USI Flow

USER MANUAL

Version – 1.0

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1 Revision History

Version	Date	Modifications	Approved by PTL
V1.0	21/09/2012	Original	V CHAPRONT
V2.0	18/03/2013	Change UI, added dimensional diagram	V CHAPRONT

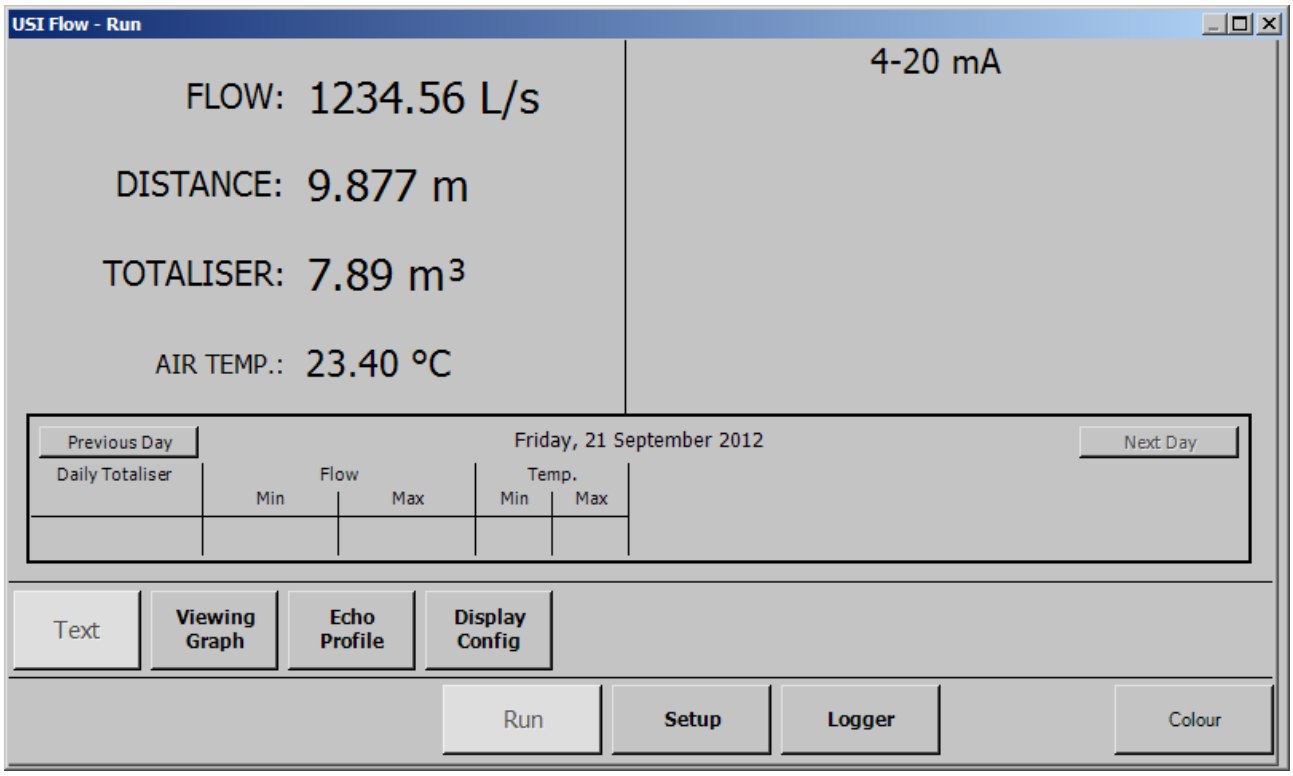
Welcome to the USI. The USI uses intuitive programming through its touch screen display. The user will navigate through the different screen with ease to calibrate, programme and display chosen options. This largely negates the need for a detailed instruction manual and provided the user is familiar with the generic terms (see glossary) he or she should enjoy trouble-free operation.

2 Design

2.1 Run

2.1.1 Text

What: Display the current readings value.

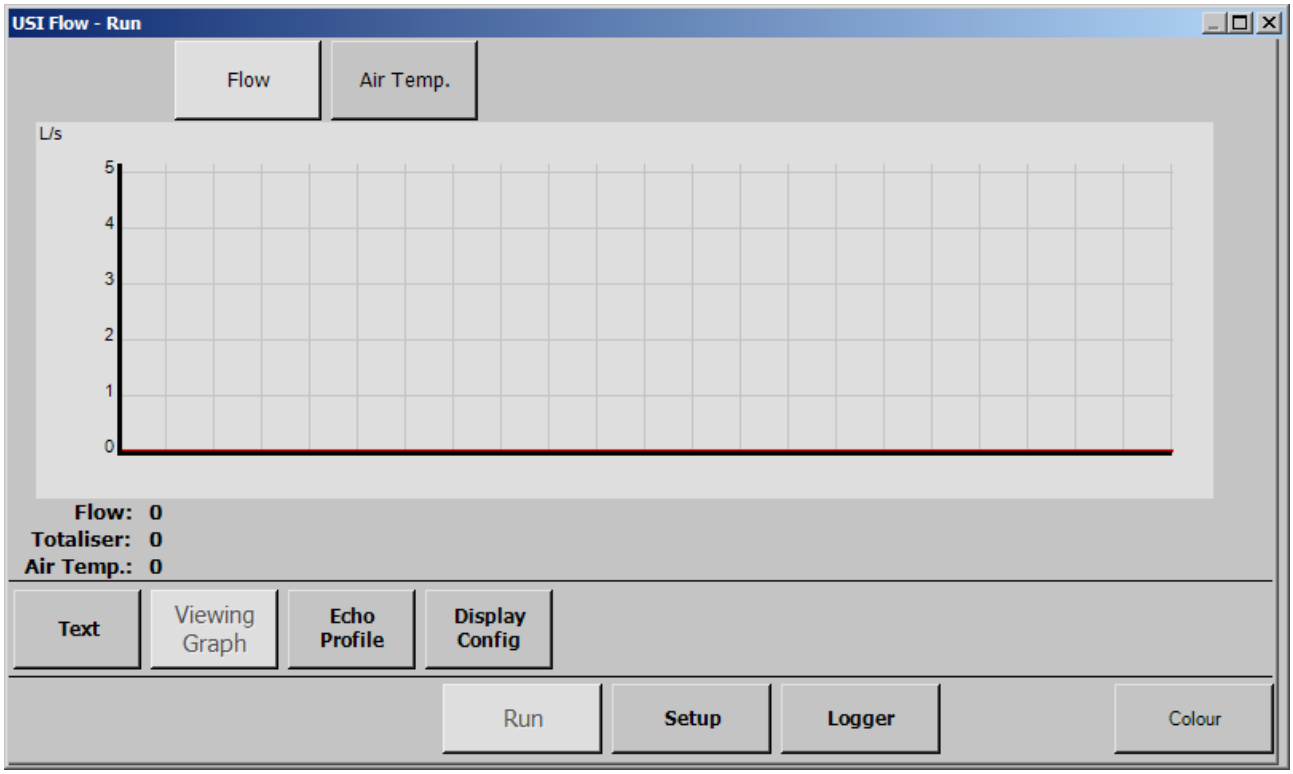


Description:

- Displays the value of Flow, Temperature, Totaliser, and all of the defined inputs.
- The box below the value displays the daily readings of the last 7 days. Scroll to view.

