Sontex . Thermal Energy . Flow Metering .

Superstatic 470 SPF Superstatic 479 SPF

Superstatic 470/479 SPF

Fluidic oscillation meter Superstatic to measure the efficiency of heat pumps

Application

The **Superstatic 470/479 SPF** is an autonomous compact thermal energy meter that enables the measuring of the **Seasonal Performance Factor** (**SPF**) and the efficiency of a heat pump.
The performance factor is equivalent to the ratio between the delivered heat energy and the electrical energy absorbed by each electricity meter of the heat pump during a given period of time.
The energy meter Superstatic 470/479 SPF consists of a static fluidic oscillation flow sensor, an integrator and a pair of temperature sensors.
It's used in local heating/cooling systems using a heat pump to record the consumption for the billing of the thermal energy consumption costs and to measure the efficiency of the heat pump.
The thermal energy meter **Superstatic 749** meets the requirements of the European directive 2004/22/EC (MID) and the standard EN 1434 class 2.

Main features

The heat meters **Superstatic 470/479 SPF** are optimized for the measurement and calculation of heat / cooling energy consumption in local heating systems using heat pumps.

- Interchangeable measuring head
- Complete range of pipes 1.0 – 60 m^3/h
- Corrosion resistant materials
- No moving parts, therefore no wear
- Not sensitive to dirt
- Measurement stability
- Direct pick-up of voltage pulses without reflectors
- Long-term, stable, accurate and reliable measurement
- Non-volatile EEPROM memory
- 4 configurable digital inputs
- Communication interface: optical and M-Bus (according to Standard EN1434)
- Self-monitoring

Three different performance factors can be measured and displayed using the **Superstatic 470/479 SPF.**

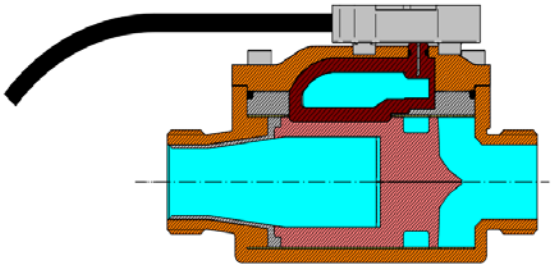
- ***SPF1***, this factor can be equated with a seasonal performance factor (COPA). The value of the previous period is stored and can be displayed.
- ***SPF2***, this factor shows the performance factor of the heat pump since its initial commissioning.
- ***SPF3***, this factor shows the performance factor of the heat pump in an event period of one day.
- 31 monthly values stored for thermal energy emitted, electrical energy absorbed and performance factor SPF3.

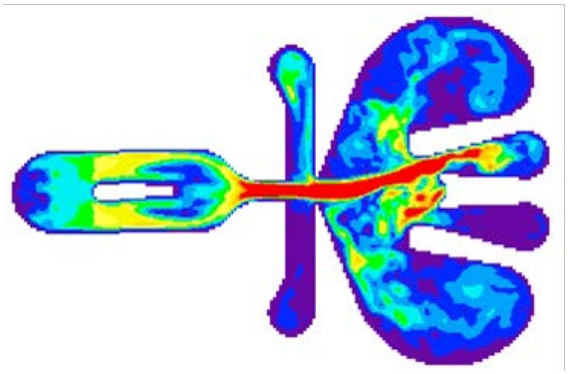
Functions

- Recording of heating energy or combined heating/cooling energy by means of measuring the flow and the temperature difference.
- Recording of electrical energy absorbed during a given period of time.
- Possibility to connect two additional pulse inputs
- Displaying the efficiency of the heat pump with Seasonal Performance Factor SPF1, SPF2 and SPF3.
- Displaying consumption data :
  - Displaying 31 monthly values of emitted thermal energy
  - Displaying 31 monthly value of absorbed electrical energy during a given period of time.
  - Displaying 31 last daily values of the performance factor SPF3.

