Flow Measurement Solutions for Water & Waste Water

INSTALLATION OPERATION & MAINTENANCE MANUAL
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SECTION 1 - INTRODUCTION

The VM V-Cone Water and Waste Water Flow Meter System consists of a flanged Flow Tube, Flow Transmitter and Flow Indicator. The Flow Transmitter detects flow and transmits a 4-20mA signal proportional to the flow rate. The Flow Indicator converts the signal into a flow Rate and Total, displayed on an LED display. The flow indicator is either integrated to the flow transmitter or remote mounted from the meter body. The Flow Indicator outputs an auxiliary 4-20 mA signal and an open collector transistor alarm pulse assignable to Rate or Total. A 3-way-valve isolation manifold is standard.

PERFORMANCE

ACCURACY: ±0.5% of reading over standard flowrange
RANGE: See dimensions chart below
HEAD LOSS: Typical ≤ 2 psi at Full Scale
MAXIMUM TEMPERATURE: (Standard Construction) 180°F constant
PRESSURE RATING: 150 psi
POWER: 24VDC, Remote Display 110 VAC
OUTPUTS: Analog 4-20mA
OPTICALLY ISOLATED PULSE OUTPUT for Remote Totalization
TRANSMITTER HOUSING & DISPLAY ENCLOSURE: NEMA 4X (IP66)

MATERIALS

Remote mount display includes 25 feet of power/signal cable. For additional length, please consult factory.

BODY: 6-inch & larger: Fusion-bonded epoxy coated carbon steel
4-inch & smaller: All 304 stainless steel

MEASURING ELEMENT: 304 stainless steel

END CONNECTIONS

150#: 6-inch & larger: Carbon Steel AWWA Class D;
4-inch & smaller: Raised Face ANSI Class 150
300#: 6-inch & larger: Carbon Steel AWWA Class F;
4-inch & smaller: Raised Face ANSI Class 300

OPTIONS

- Other flange standards available
- Other laying lengths available

McCrometer reserves the right to change design specifications without notice.

### Flow Range Chart

<table>
<thead>
<tr>
<th>Size (in)</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>6</th>
<th>8</th>
<th>10</th>
<th>12</th>
<th>14</th>
<th>16</th>
<th>18</th>
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<tbody>
<tr>
<td>150#</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approx. Shipping Weight - lbs.</td>
<td>24</td>
<td>39</td>
<td>54</td>
<td>115</td>
<td>135</td>
<td>197</td>
<td>325</td>
<td>465</td>
<td>530</td>
<td>744</td>
<td>920</td>
<td>1254</td>
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<tr>
<td>W (width - inches)</td>
<td>15.5</td>
<td>17</td>
<td>18.25</td>
<td>21</td>
<td>23</td>
<td>25.25</td>
<td>27.75</td>
<td>29.5</td>
<td>31.75</td>
<td>34</td>
<td>36.25</td>
<td>41</td>
</tr>
<tr>
<td>H (height - inches)</td>
<td>15</td>
<td>16</td>
<td>13.8</td>
<td>15</td>
<td>16.3</td>
<td>17.5</td>
<td>20.5</td>
<td>23</td>
<td>25.5</td>
<td>28</td>
<td>30.5</td>
<td>36</td>
</tr>
<tr>
<td>L (length - inches)</td>
<td>12</td>
<td>14</td>
<td>16</td>
<td>22</td>
<td>26</td>
<td>28</td>
<td>30</td>
<td>30</td>
<td>32</td>
<td>36</td>
<td>36</td>
<td>48</td>
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<tr>
<td>No. of Bolts per Flange</td>
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<td>4</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>16</td>
<td>16</td>
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<tr>
<td>300#</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Approx. Shipping Weight - lbs.</td>
<td>29</td>
<td>44</td>
<td>90</td>
<td>145</td>
<td>220</td>
<td>340</td>
<td>430</td>
<td>650</td>
<td>820</td>
<td>1315</td>
<td>1517</td>
<td>1917</td>
</tr>
<tr>
<td>W (width - inches)</td>
<td>15.5</td>
<td>17</td>
<td>18.25</td>
<td>21</td>
<td>23</td>
<td>25.25</td>
<td>27.75</td>
<td>29.5</td>
<td>31.75</td>
<td>34</td>
<td>36.25</td>
<td>41</td>
</tr>
<tr>
<td>H (height - inches)</td>
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<td>16</td>
<td>13.8</td>
<td>15</td>
<td>16.3</td>
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<td>20.5</td>
<td>23</td>
<td>25.5</td>
<td>28</td>
<td>30.5</td>
<td>36</td>
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<tr>
<td>L (length - inches)</td>
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<td>14</td>
<td>16</td>
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<td>26</td>
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<td>30</td>
<td>30</td>
<td>32</td>
<td>36</td>
<td>36</td>
<td>48</td>
</tr>
<tr>
<td>No. of Bolts per Flange</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>12</td>
<td>12</td>
<td>16</td>
<td>16</td>
<td>20</td>
<td>20</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
</tbody>
</table>

