



**FINISH THOMPSON INC.**  
Drum Pump **Flow Meter**

## Model FM3000 Series Operating Instructions



# Table of Contents

Safety .....	1
Introduction.....	1
Specifcatons .....	1
Features.....	1
Section 1 - Installation .....	2
Section 2 - Operation .....	2
Section 3 - Maintenance .....	3
Section 4 - Warranty .....	3
Section 5 - Spare Parts .....	3

## Safety

**ALWAYS** wear protective clothing, eye protection and follow standard safety procedures when handling corrosive or personally harmful materials.

**NEVER** use this flow meter with flammable or combustible liquids.

**NEVER** use this flow meter in a hazardous environment.

**ALWAYS** verify chemical compatibility with the flow meter and pump materials of construction before operation.

**ALWAYS** make sure the pump and hose are properly supported.

**ALWAYS** use a chemically compatible hose rated for the temperature of the product being pumped.

**ALWAYS** place pump tube in liquid before starting.

## Introduction

Thank you for purchasing an FM-3000 Series electronic flow meter. The FM-3000 Series is designed to measure the flow of a fluid being dispensed from Finish Thompson's PFP, PFM, & PFV drum pumps. The meter is factory calibrated and displays information on an LCD display. In addition, the meter can be field calibrated to improve accuracy at a given flow rate. One lithium battery powers the unit.

**FM-3000** is a rate/totalizer meter – designed to measure and display both the rate of flow and the total flow.

## Specifications

Maximum Working Pressure:	62 PSIG (4.3 bar)
Maximum Fluid Temperature:	PFM & PFP Models = 86° F (30° C)
Ambient Temperature Range:	41° to 122°F / 5° to 50° C
Enclosure:	Splash resistant
Sensor/Paddle/Axle Material:	PVDF/PVDF/Hastelloy C
O-ring seals:	Viton
Accuracy:	+/-1.0% of full-scale rate reading; can be field calibrated
Repeatability:	+/-0.5% of full-scale rate reading
Power Requirements:	One 3.6V lithium, AA battery included
Battery Life Expectancy:	1 year minimum
Maximum Viscosity:	20 cP/mPas
Maximum Specific Gravity:	1.8

## Features

- Easy to read two (6) digit LCD display
- Installs quickly on PFM, PFP, PFV Series pump tubes with supplied fittings
- Batch control feature stops pump motor when preset volume has been pumped
- Displays either US gallons or liters
- Digital flow indicator
- Factory calibrated; can be field calibrated using front panel touch buttons
- Four ranges allow the meter to be calibrated and stored for different fluids or flow rates and can be totaled independently
- Minimal maintenance required
- Corrosion resistant PVDF sensor with polypropylene body
- Splash resistant enclosure
- High accuracy
- Meter automatically turns on and begins operation when flow is detected
- Extended battery life mode – display switches off after 2 minutes without flow Low battery warning
- Non-volatile memory stores settings even when batteries are removed

### Kit Contents:

- FM-3000 Series Meter
- Flow meter adapter
- Discharge nut
- 1" NPT x 1" BSPP coupling
- 1" BSPP x hose barb adapter
- (2) Viton o-rings

