Water Tool™ Filters
12” TANK
The Ultimate Modular Media Filter

INSTALLATION MANUAL
AN OVERVIEW OF THE FILTER ASSEMBLY PROCESS

I am Paul Cordua, President of Hit Products Corporation. First of all, thank you for buying a Water Tool Sand Media Modular Filter! I am the guy that invented the Water Tool Filter.

I am also an orange grower. I have personally installed five units in my orange groves, so I know the ins and outs of the installation. My units were all 16 and 18 tank systems. Some were new installations and they were easy because I could put the inlet and outlet anyplace, but the existing system already had the inlet and outlet set in place.

As you read through the step-by-step instructions, you will find it very easy to install this filter system. First, I would like to give a narrative to start; I think this will make it easier for you when you begin the installation.

The system is “modular,” so you can have as many tanks as you desire, but you must have a minimum of two tanks for proper back flushing.

**Getting started:**

Lay a level slab of concrete; you can get dimensions from the specification sheet on filter dimensions. When you get your filters, open the boxes and lay out every part so you can see what you have. Remember, the inlet and outlet manifolds are designed to carry water for three tanks only, so we provide a 2 inch manifold system to hook up multiples of three tanks that can be stacked, so that you can have a six-tank system with a footprint of a three-tank system.

Take the tank bases and lay them on the concrete slab. Put the tank on their bases, and remove the nuts and washers from the top of the tank. Make sure the o-ring is clean and properly seated. Put the back flush valve on the tank (make sure the back flush valve is oriented to not cover the “fill area for the sand”). Assemble the washers and nuts to hold the back flush valve to the tank. Assemble the back flush portion of the valve to the filter valve. It has four flats to align it in the filter valve. Make sure you have the back flush outlet pointing straight up.

Do the above for all the tanks that you have. Now you have a complete filter tank with valve.

If this tank system is not stacked, then proceed as follows:

You will find multiple molded 2 inch nipples with union threads and various outlets. Some will have a pressure gauge only, some with pressure gauge and 1/4-inch tube outlet, some with air release valve and some with a small inline filter, valve and 1/4-inch outlet. Each of these has the purpose of making your life easier during installation.

If you are going to stack filter tanks, then remember to put the air release valves on the upper manifolds. You will find elbows and tees that have female union threads. These all interchange for inlet, outlet and back flush connections. The elbow is used on the last tank in the row of three (or two if you only use two in a row). The Tee is used on the middle tank and the first tank.

So, go ahead and install the tees and elbow on the proper tanks. OK, now line the tanks up in a straight row. If you are stacking tanks, then use the “plain” nipples and connect the tanks together, screwing the nipples into the tees and elbows you previously installed on the filter tank valves. Just hand tighten right now, you can come back and tighten up the unions later.

OK, now you should have the tanks all lined up with inlet, outlet and back flush manifolds installed.
Depending on what you ordered; we offer a “union” or “groove” connection for the inlet and outlet. If you have a union setup, then put the nipple on the inlet and outlet (this is the nipple that one end comes with a socket union on it that came with all the other nipples). If you ordered groove, you will find a nipple with union threads on one end and a groove on the other. The union thread will screw into the tee on the first filter inlet and outlet. The back flush manifold always comes with a socket union for solvent-welding the back flush pipe and valve.

Oh, by the way, regarding the back flush 1-inch ball valve — make sure you set it after starting the system. If you have high pressure and the valve is wide open, you might back flush all the sand out of the tanks. I will talk about this later; I just wanted you to start thinking about this.

OK, you now have the bottom tanks assembled with the inlet and outlet manifolds. If this was a system with only bottom tanks, you are finished, if you have a top row of tanks then you need to do the following on the top tanks as I explain what to assemble on the upper tanks.

Put the four legs on the bottom filter tanks; point the flat piece on in the middle of the leg toward the filter valve. You will find some bolts and nuts; attach the flat piece to the valve. Assemble the nut and bolt to the valve on each of the four legs. Do not tighten them yet. Remember, we installed the valves on all the tanks at the beginning. OK, now lift a tank up and put it on the four legs. This takes a little wiggling to get them on, because the legs are not tightened to the valve yet. Two people make this task a lot easier. Remember to make sure all the valves are pointing in the same direction as the lower tanks; this is necessary to line up the inlet and outlet manifolds.

