

**BIRM FILTER WITH AIR INJECTION ASM  
and high-flow 1" valve**

**MODEL  
NS AIIF2**

**Installation • • Operation • • Maintenance**  
**• • Repair Parts • •**



Printed on recycled paper



## WATER FILTER WARRANTY

Warrantor: North Star Water Conditioning, 1890 Woodlane Drive, Woodbury, MN, 55125

Warrantor guarantees, to the original owner, that:

### One Year Full Warranty:

For a period of one (1) year after installation, all parts will be free of defects in materials and workmanship, and will perform their normal functions.

For a period of one (1) year after installation, labor to repair or replace any part deemed to be defective in materials and workmanship, will be provided at no additional cost.

### Limited Warranties:

Limited ten (10) year warranty, from date of purchase, the salt tank and fiberglass mineral tank will not rust, corrode, leak, burst, or in any other manner, fail to perform their proper functions.

Limited three (3) year warranty, after installation, the electronic control board and valve body will be free of defects in materials and workmanship, and will perform their normal functions.

If, during such respective period, a part proves to be defective, Warrantor will ship a replacement part, directly to your home, without charge. After the first year, labor necessary to maintain this product is not covered by the product warranty.

### General Conditions

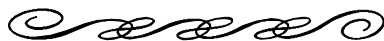
Damage to any part of this water filter because of misuse, misapplication, neglect, alteration, accident, installation or operation contrary to our printed instructions, or damage caused by any unusual force of nature such as, but not limited to, freezing, flood, hurricane, tornado, or earthquake is not covered by this warranty. In all such cases, regular parts and service charges will apply.

We assume no warranty liability in connection with this water filter other than specified herein. This warranty is in lieu of all other warranties, expressed or implied, including warranties of fitness for a particular purpose. We do not authorize any person or representative to assume for us any other obligations on the sale of this water filter.

Should a defect or malfunction occur, contact your contractor. If you are unable to contact your contractor, return the part, freight prepaid, directly to the factory at the address below. Enclose with the part a full description of the problem, with your name, full address, date purchased, model and serial numbers, and selling contractor's name and address. We will repair or replace the part and return it to you at no cost if our repair department determines it to be defective under the terms of the warranty.

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

This water filter is manufactured by North Star Water Conditioning, 1890 Woodlane Drive, Woodbury, MN, 55125; customer information telephone no. 1-800-972-0135.



## SAFETY GUIDES

Follow the installation instructions carefully. Failure to install the filter properly **voids the warranty**.

Before you begin installation, read this entire manual. Then obtain all the materials and tools you will need to make the installation.

**Check local plumbing and electrical codes.** The installation must conform to them.

**NOTE:** Codes in the state of Massachusetts require installation by a licensed plumber. For installation, use plumbing code 248–CMR of the Commonwealth of Massachusetts.

**Use only lead–free solder and flux** for all sweat-solder connections as required by state and federal codes.

Use care when handling the filter. Do not turn upside down, drop, or set on sharp protrusions.

Do not locate the filter where freezing temperatures occur. Do not attempt to filter water over 120°F. **Freezing, or hot water damage voids the warranty.**

Avoid installing in direct sunlight. Excessive sun heat may cause distortion or other damage to non–metallic parts.

The filter requires a **minimum water flow of 5 gallons per minute** at the inlet for *backwash*.

**Recommended maximum allowable inlet water pressure is 80 psi.** Use a pressure reducing valve if necessary. Be sure the addition of a pressure reducing valve will not reduce the flow to less than the 5 gpm needed for backwash.

**This filter controller works on 24 Volt, 60 Hz electrical power only.** Be sure to use the included transformer, and plug it into a nominal 120V, 60 cycle household outlet that is grounded and properly protected by an over–current device such as circuit breaker or fuse. The relay box for the air pump must be plugged into a separate 120V grounded household outlet.

This system is not intended to be used for treating water that is microbiologically unsafe or of unknown quality without adequate disinfection before or after the system.



European Directive 2002/96/EC requires all electrical and electronic equipment to be disposed of according to Waste Electrical and Electronic Equipment (WEEE) requirements. This directive or similar laws are in place nationally and can vary from region to region. Please refer to your state and local laws for proper disposal of this equipment.

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## UNPACKING

The Air Injected Iron Filters are shipped from the factory with the following:

- Filter assembly, packed with quartz and birm ♦
- Air pump
- Relay box assembly
- Transformer
- Parts bag

Thoroughly check the filter for possible shipping damage and parts loss. Also inspect and note any damage to the shipping carton. Notify the transportation company if damage is present. The manufacturer is not responsible for in-transit damages.

Remove and discard (recycle) all packing materials.

♦ **Note:** Do not backwash this unit for 24 hours. The birm will initially retain large amounts of air. If it is backwashed before the air is removed, the valve may become plugged with birm particles, or particles may be flushed to the drain.

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## SPECIFICATIONS / DIMENSIONS

Filter Type ..... *Oxidizing*  
 Type of Mineral ..... *Birm*  
 Amount of Mineral ..... *1 cu ft*  
 Amount of Gravel ..... *17 lbs*  
 Recommended **Maximum** Water  
 Supply Pressure ..... *80 psi*  
 Maximum Water Temperature . *120 °F*  
 Minimum Water Supply pH ... *7.0*  
**Maximum** Service Flow ..... **5.0 gpm**  
**Minimum** Backwash Flow ① .. **5.0 gpm**  
 Minimum In-Out Pipe Size ... *3/4 in.*  
 Electrical: Filter Timer ..... *24V, 60 Hz*  
                   Air Pump ..... *120V, 60 Hz*

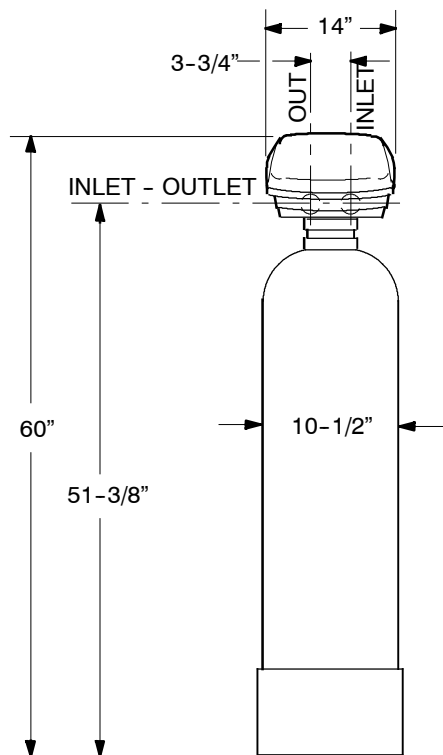
Some feed water with high iron concentrations, or low pH may require limited service flows or a neutralizer filter before the system.

		TABLE 1			
		pH			
		6.5	7.0	7.5	8.0
IRON CONC.	2 PPM	4*	4	6	8
	5 PPM	4*	4*	5	7
	10 PPM	4*	4*	4	6
	15 PPM	4*	4*	4*	5
	20 PPM	4*	4*	4*	4
* Neutralizer needed					

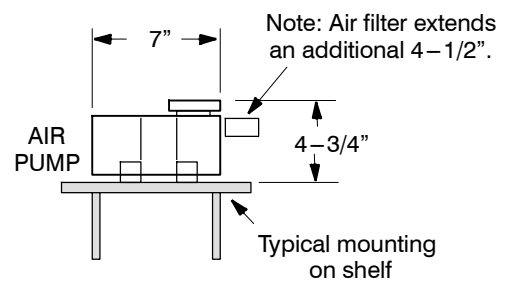
### Contaminant Removal Limitations:

- ☞ up to 10 ppm iron\* and 3ppm hydrogen sulfide at pH of 7.0 and higher
  - ☞ up to 20 ppm iron\* and 2ppm hydrogen sulfide at pH of 8.0 and higher
    - ☞ up to 2 ppm manganese at pH of 8.5 and higher
- \* *except*, bacterial and organically bound iron

