



**INSTALLATION, OPERATION,
AND MAINTENANCE MANUAL**

MFS ACA 20-72

**SINGLE – SYSTEM 4
MX-III CONTROLLER
COMMERCIAL WATER FILTERS**

COMPLETE FOR FUTURE REFERENCE:

MODEL NO:

SERIAL NO:

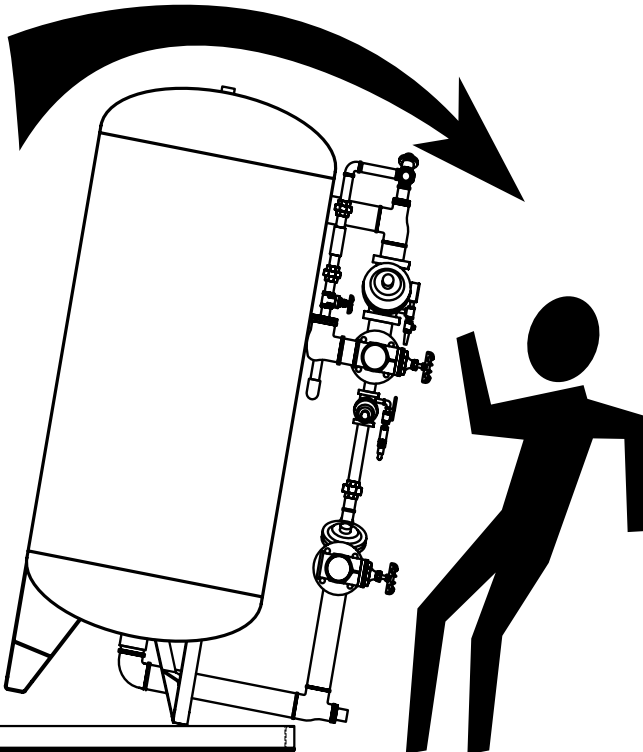
DATE INSTALLED:

DEALER:

Marlo Incorporated
2227 South Street
P.O. Box 044170
Racine, WI 53404-7003
Ph. (262) 681-1300
Fax (262) 681-1318
Info@Marlo-Inc.com
www.Marlo-Inc.com

CAUTION

Unit is front-heavy and may tip.
Use caution when uncrating.



Form 5-244 07/04
Part# A2006051

INSTALLATION WARNING

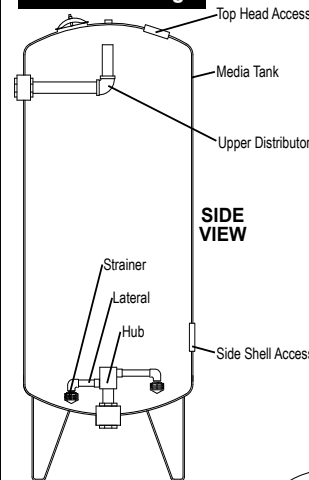
Inspection Requirement Prior to Loading Media

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 laterals are secured to hub and strainers are secured to laterals.

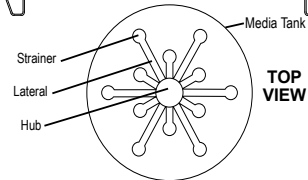
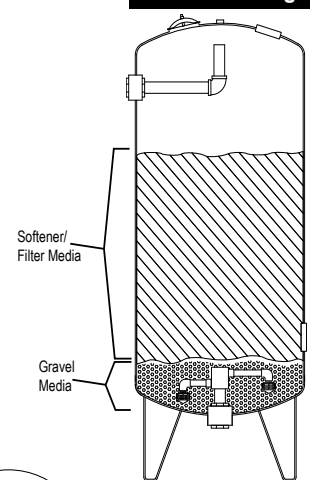
INSTALLER WARNING

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. Refer to installation instructions for media loading procedure. Improper loading of media will damage components inside media tank.

PRIOR TO Media Loading



AFTER Media Loading



Form 5-136-1
Part# A2006050

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Ordering:

Orders may be phoned, faxed, or emailed to Marlo Incorporated. Purchase orders must include Marlo Incorporated part numbers and pricing. Purchase orders must also state if partial shipments are allowed. If you do not have the correct part numbers, pricing, or case quantities, please contact our customer service department.

Order Confirmations:

All purchase orders will be confirmed by phone, fax, or email. Any discrepancies in part numbers, pricing, descriptions, or case quantities will be listed in the order confirmation. It is the customer's responsibility to review the order confirmations and advise if any changes are to be made. If we do not hear from the customer regarding the confirmation within 24 hours, we will assume everything is correct and will invoice and ship accordingly.

Quotes & Prices:

Quotations are valid for a period of up to 45 days or for the term stated on the quote, whichever term is shortest. We make every effort to notify customers with price change information. However, prices are subject to change or correction without notice. Shipping weights, dimensions and anticipated ship dates are all approximate and subject to change.

Minimum Orders:

Minimum order accepted is \$25.00, not including freight or taxes.

Taxes:

Taxes are not included. Quoted prices are exclusive of all taxes. Purchaser shall be responsible for payment of all applicable state/local taxes. Orders shipped within Wisconsin are subject to applicable state tax rates unless a completed resellers card or exempt certificate is on file.

Freight:

All shipments are F.O.B. Marlo Incorporated Racine, Wisconsin, unless otherwise specified.

Shipment:

The shipment method should be specified by the customer on the purchase order; otherwise, Marlo Incorporated will choose the best method of shipment.

Packaging:

Pricing includes packaging that is satisfactory for air, truck, or containerized shipment at no additional cost, unless otherwise stated. Ocean export crating will require an additional charge.

Terms - Domestic Customers:

Terms of payment on open accounts are net 30 days from the date of invoice, unless otherwise stated and mutually agreed upon by both parties. This agreement is subject to credit approval. Terms will only be issued to companies which reside in the United States of America. Orders will not be shipped if any account is past due and/or until payment by check has cleared.

Orders in excess of \$60,000 will require partial payments prior to shipment. A specific progress payment schedule will be stated in the quotation. Partial payments may also be required for orders involving special engineering or custom ordered items regardless of order amount.

Interest will be charged on past due accounts. Interest charges will be calculated on the unpaid balance at 1.5% per month. All questions regarding invoices and terms must be addressed with our accounting department before invoices become due.

Unless specifically included as a separate item, prices quoted do not include any city, county, state or federal taxes, or transportation of merchandise.

Terms - International Customers:

All payments due are in U.S. dollars and must be made in advance by check (must clear before shipment), money orders, wire transfer, or credit card. Credit cards that are accepted are Visa, MasterCard, and American Express. Irrevocable Letters of Credit are accepted with a minimum order of \$25,000.00 U.S. dollars, per order. Unless specifically included as a separate item, prices quoted do not include any city, county, state or federal taxes, or transportation of merchandise. A deposit may be required for special or custom ordered items.

Freight Claims:

Any damage, discrepancies and/or freight claims must be made immediately and directly, in writing within ten (10) days to Marlo Incorporated. Marlo Incorporated will help as much as possible in settling claims. However, Marlo Incorporated will not be held responsible for breakage or shortage after products are accepted by common carrier. All shipments must be inspected for damages and counted for shortages at the time of delivery.

Order Changes:

Additions to an order may be made at no charge prior to the processing of an order. Processing of an order typically begins within one hour of receipt of a purchase order and is typically accomplished within one working day.

Orders cancelled after the order has been processed and sent to shipping or engineering, will be subject to a minimum 10% cancellation fee, assuming manufacturing has not commenced, and no detailed engineering or special parts have been ordered. Additional fees may be charged depending on the level of completion of detailed engineering, manufacturing, and/or if any special parts have been ordered.

Returns & Restocking:

A Return Goods Authorization (RGA) number must be obtained from Marlo Incorporated before any product returns can be accepted and/or replacements shipped. All returns for warranty consideration are to be shipped prepaid and must be returned within ten (10) business days from the RGA issuance. Returns determined to be in warranty will be replaced or repaired and will be returned to Buyer prepaid. Products returned, other than valid warranty claims, may be subject to a restocking charge of up to 25%. Orders shipped incorrectly by Marlo Incorporated are not subject to restocking charges and correct items will be shipped to Buyer prepaid.

Excusable Delays:

Marlo Incorporated shall not be in default for failure to deliver or delay in delivery arising out of causes beyond its control and without its negligence, including but not limited to Acts of God or the public enemy; acts of the Government in either its sovereign or contractual capacity; fires; floods; epidemics; quarantine restrictions; strikes; shortages of materials or supplies; labor disputes; freight embargoes; delays in transit; consignments lost or damaged by freight agent(s); and unusually severe weather.

Warranty:

Marlo Incorporated warrants its products to be free from defects in design, material, or workmanship for a period of 18 months from shipment date or 12 months from installation, whichever occurs first, when said products are installed and operated in accordance with the written instructions provided. The fiberglass reinforced polyester (FRP) resin/media tanks used in certain products alone have an extended warranty period of five (5) years from the shipment date. 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 including labor charges, back charges or handling charges are excluded from Marlo Inc.'s warranty provisions.

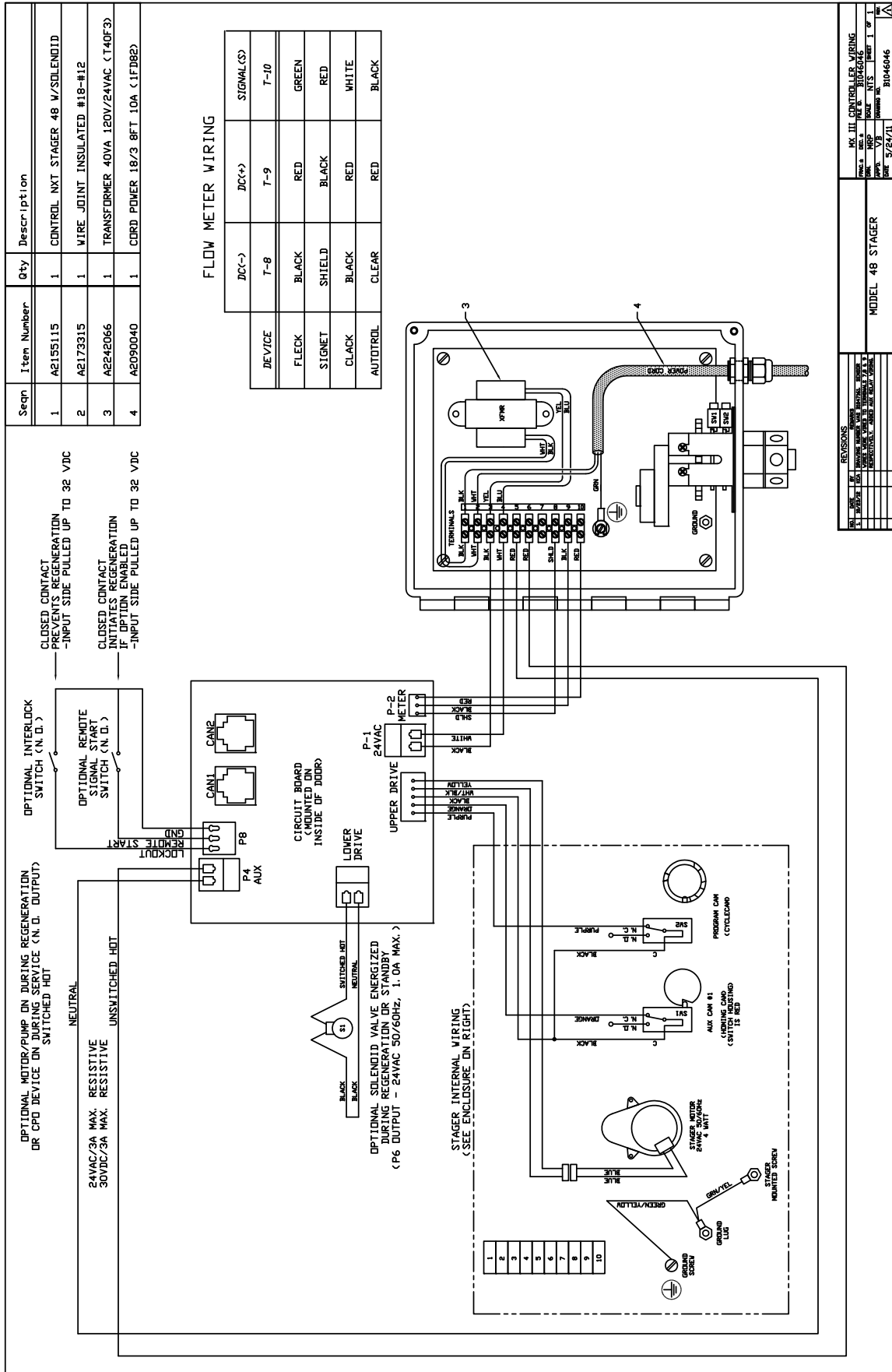
Policy:

These terms and conditions may be superseded by specific provisions provided by Marlo Incorporated. However, should any of these terms and conditions be contrary to or inconsistent with any terms and conditions contained in any purchase order form or other document between Marlo Incorporated and the buyer, which is prepared by the buyer and whenever executed, the provisions hereof shall be controlling and shall supersede the conflicting terms and conditions which are contained in such other document. No changes shall be made to our terms and conditions unless prior written authorization by Marlo Incorporated.

