



EU-TYPE EXAMINATION CERTIFICATE

Number: TCM 142/20 - 5766

Addition 1

This addition replaces all previous versions of this certificate in full wording.

Page 1 from 8 pages

In accordance: with Directive 2014/32/EU of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available on the market of measuring instruments (implemented in Czech Republic by Government Order No. 120/2016 Coll.).

Manufacturer: COMAC CAL, s.r.o.
Třanovice 239
739 53 Třanovice
Czech Republic

For: flow sensor with calculator as sub-assemblies of thermal energy meter
type: Calor 38 MID

Accuracy class: 2

Valid until: 1 November 2030

Document No: 0511-CS-A025-20

Description: Essential characteristics, approved conditions and special conditions, if any, are described in this certificate.

Date of issue: 7 January 2021

Certificate approved by:




RNDr. Pavel Klenovský

1 Measuring device description

The flow sensors with calculators type Calor 38 MID are designed as sub-assemblies of thermal energy meters to measure the thermal energy which, in a thermal energy exchange circuit, is given up by a liquid called the thermal energy-conveying liquid in the sense of the Directive of the European Parliament and of Council no. 2014/32/EU of measuring instruments (implemented in Czech Republic by Government Order No. 120/2016 Coll.), as amended.

Calor 38 MID consists of electro-magnetic (EMD) flow sensor (as sub-assembly of thermal energy meter), electronic calculator (as sub-assembly of thermal energy meter). Electronic calculator is mounted in flow sensor electronic part. These sub-assemblies are compatible with temperature sensors pairs Pt500 (approved in flow sensor and calculator temperature range).

Determination flow values by EMD flow sensor is based on principle of Faraday's law (electromagnetic induction). By flow of liquid with electric conduction through a magnetic field, it is generated an electric potential. This voltage is scanned by two electrodes, having a contact with flow medium (cold and hot water here). Minimum water conductivity for measurements is determined by value 20 $\mu\text{S/cm}$, speed range of water is defined from 0,01 m/s up to 12 m/s.

The electronic calculator unit is supplied by mains voltage. Temperature sensors pair is installed in determined clamps of unit. Unit may be connected either directly on flow sensor (compact version) or may be connected with flow sensor by cable (remote version). Calculator unit permits an installation of flow sensor either in inlet or in outlet pipes of thermal circuit. Inside electronic of calculator unit is protected by security seal of manufacturer. Measured thermal energy is evaluated on base of measured signal from flow sensor and from temperature sensors pair.

Electronic calculator unit as sub-assembly of thermal energy meter Calor 38 MID can be equipped with different communication interfaces.

Thermal heat energy calculation by Calor 38 MID meter is described by next two basic formulas:

Thermal power is determined as:

$$P = Q \times \rho \times (hTV - hTR)$$

where are:

P , thermal power (W)

Q , volumetric flow (m^3/s)

ρ , density of water (kg/m^3)

hTV , specific enthalpy (J/kg) by inlet temperature

hTR , specific enthalpy (J/kg) by outlet temperature

By integration during a time (from t_1 up to t_2), calculator unit determines an energy E (J) as:

$$E = \int_{t_1}^{t_2} P(t) dt$$

Flow sensors with calculators as sub-assemblies of thermal energy meter type Calor 38 MID are manufactured, described and specified according to the next main technical documentation of the company COMAC CAL s.r.o.: Installation and technical conditions, Ver. 1.00, dated 18.6.2019. Document Parameters of meter Calor 38, dated 20.5.2019. Document Calor 38_WELMEC 7.2.2019, dated 17.12.2019. Statement of manufacturer Nr. 608810031, dated 10.12.2019. Photos, pictures concerning a labels and sealing of the meter. Dated, December 2019.

