

Ultraflux

ULTRASONIC MEASUREMENTS

DIGITAL PORTABLE FLOWMETER

DIGISONIC P™



Digital
Signal
Processing
for flow
measurements
by
time-of-flight
of ultrasounds

The DigiSonic P operates as the former ULTRAFLUX proven instruments on the well-established ultrasonic time-of-flight principles.

The DigiSonic P incorporates the highly sophisticated technologies - DSP (Digital Signal Processing), microprocessors and memory card readily replaceable, thereby offering enhanced computation and memory capabilities.

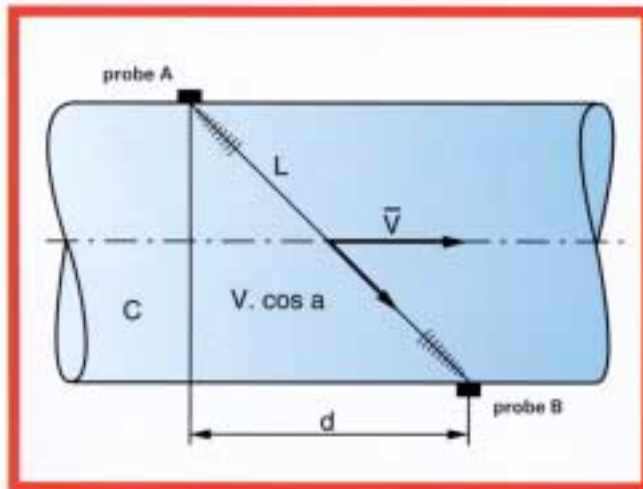
Using the innovative acoustic signal processing technique, the device accommodates to a wider range of measurements right from a null rate, achieving in fact a higher accuracy -with a time resolution of some 100 picoseconds-, programming and utilization remaining as handy.

Measurement data are displayed both in stripchart and datalog formats which moreover ensures easy dialogue and operation.

...These features and benefits combine to provide the user friendly and site dedicated instrument.

PRESENTATION

Measurement by time-of-flight of ultrasounds : a state-of-the-art technology



- L : length of acoustic path
- d : projected distance of L through acoustic path
- C : speed of sound in the fluid
- \vec{V} : fluid velocity
- ΔT : $T_{AB} - T_{BA}$

Fluid velocity measurement is made by ultrasounds. It is more particularly based on the measurement of transit-time difference of the ultrasonic pulse emitted by each probe of a same chord.

Given two probes A and B mounted according to the figure hereagainst. As they are alternately emitting and receiving, the propagation times in turn between upstream and downstream sides (T_{AB} and T_{BA}) allow to compute speed (\vec{V}) according to the following formula:

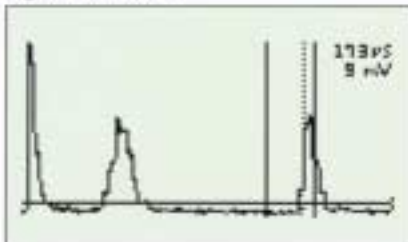
$$\vec{V} = \frac{L^2}{2d} \left(\frac{\Delta T}{T_{AB} \cdot T_{BA}} \right)$$

Thereof and as standard, the DigiSonic P is engineered to measure one or two speeds on a same pipe (single or dual-chord system); dual chord systems help withstanding hydraulic disturbances and therefore enhance accuracy mostly at very low speeds.

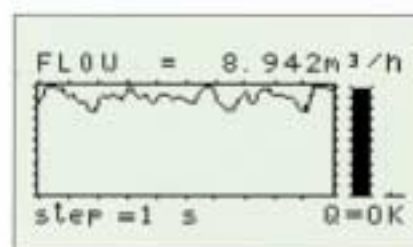
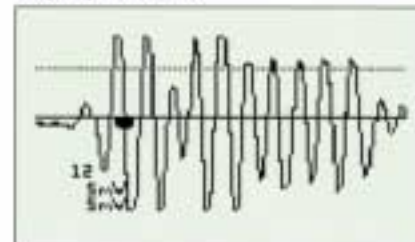
Using a single pair of probes on a diametral plane, the hydraulic coefficient K_H helps computing, from the measured speed, the average speed in the whole measurement section, and can here be automatically calculated by the instrument itself or scaled to a fixed value.

