



AUTOMATED TANK
CLEANING SOLUTION

A large, stylized graphic in the background of the lower half of the page. It consists of several concentric, overlapping oval shapes. The outermost layer is a light blue band. Inside that is a larger, light orange band. The center of this graphic is a large, pale yellow oval. The text "INSTRUCTION MANUAL" is centered within this yellow oval.

INSTRUCTION MANUAL

The Vorso Automated Tank Cleaning Kit is designed to offer a simple solution to integrating a Clean-In-Place (CIP) routine for water and nutrient storage tanks in your horticultural facility. Vorso can be added to an existing irrigation or fertigation system or included as part of a new installation. With the help of the Vorso Starter Kit (sold separately), you can even install it as its own standalone CIP solution without the need for any existing infrastructure aside from your tanks.

By utilizing simple automation and high-quality components, Vorso will save your business time and money by drastically reducing the labor required to keep your storage tanks clean and operable. This instruction manual will explain what the kit includes, how it works, how to install it, and how to use it.



TABLE OF CONTENTS

WHAT'S IN THE KIT?	3
HOW DOES IT WORK?	4
HOW TO INSTALL IT	5-10
VALVE PROGRAMMING	7
HOW TO USE IT	11
ADDITIONAL TIPS	12

WHAT'S IN THE KIT?

Each Vorso kit includes the equipment needed to service a single tank, either as part of an integration with an existing system or as a new installation. If you want to use Vorso on its own – such as for batch tanks used with hand-watering – remember that you will need a starter kit in addition to your Vorso. One starter kit can supply 20+ Vorso cleaning kits. If you're interested in running more Vorso cleaning kits off a single starter kit, please contact us to discuss it first.

QTY	DESCRIPTION	SKU	PER C&R	PER DU
1	3/8" STAINLESS STEEL SPRAY HEAD	SH-38-001	1	
1	3/4" ACTUATED BALL VALVE	CVI-075-01	1	
1	1.5" ACTUATED BALL VALVE	CVI-150-02		1 *
1	3/8" DIAMETER 16" LONG STAINLESS STEEL RISER	R3816	1	
1	3/4" FPT QUICKLOCK FITTING	QC075A	1	
1	3/4" MPT QUICKLOCK FITTING	QC075B	1	
1	3/4" BULKHEAD FITTING	PBH80-34-002	1	
2	3/4" SLIP X SLIP PVC UNIONS	PU80-34-001	2	
1	3/4" MPT X 3/8" FPT PVC REDUCER	PRE80-34-005	1	
5	3/4" SLIP X 3/4" MPT PVC ADAPTERS	PA80-34-002	5 **	
1	INSTRUCTION MANUAL		1	

C&R = CLEAN & RINSE UNIT
DU = DRAINAGE UNIT

* The Drainage Unit only consists of a 1.5" actuated ball valve with both slip and threaded ends. Simply install it on the drainage line coming from the bottom of your tank, that's it!

** One extra adapter is included. If you don't use it, don't worry!

There are a few things you'll need in addition to the items in the kit to complete installation:

- 3/4" SCHEDULE 80 PVC PIPE (FOR THE CLEAN & RINSE UNIT)
- 1.5" SCHEDULE 80 PVC PIPE (FOR THE DRAINAGE UNIT)
- PVC GLUE
- PVC CUTTER
- TEFLON TAPE
- HARDWARE TO SECURE YOUR PIPES AND VALVES



Missing an item? Having trouble figuring something out?
Remember that you can always call us at **844-420-4100** for help.

HOW DOES IT WORK?

Vorso is a Clean-In-Place solution intended for tanks that store nutrient solution or water. Once installed, your kit will have two distinct parts: the Clean & Rinse Unit and the Drainage Unit. The Clean & Rinse unit goes into the top of your tank, while the Drainage Unit is connected to the drain of your tank. These units work together to clean your tanks, rinse them out, and dispose of the water and chemicals used in this process without requiring any manual labor.

