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**WELL WIZARD<sup>®</sup>**

Dedicated Monitoring Systems

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# INSTALLATION GUIDE

P/N 34999



[QEDENV.COM](http://QEDENV.COM)

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## Safety Warnings



Wear appropriate Personal Protective Equipment (PPE) including safety glasses when working with QED sampling pumps. Disconnect air supply to the pump before removing the pump from the well. Do not apply more than 5 psi air pressure to the pump if the pump is above ground.

## Introducing Well Wizard

**WELL WIZARD®**

### Contacting QED

Please call our Customer Service Department at one of the following numbers for assistance

- **Monday through Friday, 8:30 a.m. to 5:00 p.m. EST:** (734) 995-2547
- **After Hours and weekends:** 1-800-272-9559 (or 1-734-746-8045 if you are outside the U.S.)

### Introduction

To monitor the quality of ground water, you need an efficient way to collect unbiased samples. Well Wizard® is a total system for meeting all your ground water monitoring needs - with the flexibility to meet your special requirements. This section describes the components of the Well Wizard System.

The Well Wizard system includes both dedicated and portable components. The water contacting components are dedicated; you permanently install them in each well. The control elements are portable; you transport them from well to well.

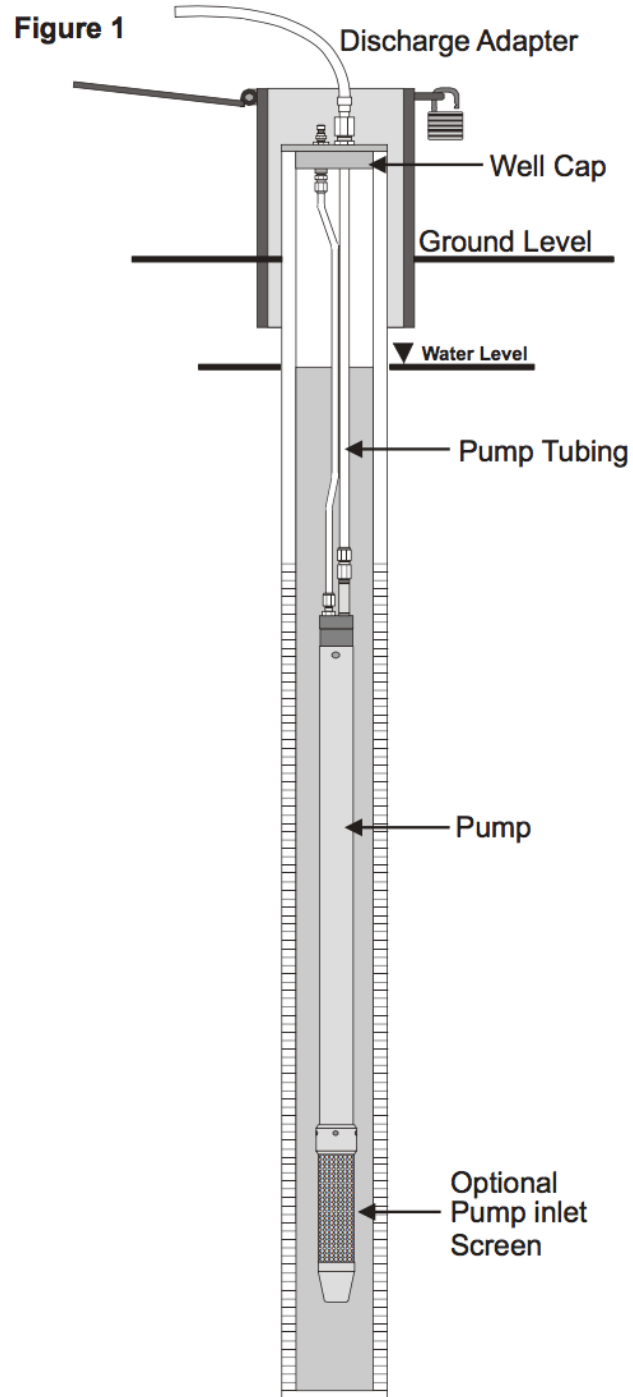
### BASIC DEDICATED COMPONENTS

- A sampling pump
- Pump Tubing
- An optional inlet screen
- A well cap
- Discharge Adapter
- Freeze Protection

The following sections describe these components.

## Sampling Pump

A Well Wizard® sampling pump is an air-actuated bladder pump that you permanently position in the well.



## Sampling Pump

As figure 1 shows, you normally position the pump inlet midway in the screened section of the well, suspending it by two tubes that supply air to the pump and convey the water sample to the well cap. Whenever possible, pumps are shipped already preassembled to the tubing and the well cap assembly.

Several types of Well Wizard® bladder pumps are available.

### 1100 Series Pumps

The 1100 series pumps include 4 major components:

- Upper-end check valve assembly (polyvinyl chloride (PVC or Teflon®))
- Lower-end check valve assembly (PVC or Teflon)
- Bladder Cartridge (Teflon)
- Pump Body (PVC or Teflon )

You can totally disassemble the pump without tools by unscrewing each end cap and pushing the bladder cartridge out of the pump body (for more information refer to the instructions included with the field-replaceable bladder kit).

### 1200 Series Pumps

The 1200 series pumps include 2 major components

- Bladder Cartridge assembly (either Teflon and stainless steel or PVC and stainless steel)
- Pump Body (Stainless Steel)

You can partially disassemble the pump (for more information refer to the instructions included with the field-replaceable bladder kit).

## How A Bladder Pump Works

The bladder pump has two alternating cycles (refer to figures 2 & 3).

