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**Standards and documents applied:**

LST EN 1434-1:2015+A1:2019;  
 LST EN 1434-2:2015+A1:2019;  
 LST EN 1434-4:2015+A1:2019;  
 LST EN 1434-5:2016.  
 WELMEC 7.2:2015.

The measuring instrument must correspond with the following specifications:

**1 Design of the instrument**

**1.1 Construction**

Heat meter calculator QALCOMET E1 is a sub-assembly of the heat meter designed for accounting of heating energy consumption and operates together with the connected type approved flow sensor and type approved temperature sensor pair. The calculator QALCOMET E1 is microprocessor based measuring device. It can measure and record simultaneously parameters from two heating systems. The calculator can be operated by 3,6 V DC lithium battery or by 230 V AC mains.



Fig.1.Heat meter calculator QALCOMET E1

The user may select (when orders) one of seven possible installation diagrams (measurement schemes), depending on heating system type, or measurement scheme U0, which is used only for measurement of the individual parameters - flow, temperature and pressure. Application of measurement schemes and possibility of their selection for the 1-st or 2-nd measurement system, which measurement results can register the calculator, are presented in the Table 1:

Table 1. Energy measurement schemes of the heat meter calculator QALCOMET E1

Measurement scheme application	Conventional designation	Selection possibility	
		1-st system	2-nd system
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
For closed systems. Flow sensor in inlet pipe	U1	specified	specified
For closed systems. Flow sensor in outlet pipe	U2	specified	specified



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<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
For closed systems. Flow sensor installed in heating circuit	U3*	specified	not specified
For open heating systems. Flow sensors in inlet and outlet pipes	A1*	specified	not specified
For accounting of supplied heating energy in open heating systems (flow sensors on replenishment and outlet pipes) or for closed heating systems with local hot water preparation system (flow sensor in outlet pipe)	A2*	specified	not specified
For single-pipe hot water supply systems	A3*	specified	not specified
For accounting of supplied heating energy in open heating systems (flow sensors in replenishment and inlet pipes) or for closed heating systems with local hot water preparation system (flow sensors in inlet and outlet pipes)	A4*	specified	not specified
The possibility of the measurement of the heating energy is not available.	U0*	not specified	specified

Notes:

- \* The requirements of the Directive 2014/32/EU to these measurement schemes are not applied. Scheme U0 is applied only for measurement of individual parameters (flow, temperature, pressure) and is not used for accounting of energy.
- At least one of the installed measurement schemes of calculator must be U1 or U2, for which requirements of the Directive 2014/32/EU are applied.

**1.2 Sensor**

The calculator measures the resistance of type approved temperature sensor pair with Pt 500 elements and converts it to temperature according to formulas of LST EN 60751. The calculator also measures the volume of the heat-conveying liquid by processing signals (volume pulses) from the type approved flow sensor.

**1.3 Measurand processing**

The energy, consumed for heating, is calculated by integrating the temperature difference and the volume of the heat-conveying liquid over time. The temperature difference is calculated from the measured resistance of the temperature sensor pair.

**1.4 Indication of the measurement results**

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

**1.5 Optional equipment and functions subject to MID requirements**

Not applicable.

**1.6 Technical documentation**

Calculator for thermal energy meter QALCOMET E1 – Technical description, operating instruction, passport: PLQME1V02, 21-11-2017.

Other reference documents on which basis this certificate is issued, are stored in a file No. LEI-12-MP-086.19.

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**Structure of type number of the calculator QALCOMET E1**

