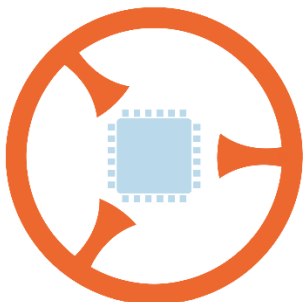
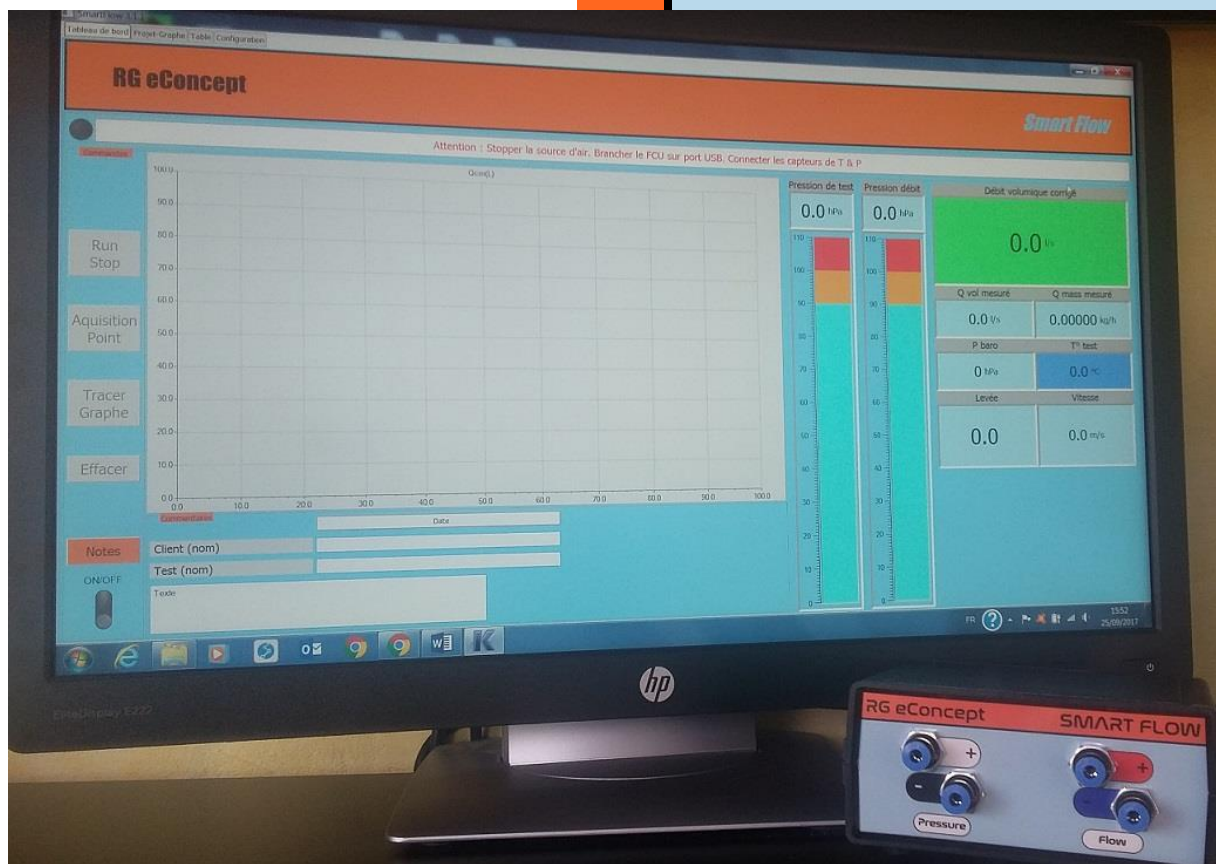


User's manual

SmartFlowVel-SCV1



RG eConcept
Smart Motorsport

rgeconcept.fr

StFwVI-UM

| Révision | Commentaire | Date |
|----------|----------------------------|------------|
| 1.0 | Version initiale | 13/02/2020 |
| 1.1 | Mode Paux ou Vitesse Pitot | 24/02/2025 |
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1. Introduction : Gas velocity measurement

Purpose of the SmartFlowVel version

This version of the software allows to measure and visualize the gas velocity in a duct. The measurement is performed by a Pitot probe and an additional auxiliary pressure channel of the FCU, version FCU-3.

The measurement is displayed in real time with the flow rate measured on the flow bench, but it is also possible to map these measurements for comparison between the locations of a modified or unmodified duct.

