Tommy Duplex Water Softening System

INSTALL INSTRUCTIONS & SUPPORT GUIDE

3/2024 Rev 3

TOMMY CAR WASH SYSTEMS | 648 SOUTH POINT RIDGE, HOLLAND, MI, 49423

Contents

Compatibility List

This document pertains to the following parts:

- 40004-K – *Duplex Water Softening System, 300k Capacity, w/ manifold*
- 40008-K – *Duplex Water Softening System Kit w/ Stainless Steel Skid*

Section 1: Onsite Install & Set-Up

1.1 – Softener Tank Installation

1) Tools Needed:
   a) 15 gallons of water per softener tank
   b) Ladders
   c) 5-gallon buckets
   d) Masking tape/duct tape

2) Tank Positioning:
   a) Tanks should be positioned approximately 28.25" apart, from center-to-center dimension. This will be critical for the manifold.
   b) Before filling with gravel and resin, dry fit each head on a tank. **Be careful not to strip the threads of the tank.** The heads should face towards the center of the backroom. Reposition the tanks so the heads will both land outwards. Adjust the tanks as needed while maintaining the center-to-center spacing of 28.25".
   c) Remove the heads from the tanks.

3) Tank Filling – *Gravel*

   NOTE: the resin pours best when it is NOT WET.

   a) Take masking tape/duct tape and tape the top of the PVC pipe inside the softener tank. You do not want resin spilling inside during filling. **Make sure the tape can be removed. It be removed later in the process.**
   b) Fill each tank with a minimum of 15 gallons of water.
   c) Each softener gets the following:
      i) 4 bags of gravel – 200 lbs
      ii) 10 bags of resin
   d) With the funnel provided, pour gravel slowly into each tank. **This is to prevent the 1.5" PVC distribution manifold at the bottom of the tank from shifting side to side.** The manifold needs to be centered at the bottom to allow the proper installation of the heads.

4) Tank Filling – *Resin*
   a) Person A: stands on the ladder near the tank opening.
   b) Person B: stands near the tank holding the resin funnel (provided with the softener) **approximately ½" to 1" raised from the tank flange.** This prevents the resin from clogging in the funnel.
   c) Person C: opens bags of resin and hands buckets of resin to Person A.
   d) *NOTE: sometimes it is easier to dump partial bags of gravel/resin into the 5 gallon bucket and use the scoop to place the material into the tank.*
   e) Fill each tank with 10 bags of resin.
   f) *NOTE: the resin pours best when it is dry.*

5) Installing the Manifold and heads:
   a) Install the black plastic cone onto the bottom of each head. It will snap into place.
   b) Thread the head onto the tank. Be careful NOT to strip the threads on the tank.
   c) Position the heads so they are both parallel to each other and parallel to the aisleway/RO unit.
   d) Connect the Manifold to the heads. It is easiest to install the parts in the following order:
      i) P-WAT-3202-1
      ii) P-WAT-3202-3
      iii) P-WAT-3202-4
      iv) Alternating valve/MAV – P-WAT-2970
      v) P-WAT-3202-2
      vi) P-WAT-3202-5
      vii) P-WAT-3202-6
   e) See *Appendices for drawings of an assembled softener manifold.*