Fluidic oscillator flow sensor: The principle

Picture 1: The main part of the flow passes through a Venturi nozzle in the pipe, creating the differential pressure to bypass the other part of the flow through the fluidic oscillator.
In the oscillator the liquid is led to a nozzle and accelerated to a jet. Opposite of the nozzle the jet is redirected to the left or right into a channel that leads upwards to the sensor head equipped with a piezo sensor. The pressure on the sensor creates an electrical pulse. The liquid flows back to the pipe through a return loop and redirects the jet into the other channel where the action is repeated and fluidic oscillation is created. The frequency of this oscillation is linear proportional to the volume flow. A supplementary benefit is the self-cleaning effect due to the oscillating character.
Picture 2: The animated top view on the oscillator shows the differences of velocity of the liquid. The jet accelerated by the nozzle with the highest velocity in red, slow velocity 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 with the flow sensor and converted into flow.





Flow direction

Picture 1 : Section through the flow sensor

Picture 2 : Fluidic oscillation with jet (RED)

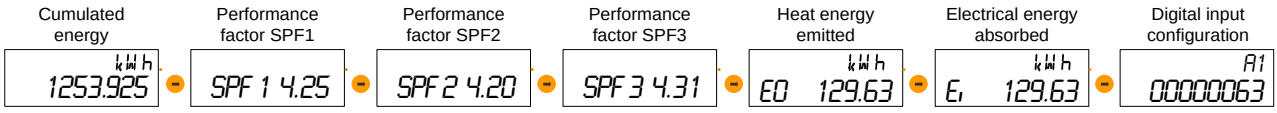
Temperature sensor pair

The temperature sensors and the integrator in combination with the Superstatic flow sensor are available as Pt 500 or Pt100 version. The temperature sensors are paired. They are always supplied in pairs and must not be separated, extended or shortened.

Integrator

The integrator, as part of the heat meter **Superstatic 470/479 SPF**, is suitable for connecting Pt 500 or Pt 100 temperature sensor pairs with 2 or 4- wire techniques. The additional pulse inputs allow the connection of hot water, cold water, gas, oil and electricity meters. The consumption values can easily be read on the LCD display, via the optical interface or M-Bus.

Display sequence



Measurement technology

The integrator with mains power supply records every 3 seconds the supply and return temperature. The recording of the flow is dependent on the pulse values of the flow sensor and is constantly updated. With the average flow rate, the temperature difference and the heat coefficient the energy of the captured medium is calculated and displayed on the 8-digit LCD display.

