Superstatic 789

Compact thermal energy meter

Application

The Superstatic 789 is a lightweight and robust compact heat 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 Sontex. Thanks to the use of a static flow sensor, the heat 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. 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 Superstatic 789 meets the requirements of the European Measuring Instruments Directive (MID) 2014/32/EU and the standard EN 1434 class 2.

Sontex
your link to innovative metering

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
- LoRaWAN technology as optional communication interface

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 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

Sizes

The Superstatic 789 is available in the following sizes:

- qp 1.5 m3/h, L= 110 mm or 130 mm,
- qp 2.5 m3/h, L= 130 mm

Options

The Superstatic 789 can be ordered with following options:

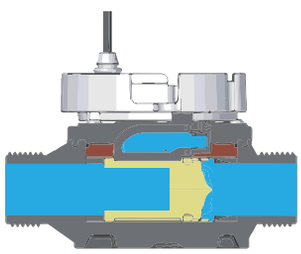
- Ø5,2 mm or Ø 6 mm temperature sensors
- 12+1 years battery
- One of the following communications options:
  - Self-powered M-Bus
  - LoRaWAN technology
  - Bidirectional Radio SONTEX interface.
  - Wireless M-Bus.
  - Two pulse outputs either heating or cooling energy consumption and volume, or heating and cooling energy consumption
- Two additional pulse inputs

Functions

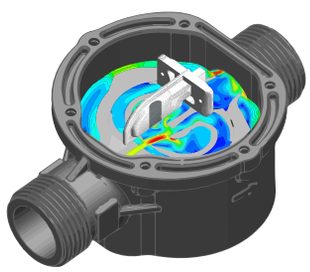
- Measure and record energy consumption and volume of the flow in heat or cooling applications
- Optionally measure and record a second “energy consumption”, for heating/cooling applications
- If two additional inputs were configured then records the provided values. The configuration can be done either through the optical interface, or via M-Bus or by radio SONTEX
- 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

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.



Picture 1: Section through the flow sensor



Picture 2: Schematic of the oscillator with oscillating jet (red)

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.

Temperature sensors

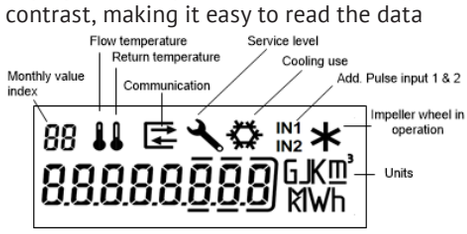
The pair of temperature sensors Pt 1'000 is connected to the calculator and is an integral part of the heat meter. The temperature sensor without frame marking on the label is fitted close to the flow meter or directly into it. The temperature sensor cable marked with a black frame mark on the label is mounted in the “opposite” pipe (in the other side of the heat exchanging circuit) of the one with the Supercal 739.
The temperature sensors mustn’t be changed or modified.

