# SeaSide Automation

# MiniWarden

## Automated Pool & Spa Chemical Controller And Data Recorder


## Installation Manual

## Including

## PW-Plus and TrueDPD

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# Table of Contents

# IMPORTANT WARNING AND SAFETY INSTRUCTIONS

1 READ AND FOLLOW ALL INSTRUCTIONS

2 SAVE THESE INSTRUCTIONS

3 WARNING – To reduce the risk of injury, do not permit children to use this product

4 DANGER – Risk of injury

4.1 Replace damaged cord immediately.

4.2 Do not bury cord.

4.3 Connect to a grounded, grounding type receptacle only.

4.4 Do not use an extension cord.

5 WARNING – This product is provided with a ground-fault circuit-interrupter at the end of the power cord. The GFCI must be tested before each use. With the MiniWarden on and operating, push the test button on the GFCI and the MiniWarden should turn off. Now push the reset button on the GFCI and the MiniWarden should now operate normally. When the product fails to operate in this manner, there is a ground current flowing indicating the possibility of an electric shock. Disconnect the power until the fault has been identified and corrected.

6 It is very important to follow the safety guidelines in this manual to ensure safe installation and programming. Safety of any system incorporating this equipment is the responsibility of the assembler of the system. Upon installation, it is important to properly train all personnel basic water quality management techniques, proper operation and programming to anyone who operates or services MiniWarden.

7 All applicable local installation codes and ordinances must also be adhered to. Improper installation will create an electrical hazard which could result in death or serious injury to pool users, installers or others due to electrical shock, and may also cause damage to property. The MiniWarden must be installed by a licensed or certified electrician or a qualified pool professional:

7.1 United States: National Electrical Code (NEC), NFPA 70

7.2 Canada: Canadian Electrical Code (CEC), CSA C22.1.

# IMPORTANT WARNING AND SAFETY INSTRUCTIONS

8 ***WARNING – Disconnect all power to MiniWarden prior to any service including the main AC power. Never apply power when MiniWarden service door is unlocked or in the open position. Only qualified and licensed technicians should perform any service or repair.***

9 ***WARNING – Do not install load bearing leads and/or sensor cables longer than 3 meters.***

10 ***WARNING – Always mount MiniWarden in safe and dry area. Never mount MiniWarden above any other electrical equipment.***

11 ***WARNING – Install MiniWarden in a location that is not accessible to the public.***

12 ***WARNING – Pool and Spa Chemical Safety***

***12.1 Never mix sodium hypochlorite and muratic acid!***

***12.2 When mixing acid and water, always add acid to the water, never add water to the acid.***

13 **CAUTION – TEST THE GROUND FAULT CIRCUIT INTERRUPTER BEFORE EACH USE OF THE POOL/SPA**

14 **CAUTION – CONNECT ONLY TO A CIRCUIT PROTECTED BY A CLASS A GROUND FAULT CIRCUIT INTERRUPTER**

15  **Do not dispose in trash.**

***ATTENTION: TOUJOURS VÉRIFIER L'EFFICACITÉ DU DISJONCTEUR DIFFÉRENTIEL AVANT D'UTILISER LE BAIN***

***ATTENTION: LIRE LA NOTICE TECHNIQUE***

***AVERTISSEMENT: DÉCONNECTER DU CIRCUIT D'ALIMENTATION ÉLECTRIQUE AVANT L'ENTRETIEN***

***ATTENTION: CONNECTER UNIQUEMENT À UN CIRCUIT PROTÉGÉ PAR UN DISJONCTEUR DIFFÉRENTIEL DE CLASSE A***

# MiniWarden Overview

SeaSide Automation, with over 20 years of technological leadership in Pool & Spa Chemical Control Systems congratulates you on your selection of the MiniWarden Chemical Controller. MiniWarden is a water chemistry control system with capabilities to control the pH and sanitizer on a pool, spa, fountain or any other similar body of water. Using ORP (oxidation reduction potential) technology the control of sanitizer takes into account the effects of pH and a pH lockout feature is also included for high pH values. Supporting both 110 and 240 VAC, the MiniWarden will control chemical feed equipment using relays to keep the pool or spa water in balance. Water measurements are taken continuously while MiniWarden's internal relay programing determines if chemical adjustments are needed. MiniWarden also contains a selection for the sanitizer relay to be dry-contact which can be used for salt water chlorine generators and solenoid valves that are controlled with a different voltage or a simple switch.

## MiniWarden Plus

When adding the PW-Plus communication module, the software feature set will also be updated. Where there are differences that will be pointed out.

## System Components

- **CONTROLLER**: MiniWarden is a microprocessor based, modular automation system that is capable of continuous monitoring locally onsite or remotely offsite.
- **INTERFACE**: MiniWarden uses a 16-button built in keypad, and an easy to read 80 character liquid crystal display. The display's internal back-light provides controller viewing in pool rooms with low light conditions.
- **MEMORY**: MiniWarden is designed with nonvolatile memory which preserves all internal programming in case of power loss. Internal memory is preserved for up to 10 years without having power applied.
- **RELAYS**: MiniWarden includes 2 output relays for the control of pH and sanitizer.
- **SENSORS**: ORP, pH, Temperature, flow and optional free chlorine sensors.
- **VOLTAGE**: Requires 120VAC input voltage in North America and 240VAC input voltage in Europe.
- **SECURITY**: MiniWarden is designed with a lockable enclosure and provides up to four levels of password security protection (Admin, Tech, Service and Guest) for both local onsite and remote offsite interaction with the controller with 4 passwords.
- **COMMUNICATION**: MiniWarden can connect to the Internet for direct monitoring, setup, and data interface by adding the PW-Plus communication module which adds WIFI and Ethernet.
- **DATA**: MiniWarden will record up to 8192 lines of data with the built in internal memory. There is no limit when adding the PW-Plus communication device
- **OVERFEED PROTECTION**: MiniWarden is designed with overfeed protection. Standard Overfeed limits the amount of time a relay can turn on feed equipment in a 24-Hour period. Also includes a setpoint overfeed limit that can be used to prevent chemicals from being fed onto the floor of the equipment room by damaged feed tubes.
- **PROPORTIONAL/SPAN CONTROL**: Proportionally reduces the on-time as the measurement gets closer to the set-point to prevent overshoot.
- **E-MAIL ALERTS**: The data server provides support for 4 email addresses and 4 phone numbers for texts.
- **PRINTING**: Bluetooth printing when adding the PW-Plus communication module.
- **SOFTWARE UPDATING**: PW-Plus supports immediate software updating over the Internet.