### Discharge Cycle

During the discharge cycle, air forced into the space between the pump body and the pump bladder squeezes the water inside the bladder into the exit/entrance holes of the fill rod. As air pressure increases, liquid having no place else to go is forced up the discharge line and to the surface. At the same time, the top check ball rises with the discharging liquid while the bottom check ball is forced down by the air pressure; this seals the pump inlet so that no water can enter the bladder chamber.

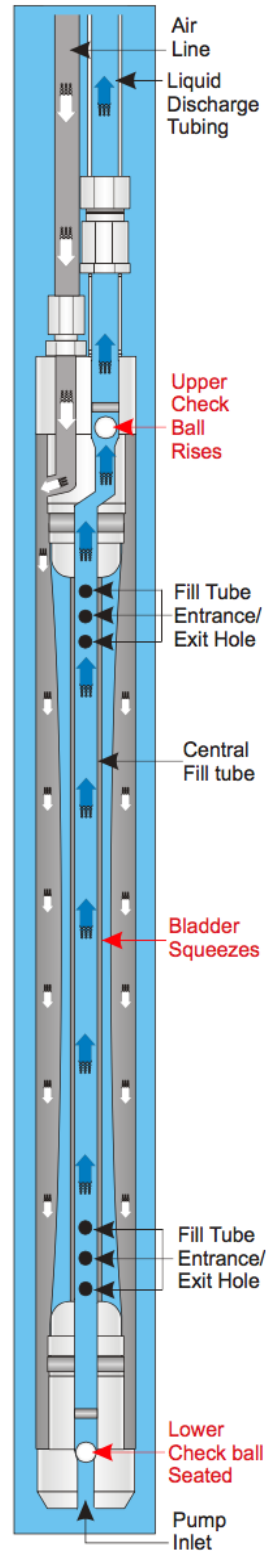


Figure 2

## How A Bladder Pump Works

### Refill Cycle

During the refill cycle, with no air pressure holding it down, the water pressure pushes the bottom check ball up, allowing the water to reenter the bladder chamber. The bladder expands as it refills with water. Simultaneously, the top check ball is forced down and seals because of the force of the water pressure above it from the water in the discharge tubing, this prevents the water in the discharge tube from reentering the bladder chamber.

**Caution:** A Well Wizard® pump bladder can be punctured if you pump sand. So be sure to use an inlet screen in wells with high sand and sediment content, or when the inlet of the pump is placed within 2 feet of the bottom of the well. Remember, the Well Wizard 10-year warranty is void if you do not use an inlet screen.

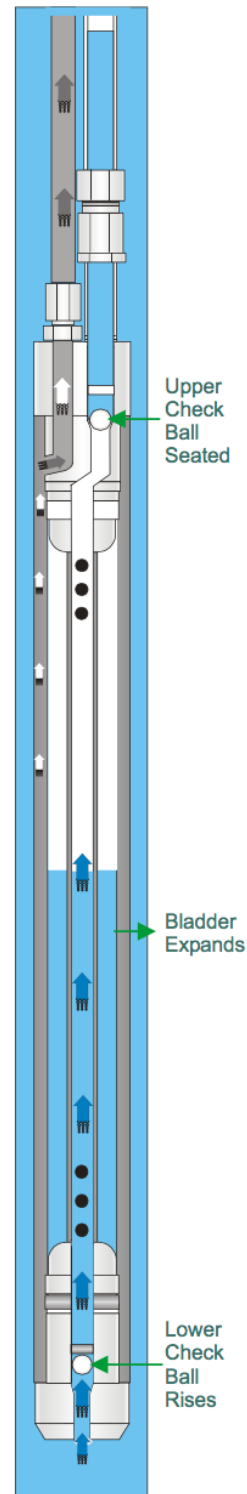


Figure 3

### Pump Tubing

A ground water sample is only as good as the tubing it runs through. Your Well Wizard® was shipped with one of the following types of superior-quality tubing:

- Polyethylene
- Teflon® -lined polyethylene
- Teflon

Most tubing is supplied as a bonded pair (air supply and discharge), to save time and avoid tube entanglement.

Unless your order specified that you wanted bulk tubing, the tubing for your Well Wizard bladder pump is pre-cut to the correct length for your well.

### Inlet Screen

An inlet screen can protect the bladder in your Well Wizard pump by preventing sand from contacting the bladder. If you install a screen on your dedicated Well Wizard bladder pump, QED warrants the pump for a full 10 years.

### Well Cap

You fit a well cap to the top of the well casing to suspend the pump and tubing. There are two terminal fittings inside the basic well cap (see figure 4).