Calculator

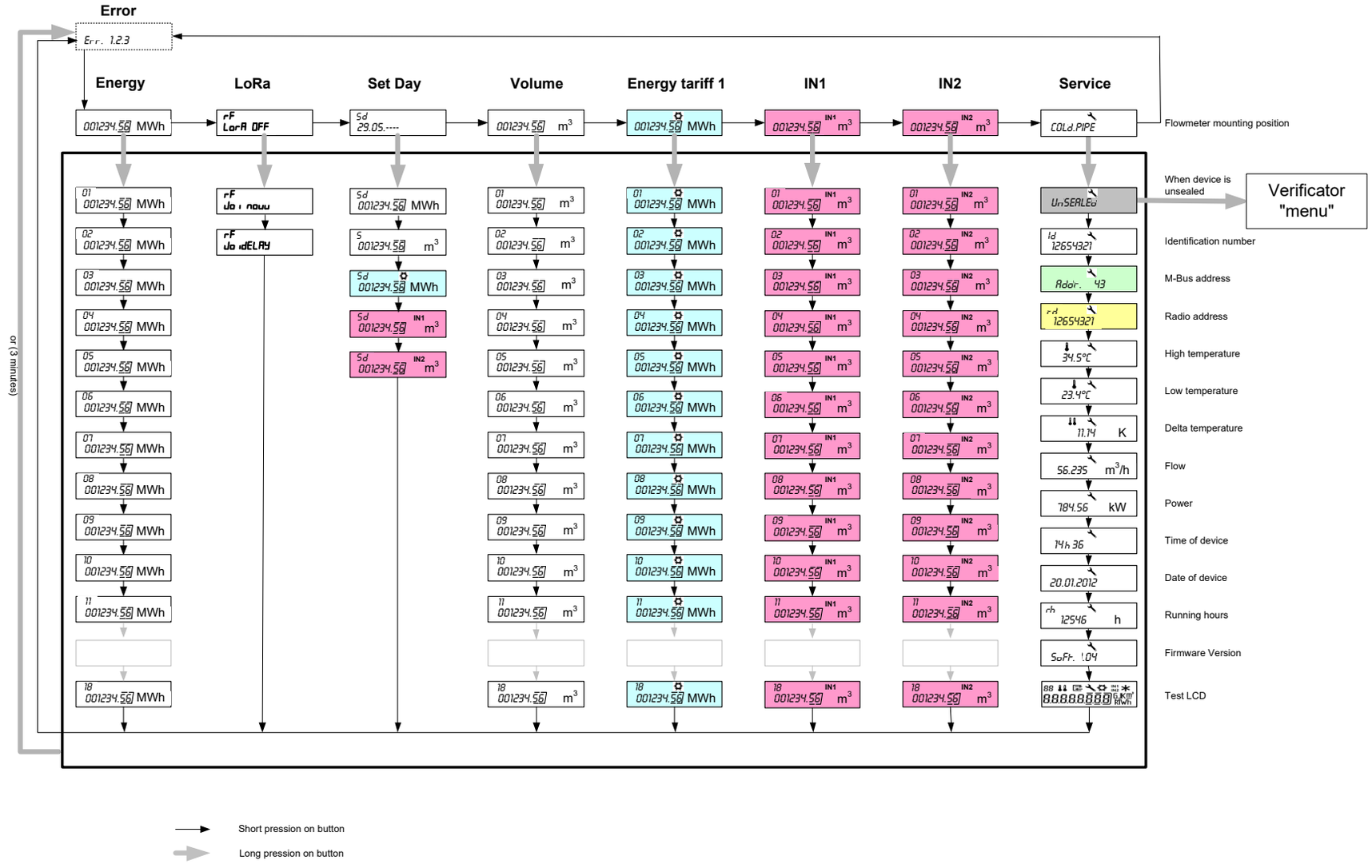
The calculator is equipped with a large 8-digits display and can be rotated by 360°. The calculator can be separated from the flow sensor and be installed separately. A cable of 0,6 meter connects the calculator to the flow sensor.
The housing has a protection index of IP65 against dust and humidity.

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 or 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 or 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.
By means of the free software Prog7x9, it is possible to select special 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 and will be cumulated only if the two following conditions are fulfilled:

Temperature difference(Δt) < -0.5K
Supply temperature < 18°C

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 (-). If required it is possible to order the Superstatic 789 with another threshold than the 18°C.

Non-volatile memory
The device parameters, as well as the cumulative values for energy and volume, cooling energy, monthly values, set day values, values of the pulse input counters 1 and 2,
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.

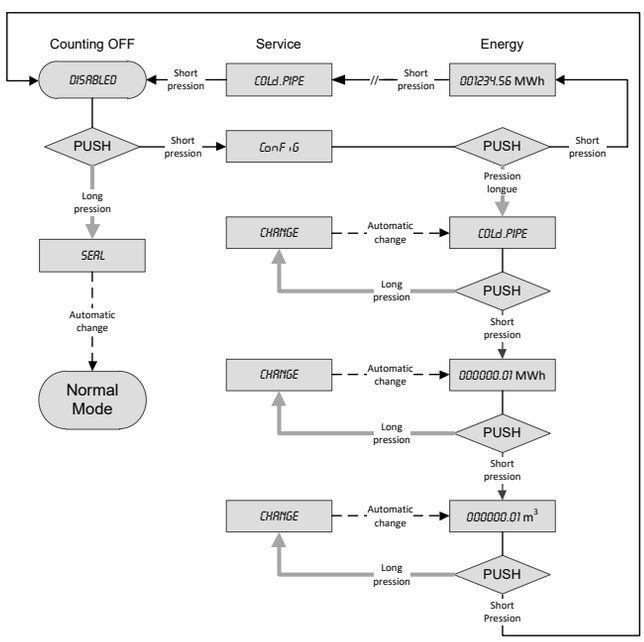
Monthly values
At the end of each month, the monthly values are stored.
Depending on the configuration a total of 18 monthly values of heat energy, volume, cooling energy and of the additional pulses inputs 1 and 2 are memorized in the calculator.

Pulse inputs
As an option the Superstatic 789 offers the possibility to integrate two additional pulse inputs such as from a hot water and a cold water meter.