Upper tank manifolds will have the nipples with the air release valves (one for the inlet side and one for the outlet side). This is where you want to install the nipples with the pressure gauges, again, with one on the inlet and one on the outlet. Whether this is a manual or automatic system, you need to install the nipple with the ball valve and air release valve and small filter on the inlet side manifold. For automatic systems, you need to install the nipple with the pressure gauge that has a 1/4-inch fitting on it. Again, one goes on the inlet and one on the outlet. These are used to supply water pressure to the pressure differential switch. We call it a “PD” switch. The PD switch is used to tell the controller when to back flush if the filter gets plugged with the dirt we are filtering out of your system. If you look at the PD switch connections, one side is marked “HI” and the other side is marked “LO.” Hook up the inlet tube on the nipple to the “HI” side and the outlet tube to the “LO” side.

OK, you should now have your filters installed and manifolds hooked up. We offer a 4 inch by 4 inch by 2 inch by 2 inch cross with groove connections for installing multiples of three-tank systems. We sell the parts individually or in a “component form.” The component set comes with a cross with a 4-inch cap and plain cross and all the nipples and groove couplings you need. The cross with the cap goes on the top to connect the top tanks and plain cross connects the lower tanks to the main manifold. This set is installed on the inlet and outlet of the filter manifolds that you just installed. Using this set can complete a 12-tank system, for example; six tanks on each side stacked or maybe an eight-tank system, four tanks (two on the bottom and two on the top with the set in between to make an eight-tank system). The catalogue shows all the combinations you can make with the modular design.

Now we need to hook up the 1/4 inch control tubing to manually or automatically back flush the filters. Manually, you will find a 1/4-inch electric solenoid valve. You won’t need the electric solenoid for manual operation, but keep it installed anyway. There is a small white handle on the 1/4-inch valve. This is used to lift the plunger in the solenoid. Lifting the plunger with this handle will allow water to go to the back flush valve — putting the filter in back flush, while turning it back will stop the back flush. Mount this on the filter valve; there are some brass inserts on the side of the valve for this purpose.
If you are installing an automatic system, you will have the 1/4-inch solenoid valve with a “decoder” on it. The decoder will have a small black plastic tag with a number engraved on it. The black tag will let you know that the decoder has been programmed to a number that will be used by the controller to turn that valve on during back flush. You should install these on the filter valve in sequential order. If you have a stacked tank system, I recommend that you put the upper and lower tank solenoid control valve on the top tank filter valve (it’s easier this way). If you have no black tag on the solenoid unit, then you will have to “program” the decoder. Refer to the controller instruction manual to see how to do this. After you have installed the solenoid valve (manual or automatic) you will need to install the 1/4-inch tubing for the hydraulic operation of the back flush valve. This brings up the question, how does this valve back flush the tanks? The filter valve is constructed with a diaphragm that is connected to a rod with a valve seat on it. When water pressure is put on the diaphragm, it moves the diaphragm forward in the valve. The valve seat shuts off the inlet water and opens the tank to atmosphere. The clean water from the other tank(s) moves backward through the filter that is being activated and lifts the sand bed (we call this “sand bed expansion”) and flushes the dirt out to atmosphere. When the valve is deactivated, the water drains off the diaphragm and returns the filter valve to its normal position and the tank is now filtering again. Remember, earlier I mentioned the 1-inch PVC ball valve installed on the back flush manifold. This needs to be adjusted to control the amount of flow during back flush. When you unpacked everything you found a “clear” nipple. This is installed before the 1-inch PVC ball valve. During the back flush, adjust the ball valve so you can see some sand coming through the sight tube, and then close the valve a little until no sand is visible in the sight tube. By doing this you will achieve the maximum flow during the back flush cycle without losing any sand media. This should be checked periodically during the irrigation season. Achieving the maximum back flush flow will clean the filters fast and save water. Lower flows will take a longer cycle to back flush the filters and wastewater. OK, back to installing the 1/4-inch control tubing. Connect the tube to the nipple fitting on the inlet manifold side that has the valve and small filter. You should have found some 1/4-inch tees with compression connections on all three sides. These will be used to “tee” the line to each 1/4-inch filter solenoid valve. The last one doesn’t need a tee; just hook it directly to the 1/4-inch solenoid valve. OK, now, which sides do you put the tube into on the 1/4-inch valve? Look at the 1/4-inch solenoid valve, it’s as easy as 1-2-3. The tube from the inlet manifold nipple goes to port marked 1, port 2 goes to the back of the back flush valve and 3 (not marked, but is on the top of the solenoid) goes to atmosphere. I would suggest connecting enough 1/4-inch tubing to 3 to go all the way down the tank to the ground to drain the water off the valve when back flushing — it’s a lot cleaner-looking this way. I did not do it on the first one I did and after a few irrigations, the calcium in the water left some ugly white stains on the black tanks. I went back and corrected this situation. If you have an automatic system, we need to hook up the electrical portion of the system now. You should have found two waterproof connections in the plastic bag with the solenoid valve and decoder. Run a cable with four wires in it from the controller to the filter units. You will use two wires for all the decoders and two wires for the PD switch. Make sure the wire is color-coded. Hook up each decoder to the same two colored wires, it doesn’t matter which way. Hook up the other two colored wires to the PD switch. Use the waterproof connectors provided. Even though we provide two connectors for each decoder, you don’t have to hook up each one independently. When there are two decoders on the valve, I have found that I can hook both of them together. This eliminates half of the connections. The wires are long enough to do this. Now, go to the controller and connect the valve wires to where it says “lineout” and connect the PD wires where it says “pressure switch”: refer to the controller instructions.
Power the controller:

