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INSTALLATION AND OPERATING INSTRUCTIONS

CS/CSM SERIES RESIDENTIAL WATER SOFTENERS

MODELS:

CS1001	CSM1001
CS1501	CSM1501
CS2001	CSM2001

Installer, please leave with homeowner.
Homeowner, retain for future reference.

INSTR2201 0312





SAFETY INFORMATION

Read, understand, and follow all safety information contained in these instructions prior to installation and use of the Aqua-Pure® CS/CSM Series Residential Water Softener. Retain these instructions for future reference. Failure to follow installation, operation and maintenance instructions may result in property damage and will void warranty.

Intended use:

The Aqua-Pure CS/CSM Series Residential Water Softeners are intended for use in softening water in homes and have not been evaluated for other uses. These systems must be installed indoors near the point of entry of a home water line, and be installed by qualified professional installers according to these installation instructions.

EXPLANATION OF SIGNAL WORD CONSEQUENCES

 WARNING	Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury and/or property damage.
 CAUTION	Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury and/or property damage.
CAUTION	Indicates a potentially hazardous situation, which, if not avoided, may result in property damage.

WARNING

To reduce the risk associated with choking:

- **Do not** allow children under 3 years of age to have access to small parts during the installation of this product.

To reduce the risk associated with ingestion of contaminants:

- **Do not** use with water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after the system.

To reduce the risk of physical injury:

- Shut off inlet water supply and depressurize system as shown in manual prior to service.

To reduce the risk associated with a hazardous voltage:

- If the home electrical system requires use of the cold water system as an electrical safety ground, a jumper must be used to ensure a sufficient ground connection across the water softener installation piping — refer installation to qualified personnel.
- **Do not** use the system if the power cord is damaged — contact qualified service personnel for repair.

To reduce the risk associated with back strain due to the heavy weight of the various system components:

- Follow safe lifting procedures.

CAUTION

To reduce the risk associated skin, eye, and respiratory tract irritation from gravel and filter media during installation:

- Gravel and several types of filter media may be used in this product, depending upon the application. During installation, dust may cause irritation to skin, eyes, and respiratory tract.
- Utilize a NIOSH-approved dust filter mask, protective gloves, and appropriate eye protection when handling and pouring gravel and filter media.
- To request an MSDS relating to this product, call 203-238-8965 or go to www.3M.com, select country, and use the search engine to search MSDS. For emergencies, call 800-364-3577 or 651-737-6501 (24 hours).

CAUTION

To reduce the risk associated with property damage due to water leakage:

- **Read and follow** Use instructions before installation and use of this water treatment system.
- Installation and use **MUST** comply with existing state or local plumbing codes.
- **Protect from freezing**, relieve pressure and drain system when temperatures are expected to drop below 40°F (4°C).
- **Do not** install on hot water supply lines. The maximum operating water temperature of this water softener is 110°F (43.3°C).
- **Do not** install if water pressure exceeds 125 psi. If your water pressure exceeds 80 psi (552 kPa), you must install a pressure limiting valve. Contact a plumbing professional if you are uncertain how to check your water pressure.
- **Do not** install where water hammer conditions may occur. If water hammer conditions exist you must install a water hammer arrester. Contact a plumbing professional if you are uncertain how to check for this condition.
- Where a backflow prevention device is installed on a water system, a device for controlling pressure due to thermal expansion must be installed.
- **Do not** use a torch or other high temperature sources near system.
- On plastic fittings, never use pipe sealant or pipe dope. **Use PTFE thread tape only**, pipe dope properties may deteriorate plastic.
- Take care when using pliers or pipe wrenches to tighten plastic fittings, as damage may occur if over tightening occurs.
- **Do not** install in direct sunlight or outdoors.
- Install system in such a position as to prevent it from being struck by other items used in the area of installation.
- Ensure all tubing and fittings are secure and free of leaks.
- **SHUT OFF FUEL OR ELECTRIC POWER SUPPLY TO WATER HEATER** after water is shut off.
- **Do not** install system where water lines could be subjected to vacuum conditions without appropriate measures for vacuum prevention.
- **Do not** apply heat to any fitting connected to bypass or control valve as damage may result to internal parts or connecting adapters.
- Install on a flat/level surface. It is also advisable to sweep the floor to eliminate objects that could pierce the brine tank.

To reduce the risk associated with property damage due to plugged water lines:

- Pay particular attention to correct orientation of control valve. Water flow should match arrow on control valve. The Inlet and Outlet of other water treatment equipment products will vary depending on the control valve brand used.

IMPORTANT NOTES

- Failure to follow instructions will void warranty.

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SECTION 1: BEFORE INSTALLATION

Congratulations! We believe your purchase of this water softener will prove to be a very wise choice. When properly installed, operated, and maintained, your new water softener will provide years of dependable service. Before starting the installation, please read this entire manual for an overview, and then follow the installation instructions. **Failure to follow the instructions will void the warranty.**

Inspecting And Handling Your Water Softener:

Inspect shipping carton and the equipment for shipping damage. If damaged, notify the transportation company and request a damage inspection.

Handle the equipment with care. Damage can result if dropped or if the brine tank is set on sharp, uneven projections on the floor. When handling, do not turn the water softener unit upside down or on its side to help prevent media from entering valve and being discharged downstream.

Make Sure Your Water Has Been Thoroughly Tested:

An analysis of your water should be made prior to the selection of your water softener. You can typically get this service through your place of purchase, which may require sending a sample to the factory for analysis and recommendations.

IMPORTANT NOTES

Water softeners are designed to reduce hardness and reasonable amounts of soluble iron if consideration is given to iron content when selecting model and regeneration settings. To treat sulfur (hydrogen sulfide), bacterial iron, precipitated iron or very high levels of soluble iron special equipment in addition to a water softener is required. For best results, the Aqua-Pure® APPM or APIF Series Systems are recommended for use on waters containing more than 2 ppm of iron.

Check Your Pumping Rate and Water Pressure:

Two water system conditions must be checked carefully to avoid unsatisfactory operation or equipment damage:

- 1) **MINIMUM** water pressure required at the water softener inlet is 20 psi (138 kPa).

CAUTION

To reduce the risk associated with property damage due to water leakage:

- **Do not** install if water pressure exceeds 125 psi. If your water pressure exceeds 80 psi (552 kPa), you must install a pressure limiting valve. Contact a plumbing professional if you are uncertain how to check your water pressure.

NOTE: Call your local water department or plant operator to obtain pressure readings. If you have a private well, the gauge on the pressure tank will indicate the high and low system pressure. Record your water pressure data below:

Water Pressure:

Low _____ psi

High _____ psi

CAUTION

To reduce the risk associated with property damage due to water leakage:

- **Do not** install system where water lines could be subjected to vacuum conditions without appropriate measures for vacuum prevention.

The installer is required to take appropriate measures if there is the possibility a vacuum condition may occur. This would include the installation of an appropriate device in the supply line to the system, i.e., a vacuum breaker or backflow prevention device. Vacuum damage voids the factory warranty.

- 2) The pumping rate of your well must be sufficient for satisfactory operation and BACKWASHING of the water softener. (See Specifications And Operating Data, Section 6).

IMPORTANT NOTE

If sediment is present, the installation of a sediment pre-filter is recommended. Even if sediment is not currently present or at a level high enough to be objectionable, a pre-filter can help increase the efficiency of the softener and help reduce the amount of maintenance required.

Installation Site Selection:

Select the location of your water softener with care. Various conditions which contribute to proper location are as follows:

- 1) Locate as close as possible to water supply source.
- 2) Locate as close as possible to a drain.
- 3) Locate in correct relationship to other water conditioning equipment (Figure 1, page 2-1).
- 4) Locate the water softener in the supply line BEFORE the water heater. Temperatures above 110°F (43°C) will damage the water softener and void the factory warranty.
- 5) DO NOT install the water softener in a location where freezing temperatures occur. Freezing may cause permanent damage and will also void the factory warranty.
- 6) Allow sufficient space around the installation for easy servicing.
- 7) Provide a non-switched 110V, 60Hz (220V, 50Hz for specified systems) power source for the control valve.

WARNING

To reduce the risk associated with ingestion of contaminants:

- **Do not** use with water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after the system.

CAUTION

To reduce the risk associated with property damage due to water leakage:

- **Protect from freezing**, relieve pressure and drain system when temperatures are expected to drop below 40°F (4°C).
- **Do not** install on hot water supply lines. The maximum operating water temperature of this water softener is 110°F (43.3°C).
- **Do not** install in direct sunlight or outdoors.

Facts to Remember While Planning The Installation:

- 1) All installation procedures **MUST** conform to local and state plumbing codes.
- 2) If lawn sprinklers, a swimming pool, or geothermal heating/cooling or water for other devices/activities are to be treated by the water softener, a larger model **MUST** be selected to accommodate the higher flow rate plus the backwashing requirements of the water softener. Consult your Dealer/Installer or our Customer Service Department at 1-800-222-7880 for alternative instructions if the pumping rate is insufficient.
- 3) Remember that the water softener **INLET** is attached to the pipe that supplies water (i.e. delivers water from the well pump or after the water meter) and the **OUTLET** is the line that runs toward the water heater.

CAUTION

To reduce the risk associated with property damage due to plugged water lines:

- Pay particular attention to correct orientation of control valve. Water flow should match arrow on control valve. The Inlet and Outlet of other water treatment equipment products will vary depending on the control valve brand used.

- 4) Before beginning the installation review the existing piping system and to determine the size, number and type of fittings required.