Saving, replaying and comparing the maps is also possible.

2. Presentation of the software

The **C:\DataSmartFlow** directory contains the ".mpk" velocity map files that will be created when saving the velocity measurements made on a duct.

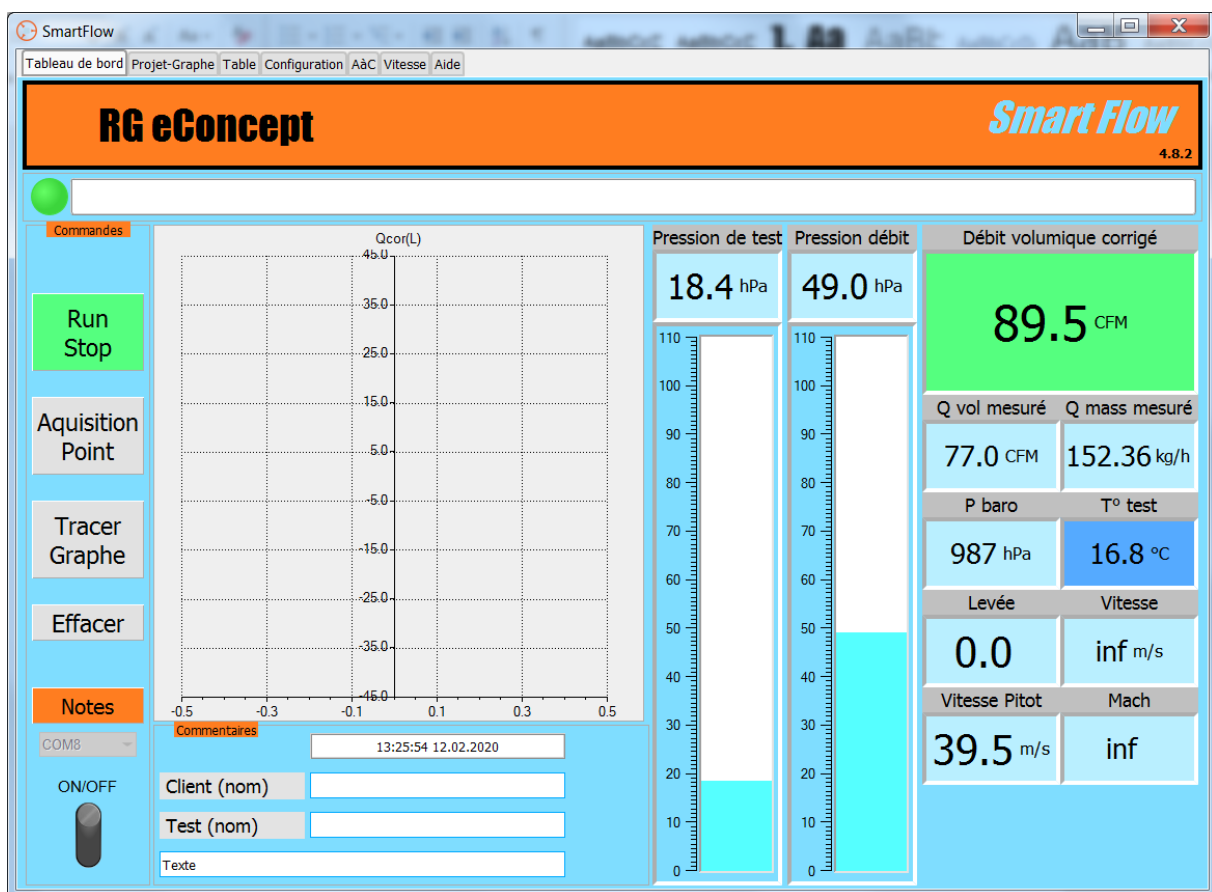
Dashboard

In this version, the "Dashboard" tab contains a new display that is validated if the software detects the FCU-3:

"Pitot velocity". It indicates the speed measured by the Pitot probe connected to the auxiliary input of the FCU-3.

The background of the display changes colour if the speed exceeds certain thresholds:

Around 120 m/s (394 f/s) it becomes orange and above 130 m/s (427 f/s) it turns red because the measurements may be erroneous due to sensor saturation.