DIGITAL SIGNAL PROCESSING : A METHOD

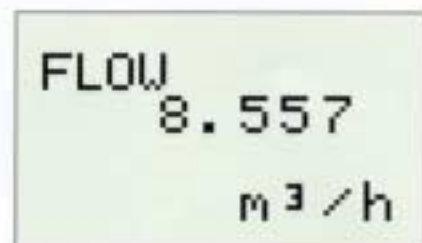
Signal analysis



Display of echo



Numerical & graphical display



TECHNICAL FEATURES

RESOURCES AND STORAGE OF INFORMATION

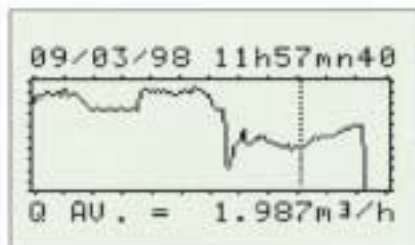
As standard, DigiSonic P includes a date, time data logger (1Mo) :

- 32640 lines of 4 variables

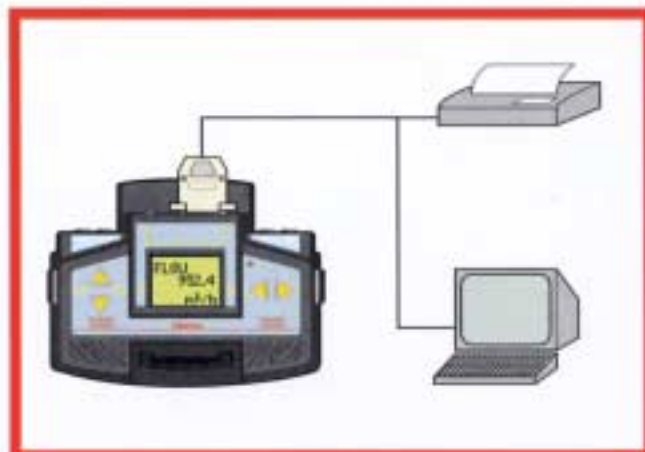
ou

- 16320 lines of 9 variables

17 password protected Site Setups can be stored in memory and called up at any time.

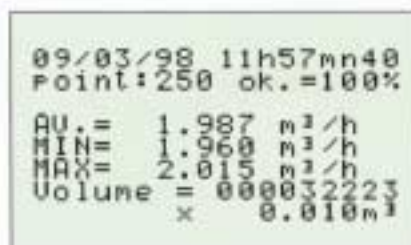


The information transferred via the RS 232 Bus can be later processed on a personal computer through the LSDP data retrieval software.



Through its RS232 serial data bus, communication can be extended to:

- a portable printer for print-out of instantaneous measurements, set data or of different screens.
- A personal computer or controller (JBus type protocole) to process or display the data logged up.



choise of units : m³/s, m³/h, m³/day, l/h.

AND OPTIONALLY :

