 hanged seals of heat supplier.

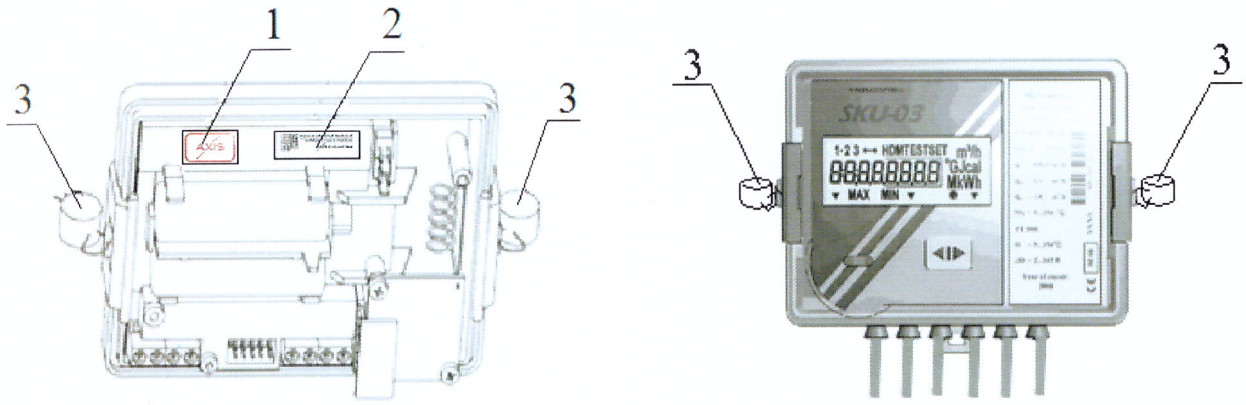


Fig.10. Sealing of the calculator of the heat meter SKU-03

The following flow sensor sealing is provided:

- manufacturer adhesive warranty seal - sticker on the bolts of the cover (Fig.11, Fig.12, Fig.13, Fig.14);

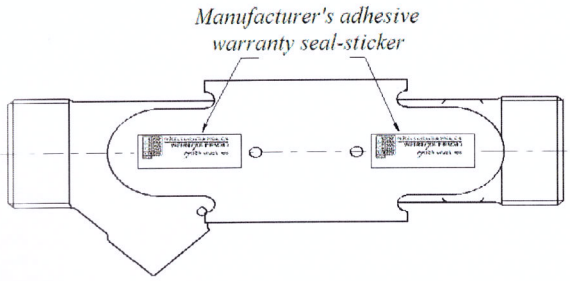


Fig. 11. Sealing of flow sensor of the heat meter SKU-03 q_p = 0,6/1,0/1,5/2,5 m³/h