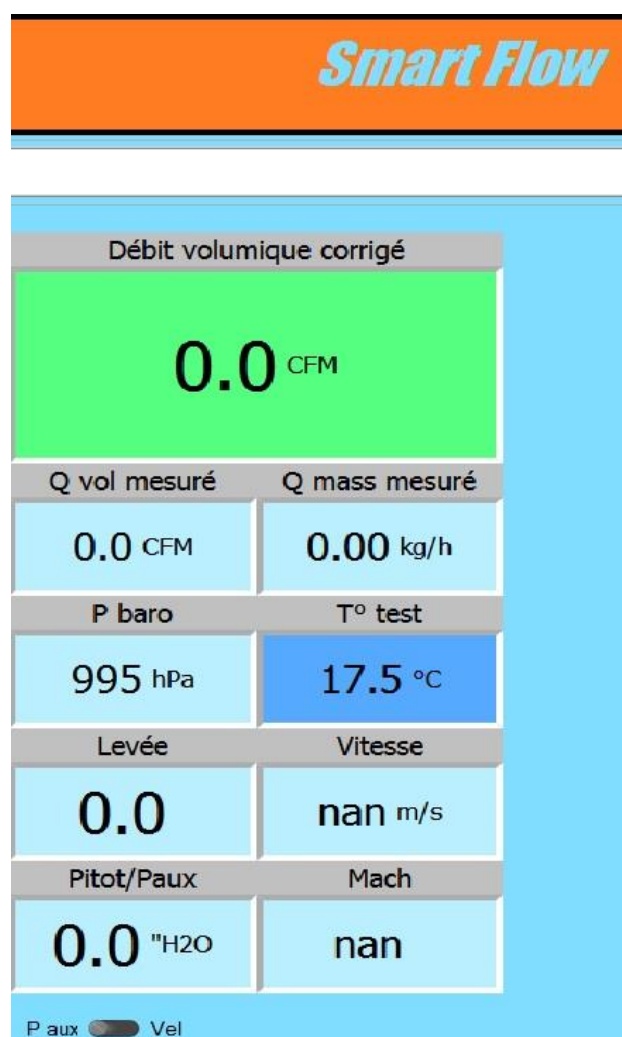
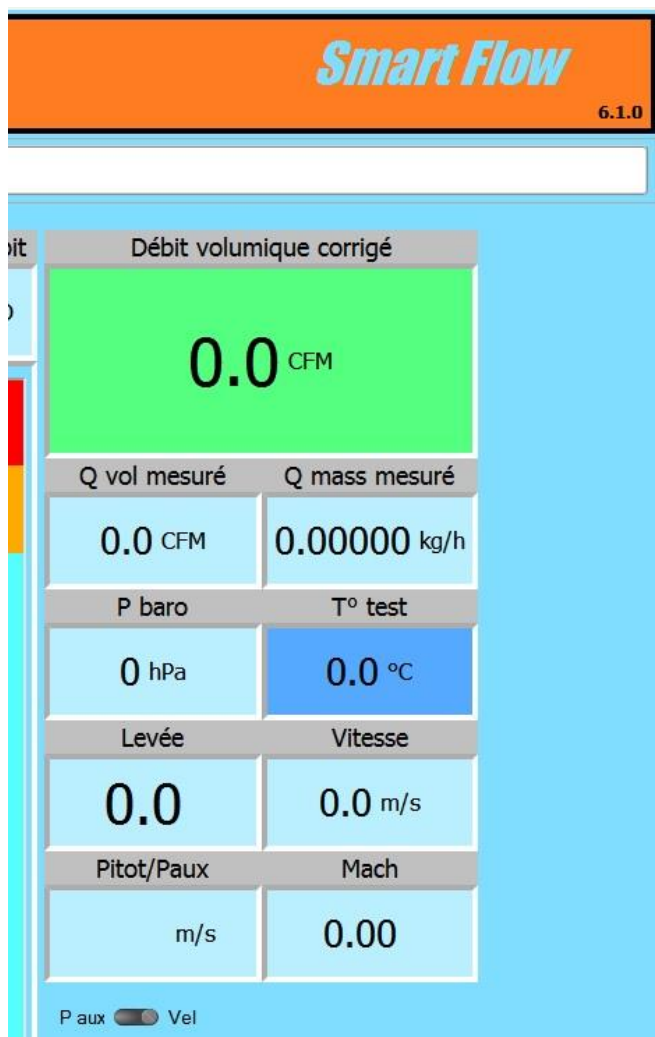


Addendum for versions V6.1.0 and higher:

These versions offer the option of reading and displaying the pressure applied to the FCU auxiliary input.

