



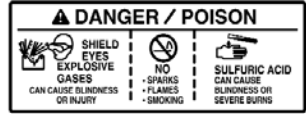
Installation, Operation & Maintenance Manual

For Model:
Clampless Millennium
SPW Systems



General Information & Precautions

This publication provides detailed instructions for installing the single point watering system kit and/or related water supply. Thoroughly review this document before any installation procedures are performed.



The following safety statements relate to specific safety issues and must be read, understood, and heeded before a kit is installed. Failure to do so could result in personal injury and/or property damage.

DANGER

- Battery – Explosive gases! Do not smoke. Keep sparks and flames away from the vehicle and service area. Ventilate when charging or operating vehicle in an enclosed space. Wear a full face shield and rubber gloves when working on or near batteries.
- Battery – Poison! Contains acid! Causes severe burns. Avoid contact with skin, eyes, or clothing. Antidotes:
 - External: Flush with water. Call a physician immediately.
 - Internal: Drink large quantities of milk or water. Follow with milk of magnesia or vegetable oil. Call a physician immediately.
 - Eyes: Flush with water for 15 minutes. Call a physician immediately.

WARNING

- Follow the procedures exactly as stated in this instruction, and heed all DANGER, WARNING, and CAUTION statements in this instruction as well as those on the vehicle and battery charger.
- Only trained technicians should service or repair the single point watering system. Anyone doing even simple repairs or service should have knowledge and experience in plumbing, electrical and mechanical repair. The appropriate instructions must be used when performing maintenance, service, or accessory installation.
- Prior to servicing the vehicle or leaving the vehicle unattended, turn the key switch OFF, remove the key, and chock the wheels when servicing the vehicle.
- Wear safety glasses or approved eye protection when servicing any part of the watering system. Wear a full face shield and rubber gloves when working on or near batteries.
- Do not wear loose clothing or jewelry such as rings, watches, chains, etc., when servicing the vehicle or battery charger.
- Moving parts! Do not attempt to service the vehicle while it is running.
- Hot! Do not attempt to service hot engine, exhaust system, or motor. Failure to heed this warning could result in severe burns.
- Use insulated tools when working near batteries or electrical connections. Use extreme caution to avoid shorting of components or wiring.
- If wires are removed or replaced, make sure wiring and wire harness are properly routed and secured. Failure to properly route and secure wiring could result in vehicle malfunction, property damage, personal injury, or death.

Battery Maintenance

Deep cycle batteries need water. More importantly, water must be added at the right time and in the right amount or the battery's performance and longevity suffer.

Checking and maintaining the electrolyte levels in your batteries can save thousands of dollars by preventing early battery failure due to cell dilution and imbalance. Although adding water to battery cells is considered a tedious job, it is a necessity.

Electrolyte levels drop during discharge and rise during charge. Therefore, it is imperative that electrolyte levels be checked and adjusted after the batteries are fully charged. Adding water correctly using a Flow-Rite Single Point Watering system helps maintain the electrolyte level among the battery cells.

Water, when needed, must only be added to a fully charged battery. Prior to charging, there should be sufficient water to cover the plates. If the battery has been discharged (partially or fully), the water level should still be above the plates.

Subsequent watering intervals are dependent on the local climate, charging methods, application, and age of batteries. Flow-Rite recommends that new batteries be checked once a month and older batteries be checked weekly until you get a feel for your water consumption rate.

Customer Supplied Items & Tools



Personal Protection
Equipment



Tube Cutter
p/n: BA-007



Drill Bit p/n: BA-107
Note: only needed for kits that include
Cell Inspection Plugs or Level Lites

Precut Kit - Package Contents



Millennium SPW
Valve
Qty = 1 per cell



Coupler with dust
cover
Qty = 1 per kit
Note: may
already be
preinstalled on
feed tube



Red End Caps
Qty = (9) per 6 cells



Spanner Tool
Qty = 1 per kit



Tubing
Qty = (1) 6.75 inch precut
section per cell + 1 Feed tube

Master Pack - Package Contents



Millennium SPW Valve
Qty = 60



Red End Caps
Qty = 70



Tubing
Qty = 40 feet uncut

Bulk Master Pack - Package Contents

Distributor Bulk Master Packs consist of 10 Master Packs

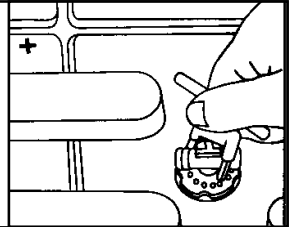
Installation

Step 1 - Clean Battery & Remove Vent Caps

- Wipe down battery top and remove any loose debris. Remove existing vent caps from battery.