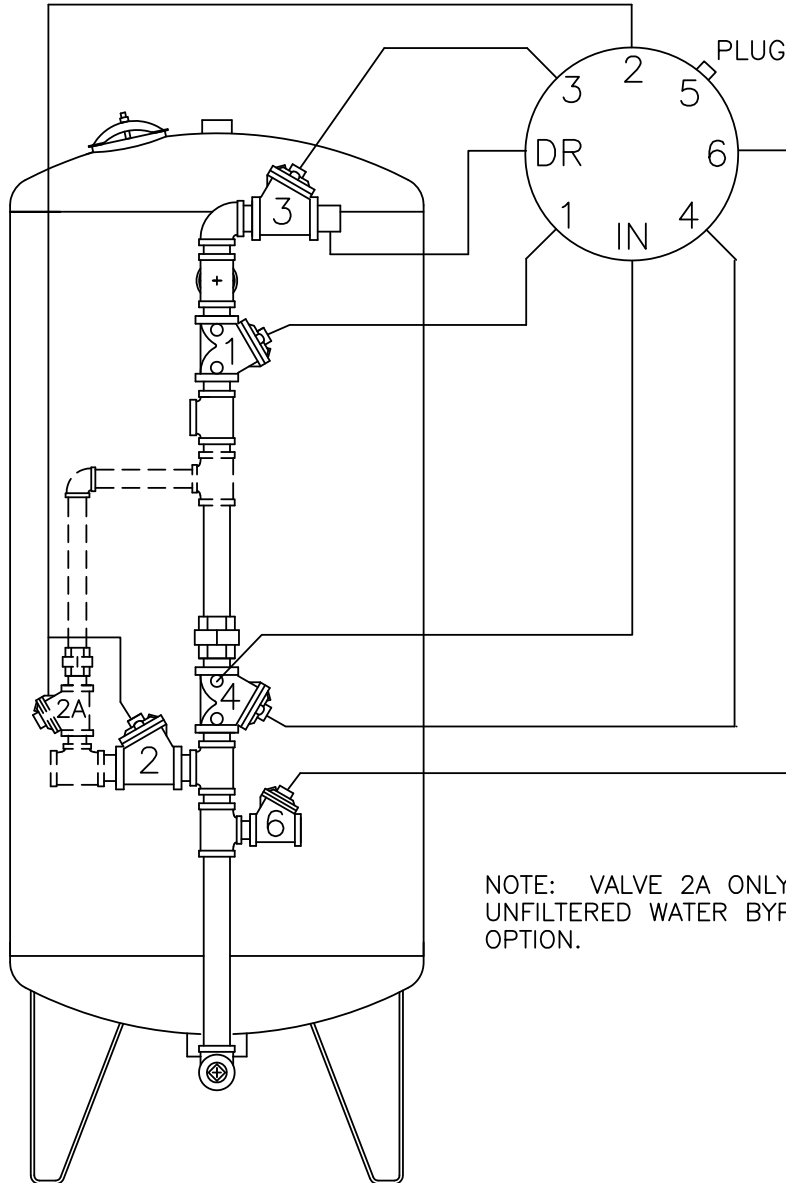
SPECIFICATION CHART

SYSTEM SIZE	MODEL ACA-	20	24	30	36	42	48	54	60	66	72	
	Service Connection (in.)	1	1-1/2	1-1/2	2	2	3	3	3	3	3	3
	Drain Connection (in.)	1-1/4	1-1/2	1-1/2	2	2-1/2	3	4	4	4	4	4
	Dimensions (LxWxH)	21x30x72	25x34x73	31x40x76	37x48x84	43x54x88	49x62x95	55x70x97	61x76x103	67x82x105	73x88x107	
FLOWRATE (GPM)	Service - Normal (gpm)	10	15	25	35	50	65	80	100	120	140	
	Service - DP (psi)	1	2	3	3	4	2	2	3	4	6	
	Service - Peak (gpm)	20	30	50	70	100	125	160	200	240	285	
	Service - DP (psi)	6	6	6	10	16	5	5	10	13	26	
	Backwash & Fast Flush (gpm)	20	30	50	70	100	125	160	200	240	285	
	Settle (gpm)	0	0	0	0	0	0	0	0	0	0	0
TIMER SETTINGS (MINS)	Backwash	16	16	16	16	16	16	16	16	16	16	
	Brine Draw/Rinse	0	0	0	0	0	0	0	0	0	0	
	Rapid Rinse	6	6	6	6	6	6	6	6	6	6	
	Brine Tank Refill	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	
TANK	Size - Dia. X Ht. (in.)	20x54	24x54	30x54	36x60	42x60	48x60	54x60	60x60	66x60	72x60	
	Gravel Subfill (lbs)	100	200	300	400	600	900	1200	1500	2400	2500	
	Media (cu. ft.)	5	8	12	18	24	32	40	50	60	70	

WIRING DIAGRAM 48 STAGER CONTROLLER

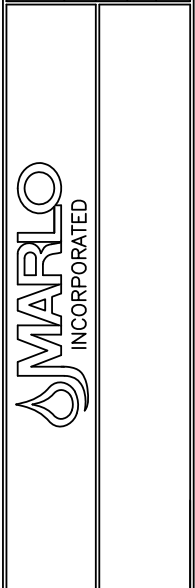


TUBING DIAGRAM - VALVE NEST SINGLE TANK



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

CONTROL TUBING DIAGRAM MFS SERIES FILTER			
FRAC. ±	DEC. ±	FILE ID.	A2006021
DRN.	BCD	SCALE	nts
APP'D.	BCD	SHEET	1 OF 1
DATE	10-30-96	DRAWING NO.	A2006021
			REV. 1



REVISIONS		REMARKS
NO.	DATE	BY
1	1-23-97	BCD

INSTALLATION INSTRUCTIONS**GENERAL INFORMATION**

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.

Refer to specific equipment layout drawing, water meter installation instruction, and interconnecting electrical wiring diagram for your system.

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.

NOTES:

- Install the piping conforming to federal, provincial, and local codes.
- Union or flanges are recommended at the control valve's inlet, outlet, and drain connections
- To enhance the monitoring of the system's performance sample valves and pressure gauges are to be installed at the inlet and outlet piping to each control valve.
- If distance of drain line is over a 10 ft. vertical, or 25 ft. horizontal run, increase drain line one pipe size over that provided on the control valve.
- Do not make a direct connection to the drain. Provide an air gap of at least four times the diameter of the pipe to conform to sanitation codes and to permit observation of the flow.

PIPING INSTALLATION:

1. Install piping as shown on the layout drawing. Include unions and shut-off valves on the inlet and outlet of each softener. It is recommended that a union be installed in each filter drain-line to facilitate cleaning the backwash flow control.
2. 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).
3. If your system has a water meter thoroughly read the meter instructions manual located in the back of this manual before installing any water meters or flow sensors. Water meters typically must be installed in a particular manner (i.e. horizontal, plane or with recommend pipe lengths) to function properly.
4. After the piping has been completed, make sure to close all isolation valves.

INSTALLATION INSTRUCTIONS**FILTER LOADING**

Before loading, visually check the lower distributor for damage. All radial arms and baskets strainers should be 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.

GRAVEL LOADING - (Load First)

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 filter media.

MEDIA LOADING - (Load Second)

1. Reopen the inlet valve and fill the tank to 1/3 to 1/2 full of water.
2. Pour the quantity of media marked for the tank in through the top opening.
3. Reopen the inlet valve and fill the tank with water to the top access opening. Close and secure the top access opening.
4. Open inlet valve and continue to fill the tank with water until it is fully pressurized.



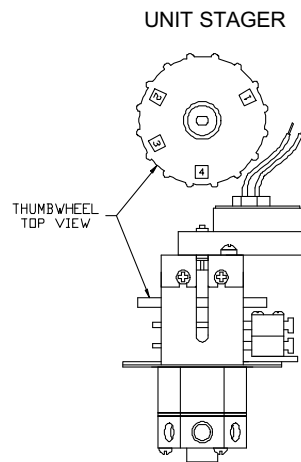
START-UP INSTRUCTIONS

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

With all piping and installation completed, and with the mineral in the tank, proceed as follows:

1. Open the manual by-pass valve. The manual inlet and outlet valves are to remain closed.
2. Connect the power to the MX III controller. The controller display window will light up.
3. Verify the following and change if required.
SYSTEM 4 is displayed in the window for single systems
The **K FACTOR** is correct for your unit size - (metered units only)



4. Open the cover of the enclosure 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 **EXTRA CYCLE** button on the front of the controller. This will advance Unit 1 to the backwash step. The Unit 1 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.

NOTE: Carbon filters will normally have considerable black fines on the initial backwash and may take 10-15 minutes to run clear.

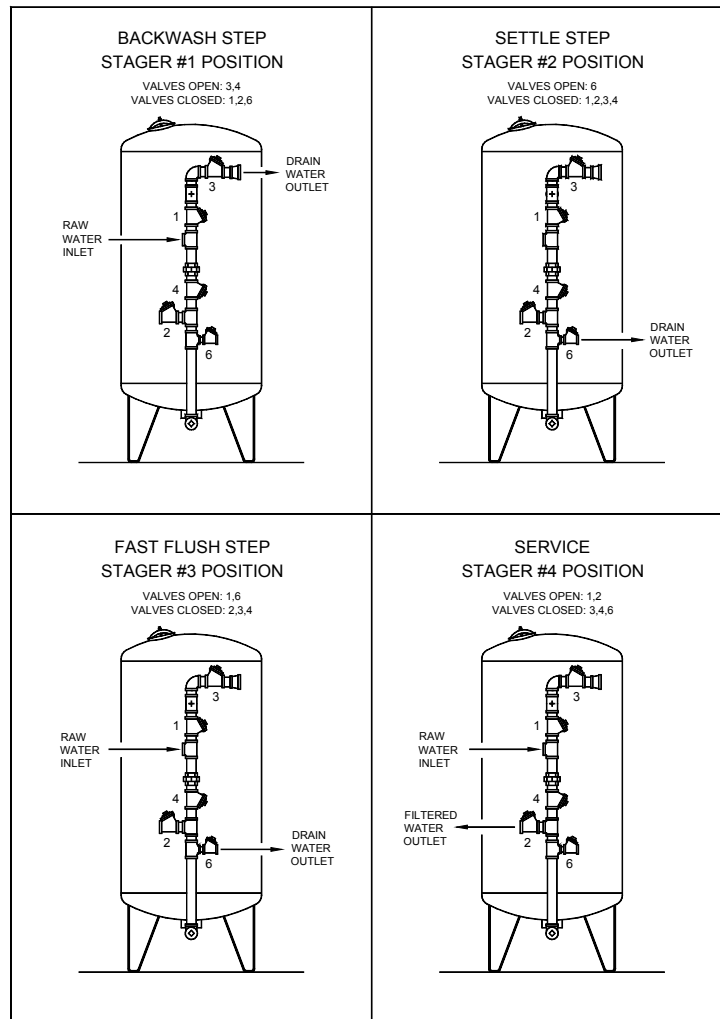
8. Advance Unit to the brine/slow rinse step by pressing and holding the **EXTRA CYCLE** button. The stager should rotate to the STEP 2 (**BRINE/SLOW RINSE**) position. There will be no flow to the drain.
9. Advance Unit to the Fast Rinse position by pressing and holding the **EXTRA CYCLE** button. The 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.
10. Advance Unit to the service position by pressing and holding the **EXTRA CYCLE** button. The stager should rotate to STEP 4 (**SERVICE**) position. There will be no flow of water to the drain.
11. 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:

1. **Backwash:** The flow through the mineral bed is reversed and allowed to flow to drain. The upflow 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).
2. **Settle:** The media is allowed to settle in a stratified manner.
3. **Fast Flush:** The downward flow to drain in this step is increased to a high rate, which will repack the media bed.



HOW THE STAGER FUNCTIONS

The regeneration of the equipment provided is carried out through the redirection of flow through the valve manifold. This manifold consists of individual diaphragm valves, which are controlled by the hydraulic stager mounted at the bottom of the stager controller. The stager applies or relieves water pressure to close or open valves as required. When water pressure is applied to the top of a diaphragm valve, it forces a diaphragm in causing it to close the seat assembly. When pressure is relieved from the top of the valve, by venting it to drain through the stager, the water pressure under the diaphragm forces it out thereby opening the seat assembly.

The regeneration timer located inside the stager controller determines the duration of each step of the regeneration cycle.

