INSTALLATION, OPERATION, AND MAINTENANCE MANUAL

MFS MID 20-72
MX II CONTROLLER
SINGLE COMMERCIAL WATER FILTERS
**INSTALLATION WARNING**

**Inspection Requirement**

**Prior to Loading Media**

1. Inspect condition of upper distributor piping. Verify fittings are tight and positioned as shown.
2. Inspect condition of strainers, laterals and hub through top or side access ports. Verify fittings are secured to hub and strainers are secured to laterals.
3. **DO NOT** load media if damaged components are observed. Contact factory.
4. Installer is responsible for media loss into treated water resulting from failure to report and repair damaged components inside media tank prior to media loading.
5. **INSTALLER WARNING:** Refer to installation instructions for media loading procedure. Improper loading of media will damage components inside media tank.

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**PRIOR TO Media Loading**

- Top Head Access
- Media Tank
- Upper Distributor
- Strainer
- Lateral
- Hub
- Side Shell Access

**AFTER Media Loading**

- Softener/Filter Media
- Gravel Media
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WATER TREATMENT PRODUCT WARRANTY

Marlo, Inc. warrants all water treatment products manufactured and/or distributed by it to be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If within that period any products shall be proven to Marlo, Inc.’s satisfaction to be defective, those products will be replaced, or the price refunded at Marlo Inc.’s option.

Marlo Inc.’s obligations or nonperformance, defective, or any damage caused by its products or their use, and buyer’s exclusive remedy therefore, shall be limited to product replacement or refund and shall be conditioned upon Marlo Inc.’s receiving written notice together with a demand for such replacement or refund:

The foregoing warranty is exclusive and in lieu of all other expressed implied warranty (except of title) including but not limited to implied warranty of merchantability and fitness for particular purpose.

Marlo Inc. will not be subject to and disclaims the following:

1. Any other obligations or liabilities arising out of breach of contract or out of warranty.

2. Any obligations whatsoever arising from tort claims (including negligence and strict liability) or arising under other theories of law with respect to products sold or services rendered by Marlo Inc. or any undertakings, acts, or omissions relating thereto.

3. All consequential, incidental, and contingent damages.

Labor charges, change backs or handling charges are excluded from Marlo Inc.’s warranty provisions.

WATER MEDIA GUARANTEE

Under normal operating conditions:

1. The loss of filter media through attrition during the first three (3) years shall not exceed 3% per year.

2. The filter media shall not be washed out of the system during backwash.

3. The color and turbidity of the effluent shall not be greater than the incoming water.

Any mechanical equipment proving defective in workmanship or material within one year after installation or eighteen (18) months after shipment, whichever comes first, shall be replaced FOB factory.
NOTE: ALL PIPING, FITTINGS, VALVES, ETC SHOWN IN BROKEN LINES ARE BY OTHERS
### SPECIFICATION TABLE

<table>
<thead>
<tr>
<th>Model</th>
<th>EXCELLENT</th>
<th>HIGH</th>
<th>UTILITY</th>
<th>BACKWASH</th>
<th>PIPE</th>
<th>TANK</th>
<th>FLOOR SPACE</th>
<th>HEIGHT</th>
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<tbody>
<tr>
<td></td>
<td>GPM</td>
<td>.P</td>
<td>GPM</td>
<td>.P</td>
<td>GPM</td>
<td>.P</td>
<td>inches</td>
<td>inches</td>
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<td>4</td>
<td>35</td>
<td>7</td>
<td>50</td>
<td>12</td>
<td>30</td>
<td>1 1/2</td>
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<tr>
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<td>10</td>
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<td>17</td>
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<td>106</td>
<td>9</td>
<td>141</td>
<td>15</td>
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<td>2 1/2</td>
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<td>7</td>
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<td>12</td>
<td>192</td>
<td>20</td>
<td>150</td>
<td>2 1/2</td>
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<td>189</td>
<td>11</td>
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<td>239</td>
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<td>318</td>
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<td>393</td>
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<td>360</td>
<td>17</td>
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<td>8</td>
<td>575</td>
<td>12</td>
<td>420</td>
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</table>