WARNING

To reduce the risk associated with a hazardous voltage:

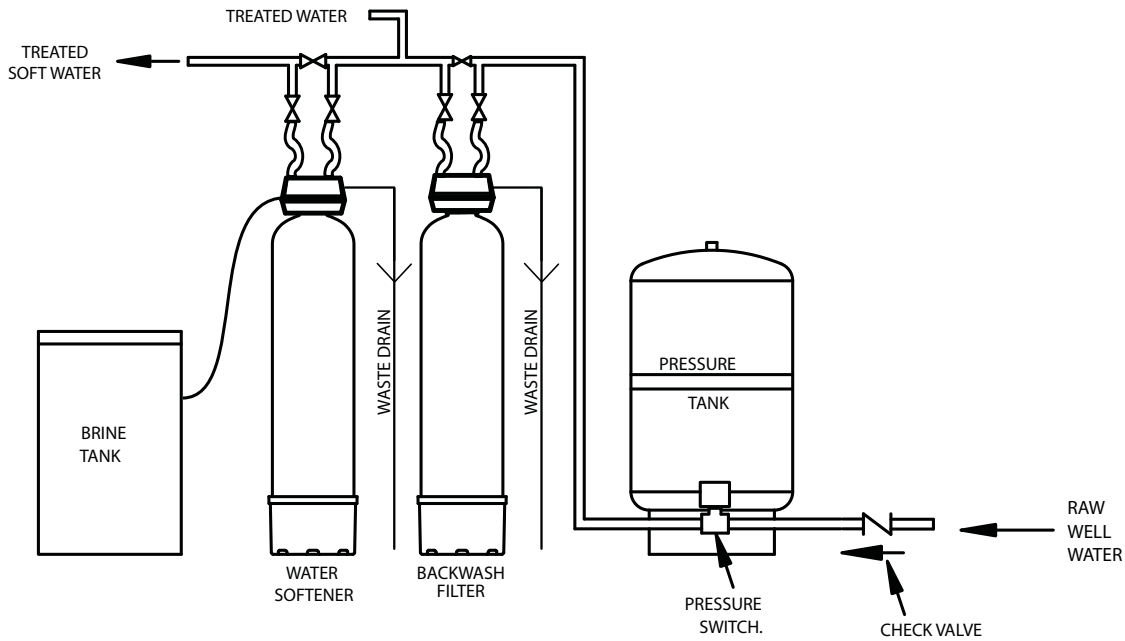
- If the home electrical system requires use of the cold water system as an electrical safety ground, a jumper must be used to ensure a sufficient ground connection across the water softener installation piping — refer installation to qualified personnel.

- 5) Sweep the floor to eliminate objects that could pierce the brine tank.

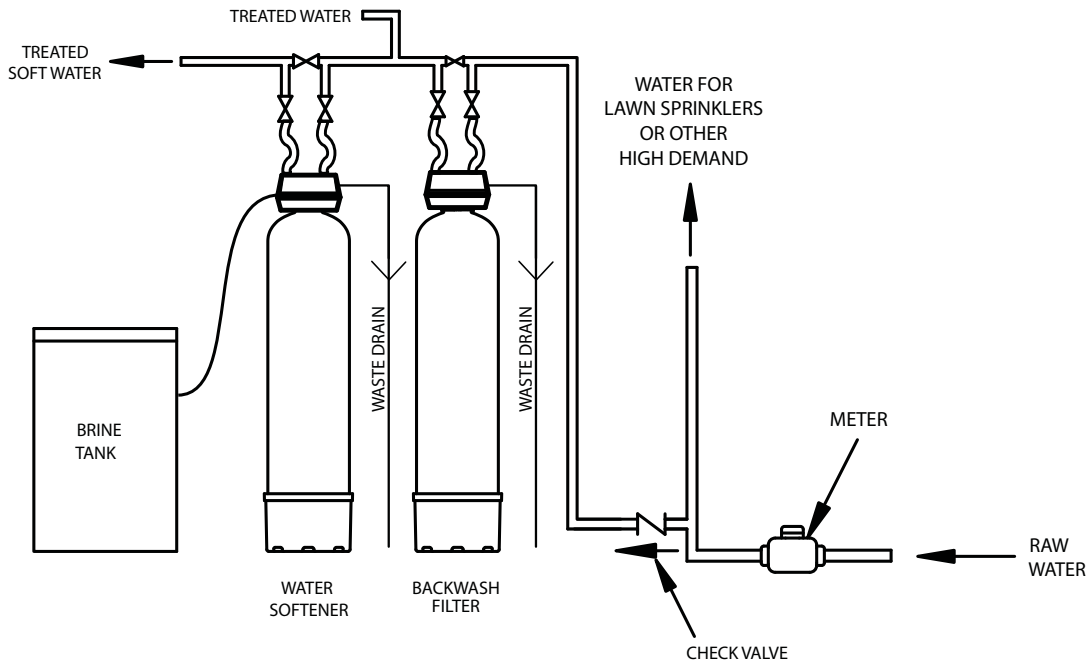
IMPORTANT NOTE

SODIUM INFORMATION: Water softeners using sodium chloride for regeneration add sodium to the water. People who are on sodium restricted diets should consider the added sodium as part of their overall sodium intake.

SECTION 2: INSTALLATION



TYPICAL WELL INSTALLATION



TYPICAL PUBLIC WATER SUPPLY INSTALLATION

Figure 1. Typical Installation Sequence Of Water Conditioning Equipment

CAUTION

To reduce the risk associated with property damage due to water leakage:

- **Read and follow** Use instructions before installation and use of this water treatment system.
- Installation and use **MUST** comply with existing state or local plumbing codes.

To reduce the risk associated with property damage due to plugged water lines:

- Pay particular attention to correct orientation of control valve. Water flow should match arrow on control valve. The Inlet and Outlet of other water treatment equipment products will vary depending on the control valve brand used.

Step 1

If not factory pre-installed, attach bypass valve or yoke assembly using adapter couplings, clips and screws to control valve (Figure 2). On meter initiated models, attach meter between bypass valve and control valve (Figure 2).

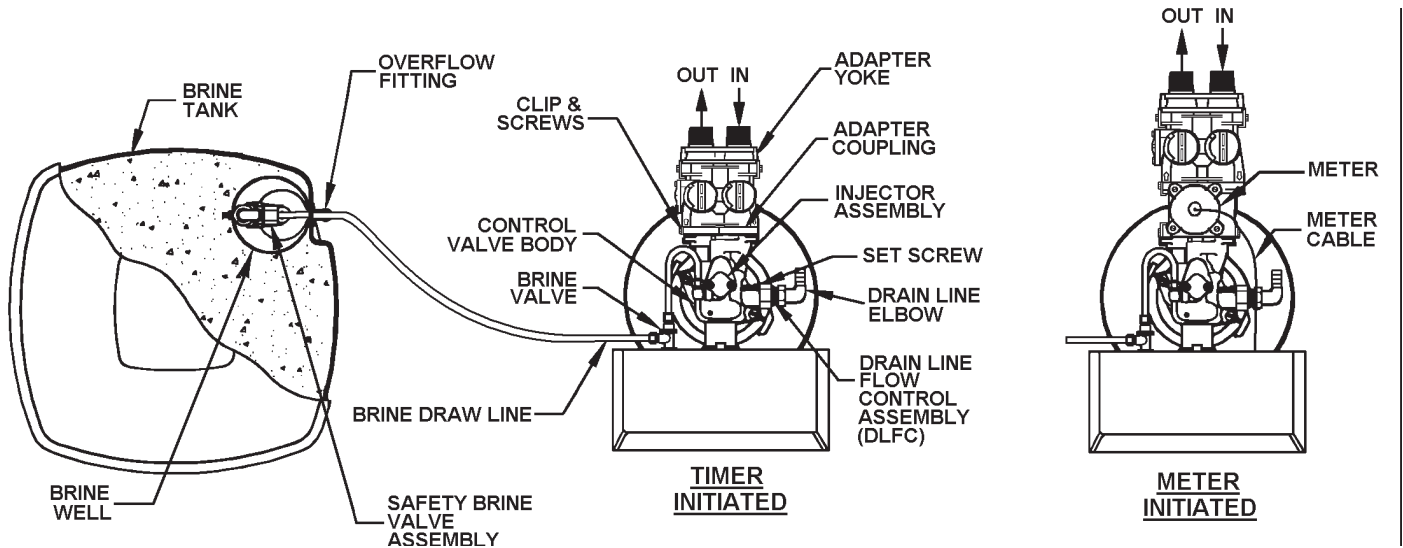


Figure 2. Softener And Brine Tank Assembly, Top View

Step 2

Shut off all water at main supply valve. On a private well system, turn off power to pump and drain pressure tank. Make certain pressure is relieved from complete system by opening nearest faucet to drain system.

CAUTION

To reduce the risk associated with property damage due to water leakage:

- **SHUT OFF FUEL OR ELECTRIC POWER SUPPLY TO WATER HEATER** after water is shut off.

Step 3

Cut main supply line as required to fit plumbing to inlet and outlet of unit.

Step 4

Attach plumbing. Do not apply heat to any fitting connected to bypass or control valve as damage may result to internal parts or connecting adapters. Make certain water flow enters through inlet and discharges through outlet. Loosen set screw and pull out drain line flow control (DLFC) assembly from valve body (Figure 2). Unscrew drain line elbow from DLFC. Apply thread tape to threads. Reassemble and fully insert into valve body before tightening set screw with finger pressure only (overtightening set screw may crack fitting).

CAUTION

To reduce the risk associated with property damage due to water leakage:

- **Do not** use a torch or other high temperature sources near filter system, cartridges, plastic fittings or plastic plumbing.
- On plastic fittings, never use pipe sealant or pipe dope. **Use PTFE thread tape only**, pipe dope properties may deteriorate plastic.
- Take care when using pliers or pipe wrenches to tighten plastic fittings, as damage may occur if over tightening occurs.