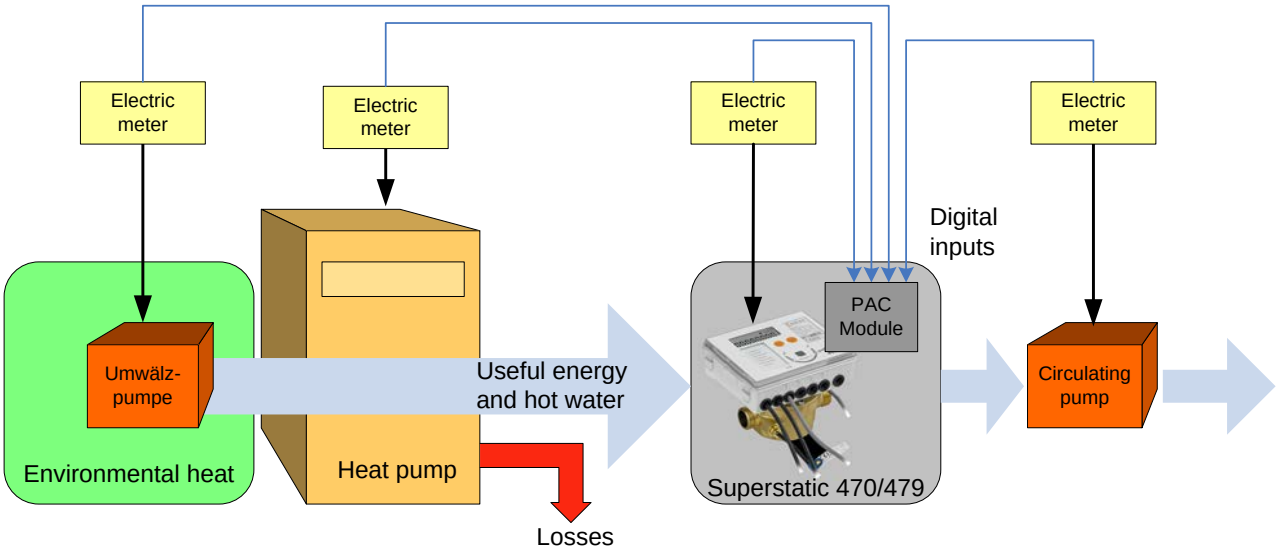
Power supply

The flexible power supply concept of the integrator allows the following combinations:

- 230 VAC 50/60 Hz
- 24 VAC 50/60 Hz
- 12...24 VDC

Configuration of the four digital inputs

Each current meter of the heat pump can be connected to the heat pump module to determine the electrical energy absorbed by the whole facility.



The Superstatic 470/479 can be configured with the Prog470/Prog479 software. By means of this software, the four digital inputs can be configured and parameterized depending on the desired SPF type:

- Binary counting: pulse counting.
- Time counting: counting the operating time.
- Amount counting: time factor for each digital input.
- Disable: counting disabled.

Solar- and cooling installations

The integrator units, calibrated for water ensure also with glycol mixtures a precise measurement, as the average mixing ratio can be customized over the optical interface.
The Superstatic 470/479 SPF processes and computes also negative temperatures.
The dust proof and splash water-protected housings, IP65, are especially suitable for cooling installations. For these customized mixing ratios no official approvals are possible.
The integrator Superstatic 470/479 SPF has programmed more than 60 different cooling medium and additional countless coolant-water mixtures can also be defined by software.

Cooling energy

The cooling energy is cumulated if the two following conditions are fulfilled at the same time:

- (Δt) temperature difference > -0.2K,
- supply temperature < 18°C

The threshold value of the temperature is set at the factory at 18°C. It can be changed via the optical interface. The cooling energy has the same physical unit as the heat energy. If the integrator unit is used for the combined heating and cooling measurement, then cooling energy, cooling power and the temperature difference with a minus (-) displayed and the appropriate values are assigned to the tariff 1.

Pulse inputs

As an option the **Superstatic 470/479 SPF** offers the possibility to integrate up to two additional pulse inputs such as a hot and cold water meters.