A selector located below the pitot speed display allows you to select either the pitot speed obtained with the pitot tube ("Vel" position) or the pressure if the input is connected to a desired measurement point ("Paux" position). The pressure unit can be configured in the same way as for the other pressures in the "Configuration" tab.) The choice of mode is saved in the same way as the configuration parameters.

The measurable pressure range is **100 mbar/hPa (40 inches of water)**.



Velocity

The " Velocity " tab is the control, file and display manager of the velocity measurements. See figure 2.

Frame "Files":

The buttons allow to save, read (1 or 2 files) and print.

Frame " Commands ":

The " Velocity " display shows the velocity measured by the Pitot probe, the flow rate is also shown in the " Q cor " display and the valve lift is manually entered for indication and storage by the user in the " Lift " field.

A 3D graph allows to visualize the velocities in different measurement locations in the form of a colour map.

A block of 9 round buttons superimposed on the 3D graph allows the acquisition of the velocity in 9 locations of the examined pipe. At the time of the click on one of the buttons the corresponding box of the grid located below is loaded with the numerical value of the speed read in this place.

Frame " Maps 1 ":

Allows to capture and memorize 4 3D graphs with their value of lift, flow and the corresponding grid. A text box for comments is available for each " map ". This frame is also used to display the values read in the first opened file. The name of the opened file is recalled in the display at the top of the " Velocity " tab.

Frame " Maps 2 ":

Allows to read the second file in order to compare it to the first one. It opens only if the first file is read. The name of the second open file is also recalled in the display at the top of the " Velocity " tab.

Frame " Language ":

Allows the choice of the language and contains the check mark which makes it possible to scale or not the 3D graphs between them in order to compare them at the same scale (fig.8).