We use a power inverter rather than a transformer to power the controller. It is capable of operating from 90 to 250 volts single phase and provides 12 volts DC output. It’s the same thing that powers your laptop computer. It’s cool and acts like a surge protector, too. Because 12 volts is the same as a battery, if you have no power you can install a solar panel and charge a battery and hook the controller directly to the battery and you’re in business (remove the power inverter and hook up directly to a 12 vdc battery).

Read the controller instructions a couple of times. This controller has some neat features beyond a normal back flush controller:

• You can see how many times it back flushed in a certain amount of time (you can clear it anytime you want).
• You can install a delay on the PD so it doesn’t go into a back flush when you have a surge in pressure.
• You can put in time for activating a pressure-sustaining valve to help back flush pressures.

Talking about pressure-sustaining valves, if you don’t know what one is, here is a brief explanation: It is the opposite of a pressure-control valve. A PS valve maintains a set pressure in front of the valve, rather than on the outlet of the valve like a pressure control valve. This is necessary in a filter operation in which you have a minimum number of tanks and a predetermined amount of water and pressure. For example, when you have a two-tank system flowing 50 gpm at 25 psi, when the back flush starts, you need about 25 gpm to get a good back flush, but water is going to the system and one tank is open to atmosphere trying to back flush. The bottom line is that you don’t have enough flow and pressure to get a good back flush. So, install a PS valve and hook it to the controller, make sure it has a 12 VDC solenoid. When the controller says, “go to back flush,” it sends power to the PS valve and it shuts down and keeps enough pressure to back flush. When back flush is complete, it shuts off power to the valve and all the water goes back to the irrigation system. Your dealer can help you with this if you find yourself needing a PS valve.

If you have a manual system that needs a PS valve, just install a manual valve after the filters and turn it down when back flushing the filters, this accomplishes the same thing as an automatic PS valve, but manually.

I get questions about putting a restrictor on the back flush line all the time. The bottom line is that it won’t work. You must be able to adjust the 1-inch back flush manual valve. If you have high pressure in the system, the 1-inch valve needs to be closed more than if you have low pressure in the system and the valve needs to be opened more to allow for more flow. The higher the pressure, the more water flow, so you must be in a position to adjust it so no sand leaves the filter beds. Every installation is different. That why we provided everything you need for a system, from air release valves to the site tube for back flushing.

When you start operating your Water Tool Modular filter system, you will be operating the most efficient media system on the market. The Under Drain in this filter was specifically designed for this purpose and the Under Drain is the most important component of a media filter. Go to our website and watch the video demonstration on the back flush. Do to our innovative design, the back flush valves are so easy to take apart for service; it takes less than a minute to remove a valve.

If you have any question call Jason or me at (559) 562-5975.
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Remove nuts and washers from top, open end of tank. Make sure o-ring is clean and properly fitted in groove before attaching valve.
Attach main valve body onto tank using nuts and washers removed in Step 2. Torque nuts to 120 in-lbs., using a 13 mm socket or wrench.

Position main valve body outlet on either side of media fill cap. DO NOT install valve so inlet or outlet covers media fill cap.

Insert back flush valve into main valve body. Do not force. Make sure o-rings are clean and properly seated in groove before installing.
Assemble union elbows or tees to the back flush, inlet, and outlet, making sure o-rings are clean and properly seated in o-ring grooves.

Use elbows on last tank. Use tees on middle tank and inlet/outlet tank.

**NOTE:** Make union connections hand tight ONLY. Unions can be fully tightened after assembly is complete.

Assemble nipples to union elbows and tees making sure o-rings are clean and properly seated. Connect the nipple with filter and air release to the inlet and the nipple with air release to the outlet. Use a plain nipple on the back flush.