FEATURES OF THE MX III CONTROLLER

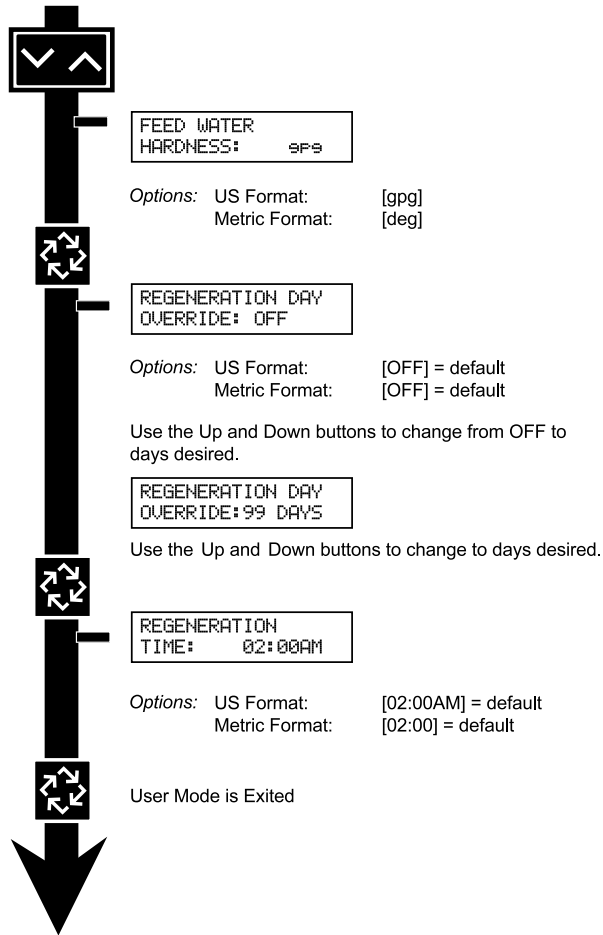
System Number	System Description	# of Tanks	Connect meter and/or remote regeneration input to...	Regeneration Type	Service Outlet Valve controlled by...	Operation Discussion
4	Single Unit	1	#1 Controller	Time Clock: No Meter Immediate: One Meter Delayed: One Meter Remote Signal Start: No Meter	Stager (no solenoid required)	Single tank configuration. During Regeneration no water available to service unless optional bypass valve #2A installed.
5	Interlocked	2, 3, or 4	Each Controller	Immediate: All Meters Remote Signal Start: No Meter	Stager (no solenoid required)	All tanks in parallel supplying treated water. Each unit in the system will have its own flow meter/sensor input. The control will delay the start of Regeneration if another unit is already in Regeneration. Once that unit has completed a Regeneration cycle, and has returned to Service, the unit with longest regeneration queue time will begin Regeneration. No more than one unit will be in Regeneration at a time.
6	Series Regeneration	2, 3, or 4	#1 Controller Only	Immediate: One Meter Delayed: One Meter Remote Signal Start: No Meter	Stager (no solenoid required)	All tanks in parallel supplying treated water. Only #1 control will monitor flow meter/sensor input. When a regeneration is required for the system, it will regenerate valve address #1 first, immediately followed by #2, then #3, then #4 if installed. No more than one unit will be in Regeneration at a time.
7	Twin Alternating	2	#1 Controller Only	Immediate: One Meter Remote Signal Start: No Meter	Solenoid	One tank online supplying treated water, one tank in Standby. Only #1 control will monitor its flow meter/sensor input. Regeneration of a unit will begin after the other control has left Standby and returned to Service. When the Regeneration cycle is complete, the regenerated unit will enter Standby. Standby on each tank is controlled by a solenoid connected to the service outlet valve of that tank.
9	Multiple Tank Alternating	2, 3, or 4	Each Controller	Immediate: All Meters Remote Signal Start: No Meter	Solenoid	One, two, or three tanks online supplying treated water, one tank in Standby. Meter/sensor input is required on each tank. Regeneration of a unit will begin after the other control has left Standby and returned to Service. When the Regeneration cycle is complete, the regenerated unit will enter Standby. Standby on each tank is controlled by a solenoid connected to the service outlet valve of that tank.
14	Demand Recall	2, 3, or 4	Each Controller	Immediate: All Meters	Solenoid	Meter/sensor input is required on each tank. Unit #1 will begin in Service with #2, #3, and #4 (if installed) will begin in Standby. At least one unit is in Service at all times. When flow rate to the Primary Service Unit increases to a user specified rate, the next unit in sequence will move from Standby to Service. As the flow rate falls below the user specified rate subsequent tanks will return to Standby. When the Primary Service Unit regenerates, the next unit in sequence will become the new Primary Service Unit. As each unit's capacity is reached the controller will initiate a Regeneration of that unit. Depending on the number of units in the system, and flow rate demand the regenerated unit will then be placed either into Standby or Service. Only one unit will be in Regeneration at a time.

USER MODE PROGRAMMING FLOW CHART

NOTE: User Mode is only displayed when a metered option is chosen under System Type.
Depending on current option settings, some displays cannot be viewed or set.

Entering User Mode:

Hold the Up and Down buttons for 5 seconds.



NOTE: User Mode cannot be entered on the Lag unit for System 6.

1. Enter User Mode

Press and hold the Up and Down buttons for 5 seconds.

2. Set Language Option

Press up or down to select language.
Press the Extra Cycle button to proceed to the next step.

3. Set Feed Water Hardness

Press the Shift, Up, and Down buttons to move the cursor and change the value of the numbers.
Press the Extra Cycle button to proceed to the next step.

NOTE: Only displayed when a metered option is chosen under System Type.

4. Set Regeneration Day Override

To turn on and set the days, press the Down button.
Press the Shift, Up, and Down buttons to move the cursor and change the value of the numbers.
Press the Extra Cycle button to proceed to the next step.

5. Regeneration Time

Press the Shift, Up, and Down buttons to move the cursor and change the value of the numbers.
Press the Extra Cycle button

6. End of User Programming Mode

MX III CONTROLLER OPERATION

SETTING THE TIME OF DAY

NOTE:

Set Time of Day on the Lead Unit (#1) and the rest of the units in the system will populate with the Time of Day within 10 seconds.

1. Press and hold the Up or Down button for 2 seconds.
2. Press the Shift button to select the digit you want to modify.
3. Press the Up or Down buttons to adjust the value.
4. Press the Extra Cycle button to return to the normal display screen, or after a 5 second timeout.

NOTE:

The “D” button (Diagnostic) can be pressed to exit without saving.

MANUALLY INITIATING A REGENERATION

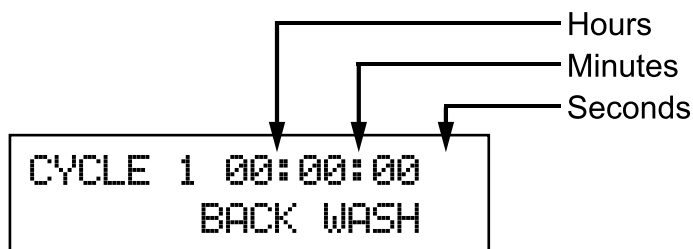
1. When timer is in service, press the Extra Cycle button for 5 seconds on the main screen.
2. The timer advances to Regeneration Cycle Step #1, and begins programmed time count down.
3. Press the Extra Cycle button once to advance valve to Regeneration Cycle Step #2 (if active).
4. Press the Extra Cycle button once to advance valve to Regeneration Cycle Step #3 (if active).
5. Press the Extra Cycle button once to advance valve to Regeneration Cycle Step #4 (if active).
6. Press the Extra Cycle button once to advance valve to Regeneration Cycle Step #5 (if active).
7. Press the Extra Cycle button once more to advance the valve back to in service.

NOTE:

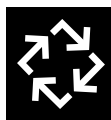
A manually initiated or queued regeneration can be cleared by pressing the Extra Cycle button for less than 5 seconds. A system queued regeneration can only be cleared by stepping through a manual regeneration. If regeneration occurs for any reason prior to the delayed regeneration time, the manual regeneration request shall be cleared. Pressing the Extra Cycle button while in regeneration will cause the upper drive to advance to the next step immediately.

CONTROLLER OPERATION DURING REGENERATION

In the Regeneration Cycle Step display, the controller shows the current regeneration cycle number the valve is on, or has reached, and the time remaining in that step. Once all regeneration steps are complete the timer returns to in Service and resumes normal operation.



Example: 12 Minutes Remaining in Cycle 1 (Back Wash)



Press the Extra Cycle button during a Regeneration Cycle to immediately advance the valve to the next cycle step position and resume normal step timing.

FLOW METER EQUIPPED CONTROLLER

- During normal operation, the Time of Day screen alternates with the error screen (if errors are present).
- As treated water is used, the Volume Remaining display counts down from the calculated system capacity to zero. When this occurs a Regeneration Cycle begins if no other units are in regeneration.

MX III CONTROLLER OPERATION

CONTROLLER OPERATION DURING PROGRAMMING

The controller enters the Program Mode in standby or service mode as long as it is not in regeneration. While in the Program Mode the controller continues to operate normally monitoring water usage. The controller's programming is stored in memory permanently.

CONTROLLER OPERATION DURING A POWER FAILURE

All program settings are stored in permanent memory. Current valve position, cycle step time elapsed, and time of day are stored during a power failure, and will be restored upon power re-application. Time is kept during a power failure, and time of day is adjusted upon power up (as long as power is restored within 12 hours).

NOTE:

A flashing Time of Day display indicates a power outage. The flashing of the time of day can be stopped by pressing any button on the display.

REMOTE LOCKOUT

The controller does not allow the unit/system to go into Regeneration until the Regeneration Lockout Input signal to the unit is cleared. This requires a contact closure to activate the unit. The recommended gauge wire is 20 with a maximum length of 500 feet. See P4 remote inputs in the wiring diagrams in the service manual.

REGENERATION DAY OVERRIDE FEATURE

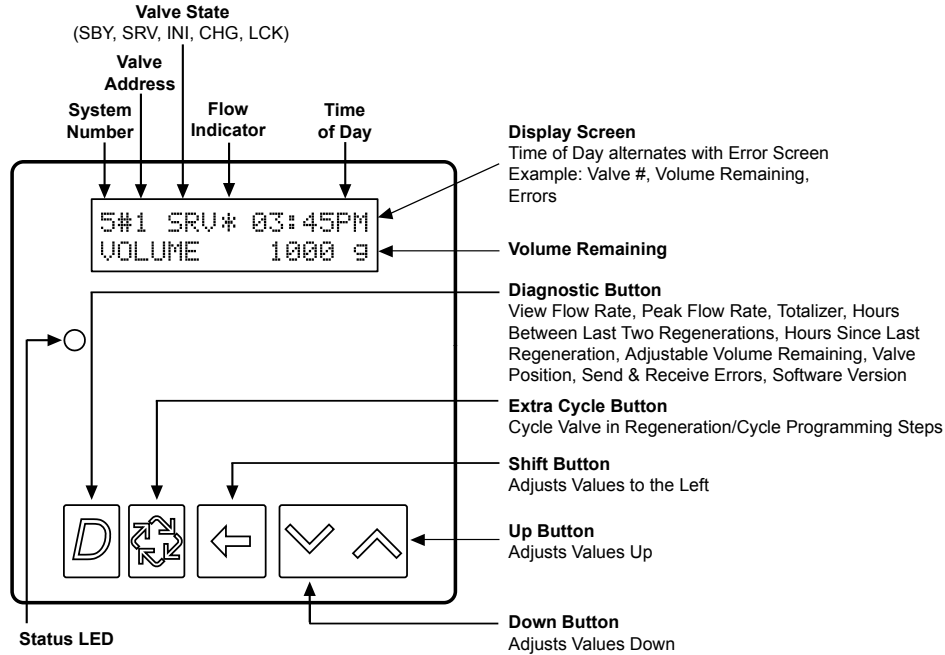
If the Day Override option is turned on and the valve reaches the set Regeneration Day Override value, the Regeneration Cycle starts if no other unit is in Regeneration. If other units are in regeneration, it is added to a regeneration queue. This occurs regardless of the remaining volume available.



WARNING

Transformer must be grounded and ground wire must be terminated to the back plate where grounding label is located before installation.

CONTROLLER DISPLAY FEATURES



VALVE STATE:

INI (Initializing)

INI will display on the screen for 30 to 45 seconds when initializing after a power failure reset or programming.

RGQ (Regeneration Queued)

RGQ indicates that the reserve has been entered in a delayed system and regeneration has been queued. When in the main screen, press the Extra Cycle button to toggle service (SRV) with RGQ.

Service (SRV)

SRV will display when the unit is in service.

LCK (Lock)

Lock will be displayed when the terminal/remote input block P4 on the circuit board is switched to "lock". See the "Network/Communication Cables & Connections" section of this manual.

LED STATUS LIGHTS:

Blue LED:

Illuminates while the unit is in service and no errors exist. The unit will always be in service unless a regeneration trigger has occurred (green LED light will be displayed).

A **blinking blue light** indicates the timer is in service, and queued for regeneration.

