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# **Spectra Hydro Pro Controller**

## Professional Grade Bladder Pump Controller Operation Manual



**6315 Shawson Drive Unit #8, Mississauga, Ontario, Canada L5T-1J2.**

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# Safety Warnings

**Warning:** Over-pressurizing an air compressor or failing to follow recommended use guidelines can result in serious injury or property damage. Always operate the compressor within the recommended pressure limits and adhere to all safety guidelines provided by the manufacturer.

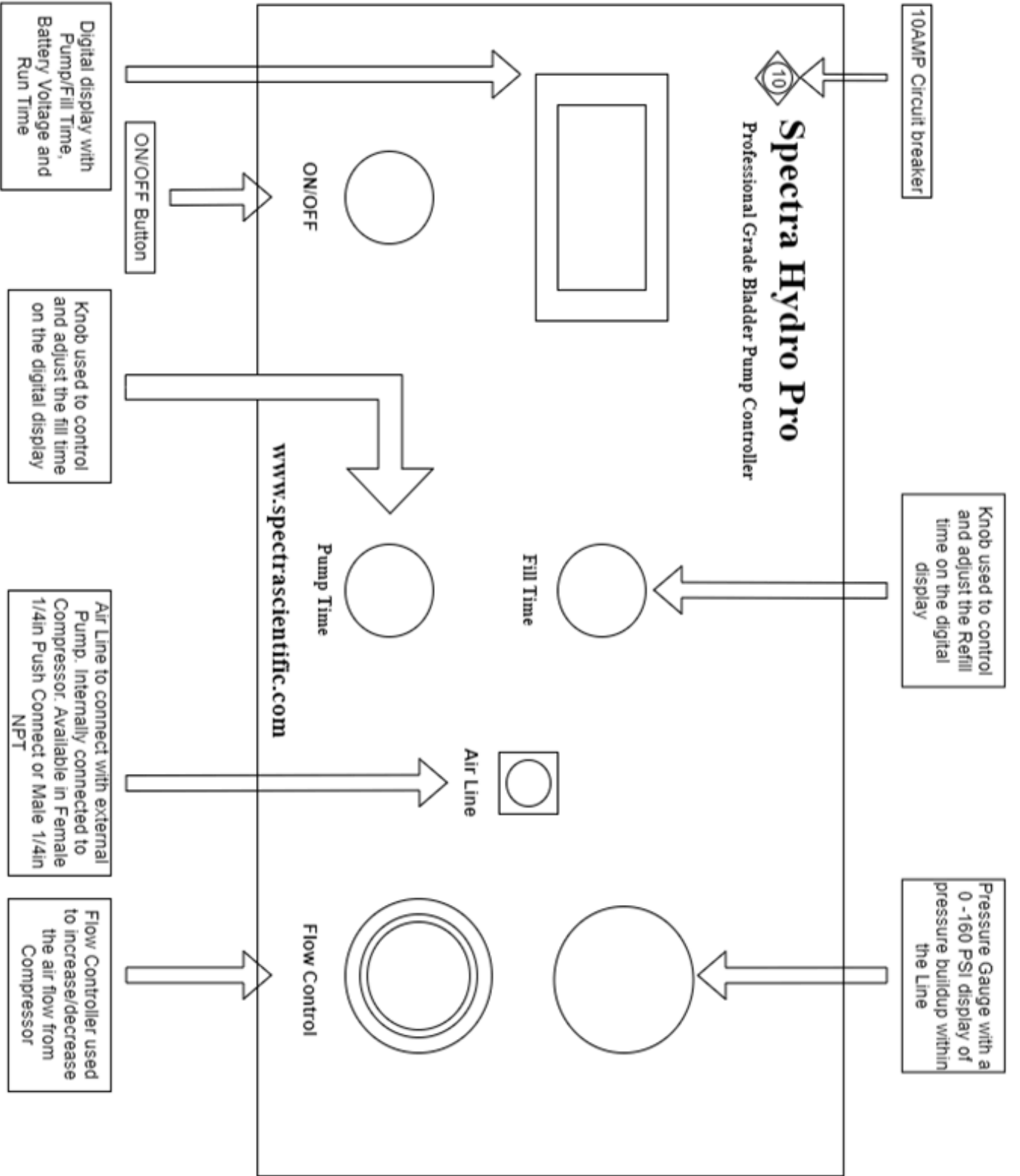
## Important Notice

The Spectra Hydro Pro Controller is a Bladder/Pneumatic Pump Controller that is designed for specific uses only. Improper use of the device can result in damage to the controller and the equipment it controls, as well as potential harm to individuals nearby. Please adhere to the following guidelines to ensure the safe and effective use of the controller:

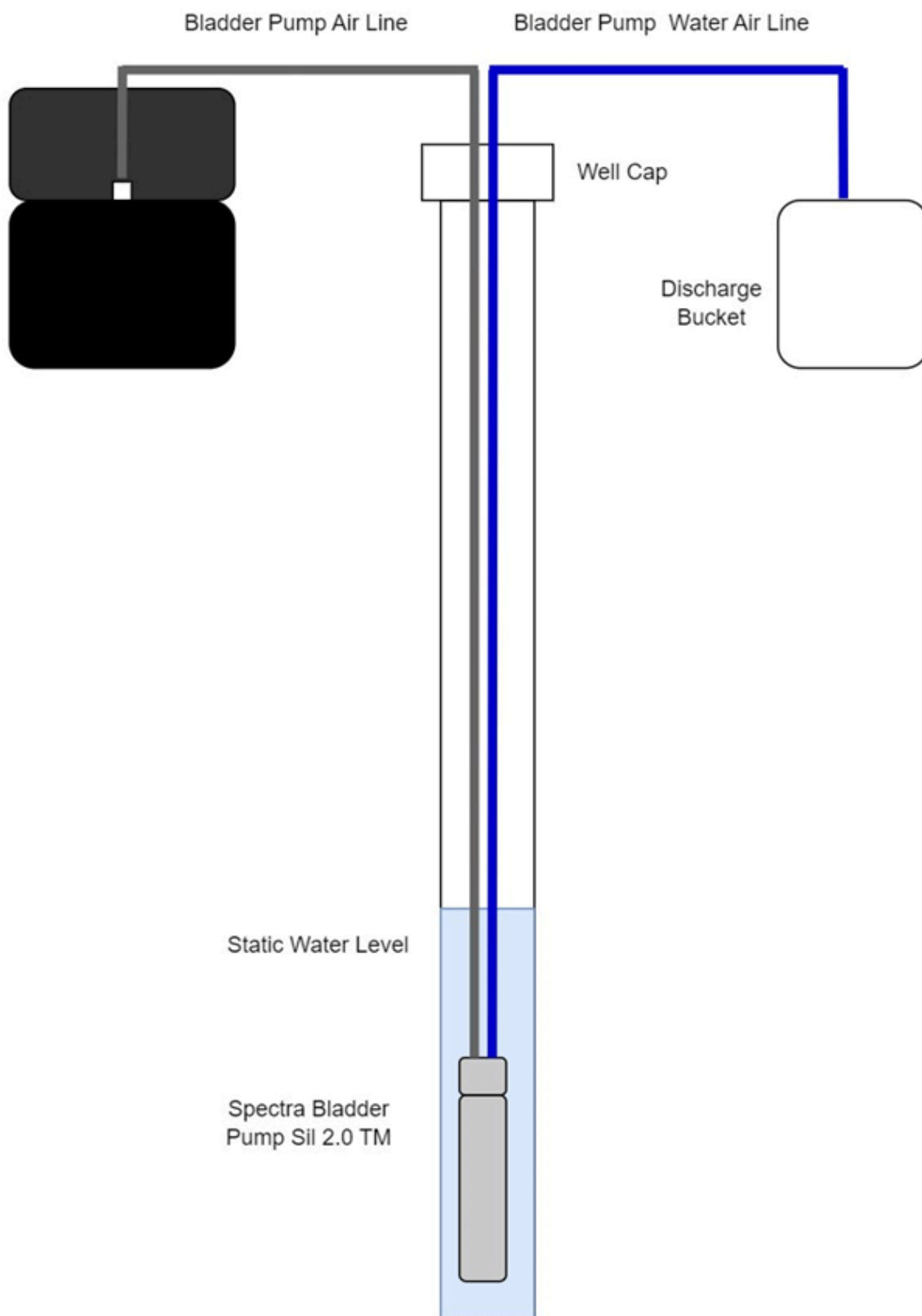
- Do not use the controller in rainy or wet conditions. Moisture can damage the device's internal components, leading to system failure and potential harm.
- Do not submerge the controller in water. The device is not waterproof and is not intended for use underwater. Submergence in water can cause severe damage to the controller and the equipment it controls.
- Do not expose the controller to extreme temperatures. The device is designed to operate within specific temperature ranges and can be damaged by exposure to extreme heat or cold.
- Do not modify or tamper with the controller in any way. Unauthorized modifications can compromise the safety and functionality of the device.
- Do not exceed the recommended voltage range for the controller. Overvoltage can cause severe damage to the device and the equipment it controls.