**NOTE:** Make union connections hand tight ONLY. Unions can be fully tightened after assembly is complete.

**NOTE:** When stacking tanks, use plain nipples to connect bottom tanks and air release nipples to connect upper tanks.
Line up nipples of one tank to union tees and elbows of another tank to make connection.

**NOTE:** Make union connections hand tight ONLY. Unions can be fully tightened after assembly is complete.

**NOTE:** Do Not install more than 3 tanks per inlet/outlet manifolds due to 2” pipe flow limitations.

Assemble end connections and position tanks to desired location.

Stacking tanks requires additional manifolds. Inlet manifold (WTA-183) and outlet manifold (WTA-182) are recommended.

(See page 27)

A site tube and 1” PVC ball valve are provided to manage back flush flow. Additional back flush plumbing (pipe and fittings) not provided.

To prevent loss of sand or other media during back flush, start with ball valve partially closed or with handle at 45°.

To maximize back flush effectiveness, adjust ball valve to maximum flow while preventing any media loss as seen in sight tube.

**NOTE:** Back flush valves require a minimum operating pressure of 15 psi. Installation of either a manual valve or a pressure sustaining valve (not provided) to the outlet manifold is recommended in order to maintain minimum pressure for back flush operation.
STEP 9

Remove nuts, washers and media fill cap. Fill each tank with a volume of 5 gallons of media.

NOTE: Filling bottom tanks with media before stacking top tanks (step 13) is recommended.

STEP 10

A 5 gallon bucket will ensure proper volume of media is achieved.

Place a funnel (not included) into the media fill hole.
STEP 11

Pour media into each tank. Proper media level will be about 6” from top of tank to level media bed inside tank.

STEP 12

Clean sealing surface of all media particles and debris before replacing media fill cap.

Torque nuts to 120 in - lbs.
Remove bolts, nuts and washers from legs. Insert legs into tank. Line up leg bolt hole with the hole on the main valve body.

Make sure rubber grommets are installed on both ends of legs.

**NOTE:** When stacking tanks, make sure parts #WTA-165AR and #WTA-165FAR (air release valves) are installed on the upper tank manifolds.

Connect legs to main valve body with bolts, washers, and nuts provided. See note below.

**NOTE:** For ease of assembly, wait until all tanks are stacked and inlet/outlet manifolds connected before fully tightening nuts, bolts and unions.
Set upper tank on legs.

NOTE: For ease of assembly, wait until all tanks are stacked and inlet/outlet manifolds connected before fully tightening nuts, bolts and unions.
Mount the pressure differential switch to the top of the main valve body using screws provided.

Use 1/4” tubing to plumb the pressure differential switch. One side of the pressure differential switch is marked “HI”, and the other side is marked “LO”. Connect the “HI” side to the inlet. Connect the “LO” side to the outlet.

NOTE: Refer to Water Tool Back Flush 2 Wire Controller manual provided with controller for additional information.
Mount solenoid valves to either side of the top of the main valve body using the two screws provided.

**NOTE:** Solenoid valves with decoders require programming. New filter systems with controllers have factory programmed decoders and are tagged with numbers from 1 to the number of tanks in the system. Additional information can be found in the Water Tool Back Flush 2 Wire Controller manual.
Use 1/4” tubing to plumb the solenoid valves. The picture to the right shows how to identify the inlet (#1), the outlet (#2), and the discharge (#3) of the solenoid valves. Connect #1 to the screen filter. Connect #2 to the back flush valve. #3 can be plumbed to a suitable location for discharge water.

The manual back flush lever manually operates the back flush valve.

All tanks can be flushed by using the manual back flush lever. Twist the lever so it points up to open the back flush valve and to the side to close.

**Note:** Only back flush one tank at a time.
Use 1/4” tees (provided) to connect multiple solenoid valves to the screen filter.

NOTE: When stacking tanks, solenoid valves for both the top tank and the bottom tank can be installed to the top of the main valve body on the top tank(s) as shown.
Two wires are required to connect to each decoder. Using the wire connectors provided, attach the 1st field wire lead to one red wire of each decoder. Attach the 2nd field wire lead to the remaining red wires of each decoder.

At the controller, attach the two field wires to the terminal marked “line out”. It is recommended to use a 4 wire conductor cable as shown in the picture; one pair of wires for the decoders and one pair of wires for the pressure differential switch.