Green LED:

Illuminates when the unit is in Regeneration mode, unless an error condition exists.

A **blinking green light** indicates the timer is in standby, and not in regeneration.

Red LED:

Illuminates when there is an error.

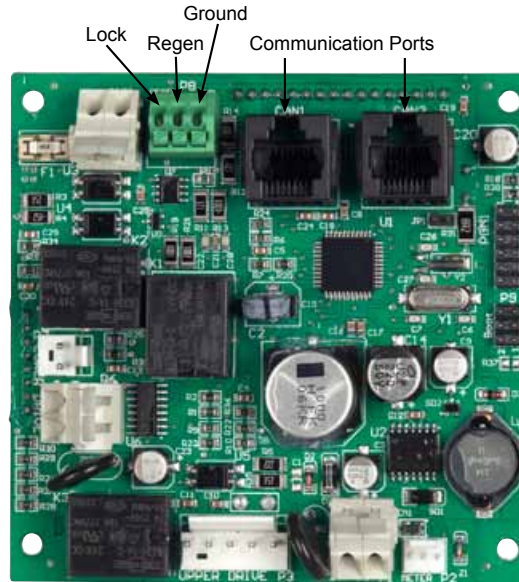
FLOW INDICATOR:

A rotating line (appearing as a rotating star shape) will display on the screen when flow is going through the the meter.

NETWORK/COMMUNICATION CABLES & CONNECTIONS

Use a CAT5 Network/Communication cable.

1. Connect the network/communication cable first before programming.
2. The maximum cable length between timers is 100 feet.
3. Connect each unit together from one communication port to the next communication port. It does not matter which one goes to the next one.



NXT Circuit Board

The number of network/communication cables needed for setup is one less than the total number of valves.

- Two-Unit System:** One network/communication cable
Three-Unit System: Two network/communication cables
Four-Unit Systems: Three network/communication cables

CONTROLLER DISPLAY - SCREEN EXAMPLES

```
4# SRV 03:45PM  
REGEN IN 07 DAYS
```

EXAMPLE:

In Service:
System 4 Time Clock

```
4# SRV* 03:45PM  
VOLUME 1000 g
```

EXAMPLE:

In Service:
1. System 4 Flow Meter Initiated
or
2. System 4 Flow Meter Delayed

```
5#1 SRV* 03:45PM  
VOLUME 1000 g
```

EXAMPLE:

In Service:
1. System 5 Flow Meter Initiated (Lead Unit)

```
5#3 SRV 03:45PM  
VOLUME 1000 g
```

EXAMPLE:

In Service:
1. System 5 Flow Meter Initiated (Lag Unit #3)

```
6#1 SRV* 03:45PM  
SYSVOL 4000 g
```

EXAMPLE:

In Service:
1. System 6 Flow Meter Initiated (Lead Unit)



SINGLE (SYSTEM 4) PROGRAMMING AND RANGES

Programming Parameters and Ranges

System Type	4 Time Clock	4 Metered Immediate	4 Metered Delayed	Programming Parameter Ranges	
				Gallons	Liters
Valve Address				1	
Select Language	x	x	x	English, Espanol, Portugues, Deutsch, Francais	
System Size				1	
Regen Type	x	x	x	Time Clock, Metered Delayed, Metered Immediate	
Valve Type	x	x	x	2750, 2850, 2900, 3150, 3900, Stager	
Regenerant Flow	x	x	x	Downflow, Upflow, Upflow Fill First	
Remote Signal Start	x	x	x	Off, 00:00:01 - 01:39:00	
Display Format	x	x	x	US - Gallons	EU - Metric-Liters
Unit Capacity		x	x	1 - 9900000 Grains	1 - 198000 gCaCO3
Capacity Safety Factor		x	x	0- 50%	
Feed Water Hardness		x	x	1 - 199 Grains/Gallons	1 - 1999 mgL
Trip Point 1				0 - 997gpm	0 - 3997 Lpm
Trip Delay 1				30 - 99 Seconds	30 - 99 Seconds
Trip Point 2				Trip Point 1 + 1 - 998 gpm	Trip Point 1 + 1 - 3998 Lpm
Trip Delay 2				30 - 99 Seconds	30 - 99 Seconds
Trip Point 3				Trip Point 2 + 1 - 999 gpm	Trip Point 2 + 1 - 3999 Lpm
Trip Delay 3				30 - 99 Seconds	30 - 99 Seconds
Regeneration Day Override	x	x	x	Off, 1 - 99	
<i>Regeneration Time</i>	x	o	o	12:00 a.m. - 11:59 p.m.	00:00 - 23:59 Hour
Cycle 1	x	x	x	00:00:00 - 04:00:00	
Cycle 2	x	x	x	Off, 00:00:00 - 04:00:00	
Cycle 3	x	x	x	Off, 00:00:00 - 04:00:00	
Cycle 4	x	x	x	Off, 00:00:00 - 04:00:00	
Cycle 5	x	x	x	Off, 00:00:00 - 04:00:00	
Auxiliary Relay	x	x	x	Enabled, Disabled	
<i>Aux Relay Output Start</i>	c	c	c	00:00:01 to Total Regeneration Time - 1	
<i>Aux Relay Output End</i>	c	c	c	Start Time + 1 to Total Regeneration Time	
Chemical Pump		x	x	Enabled, Disabled	
<i>CPO Aux Relay Volume</i>		c	c	1 - 999 gallons	0001 - 9999 Liters
<i>CPO Aux Relay Time</i>		c	c	00:00:01 - 02:00:00	00:00:01 - 02:00:00
Flow Meter		x	x	1" 1.5" Paddle or Turbine, 2" Paddle, 3" Paddle, Generic	
<i>Generic</i>		x	x		
<i>Maximum Flow Rate</i>		a	a	20 - 2000 GPM	20 - 2000 LPM
<i>Add _ _ _ Gallons or Liters</i>		a	a	1 - 255 Gallons	001 - 255 Liters
<i>Every _ _ _ Pulses</i>		a	a	1 - 255	1 - 255

a - If Generic Flow Meter is chosen, then programming parameters will be viewed.

c - All Relay Output parameters programming will be viewed if Enabled.

o - Regeneration Time will only be viewed if Regeneration Day Override is used

u - If Auxiliary Relay is Enabled then Chemical Pump Relay will not be viewed or if Chemical Pump Relay is

Enabled then Auxiliary Relay will not be viewed

*Indicates Required settings for Stager Controller

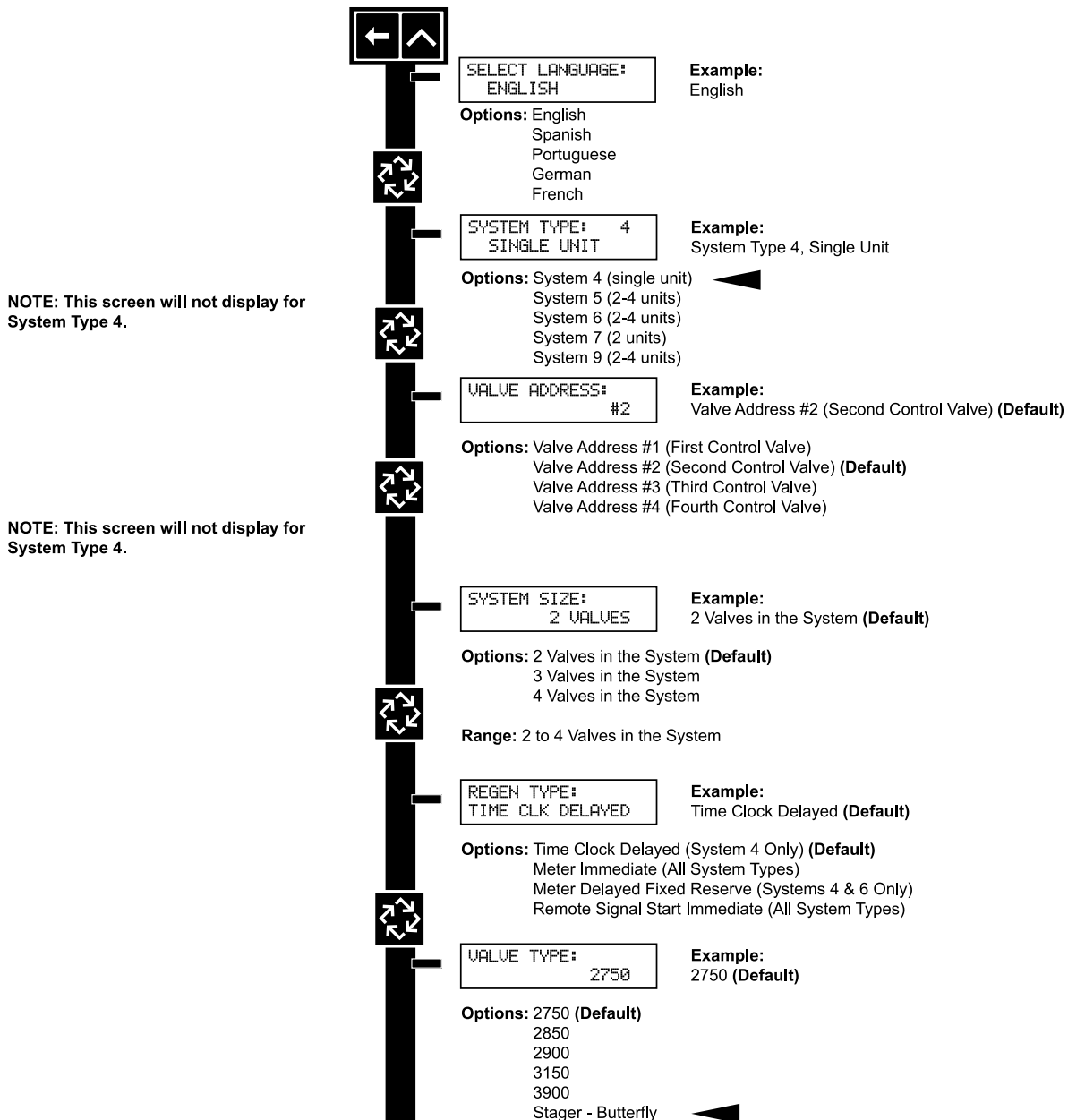
MASTER PROGRAMMING MODE FLOW CHART

NOTE: Depending on current option settings, some displays cannot be viewed or set.

Entering Master Programming Mode:

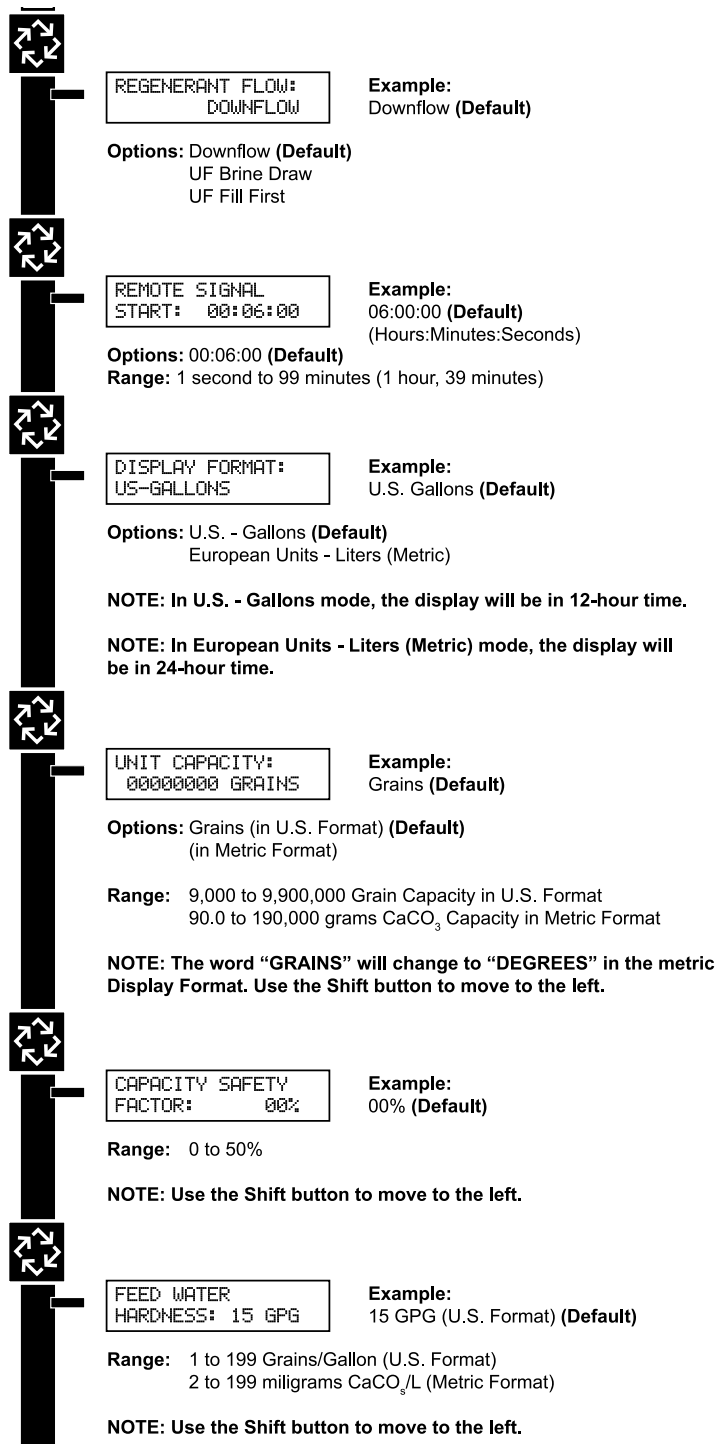
1. Press and hold the Shift and Up buttons for 5 seconds.
Press the Extra Cycle button once per display until all displays are viewed and Normal Display is resumed. Option setting displays may be changed as required by pressing either the Up or Down button. Use the Shift button to move one space to the left.
2. Depending on current valve programming, certain displays may not be viewed or set.

