# Compact Static Heat- and Cooling Meter of High-Tech Composite


## Application

The **Superstatic 789** is a lightweight and robust compact heat- and cooling meter consisting of a high-tech composite 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 **Superstatic 789** is designed on the basis of the proven **fluid oscillation** principle used exclusively by GWF. Thanks to the use of a static flow sensor, the heat- and cooling meter **Superstatic 789** 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 $m^3$/h and qp 2.5 $m^3$/h and measures the temperature within the range of 0°C to 110°C.
The **Superstatic 789** meets the requirements of the European Measuring Instruments Directive (MID) 2014/32/EU and the standard EN 1434 class 2.

## Benefits

**Permanent flow detection thanks to the fluidic oscillation measuring principle**

- **Flow meter of High-Tech Composite lightweight and robust**
- 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

GWF Superstatic 789

## Standard features

The heat and cooling meters **Superstatic 789** are optimized for the measurement and calculation of energy consumption in district or local heating systems.

- Configured as a heat- and cooling 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- and cooling energy and volume
- Self-monitoring and error display

## Sizes

The **Superstatic 789** is available in the following sizes:

- Flow meter for qp 1.5 $m^3$/h, with a length of either 110 mm or 130 mm, and qp 2.5 $m^3$/h 130 mm

## Options

The **Superstatic 789** can be ordered with following options

- 12+1 years battery
- One of the following communications options:
  - Self-powered M-Bus
  - Wireless M-Bus

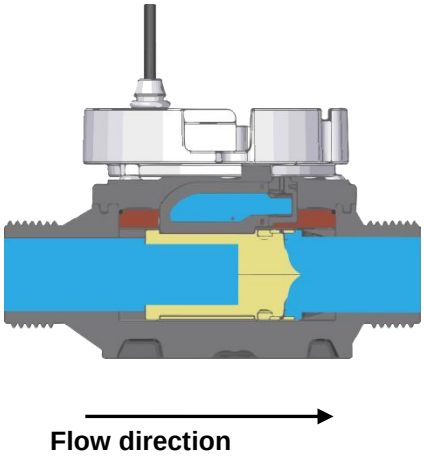
## Functions

- Measure and record energy consumption and volume of the flow in heat- and cooling applications
- Display of consumption data depending on configuration:
  - 18 monthly energy and volume values
  - 18 monthly cooling energy values
  - Set day values
- Display operating data including self-monitoring with error display

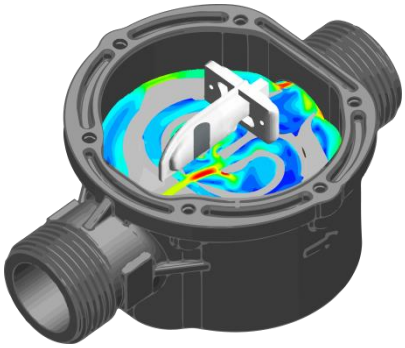
## Fluid oscillation flow sensor: The principle

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 the 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 2: The animated top view shows the oscillating jet and its differences in velocity: The oscillation jet accelerated by the nozzle has 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 1: Section through the flow sensor



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

## Temperature sensors

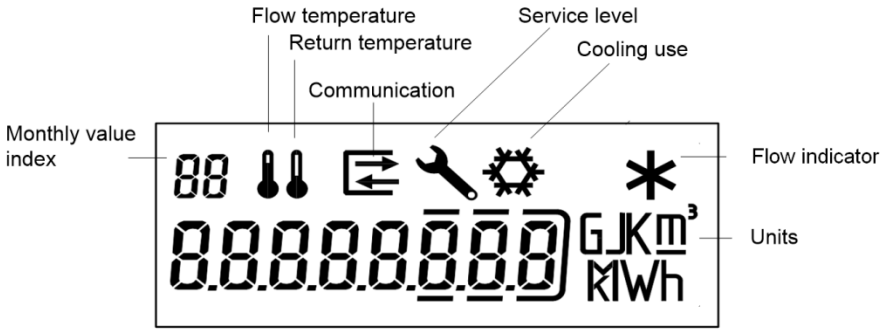
The pair of temperature sensors Pt 1'000 is connected to the integrator and is an integral part of the heat meter. The sensor with a colourless marking is mounted and sealed directly into the flow sensor. The temperature sensor with the orange marking must be mounted in the pipe “opposite” to the **Superstatic 789** (direct immersion installation). The temperature sensors mustn’t be changed or modified.

