FLOWMETERS

PRECISION IN WATER FLOW MEASUREMENT

Operation and Maintenance Manual

Flowmaster_PFT

The Flowmaster_PFT provides the most reliable and accurate flow, turbidity and pressure measurements. Ideal for producing verifiable and traceable data for your reports.

Measures flow rates to 50 lps, turbidity to 40 NTU, pressure to 25 bar. No moving parts which in turn means that measurements are not affected by debris in the water stream.

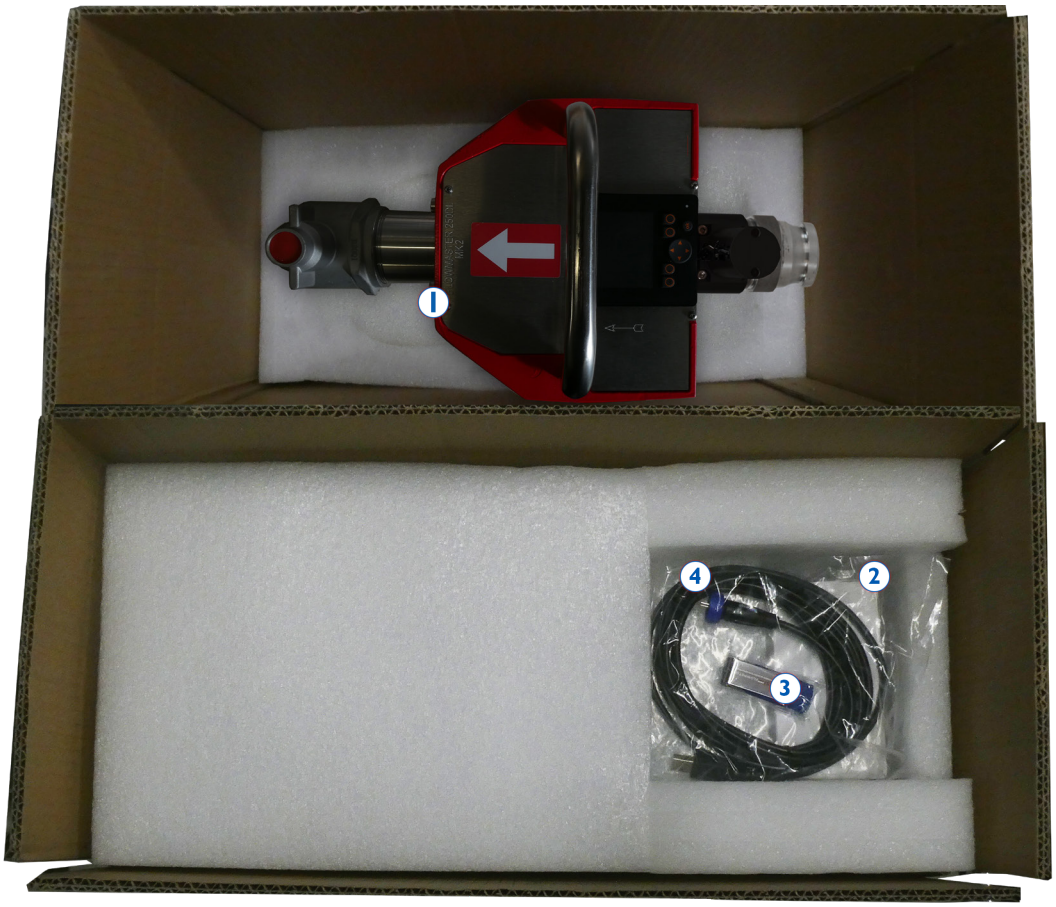
Invaluable for hydrant testing, pump testing, flushing and water main condition testing.

Address: **Unit 1, Portlaoise Enterprise Centre, Clonminam Business Park, Portlaoise, Co. Laois, Ireland R32 VK07**

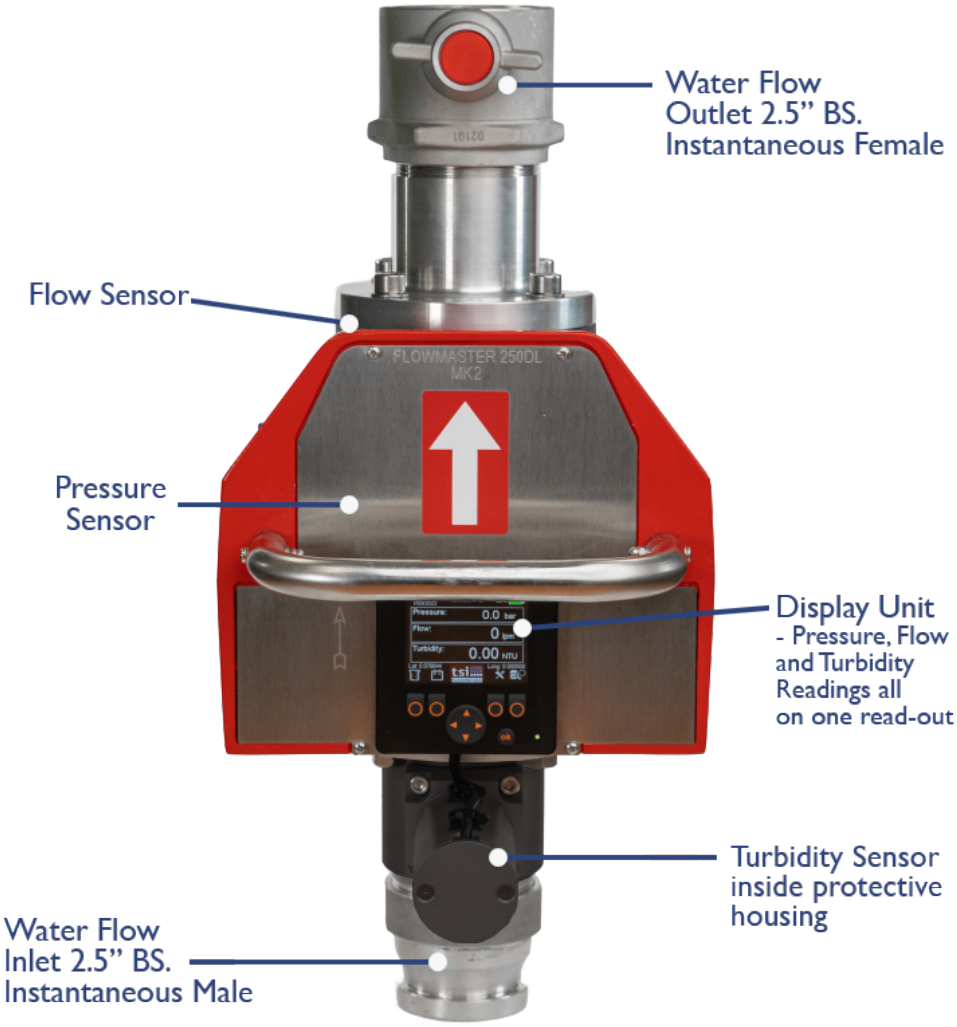
Sales: **+353 (0)57 866 3852** | **mto@tsi.ie** | **www.tsi.ie**