# Maximum Electrical Specifications

| ITEM | DESCRIPTION | LIMIT |
|---|---|---|
| Input Voltage | Maximum input AC voltage | 120/240 VAC |
| Input Current | Maximum input current | 5.0 A |
| Relay Voltage | Maximum relay voltage | 240 VAC |
| Relay Current | Maximum Relay Current | 2.5 A |
| Standby Current | Maximum operating current | 0.1 A Max |
| Fuse Rating | F1 | 5A, 250V, 05x20 |
| Fuse Rating | F2 | 5A, 250V, 05x20 |
| Fuse Rating | F3 | 1A, 250V, 05x20 |
| pH | Measurement of pH | 4.22 to 9.98 |
| ORP | Oxidation Reduction Potential | 0 to 999 mV |
| Free Chlorine - PPM | With optional TrueDPD sensor NSF Certified Range | 0 to 6.0 PPM 10% |
| Free Chlorine - PPM | Extended non-NSF Certified Range | 6.0 to 9.5 PPM 20% |

# Environmental Specifications

| ITEM | DESCRIPTION | LIMIT |
|---|---|---|
| Elevation | Not to be used above | 2000 m |
| Temperature | Minimum/Maximum Operating Temperature | 30/110 °F |
| Temperature | Water temperature measurement. | 32 to 122 °F |
| IP Rating | Suitable for Outdoor Use | IPX3 |
| Pollution | Pollution Degree | 2 |

# Certifications

Certified to NSF/ANSI Standard 50

**NSF/ANSI 50 -** Equipment for Swimming Pools, Spas, Hot Tubs and Other Recreational Water Facilities
http://info.nsf.org/Certified/Pools/Listings.asp?Company=C0214550&Standard=050&

# Models and Options

| ITEM | DESCRIPTION |
|---|---|
| **MW: MiniWarden** | Controller Only with no sensors or flow cell. |
| **MW-MTD** | Controller including flow cell, sensors and pre-mounted on back board. |
| **MW+MTD** | Add the PW-Plus communication module |
| **MW-FAC** | Adds free chlorine measurement using the TrueDPD DPD colorimetric method. |
| **MW+FAC** | Add the PW-Plus communication module |
| **Pigtail Option** | Option: Two foot extension cable to connect to feed equipment. |

# MiniWarden Installation

## Mounting MiniWarden

Turn off any heaters, pool or spa circulation systems, chemical feed pumps or any related shut-off valves or equipment and relieve pressure from the filtration system. Find a suitable mounting location near a 120/240 VAC power source that meets the following criteria:

- Facilitates a combined (influent & effluent) maximum tubing run of 30'.
- Do not mount controller above electrical sources or electrical equipment.
- At least 10' away from any pool, spa or body of water and not accessible to the public.
- Away from corrosive materials and physical hazards.
- Not in direct sunlight or directly above or near any heat source.
- For 240 VAC, ability to hard wire with GFCI (ground fault circuit interrupter) protection.

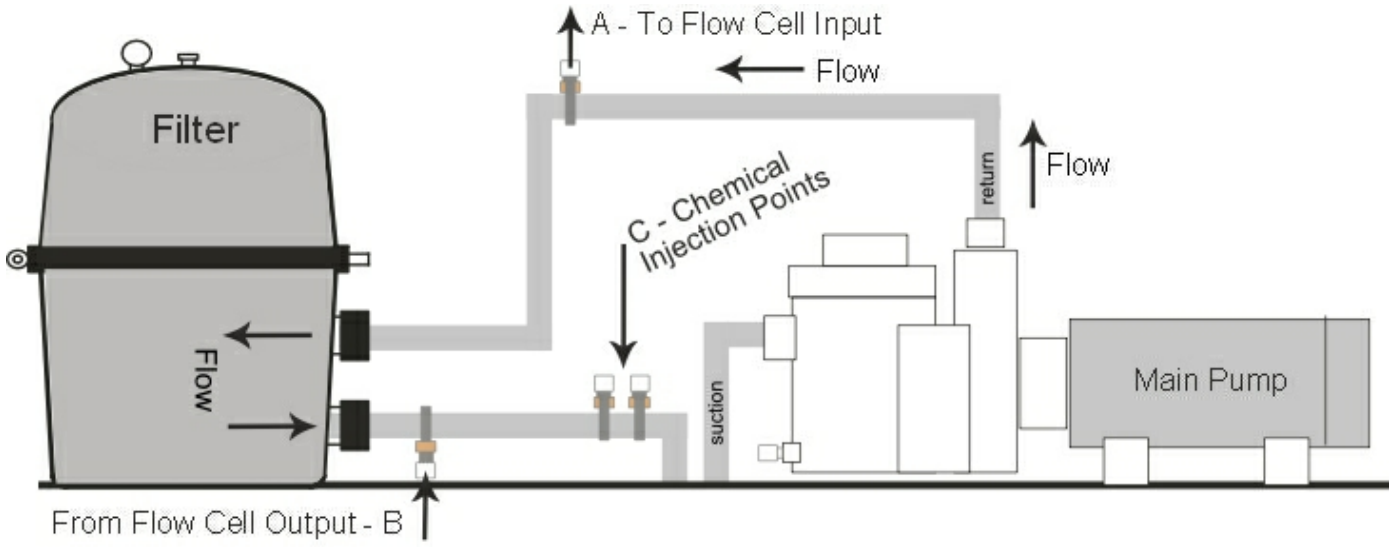
Securely mount controller or the optional controller backboard vertically on the wall using supplied screws or appropriate fasteners for the wall construction. Never mount MiniWarden horizontally. Product shall be positioned such that the power supply cord plug, which is the disconnect device, can be easily accessible.

## Flow Cell To Circulation Plumbing

There are many ways to connect the flow cell tubing to the circulation plumbing. Successful flow cell installation requires a pressure differential. One way to install is to make sure the input source to the flow cell is well upstream from any chemical injection point (C Below). The Flow cell input and output points before and after the filter provide the greatest pressure differential (see below). MiniWarden is equipped with a strainer to filter out any debris from the unfiltered water. Periodically check and clean the strainer. However, the flow cell input and output can also be installed before and after the heater if enough pressure differential is available to create adequate flow through the flow cell.