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 Sontex.

Configuration
The heat meter is delivered ex works in the “storage” mode, it means it does not count and the display shows "Disabled". The storage mode is active as long as the meter is not sealed "Seal". Optionally, the “Config” menu can be ordered in addition. The transition from “storage” mode to "Config" menu is made with a short press on the orange navigation button. Another short press gives access to the whole sequence of the "Normal" mode. In the "Config" menu, a long press on the button will change the below settings:

- Flow meter mounting position in the installation. Hot (HOT PIPE) or cold side (COLD PIPE).
- Energy unit (0.1kWh, 1 kWh, 0.001MWh, 0.01MWh, 0.001GJ and 0.01GJ).
- Volume unit (0.01m3 and 0.001m3)



Technical Data

Temperature sensors	■ Temperature sensors 2 wires ■ Diameter ■ Cables lenght	Pt1000 ø 5, ø 5.2 , ø 6 mm 1.5 m
Measurement	■ Approved temperature range ■ Approved long term operating temperature ■ Differential range ■ Response limit ■ Temperature resolution (display) ■ Temperature resolution ΔT (display) ■ Temperature measurement cycle at nominal flow ■ Volume measurement cycle	0° ...110°C 5°... 90°C 3...75 K 0.5 K 0.1°C 0.01 K 20 seconds permanent
Calculator	■ Environment class ■ Mechanics ■ Electronics ■ Battery protection class ■ Protection class ■ Cable length between flow sensor and calculator ■ Operating temperature (electronic circuits) ■ Operating temperature (version with radio) ■ Storage and transport temperature	C M1 E1 III IP65 0.6 m 5...55°C 5...40°C -10...60°C (dry environment)
Display & Display units	■ 8-digits LCD ■ Energy ■ Volume ■ Additional pulse inputs ■ Temperature ■ Δ Temperature	 kWh, MWh, GJ m^3 Volume or pulses °C K
Power supply	■ 3 VDC Lithium Battery	6+ 1 or 12+ 1 years
Radio communication	**Sontex Radio** ■ Frequency ■ Communication ■ Protocol ■ Encryption ■ Transmission power ■ Transmission interval **wM-Bus** ■ Frequency ■ Communication ■ Protocol ■ Encryption ■ Transmission power ■ Transmission interval **LoRaWAN®** ■ Frequency ■ Communication ■ Protocol ■ Encryption ■ Transmission power ■ Transmission interval ■ Uplink / Downlink	 433.82 MHz bidirectional Radian 0 AES 128 10 mW (10 dBm) on request 868.95 MHz unidirectional wM-Bus EN13757-4 AES 128 25 mW (14 dBm) Standard 120 sec. (Mode T1, C1 encryption mode 5, 7), 24/24 or 12/24 (Walk-by), 7/7 EU868 bidirectional class A according EN60870-5 AES 128 25 mW (14 dBm) from 1h to 4h depending on the network data coded according to EN60870-5 (M-Bus)
Pulse output	■ Open drain (MOS Transistor) Vccmax : 35 VDC ; Iccmax : 25 mA	1 Hz, 500 ms
Pulse input with a dry contact	■ Power supply internal ■ Rpull UP internal ■ Pulse factor	2.3 VDC 2 MΩ 0...999.999 m^3/pulse or without unit
Powered by M-Bus line	■ 1 device = 2M-Bus charges	max 2 x 1.5 mA
Metrological class		EN 1434 class 2
Examination type	■ Heating ■ Cooling	CH-MI004-13019 DE-16-M-PTB-0084