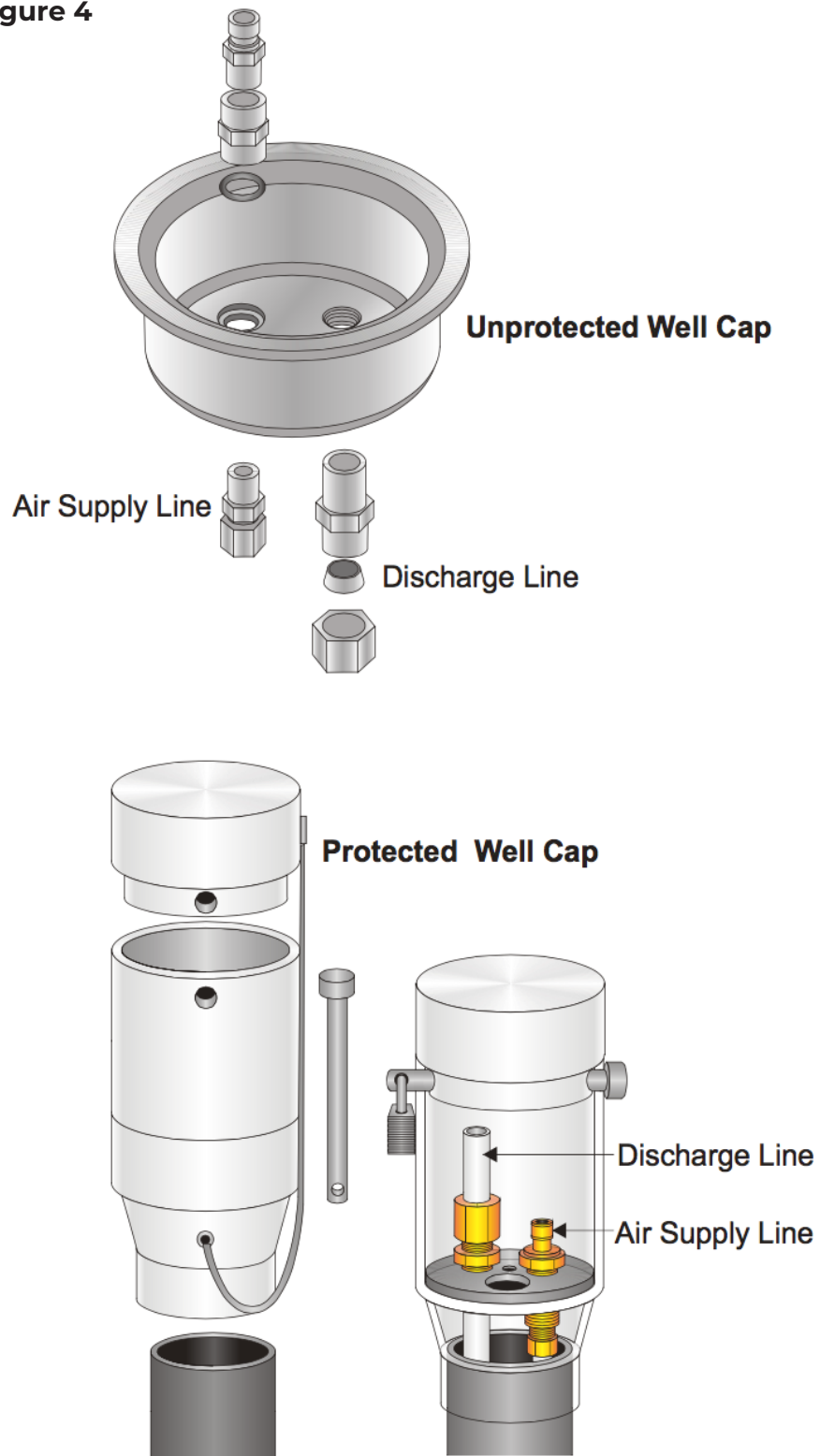
- A compression *through fitting* for the discharge line
- A short brass *quick-connect nipple* for the pump air-supply line

The *protected* well cap has a lid with a lock pin. You can record well identification and reference date information on the cap label. The *unprotected* well cap is meant for wells located within a user-supplied protected standpipe.



## Well Cap (Figure 4)

Figure 4



## Portable Components

Portable Well Wizard® components include a cycle controller, water level meter, disposable sample filters, and a flow-through cell.

### **Controller**

A controller controls operation of the Well Wizard pump by regulating the air flow from a compressed-gas source to the pump. When connected to an appropriate compressed-gas source, the controller alternately pressurizes then vents the air supply line to the pump, allowing the pump to discharge and then fill with water. For more information, please refer to the operation and installation manuals for the individual controllers.

### **Water Level Meter**

The model MP30 drawdown/water level meter can be connected to the QED cycle controllers to automatically control the drawdown during purging and sampling.

The series 6000 electronic water-level meters use a portable conductivity probe attached to a calibrated tape. There is a light and audio signal when the probe touches the water surface.

### **Flow Cell**

The MP20 is QED's optional flow cell. The MP20 lets you know when it's okay to sample - generally saving you from spending a lot of time and from removing large volumes of purge water. The MP20 signals when stabilization has been achieved for selected water parameters.

### **QuickFilter®**

To ensure accurate samples of dissolved metals, you can use an optional QED QuickFilter. It removes solids larger than 0.45 micron. Because QuickFilters are disposable - you use one for each sampling event - there's no need to try to clean or decontaminate the filter from well to well.

## Installing the Components

If you've received a set of preassembled dedicated components, you'll find that unpacking them and installing them is easy when you follow the following instructions. Because not everyone needs to read this whole section, the first section helps you decide which of the other sections you need to read.

If, instead of preassembled components you've received unassembled components and bulk tubing, read the section titled "Installing a Pump Using Bulk Tubing."

### Unpack the Components

Here's how to unpack the Well Wizard® dedicated components.

1. If you need to install a Well Wizard system in more than one well, decide which well you want to do first. Then find the box of components with the correct well-identification number written on the outside of the box.
2. Open the box, then before unpacking the rest of the box, put on a pair of latex gloves. Check your shipment against your order confirmation and packing list. Make certain every component you ordered is there, and familiarize yourself with how components go together before you go to the field.
3. Carry the box to the well site.

**Caution:** Put on a pair of latex gloves before touching any of the pump components. Touching well components with your bare hands can contaminate the components and degrade the quality of the samples obtained using the Well Wizard system, and at any time when your hands might touch a water contacting component.

4. Taking care to *not kink the tubing*, gently remove the plastic wrapped pump and tubing from the box. A label on the package provides the well cap ID, cap, and tubing length. You may need this information later, so save the label.

**Note:** The plastic bag also contains the lab-clean certificate on which is recorded the pump batch serial number. Keep this tag for each pump you install. It's your proof that the pump is contaminant free - if you need to, you can call QED with the serial number to find out which lab certified the pump.