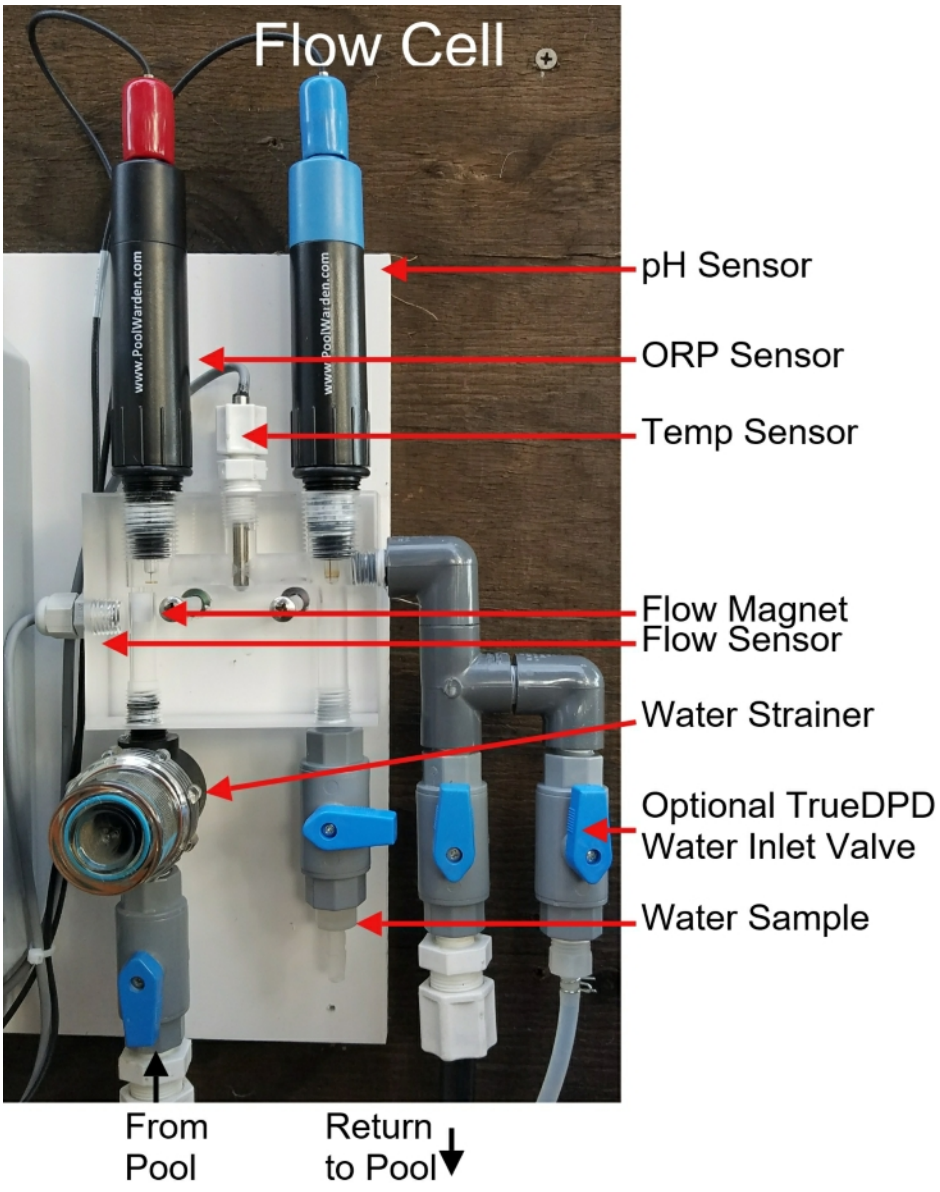
- Flow Cell Input: Drill & tap a connection point in the circulation system at a location just up-stream from the filter (A - Below). Install tubing connector and run tubing to the input side of the flow cell.
- Flow Cell Output: Drill & tap a connection point in the circulation system at a location with reduced pressure just after the filter (B - Below). Install tubing connector and run tubing to the output side of the flow cell.

**CAUTION**: Maximum pressure across the sensors should be 10 PSI (pressure gauge may be required). Always expose the sensors to positive pressure. Prevent exposing the sensors to negative pressure or a vacuum by connecting the flow cell output tubing to the suction side of the pump as the vacuum may suck the sensor gel from the sensors rendering the sensors inoperable in a very short period of time.



- If not pre-mounted, find a suitable location to mount the acrylic flow cell within 3 feet of the controller. Mount and assemble flow cell parts according to Picture 2.
- There is a small magnet in the flow cell that is held in place with a piece of tape. Remove the tape and make sure the magnet remains in the hole above the filter / strainer.
- Remove pH (Blue) and ORP (Red) sensors from the boxes. Use Teflon tape on sensor threads and all other flow cell parts to ensure water tight connection and fasten accordingly. **IMPORTANT: Remove the sensor guars that protect the tips.**
- Install the appropriate 1/2" or 3/8" hard vinyl input and output tubing from the pools circulation system connection points to the "In" and "Out" connection points on the flow cell.
- Once connected, turn circulating pump back on, test for leaks at all connection points, and make sure all air evacuates form the tubing.