Flow sensor Superstatic 789

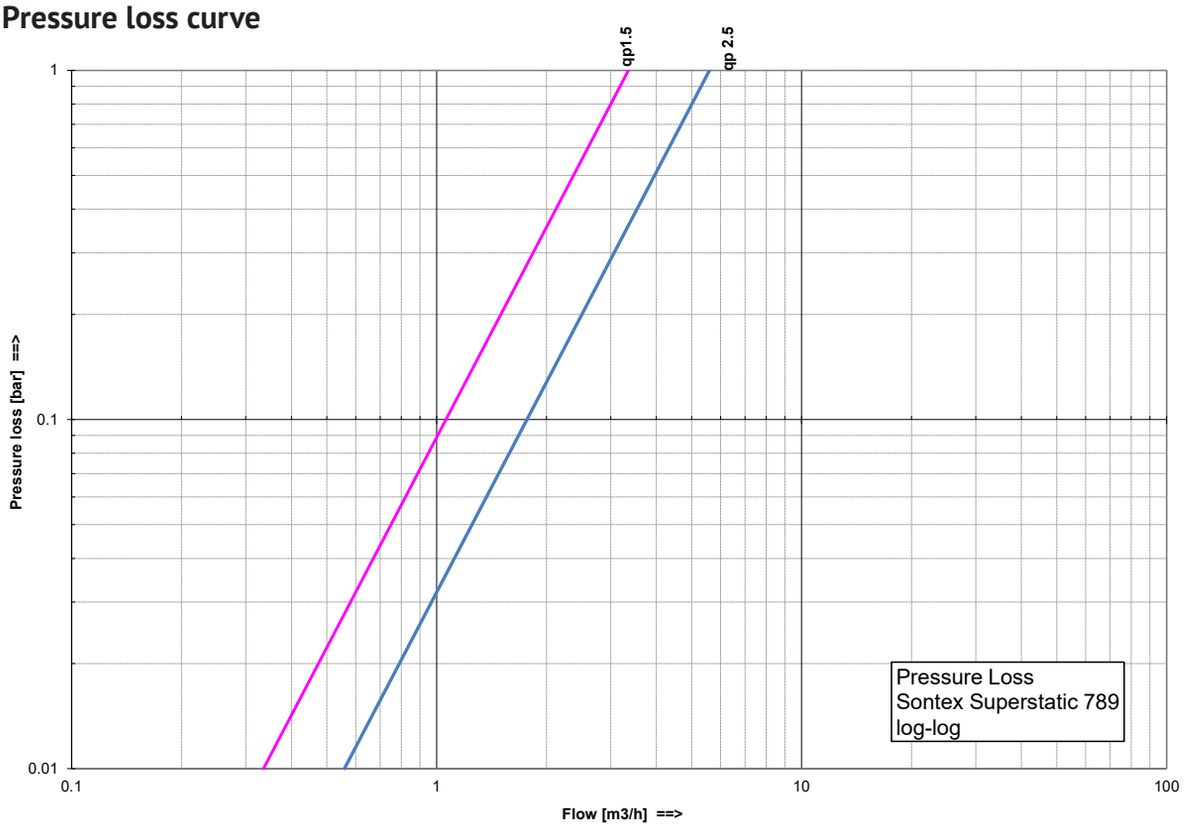
Qn	Threaded connection		Mounting length	Mat	PN	Maximal flow qs	Minimal flow qi	Low flow threshold value (50°C)	Threaded hole for sensor	Total Meter Weight	Kvs value (20°C)	Pressure loss at qp
m^3/h	G''	DN	mm		bar	m^3/h	l/h	l/h		Kg	m^3/h	bar
	(EN ISO 228-1)											
1.5	3/4''	(15)	110	Comp	16	3.0	15	10	yes	0.72	3.4	0.20
1.5	1''	(20)	130	Comp	16	3.0	15	10	yes	0.74	3.4	0.20
2.5	1''	(20)	130	Comp	16	5.0	25	17	yes	0.75	5.6	0.20

Comp = High-tech composite 16 bar = 1.6 MPa

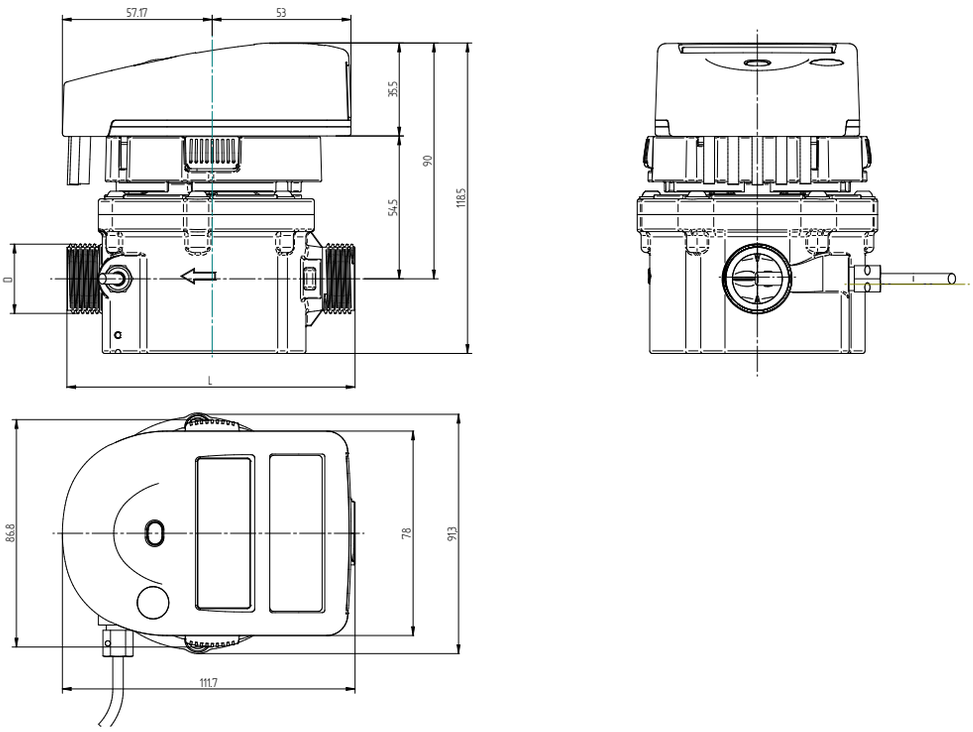
Mounting
The Superstatic 789 should not be mounted on the side where the continuous operating temperature of the liquid exceeds 90°C or is below 5°C.

