USER MANUAL

FL530
Flow Probe

Index

General Instructions

1

The FL530 Flow Probe is a tool that measures water velocity in partially filled channels, rivers and pipes. The system consists of a telescoping probe handle ending in with a LCD display flow computer. The operating principle consists of a rotating propeller which, inserted in a watercourse, creates a quantity of pulses directly proportional to the speed of the water (fig.1).

fig.1

Before starting the measurement, check the movement of the propeller by blowing on it (fig.17) and remove the obstacles that could interfere with the propeller (debris etc.).
Insert the propeller making sure that the flow direction corresponds to that of the arrow positioned laterally (fig.2).
Take care before measuring that the mini-display is not in the LOW BATTERY state.
Check that the mini-display is correctly inserted in its housing (fig.3-4).
Place the instrument in the desired altitude and press the RESET button. If you do not press RESET, the average value will also include the "ZERO" value.
The measurements are updated every second, i.e. in 10 sec the instrument will read 10 values and divide them by 10 to have an average value.

fig.2

fig.3

fig.4

LCD Display

2

The flow computer consists of a display and 4 buttons, their function depends on the instruction shown in the display (fig.5).

fig.5

MODE

By pressing the MODE button you can choose to display the following options:

- Average Velocity
- Minimum Velocity
- Full Velocity
- Timer

MENU

By pressing the MENU button you can run the following operations:

- View stored Data
- Delete stored Data
- Set the Flow Units to FT/S or M/S
- Set the Calibration Factor
- Press the MENU button for 2 seconds to enter the setup menu. In menu mode, the labeling of the 4 buttons on the LCD display may change to indicate different functions.
- Press the BACK button to return to the general view.

View Data

From the View Data menu screen, press SET to review recorded data.
The memory location is shown in the upper display and the data is shown in the lower larger display. Use the UP and DOWN arrow buttons to change the memory location you wish to view. Use the MODE button to select the average, minimum or maximum data value for the selected memory location. The AVG, MIN or MAX icon is shown at the far right to indicate which data value is being displayed, AVG in the example shown. Press the SET button to return to the menu display.

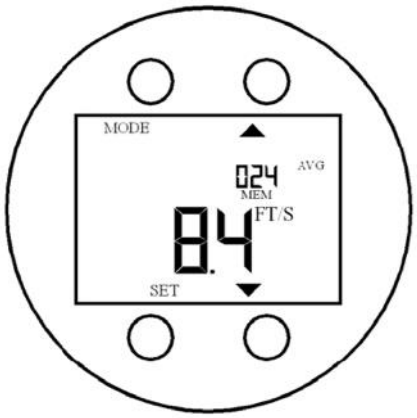

fig.6

Delete Data

From the Delete All menu screen, press SET to delete all stored data.
The upper display shows the number of stored data sets and the lower display reads zero. As a warning, the display is flashing. Press BACK to abort the Delete All function and return to the menu screen. Press SET to delete all data from memory. Once deleted, the data cannot be recovered.

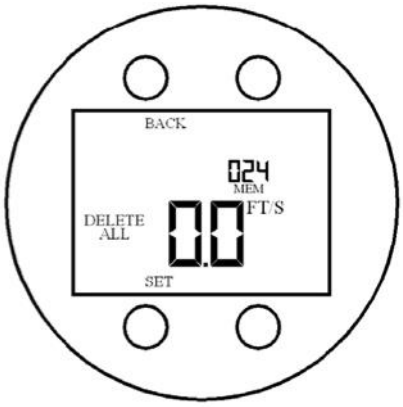

fig.7

Set Flow Units

From the Set Units menu display, Press SET to change the Flow Units.
The lower display shows the current flow units of either FT/S or M/S. Use the UP and DOWN arrows to select a new unit. Press SET to save the new selection and return to the menu screen. Press BACK to return to the menu screen without saving. In the menu screen, the current unit selected is displayed.