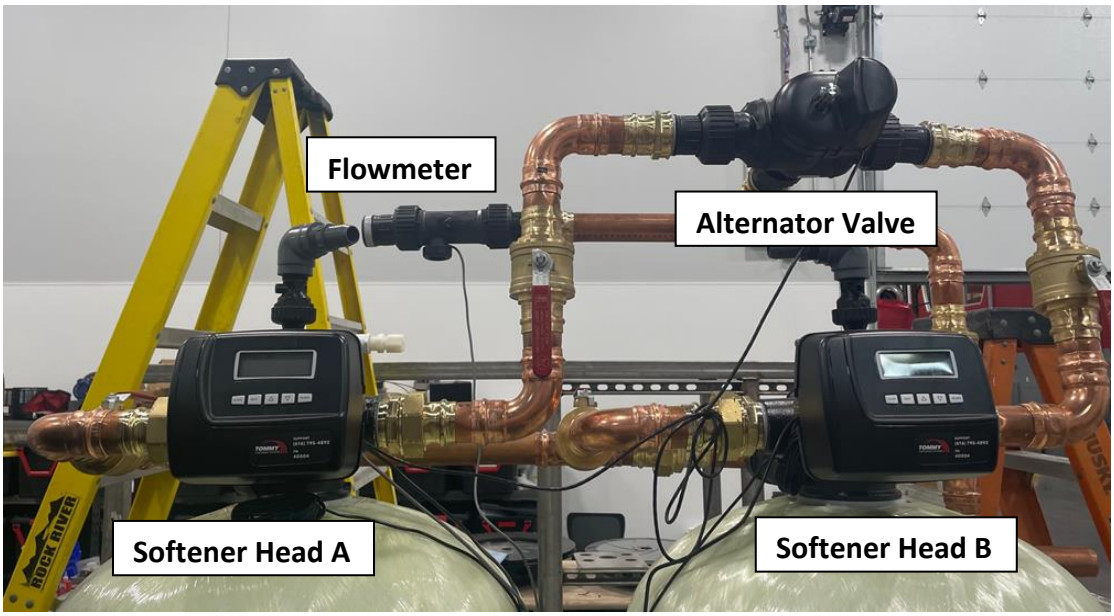

Figure 1 - Softener Heads. NOTE the configuration of the alternator valve. Orientation is important!

1.2 – Softener Head Installation

1. Once the heads are installed on the tanks, they can be plugged into 110V power.
2. The heads <u>should be</u> preprogrammed prior to shipping with all the TCWS specific parameters. If they are not, please see *Section 2: Programming Softener Heads.*
3. Remove each softener head cover and knock out the wire "through-hole" in the back of each softener head. See *Figure 10.*
4. Connect the wires to softener heads A and B. See *Figure 11 & 12.*
5. *NOTE: Softener head A MUST be the left softener. Softener head B MUST be the right softener.*

1.3 – Brine Draw & Softener Drain Installation

1. The brine draw and softener drain parts that ship from the factory need to be modified for TCWS use.

2. Brine Draw Connection:
    a. From the factory, the plumbing connection for the brine draw needs to be modified for TCWS use. Remove the white snap ring, the black threaded coupler, and the o-ring from the connection included with the head. Install these parts on the grey PVC connection with a 1” female socket connection. See *Figure 2.*
    b. Install the 1” male x ½” FNPT socket adapter to the grey PVC part, then the plastic 3/8” compression adapter. Install this assembly on the softener head. See *Figure 3*

Figure 2 - Black piece on the left is what comes from the factory. Remove the snap ring, black threaded adapter, and O-ring. Install these on the grey part on the right.

Figure 3 - Assembled brine draw assembly for the softener head.

3. Drain Connection:

    a. From the factory, the softener does not have the correct drain plumbing. Included with the softener is a 1” plastic 90 deg elbow and a 1” MNPT x 1” hose barb. These must be installed on the included adapter. See *Figure 4.*

Figure 4 - Drain connection assembly

Figure 5 - Installed brine connection and drain fittings

1.4 – Brine Tank

1. Drain Float
    a. The drain on the brine tank must be modified before first time use.
    b. Remove the white cap off the drain assembly, the black plumbing adapter sticking through the side of the brine tank, and the plastic nut from the side of the drain assembly. *See Figure 6.* Set these items aside.

Figure 6 - Brine tank float. Remove the items circled in red PLUS the black threaded plumbing adapter sticking through the side of the brine tank.

    c. From the factory, the float is installed at the very end of the float rod. Loosen the adjustable nut and move the float approximately 4” to 5” from the end of the float. This sets the water level in the brine tank. See *Figure 7.*
    d. Reassemble float assembly inside of the white tube.
    e. The black threaded plumbing adapter ships with a 1/2” FNPT socket on the end. Attach the plastic female compression fitting to the socket. Cut approximately 4” to 6” of 3/8” poly line provided in the brine tank. Insert this into the end of the compression fitting.
    f. Install this assembly back onto the float assembly in the brine tank.
    g. Included with the softener is a plastic 3/8” compression tee. Install the tee on the end of the 3/8” poly line sticking through the brine tank. See *Figure 8.*
    h. The brine tank assembly has now been completed.