Type	M1	-	□	□	-	□	□	-	□	□	-	□	□	-	□	□	-	□	□
Language of attached documents: K1 -Lithuanian, K4 -English																			
Conventional scheme designation for the 1st measurement system:																			
Designation	Code	Designation	Code																
		A1	5																
U1	2	A2	6																
U2	3	A3	7																
U3	4	A4	8																
Conventional scheme designation for the 2nd measurement system:																			
Designation	Code	Designation	Code																
U0	1	U2	3																
U1	2	None	4																
Type of 1 <sup>st</sup> flow sensor. Types and codes of sensors are presented in PLQME1V02																			
Type of 2 <sup>st</sup> flow sensor. Types and codes of sensors are presented in PLQME1V02																			
Type of 3 <sup>st</sup> flow sensor. Types and codes of sensors are presented in PLQME1V02																			
Type of 4 <sup>st</sup> flow sensor. Types and codes of sensors are presented in PLQME1V02																			
Type of 5 <sup>st</sup> flow sensor. Types and codes of sensors are presented in PLQME1V02																			
Type and installation set of the temperature sensor pair, temperature difference range:																			Code
PL-6 Pt500 with pocket (two-wire connection method), $\Delta\theta = (3 - 160) \text{ K}$																			4
PL-6 Pt500 without pocket (two-wire connection method), $\Delta\theta = (3 - 160) \text{ K}$																			5
PL-6 Pt500 with pocket (four-wire connection method), $\Delta\theta = (3 - 160) \text{ K}$																			6
PL-6 Pt500 without pocket (four-wire connection method), $\Delta\theta = (3 - 160) \text{ K}$																			7
Without temperature sensor pair (Pt500, four-wire connection method), $\Delta\theta = (3 - 160) \text{ K}$																			8
Without temperature sensor pair (Pt500, two-wire connection method), $\Delta\theta = (3 - 160) \text{ K}$																			0
Without temperature sensor pair (Pt500, four-wire connection method), $\Delta\theta = (2 - 160) \text{ K}$																			1
Without temperature sensor pair (Pt500, two-wire connection method), $\Delta\theta = (2 - 160) \text{ K}$																			2
The external communication interface:																			
Type	Code	Type	Code	Type	Code														
None	0	RS232	3	Universal with current outputs	6														
M-Bus	1	868 MHz RF module	4	Universal with pulse outputs	7														
Power supply:																			Code
3,6 V for calculator; 3,6 V for flow sensor																			1
3,6 V for calculator; 230 V for flow sensor																			2
3,6 V for calculator; 18 V for flow sensor																			3
3,6 V for calculator; for flow sensor external power supply is not required																			5
230 V for calculator; 230 V for flow sensor																			6
230 V for calculator; 18 V for flow sensor																			7
230 V for calculator; 3,6 V for flow sensor																			8

**1.7 Integrated equipment and functions not subject to MID**

Optical interface according to LST EN 62056-21 requirements integrated in the calculator.

The calculator can be without communication module or equipped with one of the following modules:

- M-Bus module;
- RS232 module;
- 868 MHz RF radio module;
- M-Bus, CL, or RS232 communication module with pulse outputs;
- M-Bus, CL, or RS232 communication module with current outputs.

*M. V. V.*

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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 calculator to which requirements of the Directive 2014/32/EU are applied.

The calculator can be used also for cooling energy measurement under rated operating conditions listed in section 2.1.

## 2 Technical data

### 2.1 Rated operating conditions

#### 2.1.1 Measurand

Heating energy, calculated from the measured volume of water and the measured temperature difference in inlet and outlet pipes.

#### 2.1.2 Measurement range

- limits of temperature  $\Theta$ : 0 °C to 160 °C;
- limits of temperature differences\*  $\Delta\Theta$ : 2 K\*\* to 160 K, or 3 K to 160 K.

Notes:

1. \* - the lower limit of the temperature difference of the calculator and connected temperature sensor pair must be the same.
2. \*\* - for calculators with the lower limit of the temperature difference 2 K, the requirements of the Directive 2014/32/EU are not applied.

#### 2.1.3 Maximum permissible error

$$E_c = \pm (0,5 + \Delta \Theta_{\min} / \Delta\Theta), \%$$

where:  $\Delta \Theta_{\min}$  - the lower limit of temperature difference of calculator, K;  
 $\Delta\Theta$  - measured temperature difference, K.

#### 2.1.4 Environmental conditions / Influence quantities

Ambient temperature	:	5 °C to 55 °C;
Humidity level	:	non-condensing;
Installations	:	indoor;
Mechanical environment	:	class M1;
Electromagnetic environment	:	class E2.

## 3 Interfaces and compatibility conditions

### 3.1 Compatibility conditions

The following sensors can be connected to the calculator:

- up to five temperature sensors Pt 500 using two-wire or four-wire connection method;
- up to five flow sensors. The pulse input device class – IB (or IC, if noise filter is out). The volume pulse value is programmable;
- up to two pressure sensors.

### 3.2 Interfaces

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



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Two configurable pulse/frequency outputs (available with plug-in multi module SKU46). Class of pulse output device – OD according to LST EN 1434-2.

Two configurable current outputs (available with mains supply and with plug-in multi module SKU45). Current range: 0 mA to 20 mA or 4 mA to 20 mA.

Configurable double relay 230 V, 2A output for limiting regulation or alarm function (available with mains supply module SKM37).