The flow sensors with calculators type Calor 38 MID are manufactured according to the technical documentation of manufacturer. Technical documentation contains following drawings:

Document reference	Date	Brief description
SESTAVA 30	22.10.2020	Remote evaluation unit sealing
SESTAVA 31	22.10.2020	Remote sensor sealing
SESTAVA 32	22.10.2020	Compact version main security sealing
SESTAVA 33	22.10.2020	Compact version installation sealing
SESTAVA 34	22.10.2020	Sealing mark
SESTAVA 35	22.10.2020	Labels
SESTAVA 36	22.10.2020	Compact version dimension
SESTAVA 37	22.10.2020	Separate version flowsensor dimension
SESTAVA 38	22.10.2020	PCB scheme

2 Basic technical data

2.1 Flow sensor

Table 1 Dimensions and flowrate parameters:

Nominal diameter DN [mm]	$q_i [1/100]$ [m ³ /h]	$q_i [1/50]$ [m ³ /h]	$q_i [1/25]$ [m ³ /h]	$q_i [1/10]$ [m ³ /h]	q_p [m ³ /h]	q_s [m ³ /h]	Flowsensor length [mm]
10	0.017	0.034	0.068	0.17	1.70	3.40	200
15	0.038	0.076	0.152	0.38	3.80	7.60	200
20	0.071	0.142	0.284	0.71	7.10	14.20	200
25	0.105	0.21	0.42	1.05	10.50	21.00	200
32	0.17	0.34	0.68	1.70	17.00	34.00	200
40	0.27	0.54	1.08	2.70	27.00	54.00	200
50	0.42	0.84	1.68	4.20	42.00	84.00	200
65	0.72	1.44	2.88	7.20	72.00	144.00	200
80	1.10	2.20	4.40	11.00	110.00	220.00	200
100	1.70	3.40	6.80	17.00	170.00	340.00	250
125	2.67	5.34	10.68	26.70	267.00	534.00	250
150	3.80	7.60	15.20	38.00	380.00	760.00	300
200	6.75	13.50	27.00	67.50	675.00	1350.00	350
250	10.00	20.00	40.00	100.00	1000.00	2000.00	450
300	15.00	30.00	60.00	150.00	1500.00	2000.00	500
350	15.00	30.00	60.00	150.00	1500.00	2000.00	550
400	15.00	30.00	60.00	150.00	1500.00	2000.00	600

Table 2 Next parameters of flow sensor:

Dynamic range q_i / q_p (see over table 1)	1:100, 1:50, 1:25, 1:10 Horizontal, vertical position
Connection	Flange
Lining	Fluoroplast
Ambient temperature, °C	5 - 55
Pressure loss at q_p , bar	< 0,1
Accuracy class (EN1434)	2
Nominal pressure, bar	10; 16; 25; 40
Liquid specification	water

Direction of flow	one direction
Temperature range, °C	(10 – 120); (10 – 170)
Installation	Inlet, outlet pipe of thermal circuit
Standard length of cable to calculator (by remote version), m	3 ¹⁾
Flow profile sensitivity classes	U5, D3

Remark, concerning over Table2:

¹⁾ Other length, in accordance with documentation of manufacturer, “Installation and technical conditions”

2.2 Calculator

Table 3 Calculator parameters:

Temperature range, °C	10 - 170
Temperature difference range, K	2 - 120; 3 - 120
Temperature solution, °C	0,01
Ambient temperature, °C	5 - 55
Protection	IP65
Environmental class	A
Electromagnetic class	E1
Mechanical class	M1
Display	LCD, 16 x 2 characters
Units	GJ
Power supply	Mains voltage, 230 V/AC/50 Hz
SW version, CRC	SW version v1.00, CRC: 325CA036

2.3 Interfaces of Calor 38 MID

User interface:	LCD display, buttons for overview a measured data
Communication interfaces:	RS 485 output pulses current outputs, (4 – 20) mA

3 Test

All tests of flow sensor with calculator as sub-assemblies of thermal energy meter type Calor 38 MID were performed in compliance with the International Recommendation OIML R 75 Edition 2006 (E) and with conformity to EN 1434:2015. Results of all performed tests are presented in: Test Reports Nr. 6015-PT-0050-20 and Nr. 6015-PT-P0062-20.

Remarks:

As for a results of flow sensor testing in over Test report Nr. 6015-PT-0050-20 and concerning already quoted “Statement of manufacturer Nr. 608810031”, flow sensor of thermal energy meter Calor 38 MID can be tested by cold water also. There are not significant declination between application either by hot or by a cold water.

