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Minisonic II Ex

Instruction manual

Faure Herman
ULTRAFLUX

Content

Minisonic II Ex

Introduction

Thank you for choosing the Minisonic: we hope you will appreciate all its metrological qualities and ease of use.

The purpose of this manual is to guide you as simply as possible towards using the instrument confidently to achieve results that match your expectations.

Specializing in ultrasonic flow meters since 1974, Ultraflux develops, manufactures and sells solutions based on the principle of differential ultrasonic transit times.

This method provides non-intrusive, constant and bi-directional flow measurements.

Ultraflux flow meters allow non-intrusive or intrusive, constant or occasional flow measurements on any type of homogeneous fluid (liquid or gas) and through any type of homogeneous material.

Always aiming to better serve its customers' needs while preserving the environment, Ultraflux has been committed for many years to a quality improvement and sustainable development policy.

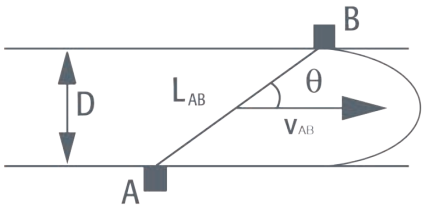
Since it started in 1974, Ultraflux has developed and manufactured all its products in France, in order to ensure that its production processes are reliable and meet the standard required.

Operating principle

The Minisonic uses the transit time measurement method.

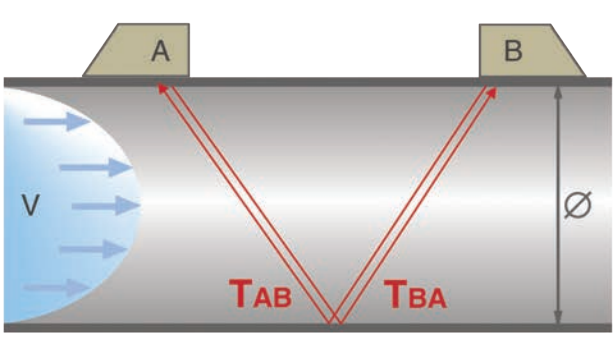
This method consists in measuring the difference in propagation time between the ultrasonic pulses transmitted in the direction of the flow and in the against the flow direction from A to B and from B to A, respectively T_{AB} and T_{BA}.

The average velocity VAB along the segment AB is proportional to (TBA - TAB).

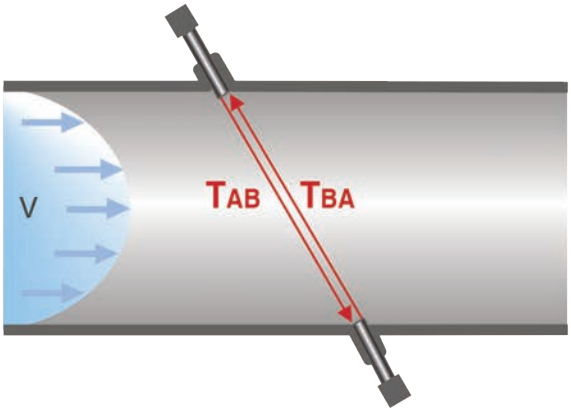


$$V_{AB} = \frac{L_{AB}}{2 \times \cos\theta} \times \frac{T_{BA} - T_{AB}}{T_{BA} \times T_{AB}}$$

With external probes



With insertion probes



Safety instructions

Using the device

The device, equipped with ultrasonic probes, enables the flow measurement of a fluid (gas or liquid) in a pipe.
It is important to set up the device correctly so that the measurement results are correct.
Your local Ultraflux qualified contact is always available to assist with technical advice and on-site assistance.
This is strongly recommended if your equipment is used to control a process, to intervene in a monitoring system, or in the case of other applications where incorrect flow measurement would entail risks.
Always ensure your Ultraflux device is stored and operated according to the information in the technical Specification.
The modification or disassembly of the unit must only be carried out by Ultraflux personnel.
Always ensure the supply power is isolated before making connections to the equipment.
Ultraflux declines all responsibility for any incidents that may occur as a result of failure to observe these instructions.

Equipments connected to the device

All equipment connected to the device must comply with the relevant safety standard and have SELV circuits. (double insulation between primary and secondary).
Caution: The supply voltage of the measuring probes is high (may exceed 200V).

Maintenance work on the device

Maintenance of the device must only be carried out by Ultraflux trained personnel and using only parts supplied by Ultraflux.

Temperature limits for Minisonic electronics

Aluminium Housing : Use from -20°C to +50°C
Stainless Steel Housing : Use from -40°C to +60°C
Storage from -35°C to +60°C

Symbol used on the flowmeter

Instruction manual must be read before use.

The flowmeter must be disconnected and powered off before opening the unit, connecting or disconnecting inputs & outputs

CE marking indicates compliance with European Community requirements

Dangerous voltage in the unit

Caution danger: refer to instruction manual recommendations

The device ground must be connected

Do not dispose of the device in the garbage; follow the recycling instructions.

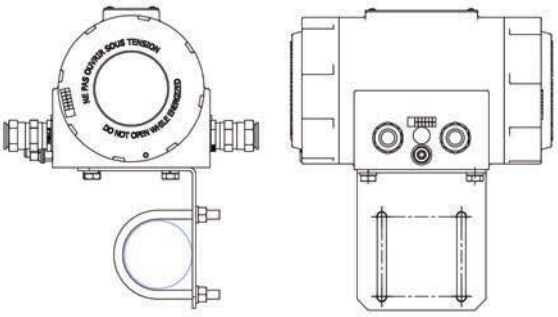
General characteristics

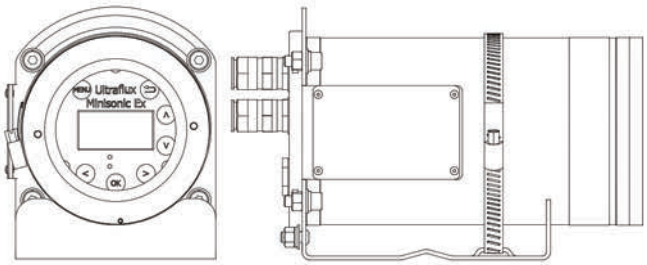
- Ultrasonic flow measurement by transit time measurement.
- 2 measuring cords (i.e. 4 probes)
- Power supply: 2 versions 12-24Vdc or 110-220 Vac
- Consumption: 7W typical, 15W peak.
- Protection class: IP67 closed case

Dimensions / Weight

Aluminum housing version
- Length 233 mm
- Width : 140 mm w/o cable gland / 226mm with cable gland
- Height : 141 mm wo installation kit
- Weight : 6.5 kg

Stainless Steel housing version
- Length 264.3 mm w/o cable gland
- Width : 140 mm
- Height : 160 mm wo installation kit
- Weight : 11.3 kg wo option





Mechanics / Ergonomics

- Aluminum or Stainless Steel housing
- Wall mounting: special sheet metal rear panel + hole for locking screw accessible at the bottom of the meter
- Monochrome graphic OLED display 128x64 pixels
- Lexan keyboard with 7 keys
- Blue LED: ultrasonic operation
- RGB LED for diagnostics (operation to be described according to the errors to be reported to the user)

Cable glands

- Aluminum housing : 4x M20 type cable gland

Note : for this Aluminum housing version, a 2nd chord could be proposed by adding a junction box.

- Stainles Steel housing : 4+ 2 optional (for a 2nd chord) M20 type cable gland

Integrated wiring compartment / integrated connection

Basic functions
- Power supply : 3 ways connector (base plate with pluggable screw terminal block)
- USB : USB type A socket
- Ethernet : 1 RJ45 socket
- (2x) 4-20mA Inputs : 1 connector 8p
- (2x) 4-20mA Outputs : 1 connector 8p shared with digital Ouputs
- (2x) PT100 Inputs : 1 connector 6p
- (3x) Digital Outputs : 1 connector 3p for Relay and 1 connector 8p shared with 4-20 mA outputs
- (2x) Chord connections : 4 connectors 3p

Optional function / Modules
- RS485 interface or HART interface: 1 connector 4p
- Connectors with 3.5mm pitch (base plates with spring-cage (pluggable) terminal blocks)

Electrical characteristics Inputs / Outputs

Digital output: Maximum output voltage of 500V between contact and its ground
Current 1 mA at a frequency of 10 kHz

Modules In:

Galvanic insulation between modules: 500V.

ATEX IECEx Certifications

FAURE HERMAN
FR – LA FERTE BERNARD
6017_Uf841 & 6019_MINISONIC INOX & 6038_MINISONIC Ex
INERIS 13ATEX0054X

EX II 2 GD
Ex db IIC T6 or T5 Gb Ex-tb III C T85°C or T100°C Db
IP66/67
T. Amb: -40°C to +50°C or +60°C

CE marking

Ultraflux **Minisonic** flowmeters comply with CE certifications

EN 61000-4-2	Immunity to electrostatic discharges – Criterion A
EN 61000-4-3	Immunity to radiated electromagnetic fields at radioelectric frequencies - Criterion A
EN 61000-4-4	Immunity to fast electrical transients in bursts - Criterion A
EN 61000-4-5	Immunity to shock waves - Criterion A
EN 61000-4-6	Immunity to conducted disturbances, induced by radioelectric fields - Criterion A
EN IEC 61000-4-11	Immunity to voltage dips, short breaks, and voltage variations - Criterion A
EN 55011	Radiated emission at 3m for the class A (Industrial surrounding)
EN 55011	Conducted emission
FCC Title 47 Part 15	Radiated emission at 3m
FCC Title 47 Part 15	Conducted emission

Recycling the device

In accordance with decree no. 2005-829 of 20 July 2005 and decree no. 2009-1139 of 22 September 2009 concerning the obligations to collect, treat and dispose of electrical and electronic equipment, batteries and accumulators in France, Ultraflux delegates responsibility for the financial and logistical recovery to users who will manage their waste themselves. Separate collection and recycling of your waste at the moment of disposal will help preserve natural resources and guarantee recycling respectful of the environment and human health. For more information on the recycling centre nearest to your site, contact your City Hall or waste disposal department.

Contact address

For any request for information, do not hesitate to contact us:

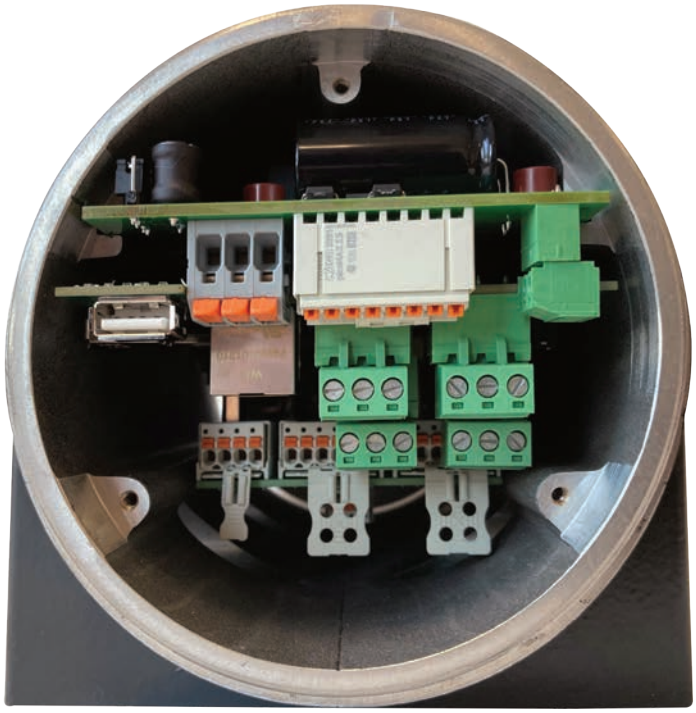
Postal address
Bâtiment Texas
9 Allée Rosa Luxemburg
Éragny Parc – Parc des Bellevues
95610 Éragny sur Oise

Delivery address
Bâtiment Texas
9 Allée Rosa Luxemburg
Éragny Parc – Parc des Bellevues
95610 Éragny sur Oise