Serial interface M-Bus (available with plug-in module SKU46, SKU45 or SKS43), CL (available with plug-in module SKU46 or SKU45), or RS232 (available with plug-in module SKU46, SKU45 or SKS48).

Wireless interface (available with 868 MHz RF module).

Two configurable pulse outputs for test signals. Class of pulse output device – OD according to LST EN 1434-2.

#### **4 Requirements on production, putting into use and utilization**

##### **4.1 Requirements on production**

At the end of the manufacturing and adjustment process the calculators shall be tested according to the requirements of the LST EN 1434-5. Errors of indication shall not exceed the maximum permissible errors, described in Annex VI (MI-004) of Directive 2014/32/EU.

##### **4.2 Requirements on putting into use**

The calculator must be installed and used in accordance with the requirements of document listed in section 1.6.

##### **4.3 Requirements for utilization**

No special requirements identified.

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

##### **5.1 Documentation of the procedure**

None.

##### **5.2 Special equipment or software**

No special requirements identified.

##### **5.3 Identification of hardware and software**

Identification of hardware:

- see Fig.1 and Fig.2 of this appendix.

Identification of software:

- version number of the software is **1.02**. This number on demand can be shown on the display.

##### **5.4 Calibration-adjustment procedure**

Calculator errors determination test shall be carried out when TEST mode is activated as indicated in section 8.7 of the document noted in section 1.6 of the present appendix.

Determination of the energy errors 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. Inlet and outlet flow temperatures should be simulated using precise resistors. Test should be carried out in accordance with section 6.4 of LST EN 1434-5.

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## 6 Security measures

### 6.1 Sealing

The following calculator sealing is provided:

- manufacturer's adhesive seal-sticker on the fixing bolt of electronic module under protecting cover (Fig. 2, pos. 1) and on the one bolt of cover protecting electronic module, which protect the access to the adjustment activation jumper (Fig. 2, pos. 2);
- locks of top and bottom parts of the calculator are sealed with one or two hanged seals of heat supplier after installation (Fig. 2, pos. 3).