* Meter will be 10:1 flow range standard (i.e. 400 to 40 GPM)

NOTE: Larger meter sizes, special laying lengths, other flow ranges available by special order.
WARNING!
SERIOUS INJURY CAN RESULT FROM WORKING ON A LINE UNDER PRESSURE. Shut off the water and relieve the pressure from the line before attempting to install, remove or service the flow tube and/or the 3-way-valve manifold.

FLOW TUBE INSTALLATION - DIRECT MOUNT

1. Provide an adequate opening for the flow tube and gaskets. Allow enough room around the flow tube to access the instrumentation. Use only installation hardware that is appropriate for the process fluid, temperature and pressure.

2. Match the flow tube direction with the system flow - a Flow Direction Arrow is indicated on the flow tube Data Plate.

3. The meter body is always installed with the Transmitter connections on the side of the meter body kept in a horizontal orientation (see below).

4. Direct mount transmitters can be used in vertical down applications when there is no entrained air. They can also be used in vertical up if there is no debris.
SECTION 2 - INSTALLATION (continued)

FLOW TUBE INSTALLATION - REMOTE MOUNT TRANSMITTER

1. The pressure taps shall be between horizontal centerline and 60˚ below centerline (3 o’clock to 5 o’clock or 7 o’clock to 9 o’clock). Taps at bottom dead-center may accumulate solids if they are present in the liquid; taps above the centerline will accumulate air or non-condensing gases. In neither case should the taps be more than 60˚ to the horizontal plane.

2. In vertical applications with entrained air or debris, it is recommended to use wall taps (Process Connection W must be selected). It is always best to install the transmitter below the pressure taps.
SECTION 2 - INSTALLATION (continued)

UPSTREAM PIPING

Some flow meter installations require longer upstream runs of straight pipe to lessen the effects of upstream turbulence. Turbulence can be caused by a variety of upstream conditions. Proper upstream straight pipe lengths (dimension D, below) will ensure accurate flow measurement. Refer to the guide below for recommended upstream runs of straight pipe.

ACCEPTABLE DIRECT UPSTREAM PIPE CONNECTIONS
- Transitions from upstream pipe (schedules 10 to 80)
- Single Elbows
- Double Elbows
- Fully open Gate Valve
- Transitions from pipe inside diameters smaller than schedule 80; typically concrete lined pipe

PROVIDE UP TO 3 DIAMETERS UPSTREAM STRAIGHT PIPE IF ANY OF THESE CONDITIONS EXIST:
- Pumps
- Butterfly Valves
- Partially open Gate Valves
- Check Valves
- Strainers and Sand Separators

EXAMPLE: A 6” diameter meter with a butterfly valve upstream may need as much as 18” of straight pipe (“D”) before the meter to ensure accuracy.