### VOLUME VERSES WEIGHT OF MEDIA

<table>
<thead>
<tr>
<th>MODEL</th>
<th>ANTHRACITE</th>
<th>RED SAND</th>
<th>GARNET 30-40</th>
<th>GARNET 8-12</th>
<th>GRAVEL</th>
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<tbody>
<tr>
<td>MID-20</td>
<td>112</td>
<td>150</td>
<td>150</td>
<td>100</td>
<td>100</td>
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<tr>
<td>MID-24</td>
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<tr>
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<td>350</td>
<td>250</td>
<td>300</td>
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<tr>
<td>MID-36</td>
<td>392</td>
<td>550</td>
<td>550</td>
<td>350</td>
<td>400</td>
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<td>MID-42</td>
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<td>700</td>
<td>750</td>
<td>500</td>
<td>600</td>
</tr>
<tr>
<td>MID-48</td>
<td>728</td>
<td>950</td>
<td>1000</td>
<td>650</td>
<td>900</td>
</tr>
<tr>
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<td>1200</td>
<td>1250</td>
<td>800</td>
<td>1200</td>
</tr>
<tr>
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<td>1120</td>
<td>1500</td>
<td>1500</td>
<td>950</td>
<td>1500</td>
</tr>
<tr>
<td>MID-66</td>
<td>1344</td>
<td>1800</td>
<td>1850</td>
<td>1150</td>
<td>2000</td>
</tr>
<tr>
<td>MID-72</td>
<td>1624</td>
<td>2100</td>
<td>2150</td>
<td>1350</td>
<td>2500</td>
</tr>
</tbody>
</table>

All values are in pounds

Power Requirements: 120 Volt, 60 Hertz, Single Phase, 2A
Operating Pressure Range: 30 - 100 psig
Operating Temperature Range: 35 - 100 F

NOTE: Bag size may vary. Please confirm weight and volume before loading. Consult Media sheet on media pallet.
INSTALLATION INSTRUCTIONS

Before beginning installation, thoroughly review the following instructions to familiarize yourself with the general placement and identification of all components.

These instructions are written for a single unit installation, but they also generally apply to twin and triple units.

The operating pressure range is 30 - 100 psi. Water pressures not meeting these specifications should have a booster pump installed for pressure lower than 30 psi and a pressure regulator installed for pressure exceeding 100 psi.

The operating temperature range is 35-100°F. Special filters are available to handle higher temperature ranges. Consult factory for recommendations.

Catalog filters are shipped fully assembled with face piping and controllers. Care must be taken not to damage valves or controllers during uncrating and installation.

FILTER LOCATION

Select a position near a floor drain that has adequate carrying capacity to handle the water filter backwash rate. See the Specification Table located on page 3 for the backwash rate of your system.

Make sure the softeners are placed on a level concrete surface.

PIPING INSTALLATION

Install piping as shown on the general arrangement drawing. Include unions and shut-off valves on the inlet and outlet of each tank. It is recommended that a union be installed in each filter drain-line to facilitate cleaning the backwash flow control.

Note: Do not reduce drain-line pipe size. Do not install a shut off valve in the drain-line. Provide an air gap in the drain line in accordance with local codes (minimum: four (4) pipe diameters).

On installations with a differential pressure switch, the ¼” male tube fitting connectors must be installed in the main inlet and outlet headers as shown on the general arrangement drawing. After the piping has been completed, make sure to close all isolation valves.
CONTROL TUBING INSTALLATION

Refer to the control-tubing diagram for your filter.

On single and skid mounted units the factory does the control tubing.

NOTE: VALVE 2A ONLY WITH UNFILTERED WATER BYPASS OPTION.
FILTER TANK LOADING

GRAVEL LOADING

Before loading, visually check the lower distributor for shipping damage. All radial arms and baskets strainers are in place and pointing downward. Tighten any loose laterals. Do not load tank if there is damage is evident. Call the factory if any damage is observed.

Do begin to load the tank until you have verified that all required gravel and filter media is on site. Refer the media loading table on page 3 for the required amounts.

1. Slowly open the inlet valve and fill the tank half way or as full as possible with water. There might be a flow of water to drain.

2. The equipment provided has a plastic lower distributor system. Care should be exercised in the loading of the gravel in order to insure that the distributors are not damaged.

3. Slowly and gently pour the gravel marked for the mineral tank into the unit.

4. Drain the tank down until the gravel and water levels are the same.

5. Carefully level the gravel before loading the resin.

MEDIA LOADING

1. Reopen the inlet valve and fill the tank with water approximately 6” above the present media level.

2. Pour the quantity of L2 media specified for the unit in through the top opening and then level the layer of media.

3. Repeat steps 1 and 2 until all five layers (L3, L4, L5) of media are loaded.

4. Reopen the inlet valve and fill the tank with water to the top access opening. Close and secure the top access opening.

5. Open inlet valve and continue to fill the tank with water until it is fully pressurized.
START-UP INSTRUCTIONS

Before proceeding to start-up:

- Make sure the unit is properly installed with all piping complete
- All of the required media has been properly loaded in the tank
- Read the controls section located in this manual

1. Open the manual by-pass valve. The manual inlet and outlet valves are to remain closed.

2. Connect the power to the MX II controller. The controller display window will light up.

3. Verify the following and change if required.
   - **SINGLE TIME CLOCK** is displayed in the window

4. Open the cover of the enclosure on and manually rotate the stager to the #1 (BACKWASH) position. The stager motor will rotate back to the #4 (SERVICE) position. This is done to confirm the controller’s homing signal is operational.

