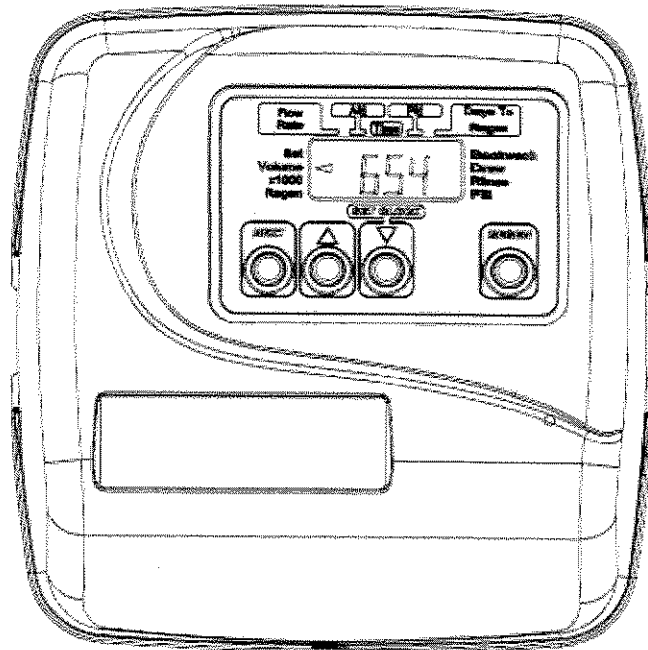


WATER TENDER®

Quality Water Treatment Products



WTCTT Twin Alternating Series Water Softeners

Installation and Operation Manual

May 2015

Table of Contents

Model Number.....	1
Shipping Description / Unit.....	1
Softener Positioning.....	1
WTCTT Control Valve.....	2-3
Service and Drain Piping.....	4
Schematic.....	5
Electrical Supply.....	5
Brine Tank.....	5-6
Filling Softener with Water.....	6-7
WTCTT Control Valve Timer Settings.....	7-8
Final Check.....	8-9
Bypass.....	10
Troubleshooting.....	11-14
Error Code Troubleshooting.....	15
WTCTT Valve Parts List and Schematics.....	16-19
Warranty.....	20

Figures

1 – Installation Diagram.....	5
-------------------------------	---

**Installation and Operating Instructions for WTCTT
Top Mount Twin Alternating Water Softeners**

Model #:

_____	WTC320TT	32,000 grain softener
_____	WTC480TT	48,000 grain softener
_____	WTC640TT	64,000 grain softener

Shipping Carton Description / unit:

# of cartons	Contents	Description
2	Mineral tank	Distributor pipe installed
1	Brine tank	Brine tubing, brine well, brine shutoff valve, overflow fittings installed.
1	WTCTT control valve	WTCTT control valve and bypass
	C-800	Pre-loaded @ factory

Filter Media is Packaged as Follows:

Model #	C-800 Cation Resin
WTC320	1.0 CF*
WTC480	1.5 CF*
WTC640	2.0 CF*

*Already installed at the factory

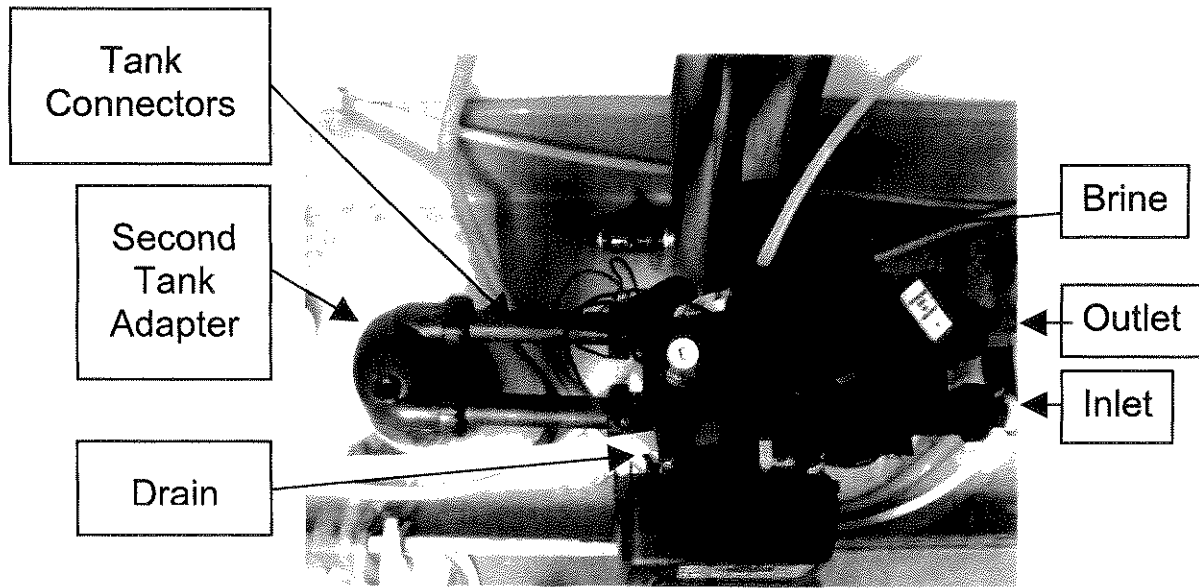
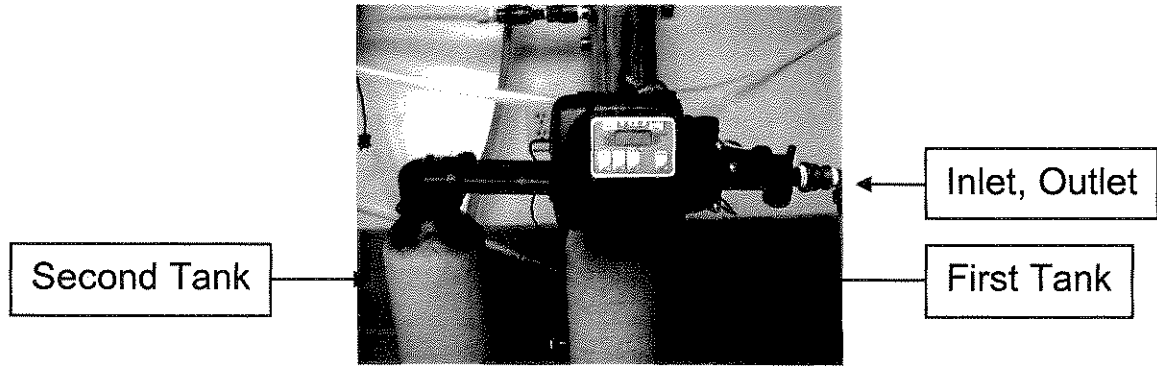
NOTE: THIS SOFTENER IS NOT INTENDED TO BE USED FOR TREATING WATER THAT IS MICROBIOLOGICALLY UNSAFE OR OF UNKNOWN QUALITY WITHOUT ADEQUATE DISINFECTION WHETHER BEFORE OR AFTER THE SYSTEM.