Step 5

Attach drain line to drain line fitting. To prevent back pressure from reducing flow rate below minimum required for backwash, drain line must be sized according to run length and relative height. Be careful not to bend flexible drain tubing sharply enough to cause "kinking" (if kinking occurs drain line must be replaced). Typical examples of proper drain line diameters are:

- (1) 1/2 in. ID up to 15 ft. when discharge is lower than inlet.
- (2) 5/8 in. ID up to 15 ft. when discharge is slightly higher than inlet.
- (3) 3/4 in. ID when drain is 25 ft. away and/or drain is installed overhead.

Some areas prohibit the use of flexible drain lines. Check with local code officials prior to installation.

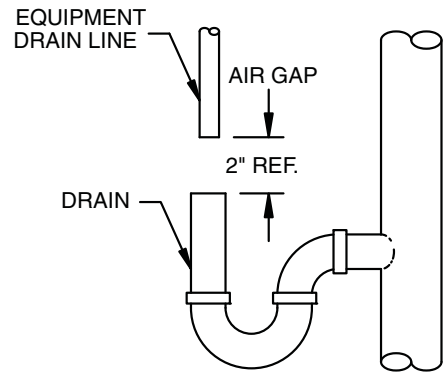


Figure 3. Typical Drain

Step 6

Position drain line over drain and secure firmly. To prevent backsiphoning of waste water, provide an air gap of at least 2 in. or 2 pipe diameters between end of drain hose and drain (Figure 3). DO NOT raise drain line more than 10 ft. above floor.

Step 7

Connect one end of the 3/8 in. poly line to brine valve located on the right side of control valve. Connect other end to elbow inside of brine well. Brass insert sleeves and plastic ferrules must be used where necessary. (Figure 2 and Control Valve Parts drawing, Section 7).

Step 8

Install overflow line to brine tank overflow fitting (Figure 2). Discharge of line must be lower than overflow fitting. DO NOT INTERCONNECT OVERFLOW LINE WITH VALVE DRAIN LINE.

Step 9

Make certain bypass valve inlet and outlet knobs are in "BYPASS" position. After all plumbing connections have been completed, open main water shut-off valve or restore power to well pump. Check for leaks and correct as necessary.

Step 10

Plug control valve power cord into 110v/60hz, non-switched power source. Manually stage control to backwash position (See "How To Manually Regenerate Your Water Softener At Any Time") and then unplug power cord to prevent the unit from advancing automatically.

Step 11

Partially open inlet valve in plumbing or on bypass valve (Figure 4). This will allow the unit to fill slowly from the bottom up, eliminating air entrapment. Allow unit to fill slowly, failure to do so could result in loss of resin to the drain. Once a steady stream of water, no air, is flowing to drain, the inlet valve can be fully opened. The outlet valve can also be opened and the bypass (if applicable) can be closed.

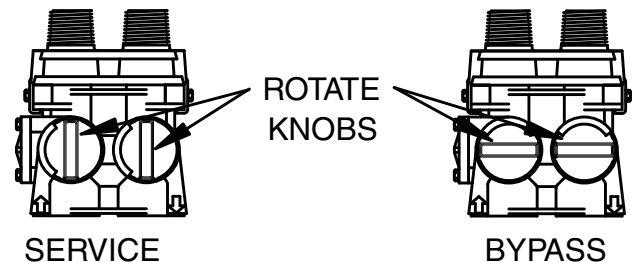


Figure 4. Bypass Valve

Step 12

On time clock initiated models, set regeneration frequency. Refer to Regeneration Frequency Schedules (Section 3) to determine correct frequency, then refer to How To Set Time Clock Regeneration Control (Section 3) for instructions on setting frequency. For meter initiated models, refer to How To Set Meter Regeneration Control.

NOTE: Regeneration settings for both time clock and meter initiated models are factory preset for the most efficient salt use and minimum water consumption used for regeneration (as little as 30 gallons), and conform to the industry salt efficiency standards (required by some states). Regeneration frequency schedules are designed for use with factory regeneration settings (listed in Specifications And Operating Data, Section 6).

The control valve design permits adjustment of the salt dosage. This adjustment may be necessary when unusual operating conditions exist, such as high concentrations of iron or hardness and/or high flow rates or daily water consumption (refer to "How To Set Regeneration Cycle Program" Section 3) for adjustment procedures.

NOTE: For salt dosages greater than 15 lbs (6.8 kg), grid leg extensions must be attached to bottom of grid legs. For salt dosages less than 15 lbs (6.8 kg). DO NOT use extension legs.

Step 13

Set time of day (refer to appropriate How To Set Time Clock/Meter Regeneration Control, Section 3). When shifting to daylight saving time (and back), you may wish to adjust time of day accordingly.

NOTE: time of regeneration is preset for 2:00 a.m. because at this time water consumption is generally minimal (a built-in hard water bypass does, however, permit water to be drawn during regeneration). Should your life style require regular use of water during the 2:00 to 3:00 a.m. regeneration period, or if other water treatment equipment is also set for 2:00 a.m. regeneration, the time of regeneration will need changing. Refer to Section 3, How To Set Time Clock Regeneration Control, for adjustment procedure.

Step 14

Before loading salt, using a pail or garden hose, add approximately 3 gals. water to brine tank (6 gals. for units with extended grid legs). Then add initial salt fill to brine tank, and one cup full of unscented laundry bleach to brine well.

Step 15

Put softener through complete regeneration to sanitize the system before use (Refer to How To Set Time Clock (or Meter) Regeneration Control for instructions on manual regeneration). Restore fuel supply or power to water heater.

Installation is now complete, and your water softener is now ready for service!

SPECIAL SERVICE INSTRUCTIONS:

Under normal circumstances removal of the valve should not be required. However, if it must be removed, disconnect the plumbing attached to the bypass valve first. Then, rotate the valve head assembly to the left or counter-clockwise. Before attempting any disassembly, pressure should be relieved by shutting off water to the system and opening a faucet. Upon reassembly, all o-rings should be lubricated with silicone grease. Reattach valve head assembly by rotating to the right or clockwise until valve head assembly is seated to the tank hand tight. Reconnect the plumbing to the bypass valve.

SECTION 3: REGENERATION INSTRUCTIONS

INSTRUCTIONS FOR USING REGENERATION FREQUENCY SCHEDULES:

(Time clock initiated models only)

- 1) Determine ADJUSTED HARDNESS by adding three (3) times the iron content in parts per million (ppm) to the hardness in grains per gallon (gpg). The resulting number is ADJUSTED HARDNESS.

EXAMPLE: Hardness is 14 gpg and iron is 2 ppm. ADJUSTED HARDNESS is 20 gpg (14 plus 3 times 2).

- 2) Select REGENERATION FREQUENCY SCHEDULE corresponding to your model. Locate box intersected by NUMBER IN FAMILY and ADJUSTED HARDNESS (if ADJUSTED HARDNESS is between two numbers in schedule, use higher number). Number in box represents FREQUENCY or NUMBER OF TIMES PER 12 DAYS time clock should be set to regenerate. Refer to HOW TO SET TIME CLOCK REGENERATION CONTROL to set correct frequency.

EXAMPLE: You have Model CS1001, 4 in family and 20 gpg adjusted hardness. Refer to REGENERATION FREQUENCY SCHEDULE for Model Series 1001 and locate box intersected by 4 in family and 20 gpg adjusted hardness. The figure "3" in box indicates a REGENERATION frequency of THREE TIMES PER 12 DAYS (if a "1", "2", "4", etc. were in box, frequencies of once twice and four times per twelve days, respectively, would be indicated.)

REGENERATION FREQUENCY SCHEDULES (TIMES PER 12 DAYS)

Model CS1001

Persons in Family	Hardness -- GPG											
	5	10	15	20	25	30	35	40	45	50	55	60
1	1	1	1	1	1	2	2	2	2	2	2	2
2	1	1	2	2	2	3	3	3	4	4	4	6
3	1	2	2	3	3	4	4	6	6	6	6	12
4	1	2	3	3	4	6	6	6	12	12	12	12
5	1	2	3	4	6	6	12	12	12	12	12	12
6	2	3	4	6	6	12	12	12	12	12	12	
7	2	3	4	6	6	12	12	12	12			
8	2	3	6	6	12	12	12	12				

