

# TrueDPD Operation

## PoolWarden and MiniWarden

### Colorimetric DPD Free Chlorine Sensor

## A New Era In Pool & Spa Chemical Automation!

The TrueDPD is an optional accessory that adds a free chlorine measurement to the PoolWarden and MiniWarden. 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 measurement. It interfaces with the controllers using one of the existing flow switch inputs.



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## Step 1 - Installation

**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 tube to reach.

**Drain:** Attach 1/2" tubing to the drain connection on the front of the measuring 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.

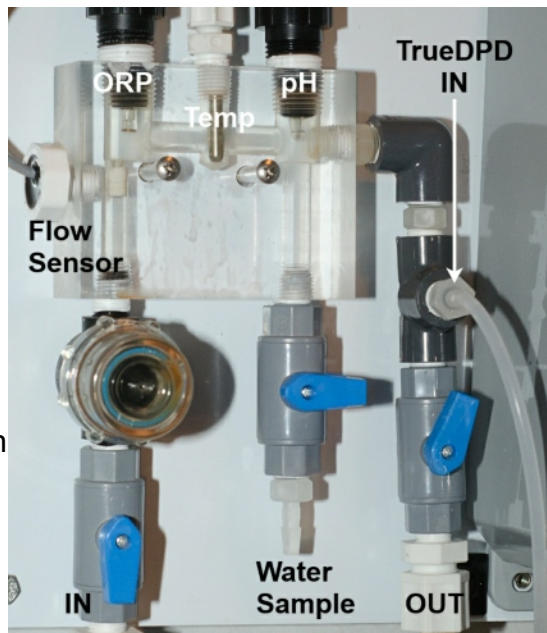
**Water In:** Attach a 1/4" "T" to the exit of the flow cell before the shut off valve. Attach the 1/4" NPT to barb into the "T". Route the inlet tube from the TrueDPD and attach to the barb.

- Pool1 (PPM1) uses the lower pump on the left and Pool2 (PPM2) uses the pump on the right.

**PoolWarden Interface:** Connect the red interface wire to the Flow4 input on the PoolWarden display board and the black wire to GND.

**MiniWarden Interface:** Connect the red interface wire to the Flow2 input on the MiniWarden display board and the black wire to GND.

**Power Supply:** Plug the power supply into the power source. The power supply does supports 220 VAC. If power source is 220 VAC then a suitable plug adapter may be needed.



## Step 2 - DPD Bottle Fill

1. Remove the bottle from the TrueDPD. Hold the lid and twist the bottle to keep the tube from twisting.
2. Rinse out the bottle with tap water. Make sure to not get any of the liquid from the bottle on your hands, wear protective rubber gloves.
3. **CLEANING:** Fill the bottle with tap water and place back into the TrueDPD. Turn the system on and go to the manual operation menu and run a continuous purge for 60 seconds. This will clean out the tubes. Remove the bottle and any remaining water.
4. Add 0.5 grams of the DPD powder to the empty bottle using the small supplied spoon. Keep spoon dry.
5. Fill the bottle to the neck with distilled water, no need to fill all the way to the top. If TrueDPD is in a location over 80 degrees Fahrenheit the DPD mixture will get dark over time. Do not use tap water.
6. Replace the bottle back into the TrueDPD and tighten the lid.
7. **IMPORTANT:** Prime the DPD pump. From the readings screen press 6 for the TrueDPD status screen and press 2 "Purge" to start a 3 second on cycle, make sure it turns off - note: if currently in a measurement cycle pressing 2 will not purge. Observe the liquid progressing down the tube and entering the measuring chamber. Then press 3 "Meas" to start a measurement cycle.
8. In the service menu the last selection is the DPD level percentage, press the right arrow or the Enter button to change the value. Or in the TrueDPD status screen press the Up Arrow to set the DPD reagent level.

## Step 2 - Configuration

The initial setup is the same for both the PoolWarden and the MiniWarden.

