

# **PULSE PUMP**<sup>®</sup>

## **PNEUMATIC PUMPING SYSTEMS**

Patent No. 5147185

# **Installation and Operation Manual**

P/N 35750 3/5/15



## INTRODUCTION

# PULSE PUMP<sup>®</sup>

## PNEUMATIC PUMPING SYSTEMS

The Pulse Pump system from *QED Environmental Systems* can be used in many different applications and in various configurations. The simplest system would consist of a controller, well cap, tubing, exhaust valve, and pump. Many options are available, including floating layer inlets and on/off level control. Pumps are available in a wide range of sizes and materials.

Included in this manual are individual product sheets showing connector configurations, connection options (typically 1/4" and 1/8" NPT) and operation instructions. You will also find system configuration diagrams which show an overall view of how a typical Pulse Pump system interconnects.

## DANGER!

**When the Pulse Pump pneumatic pumping system is used, care should be taken to ensure the controller is located in a well ventilated area away from sources of an open flame, sparks and extreme heat.**

**As in all situations, failure to take adequate precautions may result in catastrophic injury or death.**

## AIR SYSTEM RECOMMENDATIONS

To insure reliable operation of your Pulse Pump system, your air supply needs to deliver clean, dry air to all system components. Local, experienced compressor suppliers can work with you to meet our suggested specifications.

Recommended Pressure (at the components):	100 P.S.I.
Maximum Pressure:	125 P.S.I.
Minimum Pressure:	60 P.S.I.
Air Flow Rate:	2.5 S.C.F.M. at 100 P.S.I.
Air Quality:	10 Micron filtration Less than 10 P.P.M. of oil Dew point 20 degrees Fahrenheit below minimum operating temperature, (especially for northern climate installations).

If you have any questions concerning your system or available options, please contact us at 1-800-624-2026 (in Michigan: (734) 995-2547).

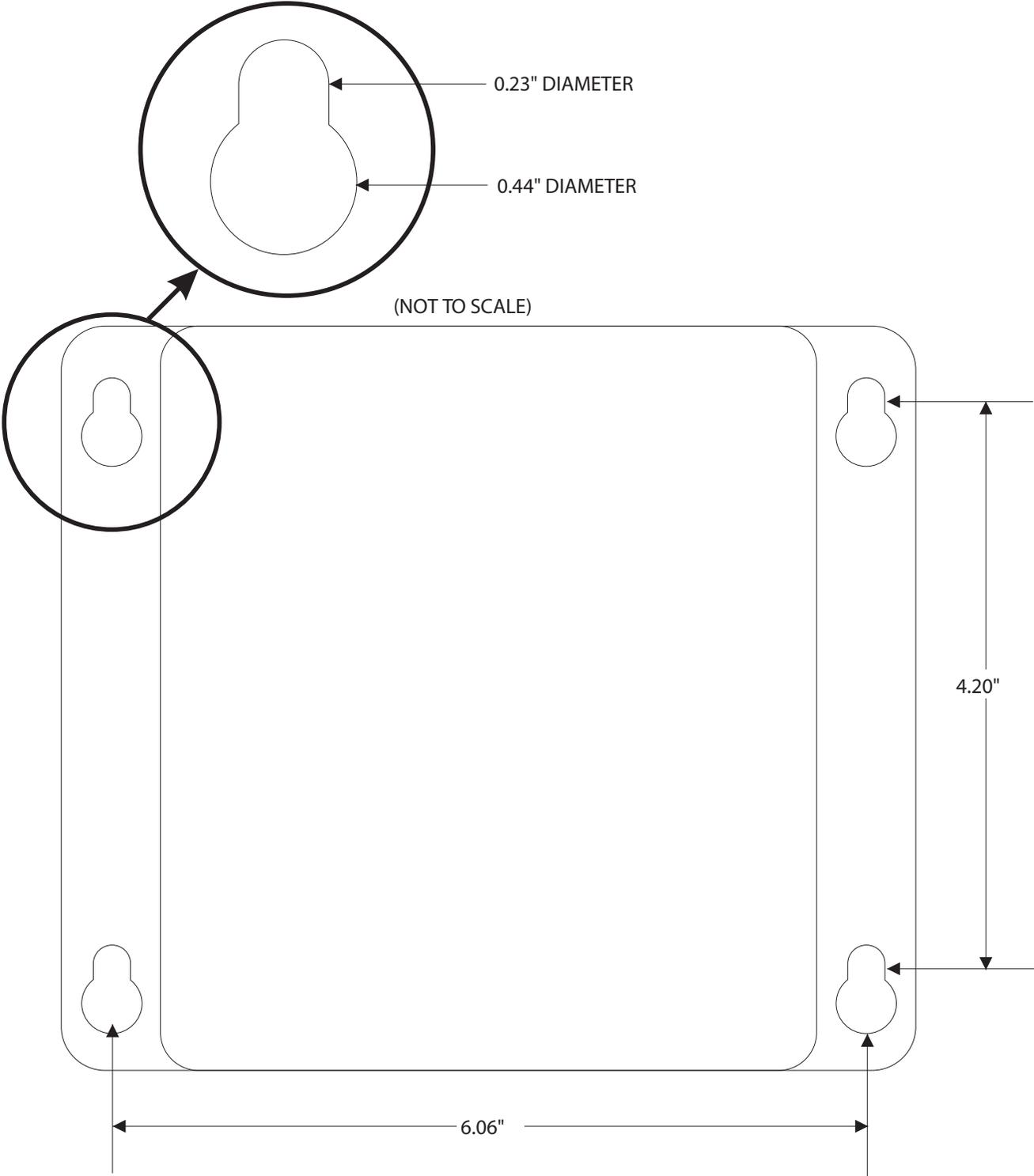
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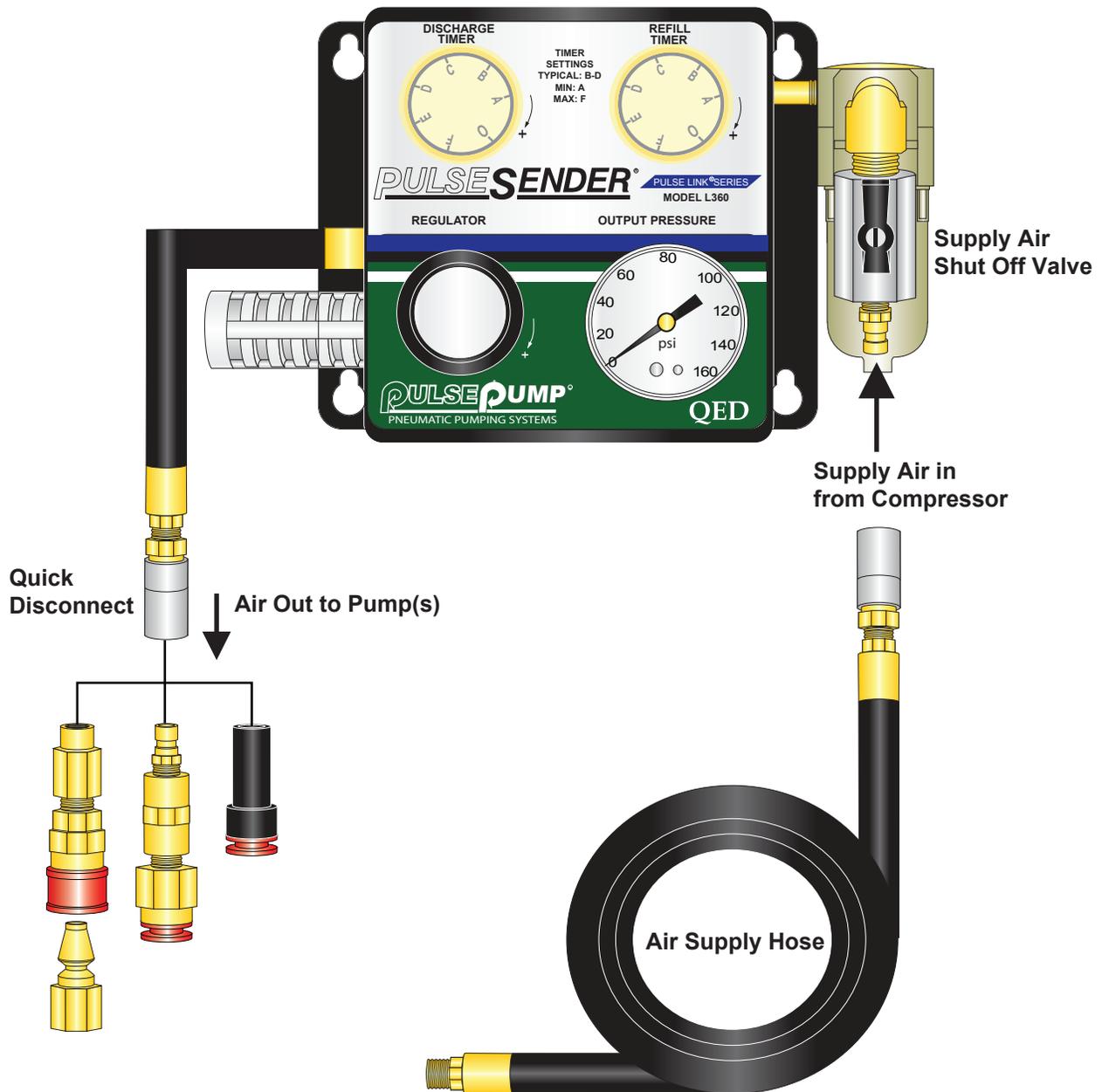
## PUMP INSTALLATION