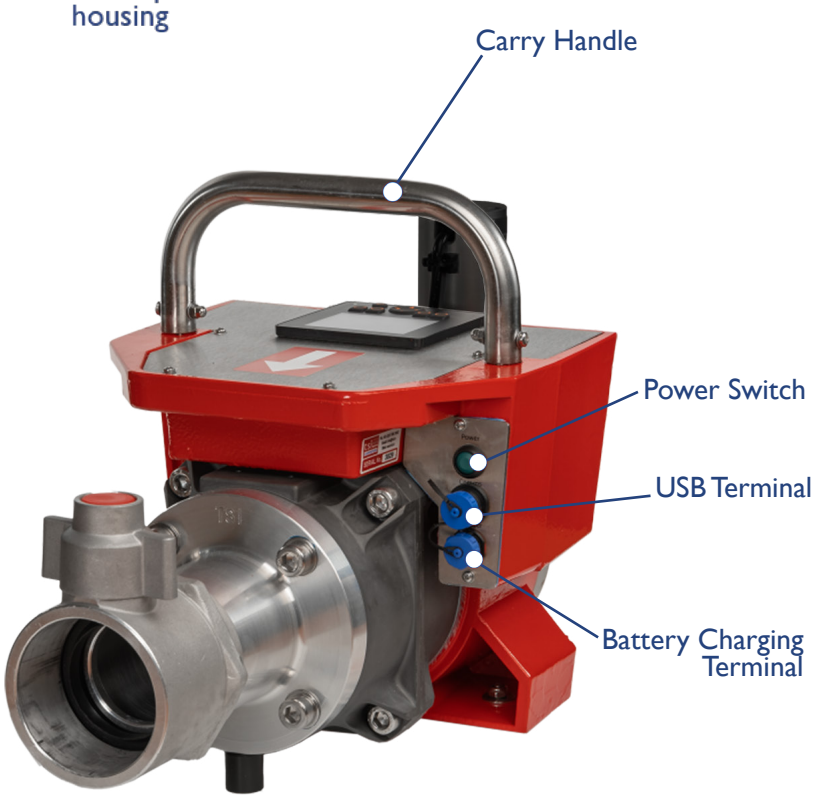
Contents

1.1 What's in the box?



1. Flowmaster_PFT
2. Battery Charger
3. USB Key (containing further manuals)
4. USB Cable


Water Flow
Outlet 2.5" BS.
Instantaneous Female
Flow Sensor
Pressure
Sensor
Display Unit
- Pressure, Flow
and Turbidity
Readings all
on one read-out
Turbidity Sensor
inside protective
housing
Water Flow
Inlet 2.5" BS.
Instantaneous Male


Carry Handle
Power Switch
USB Terminal
Battery Charging
Terminal

2 Specification

2.1 GENERAL

Weight	12.5 kg including battery pack & instantaneous adaptors
Dimensions	210mm height, 240mm width 560mm length
Power	Internal Battery Pack. DC 12V @ 250 mA
Case Material	Aluminium
Operating Temp.	-10°C ~ +50°C
Adaptors	2.5" BSPM or BS Instantaneous Storz B, Storz 65, 2.5" NST adaptors available on request

2.2 FLOWMETER

Colour	Firemen Red & anodised aluminium
Sensor Type	Electromagnetic
Range	Flow: 30 - 3,000 lpm Turbidity: 0 - 40 NTU Pressure: 0 - 25 bar / 0 - 350 PSI
Resolution	50 ~ 750 l/min ± 15 l/min 750 l/min ~ ±2%
Standard Functions	Flow reading Totaliser reading
Casing Material	Corrosion resistant ADC6-12 (JIS) aluminium (painted)
Pressure rating	16 bar

2.3 DISPLAY

Display Type	320 x 240 backlit graphic colour display All readings are available on this display.
Flow sensor	There are four flow unit selections to choose from; - LPM - m3/h - LPS - US GPM
Pressure Transducer	Bar, PSI, KPa, MTrH readouts selectable Type - Strain Gauge Range - 0 ~ 25 bar, ±1%
Turbidity sensor	Measured in NTU ATi-UK M-node Displayed on LCD Panel
Volume Totaliser	Showcase of total volume. Sortable by test and group, as well as keeping track of lifetime total

2.4 DATA LOGGER

- Internal data logger
- 64Kb memory capacity. Record 12 hours of data at one second interval
- Records flow rate, pressure and turbidity
- Real time clock and date/time stamp added to each recorded event
- USB connection to PC for settings and for recorded data transfer
- Automatic trigger of logger by flow event