## Integrator

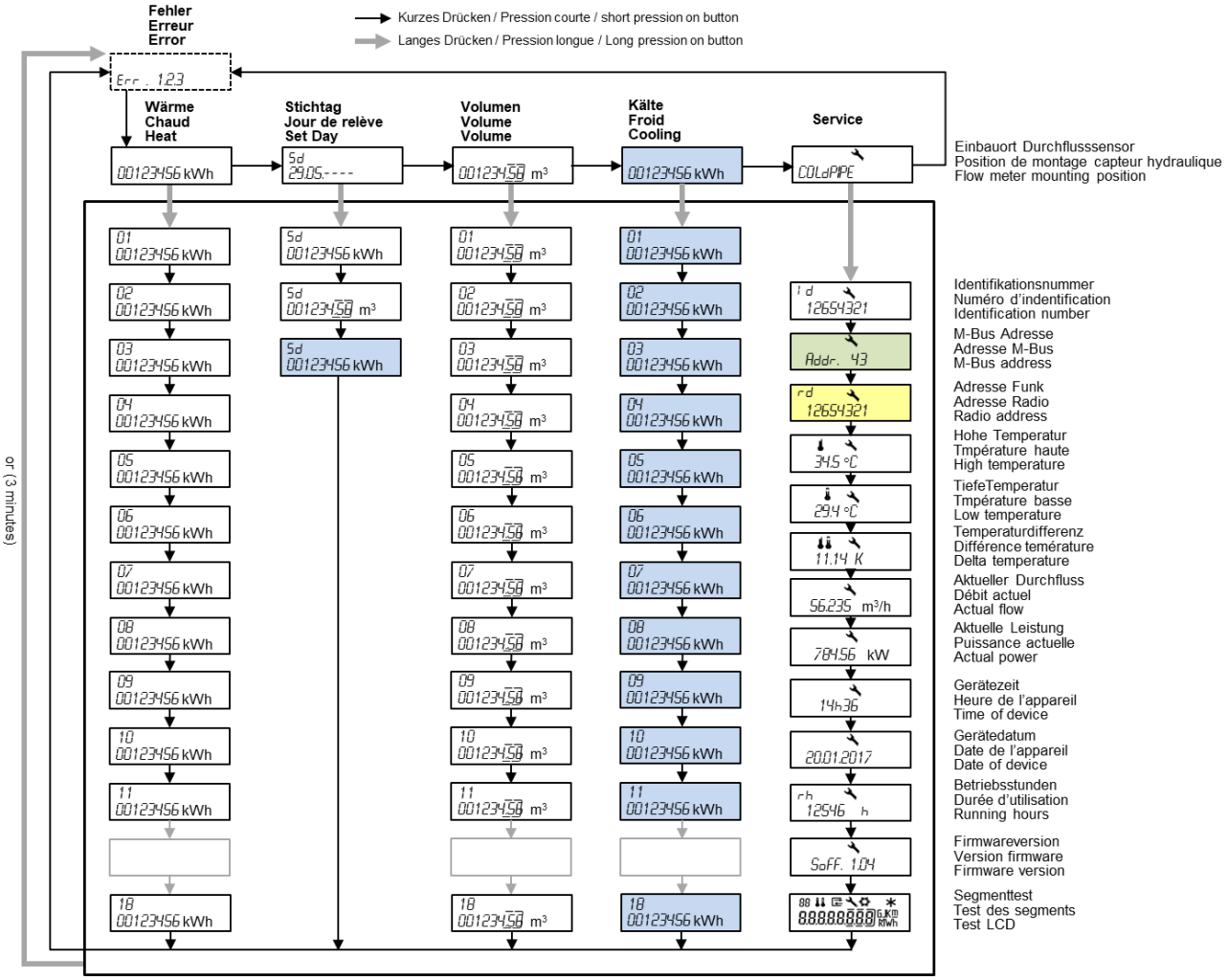
The integrator is equipped with a large 8-digits display and can be rotated by 360°.
The integrator can be separated from the flow sensor and be installed separately.
A cable of 0,6 meter connects the integrator to the flow sensor.
The housing has a protection index of IP65 against dust and humidity.