Water Softener Positioning:

1. Place water softener in desired position, far enough from walls and other obstructions to allow for servicing the unit.
2. Place the water softener within reasonable access to a grounded 115V/60 HZ circuit and a legal drain line connection.

WTCTT Control Valve:

1. When facing the front of the WTCTT timer, the inlet connection is located on the front right and the outlet connection is on the back right. The control valve's inlet and outlet connections are either 1" copper or PVC equipped with split ring and nut.



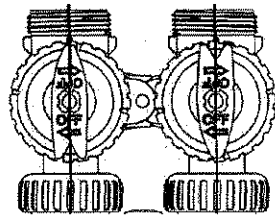
TOP VIEW

2. Turn the control valve and the second tank adaptor upside down and ensure that the distributor o'rings are in place. Use silicone lubricant on the o'rings.

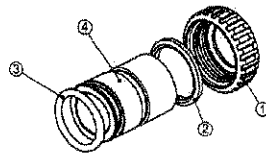
****DO NOT USE PETROLEUM!****

****USE ONLY SILICONE ****

3. Place the control valve onto the distributor pipe and into the first tank opening.
4. Thread the control valve hand tight. Do not overtighten.
5. Place the second tank adaptor onto the distributor pipe and into the second tank opening.
6. Thread the adaptor hand tight. Do not overtighten.
7. Connect the two connectors between the valve and the second tank adaptor. Hand tighten only.
8. Locate the bypass valve assembly that is packaged with the control valve. The bypass valve has two red handles that indicate flow direction, two threaded connections for the tail piece kit, and two o'ring seal connections with nuts for the control valve. Align the insert connection ends with o'ring seals and nuts to the inlet and outlet connections of the control valve. Hand tighten the nuts. **DO NOT OVERTIGHTEN THE NUT!**



Bypass Valve

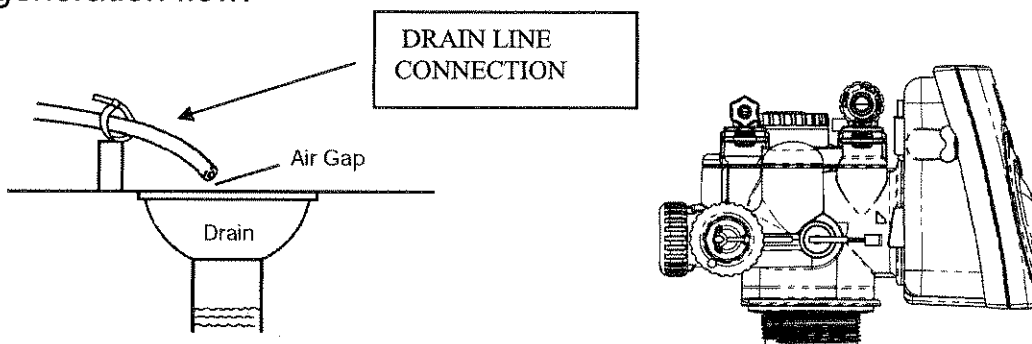


Tail piece assembly

9. Locate the tail piece kit that is packaged with the control valve. The standard tail piece kit is 1" copper with optional 1" or 3/4" PVC, or 3/4" copper kits available as a special order. Each tail piece, o'ring, split ring, and nut is presassembled at the factory. Align a tail piece assembly to the bypass valve threaded inlet and insert until the nut can be tightened. Hand tighten the nut because excessive tightening will damage the assembly. **REPEAT THE PROCEDURE FOR THE OUTLET CONNECTION.**

Service and Drain Piping:

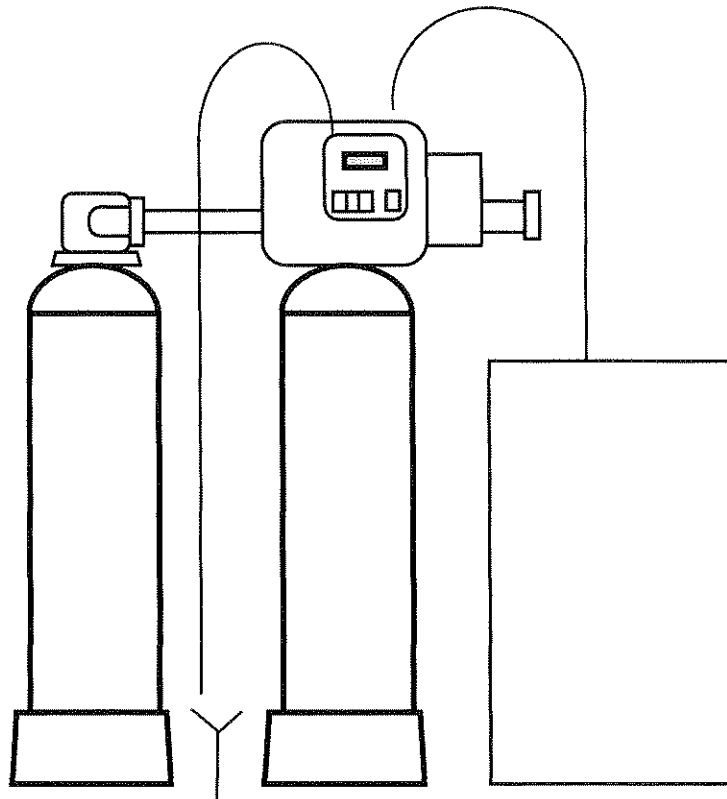
1. Pipe the water softener into the service lines. The inlet and outlet connections of the control valve are 1" copper or PVC, and are located on the side of the valve body. As you face the timer the inlet is on the front right and the outlet is on the back right. Always follow local plumbing codes when installing our water treatment equipment.
2. If sweat fittings are used, be sure soldering is done in such a manner as not to allow heat to reach the control valve or bypass. (If Schedule 80 PVC is used, make sure to follow the proper primer and solvent instructions.)
3. The drain line connection is 5/8" OD or 3/4" npt, and is located on the top left of the valve as you face the timer. It is recommended you install a 3/4" union on the drain line for servicing if not using 5/8" OD. The drain line must be of adequate size to allow for full regeneration flow.