5. Press and hold the **MANUAL START** button on the front of the controller. This will advance the controller to the backwash step. The stager should rotate to the step 1 (BACKWASH) position.

6. Slowly open the softener’s manual inlet supply valve. Do not open fully. Full flow of water could cause loss of media. Continue to fill slowly until all air is expelled and only water flows to the drain. Water will enter from the bottom of the resin tank as air is expelled from the top drain. If the system is supplied with an air vent make sure that the valve is open during this process.

7. When only water flows to the drain and out the air vent (if applicable), open the manual inlet valve all of the way. Backwash until the water looks clean when caught in a container.

8. Advance the controller to the brine/slow rinse step by pressing and holding the **ADVANCE** button. The stager should rotate to the STEP 2 (BRINE/SLOW RINSE) position. There will be a slow flow to the drain.

9. While the stager is in the Brine/Slow Rinse position, check the level in the brine tank. The level should be dropping at a slow rate (approximately 2” per minute).
10. Advance the controller to the Fast Rinse position. The Unit 1 stager should rotate to the STEP 3 (FAST RINSE) position. There will be a high flow of water to the drain. Allow the water to flow to the drain until clear. During this time, the brine tank will fill with water until the float closes the brine tank valve. Check that all brine fittings are tight and that the water level in the brine tank is according to the unit specifications.

11. Advance the controller to the service position. The stager should rotate to the STEP 4 (SERVICE) position. There will be no flow of water to the drain.

12. Fill the brine tank with the proper amount and type of salt recommended for use with the system. See RECOMMENDED TYPES OF SALT.

13. Close the manual by-pass valve and open all outlet valves fully. The system is now in service.
WATER FILTER GENERAL OPERATION

Raw water passes through the valve manifold into the top of the tank. It flows downward through the mineral bed and out through the bottom of the tank to service. As the water passes through the mineral bed, sediment present is removed by filtration action of the mineral. The media must be cleaned periodically by the following procedure:

**Backwash:** The flow through the mineral bed is reversed and allowed to flow to drain. The up-flow action washes any sediment or foreign material collected in the unit out to drain. At the same time the mineral itself is restratified, thereby eliminating any possibility of channeling (approximately 10 minutes).

**Settle:** The media is allowed to settle in a stratified manner.

**Fast Flush:** The downward flow to drain in this step is increased to a high rate, which will repack the media bed.

FLOW DIAGRAM
Program Guide - Single Filter MXII

NOTE: Steps must be performed within 30 seconds of each other or the controller will exit programming mode.

BEGINNING FROM FACTORY DEFAULT

NOTE: To get to Factory Default press & hold “MANUAL START and ▼” keys until the display reads “Factory Default”. Ignore “Press ENTER to Program”

STEP 1

A. Press ◀▶ keys simultaneously for 3 seconds to enter program mode.
B. “▼SYSTEM TYPE” appears. Press ENTER.

STEP 2

A. “▼SOFTENER” appears; If “▼FILTER” is not displayed, use ▲▼ keys until it is.
B. Press ENTER to choose FILTER.

NOTE: If you toggle to “FILTER” then back to “SOFTENER”, press “ENTER” key until only “▼SYSTEM TYPE” appears on top line with nothing displayed on the second line.

STEP 3

A. “▼SYSTEM TYPE” appears.
B. Press ▼.

STEP 4

A. “$SYSTEM MODE” appears.
B. Press ENTER.
C. Use ▲▼ to scroll to “$SINGLE TIME CLOCK”. The screen shown here is displayed.
D. Press ENTER to choose SINGLE TIME CLOCK.
E. If necessary, Press ENTER again until the display is as shown below.
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**STEP 5**

```
SYSTEM MODE
```

A. “$SYSTEM MODE” should be displayed on the top line, with nothing displayed in the second line.

B. Press ↓.

**STEP 6**

```
UNIT DATA
```

A. “$UNIT DATA” appears.

B. Press ▶.

**STEP 7**

```
UNIT DATA
K-FACTOR
```

A. “↓K-FACTOR” appears.

B. Press ENTER.

**STEP 8**

```
K-FACTOR
0000.00
```

A. Use [▲, ▼] keys to enter K-FACTOR value.

B. Press ENTER until the next display in step 9 is shown.

**STEP 9**

```
UNIT DATA
K-FACTOR
```

A. “↓K-FACTOR” appears.

B. Press ▼.
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### STEP 10

<table>
<thead>
<tr>
<th>UNIT DATA</th>
<th>↑UNIT #</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- A. “UNIT #” appears on second line.
- B. Press [**ENTER**].