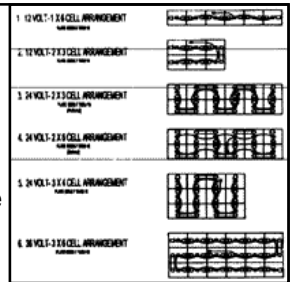
Step 2 - Install Valves

- Insert and secure Millennium SPW Valve into each battery cell by turning valve in a clockwise direction. Use the Spanner Tool to tighten. To secure the the 35 mm DIN Cap style simply push in by hand.



Step 3 - Determine Tube Routing

- Choose the proper tube routing for your battery. In general, we recommend the tubing follow the electrical path and the feed tube be placed near the center of the battery. For batteries 72 volts and larger we require a large battery manifold kit to be used. For specific layouts please refer to SPW system installation diagrams on pages 7-8.

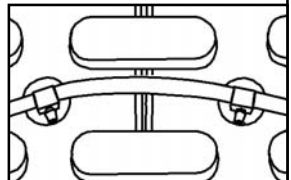
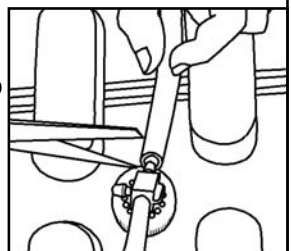
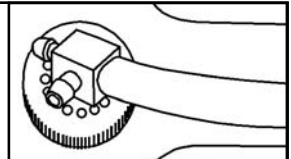


Step 4 - Install Tubing Segments

- Push one end of a tube segment onto a Swivel Connector. Tubing should be pushed up fully to the stop.

- If needed, trim the tube and then connect to the adjacent valve. When trimming, cut tube squarely and leave a slight curve in the tube to prevent stretching or kinking.

- Repeat until all valves are connected with tubing.

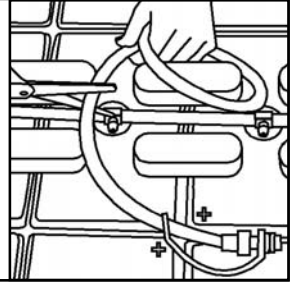


Note: We have included extra tubing attached to the Quick Coupler in case it is needed to connect the cell rows (in battery width direction) if the precut tubing segments are too short. This extra piece of tubing may be necessary depending on battery plate size.

Installation Continued

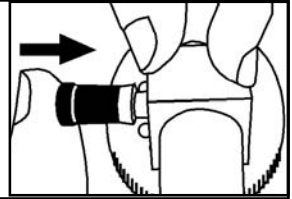
Step 5 - Connect Feed Tube

- Locate tube near the center of the battery ensuring that the Water Supply can be connected without kinking the tubing. Cut to the desired length and connect to a Swivel Connector. Connect the Quick Coupler if applicable.



Step 6 - Install Red End Caps

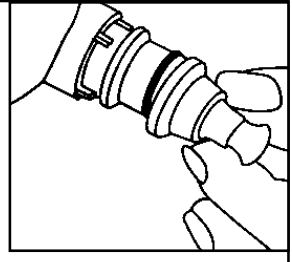
- Press Red Caps onto all the unused Swivel Connector ports.



Step 7 - Dust Cover

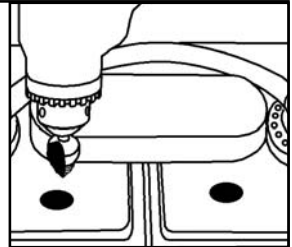
- Place the Dust Cover on or in the Quick Coupler depending on the coupler type.

Tip: If you slightly squeeze the dust cover when sliding it over the coupler it will create a vacuum allowing it to hold tightly.



Step 8 - Cell Inspection Plugs

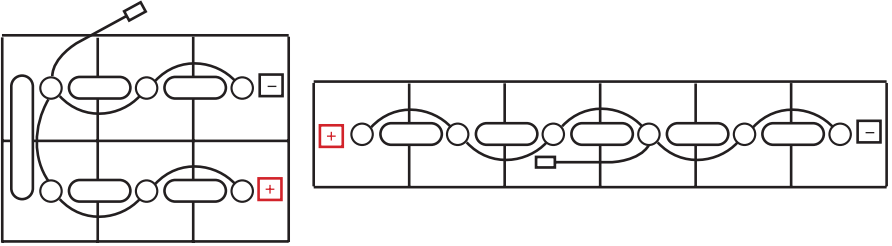
- Cell inspection plugs must be installed after the system is installed to make sure the plugs are located away from the tubing. This will ensure easy access to them. Be sure to locate the Cell Inspection Plug hole where there is direct access to the electrolyte below. Avoid drilling hole directly above lead structure under cover. Using a variable speed drill, drill 1/2" (12.7mm) diameter holes in each cell cover. (We strongly recommend using Flow-Rite's drill bit P/N BA-107. This drill bit will not allow chips and shavings to fall in and contaminate the battery cells.)