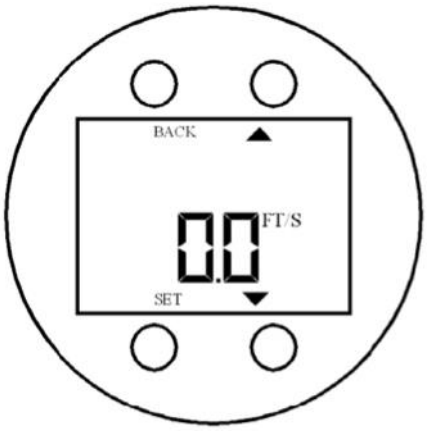

fig.8

Set Calibration Factor

From the Set Calibration menu screen, press Set to change the calibration factor.
The calibration factor is factory set and will generally not need to be changed. If you wish to change it, press SET. Use the UP and DOWN arrow buttons to select a new calibration factor. Press SET to save the new selection and return to the menu screen. Press BACK to return to the menu screen without saving. In the menu screen, the calibration number shown indicates the current stored setting.

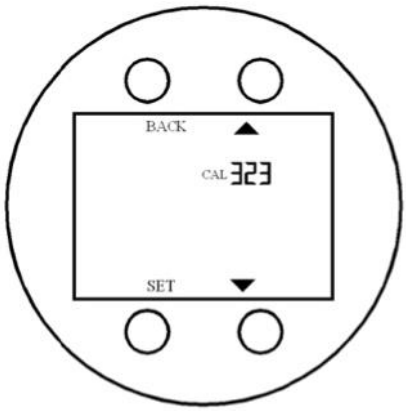

fig.9

Normally this value should not be changed.

Average Velocity

3

Stream flow velocity varies for several reasons:

- The velocities vary throughout the flow's cross-section due to the friction between the water and the channel. In general, the velocities are greater in the center of the flow and less near the bottom and sides of the channel.

- The water surges in velocity with time. In a smooth running stream, the velocity at a specific point can easily vary 1-2 feet per second over the period of a minute. This pulsating or surging of flow should be averaged to obtain an accurate average flow reading (leave the probe in the flow through a series of flow surges).

- The water is not always moving in the same direction. Even the smoothest water flow contains turbulence that causes the water to move in different directions. These velocity vectors not parallel to the flow will be seen as moving slower because only a part of the vector parallel to flow. Unlike other types of water velocity measuring devices, the SIM STRUMENTI's Flow Probe propeller's protective housing will channel the water parallel to flow and help to eliminate errors caused by improperly measuring velocity vectors not parallel to flow.

- Large obstructions in the flow such as rocks and trees will cause the water to flow around them, which may cause the flow to change direction for a short distance from these obstructions. To properly measure the true water velocity, the flow probe needs to be directly inline with the flow.

The Flow Probe can be used in three ways to determine average velocity in a stream

- For small streams and pipes, the probe can be moved slowly and smoothly throughout the flow during average velocity measurements. Move the probe smoothly and evenly back and forth from top to bottom of the flow so that the probe stays at each point in the flow for approximately the same amount of time. The timer function in the display can be used to monitor the measurement time. Keep moving the probe for 20-40 seconds to obtain an accurate average value that accounts for surging. (Move the probe as if you were spray painting and attempting to get an even coat of paint over the entire surface.) The Flow Probe uses true velocity averaging. Pushing the RESET button zeros the average /minimum /maximum velocities and a running average is started. As long as the probe remains in the flow, the averaging continues. To stop averaging press the SAVE button, in Save Data mode the averaging is halted. In this mode the function of the SAVE button changes to SET. Press SET to store the data and reset avg/min/max, or press BACK to resume the previous averaging without storing the data to memory. One reading is taken per second, and a continuous average is displayed. For example, after 10 seconds, 10 readings are totaled and then

divided by 10 and this average is displayed. Once the average reading becomes steady, the true average velocity of the stream is obtained.

