# Operation & Installation Instructions

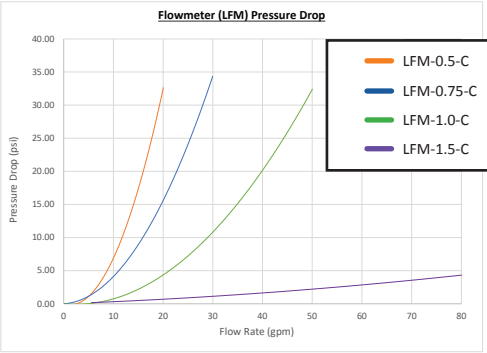
# FLOWMETER MODULE

**MODEL # LFM-0.5-C, LFM-0.75-C, LFM-1.0-C, LFM-1.5-C**


The Flowmeter uses the latest in ultrasonic technology to measure water flow. The technology uses sensors that communicate with each other using ultra-sonic sound that travels through the Flowmeter pipe. This allows for accurate and reliable means to measure flow without any mechanical wear or fatigue. This module, in connection with the CULLIGAN UV system, will allow for the UV system to enter Energy Saver Mode by dimming the UV lamp when no water is being used after a period of time. This will reduce energy costs associated with running the UV system, and prevent over heating of standing water in the UV chamber during no-flow conditions. Once water flow is present the UV system immediately exits Energy Saver Mode to provide proper disinfection. The Flowmeter incorporates an internal fail-safe in the case any failure occurs to make sure that the UV system is properly disinfecting the water at all times.

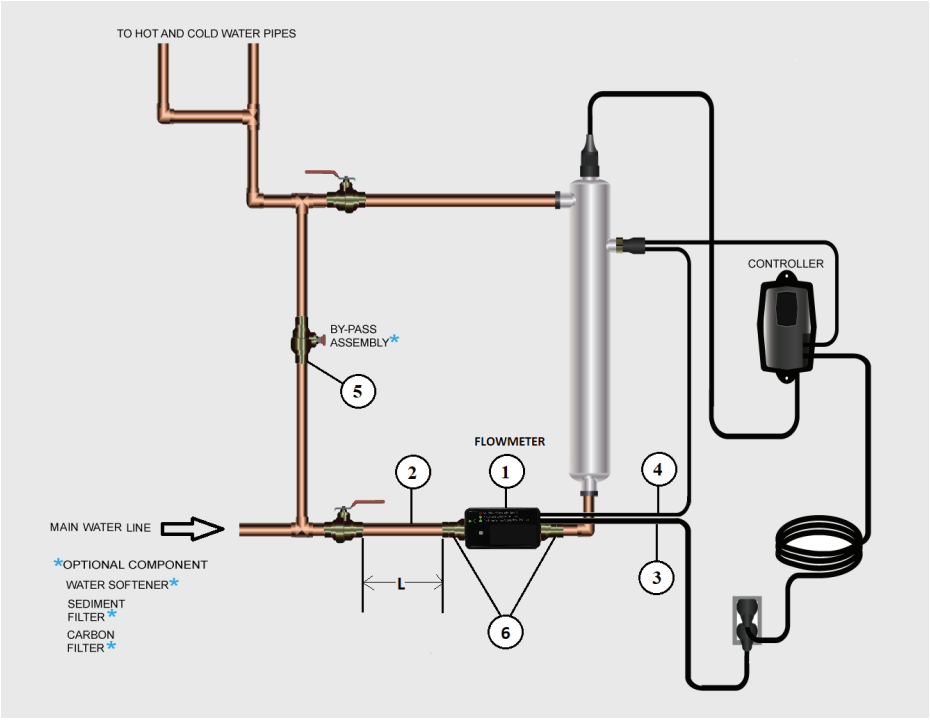
## Specifications

| | LFM-0.5-C | LFM-0.75-C | LFM-1.0-C | LFM-1.5-C |
|---|---|---|---|---|
| **Pipe Diameter** | ½" | ¾" | 1" | 1 ½" |
| **Flow Range** | 0.1 – 20 gpm | 0.1 – 30 gpm | 0.15 – 60 gpm | 0.4 – 80gpm |
| **Adaptors** | ½" NPT | ¾" NPT | 1" NPT | 1 ½" NPT |
| **Inlet Piping Length** | 5 Inches | 7.5 Inches | 10 Inches | 15 Inches |
| **Input Voltage** | $+5V_{DC}$[1] | | | |
| **Current Rating** | 100 mA Max | | | |
| **Accuracy** | 5% Relative Error within flow range | | | |
| **Firmware Version** | UV Systems with Firmware Version 2.13 or greater support the Flowmeter module[2] | | | |