REMOTE FLOW INDICATOR INSTALLATION

Mount the Flow Indicator housing in a location that provides access, viewing, and it suitable for a NEMA 4X rated device. The Indicator is prewired to the Flow Meter Transmitter with 50 feet of cable for remote mounting. The housing mounting holes are located at the bottom of the indicator housing base, beneath the cover screws. Not applicable for V-Cones with local flow indication.

Indicator housing mounting holes are at the bottom of the cover screw holes.
SECTION 2 - INSTALLATION (continued)

WIRING - LOCAL DISPLAY

Electrical connection 4-20mA HART

1. Housing
2. Jumper for 4-20mA test signal
3. Internal ground terminal
4. External ground terminal
5. 4-20mA test signal between positive and test terminal
6. Minimum supply voltage = 10.5 VDC, jumper is set as illustrated in the diagram
7. Minimum supply voltage = 11.5 VDC, jumper is inserted in “Test” position
8. Devices with integrated overvoltage protection are labeled OVP (overvoltage protection)

WIRING - REMOTE DISPLAY

The flow meter is pre-wired to the Flow Indicator. The cable for the A/C power input should have an outside dimension (OD) at least as large as the provided cables to ensure proper sealing in the compression fitting.

<table>
<thead>
<tr>
<th>WIRE COLOR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>FLOW METER</strong></td>
</tr>
<tr>
<td>RED (+)</td>
</tr>
<tr>
<td>BLACK (-)</td>
</tr>
<tr>
<td>WHITE (not used)</td>
</tr>
<tr>
<td>GREEN (not used)</td>
</tr>
<tr>
<td><strong>OUTPUTS</strong></td>
</tr>
<tr>
<td>RED Analog (+)</td>
</tr>
<tr>
<td>BLACK Signal Common (-)</td>
</tr>
<tr>
<td>WHITE Preset A</td>
</tr>
<tr>
<td>GREEN Preset B</td>
</tr>
<tr>
<td>BLACK Signal Common (-)</td>
</tr>
</tbody>
</table>

110 VAC inputs are not polarized.
SECTION 3 - START UP

PURGING THE SYSTEM

1. Meter is shipped with valves in operating positions with both isolation valves open and cross valve closed.

2. Start the flow. **Check all connections for leaks and correct as necessary before continuing.**

3. Open each vent screw (below) to purge any air from the system, and then close the vent screws.

ZEROING LOCAL DISPLAY
(display on transmitter)

1. Close both isolation valves and open the cross over (equalizing) valve.
2. Remove the cap over the LCD display.
3. Press the enter key.
4. Press the up or down key until “Setup” is highlighted.
5. Press the enter key.
6. Press the up or down key until “Pos. zero adjust” is highlighted.
7. Press the enter key.
8. Press the down key and highlight “confirm”.
9. Press the enter key
10. To return to operating mode press the up and down keys at the same time. Do this until you are in run mode.
11. Return the valves to operating positions. Both isolation valves open and cross over (equalizing) valve closed.
ZEROING REMOTE DISPLAY
(no display on transmitter)

1. Close both isolation valves and open cross over (equalizing) valve.
2. Remove the cap.
3. Press and hold both the zero and span buttons (see figure below, item #7). Release both buttons after the green LED flashes (item # 6) which will be about 3 seconds. (See Warning below).
4. Return the valves to operating positions. Both isolation valves open and cross over (equalizing) valve closed.

![Diagram of control panel with labels for zero and span buttons, DIP switches, and LED]

**WARNING!**
Pressing the Span button alone will set the span to zero and cause the meter to show maximum flow all the time.