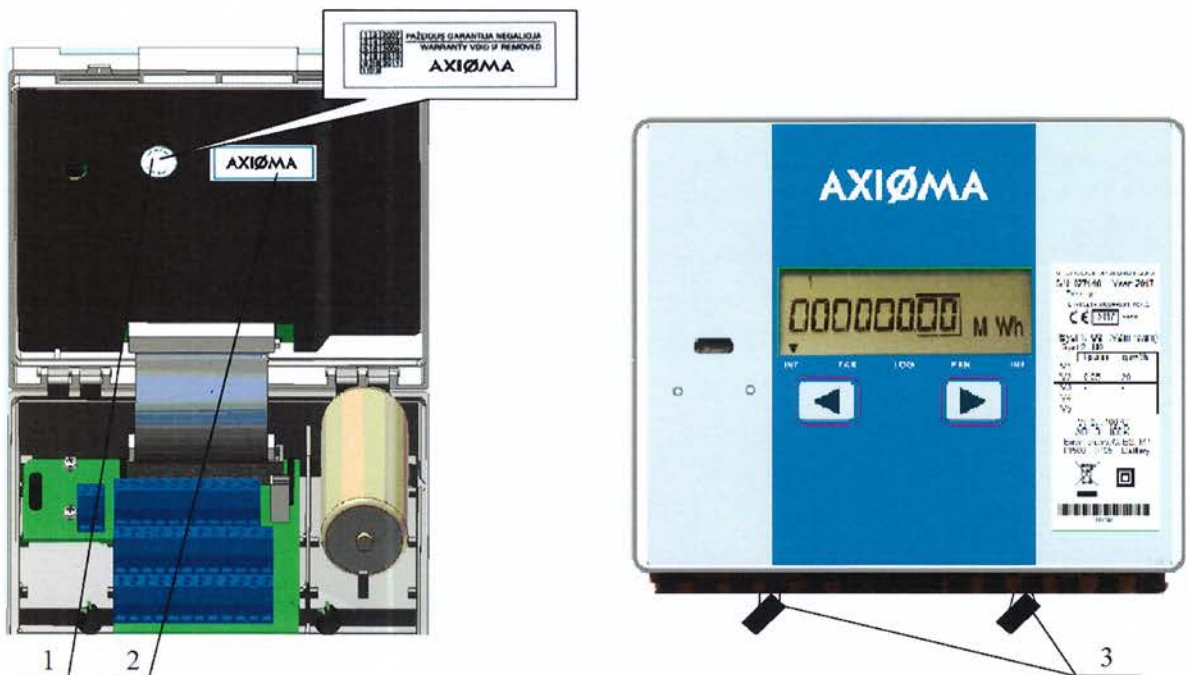


Fig.2. Sealing of the calculator QALCOMET E1



a) Manufacturer's adhesive seal-sticker



b) Manufacturer's adhesive warranty seal-sticker

Fig 3. Examples of the manufacturer's adhesive seal-stickers

## 7 Marking and inscriptions

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

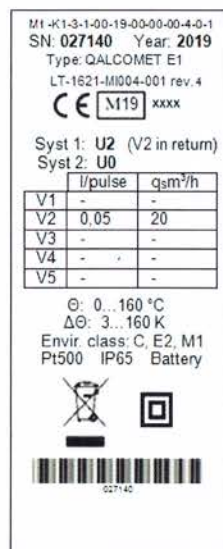
The following information shall appear in legible and indelible characters on the calculator casing and his label:

- EU-type examination certificate number (LT-1621-MI004-001 rev. 4);
- manufacturer's mark or name;

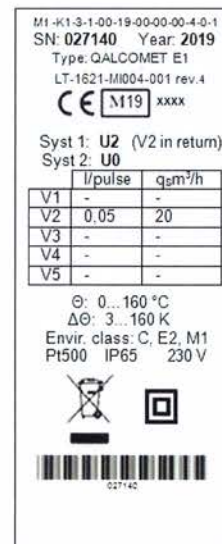


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- type designation and type number;
- year of manufacture and serial number;
- limits of the temperature;
- limits of temperature differences;
- type of temperature sensors (Pt 500);
- meter factor (pulse value) for the flow sensor;
- flow sensor to be installed in the flow (supply) or return;
- climatic class;
- electromagnetic class;
- mechanical class;
- voltage level for external power supply;
- identification code of measurement scheme for 1<sup>st</sup> and 2<sup>nd</sup> heating systems (see table 1 of the present appendix).



a) powered by 3,6 V DC battery



b) powered by 230 V AC mains

Fig 4. Examples of the calculator marking labels

## 7.2 Conformity marking

In addition, the label of 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;
- 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	Date and reference No.	Description
<b>1</b>	<b>2</b>	<b>3</b>
LT-1621-MI004-001	14-01-2009, No. LEI-12-MP-001.08	Type examination certificate first issued



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1	2	3
LT-1621-MI004-001 Revision 1	12-11-2014, No. LEI-12-MP-027.14	<p>1. The calculator can be equipped with 868 MHz RF radio module.</p> <p>2. The limits of temperature differences of the calculator can be: <math>\Delta\theta</math>: 2 K to 160 K, or 3 K to 160 K (<math>\Delta\theta</math>: 2 K to 160 K in the certificate first issued).</p> <p>3. Section 5.4 of the appendix to certificate is added with application of the calculator errors determination test.</p> <p>4. Document PLSKS3MID02, issued 27-02-2008, is replaced by document PLSKS3MID03, issued 06-06-2014.</p>
LT-1621-MI004-001 Revision 2	16-09-2015, No. LEI-12-MP-034.15	<p>1. Type designation SKS-3 changed in to QALCOMET HEAT 1 (brand QALCO).</p> <p>2. Document PLSKS3MID03, issued 06-06-2014 is replaced by document PLQH1V01, issued 24-07-2015.</p>
LT-1621-MI004-001 Revision 3	29-01-2018, No. LEI-12-MP-068.17	<p>1. Manufacturer's name AB „Axis Industries” changed to UAB „Axioma LEZ”.</p> <p>2. The name of the calculator type from QALCOMET HEAT 1 has been changed to QALCOMET E1.</p> <p>3. Type designation QALCOMET HEAT 1 on the calculator casing has been replaced by manufacturer's brand AXIOMA.</p> <p>4. Calculator labels have been changed.</p> <p>7. The document PLQH1V01, issued 24-07-2015, has been replaced by the document PLQME1V02, issued 21-11-2017.</p>
LT-1621-MI004-001 Revision 4	04-04-2019, No. LEI-12-MP-086.19	<p>1. Certificate validity extended until 14-01-2029.</p> <p>2. Manufacturer's name UAB „Axioma LEZ” changed by name UAB „Axioma Metering”.</p>