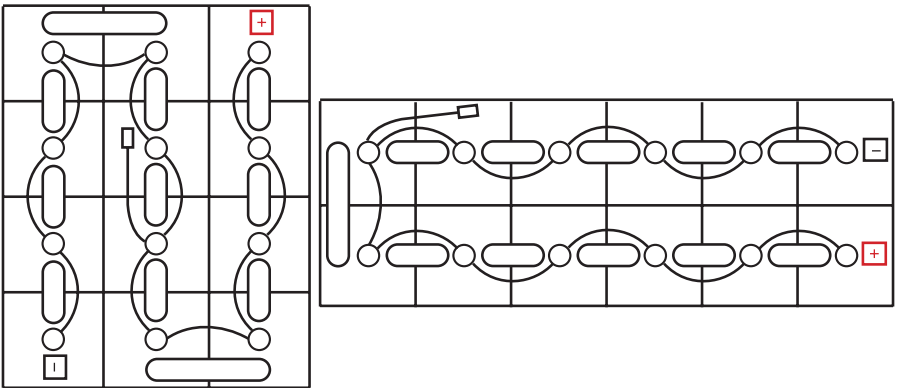
Note: Cell inspection plugs are not included with kits that have Flame arrested or Flip top valves.

Installation Diagrams

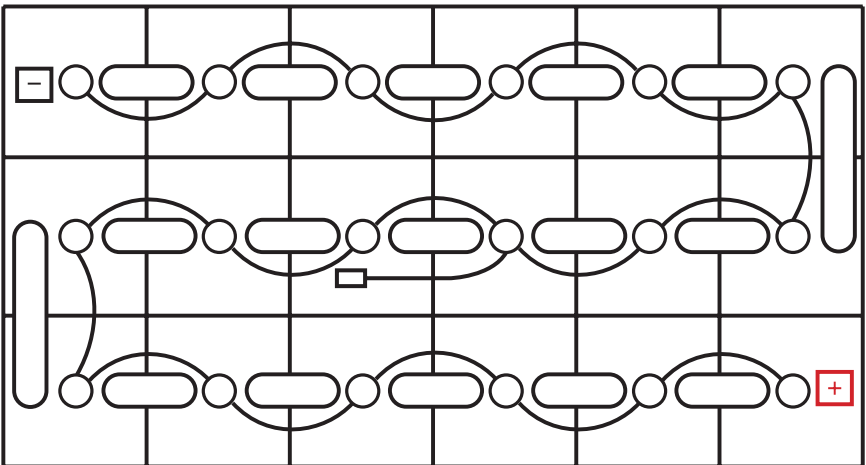
6 Cell / 12 Volt Layout



12 Cell / 24 Volt Layout

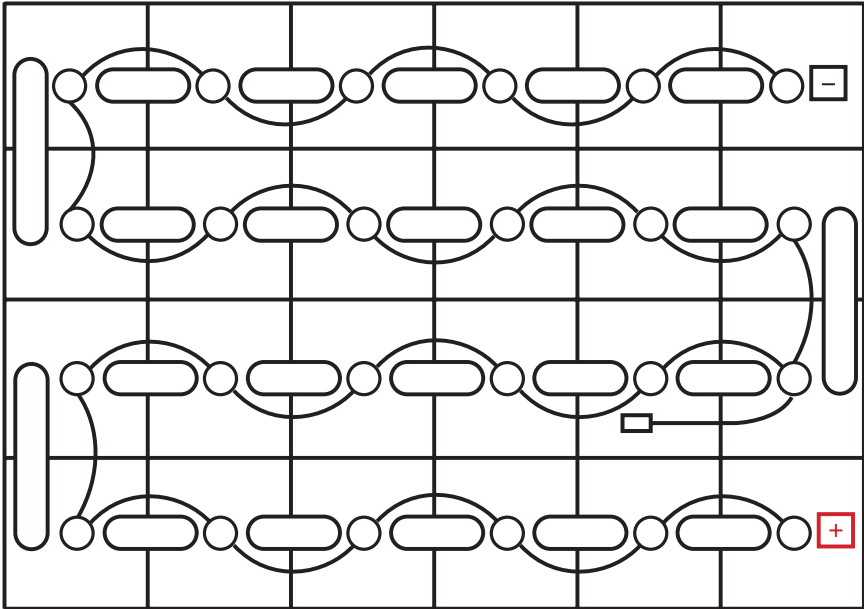


18 Cell / 36 Volt Layout



Installation Diagrams

24 Cell / 48 Volt Layout



Note: Batteries larger than 24 Cell / 48 Volt require the use of a large battery manifold kit (p/n: BA-017). A manifold kit is included with pre-cut Millennium SPW kits when applicable. Please refer to the instructions included with this kit for proper tubing layout. Large Battery Manifold Kits are not included with Master Packs or Bulk Master Packs, and must be purchased separately if needed.