**NOTE:** Minimum 18 gauge wire required. Refer to pages (12-15) in the controller manual.
Remove drain plug to drain water from tank. This will prevent damage during freezing temperatures.
A screen above the drain plug will prevent loss of media.
1. Tank will not flush

   **ELECTRICAL**
   1. Check controller for proper programming.
   2. Check wiring.
   3. Check decoders. Reprogram if necessary.

   **HYDRAULIC**
   1. Check plumbing.
      A) #1 to screen filter.
      B) #2 to back flush valve.
   2. Check filter screen.

2. Back flush valve stuck (will not close)

   1. Check discharge from top of solenoid valve (#3).
      Remove obstructions from plumbing.
   2. Sand or silt in guide - Turn off water to system and remove back flush valve. Use clean water to wash out sand and clean valve shaft guide. (Page 9)

3. High differential pressure

   1. Flush tank to clean media. Proper back flush flow may be achieved by doing one or both of the following:
      A) Adjust 1” ball valve on back flush line.
      B) Close valve on outlet manifold to create more flow for back flush.
      *A pressure sustaining valve may be installed on the outlet manifold to automatically control system pressure during back flush.
   2. Check that system flow is not exceeding the maximum of 25 gpm per tank.
3 TANK HORIZONTAL

Flush
Inlet
Outlet

45-75 GPM
170-284 L/M

4 TANK HORIZONTAL STACKED

Flush
Inlet
Outlet

60-100 GPM
227-379 L/M
5 TANK HORIZONTAL STACKED

75-125 GPM
284-473 L/M

6 TANK HORIZONTAL STACKED

90-150 GPM
340-567 L/M
6 TANK STACKED ASSEMBLY WITH MANIFOLD

MAXIMUM OPERATING PRESSURE

80 PSI
550 kP
5.51 BARS

INLET MANIFOLD
WTA-183

OUTLET MANIFOLD
WTA-182

All parts listed above are included in WTA-183

All parts listed above are included in WTA-182
### SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filters Available</td>
<td>1-96</td>
</tr>
<tr>
<td>Back Flush Time</td>
<td>15 seconds to 300 seconds in preset increments</td>
</tr>
<tr>
<td>Dwell Time</td>
<td>15 seconds to 180 seconds in preset increments</td>
</tr>
<tr>
<td>Period Flush Time</td>
<td>1 hour to 24 hours in preset increments</td>
</tr>
<tr>
<td>Manual Flush Time</td>
<td>Yes</td>
</tr>
<tr>
<td>Accumulated Flush / Time</td>
<td>Yes</td>
</tr>
<tr>
<td>Flush Valves Per Decoder</td>
<td>1</td>
</tr>
<tr>
<td>Pressure Differential Switch Capable</td>
<td>Yes</td>
</tr>
<tr>
<td>Field Wire Outputs</td>
<td>Two Wire path may include branches and tees as necessary</td>
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<tr>
<td>Minimum Wire Size</td>
<td>18 gauge</td>
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<tr>
<td>Maximum Wire Run</td>
<td>500'</td>
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<tr>
<td>Maximum Number of Decoders on system</td>
<td>96</td>
</tr>
<tr>
<td>Decoders Programmable and Re-Programmable to desired valve number</td>
<td>Yes</td>
</tr>
<tr>
<td>On Board Decoder Programming Capability at Controller</td>
<td>Yes</td>
</tr>
<tr>
<td>Master Valve Capable</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Wire Type:** Outdoor rated single or stranded copper connector

**Wire Size:** Minimum 18 gauge

**Wire Runs:** Maximum 500’

**Branching & Teeing:** Yes

**DO NOT “Loop”** the control wires back to the controller **OR** back onto themselves.

**DO NOT splice and direct bury** wire connections/splices. All wire connections/splices should be made in valve boxes.

**Wire Connectors:**
Use the supplied LT-10 connectors, for Two Wire to Decoder Connection.

**Input Power:** 100VAC-240VAC 50/60Hz
WIRING CONNECTIONS

Power Supply

Power Input
90-240VAC 50/60Hz

Field Wires
To Tanks

12V DC
WT BACK FLUSH GETTING STARTED INSTRUCTIONS

1. With the power applied, turn the Dial to Position 1 Number of Filters. Use the Arrow Buttons to select the number of tanks in the system 1-96.

2. Turn the Dial to Position 2. Use the Arrow Buttons to select the Back Flush duration of each individual tank in 15 seconds increments from 15 seconds to 180 seconds and 30 second increments from 180 seconds to 300 seconds.

3. Turn the Dial to Position 3. Use the Arrow Buttons to select the Dwell Time, between one individual tanks flushing cycle to end and the next tank to begin Back Flushing. In preset increments from 15 seconds to 180 seconds.