NOTE: If the “D” button is pressed while in master programming, no changes will be saved.



MASTER PROGRAMMING MODE FLOW CHART

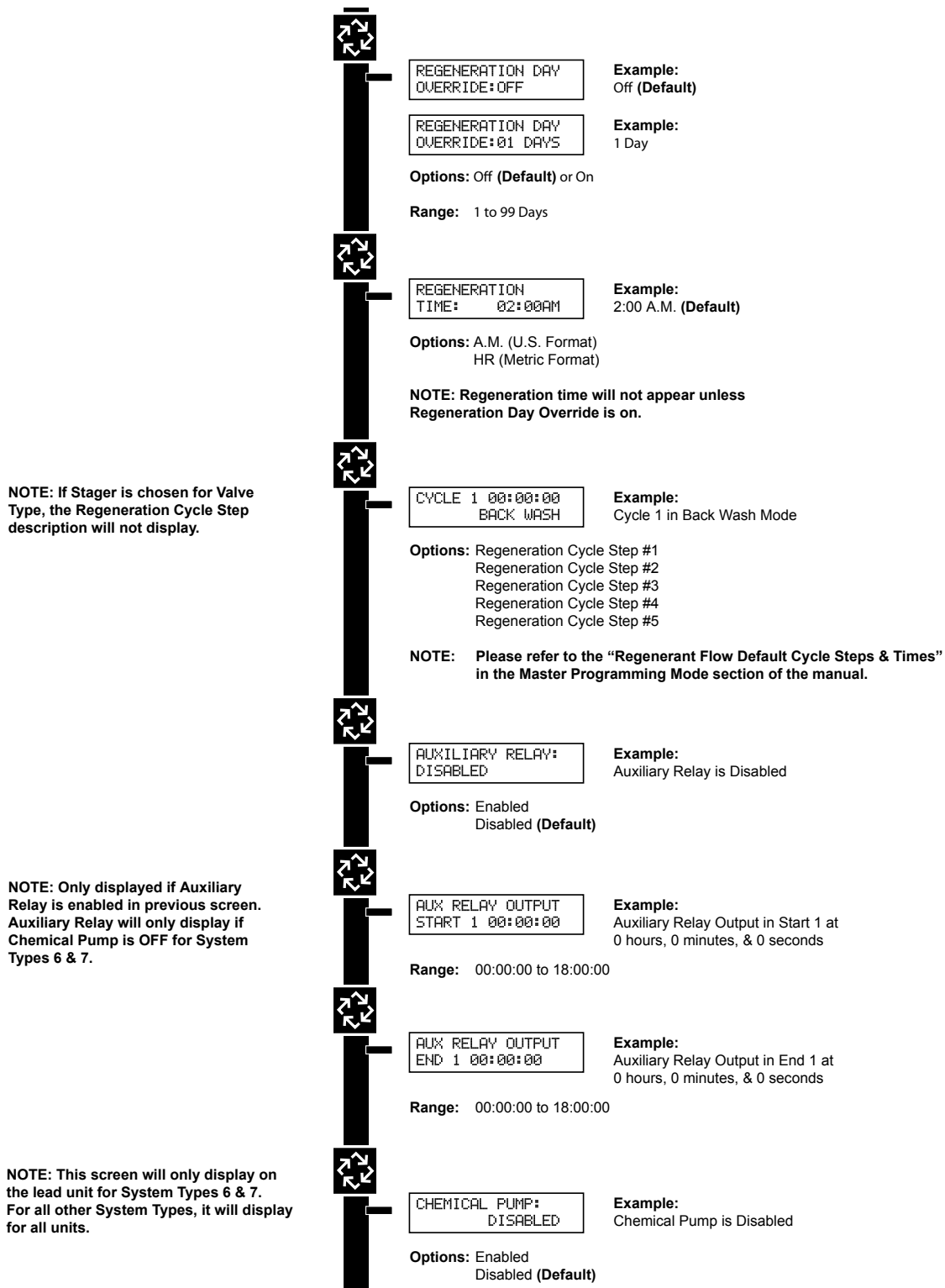
NOTE: Depending on current option settings, some displays cannot be viewed or set.



NOTE: This screen will only display on the lead unit for System Types 6 & 7. For all other System Types, it will display for all units.

CAUTION: Before entering Master Programming, please contact your local professional water dealer.

MASTER PROGRAMMING MODE FLOW CHART



CAUTION: Before entering Master Programming, please contact your local professional water dealer.

MASTER PROGRAMMING MODE FLOW CHART

NOTE: Only displayed on units that physically have a meter (Lead always has a meter). Only shown if Auxiliary Relay is disabled on System Types 6 & 7.



CPO AUX RELAY
VOLUME: 000 g

Example:
Chemical Pump Auxiliary Relay
Volume at 0 Gallons

Range: 000 to 999 gallons in U.S. Format
0.000 to 9.999 m3 in Metric Format



CPO AUX RELAY
TIME: 00:00:00

Example:
Chemical Pump Auxiliary Relay at 0 Hours,
0 Minutes, & 0 Seconds

Range: 00:00:00 to 02:00:00

NOTES: Default flow meter type is based on the valve type. This screen will only display on the lead unit for System Types 6 & 7. All other system types it will display for all units.



FLOW METER:
1.0 PADDLE

Example:
1.0 Paddle Flow Meter

Options: 1.0 Paddle
1.0 Turbine
1.5 Paddle
1.5 Turbine
2.0 Paddle
3.0 Paddle
Generic

Options Only if Generic Flow Meter Chosen:



MAXIMUM FLOW
RATE: 0000 gpm

Example:
Maximum Flow Rate of 0 gpm

Range: 20 - 2,000 gpm (U.S. Format)
2.0 - 200.0 m3 (Metric Format)



ADD 01 GALLONS
EVERY 001 PULSES

Example:
Add 1 Gallon for Each Pulse in U.S. Format

Options: Gallons (U.S. Format)
Meter3 (Metric Format)

Range: 1 - 99 Gallons (U.S. Format)
0.1 - 09.9 M3 (Metric Format)
Pulses: 1 - 99



PROGRAMMING UNIT
PLEASE WAIT...

Example:
Master Programming Mode is Exiting



OPTIONS FOR GENERIC FLOW METER SETTING K-FACTOR TABLE

PIPE SIZE	SIGNET 2536 FLOW SENSOR SETTINGS				CLACK METER (in)	MAX FLOW RATE (gpm)	K-FACTOR (Pulses per Gallon)
	MAX FLOW RATE (gpm)	TEE GALVANIZED	TEE PVC	SADDLE IRON			
(in)	(gpm)						
1	49	213	352		1-1/2	75	37
1-1/4	76	128	177		2	150	20
1-1/2	110	94	118		3	350	8
2	195	59	67	54	AUTOTROL METER		K-FACTOR
2-1/2	306		43	38	(in)	(gpm)	(Pulses per Gallon)
3	440		27	23	1	25	65
					2	255	15

MASTER PROGRAMMING GUIDE

When the Master Programming Mode is entered, parameters can be set to make the timer(s) function as needed.

NOTE:

Depending on current option settings, some displays cannot be viewed or set.

Entering Master Programming Mode:

1. Press and hold the Shift and Up buttons for 5 seconds.
OR
2. Set the time of day display to 12:01 PM or 12:01HR (See the “Setting the Time of Day” section on the “Timer Operation” page). Then go to the main display screen, press the Up and Down buttons at the same time for 5 seconds.

Exiting Master Programming Mode:

1. Press the Extra Cycle button once per display until all are viewed. Master Programming Mode is exited and the normal display screen appears.
2. To exit the Master Programming Mode without saving, press the Diagnostic button.

NOTE:

If no keypad activity is made for 5 minutes while in the Master Programming Mode, or if there is a power failure, no changes will be made, and the unit will go back to the main display screen.

Resets:

Soft Reset: Press and hold the Up and Down buttons for 25 seconds until 12:00PM (or 12:00HR) appears. This resets all parameters except for the flow meter totalizer volume.

Master Reset: Hold the Extra Cycle button while powering up the unit. This resets all of the parameters in the unit. Check and verify the choices selected in Master Programming Mode.

1. Choice of Language

This option selects the language for programming and display.

1. Use Up or Down to select language.
2. Press the Extra Cycle button.



```
SELECT LANGUAGE
ENGLISH
```

2. System Type

This program type selects the system type (4, 5, 6, 7, or 9).

1. Use Up or Down buttons to adjust this value.
2. Press the Extra Cycle button.



```
SYSTEM TYPE: 4
SINGLE UNIT
```

3. Valve Address

This program step selects the valve address (1, 2, 3, or 4) within the network needed for each timer for communication. The #1 is the “master” or “lead” which contains programmed parameters, that will be used by all of the timer(s) in the network to control Regeneration, in Service, or Standby of all the valve(s) in the system.

1. Use Up or Down buttons to adjust this value.
2. Press the Extra Cycle button.



```
VALVE ADDRESS:
# 2
```

CAUTION: Before entering Master Programming, please contact your local professional water dealer.

MASTER PROGRAMMING GUIDE

4. System Type

This program step is used to set up the number of valves (1, 2, 3, or 4) in the system.

1. Use Up or Down buttons to adjust this value.
2. Press the Extra Cycle button.

```
SYSTEM SIZE:  
      2 VALVES
```

5. Regeneration Type

This program step is used to set up the trigger type.

1. Use Up or Down buttons to adjust this value.
2. Press the Extra Cycle button.

```
REGEN TYPE:  
TIME CLK DELAYED
```

6. Valve Type

This program step selects the valve type (2750, 2850, 2900s, 3150, 3900, Stager-Butterfly, or Stager-Notch Cam)

1. Use Up or Down buttons to adjust this value.
2. Press the Extra Cycle button.

```
VALUE TYPE:  
      2750
```

7. Regenerant Flow

This program step selects the regenerant flow type (Downflow, Upflow, or Upflow Fill First)

1. Use Up or Down buttons to adjust this value.
2. Press the Extra Cycle button.

```
REGENERANT FLOW:  
      DOWN FLOW
```

8. Remote Signal Start

This program step selects the remote signal start. Hours, minutes, and seconds can be changed. When Remote Signal Start is active, the main screen will display. The options are either Off or set to the desired time.

1. Use Up or Down buttons to adjust this value.
2. Press the Extra Cycle button.

```
REMOTE SIGNAL  
START: 00:00:00
```

```
5#1 SRV* 05:38PM  
SIGNAL 00:06:00
```

Example: Remote Signal Start set to 6 minutes.
If the Signal is detected continuously for 6 minutes, the display will count down to 0 and it will remotely start.

MASTER PROGRAMMING GUIDE**9. Display Format**

This program step is used to set the desired volume display format. This option must be the same on all system units. U.S. will display volumes in gallons and is in 12 hour timekeeping. Metric will display volumes in liters and is in 24 hour timekeeping.

1. Use Up or Down buttons to adjust this value.
2. Press the Extra Cycle button.

```
DISPLAY FORMAT:  
US-GALLONS
```

10. Unit Capacity

This program selects the individual timer's total capacity of hardness that can be removed. The unit capacity is measured in grains if in U.S. mode and degrees in Metric mode.

U.S. Range: 9,000 to 9,900,000 Grains (Default = 300,000 Grains)

Metric Range: 90.0 to 199,000.0 grams CaCO₃ (Default = 300.0 grams CaCO₃)

1. Use the Shift button to select the digit you want to modify.
2. Use Up or Down buttons to adjust this value.
3. Press the Extra Cycle button.

```
UNIT CAPACITY:  
300000 GRAINS
```

11. Capacity Safety Factor

This program step is used to adjust the capacity of the system. This is a percentage by which the unit's capacity is reduced.

Range: 0 – 50% (Default = 0%)

1. Use the Shift button to select the digit you want to modify.
2. Use Up or Down buttons to adjust this value.
3. Press the Extra Cycle button.

```
CAPACITY SAFETY  
FACTOR: 00%
```

12. Feed Water (Hardness)

This program step is used to set the feed water hardness. The system will automatically calculate volume remaining based on the Unit Capacity, Capacity Safety Factor and Feed Water Hardness entered.

