

## Superstatic 440

### Static Heat Meter, Static Cooling Meter



#### Application

The Superstatic 440 is a static heat or cooling meter according to standard EN1434 class 2 based on the fluid oscillation principle, covering a wide range of flows for all applications in district heating and cooling or building automation. The fluid oscillation principle guarantees a high stability and repeatability for a reliable and precise measurement of flow and thermal energy.

#### Design

The heating and cooling meter Superstatic 440 meter consists of the fluid oscillator flow sensor, the integrator Supercal 531, battery or mains powered, and a pair of temperature sensors Sontex 460. Consumption values can easily be read over the display or various data interfaces like optical probe, bidirectional radio SONTEx, M-Bus, LON, BACnet, Modbus, GSM and so on.

#### Temperature sensor pair

The temperature sensors and the integrator Supercal 531 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. In the case of temperature sensor pairs with a cable longer than 3 m, we recommend the exclusive use of screened temperature sensor pairs.

#### Measurement technique

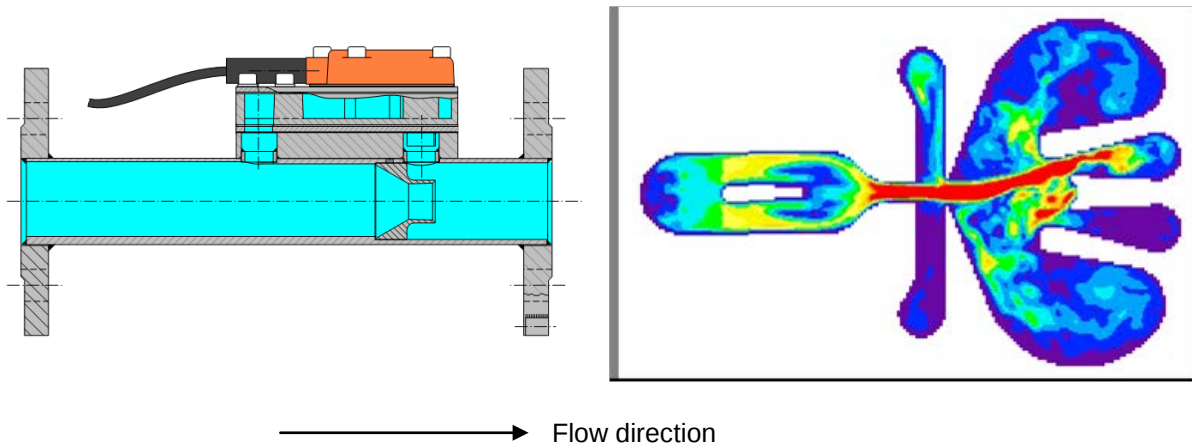
The integrator Supercal 531 with mains power supply records every 3 seconds the supply and the return temperature, with battery power every 30 seconds (D-type battery). The recording of the flow is dependent of the pulse value of the flow sensor and is constantly updated. With the mean flow rate, the temperature difference and the heat coefficient the energy is calculated of the captured medium and displayed on the 8-digit LCD display.

### Fluid 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 fluid 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 of the liquid 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 fluid 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.



Picture 1: Section through the flow sensor

Picture 2: fluidic oscillation with jet (RED)

### Main features

The heat meters Superstatic 440 are optimized for the measurement and calculation of energy consumption in district heating systems. They are also extremely well suited to use purely as volumetric flow meters for various media.

- Interchangeable measuring head
- Complete range of pipes 1 – 1500 m<sup>3</sup>/h
- Purchase and maintenance costs are reasonable compared with other static flow sensors
- Corrosion resistant materials
- Protection degree of flow sensor IP68
- Threaded and flange fittings
- No straight section necessary up to DN40
- No moving parts, therefore no wear
- Not sensitive to dirt
- Stable
- For horizontal, upstream and downstream pipes, independent mounting position
- Common spare parts 1qp 1 – 1500 m<sup>3</sup>/h
- Dynamic range:
  - 1 : 100 at qp 1 – 25 m<sup>3</sup>/h
  - 1 : 50 at qp 40 – 400 m<sup>3</sup>/h
  - 1 : 25 at qp 800 – 1500 m<sup>3</sup>/h
- Direct pick-up of voltage pulses without reflectors
- Measurement independent of medium
- Long-term, stable, accurate and reliable measurement, even with poor water quality