4 The measuring device data

The measuring instrument type Calor 38 MID shall be clearly and indelibly marked with the following information:

- CE marking and metrology marking in line with the Directive 2014/32/EU
- Number of EU-type examination certificate
- Manufacturer's name, registered trade name or registered trade mark
- Post address of manufacturer
- Year of manufacture
- Measuring device type
- Serial number
- Unit of measurement
- Accuracy class 2
- Flowrate range (q_i ; q_p ; q_s)
- Environment class: A
- Mechanical environment: M1
- Electromagnetic environment: E1
- Protection class: IP65
- Nominal pressure PN
- Range of temperature measurements
- Type of temperature sensor pair (Pt500)
- Range of temperature difference measurements
- Limiting values of flow rate, dimension of flow sensor DN
- Place of the flow sensor installation (inlet, outlet pipe)
- Flow profile sensitivity classes: U5, D3
- Direction of flow arrow on the meter body
- SW version and CRC value

These markings shall be visible without dismantling the water meter after the instrument has been placed on the market or put into use. Example is in Picture 4 and 5.

5 Conditions of conformity assessment of measuring instruments produced with type approval

The flow sensor with calculator type Calor 38 MID shall be put onto the market in line with the procedure of conformity assessment according to the Annex D or F of the Directive 2014/32/EU as well as in compliance with the technical description of this report and shall be tested in accordance with the requirements determined in EN 1434-5:2015, respectively OIML R 75.

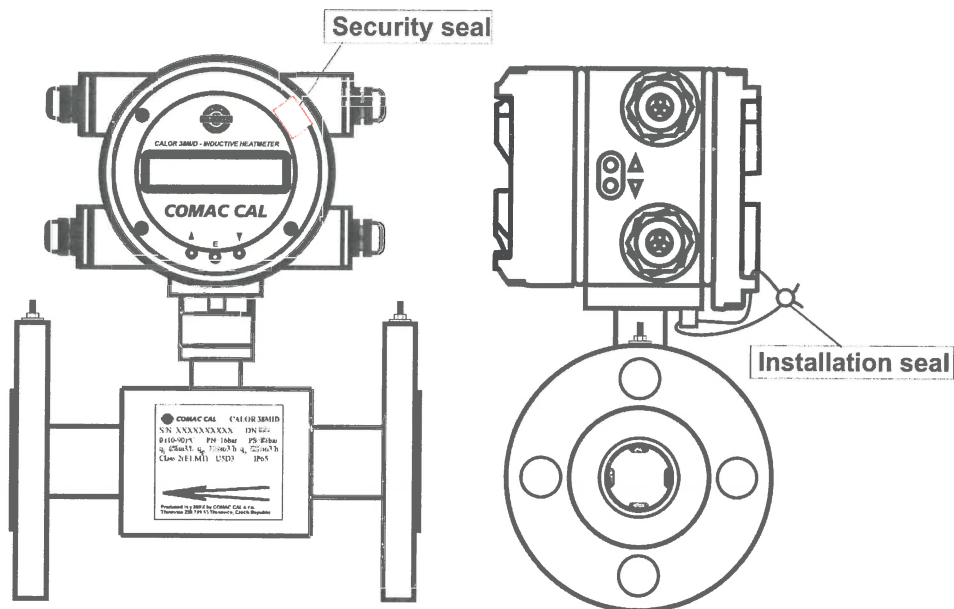
A metrological test may only be performed by a producer, or by a notified body respectively in line with the conformity assessment procedure by the D or F Annexes of the Directive 2014/32/EU, respectively.