U.S. Range: 1 – 199 gpg (Grains per Gallon)(Default = 15)

Metric Range: 2 – 199 grams CaCO₃/Liter (Default = 30)

1. Use the Shift button to select the digit you want to modify.
2. Use Up or Down buttons to adjust this value.
3. Press the Extra Cycle button.

```
FEED WATER  
HARDNESS: 015 GPG
```



MASTER PROGRAMMING GUIDE

13. Regeneration Day Override

This program step sets the maximum amount of time (in days) the unit can be In Service without a Regeneration.

U.S. Range: 1 – 199 gpg (Grains per Gallon)(Default = 15)

Metric Range: 2 – 199 Degrees (Default = 30)

1. Use the Shift button to select the digit you want to modify.
2. Use Up or Down buttons to adjust this value.
3. Press the Extra Cycle button.

```
REGENERATION DAY
OVERRIDE: OFF
```

```
REGENERATION DAY
OVERRIDE: 01 DAYS
```

14. Regeneration Time

This program step sets time of day for a delayed regeneration to occur, or regeneration day override.

Default U.S.: 02:00 AM

Default Metric: 02:00 HR

1. Use the Shift button to select the digit you want to modify.
2. Use Up or Down buttons to adjust this value.
3. Press the Extra Cycle button.

```
REGENERATION
TIME: 02:00AM
```

15. Regeneration Cycle Steps

This program step programs the Regeneration Cycle step times 1 through 5. Please refer to the chart below for regenerant flow default cycle steps and times.

Regenerant Flow	Cycle 1	Time	Cycle 2	Time	Cycle 3	Time	Cycle 4	Time	Cycle 5	Time
Down Flow	Back Wash	10 Minutes	Brine & Slow Rinse	1 Hour	Rapid Rinse	10 Minutes	Brine Tank Fill	12 Minutes	Pause	N/A

16. Auxiliary Relay Output

The next two displays are part of a series of settings used to program the optional relay output. The first setting turns the output on/off during Regeneration only. The second turns the output on during Service only, every time a set volume of water used has accumulated.

```
AUXILIARY RELAY:
ENABLED
```

17. Timed Auxiliary Relay Output Window (Start & End Time Setting, If Auxiliary Relay is Enabled)

This option setting consists of two displays. The first display sets the turn-on time of the output, referenced to the start of the first Regeneration Cycle. The second display sets the output turn-off time, referenced again to the start of first Regeneration Cycle.

Start Time: Anytime During Regeneration (Except Last Minute of the Regeneration Time)

End Time: At start time, and anytime during the regeneration cycle.

```
AUX RELAY OUTPUT
START 00:00:00
```

```
AUX RELAY OUTPUT
END 00:00:00
```

MASTER PROGRAMMING GUIDE

18. Chemical Pump Auxiliary Relay Output Window

This option setting consists of two displays. The first display sets the volume of water flow at which the output turns on. The second display sets the time of the output.

U.S. Range: 0 – 999 Gallons (1 – 999 Seconds)

Metric Range: 0.00 – 9.99 m³ (1 – 999 Seconds)

Activate Output After Volume Set is Reached.

Use the Shift button to move one space to the left for each number entered.

Use Up or Down buttons to adjust this value.

Press the Extra Cycle button.

```
CHEMICAL PUMP:
      ENABLED
```

```
CPO AUX RELAY
VOLUME:   000  g
```

```
CPO AUX RELAY
TIME:     00:00:00
```

19. Fleck Flow Meter Size (Default to Valve Type)

This program step sets the size of the Fleck flow meter.

- 1.0" Paddle (2750 Default)
- 1.5" Paddle (2850/2900 Default)
- 2.0" Paddle (3150 Default)
- 3.0" Paddle (3900 Default)
- 1.0" Turbine
- 1.5" Turbine
- Generic Flow Meter (Non Fleck Brand)

1. Use Up or Down buttons to adjust this value.

2. Press the Extra Cycle button.

```
FLOW METER:
      .75 PADDLE
```

**OPTIONS FOR GENERIC FLOW METER SETTINGS (Non-Fleck Brand)
K-FACTOR TABLE**

PIPE SIZE (in)	SIGNET 2536 FLOW SENSOR SETTINGS				CLACK METER (in)	MAX FLOW RATE (gpm)	K-FACTOR (Pulses per Gallon)
	MAX FLOW RATE (gpm)	GALVANIZED TEE FITTING	PVC TEE FITTING	IRON SADDLE FITTING			
1	49	213	352		1-1/2	75	37
1-1/4	76	128	177		2	150	20
1-1/2	110	94	118		3	350	8
2	195	59	67	54	AUTOTROL METER		
2-1/2	306		43	38	(in)	(gpm)	(Pulses per Gallon)
3	440		27	23	1	25	65
					2	255	15

20. Maximum Flow Rate

This program step sets maximum flow rate of the generic flow meter.

1. Press the Shift button to select the digit you want to modify.
2. Press the Up or Down buttons to adjust this value.
3. Press the Extra Cycle button.

```
MAXIMUM FLOW
RATE:   0000  gpm
```

CAUTION: Before entering Master Programming, please contact your local professional water dealer.

MASTER PROGRAMMING GUIDE**21. Pulses per Gallon/Liter**

This program step sets the pulses per gallon/liter for generic flow meters.

1. Press the Shift button to select the digit you want to modify.
2. Press the Up or Down buttons to adjust this value.
3. Press the Extra Cycle button.

```
ADD 01 GALLONS  
EVERY 001 PULSES
```

22. End of Master Programming Mode

```
PROGRAMMING UNIT  
PLEASE WAIT...
```

CAUTION: Before entering Master Programming, please contact your local professional water dealer.

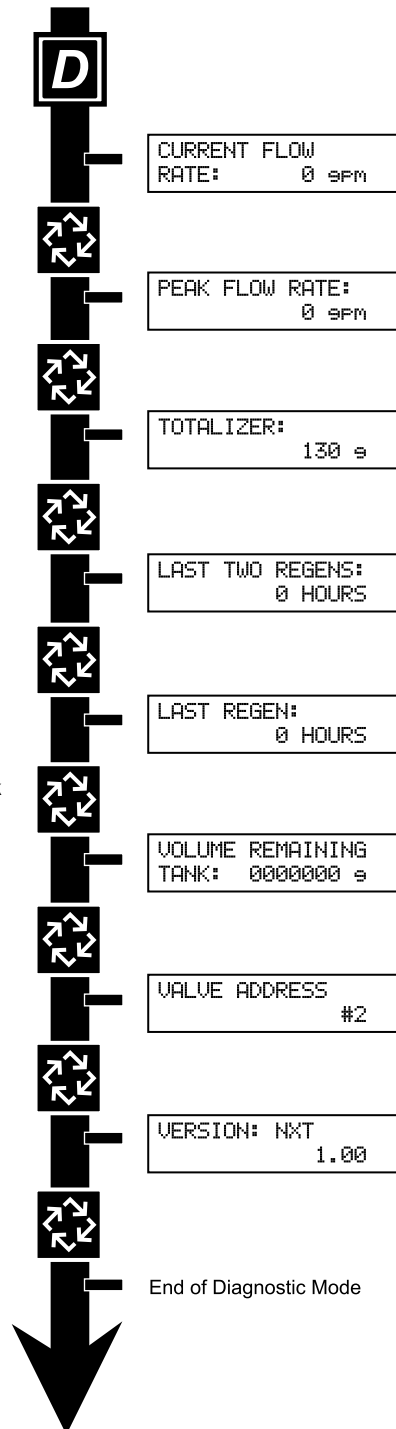


DIAGNOSTIC MODE FLOW CHART

Entering Diagnostic Mode:

1. Push and release the “D” button.
2. Press the Extra Cycle button once per display until all displays are viewed and Normal Display is resumed.
3. Push and release the “D” button at anytime during diagnostic mode and the timer will exit the mode.
4. Depending on current valve programming, certain displays may not be able to be viewed or set.

NOTE: If a System 6, Unit#1 of “Tank Remaining” will display “System Remaining”).



DIAGNOSTIC PROGRAMMING GUIDE

When the Diagnostics Mode is entered, all available displays are viewed as needed. Depending on current option settings, some displays cannot be viewed.

Overview Diagnostic Mode

The current diagnostic will be displayed until Extra Cycle key is pressed. There is no time limit on each display. The timer will display individual valve information, not system information. In the event of regeneration occurring while displaying diagnostics, the regeneration step and time remaining will be displayed. When regeneration has been completed, the display will return to the normal Time of Day display.

Overview Diagnostic Mode

Push and Release the “D” button to enter. Pressing the Extra Cycle button will move to the next diagnostic to be displayed. Push the Extra Cycle button once per display until all are viewed. Pressing the Diagnostic button, while in the Diagnostic Mode, will cause the unit to leave the Diagnostic Mode and return to the normal time of day display.

Current Flow Rate

Flow Rate for this particular Timer will be calculated and displayed. Flow rates will be calculated every second. The display updates once per second. Flow rates are dependent upon the meter used.

- **1” Paddle Meter Maximum Flow Rate:** 75 gpm (.28 m3/m)
- **1.5” Paddle Meter Maximum Flow Rate:** 90 gpm (.34 m3/m)
- **2” Paddle Meter Maximum Flow Rate:** 175 gpm (.66 m3/m)
- **3” Paddle Meter Maximum Flow Rate:** 350 gpm (1.32 m3/m)
- **1” and 1.5” Turbine Meter:** 75 gpm

1. Press the Extra Cycle button.



```
CURRENT FLOW
RATE:      0 GPM
```

Peak Flow Rate

The Peak Flow Rate since the last regeneration will be captured.

- **Range:** 0 to Maximum Number

1. Press the Extra Cycle button.



```
PEAK FLOW RATE:
              0 GPM
```

Totalizer

The total volume of treated water that passes through a meter will be counted.

NOTE: The user cannot edit below the current volume remaining.

1. Reset to zero by holding the Up and Down arrow keys for 5 seconds during the Totalizer display.
2. Press the Extra Cycle button.



```
TOTALIZER:
          00000000 g
```

Hours Between Last Two Regenerations

The hours between the last two regenerations will be saved and displayed.

1. Depress the Extra Cycle button.



```
LAST TWO REGENS:
              0000 HOURS
```


DIAGNOSTIC PROGRAMMING GUIDE

Hours Since Last Regeneration

The hours since the last regeneration will be saved and displayed.

1. Depress the Extra Cycle button.

```
LAST REGEN:  
0000 HOURS
```

Volume Remaining (This Tank Only)

Volume remaining in the current tank will be adjustable when displayed in this mode. Regeneration will occur if set to zero.

NOTE: Volume Remaining will not display for System Type 6.

The maximum ranges are the same as the maximum volume calculated on the main screen.

1. Press the Shift button to select the digit you want to modify.
2. Use Up or Down buttons is used to adjust this value.
3. Depress the Extra Cycle button

```
VOLUME REMAINING  
TANK: 0000000 9
```

Volume Remaining (System)

Volume remaining in the system cannot be edited when displayed in this mode, except for the Lead unit. It can only be viewed on the Lag unit.

1. Depress the Extra Cycle button

```
VOLUME REMAINING  
SYS: 000000000 9
```

Valve Address

This diagnostic display is for 2 control valves or more in a system (a single valve will not display).

1. Depress the Extra Cycle button.

```
VALUE ADDRESS:  
# 2
```

Software Version

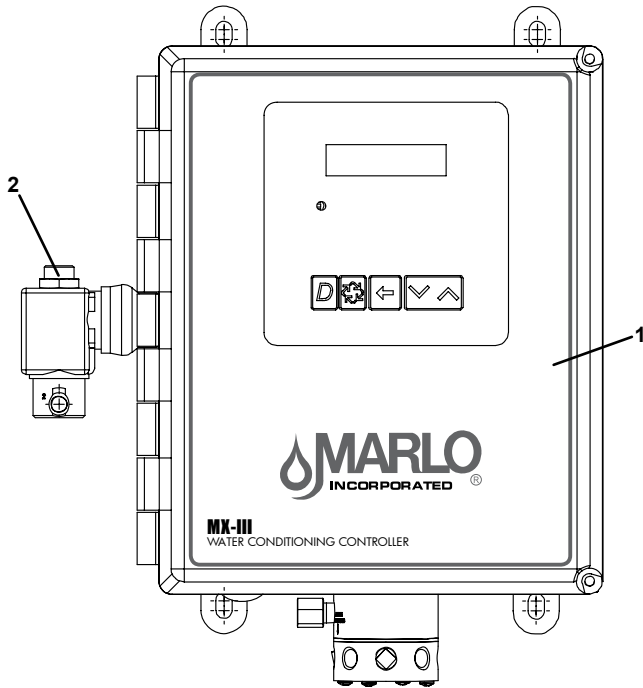
The electronic timer's software program version number will be displayed.