4. Turn the Dial to Position 4. Use the Arrow Buttons to select the Periodic Flush Time in one hour increments from 1 hour to 16 hours and 2 hours increments from 16 hours to 24 hours or P.D. Switch Only. This is for setting the frequency that the controller will initiate a complete Back Flush Cycle of all the tanks in the system.

5. To start a complete Back Flush Cycle manually turn the Dial to Position 5 and press either Arrow Button. To allow the controller to run automatically turn the Dial to Position 12 RUN / AUTO. The time remaining until the next cycle will be displayed.

6. Position 10 will show how many Back Flush Cycles accumulated during the time shown on the right side of the display. To reset, press the up Arrow Button.

7. Set the Pre Dwell and Pressure Differential Delay Time if needed.

PROGRAMMING THE CONTROLLER

POSITION 1
Number of Filters
Use the arrow buttons to select the number of filters 1 thru 96.

POSITION 2
Back Flush Time
Use the arrow buttons to select the Back Flush Time of 15, 30, 45, 60, 75, 90, 105, 120, 135, 150, 165, 180, 210, 240, 270 or 300 seconds.

POSITION 3
Dwell Time
Use the arrow buttons to select Dwell Time of 15, 30, 45, 60, 75, 90, 105, 120, 135, 150, 165 or 180 seconds.
**POSITION 4**
**Periodic Flush Time**
Use the arrow buttons to select the Periodic Flush Time of 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 22 or 24 hours, or P.D. Switch Only.

**NOTE:**
No Timed Back Flushes will occur when P.D. Switch Only is selected. When a Timed Back Flush is selected the P.D. Switch, if connected, will initiate a Back Flush.

**POSITION 5**
**Start Manual Flush Cycle**
Use the UP arrow button to start a Manual Flush Cycle using the programmed information in Dial Positions 1, 2 and 3. To stop a Back Flush turn the Dial to Position 11 and press the UP arrow button.

**POSITION 6 AND 7**
**Programming Decoders**
These positions are used to program the decoders for each filter. In Position 6 select the number of the decoder that will be programmed. Turn the Dial to Position 7 and press the UP arrow button to program the decoder. Have the decoder red wires connected to PRGM terminals and the field wires disconnected.

**NOTE:**
See Programming Instructions on page 9.

**POSITION 8**
**Pre Dwell**
Use the arrow buttons to select a Pre Dwell setting from 0-360 seconds in 10 second increments. The Master Valve will stay activated during the Dwell Time selected in Dial Position 3. If no Master Valve is used, no Pre Dwell is required. Set the Pre Dwell time to 0.

**POSITION 9**
**Pressure Differential Switch Delay**
Use the arrow buttons to select Pressure Differential Switch Delay of 0 to 360 seconds in 10 second increments. This delay is the time the Pressure Differential Switch must remain closed before a Back Flush is initiated. If a Pressure Differential Switch is not used no delay is required. Set the Pressure Differential Delay to 0.

**POSITION 10**
**Accumulated Flush / Times**
This position displays the accumulated flushes and time.

**NOTE:**
Use arrow buttons to clear the accumulated flushes and times.
POSITION 11
OFF
Use the UP arrow buttons to turn the controller OFF and leave the Dial in Position 11 after the controller turns OFF.

NOTE:
Rotating the Dial out of Position 11 will turn on the controller.

NOTE:
The information selected in Dial Positions 1, 2, 3 and 4 will not be lost when the controller is turned OFF or during a power outage.

NOTE:
A controller with a connected Pressure Differential Switch will activate a Back Flush Cycle when the controller is OFF. No “Periodic” Back Flush Cycles will be initiated.

NOTE: Disconnect power to completely turn controller OFF.

POSITION 12
Run / Auto
This position displays the time remaining before the next Back Flush Cycle or P.D. Switch Only and will display the tank number and the Flush/Dwell times during a Back Flush Cycle.

Master Clear: Press the DOWN arrow button to access this feature. A Master Clear restores the information in Dial Positions 1, 2, 3 and 4 to the default values.

NOTE:
A flashing “*”, will be displayed if the controller has encountered a loss of power. Rotating the Dial to the OFF position and back will clear “*”.
There is no need to press the arrow button at this time.

NOTE:
The controller will run automatically if the dial is left in any other position than Run/Auto Dial Position 12.
The dial can be turned to Run/Auto to view the status of a Back Flush without interrupting a Back Flush Cycle.