## Integrator

The Supercal 531 integrator is suitable for connecting Pt 500 or Pt 100 temperature sensor pairs with 2 or 4-conducting wire techniques. Volume inputs can be combined with mechanical, magnetic-inductive, ultrasonic or fluidic oscillators flow sensors with a maximum nominal flow rate of 10'000 m<sup>3</sup>/h. The factor of the pulse value is defined in the flow meter unit. The volume input value is defined when the unit is produced. The additional pulse inputs allow the connection of hot water, cold water, gas, oil and electricity meters. Consumption values can easily be read on the LCD display, via the optical interface, RS-232, M-bus, bidirectional radio SONTEx, M-Bus, LON, BACnet, Modbus or modem.

## Power supply module

The flexible power supply concept of the Supercal 531 allows the following combinations

- 10 + 1 year battery, D type
- 220...240V alternating voltage 50/60 Hz
- 110...240V alternating voltage 50/60 Hz
- 12...24V alternating voltage 50/60 Hz
- 12...24V DC voltage

## Communication module

All versions can be ordered with two optional galvanically separated communication modules or the two communication modules can also be equipped later on when the integrator is in operation and this without compromising verification:

- Optical (default)
- RS 232
- Combined : 1 x RS-232, 3 x relay output, 4 x analogue output
- RS 232 with two additional relay outputs
- Relay module
- M-Bus module (factory assembly or post-assembly)
- M-Bus module two additional relay outputs
- Analogue module 2 outputs 4-20 mA
- Analogue module 2 inputs 0-20 mA or 4-20mA or 0-10V
- Bidirectional radio SONTEx module, 433 MHz (factory assembly)
- GSM
- LON module
- BACnet module
- Modbus module

## Data storage

The Supercal 531 has in case of power failure two non-volatile EEPROMs for extensive data safety storage. In both EEPROMs the data are updated every hour. The first non-volatile memory is located inside on the printed circuit board of the relevant calibration and measurement part of the integrator and stores the following data:

- Parameters of the integrator and configuration parameter
- Cumulated energy
- Cumulated volume
- Customer specific tariff
- 15 monthly values
- 32 maximum values
- 32 average values
- Two set day
- Cumulated energy or volume on the set day
- Operating hours
- Date and time
- MET serial number (integrator upper part, calibration and measurement part)
- pulse value of the flow meter

The second non-volatile EEPROM is located on the printed circuit board in the integrator base part and stores the following parameters:

- MIO serial number (integrator base part, printed circuit board)
- identification number and customer number
- pulse value of additional meters 1 and 2
- cumulated values of additional meters 1 and 2
- unit of additional meters 1 and 2
- M-Bus or radio address (primary and secondary)
- radio address
- baud rate (M-Bus)
- pulse value of the pulse output
- parameter setting of the analogue outputs
- alarm and threshold value

This EEPROM ensures a smooth exchange of the calibration and measurement relevant part, without a new entering of the configuration of the communication.

### **Supply and return temperature**

The Temperatures are displayed with one decimal. Temperatures under 0°C are shown with a – (minus) sign. The display range is –20...200°C. The temperature indication, can upon request, also be displayed in °F.

### **Set day values**

The Supercal 531 has two set days. On set day the cumulated energy, volume, tariff values and additional pulse inputs are stored with date.

### **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 Supercal 531 processes and computes also negative temperatures. The dust proof and splash water-protected housings, IP65, is especially suitable for cooling installations. For these customized mixing ratios no official approvals are possible. The integrator Supercal 531 has programmed more than 70 different cooling medium and countless coolant-water mixtures can also be defined by software.

### **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:

- ( $\Delta t$ ) temperature difference  $> -0.2K$ ,
- as well as the supply temperature  $< 18^{\circ}C$

The threshold value of the temperature is set at the factory at 18°C. The threshold value can be changed in steps of 1°C 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 power and the temperature difference with a minus (-) displayed and the appropriate values are assigned to the tariff 1.