## Display

The LCD display of the **Superstatic 789** has a large, clear design and high contrast, making it easy to read the data.



## Display sequences



**Error messages**

| | |
|---|---|
| Err 1 | Flow higher than 1.2 x qs or faulty flow sensor. |
| Err 2 | Measured temperature out of range or faulty temperature sensor. |

**Energy calculation**

The flow sensor counts up the volume of the liquid flowing through the sensor. The thermal energy consumption, respectively the heating and cooling energy are calculated by means of the temperature difference between hot and cold pipe, the recorded volume, and the heat coefficient. The latter takes into consideration the density, the viscosity and the specific heat of the liquid used. All these are dynamically adapted in function of the temperature.

**Solar-, cooling and other installations**

The standards allow for approvals using water as heating and or cooling liquid and the **Superstatic 789**, while having received all according approvals, ensures also a precise measurement with other liquids.
The calculator contains the data for many different special liquids and, by means of the free software Prog7x9, it is possible to select the liquid, its level of concentration if so defined and be set to calculate properly the energy consumption.

**Cooling energy**

The cooling energy in combined heat/cooling applications is stored in another memory than the heat energy.

The cooling energy has the same physical unit as the heat energy. The cooling power and the temperature difference are in this case displayed with a minus sign (-).

**Non-volatile memory**

The device parameters, as well as the cumulative values for energy and volume, cooling energy, monthly values, set day values, operating hours and error type are stored in a non-volatile memory (EEPROM), where they are saved even in case of a power failure (e.g. changing batteries). Once an hour and in the event of battery failure, the cumulative values are updated in the EEPROM.

**Monthly values**

At the end of each month, the monthly values are stored.
A total of 18 monthly values of heat energy, volume and cooling energy are memorized in the integrator.

**Communication options**

Several communication interfaces are available.
The configuration of the selected communication option of the **Superstatic 789** can be carried out with the free software Prog7X9 from GWF.

GWF Superstatic 789

## TECHNICAL DATA

### Temperature sensors

| | |
|---|---|
| 2 wire temperature sensor | Pt1‘000 |
| Diameter | Ø5.0 mm, M10x1 |
| Cables length | 1.5 m |
| Installation | Direct immersion |

### 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 Δt (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 index | IP 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 |
| Volume | $m^3$ |
| 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 loads (2 x 1.5mA)