NOTE:
To stop a Back Flush Cycle in progress. Turn the dial to “OFF” dial position 11 and press the up arrow.

NOTE:
A flashing “C” indicates three consecutive back flushes. Rotate the dial to clear.
DECODER PROGRAMMING

Decoder Solenoid

Red LED
Located below the surface of Epoxy next to Black wires

Red

Black
WATER TOOL BACK FLUSH CONTROLLER DECODER PROGRAMMING INSTRUCTIONS

1. Turn the Dial to Position 11, press the UP arrow button. This will turn the controller OFF.

2. Disconnect field wires from “Line Out” terminal.

3. Connect the red wires of the decoder to the “Program” terminal. The supplied alligator leads may be used to assist in programming multiple decoders.

4. Turn the Dial to Position 6 “Select Programming Number”.

5. Use the arrow buttons to select the number of the connected decoder or MSTR if a Master Valve is required.

6. Turn the Dial to Position 7 “Enter Programming Number” to be programmed.

7. Use the UP arrow button to start the programming process. The display shows “Programming Station” and then, “Programming Complete”. Also the red led in the decoder will flash 3 times.

8. Remove the red wires from the “Program” terminal.

9. Install a “Decoder Number Identification Tag” on one of the red wires.

10. Repeat steps 3-7 to program another decoder.

11. Reconnect the field wires in Line Out when completed.

NOTE:
If a Back Flush Cycle was interrupted to program a Decoder, when the Dial is returned to the “Run/Auto” position the “Periodic Flush Time” scheduled Back Flush will start from the beginning.
Pressure Differential Switch

The Pressure Differential Switch terminal is located on the bottom right of the Controller board labeled Pressure Switch. A Pressure Differential Switch can be used to initiate a complete Back Flush cycle. When a Pressure Differential Switch is installed and a preset Pressure Differential is reached a Back Flush Cycle will start.

For adjustment see page 12.

NOTE: A connected P.D. Switch will initiate a Back Flush when:

a) A Periodic Flush time is selected. Dial Position 4.
b) P.D. Switch only is selected. Dial Position 4.
c) The Controller has been turned OFF in Dial Position 11.

MOUNTING

To mount the Pressure Differential Switch, place the switch on the valve and screw it on with screws (A) and (B) as shown in Figure A.

ADJUSTING

Loosen screws (D) and (E) and align edge (C) for desired Pressure Differential as shown in Figure B.
A Master Valve or a Pressure Sustaining Valve can be added to the Two Wire path if required. Program the WTA-150 D or WTA-150 D/S Decoder as a Master.

Pre Dwell is the selected Time between the activation of the Master Valve and the start of Tank 1 in a Back Flush Cycle. This will allow sufficient pressure and flow for efficient Back Flushing of the media filter.

See Decoder Programming page 9.

Refer to Pre Dwell settings page 7.
WT DECODER FIELD WIRING

From Controller

Cap

Splice

DB-SPL

To Next Tank

Field Wires

Red

Black
MANUAL Flush LEVER OPERATION

The Manual/Auto Lever is used to activate the Back Flush Valve manually on each individual tank. Figure A shows the lever in the closed position. This is the position the lever must be in for the controller to start a Black Flush. It is also the position for normal filtration and when no active Manual Back Flushing is desired.

Figure B shows the lever in the manual Back Flush position. This lever must be returned to the position in Figure A to stop a Manual Back Flush and/or allow the controller to electrically initiate a Back Flush.
TWO WIRE OPERATION

Controller Operation
When the controller is activated by either “Auto” programming or a “Manual” Input, the encoded signal is supplied to the Line Out Terminals.

Decoder Operations
The Decoder operates as an electronically controlled switch. When the decoder recognizes the encoded signal that matches its programmed number, it then allows or “switches” power to the solenoid on the valve Back Flushing the tanks.

Line Short/Valve Short Codes
The controller, through its current monitoring ability, can display two fault conditions: One being “Short Line” the second being “Valve Short.” These faults are triggered when current draw has exceeded a pre-set level.

Note: No Output is sent to the field during the following conditions:

“Short Line” will retry at the next flush time. Turning the Dial out of “Run” and back will clear the display. If the short has not been corrected the controller will go back into “Line Short.” This fault can be caused by shorted field wires or bad decoder.