- The control valve drain connection is 5/8" OD or 3/4" npt.
- Never decrease the drain piping size to below the drain connection size.
- Maximum drain line length is 30 feet with proper sloping the entire length.
- Maximum drain line height is 6 feet above the control valve.
- The drain line must be piped to an open air gap (See Figure above).
- Always follow local plumbing codes.

UNDER NO CIRCUMSTANCES SHOULD THERE BE A DIRECT CONNECTION WITH SANITARY SEWAGE FACILITIES.

Figure 1



Electrical Requirements:

Always follow all local electrical codes when installing our water treatment equipment.

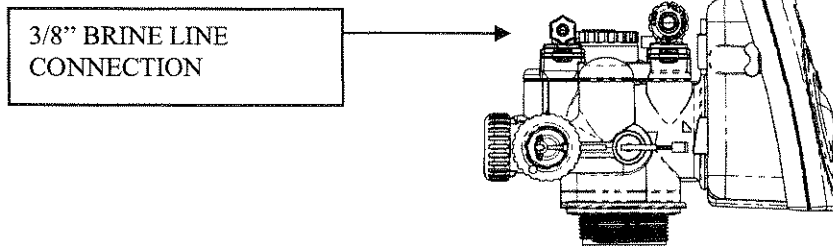
1. Provide an 115v/60Hz properly grounded dedicated electrical outlet. (It's very important that the polarity be correct.)
Avoid using outlets that are switch controlled.
2. Maximum amperage required is 5 amps.
3. Make sure the electrical service provides power 24 hours per day.
We recommend installing a **surge protector** to protect the unit from power surges, which are not covered by warranty.

Brine Tank:

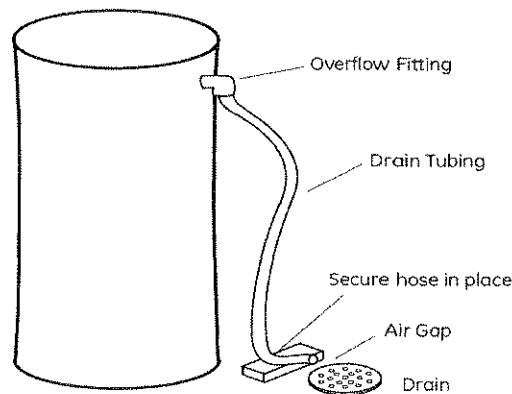
1. The brine tank should be located directly beside the water softener mineral tank.

2. Connect the 3/8" poly tubing to the 3/8" black elbow compression fitting located on the top left side of the WTCTT control valve.

See Figure Below.



The brine tank is equipped with a shutoff valve, the float height was preset at the factory.



Filling Water Softener with Water:

1. Connect the WTCTT control valve transformer into the electrical outlet provided.
2. Press and hold the REGEN button until the drive motor starts. When the drive motor stops, the display will read "BACKWASH" position.
3. Open the inlet ball valve a ¼ turn of its full open position to allow water to enter the water softener mineral tank slowly. The water is going to enter both tanks from the bottom of the distributor pipe and leave the tank from the top. This will slowly purge all the air from the tank.

IF WATER ENTERS THE TANK TOO FAST, ALL THE CATION RESIN WILL BE FLUSHED TO DRAIN DURING START UP.

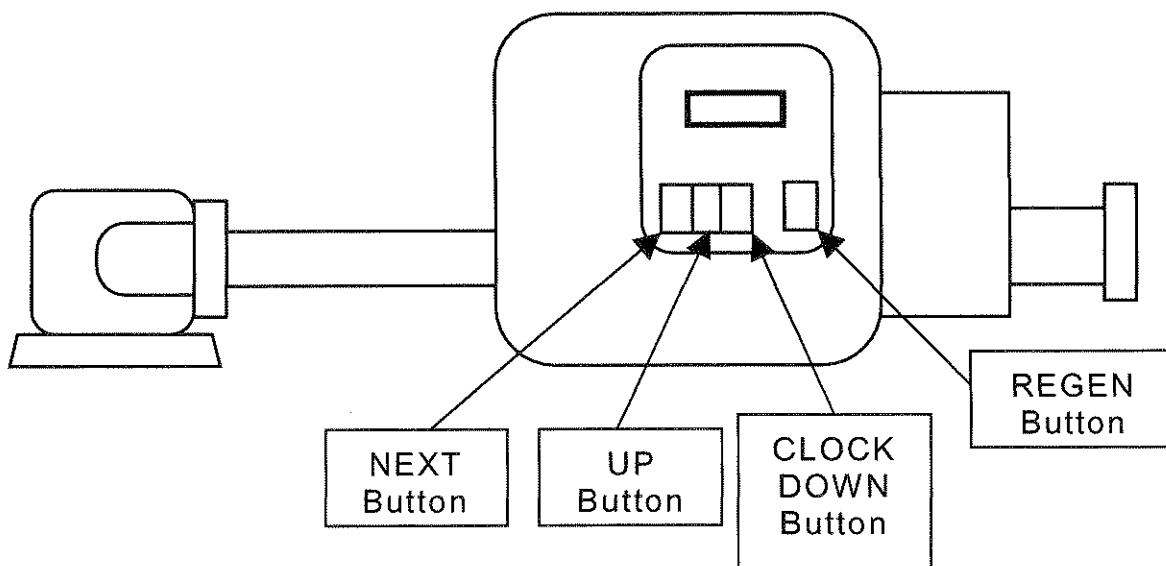
4. When only water is running to the drain, open the inlet and outlet ball valves fully.

5. Press the REGEN button again until the drive motor starts. When the drive motor stops, the display will read "BRINE" position.
6. Press the REGEN button again until the drive motor starts. When the drive motor stops, the display will read "2 BACKWASH" position.
7. Press the REGEN button again until the drive motor starts. When the drive motor stops, the display will read "RINSE" position. The fast rinse position will rinse the softener tank.
8. The control valve will automatically advance to the brine refill position where the brine tank will fill with the proper amount of water. The display will read "REFILL".

NOTE: THE TIMER WILL AUTOMATICALLY ADVANCE TO THE SERVICE POSITION AND THE DISPLAY WILL READ THE CAPACITY REMAINING, IN GALLONS.

