

Applied harmonized standards: LST EN 1434:2007 (part 1, 2, 4 and 5), LST EN 1434:2009 (part 3).

The measuring instrument must correspond with the following specifications:

1 Design of the instrument

1.1 Construction

Heat meter SKU- 4 consists of the primary flow sensor and the calculator with type approved pair of temperature sensors with Pt500 elements.

Flow sensor (depending on the size) consists of housing, made of brass or steel with the mounted ultrasound transducers. The flow sensor is connected to the calculator with two coaxial cables.

The calculator may be mounted directly on a flow sensor or separately.

The heat meter can be operated by 3,6 V lithium battery or by AC 230 V $^{+10}_{-15}$ % mains.

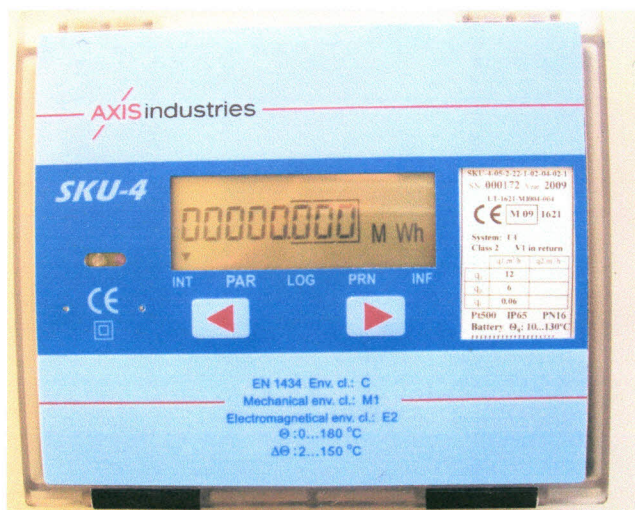


Fig.1. Calculator of the heat meter SKU-4



Fig.2. Flow sensor of the heat meter SKU-4, $q_p = 3,5/6 \text{ m}^3/\text{h}$

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Fig.3. Flow sensor of the heat meter SKU-4, $q_p = 10 \text{ m}^3/\text{h}$

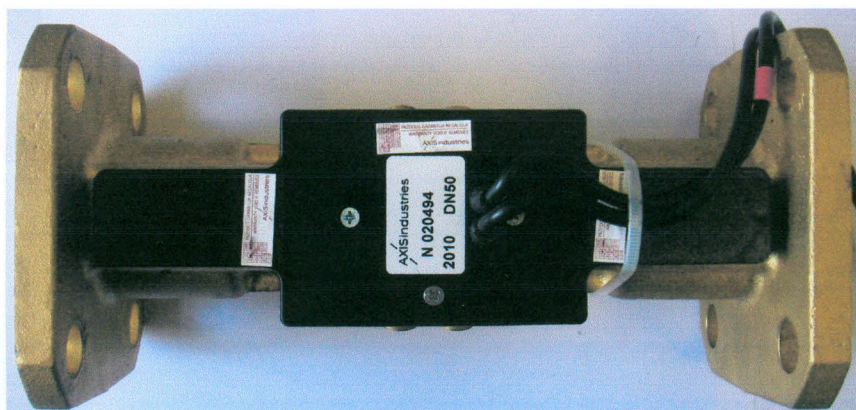


Fig.4. Flow sensor of the heat meter SKU-4, $q_p = 15 \text{ m}^3/\text{h}$

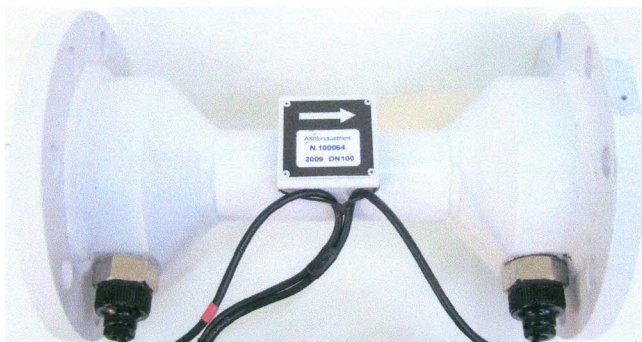


Fig.5. Flow sensor of the heat meter SKU-4, $q_p = 25/40/60 \text{ m}^3/\text{h}$