① **A minimum flow of 5 gpm is required for filter backwash.**

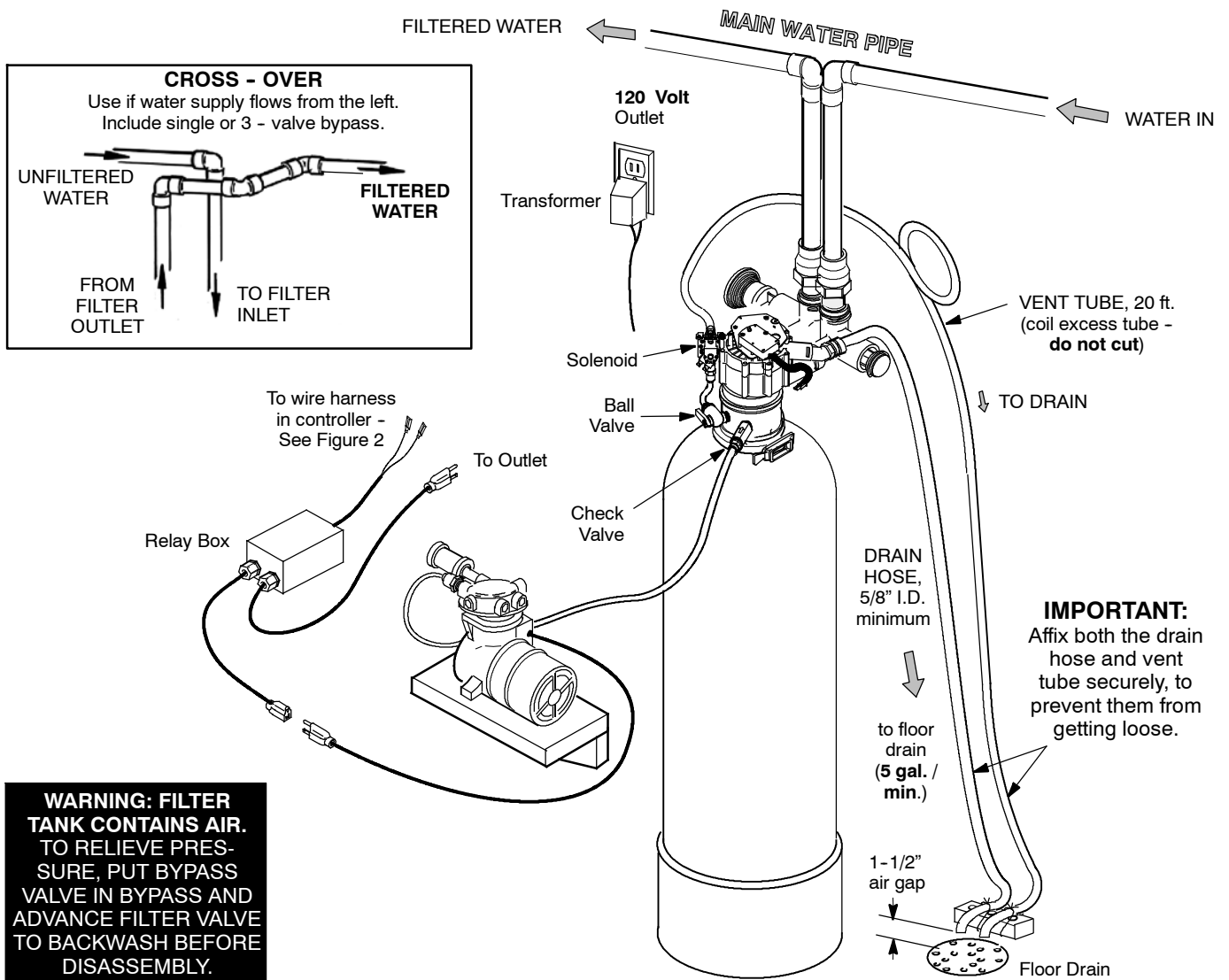


<b>Nominal Mineral Tank Size</b>	10" dia. by 47" high
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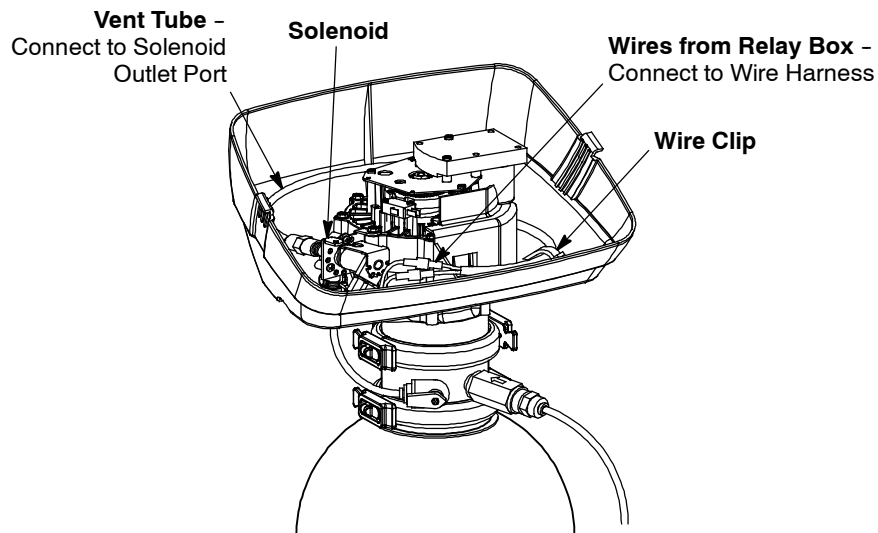


**FIGURE 1**

**TYPICAL FINISHED INSTALLATION**



**FIGURE 2**



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## ► INLET - OUTLET PLUMBING OPTIONS

1. ALWAYS INSTALL either a single bypass valve, #7214383, or a 3 valve bypass system.
2. Use 1" ... or, 3/4" (minimum) pipe and fittings.
3. Use sweat copper... or, threaded pipe\*... or, PVC plastic pipe.\*

\*Sweat soldering is required to adapt to the fittings (1" male) supplied with the filter, or obtain approved compression adaptors. The following special fittings are available from Ecodyne. **Be sure to comply with all local plumbing codes.**

### OPTIONAL INLET/OUTLET FITTINGS



— #7104546 PVC Nipple – Use in place of included copper inlet and outlet tubes.



— #7129211 Adaptor Fitting, 1–1/2" (2) – Use in place of included copper inlet and outlet tubes.



— #7120259 Elbow – Extends inlet and/or outlet in any 90° direction.

## ► OTHER REQUIREMENTS

4. A drain is needed for recharge discharge water. A standpipe, close to the filter is preferred. A laundry tub, floor drain, etc., are other options.

**CAUTION:** Drain water exits the hose at a fast flow rate, and at water system pressure. Be sure the hose is fastened in some manner to prevent "whipping" and splashing to prevent water damage to surrounding area.

5. A 120v–60Hz, grounded electrical outlet (continuously "live") is needed within 10' of the filter.

## ► TOOLS YOU MAY NEED

- tape measure
- pliers
- tubing cutter
- pipe joint compound
- LEAD-FREE solder and flux
- common screwdriver
- adjustable wrench
- propane torch
- primer
- cross-point screwdriver
- hacksaw
- emery cloth, sandpaper or steel wool
- solvent cement

## ► MATERIALS YOU WILL NEED

- bypass valve, or 3 valves
- pipe and fittings as required
- 5/8" I. D. minimum drain hose, either standard garden hose, or hose onto a barb fitting\*

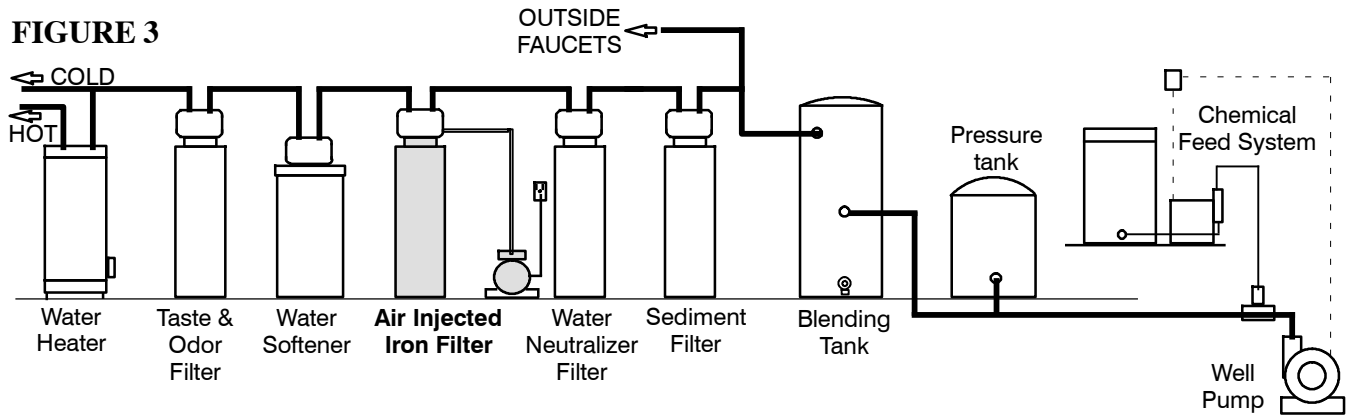
\***VALVE DRAIN OPTIONS:** Flexible drain hose is not allowed in all localities (check your codes). For a rigid valve drain run, plumb according to local codes. To connect to the valve drain fitting, purchase an adaptor, garden hose thread x 5/8" (minimum) tube.

## ► SELECT INSTALLATION LOCATION

Consider all of the following when selecting an installation location for the filter selected.