### STEP 11

<table>
<thead>
<tr>
<th>UNIT #</th>
<th>↑1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- A. “UNIT #” appears on top line with the unit’s # displayed on second line.
- B. Use [**^**]/[**v**] to scroll to unit (1).
- C. Press [**ENTER**] until the next display in step 12 is shown.

### STEP 12

<table>
<thead>
<tr>
<th>UNIT DATA</th>
<th>↑UNIT #</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- A. Press [**v**].
- B. “UNIT DATA” appears by itself on top line.
- C. Press [**v**].

### STEP 13

<table>
<thead>
<tr>
<th>$CYCLES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

- A. “$CYCLES” appears.
- B. Press [**v**].
- C. “↑CYCLE 1 NAME” appears on second line.

### STEP 14

<table>
<thead>
<tr>
<th>CYCLE 1 NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>BACKWASH</td>
</tr>
</tbody>
</table>

- A. Press [**ENTER**] to choose cycle name (BACKWASH) to appear instead of CYCLE #. ‘BACKWASH’ is displayed on the second line.
- B. Press [**ENTER**] until the display in step 15 is displayed.
STEP 15

A. “CYCLE 1 NAME” appears on second line.
B. Press \( \downarrow \), “CYCLE 1” appears.
C. Press \( \text{ENTER} \).

STEP 16

A. “CYCLE 1” appears on the first line. “0016 MINS” appears on the second line.
B. Use arrow keys to dial in time of cycle.
C. Press \( \text{ENTER} \) until the screen in step 17 is displayed.

STEP 17

A. Press \( \downarrow \).
B. “CYCLE 2 NAME” appears on second line.

STEP 18

A. Press \( \text{ENTER} \). “\( \$\text{SETTLE} \)” appears.
B. Press \( \text{ENTER} \) until the screen in step 19 is displayed.

STEP 19

A. Press \( \downarrow \). “CYCLE 2” appears on second line.
B. Press \( \text{ENTER} \).
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#### STEP 20

<table>
<thead>
<tr>
<th>CYCLE 2</th>
<th>0004</th>
</tr>
</thead>
<tbody>
<tr>
<td>MANUAL</td>
<td>START</td>
</tr>
<tr>
<td>ADVANCE</td>
<td></td>
</tr>
</tbody>
</table>

A. “CYCLE 2” appears on top line. “0004 MINS” appears on second line.
B. Use arrow keys to dial in number.
C. Press ENTER until the screen in step 21 is displayed.

#### STEP 21

<table>
<thead>
<tr>
<th>CYCLES</th>
<th>→ CYCLE 2</th>
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<tr>
<td>MANUAL</td>
<td>START</td>
</tr>
<tr>
<td>ADVANCE</td>
<td></td>
</tr>
</tbody>
</table>

A. “CYCLES” appears on first line. “CYCLE 2” appears on second line.
B. Press →. “CYCLE 3 NAME” appears on second line.

#### STEP 22

<table>
<thead>
<tr>
<th>CYCLE 3 NAME</th>
<th>→ FLUSH</th>
</tr>
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<tr>
<td>MANUAL</td>
<td>START</td>
</tr>
<tr>
<td>ADVANCE</td>
<td></td>
</tr>
</tbody>
</table>

A. Press ENTER.
B. Use ▲▼ to choose the name “FLUSH”.
C. Press ENTER until the screen in step 23 is displayed.

#### STEP 23

<table>
<thead>
<tr>
<th>CYCLE 3 NAME</th>
<th>→</th>
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<tbody>
<tr>
<td>MANUAL</td>
<td>START</td>
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<tr>
<td>ADVANCE</td>
<td></td>
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</tbody>
</table>

A. Press ▼. “CYCLE 3” appears on the second line.
B. Press ENTER.

#### STEP 24

<table>
<thead>
<tr>
<th>CYCLE 3</th>
<th>0006 MINS</th>
</tr>
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<tr>
<td>MANUAL</td>
<td>START</td>
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<tr>
<td>ADVANCE</td>
<td></td>
</tr>
</tbody>
</table>

A. Dial in minutes using arrow keys.
B. Press ENTER until “CYCLE 3” is displayed on second line.
C. Press ▼.
STEP 25

- CYCLES
- CYCLE 4 NAME

A. “CYCLE 4 NAME” appears on second line.
B. Press . “CYCLES” appears alone on first line.
C. Press .

STEP 26

- SETTINGS
- DAY OF WEEK

A. “SETTINGS” appears.
B. Press .
C. “DAY OF WEEK” appears on second line.

STEP 27

- DAY OF WEEK
  S M T W T F S

A. Press .
B. Press or to cycle through the days of the week to regenerate.
C. Press or to select or turn on the day of the week to regenerate the filter.