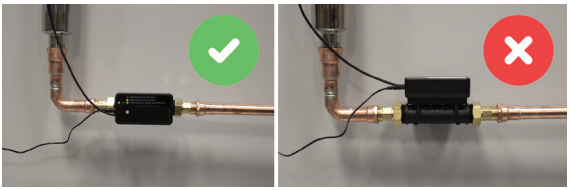



*Note 1: The Flowmeter Module only supports +5VDC, anything more will trip internal fuses.*

*Note 2: UV Systems with Firmware Version 2.13 and greater support the Flowmeter. Firmware can be upgraded in-field to the newest version to support the Flowmeter, please contact your plumber/dealer/ distributor for more information.*



## Installation

| | | |
|---|---|---|
| 1 | **Flowmeter** | • Must be installed on the inlet to the UV chamber only.<br>• Recommended to be installed horizontally. **Can be installed vertically, but installation must allow the flowmeter to maintain a full volume state at all times in order to operate.**<br>• **Flowmeter must be orientated with the labeling & LED facing sideways towards the user for proper operation**. Depending on the installation, text may be upside down.<br>  <br>• Direction of water flow is indicated on the top label, as well as the Flowmeter spool body. |
| 2 | **Inlet Pipe** | Every Flowmeter requires a length of straight pipe prior to inlet to the Flowmeter. Failure to do so will prevent proper Flowmeter operation.<br>Length of pipe (L) = 10 * Diameter of pipe (plumbing installation)<br>**Please refer to specifications table for proper lengths.**<br>*Note: If a pump or Flow-Adjustment Valve is connected directly to the Flowmeter, it is recommended that there is at least 48" Inches of straight pipe. ON-OFF valves are suitable as long as the valve remains fully in the ON position during operation.* |
| 3 | **Wall Adaptor Power Supply** | Requires access to wall outlet. Cable is 3 ft long and is recommended that it be connected to a GFCI outlet. |
| 4 | **IEP Cable** | Requires access to the controllers IEP port or the IEP port on other modules. |
| 5 | **Bypass Assembly (optional)** | It is highly recommended that a bypass line is installed around the Flowmeter and the UV chamber. This improves the maintenance ability of the Flowmeter and UV chamber. |
| 6 | **Adaptors** | NPT adapters with union nut and NPT fitting with 2 rubber washers |

*** Do not install the flow meter or the connection cable close to electric motors, transformers, sparking devices and/or high voltage lines. These devices can induce false signals in the flow meter causing the meter to read inaccurately.**

## Install Procedure – NPT Adapters

1. Place one of the union nuts over an NPT tail piece
    - Make sure to use plumber's tape on the NPT thread
2. Install Flowmeter adapter to the piping on the UV chamber's Inlet.
    - Flowmeter must be installed horizontally.
    - Place the rubber washer inside of the union nut and attach the Flowmeter to the union nut
    - The flow direction arrows MUST pointing to the inlet of the UV chamber.
    - The union nut only needs to be hand tightened.
4. Place the other union nut over the other NPT tail piece, place the rubber washer inside of the union nut and attach the adapter to the other side of the Flowmeter
    - The union nut only needs to be hand tightened.
5. Prepare/measure the required piping to install to the NPT adapter
    - Make sure that the length of pipe on the inlet to the Flowmeter is 10 times the diameter of the pipe. Refer to specifications for lengths.
6. Remove the Flowmeter, and install the piping to the NPT adapter.
    - Do not apply any heat to the piping or sweat adapters with the Flowmeter installed, this could potentially damage the rubber washer and Flowmeter creating a major leak.
7. Install the piping to the NPT adapter
    - Make sure to use plumbers' tape on the NPT thread
8. Install the Flowmeter back to the union nuts of the NPT adapters.
    - The flow direction arrows MUST be pointing to the inlet of the UV chamber.
    - The union nut only needs to be hand tightened, allows for easy maintenance.