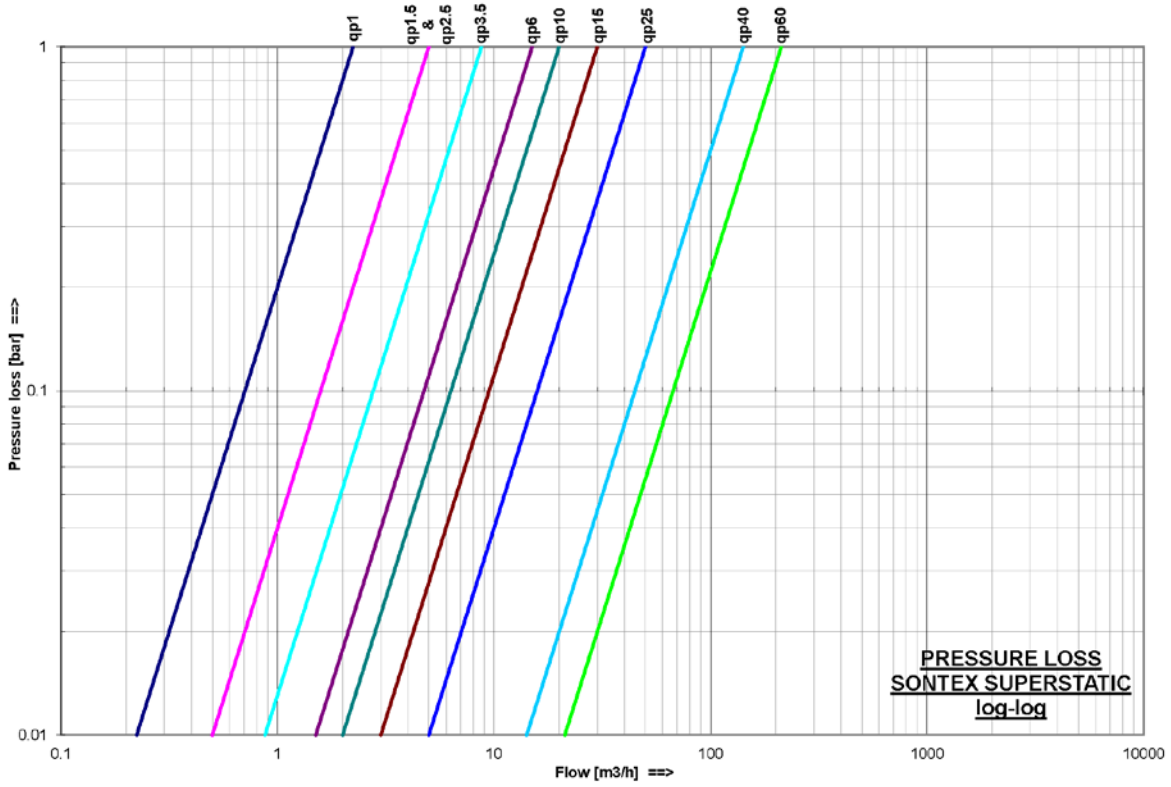
For detailed information on the integrator 470/479 SPF, please refer to the data sheet Data Sheet Supercal 531 EN of the related integrator Supercal 531, Data Sheet Superstatic 440 EN of the related Superstatic 440 and also Data Sheet Superstatic 449 EN of the related integrator Superstatic 449.

Technical Data Flow Sensor Superstatic 470 SPF

qp	Threaded connection	Flanged connection	Length	Mat.	PN	Maximal flow qs	Minimal flow qi	Low flow threshold value (50°C)	Threaded hole for sensor	Weight.	Kvs value (at 20°C)	Pressure loss at qp
m^3/h	G"	DN	mm		PN	m^3/h	l/h	l/h		kg	m^3/h	bar
	(EN ISO 228-1)	(ISO 7005-3)										
1	3/4"	*(15)*	110	Brass	16/25	2	10	4	Yes	1.8	2.09	0.20
1	1"	*(20)*	190	Brass	16/25	2	10	4	Yes	2.3	2.09	0.20
1.5	3/4"	*(15)*	110	Brass	16/25	3	15	10	Yes	1.8	2.06	0.25
1.5	1"	*(20)*	190	Brass	16/25	3	15	10	Yes	2.3	5.44	0.09
2.5	1"	*(20)*	190	Brass	16/25	5	25	10	Yes	2.3	5.21	0.25
3.5	1 1/4"	*(25)*	260	Brass	16/25	7	35	15	Yes	1.96	7.46	0.16
3.5		25	260	Brass	16/25	7	35	15		1.96	7.46	0.16
6	1 1/4"	*(25)*	260	Brass	16/25	12	60	30	Yes	1.96	13.4	0.16
6		25	260	Brass	16/25	12	60	30		2.9	13.4	0.16
10	2"	*(40)*	300	Brass	16/25	20	100	50	Yes	6.1	20.9	0.25
10		40	300	Brass	16/25	20	100	50		7	20.9	0.25
		(ISO 7005-1)										
15		50	270	CI	16/25	30	150	75		12.2	31.6	0.25
25		65	300	CI	16/25	50	250	125		12.8	51.8	0.25
40		80	300	CI	16/25	80	800	400		12.2	142	0.09
60		100	360	CI	16/25	120	1200	600		14.6	210	0.10

