PARATRONIC
Eau Environnement Risques Naturels

INSTALLATION INSTRUCTIONS

Entreprise certifiée
ISO 9001

French manufacturer

ULTRASONIC SENSOR
4-20 mA

Commissioning and calibration
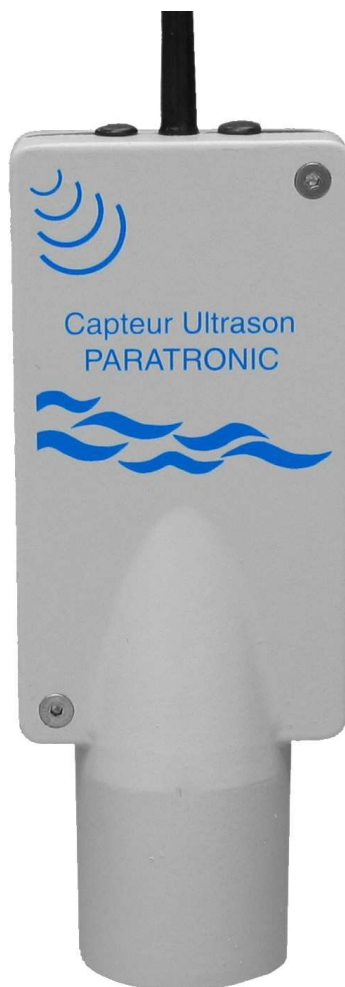
Contents

1   SAFETY INSTRUCTIONS

⚠**:** WARNING: The sensor must be powered by a LIMITED POWER SOURCE.
The protection offered may be compromised if the ultrasonic sensor is not used as specified.
A suitable isolation device must be provided outside the equipment.
Detailed information on safety symbols and marks can be found on the last page of this document (**section 9**).

2   DESCRIPTION

PARATRONIC ultrasonic sensors are designed for non-submerged level measurement, free from contact with liquids. They are particularly suitable for use in treatment stations, reservoirs, storm overflows, waterways, discharge channels, etc., and are protected against submersion effects (IP68).
Self-powered by the measurement circuit, they supply a 4/20mA signal for a measurement of up to 10m (depending on the model). They are simple and quick to use as they can be suspended from the cable.
Commissioning via the configuration console takes a matter of seconds. It is also possible to use "WinUS" software and the "ADP 232-US" adapter from **PARATRONIC**.

3   TECHNICAL SPECIFICATIONS

3.1   MECHANICAL SPECIFICATIONS

Description: Metal casing
Material: Cast aluminium, epoxy paint
Dimensions (mm):   L=95 x W=67 x H=242 (see detailed drawing)
Weight (kg):   1.7 + cable
Mounting: Suspended with cable or on plate
Cable: PVC sleeve, electrical shielding, 2 x 0.60 mm² conductors
   Diam. 7 mm +/-0.5 mm, weight 60 g per metre

3.2   ELECTRICAL SPECIFICATIONS

Power supply voltage: 10 to 40 V=
Output signal: 4/20 mA on 2 wires (protected against polarity inversion)
Fault signal: 22 mA (no echo)
Fault time delay: 240 sec (adjustable on request from 10 to 250 sec)
Max permissible resistance: 1350 Ω
Measurement range: 6 metres (6m sensor), 10 metres (10m sensor)
Emission cone: +/- 6° at -3 dB
Blind zone: 30 cm
Level variation rate: 5 cm/s (adjustable on request from 1 to 50 cm/s)
Resolution: 1 mm
Linearity: 0.2% of full scale
Heating time: 3 s
Temperature compensation: yes
Residual temperature drift: 0.04% / °C
Connection: Cable with 2 x 0.60 mm² conductors

3.3 ENVIRONMENT, STANDARDS

Maximum altitude:	2000m above sea level
Protection rating:	IP68
Operating temperature:	-20°C to 60°C
Storage temperature:	20°C to 60°C
Electromagnetic compatibility:	Fast transients level 4
	Lightning surge wave 8/20, 2 KV
	EN 61000-6-2, EN 61000-6-3
Electrical safety:	EN 60950-1
Health:	EN 62479
Environment	EN 50581