The Clean & Rinse Unit is connected to an input pipe that can feed the unit both fresh, clean water and water that has been amended with a cleaning solution additive. For facilities with an existing irrigation or fertigation system, this is as easy as running a line to your nutrient injection machine and programming it to run the schedule you want. For standalone systems utilizing the Vorso Starter Kit, you just need to connect the starter kit to a fresh water line; the starter kit includes a hydraulic chemical injector and actuating ball valves for clean or rinse cycles.



The first step in the cleaning process is to apply the cleaning solution. The spray head in Vorso is not a pressure washer. Rather, it is a spray applicator for the cleaning solution of your choice. Water with the cleaning solution added is sprayed through the head onto the inside of the tank. The sprayer head is then turned off and the cleaning solution is left to sit on the inside walls of the tanks where it can dissolve nutrient buildup, kill bacteria and algae, or whatever else your chosen cleaning solution is intended to do. Once the solution has sat for long enough, the sprayer head is reactivated. This time, however, it only sprays clean water. This is the “rinse” part of Clean & Rinse. The valve on the Drainage Unit is always open whenever the sprayer head is active to let used water, cleaning solution, and debris drain freely from the tank. Multiple cleaning actions can be scheduled in a row if multi-step cleaning is required.

Only minor programming is required to make this action possible. This can easily be achieved regardless of the type of control system your Vorso is connected to. Sophisticated fertigation control systems like Rhythm, Growlink, and Dilution Solutions will have no issue whatsoever integrating your Vorso. If you’re using something simpler, such as a standard irrigation timer, just make sure you have two available zones per tank: one for the valve on the Clean & Rinse unit and one for the valve on the Drainage Unit.



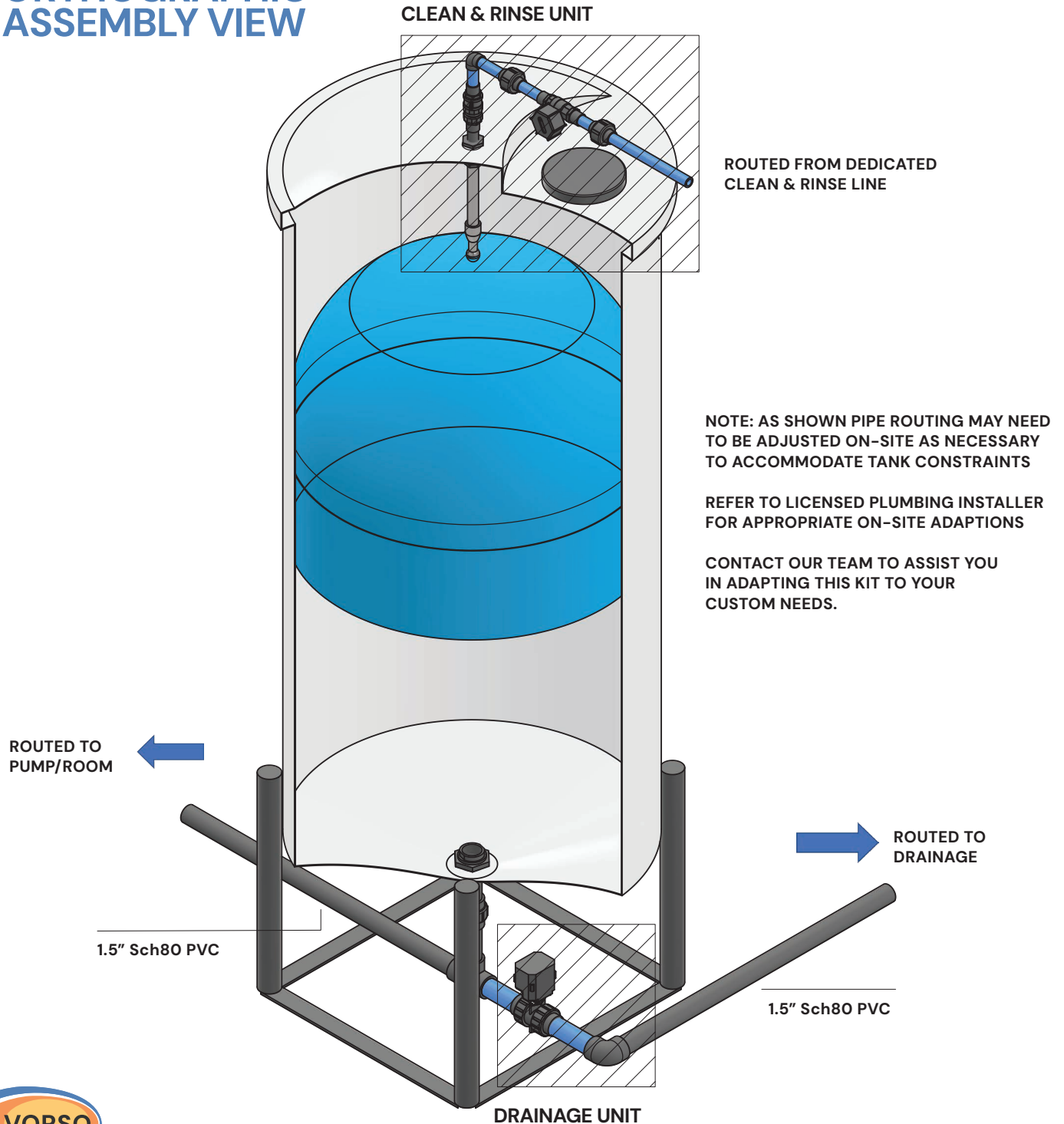
Decide what kind of cleaning schedule you want, then program the valves as described on page 7 of this manual. This will drain the tank, apply cleaning solution, rinse it off, then ensure the tank is drained before allowing it to be filled again. If you’re using the Vorso Starter Kit, remember that you’ll need two available zones on your controller for the starter kit itself, plus an additional two for each tank: one each for the clean and drain master valves on the starter kit, and one each for the Clean & Rinse Unit and Drainage Unit on each tank.