1. Determine desired location of pump.  
To maximize product only pumping in thicker layers, position the floating layer inlet into the top 20-30% of the layer
2. Install any inlet options.  
Inlet screens, floating layer inlet adapters to the pump.
3. Install air supply and discharge tubing to pump fittings.  
Fittings are located at the top of the pump (see fitting diagrams on pages 18 & 19).
4. Install on/off level control tubing (if applicable).
  - A. The system will turn ON when this tubing is submerged approximately 6".
  - B. The system will turn OFF when this tubing is submerged approximately 3" or less.
  - C. Determine the desired location of the on/off control points.
  - D. If the level required is at the pump body, the tubing can be held in place, attached to the pump using the cable ties included with the pump.  
  
If the level control required is above the pump location, it is necessary to cable tie the tubing to the pump's tubing bundle or install a level probe/weight onto the end of the level control tubing.
  - E. If a bubbler tube extension (see page 26) is used to put the tubing into the floating layer inlet adapter, insert the tubing into the fitting of the extension and tighten. Insert the extension between the pump and the inlet. Cable tie the tubing to the top of the pump or the pump's tubing bundle to prevent accidental removal during installation.
5. Install the pump exhaust valve (4" diameter wells or larger)  
The exhaust valve is installed in the pump's air supply line. The valve should be located beneath the well cap in a position (typically 5-10 feet below the cap) where it will not become submerged at the highest anticipated liquid level of the well.
6. Install pump tubing to well cap fittings.
  - A. Fixed location caps- Pull discharge and on/off level control tubing (if applicable) through appropriate cap fittings, allowing enough tubing to reach the discharge piping / container and the on/off level controller (if applicable) tighten fittings securely onto tubings. Cut the air supply tubing and connect to fitting on the underside of well cap. (Additional tubing can be ordered and coupled on to reach longer distances.)
  - B. Adjustable caps- Pull all tubing through the appropriate well cap fittings, allowing enough tubing above the well cap to provide for future adjustments up or down if liquid levels rise or fall (tubing can be added to lower the pump further if needed). Insert air supply tubing into "roving" air fitting (included with cap) if necessary to make control connections.  
  
When adjusting the pump location in a floating layer application, the best inlet position can be found by leaving the pump running and monitoring the discharge. Adjust the pump until only the liquid level from the floating layer is discharged.
7. Install external exhaust valve (2" & 3" diameter wells only).  
Install onto air fitting on well cap.
8. Install / connect control modules.  
Refer to the individual module diagrams in this manual for assistance.