CI: Spheroidal cast iron

Pressure loss curve



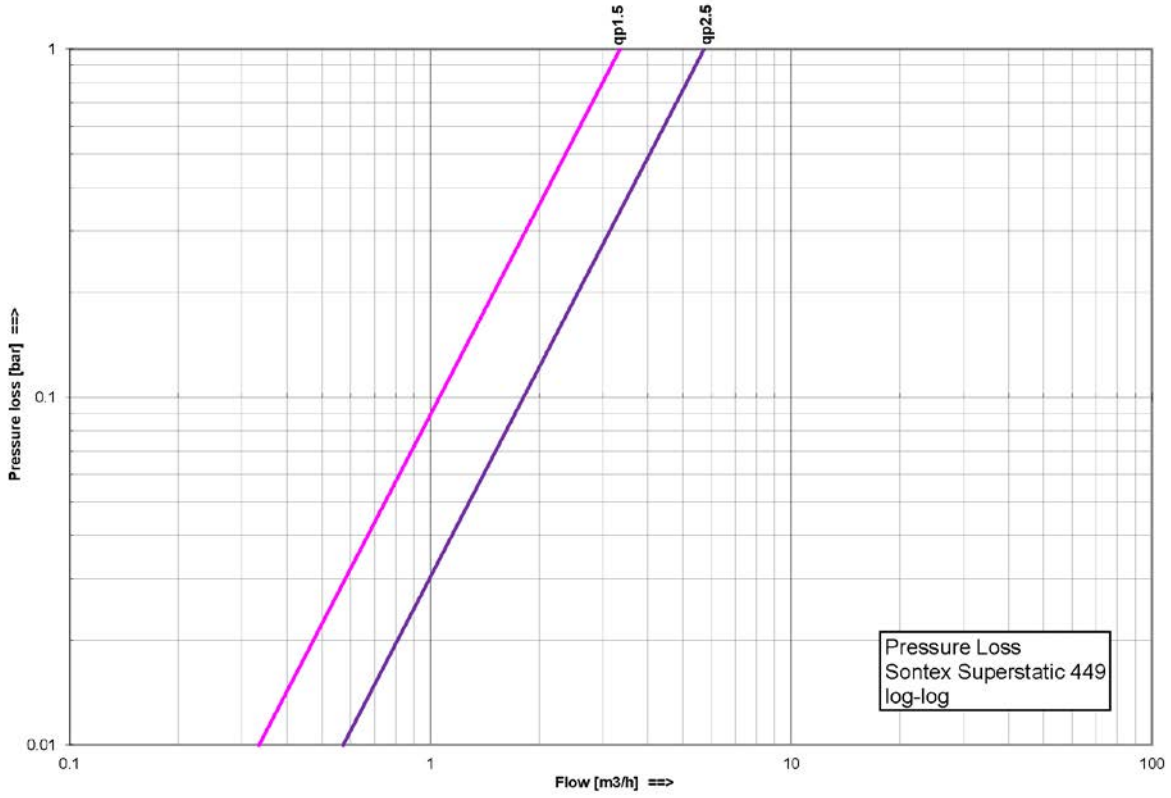
Technical Data Flow Sensor Superstatic 479 SPF

qp	Thread connection		Length	Mat.	PN	Maximum flow qs	Minimum flow qi	Low flow threshold value (50°C)	Threaded hole for sensor	Weight	Kvs value (20°C)	Pressure loss at qp
m^3/h	G"	DN	mm		PN	m^3/h	l/h	l/h		kg	m^3/h	bar
	(EN ISO 228-1)											
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

Installation

Permanent temperature	90°C
Straight pipe section in front of the flow sensor for installation lengths 110 mm (acc. EN 1434).	3D
Straight pipe section in front of the flow sensor for installation length 130 mm and 190 mm (acc. EN 1434)	0D
Connection between flow sensor and integrator	0.8 m; fix

Pressure loss curve



TECHNICAL DATA SUPERSTATIC 470/479 SPF

The integrator

Temperature sensors

Pt 100 or Pt 500	
2- and 4-wire technology	
Absolute temperature range	-20...200°C
Admissible range	2...200°C
Absolute temperature difference	1...150K
Admissible range	3...150K
Response limit	0.2 K
Temperature resolution t (display)	0.1 K
Temperature resolution Δt	0.01 K
Measuring precision: precision better than EN1434-1 Class 2 request	