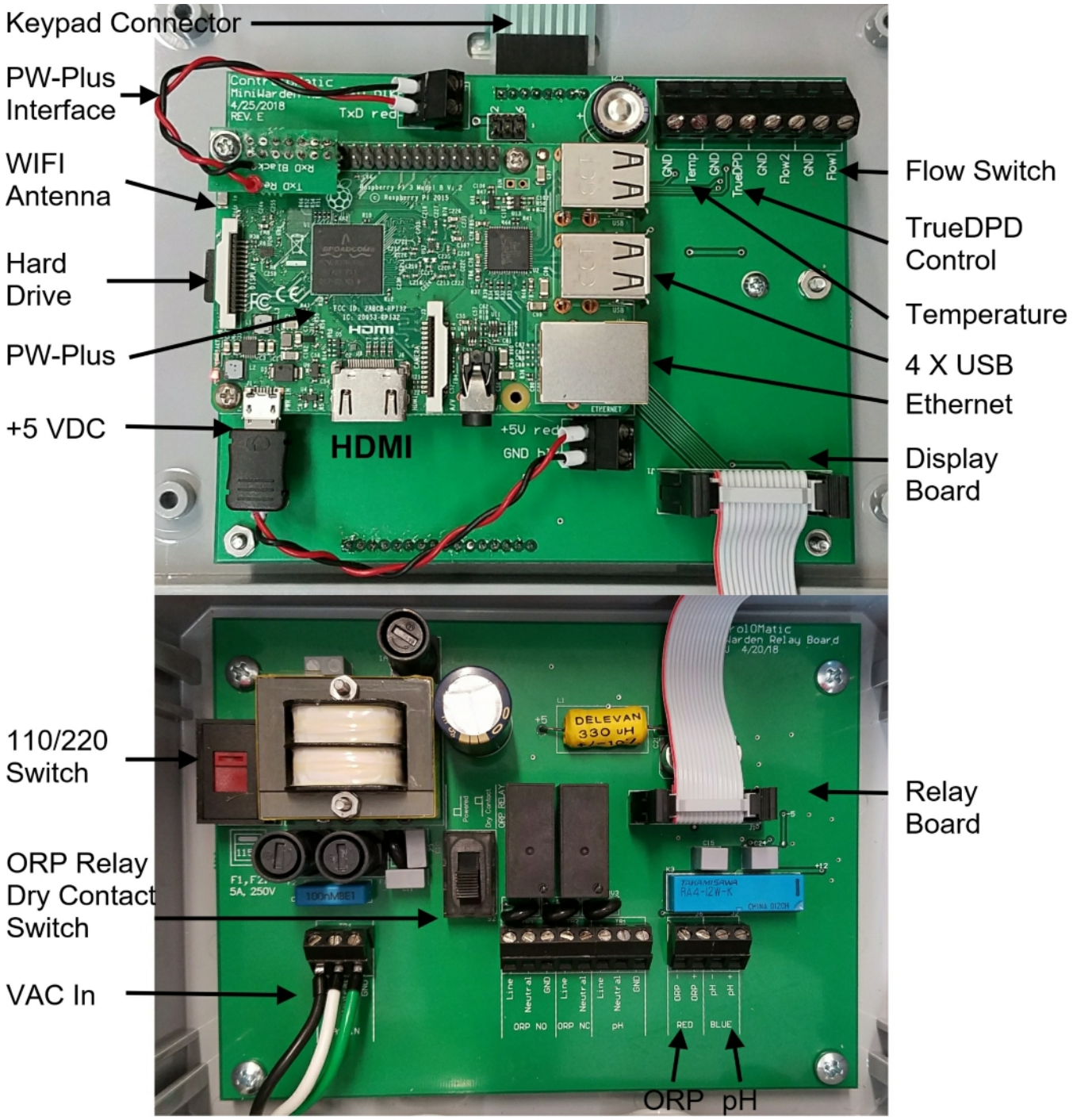
**IMPORTANT NOTE:** There needs to be just enough water flow through the flow cell to raise the flow magnet inside the flow cell to make contact with the flow sensor. To test this, turn the "input" shut-off valve to the off position and watch the flow magnet drop from the flow sensor. Next, turn the input shut-off valve back on and watch the flow magnet raise to the flow sensor. If the flow magnet raises abruptly and pings/ knocks the flow cell acrylic then there is too much flow pressure. To reduce pressure, perform the same exercise, but now open the shut-off valve slowly and stop when you see the magnet "slowly" raise to make connection with the flow sensor. Leave the shut-off valve in that position.



# Sensor Wire Connections

If not pre-mounted, route the pH (Blue Sensor Wire), ORP (Red Sensor Wire), gray flow switch and the gray temperature sensor wire through the small cable grip on the right side on the bottom part of the controller and connect as labeled inside MiniWarden or as indicated below in PICTURE 3. **Please Note: Black wires are always negative (-) and the Clear or Red wires are always positive (+).**

- Flow Sensor Connection: Connect flow the sensor to Flow1 on the display board on the lid.
- Temperature Sensor Connection: Connect the sensor to the Temp connection on the display board on the lid.
- ORP and pH Sensors: Connect to the appropriate connector on the Relay Board.



# Supply 110/240 Vac Input Selection

The MiniWarden supports both 110 VAC and 240 VAC. For 110 VAC the power cord includes a GFCI on the end of the cord that plugs in. For 240 VAC the cord should be removed and the MiniWarden should be hardwired to a circuit breaker with a GFCi by a licensed electrician. The cord can be returned to SeaSide Automation for a credit.

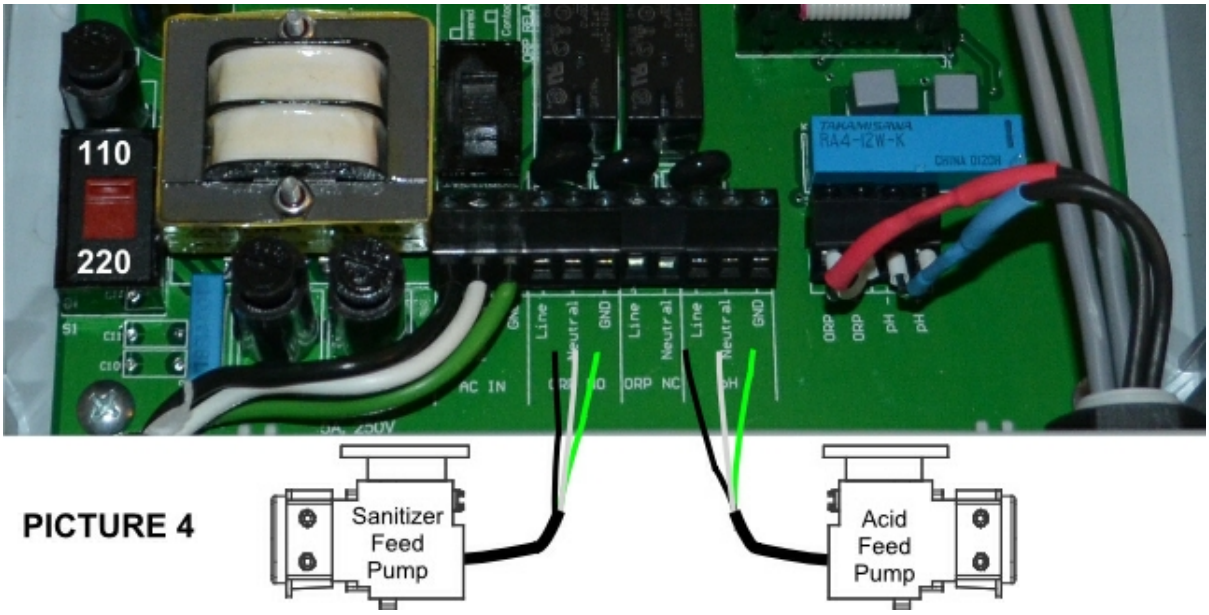
- **VAC Selector:** The red switch on the left of the bottom circuit board must have the switch notch up for 110 VAC, and down for 240 VAC. Incorrect selection will damage the MiniWarden.
- A good solid earth ground is required for MiniWarden to work properly.
- The ORP and pH relay are directly connected to the input VAC. If you have the MiniWarden set for 240 VAC then the loads must also be 220 VAC.
- For 240 VAC operation, the neutral line will be connected to the Red 240 VAC wire and the Line connection will be to the Black 240 VAC wire. The Neutral connection for pH and ORP relays switches the Neutral input VAC wire. The relays are double through and break both lines.