## Section 1 - Installation

**NOTE:** Avoid exposing the LCD for prolonged periods to direct sunlight or the life of the LCD may be reduced.

1. The meter must be installed so the arrows molded in the body of the meter point away from the pump discharge.
2. Slide two o-rings (Items 3) over threads of flow meter body (item 1) until they reach the face of the body. Wrap Teflon tape on threads of both ends of flow meter. Screw the Hose Barb Adapter (Item 2) onto discharge end of flow meter. Tighten securely by hand until it compresses the o-ring inside the adapter, being very careful not to over-tighten.
3. Screw coupling (item 4) onto the other end of the flow meter. The coupling is 1" NPT x 1" BSPP. The BSPP end has the larger chamfer. Make sure the BSPP end is threaded onto the flow meter body. Tighten securely by hand until it compresses the o-ring inside the coupling, being very careful not to over-tighten.
4. Remove discharge nut, spout and o-ring (items 9, 8, 7) from PF discharge. Discard the discharge nut and spout (or save for later use if no longer using the pump with a flow meter). Save the o-ring for use in the next step.
5. Place the flow meter adapter (item 6) into the discharge nut (item 5) supplied with the flow meter kit. Threads of the adapter will protrude through the front of the discharge nut. Place the o-ring (item 7) inside the discharge nut (item 5). Press down on the o-ring to ensure it is seated in the nut.
6. Screw discharge nut/adapter/o-ring assembly onto the discharge of the PF pump tube. Use a wrench to tighten securely but do not over-tighten. This step prevents the adapter from rotating when the flow meter is installed.
7. Grasping the flow meter body (being careful not to put pressure on the digital display), screw the flow meter assembly onto the 1" NPT discharge adapter on the PF Series pump tube until tight. If the flow meter display is not in the upright position proceed to step 8 for adjustment.
8. Using a wrench, loosen the discharge nut (item 5) on the discharge of the PF Series tube. Position the flow meter assembly so the display is in the upright position and retighten the discharge nut (while holding the flow meter assembly).

**NOTE:** Meter can be tilted as much as 45° from upright position.

**⚠ WARNING:** Use chemically compatible hose rated for the temperature of the fluid being pumped.

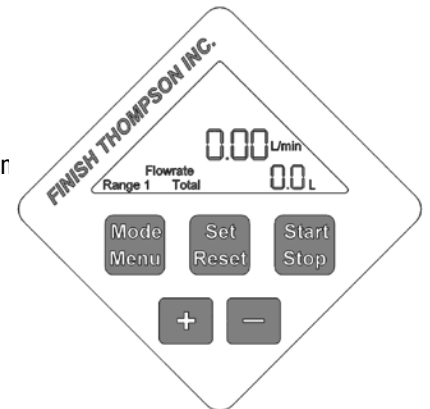
9. Attach 1" ID hose to the hose barb located at the discharge end of the flow meter. Secure with a hose clamp.

## Section 2 - Operation

**⚠ WARNING:** When the motor is connected to the batch control relay module make sure the motor switch is in the OFF position until ready to use the batch control feature to prevent unintended pump operation.

### NOTES:

- The FM-3000 can display either U.S. gallons or liters.
- The meter is shipped from the factory with the lithium battery installed.
- The FM-3000 Series is factory calibrated to  $\pm 1\%$  of full-scale rate reading. Accuracy is based on laboratory testing using a PF Series pump tube and water.
- The meter automatically turns on and begins operation when flow is detected.



### Theory of Operation

Start the pump motor. Fluid flowing through the meter causes a radial turbine wheel to spin. Pulses generated by the spinning turbine wheel are counted and multiplied by scaling factors. The resulting flow rate amounts and total flow amounts are displayed on the LCD readout. Pressing the "Mode Menu" button located on the front panel toggles the display between flow rate and total flow.

### Four Flow Ranges

There are four flow ranges. Range 1 is factory set for water. The other three are user adjustable. Each range totals independently from the other ranges. These ranges can be used to calibrate the meter for different fluids or to accommodate different flow ranges (low, medium and high flow for example).

## Changing From One Range To Another



Press the “+” button to change to another range. Push the button repeatedly until the desired range is reached. The range is displayed in the lower left hand corner of the meter (“Range 1”, “Range 2”, etc). The accumulated total for each range will be displayed in the lower right hand corner.

**NOTE:** “Range 1” is factory calibrated for water-like fluids and cannot be changed. “Ranges 2,3,4 can be user calibrated (see calibration section).

## Resetting Accumulated Total For each Range



Press and hold the “Set Reset” button and then the “+” button to clear the accumulated total for each range. Each range must be individually reset.

## Changing display from Flowrate or Volume



Press the “Mode Menu” button to toggle between the FLOWRATE and VOLUME (displayed as “VOL”) display modes. This information will be displayed on the top line.