# L360/L370 MODULE MOUNTING DIAGRAM



## PULSE SENDER MODEL L360 CONNECTIONS



1. Mount in desired location.
2. Turn "SUPPLY AIR SHUT OFF VALVE" to the "OFF" (horizontal) position.
3. Connect compressed air source to " SUPPLY AIR IN" using the air supply hose.
4. Connect "AIR OUT TO PUMPS" using the appropriate connectors.
5. After all of the system's air supply and fluid discharge lines have been connected, turn the "SUPPLY AIR SHUT OFF VALVE" to the "ON" (vertical) position.
6. If using the L360 with a Ferret Pump, refer to the Ferret manual for recommended timer settings. If using the L360 with a QED "product only" bladder pump, refer to "Timer Settings for QED "Product Only" Bladder Pumps" on the following page. If using the L360 with any other type of QED pump, refer to "Table 1" and the "FLOW RATE OPTIMIZATION" instructions on the following pages.

# PULSE SENDER MODEL L360 OPERATION

## Timer Settings for QED “Product Only” Bladder Pumps

Set the pneumatic timers for 30 seconds “ON” and 1 minute “OFF”. For greater flow rates, decrease the “ON” time and the “OFF” time. Do not decrease the “ON” time below the necessary time to push the product out of the pump. In addition, do not decrease “OFF” time below the setting of the “ON” time.

Use the following table as an approximate guide for setting the pneumatic timers. The recovery rate will vary due to skimmer design, well depth and hose lengths.

Product Recovered		“ON” Time (Seconds)	“OFF” Time (Seconds)
Gallons Per Day	Liters Per Day		
15	57	7*	180
20	76	7	130
25	95	7	100
30	113	7	75
80	303	7	25
160	605	7	10

\* Minimum recommended “ON” time setting to empty the pump. If there is a great deal of air hose between the L360 and the pump, a longer “ON” time may be necessary.

Of course, the pump/skimmer cannot remove product faster than the soil will give it up. Most spills are recovered at less than 25 gallons per day.

## Timer Settings for other QED pumps

TABLE 1

Pump Model	Inlet Depth	2' submergence		5' submergence		10' submergence	
		Discharge	Refill	Discharge	Refill	Discharge	Refill
LP1001	10	2.0	0.8	2.0	0.6	1.9	0.4
	25	3.2	1.3	3.1	1.0	3.1	0.7
	50	7.5	2.1	7.4	1.6	7.3	1.3
	100	15.6	4.1	15.5	3.3	15.3	2.7
LP1301	10	1.3	1.7	1.3	1.2	1.3	0.9
LP1602	25	2.0	2.4	2.0	1.7	2.0	1.3
LP1610	50	4.3	3.5	4.3	2.6	4.3	2.1
LP1650	100	8.7	6.1	8.6	4.9	8.6	4.1
LP1401	10	1.1	2.6	1.1	1.7	1.1	1.2
	25	1.6	3.0	1.6	2.1	1.6	1.6
	50	3.7	3.9	3.7	2.9	3.7	2.3
	100	7.7	6.3	7.7	5.0	7.6	4.1
LP1702	10	3.6	3.3	3.6	2.1	3.6	1.5
LP1705	25	5.7	3.9	5.7	2.6	5.7	1.9
LP4600	50	14.8	5.0	14.8	3.5	14.7	2.7
LP4700	100	32.0	7.4	31.8	5.6	31.5	4.4

Inlet depths are in feet. Times are in seconds.

## FLOW RATE OPTIMIZATION

The purpose of optimizing flow rates is to create maximum flow rates and pump efficiency at the pump's operating conditions. To accomplish this, both the refill and discharge times on the pump controller must be optimized.

Pulse Pump refill and discharge cycle times can be adjusted to deliver the maximum possible flow rates from your system. Pumping conditions, such as the depth of the pump, the amount of submergence of the pump's inlet, or the recovery rate of the well, affect the performance of the pump. Adjustable cycle timers on the Pulse Pump controller let you tune your system to your site.

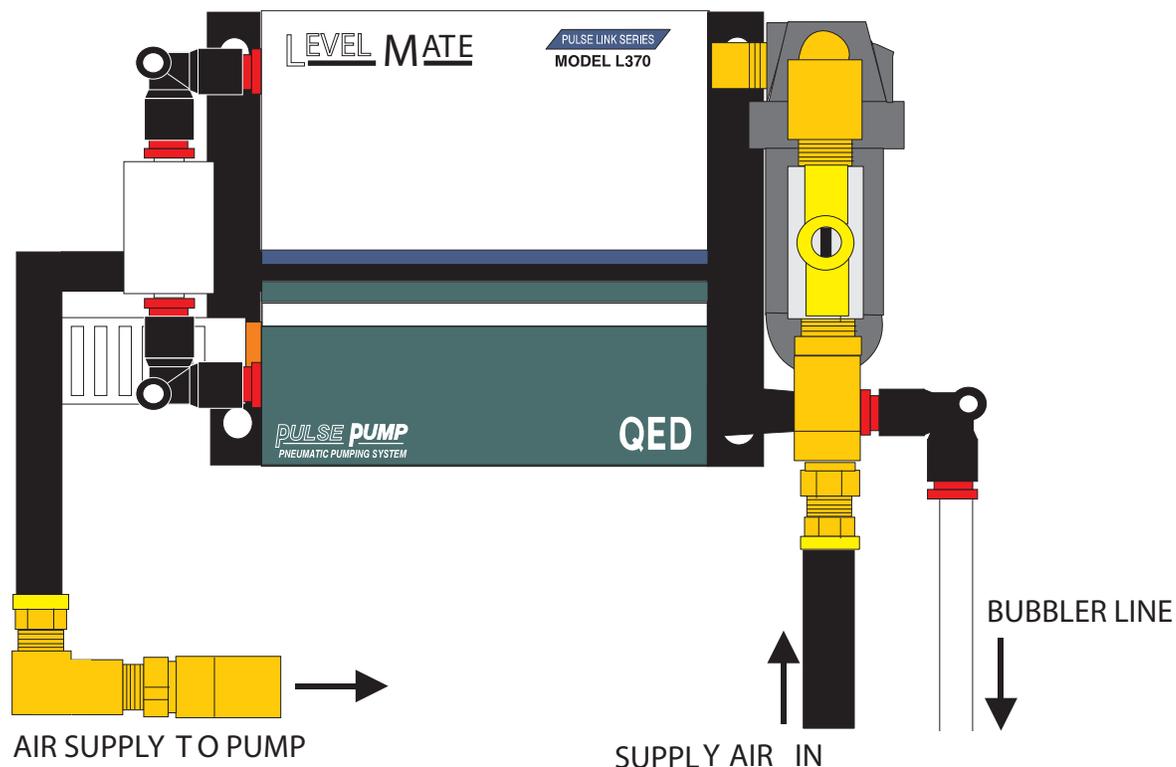
### To optimize your pump's flow rate follow the following steps:

1. Set the refill time on the controller at 15 seconds. Set the discharge time at 1 second if your well depth is under 50', set the discharge time at 3 seconds if your well depth is 51' to 100', for wells with a depth greater than 100' set the discharge timer at 5 seconds. With these settings, it should take 5-15 cycles to purge the air from the discharge line depending on the pump's depth. If liquid fails to discharge after 15 cycles, begin increasing the discharge time (as discussed in step #2 below). When liquid begins to flow from the discharge line, measure the amount of liquid being discharged per cycle. At this point the volume measured is probably less than the full internal volume of the well development pump which is 1.15 liters
2. Begin to increase the discharge time slightly in about 1/2 second increments allowing the pump to cycle 3-5 times between each adjustment. Repeat this operation until air can be detected coming up through the discharge line in the form of bubbles. The amount of liquid being discharged per cycle at this point should be close to the full internal volume of the pump (1.15 liters). If air and water begin to burst out of the discharge line, it means that the pump's discharge time is set too long. Decrease the discharge time and repeat the initial procedure with using smaller time increments (i.e. 1/4 sec. Vs. 1/2 sec.). The Discharge time of the pump should now be optimized.
3. Now begin to decrease the refill time slightly in about 1 second increments allowing the pump to cycle 3-5 times between each adjustment. Repeat this operation until air can be detected coming through the discharge line in the form of air bubbles. The amount of liquid being discharged per cycle at this point should still be close to the full internal volume of the pump (1.15 liters). If air and water begin to burst out of the discharge line hard it means that your refill time is too short. Increase the refill time and repeat the initial procedures this time with smaller time increments (i.e. 1/2 sec. Vs. 1 sec.). Both the discharge and refill times should now be optimized.

NOTE: The best of flow rates are obtained when the pump's submergence is 10' or more. Partial submergence of the well development pump will severely lower the pumps efficiency and flow rates.

Alpha Pump Model	Internal Volume Gallons	Internal Volume Liters
LP1001	0.17	0.65
LP1201	0.17	0.65
LP1301	0.09	0.35
LP1401	0.09	0.35
LP1501	0.01	.045
LP1602/LP1610	0.05	0.18
LP1702/LP1705	.528	2.00
LP1650	0.05	0.18
LP4600/LP4700	0.92	3.50
SL6000 Slider Pump	1.30	4.92

## LEVEL MATE L370 LEVEL CONTROLLER



### CONNECTION:

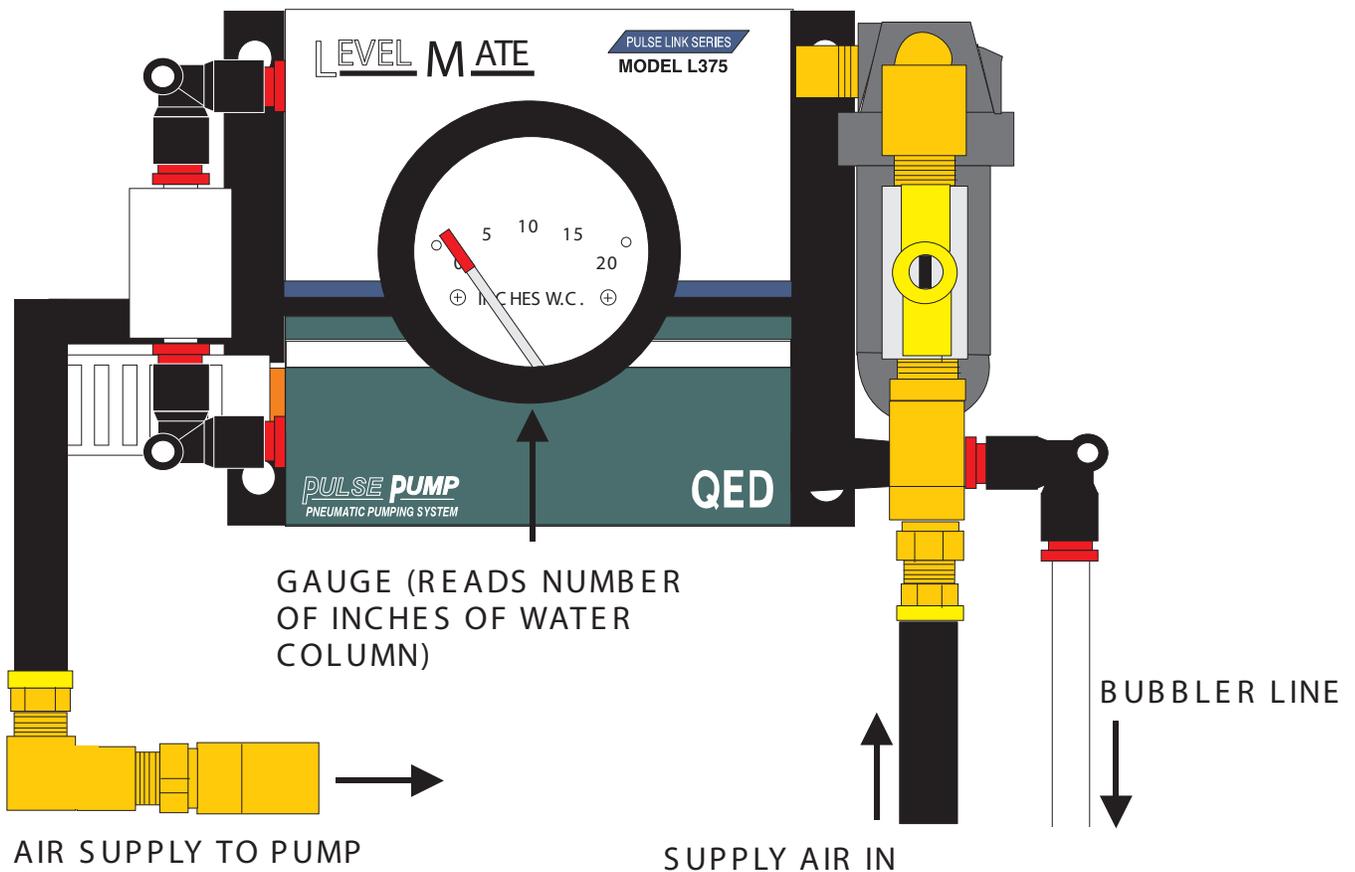
1. Mount L370 in a desired location near the L360 Pulse Sender module.
2. Turn "SUPPLY AIR SHUT OFF VALVE" to the "OFF" position (Handle perpendicular to valve body).
3. Connect compressed air source to "SUPPLY AIR IN" using connections (1/2" O.D. tubing, 1/4" N.P.T.) on 5' black hose.
4. Connect "SUPPLY AIR OUT" to "SUPPLY AIR IN" on L360 using quick disconnect on 15" black hose.
5. Connect 1/4" O.D. tubing to fitting labeled "BUBBLER TUBE" on L370. In order to make a leak-free seal, the tubing needs to be cut off straight and clean.