<table>
<thead>
<tr>
<th>Item Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DIP switch for locking/unlocking parameters relevant to the measured value</td>
</tr>
<tr>
<td>2</td>
<td>DIP switch for switching damping on/off</td>
</tr>
<tr>
<td>3</td>
<td>DIP switch for alarm current SW / Alarm Min (3.6 mA)</td>
</tr>
<tr>
<td>4</td>
<td>DIP switch only for Deltabar M: Switch 4: “SW/Square root”; used to control the output characteristics Switch 5: “SW/P2-High”; used to determine the high-pressure side</td>
</tr>
<tr>
<td>5</td>
<td>Slot for optional local display</td>
</tr>
<tr>
<td>6</td>
<td>Green LED to indicate successful operation</td>
</tr>
<tr>
<td>7</td>
<td>Operating keys for lower range value (zero) and upper range value (span)</td>
</tr>
</tbody>
</table>
SECTION 4 - TROUBLESHOOTING

CHANGES IN FLOW ACCURACY OR METER OPERATION:

TUBE

1. Debris in the tube. Repeat the purging procedure (see PURGING THE SYSTEM page #7) to remove any dirt and/or air from the flow transmitter and manifold. Trash or debris may be caught inside the meter - removal and inspection of the interior of the meter body may be required.
2. Verify that the flow tube was designed for the expected flow rates (see SPECIFICATIONS page #2).
3. Less-than-full-pipe. Verify the pipe remains full at all times. Modify the piping or relocate the flow tube.

NO CHANGE IN FLOW MEASUREMENT OR FLOW READING INACCURACY:

3-WAY VALVE MANIFOLD

1. One or both ISOLATION VALVES not open. Keep them FULLY OPEN during operation.
2. The cross VALVE is not closed. Keep it FULLY CLOSED during operation.
3. Debris in the manifold. Repeat the purging procedure (see PURGING THE SYSTEM page #7).

INACCURATE OR ERRATIC FLOW READINGS:

FLOW TRANSMITTER

1. Debris in the transmitter. Repeat the purging procedure (see PURGING THE SYSTEM page #7). Debris in the transmitter may damage and/or permanently change its calibration.
2. Improper transmitter programming. Verify that the flow transmitter is on the correct meter.

The flow transmitter is programmed by the factory for the flow rate specified by the customer. An Operation, Configuration and Calibration manual is shipped with the VM V-Cone System.

INACCURATE OR ERRATIC FLOW READINGS:

FLOW INDICATOR

1. Changes to the original settings. Contact the factory for the proper programming data.
2. Loose or improper wiring. Check all connections and verify the correct source voltage.
3. Line noise or electrical interference. Locate the indicator away from power lines, protect from power surges.

The flow indicator is programmed by the factory for the flow rate and flow units specified by the customer. Flow Indicator program parameters are accessed after entering a factory default password of “1000”. The user can verify and/or change the program parameters, assign a new password, and lockout the front panel to prevent further changes.

More Flow Indicator information can be found in the EA402 IOM manual (included with the VM V-Cone System), or from the McCrometer website at www.mccrometer.com. The document number is 24508-68.
## PARTS IDENTIFICATION (continued)

<table>
<thead>
<tr>
<th>Drawing Number</th>
<th>Part Number</th>
<th>Description</th>
<th>Quantity Required</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>*</td>
<td>V-Cone Primary Element</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>F1131</td>
<td>3-way Valve Isolation Manifold</td>
<td>1</td>
<td>Includes two ring seals</td>
</tr>
<tr>
<td>3</td>
<td>10299</td>
<td>Bolt, 7/16-20 x 1”, Grade 5</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>10300</td>
<td>Seal, Manifold-to-Meter</td>
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<td>Included with 3-way Valve Manifold</td>
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<td>10300</td>
<td>Seal, Transmitter-to-Manifold</td>
<td>2</td>
<td>Included with Flow Transmitter</td>
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<tr>
<td>6</td>
<td>DP124-xxx</td>
<td>Flow Transmitter</td>
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<tr>
<td>7</td>
<td>EJ120-00</td>
<td>Compression fitting, 1/2&quot; NPT</td>
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</tr>
<tr>
<td>8 - OPTIONAL</td>
<td>EA402-10</td>
<td>Flow Indicator</td>
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<td>Remote Mount Display</td>
</tr>
<tr>
<td>9 - OPTIONAL</td>
<td>EA402-50</td>
<td>Indicator Housing</td>
<td>1</td>
<td>Includes 3 each EH445-00 and EJ120-00</td>
</tr>
<tr>
<td>10</td>
<td>EW550-00</td>
<td>Wire, 4-conductor Flow Meter-to-Flow Indicator</td>
<td>300&quot;</td>
<td>Not to be used for A/C source voltage</td>
</tr>
<tr>
<td>11</td>
<td>EH445-00</td>
<td>Lock nut, 1/2&quot; NPT</td>
<td>3</td>
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</tr>
<tr>
<td>12</td>
<td>10771</td>
<td>Mushroom Plug</td>
<td>1</td>
<td>Seals output when not in use</td>
</tr>
</tbody>
</table>