Failure to adhere to these guidelines may result in damage to the Spectra Hydro Pro Controller and the equipment it controls, as well as potential harm to individuals nearby. Please refer to the product manual for additional safety information and guidelines. Failure to adhere to these guidelines will declare the warranty void and null.

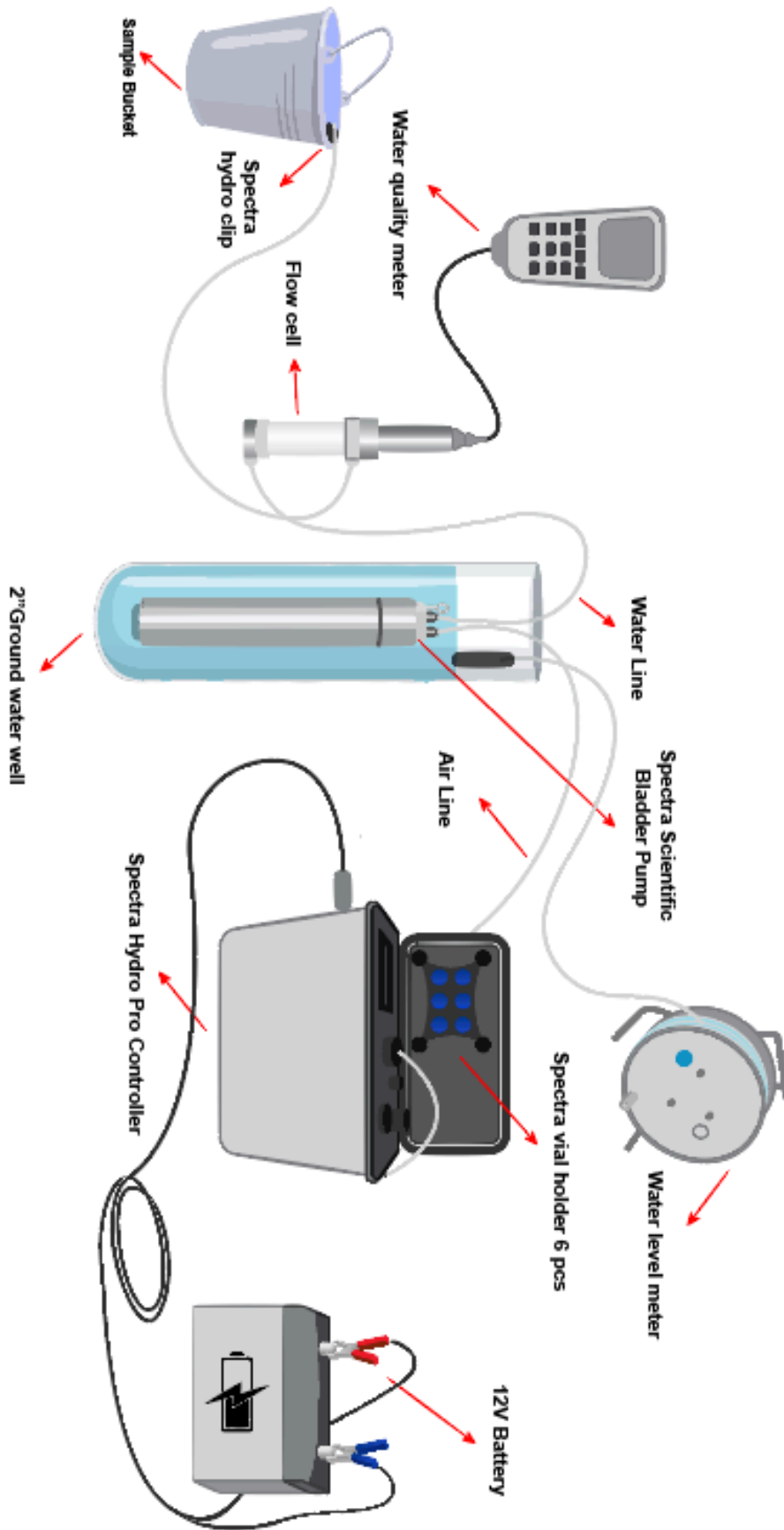
# Spectra Hydro Pro Panel Design



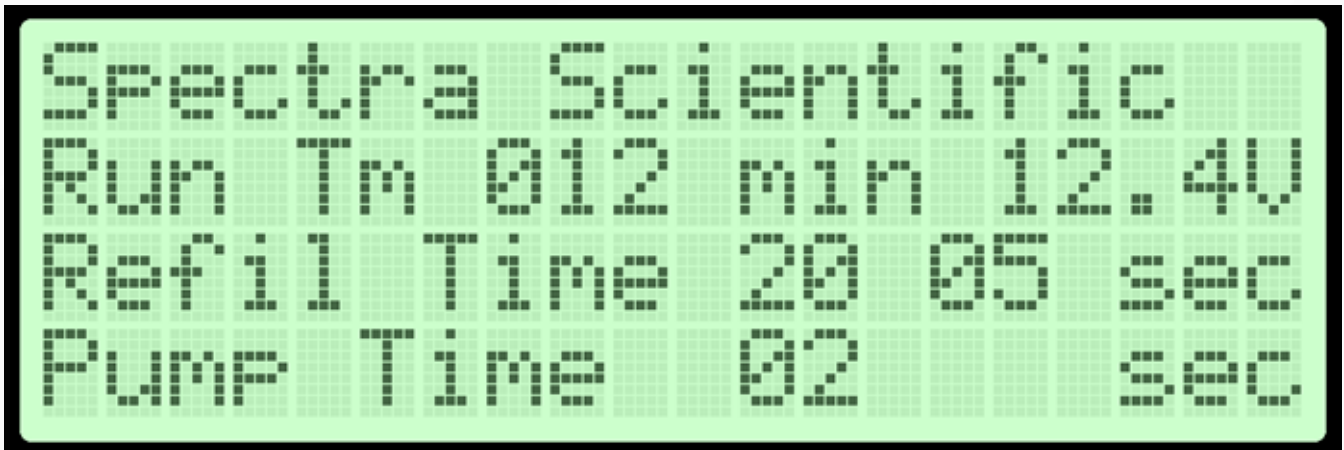
# Spectra Hydro Pro Basic Sampling Setup



# Spectra Hydro Pro Advanced Sampling Setup



# Spectra Hydro Pro LCD Display Diagram



## Definition of Terms

**Run Time (Run Tm):** This refers to the TOTAL time the controller has been ON, displayed in minutes.

**Refill Time (Refill Time):** This refers to the Refill Time, with a set time between 1 – 60 seconds. The refill time is the period in which the compressor is not pressurizing the internal bladder chamber, meaning the bladder is expanding and refilling with water via hydrostatic pressure.

**Pump Time:** This refers to the period when the compressor is actively pressurizing the internal chamber and pushing water through the water line. Depending on the depth it takes between 5 seconds to 20 seconds to empty the bladder.

Both Refill and Pump have a countdown time located to the right of the set time. This is to give users an estimate of the time left in each cycle.