2.5 BATTERY PACK

Battery Type	Lithium-Ion, Li Ion
Rated Capacity	2.6 Ahr (10 hours operation)
Recharging	Mains operated recharger is supplied
In-car charger	Available as separate item
Monitor	A built-in battery monitor displays remaining capacity in hrs/mins
External Battery Pack	Available as separate item

2.6 SOFTWARE

- FMS software supplied for management of logged files and report generation
- Each log file is identified by its recorded date and recorded time
- File name can be edited in software
- Graph of logged data is automatically produced. Auto-scaling ensures data fits into the frame
- Text notes can be added to the graph
- Graph can be printed directly from FMS software or stored as a .BMP file for inclusion in MS Word or MS Excel documents
- USB cable is supplied

2.7 FURTHER MANUALS

The following manuals are provided on a CD supplied with the Flowmaster:

- Operation and Maintenance Manual
- Software Manual
- You Tube videos demonstrating how to use the Flowmaster 250DL
- You Tube videos demonstrating how to use the flow monitoring software supplied with the Flowmaster 250DL

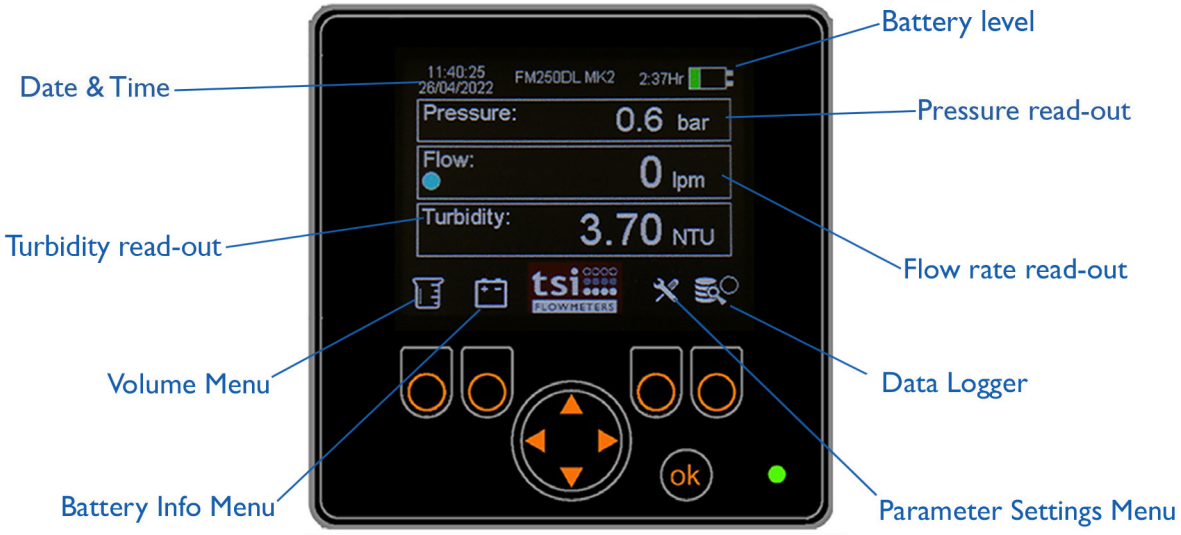
Please go to **www.tsi.ie** for manual updates.

3.1 DISPLAY PANEL POWER-ON SEQUENCE

Turn on the Flowmaster_PFT by pressing the ON/OFF switch to "I" position. When the Flowmaster is first turned on, the flow meter's self-test mode will commence. This can last up to 5 seconds, after which the Flowmaster will be booted and ready for use.

3.2 EXPLANATION OF DISPLAY PANEL

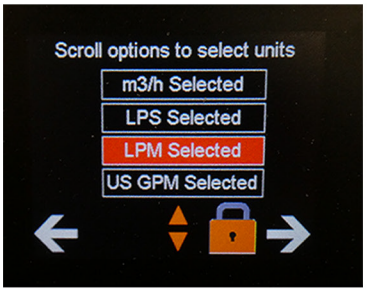
The display panel features a 320 x 240 pixel LCD panel. Beneath the LCD panel, there are four buttons (icons above the buttons indicate their function), a joystick and an OK button, as shown below.



Parameter Settings Menu

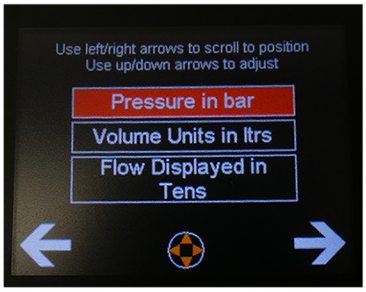
Flow Units Selection Menu

Press button 3 on home page to access. Navigate using the joystick. Use button 1 to return to home page, use button 4 to proceed to next menu.



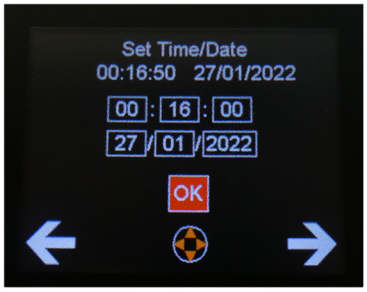
Pressure and Volume Selection Menu

Use the up-down arrows on the joy-stick to change pressure and volume units. You can navigate the options by the left-right joysticks.



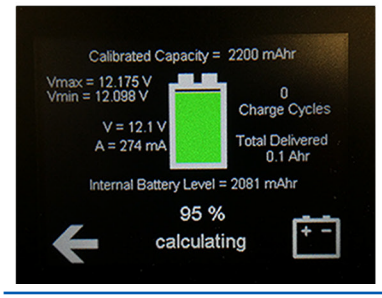
Date & Time Menu

Use the up-down joysticks to change time and date and the left-right arrows to navigate. Press the OK button for changes to come into effect.