Model CS1501

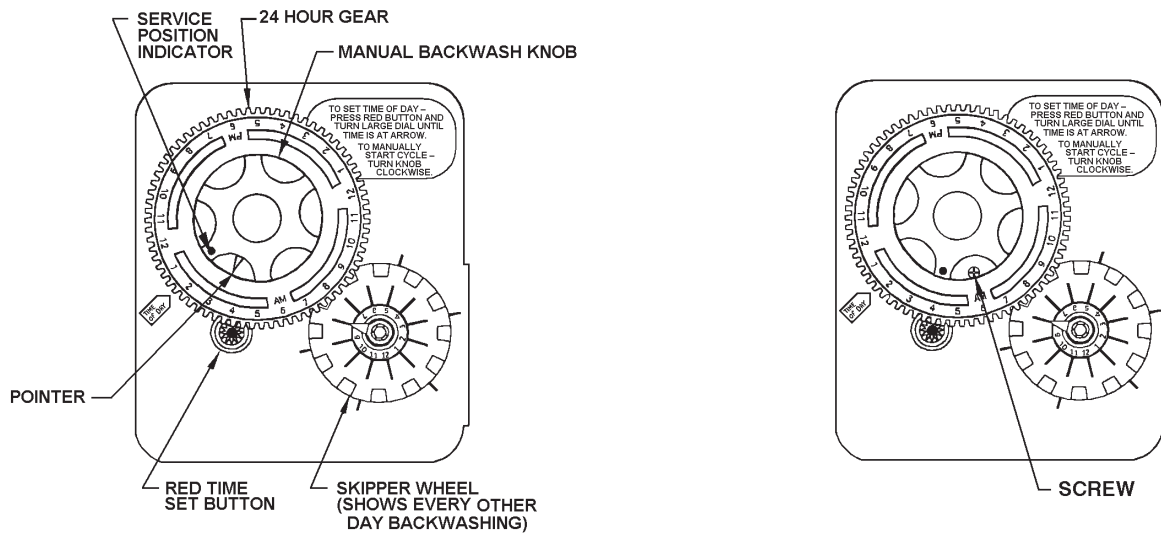
Persons in Family	Hardness -- GPG														
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2
2	1	1	1	1	2	2	2	2	3	3	3	3	3	4	4
3	1	1	1	2	2	3	3	3	4	4	4	6	6	6	6
4	1	1	2	2	3	3	4	4	6	6	6	6	6	12	12
5	1	2	2	3	3	4	4	6	6	6	12	12	12	12	12
6	1	2	3	3	4	6	6	6	12	12	12	12	12	12	12
7	1	2	3	4	4	6	6	12	12	12	12	12	12	12	12
8	1	2	3	4	6	6	12	12	12	12	12	12	12		
9	1	3	4	6	6	12	12	12	12	12	12				
10	2	3	4	6	6	12	12	12	12	12					

REGENERATION FREQUENCY SCHEDULES (Cont'd)
(TIMES PER 12 DAYS)

Model CS2001

Persons in Family	Hardness -- GPG																	
	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2
2	1	1	1	1	1	2	1	2	2	2	2	3	3	3	3	3	3	4
3	1	1	1	2	2	2	2	3	3	3	3	4	4	4	4	6	6	6
4	1	1	2	2	2	3	2	3	4	4	4	6	6	6	6	6	6	12
5	1	1	2	2	3	3	3	4	4	6	6	6	6	12	12	12	12	12
6	1	2	2	3	3	4	3	6	6	6	6	12	12	12	12	12	12	12
7	1	2	2	3	4	4	4	6	6	12	12	12	12	12	12	12	12	12
8	1	2	3	3	4	6	4	6	12	12	12	12	12	12	12	12	12	
9	1	2	3	4	4	6	6	12	12	12	12	12	12	12	12			
10	1	2	3	4	6	6	6	12	12	12	12	12	12					

HOW TO SET TIME CLOCK REGENERATION CONTROL



Above time clock shown in the SERVICE POSITION with dot opposite TIME OF DAY ARROW.

HOW TO SET DAYS ON WHICH WATER SOFTENER IS TO REGENERATE:

Rotate the skipper wheel until the number "1" is at the red pointer. Set the days that regeneration is to occur by sliding tabs on the skipper wheel outward to expose trip fingers. Each tab is one day. Finger at red pointer is tonight. Moving clockwise from the red pointer, extend or retract fingers to obtain the desired regeneration schedule.

HOW TO SET THE TIME OF DAY:

- 1) Press and hold the red button in to disengage the drive gear.
- 2) Turn the large gear until the actual time of day is opposite the time of day pointer.
- 3) Release the red button to again engage the drive gear.
- 4) Time of regeneration is preset for 2:00 a.m.

HOW TO MANUALLY REGENERATE YOUR WATER SOFTENER AT ANY TIME:

Turn the manual regeneration knob clockwise.

A slight, clockwise movement of the manual regeneration knob engages the program wheel and starts the regeneration program.

The black center knob will make one revolution in the following approximately three hours and stop in the position shown in the drawing (SERVICE POSITION).

Even though it takes three hours for this center knob to complete one revolution, the regeneration cycle of your unit might be set only one-third of this time.

In any event, conditioned water may be drawn after rinse water stops flowing from the water softener drain line.

HOW TO ADJUST REGENERATION TIME:

- 1) Disconnect the power source.
- 2) Locate the three screws behind the manual regeneration knob by pushing the red button in and rotating the 24 hour dial until each screw appears in the cut out portion of the manual regeneration knob.
- 3) Loosen each screw slightly to release the pressure on the time plate from the 24 hour gear.
- 4) Locate the regeneration time pointer on the inside of the 24 hour dial in the cut out.
- 5) Turn the time plate so the desired regeneration time aligns next to the raised arrow.
- 6) Push the red button in and rotate the 24 hour dial. Tighten each of the three screws. DO NOT OVERTIGHTEN.
- 7) Push the red button and locate the pointer one more time to ensure the desired regeneration time is correct.
- 8) Reset the time of day and restore power to the unit.

HOW TO SET REGENERATION CYCLE PROGRAM

The regeneration cycle program on your water softener has been factory preset, however, portions of the cycle or program may be lengthened or shortened in time to suit local conditions.

To expose cycle program wheel, grasp time clock in upper left-hand corner and pull, releasing snap retainer and swinging time clock to the right.

To change the regeneration cycle program, the program wheel must be removed. Grasp program wheel and squeeze protruding lugs toward center, lift program wheel off time clock. (Switch arms may require movement to facilitate removal.)

After making any desired changes, as desired below, return program wheel dial to closed position.

Return time clock to closed position engaging snap retainer in back plate. Make certain all electrical wires locate above snap retainer post.

HOW TO CHANGE THE LENGTH OF THE BACKWASH TIME:

The program wheel as shown in the drawing is in the service position. As you look at the numbered side of the program wheel, the group of pins starting at zero determines the length of time your unit will backwash.

FOR EXAMPLE: If there are six pins in this section, the time of backwash will be 12 min. (2 min. per pin). To change the length of backwash time, add or remove pins as required. The number of pins times two equals the backwash time in minutes.

HOW TO CHANGE THE LENGTH OF BRINE AND RINSE TIME:

The group of holes between the last pin in the backwash section and the second group of pins determines the length of time that your unit will brine and rinse. (2 min. per hole)

To change the length of brine and rinse time, move the rapid rinse group of pins to give more or fewer holes in the brine and rinse section. Number of holes times two equals brine and rinse time in minutes.

HOW TO CHANGE THE LENGTH OF RAPID RINSE:

The second group of pins on the program wheel determines the length of time that your water softener will rapid rinse (2 minutes per pin).

To change the length of rapid rinse time, add or remove pins at the higher numbered end of this section as required. The number of pins times two equals the rapid rinse time in minutes.

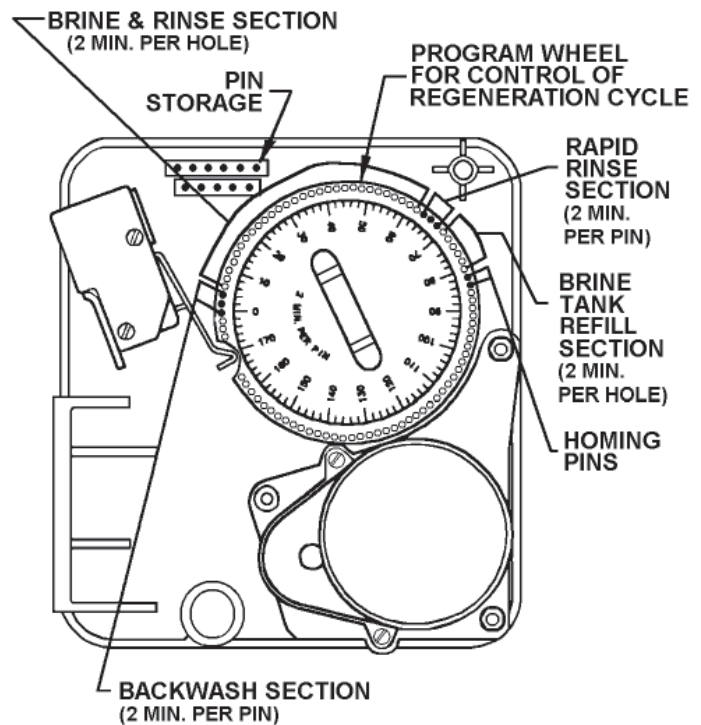
HOW TO CHANGE THE LENGTH OF BRINE TANK REFILL TIME:

The second group of holes on the program wheel determines the lengths of time that your water softener will refill the brine tank. Each hole represents 2 mins. and 3 pounds of salt.

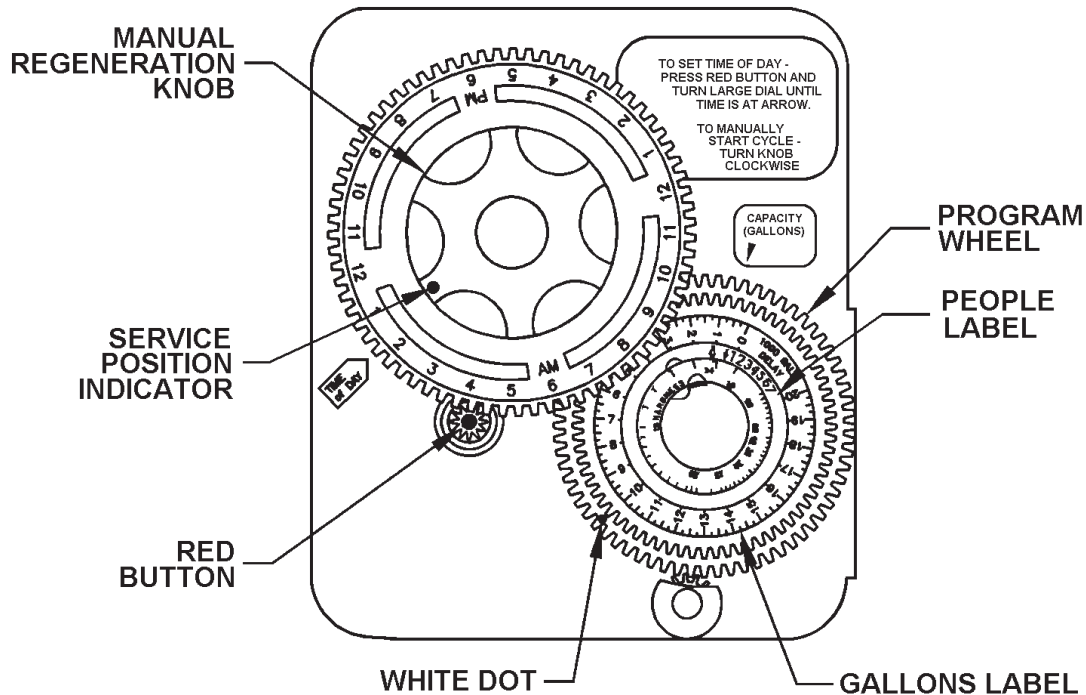
To change the length of refill time, move the two pins at the end of the second group of holes as required.