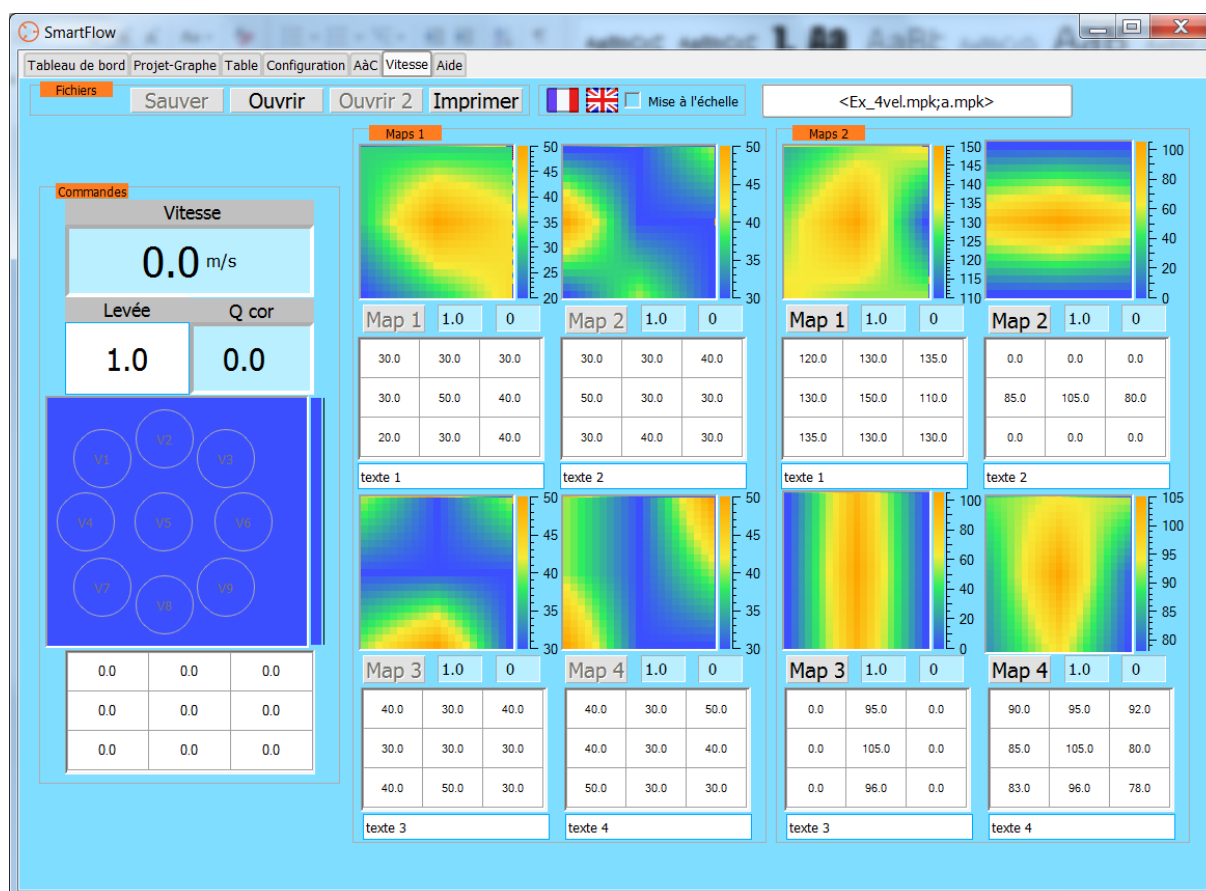


Figure 1 Velocity tab with sample maps (dummy for demonstration purposes)

3. How to use the software

Probe installation

Use the Pitot probe connected to the auxiliary pressure taps of the FCU as follows:

- The upper socket of the FCU receives the pipe coming from the central socket of the Pitot probe (P+). This is the total pressure.
- The low socket of the FCU receives the pipe from the side socket of the Pitot probe (P-). This is the static pressure.

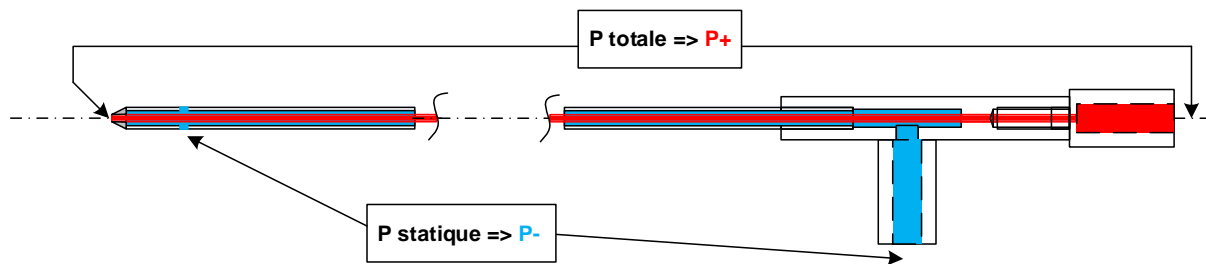


Figure 2 Pressure taps on a schematic Pitot Probe

The principle of the Pitot probe is to measure the pressure difference between the total pressure and the static pressure which allows to calculate the flow velocity.

Note: for measurements on an intake port, the probe has a U-shaped curved shape.

Starting, reading and storing

Start SmartFlow as for a flow measurement. The velocity will be displayed in real time in its dedicated display on the Dashboard. See Figure 1.

For velocity analysis at different locations switch to the "Velocity" tab. The speed and flow rate are repeated.

Place the probe on the desired location and once the velocity has been measured, click on the button (round) of the corresponding location, the velocity will be memorized in the grid and displayed on the 3D graph by a color. 9 locations are possible (fig. 4).

Once the 9 locations have been measured then you can save the whole in the frame " Maps 1 " on one of the 4 maps by clicking the corresponding " Map " button (fig. 5). Each map has a comment field to note the measurement conditions.

