User Manual

USI Flow



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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

<u>What:</u> Display the current readings value.

USI Flow - Run							
FLOW:	1234.56 L/s	4-20 mA					
DISTANCE:	9.877 m						
TOTALISER:	7.89 m³						
AIR TEMP.:	23.40 °C						
Previous Day	Friday, 21 S	September 2012 Next Day					
Daily Totaliser	Flow Temp.						
Min	Max Min Max	_					
Text Viewing Echo Display Config							
	Run	Setup Logger Colour					

- 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.



- 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.



- 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

USI Flow - Run							
Device Type: BS3680 V-Notch Weir No Flow: 1000.00m Max Flow: 100.00m Angle: 90°	Span: 4.4 Deadband: 0.0 Temp. Mode: Aut At: At Sensor Type: Typ Blanking Distance: 250	3 L/s 0 o 0e 014).00m	 4-20 mA Input pH Internal Disabled Disabled Disabled 				
	Penstock						
Type On Off R1 Flow Switch 2 L/s 4 L/s R2 Sampler 1000 m ³	Flow Tolerar	ice On	Delay				
R3 Penstock Do	1 L/s 5 %	5 s	0 s				
R4 Penstock Up R5 Disabled R6 Disabled	3 L/s 12 %	8 s	0 s				
Viewing Graph Echo Profile Display Config							
F	Setup	Logger		Colour			

2.2 Setup

2.2.1 System

<u>What:</u> Configure the USI.

USI Flow - Setup									
Run Units		Communication		Every minute					
System: Volume: Flow: Metric / SI Metric		Internet Enable:		Every 2 minutes Every 5 minutes Every 15 minutes Every 30 minutes					
Length: Temperature:		Password: PTL		Every 60 minutes					
		Mobile No:							
User Password Log Interval:		IP Address: 192.168.1.73							
	Livery minute	Current Totaliser							
Reset			0.01 m³						
	Graph Range: 24 Hours	Set Time/Date	Reset Totaliser	Enter	Cancel				
System Device Setu	ce Relay Ip Setup	I/O Site Detai	About						
		Run	Setup Logg	er	Colour				

- 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.

USI Flow - Setup			
Device			
Shape: Angle			
BS3680 V- Notch Weir			
No Flow Distance:			
1000.00 mm			
Max Flow Height:		Temperature	
100.00 mm		Manual Temp.:	
Deadband: Span:			
0.00 mm 4.43 L/s		Manual temp	
		override:	
		20.00 °C	
System Device Relay Setup Setup	I/O S De	ite About	
	Run	Setup Logger	Colour

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.

USI	Flow - Setup									
Re	lay Contro	bl		Penstock						
	Relay Type	e On	Off	Flow	Tolerance	On	Delay			
R1	Flow Switc	h 2.00 L/s	4.43 L/s							
R2	<u>Sampler</u>	1.00 m ³								
R3	<u>Penstock</u> <u>Down</u>			1.00	<u>5.00 %</u>	<u>5.00 s</u>	<u>0.00 s</u>			
R4	Penstock Up			3.00	<u>12.00 %</u>	<u>8.00 s</u>	<u>0.00 s</u>			
R5	<u>Disabled</u>									
R6	<u>Disabled</u>							-		
System Device Relay Setup Setup		I/O	Site Details	s Abo	ut En	gineer	Sensors			
				Rur	n	Setup	Logge	er		Colour

- 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

<u>What:</u> Define optional input and output.

USI Flow - Set	JSI Flow - Setup									
4-20 mA In	put	Read V	alue 4	-20 mA Output		Disabled pH Internal	_			
1) Disable	d Calibra	ate	1]	Disabled	Calibrate	pH External Redox				
2) Disable	d Calibra	ite	2)	Disabled	Calibrate	Chlorine Temperature				
3) Disable	d Calibra	ite	3)	Disabled	Calibrate					
			4)	Disabled	Calibrate					
						Enter	Cancel			
System	Device Setup	Relay Setup	I/O	Site Details	About					
			R	un Se	etup L	ogger	Colour			

- 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

<u>What:</u> Calibrate the input

🔡 Calibrate Input						
To calibrate the input, enter field and press save	the expected value in each	0.0				
inclu and press sure.		7	8	9	<	
New Value	Previous Value					
0.00	0	4	5	6	Clear	
0.00	0	1	2	3		
		(0	•		
				·		
S	àave	Ca	ancel	Enter		
					111	

Description:

Pulsonic Technologies Ltd.

• 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.

USI Flow - Set	USI Flow - Setup										
Site Name:	<u>PTL</u>		Site ID:				_				
								ABC	DEF	<	
Address:			Voice No.:				GHI	JKL	MNO	Numb er	
City/Town:			Fax No.:								
Country:	J		Comment:				PQRS	TUV	WXYZ	Shift	
Postcode:			_					Spa	ace	e	
Contact:							En	ter	Car	ncel	
System	Device Setup	Relay Setup	I/0	Site Details	About						
Run Setup Logger Colour								Colour			

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

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

USI Flow - Logger					
	Dov	vnload	Choose Date Range	,	
Download Viewer	Run	Setup	Logger		Colour

- 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

<u>What:</u> Configure a viewer to display previous logged data.

USI Flo	USI Flow - Logger											
Start	Start Date: 01/01/2012			End Date: 12		12/01/2012						
The m	The maximum range for "Daily Summary" is 4 weeks.								Jan 2012		Next	
	Viewer		Daily	Report (up to 6	choices)	_						
	Daily Sumn	narv [Totaliser									1
	,,	, [Flow Min	Flow Avg	Flow Max	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	Z	8
$\left \right $	Graph	Г	Temp Max	🗖 Temp Avg	🗖 Temp Min	<u>9</u>	<u>10</u>	<u>11</u>	<u>12</u>	<u>13</u>	<u>14</u>	<u>15</u>
\sim			Input 1 Min	🗌 Input 1 Avg	🗌 Input 1 Max	<u>16</u>	<u>17</u>	<u>18</u>	<u>19</u>	<u>20</u>	<u>21</u>	22
$ \bigcirc$	Detailed	Г	Input 2 Min	🗌 Input 2 Avg	🗌 Input 2 Max	23	24	<u>25</u>	<u>26</u>	27	<u>28</u>	29
		Г	Input 3 Min	🗌 Input 3 Avg	🗌 Input 3 Max	30	31	1	2	3	4	5
		Display				Er	iter		С	ancel		
Dowr	Download Data Viewer											
				Run	Setup	Logger					Col	our

- 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