**TrueDPD Menu:** Located in the Main Menu, (for older PoolWarden versions it will be in the System Menu). Select the TrueDPD Menu to enable the PPM measurement. PPM and select None, Pool1, Dual, or Pool2. Cycle power for this change to take effect.

- TrueDPD PPM: Select the appropriate choice to enable. Cycle power for this change to take effect.
- TrueDPD Cycle: Select the desired measurement cycle time: 5, 15, 30, 60 minutes or 6 hours. The shorter the measurement time the quicker the DPD mix will run out.
- Reagent: Select Liquid or Powder. The powder DPD mix is supplied with the TrueDPD.

- Skip A Cycle: None, Pool1, Pool1&2, Pool2. PoolWarden only, used to skip a measurement on the larger body of water to save on reagent.
- DPD Bottle: Select 4oz (default), 8oz or 16oz. The TrueDPD comes with the 4oz bottle.
- PoolWarden only: P1/P2 Feed/Measure: Off, 5m, 10m, or 15m. This advances feature allows for a increased measurements after feeding chlorine. Set the cycle time to a value larger than you normally would, such as 1 hour. After a measurement is made if the PPM is less than the setpoint a feed cycle will start. After the chemical feed cycle is finished, a new PPM measurement will be made after the Feed/Measure time. Set the time to give the sanitizer time to mix.

### Step 3 - Manual Operation

The TrueDPD should be manually operated to verify correct operation after installation and from time to time. Go to the Service menu and scroll down to TrueDPD PPM Manual to manually control the TrueDPD. Note that when some of the manual actions are turned on, the stirring motor and green LED may turn on.

- 1 = DPD: Pressing number 1 will manually feed a drop of DPD
- 2,4 = Flow: Pressing numbers 2 or 4 will turn on a water flow pump.
- 3 = AllOFF: Will turn off anything that may be on in the TrueDPD except for the green LED.
- 5 = AllOn: Will turn on everything to run continuously.
- 9 = DPD Purge, this will turn on the DPD pump to purge the lines and you must press 3 to stop it. Select this option to prime the DPD pump when re-filling the bottle.

TrueDPD Manual Mode	
1=DPD	9=DPD Purge
2=Flow1	4=Flow2
3=AllOFF	5=AllOn
6=Stir	v=4.25

**Voltage:** When the sensing chamber is clear the voltage should be between 4.0 and 4.6 V (3.50 is the minimum). There is a small adjustment dial inside the TrueDPD that is used to set this voltage. When some DPD is added and the sensing chamber water turns pink this voltage will drop. The amount that it drops is an indication of the free chlorine level. Do not adjust when the door is open in direct sunlight.

**Manual Cycle:** To operate a manual cycle, turn on the flow to clean out the sensing chamber with the water to be measured, the magnet will also be spinning. The clear voltage should be between 4 and 4.5 V. Press number 1 two times to feed two drops of DPD, press at least 1 second apart. Observe the voltage dropping and leveling off after 20 to 40 seconds. When done turn on a flow to clean out the sensing chamber.