5. Open the plastic wrapping, then gently slide the pump out of the bag.

## Installing the Inlet Screen

### Install the Inlet Screen

Well Wizard bladder pumps have a 10 year warranty that is valid *only* if you use the appropriate inlet screen.

There are two types of inlet screens: One that you thread onto the pump inlet for 1100 series pumps, and one that you secure with set screws for 1200 and 1300 series pumps. The correct screen for each pump is usually included with the other components for the well - the box label tells you where to find the screen. The following sections describe how to install the two types of inlet screens.

### Screens For 1100 Series Pumps

To install a screen on an 1100 series pump, follow these steps:

1. Still wearing the latex gloves, open the plastic wrapping, then remove the screen.
2. Thread the screen onto the male-threaded pump inlet, making sure the screen is firmly tight.

### Screens For 1200 and 1300 Series Pumps

To install a screen on an 1200 & 1300 series pump, follow these steps:

1. Still wearing the latex gloves, open the plastic wrapping, then remove from the bag both the screen and the small plastic bag that contains spare set screws and a small Allen wrench.
2. Find the groove around the inlet end of the stainless steel pump body (the end opposite the air and water connectors), then slide the screen onto the bottom of the pump assembly, aligning the top rim of the screen with the top groove.

**Note:** If you have difficulty installing the screen, use the Allen wrench to loosen the set screws a little.

3. Using the Allen wrench, lightly tighten each of the set screws, then make sure the screws have engaged the groove.
4. Using the Allen wrench, firmly tighten each of the set screws.
5. Check to make sure the screen is secure.

## Installing The Sampling Pump

**Caution:** Make sure that you don't bring the tubing or other pump components in contact with the ground or any other surface. It's often helpful to spread out a polypropylene tarp next to the well during installation.

1. Still wearing the latex gloves, if you have a protected well cap, mark any necessary information - such as well ID and depth - on the label inside the well cap.
2. Slowly lower the pump into the well while uncoiling the tubing bundle, until the entire length of tubing is in the well. Be sure to control the rate of descent. Do not let the tubing free fall into the well.
3. An optional support cable is available for the ST1102 and ST1102M pumps, and for all deep well applications on all sampling pump models.

### Attaching Tubing to the Well Cap

To attach tubing to the well cap, follow the instructions included with the shipment for the appropriate well cap.

## Installing A Pump With Bulk Tubing

This section is for you if you ordered your Well Wizard® components and tubing unassembled, The following sections tell you how to assemble the components and tubing.

### Getting Ready

It's important to not contaminate pump components. Doing so can degrade the quality of the samples obtained using your Well Wizard system. Always wear latex gloves when unpacking and installing Well Wizard components, and any other time when your hands might touch a water-contacting component.

### Install the Inlet Screen

Well Wizard bladder pumps have a 10 year warranty that is valid *only* if you use the appropriate inlet screen.

There are two types of inlet screen: One that you thread onto the pump inlet for 1100 series pumps, and one that you secure with set screws for 1200 and 1300 series pumps. The correct screen for each pump is usually included with the other components for the well - the box label tells you where to find the screen. The following sections describe how to install the two types of inlet screens.

#### Screens For 1100 Series Pumps

To install a screen on an 1100 series pump, follow these steps:

1. Still wearing the latex gloves, open the plastic wrapping, then remove the screen.
2. Thread the screen onto the male-threaded pump inlet, making sure the screen is firmly tight.

#### Screens For 1200 and 1300 Series Pumps

To install a screen on an 1200 & 1300 series pump, follow these steps:

1. Still wearing the latex gloves, open the plastic wrapping, then remove from the bag both the screen and the small plastic bag that contains spare set screws and a small Allen wrench.
2. Find the groove around the inlet end of the stainless steel pump body (the end opposite the air and water connectors), then slide the screen onto the bottom of the pump assembly, aligning the top rim of the screen with the top groove.

## Installing A Pump With Bulk Tubing

**Note:** If you have difficulty installing the screen, use the Allen wrench to loosen the set screws a little.

3. Using the Allen wrench, *lightly* tighten each of the set screws, then make sure the screws have engaged the groove.
4. Using the Allen wrench, *firmly* tighten each of the set screws.
5. Check to make sure the screen is secure.

### Connect the Pump to the Tubing

To connect the pump to the tubing, follow these steps:

1. Separate the discharge (larger) tubing from the air-supply (smaller) tube for 8-12 inches from one end.
2. Loosen the nut-and-ferrule assembly as much as possible without actually removing the nut.
3. Push the air-supply tube into the matching fitting on the top end of the pump.
4. Tighten the nut.
5. Cut off a short length from the end of the discharge tubing to compensate for the offset height of the discharge tube fitting.

**Note:** This is usually 3 to 4 inches. You determine the exact length by checking both fitting nuts for full tube insertion after loose assembly.

6. Make sure that the tube-to-pump fit is correct before proceeding.
7. If the discharge tubing is 3/8" O.D. or larger, or if it has a Teflon lining, you must use a tubing insert, just push the insert into the tubing before inserting the tubing into the tubing fitting.
8. Tighten both fitting nuts finger tight.
9. For each fitting nut, hold the fitting base with *one* wrench and the fitting nut with *another* wrench, then tighten the fitting nut one additional turn.

### Cut Tubing to Length

To cut the tubing to the correct lengths, follow these steps:

1. Lower the pump into the well until the pump touches the bottom of the well.
2. Raise the pump up, as follows:
  - 1 foot, for low recovery wells
  - To the middle of the screen, for high recovery wells

### Attaching Tubing to the Well Cap

To attach tubing to the well cap, follow the instructions included with the shipment for the appropriate well cap.