A battery voltage is also displayed in the top right corner, this displays the voltage of the connected battery

# System Specifications

Specification	Performance
Operating Temperature	-20°C – 50°C (-4°F)
Humidity Response	Fully epoxied board, Internal ventilation via Fan and Exhaust. No Issues running during 100% humidity condition.
Dimensions	39 x 35 x 20 cm (LWH)
Weight	16 lbs
Case Material	Structural Resin
Display	4 x 20 LCD Display
Pump/Fill Time	1 sec. MIN. – 60 sec. MAX.
Air Line	¼ inch Push Connect OR ¼ inch Male NPT Fitting
Max Pressure	120 PSI
Max Depth	300 ft/91 m
Power Supply	External 12V Supply
Power Cable	Industrial Grade cable with Military Grade connections. Standard 4ft with customized options available.

# Product Introduction

## Introduction:

The Spectra Hydro Pro Bladder Pump Controller is the best-in-class solution for all your bladder pump control needs. Designed with a full-duty cycle internal compressor featuring a maximum pressure of 150 PSI, this controller provides unmatched performance and precision. The Hydro Pro is made with Professional-grade quality components that ensure reliable and efficient operation, even in harsh and demanding conditions. The user-friendly design and intuitive interface make the controller easy to set up and operate, saving you time and effort. With the Spectra Hydro Pro, you can trust that you are getting the most advanced and reliable bladder pump controller available on the market.

## Functional Design Theory:

The Spectra Hydro Pro is designed to provide compressed air for the operation of down-well pumps such as Pneumatic and Bladder Pumps. The Hydro Pro operates in two cycles: The Fill Cycle and the Pump Cycle explained below. The Hydro Pro is designed with a Pneumatic Circuit comprised of an internal air compressor, humidity filter, solenoid, and plumbing connecting the different components. In addition to the Pneumatic Circuit, the Electrical Circuit operates via a Microprocessor connected to an LCD display with real-time display of battery voltage, cycle countdown timers, pump and fill times, as well as total run time.

## Fill Cycle:

The Fill Cycle is when the Compressor is not actively pumping air. This allows the internal Bladder to expand and refill with water via hydrostatic pressure. It can take anywhere between 5 - 20 seconds for the Spectra Bladder Pump Sil 2.0 to expand and fill up (depending on depth/pressure). The Spectra Bladder Pump is designed with a top-angled intake valve located above the Bladder; this means that if the Bladder Pump is immersed under the water column water will fill the internal Bladder.

## Pump Cycle:

The Pump Cycle is when the Compressor is actively pushing compressed air into the Bladder Chamber via the Air Line. This constricts the internal Bladder forcing water up the well via the water line. Initially, when setting up the Pumping Cycles it is recommended to have faster Pump Cycles to push the water up the tubing line.

# System Operation

The Spectra Hydro Pro is a professional grade Bladder Pump Controller designed for use with Bladder and Pneumatic Pumps. To operate the Spectra Bladder Pump, it is recommended to first familiarize oneself with the mechanical and software controls of the Hydro Pro (See Figure 1).

## Setting up the Spectra Bladder Pump System

### Required Components:

- 12V Battery - Using a larger Marine Battery is recommended, particularly in difficult conditions.
- Spectra Hydro Pro Bladder Pump Controller/Compressor
- Spectra Bladder Pump Sil 1.0/2.0 or Spectra Pneumatic Pump
- Air & Water Tubing Lines
- Optional – Well Cap

The first thing one should do when setting up the Spectra Bladder Pump is to set up their system. This involves connecting the Pump to the Controller via the Air Line. The Water (Discharge) Line should be either connected to a flow cell or a discharge bucket depending on the type of sampling being conducted.

The Pump should now be lowered to sit a couple of feet under the static water level. This is to ensure that hydrostatic pressure fills the internal bladder in between Pump Cycles and to maintain the water intake below the water line. One can use Figure 2 to set up Pump Times and Fill Times (Please note that this is measured in a controlled environment and will slightly differ from actual field conditions, Figure 2 should be used as a general guide). Otherwise, the operator can use trial and error until they reach a desired flow rate.

Initially, the Fill Time should be set at 5 seconds and the Pump Time should be set at around 10 seconds (This is for depths of around 20ft, for every 50ft increase, multiple both times by a magnitude of 2). This will allow the water line to fill, bringing the water from the bladder pump intake point to the discharge point above ground. Once the water meniscus is visible at the tip of your water/discharge line, you can adjust the Fill Time using Figure 2 to reach desirable flow rates.