Length of straight section fitted upstream/downstream of each flow meter (EN1434):
U3 / D0 for: L = 110mm
U0 / D0 for: L = 130 mm

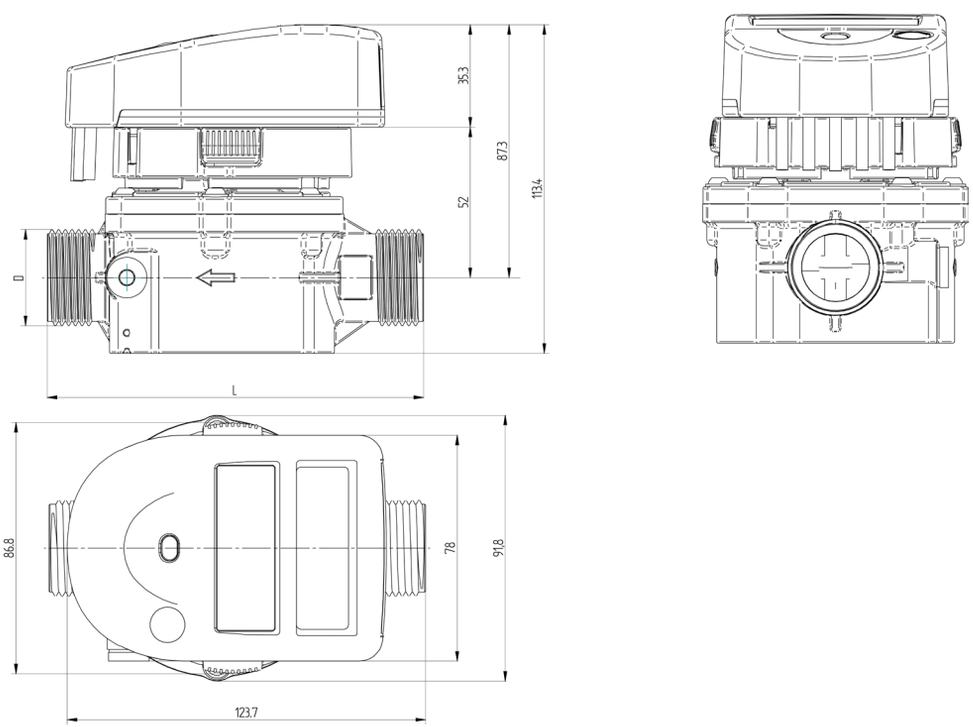
Pressure loss curve



Dimension qp1.5 m³/h L= 110 / 130 mm



Dimension qp2.5 m³/h L = 130 mm



	qp 1.5 m³/h	qp 1.5 m³/h	qp 2.5 m³/h
Lenght (mm)	110	130	130
Calculator (mm)	110.2 x 86.8	110.2 x 86.8	110.2 x 86.8
Total height (mm)	118.5	118.5	113.4
Height from the axe to the tube (mm)	90.0	90.0	87.3
Height without calculator (mm)	54.5	54.5	52.0

CE Conformity

according to Directive MID 2014/32/EU
according to RED 2014/53/EU

UKCA Conformity

Technical Support

For technical support, please contact your local Sontex agent or Sontex SA directly.

Sontex Hotline

support@sontex.ch, +41 32 488 30 04

Specifications are subject to change without notice.

Sontex
your link to innovative metering

Sontex SA
Rue de la Gare 27
CH-2605 Sonceboz

Tel. +41 32 488 30 00
sontex@sontex.ch

www.sontex.ch