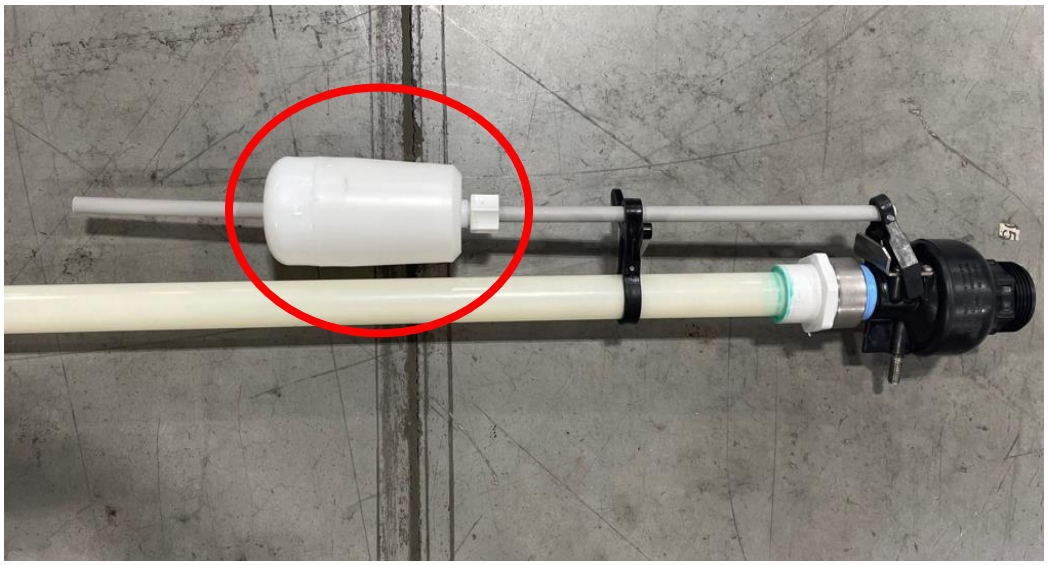

Figure 7 - Adjust the float approximately 4" to 5" from the end of the rod.

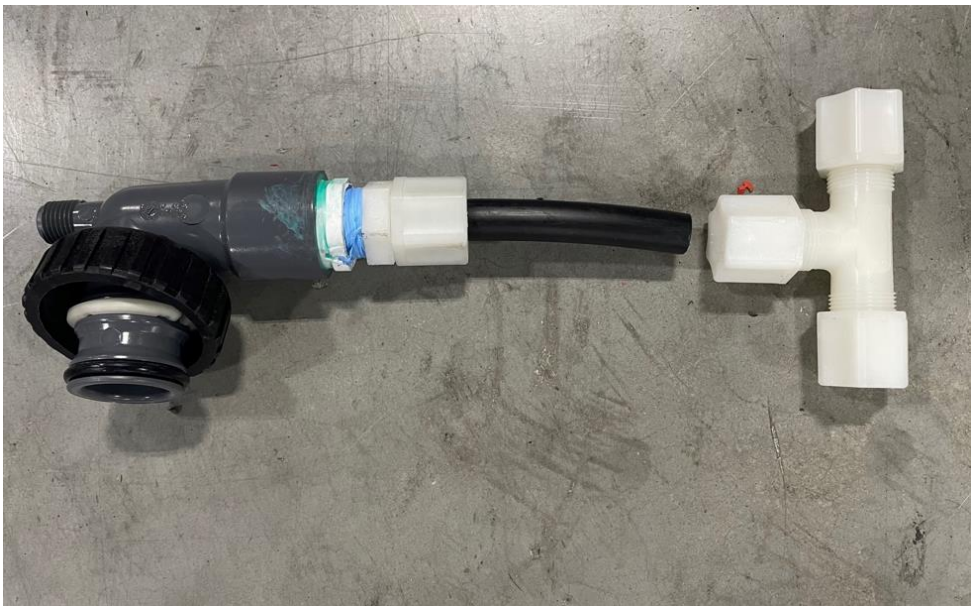

Figure 8 – Brine tank drain assembly; threaded plumbing adapter with 3/8" poly line installed. The plastic compression tee is added after plastic assembly has been installed in the brine tank. This plastic fitting will be on the exterior of the brine tank.

Section 2: Softener Heads

NOTE: this section is for reference only. The vendor programs the heads prior to shipping to Tommy's.

2.1 – Set Up & Wiring

Figure 9 – Softener Head Control Panel

1. CLOCK: Press and hold this button to set the local time.
2. NEXT: cycle through *Gallons Remaining, Flow Rate, and Time.*
3. UP arrow: used during programming.
4. DOWN arrow: used during programming.
5. REGEN: holding this button down will manually put the softener in regeneration mode.

2.2 – Softener Head Wiring

1. Knock out the plastic area circled in *Figure 10*. This is where wiring will be installed for each softener head. This must be done on both heads.

Figure 10 - Punch out plastic area circled in red

2. **Wiring for Softener head A**
    1. Alternator valve cable.
    2. Communication cable between softener head 2 & 3.
    3. 110V Power cable.
    4. Flow meter cable.
        a. **NOTE:** the terminals on the wiring harness will need to be installed into the white clip. The black wire will be factory installed, the white and red wires will not. The white wire goes in the center slot and the red in the rightmost slot.