STEP 28

- SETTINGS
- ELAPSED TIME

A. Press to save.
B. Press to exit.
C. Press until “ELAPSED TIME” is displayed.

STEP 29

- ELAPSED TIME
  000 HRS

A. Press .
B. Press to enter the amount of HRS that must pass before the filter will regenerate.

NOTE: All zeros will disable this feature.
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**STEP 30**

A. Press \[ \text{ENTER} \] to save.
B. Press \[ \text{ENTER} \] to exit.
C. Press \[ \downarrow \] until “BW/REGEN TIME” is displayed.
D. Press \[ \text{ENTER} \].

**STEP 31**

A. Press \[ \leftarrow \rightarrow \downarrow \uparrow \] to change the regen time.
B. Press \[ \text{ENTER} \] to save.
D. Press \[ \text{ENTER} \] to exit.

*NOTE: Default time is 2 AM.*

**STEP 32**

A. Press \[ \text{ENTER} \] until “SETTINGS” appears on the first line.
B. Press \[ \leftarrow \] to get out of “SETTINGS”.
C. Press \[ \downarrow \] until “$UNIT OF MEASURE” appears.

**STEP 33**

A. Press \[ \rightarrow \]. “$FLOW” appears on the second line. If not, press \[ \downarrow \] until “$FLOW” appears on the second line
B. Press \[ \text{ENTER} \].

**STEP 34**

A. “FLOW UOM” appears on the first line and “$GPM” appears on the second line.
B. Press \[ \text{ENTER} \].
C. Press \[ \leftarrow \], then \[ \rightarrow \] and finally \[ \rightarrow \] to exit. Programming is finished and display will return to normal.
When the unit detects a fault, the red alarm LED will display and the detected error will be displayed.

<table>
<thead>
<tr>
<th>ERROR MESSAGE-</th>
<th>CAUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMM FAILURE MASTER</td>
<td>No Unit is programmed as Unit 1 - the Master</td>
</tr>
<tr>
<td>COMM FAILURE UNIT 2</td>
<td>A faulty cable or a bad connection with the COM jack.</td>
</tr>
<tr>
<td></td>
<td>Multiple units programmed with the same UNIT#.</td>
</tr>
<tr>
<td></td>
<td>UNIT# is different from MODE selected.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ERROR MESSAGE-</th>
<th>CAUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODE ERROR UNIT 2</td>
<td>Unit 2 is programmed in a mode different from the Master - Unit 1.</td>
</tr>
<tr>
<td>AUX RELAY SP ERROR</td>
<td>Aux Relay Start time is programmed to a value other than 0 and the Aux Relay Stop time is not greater than the Aux Relay Start time</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>ERROR MESSAGE-</th>
<th>CAUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>DRIVE FAILURE</td>
<td>Faulty motor wiring to terminal strip or terminal block on circuit board</td>
</tr>
<tr>
<td></td>
<td>Faulty switch on the stager</td>
</tr>
</tbody>
</table>

**RESET**

- **Soft Reset** – Press the reset button located on the circuit board
- **Hard Reset** – Press and hold the MANUAL START and DOWN arrow for five seconds until UNIT displays the following text:
  - FACTORY DEFAULT
  - HIT ENTER TO PROGRAM

Press ENTER to restore controller to default settings
AquaMatic® Product Specifications

**Features and Options**

- **Low Pressure Loss** ............................................. The AquaMatic Y-pattern diaphragm valve features a large seat opening and high lift-disc for higher flow rates at a lower pressure loss than other comparable valves.
- **Positive Control** ............................................. A separate valve flow and control chambers permits positive sealing without springs. The optional spring-assist open feature is available for low pressure and self-draining applications.
- **Cost Effective** .................................................. The AquaMatic is a cost-effective solution both in initial cost, as well as lifetime maintenance expenses.
- **Long Diaphragm Life** ........................................... Separate diaphragm chambers protects the diaphragm from the flow stream, while allowing the valve to be serviced in-line.
- **Durable Construction** ......................................... The valve is constructed of cast iron, brass, stainless steel and Nitrile elastomer components, giving an unparalleled service life of three years or longer depending on the application’s environment.
- **Design and application engineering service**
- **Optional seal and diaphragm materials for special applications**
- **Handles liquid and gases**
- **Adaptable to wide variety of control devices**
- **Optional adjustable flow rate control**
- **Optional spring assist**
- **Optional position indication**
- **Optional all stainless internals (3” and 4” sizes only)**

**Principles of Operation**

- **Drip-Tight Closing**: Closure is obtained by directing line pressure or equivalent independent pressure into the upper chamber. This pressure on the large diaphragm area causes the valve disc to seal against the seat. (Ratio of diaphragm to disc area is 1.3 or greater.)