**For detailed information on the integrator Supercal 531, please refer to the manual:  
Data Sheet Supercal 531 EN.**

## TECHNICAL DATA SUPERSTATIC 440

### Dimensions fluid oscillator flow sensor

### Dimensions brass pipes (DN 15 – DN 40)

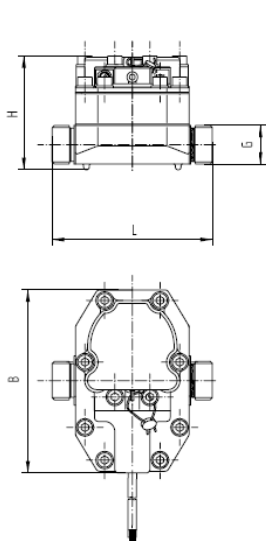


Fig1

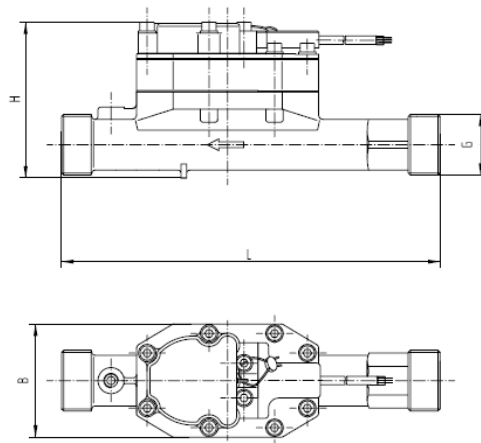


Fig2

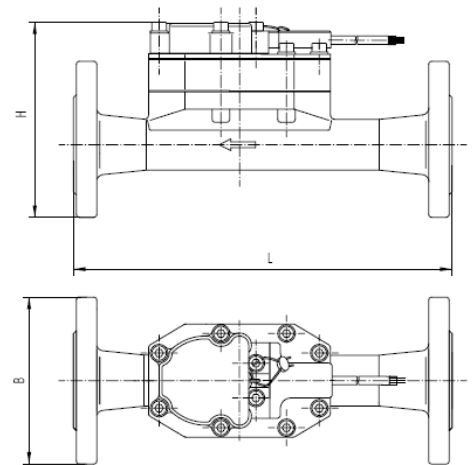


Fig3

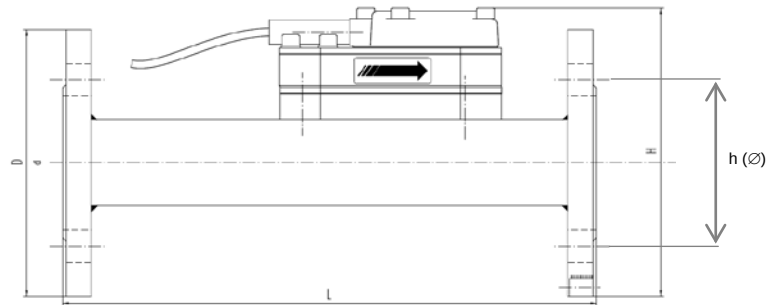
| qp                    | DN  | G    | PN      | Fig.No | B (mm) | H (mm) | L(mm) | h (Ø mm) | # bolts (M) |
|-----------------------|-----|------|---------|--------|--------|--------|-------|----------|-------------|
| 1 m <sup>3</sup> /h   | --- | ¾"   | 16 / 25 | 1      | 125    | 79     | 110   |          | -           |
| 1 m <sup>3</sup> /h   | --- | 1"   | 16 / 25 |        | 125    | 79     | 190   |          | -           |
| 1.5 m <sup>3</sup> /h | --- | ¾"   | 16 / 25 |        | 125    | 79     | 110   |          | -           |
| 1.5 m <sup>3</sup> /h | --- | 1"   | 16 / 25 |        | 125    | 79     | 190   |          | -           |
| 2.5 m <sup>3</sup> /h | --- | 1"   | 16 / 25 |        | 125    | 79     | 190   |          | -           |
| 3.5 m <sup>3</sup> /h | --- | 1 ¼" | 16 / 25 | 2      | 78     | 105    | 260   |          | -           |
| 3.5 m <sup>3</sup> /h | 25  | ---  | 16 / 25 | 3      | 115    | 134    | 260   | Ø 85     | 4 (M 12)    |
| 6 m <sup>3</sup> /h   | --- | 1 ¼" | 16 / 25 | 2      | 78     | 105    | 260   |          | -           |
| 6 m <sup>3</sup> /h   | 25  | ---  | 16 / 25 | 3      | 115    | 134    | 260   | Ø 85     | 4 (M 12)    |
| 10 m <sup>3</sup> /h  | --- | 2"   | 16 / 25 | 2      | 78     | 122    | 300   |          | -           |
| 10 m <sup>3</sup> /h  | 40  | ---  | 16 / 25 | 3      | 150    | 157    | 300   | Ø 110    | 4 (M 16)    |