CE Mark : $C \epsilon$

4   DIMENSIONS
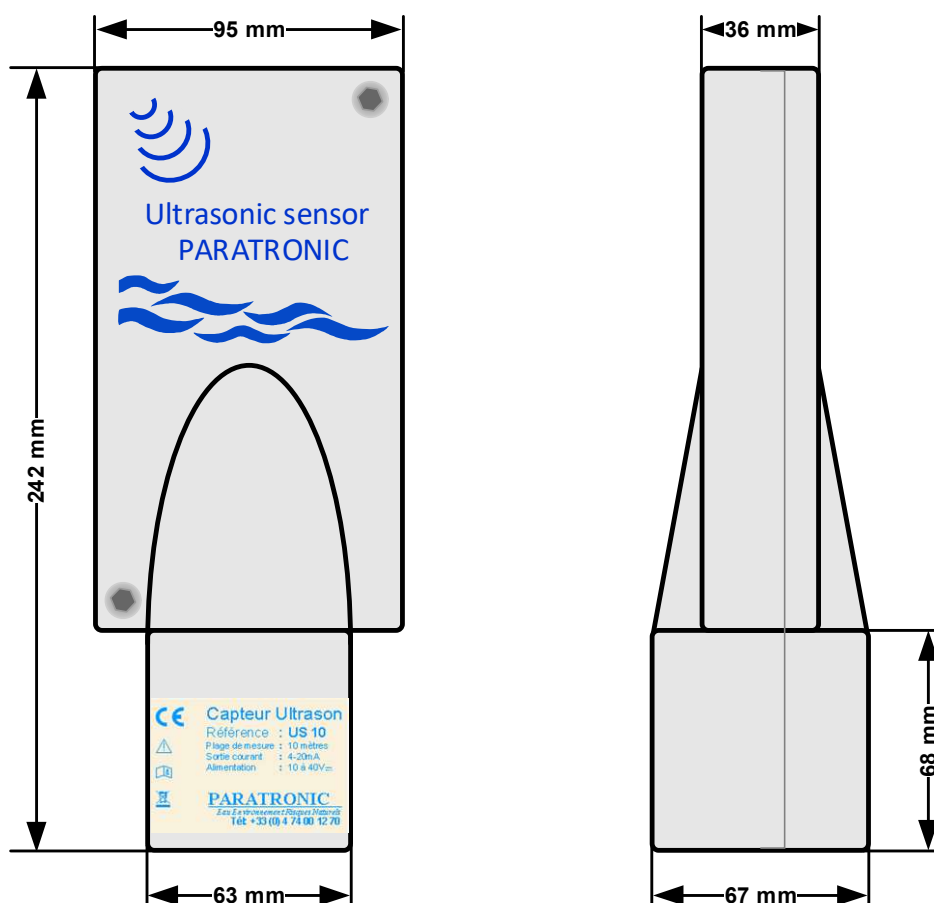
5   INSTALLATION

5.1   USE

Suspended with hook on cable   or   Fitted on special mount

Diam. 5 mm

74 mm
120 mm
114 mm
160 mm
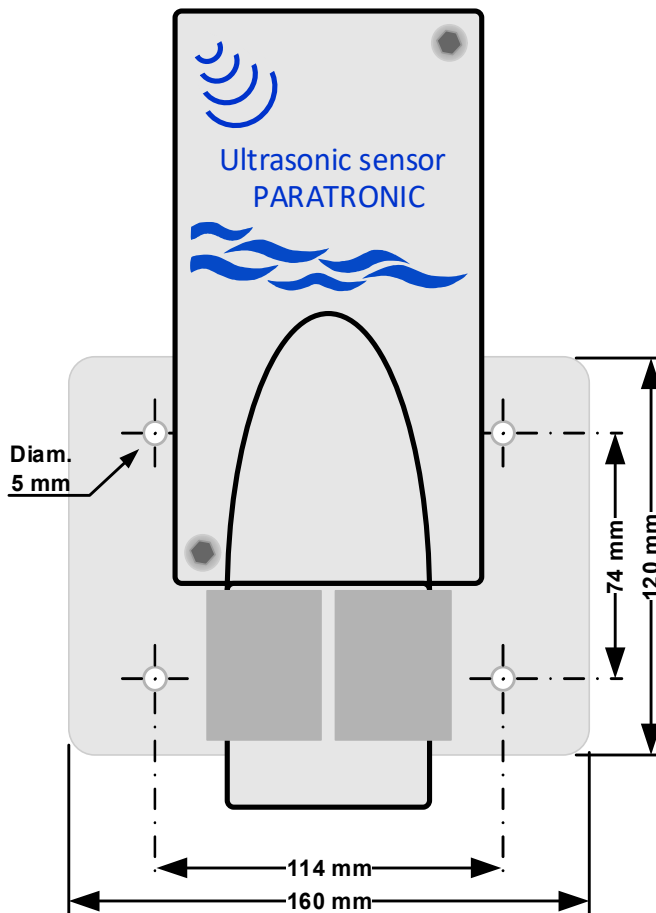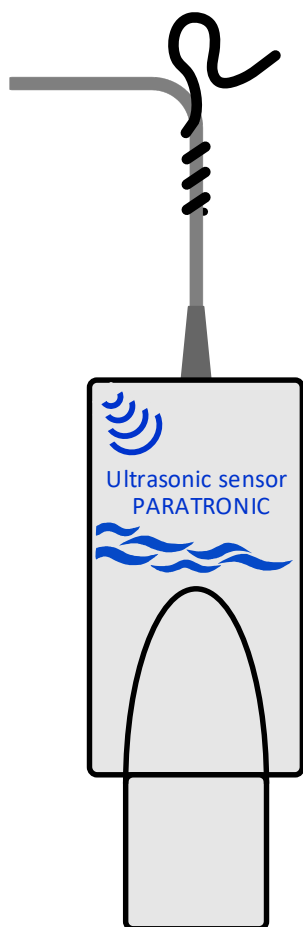
5.2   INSTALLATION

To reduce the risk of unwanted echoes, the sensor must be installed