WTCTT Control Valve Timer Settings:

Note: The control valve is set at the factory. You only need to set the time of day, capacity, and regeneration time if required, which is preset at 2 am.



Time of Day Setting

- 1) Press and hold the UP or DOWN button. The screen will display "Set Time" and the hour will be blinking.

- 2) Press the UP or DOWN arrows to adjust the hour —check for correct am or pm mode.
- 3) Press the NEXT button. The screen will show “Set Time” and the current minutes will be blinking.
- 4) Press the UP or DOWN arrows to adjust the minutes. Press the NEXT button. (Screen will display time)

Capacity Setting

- 1) Simultaneously press the NEXT and the UP arrow for 3 seconds. The screen will display the Gallon Capacity setting. This setting is calculated by dividing the system capacity (60,000) by the hardness as tested at the site.
- 2) Remember to calculate the compensated hardness when programming. $\text{Compensated hardness} = \text{tested hardness} + 2.5 \text{ gpg of additional hardness estimated for every ppm of iron, and } 4.0 \text{ gpg of additional hardness estimated for every ppm of manganese.}$
- 3) To change the number, use the UP or DOWN arrows.

Regeneration Day Override Setting (the factory default is off)

- 1) Press the NEXT button. The screen will display the Regeneration Day Override, and the days of regeneration frequency will be blinking.
- 2) To change the number, use the UP or DOWN arrows.

Time of Regeneration Setting (the factory default is 2 AM)

- 1) Press the NEXT button. The screen will display the Time of Regeneration, and the hour will be blinking, use the UP or DOWN arrows to adjust the hour.
- 2) Press the NEXT button. The screen will display the Time of Regeneration, and the minutes (preset @ 00, flashing) will be blinking. Use the UP or DOWN arrows to adjust the minutes.
- 3) Press the NEXT button to exit programming. The timer will display Time of Day.

Final Check:

1. Fill the brine tank with Solar Salt and the Res-Up Feeder with Res-Up (one quart is provided).
2. Make sure the drain line connection meets all plumbing codes and that the drain line size can handle the backwash flow rate of the softener.
3. Make sure the Inlet and Outlet on the bypass valve are open.

4. Make sure the control valve timer is plugged into an electrical outlet with power 24 hours per day.
5. Check all piping for leaks.

Power Loss

If the power goes out for less than two hours, the system will automatically reset itself. If an extended power outage occurs, the time of day will flash on and off, which indicates the time of day should be reset. The system will remember the rest.

Error Message

If the word "ERROR" and a number are alternately flashing on the display, contact a service technician for help. This means the valve is unable to function properly.

Default Timer Display Options:

- 1) By pressing the NEXT button you will advance through gallons per minute, gallons x 1000, capacity-gallons remaining, days remaining until override regeneration, and time of day.
- 2) You choose the default display. You can always scroll through them by pressing the NEXT button.

NOTE: Regardless of your default display, when water is running through the system the word "SOFTENING" will flash on the timer screen.

Manual Regeneration Options:

- 1) To initiate a manual regeneration for today at the preprogrammed time, press the REGEN button (regen will flash). To cancel, press the REGEN button again.
- 2) To initiate an immediate regeneration, press and hold the REGEN button for 3 seconds. The motor will engage and regeneration will start.

BYPASS VALVE OPERATION

Figure 1

NORMAL OPERATION

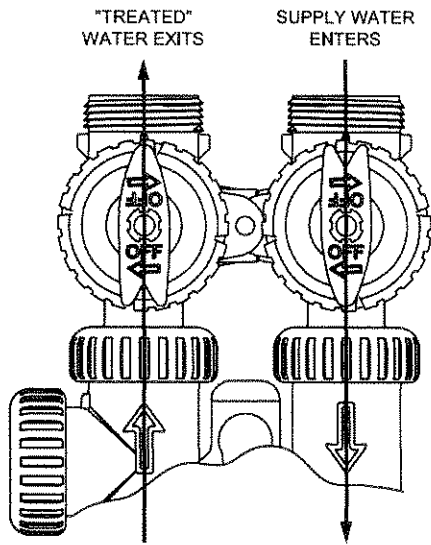


Figure 2

BYPASS OPERATION

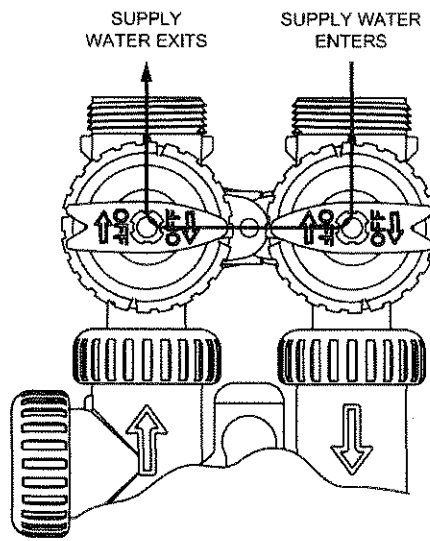


Figure 3

DIAGNOSTIC MODE

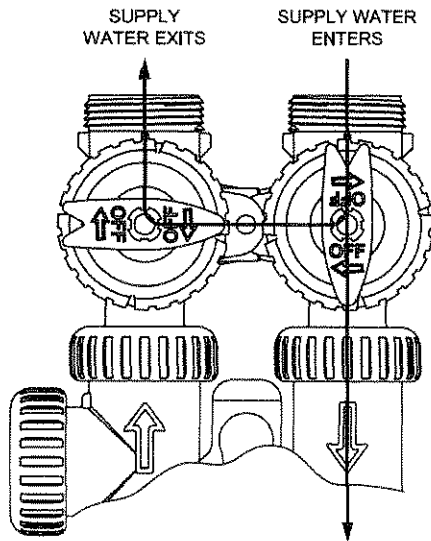
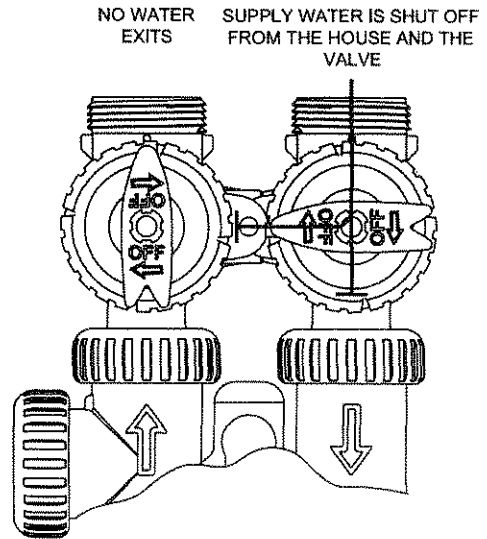


Figure 4

SHUT OFF MODE



Troubleshooting

Problem: Water conditioner fails to regenerate. No soft water.