6 Sealing

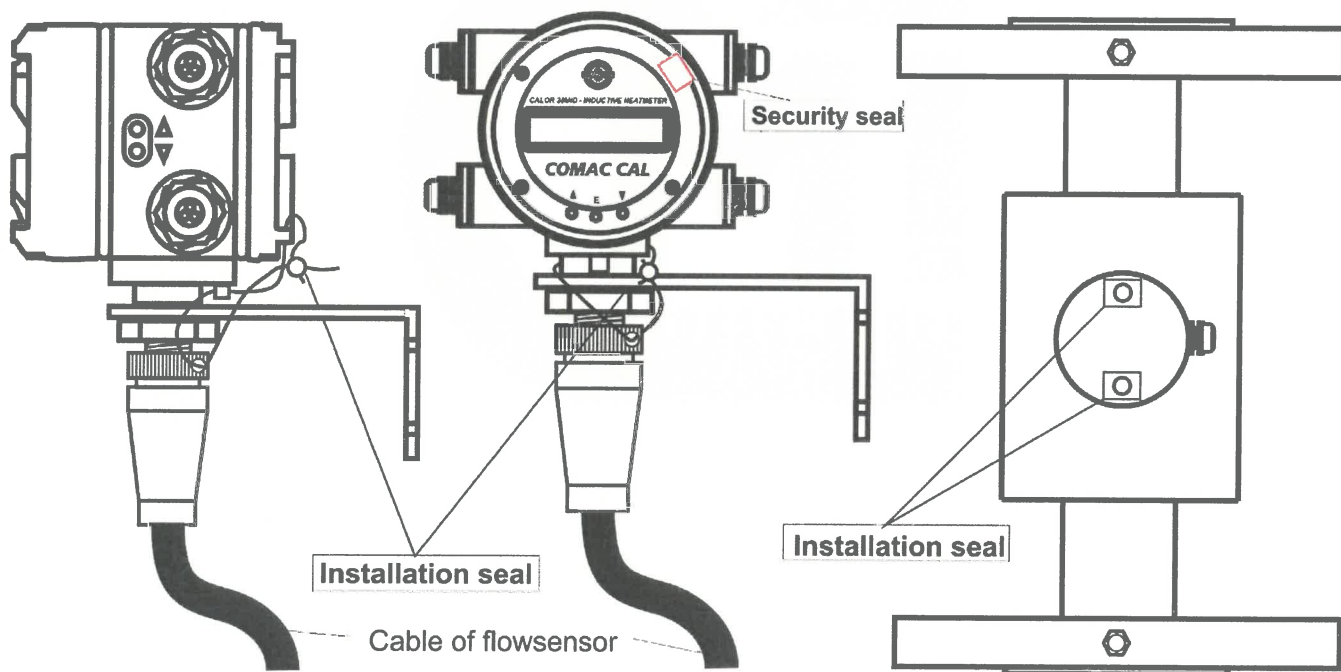
Over quoted information concerning flowsensor with calculator Calor 38 MID are presented on next pictures from 1 up to 7. Pict. 1, sealing scheme of compact version. Pict. 2, sealing scheme of remote version . Pict. 3, wire connection clamps of meter. Pict. 4, example of metrological labels. Pict. 5, metrological labels position. Pict. 6, LCD display, value of energy. Pict. 7, LCD display, SW version, CRC. Sealing of meter type Calor 38 MID are performed by lead seal and safe guarding mark (stickers). Both metrological labels (on flowsensor and electronic) must be secured to meter body by safe guarding mark (sticker).

History of additions

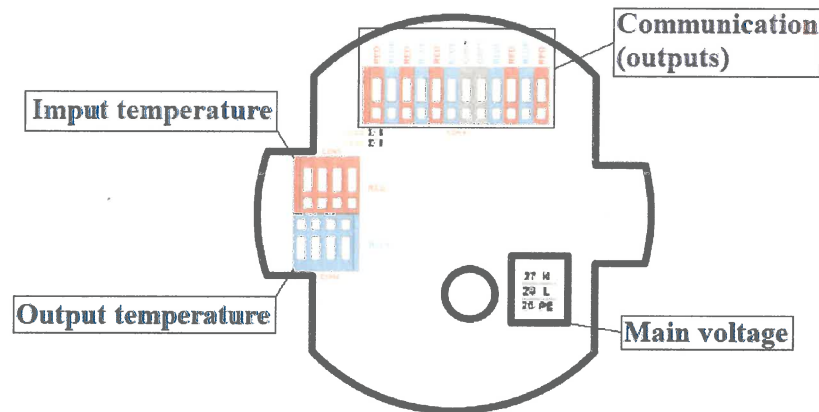
Addition No.	Description
Addition 0	Issuing certificate
Addition 1	Added $\Delta\theta = 3 \text{ K}$; $T_{\max} = 170 \text{ }^{\circ}\text{C}$; $T_{\max} = 120 \text{ }^{\circ}\text{C}$; PN40; fix low range $10 \text{ }^{\circ}\text{C}$ of flow sensor



Picture 1, sealing scheme of compact version, security seal (sticker) is under display cover, lead seal for electronic and sensor connection




Picture 2, sealing scheme of remote version (lead seal for electronic and cable connection, sticker seal for screws of sensor cable cover)




