

# Operation and Maintenance Manual

## Flowmaster 250 MK2

Portable Flow & Pressure Test Instrument.  
Invaluable for hydrant testing, pump testing, flushing  
and water main condition testing.



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# I Getting to Know Your Flowmaster

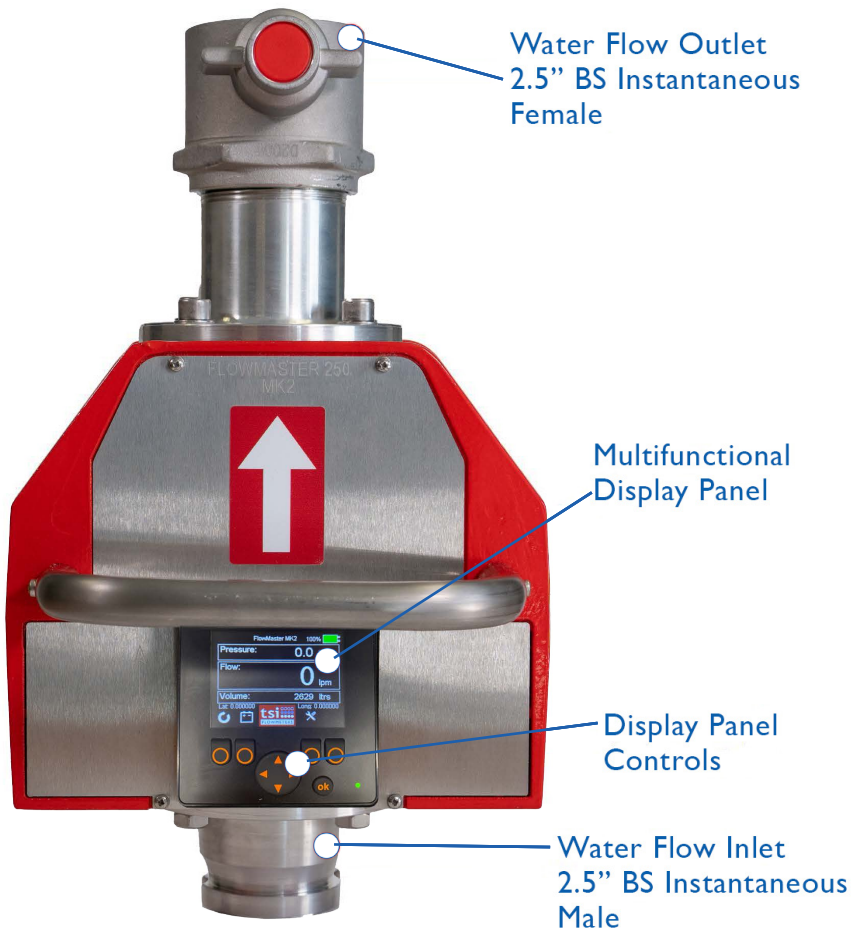
## I.1 What's in the box?

Flowmaster 250DL MK2



Battery Charger







# 2 Specification

## 2.1 GENERAL

<b>Weight</b>	12.5 kg including battery pack & instantaneous adaptors
<b>Dimensions</b>	342 (L) x 146 (W) x 336 (H) mm
<b>Power</b>	Internal Battery Pack. DC 12V @ 250 mA
<b>Case Material</b>	Aluminium
<b>Operating Temp.</b>	-10°C ~ +50°C
<b>Adaptors</b>	2.5" BSPM or BS Instantaneous Storz B, Storz 65, 2.5" NST adaptors available on request

## 2.2 FLOWMETER

<b>Colour</b>	Firemen Red & anodised aluminium
<b>Sensor Type</b>	Electromagnetic
<b>Range</b>	30 - 3,000 lpm By changing the sensor control pcb, range can be extended to 5,000 lpm
<b>Resolution</b>	50 ~ 750 l/min $\pm$ 15 l/min 750 l/min $\sim$ $\pm$ 2%
<b>Standard Functions</b>	Flow reading Totaliser reading
<b>Casing Material</b>	Corrosion resistant ADC6-12 (JIS) aluminium (painted)
<b>Pressure rating</b>	16 bar

## 2.3 DISPLAY

<b>Display Type</b>	320 x 240 backlit graphic colour display All readings are available on this display.
<b>Flow sensor</b>	There are four flow unit selections to choose from; - LPM            - m3/h - LPS            - US GPM
<b>Pressure Transducer</b>	Bar, PSI, KPa, MTrH readouts selectable Type - Strain Gauge Range - 0 ~ 25 bar, $\pm$ 1%
<b>Volume Totaliser</b>	Showcase of total volume. Sortable by test and group, as well as keeping track of lifetime total
<b>Calibration</b>	Sensor calibration is accessible via the password protected engineering page