2.1.2 Graph

What: Shows the measured readings as a graph.

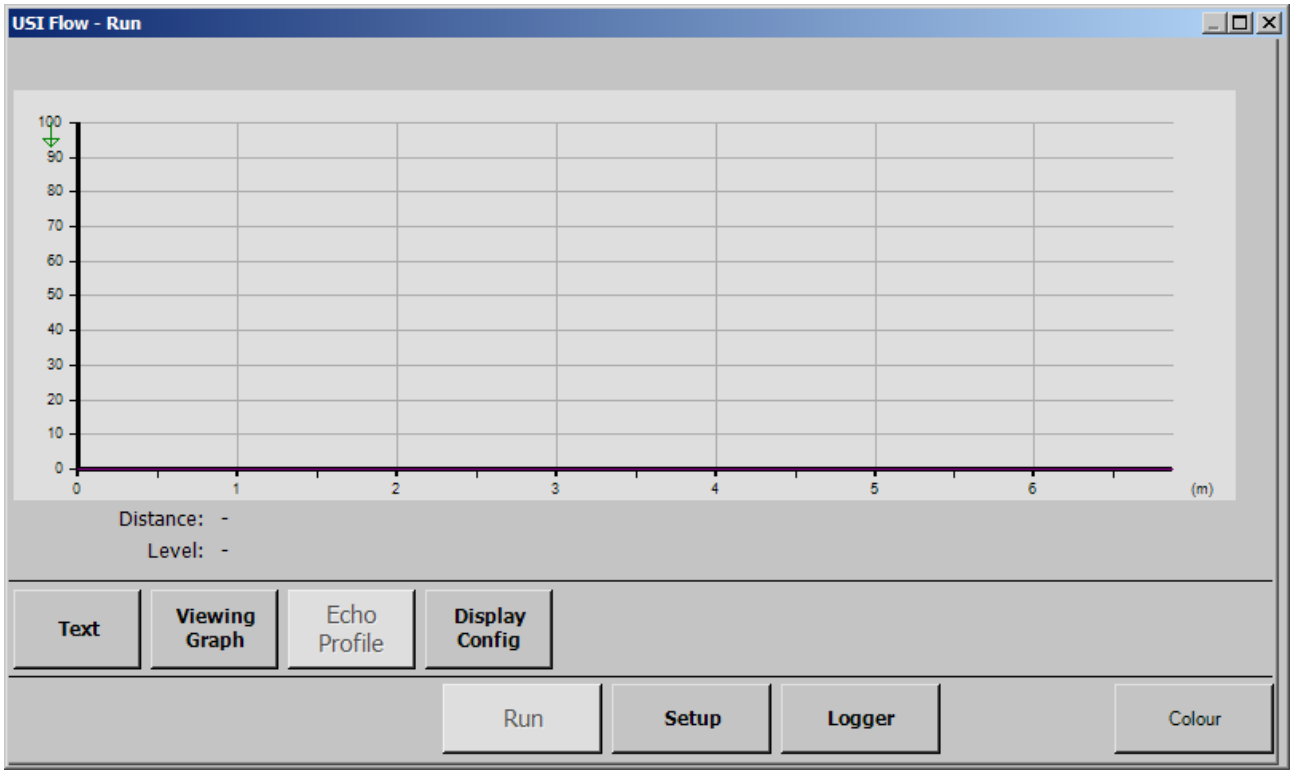


Description:

- Show each readings as a graph.
- The range of the graph is defined in Setup-System (see section 2.2.1 System on page 8).

2.1.3 Echo Profile

What: Show the actual signal received by the sensor.

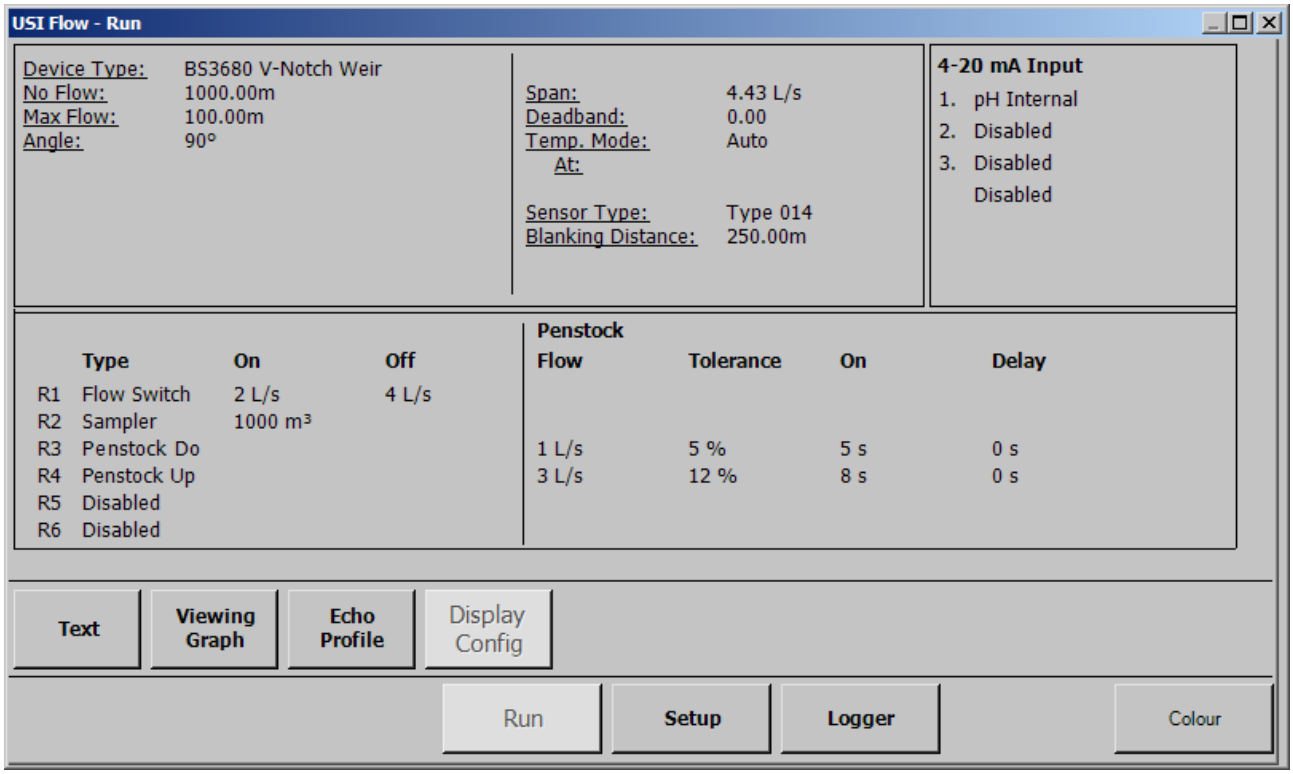


Description:

- The signal received by the sensor is display on the graph.
- The distance calculated is shown by a green arrow at the top of the graph.

2.1.4 Display Config

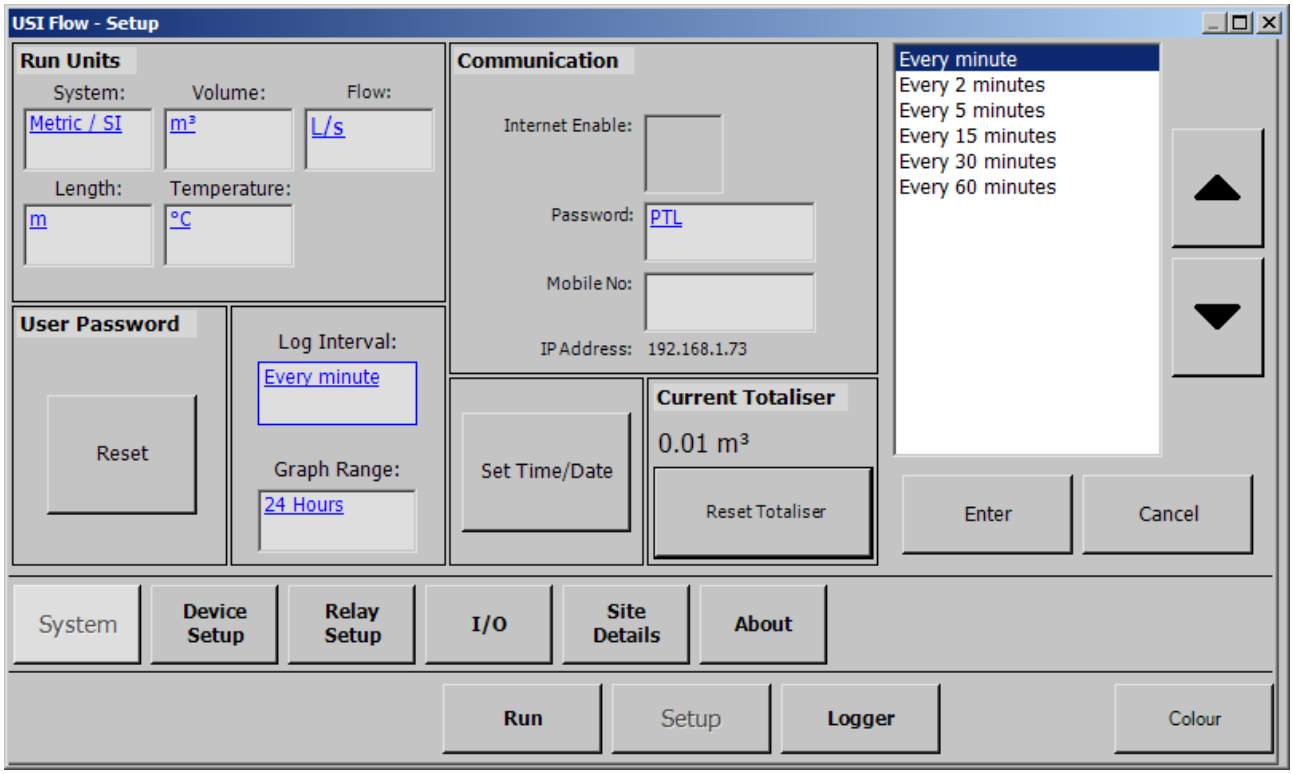
What: Shows the current configuration of the device



2.2 Setup

2.2.1 System

What: Configure the USI.