Battery Info Menu

In this menu, you can view information about battery life and details about the charges, voltage and internal battery level.

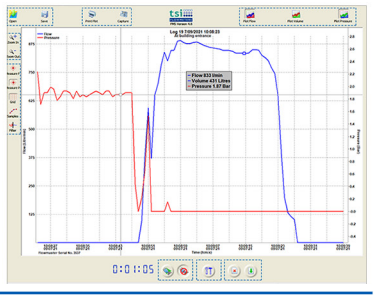


Data Logger

Access information about the current log time and how much log data memory your Flowmaster has. You can *activate logging* by pressing *button four.*

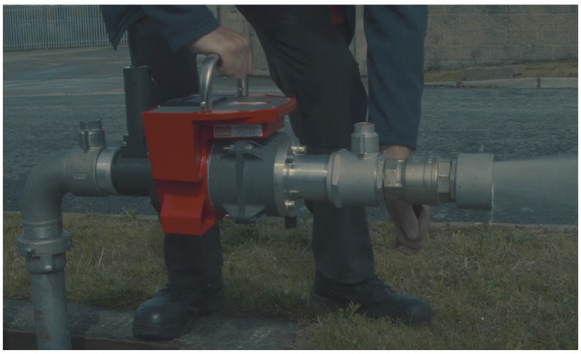
FMS Software

The FMS Software is accessible on your PC, and allows you to graph logging info and keep track of previous logs.



4.1 SIMPLE STEPS TO RAPID DEPLOYMENT

1.

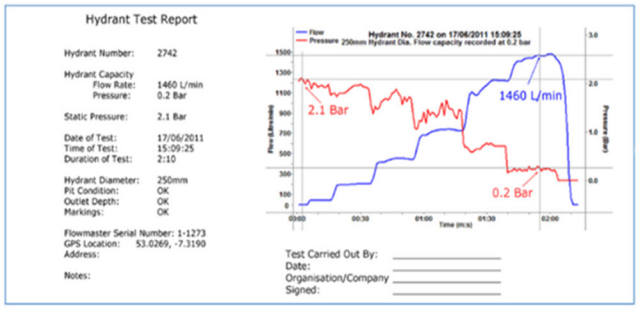


Measure and record pressure, flow rate and turbidity

2.

Upload results to PC and use FMS software to manage and graph log files

3.



Label data for reports

4.2 PRECAUTIONS FOR USE

IMPORTANT - PLEASE READ THIS SECTION BEFORE USING YOUR FLOWMASTER.

It is important to think safety first, especially when working with pressure.

- Please ensure the Flowmaster is securely attached to the service fitting (eg. hydrant outlet, pump, etc.) before pressurising.

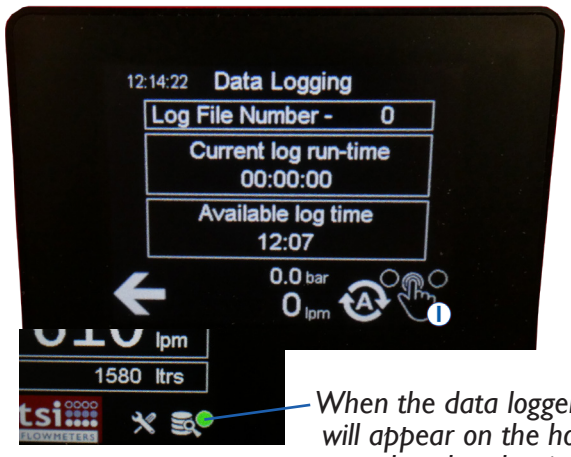
- Please consider carefully the expected system pressures if you plan to use a length of hose between the service point and the Flowmaster.

- **Never** allow the Flowmaster to be used in an open-ended or non-fixed position. It is essential to secure the Flowmaster so that it cannot move about freely, as this may result in injury and/or Flowmaster damage.

4.3 HOW THE DATA LOGGER WORKS

With this Flowmaster, there are **three** options when logging data.

- The first of these is to live-log, with your Flowmaster connected directly to your PC.
- The second is to use the trigger conditions for the logger activating automatically.
- The final option is to manually activate the logger by accessing the data logging screen (shown below) and pressing the button underneath the icon highlighted with ⓘ



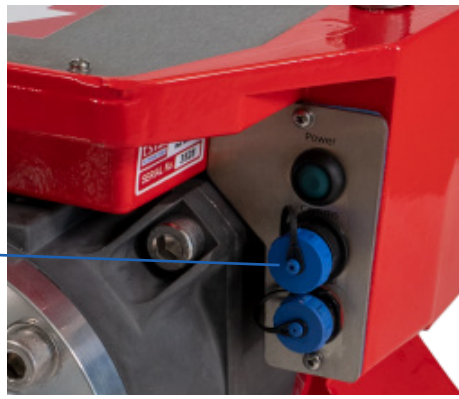
When the data logger is active, a green dot will appear on the homescreen to indicate that data logging is taking place.

The data logger is activated when trigger conditions are met, you can utilise default trigger conditions or set custom conditions for when the logger will turn on.

- When using default trigger conditions; the data logger will activate when flow rate exceeds 50 LPM for >3 seconds.