perpendicular to the surface to be measured, and in such a way that the emission cone (+/- 6° at -3 dB) is clear of any obstacle.

On a tube diam. > 67 mm

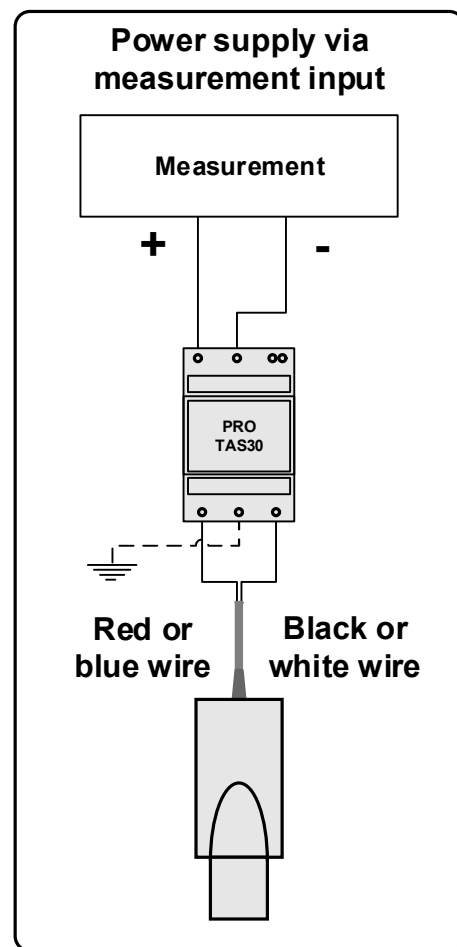The sensor can be mounted near a vertical wall if it has no rough areas.
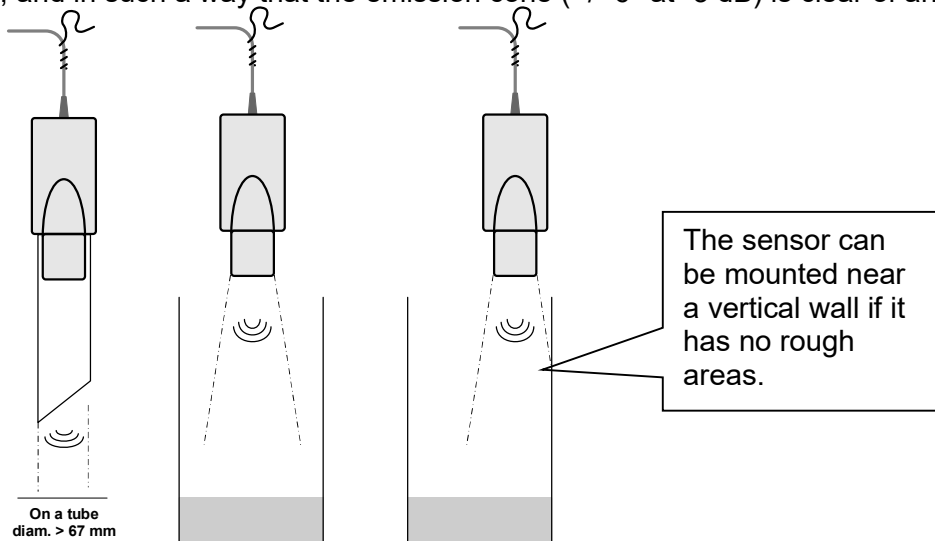
The ultrasonic sensor must be protected from direct sunlight by a screen.