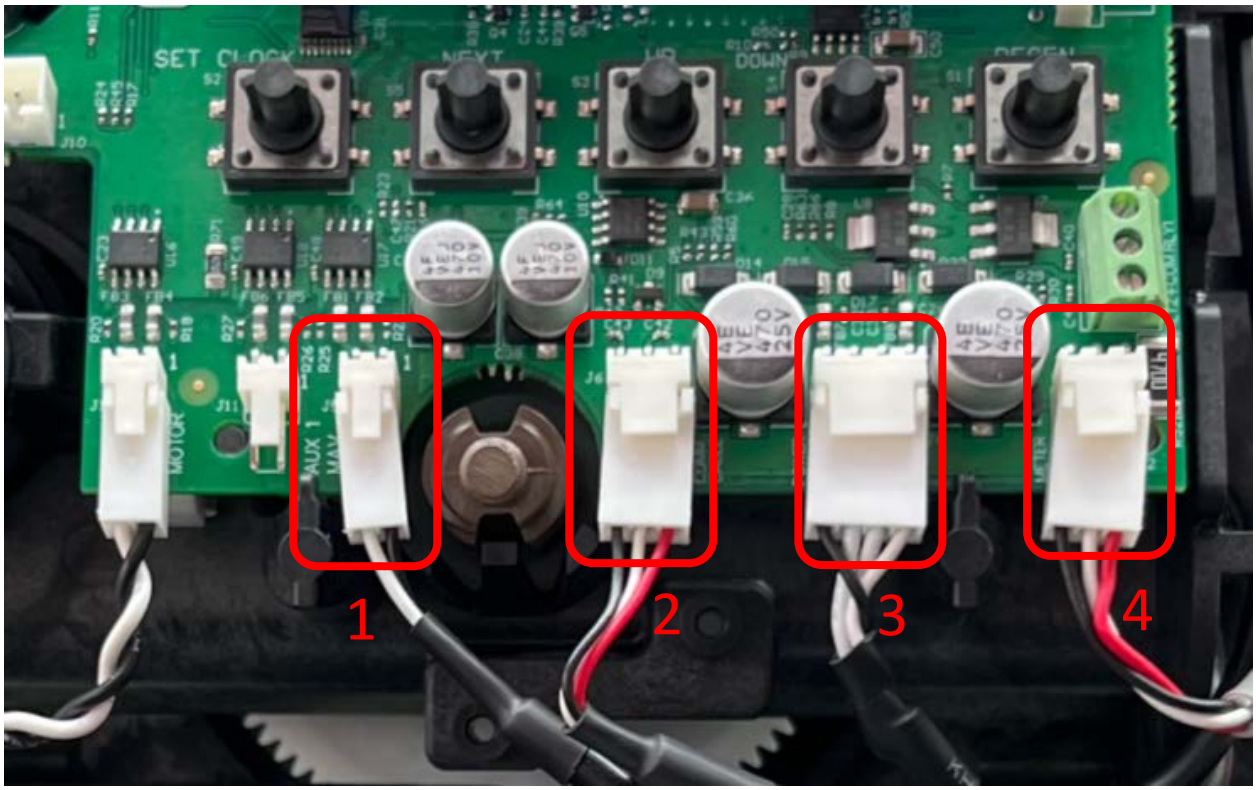

Figure 11 - Wiring for Softener Head A

3. **Wiring for Softener head B**
    1. Communication cable between softener head 1 & 2.
    2. Power Cable.