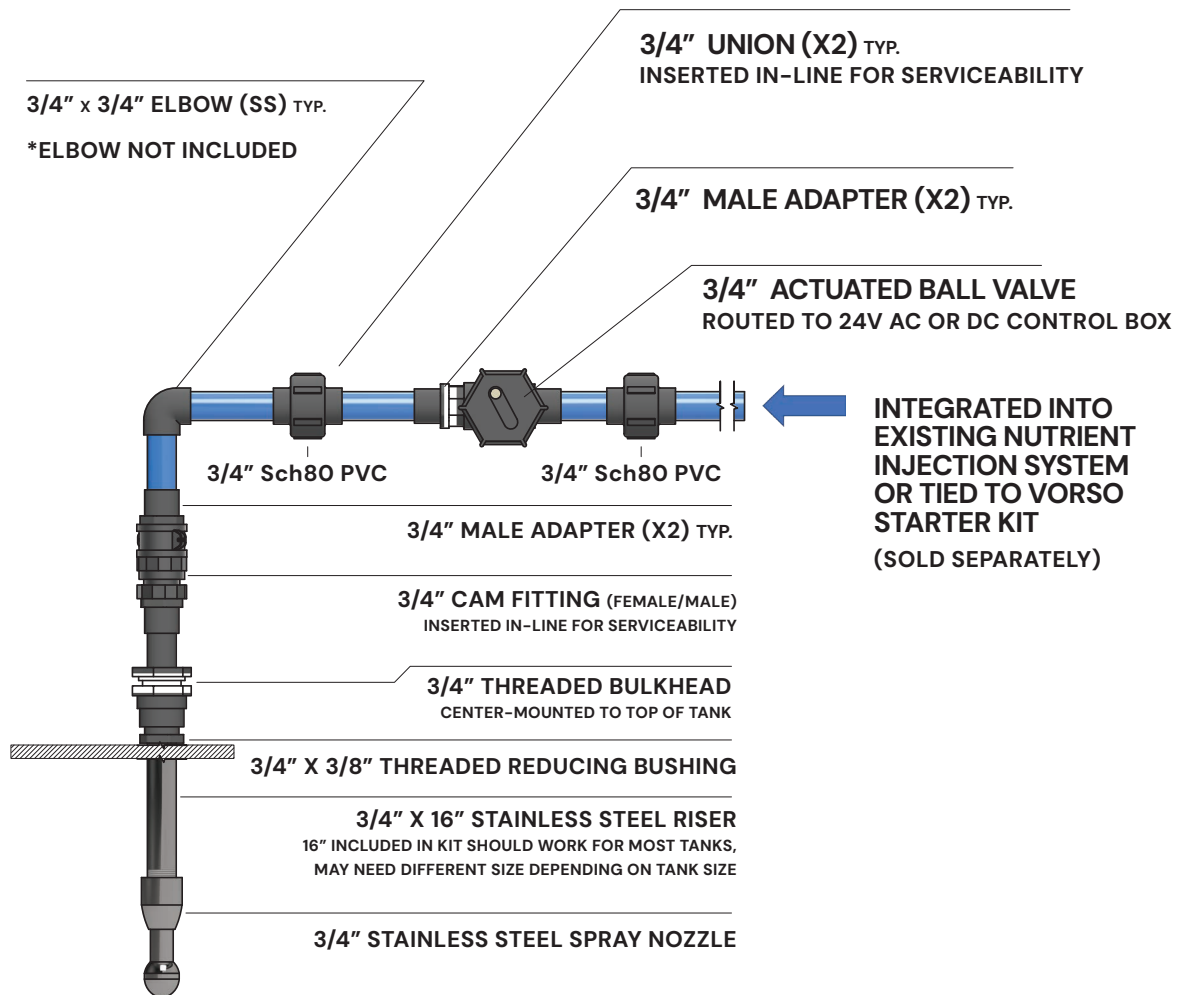
HOW TO INSTALL IT

The following pages will illustrate proper installation of a Vorso kit on a single tank. The installation process is the same regardless of the number of tanks. These illustrations are intended to show how the parts of the kit go together and are not intended as an exact blueprint for your facility. Remember to consult with a licensed plumbing installer for any required on-site adaptation.