Watering Procedures

1. Water After Charge

- Electrolyte levels drop during discharge and rise during charge. In addition, charging generates heat, fluid expansion and explosive gases. Watering a battery before charge (or with a low charge level) can lead to boil over resulting in potential damage of the watering system, battery and vehicle.

Water, when needed, must be added to fully charged battery. Prior to charging, there must be sufficient water to cover the plates. If the battery has been discharged (partially or fully), the water level should still be above the plates.

2. Watering Intervals

- Watering intervals are dependent on the local climate, charging methods, application, and age of batteries. Flow-Rite recommends that new batteries be checked once a month and older batteries be checked weekly until you get a feel for your water consumption rate.

Typically for a heavy use application, we recommend watering a maximum of once per week, and for light use applications once per month. Generally it is best to water on Wednesdays for most applications. Specifically you should not water a battery that has been sitting for an extended period of time with no activity (non use or not on charge) such as a battery that has sat idle over the weekend. It is best to water a warm battery that has just been fully charged.

Important: Water quality is important to maintain the life of your battery and watering system. Always use water that meets the quality requirements of your batteries' manufacturer.

Operation

For continued successful operation of your Single Point Watering system always:

1. Only use Flow-Rite approved equipment
Warning! Use of unapproved equipment or modification of approved equipment can lead to system failure and will void your warranty
2. Always follow Flow-Rite's required watering procedures.
3. Perform regular scheduled maintenance!

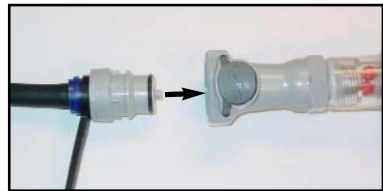
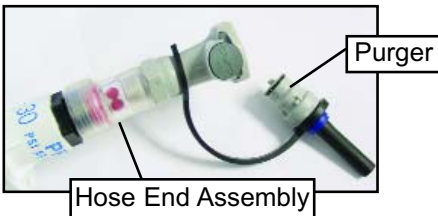
Warning! Only fill batteries after they have been fully charged, and require water.

Important: If you are using a Hand Pump or Gravity Feed water supply to fill your Millennium SPW system, please refer to their instructions for proper operation!

Step 1 - Qualify Water Supply

- Check flow rate through included purger by mating purger with hose end assembly. Verify that a minimum of 2 GPM (Gallons per minute) is achieved. This can be measured with a bucket and a stop watch or a watch with a second hand.

Note: Should a 2 GPM flow rate not be produced refer to the troubleshooting guide in your water supply's instruction booklet.



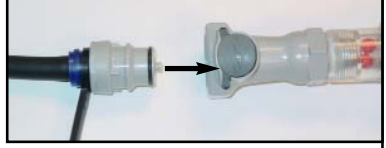
Step 2 - Remove Dust Cover



Operation Continued

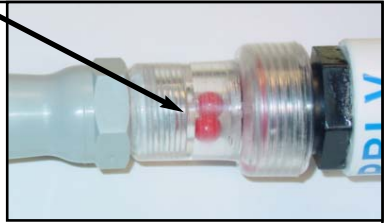
Step 3 - Mate Couplers

- Insert the male coupler on the spw system into the female coupler on the end of the water supply.



Step 4 - Observe Flow Indicator

- The red balls inside the flow indicator will begin to spin indicating that water is flowing into the battery. As the cells fill and the valves shut off, the balls will begin to spin slower until they come to a stop. This indicates that all valves have shut off and filling is complete.



Step 5 - Disconnect

- When the balls stop spinning, and not before, immediately disconnect the couplers by depressing the push button on the female coupler. If the water supply is left connected after the filling process is finished it could lead to an overflow. Disconnecting before the balls come to a complete stop will lead to underfilled cells.