Possible Cause	Solution
Power supply to WTCTT control has been interrupted.	Determine reason for power interruption and correct. Reset time of day.
Water pressure lost.	Restore water pressure.
Corrupted programming of WTCTT timer.	Reprogram timer assembly.
Defective WTCTT timer.	Replace timer assembly.
No salt in brine tank.	Add salt and regenerate.
Manual bypass valve is open.	Close manual bypass valve.
Leak at riser pipe seal.	Insure that riser pipe is properly sealed at o'ring seal. Inspect pipe for cracks.
Insufficient brine.	Check brine float height and clean assembly if necessary. Check flow rate capabilities of safety float and air check assembly.
Plugged injector or injector screen.	Inspect and clean injector and/or injector screen.

Problem: No Brine Draw

Possible Cause	Solution
Plugged injector or injector screen.	Inspect and clean injector and/or injector screen.
Insufficient water pressure.	Increase water pressure above 25 psig (172kPa) minimum.
Corrupted programming of WTCTT timer.	Reprogram timer assembly.
Defective WTCTT timer.	Replace timer assembly.
Obstructed drain line.	Remove obstruction.

Problem: Insufficient Brine draw

Possible Cause	Solution
Partially clogged injector or injector screen	Inspect and clean injector and/or injector screen assembly.
Restricted flow rate in brine line	Check flow rate capabilities of the safety float/aircheck assembly.
Insufficient water pressure	Increase water pressure above 25 psig (172kPa) minimum.
Excessive back pressure on injector due to elevated drain line	Reduce drain line elevation to height of valve.
Damaged piston assembly	Inspect and if damaged replace the piston assembly.
Control valve has incorrect program values.	Reset values.
Partially restricted drain line	Remove restriction.

Problem: Insufficient Refill to Brine Tank

Possible Cause	Solution
Brine refill control	Remove and clean
Restricted flow rate in brine line.	Check flow rate capabilities of the safety float/aircheck assembly.

Problem: Excessive Water in Brine Tank

Possible Cause	Solution
Plugged drain line flow control.	Clean flow control.
Plugged injector and/or injector screen	Inspect and clean injector and/or screen.

Problem: Loss of Media to Drain

Possible Cause	Solution
No flow control installed in drain line.	Install drain line flow control.

Problem: Leak to Drain

Possible Cause	Solution
No flow control installed in drain line.	Install drain line flow control.
Insufficient water pressure.	Increase water pressure above 25 psig (172kPa) minimum.

Problem: Loss of Water Pressure

Possible Cause	Solution
Fouled resin bed due to iron accumulation.	Clean control valve and mineral bed with cleaner.
Slots in riser pipe or laterals are filled with resin fines.	Inspect and clean distributor pipe slots as needed.

Problem: Brine in Water to Service After Regeneration

Possible Cause	Solution
Injector is too small for system size.	Install correct injector.
Plugged injector and/or injector screen	Inspect and clean injector and/or injector screen.
Brine draw time excessively long due to low water pressure	Increase water pressure above 25 psig (172 kPa) minimum.
Restricted drain line	Remove drain line restriction.
Insufficient rinse volume	Increase slow rinse time, fast rinse time, or both.
Damaged piston assembly or spacer kit	Inspect and if damaged replace the piston assembly.
Control valve has incorrect program values.	Reset values.

Problem: Timer does not display time of day

Possible Cause	Solution
AC Adapter unplugged	Connect power
No electric power at outlet	Repair outlet or use working outlet
Defective AC Adapter	Replace AC Adapter
Defective PC Board	Replace PC Board

Problem: Timer does not display correct time of day

Possible Cause	Solution
Switched outlet	Use uninterrupted outlet
Power Outage	Reset time of day
Defective PC Board	Replace PC Board

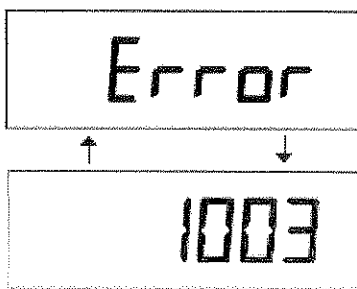
Problem: Control Valve regenerates at wrong time of day

Possible Cause	Solution
Power Outages	Reset control valve to correct time of day
Time of day not set correctly	Reset to correct time of day
Time of regeneration incorrect	Reset regeneration time

ERROR CODES

Problem: E1001 : Unable to recognize start of regeneration,
 E1002 : Unexpected Stall, E1003 : Motor ran too long, timed out trying to reach the next cycle position or E1004 : Motor ran too long, timed out trying to reach home position,