# Load / Equipment Connection & Installation

**ORP & pH RELAYS:** The chemical feed relays for pH and ORP are internally connected to the input VAC main input which is located on the left side connector on the circuit board through 5 AMP fuses F1 and F2. No voltage is being supplied to the load / equipment when the relay is off, hence, voltage is being supplied to the load / equipment when the relay is on. Any standard chemical feed pump or solenoid valve can be hard wired directly into the appropriate ORP and pH connection terminals as shown below in PICTURE 4 so long as their voltage matches the input VAC connected to the MiniWarden. **Note**: Minimum wire gauge for output relays is 16 gauge.

# Relay Board Acronyms for ORP & pH 120/240 VAC Relays:

- ❑**Line**: Normally Open Black. When the ORP & pH relay is off the terminal will have no voltage. Hence, when the relay is on the terminal will have voltage.
- ❑**Neutral**: For 110 VAC - This is connected to the input white neutral wire when the relay is on. For 240 VAC - This is connected to the neutral connection on the VAC input terminal which is connected to the 240 VAC red wire.
- ❑**GND** (⏚): The ground connection for the ORP and pH chemical feeders.
- ❑**ORP NO**: The connection to the relay that is normally open. When the relay is off there is no supplied voltage, only when the relay is on.
- ❑**ORP NC**: The connection to the relay that has voltage when the relay is off. When the relay is on there is no voltage.




PICTURE 4

# ORP Dry Contact Relay

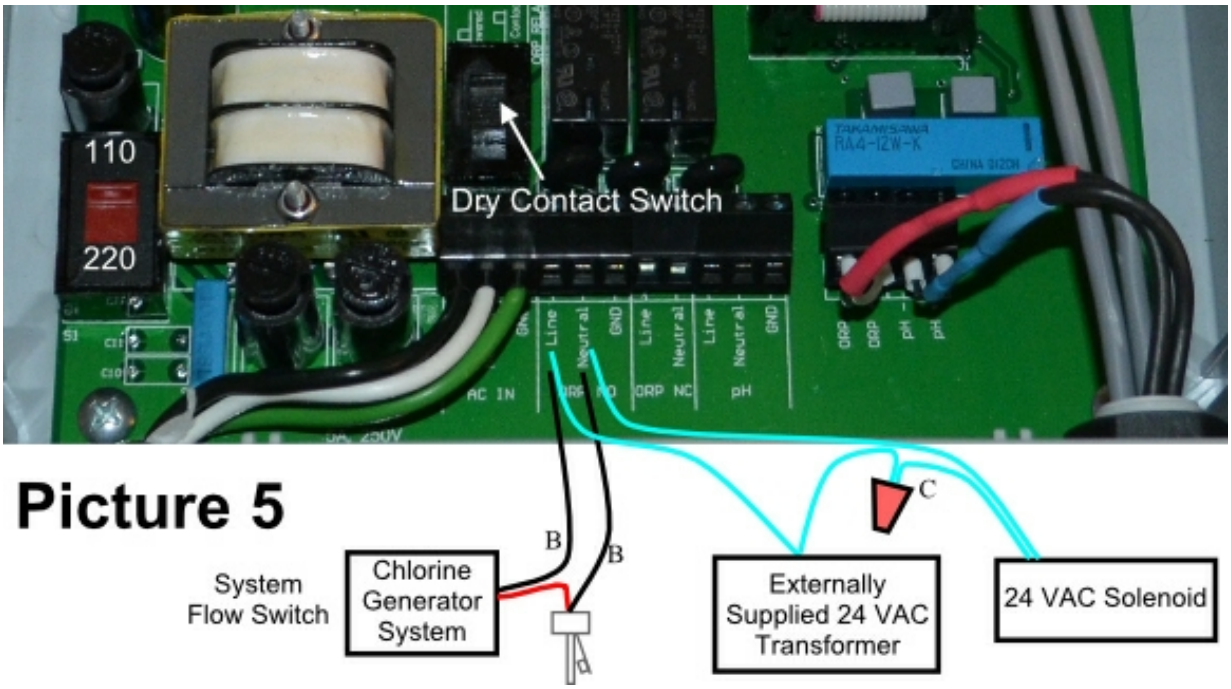
A dry contact relay is not connected to any voltage and acts as a switch. To supply power to a load / equipment (such as a chemical pump) through a dry contact relay, the voltage must be supplied using a jumper to the appropriate voltage. To change the ORP relay to dry contact the Dry Contact Switch must be switched to the upper position. In this case, when the relay is on the Line connection will be connected to the Neutral connection when the relay is on. For the control of a saltwater chlorine generator the dry contact can be used as a switch with no voltage.

**Relay Board Acronyms for the ORP Dry Contact Relay:**

- ❑Line: One side of the dry contact relay. ❑Neutral: Other side of the dry contact relay
- ❑ORP NO: Line is connected to Neutral when the relay is on.
- ❑ORP NC: Line is connected to Neutral when the relay is off.

# Supported Auxiliary Dry Contact Loads / Equipment

- ♦ Chlorine Generators: A high power chlorine generator should not be powered using MiniWarden's internal VAC power as it may exceed the input 2.5 AMP relay rating. One way is to break the chlorine generator flow switch line (B) as shown in PICTURE 5. When MiniWarden's relay turns on while the flow switch is on then the chlorine generator will turn on. When the relay is turned off it makes the chlorine generator think there is no flow and the chlorine generator will turn off.
- ♦ Loads / Equipment Using External 24 VAC (Erosion Feeders & Suction Side Cal Hypo): Solenoids are used to control water flow through a chlorine erosion feeders and suction side cal hypo systems and may use 24 VAC. Install a 24 VAC Transformer external to the MiniWarden and connect one of the output leads to the Line connection of the ORP relay and connect the Neutral connection of the ORP relay to the solenoid as shown in PICTURE 5. Connect the other 24 VAC Transformer wire to the remaining solenoid wire (C). If the 24 VAC Transformer has an output ground wire then connect it to one of the GND terminals on the relay board.