After-sales
+33(0)1 30 27 29 30
Email address ultraflux@faureherman.com

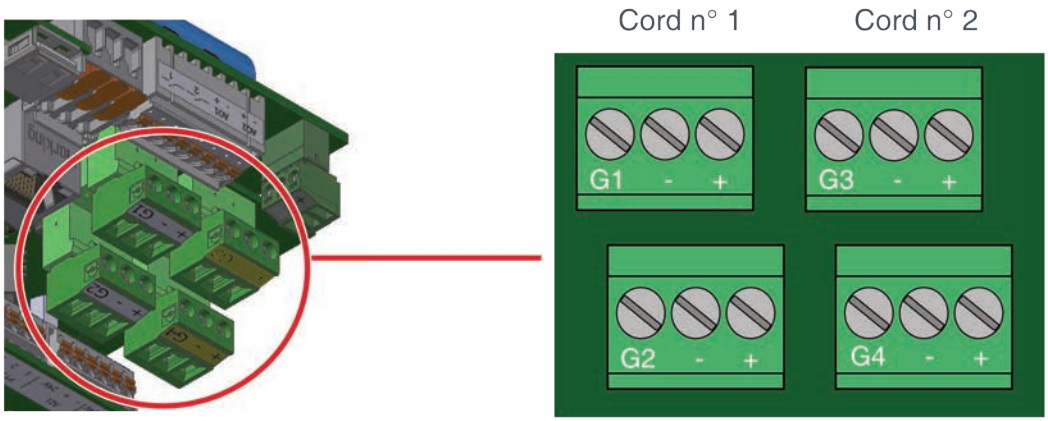
Wiring of the Minisonic

Overview of the connection department



Probes connection

Connection of cord no. 1 (pair of sensors no. 1) and cord no. 2 (pair of sensors no. 2)



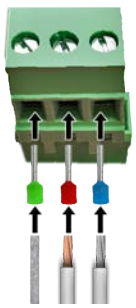
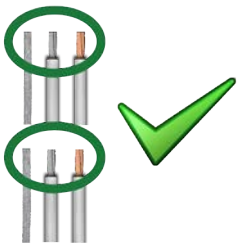
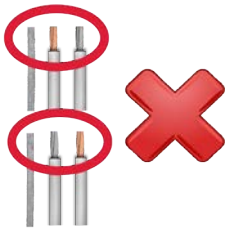
Chord nº 1

Chord 1		
Probe 1 / Upstream probe		
G1	**-**	**+**
Upstream probe ground	Upstream probe -	Upstream probe +
Probe 2 / Downstream probe		
G2	**-**	**+**
Downstream probe ground	Downstream probe -	Downstream probe +

Chord nº 2

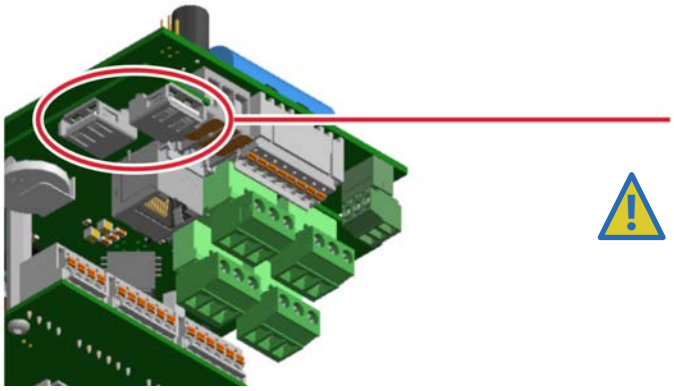
Chord 2		
Probe 1 / Upstream probe		
G3	**-**	**+**
Upstream probe ground	Upstream probe -	Upstream probe +
Probe 2 / Downstream probe		
G4	**-**	**+**
Downstream probe ground	Downstream probe -	Downstream probe +

Note:
There is no + or - plug for connecting the sensors.
The choice of wire (silver or gold) for the upstream sensor must be the same for the downstream sensor.
Example:
If the "gold" wire of the upstream sensor is connected to "upstream sensor +", then the "gold" wire of the downstream sensor must be connected to "downstream sensor +".
Caution: The supply voltage of the measuring probes is high (may exceed 200V): Use electrical terminals.

	Upstream probe	Upstream probe
		
Electrical terminals recommended	**Downstream probe**	**Downstream probe**

USB Connection

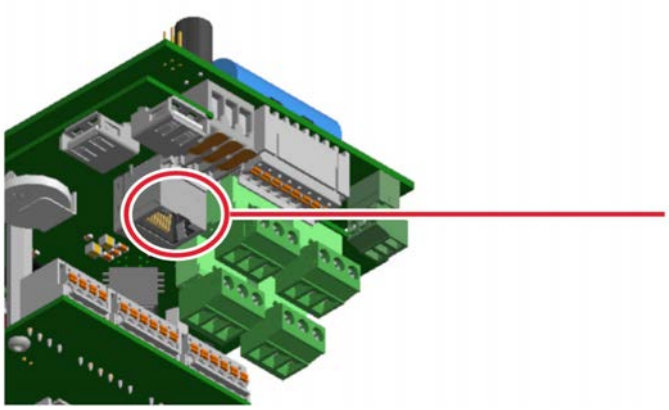
USB type A socket for software update and logger download



USB socket

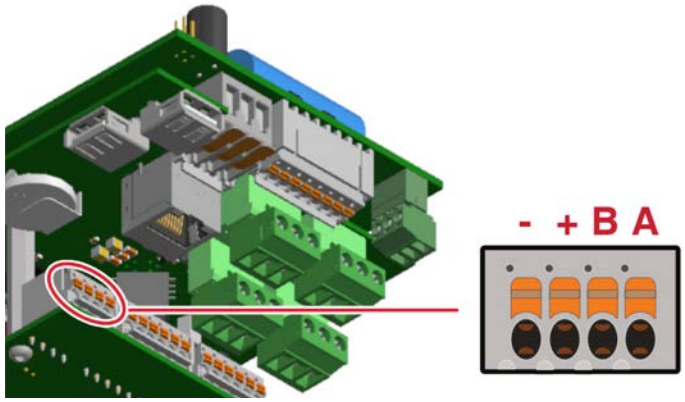
The 2 USB ports cannot be used simultaneously.
Only 1 port at a time

Ethernet connection



RJ 45 Ethernet socket
Through supplied specific cable gland

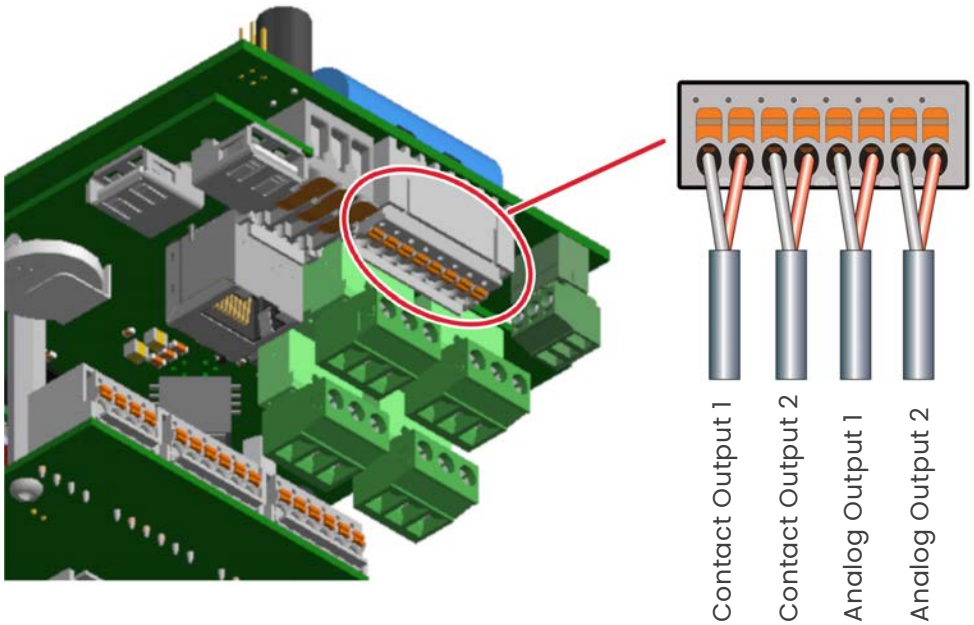
Connection of the HART or serial link 485



PIN	Function
-	HART -
+	HART +
3	RS 485 B
4	RS 485 A

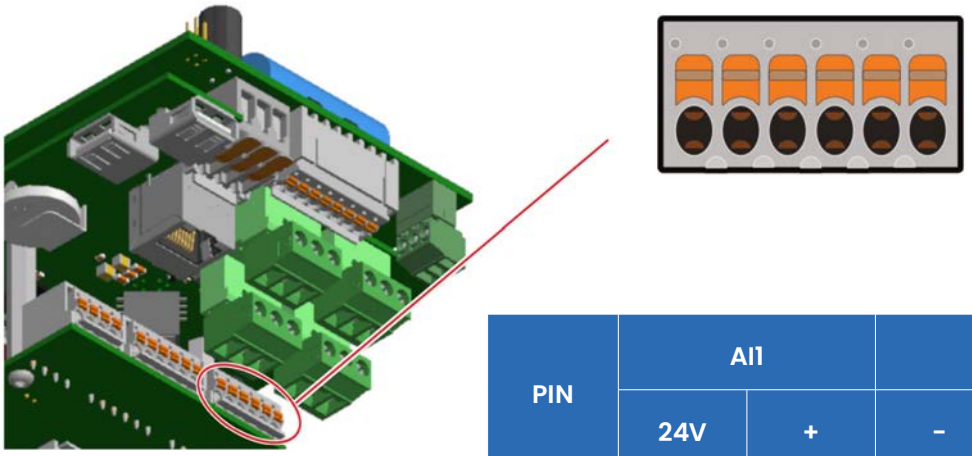
Only one option available.
The HART or RS485 as an option

Digital output connection & Analogic 4-20 mA output



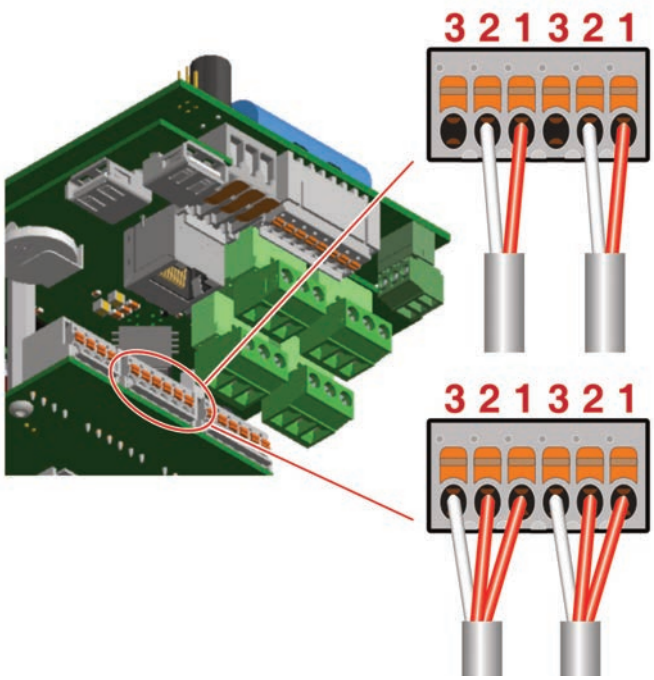
PIN	1		2		AO1		AO2	
					+	-	+	-
Function	Contact 1	Contact 1	Contact 2	Contact 2	AO1 4-20mA +	AO1 4-20mA -	AO2 4-20mA +	AO2 4-20mA -