## Bladder Pump Operation In Low-Submergence

### Bladder Pump Operation in Low-Submergence Applications

Pump submergence is defined as the height of the static water column above the top of the pump. In wells in which this water column height is 5 feet or less, the pump is considered to be in a low-submergence application.

QED sampling bladder pumps fill by hydrostatic pressure. As the inside of the pump's bladder fills with water, the bladder expands. This filling and expanding of the bladder is referred to as the "refill" half of the pump cycle. When air pressure is applied to the outside of the bladder, the bladder is squeezed, forcing the water up the discharge tubing. This is referred to as the "discharge" half of the pump cycle. In low-submergence applications, there is less water pressure available to expand the bladder during the refill.

This can result in a smaller volume of water being pumped with each pump cycle because the bladder may not fully expand.

As a result of the lower volume per cycle, more time will be required to bring the water to the surface. An easy way to verify that the pump is working, prior to the water reaching the surface, is to submerge the pump's discharge tubing in a beaker of water. Each time the pump goes into discharge, air in the discharge tubing, which is displaced as the water level in the tubing rises, can be seen as air bubbles coming from the end of the tubing. To optimize the pumping rate, the refill time should be set long enough to achieve the maximum volume of air bubbles on each pump cycle, and the discharge time should be set long enough to ensure that the air has stopped bubbling out of the tube before the pump controller switches back into refill.

In low submergence wells, **it is critical that the air pressure driving the pump not be more than 10-15psi higher than the minimum requirement of 0.42psi per foot of pump depth.** Higher pressures than this can cause the bladder to be squeezed too tightly during discharge, a condition which can prevent the bladder from expanding during refill. To avoid this condition in deeper wells, it is suggested that the air pressure applied to the pump be gradually increased as the water level in the pump's discharge tubing rises. It is recommended that the air pressure be set at 15psi initially, and slowly increased in increments of 10psi as needed until the water reaches the surface. Submerging the end of the discharge tubing under water as described above will verify whether the air pressure is set high enough.



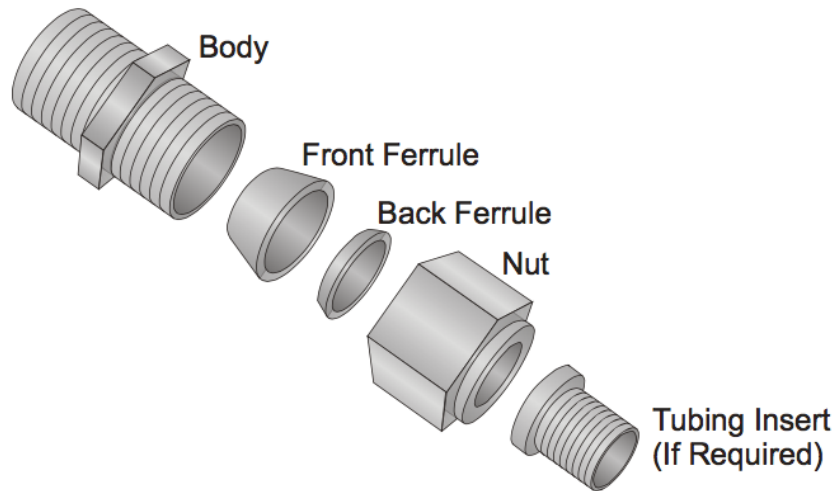
## Install or Replace Pump Connectors

The following sections describe how to install or replace the three types of connectors that may be included in your Well Wizard system.

### Stainless Steel Connectors

Swagelok™ tube fittings, which include four pieces (see figure 5), come to you completely assembled, finger tight.

**Figure 5**  
Parts of the Swagelok Tube Fitting



**Caution:** If you disassemble a connector before you use it, dirt or foreign material can get into the fitting and later cause a leak.

To install a stainless steel connector, follow these steps:

1. If you are working with a 1/2- or 3/4-inch connector, wrap the male threads under the nut with Teflon tape.
2. Insert the tubing into the Swagelok tube fitting as follows:
  - **For 1/4 -inch tubing**, insert it approximately 5/8 inch
  - **For 3/4 -inch tubing**, insert it up to 7/8 inch

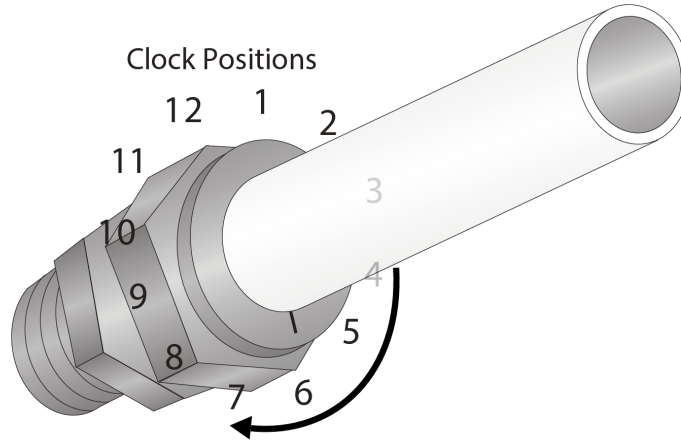
Make sure that the tubing firmly contacts the shoulder of the fitting and that the nut is finger tight.

**Note:** If the discharge tubing is 3/8 inch or larger, you must use a tubing insert, just push the stainless steel insert into the tubing before inserting the tubing into the tube fitting.

## Install or Replace Pump Connectors

- Referring to figure 6, scribe or mark the nut at the 6 o'clock position.