6   CONNECTION

The ultrasonic sensor must be powered by a LIMITED POWER SOURCE. It is connected using its 2-conductor cable: Red or blue = "**+**", black or white = "**-**".

Example of connection

Separate power supply

Power supply
10 to 40 V=

Measurement input

+   **-**   **-**   **M**

PRO
TAS30

Red or
blue
wire

Black or
white
wire

**Power supply via
measurement input**

Measurement

+   **-**

PRO
TAS30

Red or
blue wire

Black or
white wire

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Tel.: +33 (0)4 74 00 12 70 – Fax: +33 (0)4 74 00 02 42 - E-Mail: info@paratronic.fr - Web: http://www.paratronic.com
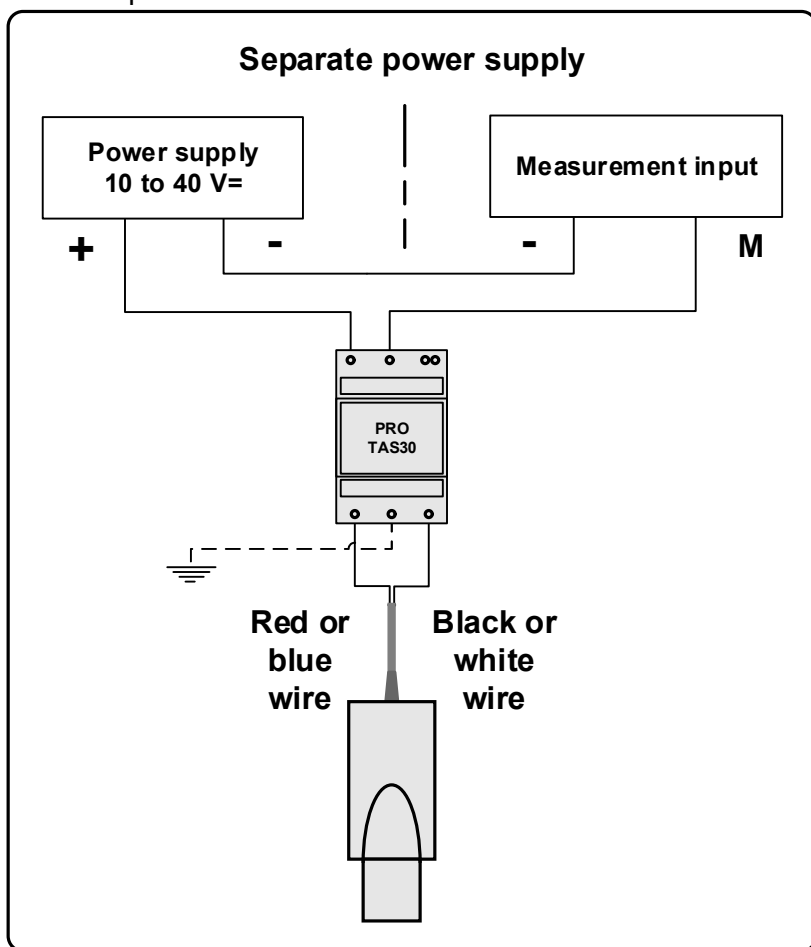
7   PROGRAMMER USE