## Resetting Volume Setting



With “VOL” displayed on the top line, press the “Set Reset” button to reset the total volume. This is independent of the accumulated total (displayed in bottom right hand corner).

**NOTE:** Any time the “Mode Menu” or “+” button is pressed, the volume will be automatically reset to zero.

## Changing Units of Measure



To change from liters to gallons or gallons to liters, press and hold the “Mode Menu” button and then the “-” button to enter the change menu. Press the “+” button to cycle between the two. To exit the menu and save the setting, press the “Mode Menu” button.

## Calibration

While the FM-3000 has been calibrated at the factory, field calibration is possible to increase accuracy at a given flow. Use the following steps for field calibration.

### Step One – Prepare a Calibrated Container

Use either a known calibrated container or create a calibrated container by using a known weight method. In either case, use as large a container as practical (for instance twenty liter versus one liter container).

To create a calibrated container, weigh the container empty. Fill the container with the desired amount of fluid, mark a line on the container at water level in permanent marker and reweigh. Subtract the weight of the empty container to get the net fluid weight. Determine the actual volume by dividing the weight by the specific gravity (density) of the liquid. For example if the fluid is water and the net weight was 20 kg, the container has 20 liters of liquid (20 divided by 1 kg per liter which is the weight of water per liter).

### Step Two – Enter Calibration Mode



To enter the calibration mode, press and hold the “Mode Menu” button and then the “+” button. “CAL” will be displayed on the top of the screen when this mode is active.

**NOTE:** The meter must be in Range 2,3 or 4 to calibrate the meter. Range 1 is factory calibrated for water-like fluids and cannot be changed.

### Step Three – Measure Actual Volume

Turn on the pump motor and fill the container to the fill line from Step One. Compare the actual volume of the fluid being pumped (determined by Step One) with the volume shown on the meter.

### Step Four – Enter Actual Volume into Meter



Make sure the pump motor is “OFF” and no flow is passing through the meter. Using the “+” or “-” buttons, adjust the volume on the flow meter display (top line) to match the actual volume pumped. Press the “Set Reset” button to store this data. The new calibration factor will briefly flash in lower right hand corner.



**NOTE:** If no reading is entered within two minutes, the meter will automatically shutoff and exit the calibration mode.

**NOTE:** All four ranges are preset with a calibration factor of 182.0

**NOTE:** If “Set Reset” button is pressed before any liquid passes through the meter when it is in calibration mode, an incorrect calibration factor will result. If this occurs, “EE” will briefly flash on the bottom line of the display. If this occurs, the meter will need to be calibrated again.

**NOTE:** To verify that the meter is properly calibrated, repeat Step Three. If not, repeat calibration process.

## Restoring Factory Defaults



To restore all the meter settings to the factory defaults, enter the programming menu by pressing and holding the “Mode Menu” button and then press and hold the “+” button, then press and hold the “-” buttons at the same time. Then press the “Set Reset” button to restore factory defaults and automatically exit the programming mode.



**NOTE:** This will return all four calibration ranges to factory settings and also resets accumulated totals for all four ranges.

## Flow Indicator



The top center of the meter display has a flow direction indicator. The legs will turn in a clockwise direction when the flow direction is correct. If the flow is backwards through the meter, the legs do not turn and the flow total is subtracted by the amount flowing through the meter backwards.

## Section 3 - Maintenance

The FM-3000 Series was engineered for low maintenance; however, some conditions will cause increased wear on the paddle and/or possible damage to the unit. Damage caused by corrosives incompatible with the meters materials of construction or abrasive fluids is not covered under warranty.