**Figure 6**



- While holding the fitting body steady with a backup wrench or vise, tighten the nut as follows, depending on the size of the tube fitting:
  - For fittings larger than 3/16 inch**, turn the fitting one and one quarter turns (watch the scribe mark make one complete turn, then continue to the 3 o'clock position).
  - For fittings sizes 1/6, 1/8, and 3/16 inch**, turn the fitting three quarters of a turn (watch the scribe mark turn to the 9 o'clock position).

**Note:** These are guidelines, you may need to further tighten the nut.

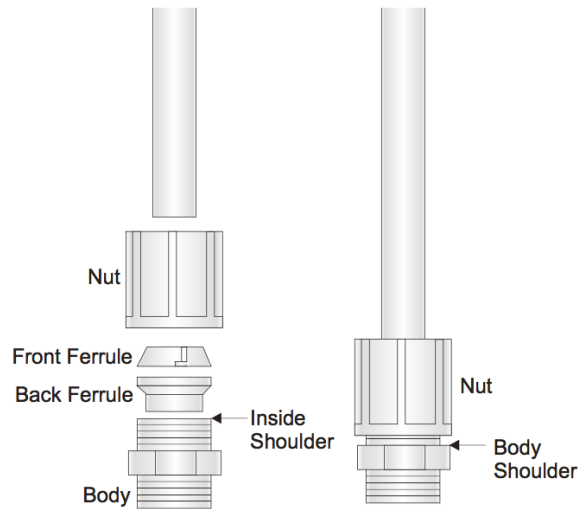
## Install or Replace Pump Connectors

### Polypropylene Connector

To install a polypropylene connector, follow these steps:

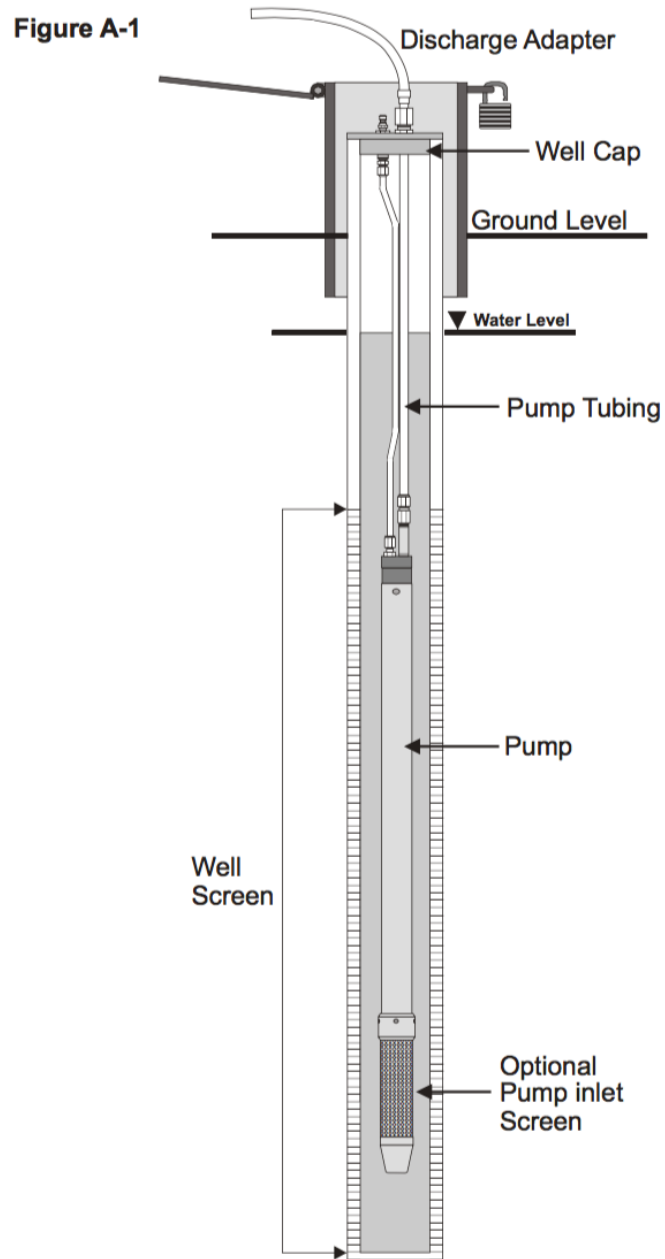
1. Cut the tubing cleanly and squarely to length.
2. If the tubing is larger than 1/2 inch, push an insert into the tube.
3. Push the tubing into the completely assembled connector until it contacts the shoulder inside the fitting (see figure 7).
4. Tighten the nut with a wrench, but be careful to not over tighten it; the nut should not come in contact with the shoulder of the body (see figure 7).