## Module Installation

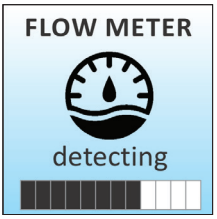
Once the Flowmeter and the UV system has been plumbed:

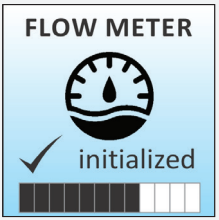
**Step 1)** Power off the CULLIGAN controller.

**Step 2)** Plug in the AC/DC wall adapter (5V Max) into the power port on the Flowmeter.

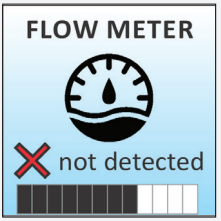
**Step 3)** Plug the male plug of the Flowmeter into the IEP (Infinite Expandability Port) on the controller, or into any other module that contains an IEP (sensor, 4-20mA module, solenoid module, etc).


**Step 4)** Power on the system and the controller will detect and initialize the Flowmeter module during the start-up sequence.



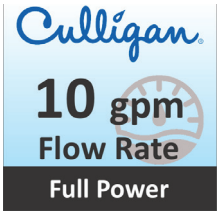
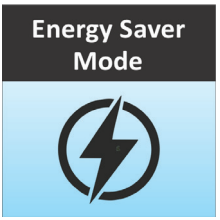




OR




## Operation

When the Flowmeter is connected and active on a UV system, a new flow screen will appear after the home screen. This flow screen will display the current flow rate in the controllers programmed flow-units, the status of the UV lamp (Full Power or Energy Saver Mode) or Flowmeter error.

| Flow Rate Screen | Energy Save Mode Screen | Flowmeter Error Screen |
|---|---|---|
|   |   |   |
| Displays the flow rate, indicates full power lamp operation for UV disinfection.<br>Supported flow rate units[Note1]:<br>• Gallons per minute (GPM)<br>• Liters per minute (LPM)<br>• Cubic meters per hour ($M^3$/h). | The system has entered Energy Saver Mode:<br>the UV lamp has reduced power (dimmed) after no water flow for an hour.<br>UV intensity is masked when the UV lamp is dimmed. Refer to *Energy Saver Mode* operation for further details. | Indicates there's an error with the Flowmeter module.<br>Refer to troubleshooting for further details. |

*Note 1: The UV system units are set using the programmer. If a user wishes to have the flow units changed, they need to contact their plumber/dealer/distributer. Default is GPM.*

## The FLOWMETER as well has a Status LED indicator:

| LED State | Flowmeter Status |
|---|---|
| **Solid green** | Flowmeter is active and no flow is present in the pipe |
| **Flashing green** | Flowmeter is active and there is flow present in the pipe |
| **Solid red** | Flowmeter has failed and cannot reliably measure flow. Dimming is disabled.<br>Refer to troubleshooting for more information. |
| **Flashing red** | The flow rate is well above the rated flow rate for the Flowmeter and piping diameter. Refer to troubleshooting for more information. |

**Energy Saver Mode Operation**

After 1-hour of no water flow through the Flowmeter, the UV system will reduce the power to the UV lamp (dimmed) for energy savings. As soon as water flow is present in the Flowmeter, the UV system will immediately supply flow power to the UV lamp for proper disinfection.

To provide proper UV disinfection for various installations with varying water temperatures, the Flowmeter uses a 1-hour timer duration of No-Water-Flow, this allows for proper disinfection as soon as water flow is present.