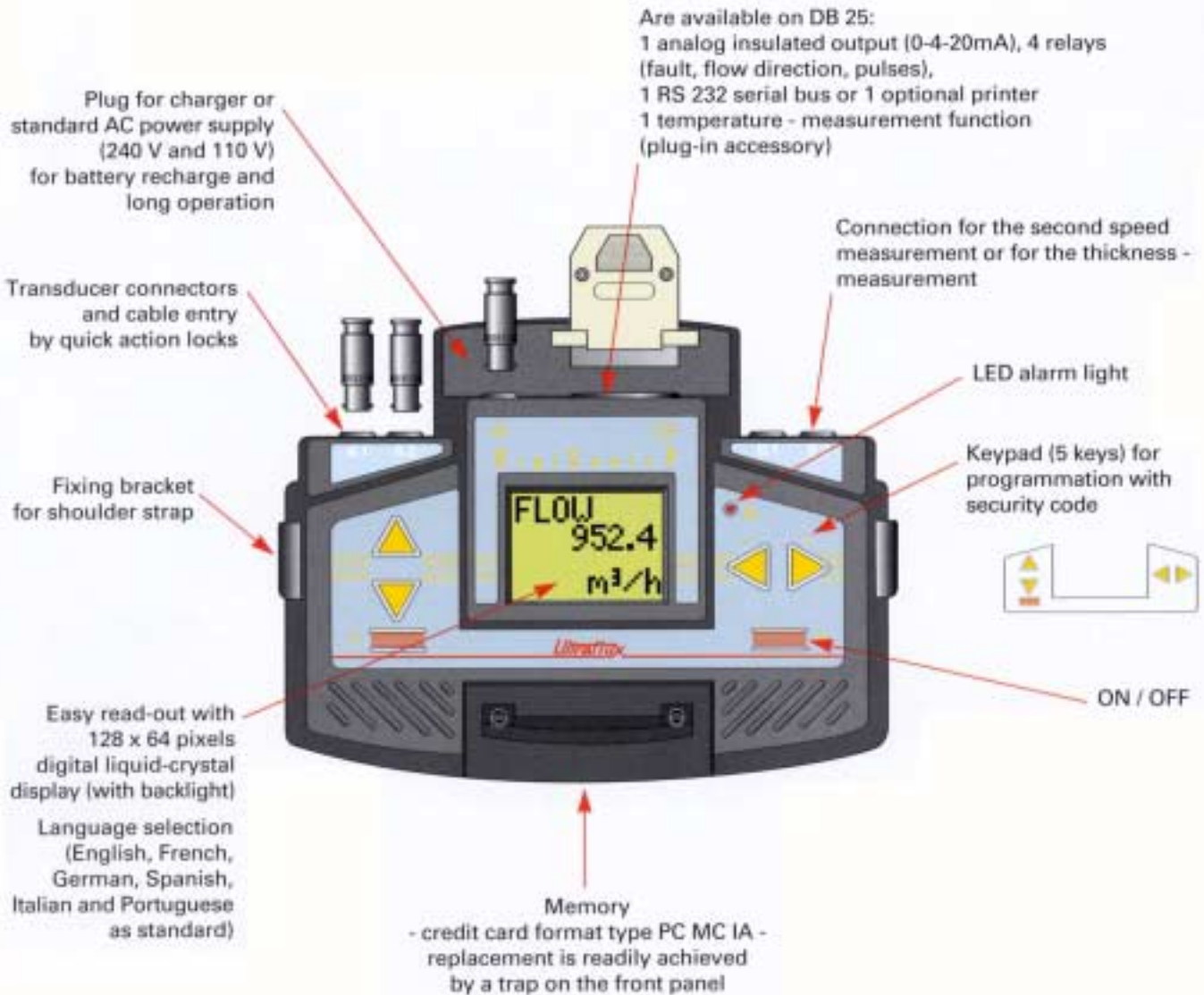
- Precise (numerical and graphical) integrated thickness - measurement gauge
- Temperature - measurement and energy counting function
- Portable thermal printer powered by the DigiSonic P
- Some connection cords (printer, personal computer...)
- External power supply
- LSDP data retrieval software (a window compatible communication software). It permits logger conversion into datafiles compatible with standard softwares such as excel.



TECHNICAL FEATURES

THE CONVERTER :

- The main unit is housed in an aluminium enclosure measuring only 246 x 188 x 70 mm and weighing 2.6 kg.
- A fitted case includes the lightweight device and associated charger; a second case holds the standard composition: transducers, cables (2 as standard), coupling compound and auxiliary equipment:



TRANSDUCERS AND CONNECTION

- Digisonic P can be used with the whole range of ULTRAFLEX transducers.

They are acoustically coupled to the pipe with suitable agent.

They are fixed to the pipe using a specific belt, strap or magnetic support, according to model.

- The device can also be used with wetted or insertion probes.



TECHNICAL FEATURES

A HANDY OPERATION :



- The smart styling of the main unit and of the keypad together with the software design makes it most convenient for field survey.
- For safety purposes, the instrument may be operated in its transportation case.
- For easy on-site checking and troubleshooting, faults are screen displayed with LED signal light.
- The device computes and displays the appropriate distance for locating the second clamp-on transducer; as echoes are displayed, mounting is easier.

CONDITIONS OF USE :

- Any liquid or organic slurry transparent to ultrasonic waves: water, chemical et petrochemical products, foodstuffs...
- Full circular pipes.
- Pipe size range from 8 to 5000 mm.
- Velocity ranging from a few mm/s to more than 10m/s.
- Maximum temperature of fluid: about 180°C (depends on probes)
- Most pipe materials (stainless steel, steel, copper, glass, PVC, cast iron...) irrespective of lining.

A PERFORMING DEVICE :

- Response time: real time measurement and display occurring at a rate of 3 measurements/second.
- Linearity : 0.1%
- Typical accuracy :
 - $V \geq 0.5 \text{ m/s} : \pm 1\% \text{ of reading}$
 - $V < 0.5 \text{ m/s} : \pm 0.5 \text{ cm/s}$in the case of a fully developed flow and if ID $\geq 200 \text{ mm}$
- Repeatability : 0.2%
- Autonomy of built-in Ni-Cd battery : 8 h.
- The charger may be used as external power source from the 220 V or 110 V mains.
The unit may also be powered by any DC source that provides voltage from 12 V to 50 V
- Time resolution : 0.1 ns
- Temperature ranges : -25°C to +50°C

Ultraflux

LE TECHNOPARC - 17, rue Charles Édouard Jeanneret - 78306 Poissy Cedex - FRANCE
Tél. : +33 1 39 79 26 40 - Fax. : +33 1 39 79 91 22