**Figure 7**



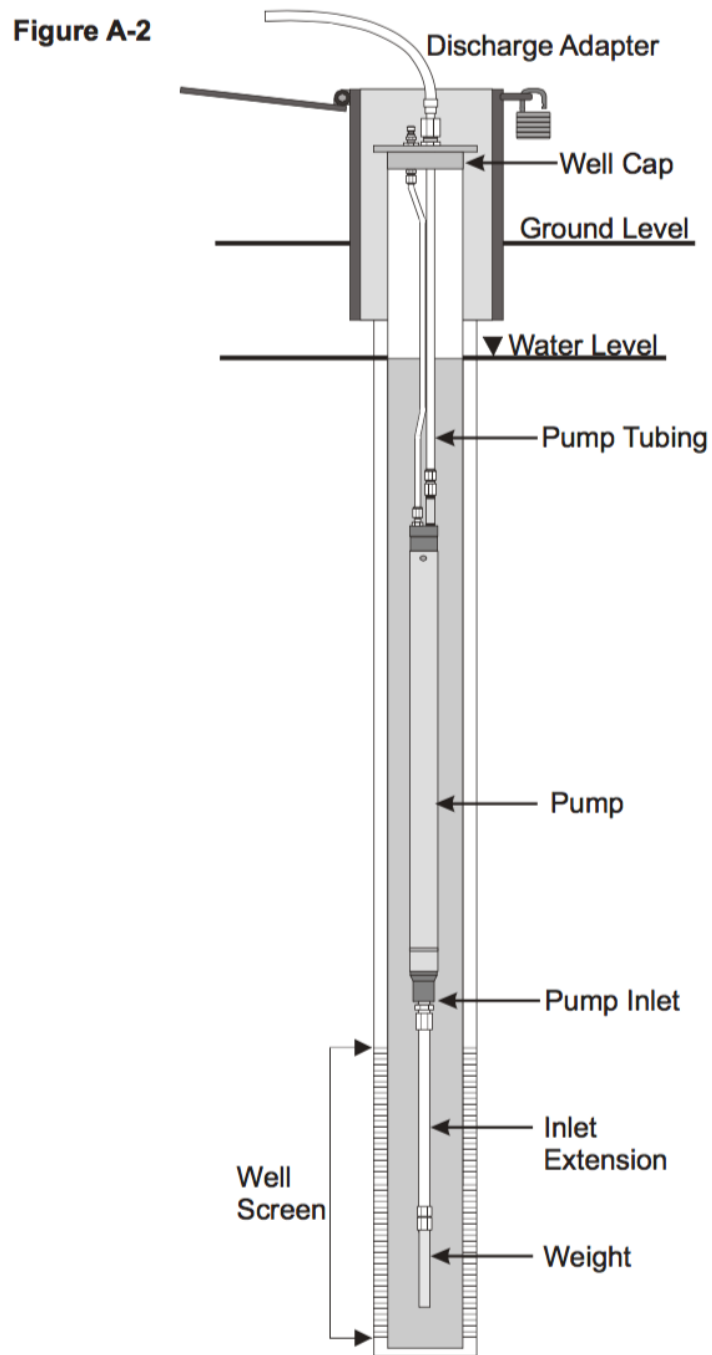
## Sampling System Type A

Figure A-1 shows the Type A sampling system, the basic bladder pump.

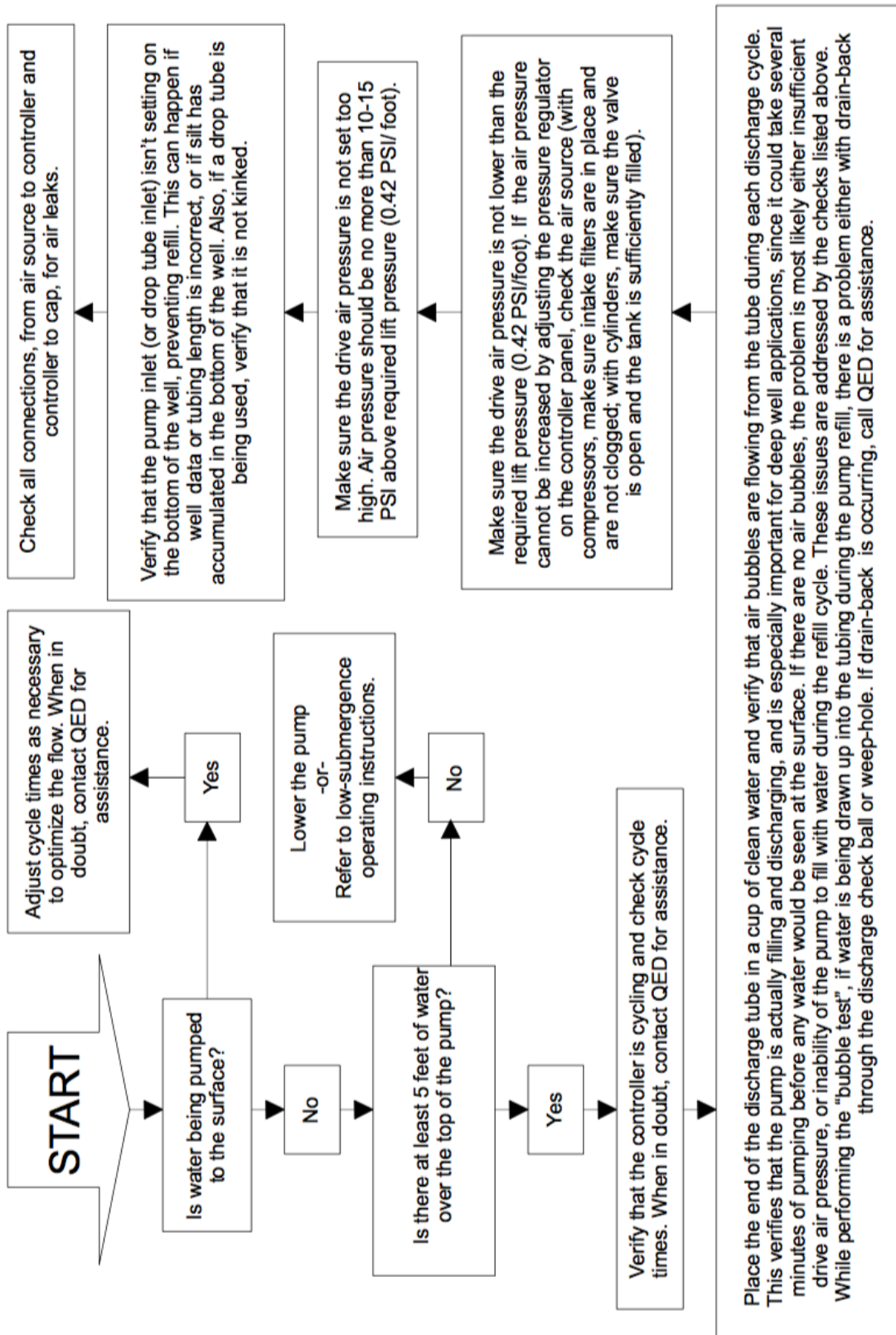


## Sampling System Type L

Figure A-2 shows the Type L sampling system, a bladder pump with an inlet extension.