Analog Input connection



PIN	AI1			AI2		
	24V	+	-	24V	+	-
Function	24V dc	+	-	24V dc	+	-

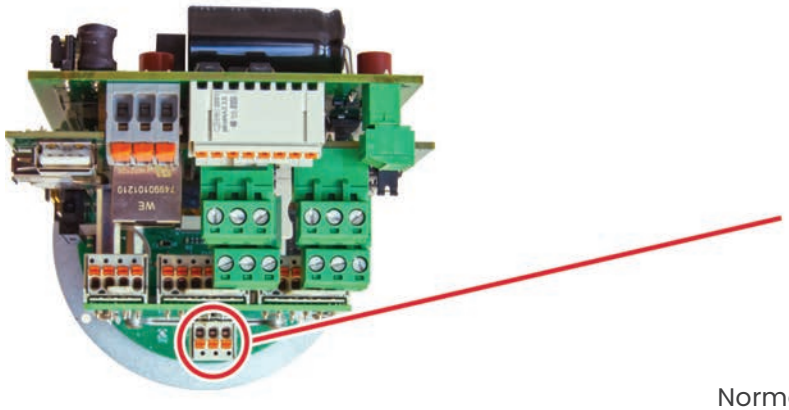
PT 100 Temperature. Probes connection

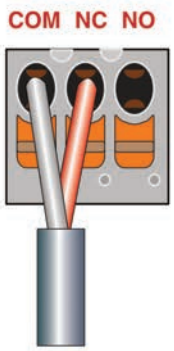


2 Wire Pt 100 connection						
PIN	**1**	**2**	**3**	**4**	**5**	**6**
		Pt 1 White	Pt 1 Red		Pt 2 White	Pt 2 Red

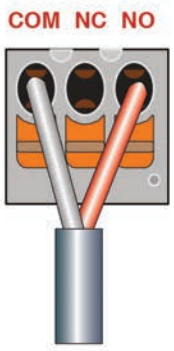
3 Wire Pt 100 connection						
PIN	**1**	**2**	**3**	**4**	**5**	**6**
	Pt 1 White	Pt 1 Red	Pt 1 Red	Pt 2 White	Pt 2 Red	Pt 2 Red

Relay connection





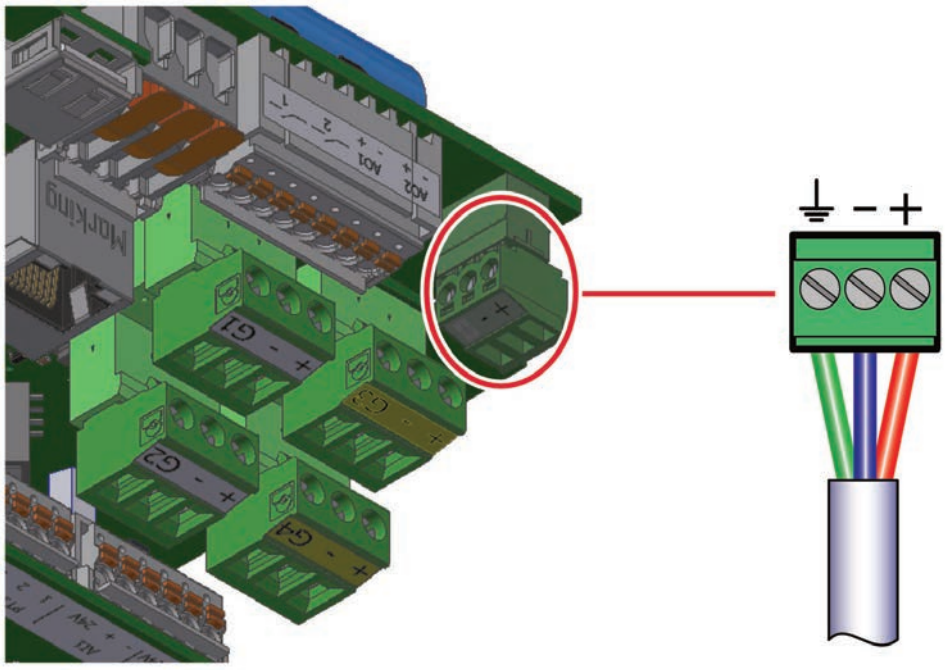
Normaly Closed relay Output connection



Normaly Open relay Output connection

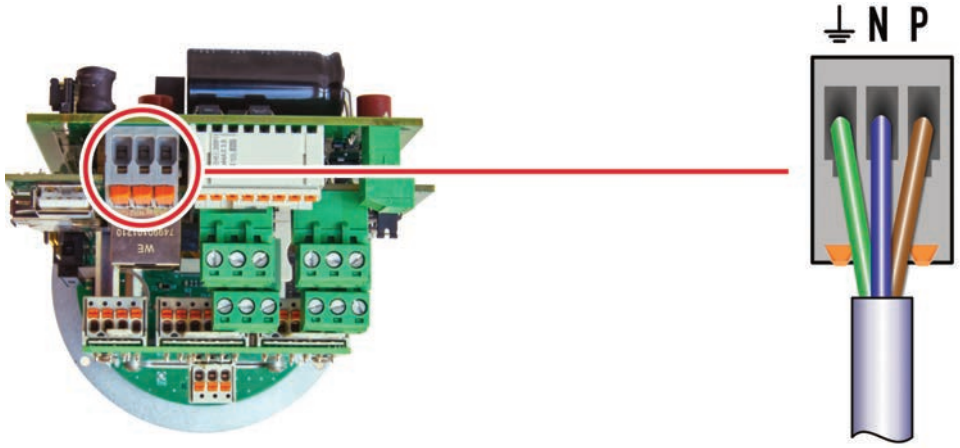
Relay output connection		
COM	**NC**	**NO**
Common	Normaly closed	Normaly open

DC Power supply connection DC 12-24 Vdc



Power supply connection DC 12-24 Vdc		
⏚	-	+
Ground	12-24 Vdc -	12-24 Vdc +

AC Power supply connection 110-220 Vac



Power supply alternating current110 - 220 Vac		
	N	P
Ground	Neutral	Phase

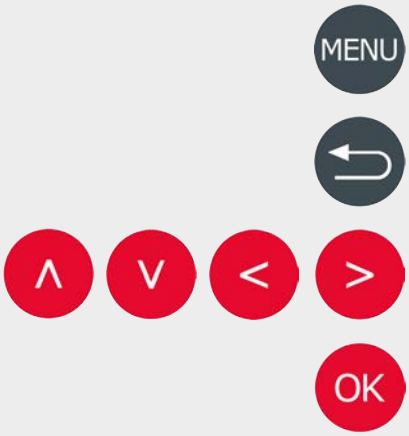
Minisonic configuration

Description of navigation

The menus detailed in this manual correspond to the Normal mode of the setup level menu.

The Minisonic is equipped with a screen and a keypad for configuration and viewing measurements directly.

Keypad
The keypad has seven keys which have different uses in different menus. However, navigation between the fields and menus is always based on the same principles:



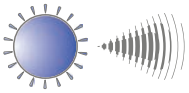
Switches between the measurement viewing screens and the main configuration menu

Takes you back to the previous screen.

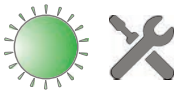
Changes measuring screen, moves within the menus or changes parameter values.

Goes into the menus in reverse video and is used to validate the parameters selected.

LED Display



Flash indicating the emission of ultrasonic waves



Flash indicating measurement status

If on at least one pipe all chords are working: green flash

If at least one chord does not work, or if there is an error on the input/output: orange flash.

If at least one line does not have a measurement: red flash

Types of screen

The Minisonic Fixed is based on several types of screens which are found throughout the navigation and work in the same way.

Screen for editing alphanumeric fields:

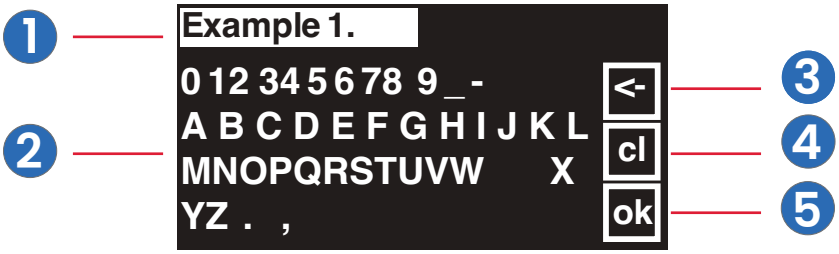
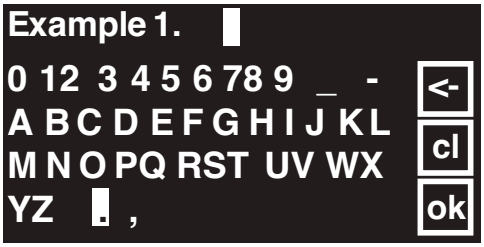


Figure 14 - Alphanumeric field edit screen

These screens are used to edit all the alphanumeric fields of the device, such as driving name, configuration names etc...

1 **Fields currently being edited**



Allows the field being edited. Select a character using the multi-directional keys and then select a character from the keypad to replace it.

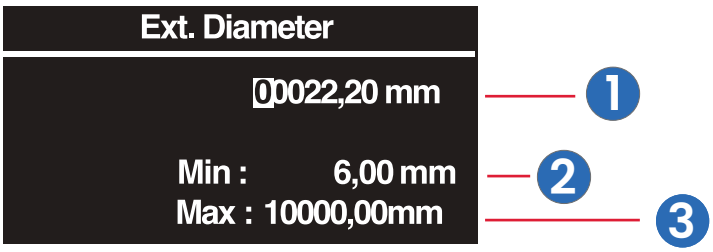
2 Select the characters to be placed in the field by pressing “OK”.

3 “Delete” key : This key is used to delete the characters in the field being edited.

4 “CapsLock” key switches from the keyboard with upper case keys to the keyboard with lower case keys.

5 “OK” key validates the field and exits the screen.

Numeric field edit screen



< > Moving from digit to digit

∧ ∨ Increases or decreases the value of the selected digit.

OK Validates the modification and returns to the previous level

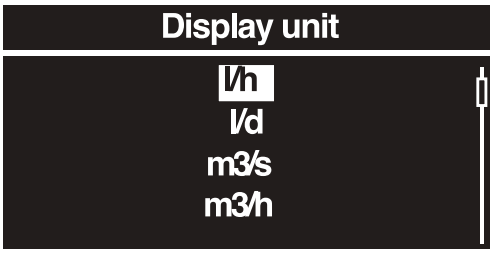
This type of screen allows entry all the numerical parameters in the device.

1 **Currently edited field :**
The number being edited appears in black on a white background. The value of the field is changed using the up and down keys. Move from left to right using the direction keys to change the number being edited.

2 **Minimum field value :**
This number indicates the minimum value that can be set.

3 **Maximum value of the field :**
This number indicates the maximum value that can be set.

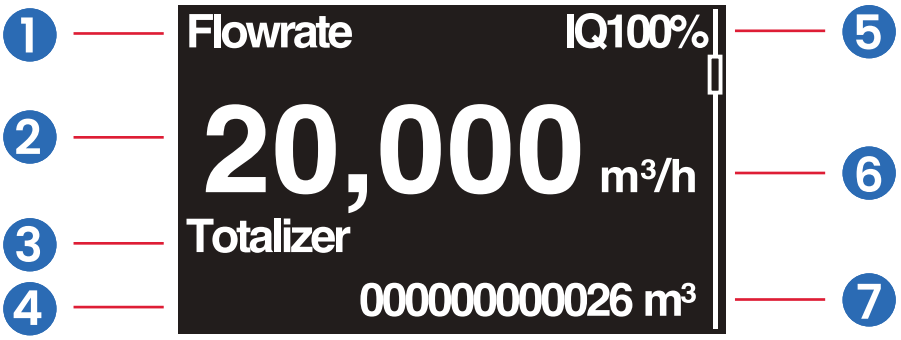
List selection screen



∧ ∨ Choice among the proposed list

OK Validates the modification and returns to the previous level

Presentation of the measurement screens

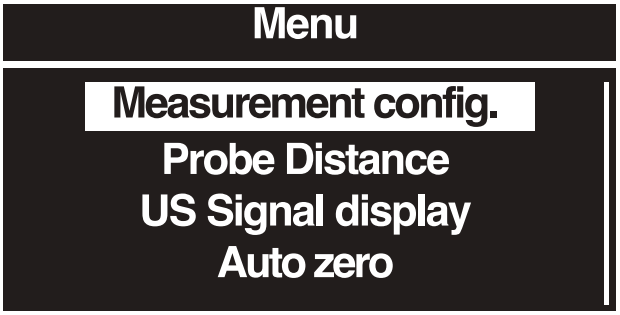


MENU Access to menus

V Views of the various measurement screens

1. Main measurement variable
   Example: Volume flow / Speed ...
2. Value of the main measurement unit
3. Designation of the secondary measurement variable - can be displayed by configuration
   Example: Totalizer / speed / velocity / velocity / gain ...
4. Quality index
   Indicates the percentage signal strength
   This factor makes it possible to evaluate the difficulty of measurement, for example it is lower in the presence of loaded or aerated water. The higher the index, the simpler the measurement is for the device to carry out.
5. Value of the secondary measurement variable - can be displayed by configuration
6. Physical unit of the main measurement variable
7. Physical unit of the secondary measurement variable - can be displayed by configuration

Configuration menus



Choice of chapter

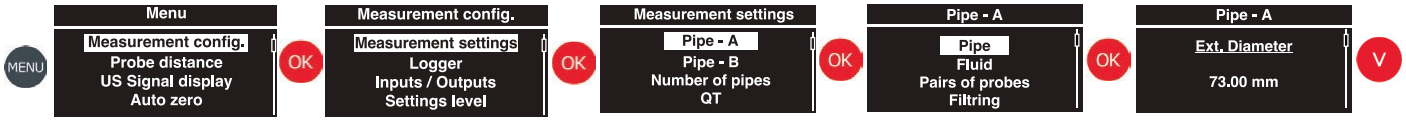
Confirms the entry in the chapter in “inverse video” display.