1. Depress the Extra Cycle button to exit.

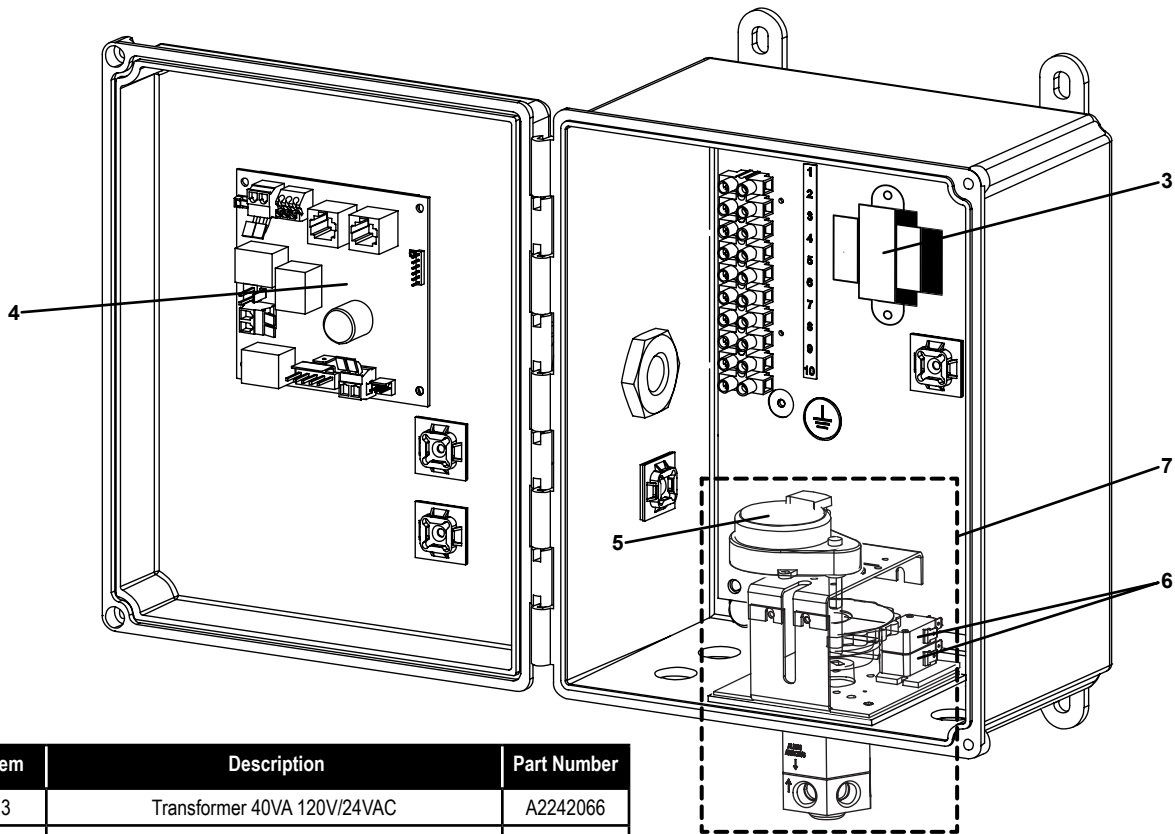
```
VERSION: NXT  
1.00
```

NOTE: Diagnostic Mode programming will stop if the system goes into regeneration.

MX-III CONTROLLER REPLACEMENT PARTS



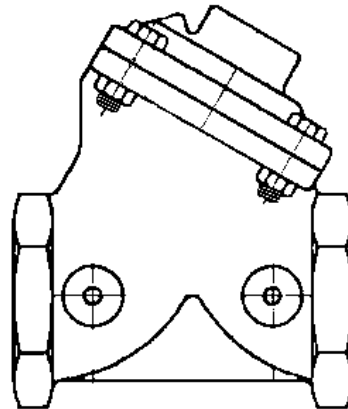
Item	Description	Part Number
1	MX-III Complete Controller for Single or Twin - Unit 1	B1046051
1	MX-III Complete Controller for Twin or Triple - Unit 2	B1046052
1	MX-III Complete Controller for Triple - Unit 3	B1046053
2	Valve Solenoid - Complete Assembly - NEMA 1 NXT	A2221072



Item	Description	Part Number
3	Transformer 40VA 120V/24VAC	A2242066
4	Timer Assembly 3200 NXT (Circuit Board)	A2084073
5	Motor Stager 24/60	A2085052
6	Microswitch Valve / Stager RO Lockout	A2154001
7	Complete Stager Assembly 24V	A2155112
no pic	CAT-5 Ethernet Communication Cable (not pictured)	A2090041

AQUAMATIC VALVES - SERIES 420

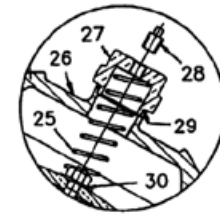
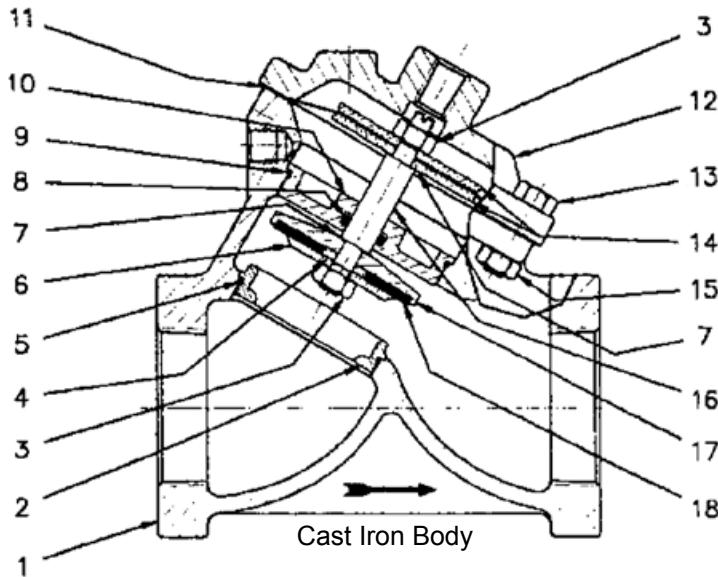
**COMPLETE VALVE ASSEMBLY
CAST IRON BODY
PAINTED EXTERIOR - SAFETY BLUE**



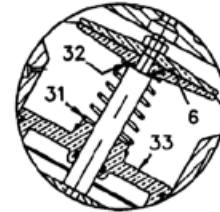
Working Pressure:	Class 125
Operating Temperature:	150° F (max.)
Seal Material:	BUNA-N

DIAPHRAGM VALVES		PART NUMBER			
Pipe Size	Valve Service	Normally Open	Normally Closed	N.O. Spring Assist Open	N.O. Spring Assist Closed
3/4"	421	A2010001B	A2009001B	A2007001B	A2008001B
1"	421	A2010002B	A2009002B	A2007002B	A2008002B
1-1/4"	424	A2010003B	A2009003B	A2007003B	A2008003B
1-1/2"	424	A2010004B	A2009004B	A2007004B	A2008004B
2"	425	A2010005B	A2009005B	A2007005B	A2008005B
2-1/2"	426	A2010007B	A2009007B	A2007007B	NA
3"	427	A2010008B	A2009026B	A2007008B	NA
3" FLGD	427	A2010009B	A2009008B	A2007009B	NA
4" FLGD	428	A2010010B	A2009010B	A2007014B	A2008010B
6" FLGD	429	A2010011B	NA	NA	NA

AQUAMATIC REPAIR KITS



Spring Assist Closed



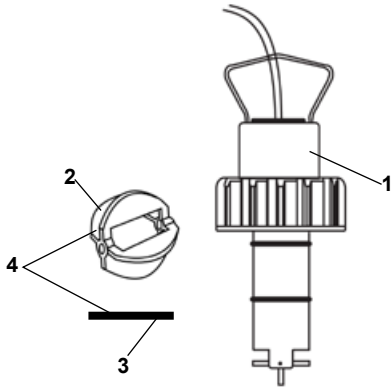
Spring Assist Open

- RA - Diaphragm & Seal Kits - Includes Buna N Seals and Diaphragm (Items 3(2),5,6,8(2),9,14&7)
- RF - Metal Parts Kit (Normally Open) - (Items 4,7,10,11(2), 17)
- RG - Metal Parts Kit (Normally Closed) - (Items 4,7,10,11(2), 23)
- SC - Repair Kit (Spring Assist Closed) - (Items 24,27,28)
- SO - Repair Kit (Spring Assist Open) - (Items 8,31,32)
- GT - Tool - To Install & Remove O-Ring Retainer (Not Shown)

Pipe Size	Valve Series	REPAIR KITS						SHAFTS (ITEM 16)	
		RA Type	RF Type	RG Type	SC Type	SO Type	GT Tool	Normally Open	Normally Closed
3/4"	421	A2089028	A2089071	A2089078	A2089085	A2089092	A2089098	A2137001	A2137008
1"	421	A2089028	A2089071	A2089078	A2089085	A2089092	A2089098	A2137001	A2137008
1-1/4"	424	A2089029	A2089072	A2089079	A2089086	A2089093	A2089098	A2137002	A2137009
1-1/2"	424	A2089029	A2089072	A2089079	A2089086	A2089093	A2089099	A2137002	A2137009
2"	425	A2089030	A2089073	A2089080	A2089087	A2089094	N/A	A2137003	A2137010
2-1/2"	426	A2089031	A2089074	A2089081	A2089088	A2089095	N/A	A2137004	A2137011
3"	427	A2089032	A2089075	A2089082	A2089089	A2089096	N/A	A2137005	A2137012
3 FLGD	427	A2089032	A2089075	A2089082	A2089089	A2089096	N/A	A2137005	A2137012
4 FLGD	428	A2089033	A2089076	A2089083	A2089090	A2089097	N/A	A2137006	A2137013
6 FLGD	429	A2089034	A2089077	A2089084	A2089091	N/A	N/A	A2137007	A2137014

2536 FLOW SENSOR AND FITTINGS

2536 GF SIGNET FLOW SENSOR



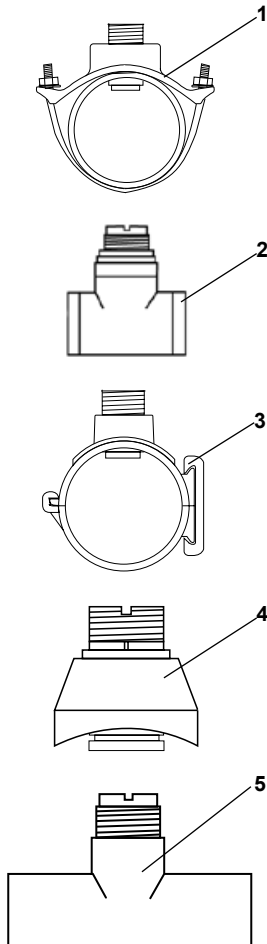
Item	Description	Part Number
1	Complete 2536 Flow Sensor	A2296001
2	Replacement Paddle / Rotor	A2456004
3	Pin	A2098027
4	Replacement Paddle Rotor & Pin	B1175025

K-FACTOR TABLE - SIGNET 2536

(Pulses per Gallon)

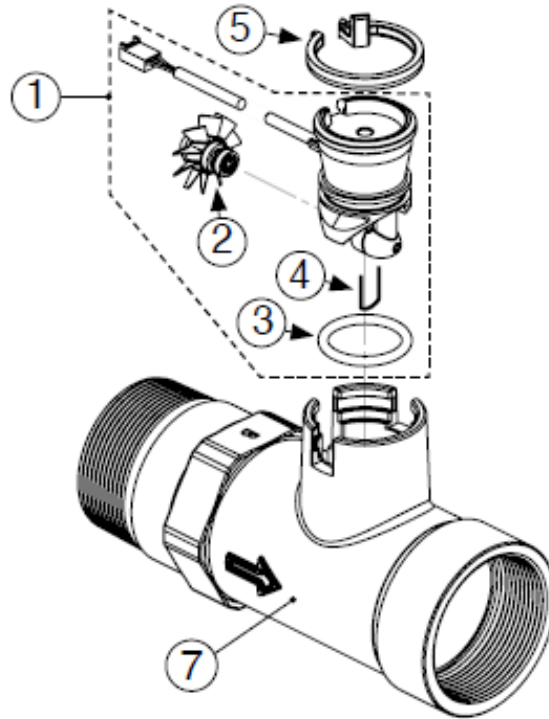
PIPE SIZE (inches)	GENERIC FLOW METER SETTINGS				
	MAX FLOW RATE (gpm)	TEE GALVANIZED	TEE PVC	SADDLE IRON	SADDLE PVC
1	49	213.01	352.44		
1-1/4	76	127.75	177.18		
1-1/2	110	94.40	117.85		
2	195	59.42	66.74	53.64	66.74
2-1/2	306			37.60	42.99
3	440			23.22	26.65
4	783			13.26	15.00
6	1762			11.04	8.32