### Step 3 - Normal Operation

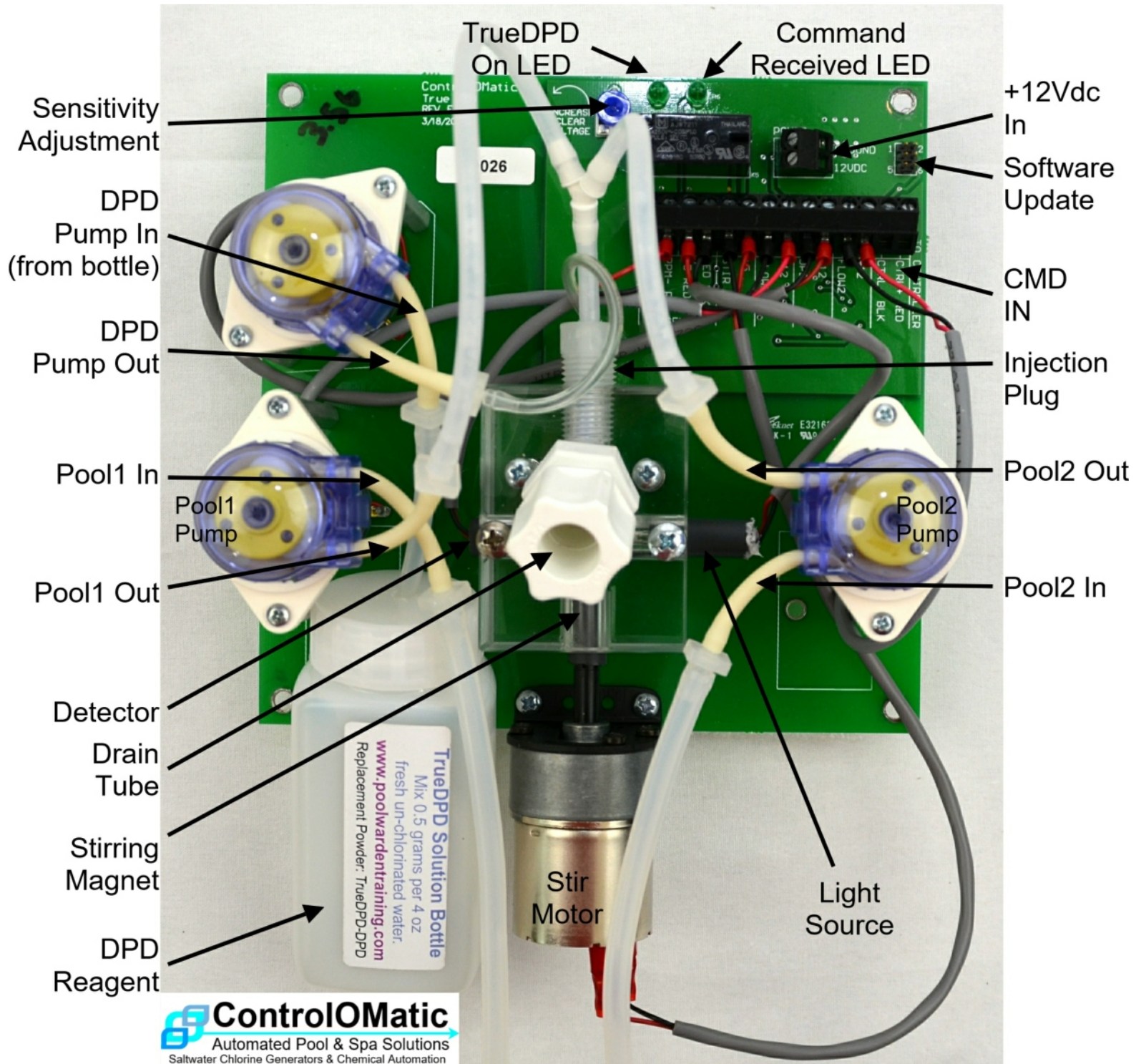
In the normal operation the TrueDPD will start a measurement at the cycle time in line with the actual time in the controller. If every 30 minutes, then on the hour and 30 minutes after the hour it will make a measurement. To observe the previous measurement information: from the readings screen press number 6 to bring up the TrueDPD status screen.

- CLRv: Clear Voltage reading without DPD in the sensing chamber (> 4.0 V)
- DPDv: Voltage after DPD has been added
- PPM: Calibrated free chlorine PPM measurement
- CTR: Counts the complete measurement cycle in seconds
- V: Current measured voltage
- First Line Last Number: If shown, 1 is pool 1 and 2 is pool 2
- If there are any errors the last line will show "err>", press 1 to view the previous measurement errors. When exiting this screen the error codes clear.