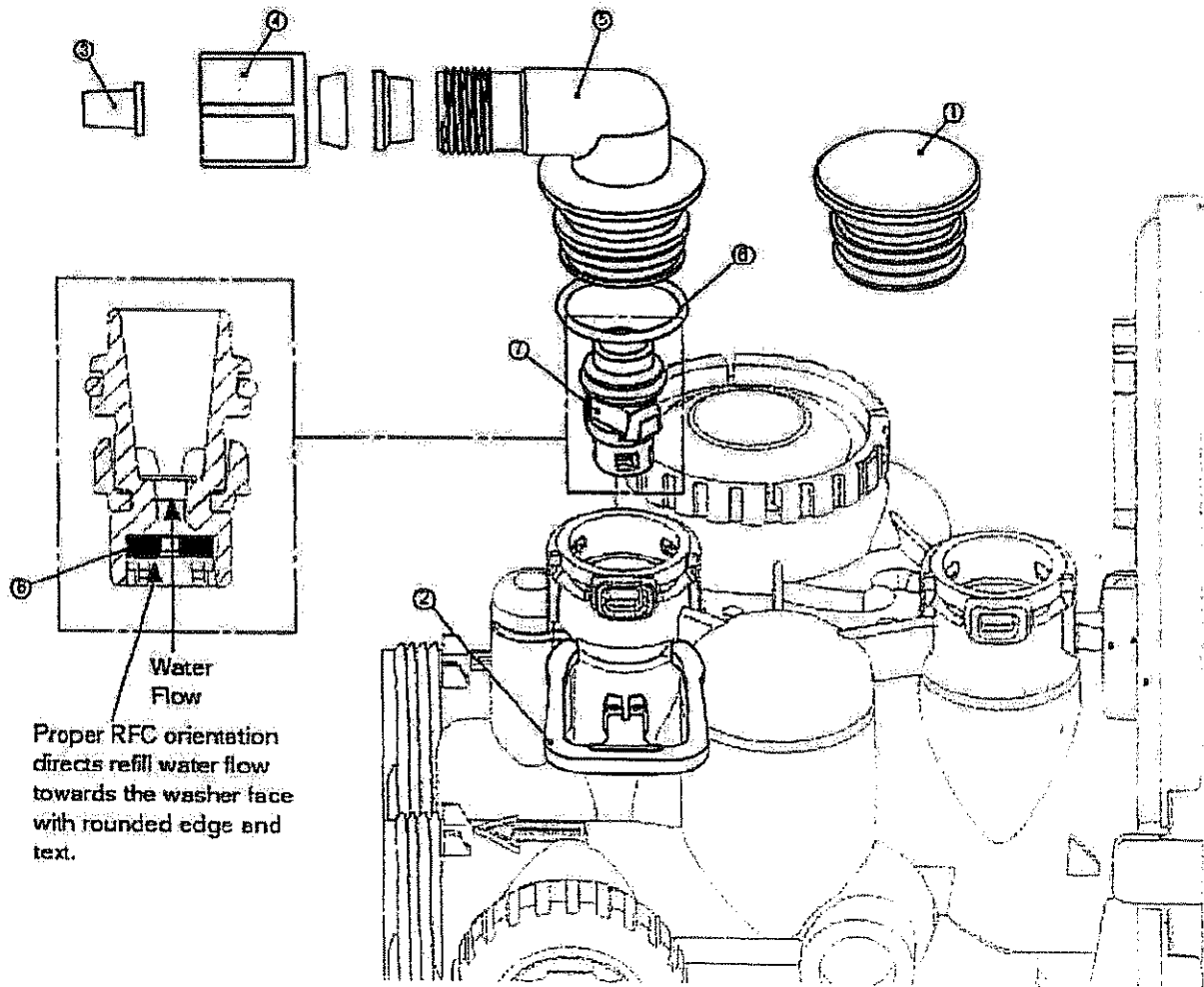
Possible Cause	Solution
Control valve has just been serviced	Press NEXT and REGEN for 3 seconds or unplug power source jack (black wire) and plug back in to reset control valve
Foreign matter is lodged in control valve	Check piston and spacer stack assembly for foreign matter
High drive forces on piston	Replace piston(s) and spacer stack assembly
Control valve piston not in home position	Press NEXT and REGEN for 3 seconds or unplug power source jack (black wire) and plug back in to reset control valve
Motor not inserted fully to engage pinion, motor wires broken or disconnected, motor failure.	Check motor and wiring. Replace motor if necessary.
Drive gear label dirty or damaged, missing or broken gear	Replace or clean drive gear
Drive bracker incorrectly aligned to drive bracket	Reseat drive bracket properly
PC board is damaged or defective	Repalce PC board
PC board incorrectly aligned to drive bracket	Ensure PC board is correctly snapped on to drive bracket



Refill Flow Control Assembly and Refill Port Plug

Drawing No.	Order No.	Description	Quantity
1	V3195-01	WS1 Refill Port Plug ASY	This part is required for backwash only systems
2	H4615	Elbow Locking Clip	1
3	JCP-P-6	Polytube insert 3/8"	1
4	JCPG-6PBLK	Nut 3/8"	1
5	H4613	Elbow Cap 3/8"	1
6	V3163	O-ring 019	1
7	V3165-01*	WS1 RFC Retainer ASY	1
8	V3182	WS1 RFC	1
Not Shown	H4650	Elbow 1/2" with nut and insert	Option

*Assembly includes WS1 RFC.