- To filter all water in the home, install the filter close to the water supply inlet. To conserve filtered water, outside faucets should remain on raw water.
  - If other water conditioning equipment is installed, locate as shown in Figure 3.
  - A nearby drain is needed to carry away recharge discharge water. A standpipe is preferred, with a laundry tub, floor drain, etc., as other options (check your local codes).
  - The filter works on 24 volts only. A transformer is included (FOR INDOOR USE) to reduce 120V–60 Hz house electrical power. Provide an approved, grounded outlet within 10' of the filter. The filter includes a 10' power cable for connection between the transformer and the timer.
  - Position the filter at least 6" from surrounding walls, or other appliances, to allow access for servicing.
  - If installing the filter in an outside location, be sure to provide protection from the elements, contamination, vandalism, and sunlight heat. The sun's heat can melt plastic parts.
-

**FIGURE 3**



## INSTALLATION STEPS

### IMPORTANT SANITIZING PROCEDURES

Care is taken at the factory to keep your water filter clean and sanitary. Materials used to make the filter will not infect or contaminate your water supply, and will not cause bacteria to grow. However, during shipping, storage, installing and operating, bacteria could get into the filter. For this reason, sanitizing as follows is suggested\* when installing.

- a. Pour about 1 oz. or 2 oz. of the following disinfectant into the valve **inlet** fitting.
  - Calcium hypochlorite, available in granular or tablet form, under trade names such as Perchloron or HTH  
– OR –
  - Common 5.25% household bleach (Clorox, Linco, Bo Peep, White Sail, Eagle, etc. brands)
- b. Sanitizing will be continued when you complete step 9 on page 9.

\*Sanitizing is recommended by the Water Quality Association for disinfecting. On some water supplies, they suggest periodic sanitizing.

### 1. INSTALL INCLUDED SINGLE BYPASS VALVE and/or INSTALLATION ADAPTORS

**NOTE:** All fittings are in the parts bag.

- a. Push the bypass valve, with lubricated o–ring seals in place, into the valve inlet and outlet ports, Figure 5. Be sure the o–ring sealing surface is clean.

– AND/OR –

- b. Slide plastic installation adaptors, with lubricated o–ring seals in place, into the filter valve or bypass valve inlet and outlet ports, Figure 4 and Figure 5. Be sure the o–ring sealing surface is clean.

**NOTE:** Be sure the turbine and support are in place in the valve outlet, as shown in Figure 4 and Figure 5.

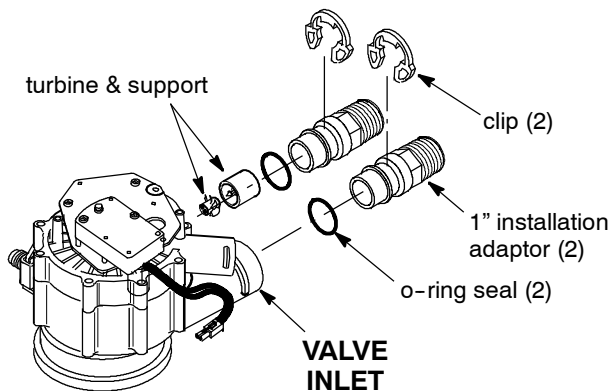
- c. Snap the two large plastic clips into place, from the top down, Figure 4 and Figure 5. Be sure they snap into place. Pull on the bypass valve, or installation adaptors, to make sure they are held securely in place.

**NOTE:** For lubrication, use silicone grease approved for use on potable water supplies.

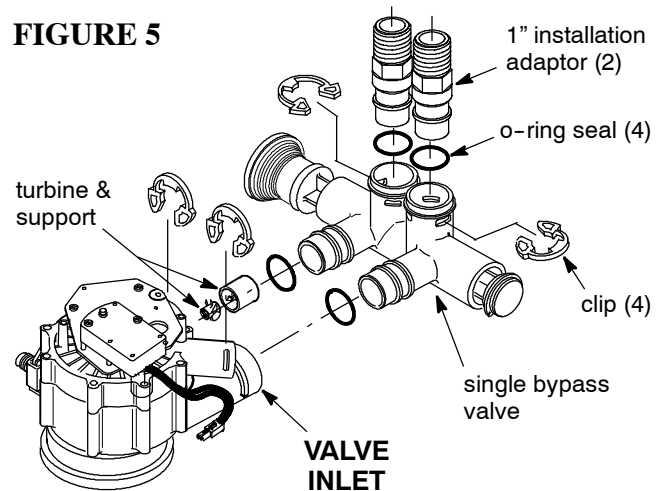
### 2. TURN OFF WATER SUPPLY

- a. Close the main water supply valve, near well pump or water meter.
- b. Shut off the electricity or fuel supply to the water heater.
- c. Open high and low faucets to drain all water from hose pipes.

**FIGURE 4**



**FIGURE 5**



### **3. INSTALLING 3-VALVE BYPASS**

If installing a 3-valve bypass system, plumb as needed. If installing sweat copper, be sure to **USE LEAD-FREE SOLDER** as required by Federal and State codes. Use pipe joint compound on outside pipe threads. Use pipe joint compound on outside pipe threads.

### **4. MOVE FILTER INTO PLACE**

Move the filter into the installation position, setting on a solid, smooth and level surface.

**CAUTION:** DO NOT PLACE SHIMS DIRECTLY UNDER THE FILTER. The weight of the tank may cause the tank base to fracture at the shim.

### **5. ASSEMBLE INLET AND OUTLET PLUMBING**

Measure, cut and loosely assemble pipe and fittings from the main water pipe, or from bypass valves installed in step 3, to the filter inlet and outlet copper tubes.

BE SURE UNFILTERED WATER SUPPLY PIPE GOES TO THE FILTER INLET SIDE. Trace the water flow direction to be sure.

### **6. CONNECT INLET AND OUTLET PLUMBING**

Complete the inlet and outlet plumbing as applicable.

#### **a. SOLDERED COPPER**

- (1) Thoroughly clean and apply solder flux to all joints.
- (2) Make all solder connections.

NOTE: Do not solder with plumbing attached to installation adaptors and single bypass valve. Soldering heat will damage the adaptors and valve.

IMPORTANT: Secure ground clamp to metal pipes.

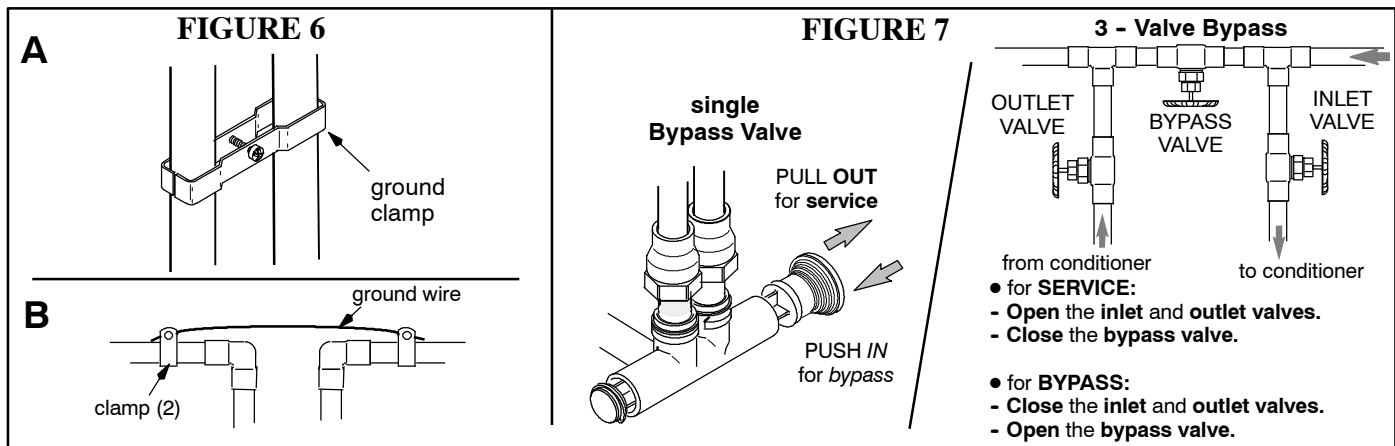
#### **b. THREADED PIPE**

- (1) Apply pipe joint compound or Teflon tape to all male pipe threads.
- (2) Tighten all threaded joints and make all solder connections.

IMPORTANT: Secure ground clamp to metal pipes.

#### **c. CPVC PLASTIC PIPE**

- (1) Clean, prime and cement all joints, following the manufacturer's instructions supplied with the plastic pipe and fittings.



## 7. COLD WATER PIPE GROUNDING

The house cold water pipe (metal only) is often used as a ground for the house electrical system. The 3–valve bypass type, if installed, will maintain ground continuity. If you use the plastic bypass valve at the filter, continuity is broken. To restore the ground, install one of the following grounds.