* Part number varies by application flow rate and line size. Contact the factory for the correct part number.

## CONTACT INFORMATION

Product information, pricing, and technical assistance is available from the McCrometer Customer Service Department at 951-652-6811.

Information on all McCrometer products is available on our website at www.mccrometer.com.
MANUFACTURER’S WARRANTY

This Warranty shall apply to and be limited to the original purchaser consumer of any McCrometer product. Meters or instruments defective because of faulty material or workmanship will be repaired or replaced, at the option of McCrometer, Inc., free of charge, FOB the factory in Hemet, California, within a period of one (1) year from the date of delivery.

Repairs or modifications by others than McCrometer, Inc. or their authorized representatives shall render this Warranty null and void in the event that factory examination reveals that such repair or modification was detrimental to the meter or instrument. Any deviations from the factory calibration require notification in writing to McCrometer, Inc. of such recalibrations or this warranty shall be voided.

In case of a claim under this Warranty, the claimant is instructed to contact McCrometer, Inc. 3255 West Stetson Ave., Hemet, California 92545, and to provide an identification or description of the meter or instrument, the date of delivery, and the nature of the problem.

The Warranty provided above is the only warranty made by McCrometer, Inc. with respect to its products or any parts thereof and is made expressly in lieu of any other warranties, by course of dealing, usages of trade or otherwise, expressed or implied, including but not limited to any implied warranties of fitness for any particular purpose or of merchantability under the uniform commercial code. It is agreed this warranty is in lieu of and buyer hereby waives all other warranties, guarantees or liabilities arising by law or otherwise. Seller shall not incur any other obligations or liabilities or be liable to buyer, or any customer of buyer for any anticipated or lost profits, incidental or consequential damages, or any other losses or expenses incurred by reason of the purchase, installation, repair, use or misuse by buyer or third parties of its products (including any parts repaired or replaced); and seller does not authorize any person to assume for seller any other liability in connection with the products or parts thereof. This Warranty cannot be extended, altered or varied except by a written instruction signed by seller and buyer.

This Warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

McCrometer, Inc. reserves the right to make improvements and repairs on product components which are beyond the warranty period at the manufacturer’s option and expense, without obligation to renew the expired warranty on the components or on the entire unit. Due to the rapid advancement of meter design technology, McCrometer, Inc. reserves the right to make improvements in design and material without prior notice to the trade.

All sales and all agreements in relation to sales shall be deemed made at the manufacturer’s place of business in Hemet, California and any dispute arising from any sale or agreement shall be interpreted under the laws of the State of California.
OTHER McCROMETER PRODUCTS INCLUDE:

- Propeller Flowmeters
- Magnetic Flowmeters
- Magnetic Flowmeters
- Magnetic Flowmeters
- Magnetic Flowmeters
- Wireless Monitoring Systems
- Differential Pressure Flowmeters
- Differential Pressure Flowmeters
- Differential Pressure Flowmeters