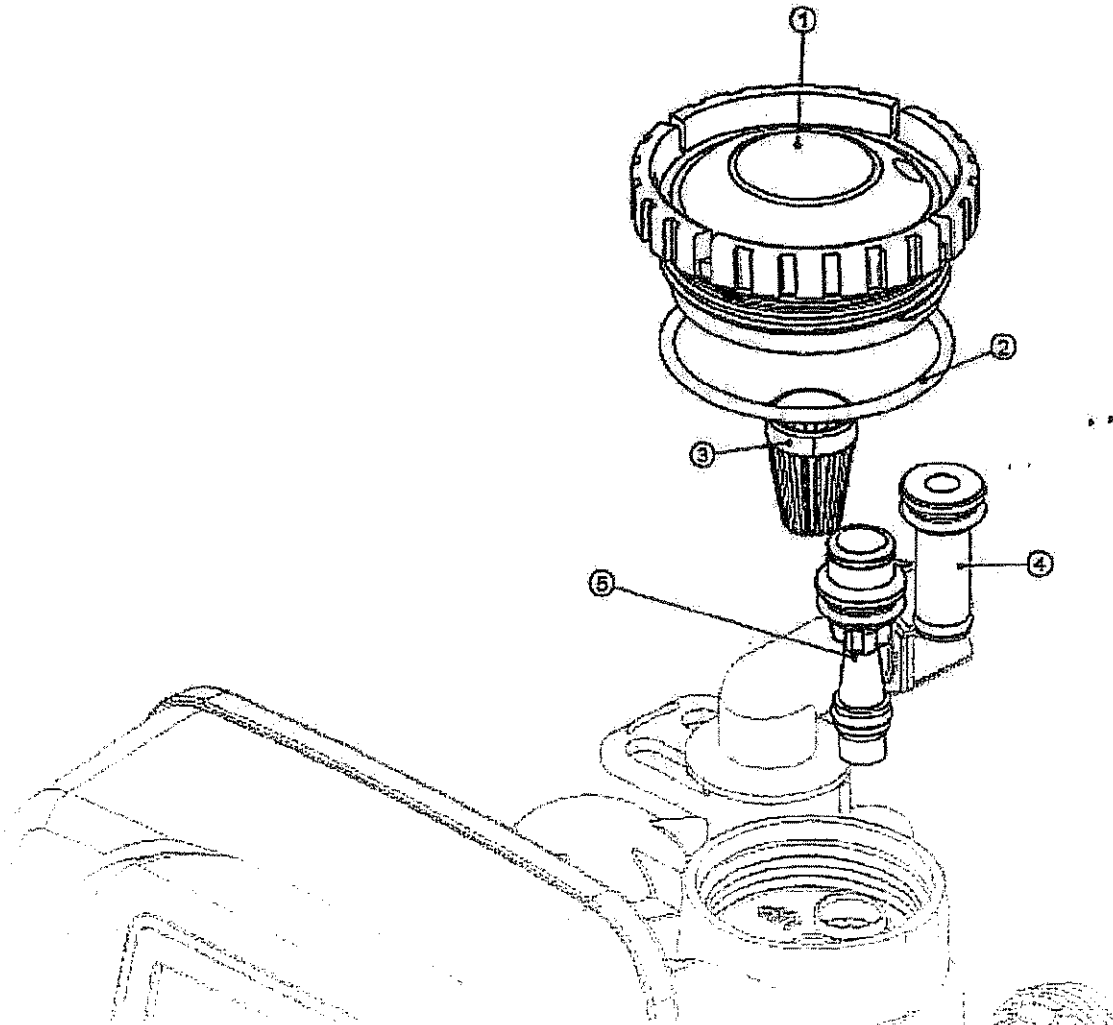


Injector Cap, Injector Screen, Injector, Plug and O-Ring

Drawing No.	Order No.	Description	Quantity
1	V3176	Injector Cap	1
2	V3152	O-ring 135	1
3	V3177	Injector Screen	1
4	V3010-1Z	WSI Injector ASY Z Plug	1
5	V3010-1A	WSI INJECTOR ASY A BLACK	1
	V3010-1B	WSI INJECTOR ASY B BROWN	
	V3010-1C	WSI INJECTOR ASY C VIOLET	
	V3010-1D	WSI INJECTOR ASY D RED	
	V3010-1E	WSI INJECTOR ASY E WHITE	
	V3010-1F	WSI INJECTOR ASY F BLUE	
	V3010-1G	WSI INJECTOR ASY G YELLOW	
	V3010-1H	WSI INJECTOR ASY H GREEN	
	V3010-1I	WSI INJECTOR ASY I ORANGE	
	V3010-1J	WSI INJECTOR ASY J LIGHT BLUE	
V3010-1K	WSI INJECTOR ASY K LIGHT GREEN		
Not Shown	V3170	O-ring 011	*
Not Shown	V3171	O-ring 013	*

*The injector plug and the injector each contain one 011 (lower) and 013 (upper) o-ring.

Note: For upflow position, injector is located in the up hole and injector plug is in the other hole. WSI-MR upflow bodies are identified by having the DN marking removed. For a filter that only backwashes, injector plugs are located on both holes.



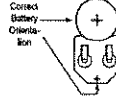
EE Front Cover and Drive Assembly

Drawing No.	Order No.	Description	Quantity
1	V3175EE-01	WS1EE FRONT COVER ASSEMBLY	1
2	V3107-01	WS1 MOTOR	1
3	V3106-01	WS1 DRIVE BRACKET & SPRING CLIP	1
4	V3408EE-03BOARD	WS1THRU2L/2 EEPICBRD MAV/ALT REPL	1
5	V3110	WS1 DRIVE GEAR 12X36	3
6	V3109	WS1 DRIVE GEAR COVER	1
Not Shown	V3186	WS1 AC ADAPTER 120V-12V	1
	V3186-01	WS1 AC ADAPTER CORD ONLY	
Not Shown	V3178	WS1 Drive Back Plate	1

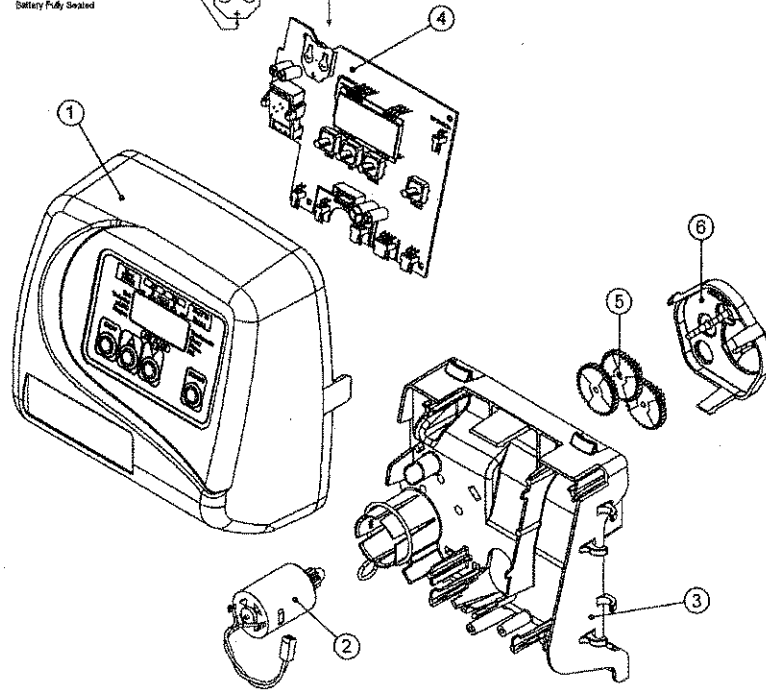
Refer to Control Valve Service Manual for other drawings and part numbers.

AC Adapter	U.S.	International
Supply Voltage	120 V AC	230V AC
Supply Frequency	60 Hz	50 Hz
Output Voltage	12 V AC	12 V AC
Output Current	500 mA	500 mA

When replacing the battery, align
positive and push down to fully seat.