The regeneration cycle is complete when the outer micro-switch is tripped by the two pin set at end of the brine tank refill section. The program wheel, however, will continue to rotate until the inner micro-switch drops into the notch on the program wheel.

NOTE: For salt dosages greater than 15 lbs. (6.8 kg) grid leg extensions must be attached to bottom of grid legs.



HOW TO SET METER REGENERATION CONTROL



TYPICAL RESIDENTIAL APPLICATION:

To program, just set the time, set the hardness and it automatically monitors system needs and regenerates only when necessary. To set time of day press red time set button and turn 24-hour gear until present time of day is opposite "time of day arrow." Set program wheel by lifting the "people" dial and rotating it so that the number of people in the household is aligned with the grains per gallon water hardness (adjusted hardness*) scale. Release the dial and check for firm engagement at setting. (This method will provide reserve capacity of one day's supply based on 75 gallons per person.)

OPTIONAL PROGRAMMING PROCEDURE:

Calculate the gallon capacity of the system, subtract the necessary one day's reserve requirement and set the gallons available opposite the small white dot on the program wheel gear. The capacity (gallons) arrow denotes remaining gallons exclusive of fixed reserve.

HOW TO SET TIME OF DAY:

- (1) Press and hold the red button in to disengage the drive gear.
- (2) Turn the large gear until the actual time of day is opposite the time of day pointer.
- (3) Release the red button to again engage the drive gear.

HOW TO MANUALLY REGENERATE YOUR WATER SOFTENER AT ANY TIME:

A slight, clockwise movement of the manual regeneration knob engages the program wheel and starts the regeneration process.

The black center knob will make one revolution in the following approximately three hours and stop in the position shown in the drawing.

Even though it takes three hours for this center knob to complete one revolution, the regeneration cycle of your unit might be set for only one-third of this time.

In any event, conditioned water may be drawn after rinse water stops flowing from the water softener drain line.

NOTE: The backside of the time clock is set the same as the standard time clock regenerated models.

* Adjusted hardness equals hardness in grains per gallon (gpg) plus three times the iron in parts per million (ppm).

SECTION 4: MAINTENANCE

REPLENISHMENT OF SALT SUPPLY:

The salt storage capacity of the brine tank is approximately 160 lbs (72.6 kg). During each regeneration a specific amount of salt is consumed, thus requiring its periodic replenishment (the frequency is dependent on the regeneration schedule). Always replenish salt before the supply is exhausted to assure a continuous supply of softened water.

TYPE OF SALT TO USE:

Any type of water softener salt may be used. There are advantages and disadvantages to every type of salt. Please ask your local dealer for advice. Your unit is designed to compensate for the disadvantages. 3M does not recommend the use block type salt.

BRINE TANK CLEAN-OUT:

As part of routine maintenance, the brine tank should be emptied and flushed out with a garden hose when dirt and other insolubles accumulate. The clean-out frequency depends on the type salt used and regeneration frequency. The clean-out should be done when the salt level is low. Steps to follow:

- (1) Disconnect brine line at either end.
- (2) Turn brine tank upside down and discard old salt.
- (3) Rinse out with a garden hose.
- (4) Reconnect brine line.
- (5) Add about 3 gallons of water (6 gallons for units with extended grid legs) to brine tank before adding new salt. Perform approximately once a year if rock salt is used; with other types of salt, approximately once every other year.

PREVENTING IRON-FOULING OF MINERAL BED:

If iron is present in the water supply, the softener mineral bed will eventually become iron-fouled, resulting in reduced softening capacity and rust-stained fixtures. Mixing one to two ounces of Mineral Cleaner with every 80 lbs. of salt added to brine tank will minimize these problems from occurring. Mineral Cleaner is available from your dealer.

PERIODICALLY CHECK TIME OF DAY SETTING:

Power outages will cause Time Of Day time clock setting to become incorrect. To reset, refer to appropriate How To Set Time Clock (Or Meter) Regeneration Control page, Section 3.

MALFUNCTION OF UNIT:

Your water softener, under normal conditions, should provide years of trouble-free service; however, since it is a mechanical device, it can malfunction. (Refer to Section 5, SERVICE INSTRUCTIONS, if necessary).

CHANGE OF OPERATING CONDITIONS:

Should your family size, your water usage habits, or your water quality change, the regeneration program settings may have to be adjusted. Consult your dealer if any of the above occur.

SPECIAL SERVICE INSTRUCTIONS:

Under normal circumstances removal of the valve should not be required. However, if it must be removed, disconnect the plumbing attached to the bypass valve first. Then, rotate the valve head assembly to the left or counter-clockwise. Before attempting any disassembly, pressure should be relieved by shutting off water to the system and opening a faucet. Upon reassembly, all o-rings should be lubricated with silicone grease. Reattach valve head assembly by rotating to the right or clockwise until valve head assembly is seated to the tank hand tight. Reconnect the plumbing to the bypass valve.

SECTION 5: SERVICE INSTRUCTIONS

PROBLEM		POSSIBLE CAUSE		SOLUTION	
1	Hard water, (unit not using salt; liquid level in brine tank not too high).	A.	Electrical service to unit interrupted.	A.	Assure permanent electrical service (check fuse, plug, pull chain or switch).
		B.	Time clock not working.	B.	Replace time clock motor.
		C.	Time clock improperly set.	C.	Increase frequency of regeneration and/or setting.
		D.	Safety brine valve not opening.	D.	Replace safety brine valve.
		E.	Salt "bridged" in brine tank.	E.	Break up salt.
		F.	Control Valve not refilling brine tank in brine refill cycle.	F.	Add shim between backplate and valve body.
2	Hard water, (unit using salt; liquid level in brine tank NOT too high).	A.	Bypass open.	A.	Close bypass (replace if necessary).
		B.	Time clock improperly set.	B.	Increase frequency of regeneration.
		C.	No salt in brine tank.	C.	Add salt; maintain above water level.
		D.	Excessive water usage.	D.	Increase frequency of regeneration and/or salt setting (See HOW TO SET Time clock).
		E.	Unit installed backwards.	E.	Reinstall unit.
		F.	Unit undersized.	F.	Replace with larger unit.
3	Liquid level in brine tank TOO high.	A.	Brine valve not closing.	A.	Replace brine valve.
		B.	Salt setting too high.	B.	Reset time clock.
		C.	Injector screen plugged.	C.	Clean injector and screen.
		D.	Drain line frozen, plugged or restricted.	D.	Free drain.
		E.	Salt "mushed" or sand from salt plugging bottom of brine tank.	E.	Clean out brine tank (see instructions).
		F.	Incorrect brine line flow control (BLFC).	F.	Replace with correct flow control (See specifications).
4	Brine tank not refilling.	A.	Piston stops at incorrect position for refill.	A.	Add shim between backplate and valve body.
5	System regenerates at wrong time-of-day.	A.	Power outage occurred.	A.	Reset time clock.
6	Water continuously flows to drain.	A.	Foreign material in control valve.	A.	Remove piston assembly and inspect bore; remove foreign material and check control in various regeneration positions.
		B.	Internal control leak.	B.	Replace seals and/or piston assembly.
		C.	Control valve jammed in brine or backwash position.	C.	Replace piston, seals and spacers.
		D.	Defective micro-switch.	D.	Replace micro-switch.
7	Water tastes salty.	A.	Salt setting too high.	A.	Reset program cycle.
		B.	Brine draw & rinse cycle too short for salt setting.	B.	Reset program cycle.
		C.	Distributor tube is too short.	C.	Replace distributor tube.
8	White spots on glassware and dark surfaces.	A.	Sodium residual resulting from water having very high hardness or total dissolved solids (TDS).	A.	Installation of additional water treatment equipment such as reverse osmosis or demineralization.
9	Low water pressure (low flow rate).	A.	Iron build-up in line to water softener.	A.	Clean line to water softener.
		B.	Iron build-up in water softener.	B.	Clean control and add Mineral Cleaner to resin bed; increase frequency of regeneration.
		C.	Well pumping sand.	C.	Install sand trap.
		D.	Pump losing capacity.	D.	Contact pump repair service.
10	"Rotten egg" smell (from hot water ONLY).	A.	Magnesium rod in water heater.	A.	Replace with aluminum rod, as per water heater manufacturer recommendations.
11	"Rotten egg" smell (from both and cold water).	A.	Hydrogen sulfide ("sulfur") in water supply.	A.	Install Sulfur Reduction System.
		B.	Bacterial iron in water supply	B.	Install Chem-Free Iron Reduction Filter.
		C.	Algae in water supply.	C.	Pour approximately 1/2 cup unscented laundry bleach into brine well just before regeneration as frequently as necessary.
12	Loss of resin through drain line.	A.	Air in water system.	A.	Assure that well system has proper air eliminator control; check for dry well condition.