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Application of measurement schemes and conventional designation are presented in the Table 1:

Table 1

Measurement scheme application	Conventional designation
For closed heating system with flow sensor in supply pipe.	U1
For closed heating system with flow sensor in return pipe.	U2
For closed heating system with flow sensor in supply pipe. With leakage detection option.	U1F
For closed heating system with flow sensor in return pipe. With leakage detection option.	U2F
For closed system for accounting of heating - cooling energy with flow sensor in flow pipe.	U1L
For closed system for accounting of heating - cooling energy with flow sensor in return pipe.	U2L
For closed heating system with flow sensor in flow pipe or for open heating system with cold water temperature measurement and with two flow sensors, installed in flow and return pipes.	A*
For closed heating system with flow sensor in return pipe or for open heating system for accounting energy consumption for heating and for hot water preparation with cold water temperature measurement and with two flow sensors, installed in flow and return pipes.	A1*
For closed heating systems with flow sensor in return pipe or for open heating system with two flow sensors, installed in return and replenishment pipes, for accounting of supplied heat energy.	A2*
For closed heating systems with flow sensor in return pipe or for open heating system with two flow sensors, installed in flow and replenishment pipes, for accounting of supplied heat energy.	A4*
For combined heating - hot-water preparing systems. Two independent heat meters. 1st - For closed heating system with flow sensor in flow pipe. 2nd - For accounting of hot water energy.	U1A3**
For combined heating - hot-water preparing systems. Two independent heat meters. 1st - For closed heating system with flow sensor in return pipe. 2nd - For accounting of hot water energy.	U2A3**

Remarks:

1* - The requirements of the Directive 2004/22/EC are applied only to these measurement schemes when the meter is used for measurement of thermal energy in the closed heating system. In this case when the meter is used for measurement of thermal energy in open heating system, it is a subject of Lithuanian national technical rules ("Rules on accounting of thermal energy and amount of heat-conveying liquid", Official Gazette: 1999, No.112-3270, in Lithuanian).

2. ** The requirements of the Directive 2004/22/EC are applied only to these measurement schemes when the meter intended for accounting of thermal energy in closed heating system. "Rules on accounting of thermal energy and amount of heat-conveying liquid" are applied to the meter, which is intended for accounting hot water thermal energy.

3. Heat (cooling) energy calculation formulas for each measurement diagrams are presented in the technical description of heat meter PLSKU4MIDV03.



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Type number combination of the heat meter SKU-4

Type	SKU-4	-	□	-	□	-	□	-	□	-	□	-	□	-	□	-	□	-	□	-	□	-	□
Measurement scheme:																							
Conventional designation	Code	Conventional designation	Code	Conventional designation	Code																		
U1	01	U1L	06	A2	12																		
U2	02	U2L	07	A4	14																		
U1F	04	A	08	U1A3	16																		
U2F	05	A1	10	U2A3	17																		
Accuracy class:																							
																							Code
2																							2
Temperature sensors connection scheme, temperature difference measurement range:																							
		Code			Code																		
2-wire method, (2...150) K		22	2-wire method, (3...150) K		23																		
4-wire method, (2...150) K		42	4-wire method, (3...150) K		43																		
Power supply:																							
																							Code
Battery 3,6 V																							1
Main power supply 230 V																							2
Permanent flow rate q_p of sensor of 1st flow measurement channel:																							
$q_p, m^3/h$	Code	$q_p, m^3/h$	Code	$q_p, m^3/h$	Code																		
3,5	01	15	04	60	08																		
6	02	25	05																				
10	03	40	06																				
Permanent flow rate q_p of sensor of 2nd flow measurement channel:																							
$q_p, m^3/h$	Code	$q_p, m^3/h$	Code	$q_p, m^3/h$	Code																		
3,5	01	15	04	60	08																		
6	02	25	05																				
10	03	40	06																				
Connection cable length of flow sensors, m:																							
Lenght	Code	Lenght	Code	Lenght	Code	Lenght	Code	Lenght	Code														
3 m	01	10 m	03	20 m	05	60 m	07	100 m	09														
5 m	02	15 m	04	40 m	06	80 m	08	None	00														
Connection cable length of temperature sensors, m:																							
Lenght	Code	Lenght	Code	Lenght	Code	Lenght	Code	Lenght	Code														
3 m	01	10 m	03	20 m	05	60 m	07	100 m	09														
5 m	02	15 m	04	40 m	06	80 m	08	None	00														
Communication interface:																							
Type	Code	Type	Code																				
None	0	M-bus/RS232/CL, current output	4																				
M-bus	1	M-bus/RS232/CL, pulse output	5																				
RS232	2																						
RS485	3																						



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1.2 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 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.