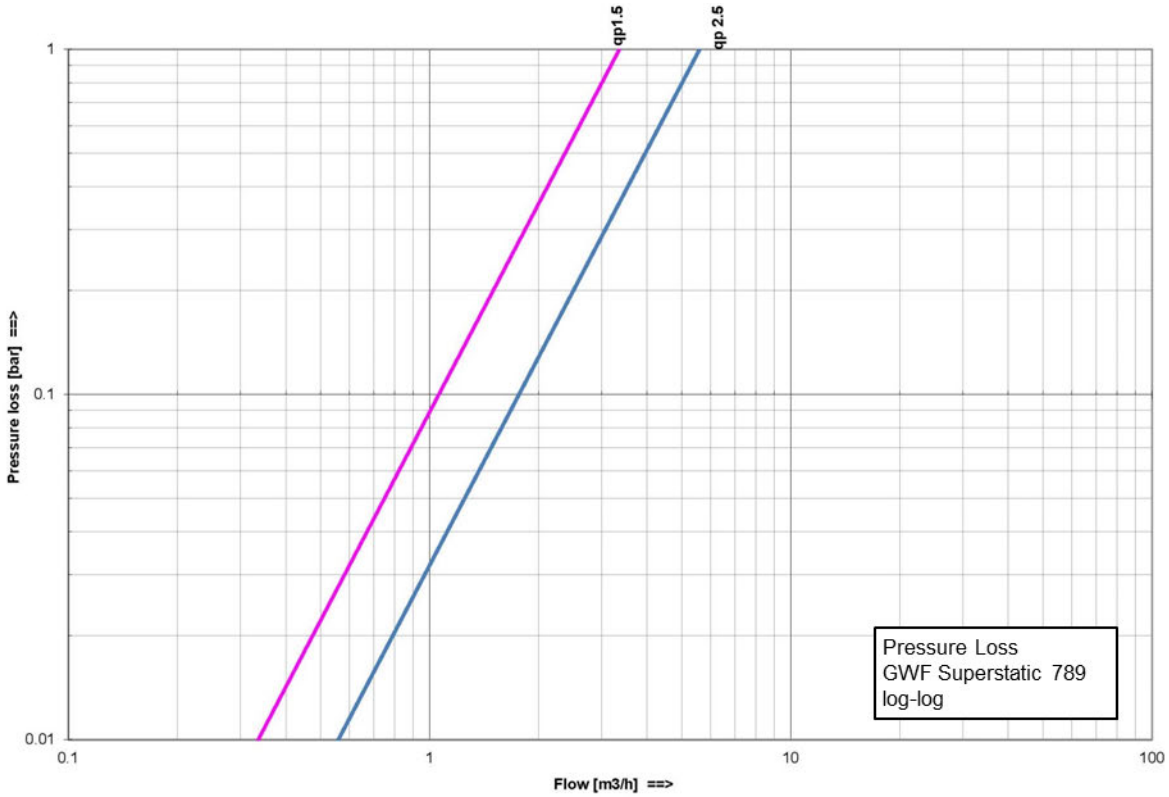
## Fluidic Oscillation Flow Sensor

| 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 |
| 1.5 | 3/4" | *(15)* | 110 | Comp | 16 | 3 | 15 | 10 | Yes | 0.72 | 3.4 | 0.2 |
| 1.5 | 1" | *(20)* | 130 | Comp | 16 | 3 | 15 | 10 | Yes | 0.74 | 3.4 | 0.2 |
| 2.5 | 1" | *(20)* | 130 | Comp | 16 | 5 | 25 | 17 | Yes | 0.75 | 5.5 | 0.2 |