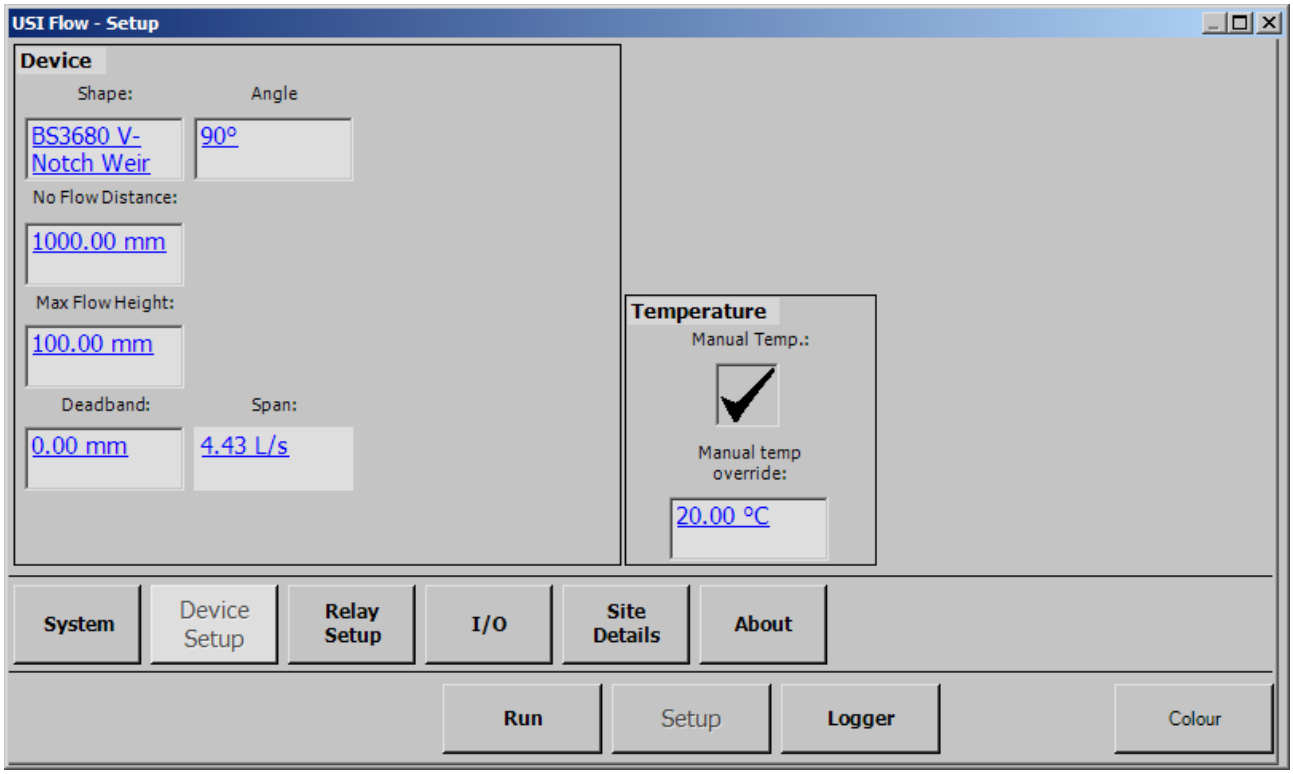


Description:

- Units: Set the units used to display value. If the system of units (Metric or Imperial) is changed, the USI will have to be reset to its factory settings. Please download any data before doing that (see section 3.1 Download on page 17);
- Log Interval: Define the time between each logged value. The USI will read value every seconds on that interval and logged the average at the end of the interval;
- Communication: Enable and configure the Ethernet capabilities. The IP address and the password will be required to connect to the USI.
- User Password: **Factory default is 0001**

2.2.2 Device

What: Define the primary device used to measure the flow.



Description:

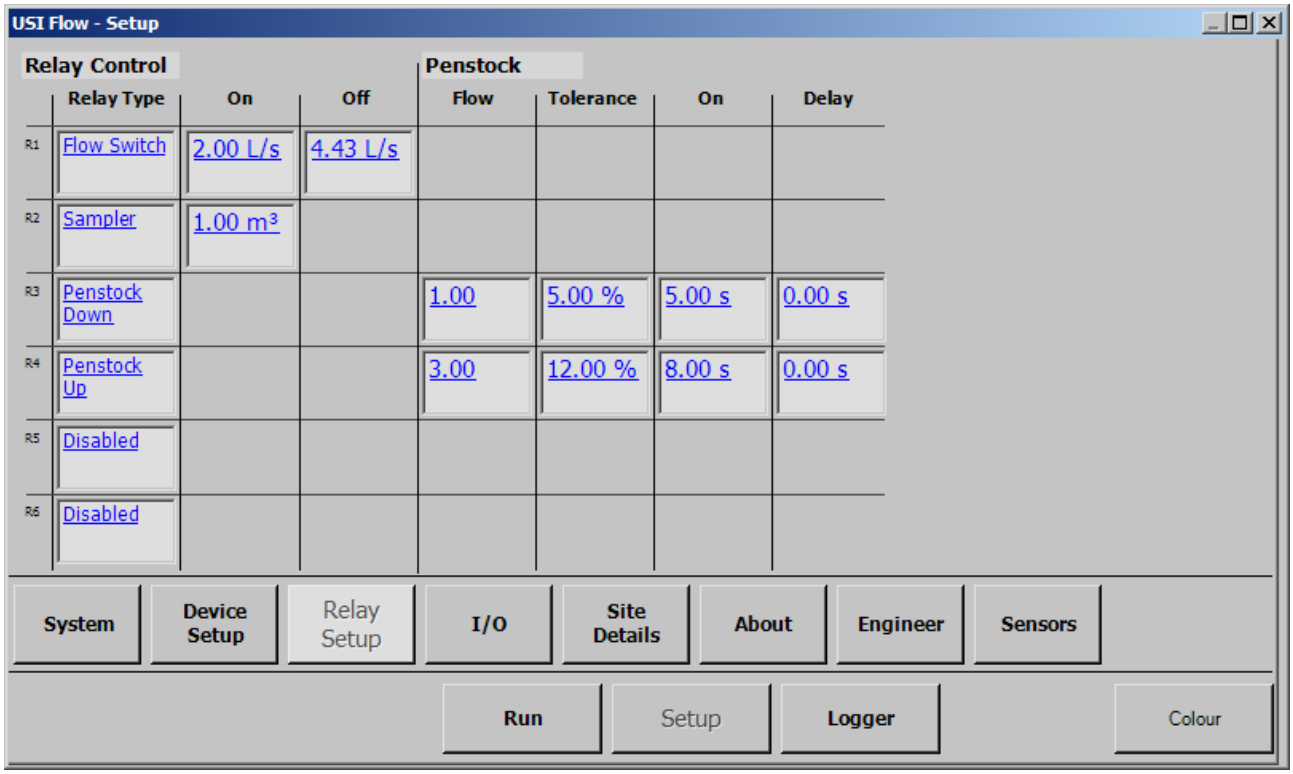
- Device: Describe the type the dimensions of the device used to measure the flow (for more details, see see section 3.3 Define Device on page 17)
- Temperature: If "Manual temp." is checked, the USI will use a user defined temperature to calculate the distance, otherwise the temperature read by the sensor will be used.
- Span: The USI calculates the maximum flow span for the dimensions programmed.

Calibration

To calibrate the flow meter with the primary device you must enter the distance from the sensor to the zero flow point of the primary device. This is the bottom of the notch on V-notch weir and a rectangular flume and the bottom of the channel in a flume.
Do not use a measure to make this measurement
Ensure no flow is flowing through the primary device and put the USI into run mode. Record the distance that is displayed on the USI screen. This is an accurate measurement of the zero calibration point.
Enter this value as the "No Flow Distance".

2.2.3 Relay

What: Configuration screen for the relays.