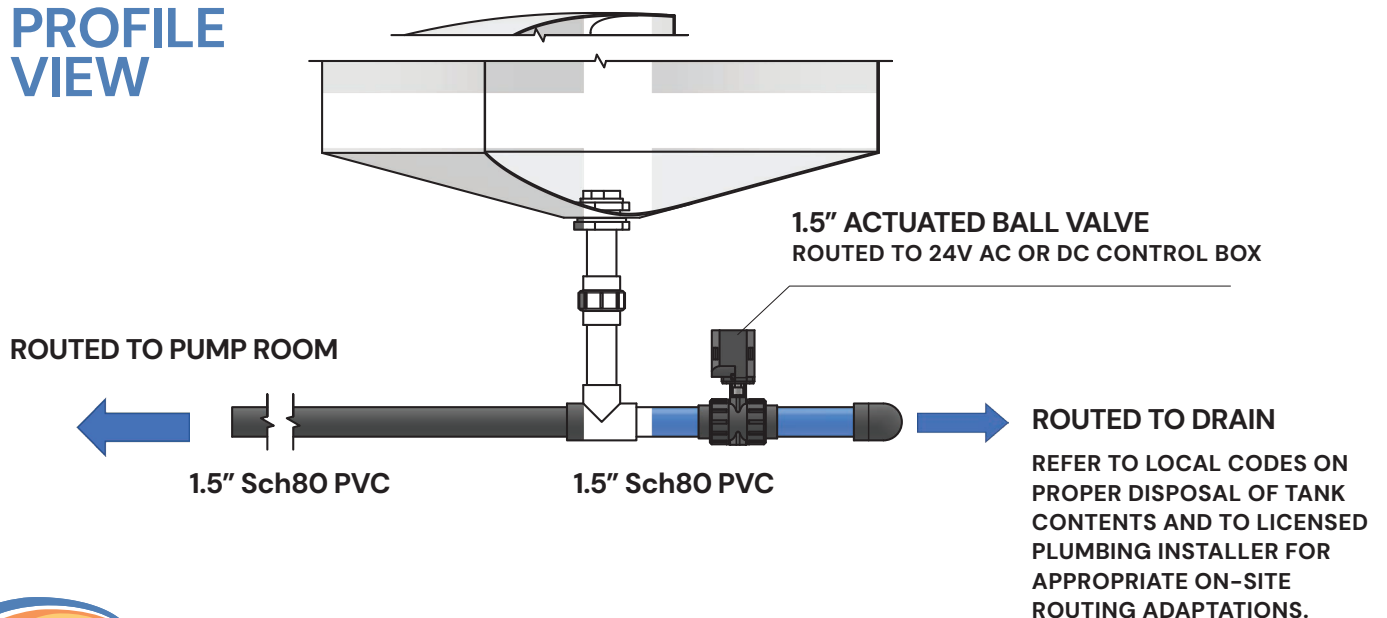
ORTHOGRAPHIC ASSEMBLY VIEW



CLEAN & RINSE UNIT



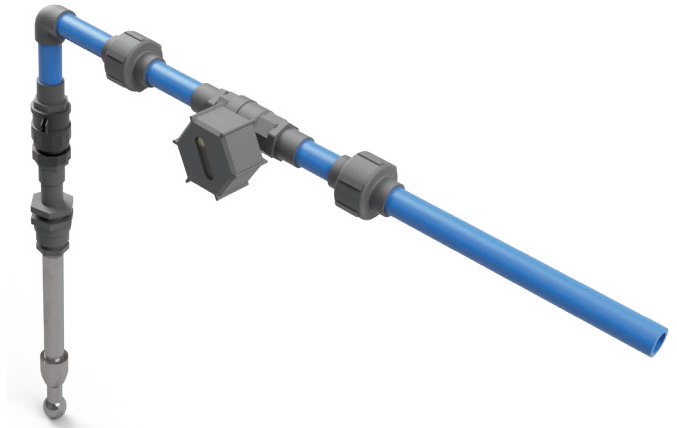
DRAINAGE UNIT PROFILE VIEW



CLEAN & RINSE UNIT

ACTUATED BALL VALVES CAN BE ROUTED TO A 24V AC OR DC CONTROL BOX

ONCE BOTH VALVES ARE CLOSED AT THE END OF A CLEAN & RINSE CYCLE, YOUR TANK WILL BE READY FOR RECIPE FILL AND DISTRIBUTION



VALVE PROGRAMMING

Before programming your valves, fill your tank with fresh water to the level it is normally filled to during operation, then open the drainage valve and time how long it takes to fully empty.

VALVES ARE TO BE CONFIGURED AND ADJUSTED AS FOLLOWS:

1. DRAINAGE VALVE – OPEN
2. CLEAN & RINSE VALVE – OPEN
(LEAVE THE DRAINAGE VALVE OPEN FOR AS LONG AS IT TAKES TO DRAIN THE TANK, THEN PROGRAM THE CLEAN & RINSE VALVE TO OPEN)
3. CLEAN & RINSE VALVE – LEAVE OPEN LONG ENOUGH TO APPLY YOUR CHOSEN CLEANING SOLUTION
4. CLEAN & RINSE VALVE – CLOSED FOR SOAKING
5. CLEAN & RINSE VALVE – OPEN FOR RINSING (DEPENDING ON YOUR SPECIFIC CLEANING REGIMEN, YOU MAY NEED TO HAVE YOUR CLEAN & RINSE VALVE OPEN AND CLOSE A NUMBER OF TIMES TO APPLY AND THEN RINSE OFF EACH OF YOUR CHOSEN CLEANING SOLUTIONS)
6. DRAINAGE VALVE – CLOSED (LEAVE THE DRAINAGE VALVE OPEN FOR ONE MINUTE AFTER THE CLEAN & RINSE VALVE HAS CLOSED FOR THE LAST TIME TO ALLOW ANY RINSE WATER TO DRAIN FROM THE TANK, THEN HAVE IT CLOSE)