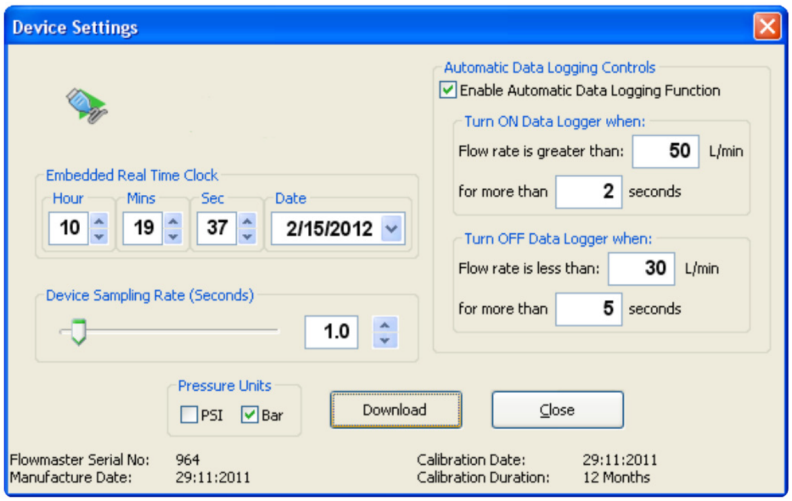
- To set custom trigger parameters, use the TSI Software on your PC when the Flowmaster is connected via USB.

Establishing Connection and Setting Up Trigger Parameters



To establish connection between the Flowmaster and your PC, connect the mini-USB end of the cable into the USB input on the Flowmaster (showcased here)

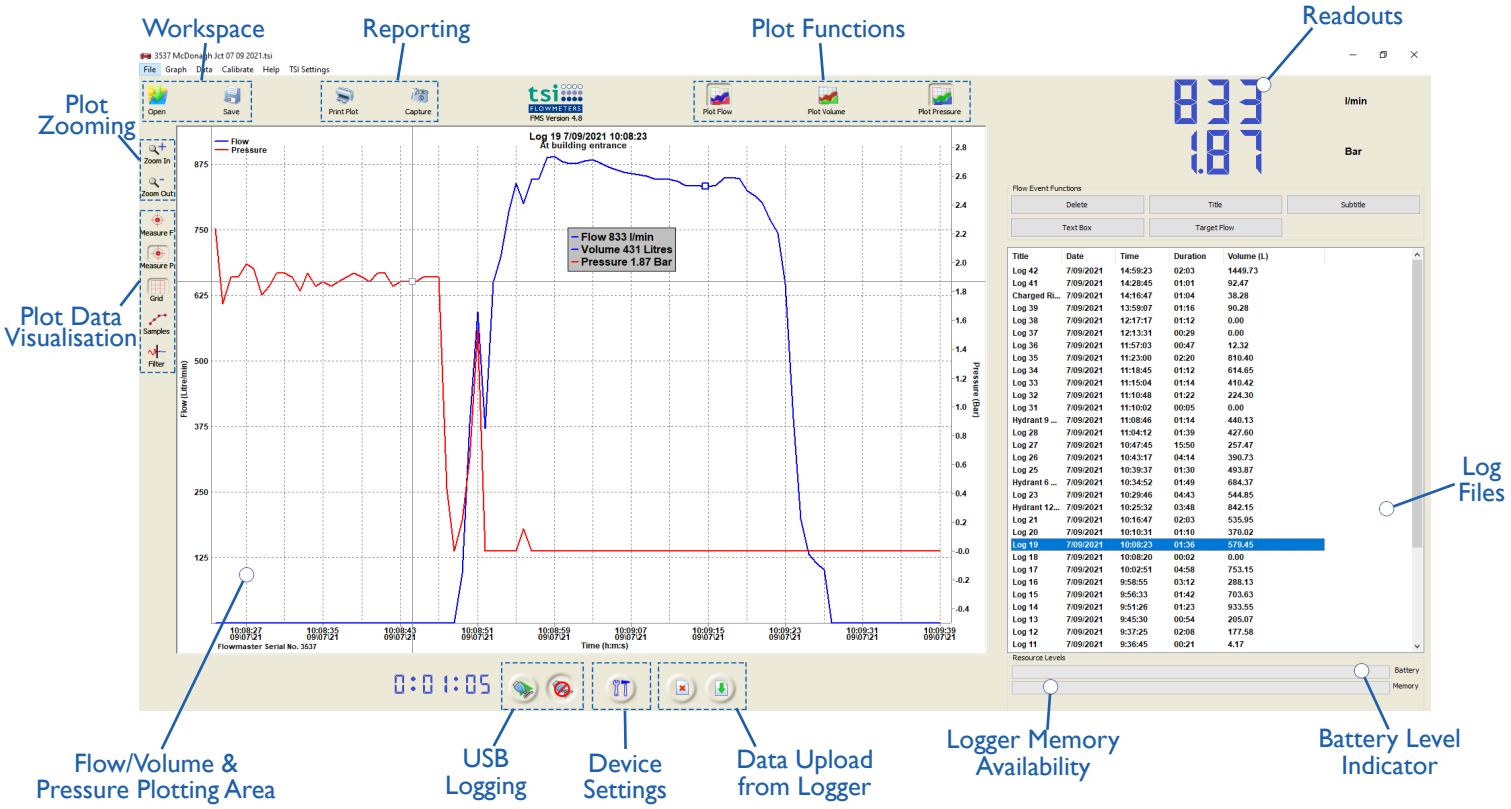
After connection has been established, start up the Flow monitoring software on your PC. In the first window, click on the 'Device Setting' located at the bottom centre of the program. This will bring up a new window, *shown below*.



The data logging trigger conditions can be edited on the right side of this window.
Simply input the LPM and seconds you wish the data logger to activate on and which you want the logger to deactivate on.

Also, in this window you can edit the date and time setting of your Flowmaster, and the sampling rate in seconds. Both of these options are located on the left side of the window.

4.4 NAVIGATING THE DATA LOGGER SOFTWARE



Direct-to-PC Data Logging Procedure

To live log directly from Flowmaster to PC, use the Live Log Button in the software. This button is highlighted above with a ⓘ mark.