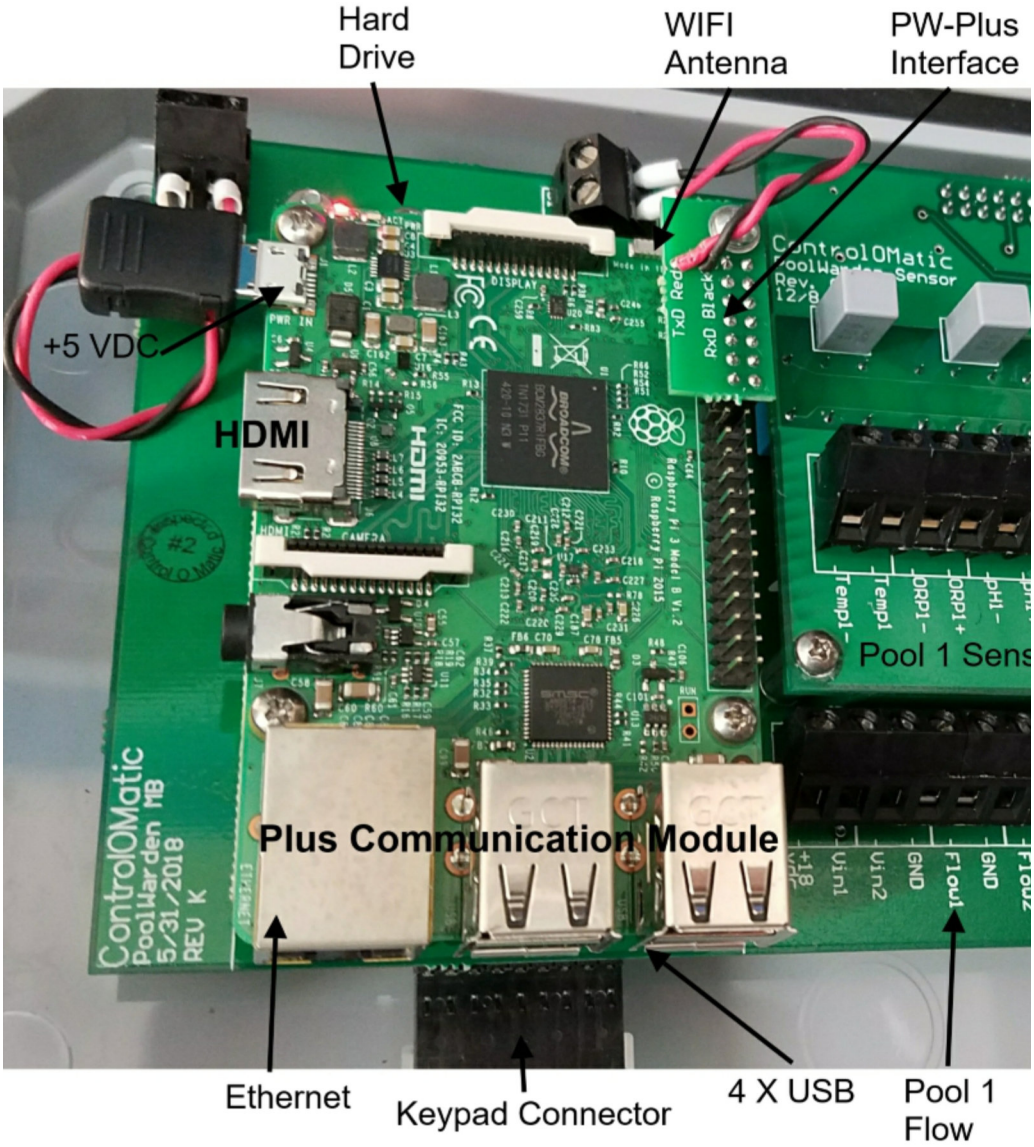



**Picture 5**

# MiniWarden Plus - Option

When adding the PW-Plus module some steps are required to activate it.  Whenincluded with the MiniWarden it will already be activated.

- Step 1: Install the PW-Plus module, make sure the MiniWarden is unplugged and off.
- Step 2: Connect the +5 power connector and the interface connector.
- Step 3: Turn the MiniWarden on.
- Step 4: Wait at lease 30 seconds before proceeding.
- Step 5: Press the down arrow from the readings screen, select enter password and enter 1927192766. That will reconfigure the software for the PW-Plus.
- The PW-Plus must be connected to the Internet for the time to update. Instructions are in the operation manual.



# TrueDPD Free Chlorine Sensor - Option

The **TrueDPD** is an optional accessory that adds a free chlorine measurement. The measurement uses the DPD method and is not affected by pH, cyanuric acid, saltwater chlorine generators or any other variables that affect an ORP or amperiometric measurement. It interfaces with the controller using the TrueDPD connector on the display board (if that connector doesn't exist use flow switch 2).

**Mounting**: Locate  a vertical section of wall space close enough to the controller so that the interface cable can reach the controller. Attach to the wall with 4 screws. The TrueDPD must be located close to the flow cell for the 2 foot tube to reach. When ordering the MiniWarden mounted with the TrueDPD it will be pre-installed as shown in the picture.

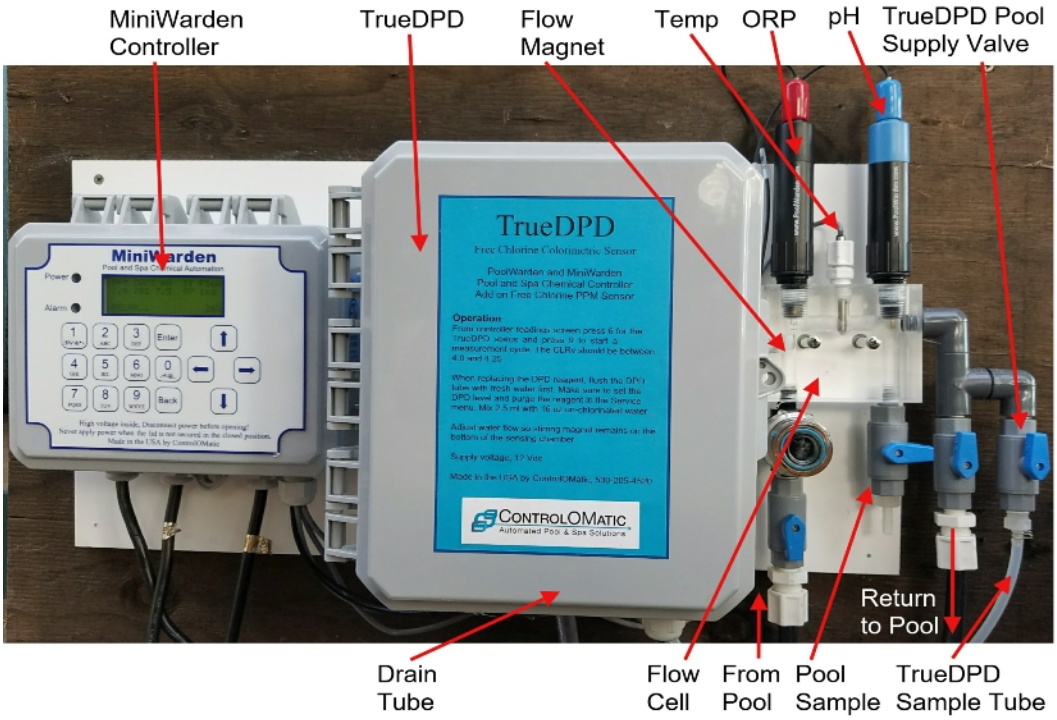
When making a measurement, water will flow through the supply tube for about 20 seconds and for fresh water to reach the sample chamber the supply tube must be as short as possible. Water from the TrueDPD goes to the drain and does not continuously flow to keep the water fresh. With higher sample times, the water in the tube will be less representative of the pool water as time goes on until the next measurement.