**Dimensions:**

**Stainless steel pipes (DN 50 – DN 250)**

**Spheroidal cast iron pipes (DN 50 – DN 150)**

**Steel pipes (DN 350 – 500)**



| qp                     | DN  | PN     | L (mm) | D (mm) | H (mm) | h (Ø mm) | # bolts (M) |
|------------------------|-----|--------|--------|--------|--------|----------|-------------|
| 15 m <sup>3</sup> /h   | 50  | 16, 25 | 270    | 165    | 171    | Ø 125    | 4 (M 16)    |
| 25 m <sup>3</sup> /h   | 65  | 16, 25 | 300    | 185    | 189    | Ø 145    | 8 (M 16)    |
| 40 m <sup>3</sup> /h   | 80  | 16, 25 | 225    | 200    | 203    | Ø 160    | 8 (M 16)    |
| 40 m <sup>3</sup> /h   | 80  | 16, 25 | 300    | 200    | 203    | Ø 160    | 8 (M 16)    |
| 60 m <sup>3</sup> /h   | 100 | 16     | 250    | 220    | 226    | Ø 180    | 8 (M 16)    |
| 60 m <sup>3</sup> /h   | 100 | 25     | 250    | 235    | 235    | Ø 190    | 8 (M 20)    |
| 60 m <sup>3</sup> /h   | 100 | 16     | 360    | 220    | 226    | Ø 180    | 8 (M 16)    |
| 60 m <sup>3</sup> /h   | 100 | 25     | 360    | 235    | 235    | Ø 190    | 8 (M 20)    |
| 100 m <sup>3</sup> /h  | 125 | 16     | 250    | 250    | 254    | Ø 210    | 8 (M 16)    |
| 100 m <sup>3</sup> /h  | 125 | 25     | 250    | 270    | 270    | Ø 220    | 8 (M 24)    |
| 150 m <sup>3</sup> /h  | 150 | 16     | 300    | 285    | 286    | Ø 240    | 8 (M 20)    |
| 150 m <sup>3</sup> /h  | 150 | 25     | 300    | 300    | 300    | Ø 250    | 8 (M 24)    |
| 150 m <sup>3</sup> /h  | 150 | 16     | 500    | 285    | 286    | Ø 240    | 8 (M 20)    |
| 150 m <sup>3</sup> /h  | 150 | 25     | 500    | 300    | 300    | Ø 250    | 8 (M 24)    |
| 250 m <sup>3</sup> /h  | 200 | 16     | 350    | 340    | 340    | Ø 295    | 12 (M 20)   |
| 250 m <sup>3</sup> /h  | 200 | 25     | 350    | 360    | 360    | Ø 310    | 12 (M 24)   |
| 400 m <sup>3</sup> /h  | 250 | 16     | 450    | 405    | 405    | Ø 355    | 12 (M 24)   |
| 400 m <sup>3</sup> /h  | 250 | 25     | 450    | 425    | 425    | Ø 370    | 12 (M 27)   |
| 800 m <sup>3</sup> /h  | 350 | 10     | 500    | 505    | 505    | Ø 460    | 16 (M 20)   |
| 800 m <sup>3</sup> /h  | 350 | 16     | 500    | 520    | 520    | Ø 470    | 16 (M 24)   |
| 1500 m <sup>3</sup> /h | 500 | 10     | 500    | 670    | 670    | Ø 620    | 20 (M 24)   |
| 1500 m <sup>3</sup> /h | 500 | 16     | 500    | 715    | 715    | Ø 650    | 20 (M 30)   |