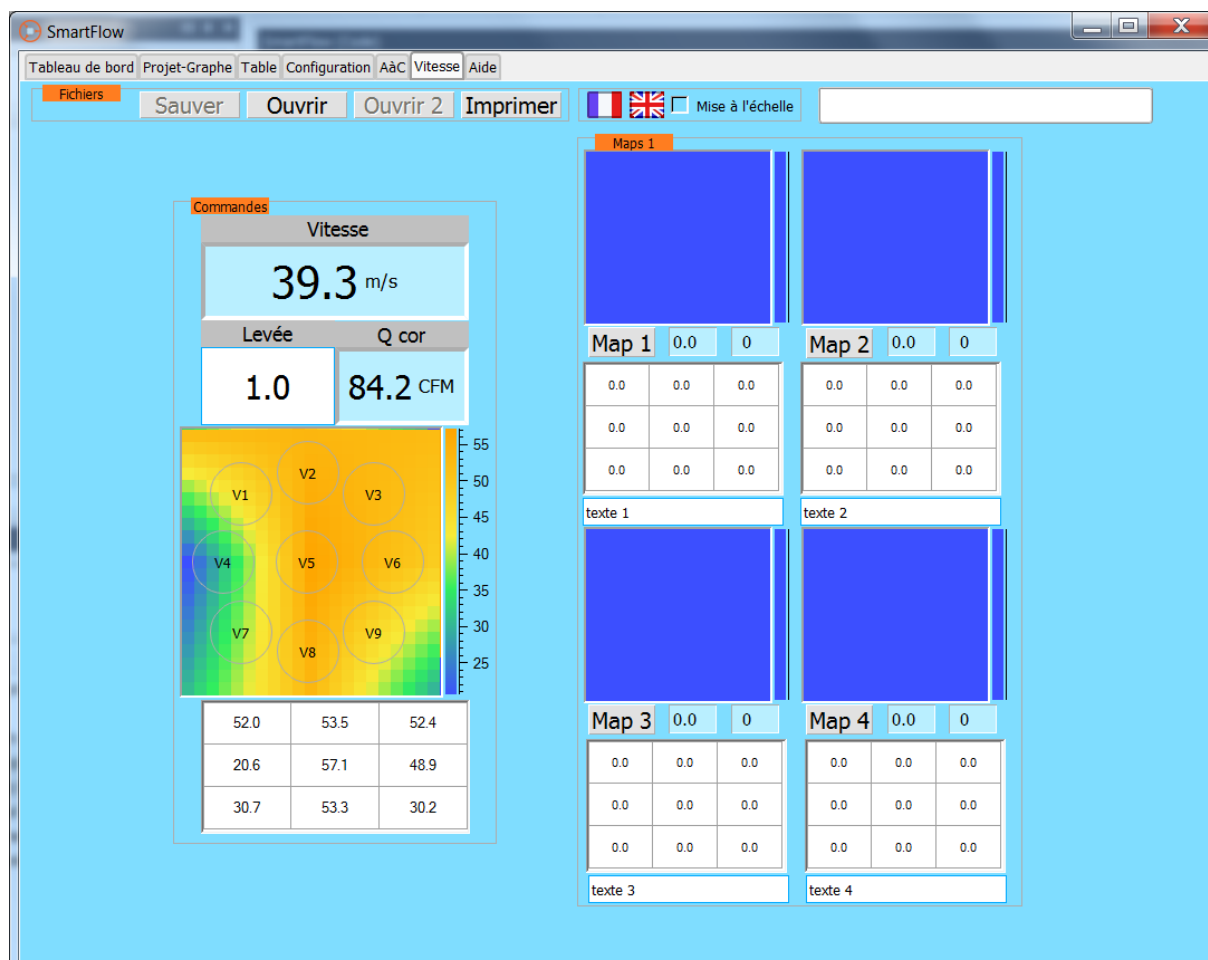


Figure 3 The 9 points are measured (e.g. made on a cylinder head without the valve).