Integrated software of heat meter SKU-4 is identified by a unique version number „3.01“.

1.4 Indication of the measurement result

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

Technical description, operating instruction, passport PLSKU4MIDV03, 2010-05-10.

Description of the integrated software structure PIASKU4MIDV02, 2009-09-10.

Other reference documents on which basis this certificate is issued, are stored in a file Nr. LEI-12-MP-007-10.

1.7 Integrated equipment and functions not subject to MID

Additional schemes of energy measurement are provided (marked with “*”, “***” in the Table 1), and also extra channels for measurement of flow, temperatures and pressure are designed. These additional functions don't influence operation of the basic functions of the heat meter to which requirements of the Directive 2004/22/EC are applied.

2 Technical data

2.1 Rated operating condition

2.1.1 Measurand

Thermal (cooling) energy, which is 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:

- temperature range $\Theta_{\min} - \Theta_{\max} : (0 \dots 180)^{\circ}\text{C};$
- temperature difference range $\Delta\Theta_{\min} - \Delta\Theta_{\max} : (2 \dots 150)\text{K}$ or $(3 \dots 150)\text{K}$ – depending on the value of the lower measurement limit of the temperature difference of the connected pair of temperature sensors.



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For flow sensor:

Heat meter flow sensor data are presented in Table 2:

Table 2

Connection type	Flow rate, m ³ /h			Overall length, mm
	q_i^*	q_p	q_s	
G 1¼	0,035 (0,14)	3,5	7,0	260
G 1¼	0,06 (0,25)	6,0	12,0	260
G 2	0,1 (0,4)	10,0	20,0	300
DN50	0,15 (0,6)	15,0	30,0	270
DN65	0,25 (1)	25,0	50,0	300
DN80	0,4 (1,6)	40,0	80,0	350
DN100	0,6 (2,4)	60,0	120,0	350

Note:

1. *Values of the minimum flow rates for measurement schemes U1L and U2L (accounting of heat-cooling energy) are presented in brackets.

Temperature limits of heat conveying liquid:

$\Theta_q = (10 \dots 130)^\circ\text{C}$ (for all measurement schemes, except U1L and U2L);

$\Theta_q = (0 \dots 130)^\circ\text{C}$ (for measurement schemes U1L and U2L).

2.1.3 Accuracy class

Accuracy class - 2.

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 (class PN)

The maximum admissible working pressure of flow sensor is 1.6 MPa (PN16).

2.2.2 Mounting position of flow sensor

Flow sensor can be mounted both vertically and horizontally in pipelines.



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3 Interfaces and compatibility conditions

3.1 Compatibility conditions

2 pulse input with programmable pulse value for flow meters. Class of pulse input device –IB or IC. Type of pulses: active or passive. High voltage level of active pulses (2,5....3,7) V, low voltage level of active pulses (0 ...0,7) V.

2 or 3 temperature measurement channels for connecting temperature sensors with Pt500 sensing elements and 2-wire or 4-wire connection method.

Up to 2 pressure measurement channels. Input current limits: (0-5) mA, (0-20) mA or (4-20) mA.

3.2 Interfaces

Integrated optical communication interface according to LST EN 62056-21:2003 requirements.

Additionally (as optional plug-in modules):

- M-bus;
- M-bus / CL/ RS232 / 2 pulse outputs;
- M-bus / CL/ RS232 / 2 current outputs;
- RS232;
- RS485.

4 Requirements on production, putting into use and utilization

4.1 Requirements on production

No special requirements identified.

4.2 Requirements on putting into use

The heat meter SKU-4 must be installed in accordance with the requirements of documents, listed in 1.6.