- Use the included ground clamp to jumper across the inlet and outlet copper tubes Figure 6a.
- Install a #4 copper wire across the removed section of main water pipe, securely clamping on both ends, Figure 6b.

## 8. INSTALL VALVE DRAIN HOSE

**a.** Connect a length of 5/8" I.D. (minimum) hose to the valve drain elbow on the controller, Figure 1. The elbow accepts a standard garden hose onto the threads.

**NOTE:** Flexible drain hose is not allowed in all localities. See option on page 6.

**b.** Route the hose to the drain point (standpipe, laundry tub, floor drain, etc.) as typically shown in Figure 1. **Affix the end of the hose securely** to prevent “whipping” during recharges. Be sure to provide a 1 – 1/2” minimum air gap, to prevent possible sewer water backup.

**NOTE:** Avoid long drain hose runs, or elevating the hose.

## 9. INSTALL VENT TUBE

**a.** Locate the 20’ coil of 1/4” O.D. tubing included with the filter. Connect one end of the tubing to the outlet port of the solenoid valve, Figure 2.

**NOTE:** Do not cut the vent tubing – use the entire 20’ length.

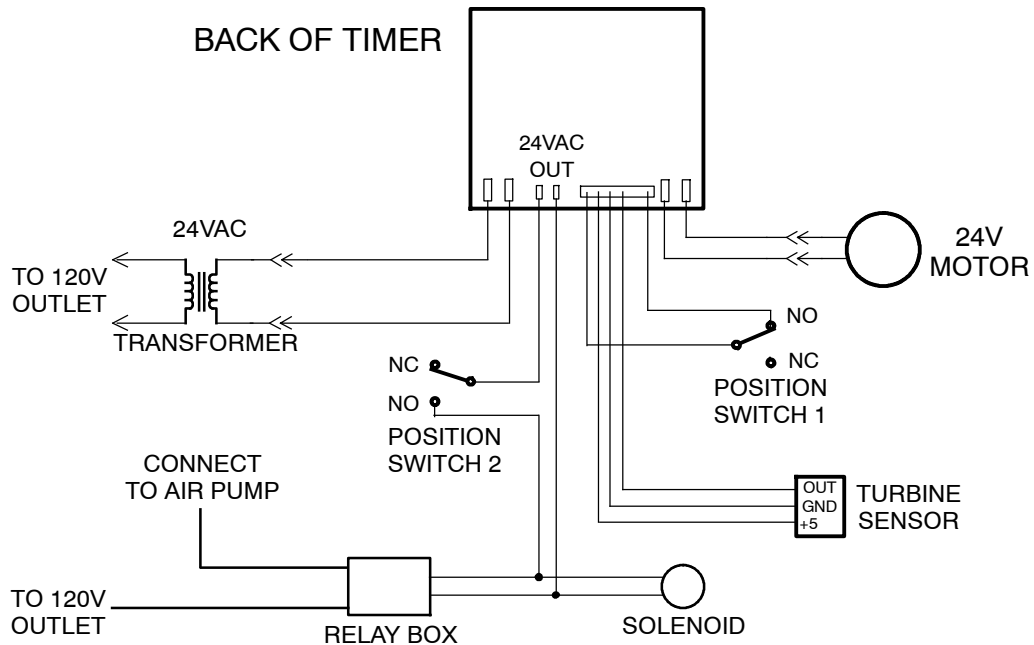
**b.** Route the vent tubing to the drain point (standpipe, laundry tub, floor drain, etc.) as typically shown in Figure 1. **Affix the end of the tube securely**, as water and air will exit this vent with force.

## 10. PRESSURE TESTING FOR LEAKS

TO PREVENT EXCESSIVE AIR PRESSURE IN THE FILTER AND PLUMBING SYSTEM, DO THE FOLLOWING STEPS IN ORDER.

- Open two or more filtered water faucets, both hot and cold.
- Referring to Figure 7, turn the bypass valves to service position.
- Slowly open the main water supply valve.
- Close the filtered water faucets.
- Check your complete installation for leaks. If rework is required, be sure to observe precautions in step 7.

**FIGURE 8**



## **11. CONNECT ALL LEADWIRES**

**a.** Locate the power cable, which is shipped with one end plugged into the timer (PWA) under the top cover. Refer to Figure 8. Attach the other end of the power cable to the transformer.

**NOTE:** Check to be sure the connectors are secure on the back of the timer.

**b.** Plug the leads from the relay box into the corresponding connectors of the wire harness, located near the solenoid under the top cover. Route the wiring through the clip in the bottom cover, as shown in Figure 2.

## **12. CONNECT AIR PUMP**

**a.** Fasten the air pump in place on the floor or a shelf nearby the filter.

**b.** Install the air filter (if required) and tubing connector fitting.

**c.** Connect the tubing from the check valve on the adaptor to the connector fitting on the air pump.

**d.** Plug the pump into the relay box connector.

## **13. CONNECT TO ELECTRICAL POWER**

Plug the transformer into a continuously “live”, grounded, 120V, 60 Hz house electrical outlet, approved by local codes.

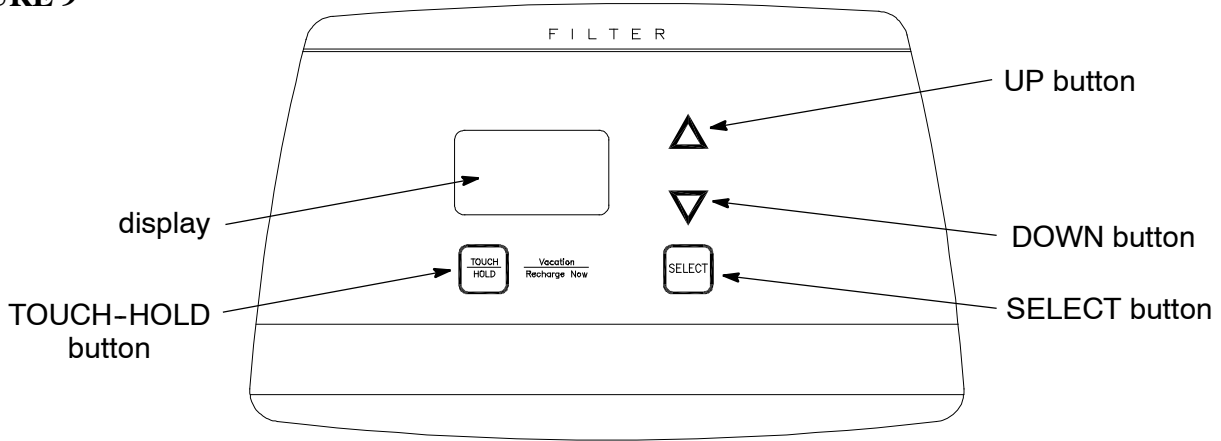
**14.** To complete the installation, do the programming steps on pages 11 and 12.

**NOTE:** See water heater start-up on page 12.

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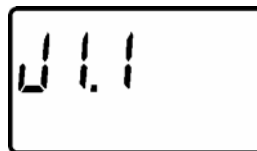
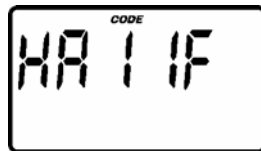
## PROGRAMMING THE FACEPLATE TIMER

FIGURE 9



► **TIMER SETTINGS REQUIRED**, upon installation, and after an extended power outage, see Power Outage Memory, page 14.

When the transformer is plugged into the electrical outlet, the model code and a test number (example: J1.1), begins to flash in the faceplate display. Then, 12:00 PM and PRESENT TIME begins to flash. Program the timer as follows.




### ► SET PRESENT TIME OF DAY

If the words *PRESENT TIME* do not show in the display, press the  SELECT button until they do.



Press the  UP or  DOWN buttons to set the present time. Up moves the display ahead; down moves the time backward. Be sure AM or PM, is correct.



Press buttons and quickly release to slowly advance the display. Hold for fast advance. This procedure applies for all following settings.

Press the  SELECT button to set present time and advance to the next set up screen.

### ► SET DAYS TO RECHARGE

The default setting is 3 days. This means the filter will recharge every 3 days. If a change is needed, use the  UP or  DOWN buttons to set from 1 to 99 days between recharges.



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## PROGRAMMING THE FACEPLATE TIMER

### SUGGESTED RECHARGE DAYS


The filter must recharge to clean iron out of the filtering mineral. How often recharge is needed depends on two things.

1. The parts per million (PPM) of iron in your water supply and;
2. The number of people that live in your house.

To use the table, find the ppm iron in your water supply across the top of the table. Read down this column, and across from the number of people in the household. At the intersecting point, the suggested days to recharge are shown. Set the recharge days on the timer.