Environment class

Mechanics	M1
Electronics	E1

Measuring cycles of temperature measurement

3 seconds with mains supply

Ambient temperatures

Operating	5...55°C
Storage and transport	-20...70°C

Display

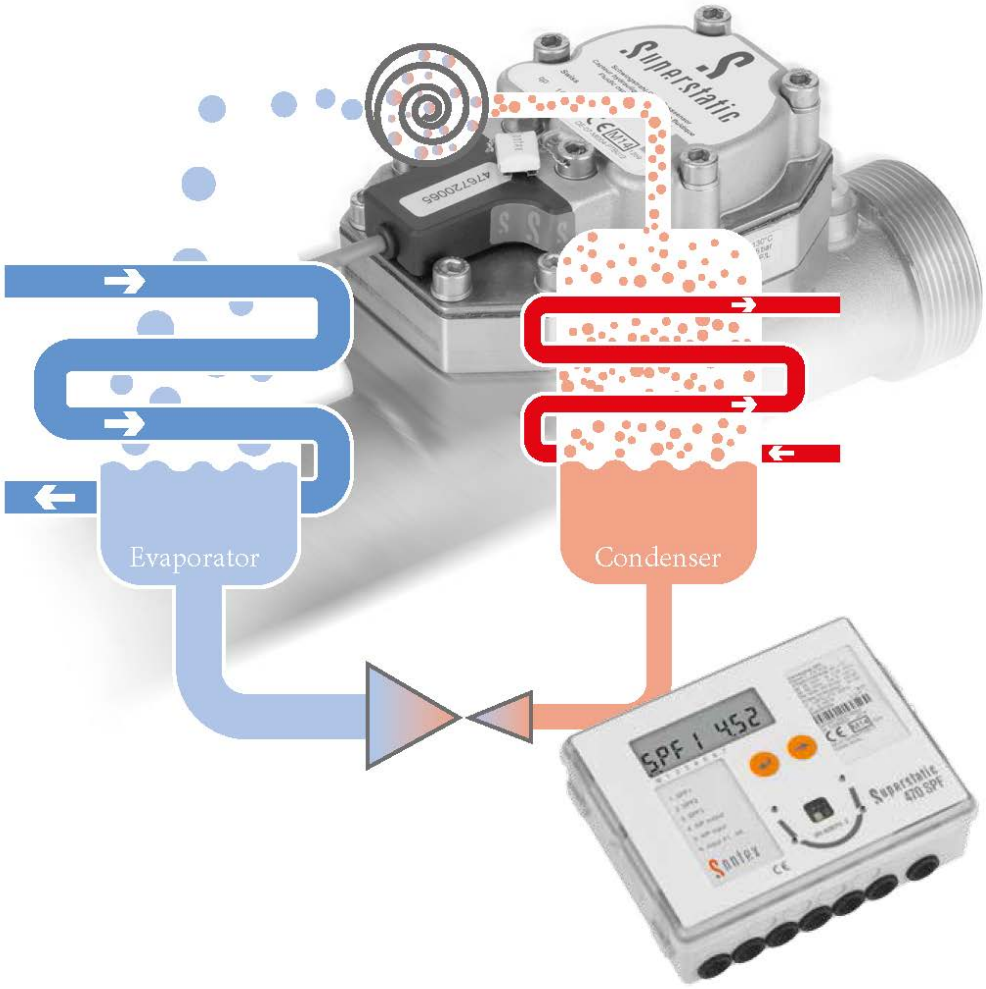
8-digit LCD display

Power supply

Modular optional	
Mains	230 V AC – 50/60 Hz
Mains	24 V AC 50/60 Hz or 12..24 V DC

Housing protection

Standard	IP 65



Technical Support
For technical support, please contact the local Sontex representations or Sontex SA directly.

Sontex hotline:
sontex@sontex.ch, +41 32 488 30 04

CE-Conformity according to:
MID Directive (2004/22/EG)
R &TTE Richtlinie 1999/5/EG

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

Modifications subject to change without notice Data Sheet Superstatic 470 SPF EN 05-06-2015