- For larger streams and rivers where the Flow Probe can't easily be moved throughout the flow, divide the stream into subsections 1-3 feet wide, depending on the width of the stream. We recommend dividing subsections on your graph paper diagram of the flow profile. Run a measuring tape across the stream for reference. Obtain a verticalflow profile at the center of each subsection: zero the averaging function and move the Flow Probe vertically from the surface to the bottom, up and down, slowly and smoothly for 20-40 seconds to obtain a good average. The average velocity (obtained with the Flow Probe) times the area of the subsection (use your graph paper diagram) equals the flow for the subsection (Q = V x A). Once the flow of each subsection is obtained, add all of the subsection flows to obtain the total stream flow.

- For the USGS "6 tens method", the Flow Probe is placed at the center of the subsection at a depth from the surface of 0.6 of the total depth. The Flow Probe is held in place and the average velocity is obtained over a period of 40 seconds. The 0.6 depth is assumed to be the average velocity point for the vertical profile. Therefore, this average is similar to that obtained in technique 2 (above) however; we feel that technique 2 is more accurate.

fig.10

fig.11

Save to Memory

4

When the SAVE button is pressed, the save data screen is displayed and the function of the buttons is changed. In this mode, the averaging and accumulation of minimum and maximum values is halted. The upper display shows the next empty memory location, in this case 024. The lower display shows the current average reading. Press the BACK button to return to the main display mode without saving and resume data collection where it left off. Pressing the SET button stores the current parameters to the memory location shown in the upper display and the computer returns to the main display mode; automatically resetting the average, minimum and maximum values.

The memory location is automatically incremented. That is, if data is saved to location 024, the next time SAVE is pressed the location will show 025. There are a total of 30 memory locations. Once data is saved to location 030, the next save function will wrap around back to location 001, take care to not overwrite previously saved data. If you do not want to store data into the location shown, use the UP and DOWN arrow buttons to select the desired memory location before pressing SET. If there is already data stored in a particular memory location, pressing SET will overwrite the old data with the new data and no warning will be given.

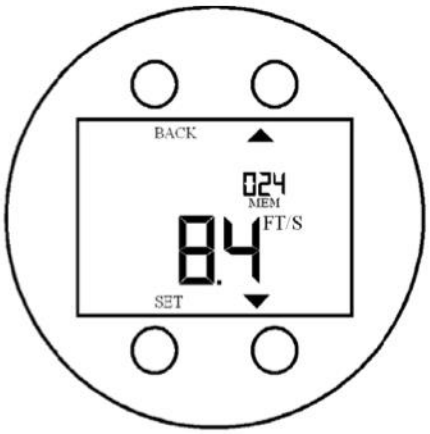

fig.12

Alignment Fin

5

When the propeller is not positioned parallel to the flow of water, significant errors may occur during measurement; to avoid this problem the Fin can be used.
The Fin is used when the lower end of the probe is not clearly visible, due to the depth or turbidity of the water. To use the Alignment Fin correctly, immerse the probe and rotate it until you feel the minimum resistance due to the flow of water (the correct flow direction is shown in fig.13).

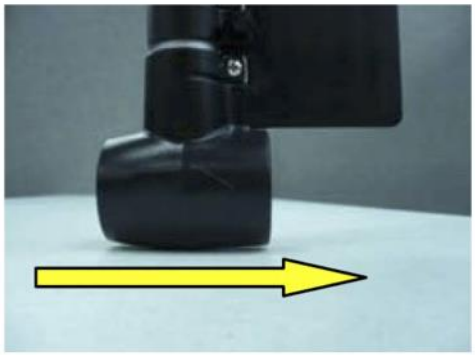

fig.13

The two fin-holder brackets are already mounted on the telescopic probe; to set the Fin, proceed as follows:

- Loosen the fastening screws of the Fin (the screws with the black knurled head, fig.14 and 15).
- Set the Fin with the arrow pointing upwards (fig.16).
- Insert:
  - the A joint in the propeller holder specific space (fig.14);
  - the B joints in the specific space of the fastening screws (fig.14 and 15);
  - the C joints in the specific space of the fin-holder bracket (fig.14).
- Push the Fin until the fastening blocks near the B joints are properly inserted.
- Tighten the two fixing screws of the Fin, so that it is firmly fixed and it can't move.