# Sampling Pump Troubleshooting Guide



## Well Wizard® System Warranty

QED ENVIRONMENTAL SYSTEMS, INC. ("Q.E.D.") warrants to the original purchaser of its products that, subject to the limitations and conditions provided below, the products, materials and/or workman-ship shall reasonably conform to descriptions of the products and shall be free of defects in materials and workmanship. Any failure of the products to conform to this warranty will be remedied by Q.E.D. in the manner provided herein.

This warranty shall be limited to the duration and the conditions set forth below. All warranty durations are calculated from the original date of purchase.

1. *Dedicated-Use Systems Products*- 10 year warranty on dedicated bladder pumps equipped with Q.E.D. inlet screens, and purge pumps used in periodic, non continuous groundwater sampling (up to 52 sampling events per year.) All other components, equipment and accessories are warranted for one year.
2. *Portable-Use Systems*- Controllers and water level meters are warranted for one year. Hose reels, Pumps and Caps are warranted for ninety (90) days. Tubing and Purge Mizers are covered by a ninety (90) day material and work-manship warranty. There will be no warranty for application on tubing and Purge Mizers when used as part of a Portable System.
3. *Separately sold parts and Spare Parts Kits*- Separately sold parts and spare parts kits are warranted for ninety (90) days. Repairs performed by Q.E.D. are warranted for ninety (90) days from date of repair or for the full term of the original warranty, whichever is longer.

Buyers' exclusive remedy for breach of said warranty shall be as follows: if, and only if, Q.E.D. is notified in writing within applicable warranty period of the existence of any such defect in the said products, and Q.E.D. upon examination of any such defects, shall find the same to be within the term of and covered by the warranty running from Q.E.D. to Buyer, Q.E.D. will, at its option, as soon as reasonably possible, replace or repair any such product, without charge to Buyer. If Q.E.D. for any reason, cannot repair a product covered hereby within four (4) weeks after receipt of the original Purchaser's/Buyer's notification of a warranty claim, then Q.E.D.'s sole responsibility shall be, at its option, either to replace the defective product with a comparable new unit at no charge to the Buyer, or to refund the full purchase price. In no event shall such allegedly defective products be returned to Q.E.D. without its consent, and Q.E.D.'s obligations of repair, replacement or refund are conditioned upon the Buyer's return of the defective product to Q.E.D. **IN NO EVENT SHALL QED ENVIRONMENTAL SYTEMS BE LIABLE FOR CONSEQUENTIAL DAMAGES OR INCIDENTAL DAMAGES FOR BREACH OF SAID WARRANTY.**

The foregoing warranty does not apply to major sub-assemblies and other equipment, accessories and parts manufactured by others, and such other parts, accessories, and equipment are subject only to the warranties, if any, supplied by the respective manufacturers. Q.E.D. makes no warranty concerning products or accessories not manufactured by Q.E.D. In the event of failure of any such product accessory, Q.E.D. will give reasonable assistance to the Buyer in obtaining from the respective manufacturer whatever adjustment is reasonable in light of the manufacturer's own warranty.

**THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED, IMPLIED OR STATUTORY (INCLUDING BUT NOT LIMITED TO THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE), WHICH OTHER WARRANTIES ARE EXPRESSLY EXCLUDED HEREBY,** and of any other obligations or liabilities on the part of Q.E.D., neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with said products, materials and/or work-manship.

It is understood and agreed that Q.E.D. shall in no event be liable for incidental or consequential damages resulting from its breach of any of the terms of this agreement, nor for special damages, nor for improper selection of any product described or referred to for a particular application.

This warranty will be void in the event of unauthorized disassembly of component assemblies. Defects in any equipment that result from abuse, operation in any manner outside the recommended procedures, use and applications other than for intended use, or exposure to chemical or physical environment beyond the designated limits of materials and construction will also void this warranty. Q.E.D. shall be released from all obligations under all warranties if any product covered hereby is repaired or modified by persons other than Q.E.D.'s service personnel unless such repair by others is made with the written consent of Q.E.D.

If any product covered hereby is actually defective within the terms of this warranty, Purchaser must contact Q.E.D. for determination of warranty coverage. If the return of a component is determined to be necessary, Q.E.D. will authorize the return of the component, at owner's expense. If the product proves not to be defective within the terms of this warranty, then all costs and expenses in connection with the processing of the Purchaser's claim and all costs for repair, parts and labor as authorized by owner hereunder shall be borne by the purchaser.

### **RESPONSIBILITY OF THE PURCHASER**

The original Purchaser's sole responsibility in the instance of a warranty claim shall be to notify Q.E.D. of the defect, malfunction, or other manner in which the terms of this warranty are believed to be violated. You may secure performance of obligations hereunder by contacting the Customer Service Department of Q.E.D. and:

1. Identifying the product involved (by model or serial number or other sufficient description that will allow Q.E.D. to determine which product is defective).
2. Specifying where, when, and from whom the product was purchased.
3. Describing the nature of the defect or malfunction covered by this warranty.
4. Sending the malfunctioning component, after authorization by Q.E.D. to:

### **QED ENVIRONMENTAL SYSTEMS**

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