Back to the previous chapter

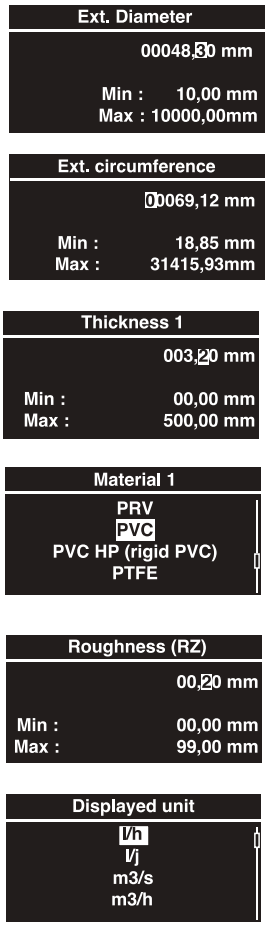
Back to the measurement screen

Measurement configuration	Configuration of the set of characteristics of a measuring point. In this menu, you will set up the device to operate on a specific application: Pipe characteristics / Fluid characteristics / Characteristics of the used probes
Probe distance	States the distance to be set between the sensors according to the data set in “Measurement Configuration”
US signal display	Displays the nature and quality of the measurement echo. It is a key factor in the analysis of the measurement conditions and can help you to identify any configuration error (diameter - thickness of the pipe ...).
Auto-Zero	Gives you the possibility to refine the response of the unit under the strict conditions of “Full pipe + Flow at standstill”. This operation is essential to obtain optimal uncertainty
Advanced meas.	Gives you access to additional diagnostic information
System Configuration	Setting the language information / Date Time / Custom features

Pipe

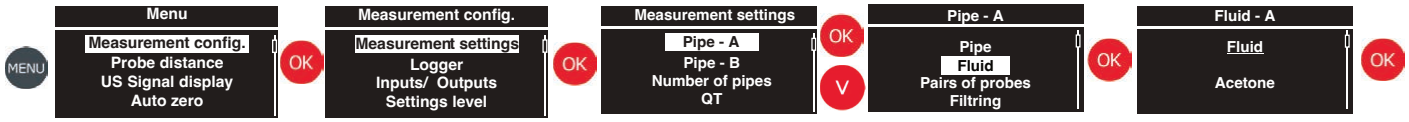


Ext. diameter	Adjustment of the outer diameter of the pipe
Ext. circumference	The outer circumference can be adjusted if the diameter is not measured
Thickness	**Pipe thickness adjustment** In case of mufti-layer piping: 3 thicknesses can be set in the EXPERT setting mode
Material	**Choice of driving material from a list.** In the case of multi-layer piping: possibility of setting 3 materi-als in EXPERT setting mode
Roughness	Specific roughness the inner wall of the pipe
Displayed unit	**Choice of volume flow unit** Determines the physical unit associated with the volume flow rate display. **Example:** m3 /h - l/min...



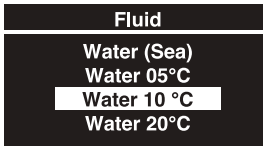
Note: The setting sub-menu for line A is the same for line B if the multi-line option is selected.

Fluid



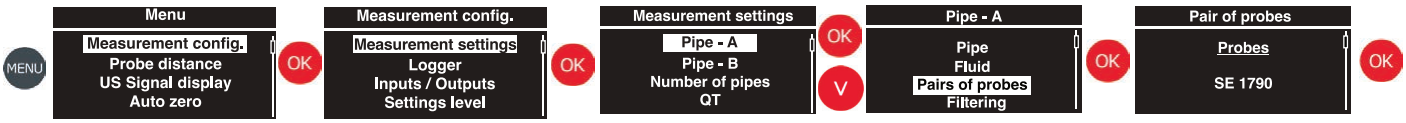
Setting the characteristics of the measured fluid

Fluid	Choice of the fluid to be measured from a list



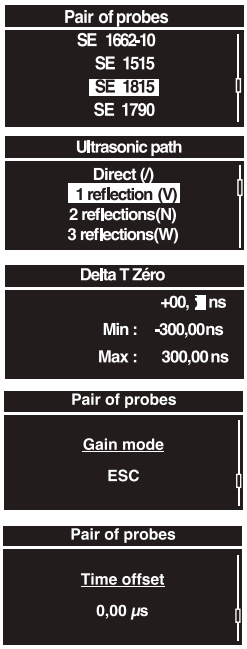
Note: The choice of fluid will be differentiated between Pipe A and Pipe B if Multi-pipe.

Pairs of probes



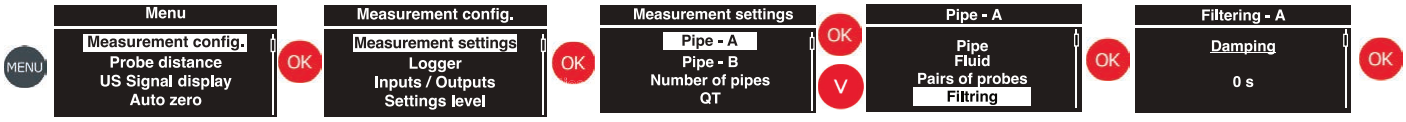
Setting of the probes used with the device

Probes	Choice of probe model from a scrolling list
Mounting type	Choice of probe mounting type
ZERO	Difference in transit time of the sound wave at zero flow. Value set automatically after “Auto Zero”.
Gain mode	See appendix / Description of the gain adjustment on page 30
Time offset	



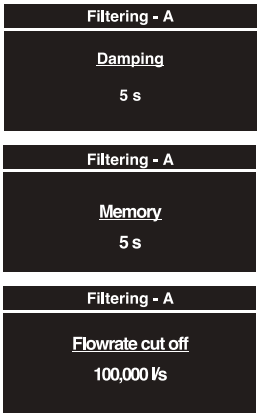
Nota :
The parameter setting of the probes is the same for probe pair 1 and probe pair 2 in the case of multi-cords. If the “number of pipes” is set to “2”, each pipe has only one sensor pair. If only one line is configured, it has the option of using 2 pairs of sensors.

Filtering

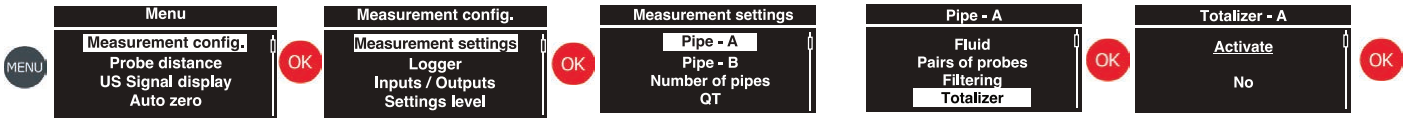


Measurement filtering settings

Damping	Damping time of the measurement. Setting to be made in the sub-menu for editing a numeric field (Unit in seconds)
Memory	Maintain measurement in case of signal loss. Setting to be made in the sub-menu for editing a numeric field (Unit in seconds)
Flowrate cut off	Flow threshold below which the measurement is forced to zero. (Display and outputs) Setting to be made in the editing sub-menu of a numeric field. (Threshold value and unit).

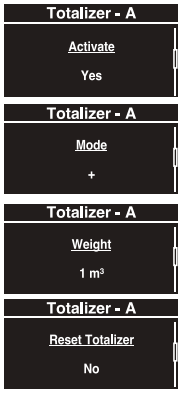


Totalizer



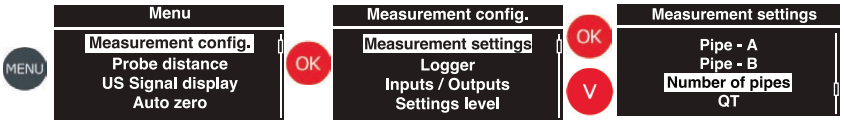
Setting the totalizer

Activate	Activates the totalizer of line A
Mode	Mode selection: “Forward flow + “ “ Reverse flow - “ “ Net +/- “
Weight	Adjusting the totalizer increment weight
Reset Totalizer	Zeroing the totalizer



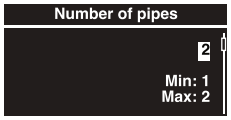
Note: The setting sub-menu for line A is the same for line B if the multi-line option is selected.

Number of pipes

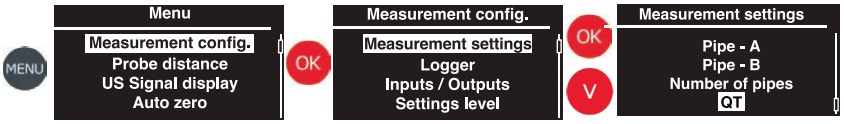


Setting the number of pipes

Numbers of pipes	The Minisonic is a flowmeter that can manage flow measurement on 2 different pipes. Minisonic has the capacity to drive 2 pairs of probes: • 2 different pipes with 1x pair of sensors each • 1 Pipe with the possibility of using 2 pairs of sensors on it

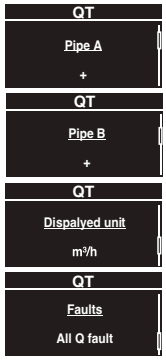


QT

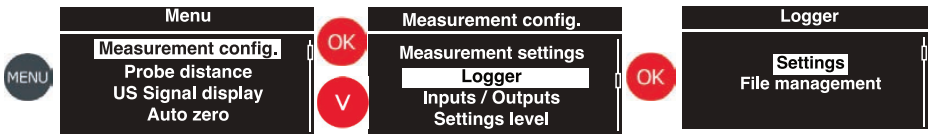


Setting the number of pipes

QT	QT is the mathematical operation carried out with the 2 possible measurements on the Minisonic: Either an addition of the 2 measurements / A difference .... • The unit of display of this total flow rate is configurable. • In the event of a measurement failure, it is possible to signal a loss of signal either with only one channel faulty or with both channels faulty simultaneously.