Necessary straight line length for flow sensor installation in pipeline:

$q_p \leq 6 \text{ m}^3/\text{h}$	no requirements for straight pipeline length in upstream and downstream
$q_p > 6 \text{ m}^3/\text{h}$	upstream straight pipeline length $\geq 5 \times \text{DN}$ and downstream $\geq 3 \times \text{DN}$, when flow disturbance is elbow type
$q_p > 6 \text{ m}^3/\text{h}$	upstream straight pipeline length $\geq 10 \times \text{DN}$ and downstream $\geq 3 \times \text{DN}$, when flow disturbance is valve, pump or similar disturber

Initial verification test of flow sensor can be carried out with cold water $(25 \pm 5) ^\circ\text{C}$.

4.3 Requirements for utilization

In accordance with the requirements of the document, listed in 1.6.

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

5.1 Documentation of the procedure

Not applicable.

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5.2 Special equipment or software

Not applicable.

5.3 Identification of hardware and software

Not applicable.

5.4 Calibration-adjustment procedure

Not applicable.

6 Security measures

6.1 Sealing

The following heat meter calculator sealing is provided:

- manufacturer warranty seal (the adhesive seal-sticker) on the fixing bolt of electronic module under protecting cover (see Fig.6 [pos.1], Fig.11 [a]) and on the bolt of cover protecting electronic module (see Fig.6 [pos.2], Fig.11 [b]);
- one or two hanged seals on the fixers of the junction of the top and bottom part of the calculator (see Fig.6 [pos.3]) are arranged after installation.

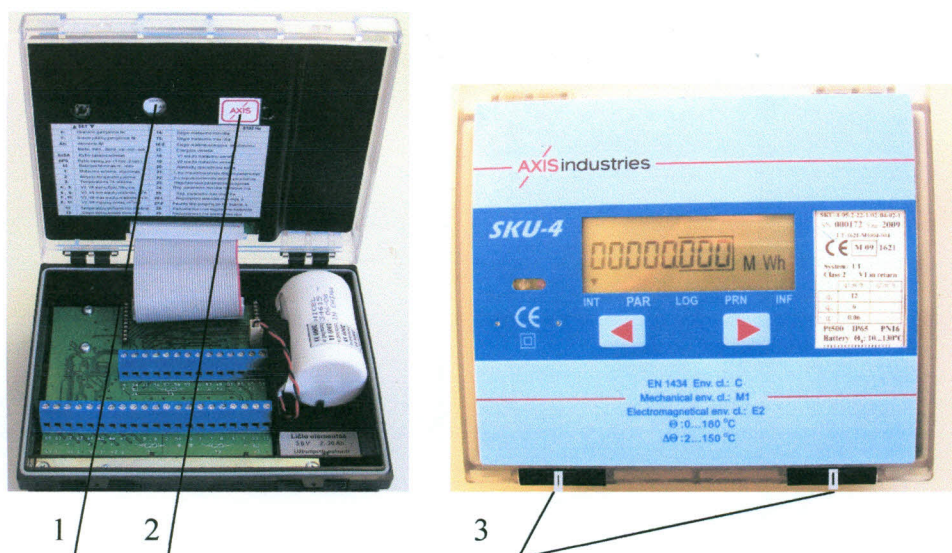


Fig.6. Sealing of the calculator of the heat meter SKU-4

The following flow sensor sealing is provided:

- manufacturer adhesive seal -sticker on the bolts of the cover protecting ultrasonic transducers (see Fig.7, Fig.8, Fig.9 and Fig.11. [a]);
- hanged seal on ultrasonic transducers (see Fig.10 and Fig.11[c]).

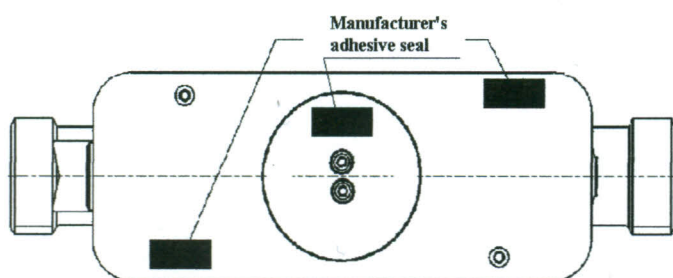


Fig. 7. Sealing of flow sensor of the heat meter
SKU-4, $q_p = 3,5/6 \text{ m}^3/\text{h}$