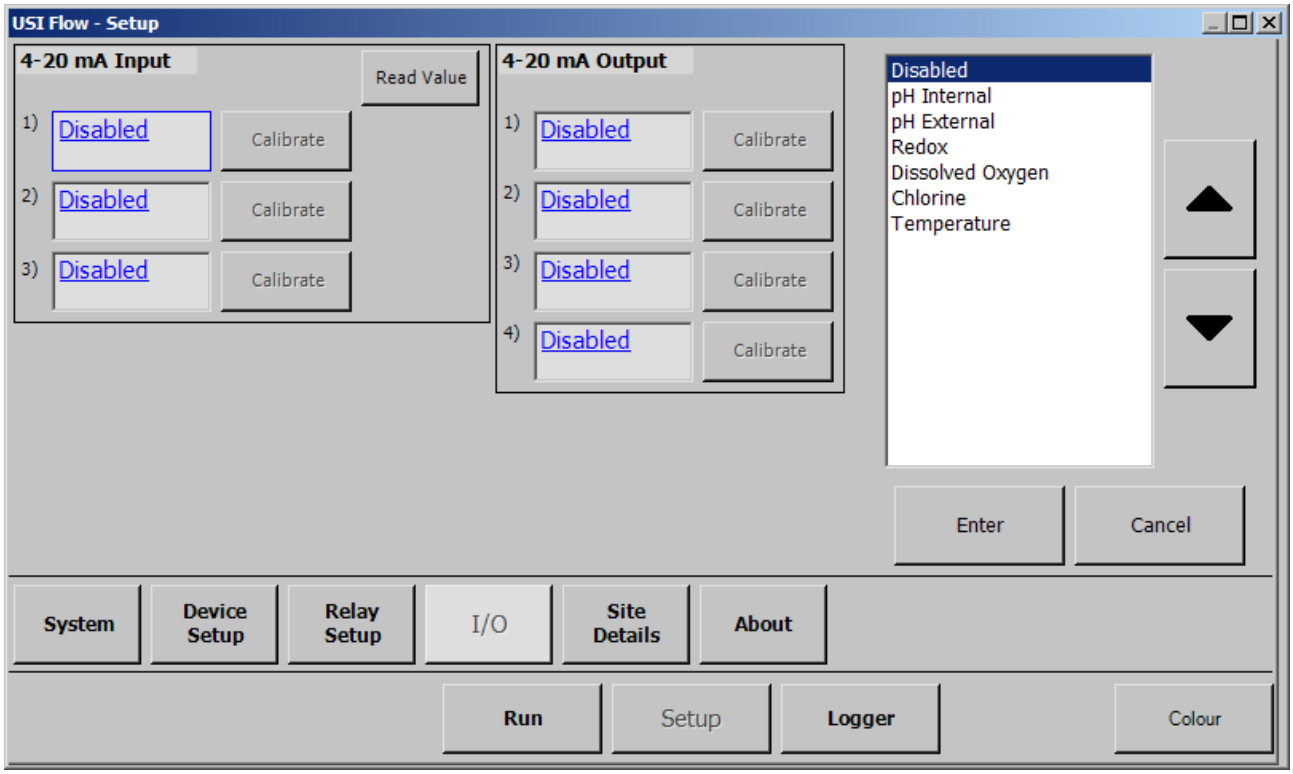


Description:

- Up to 6 relays can be configured at the same time.
- Relays can be configured as:
    - Flow switch: start when the flow goes below (or above) the defined ON, and stop when the flow goes above (or below) the defined OFF point;
    - Sampler: start for 1 second every time the flow meter record the defined volume (ON point)
    - Penstock Up and Penstock Down: Control a penstock gate
    - Parameters: Conductivity, Temperature, Turbidity, DO, pH.

2.2.4 IO

What: Define optional input and output.

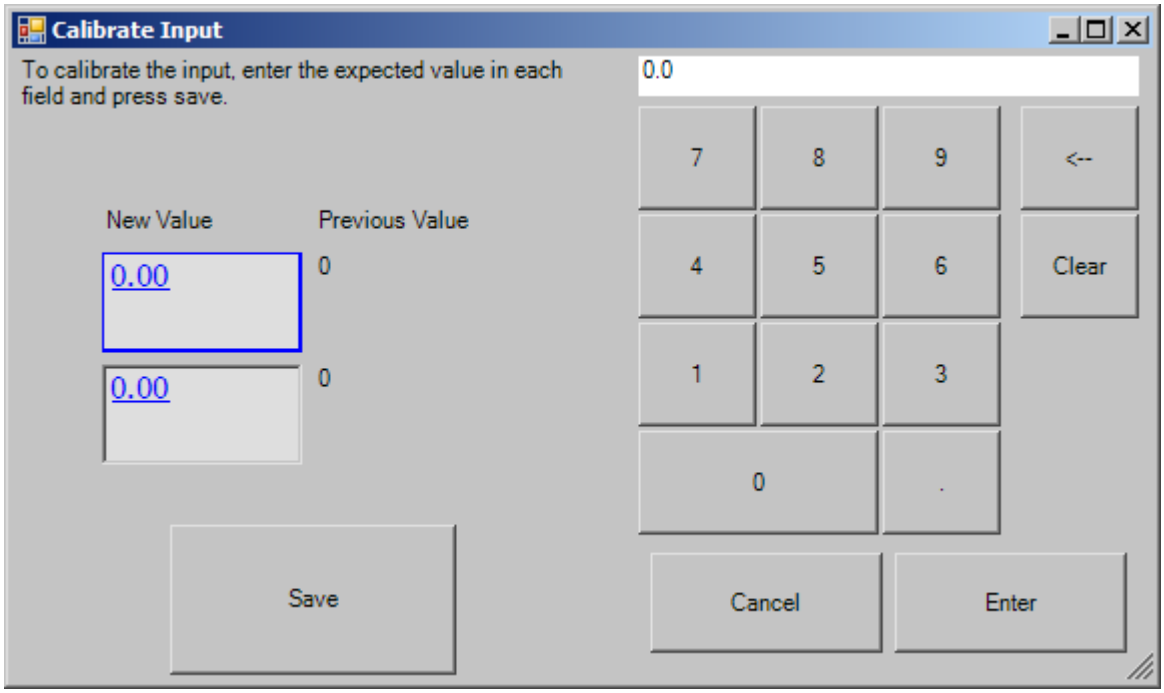


Description:

- Can read up to 3 4-20mA input channel, 1 internal pH, and can write to up to 4 4-20mA output channel.
- When an input is defined, it has to be calibrated (see section 2.2.5 Calibrate Input on page 12).
- The USI has a dedicated pH input channel to which a pH probe can be connected.