DRAINAGE UNIT



1.5" ACTUATED BALL VALVE IS INSERTED IN-LINE ON THE TANK DRAIN LINE

NOTE: PIPE ROUTING MAY NEED TO BE ADAPTED ON-SITE TO ACCOMMODATE FOR TANK OUTPUT LOCATION



VORSO AUTOMATED TANK CLEANING KIT INSTALLATION INSTRUCTIONS

CLEAN & RINSE UNIT

The line that feeds the Clean & Rinse Unit can be integrated directly into your existing nutrient injection system as a dedicated line. This enables the distribution of both water with cleaning solution added and clean rinse water to the tank without interfering with existing lines.

The Clean & Rinse line/fittings are sized to 3/4" x Sch80 PVC. Transition pipe line size to 3/4" x line size with appropriate fittings as needed.

At the bulkhead a 3/4" x 3/8" threaded reducing bushing is utilized to reduce to the 3/8" x line size for the stainless steel riser and spray nozzle (refer to profile view).

The included 16" stainless steel riser should accommodate most tanks. Ideal placement for the spray head is at the high-water level of your tank. If you'd like a differently sized riser, any 3/8" diameter stainless steel riser will work.

The included 3/8" x spray nozzle is threaded directly to stainless steel riser.

The 3/4" Actuated ball valve (24v) is routed to appropriate control box.

The 1.5" Actuated ball valve (24v) is routed to appropriate control box.

Valve Programming

Valves are to be configured and adjusted as follows:

1. **Drainage valve** – open
2. **Clean & Rinse valve** – open (leave the drainage valve open for as long as it takes to drain the tank, then program the Clean & Rinse valve to open)
3. **Clean & Rinse valve** – leave open long enough to apply your chosen cleaning solution
4. **Clean & Rinse Valve** – closed for soaking
5. **Clean & Rinse Valve** – open for rinsing (depending on your specific cleaning regimen, you may need to have your Clean & Rinse valve open and close a number of times to apply and then rinse off each of your chosen cleaning solutions)
6. **Drainage valve** – closed (leave the drainage valve open for one minute after the Clean & Rinse valve has closed for the last time to allow any rinse water to drain from the tank, then have it close)

DRAINAGE UNIT ASSEMBLY

"Teed-in" to existing batch tank output/drainage line.

Kit drain valve is sized to 1.5" Sch80 output and may need to be transitioned to accommodated for 1.5" actuated ball valve.

Note: routing may need to be adapted on-site to accommodated for tank output.

Refer to licensed plumbing installer for appropriate on-site adaptations.



KEYNOTES

1. All kit fittings are Sch80 PVC or Stainless steel (as referenced).
2. Any additional pipe/fittings to be Sch80 should be adaptable with kit.
3. Irrigation piping should be secured every 4' in pipe length or at transitions with strut and equivalent pipe support. Strut should be typically mounted to studs, or concrete with approved hardware.
4. Irrigation pipe and equipment should be leveled.
5. All strut and fittings should be galvanized.
6. PVC glue and primer need to meet specifications for Sch80.
Pipe glue should be stored in a controlled environment.
7. Primer should be clear in color. Glue and primer should be approved for use in this application.
8. Refer to local building codes for all necessary and appropriate facility requirements and specifications.
9. Refer to manufacturers' material for all necessary equipment requirements and specifications.
10. All piping must be contained and routed in temperature controlled environment.
If not piping must be appropriately insulated – refer to local building codes.