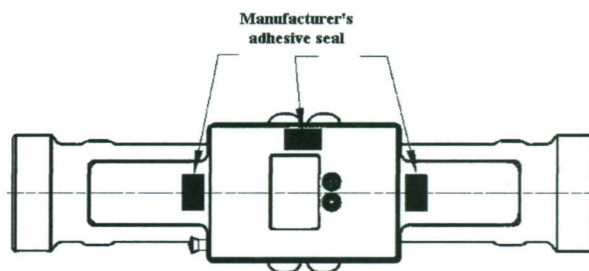


Fig. 8. Sealing of flow sensor of the heat meter
SKU-4, $q_p = 10 \text{ m}^3/\text{h}$,

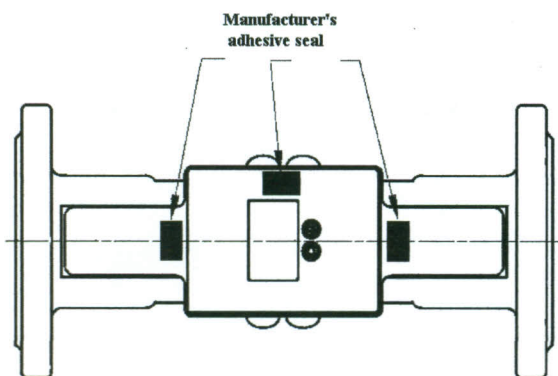


Fig.9. Sealing of flow sensor of the heat meter
SKU-4, $q_p = 15 \text{ m}^3/\text{h}$

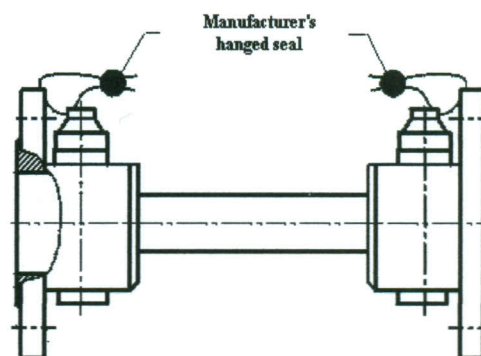
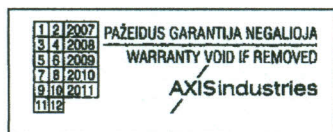


Fig.10. Sealing of flow sensor of the heat meter
SKU-4, $q_p = 25/40/60 \text{ m}^3/\text{h}$

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a) Manufacturer warranty seal –
adhesive sticker

b) Manufacturer security seal –
adhesive sticker

c) - Manufacturer hanged seal

Fig.11. Examples of security seals

6.2 Data logger

Archive data retention time is at least 12 years.

7 Labelling 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 or his label:

- EC-type examination certificate number (LT-1621-MI004-004 rev.1);
- manufacturer name or his trade mark;
- identity marking (type designation and type number);
- year of manufacture, serial number;
- limits of the temperature;
- limits of heat conveying liquid temperature;
- limits of temperature differences;
- type of temperature sensors (Pt500);
- limits of flow-rate: maximum q_s , permanent q_p and minimum q_i ;
- the maximum admissible working pressure (PN class);
- flow sensor to be installed in the flow or return;
- accuracy class;
- climatic environment class;
- electromagnetic environmental class;
- mechanical environmental class;
- voltage level for external power supply;
- conventional designation of the applied measurement scheme (see table 1 of the present appendix).



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

- manufacturer name or his trade mark;
- nominal diameter;
- arrow to indicate the direction of the flow;
- year of manufacture, serial number.

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

Issue No.	Date	Description
LT-1621-MI004-004	15 th October 2009	Type examination certificate first issued
LT-1621-MI004-004 Revision 1	15 th November 2010	<ul style="list-style-type: none">- section 1.1 of the Appendix is extended;- fig.3 and fig.4 of the Appendix are replaced;- text of section 1.6 of the Appendix is replaced;- text of section 6.1 of the Appendix is replaced;- text of section 7.1 of the Appendix is replaced;- fig.8 and fig.9 of the Appendix are replaced.