SECTION 6: SPECIFICATIONS AND OPERATING DATA

ITEM	Time Clock	CS1001	CS1501	CS2001
	Metered	CSM1001	CSM1501	CSM2001
Nominal Media Volume, cu. ft. (cu. mtr.)		1.0 (0.03)	1.5 (0.04)	2.0 (0.06)
Salt Dose, lbs. (kg)				
Factory Setting		6 (2.7)	9 (4.1)	12 (5.4)
Maximum Setting		15.0 (6.8)	24 (10.9)	24 (10.9)
Softening Capacity, grains (1)				
At Factory Salt Setting		18,600	27,900	37,200
At Maximum Salt Setting		30,000	45,000	54,000
Flow Rate, gpm (lpm) (2)				
Service (10 min. or less)		7.5 (28.45)	9.0 (34)	9.0 (34)
Pressure Loss @ Flow Rates, psi (kPa)				
Continuous (no duration limit)		6.0 (41)	9.0 (62)	9.0 (62)
Service (10 min. or less)		10.2 (70)	15.0 (104)	15.0 (104)
Regeneration Flow Rates, gpm (lpm)				
Backwash (3)		1.5 (5.7)	2.4 (9.1)	2.4 (9.1)
Brine Draw/Brine Rinse		0.45 (1.70)	0.45 (1.70)	0.45 (1.70)
Rapid Rinse		1.5 (5.7)	2.4 (9.1)	2.4 (9.1)
Brine Refill		0.5	0.5	0.5
Factory Regeneration Settings, minutes				
Backwash (3)		4	4	4
Brine Draw/Brine Rinse		46	60	60
Rapid Rinse		4	4	4
Brine Refill		4	6	8
Approx. Water Used. Gal (lit)		30 (115)	43 (163)	45 (170)
Inlet/Outlet Pipe Size, inches (cm)		1.0 (2.5)	1.0 (2.5)	1.0 (2.5)
Media tank Diameter x Height, inches (cm)		8 x 44 (21 x 112)	10 x 44 (26 x 112)	10 x 54 (26 x 137.2)
Minimum Space Requirements W X H X D inches (cm)		33 x 53 x 15 (84 x 135 x 38)	35 x 53 x 15 (89 x 135 x 38)	35 x 63 x 15 (89 x 160 x 38)
Brine Tank WxDxH, inches (cm)		15 x 15 x34 (38 x 38 x 87)	15 x 15 x 34 (38 x 38 x 87)	15 x 15 x 34 (38 x 38 x 87)
Approximate Salt Storage, lbs. (kg)		180 (81.6)	180 (81.6)	180 (81.6)
Approximate Shipping Weight, lbs. (kg)		90 (40.8)	115 (52.2)	145 (65.8)

Maximum operating temperature 110° F (43.3° C)

Electrical requirements 110/120 V, 60 Hz

Operating pressure 20-125 psi (138-862 kPa)

All types water softener salt may be used (see MAINTENANCE).

NOTES:

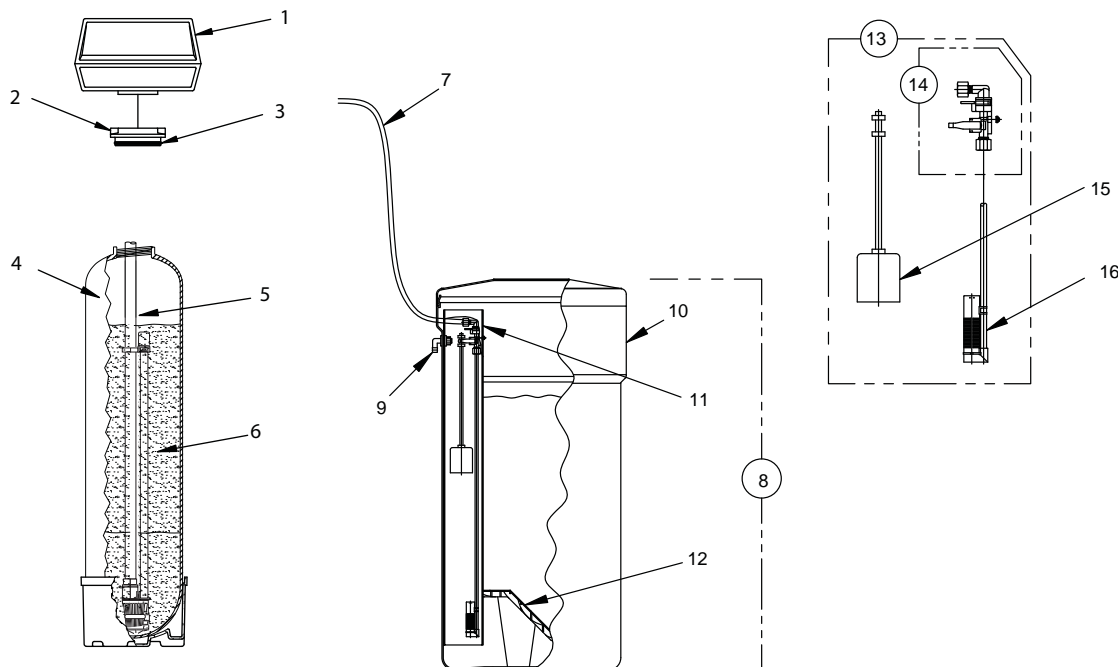
- 1) Actual capacity may vary substantially depending on water analysis and operating conditions.
- 2) For satisfactory performance indicated flow rates and duration should not be exceeded. Flow rates specified are adequate for normal residential applications. Do not use Service Flow Rate if treated water is to supply a geothermal heat pump, swimming pool, etc. (contact dealer before selecting equipment). Service flow rates have been tested against NSF Standard 44 and have a rated pressure drop of less than 15 psi (103 kPa).
- 3) For system to operate properly, pumping rate of well pump MUST be sufficient to backwash unit at rate specified.

SECTION 7: PARTS

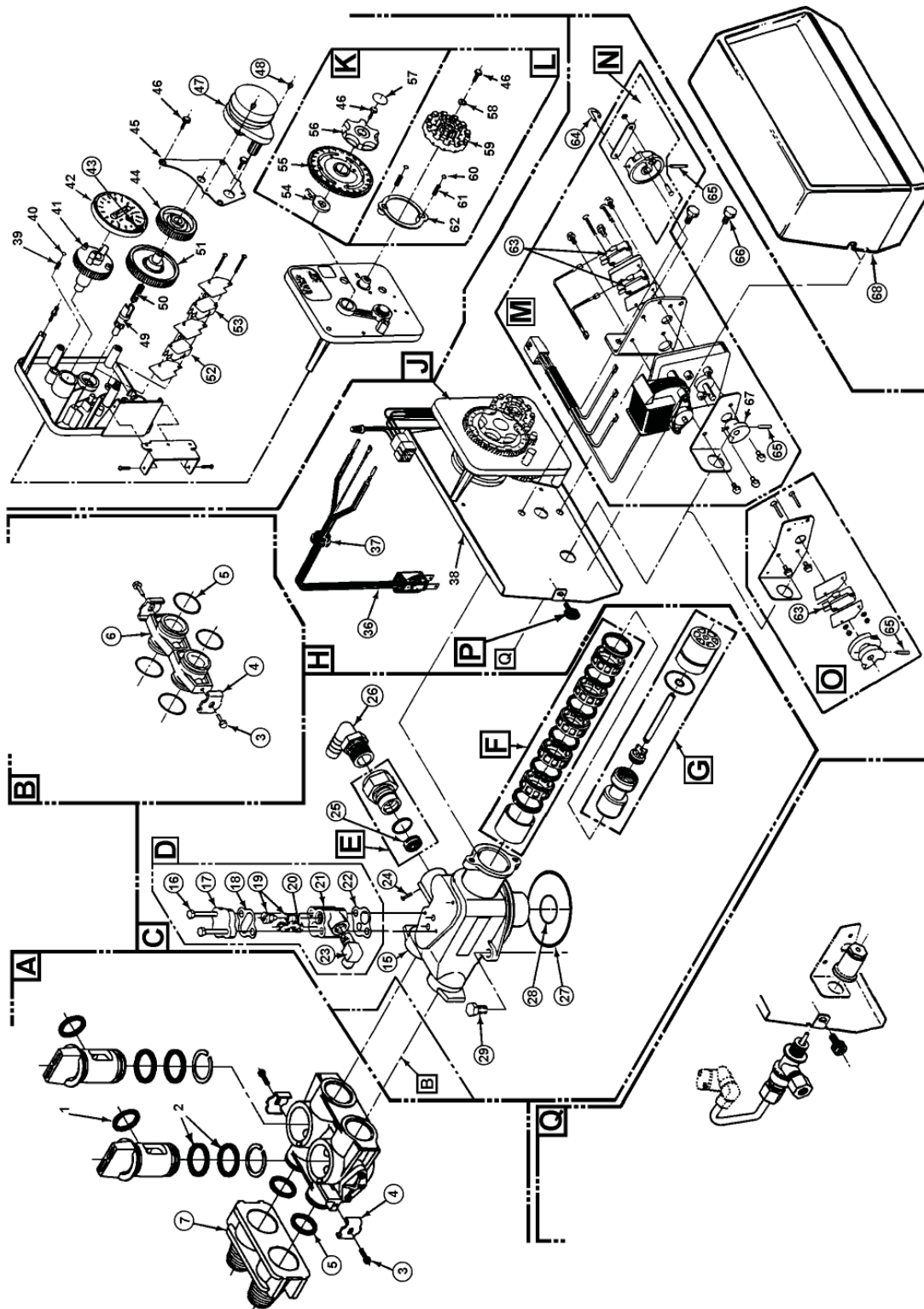
COMPONENT PARTS LIST TWO TANK MODELS (CS & CSM SERIES)