2.2.5 Calibrate Input

What: Calibrate the input

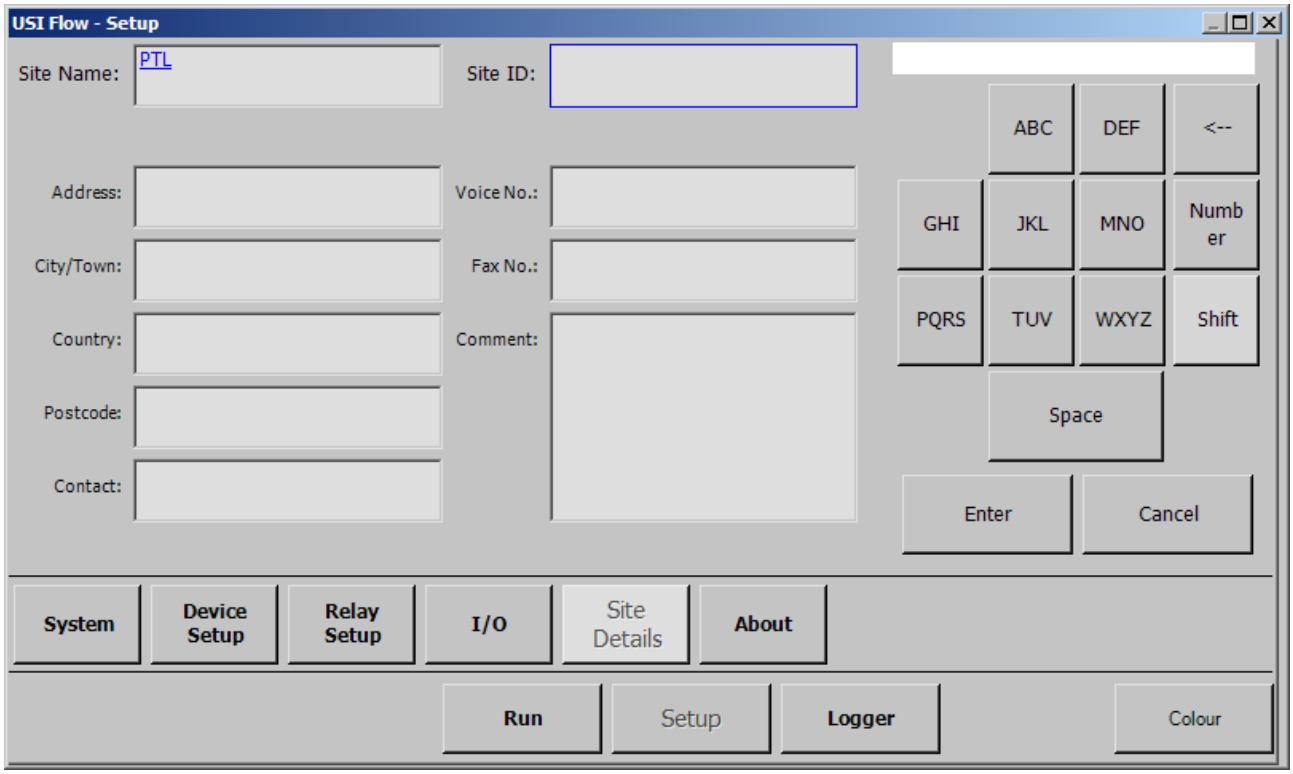


Description:

- Calibrate the input readings by settings two points (for more details, see section 3.2 Calibrate Input on page 17).

2.2.6 Site Details

What: Details of the site in which the device is installed.



Description:

- The Name and the ID are used to name the data file. Please enter something meaningful to help recognise the file.

2.2.7 About

What: Display version and copyright information.

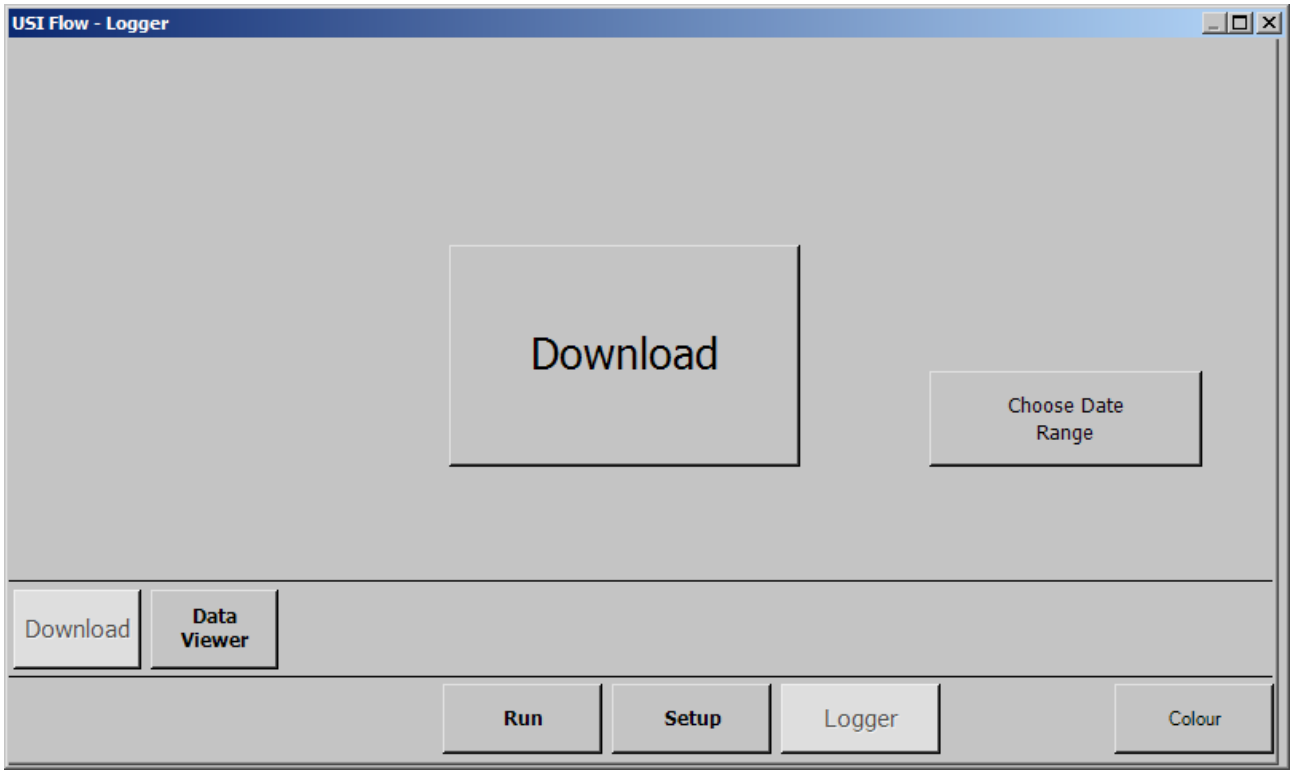
Description:

- Version: The version of the software.

2.3 Logger

2.3.1 Download

What: Download data logged on the device. For more details on how to download, see section 3.1 Download on page 17.