ACTUATED BALL VALVE INSTALLATION TIPS

1. Actuated ball valves included in kit are manufactured by Imperium.
2. Use primer and glue for socket connections.
3. Use teflon tape for threaded connections.
4. Valves need a charging time of at least 30 seconds or more to enable full closure.
5. The valve is able to be manually set from being normally closed to normally open.
(Owner's manual can be found on the product page for each valve on our website.
Refer to it for additional information.)

ACTUATED BALL VALVE SPECIFICATIONS

VOLTAGE: 24v AC/DC
WORKING CURRENT: 1A
OPEN/CLOSE TIME: approx 12 seconds
WIRING CONTROL METHOD: CR202
MAX. TEMPERATURE: 131°F
MAX. PRESSURE: 150psi
VALVE BODY MATERIAL: PVC
LIFETIME: 35,000 cycles
CIRCULATION METHOD: Nutrient solutions, water, air
PROTECTION RATING: IP67



HOW TO USE IT

Using Vorso to automate cleaning your tanks is easy. First, you need to decide on your cleaning regimen. Choose the right cleaning solution – or solutions – to clean your tanks, decide how long you'd like the cleaning solution to soak for, then decide how often you want to clean your tanks. Don't be afraid to get creative if needed. If one clean and rinse cycle with a single cleaning solution doesn't do the trick, use more.

For example, you can have Vorso apply one solution, let it sit, rinse it off, then do the same with a second, different solution to combat multiple types of contamination within your tank. Remember, since there is no manual labor required, the additional cleaning cycles only cost as much as the water and solution you're using.

Next, ensure your injection system is set up to supply the required cleaning solution(s). You should always run a dedicated line to Vorso that can supply both cleaning solution and fresh water. Ensure this line is connected properly, then make sure your injection system has enough of the right type(s) of cleaning solution.

Finally, ensure your valves are programmed correctly per the instructions on page 7. You want to let your tank drain fully, then use the Clean & Rinse valve to apply your cleaning solution. The Clean & Rinse valve is then closed to allow your solution to soak. How long this takes will depend on your unique circumstances. Once it has soaked, you'll then open the Clean & Rinse Unit again, this time using fresh water to rinse the solution off. The Drainage valve is open the entire time, only closing one minute after the last time the Clean & Rinse valve closes.

FOR EXAMPLE: Say your tank takes 3 minutes to drain, and you want to clean using dilute hypochlorous acid with a 5 minute application time, a 5 minute soak time, and a 2 minute rinse. If you want to start your cleaning cycle at 10:00, you would program your valves as follows:

1. Drainage valve open at 10:00
2. Clean & Rinse valve open at 10:03 (remember, the Clean & Rinse valve needs to be supplied with your dilute hypochlorous acid solution for the application part of the cycle)
3. Clean & Rinse valve closed at 10:08
4. Clean & Rinse valve open at 10:13 (remember, the Clean & Rinse valve needs to be supplied with fresh water for the rinse part of the cycle)
5. Clean & Rinse valve closed at 10:15
6. Drainage valve closed at 10:16



ADDITIONAL TIPS

1. Remember to read the documentation for the parts included in this kit. You can find those documents on our website on the product page for each item. Use the SKU for the items referenced at the beginning of this manual to find them on our website.
2. Trial and error may be required when first setting up your Vorso kit. Don't be afraid to play around with cleaning cycle times, soak times, rinse times, number of cycles, cleaning solutions, and more before you arrive at your perfect schedule.
3. Some cleaning solutions should never be used together. We suggest only running a single cleaning solution at a time and rinsing your tank well between each solution application. Refer to the documentation, suggestions, and warnings provided by the manufacturer of each cleaning solution you intend to use prior to use.
4. Even though Vorso is automated, it's still a good idea to have someone manually check out the inside of your tanks from time to time.