## 2.4 BATTERY PACK

<b>Battery Type</b>	Lithium-Ion, Li Ion
<b>Rated Capacity</b>	2.4 Ahr (10 hours operation)
<b>Recharging</b>	Mains operated recharger is supplied
<b>In-car charger</b>	Available as separate item
<b>Monitor</b>	A built-in battery monitor displays remaining capacity in hrs/mins
<b>External Battery Pack</b>	Available as separate item

## 2.5 MANUALS

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

- Operation and Maintenance Manual
- You Tube videos demonstrating how to use the Flowmaster 250 MK2
- Quick start guide



## 3 Flowmaster Operation

### 3.1 DISPLAY PANEL POWER-ON SEQUENCE

Turn on the Flowmaster 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

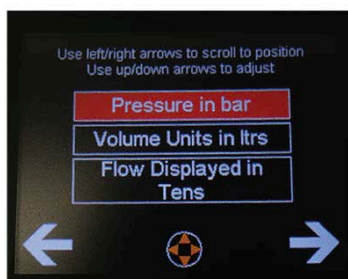
##### Flow Units Selection Menu

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 joystick to change pressure and volume units. You can navigate the options by the left-right joysticks.



##### Battery Info Menu

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



## 4 Using Your Flowmaster

### 4.1 SIMPLE STEPS TO FAST FLOW ANALYSIS

I.



**Measure and record pressure and flow rate**



**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.

### 4.5 VIDEO TUTORIALS



**Setting Up on a Hydrant**



**Setting Up In-Line Between Two Hose Lengths**



**Understanding Readouts While There Are Readings**

# 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.

## 5.3 TROUBLESHOOTING

**Incomplete Self-Test Sequence:** The LED displays a series of dashes after self-test sequence commences.

**Possible Cause:** The Sensor and Display parts of the device are not in contact.

**Action:** Check all cables are secure. If not connected, contact your local representative.

### Erratic LED Display

**Possible Cause:** The battery voltage is too low.

**Action:** Charge the batteries.

**Reading Not Displaying:** The self-test sequence is okay, but there is no reading when water is flowing.

**Possible Cause:** 1. Batteries voltage is too low. 2. No earth wire to battery. 3. Unit is faulty.

**Action:** 1. Charge or replace batteries. 2. Replace earth wire between negative terminal and red casting. 3. Return to manufacturer.

**Recharging Issues:** The unit will not charge or there are humming noises while trying.

**Possible Cause:** Faulty battery charger or batteries are over-discharged and cannot recover.

**Action:** Contact local representative for replacement charger or batteries.

**All log file dates are Year 2000:** The data logger's de-charged battery will revert to default date of the year 2000.

**Possible Cause:** Battery not charged.

**Action:** Leave Flowmaster powered on for at least 3 hours, then set the date and time.

If the above action does not work, return your meter to TSI for repair.

## 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.

<b>tsi</b> FLOWMETERS		<b>CALIBRATED</b>	
		t: +353 (0)87 235 2107 e: info@tsi.ie w: www.tsi.ie	
Serial No:	1406		
Calibration Date:	19/01/2012		
Recalibration Date:	18/01/2013		
Signature:	A. Carr		



# 6 Li Ion Battery Charger

## 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



## 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 Accessories

### 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

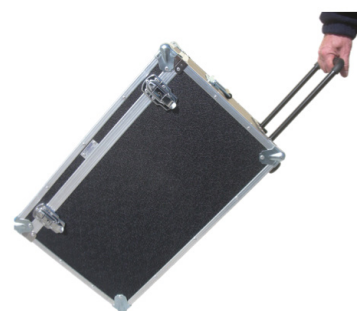


NH



### 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

Flange to  
4" BSP Male

Storz 65

Storz A

Storz B



Storz C

Guillemin 100

Guillemin 65

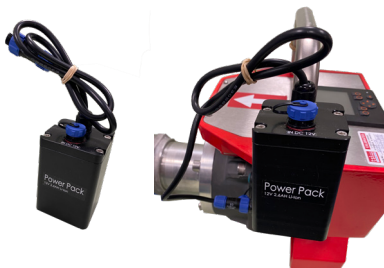
Barcelona

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.

## 9 CE Declaration of Conformity



### 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 250 MK2**

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: 10<sup>th</sup> August 2019

Place of Issue: Portlaoise, Ireland

Name: **Tim Carew**

Title: **Managing Director**



# 10 Calibration Certificate

## 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](mailto: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  $\pm 2\%$  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 & Manual Maintenance Manual**

**Flowmaster 250 MK2**

**Portable Flow, Volume and Pressure  
measuring instrument**