# System Operation

## Setting up Pump Times:

The Pump Time should not be lower than 5 seconds as that represents the minimum time it takes to expel the internal volume of the Bladder. At higher depths, we would require a slight increase in the Pump Time to compensate for the increase in pressure. To determine the optimal Pump Time one can use the Trial and Error Method OR one can view the recommended setup at different depths. It is recommended to use a mix of both methods to achieve optimal flow rates.

## System Troubleshooting

The Spectra Hydro Pro is designed to provide long-lasting service to the end user. The optimal function of the Controller is directly linked to a fully charged battery. If one finds issues with the unit flickering ON and OFF, check to ensure that the connections to the Battery via Alligator Clips are firm. If Rust/Corrosion has built up on the Batteries take steps to remove the build-up.

### **Problem: The Compressor does not turn ON**

#### **Solution:**

- Check all connections and ensure they are firmly secured and not reversed. The Spectra Hydro Pro is protected from reverse polarity.
- If the 10 AMP Circuit Breaker is tripped, push to reset.
- If the Controller still does not turn on, it could be an internal wire has become disconnected. Call Spectra Scientific or your local Distributor for the next steps on how to proceed.

### **Problem: The Controller is On and Connected but it is not pumping**

#### **Solution:**

- Connect a cut piece of tubing to the Air Line and block the end with your thumb, check to see if the pressure builds and is reflected in the regulator.
- Make sure that the sampling depth is within the recommended range/pressure.
- If pressure is being built, check the depth of your bladder pump, and ensure it does not exceed the rated depth limits. You can increase the amount of pressure produced by turning the Flow Control all the way to the right.
- Open the Bladder Pump and ensure that the Bladder is tightly secured with the stainless steel collar.

# System Troubleshooting

**Problem: The Controller screen is not working despite turning ON**

**Solution:**

- Reset the Controller by turning the Unit OFF and ON again.
- Check the Battery Voltage and ensure that you are operating with a fully charged battery capable of the operating compressor load.
- Should the issue persist despite resetting the unit, a licensed technician can open the face plate of the Hydro by unscrewing the 4 securing screws and directly reset the board via the reset button.
- If the problem persists, contact Spectra Scientific or your local distributor directly for next steps.

## Fill/Pump Time Set Up Chart

The following chart represents a recommended setup of Fill and Pump Times to achieve desired flow rates at specified depths. These values are dependent on several influencing factors (tubing size, water level, bladder pump submergence) and should not be taken as exact measurements. The values represented below serve as a starting point and should be verified by the user in the field to produce the best results.

Figure – Flow Rate Chart

Depth	Fill Time	Pump Time	Flow Rate
<b>20ft</b>	<b>55 sec</b>	<b>5 sec</b>	<b>75 ml/min</b>
20ft	25 sec	5 sec	150 ml/min
20ft	15 sec	5 sec	300 ml/min
<b>40ft</b>	<b>55 sec</b>	<b>5 sec</b>	<b>75 ml/min</b>
40ft	25 sec	5 sec	150 ml/min
40ft	15 sec	5 sec	300 ml/min
<b>60ft</b>	<b>55 sec</b>	<b>5 sec</b>	<b>75 ml/min</b>
60ft	25 sec	5 sec	150 ml/min
60ft	15 sec	5 sec	300 ml/min
<b>80ft</b>	<b>55 sec</b>	<b>5 sec</b>	<b>75 ml/min</b>
80ft	25 sec	5 sec	150 ml/min
80ft	15 sec	5 sec	300 ml/min
<b>100ft</b>	<b>50 sec</b>	<b>10 sec</b>	<b>75 ml/min</b>
100ft	20 sec	10 sec	150 ml/min
100ft	10 sec	10 sec	300 ml/min
<b>120ft</b>	<b>50 sec</b>	<b>10 sec</b>	<b>75 ml/min</b>
120ft	20 sec	10 sec	150 ml/min
120ft	10 sec	10 sec	300 ml/min

**Disclaimer – The results of the above table are produced using a Spectra Bladder Pump Sil 2.0 equipped with a 3/8 Water Line under 2ft of submergence. Flow Rates may vary depending on the submergence, depth, tubing size and Fill Time.**