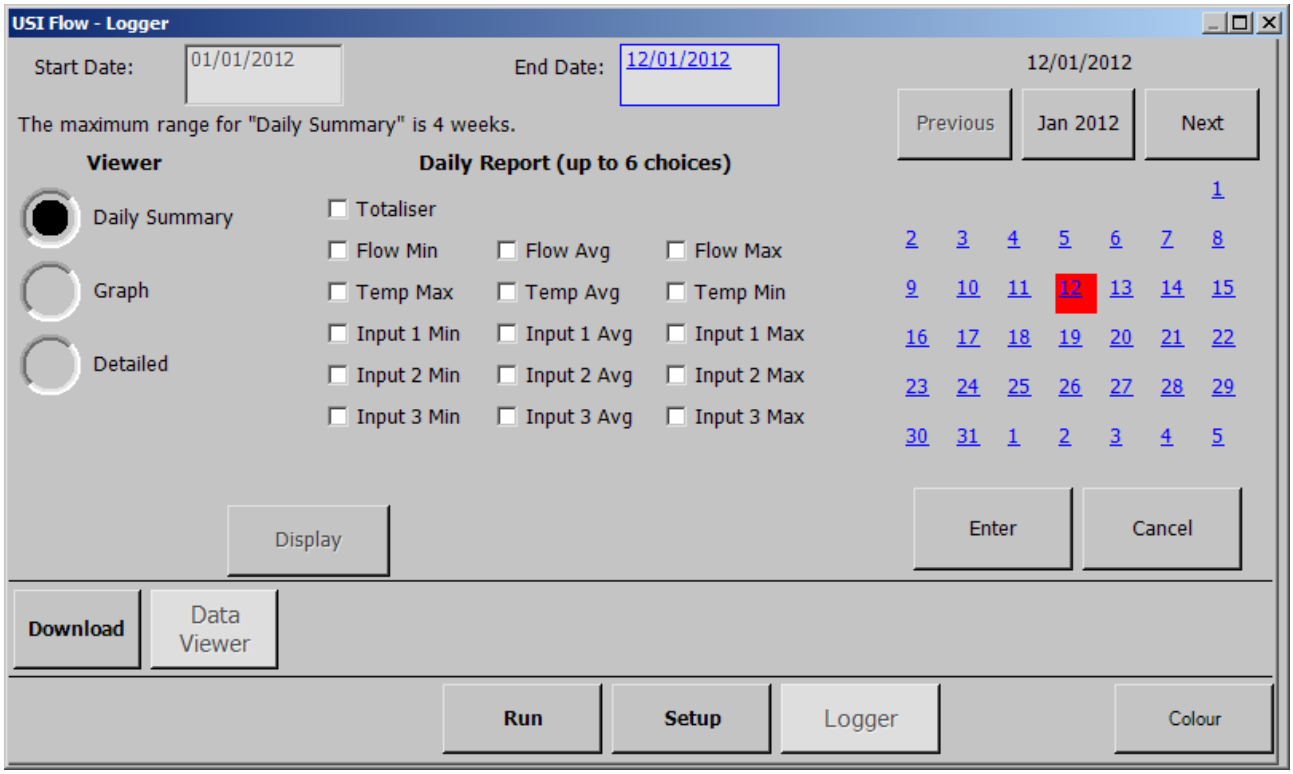


Description:

- Download: If there is an existing file, append the new data to the file, otherwise create a file and ask whether to download everything or just a time range;
- Choose Date Range: Download data in the specified time range.

2.3.2 Data Viewer

What: Configure a viewer to display previous logged data.



Description:

- 3 difference viewer can be used:
  - Daily: A summary of a daily readings display as a report (range: 4 weeks).
  - Detailed: Detailed readings display as a report (range: 1 day).
  - Graph: Detailed readings display as a graph (range: 4 weeks).
- The range is the maximum amount of data that can be displayed by the viewer. That range can be picked at any point in the logged data.

3 How To

3.1 Download

To download the data logged by the USI:

1. Connect a USB stick to one of the front USB port;
2. Go into the Logger menu. If you were in the Run menu, you will have to enter your password;
3. Go into the Download sub-menu (see section 2.3.1 Download on page 15 for the interface)
4. Press the “Download” button
   - If you have an existing file on your USB stick, the USI will automatically transfer any new data to the file;
   - If you do not have an existing file, you will be asked if you want to download all of the data stored on the USI, or just the one in a time range.
5. Wait until the download is complete;
6. Go back to the Run menu;
7. Remove your USB Stick (it is not necessary to disconnect as in other versions of Windows)

3.2 Calibrate Input

After you have selected a type of value to read from a 4-20mA input channel, you need to calibrate it:

1. On the “IO” sub-menu (see section 2.2.4 IO on page 11), press the “Calibrate” button corresponding to your Input.
2. On the “Calibrate Input” window (see section 2.2.5 Calibrate Input on page 12), for each button under “New Value” do the following:
   1. Press the button, next to it will be displayed the value read by the 4-20mA using the previous calibration (if the input has never been calibrated before, the previous value will be measured using a default calibration setting)
   2. Once the Previous Value is stable, enter the value of the solution using the keypad and press “Enter”.
3. Once both calibration points are set, press “Save”.
4. On the IO sub-menu, press “Read Value” to check the readings with the new calibration setting. You might have to press the button multiple times as the readings are processed through a moving average filter.