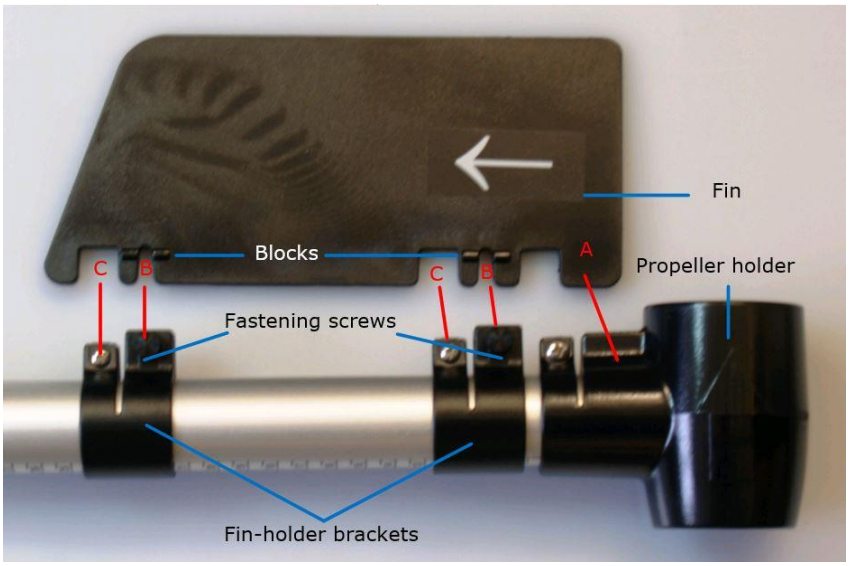

fig.14

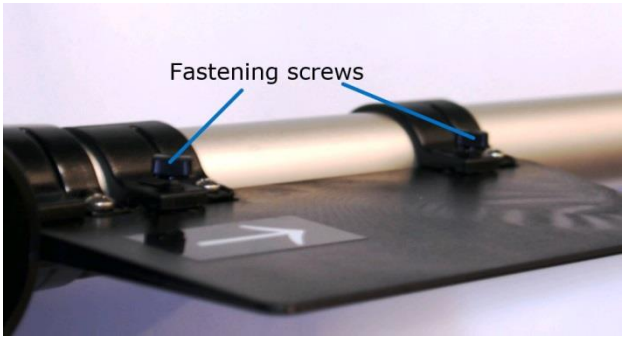

fig.15

fig.16

To remove the Fin, loosen the fixing screws (the screws with the black knurled head) and pull it out. To avoid losing the fixing screws, tighten them again.

Maintenance

6

PROBE HANDLE

After the joint of the telescopic probe is immersed, it is necessary to separate the two pieces so that they dry completely before assembling them.

DISPLAY

If the upper part of the probe is accidentally immersed, the display must be removed and carefully dried with a soft cloth.

The upper part of the instrument must NOT be immersed in water.

BATTERY

The flow probe computer's battery is not replaceable. It should last approximately 5 years with normal use. There is a low battery indicator on the display that will come on when the battery becomes too low to ensure accuracy. The display will also start to become dim as the battery voltage drops. The display may normally become dim and show the low battery indicator in very cold conditions. It should return to normal at warmer temperatures. When the battery has lost it's charge or the product is no longer useable for any other reason, do not discard the computer to a landfill. SIM STRUMENTI offers an electronics recycling program, please contact SIM STRUMENTI to arrange to have the Flow Probe Computer recycled at no charge.

PROPELLER

Remove any debris that may interfere with the flow probe's propeller (fig.17). Make sure that the propeller turns freely by blowing on it. Some chattering of the propeller in air is normal, the bearing is designed to operate best when wet; if the fault persists, remove and refit the propeller. Check that the magnet positioned on the propeller has not fallen.

fig.17

NOTES

NOTES

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