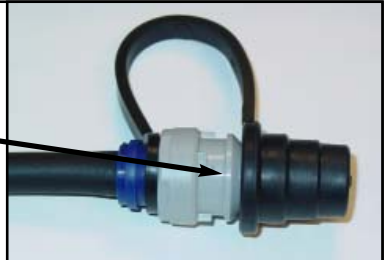


CAUTION: If at any time during the filling process you have a valve failure disconnect immediately

Step 6 - Replace Dust Cover

- Place dust cover back over the male coupler. Do not push cover past the large barb on the coupler.

Tip: If you slightly squeeze the dust cover when sliding it over the coupler it will create a vacuum allowing it to hold tightly.



Regular Maintenance

Your single point watering system requires regular preventative maintenance on at least a quarterly basis.

1. Check all screens and/or filters on water supplies

Clean or replace all filters & line strainers as necessary. Failure to do so can cause a reduction in the water pressure and flow rates needed to operate the system properly. A filter screen can be found on the inlet of all regulators, and a line strainer on all supply hoses. Pump powered water supplies include a strainer on all suction hoses. For deionizers be sure to replace the the filter cartridges as indicated by the water quality light. Consult your water supply instructions for detailed instructions.

2. Inspect the condition of all tubing connections, red end caps, swivel T's, and couplers.

Make sure that all parts are in good working condition and are secure, leak free, and properly connected. The coupler must have an O-ring and dust cover properly attached.

3. Electrolyte Levels

Flow-Rite recommends checking the electrolyte level in each cell for accuracy after the system has been installed and operational for three months.

Seasonal Maintenance

Water Supplies

Water supplies must be drained and stored in an empty state if they will be exposed to freezing temperatures. Failure to do so can cause permanent damage.

Watering Systems

If you have vehicles that are taken out of service or put into storage for a period of 6 weeks or longer, your single point watering system will require seasonal maintenance. No special steps need to be taken for winterization of the SPW system that is mounted on the batteries; however, the following steps need to be followed when bringing your vehicle back into service:

1. After the batteries have been fully charged / equalized, connect the system to its water supply for 3-5 seconds then disconnect regardless of whether or not the batteries are completely full.
2. Return the vehicle to its regular service
3. Place the vehicle back into its regular watering schedule (waiting at least 1 week until next watering).

Operating Specifications

Operating Requirement of SPW system

Flow-Rate:	2-5 gallons per minute*
Pressure Range:	3-35 PSI (no flow, static)
Temp. Range:	Freezing - 150 [°] F Freezing- 65.5 [°] C

Water supply Operating Requirements

Inlet Pressure Range	40-100 PSI (no flow, static)
Temp. Range	33 - 150 [°] F 1 - 65.5 [°] C

All product specifications should be met for proper operation of your Flow-Rite SPW system. Contact battery supplier or Flow-Rite Controls if you have any questions regarding product specifications or how to verify a water supply.

*Flow rate should be measured at the end of a purger (female / male coupler combination).

Troubleshooting

If you notice reduced run time on your vehicle check to see that each cell is filled to the proper level. In the event that a cell is not showing water, connect system to its water supply. Recheck the level of low cells. If they are still low call for service. In the event that a valve does not shut off, qualify water supply to ensure that it is producing 2GPM (measured through the purger). If the water supply qualifies, call for service. If it does not qualify, perform Maintenance procedures and requalify. If it does not qualify after performing Maintenance call for service.

Warranty



5 Year Limited Warranty for Millennium SPW Kits

Flow-Rite Controls warrants to Purchaser that its product, Millennium SPW or Pro-Fill System Kit, will be free of all defects in material and workmanship for five (5) years after the date of purchase. If within five years of the date of purchase, the product, Millennium SPW or Pro-Fill System Kit, fails to perform, Flow-Rite will repair or replace the product, Millennium SPW or Pro-Fill System Kit, free of charge. Purchaser should send any product covered under this warranty, along with copy of Supplier's invoice and description of the problem to Flow-Rite Controls, 960 74th Street S.W., Byron Center, MI 49315. Prior to sending back product, a Return Goods Authorization number must be obtained by contacting Flow-Rite Controls.

Disclaimer of Warranties: It is expressly understood and agreed that the buyer's sole and exclusive remedy shall be repair or replacement of defective parts, and that Flow-Rite Controls shall not be liable for damages or injuries to persons or property. In no event shall Flow-Rite Controls be liable for more than, and the buyer's exclusive remedy shall be limited to, the price of goods alleged to be defective. This limited warranty expressly excludes any incidental or consequential damages.

Note: Because Flow-Rite's warranty excludes any incidental or consequential damages, Flow Rite recommends for the first three months checking electrolyte levels once a month. Thereafter, check electrolyte level once per quarter.



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