- **Full Open Operation**: When closing pressure in upper chamber is relieved by venting the pilot line, the valve opens, positively, by line pressure on the disc.

**Applications**

In addition to the water treatment process systems, the valves are used in a wide variety of applications. Some of the typical applications are:

- Concrete Additive
- Agricultural Irrigation
- Turf Irrigation
- Air Dryers
- Pump Controls
- Fuel Handling
- Cooling Towers
- Level Control Systems
- Sand Blasting
- Car Wash Systems
- Process Water Systems
- Laundry Equipment
- Conveyor Systems
- Air Control Systems
- Dust Suppression
- Plastic Molding
- Machinery
- Nitrogen Handling
- Vacuum Control
- Systems
- Machine Hydraulic
- Cooling Control
- Street Cleaning Vehicles
- Centrifugal Separators
- HVAC Systems
## Series 420 Valves

Standard valves are normally open. Body and cap are of cast iron. Preformed stress-relieved diaphragm of Nitrile (Buna N) on Polyamide, and static seals are Nitrile, stainless steel and brass internal parts.

Pipe sizes are 3/4 to 3-inch threaded (N.P.T. or B.S.P.); 3-inch through 6-inch flanged drilled in accordance with ASA16.1 class 125, or BSP4504.

### Options

- Normally closed, spring assist closed, spring assist open, limit stop, position indicator, high temperature service, brass body and cap (3/4 to 3-inch only), optional seal and diaphragm materials for special application, stainless steel internal parts.

### Operating Specifications

- **Working Pressure**: 125 PSI (8.6 bar)
- **Maximum Temperature**: 150°F (65°C)

Pipe sizes are 3/4 to 3-inch threaded (N.P.T. or B.S.P); 3 to 4-inch flanged drilled in accordance with ASA16.1 class 125, or BSP4504.

### Options

- Normally closed, spring assist closed, spring assist open, FKM diaphragm for high temperature service.

### Operating Specifications

- **Working Pressure**: 125 PSI (8.6 bar) maximum
- **Temperature**: 250°F (120°C) – Optional

## Metal Body Valves

## Flow Thru Metal Diaphragm Valves

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Model Number</th>
<th>Dimensions (Approximate)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>420 Series</td>
<td>VAV Series</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>V42B</td>
<td>VAVB</td>
</tr>
<tr>
<td>1&quot;</td>
<td>V42C</td>
<td>VAVC</td>
</tr>
<tr>
<td>1-1/4&quot;</td>
<td>V42D</td>
<td>N/A</td>
</tr>
<tr>
<td>1-1/2&quot;</td>
<td>V42E</td>
<td>VAVE</td>
</tr>
<tr>
<td>2&quot;</td>
<td>V42F</td>
<td>VAVF</td>
</tr>
<tr>
<td>2&quot;</td>
<td>V42G</td>
<td>VAVG</td>
</tr>
<tr>
<td>2-1/2&quot;</td>
<td>V42H</td>
<td>VAVH</td>
</tr>
<tr>
<td>3&quot;</td>
<td>V42J</td>
<td>VAVJ</td>
</tr>
</tbody>
</table>

| Flanged   | V42J        | VAVJ        | 134 | in. | 10.62 | 270 | 10.75 | 273 | 7.00 | 178 | 7.25 | 184 | 6.00 | 152 | 0.75 | 19 |
|           | V42K        | VAVK        | 275 | in. | 11.75 | 298 | 14.75 | 373 | 10.00 | 254 | 8.75 | 222 | 7.50 | 191 | 0.75 | 19 |
|           | V42L        | N/A         | 680 | in. | 17.00 | 432 | 19.00 | 483 | 13.50 | 343 | 15.75 | 402 | 9.50 | 241 | 0.87 | 2 |

1. Bolt circle diameter  
2. Bolt hole diameter  
3. CV = Flow rate in gpm of water at 60°F @ 1 psi pressure drop

---

For More Information:  
Contact the Residential and Commercial Group at (815) 964-9421 or (800) 245-9421 or visit www.gewater.com

GE  
Water & Process Technologies

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NORMALLY OPEN

Line pressure/flow against the valve seat will open the valve. Control pressure applied to the top of the diaphragm (port "C") will close the valve.

NORMALLY CLOSED

Line pressure against the disc, transferred thru the valve's hollow shaft to the top of the diaphragm, will close the valve. Control pressure at port "D" will open the valve. Addition of "Spring Assist Closed" feature is recommended for the following conditions:
1. Low pressure and/or flow.
2. Valve discharges to atmosphere.