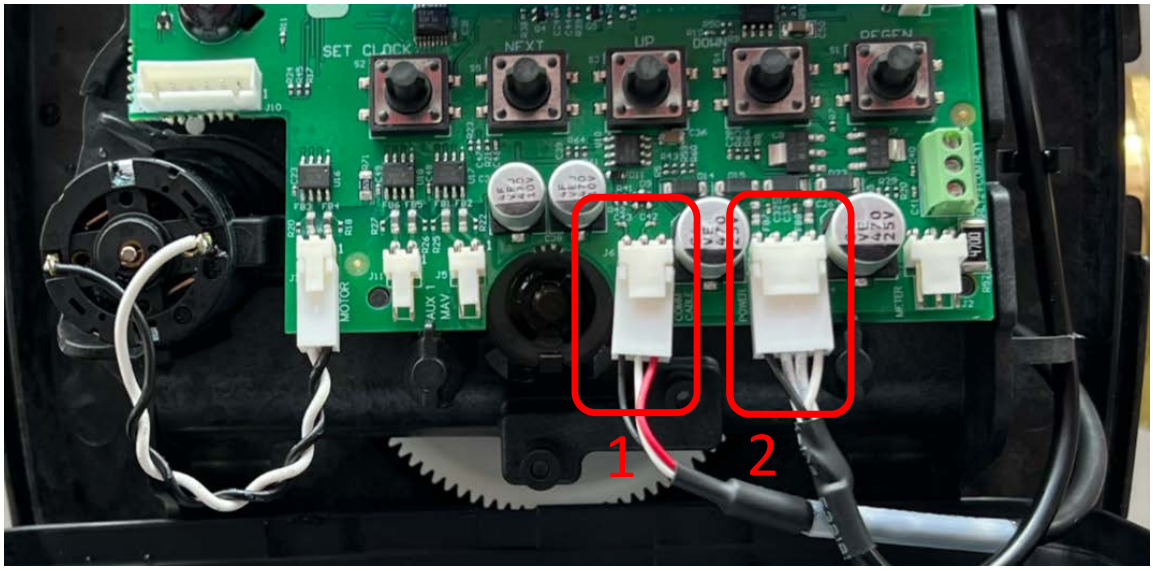

Figure 12 - Wiring for Softener Head B

2.3 – Programming Softener Sequence

1. Push and hold NEXT & DOWN buttons, when screen changes to a yellow background, push and hold NEXT & DOWN again. Screen should show a yellow background and flashing "VALVE TYPE."
    a. Set valve to "**2.0 IN**"
    b. Push NEXT
2. METER SIZE:
    a. Set meter to "**2.0 IN**"
    b. Push NEXT
3. ALTERNATOR SET UP
    a. **NOTE: this step is different for each softener head. See *Figure 1*, softener head A will always be the LEFT softener head. Softener head B will always be the RIGHT softener head.**
    b. Set LEFT softener head to "**ALT A**" (*this is the master).*
    c. Set RIGHT softener head to "**ALT B**".
    d. Push NEXT
4. PRE-SERVICE RINSE
    a. Set to "**OFF**" – push the DOWN button to change.
    b. Push NEXT.
5. AUX MAV
    a. Set to "**OFF.**"
    b. Push Next.
6. AUX INPUT
    a. Set to "**OFF.**"
    b. Push NEXT.
7. BACKWASH
    a. Set to "**STEP 1.**"
    b. Push NEXT.
8. DRAW
    a. Set to "**STEP 2.**"
    b. Push NEXT.
9. BACKWASH
    a. Set to "**STEP 3.**"
    b. Push NEXT.
10. RINSE
    a. Set to "**STEP 4.**"
    b. Push NEXT.
11. FILL
    a. Set to "**STEP 5.**"
    b. Push NEXT.
12. END
    a. Set to "**STEP 6.**"
    b. Push NEXT.
13. At this point the screen should change to blue and go back to "STAND BY."

2.4 – Programming Sequence Timings

1. Push and hold NEXT & DOWN – screen will change to yellow.
2. Change to "SOFTENING DN – SET TYPE."
    a. Push the UP and DOWN buttons to change to this setting.
    b. Push NEXT.
3. BACKWASH TIME
    a. Set to **8 min.**
    b. Push NEXT.
4. DRAW TIME
    a. Set to **60 min.**
    b. Push NEXT.
5. BACKWASH TIME
    a. Set to **5 min.**
    b. Push NEXT.
6. RINSE TIME
    a. Set to **5 min.**
    b. Push NEXT.
7. FILL TIME
    a. Set to **13.5 min.**
    b. Push NEXT.
8. GRAINS OF CAPACITY
    a. Set to **240.0** x 1K.
    b. Push NEXT.
9. GALLONS CAPACITY
    a. Set to **"AUTO."**
    b. Push NEXT.
10. REGENERATION
    a. Set to **"IMMEDIATE."**
    b. Push NEXT.
11. RELAYS
    a. Set Relay 1, 2, 3 to **"OFF."**
    b. Push NEXT.
12. SERVICE ALARM
    a. Set to **"OFF."**
    b. Push NEXT.
13. At this point the screen should change to blue and go back to STAND BY.

2.5 – Miscellaneous Softener Features

Description	Button Sequence
Factory reset head	*Press and hold* NEXT & DOWN *then* UP & DOWN
Soft reset head – use when errors are present	*Press and hold* NEXT & REGEN
Lock or unlock head	*In this order* DOWN *then* NEXT *then* UP *then* SET CLOCK
Program the phone number and business name. This will be displayed when the head is in STAND BY mode.	*Press and hold* NEXT & UP, *once the screen changes press* NEXT *until you get* ENERGY SAVER. *Press and hold* CLOCK & UP *until the screen changes, then enter the phone number.* *Press* NEXT *and enter the business name.*

Section 3: Programming Water Hardness

NOTE: a water hardness test MUST be done before the commissioning the softeners!