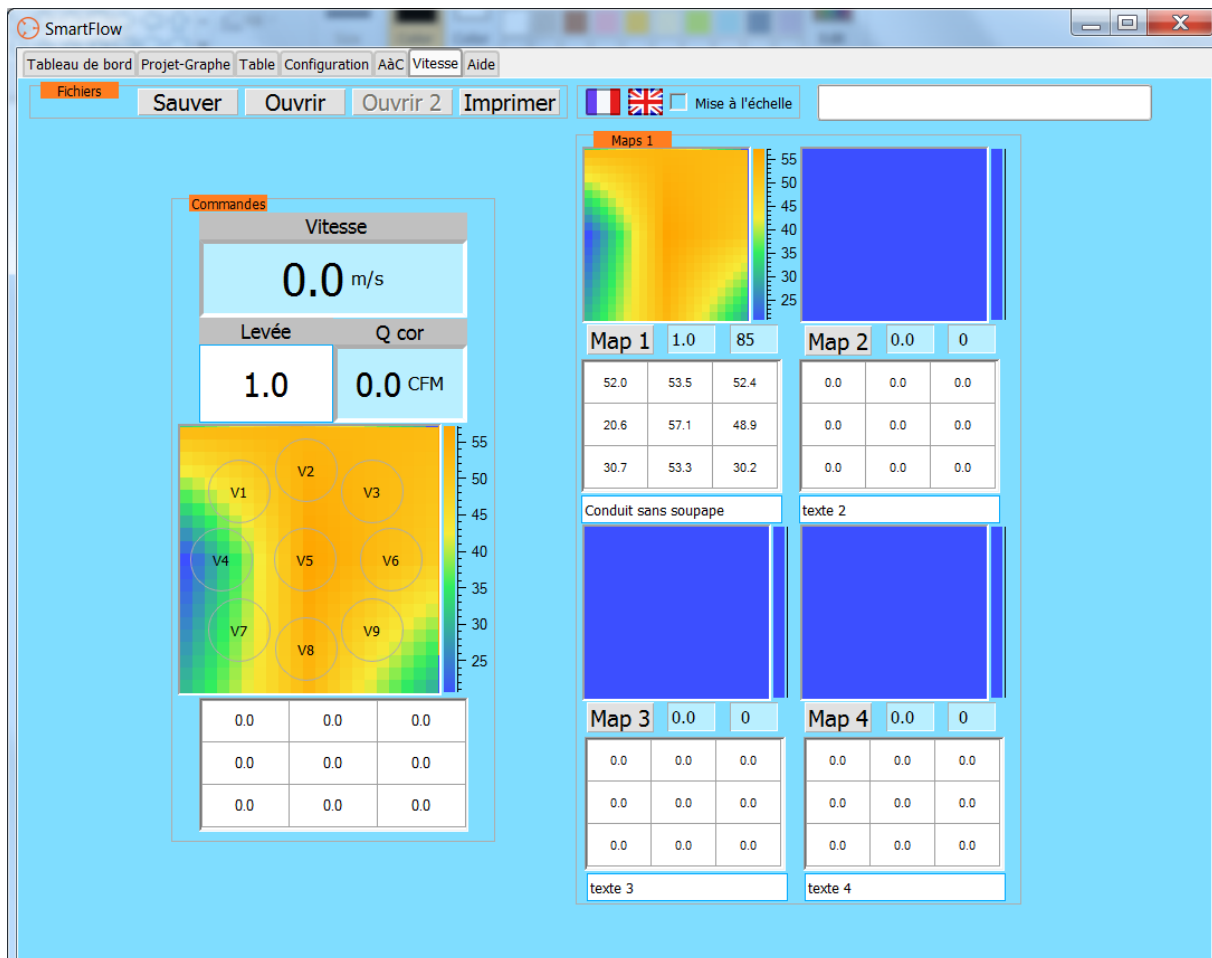


Figure 4 Storage of a map

Note: Maps can be front measurements of a pipe section at different depths: mouth, around the guide... (fig. 6) or measurements at different depths on the same axis (fig. 7).