Normally closed feature not recommended for line media containing solids, high temperatures or other media conditions which may damage the diaphragm.

LIMIT STOP

Includes an adjustment screw which limits the valve stroke. May be used to control flow rate. However, flow rate will vary with changes in pressure.

SPRING ASSIST CLOSED

Spring serves as an assist to assure full valve closure in the absence of line and control pressures.

SPRING ASSIST OPEN

Spring serves as an assist to assure full valve opening in the absence of line and control pressures.

POSITION INDICATOR

Indicator rod is attached to main valve stem to show position of valve. Only available with spring assist open option.
# Metal Diaphragm Valves (421 Thru 429)

<table>
<thead>
<tr>
<th>SERIES</th>
<th>PIPE SIZE</th>
<th>SEAT DIAMETER</th>
<th>SEAT AREA</th>
<th>DIAPHRAGM AREA</th>
<th>TOTAL STROKE</th>
<th>DIAPHRAGM CHAMBER (VOLUME)</th>
<th>Cv</th>
<th>Kv</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>IN. CM.</td>
<td>SQ. IN. SQ. CM.</td>
<td>IN. SQ. CM.</td>
<td>IN. CM.</td>
<td>CUBIC IN. CUBIC CM.</td>
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<td></td>
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<tr>
<td>V42B</td>
<td>3/4&quot;</td>
<td>0.97</td>
<td>0.74</td>
<td>2.10</td>
<td>0.47</td>
<td>2.06</td>
<td>11.4</td>
<td>9.8</td>
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<tr>
<td></td>
<td></td>
<td>2.5</td>
<td>4.8</td>
<td>13.0</td>
<td>1.2</td>
<td>33.8</td>
<td>4.1</td>
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<td>V42C</td>
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<td>0.97</td>
<td>0.74</td>
<td>2.10</td>
<td>0.47</td>
<td>2.06</td>
<td>12.8</td>
<td>11.0</td>
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<tr>
<td></td>
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<td>4.8</td>
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<td>33.8</td>
<td>5</td>
<td>10</td>
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<tr>
<td>V42D</td>
<td>1 1/4&quot;</td>
<td>1.34</td>
<td>1.41</td>
<td>6.49</td>
<td>0.61</td>
<td>5.20</td>
<td>26.5</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3.4</td>
<td>9.1</td>
<td>41.9</td>
<td>1.5</td>
<td>85.2</td>
<td>2.8</td>
<td>88</td>
</tr>
<tr>
<td>V42E</td>
<td>1 1/2&quot;</td>
<td>1.34</td>
<td>1.41</td>
<td>6.49</td>
<td>0.61</td>
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<td>32.5</td>
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<tr>
<td></td>
<td></td>
<td>3.4</td>
<td>9.1</td>
<td>41.9</td>
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<td>10</td>
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<tr>
<td>V42F</td>
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<td>3.20</td>
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<td>5.1</td>
<td>20.6</td>
<td>71.2</td>
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<tr>
<td>V42G</td>
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<td>97.0</td>
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<td>817.7</td>
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<td>26</td>
</tr>
<tr>
<td>V42H</td>
<td>2 1/2&quot;</td>
<td>2.31</td>
<td>4.19</td>
<td>15.03</td>
<td>0.99</td>
<td>16.34</td>
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<td>5.9</td>
<td>27.0</td>
<td>97.0</td>
<td>2.5</td>
<td>817.7</td>
<td>130</td>
<td>26</td>
</tr>
<tr>
<td>V42J</td>
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<td>4.86</td>
<td>22.69</td>
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<td>32.80</td>
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<td>116</td>
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<td></td>
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<td>7.5</td>
<td>44.6</td>
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<td>537.6</td>
<td>214</td>
<td>42</td>
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<tr>
<td>V42K</td>
<td>4&quot;</td>
<td>3.84</td>
<td>11.58</td>
<td>33.82</td>
<td>1.92</td>
<td>78.83</td>
<td>275</td>
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<td>9.7</td>
<td>74.7</td>
<td>218.2</td>
<td>4.9</td>
<td>1292.0</td>
<td>360</td>
<td>720</td>
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<tr>
<td>V42L</td>
<td>6&quot;</td>
<td>6.06</td>
<td>28.84</td>
<td>120.28</td>
<td>1.70</td>
<td>296.52</td>
<td>680</td>
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<tr>
<td></td>
<td></td>
<td>15.4</td>
<td>186.1</td>
<td>770.0</td>
<td>4.3</td>
<td>4860.0</td>
<td>899</td>
<td>1798</td>
</tr>
</tbody>
</table>

**NOTE 1**: Maximum continuous velocity through the valve.

**NOTE 2**: Maximum continuous velocity. Extended service at this velocity may cause cavitation.

* Cv = Flowrate (Gal/min.) of water at 60°F at 1 P.S.I. pressure drop

** Kv = Flowrate (Cu. M./hr) of water at 15.5°F.

At 1 Bar pressure drop

The data presented herein is believed to be reliable and offered as suggestion only. Actual results may vary depending upon application.