3.1 – Hardness less than 20 Grains (*default*)

1. Push and hold NEXT & UP. The screen will turn yellow and flash – "ENGLISH LANGUAGE."
    a. Push NEXT.
2. WATER HARDNESS
    a. Set to local hardness PLUS 2 grains (I.E. if the local hardness is 12, set the head to 14).
    b. *If you do not know the hardness, set the head to 15 as a starting point.*
    c. Push NEXT.
3. DAYS BETWEEN REGENERATION
    a. Set to "OFF."
    b. Push NEXT.
4. ENERGY SAVER
    a. Set to "OFF."
    b. Push NEXT.
5. At this point the screen should change to blue and go back to STAND BY.

NOTE: all the steps above need to be done for <u>BOTH</u> softener heads.

3.2 –Hardness Greater than 20 Grains

1. Push and hold NEXT & UP. The screen will turn yellow and flash – “ENGLISH LANGUAGE.”
    a. Push NEXT.
2. WATER HARDNESS
    a. Set to local hardness PLUS 2 grains (I.E> if the local hardness is 25, set the heat to 27).
    b. Push NEXT.
    c. *NOTE: If site hardness is greater than 30 grains, contact TCWS for alternate solutions.*
3. DAYS BETWEEN REGENERATION
    a. Set to “OFF.”
    b. Push NEXT.
4. ENERGY SAVER
    a. Set to “OFF.”
    b. Push NEXT.
5. At this point the screen should change to blue and go back to STAND BY.
6. FILL TIME & CAPACITY
    a. Hold NEXT & DOWN – screen will change to yellow.
    b. Keep pushing NEXT until you get to “FILL TIME.”
    c. Change the fill time from 13.5 mins to 23.0 mins.
    d. Push NEXT – should be on GRAINS OF CAPACITY
    e. Change from 240.0K to 300.0k x 1.
    f. Keep pushing NEXT until the screen changes to blue and goes back to STAND BY.

NOTE: all the steps above need to be done for <u>BOTH</u> softener heads.

Section 4: Softener Commissioning

4.1 – Commissioning

NOTE: For commissioning to happen, the steps from Section 1 & 2 MUST BE completed. In addition, the water must be turned on to the softeners.

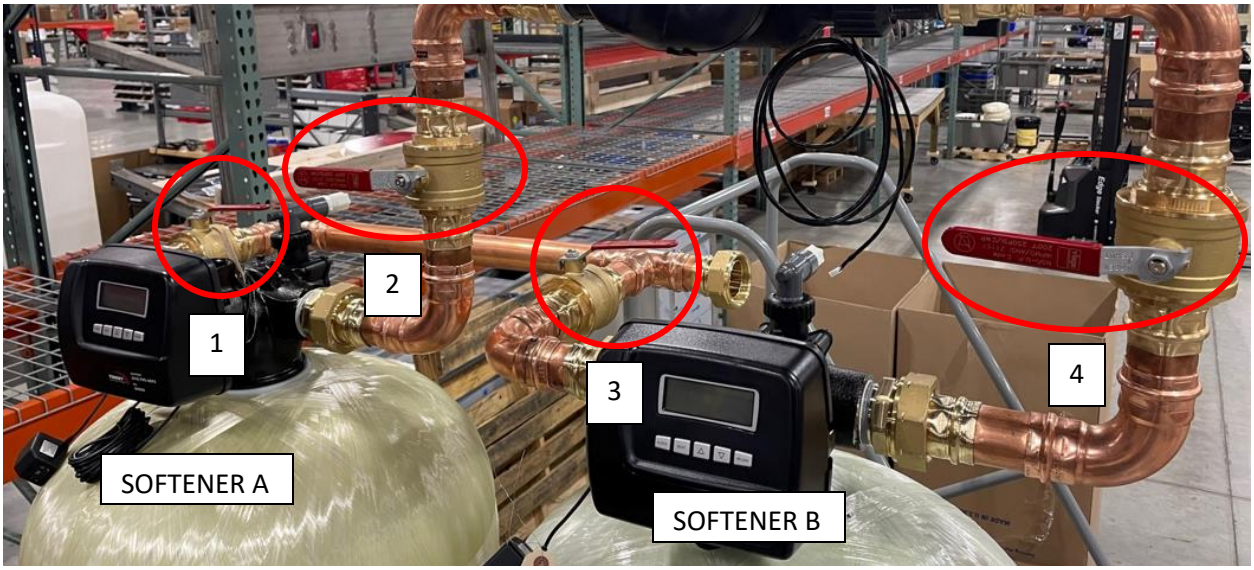

Figure 13 - Valve locations

Valve Number	Description
1	Softener A – Incoming hard water
2	Softener A – Outgoing soft water
3	Softener B – Incoming hard water
4	Softener B – Outgoing soft water