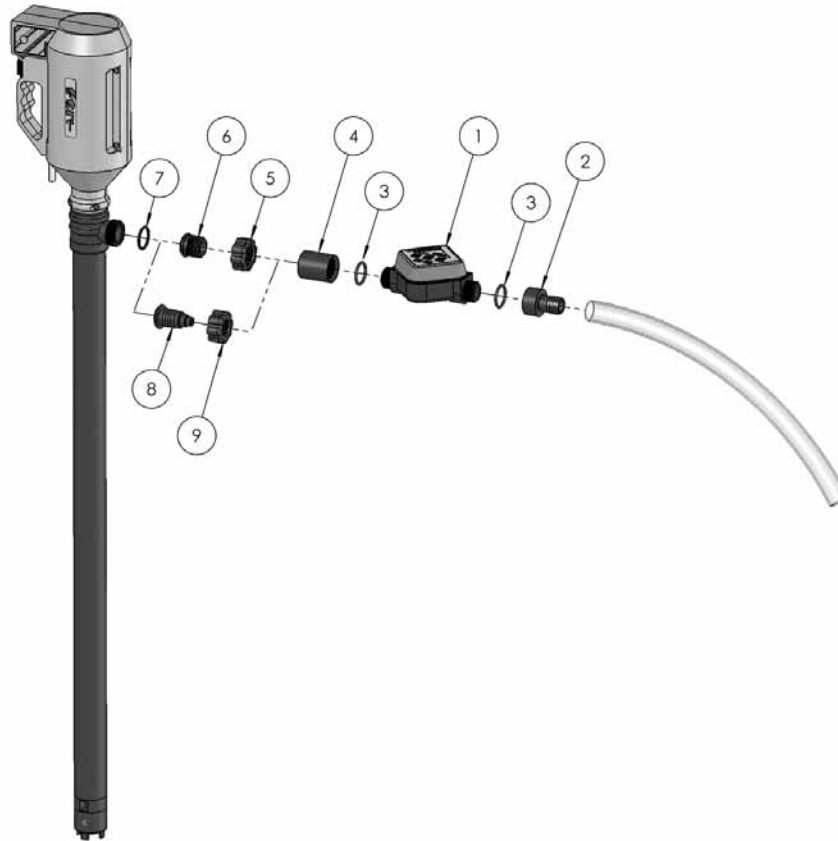
- Replace the battery when the low battery indicator (“Batt”) is displayed in the lower right hand corner. Make sure the meter is in “Power Save” mode (meter is off with nothing displayed on the front panel) before replacing the battery. The program memory is “non-volatile” and will not erase when replacing the battery. To replace the battery, open the meter enclosure by removing the four Phillips screws from the back of the meter. The battery is a lithium 3.6 volt, “AA” size. After replacing the battery, be sure the o-ring seal is in place and is in good condition, before reinstalling the screws.

## Section 4 - Warranty

Finish Thompson, Inc (manufacturer) warrants this product to be free of defects in materials and workmanship for a period of one year from date of purchase by original purchaser. If a warranted defect, which is determined by manufacturer’s inspection, occurs within this period, it will be repaired or replaced at the manufacturer’s option, provided (1) the product is submitted with proof of purchase date and (2) transportation charges are prepaid to the manufacturer. Liability under this warranty is expressly limited to repairing or replacing the product or parts thereof and is in lieu of any other warranties, either expressed or implied. This warranty does apply only to normal wear of the product or components. This warranty does not apply to products or parts broken due to, in whole or in part, accident, overload, abuse, chemical attack, tampering, or alteration. The manufacturer accepts no responsibility for product damage or personal injuries sustained when the product is modified in any way. If this warranty does not apply, the purchaser shall bear all cost for labor, material and transportation.

Manufacturer shall not be liable for incidental or consequential damages including, but not limited to process down time, transportation costs, costs associated with replacement or substitution products, labor costs, product installation or removal costs, or loss of profit. In any and all events, manufacturer’s liability shall not exceed the purchase price of the product and/or accessories.

## Section 5 - Parts List



Item Number	Quantity	Description	Part Number
2	1	1" BSPP x hose barb adapter, polypropylene	106737
4	1	1" NPT x 1" BSPP coupling, polypropylene	106736
5	1	Discharge nut, polypropylene	106622
6	1	Flow meter adapter, polypropylene	106599
3, 7	1	O-ring, Viton	J100991



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