Uploading your Data

To upload logged data, simply plug your Flowmaster into your PC, start up 'TSI Flow Monitoring' and click on the data upload button. All your data files will now be uploaded to your computer. The log files are listed in chronological order on the right side of the UI, shown in the diagram above. Once you click on a file, the flow and pressure data will be automatically graphed.

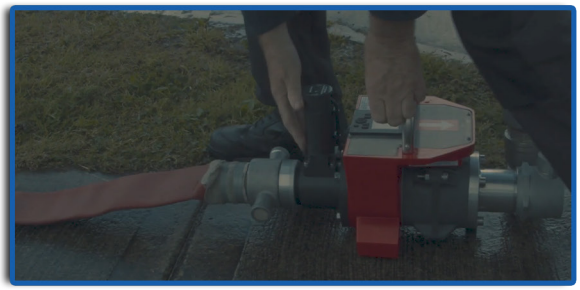
Downloaded files are not automatically saved. Please use the save button on the top left to store data permanently.
You can modify the file names using the 'Rename' button tool.
Your log files are not automatically deleted from your Flowmaster's logger memory when uploaded to the computer.
Select your files for deletion in the 'Log Files' listing and click the 'Delete' button above to activate the deletion of the files permanently.

For more detailed information on using the software, please refer to the software manual TSI_FMS_Manualv1_3.pdf

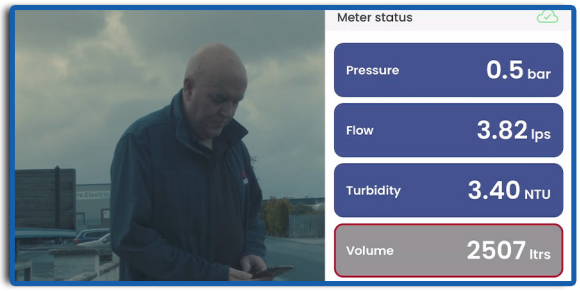
4.5 VIDEO TUTORIALS

Setting Up on a Hydrant

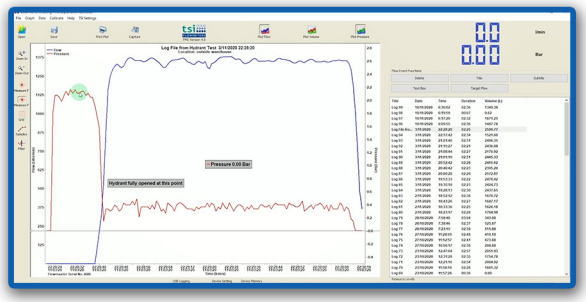
Setting Up In-Line using Hose Lengths



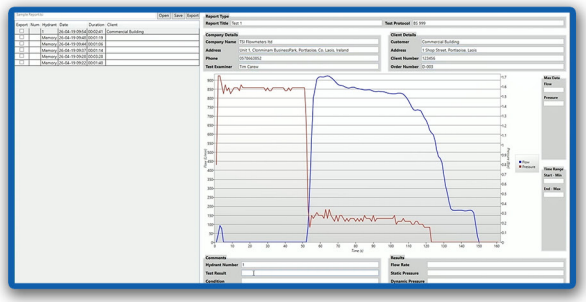
Data Collection using the TSI App & Flowmaster_PFT



Using FMS Software



Using Flow Reporting Software



5 Maintenance & Troubleshooting

5.1 BATTERY MAINTENANCE

- The battery pack operating time is 10 hours continuous usage. It is better to top up charge the batteries at regular intervals than to allow full discharge.

- The battery type is designed for regular but intermittent use. It is not ready for deep discharge that would come from leaving the Flowmaster powered on for eight to ten hours a day. If your procedures require this activity, please contact TSI Flowmeters and request alternative battery technology.

- The flow measurement will become erratic if the battery voltage is too low (readout indicating zero when water is flowing). It's recommended to use a voltmeter to check the voltage of the battery pack. If less than 10V DC, immediate recharging is necessary. If less than 12V DC, immediate top-up charging is recommended.

- Batteries have an operating life of 10 years and will need to be replaced thereafter.

5.2 FLOWMASTER MAINTENANCE

- Avoid dropping the Flowmaster. Use your hands to operate the switches and avoid use of screwdrivers. Keep abrasive chemicals away from the exterior. Wash the inner tube with clean water after.

- The flow meter control electronics are in a waterproof compartment located beneath the display gauge Do not open this compartment. This will destroy the waterproof feature and void warranty.

- The Flowmaster's flow gauge response is reduced if the electrodes are covered with a film of oil, dirt or rust. This can result in measurement error. It is recommended to clean the sensor electrodes periodically - Clean the electrodes by brushing the inside of the pipe with a soft cloth or soft brush dipped in water. If river water is used, it's recommended to clean the electrodes every 6 months. If oily water has been used, washed immediately.

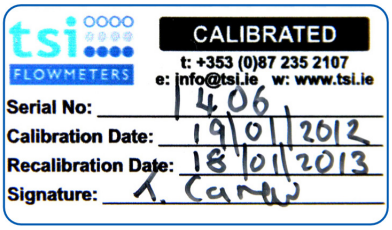
- The Flowmaster is calibrated and scale adjusted at the factory, therefore accurate measurements can be made immediately upon receipt of the product. It is recommended, however, that all measuring instruments are calibrated annually.

5.3 TROUBLESHOOTING

5.4 CALIBRATION & RESETTING CALIBRATION DUE DATE REMINDER MESSAGE

Every TSI flow meter is tested and calibrated prior to shipping. A calibration label is attached to the top of the meter, and on this label will be the date on which the meter is due its next calibration.

The master meter at TSI is calibrated annually at the Irish National Test Centre, this ensures the reading obtained by the Test Equipment referred to on certificates issued by TSI Flowmeters Ltd are traceable to National and International standards.



Resetting the Calibration Due Date Reminder Message

The procedure for resetting the calibration due date is as follows:

- Ensure your Flowmaster is connected to your computer via the USB cable.