1. Shut ball valves 1, 3 & 4 to the OFF position. Start with softener head A:
    a. Commission softener A first:
    b. *NOTE: the goal in commissioning is to fill the tanks with water and purge any trapped air out of the tanks.* ***You need to be careful during this process, as trapped air can cause the tanks to expand past their rated pressure rating of 125 psi.***
    c. *NOTE: Make sure the brine draw lines are hooked up to the brine tank and the drain lines are hooked to the drain assembly. Make sure the drain assembly is fastened and the outlet is near a floor drain.*
    d. Crack ball valve 1 open approximately 20%.
    e. Press "REGEN" to get to step 2 – *Backwash 1.*
    f. During the *Backwash 1* process, a mixture of water/air will drain from the system. As the process continues, the water/air mixture should have less air in it and become all water.

As this happens, gradually open ball valve 1. ONLY open the valve if the mixture turns to more water. **YOU DO NOT want the tank to flex and expand. If it does this, reduce how much the ball valve is open.** At the end of 8 minutes, continue to the next step.

g. Press "REGEN" to get to step 2 – *Draw.* We will skip this process.
h. Press "REGEN" again to get to step 3 – *Backwash 2*
i. During *Backwash 2*, if ball valve 1 is not fully open, slowly let the softener fill up while water/air is escaping through the drain. By the end of *Backwash 2,* ball valve 1 should be fully open.
j. Press "REGEN" to get to step 4 – *Rinse.*
k. Let the *Rinse* sequence run all 5 minutes.
l. Press "REGEN" to get to step 5 – *Fill.*
m. Let the *Fill* sequence run all 13.5 minutes. This will fill the brine tank.
n. By the end of this sequence, the brine tank should have water in it above the grid at the bottom of the tank.
o. **If water level is not above the grid, the fill time needs to be increased OR the float has engaged and needs to be adjusted higher.**
p. The water level needs to be approximately 4" to 6" above the grid.
q. Softener A is now commissioned.

2. Commission softener B:
   a. Close ball valve 1, 2, and 3. Open ball valve 4.
   b. Repeat steps 1.A through 1.P from softener A for Softener B.
   c. Once the water level is above the grid 4" to 6", put all 6 bags of salt provided with the system in the brine tank.
   d. Open ball valves 1, 2, 3, and 4.
   e. Softener B has been commissioned and is ready for operation.

Section 5: Spare Parts

5.1 – Spare Parts List

TCWS PN	Description
P-WAT-2918	30"X50" Brine Tank
P-WAT-2919	24"x72" Softener Tank
P-WAT-2920	Softener Head
P-WAT-2921	Alternator Valve, plastic
P-WAT-2922	2" Flow meter, plastic
P-WAT-2953	Softening Resin
P-WAT-2954	50 lbs Softener Gravel
P-WAT-3086	Communication Cable
P-WAT-3087	2" MNPT x 2" Quick Connect Fitting, plastic – 2 pk
P-WAT-3088	Brine Drain Adapter, Quick Connect x ½" OD Poly Tube
P-WAT-3089	Softener Drain Adapter, Quick Connect x 1" MNPT
P-WAT-3090	Softener Drain 15.0 GPM Flow Control

Section 6: Troubleshooting

6.1 – Common Errors/Codes

1. *Error 106 – MAV RAN TOO LONG*
    a. **Description of error**:
        i. Alternator valve/MAV has run for too much time and the softener cannot communicate properly with it.
    b. **Root cause:**
        i. Cable from the MAV is not plugged in OR is not plugged into the correct port on Softener Head A. See *Figure 14.*
        ii. Cable from the MAV is damaged.
    c. **Corrective actions:**
        i. Inspect that the MAV cable is plugged into the proper port on the softener head.
        ii. Inspect the MAV cable to verify there is no damage.

