Calorio 110

Fluidic oscillation compact heat / cooling meter

The Calorio 110 is an autonomous compact thermal energy meter consisting of a flow meter a detachable integrator with a wide range of communications options and a pair of temperature sensors.

It's used in home automation, local and district heating / cooling systems to measure the consumption of heating or / and cooling energy for individual billing.

The Calorio 110 is designed on the basis of the proven fluid oscillation principle. Thanks to the use of a static flow sensor, this heat meter does not have any moving parts and thus no wear. The fluid oscillation principle guarantees a high stability and repeatability for a reliable and precise measurement of flow and thermal energy. It is optimally suited for glycol and other mixtures.

It's built for flows of qp 1.5 m3/h and qp 2.5 m3/h and measures the temperature within the range of 0°C to 110°C. Through its two additional optional pulse inputs, it is possible to connect, e.g., two water meters (hot and cold) and read their values remotely via the heat meter.

The Calorio 110 meets the requirements of the European Measuring Instruments Directive (MID) 2014/32/EU, standard EN 1434 class 2 and the RED 2014/53/EU.

Application

- Compact heat / cooling meter with detachable integrator for domestic heat metering
- District heating and cooling schemes
- Home automation
- Heat / cooling metering – Riser, lateral or community

Benefits

Permanent flow detection thanks to the fluidic oscillation measuring principle

- Flow meter of an autonomous compact thermal energy
- Corrosion resistant materials
- No moving parts, thus no wear
- Not sensitive to dirt, air bubbles and liquids with changing viscosity
- Self-cleaning thanks to the fluidic oscillation pulse in the flow meter
- Long-term stability, accurate and reliable measurement

Features

- The heat and cooling meters Calorio 110 are optimized for the measurement and calculation of energy consumption in district or local heating systems.
- Configured as a heat meter MID with temperature sensors Ø 5 mm, 1.5m
- Optical interface for readout and 6+1 years battery
- Easy to operate and read
- Non-volatile EEPROM memory, that keeps stored data even in case of power failure
- 18 monthly energy values for heat energy and volume
- Self-monitoring and error display

Functions

- Measure and record energy consumption and volume of the flow in heat or cooling applications
- Optionally measure and record a second “energy consumption”, for heat / cooling applications
- If two additional inputs were configured then record the provided values. The configuration can be done either through the optical interface, or via M-Bus or by radio
- Display of consumption data depending on configuration:
  - 18 monthly energy and volume values
  - 18 monthly cooling energy values
  - 18 monthly values of additional pulse input 1
  - 18 monthly values of additional pulse input 2
  - Set day values
- Display operating data including self-monitoring with error display

SECURE
energy together

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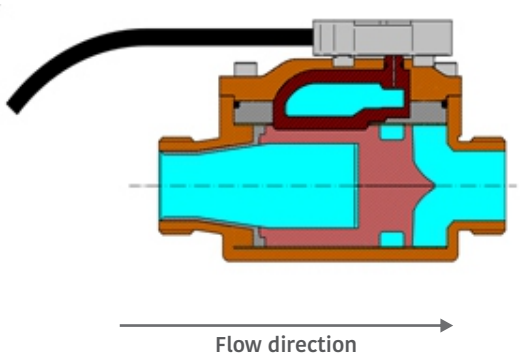
Fluid oscillation flow sensor: The principle

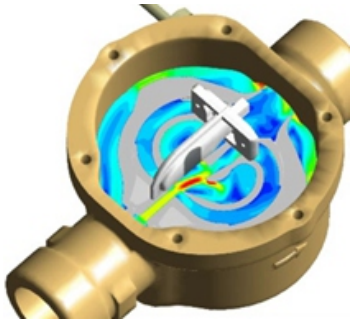
Picture1: The liquid passes through a special insert, the oscillator. Before passing the oscillator, the liquid is led to a nozzle and accelerated to a jet (oscillating jet). Opposite of the nozzle, the jet is redirected to the left or right into a channel. Due to the differential pressure generated in the channel, part of the liquid flows to the piezo-sensor above and part flows back to the pipe. The pressure of the liquid on the piezo-sensor generates an electrical pulse. Thus the liquid flows back to the pipe through a return loop and redirects the jet into the other channel. The liquid of this channel flows on the other side of the piezo-sensor and generates again an electrical pulse.



Picture 1: Section through the flow sensor

Picture 2: The animated top view on the oscillator shows the differences in velocity: The oscillation jet accelerated by the nozzle with the highest velocity and is visible in red. The jet that has slowed down is represented in blue.

The electrical pulses generated by the piezo-sensor with differential pressure correspond to the movement, the frequency of the jet. The electrical pulses are processed, amplified and filtered by the electronics. The electrical pulses are recorded by the integrator connected through a cable to the flow sensor and converted into flow. The frequency of the oscillation jet, i.e. the electrical pulse, is proportional to the flow.