**Flanges according to standard DIN-EN 1092-1 / DIN 2501 / ISO 7005-1**

### Technical Data Flow Sensor Superstatic 440

| 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 <sup>3</sup> /h | G"                     | DN                   | mm     |       | PN     | m <sup>3</sup> /h | l/h             | l/h                             |                          | kg      | m <sup>3</sup> /h   | bar                 |
| 1                 | (EN ISO 228-1)<br>3/4" | (ISO 7005-3)<br>(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    | SS/CI | 16/25  | 30                | 150             | 75                              |                          | 12.2    | 31.6                | 0.25                |
| 25                |                        | 65                   | 300    | SS/CI | 16/25  | 50                | 250             | 125                             |                          | 12.8    | 51.8                | 0.25                |
| 40                |                        | 80                   | 225    | SS    | 16/25  | 80                | 800             | 400                             |                          | 11.5    | 142                 | 0.09                |
| 40                |                        | 80                   | 300    | SS/CI | 16/25  | 80                | 800             | 400                             |                          | 12.2    | 142                 | 0.09                |
| 60                |                        | 100                  | 250    | SS    | 16/25  | 120               | 1200            | 600                             |                          | 14      | 210                 | 0.10                |
| 60                |                        | 100                  | 360    | SS/CI | 16/25* | 120               | 1200            | 600                             |                          | 14.6    | 210                 | 0.10                |
| 100               |                        | 125                  | 250    | SS/CI | 16/25* | 200               | 2000            | 1000                            |                          | 16      | 343                 | 0.10                |
| 150               |                        | 150                  | 300    | SS/CI | 16/25* | 300               | 3000            | 1500                            |                          | 26      | 514                 | 0.10                |
| 150               |                        | 150                  | 500    | SS    | 16/25  | 300               | 3000            | 1500                            |                          | 23      | 514                 | 0.10                |
| 250               |                        | 200                  | 350    | SS    | 16/25  | 500               | 5000            | 2500                            |                          | 30      | 857                 | 0.10                |
| 400               |                        | 250                  | 450    | SS    | 16/25  | 800               | 8000            | 4000                            |                          | 57      | 1372                | 0.10                |

SS: Stainless Steel; CI: Spheroidal cast iron

\*: PN 25 only SS

|      |  |     |     |       |       | m <sup>3</sup> /h | m <sup>3</sup> /h | m <sup>3</sup> /h |  |         |      |      |
|------|--|-----|-----|-------|-------|-------------------|-------------------|-------------------|--|---------|------|------|
| 800  |  | 350 | 500 | Steel | 10/16 | 1600              | 32                | 16                |  | 90/105  | 2667 | 0.10 |
| 1500 |  | 500 | 500 | Steel | 10/16 | 3000              | 60                | 30                |  | 130/195 | 5000 | 0.10 |