TrueDPD Status			
CLRv	DPDv	PPM	1
4.30	2.15	2.6	C15
4.10	3.15	1.3	v4.23
Err	Purg	Meas	95%

**Take a Reading:** When in this screen, press number 3 to start the cycle and take a measurement. Observe the counter starts from 0 and at various times the TrueDPD will perform the actions to refresh the sample chamber, add DPD, take the measurement and finally clean out the sample chamber.





## Step 4 - Calibration

When calibrating the free chlorine the entered calibrated value will update the calibration data on the next measurement which will automatically start after the calibration. The displayed value will be the new calibrated value, but if the controller is turned off before the next cycle measurement there will be no calibration performed.

To calibrate go to the service menu and select calibration. Scroll down to PPM and enter the actual free chlorine PPM.

## Step 5 - Relay Control

**IMPORTANT:** If adding the TrueDPD to an existing controller you must go to the Relay Type menu in the controller and reset the ORP relays and alarms to defaults after the TrueDPD has been enabled in the System menu to add the PPM capability to the relay setup and alarm conditions. There is also an Update All selection in the Relay Type menu that will update all relays to the selected types. If this isn't done the controller will not control or display alarms properly.

This step is required and will reset the relay and alarm to factory settings to add the PPM support. Any settings that have been changed will be over-written and should be noted before performing this step.

PoolWarden: Go to the Relay Type menu, Select Pool 1 and then ORP. Select the type of control such as Liquid(ORP+) and then select the < (Left Arrow) to accept the change and reset the relay to factory defaults which will add the PPM capability to the relay. Repeat for the Pool1 Alarm and then for Pool2.

MiniWarden: Go to the Relay Type menu. Select the type of control such as Liquid(ORP+) and then select the < (Left Arrow) to accept the change and reset the relay to factory defaults which will add the PPM capability to the relay. Repeat for the Alarm.

**Setpoints:** You will be able to have either an ORP or PPM or both as setpoints. For PPM control there is also a new setting: "and If PPM > 0.0 - YES/NO". If set to YES, then if the PPM measurement is 0.0 that will not turn the relay on, it must be greater than 0. If something is wrong with the TrueDPD such as out of DPD reagent that would give a 0 reading even if there is chlorine in the water.

## DPD Reagents

Powder: Mix 0.5 grams with 4 oz un-chlorinated water. This mixture tends to darken over time, especially at warmer temperatures. The measurements are accurate even when the DPD mixture is dark. Liquid: Lamotte DPD1B in 2 oz bottles. This reagent is more expensive and doesn't darken over time. To select go to the TrueDPD menu and for Reagent: select Liquid or Powder. There is a different calculation for both and if not selected properly the displayed PPM will not be correct.

## Skip a Cycle

Added to the PoolWarden only. When controlling a pool and a spa, skip a cycle will allow for taking fewer PPM measurements on one of them. The PPM will change quicker on the smaller body of water and this allows for taking more readings on the smaller body to save on reagent.

## Error Codes

From the TrueDPD status screen press 1 to access the recent errors. Accessing the error screen clears the error codes, make sure to note what they were before leaving the screen.

- Clear Low: The clear voltage was less than 3.50 volts. Inspect the flow into the test chamber. The walls of the flow chamber may need to be cleaned using a Q-Tip.
- Abort Clear Low: This cancels the measurement and sets the PPM to 9.8 to inhibit sanitizer feed based on PPM. This is set if the clear voltage is less than 3.50 volts two measurements in a row. Inspect the flow going into the chamber, make sure there are no air bubbles sticking to the chamber walls, clean the chamber. As a last resort, the gain knob can be rotated to increase the voltage, but if the voltage was above 4.00 before is most likely not the gain.