Picture 3, wire connecting clamps of meter


Flowsensor label


**COMAC CAL**




CALOR 38

S/N XXXXXXXXXXXX


DN 

θ : () °C

PN=  bar


q_i =  m³/h q_p =  m³/h q_s =  m³/h

Class:2(E1,M1) U5D3 IP65



**Produced In y.20XX by COMAC CAL s.r.o.
Třanovice 239,739 53 Třanovice
Czech Republic**


Label of the electronic


**COMAC CAL**

CALOR 38

S/N XXXXXXXXX

Pt500


θ : () °C


$\Delta\theta$: () K

Outlet

Enviromental class: A

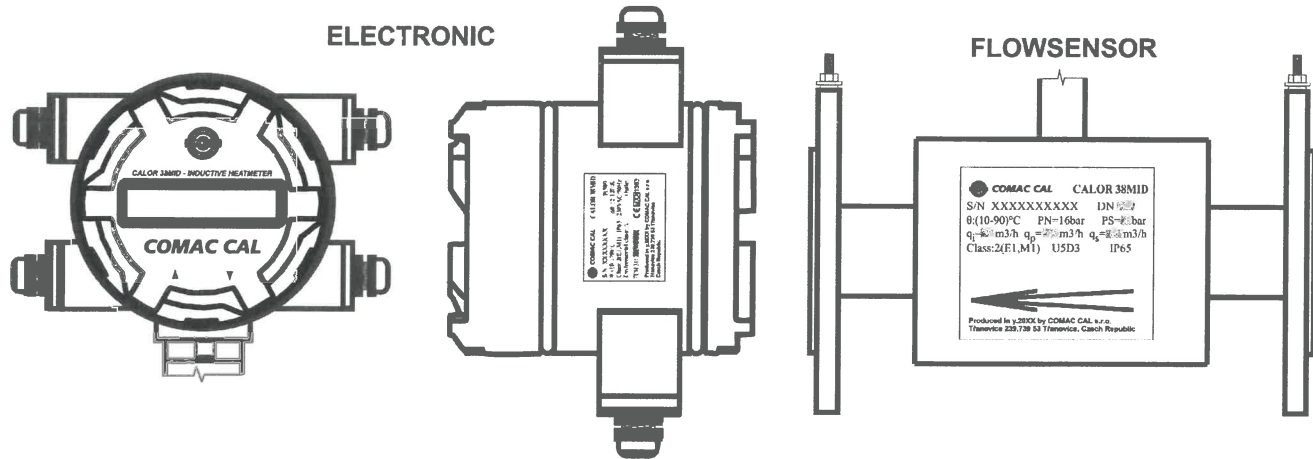
Class: 2(E1,M1) IP65 230VAC/50Hz

TCM 

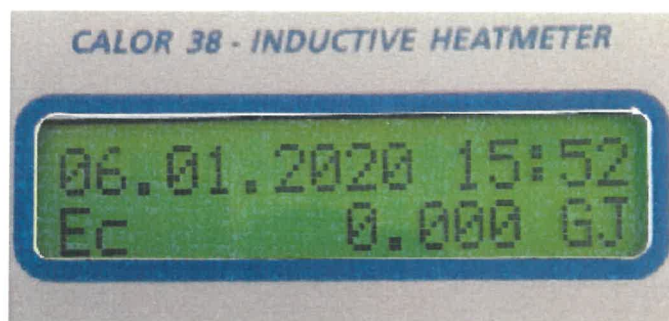
CE  1383

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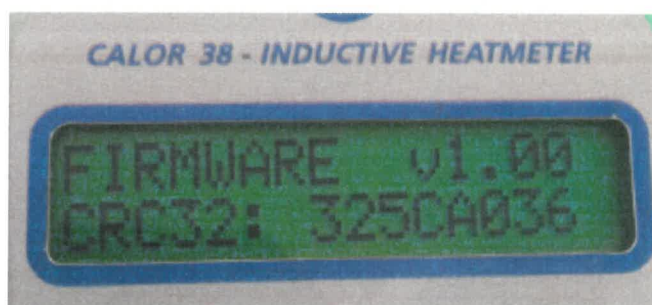
Picture 4, example of metrological labels



Picture 5, metrological labels place (top view of electronic/calculator and side view on flowsensor)



Picture 6, LCD display, information concerning thermal energy value, date and time.



Picture 7, LCD display, SW version and CRC.