---

**To Determine Flowrate at Any Given Pressure Drop**, the following formulas can be used.

**For Water and Liquids**

For Air and Gas:

\[ Q = \frac{Cv \sqrt{\Delta P}}{\sqrt{e}} \]

When \( P_2 < 0.5 P_1 \)

\[ Cv = \frac{CFM \sqrt{e}}{P_2 \Delta P} \]

When \( P_2 > 0.5 P_1 \)

\[ Cv = \frac{CFM \sqrt{e}}{P_1 \Delta P} \]

Where:

- \( Q \) = Flowrate in Gal/min.
- \( \Delta P \) = Pressure Drop (lb/sq. in.)
- \( e \) = Specific Gravity (Air = 1.00)
- \( P_1 \) = Inlet Pressure (lb/sq. in.)
- \( P_2 \) = Outlet Pressure (lb/sq. in.)

Train no. 1078116

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Printed in U.S.A.
REPAIR PARTS KITS

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1070001 (2W-85)</td>
<td>DIAPHRAGM &amp; SEALS KIT</td>
<td>WIRES</td>
</tr>
<tr>
<td>1070002 (2W-942)</td>
<td>BUNA N</td>
<td>1.00</td>
</tr>
<tr>
<td>1070003 (2W-942)</td>
<td>E.P.D.M.</td>
<td>4.00</td>
</tr>
<tr>
<td>1070004 (2W-942)</td>
<td>TFM</td>
<td>125.0</td>
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</table>

INT. PARTS KIT (NORM. OPEN) CONSISTS OF STANDARD ITEM NO'S 4,7,10,11(2),19 SEAT (ITEM NO. 2) 1074245 (424-00)

ASSEMBLY TOOLS

<table>
<thead>
<tr>
<th>PART NO.</th>
<th>DESCRIPTION</th>
</tr>
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<tbody>
<tr>
<td>1074247 (424-MT)</td>
<td>FOR INSTALLATION &amp; REMOVAL OF SEAT (ITEM #2) (TOOL NOT SHOWN)</td>
</tr>
<tr>
<td>1074227 (424-GT)</td>
<td>FOR INSTALLATION &amp; REMOVAL OF SHAFT GUIDE (ITEM #10) (TOOL NOT SHOWN)</td>
</tr>
</tbody>
</table>

NOTE:
1. AMERICAN NATIONAL STANDARD TAPER PIPE THREADS (NPT) PER ANSI B1.1-1988
2. VALVES AVAILABLE WITH B.S.P.T. END CONNECTIONS.

SEE REVERSE SIDE FOR CONFIGURATION OPTIONS

FORM NO. 1077614

GE Osmonics
1 1/4" & 1 1/2" DIAPHRAGM VALVE - STANDARD MODEL

1 1/4" & 1 1/2" N.P.T. OR B.S.P.T.
CONVERSION KITS

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>PART NO.</th>
<th>DESCRIPTION</th>
<th>PART NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONVERSION KIT (LIMIT STOP)</td>
<td>1074502 (427–LSC)</td>
<td>CONVERSION KIT (NORM. CLOSED)</td>
<td>1074519 (427–SCC)</td>
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<tr>
<td>CONSISTS OF STANDARD ITEM NO’S 20,21,22,23</td>
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<td>CONSISTS OF STANDARD ITEM NO’S 25 THRU 31</td>
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<tr>
<td>CONVERSION KIT (SPRING ASSIST CLOSED)</td>
<td>1074518 (427–SCL)</td>
<td>CONVERSION KIT (SPRING ASSIST OPEN)</td>
<td>1074520 (427–SO)</td>
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<td>CONSISTS OF STANDARD ITEM NO’S 8,32,33</td>
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<tr>
<td>CONVERSION KIT (POSITION INDICATOR)</td>
<td>1074509 (427–PIC)</td>
<td>CONVERSION KIT (POSITION INDICATOR)</td>
<td>1074503 (427–PII)</td>
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REPAIR PARTS KITS

<table>
<thead>
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<tr>
<td>INT. Parts Kit (LIMIT STOP)</td>
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<tr>
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<td>INT. Parts Kit (POSITION INDICATOR)</td>
<td>1074503 (427–PII)</td>
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