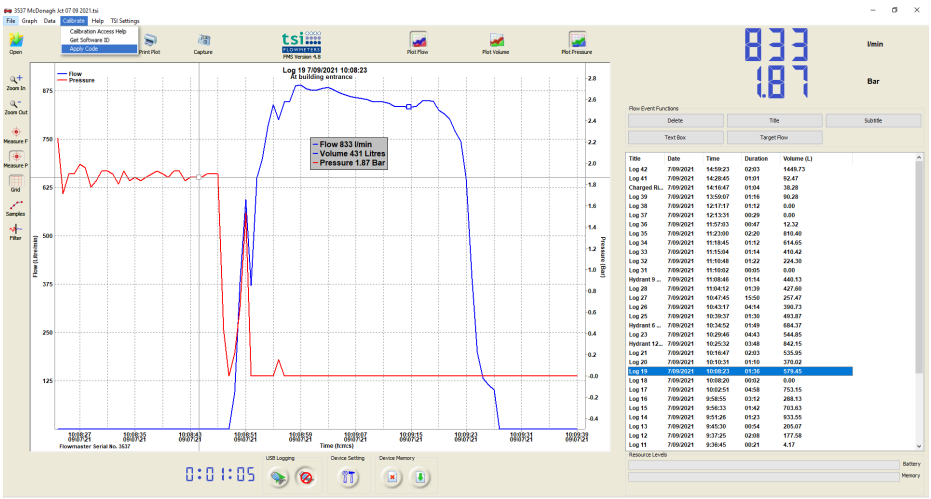
- Determine the code for your meter from *'Get Software ID'* on the **calibrate** tab.

- Send this code and the serial number of your Flowmaster to TSI Flowmeters Ltd. Inform them of the numbers of months for which the new calibration certificate is to remain valid.

- TSI will then send a new code to you. It will be a readable document in Notepad or MS Word, and the format will be as shown:

fd0f77da907e885ac74f29f45efcb76a

- To input the new code, consult the diagram below.



Return to the calibrate tab and this time select 'Apply Code' - a new window will prompt you to input the code. After input, a new window should then confirm your new code.

- If there is a problem with the procedure or the code, an error message will appear after input. If this happens, click OK and repeat the procedure with the same code. If the same error message appears, contact TSI requesting a new code. If requesting a new code, send the existing code from your Flowmaster and serial number of your Flowmaster to TSI.

6.1 How to use the charger

**** It is recommended to power off the Flowmaster while charging the Li Ion battery. ****

- The charger is started by connecting the battery packer to the charger and then connecting the charger to the mains.

- When the mains is connected the LED will be orange for approximately 8 seconds before turning to yellow when initialisation and analysis starts.

- The LED turning to orange indicates the beginning of Fast Charge. Once the batteries are fully charged and the voltage drops, the charger will go into a Top-off Charge mode.

- When the LED turns a constant green, the battery has entered Trickle Charge. It is recommended that trickle charge does not exceed 24 hours.

LED	MODE
YELLOW	Battery not connected
YELLOW	Battery initialisation and analysis
ORANGE	Fast charge
GREEN with intermittent YELLOW flash	Top-Off Charge
GREEN	Trickle Charge
Alternating ORANGE-GREEN	ERROR

If the mains input voltage is turned off, the charger will reset. When the voltage is turned on again, a new charge cycle will start.

If new batteries are to be connected, the charger must idle for approx. 15 seconds to make sure all parameters in the microprocessor have been reset. When the charger has been reset the LED changes to yellow, and a new charge cycle can begin.

The Li Ion Battery and charger

6.2 FAQ and Trouble-shooting

Battery does not seem to charge

Making a good electrical connection between charger plug and battery socket: Observe the LED indication to confirm the electrical connection between charger and battery. Redo the insertion of charger plug into meter socket, power off and on the charger and observe until a 'normal' charge cycle is achieved.

Battery charges very quickly or meter stops working after a short period of time

A full charge cycle from empty takes ~2.5 hours. If the charging cycle (from empty) is significantly briefer, it may indicate that the battery is nearing the end of its life. In this case, battery replacement is the recommendation.

Memory effect

As far as TSI is aware, there is NO memory effect with Li Ion batteries. It is acceptable to charge the batteries from any state of capacity.

How many charge cycles over life time of an Li Ion battery

Battery manufacturer literature suggests that after between 300 and 500 discharge and recharge cycles, the remaining battery capacity will be ~75% of initial rated capacity.

7.1 BALL VALVE FITTINGS

The ball valve facilitates speedy and safe static pressure readings and creates back pressure for taking flow and residual pressure measurements

BS Inst.

Storz

NH

7.2 TRANSPORT & STORAGE CASE

Transport case with castor wheels and extension handle.
Foam interior cut to hold Flowmaster and accessories.
Weight - 12.5kg.

7.3 ADAPTORS

A wide range of adaptors are available that allow the Flowmaster to work with your pipework and fittings.

NH

BS Instantaneous

Flange to 2.5" BSP Male

Flage to 4" BSP Male

Storz 65

Storz A

Storz B

Storz C

Guillemin 100

Guillemin 65

Barcelona

NOR Kuppling

GOST

7.4 EXTERNAL BATTERY/CHARGERS

External Li Ion Battery Pack available

Mains Battery Charger available

In-car Charger available

8 Limited Warranty

TSI Flowmeters Ltd., of Unit 1, Portlaoise Enterprise Centre, Clonminam Business Park, Portlaoise, Co. Laois, R32VK07, Ireland (Warrantor), warrants to the original purchaser of the new fire protection equipment manufactured by Warrantor and to any person to whom such equipment is transferred, that such equipment shall be free from defects in materials and workmanship during the one (1) year period commencing upon the receipt of such equipment by the original purchaser thereof ("warranty period").