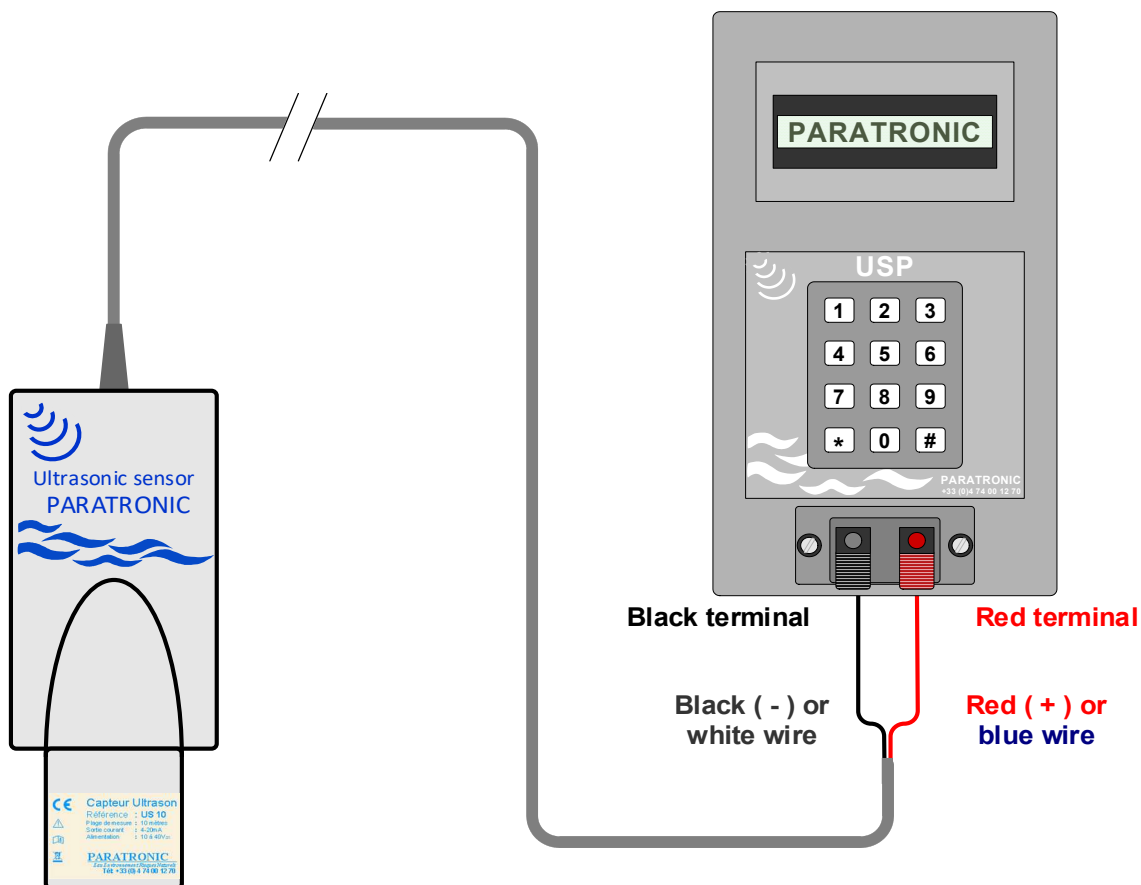Connect the 2 measurement wires on the ultrasonic sensor directly to the configuration console terminals:

> ➢ Red terminal = red or blue wire: "**+**",
> ➢ Black terminal = black or white wire: "**-**".