- **DPDv>ClrV:** If the DPD voltage is higher than the Clear voltage. Make sure there is reagent, no air bubbles in the reagent tube. Purge the reagent if necessary. This can also happen if there is no sanitizer in the water.
- **CT #:** Cycle try's and a number. The TrueDPD now requires two consecutive DPD voltage measurements that are within 0.15. It will continue to re-measure until this condition is met. The number is the number of times this has happened since the controller was turned on.



**For support and more information please visit  
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## PPM and ORP Control

Programming for the use of TrueDPD control depends on how you want to control chlorine feed. When programming you have the choice of controlling chlorine levels via PPM only, ORP only or PPM & ORP together. When properly set up, chemical levels can be tightly controlled which will save chemicals.

As an example: Liquid chlorine feed commands for TrueDPD are accessed by pressing Back from the readings screen and selecting Relays from Main Menu, then select ORP 1 Liquid(ORP+). Same steps are required if you have a 2 pool controller, just scroll down to ORP 2 Liquid+). Once set up, pressing 2 from main screen will give you quick access to chlorine set points along with on and off times.

Command	Description
ManualTime: 00:00:00	Enter time needed to effectively increase sanitizer level when in manual control. Consider water volume & feed pump output
LockON Time: 00:00:00	These two commands are used when pH lockout is enabled. This allows for chlorine to be dispensed on a time only basis such as 15 minutes every hour.
LockOff Time: 00:00:00	
Proportional: 10%	Use this command to tighten chlorine delivery rates, recommend 5-10%
On If ORP<000	Leave at 0 for PPM only control or set to level below ORP reading when water is balanced for backup.
Off If pH > 0.0	Use this command if you want to enable pH lockout.
On If PPM< 0.0	Enter the desired chlorine level in Parts Per Million
And If PPM> 0.0 -Yes/-No	Safety feature. If set to -Yes, there has to be at least a .1 PPM chlorine residual to feed. This protects from overfeed if reagent is depleted.
On Delay 00:00:20	Amount of time before a feed cycle will start once the conditions are met.
On Time 00:01:00	Amount of time the feed cycle will be on and off to mix and be read by controller. TrueDPD test intervals, chlorine pump output and pool volume should be used to determine values.
MinTimeOff 00:07:00	
Off If RLY On -none	No adjustment needed
Off If ORP>0	Leave at 0 unless you want chlorine feed to be disabled when ORP reaches a certain high level regardless of PPM reading. Can be used as a safety feature in case of reagent problem.
Off If Flow Off-1 or 3	Disables chlorine feed if no flow is detected. Cannot be changed.
SetOvrfeed 00:00:00	This overfeed is the maximum amount of chemical feed time allowed to reach set point. Can be used to prevent chlorine from being pumped in the event of feed tube or line breakage. Must be manually re-set.
Overfeed 06:00:00	This over feed is the maximum amount of time chlorine pump will be allowed to pump per day. Re-sets daily at midnight

# ORP Relay Setup

Example of values for free chlorine control with ORP as a backup control.

**On if ORP < 680:** The traditional ORP setpoint is set lower than normal to allow for the PPM setpoint to be the main control.

**Off if pH > 8.0:** Always a good idea to enable pH lockout. This only effects the ORP setpoint, will not effect the PPM setpoint.

**On if PPM < 3.0:** If the free chlorine is less than 3 a feed cycle will start.

**And if PPM > 0.0 Yes:** Very important to disable PPM control if the reading is 0. It will then use the ORP setpoint and soon the PPM should increase.

**On Time 00:01:00:** Maximum amount of on time in a feed cycle.

**MinTimeOff 00:12:00:** Time it will be off when is a feed cycle. When a feed cycle ends the relay will be off for this amount of time. If the TrueDPD cycle time is 30 minutes it will feed based on this cycle until a new measurement is made to update the PPM measurement. Set the Feed/Measure time (in the TrueDPD menu - PoolWarden) to 10 minutes to update the measurement before the 12 minute off time has finished.