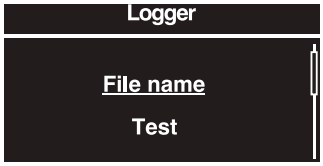


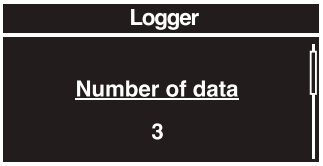
Logger

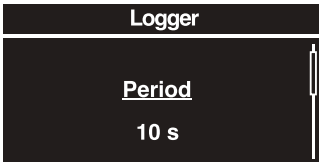


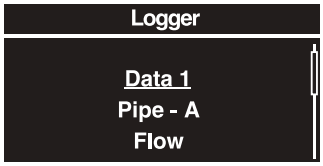
Configuration of the internal recorder

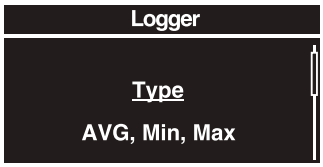
File name	Define the name of the recording file associated with the measurement point.
Number of data	Setting the number of variables to be recorded. Max : 10 values
Period	Choose a sampling period from a scrolling list. From 1s to 1hour
Data 1..2..3..	Define the nature of each variables Pipe: Physical quantities (Flow, Celerity, Speed...) General: Device status, battery charge status
Type	Choose the type of value applied to all data: • Average • Average + Min + Max • Average + Min + Max + Standard deviation





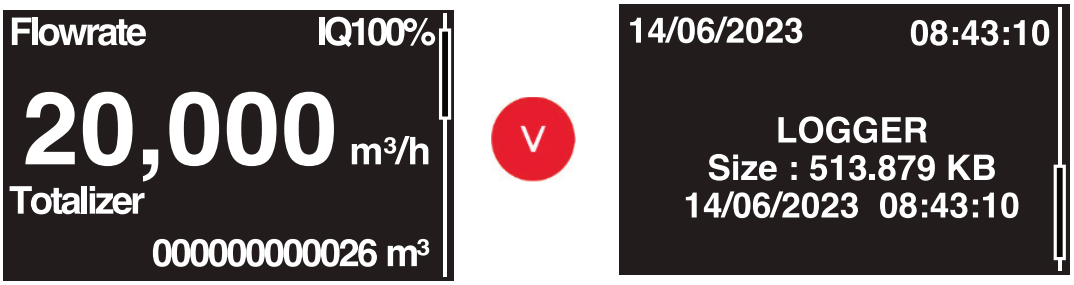




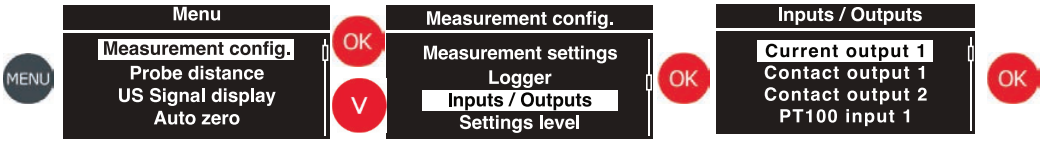


NOTA : To retrieve data from the logger, refer to chapter : Logger / Retrieving recordings

Back to the font page you can scroll down for Logger size informations

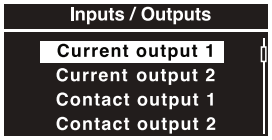


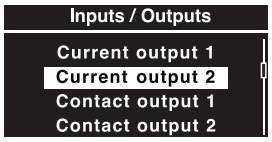
Inputs / Outputs

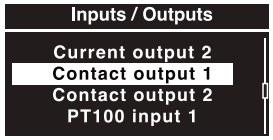


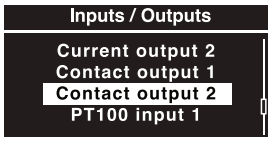
Setting Inputs / outputs

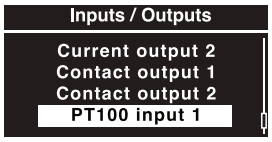
Current ouput (1-2)	Adjustment of the characteristics of the 4-20 mA analogue output (1-2) Activation / deactivation / • Selection of the variable to be assigned to this output • Flow rate corresponding to 4 mA • Flow rate corresponding to 20 mA • Flow rate unit • Default value in case of fault (in mA)
Contact output (1-2)	Function selection: • Open • Counting Choice of flow variable (A / B / A+B pipe) Counting direction (Direct + / Reverse - / Net) Pulse length Pulse weight (value and unit) • Alarm • Closed • Threshold
PT100 input (1-2)	Setting the characteristics of the Pt 100 input • Number of wires • Setting the temperature offset
Tests	Test mode of the analogue and contact outputs Caution: in test mode, the output values will be changed.

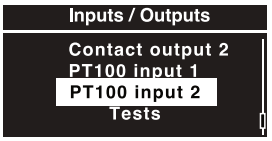


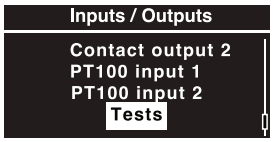




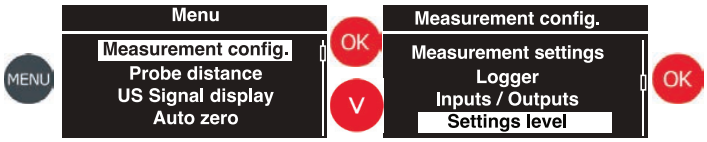






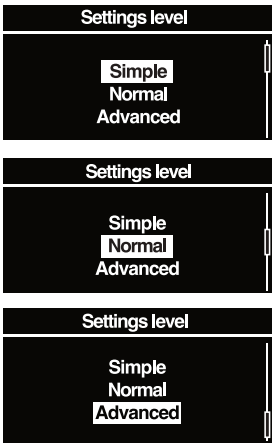


Settings level



Settings level

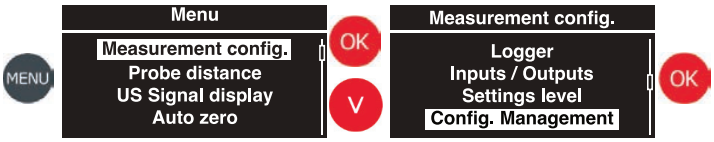
Simple	Contains the minimum parameters necessary to do flow measurement with the minimum of parameters to be set
Normal	Gives access to more features and settings to refine the measurement
Advanced	Contains all the parameters available in the unit.



The Minisonic has been designed to adapt to your level of knowledge of ultrasonic measurement.

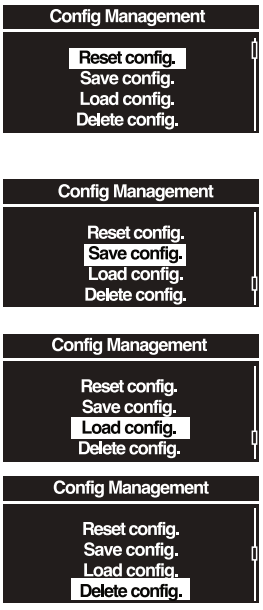
The menus detailed in this manual correspond to the Normal mode of the setting level menu.

Config. Management



Configuration management

Reset config.	Deletes the data in the current configuration and returns to the default configuration. A warning message will pop-up on the screen to ask for reset confirmation.
Save config.	Saves the current configuration. Ask a name for this configuration so that you can use it again later.
Load config.	Uploads the parameter data of a saved configuration
Delete config.	Deletes selected or all configuration files

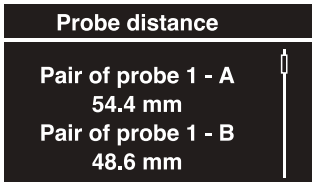


You need 2 identical firmware versions to transfer the configuration from one device to another

Measurement config. / Probe distance

Display of the probe spacing distance

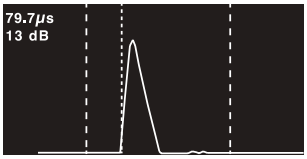
Probe distance	Displays the distance between the sensors. This distance is calculated by the device according to the configured parameters: • Diameter / thickness / pipe material • Type of fluid • Type of probes The example on the right shows the distance to apply between the probes of the Pipe A and Pipe B

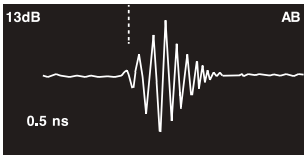


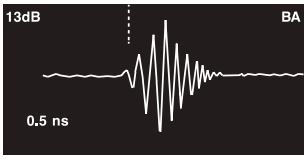
Measurement config. / US signal display

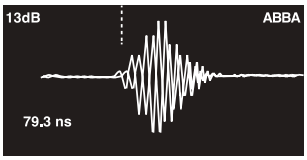
Visualisation of measurement echoes

Large view	Wide visualisation of the quality of the measurement signal according to the programmed parameters and measurement conditions
Echo from A to B	Visualisation of the ultrasonic echo emitted from probe A and received on probe B
Echo from B to A	Visualisation of the ultrasonic echo emitted from probe B and received on probe A
Phase shift AB-BA	Visualisation of the 2 echoes and the difference in transit time of the ultrasonic wave between the AB and BA paths





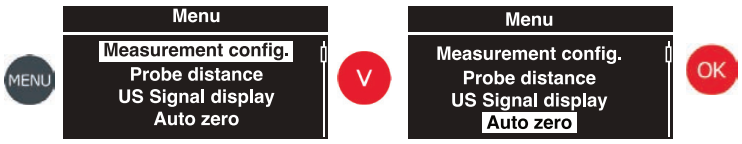




< > Allows the viewing window to be moved for signal assessment

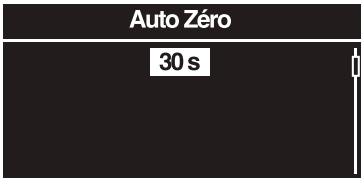
OK Allows the display to be centred on the measuring point.

Auto Zero



Minisonic zero flow adjustment

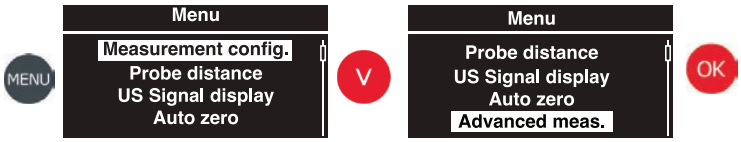
Auto Zero	Determines the duration of zero point adjustment.



Caution, this operation can only be carried out under the strict conditions of:
- **Full pipework**
- **Zero flow**

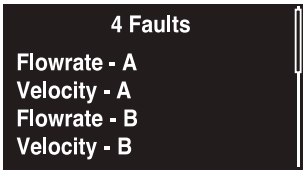
This operation is essential in order to obtain optimal accuracy. The actual stabilisation of the fluid flow at zero flow can take + or - time. This stabilisation depends on the diameter of the pipe and the type of shut-off devices. Make sure that the flow is actually mechanically shut off (valve....).

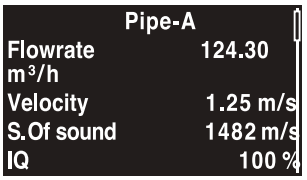
Measurement config. / US signal display

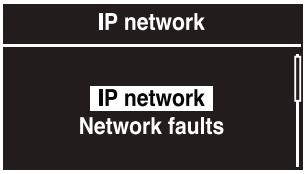


Visualisation of diagnostic variables and failures

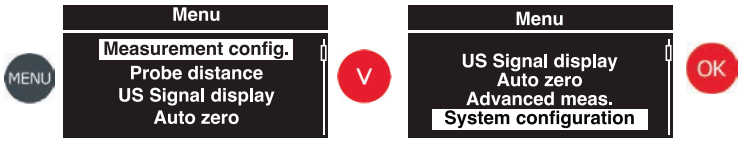
Faults	Total list of faults found by the device.
Flowrates	View of advanced variables allowing adjustment, reliability or validation of measurement quality.
IP network	Network





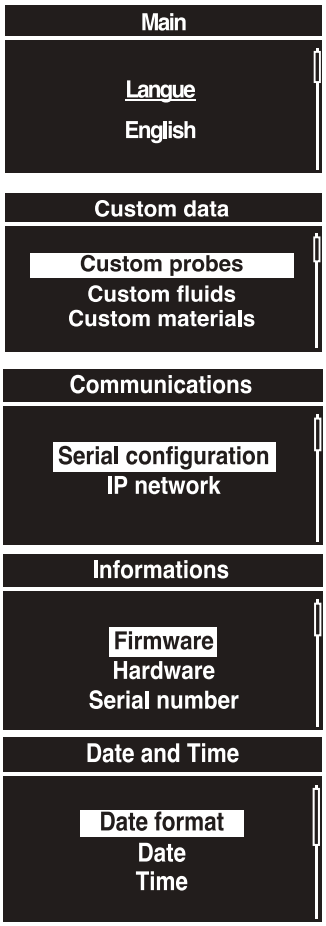


System configuration



Setting the device system data

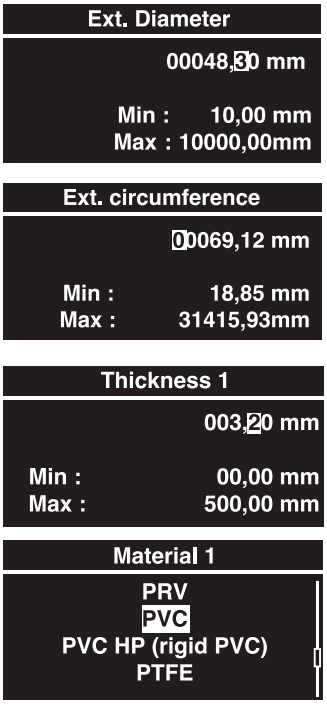
Main	Definition of : • Display and programming language • Distance units mm or inches
Custom data	The Minisonic allows the customised setting of: • Probes • Fluids • Pipe materials
Communication (only if the option has been selected)	• Serial communication setting • IP Setting
Information	Display of: • Software version (Firmware) • Electronic board version (Hardware) • Serial number of the device
Date et heure	Adjustment and adjustment of: • Format DD/MM/YY ... • Date • Time



Pipe

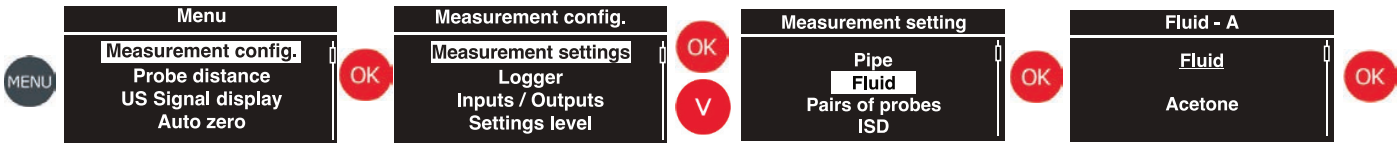
Parameter setting of the characteristics of line A and line B if multi-line.