NB.: The cable length between the configuration console and the ultrasonic sensor must not exceed 20 m.
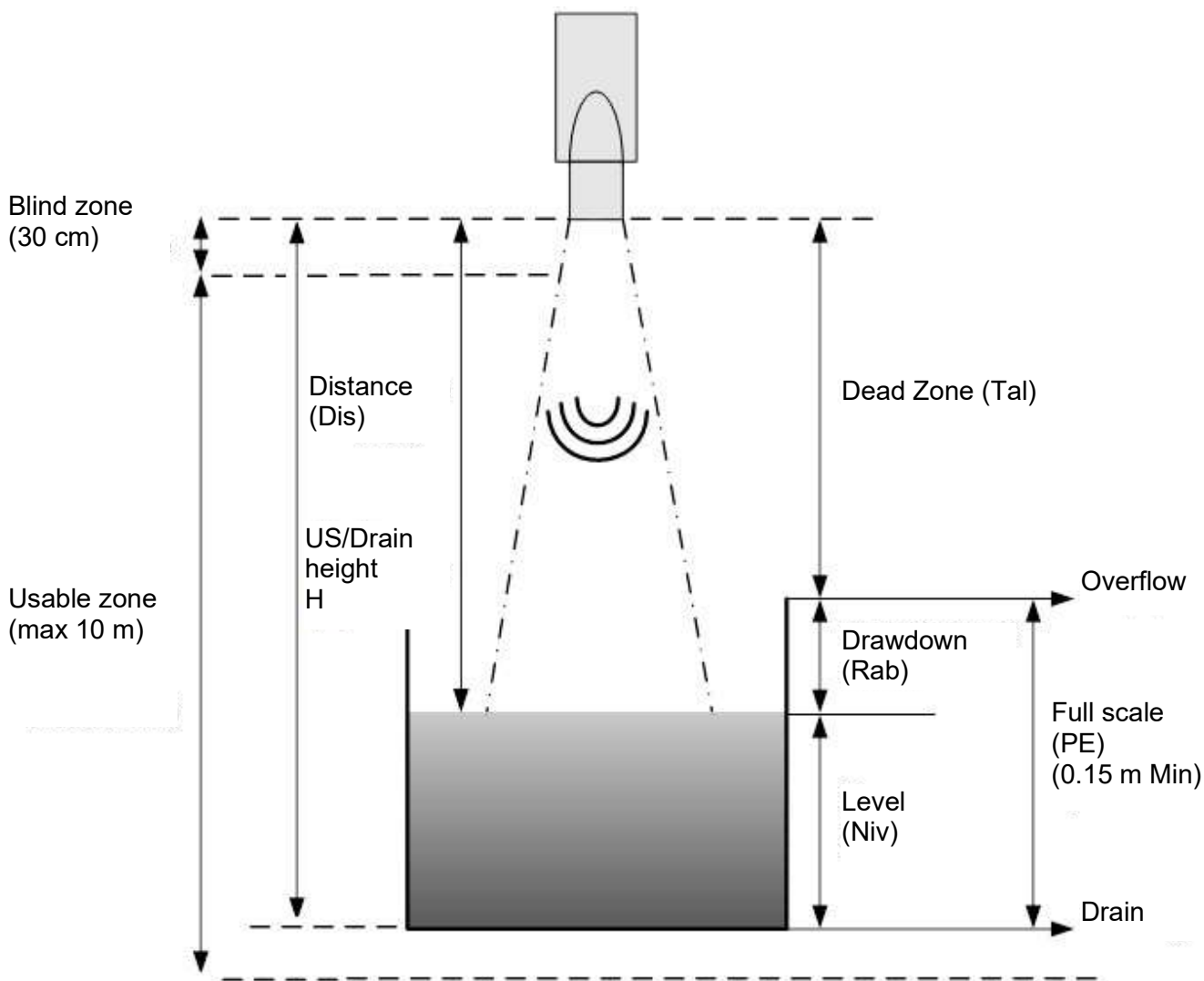

8   PROGRAMMING

The **PARATRONIC** ultrasonic sensor is configured with the **PARATRONIC** programming console.