Number of people in household	Iron (parts per million)			
	1 - 2	3 - 4	5 - 7	8 - 20
1	4 days	3 days	2 days	1 day
2	4 days	3 days	2 days	1 day
3	4 days	3 days	1 day	1 day
4	3 days	2 days	1 day	1 day
5	3 days	2 days	1 day	1 day
6	2 days	1 day	1 day	1 day
7	2 days	1 day	1 day	1 day

**NOTE:** If the water supply has high turbidity (sand, silt, sediments, etc.), manganese or hydrogen sulfide, set the filter to recharge more often than the table above shows.


Press the  SELECT button to set and advance to the next set up screen.

### ► *SET RECHARGE TIME*

The default setting is 12:00 AM. This is a good time if you have a water softener or another filter installed, the recharge time should be offset to assure adequate water flow and pressure. For example, set the filter to start backwash at 12:00 AM, or 4:00 AM, if the water softener is set to begin recharge at 2:00 AM.

If a change is needed, use the  UP or  DOWN buttons to set time.



Press the  SELECT button to set and return to the normal run display.

### *THE INSTALLATION AND PROGRAMMING STEPS ARE COMPLETE*

NOTE: After you have completed all preceding instructions, your house water supply is filtered immediately. However, **your water heater is filled with unfiltered water** and, as hot water is used, it will refill with filtered water. When all the water is replaced in the water heater, all water will be filtered. If you want totally filtered water immediately, drain the water heater until the water runs cold. **Use extreme care as the hot water could cause severe burns.**

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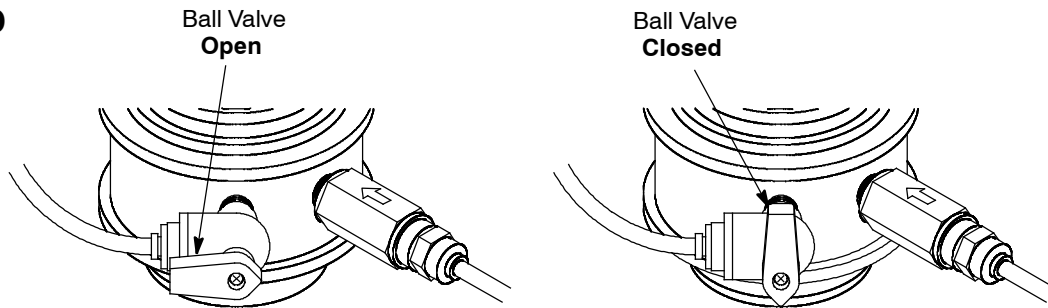
## START UP CHECKLIST

After completing the preceding installation and programming steps, check all the following:

- Make sure the bypass valve(s) are in the “service” position.
- Check for leaks.
- Open a filtered water faucet and confirm that the air pump runs. Pump will run for 8 seconds after water flow has stopped.
- Make sure the ball valve on the neck adaptor is open. See Figure 10.
- Make sure the solenoid vent is open when the air pump is running.
- **Make sure the vent tube is held securely at the drain point. Air/water mixture exits the vent tube with force. Observe the vent tube for at least 10 minutes while air pump is running and solenoid is open to ensure that vent tube is held securely and will not become dislodged from the drain.**

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**FIGURE 10**

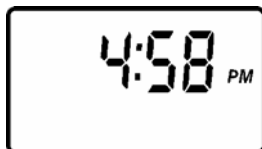


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## FACEPLATE TIMER FEATURES, SETTINGS AND SERVICE

### NORMAL OPERATION, TIMER DISPLAYS

During normal operation, the present time of day, and AM or PM, show in the time display area. When a recharge begins, *RECHARGE NOW* starts



to flash in the display, along with the present time of day. *RECHARGE NOW* flashes until the recharge is over.



#### feature: *RECHARGE NOW*

For times you expect to use more water than usual, use the *RECHARGE NOW* control. Press the Touch-Hold button until *RECHARGE NOW* begins to flash in the time display. A



recharge begins immediately. The filter begins to filter your water again in about 2 hours.

**NOTE:** Avoid using HOT water during the recharge, because the water heater will refill with unfiltered water.

#### feature: *VACATION CONTROL*

Before going on vacation, or other long absence, press (do not hold in) the Touch-Hold button so *VAC* starts to flash in the display. The timer continues to keep time, but recharges will not occur and waste water.



**When you return**, press the Touch-Hold button again to return the filter to service, and the present time in the display. **REMEMBER TO DO THIS**, or the filter will not recharge until you do.

**NOTE:** To shut off the water supply to the filter, use the plumbing bypass valve(s).

#### feature: *POWER OUTAGE MEMORY*

If electrical power to the timer is interrupted, the “memory” built into timer circuitry keeps **all** settings for 6 hours (minimum) or more. The display is blank and the filter will not recharge. When electrical power comes on, one of two things will happen.

**1.** The present time of day will show, meaning the timer memory has kept all time settings.

**NOTE:** If the filter was recharging when power was lost, it will now finish the cycle.

**2.** The display will show a time, but it will be flashing. The timer memory did **not** keep the time settings and

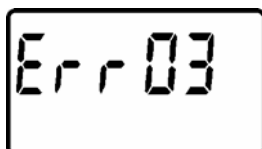
they must be reset (page 11). The display returns to a flashing time, then begins to keep time again. If you do not reset the time of day, the filter will recharge based on the days to recharge, however, recharges will most likely be at the wrong time of day.

**NOTE: The flashing display is to remind you to reset the timer.**

If the filter was recharging when power was lost, the valve will return to service position without finishing the cycle. Use *RECHARGE NOW* (see above) to start another cycle if needed.

#### feature: *ERROR CODES*

An error code could appear in the faceplate display if a problem occurs in the filter. If you see an error code, for example



Err03, instead of the present time of day, please call your local dealer for service, or see your warranty on page 2.

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## FACEPLATE TIMER FEATURES, SETTINGS AND SERVICE

service: **RECHARGE CYCLE TIME ADJUSTMENTS** .....

The default settings for backwash (25 minutes) and fast rinse (5 minutes) cycles of recharge are factory set for maximum performance of the filter. Use the following procedures to check for correct cycle times, or to change if desired. However, only trained technicians should change the time settings.

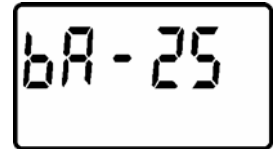
**NOTE:** Fill and brine times are adjustable, but preset at the factory to zero minutes. It is recommended to leave these settings as preset, unless the filter is used in a custom application by the installer.

service: **ADJUSTABLE BACKWASH TIME** .....

Press and hold the Select button until the display shows "000--", then press the Select button three times to advance to the Backwash time adjust screen.



Using the Up or Down buttons adjust the backwash time from 0 minutes to 60 minutes.

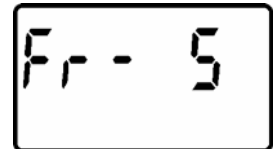


service: **ADJUSTABLE FAST RINSE TIME** .....

Press and hold the Select button until the display shows "000--", then press the Select button four times to advance to the Fast Rinse time adjust screen.



Using the Up or Down buttons adjust the Fast Rinse time from 0 minutes to 60 minutes.



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## GENERAL INFORMATION

The air injector adaptor is installed between the filter valve and mineral tank. A pump injects air into the iron filter through the adaptor. The air oxidizes the iron. The oxidized iron is then mechanically filtered by the filter mineral bed. The solenoid valve allows excess air to vent from the tank.

### SERVICE, BACKWASH AND FAST RINSE CYCLES

**SERVICE (See Figure 11):** Unfiltered water enters the valve inlet port. Internal valve porting routes the water into the mineral tank. The water is filtered as it passes through the mineral bed, then enters the bottom distributor. Filtered water flows back into the valve and out the valve outlet, to the house filtered water pipes.

In time, the filter needs cleaning to remove sediments, dirt, iron, etc., from the mineral bed. This cleaning is done in two stages, or cycles, called backwash and fast rinse. It is started automatically by the timer.

**BACKWASH (See Figure 12):** The timer starts the valve motor and moves the valve into backwash position. Water is routed down and out the bottom distributor, up through the mineral bed, and out of the filter to the drain. The fast flow (controlled by a flow plug in the drain fitting) flushes dirt, sediments, iron deposits, etc. to the drain. The mineral bed is lifted and expanded for maximum cleaning.