Ext. diameter	Adjustment of the outer diameter of the pipe
Ext. circumference	The outer circumference can be adjusted if the diameter is not measured
Thickness	Pipe thickness adjustment. In case of mufti-layer piping: 3 thicknesses can be set in the EXPERT setting mode
Material	Choice of driving material from a list. In the case of multi-layer piping: possibility of setting 3 materials in EXPERT setting mode



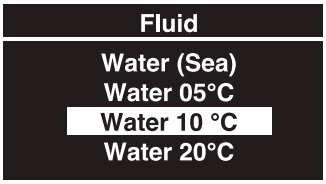
Note: The setting sub-menu for line A is the same for line B if the multi-line option is selected.

Fluid



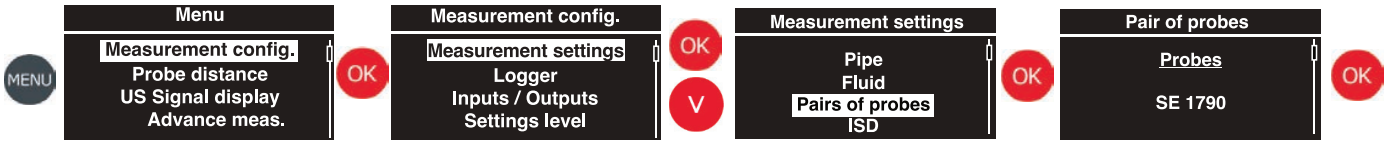
Setting the characteristics of the measured fluid

Fluid	Choice of the fluid to be measured from a list



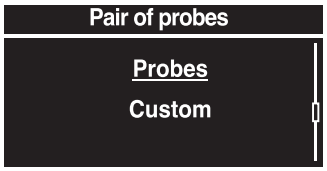
Note: The choice of fluid will be differentiated between Pipe A and Pipe B if Multi-pipe.

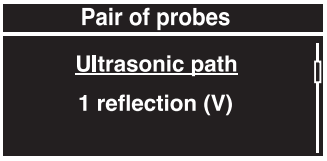
Pairs of probes

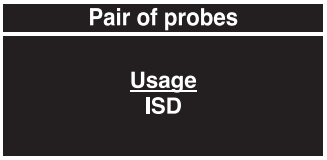


Setting of the probes used with the device

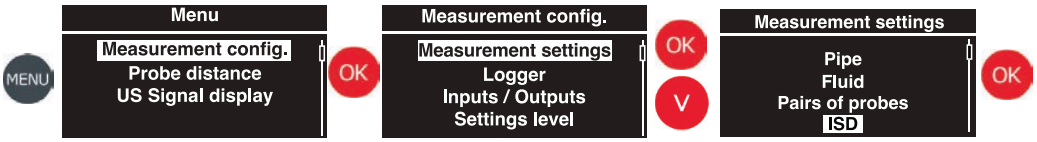
Probes	Choice of probe model from a scrolling list for ISD Usage
Mounting type	Choice of probe mounting type - 1 reflexion for ISD Usage
Usage	ISD : Interface detection





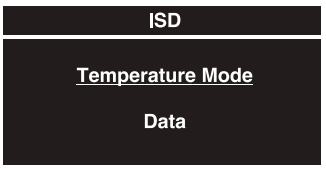


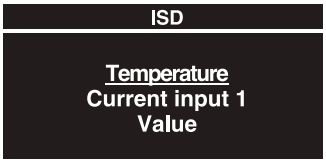
ISD

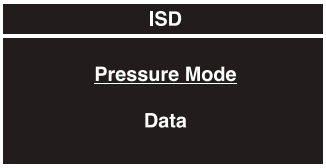


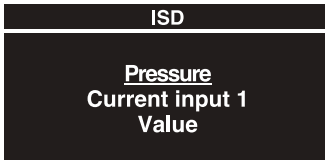
ISD Settings

Fluid	Choose between a fixed value and an actual measurement : **Contstant / Data.** For the temperature compensation
Temperature value	Set the temperature **value** or select the actual **measurement input**
Pressure mode	Choose between a fixed value and an actual measurement : **Contstant / Data** For the pressure compensation
Pressure value	Set the pressure **value** or select the actual **measurement input**





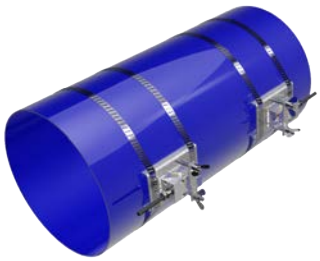




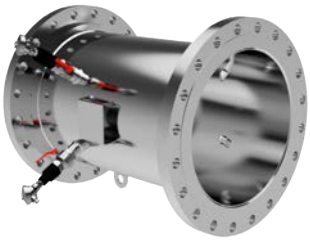
Installation and Commissioning

Setting up a measuring point

Your local Ultraflux trained representative will be happy to provide advice on site selection and provide other technical assistance installing the flowmeter
In addition to the control unit, either or external or insertion probes will be requiered



External sensors
A pair of potted cable probes with the required cable length
Suitable mounting brackets and fixing systems



Insertion probes
A pair of intrusive probes equipped with their mounting system (e.g. Valve / Boss...).
The required cable length between the sensors and the electronics.

Choosing a location for the probes

The following sets out the main precautions to be taken when choosing a location for the probes.
To achieve the most accurate measurement possible, it is necessary to have what is called 'a developed flow profile'. The aim is to obtain a hydraulic profile which is as predictable and symmetrical as possible.

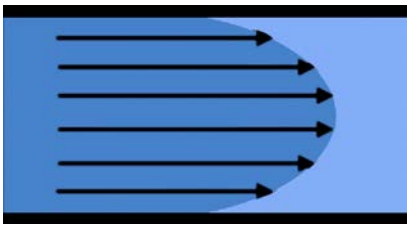


Figure 10a- Symmetrical hydraulic profile

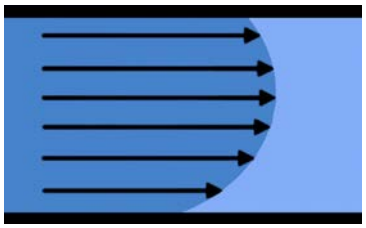
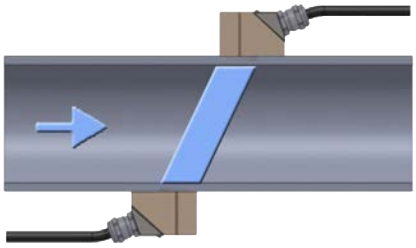


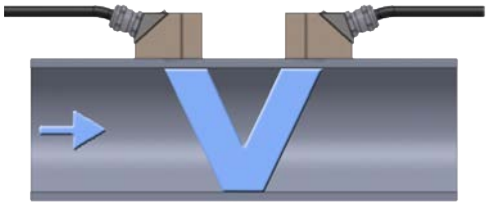
Figure 10b- Asymmetrical hydraulic profile

Choosing the measurement mode

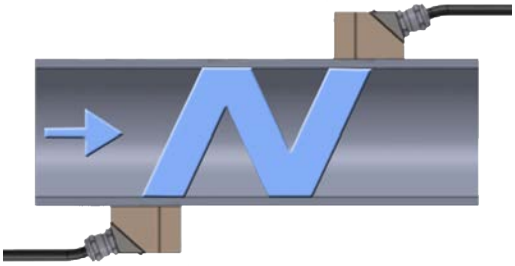
The external sensors can be installed in different ways, depending on the number of reflections of the ultrasonic wave on the pipe wall. There are four programmable types in the device:



«Direct» or«/»



« Reflex » or « V »



« N »

« W »

The preferred mounting method is the V-shaped mounting, which is suitable in most cases.

The longer the distance, the better the measuring principle is exploited. (significant difference in travel time upstream and downstream).

However, the ultrasonic echo will be all the weaker and more distorted as the number of reflections increases and may be difficult to process. A compromise must therefore be found between precision and ease of transmitting and receiving ultrasound. This compromise depends on the application (fluid, wall quality, diameter, etc...).

In practice, multiple reflection modes are reserved for smooth pipes without fouling or corrosion.

Probe positioning

The measuring probes must be placed in such a way as to avoid areas at risk of air bubbles and sediment.

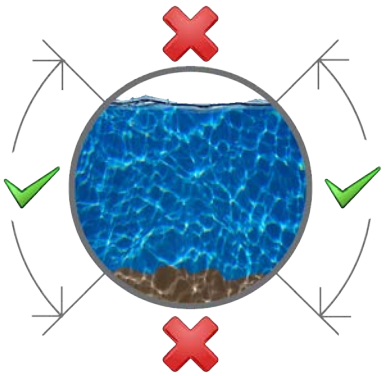


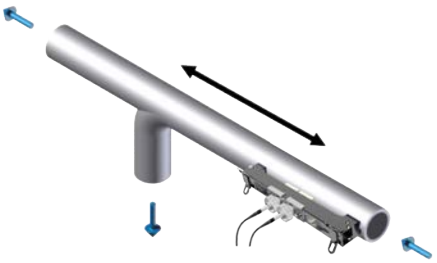
Figure 12-Profil hydrauliqueasymétrique

Respect for straight pipe lengths

We know the rules to be followed according to the layout of the pipes to obtain the ideal measuring conditions. The following paragraphs provide information on the general rules to be observed.

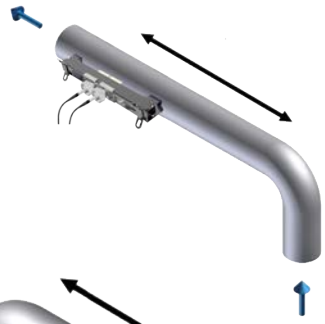
For liquids, the following instructions show the minimum distances (L) before and after a disturbance as a function of the inside diameter of the pipe (D) so that the errors induced by these disturbances remain below ± 1 %.

Measuring near an elbow.