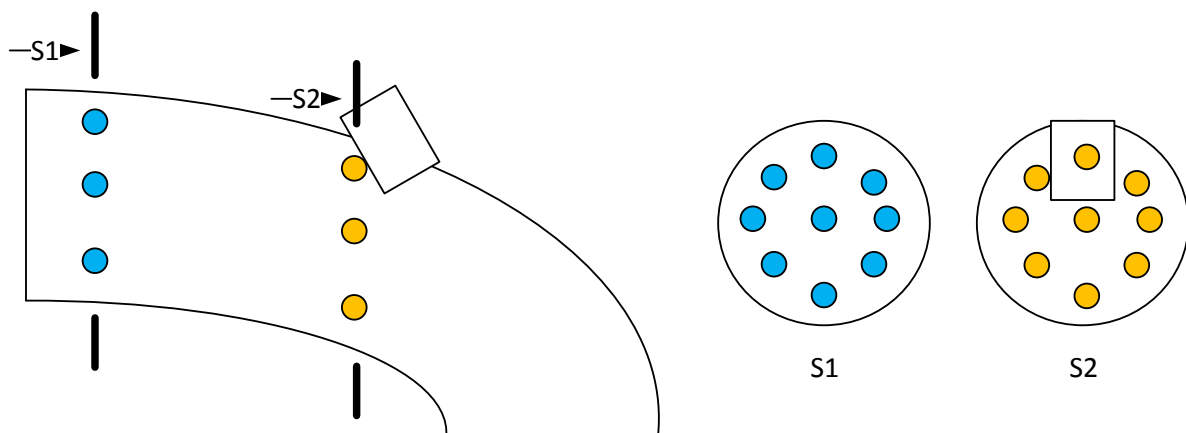


Figure 5 Front section

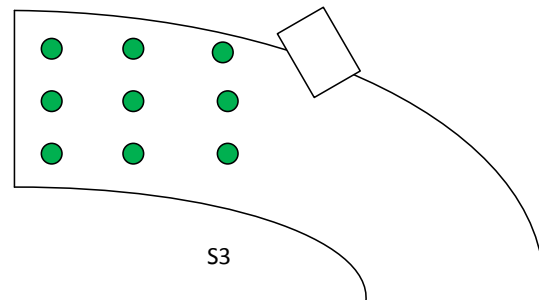
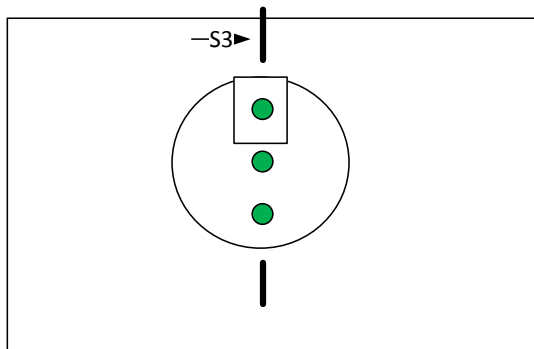


Figure 6 Side section

Backup and replay

To save a mapping session click on "Save". An invitation window allows you to save your file with the .mpk extension.

To read a map or a second one for comparison use the "Read" and "Read 2" buttons.

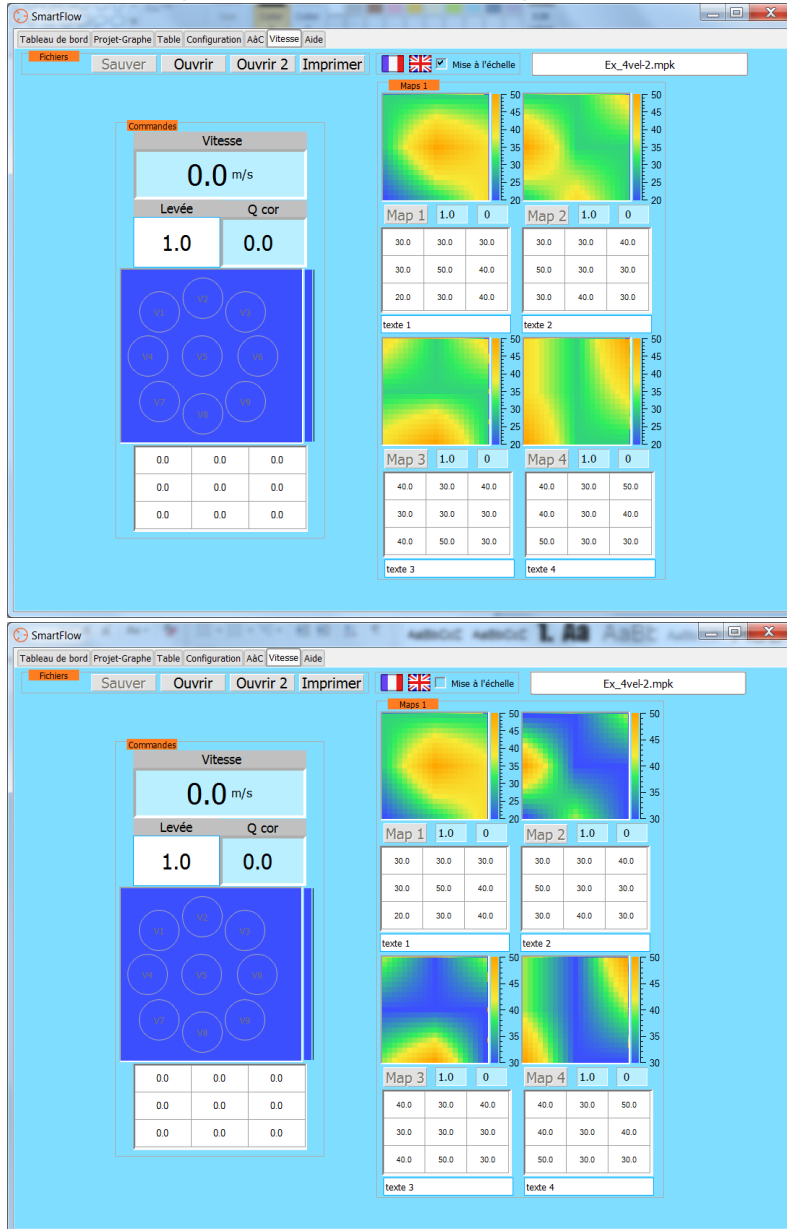


Figure 7 Display with or without scaling