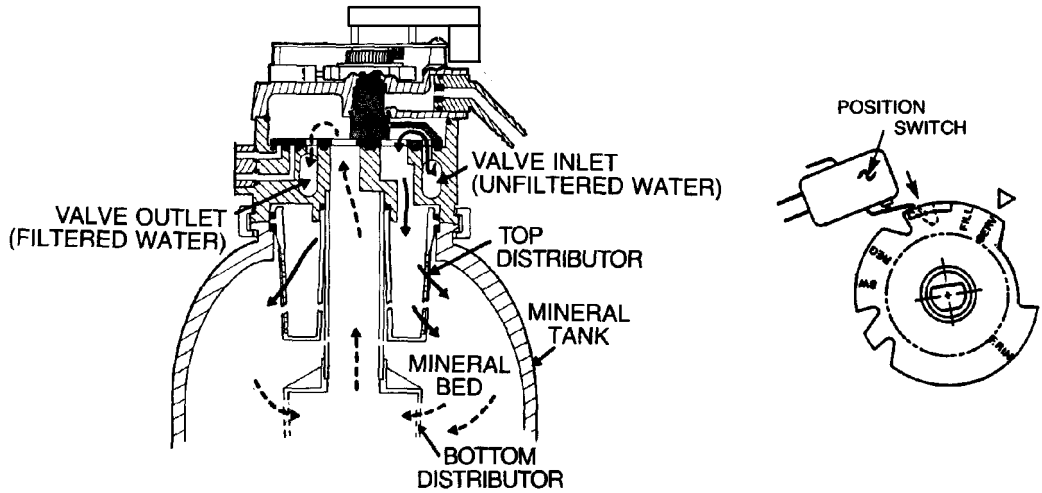
**FAST RINSE (See Figure 13):** Valve rotation positions the inner discs so water flow enters the mineral tank through the top, and exits at the bottom, to the drain. The fast flow of water downward, packs the mineral bed and prepares it for return to service.

The timer energizes the valve motor again to return the valve to service.

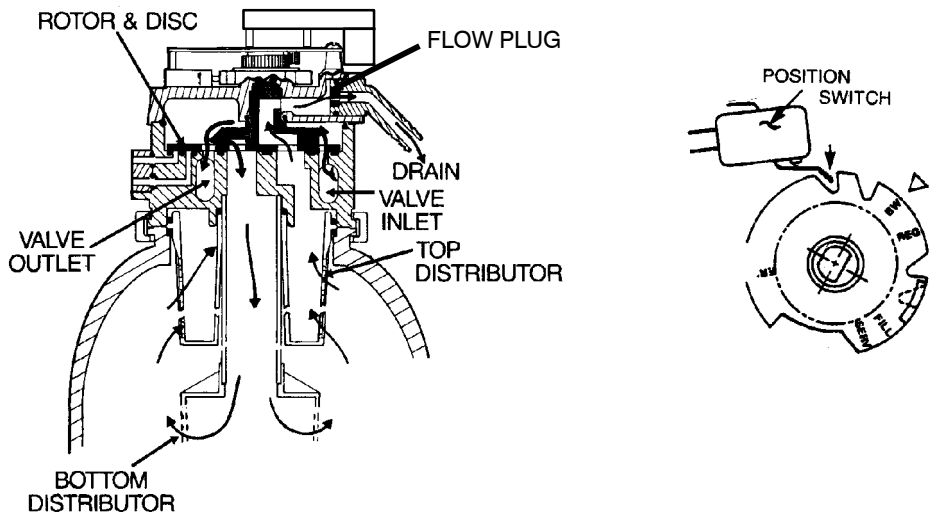
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# WATER FLOW PATHS THROUGH VALVE

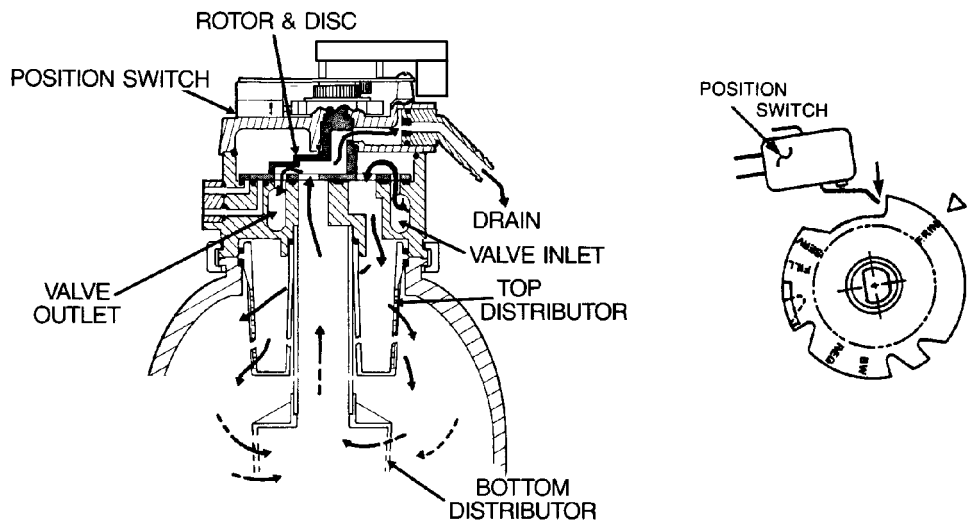
**FIGURE 11**  
**SERVICE CYCLE**



**FIGURE 12**  
**BACKWASH CYCLE**



**FIGURE 13**  
**FAST RINSE CYCLE**



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## Description of Operation - Air pump activation & solenoid venting system

When service water flows through the filter, it rotates the turbine (located in the valve's outlet port), sending a signal to the controller (PWA). The controller then activates a 24V power supply to the vent solenoid and relay box. When activated, the relay box turns on the 120V power supply to the air pump. The air pump adds a head of air in the filter tank. This supplies oxygen that aerates the water and oxidizes iron, manganese and hydrogen sulfide (generating particles). The vent solenoid is opened during this time, permitting oxygen-depleted air to escape and be continuously replaced in the tank by fresh air. After oxidation, the birm filtration media filters out the particles. During the backwash / rinse cycles, the filter cleans itself. During regenerations the air pump and vent solenoid do not activate. After service water flow stops, the air pump will run for an additional 8 seconds.

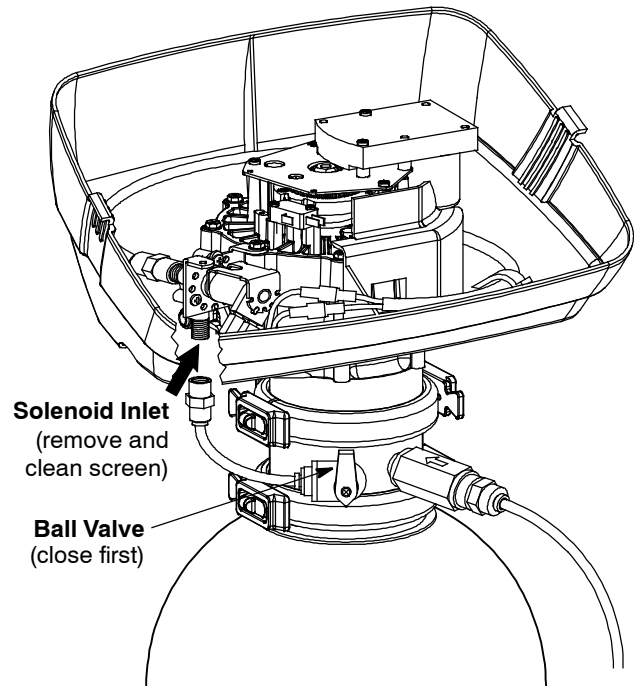
## Adaptor Troubleshooting Guide

If excess air is in household plumbing, the air vent is most likely plugged with debris.

Close ball valve. Then disconnect tubing from solenoid inlet, as shown below. Remove the inlet screen, located inside the inlet port of the solenoid. Clean and reinstall the inlet screen.

After vent is cleared, reconnect tubing, open ball valve and check for leaks.

**WARNING: FILTER TANK CONTAINS AIR. TO RELIEVE PRESSURE, PUT BYPASS VALVE IN BYPASS AND ADVANCE FILTER VALVE TO BACKWASH BEFORE DISASSEMBLY.**



## TROUBLESHOOTING

### ALWAYS MAKE THESE INITIAL CHECKS FIRST

#### 1. Does the time display show the correct time of day?

...If display is blank, check power source to the filter.

...If time is flashing, power was off for over 6 hours. The filter resumes normal operation but backwashes occur at the wrong time.

#### 2. Plumbing bypass valve(s) must be in SERVICE position, Figure 6, page 9.

#### 3. The inlet and outlet pipes must connect to the filter inlet and outlet respectively.

#### 4. Is the transformer plugged into a "live" grounded wall outlet?

#### 5. The valve drain hose must be free of kinks and sharp bends.

If you do not find the problem after making the initial checks, do the **MANUAL ADVANCE DIAGNOSTICS**.