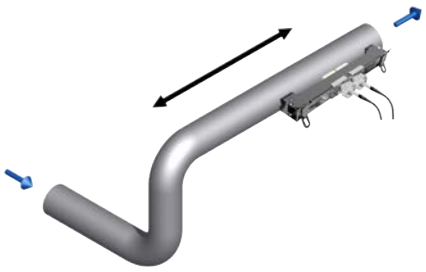
Reflex mode V : Distance > (3x) pipe diameter
Direct mode / : Distance > (5x) pipe diameter

Reflex mode V : Distance > (15x) pipe diameter
Direct mode / : Distance > (20x) pipe diameter



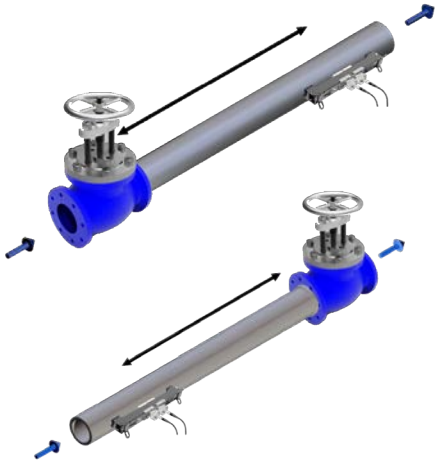
Reflex mode V : Distance > (15x) pipe diameter
Direct mode / : Distance > (20x) pipe diameter

Reflex mode V : Distance > (3x) pipe diameter
Direct mode / : Distance > (5x) pipe diameter



Reflex mode V : Distance > (15x) pipe diameter
Direct mode / : Distance > (20x) pipe diameter

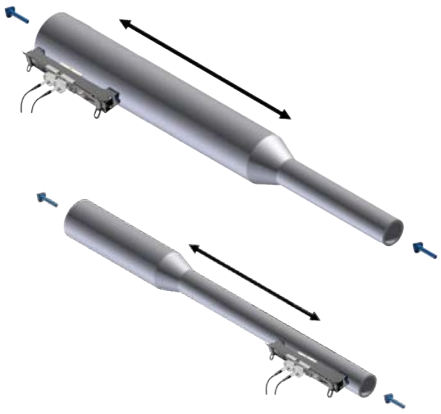
Measuring close to a valve



Reflex mode V : Distance > (15x) pipe diameter
Direct mode / : Distance > (20x) pipe diameter

Reflex mode V : Distance > (5x) pipe diameter
Direct mode / : Distance > (8x) pipe diameter

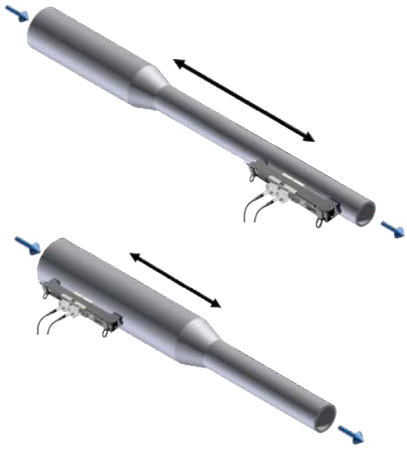
Measuring close to a divergent



Reflex mode V : Distance > (30x) pipe diameter
Direct mode / : Distance > (40x) pipe diameter

Reflex mode V : Distance > (3x) pipe diameter
Direct mode / : Distance > (5x) pipe diameter

Measuring close to a convergent



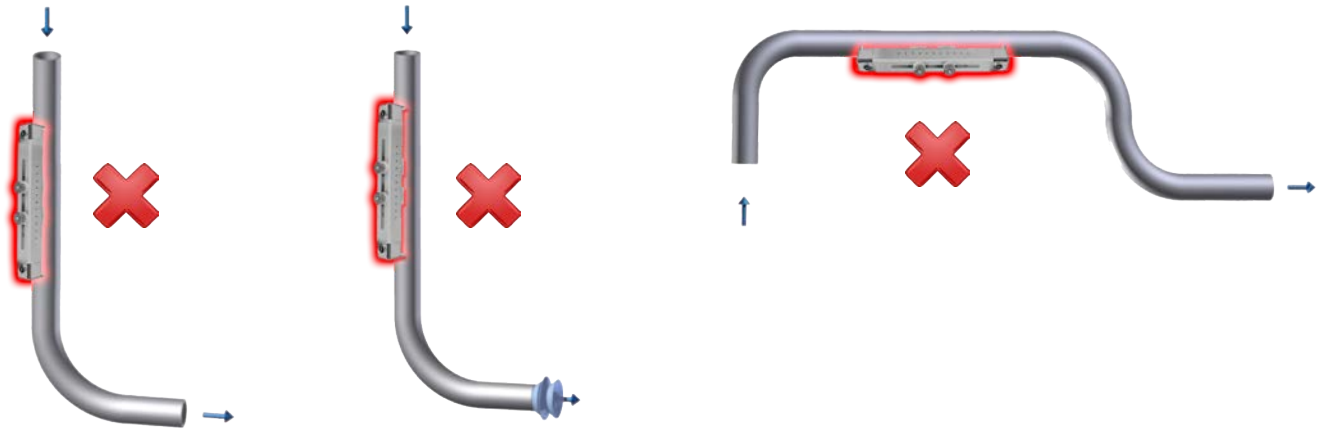
Reflex mode V : Distance > (10x) pipe diameter
Direct mode / : Distance > (15x) pipe diameter

Reflex mode V : Distance > (3x) pipe diameter
Direct mode / : Distance > (5x) pipe diameter

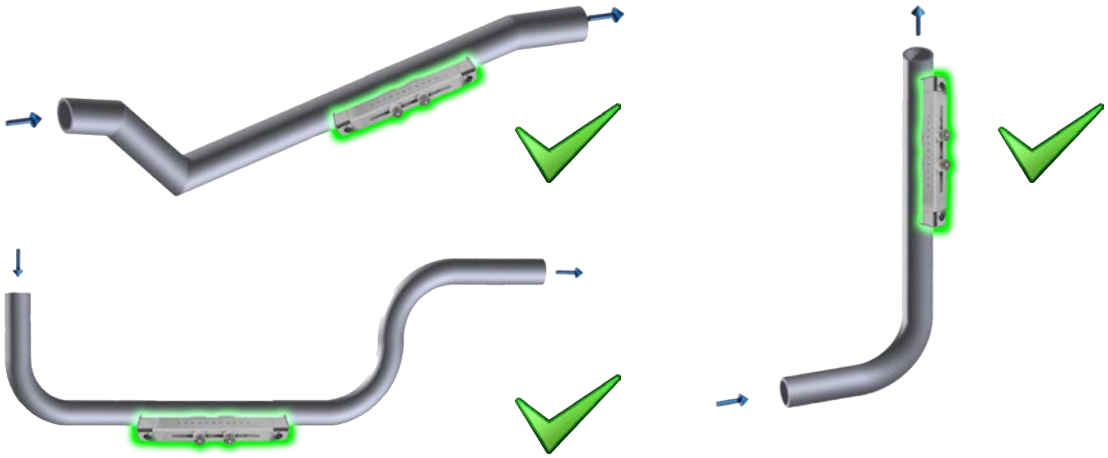
Comments :
The values indicated must be multiplied by 2.5 for gases.

Convergent pipework with an overall angle of less than 16° are not taken into account and are considered as straight lengths (this is not the case for divergent pipework).

Locations not suitable:
Vertical pipe with downflow, especially in the case of free flow.



Recommended locations:
Pipework with ascending flow.



Choice of probe type

The choice of the sensor pair depends on the pipe diameter.

The frequency of the probe has an important effect on the quality of the measurement.

The Minisonic can be used with many probes that are suitable for different pipe diameter ranges.

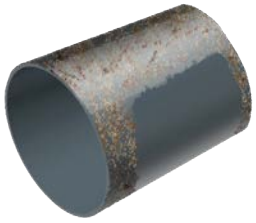
The following table defines the average operating ranges of the probes according to their frequencies:

Frequency	Pipe diameter
2 MHz	10 - 400 mm
1 MHz	40 - 2 500 mm
500 kHz	100 - 10 000 mm

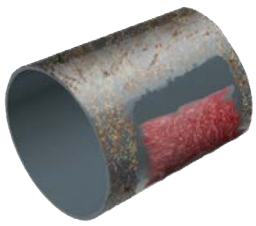
Note: The values given in the table correspond to the internal diameter of the pipe (or nominal).

Installation of the Clamp-on probes

Pipe preparation



After determining where the sensors are to be installed, clean the pipe surface by removing dirt, rust and any roughness (paintwork is not a problem if it is in good condition).

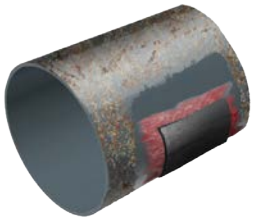


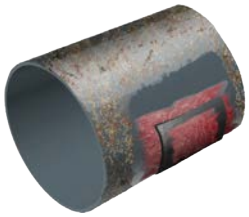
Grease the line with grease where the probes are located **(Do not use silicone grease)**.

Installation of the elastomer strip

It can be used for any surface temperature between -30°C and +100°C.

Cut a piece of elastomer the size of the probe +5mm.
Remove the protective film





Apply grease to the outside of the elastomer strip.

Installation of one of the probes

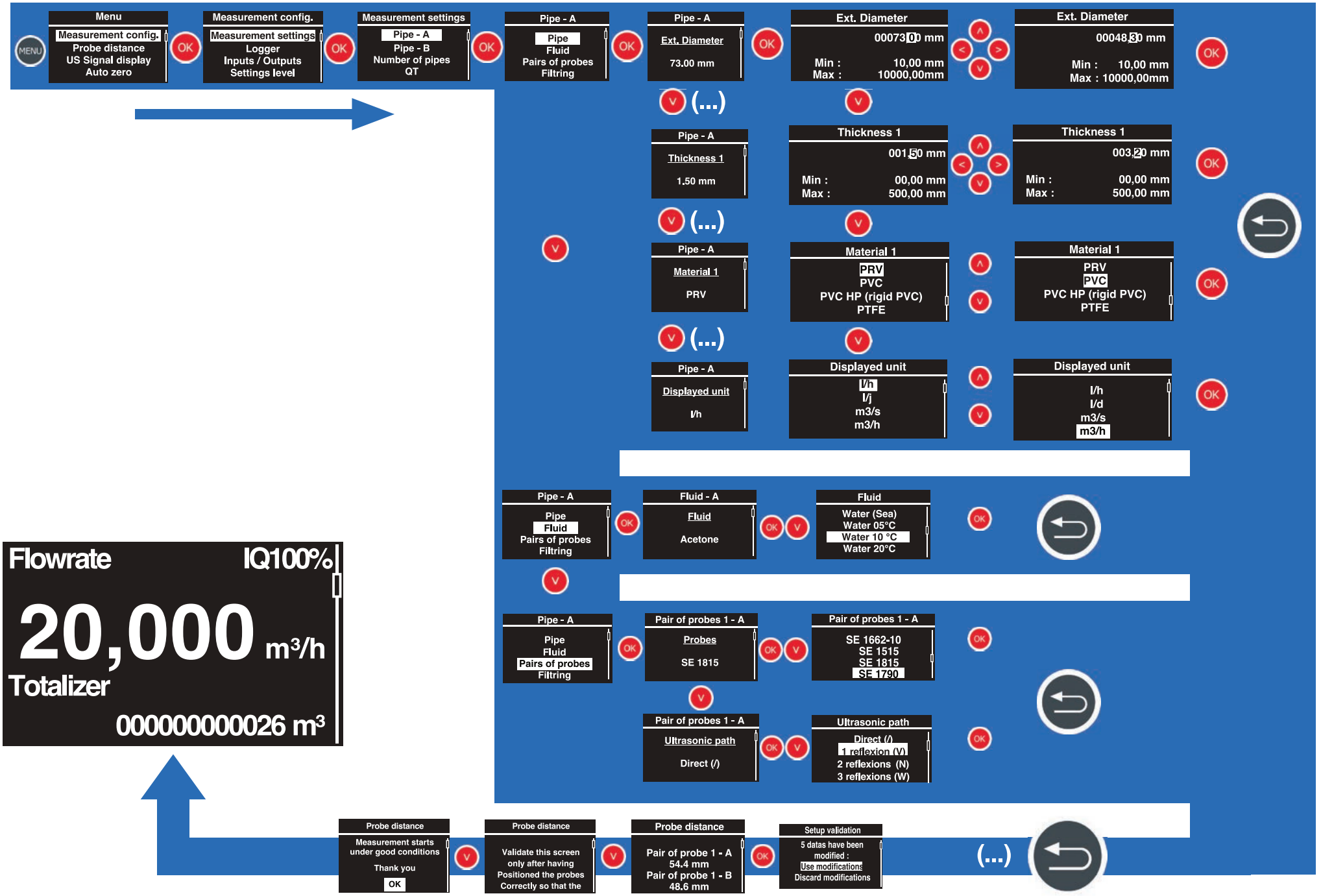
Place the sensor and its holder and secure them by tightening the stainless steel clamps.
Place the clamping screws of the clamps preferably opposite the probes.
NB: The observation of the evolution of the gain (dB) measured by the flowmeter can allow to identify the degradation of the coupling and to foresee its replacement.

Application example

Flow measurement with an ultrasonic flowmeter requires the following information:
• Pipe characteristics (External diameter + Thickness + Material)
• Fluid characteristics
• Probes used (Model)

Application
• PVC pipe / Outer diameter 48.3mm / Thickness 3.2mm
• Fluid measured: Fresh water at 12°C.
• Probes used: SE 1790, V-mounting

Use the overview on the next page to configure the unit according to the data in the example.