REF NO.	DESCRIPTION	CS1001 CSM1001	CS1501 CSM1501	CS2001 CSM2001
1	Control Valve, Time Clock Initiation, with Cover, less Bypass (CS Series)	C100150-5W3-2N1	C100240-5W3-2N1	C100240-5W3-2N1
	Control Valve, Meter Initiation, with Cover, less Bypass (CSM Series)	C12J150-5W3-2N1	C12N240-5W3-2N1	C12R240-5W3-2N1
2	Adapter Assy., Threaded-CEC (Incl. Ref. 3)	52-87001	52-87001	52-87001
3	O-ring	10381	10381	10381
4	Media Tank w/Base	6236001-0844	6236001-1044	6236001-1054
5	Distributor Tube Assembly	62362-32	62362-32	62362-36
6	Media	H-050P (2)	H-050P (3)	H-050P (4)
7	Brine Line Tubing	13000X	13000X	13000X
8	Brine Tank, Complete	BT1534X	BT1534X	--
	Brine Tank, Complete w/Extension Kit	--	--	BT1534X-EXT
9	Overflow Fitting	BT16	BT16	BT16
10	Brine Tank Shell w/Cover	BT1534L	BT1534L	BT1534L
11	Brine Well w/Cap	BT15BW	BT15BW	BT15BW
12	Grid Plate	BT15GP	BT15GP	--
	Grid Plate w/Extension Kit	--	--	BT15GP-EXT
13	Safety Brine Valve, Complete	BT15SBVA	BT15SBVA	BT15SBVA
14	Safety Brine Valve	60014	60014	60014
15	Float Assembly	60068X	60068X	60068X
16	Air Check Assembly	60002	60002	60002

NOTE: When ordering components, always specify model number.



CEC 1000 SERIES SOFTENER CONTROL - 12 DAY TIME CLOCK

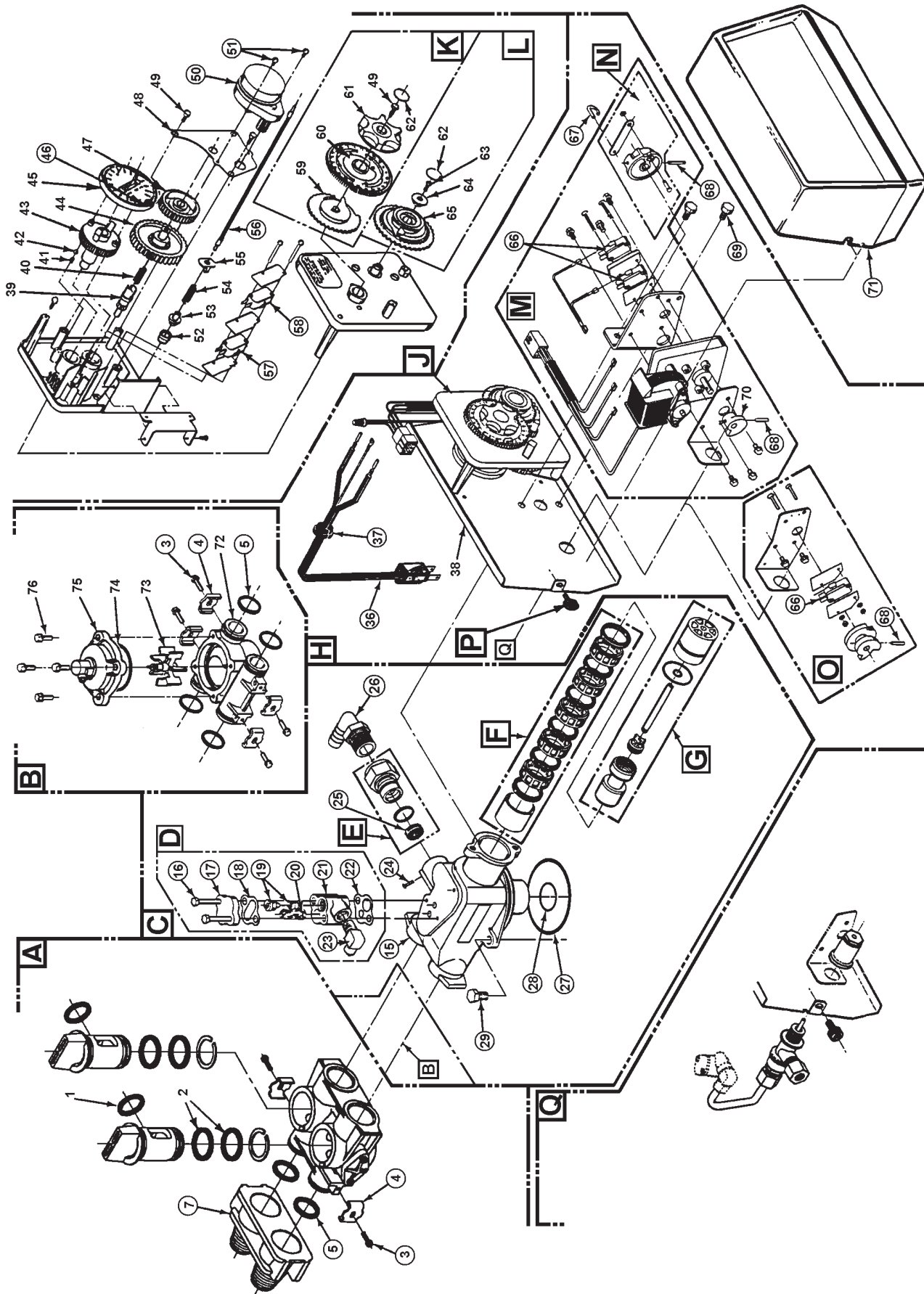


**ONLY THOSE PARTS CIRCLED IN DRAWING AND/OR LISTED BELOW ARE STOCK ITEMS
ALL OTHERS ARE SPECIAL ORDER, NON-RETURNABLE**

PARTS LIST - 12 DAY TIME CLOCK

REF.	PART NO.	DESCRIPTION
A	60049/18706X	1" Bypass Valve Assy. (Incl. 1, 2, 7 & 2 ea. Ref. Items 3-5)
	60049/18706-02X	3/4" Bypass Valve Assy. (Incl. 1, 2, 7 & 2 ea. Ref. Items 3-5) (Optional)
B	10090X	Adapter Coupling Assy. (Incl 2 ea. Ref. Items 3-4, 6 & 4 ea. Item 5)
C	10071	Control Valve Body Assy. (Incl. Ref. Items 15, 26-29, D, E, F & G) (Specify Model)
D	60080	Injector Assy. , Complete (Incl. Ref. Items 16-23) (Specify Model)
E	60705	Drain Line Flow Control Assy. (Incl. Ref. Item 25) (Specify Size)
F	60121C	Seal Kit
G	60090	Piston Kit
H	60407-05	Power Head Assy., L/Cover 0.5 GPM BLFC (Incl. Ref. Items 36-38, 64, 66, G, J, M, O, P & Q)
J	60304-13	Time clock Assy., 12-Day Time Clock (2:00 a.m. Init.) (Incl. Ref. Items 39-53 & K & L)
K	13007-XS	24-Hour Gear Assy. (Incl. Ref. Items 46, 54-57)
L	14381X	Skipper Wheel Assy. (Incl. Ref. Items 46, 58-62)
M	60050-STF	Drive Motor Assy., Complete (Incl. Ref. Items 63, 65, 67 & N)
N	60160-10	Drive Cam Assy. - Black STF (Incl. Ref. Item 65)
O	10025X	FAS Auxillary Switch Assy. (Incl. Ref. Items 63 & 65) (Optional)
P	19367	Cover Mounting Screw
Q	60011-05	1650 Brine Valve Assy. w/BLFC
3	13314	Screw - Adapter Coupling
4	13255	Adapter Clip
5	13305	Coupling O-ring
6	13709	Adapter Coupling
7	18706	1" Adapter Yoke NPT
	18706-02	3/4" Adapter Yoke NPT
15	15058	Control Valve Body - CEC1000
16	10692	Injector Body Screw
17	11893	Injector Cover, Steel (New Style)
18	10229	Injector Cover Gasket
19	10027X	Injector Set (Specify Model)
20	10227	Injector Screen
21	17776	Injector Body (New Style Cover, 11893)
22	11475	Injector Body Gasket
23	069F-04-02	90 deg. Elbow (1/4 pipe x 3/8 tube)
24	11180	Flow Control Retainer Screw
25		DLFC Button (Listed by Model Series):
	12086	1.5 GPM (CS1001 Two Tank)
	12088	2.4 GPM (CS1501, CS2001 Two Tank)
26	12338	Drain Fitting Elbow (1/2 in. Thread to Hose)
27	11208	Seal O-ring
28	11710	Inside Tube O-ring - CEC1000
29	BLT0015	Hex Head Cap Screw
36	11838	Power Cord - 7 ft.
37	13547	Strain Relief - Flat Cord
43	15493	Roll Pin
47	18743	Time clock Motor, 110V
48	13278	Screw - Motor Mounting
52	10896	Micro Switch
53	15320	Micro Switch
63	10218	Micro Switch
64	10909	Connecting Rod Pin
65	10338	Drive Roll Pin
66	10231	Box Mounting Screw
68	14779-5P	Control Cover (Specify Model)