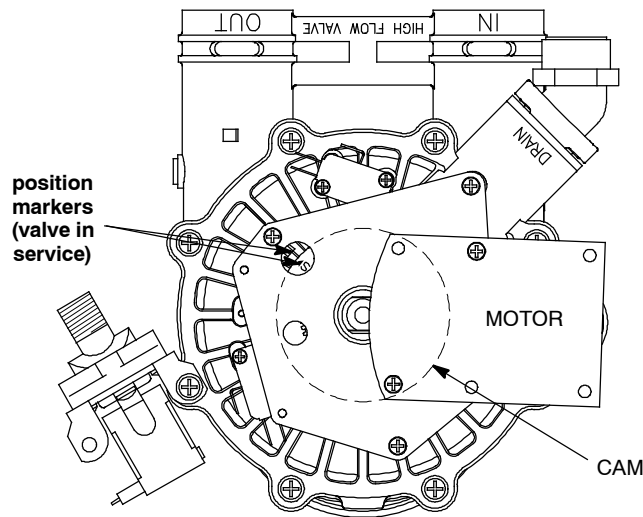
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## ► MANUAL ADVANCE DIAGNOSTICS

Use the following procedures to advance the filter valve through the recharge cycles to check operation. Remove top cover to observe valve rotation.

**NOTE:** Display must show time and day.

1. Press and hold the Select button until the display shows “000--”.



2. To advance the valve, press the Touch–Hold button each time you want to move into the next cycle.

➔ Press the Touch–Hold button to move filter into backwash.

a. If it **does not** move into backwash, the valve motor is inoperative. Check all wiring and connections.

➔ Press the Touch–Hold button to move filter into fast rinse. Again look for fast drain flow.

➔ To return filter to service, press the Touch–Hold button.

**NOTE:** While in manual advance, the time display will automatically return to the present time if a button is not pressed within four minutes.

**NOTE:** The air pump and solenoid will only operate when the valve is in the SERVICE position.

service: **MANUAL INITIATED ELECTRONICS DIAGNOSTIC** .....

1. Press and hold the Select button until the display shows "000--" to enter diagnostics.



Press the Up button to display the number of days this face plate has had electrical power applied.



The letter (P) and dash(es) indicate POSITION switch operation. The letter appearing means the switch is closed; the dash means the switch is open.



Press the Down button to display the number of recharges initiated by this face plate since the model code number was entered.



Use the Touch-Hold button to manually advance the valve into each cycle and check correct switch operation.

CORRECT SWITCH DISPLAYS	VALVE CYCLE STATUS
--	Valve in service, backwash or fast rinse position.
- P	Valve rotating from one position to another.

2. Press the Select button and hold in 3 seconds until a model code appears in the display.



For correct filter operation, the model code number must be HA IIF.

To reset the code, press the Up or Down button until the correct number shows.

While in this diagnostic screen, the following information is available and may be beneficial for various reasons. This information is retained by the computer from the first time electrical power is applied to the face plate.

3. Press Select to return the present time display. If the code was changed, make ALL the timer settings, pages 11 and 12.

► **OTHER SERVICE**

UNFILTERED WATER BYPASS (unfiltered water "bleeds" into filtered water supply).

1. Defective rotor and disc, seal or wave washer (see pages 22 and 23).
2. Missing or defective o-ring(s) at resin tank to valve connection (see pages 20 and 21).

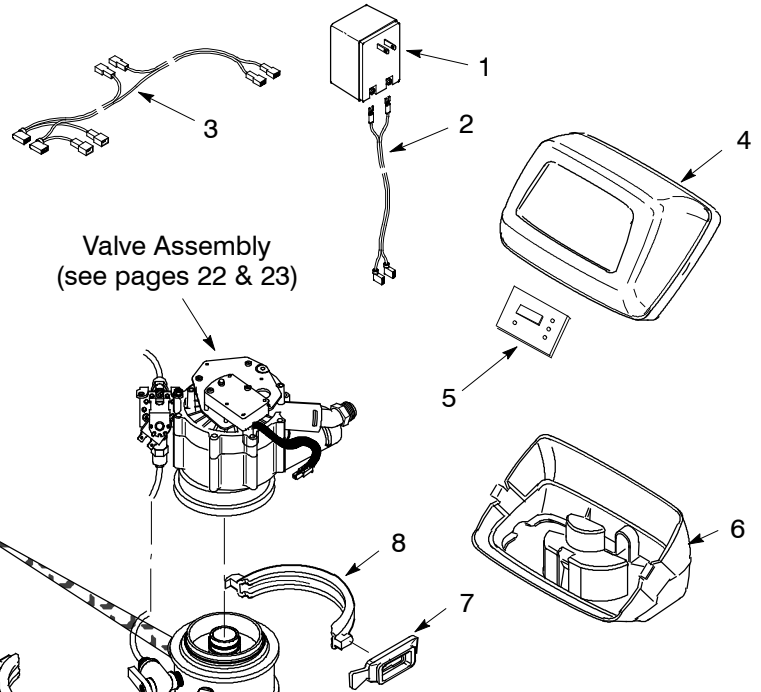
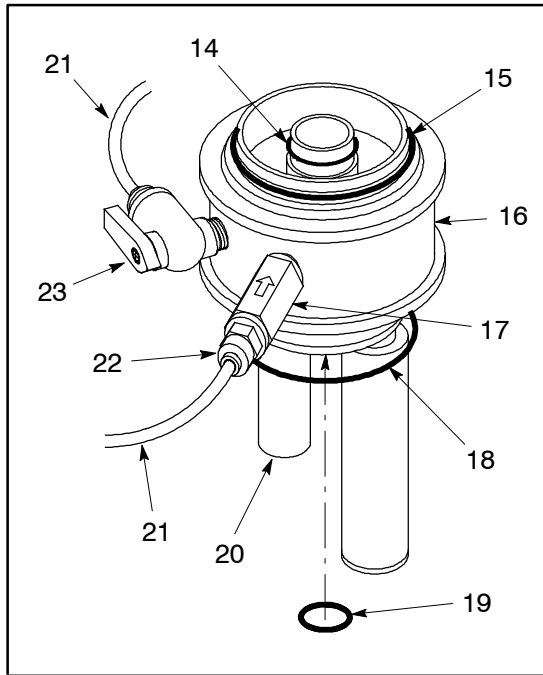
► **AUTOMATIC ELECTRONIC DIAGNOSTICS**

The face plate has a self diagnostic function for the electrical systems (except input power). The faceplate monitors the electronic components and circuits for correct operation. If a malfunction occurs, an error code appears in the faceplate display.

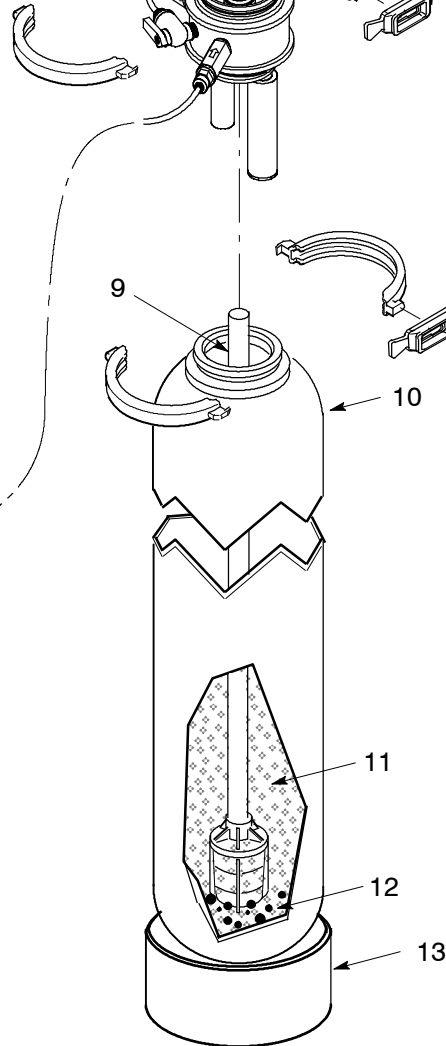
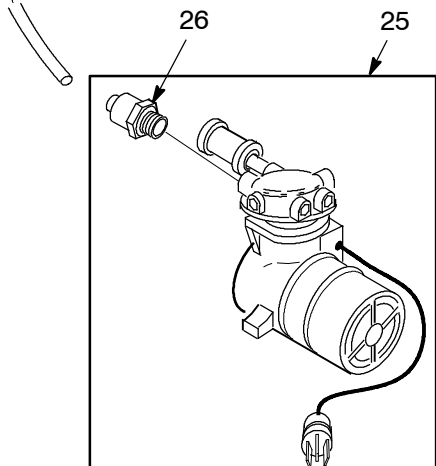
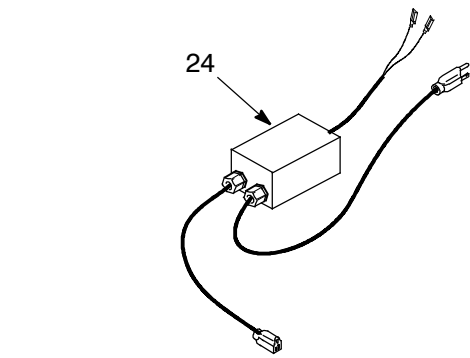
CODE	POSSIBLE DEFECT	
	MOST LIKELY	LEAST LIKELY
Err 01 Err 02 Err 03 Err 04	wiring harness or connection to position switch / switch / valve defect causing high torque / motor inoperative	
Err 05	faceplate	

**PROCEDURE FOR REMOVING ERROR CODE FROM FACEPLATE:** 1. Unplug transformer----- 2. Correct defect----- 3. Plug in transformer----- 4. Wait for 6 minutes. The error code will return if the defect was not corrected. Press and hold the TOUCH-HOLD button for 3 seconds as an alternate way to clear an error code.