Picture 2: Schematic of oscillator with oscillating jet (RED)

Temperature sensors

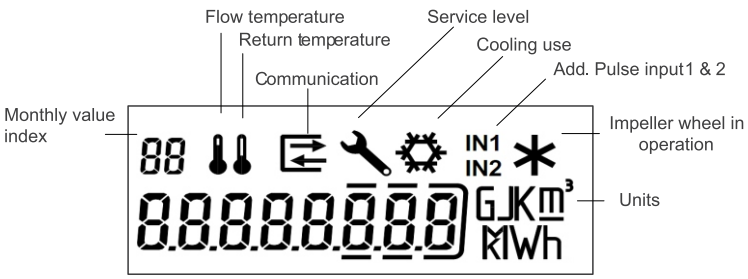
The pair of temperature sensors Pt 1'000 is connected to the integrator and is an integral part of the meter. The sensor with a colourless marking is mounted and sealed directly into the flow sensor. The temperature sensor with the orange marking must be mounted in the pipe “opposite” to the Calorio 110. The temperature sensors mustn't be changed or modified.

Integrator

The integrator is equipped with a large 8-digits display and can be rotated by 360°. The integrator can be separated from the flow sensor and be installed separately. A cable of 0,6 meter connects the integrator to the flow sensor. The housing has a protection index of IP65 against dust and humidity.

Integrator

The LCD display of the Calorio 110 has a large, clear design and high contrast, making it easy to read the data



Technical specifications

Temperature sensors	
2 wire temperature sensor	Pt1'000
Diameter	Ø5.0; Ø5.2, Ø6.0 mm
Cables length	1.5 m
Measurement	
Approved temperature range	0...110°C
Differential range	3...75 K
Response limit	0.5 K
Temperature resolution t (display)	0.1 °C
Temperature resolution t (display)	0.01 K
Temperature-measurement cycle at nominal flow	10 seconds
Flow-measurement cycle	Permanent
Integrator General	
Environment class	C
Mechanics	M1
Electronics	E1
Battery protection class	III
Cable connection between flow sensor and integrator	0.6 m, fix
	Integrator Protection indexIP 65
Operating temperature	5...55°C
Operating temperature with radio option	5...40°C
Storage and transport temperature	-10...60°C
Display & Display units	8-digits LCD
Energy	kWh, MWh, GJ
Volume	m3
Additional pulse inputs	Volume or pulses
Temperature	°C
Δ Temperature	K
Power supply	
Lithium Metal Battery (≤ 1g) 3VDC	6+1 or 12+1 years
Powered by M-Bus line	1 device = 2 M-Bus charges (max 2 x 1.5mA)
Pulse output	
Open drain (MOS Transistor)	1 Hz, 500 ms
	Vccmax : 35 VDC ; Iccmax : 25mA
Pulse inputs with a dry contact	
Power supply internal	2.3 VDC
Rpull UP internal	2 MΩ
Pulse factor	0...999.999 m3/Imp or without unit

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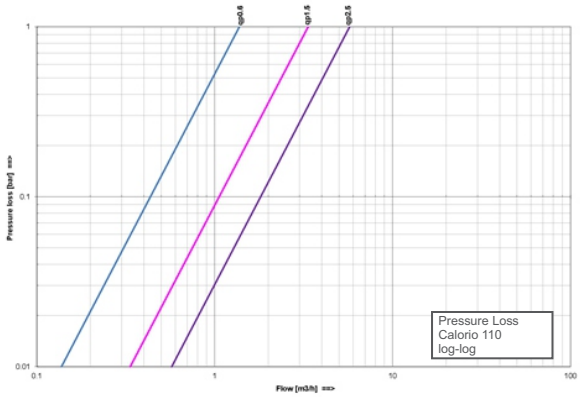
Technical specifications

Fluidic Oscillation Flow Sensor

qp	Threaded connection		Mounting length	Mat.	PN	Maximal flow qs	Minimal flow qi	Low flow threshold value (50°C)	Threaded hole for sensor	Total Meter Weight	Kvs value (20°C)	Pressure loss at qp
m^3/h	G"	DN	mm		bar	m^3/h	l/h	l/h		kg	m^3/h	bar
	(EN ISO 228-1)											
0.6	3/4"	(15)	110	Brass	16	1,2	6	4	Yes	1.2	1.4	0.19
1.5	3/4"	(15)	110	Brass	16	3	15	10	Yes	1.3	3.4	0.2
1.5	1"	(20)	130	Brass	16	3	15	10	Yes	1.4	3.4	0.2
1.5	1"	(20)	190	Brass	16	3	15	10	Yes	1.6	3.4	0.2
2.5	1"	(20)	130	Brass	16	5	25	17	Yes	1.4	5.7	0.19
2.5	1"	(20)	190	Brass	16	5	25	17	Yes	1.6	5.7	0.19

16 bar = 1.6 MPa

Pressure loss curve



Metrological class EN 1434 class 2

Mounting The Calorio 110 should not be mounted on the side where the continuous operating temperature of the liquid exceeds 90°C or is below 5°C.
Length of straight section fitted upstream/downstream of each flow meter (EN1434):U3 / D0 for: L=110 mm
U0 / D0 for: L=130 mm and L=190 mm

Flow sensor protection index IP 68

Dimensions

	qp 0.6 m^3/h	qp 1.5 m^3/h	qp 2.5 m^3/h
Mounting length [L]	110 mm	110/130/190 mm	130/190 mm
Integrator	110.2 x 86.8 mm	110.2 x 86.8 mm	110.2 x 86.8 mm
Total height	105.0 mm	110.5 mm	108.0 mm
Height from the axis of the tube	87.5 mm	90.0 mm	87.5 mm
Height without integrator	52.0 mm	54.5 mm	52.0 mm

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