**NOTE:** The "BUBBLER LINE" is typically cable-tied to the pump (down well) at a predetermined location and then passed through a compression fitting at the well cap before being connected to the L370.

### OPERATION:

1. Turn "SUPPLY AIR SHUT OFF VALVE" to the "ON" position. (Make sure the rest of your system is fully connected before this, as the pump/controller may start discharging.)

## LEVEL MATE MODEL L375 LEVEL CONTROLLER



### Connection:

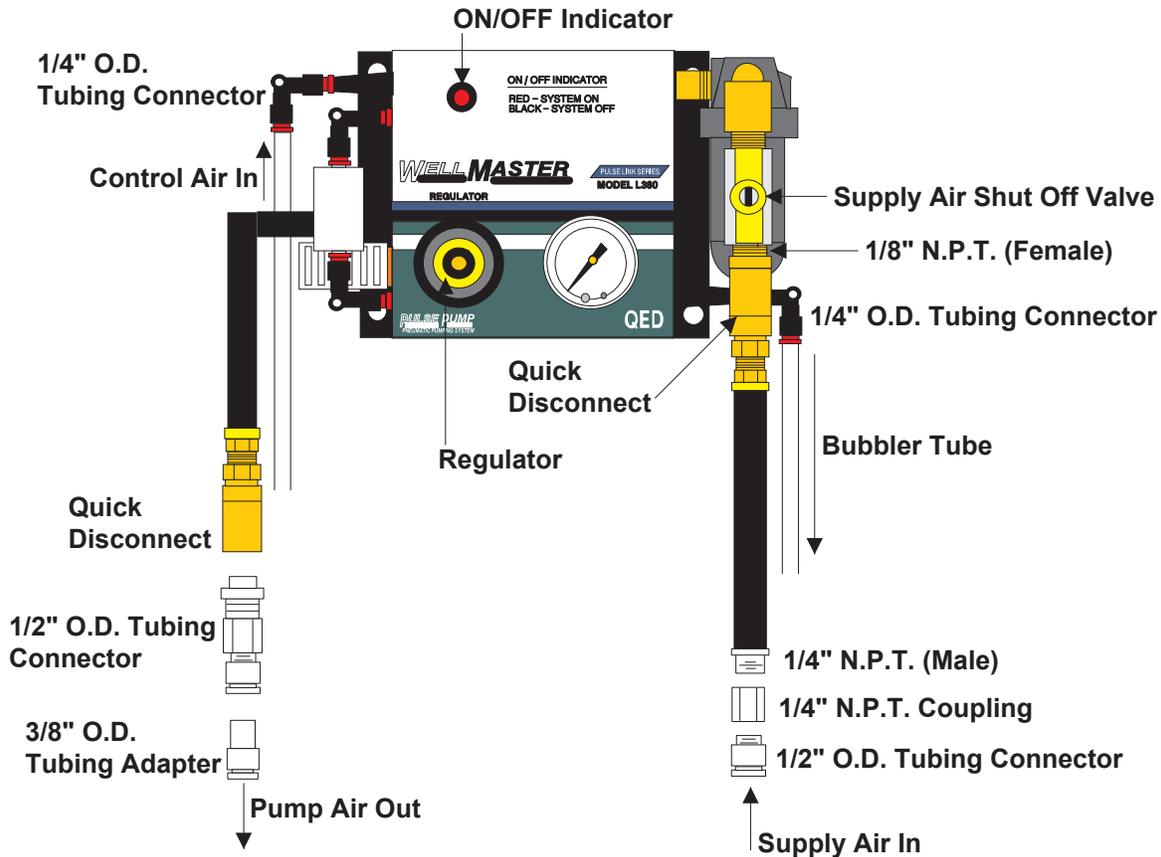
1. Mount L375 in a desired location near the L360 Pulse Sender module.
2. Turn "SUPPLY AIR SHUT OFF VALVE" to the "OFF" position (Handle perpendicular to valve body).
3. Connect compressed air source to "SUPPLY AIR IN" using connections (1/2" O.D. tubing, 1/4" N.P.T.) on 5' black hose.
4. Connect "SUPPLY AIR OUT" to "SUPPLY AIR IN" on L360 using quick disconnect on 15" black hose.
5. Connect 1/4" O.D. tubing to fitting labeled "BUBBLER TUBE" on L375. In order to make a leak-free seal, the tubing needs to be cut off straight and clean.

**NOTE:** The "BUBBLER LINE" is typically cable-tied to the pump (down well) at a predetermined location and then passed through a compression fitting at the well cap before being connected to the L375.

### Operation:

1. Turn "SUPPLY AIR SHUT OFF VALVE" to the "ON" position. (Make sure the rest of your system is fully connected before this, as the pump/controller may start discharging.)
2. On the L375 module, the gauge on the face will show inches of water column ("INCHES W.C.") above the downwell end of the 1/4" O.D. "BUBBLER TUBE".

# WELL MASTER MODEL L380 REMOTE LEVEL CONTROLLER



## Connection:

1. Mount L380 in a desired location.
2. Turn "SUPPLY AIR SHUT OFF VALVE" to the "OFF" position (Handle perpendicular to valve body).
3. Connect compressed air source to "SUPPLY AIR IN" using connections (1/2" O.D. tubing, 1/4" N.P.T.) on 5' black hose.
4. Connect "PUMP AIR OUT" to pump air tubing connector at/near cap using standard connector on 5' black hose. (1/2" O.D. and 3/8" O.D. tubing adapters are included to connect directly to the pump air tubing, if desired.)
5. Connect 1/4" O.D. tubing to fitting labeled "BUBBLER TUBE" on L380. In order to make a leak-free seal, the tubing needs to be cut off straight and clean.