When the UV System enters Energy Saver Mode with a sensor connected, the UV Intensity reading is masked until the System goes to Full Power. This will have an effect on any other modules connected:

| Module | Output/Input during Energy Saver Mode |
|---|---|
| **Sensor** | UV Intensity is Masked and Not Displayed on the Screen |
| **4-20 mA** | 20mA output |
| **Solenoid** | Solenoid Opens |
| **Remote Alarm** | Outputs OK |
| **SHERPA** | Outputs Good Status |

## Calibration

Each FLOWMETER is calibrated to achieve accurate and reliable flow readings. Re-calibration is not needed annually unlike other mechanical Flowmeters but cleaning is recommended on an annual basis to reduce scaling to maintain accuracy over the device's lifetime.

## Maintenance and Cleaning

Depending on the water quality, the Flowmeter may require periodic cleaning. At a minimum, the Flowmeter should be cleaned on an annual basis. The following steps outline a basic cleaning procedure.

**Step 1)** If a by-pass assembly is installed, shut the inlet valve off to prevent water flow through the system. Otherwise, turn off main water inlet valve (and/or turn off the water pump).

**Step 2)** Disconnect power cord of the Flowmeter and UV system from electrical outlet. Disconnect the Flowmeter from the UV System.

**Step 3)** Release water pressure by opening a downstream faucet and then close the outlet shut-off valve (if any). If there is no outlet shut-off valve, expect water to drain from the device as the head pressure in the system will cause the water to flow back down.

**Step 4)** Loosen and remove each Union nut on both Flowmeter adapters connected to the Flowmeter. Be prepared from water to drain out as well.

**Step 5)** Remove the Flowmeter from the plumbing assembly, do not lose or misplace the rubber washers from the adapter nut.

**Step 6)** Place the Flowmeter into an empty container. Fill the container with a commercial scale cleaner (i.e. CLR® or LIME-A-WAY®) enough to submerse the Flowmeter pipe. Be very careful not to get any cleaner in or on the Flowmeter case, to avoid damaging the device. Allow the Flowmeter to sit in the solution for a few minutes. Please note some Flowmeters do not sit flat.

**Step 7)** Remove the Flowmeter from the container, empty the cleaning solution from the container, rinse the container out. Place the Flowmeter back into the empty container and fill it up to the Flowmeter case edge with water. Be very careful not to get any water in or on the case, to avoid damaging the device. Allow the device to sit for a few minutes to rinse off any cleaning solution.

**Step 8)** Remove Flowmeter from the container and reinstall the Flowmeter, refer to the installation procedure.

## Troubleshooting

| Problem/Issue | Possible Cause | Possible Fix |
|---|---|---|
| **Flowmeter error screen present and the Flowmeter indicator LED is solid red. Causes: 1 - 4, 8 & 9**<br><br>**Flowmeter is indicating NO FLOW when water is known to be flowing. Causes: 1 – 4, 8**<br><br>**Flow meter is indicating fluid flow when system is shut off OR no flow is present. Causes: 1, 3 – 7**<br><br>**The indicator LED flashes red and/or The flow rate on the screen toggles between 0 gpm and "N" gpm. Causes: 4 Sub-Causes: 3 – 7**<br><br>**Flowmeter fails to reliably measure flow. Causes: 1, 3 – 8** | 1. Improper Installation is the common reason for flowmeter issues<br>2. Flowmeter not powered<br>3. Turbulent Flow or Air Bubbles are present in the Flowmeter Piping<br>4. Flowmeter is above the rated flow.<br>5. Plumbing Vibration<br>6. Water Leakage somewhere in the system.<br>7. Electrical RF/EMI noise is triggering false readings<br>8. Scaling OR excessive buildup o particles inside the flowmeter<br>9. Internal Damage caused by dropping OR plugging in an AC/DC wall adapter rate more than +5VDC. | 1. Recheck and Verify all the installation requirements; inlet piping, orientation, flow direction, etc.<br>2. Flowmeter requires separate +5VDC power source, refer to installation.<br>3. Recheck and Verify all the installation requirements; remove any air bubbles, make sure inlet piping length is adequate.<br>4. Flowmeter cannot measure flow above the Max rated flow in the specifications table.<br>5. Isolate Flowmeter from source of vibration.<br>6. Repair the leaking component or piping in the system.<br>7. Locate and remove electrical noise source.<br>8. Clean the flowmeter. Refer to maintenance and cleaning section.<br>9. Replace Flowmeter |

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