Menu
Measurement config.
Probe distance
US Signal display
Auto zero
MENU
OK
Measurement config.
Measurement settings
Logger
Inputs / Outputs
Settings level
Measurement settings
Pipe - A
Pipe - B
Number of pipes
QT
Pipe - A
Pipe
Fluid
Pairs of probes
Filtring
Pipe - A
Ext. Diameter
73.00 mm
Ext. Diameter
00073.00 mm
Min : 10,00 mm
Max : 10000,00mm
Ext. Diameter
00048.30 mm
Min : 10,00 mm
Max : 10000,00mm
(...)
Pipe - A
Thickness 1
1.50 mm
Thickness 1
001.50 mm
Min : 00,00 mm
Max : 500,00 mm
Thickness 1
003.20 mm
Min : 00,00 mm
Max : 500,00 mm
Pipe - A
Material 1
PRV
Material 1
PRV
PVC
PVC HP (rigid PVC)
PTFE
Material 1
PRV
PVC
PVC HP (rigid PVC)
PTFE
Pipe - A
Displayed unit
l/h
Displayed unit
l/h
l/j
m3/s
m3/h
Displayed unit
l/h
l/d
m3/s
m3/h
Pipe - A
Pipe
Fluid
Pairs of probes
Filtring
Fluid - A
Fluid
Acetone
Fluid
Water (Sea)
Water 05°C
Water 10 °C
Water 20°C
Pipe - A
Pipe
Fluid
Pairs of probes
Filtring
Pair of probes 1 - A
Probes
SE 1815
Pair of probes 1 - A
SE 1662-10
SE 1515
SE 1815
SE 1790
Pair of probes 1 - A
Ultrasonic path
Direct (/)
Ultrasonic path
Direct (/)
1 reflexion (V)
2 reflexions (N)
3 reflexions (W)
Flowrate
IQ100%
20,000 m³/h
Totalizer
000000000026 m³
Probe distance
Measurement starts
under good conditions
Thank you
OK
Probe distance
Validate this screen
only after having
Positioned the probes
Correctly so that the
Probe distance
Pair of probe 1 - A
54.4 mm
Pair of probe 1 - B
48.6 mm
Setup validation
5 datas have been
modified :
Use modifications
Discard modifications
(...)

Software update procedure

In order to reach the specific area for system modification and software update you must:
- Save the update file on the root of a USB key.
- If there are several update files, the unit will ask you to leave only one.
- Connect the USB key to the unit's USB port.
- Switch on the Minisonic with the USB key connected to the unit port.

• During the ignition phase which lasts 3 seconds.

ULTRAFLUX MINISONIC

Successively press and release then OK

A countdown timer appears in the upper right-hand corner for 5 seconds.

• Enter the password before the countdown reaches 0 : ROL (Right-OK-Left)

5 **ULTRAFLUX MINISONIC** > R 4 **ULTRAFLUX MINISONIC** OK RO 3 **ULTRAFLUX MINISONIC** < ROL 2 **ULTRAFLUX MINISONIC**

In case of an error in entering the code, the unit will start normally.
- Switch it off and restart the procedure
- In the "System Menu" press OK to start the loading procedure.

System Menu
Update
Informations
Battery
Battery indicator reinit.
OK

• Extract - about 30s.

• Programming - Up to 4 minutes.

• Switch off the unit and wait 1 minute...

• Switch the unit back on.

• Attention, the device does not give any sign of life: this is normal.

• Wait about 5 minutes for the device to restart with the new version.

Software update procedure / FAQ

If the device restarts immediately, what happens?
• Either the device was already in the right version
• Or the update only concerned spelling corrections in one or more languages.

After 10 minutes without any sign of life, the device does not restart, what can I do? ?
The recovery procedure must be carried out.

Switch off the unit and wait 2 seconds.

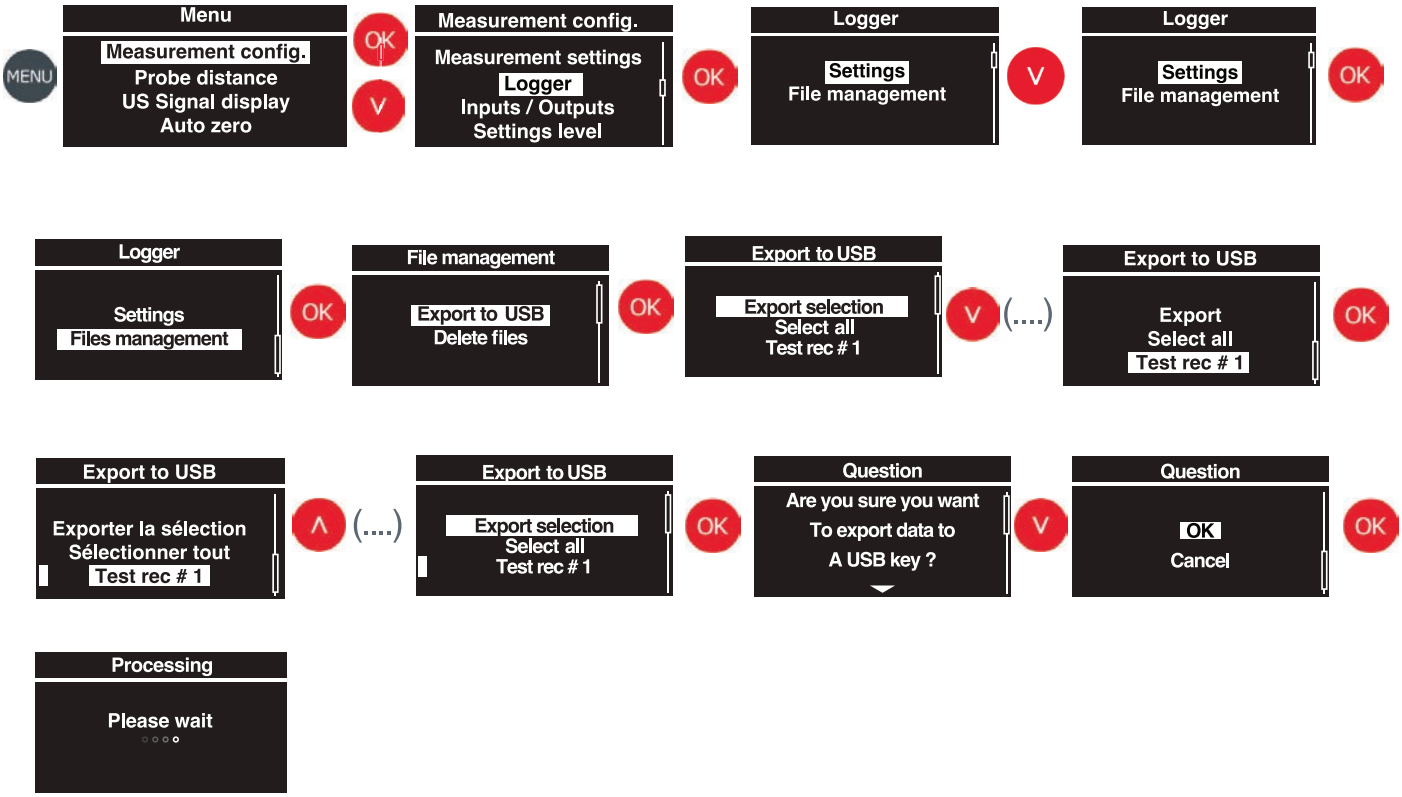
• Switch the unit back on, the device does not give any sign of life: this is normal.

Wait 5 minutes for the device to restart :Either with the new version or Or with the internal back-up version if the update has failed, in which case the complete update procedure must be started again.

Update procedure when the power switch is away from the device.
In this case, place a file with the name “sysmenutempo.txt” on the key and reboot the device.
The device will be waiting for the code to access the system menu without a countdown. Remember to remove the USB key before restarting the device at the end of the transfer of the new firmware (the device will not give any sign of life for several minutes).

Logger / Retrieving recordings

The purpose of this procedure is to inform you:
- The path to the menu for retrieving the recording files
- The procedure for selecting the files to be recovered
- The effective recovery of the file(s) on the USB key
- Importing the registration file into Excel



- Connect the USB key to the unit's USB port.
- In the export to USB submenu, select and mark the file(s) to be exported.
- Export the selection.

When the export is complete, the structure appears as shown below:

USB key	**Physical media: USB key**
Ultraflux_Minisonic SN00017	**File indicating the serial number of the device (e.g. SN00017)**
Logger_Example 1	**File indicating the name of the registration (e.g. Example 1)**
Example 1_2017.11.22_23h38_config.txt	**Text file containing the settings of the unit at the time of this recording.**
Example 1_2017.11.22_23h38.ind001.log	**Spreadsheet file containing logger record data**

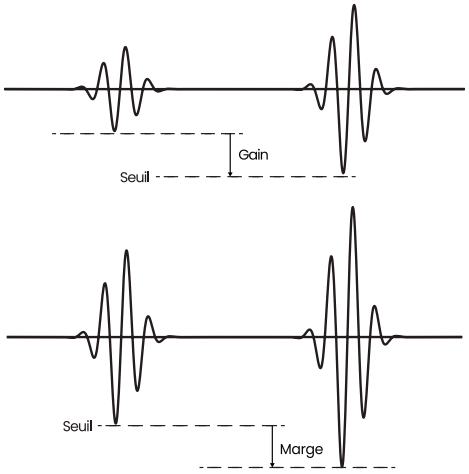
A new logger file is created each time a parameter is changed or when the file exceeds limited file size.

Measuring signal gain adjustment mode

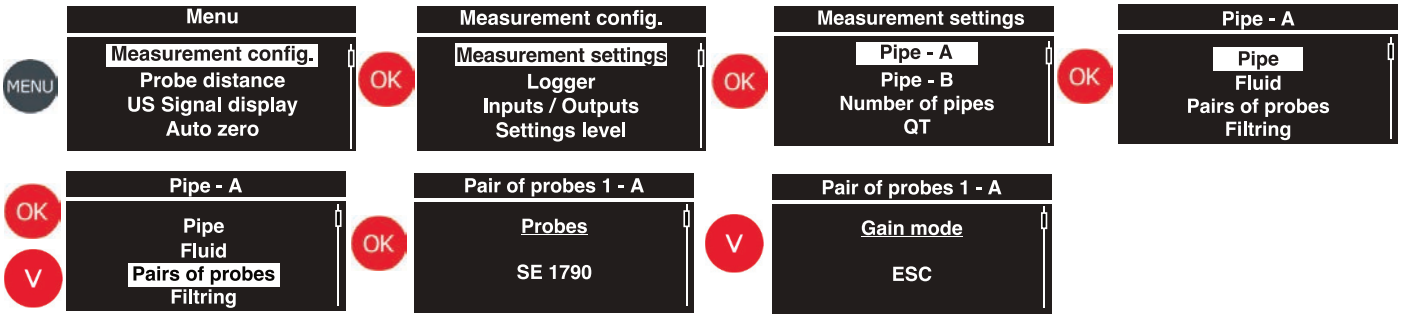
The information detailed in this chapter corresponds to the EXPERT mode of the menu setting level.

Foreword

The Minisonic can work on the positive or negative polarity of the signal. The Minisonic determines at each reception of the measurement signal, the Gain to be applied so that the peak of this signal reaches the detection threshold (example presented on a negative polarity).
To this Gain must be added an additional gain, called Margin, allowing the peak of the signal to be well above the threshold.



Path to gain type setting



The Minisonic offers several Gain and Margin adjustment modes.

ESC then Auto

Switching from ESC mode (see below) to perform the first measurement and then permanently to Automatic mode (see below) for the rest. This mode is to be recommended for long term measurements on an installation without major changes in the application conditions.

ESC (Echo Shape Control)

This mode selects the best Gain to be applied to the signal and the most appropriate Margin.
This mode is to be recommended when using a portable flowmeter that performs point measurements on different applications.
This mode requires a few seconds of signal analysis before indicating the flow rate value. In case of signal loss due to a disturbance in the measurement conditions (passing of bubbles...) the device starts a new ESC.

Automatic

In this mode, only the Gain is determined automatically; the Margin must be entered manually. The margin corresponds to the difference between the maximum signal and the measurement threshold (6dB = threshold at 50% of max, 20dB = threshold at 10% of max). The larger the margin, the lower the threshold on the signal. A large margin (between 15 and 25dB depending on the noise level) will give a more reliable but less robust measurement if it is taken on the first half-wave. There is a risk of losing the measurement if the noise level increases (which is generally accompanied by an increase in gain)".

Manual

The Gain and Margin values are determined by the user.
This mode is useful if signal disturbances make the gain too unstable for automatic search.

www.faureherman.com

Counting every drop.

Faure Herman
ULTRAFLUX

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