2536 GF SIGNET FLOW SENSOR FITTINGS



Item	Description	Part Number
1	2" Iron Strap-on Saddle	A2295014
	2-1/2" Iron Strap-on Saddle	A2295001
	3" Iron Strap-on Saddle	A2295002
	4" Iron Strap-on Saddle	A2295003
	6" Iron Strap-on Saddle	A2295005
2	1" Galvanized Iron Threaded Tee NPT	A2294012
	1-1/4" Galvanized Iron Threaded Tee NPT	A2294002
	1-1/2" Galvanized Iron Threaded Tee NPT	A2294003
	2" Galvanized Iron Threaded Tee NPT	A2294004
3	2" PVC Saddle	A2295026
	2-1/2" PVC Saddle	A2295009
	3" PVC Saddle	A2295010
	4" PVC Saddle	A2295011
	6" PVC Saddle	A2295012
4	2-1/2" Weldolet	A2579002
5	1" Copper Tee Sweat	A2569004
	1-1/2" Copper Tee Sweat	A2569009
	2" Copper Tee Sweat	A2294009

CLACK STAINLESS STEEL TURBINE METER ASSEMBLIES



K-FACTOR TABLE
(pulses per gallon)

METER SIZE	K-FACTOR
1-1/2"	37
2"	20
3"	8

ITEM NUMBER	PART NUMBER	DESCRIPTION	CLACK NO
	A2360069	1-1/2" METER COMPLETE, 15' CABLE	V3040-15
	A2426203	2" METER COMPLETE, 15' CABLE	V3094-15
	A2360072	3" METER COMPLETE, 15' CABLE	V3095-15
1	A2360061	REMOTE METER ASSY 15' CORD (incl. 2, 3 & 4)	V3221
2	A2100029	TURBINE ASSEMBLY	V3118-03
3	A2077178	O-RING -215	V3105
4		TURBINE CLIP	V3501
5	A2411021	METER RETAINING CLIP	V3632
7		WS1.5 METER HOUSING NPT	V3401-04
7		WS2 METER HOUSING NPT	V3754-01
7		WS3 METER HOUSING NPT	V3844-01
Not Shown	A2503006	WS1.5 FLOW STRAIGHTENER	V3437
Not Shown		WS2 FLOW STRAIGHTENER	V3488
Not Shown		WS3 FLOW STRAIGHTENER	V3602

NOTES:

- 1) When installing the meter, make sure the arrow on the meter body is going in the same direction as the water flow.
- 2) This water meter should not be used as the primary monitoring device for critical or health effect applications.
- 3) Operating Pressures: 20-125 psi. Operating Temperatures: 40-110°F.
- 4) Meter can be installed in either horizontal or vertical applications.

ERROR CODES

If a communication error is detected, an Error Screen will alternate with the main (time of day) screen every few seconds.

- All units In Service remain in the In Service position.
- All units in Standby go to In Service.
- Any unit in Regeneration when the error occurs completes Regeneration and goes to In Service.
- No units are allowed to start a Regeneration Cycle while the error condition exists, unless they are manually forced into Regeneration.
- When an error is corrected and the error no longer displays (it may take several seconds for all of the units in a system to stop displaying the error message), the system returns to normal operation.

NOTE: During the error condition the control continues to monitor the flow meter and update the volume remaining. Once the error condition is corrected all units return to the operating status they were in prior to the error. Regeneration queue is rebuilt according to the normal system operation. Or, if more than one unit has been queued for regeneration, then the queue is rebuilt according to which one communicates first.

ERROR MESSAGE	CAUSE FOR ERROR	CORRECTION
Flashing Time	Power outage.	Program time by holding UP on Unit #1.
Detected Error = Matching Address	Two or more units programmed with the same valve address number	Program each unit with unique valve address number in Master Programming.
Detected Error = Program Mismatch	Master program parameters do not match between two or more controls.	Confirm Master Programming for each unit.
Detected Error = No Message #1	No power to Control #1.	Power Control #1..
	Communication Cable to Valve Address #1 bad or missing.	Connect or replace Communication Cable.
Detected Error = No Message #2	No power to Control #2.	Power Control #2.
	Communication Cable to Valve Address #2 bad or missing.	Connect or replace Communication Cable.
Detected Error = No Message #3	No power to Control #3.	Power Control #3
	Communication Cable to Valve Address #3 bad or missing.	Connect or replace Communication Cable.
Detected Error = No Message #4	No power to Control #4.	Power Control #4.
	Communication Cable to Valve Address #4 bad or missing.	Connect or replace Communication Cable.
Detected Error = E2 Reset Unit	This message appears after a software reset.	Reprogram control using Master Programming section.
Test Mode	Circuit Board was not programmed at factory.	Replace Circuit Board.
Black Squares on screen	Bad Circuit Board.	Replace Circuit Board.
INI on screen for more than 2 minutes	Circuit board not getting feedback from cycle switch.	Inspect Motor - should be rotating.
		Wire Harness disconnected.
		Check Cycle Micro Switch.
CHG on screen for more than 2 minutes	Control programmed incorrectly as 2900 or 3900 valve type.	Reprogram unit as Stager Valve type.

TROUBLESHOOTING

DETECTED ERRORS

NOTE: It can take up to 30 seconds for an error to be detected and displayed. All errors on each timer in the system must be displayed before the errors can be corrected.

If a communication error is detected, an Error Screen will alternate with the main (time of day) screen every few seconds.

- All units In Service remain in the In Service position.
- All units in Standby go to In Service.
- Any unit in Regeneration when the error occurs completes Regeneration and goes to In Service.
- No units are allowed to start a Regeneration Cycle while the error condition exists, unless they are manually forced into Regeneration.
- When an error is corrected and the error no longer displays (it may take several seconds for all of the units in a system to stop displaying the error message), the system returns to normal operation.

NOTE: During the error condition the control continues to monitor the flow meter and update the volume remaining. Once the error condition is corrected all units return to the operating status they were in prior to the error. Regeneration queue is rebuilt according to the normal system operation. Or, if more than one unit has been queued for regeneration, then the queue is rebuilt according to which one communicates first.

CAUSE	CORRECTION
A. One or more units have a missing or bad communication cable.	A. Connect the communication cables and/or replace.
B. One or more units has a communication cable plugged into the wrong receptacle.	B. Connect the communication cable as shown in the wiring diagrams.
C. One or more units is not powered.	C. Power all units.

PROGRAMMING ERRORS

During the error condition the control continues to monitor the flow meter and update the remaining capacity. Once the error condition is corrected all units return to the operating status they were in prior to the error and regeneration is queued according to the normal system operation. If reprogramming the unit in the Master Programming Mode clearS the error, the volume remaining may be reset to the full unit capacity (i.e. as though it were just regenerated).

1. All units in standby go In Service.
2. Any unit in regeneration when the error occurs completes regeneration and goes to In Service.
3. No units are allowed to start a regeneration cycle while the error condition exists.

When the problem is corrected and the error no longer displays (it may take several seconds for all of the units in a system to stop displaying the error message), the system returns to normal operation.

Programming Errors Detected:

- Duplicate unit addresses or numbers
- Size of system (ex: if sized for a 4 units, and only have 2 units)
- Display format mismatches

Solution:

- Program the units correctly in the Master Programming Mode.

NOTE:

If these errors are detected, numbers 1 through 3 become true, and the main screen (time of day) will alternate with an error screen.

TROUBLESHOOTING CONTROLLER

CAUSE	CORRECTION
A. Any or all of two or more units programmed with the same unit number (Matching Address Error)	A. Connect the communication cables and/or replace.
B. Flashing/blinking display.	B. Power outage has occurred.
C. Format Mismatch (Units have both U.S. and Metric Formats)	C. Verify all units have same Format selected (all U.S. or all Metric)
D. No messages displayed/small black squares appear in display	D. Turn the contrast button on the back of unit until text appears (see "Problems Viewing Display/Changing Contrast of Display" below)
E. Size Error (Units not correctly numbered/more than one unit has the same number assigned)	E. Check each unit and verify each as the correct number, and that only one unit has that number
F. Com Error (Communication Error)	F. Check the wiring of the system and verify it is correct and that all are connected

EXAMPLE ERROR SCREENS

DETECTED ERROR=
E2 RESET UNIT

Detected Error

1. Go through Master Programming to program the unit.

DETECTED ERROR=
NO MESSAGE #1

No Message #1

1. Make sure all communication cables are connected.
2. If "No Message #1" ensure it is the lead unit.
3. Ensure #1 is configured for the correct system type.

DETECTED ERROR=
NO MESSAGE #3

No Message #3

1. Make sure all communication cables are connected.
2. If "No Message #3" ensure it is unit #3.
3. Ensure #3 is configured for the correct system type.

DETECTED ERROR=
PROGRAM MISMATCH

Program Mismatch

1. Ensure the units on the network are not configured the same as #1/the Lead unit.

DETECTED ERROR=
EXCEED UNIT SIZE

Exceed Unit Size

1. There are more units on the system than the Lead is programmed for.

DETECTED ERROR=
MATCHING ADDRESS

Matching Address

1. The unit is programmed the same # as another unit.

NOTE: The rest of the system will still function without this unit.

TROUBLESHOOTING SOFTENER

PROBLEM/SYMP TOM	PROCEDURE	POSSIBLE CAUSE
1. Slight leak to drain.	A. Disconnect tubing at backwash control	A. Flow indicates leaky seal in stager valve.
	B. If stager is not leaking, use soap test kit and check hardness of water at drain.	B. If water tests soft, Valve #6 is leaking: If water tests hard, Valve #3. See Problem 5
2. High flow to drain during service.	A. Check position dial.	A. If not in position #4, rotate stager clockwise to this position.
	B. If position dial is in #4, check for water leakage from Valve #3 or Valve #6 vent holes.	B. Leakage indicates: 1. Ruptured diaphragm 2. Loose diaphragm nut
3. Slight leak from vent hole.	A. Turn position dial clockwise to a position, which relieves pressure on valve.	A. If leaking stops, there is possibly a loose diaphragm nut, a small Tear in diaphragm, or the washer under diaphragm is missing. If leaking does not stop, shaft guide O-ring is damaged, shaft guide is not seated against gasket, or shaft is damaged.
4. Diaphragm valve does not close or seat completely.	A. Check that vent hole is not plugged.	A. If vent hole is plugged, air in space between diaphragm and shaft guide will compress and prevent valve from closing.
	B. Check for water leak at vent hole.	B. See Problem #4
	C. Loosen tubing nut at diaphragm cap.	C. If there is no flow, pilot strainer may be plugged.
	D. Turn off water pressure and disassemble diaphragm valve.	D. Seat washer may be dirty, worn or loose. Seat may be eroded.
5. Diaphragm valve does not open.	A. Check that vent hole is not plugged.	A. If vent hole is plugged, a partial vacuum will be created in the space between the diaphragm and shaft guide, preventing valve from opening.
	B. Loosen tubing nut at diaphragm cap.	B. Check for flow 1. If there is flow, stager valve is leaking. 2. If there is no flow, tubing fitting may be plugged.

TROUBLESHOOTING SOFTENER

PROBLEM/SYMP TOM	PROCEDURE	POSSIBLE CAUSE
6. Raw water leakage into service lines.	A. Close inlet and outlet valves and inspect by-pass valve.	A. Examine valve 1. Seat washer may be loose or worn. 2. Seat may be rough. 3. Shaft orifice plugged. 4. Diaphragm ruptured.
	B. Check that Valve #4 is seating.	B. See Problem 5.
7. Restricted or no drain flow during backwash.	A. Either Valve#1 or Valve#2 is not opening fully. To determine which one: Turn position dial to position #1 and then to position #3. Compare flow at drain.	A. Flow should be the same for both positions. 1. If no difference is noted, valve #4 is not opening properly. 2. If backwash flow is higher, valve #1 is not opening properly. See problem #7.
	B. Turn position dial to position #1 and then position #3. Compare flow at drain.	B. Flow should be the same. If flow for position also is low. 1. Inlet water pressure may be low. 2. Backwash flow control may be plugged. 3. If position #3 flow rate is higher, either valve #4 or valve #3 is not opening. See problem #7.
8. Loss of filter media (evidence of filter media in drain lines).	A. Open vent in top of filter tank and check for air in tank.	A. If air is present 1. Vent completely and recheck prior to next regeneration. 2. The source of air may be in the water supply to unit. Use of an automatic air relief valve is indicated in this situation (consult factory for recommendation).
	B. Check automatic backwash control valve for rate of flow in excess of listed flow (gpm)	B. Check for excessive inlet water supply pressures– reduce to rated pressure.
9. Loss of filter media (evidence of filter media and/or gravel in service lines).	A. Check for damage to filter under-drain system.	A. Investigation of damage to under-drain generally requires unloading of filter tank. Consult factory for recommended procedures before proceeding.



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