Before performing configuration, it is necessary to ensure that the sensor installation is in line with the recommendations described in **section 6**.

8.1 ZONE DEFINITION

The level of liquid to be measured must be within the usable zone.

8.2 INFORMATION REQUIRED FOR CONFIGURATION

To configure the **PARATRONIC** ultrasonic sensor using the programming console (or programmer), you will need to know some data found in the above diagram, e.g.:

➢ The height (H) between the US and the drain (or the bottom of the reservoir, pumping station, storm overflow, river, etc.)

➢ The level or drawdown for which you require a 20 mA signal
  o E.g.: the overflow height of a reservoir, the maximum level of a waterway, groundwater table, etc., or the filling level of a pumping station.

➢ The current level or drawdown measurement

8.3 ENTERING SETTINGS

Once the ultrasonic sensor has been connected to the programming console terminals,

| PARATRONIC |
is displayed for 1 second.

The programmer then switches to input mode and displays:

| PE XXXX Niv XXXX | or | PE XXXX Rab XXXX |

The first character after "**PE**" flashes.

NB.: If the screen shows other information, press the ⌷ **#** ⌷ key.

Before starting to program your US, you must first check the distance (dis) measured by your US. Press the ⌷ ***** ⌷ and 3 keys on the programmer simultaneously, the distance between the US and the liquid is displayed. Check that this measurement is accurate. Otherwise, reposition your US.

8.3.1 Entering "PE"

The full scale (**PE**) corresponds to the measurement for which the sensor outputs 20 mA. This value should also be taken into account for the acquisition system configuration.

Full Scale (PE) = Level (Niv) + Distance (Dis) – Dead Zone (Tal)

WARNING: the DEAD ZONE value must be greater than or equal to 300 mm. Otherwise, the error message **tal < 300 mm** is displayed (see section 8.5).

Your maximum PE will be **PE max =** US/Drain height (**H**) **–** Dead Zone min (**300 mm**)

➢ E.g.: distance between bottom of reservoir and overflow = 5.5 metres.
  ✓ This height is expressed in millimetres.

➢ Enter using the keypad; 5500.

After the ⌷ **5** ⌷ **5** ⌷ **0** ⌷ **0** ⌷ keys have been pressed in succession, the cursor will be set to

flashing at "**N**" of **Niv** or "**R**" of **Rab**.

| PE 5500 Niv XXXX | or | PE 5500 Rab XXXX |

8.3.2 Entering "Niv" or "Rab"

➢ The presence of the letters "**Niv**" means that the level will be measured; i.e. that the signal will be proportional to the water level between the bottom of the reservoir and the overflow.

➢ The presence of the letters "**Rab**" means that the drawdown will be measured; i.e. the measurement will be made between the water surface and the maximum level. The signal will be proportional to this clearance height.

If the display on the screen matches your choice, press the │ **#** │ key.

If you wish to change the type of measurement:

➢ Press the │ **1** │ key on the keypad to switch from "**Rab**" to "**Niv**".

➢ Press th│ **2** │ key on the keypad to switch from "**Niv**" to "**Rab**".

Now, the cursor flashes on the first character after "Niv" or "Rab".

| **PE 5500 Niv XXXX** | or | **PE 5500 Rab XXX** |
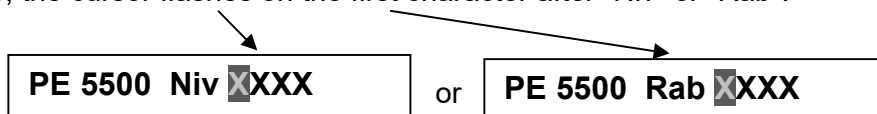
Now, you need to specify the current value detected by the sensor for level or drawdown, according to your previous choice.

➢ E.g.: for a current water level of 4.52 metres.
   ✓ This height is expressed in millimetres.

➢ On the keypad, enter: 4520 for a level measurement, or
➢   0980 for a drawdown measurement.