## REPAIR PARTS



Valve Assembly  
(see pages 22 & 23)



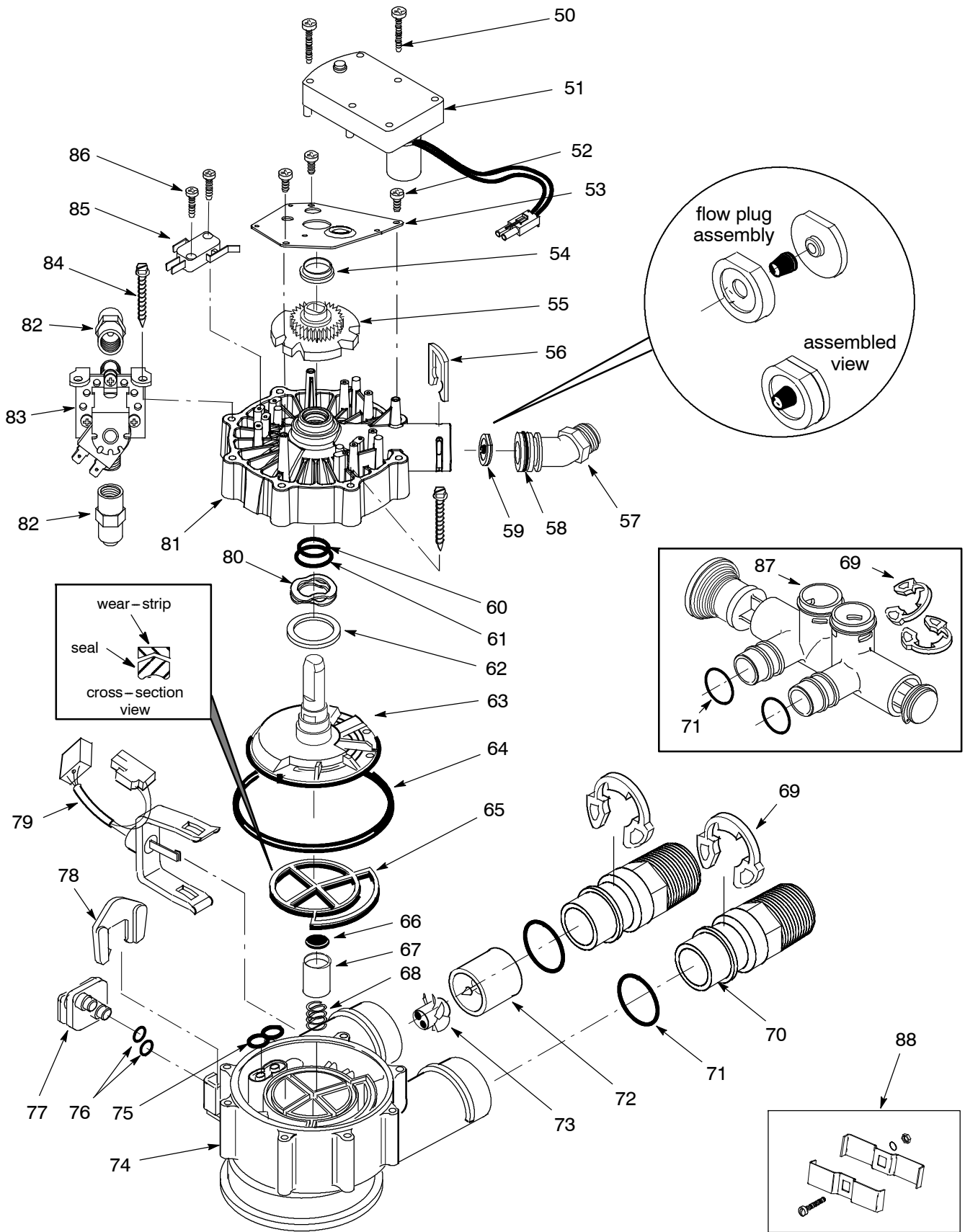
**WARNING: FILTER TANK CONTAINS AIR. TO RELIEVE PRESSURE, PUT BYPASS VALVE IN BYPASS AND ADVANCE FILTER VALVE TO BACKWASH BEFORE DISASSEMBLY.**

## REPAIR PARTS

KEY NO.	PART NO.	DESCRIPTION
1	7085297	Transformer, 24V – 40VA
2	7132840	Power Cord
3	7306847	Wire Harness, Solenoid
4	7260554	Top Cover (order following decal)
–	7285279	Decal
5	7286699	Repl. PWA
6	7189449	Bottom Cover
7	7088033	Clamp Retainer (Clip), 4 req.
8	7176292	Clamp Section, 4 req.
9	7105047	Rep'l Distributor, bottom
10	7092202	Resin Tank, 10" dia. x 47"
11	4015000	Birm, Pkd.
12	7124415	Quartz
13	7302039	Tank Base
14	7170254	O–ring, 13/16 I.D. x 1–1/16 O.D.

KEY NO.	PART NO.	DESCRIPTION
15	7170296	O–ring, 2–7/8 I.D. x 3–1/4 O.D.
16	7310278	Adaptor Assembly (includes Key Nos. 17, 19, 20, 22 & 23)
17	7190628	Check Valve
18	7170270	O–ring, 2–3/4 I.D. x 3 O.D.
19	7168312	O–ring, 63/64 I.D. x 1–1/4 O.D.
20	7306813	Nipple
21	7161784	Tubing, 1/4" x 100 ft.
22	7171666	Connector, 1/4 Tube to 1/4 NPT
23	7306839	Ball Valve
24	7276050	Relay Box
25	7288081	Air Pump, 120V (incl. Key No. 26)
26	7171674	Connector, 1/4 Tube to 1/8 NPT
–	7311313	Adaptor Kit (incl. Key Nos. 14–16, 18, 2 ea. of 7 & 8)

# REPAIR PARTS



## REPAIR PARTS

KEY NO.	PART NO.	DESCRIPTION
50	7224087	Screw, #6-20 x 7/8 (2 req.)
51	7286039	Motor (incl. 2 ea. of Key No. 50)
52	0900857	Screw, #6-20 x 3/8 (3 req.)
53	7231393	Motor Plate
54	7171250	Bearing
55	7283489	Cam and Gear
56	7169180	Clip (Drain)
57	7172793	Drain Hose Adaptor
58	7170288	O-ring, 15/16 x 1-3/16
59	7178189	Flow Plug, 5 gpm
60	7170327	O-ring, 5/8 x 13/16 ■
61	7173024	O-ring, 1-1/8 x 1-1/2 ■
62	7174313	Bearing, Wave Washer
63	7185500	Rotor & Disc
64	7173032	O-ring, 4-1/2 x 4-7/8 ■
65	7171179	Rotor Seal ■
-	7171331	Wear Strip ■
66	7172989	Seal ■
67	7171187	Plug (Drain Seal)
68	7129889	Spring
69	7089306	Clip (2 req.)
70	7271204	Installation Adaptor, 1" (2 req.)
71	7170262	O-ring, 1-1/8 x 1-3/8 (4 req.)

KEY NO.	PART NO.	DESCRIPTION
72	7094898	Turbine Support
73	7101548	Turbine
74	7171145	Valve Body
75	7195482	Seal ■
76	7170319	O-ring, 1/4 x 3/8 (2 req.)
77	7100940	Plug
78	7081201	Retainer
79	7309811	Wire Harness & Sensor Housing
80	7175199	Wave Washer
81	7171161	Valve Cover
82	7306821	Connector, 1/4 QC to 1/4 NPT (2 req.)
83	7287645	Solenoid
84	7172997	Screw, #10 x 2-5/8 (8 req.)
85	7305150	Switch (2 req.)
86	7140738	Screw, #4-24 x 3/4 (4 req.)
87	7214383	Bypass Valve (Includes following parts)
-	7172882	Stem
-	7173016	O-ring, 1.109 I.D. x 1.387 O.D. (4 req.)
-	7175238	C-ring
88	7248706	Ground Clamp
■	7185487	Seal Kit (incl. Key Nos. 60, 61, 64-66 and 75)