CEC 1000 SERIES SOFTENER CONTROL - METER INITIATED

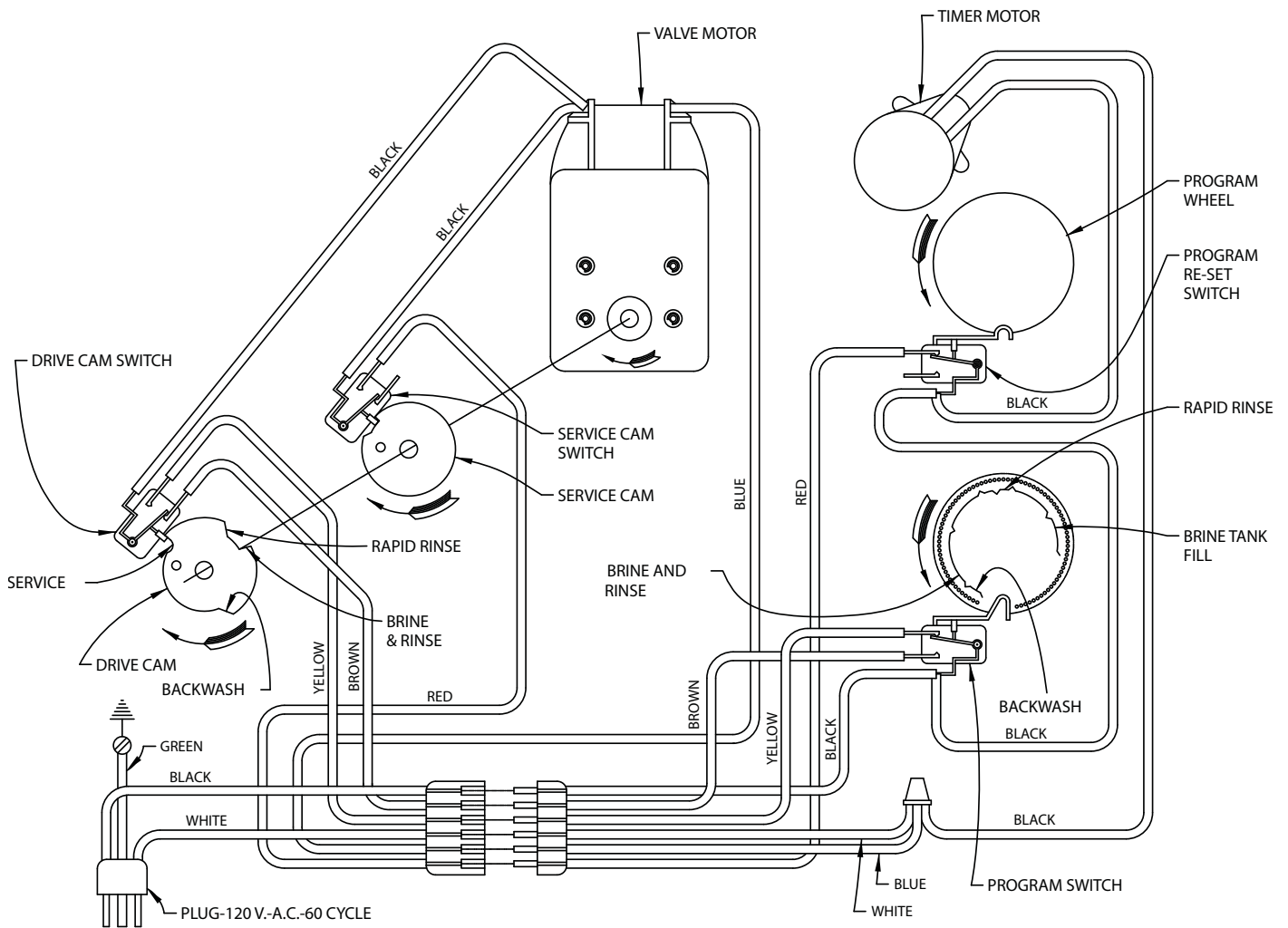


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ALL OTHERS ARE SPECIAL ORDER, NON-RETURNABLE**

METER INITIATED PARTS LIST

REF.	PART NO.	DESCRIPTION
A	60049/18706X	1" Bypass Valve Assy. (Incl. Ref. Items 1, 2, 7, & 2 ea. Ref. Items 3-5)
	60049/18706-02X	3/4" Bypass Valve Assy. (Incl. Ref. Items 1, 2, 7, & 2 ea. Ref. Items 3-5) (Optional)
B	60088	Meter Assy., Standard Range (Incl 4 ea. Ref. Items 3-5 & Ref. Items 72-76)
C	10071	Control Valve Body Assy. (Incl. Ref. Items 15, 24, 26, D,E, F & G) (Specify Model)
D	60080	Injector Assy., Complete (Incl. Ref. Items 16-23) (Specify Model)
E	60705	Drain Line Flow Control Assy. (Specify Size)
F	60121C	Seal Kit
G	60090	Piston Kit
H	60407M-05	Power Head Assy., L/Cover 0.5 GPM BLFC (Incl. Ref. Items 36-38, 67, 69, G, J, M, O, P & Q)
J	60306-13	Time clock Assy., Meter, Standard Range (2:00 a.m. Init.) (Incl. Ref. Items 39-58, K,L)
K	13008X	24-Hour Gear Assy. (Incl. Ref. Items 49, & 59-61)
L	14039X	Program Wheel Assy. (Incl. Ref. Items 62-65)
M	60050-STF	Drive Motor Assy., Complete (Incl. Ref. Items 66, 68-70 & N)
N	60160-10	Drive Cam Assy. - Black STF (Incl. Ref. Items 68)
O	10025X	FAS Auxiliary Switch Assy. (Incl. Ref. Items 66 & 68) (Optional)
P	19367	Cover Mounting Screw
Q	60011-05	1650 Brine Valve Assy. w/BLFC
3	13314	Screw - Adapter Coupling
4	13255	Adapter Clip
5	13305	Coupling O-ring
7	18706	1" Adapter Yoke NPT
	18706-02	3/4" Adapter Yoke NPT
15	15058	Control Valve Body - CEC1000
16	10692	Injector Body Screw
17	11893	Injector Cover, Steel (New Style)
18	10229	Injector Cover Gasket
19	10027X	Injector Set (Specify Model)
20	10227	Injector Screen
21	17776	Injector Body (New Style Cover, 11893)
22	11475	Injector Body Gasket
23	069F-04-02	90 deg. Elbow (1/4 pipe x 3/8 tube)
24	11180	Flow Control Retainer Screw
25		DLFC Button (Listed by Model Series):
	12086	1.5 GPM (CS1001 Two Tank)
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26	12338	Drain Fitting Elbow (1/2 in. Thread to Hose)
27	11208	Seal O-ring
28	11710	Inside Tube O-ring - CEC 1000
29	BLT0015	Hex Head Cap Screw
36	11838	Power Cord - 7 ft.
37	13547	Strain Relief - Flat Cord
46	15493	Roll Pin
50	18743	Time clock Motor, 110v
51	13278	Screw - Motor Mounting
56	14086	Flexible Cable, CEC1000, 11-1/4 in.
57	10896	Micro Switch
58	15320	Micro Switch
66	10218	Micro Switch
67	10909	Connecting Rod Pin
68	10338	Drive Roll Pin
69	10231	Box Mounting Screw
71	14779-5P	Control Cover (Specify Model)

WIRING DIAGRAM FOR VALVE DRIVE MOTOR AND Time clock CEC 1000 SERIES VALVES



SECTION 8: LIMITED WARRANTY

Limited Warranty: 3M Purification Inc. warrants this Product to be free from defects in material and workmanship during normal use for the warranty period set forth below. The warranty period commences from the date of purchase. This warranty does not cover failures resulting from abuse, misuse, alteration or damage not caused by 3M Purification Inc. or failure to follow installation and use instructions. No warranty is given as to the service life of any filter cartridge, membrane, or media as it will vary with local water conditions and water consumption.

3M PURIFICATION INC. MAKES NO OTHER WARRANTIES OR CONDITIONS, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OR CONDITION OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR ANY IMPLIED WARRANTY OR CONDITION ARISING OUT OF A COURSE OF DEALING, CUSTOMER OR USAGE OF TRADE.

If the Product is found defective within the warranty period, your exclusive remedy and 3M Purification Inc.'s sole obligation shall be, at 3M Purification Inc.'s option, to replace or repair the Product or refund the purchase price of the Product. This warranty does not cover labor. The remedy stated in this paragraph is Customer's sole remedy and 3M Purification Inc.'s exclusive obligation.

Warranty Period:

- One (1) year on the entire product unit
- Five (5) years on the media tank only (does not include internal component parts)
- Five (5) years on the control valve
- Five (5) years on salt storage container and components*

Limitation of Liability: 3M Purification Inc. will not be liable for any loss or damage arising from this 3M Purification Inc. product, whether direct, indirect, special, incidental, or consequential, regardless of the legal theory asserted, including warranty, contract, negligence or strict liability. Some states and countries do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

Warranty Claims:

To obtain warranty service, call 1-877-238-9119 or mail your request to: 3M Purification Inc., 400 Research Parkway, Meriden, CT 06450. Proof of purchase (original sales receipt) must accompany the warranty claim, along with a complete description of the Product, model number and alleged defect. **This warranty gives you specific legal rights, and you may have other rights which may vary from state to state, or country to country.**

* Water Softeners only



3M Purification Inc.
400 Research Parkway
Meriden, CT 06450
1-800-222-7880
www.3Mpurification.com

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