Comp = High-Tech Composite

16 bar = 1.6 MPa

## Pressure loss curve




## Metrological class

EN 1434 class 2

## Mounting

The Superstatic 789 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=110mm

U0 / D0 for: L=130mm

Pipeline: horizontal —
vertical |

Meter head: sideways
± 45°

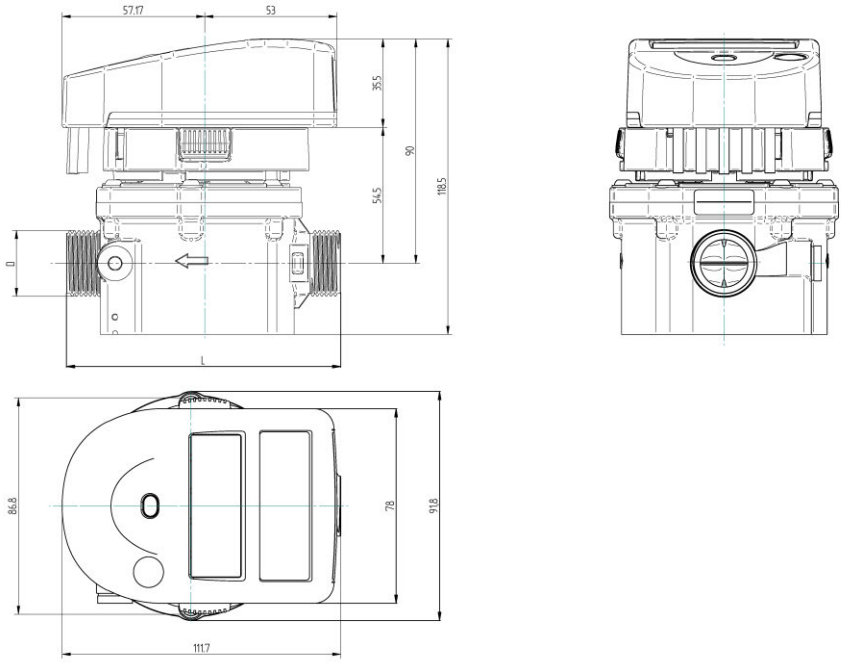
## Flow sensor protection index

IP68

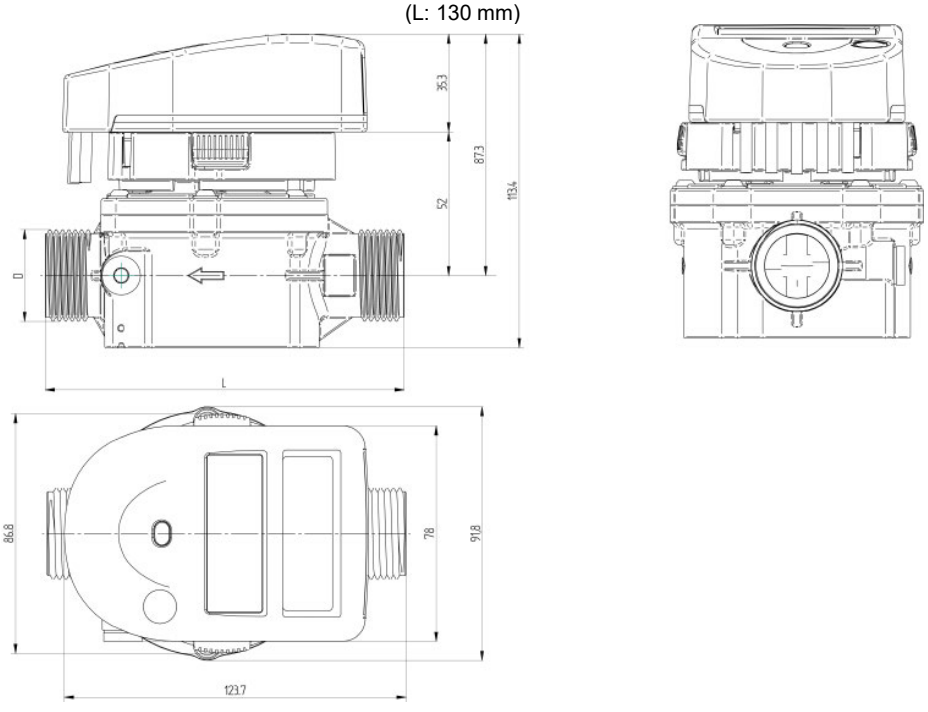
## Dimensions

| | qp 1.5 m³/h | qp 1.5 m³/h | qp 2.5 m³/h |
|---|---|---|---|
| Mounting length [L] | 110 mm | 130 mm | 130 mm |
| Integrator | 110.2 x 78 mm | 110.2 x 78 mm | 110.2 x 78 mm |
| Total height | 118.5 mm | 118.5 mm | 113.4 mm |
| Height from the axis of the tube | 90.0 mm | 90.0 mm | 87.3 mm |
| Height without integrator | 54.5 mm | 54.5 mm | 52 mm |

Superstatic 789, qp 1.5 m³/h
(L: 110 mm / 130 mm)




Superstatic 789, qp 2.5 m³/h
(L: 130 mm)



**CE conformity according to**
Directive MID 2014/32/EU
RED 2014/53/EU

Detailed declarations of conformity can be found on our homepage: www.gwf.ch

Modifications subject to change without notice Data Sheet Superstatic 789 EN 28-02-2018