- 0 980 = 5 500 – 4 520

Press the │ **4** ││ **5** ││ **2** ││ **0** │ or │ **0** ││ **9** ││ **8** ││ **0** │ keys in succession, depending on the type of measurement required.

| **PE 5500 Niv 4520** | or | **PE 5500 Rab 0980** |
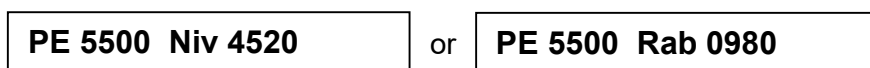
If you have made an error during input, use the │ **#** │ or │ ***** │ keys to move the cursor to the character to be changed.

This operation can be performed at any stage of the programming process.

If the information on the screen is correct, press the │ ***** │ key at the same time as

the │ **2** │ key to confirm the programming.

➢ The screen successively displays:

interrogation

programmation

programmation ok

and, if the water level has not changed, the programmed values will also be displayed.

PE 5500 Niv 4520	or	PE 5500 Rab 0980

If the water level has changed, the last 4 digits indicate the current level or drawdown.

The programming is now complete.

Disconnect the configuration console from the ultrasonic sensor and connect it to the acquisition system on your measurement circuit, observing the polarities (red wire "**+**", black wire "**-**").

8.4 READ, CHECK, MODIFICATION

At any time during operation, you can, using the programming console connected to the ultrasonic sensor:

➢ Read the sensor measurement values

✓ Read: press the | ***** | key at the same time as the | **1** | key

✓ Example of display: | **interrogation** |

PE 5000 Niv 3290	or	PE 5500 Rab 1710

➢ Check the dead zone and distance values (see **section 8.1** "zone definition")

✓ Check: press the | ***** | key at the same time as the | **3** | key

✓ Example of display: | **interrogation** |

TAL 0300 DIS 2010

➢ Modify the programming settings

✓ Modification: press the | **#** | key

✓ Example of display: See **section 8.3**.

Notes: The programming console power supply is switched off automatically once the ultrasonic sensor has been disconnected from it.

8.5 ERROR OR ALARM MESSAGES

Some of the following messages may be preceded by the display: | **mauvaise donnee.** |

| **pas de réponse** |: The sensor does not respond after programming or a programmer query.
Check the connection with the sensor.

| **tal < xxx mm** |: Based on the distances entered during configuration, the high level of the reservoir is located in the sensor blind zone.
Enter correct distances or reposition the sensor.

| **PE < xxx mm** |: The full scale (PE) is less than the minimum height.
Enter correct values.

| **tal + PE > xxx mm** |: Based on the distances entered during configuration, the bottom of the reservoir is outside the usable zone of the sensor.
Enter correct distances or reposition the sensor.

| **PE < niv ou rab** |: The value entered, for the level or drawdown, is greater than that of the full scale.
Enter correct values.

| **remplacer piles** |: The configuration console battery voltage is insufficient.
Replace the batteries on the programmer.

| **court-circuit** |: An abnormally high current is detected at the programmer output.
Check the cables and connections connecting the programmer to the sensor.

| **pas d'écho** |: The sensor does not detect an echo.
Check the ultrasonic sensor installation (**section 5**).

| **PE xxx Rab<<<<** |: The drawdown measured is less than zero.

| **PE xxx Niv <<<<** |: The level measured is less than zero.

If the display stays off after connecting the sensor to the programmer, check the polarities of the connection and the battery status.

9   SAFETY SYMBOLS AND MARKS

⚠: Hazard risk. Important information. Refer to the instructions for use.

📖: Read the instructions for use.

CE: Compliant with European Union and EFTA directives.

🗑: European Directive 2002/96/EC of 27 January 2003 on waste electrical and electronic equipment (WEEE Directive) was transposed in France by Decree No. 2005-829 of 20 July 2005.
Electrical or electronic appliances, and their spare parts and consumables must never be disposed of in household waste.
PARATRONIC has undertaken to set up an Individual Collection System.
PARATRONIC waste electrical and electronic equipment should be returned by customers (End users) to the following address:

PARATRONIC - Zone Industrielle - Rue des Genêts, 01600 REYRIEUX, France
Service Recyclage DEEE

The specifications described in this document are subject to change by the manufacturer without notice.