“Short Valve” will stay displayed during that specific tanks run time. The controller will monitor the program status and standard operation will resume when the next valve is activated. If the problem has not been corrected by the time the controller is scheduled to Run again the “Short Valve” will repeat for that specific valve until the short is repaired.
No Back Flush will occur for that specific tanks run time but all valves that do not have a “short” condition will continue to flush as programmed. This fault can be caused by a bad solenoid.
WATER TOOL BACK FLUSH CONTROLLER INSTALLATION “DO’S & DON’TS”

For Warranty To Be Valid, Installation Must Comply To All Instructions Below:

1. Use only Hit Back Flush Decoders (WTA-150D) and Solenoids (WT-160) or a Connected Decoder and Solenoid (WTA-150D/S)

2. Branching and Teeing of the Two Wire path is permitted with the Water Tool Back Flush Controller System. Wire splices should be well planned and minimized using only the DB-SPL splice kits. (Included with all Decoders).

Wire Connections

3. **DO NOT** install the Water Tool Back Flush Controller, its Decoders or any Water Tool Back Flush Controller Field Wire within 15 feet of any high voltage electrical panels, meters, pumps, equipment or controls.

4. On multiple controller Installations **DO NOT** connect any control wires of one controller with those of a different Controller.

5. **DO NOT** “loop” field wiring. Terminate the field wires at the last tank on that Two Wire path.
1. Disconnect Power Supply From Plug-In Terminal.
2. Connect Wire from 12V DC Battery or Solar Panel/Charge Controller to Terminal Block.

Note: Be Sure to Observe Polarity.
Note: 12V DC Only.
## Troubleshooting Hints for Water Tool Back Flush Controller Two Wire Systems

<table>
<thead>
<tr>
<th>Problem</th>
<th>Solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display Blank.</td>
<td>No Power.</td>
</tr>
<tr>
<td></td>
<td>1) Check: 110v or 220v supply and connections. Correct as needed.</td>
</tr>
<tr>
<td></td>
<td>2) Check: 12V Power at the output of the Power Supply.</td>
</tr>
<tr>
<td>Controller Displaying “Short Line” or Turning ON/OFF and “Clicking”.</td>
<td>High Current Draw</td>
</tr>
<tr>
<td></td>
<td>1) Short field wires.</td>
</tr>
<tr>
<td></td>
<td>2) Field wires of one controller connected to field wires of a second controller.</td>
</tr>
<tr>
<td>No Valves Activating.</td>
<td>1) Controller not activating.</td>
</tr>
<tr>
<td></td>
<td>2) Field Wire Connection.</td>
</tr>
<tr>
<td></td>
<td>1) Check the “Line Out” wire connections at the Controller.</td>
</tr>
<tr>
<td></td>
<td>2) Failed Controller Replace Panel.</td>
</tr>
<tr>
<td>Single Valve not Activating.</td>
<td>1) Bad wire connection.</td>
</tr>
<tr>
<td></td>
<td>2) Failed Decoder.</td>
</tr>
<tr>
<td></td>
<td>1) Check Decoder Wire Connection.</td>
</tr>
<tr>
<td></td>
<td>2) See Decoder Operation.</td>
</tr>
<tr>
<td>Multiple Valves not Activating.</td>
<td>1) Field wiring or connections.</td>
</tr>
<tr>
<td></td>
<td>1) Check wiring and connections between the last valve working and the first valve not working.</td>
</tr>
<tr>
<td>Controller displaying reads “Valve Short” with a valve number.</td>
<td>High current draw during valve run time.</td>
</tr>
<tr>
<td></td>
<td>1) Possible bad solenoid.</td>
</tr>
<tr>
<td></td>
<td>2) Possible bad decoders.</td>
</tr>
<tr>
<td>Display frozen, does not respond to rotating valve.</td>
<td>Micro is locked.</td>
</tr>
<tr>
<td></td>
<td>1) Turn power off for a minute, then back on.</td>
</tr>
<tr>
<td>Valves Turning ON/OFF during run time.</td>
<td>Possible EMF interference.</td>
</tr>
<tr>
<td></td>
<td>Check: Controller, Decoder and Field Wiring location in respect to any high voltage.</td>
</tr>
<tr>
<td>Display shows flashing *</td>
<td>Indicates loss of Power see Dial Position 12, page 32.</td>
</tr>
<tr>
<td>Display shows flashing “C”</td>
<td>Indicates multiple flushes see Dial Position 12, page 32.</td>
</tr>
</tbody>
</table>
SYSTEM DIMENSIONS

Minimum necessary to remove valve for maintenance

17-14/16"

54-10/16"

30-10/16"

12"

12"

66-5/8"

60-5/16"

33-9/16"

27-4/16"

41-1/16"

74-2/16"

25-9/16"

11-1/16"

14-8/16"

8-15/16"

8-15/16"