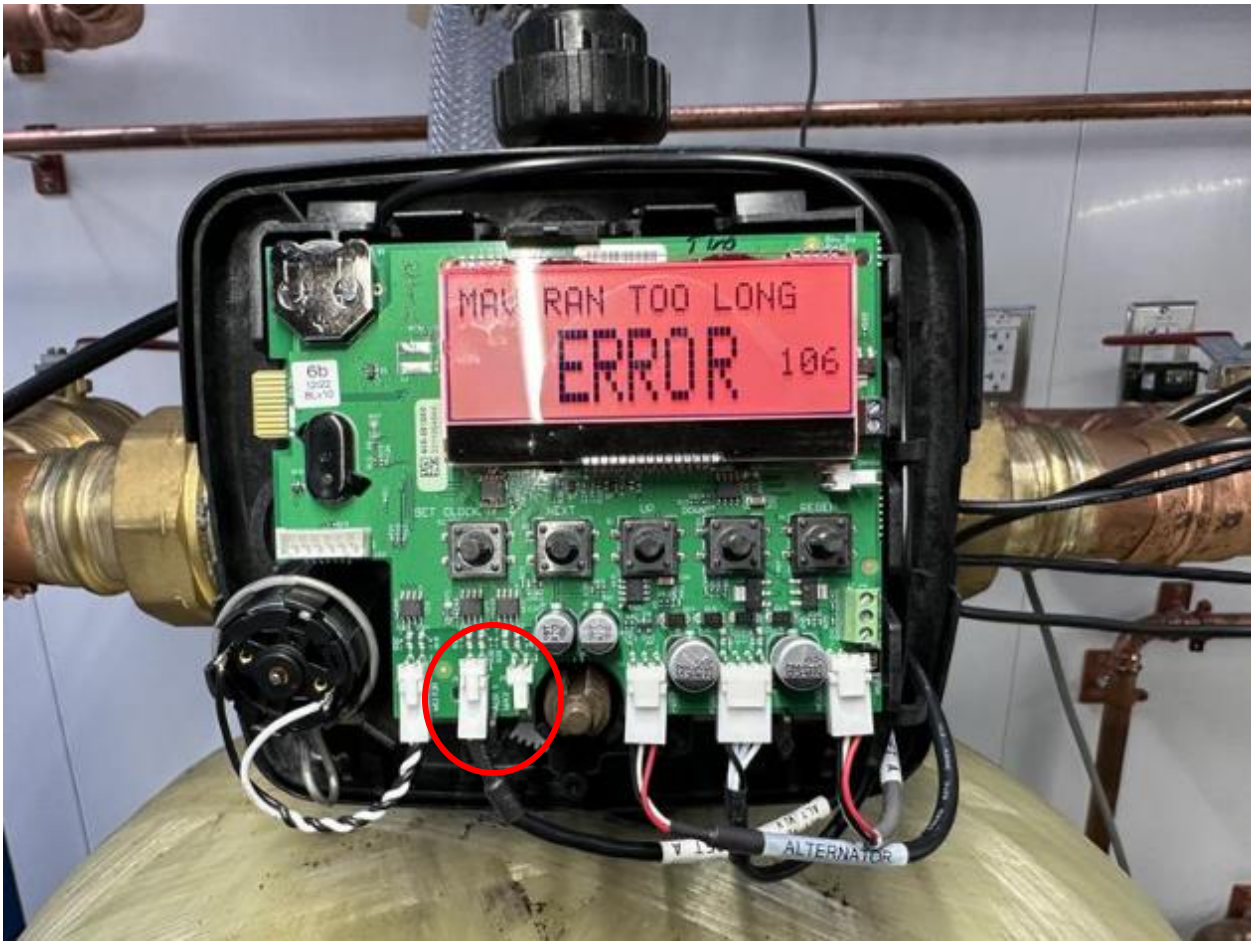

Figure 14 - ERROR 106, NOTE the MAV cable is plugged into the wrong port on the softener head.

2. *Alternator valve/MAV installed backwards*
    a. **Description of error**:
        i. Alternator valve/MAV installed backwards and softener heads are unable to operate properly.
    b. **Root cause:**
        i. Alternator valve installed backwards.
    c. **Corrective actions:**
        i. Molded on the alternator valve is an “A” and a “B” denoting which port goes to which softener head. If the valve was installed backwards, undo the couplings going to the inlet ports from each head and the outlet port and rotate the valve into the correct position.
3. *Softener running out of soft water too soon*
    a. **Description of problem:**
        i. Softener runs out of soft water faster than expected.
    b. **Root causes:**
        i. Water hardness on each softener is not properly set for local water hardness.
        ii. Site has exceptionally hard water.
    c. **Corrective actions:**
        i. Verity local site hardness and programmed hardness on each softener is set correctly.
        ii. If site has hardness <u>greater</u> than 25 grains, contact TCWS Support for further actions.
4. *Hard water bypassing softeners*
    a. **Softener not regenerating**
        i. **No salt in brine tank**
        ii. **Flowmeter not operating**
            1. **Flowmeter propellor has become logged**
            2. **Flowmeter has become inoperable.**
            3. **Flowmeter communication cable is damaged**
    b. **Power turned off to units**

Section 7: Appendices

7.1 – Assembled Softener Manifold