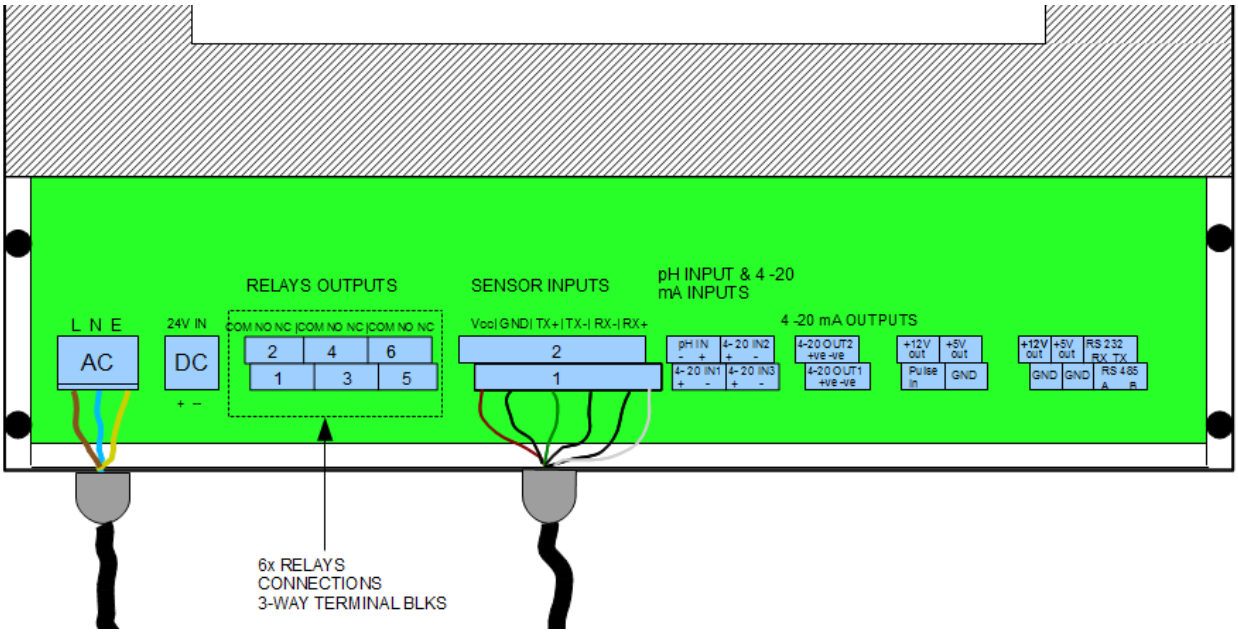
3.3 Define Device

To configure your device in the USI:

1. Go into the “Setup” menu;
2. Go into the “Device Setup” sub-menu;
3. In “No Flow Distance” enter the distance between the sensor and the bottom of your device;
4. In “Max Flow Height” enter the height of your device;
5. The “Dead-band” is a space that will be invisible to the sensor.

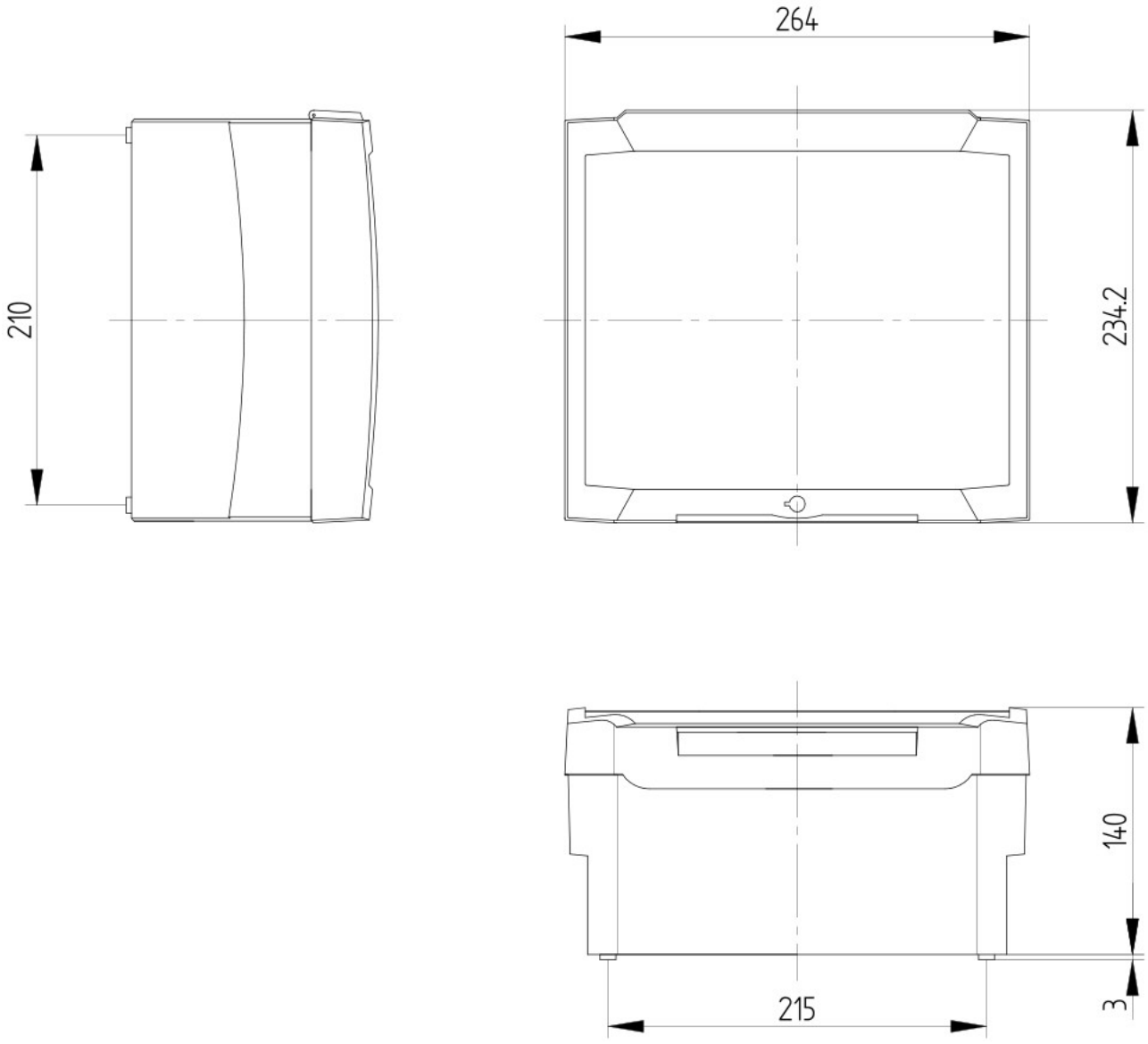
6. In “Shapes” select the correct shape of your device. Each shape will require specific dimension to calculate the flow correctly;
7. The “Span” is the maximum flow that can be measured by the device, and is updated in real time when you change the dimension of your device

4 Wiring Diagram



5 Dimension

All dimensions are in millimetres.



6 Glossary of Terms

- Angle – this is the angle of the V-notch.
- Dead Band – this is a distance from the front face of the sensor which the instrument is blind to any echoes. It has a minimum depending on the sensor model but can be extended to overcome false echoes such as the lip of a flume.
- Echo profile – the USI can display directly the echo received from the sensor.
- Max Flow Height – The maximum height of liquid flow through the primary device that can be measured. This gives the flow span.
- No Flow Distance – The distance from the sensor to the surface when no flow is current
- Penstock – a penstock is a mechanised gate that can be lowered into a flow channel to regulate flow volumes.
- pH external – a 4-20mA input signal from an external pH meter can be calibrated and logged by the USI.
- pH internal – the USI has an integrated pH meter which can be calibrated directly with a pH sensor.
- Primary Device – Either a Flume or Weir through which the flow is to be measured
- Rectangular Flume – most common flume found in Europe
- Rectangular Weir – a square notch weir used for high flows
- Totaliser – the totaliser is the cumulated volume that has flowed through the device from the start of measurement.
- USI – Universal Smart Instrument