**Drain**: Attach 1/2" tubing to the drain connection on the front of the TrueDPD flow cell. The tube needs to be routed through the cable grip near the front bottom center of the box. The tube end should be routed to a waste drain that is lower than the TrueDPD and should have no obstructions. If there is no drain then a bucket can be used but it will need to be emptied a couple times a week.

**Water In:** Attach a 1/4" "T" to the exit of the flow cell before the shut off valve. Attach the 1/4" NPT to barb into the "T". Route the inlet tube from the TrueDPD and attach to the barb. WARNING: If the pressure is too high the tube may pop off of the barb fitting. The tube has a barb fitting on the flow cell and inside the TrueDPD enclosure at the small pump. If inside the TrueDPD damage will occur to the motors and circuitry. Make sure and use the tube clamps on the supply line.

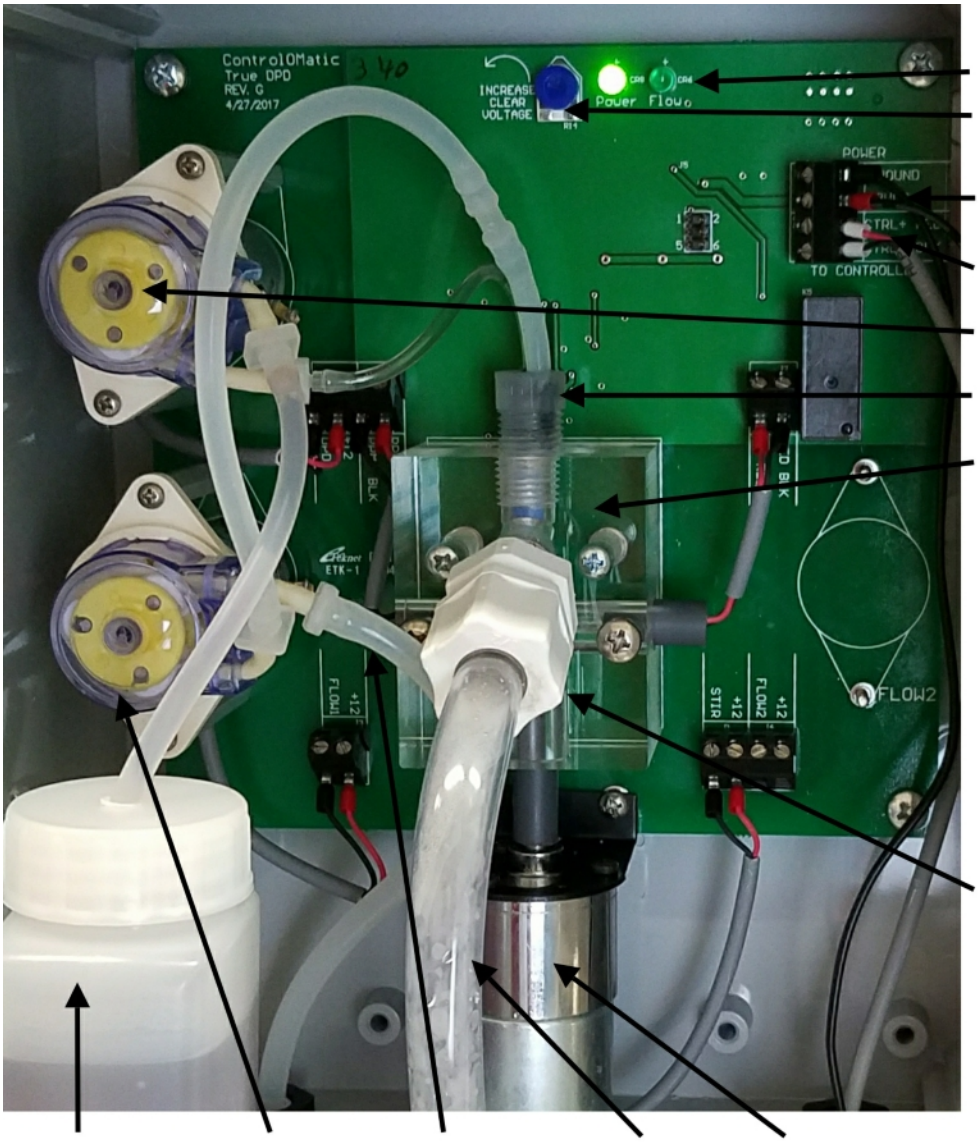
**MiniWarden Interface:** Connect the red interface wire to the TrueDPD input on the display board and the black wire to GND. If there is no TrueDPD input connect the red wire to the Flow 2 connector.

**Power Supply:** Plug the power supply into the power source.  The power supply also supports 240 VAC. If power source is 240 VAC then a suitable plug adapter may be needed. If there is no outlet, a short extension cord can be used inside the controller enclosure allowing the 12V power supply to reside inside the enclosure where it has additional protection.