NOTE: The "BUBBLER LINE" is typically cable-tied to the pump (down well) at a predetermined location and then passed through a compression fitting at the well cap before being connected to the L370/L375.

6. Connect 1/4" O.D. tubing from "CONTROL AIR OUT" on L358 (connected to the L360 Pulse Sender) to "CONTROL AIR IN" fitting on the L380.

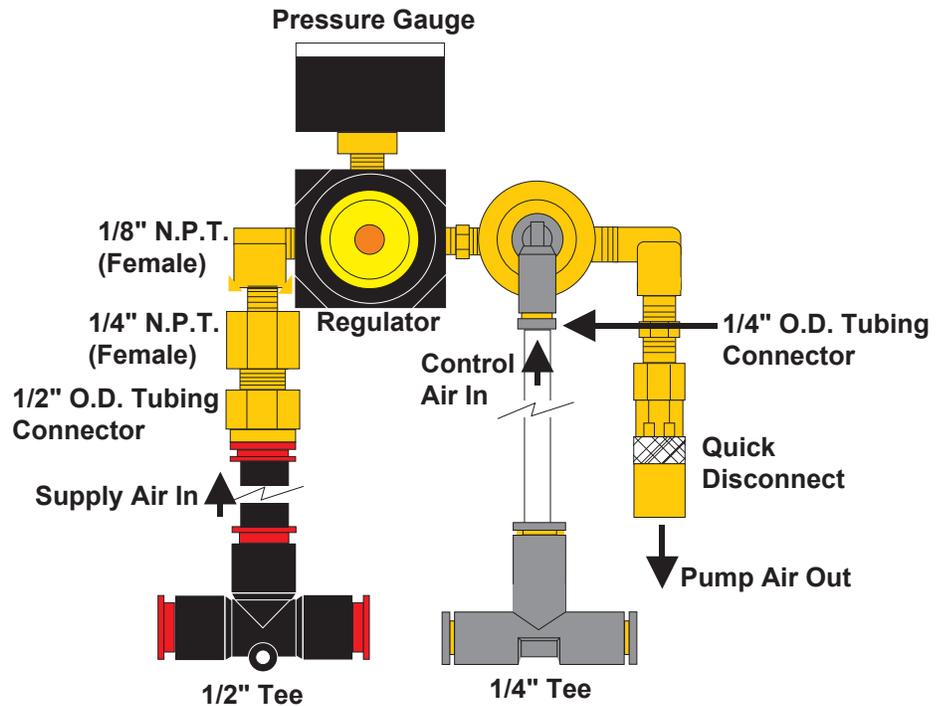
## Operation:

1. Turn "SUPPLY AIR SHUT OFF VALVE" to the "ON" position. (Make sure the rest of your system is fully connected before this, as the pump/controller may start discharging.)
2. Turn the L380 "REGULATOR" clockwise for maximum flow. (If a particular well has a low recovery rate or you desire a lower pumping rate, decrease air pressure by turning the "REGULATOR" counterclockwise.)
3. When the L380 is operating, the "ON/OFF INDICATOR" will be RED; when the L380 is off, the indicator will be BLACK.

# L600 REMOTE WELL OPERATOR

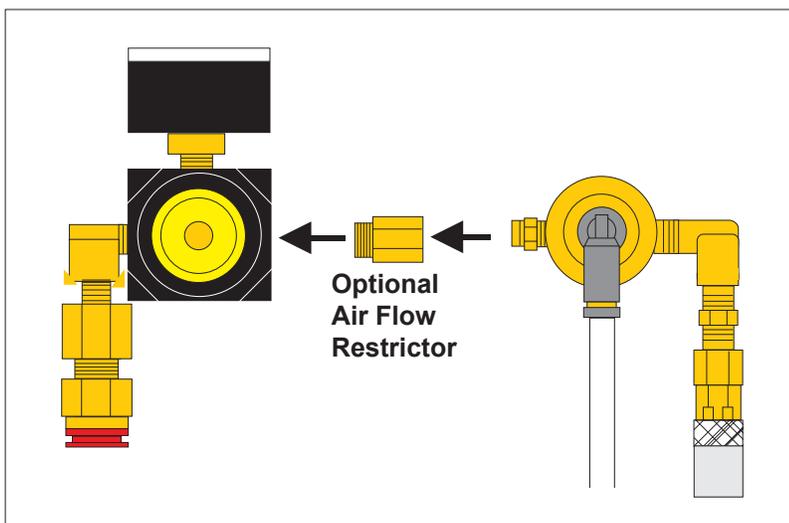
## Connection:

1. Connect "Pump Air Out" quick disconnect to mating fitting at well cap.
2. Connect compressed air supply to "Supply Air In" (1/2" O.D. tubing, 1/4" N.P.T.).
3. Connect 1/4" O.D. tubing from "Control Air Out" on L358 (connected to L360) to Control Air In" on L600.



## Operation:

1. Turn "Regulator" clockwise for maximum flow. (If a particular well has a low recovery rate or you desire a lower pumping rate, decrease pressure by turning "Regulator" counterclockwise).



**NOTE:** An optional air flow restrictor is included with the L600 to restrict the air flow through the pump, if necessary, in wells where pump rates are less than 1/2 G.P.M. or where the pump is submerged less than half the pump length.