#### Degree of protection

Standard

IP68

#### Ambient Temperatures

Operation

5...55°C

Storing and transport

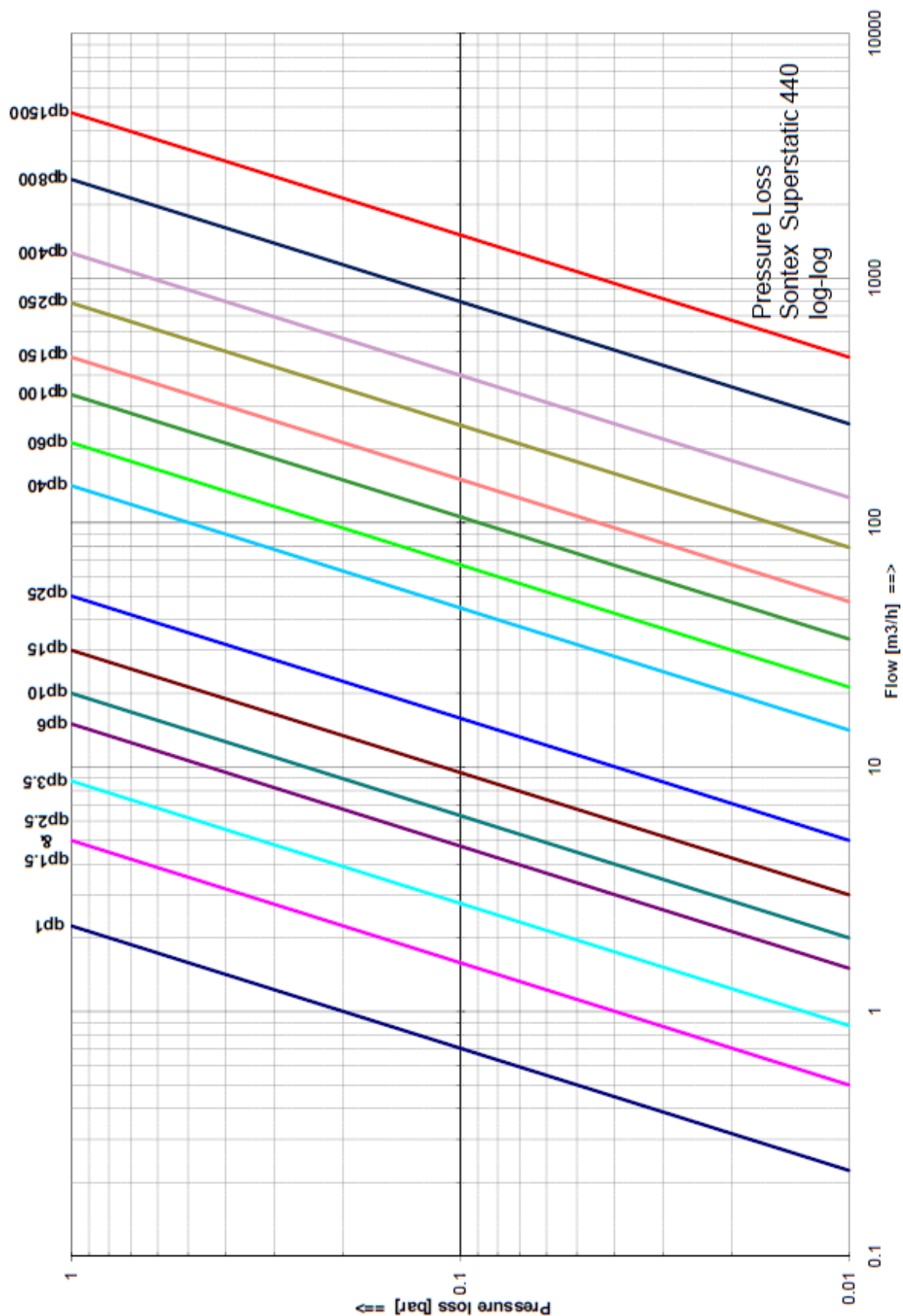
-25...70°C

#### Measurement

Approved temperature range

5...130°C

## Pressure Loss



## Integrator Supercal 531

### Temperature measurement

|                                             |                                        |
|---------------------------------------------|----------------------------------------|
| Pt100 or Pt500                              |                                        |
| 2- and 4-wire                               |                                        |
| Absolute temperature range                  | -20...200°C                            |
| Approved range                              | 2...200°C                              |
| Absolute temperature difference             | 1...150K                               |
| Homologation range                          | 3...150K                               |
| Response limit                              | 0.2 K                                  |
| Temperature resolution t (display)          | 0.1°C                                  |
| Temperature resolution $\Delta t$ (display) | 0.01 K                                 |
| Measuring                                   | precision better than EN1434-1 request |

### Measuring cycle Temperature measurement:

|                                           |
|-------------------------------------------|
| 30 seconds when battery operated (Type D) |
| 3 seconds when mains operated             |

### Ambient Temperature

|                       |            |
|-----------------------|------------|
| Operation             | 5...55°C   |
| Storing and transport | -25...70°C |

### Display

8 digits LCD-Display

### Display units

|                         |                         |
|-------------------------|-------------------------|
| Energy                  | kWh, MWh, GJ, MJ, BTU   |
| Volume                  | m <sup>3</sup> , Gallon |
| Additional pulse inputs | volume or energy        |
| Temperature             | °C, °F or K             |

### Voltage supply modular optional

|                |                                         |
|----------------|-----------------------------------------|
| Battery type D | 10 + 1 year                             |
| Mains          | 110...240VAC or 220...240VAC – 50/60 Hz |
| Mains          | 12...24VAC 50/60 Hz or 12...24VDC       |

### Degree of protection

|             |      |
|-------------|------|
| Flow sensor | IP68 |
| Integrator  | IP65 |



### Technical Support

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

### Hotline Sontex:

[sontex@sontex.ch](mailto:sontex@sontex.ch)

+41 32 488 30 04

### CE Conformity according to

Directive MID 2014/32/EU

RED 2014/53/EU

The detailed declaration of conformity can be found on our homepage: [www.sontex.ch](http://www.sontex.ch)

Modifications subject to change without notice

Data Sheet Superstatic 440 EN 31-05-2017

© Sontex SA 2007