# TrueDPD Replacement Parts

| Item | Part Number | Description |
|---|---|---|
| 1 | TrueDPD-DPD | 18 gr DPD powder with 0.75ml measuring spoon - |
| 2 | TrueDPD-MAG | Stirring motor magnet |
| 3 | TrueDPD-Tube-Pk | Set of 3 replacement peristaltic tubes for the TrueDPD pumps |
| 4 | TrueDPD-KFS-HB1 | Small peristaltic pump for the TrueDPD, 12 vdc |
| 5 | TrueDPD-Stir-MTR | TrueDPD Stirring motor assembly, 12 vdc |
| 6 | TrueDPD-Tubing | Silicon tubing, 1/4” OD x 1/8” ID |
| 7 | TrueDPD-Flow-Cell | TrueDPD machined flow cell block |
| 8 | TrueDPD-Bottle-?oz | Reagent bottle, sizes are 4, 8 and 16 oz |
| 9 | TrueDPD-Injector | Injector assembly, keeps DPD separate from the sample water |
| 10 | TrueDPD-Barbset-S | Set of the tube barb fittings for single pool version, with clamps. |
| 12 | TrueDPD-Kit-S | 2’ Silicon tubing, tube barbs for single pool, injector and 2 pump tubes |





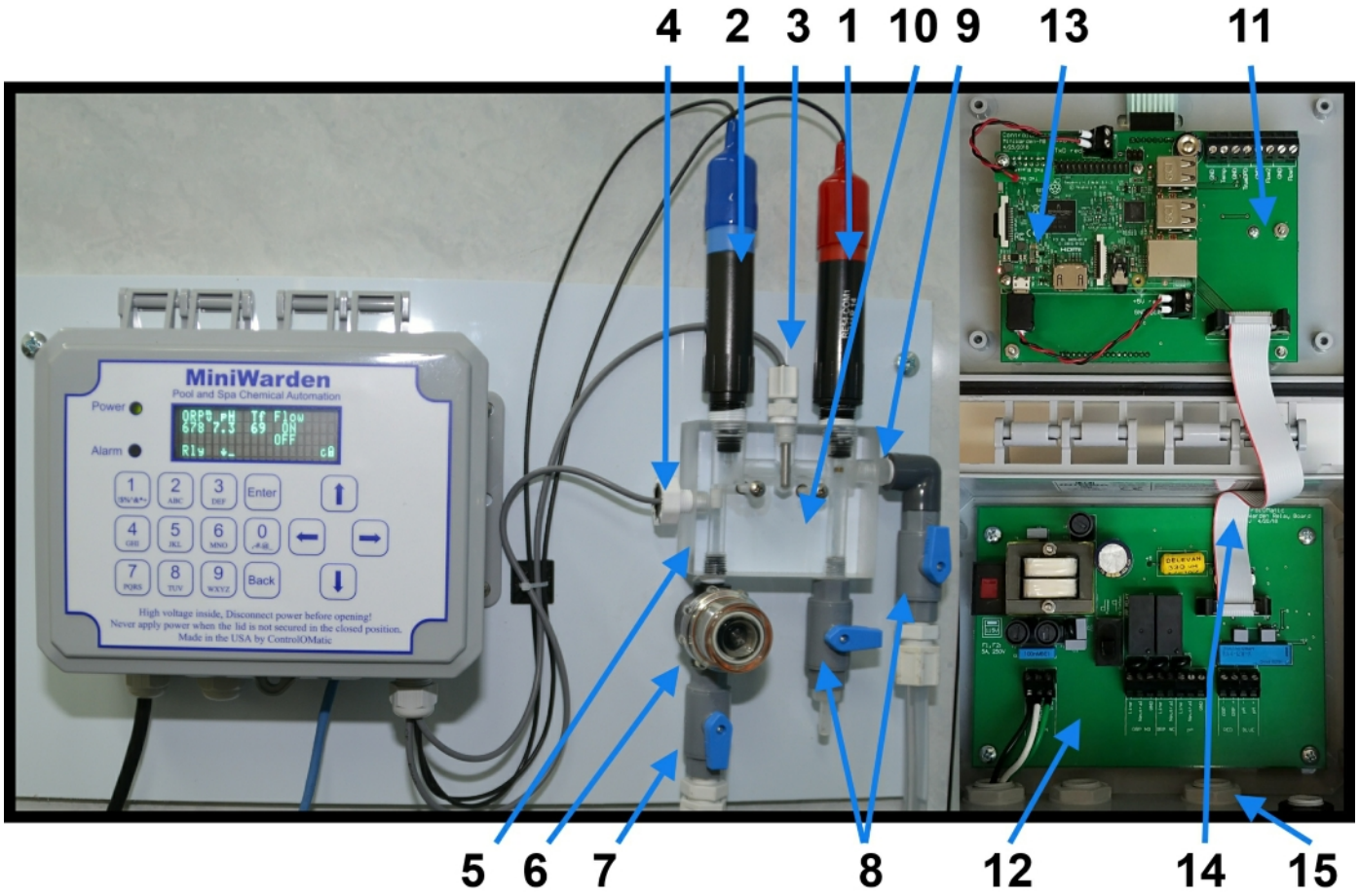
1: DPD Powder

9: Injector

5: Stir Motor

2: Tube-Pk

# MiniWarden Replacement Parts




| Item | Part Number | Type | Description |
|---|---|---|---|
| 1 | ORP-COMP | Sensor | ORP Sensor, platinum band, red sensor body |
| 1 | ORP-COMG | Sensor | ORP Sensor, gold disk for salt water chlorinators |
| 2 | PH-COM1 | Sensor | PH Sensor, blue sensor body |
| 3 | PW-T10K-3ft | Sensor | Temperature sensor, 3 foot cable |
| 4 | PW-Flow3 | Sensor | Flow sensor detector, 3 foot cable |
| 5 | PW-FlowCell-MAG | Sensor | Flow sensor magnet |
| 6 | PW-Strainer | Flow Cell | Inlet water strainer with stainless steel screen |
| 6 | PW-Strainer-Screen | Flow Cell | Stainless steel screen for inlet water strainer |
| 7 | 1250-070-01 | Flow Cell | 1/4" FNPTxFNTP, SMC 2-Way Ball Valves |
| 8 | 1250-080-01 | Flow Cell | 1/4" Ball Valve FNPT x MNPT, SMC |
| 9 | 1250-100-01 | Flow Cell | 1/4" NPT, PP Threaded Nipple |
| 10 | 2070-010-01 | Flow Cell | Machined PoolWarden flow cell acrylic block |
| 11 | 2360-010-02 | Circuit Board | MiniWarden display board |
| 12 | 2360-020-07 | Circuit Board | MiniWarden relay board |
| 13 | PW-Plus | Circuit Board | Communication module |
| 14 | 2370-040-10 | Cable | Display board to relay board interconnect cable |
| 15 | 1020-080-01 | Cable | Cable grip, 1/2" NPT (.23-.47"), GRAY, bottom row |
| 15 | 1020-070-01 | Cable | Cable grip, 3/8" NPT (.20-.39"), GRAY, top row |