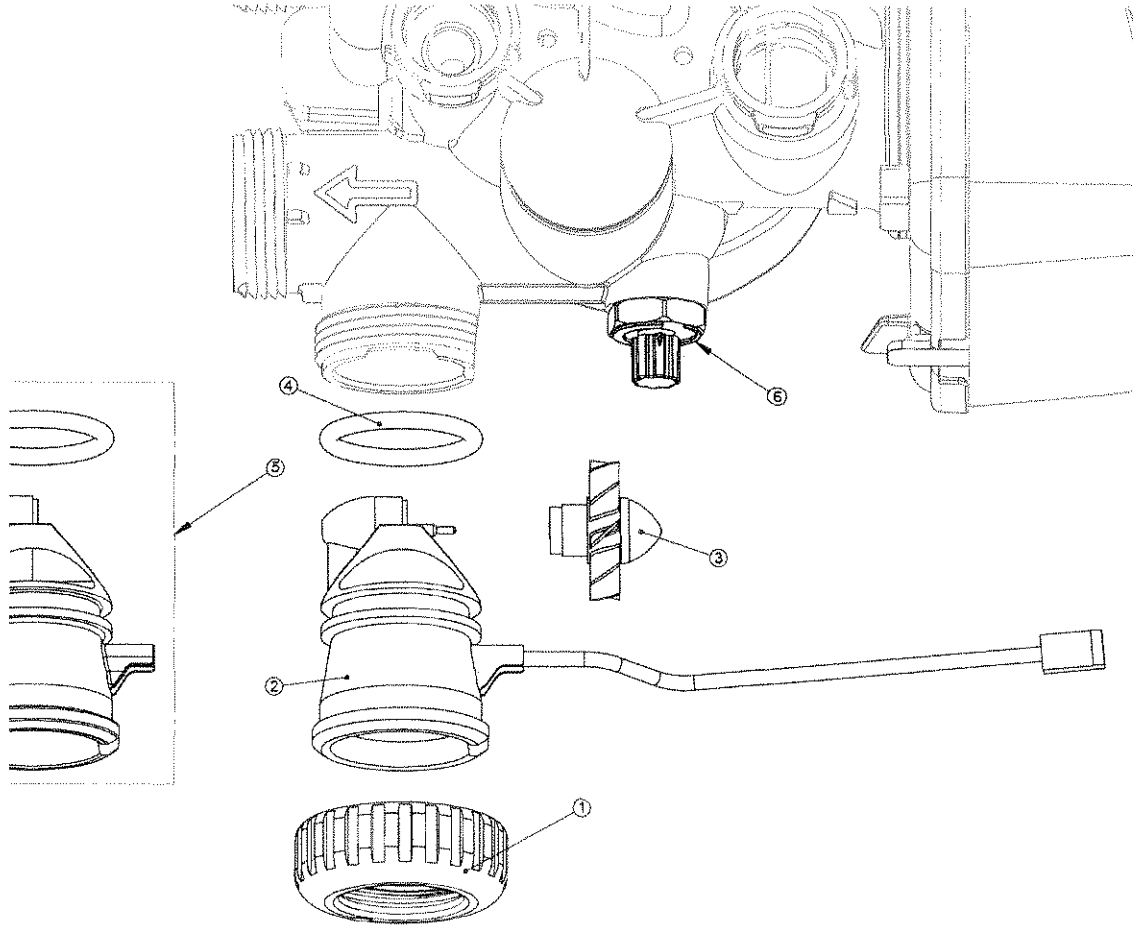
Battery replacement is
3 volt lithium coin cell
type 2032.



Water Meter, Meter Plug and Mixing Valve

Drawing No.	Order No.	Description	Quantity
1	V3151	WS1 Nut 1" QC	1
2	V3003*	WS1 Meter ASY	1
3	V3118-01	WS1 Turbine ASY	1
4	V3105	O-ring 215	1
5	V3003-01	WS1 Meter Plug ASY	1
6	V3013	Mixing Valve	Optional

* Order number V3003 includes V3118-01 WS1 Turbine Asy and V3105 O-ring 215.





QUALITY WATER TREATMENT SYSTEMS

LIMITED WARRANTY

This **LIMITED WARRANTY** applies to original purchasers of water conditioners and filters ("Unit" or "Units") distributed by the Milby Company. The Units are made from the finest materials available and are warranted for the periods shown below so long as the Units are operated in conformity with the specified Physical Properties and only in residential applications.

Any component part of a purchased Unit identified in the attached Warranty Registration Card by model and serial number that is installed by a licensed contractor according to the applicable installation manual and local plumbing and electrical codes will be repaired or replaced, at Milby's option, if a failure occurs due to defective material or workmanship. Any accident to the Unit, misuse, abuse or alteration of the Unit, or any unauthorized attempt to repair the Unit will void this warranty. Modifications or repairs by anyone other than an authorized Milby dealer are not covered by this warranty.

PHYSICAL PROPERTIES		COMPONENT PART	WARRANTY PERIOD
Max. Pressure	75 PSI	Media Tank	10 yrs. From Date of Purchase
Max. Temperature	100 Degrees Fahrenheit	Salt Storage Tank	5 yrs From Date of Purchase
Min. Temperature	32 Degrees Fahrenheit	Control Valve	3 yrs From Date of Purchase
		Media Performance due to misapplication, faulty installation, or clogging	None

Under this warranty, Milby will only repair or replace a Unit or component part with an identical or similar Unit or component part distributed by Milby. A replacement Unit or component part shall be warranted only for the remainder of the warranty period of the original purchased Unit or part. The purchaser is responsible for all other costs, including, but not limited to (1) labor charges for service, removal, repair or reinstallation of the Unit or component part, (2) shipping, delivery, handling and administrative charges for necessary or incidental costs for any materials required for installation of the replacement Unit or component parts.

THERE ARE NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE IMPLIED WARRANTIES FOR MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE WHATSOEVER WITH RESPECT TO THE INSTALLATION, OPERATION, REPAIR OR REPLACEMENT OF A UNIT AND/OR ITS COMPONENT PARTS THAT EXTEND BEYOND THE APPLICABLE LIMITED WARRANTY HEREIN. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

UNDER NO CIRCUMSTANCES SHALL MILBY BE LIABLE TO THE PURCHASER OR ANY OTHER PERSON FOR WATER DAMAGE, LOSS OF USE OF THE UNIT, INCONVENIENCE, LOSS OR DAMAGE TO PERSONAL PROPERTY, OR ANY OTHER SPECIAL OR CONSEQUENTIAL DAMAGES, WHETHER ARISING OUT OF BREACH OF WARRANTY, BREACH OF CONTRACT, TORT, OR OTHERWISE. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.

To obtain coverage under this warranty, the consumer must complete and return the attached Warranty Registration Card within thirty (30) days from the date of purchase to Milby at: Attn: Customer Service, Milby Company, 6201 South Hanover Road, Elkridge, Maryland 21075-5651. Any claim under this warranty should be initiated with the dealer who sold the Unit to the purchaser. If this is not practicable, the purchaser should contact Milby directly at 410-796-7700.

```

.....
■ WARRANTY REGISTRATION CARD
■ Purchaser Name:
■ and Address
■ Model # _____ Date of Purchase: _____
■ Dealer Name:
■ and Address
.....

```

MILBY COMPANY
 6201 South Hanover Road
 Elkridge, MD 21075-5651
 Phone: 410- 796-7700
 Fax: 410- 796-7739