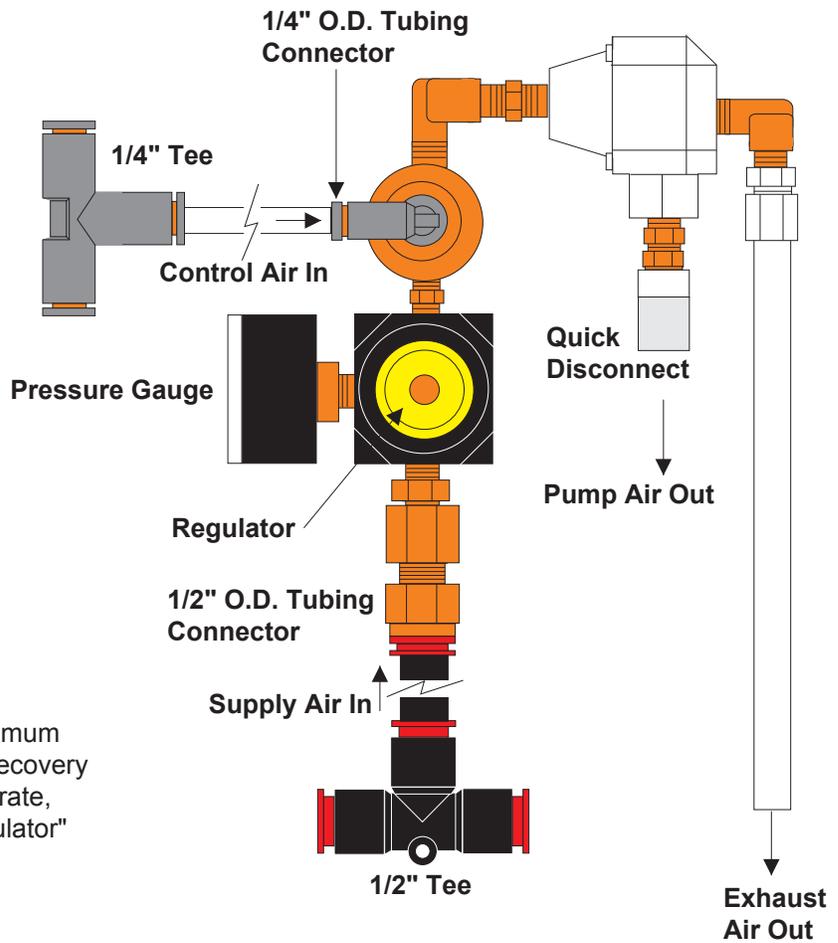
## MODEL L354 REMOTE WELL OPERATOR/EXHAUST VALVE

### Connection:

1. Connect "Pump Air Out" quick disconnect to mating fitting at well cap.
2. Connect compressed air supply to "Supply Air In" (1/2" O.D. tubing, 1/4" N.P.T.).
3. Connect 1/4" O.D. tubing from "Control Air Out" on L358 (connected to L360) to "Control Air In" on L354.
4. Position the "Exhaust Out" so it vents back down well.

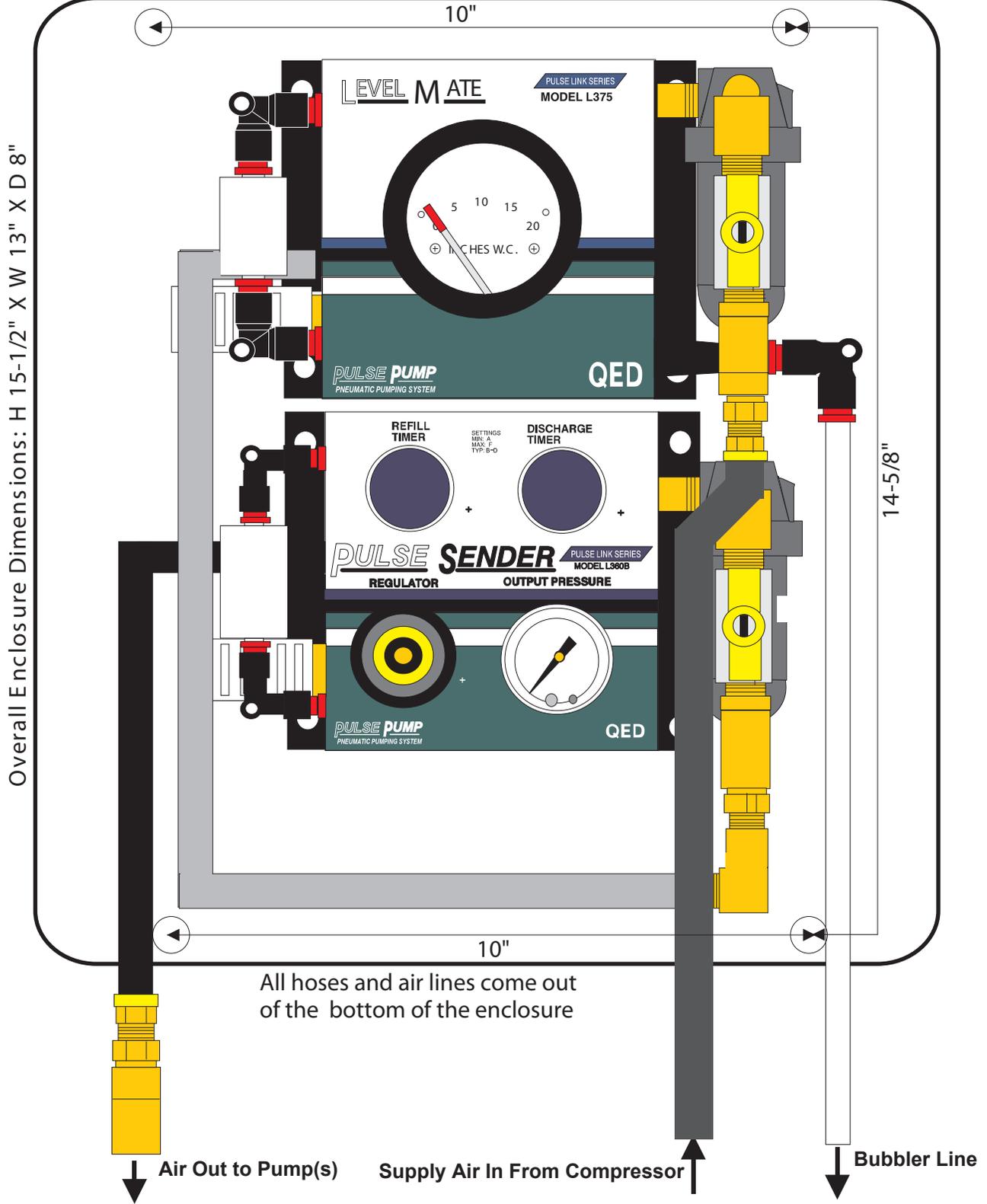
### Operation:

1. Turn "Regulator" clockwise for maximum flow. (If a particular well has a low recovery rate or you desire a lower pumping rate, decrease pressure by turning "Regulator" counterclockwise).