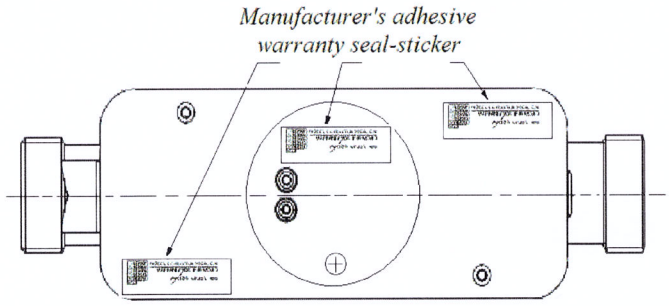


Fig. 12. Sealing of flow sensor of the heat meter SKU-03 q_p = 3,5/6,0 m³/h

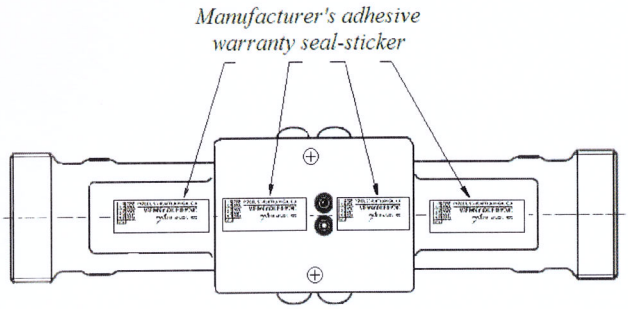


Fig. 13. Sealing of flow sensor of the heat meter SKU-03 q_p = 10,0 m³/h

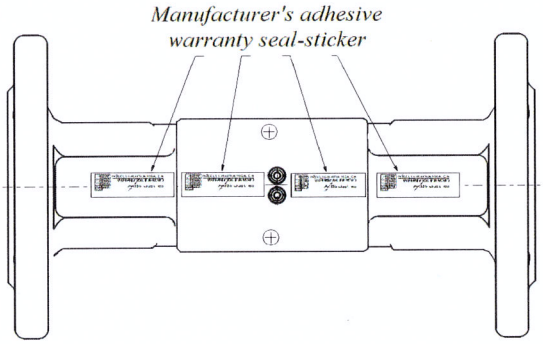
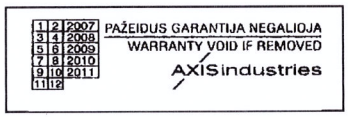


Fig. 14. Sealing of flow sensor of the heat meter SKU-03 q_p = 15,0 m³/h

a) Manufacturer's adhesive seal-sticker



b) Manufacturer's adhesive warranty seal-sticker

Fig.15. Examples of security seals

6.2 Data logger

Archive data retention time is at least 12 years.

7 Marking and inscriptions

7.1 Information to be borne by and to accompany the measuring instrument

The following information shall appear in legible and indelible characters on the heat meter calculator casing and his label:

- EC-type examination number (LT-1621-MI004-005 rev. 1);
- manufacturer name or this trade mark;
- type designation;
- year of manufacture and serial number;
- limits of the temperature;
- limits of temperature differences;
- limits of heat conveying liquid temperature;
- type of temperature sensors (Pt500);
- limits of flow-rate: maximum q_s, permanent q_p and minimum q_i;
- the maximum admissible working pressure;
- flow sensor to be installed in the flow or return;
- accuracy class;
- climatic class;
- electromagnetic class;
- mechanical class;
- logo of distributor (if applicable), as shown in Fig. 2.

Arrow to indicate the direction of the flow shall appear on flow sensor housing.

7.2 Conformity marking

In addition, the label of heat meter calculator should contain the following marking:

- "CE" marking;
- metrology marking, consisting of the capital letter "M" and the last two digits of the year of its affixing, surrounded by a rectangle;
- identification number of the notified body, which carried out the conformity assessment.

8 List of the drawings attached to the certificate.

Drawings are not added.

9 Certificate history

<table>
<tr><th>Issue</th><th>Date and reference №</th><th>Description</th></tr>
<tr><td>1</td><td>2</td><td>3</td></tr>
<tr><td>LT-1621-MI004-005</td><td>29-04-2011, Nr. LEI-12-MP-005.10</td><td>Type examination certificate first issued</td></tr>
<tr><td>LT-1621-MI004-005 Revision 1</td><td>15-04-2014, Nr. LEI-12-MP-023.14</td><td>1.Meter is supplemented with following flow sensor modifications:
<table>
<tr><th>End connections</th><th>Permanent flow-rate q_p, m³/h</th><th>Minimum flow-rate q_i, m³/h</th><th>Overall length, mm</th></tr>
<tr><td>G1 or DN20</td><td>0,6</td><td>0,006</td><td>190</td></tr>
<tr><td>G1 or DN20</td><td>1,0</td><td>0,010</td><td>190</td></tr>
<tr><td>G1 or DN20</td><td>1,5</td><td>0,006</td><td>190</td></tr>
<tr><td>G1 or DN20</td><td>1,5</td><td>0,015</td><td>190</td></tr>
<tr><td>G1 or DN20</td><td>2,5</td><td>0,010</td><td>190</td></tr>
<tr><td>G1 or DN20</td><td>2,5</td><td>0,025</td><td>190</td></tr>
<tr><td>DN25</td><td>3,5</td><td>0,035</td><td>260</td></tr>
<tr><td>DN25</td><td>6,0</td><td>0,024</td><td>260</td></tr>
<tr><td>DN25</td><td>6,0</td><td>0,060</td><td>260</td></tr>
</table></td></tr>
</table>

1	2	3
		2. Energy units kWh, MWh, Gcal, GJ displayed by heat meter calculator are changed into MWh, Gcal, GJ. 3. Logo of heat meter calculator is supplemented by logo of distributor (if applicable).