Warrantor's obligation under this warranty is specifically limited to replacing or repairing its fire protection equipment or parts thereof, which are shown by Warrantor's examination to be in a defective condition attributable hereunder to Warrantor. To qualify for this Warranty, alleged defective equipment MUST be returned to Warrantor at its above address, transportation charges prepaid, within a reasonable time after discovery of an alleged defect, and in no event later than thirty (30) days after the expiration of the warranty period. If, as a result of Warrantor's examination of returned equipment, Warrantor concludes that a product defect attributable hereunder to Warrantor exists, Warrantor shall cure such defect within a reasonable time, not to exceed forty-five (45) days after such examination. All expenses in curing such defect, except for transportation charges and shipping expenses incurred in delivering such equipment to Warrantor, shall be paid by Warrantor.

In the event that such equipment is found to be attributable hereunder to Warrantor and Warrantor is unable to provide replacement, or repair is not commercially practicable or cannot be timely made, Warrantor may elect to refund to claimant the purchase price of such equipment actually received by Warrantor, less reasonable depreciation, in complete discharge of its obligations hereunder. If Warrantor elects to comply with this warranty by means of such refund, as a condition precedent to such compliance, the claimant shall return such equipment to Warrantor free and clear of liens and other encumbrances.

THE ORIGINAL PURCHASER OF SUCH EQUIPMENT, AND PERSON TO WHOM SUCH EQUIPMENT IS TRANSFERRED, AND ANY PERSON WHO IS AN INTENDED OR UNINTENDED BENEFICIARY OF SUCH EQUIPMENT, SHALL NOT BE ENTITLED TO RECOVER FROM WARRANTOR ANY CONSEQUENTIAL OR INCIDENTAL DAMAGES FOR INJURY TO PERSON AND/OR PROPERTY RESULTING FROM ANY DEFECTIVE EQUIPMENT MANUFACTURED BY WARRANTOR.

Misuse or neglect (including failure to provide reasonable maintenance) of, or accident or unauthorised repairs or alterations to, such equipment, shall release and discharge Warrantor from any obligations under this warranty or otherwise.
WARRANTOR EXPRESSLY LIMITS WITH RESPECT TO SUCH EQUIPMENT ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND ALL IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE TO THE WARRANTY PERIOD. AFTER EXPIRATION OF THE WARRANTY PERIOD, WARRANTOR EXPRESSLY DISCLAIMS WITH RESPECT TO SUCH EQUIPMENT ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND ALL IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. THERE IS NO WARRANTY OF ANY NATURE MADE BY WARRANTOR BEYOND THAT WHICH IS CONTAINED HEREIN.

Should Warrantor fail to meet with its obligations under this warranty, a claimant may sue Warrantor to secure its compliance with this warranty. No action to enforce this warranty or to otherwise secure recovery from Warrantor for any damages arising out of the fire protection equipment manufactured by Warrantor shall be commenced later than two (2) months from and after the date of the receipt of such equipment by the original purchaser thereof.

NO PERSON HAS AUTHORITY TO ENLARGE, AMEND, OR MODIFY THIS WARRANTY.

Warrantor reserves the right to change the parts or design of its products from time to time without notice, and with no obligation to maintain spare parts or to make corresponding changes in the products previously manufactured.

CE

Declaration of Conformity

We: **TSI Flowmeters**

Unit 1, Portlaoise Enterprise Centre,
Clonminam Business Park,
Portlaoise, Co. Laois, R32 VK07,
Ireland.

Tel +353 (0)57 866 3852

declare under our sole responsibility that the product,

Flowmaster_PFT

to which this documentation relates, is in conformity with the provisions of the following directives:

2001/95/EC General Product Safety
2006/95/EC Low Voltage Directive (LVD)
2004/108/EC Electromagnetic Compatibility Directive (EMC)

The technical file is maintained at:

TSI Flowmeters Ltd,
Unit 1, Portlaoise Enterprise Centre,
Clonminam Business Park,
Portlaoise, Co. Laois, R32 VK07,
Ireland.

Date of Issue: 10th August 2022

Place of Issue: Portlaoise, Ireland

Name: **Tim Carew**

Title: **Managing Director**

Certificate of Calibration

Issued by:

TSI Flowmeters Ltd

Unit 1, Portlaoise Enterprise Centre,
Clonminam Business Park,
Portlaoise, Co. Laois, R32 VK07,
Ireland.
Tel: +353 (0)57 866 3852
Email: info@tsi.ie

The readings obtained by the Test Equipment referred to on this certificate are traceable to National and International standards. Calibration Cert No. 6825CN.

Cert No.	Date of Issue	Order No.	Job No.
-01			

Company Name: _____

_____

_____

_____

Details of Flowmeter Calibrated

Type of Meter: TSI Model EMF-300E Magflow
Serial No. _____
Date of Calibration: _____

Method of Test: Comparison with Master Flowmeter.

The zero offset was adjusted to read 0 lpm. Since this is the first calibration of a new flow meter there are no before service readings. The unit was calibrated at a flow rate of 500 lpm. This flow rate was maintained for five minutes and correct reading was observed on the unit. Totaliser readings were taken at one minute intervals; the maximum deviation observed was within the specified ±2% of master flow meter readings. Correct flow rate was verified for this calibration setting at 300, 400, 600 and 700 lpm.

Calibrated by: _____
TSI Flowmeters Ltd

Operation and Maintenance Manual

Flowmaster_PFT

Portable Pressure, Flow and Turbidity measuring instrument with Internal Data Logger

Address: **Unit 1, Portlaoise Enterprise Centre, Clonminam Business Park, Portlaoise, Co. Laois, Ireland R32 VK07**

Sales: **+353 (0)57 866 3852** | **tim.carew@tsi.ie** | **www.tsi.ie**