# MODEL 35694 WEATHER TIGHT MODULE ENCLOSURE

Back of enclosure is flat and has 1/4" mounting holes.

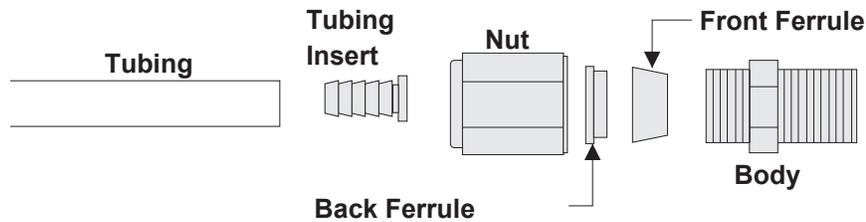


1. Assemble module(s) into enclosure.
2. Make necessary connections in accordance with the model of module you have. (Refer to individual product sheets or detailed connections instructions.)
3. Mount box in desired location.

# PUMP CONNECTORS

## Stainless Steel Compression Type Fittings

Stainless steel fittings come to you completely assembled, finger tight. They are ready for immediate use (**NOTE:** both male threads require Teflon tape). Disassembly before use can result in dirt or foreign matter getting into the fitting and cause leaks. Tubing inserts are to be used on ALL Teflon lined tubing and all other tubing over 1/2" I.D.



### Installation:

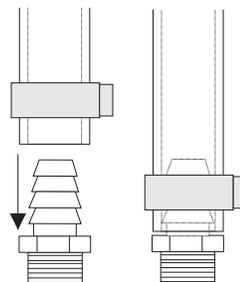


1. Insert tubing insert into I.D. of tubing (if required).
2. Insert tubing into fitting making sure that the tubing rests firmly on the shoulder of the fitting and that the nut is finger tight.
3. Tighten nut to secure tubing in fitting (approximately 1-1/4 turns).

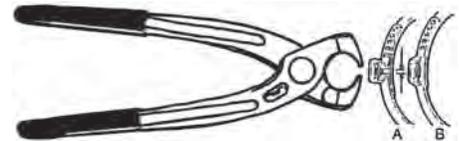
## Barb And Clamp Type Fittings

### Installation:

1. Cut tubing cleanly and squarely to length.
2. Slide Clamp onto tubing.
3. Push tubing fully onto barb fitting.
4. Position clamp directly over the barbs of the fitting and then using a clamp tool crimp clamp down onto tubing.
5. To remove clamp cut through the ear of the clamp with a pair of pincers.



Place clamp tool over the dimpled ear of the clamp and squeeze ear together

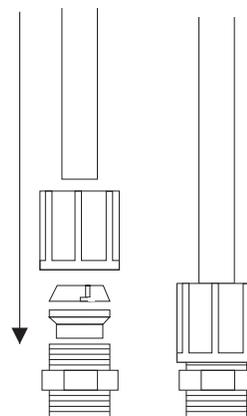


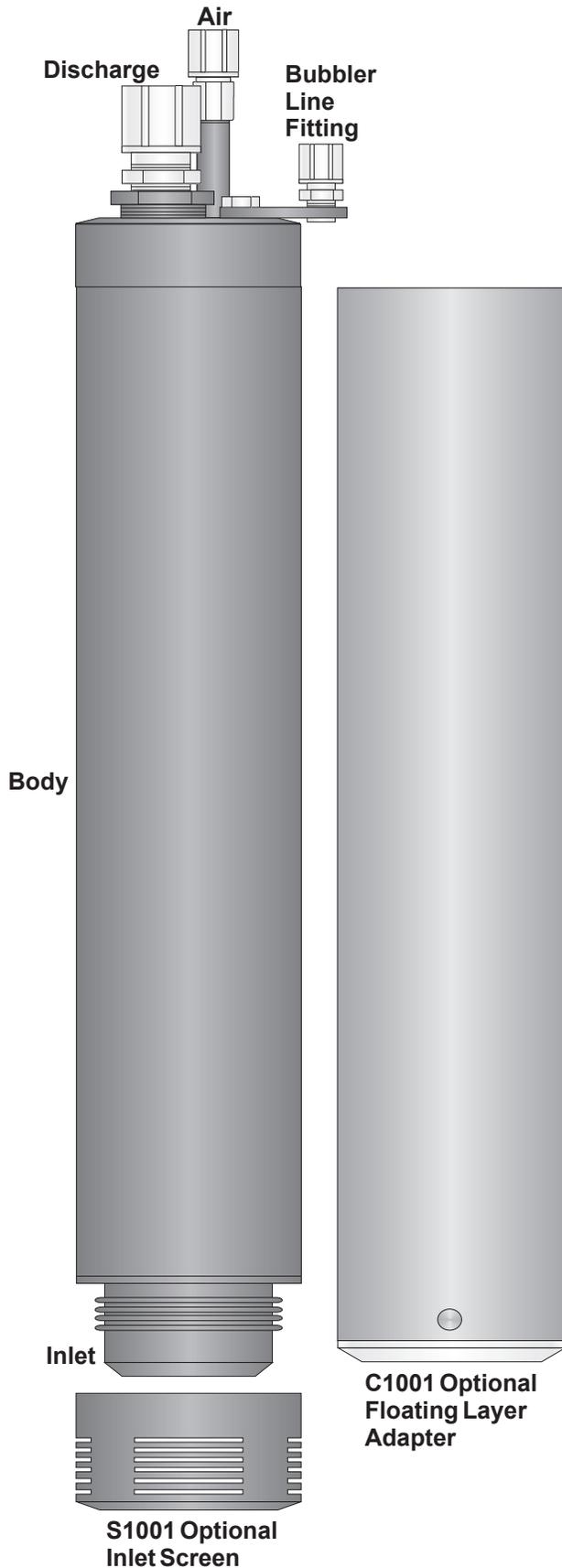
- A. Clamp in "CLOSED" position
- B. Clamp in "OPEN" position

## Polypropylene Compression Type Fittings

### Installation:

1. Cut tubing cleanly and squarely to length.
2. Push tubing fully into the completely assembled fitting, making sure that the tubing rests on the inner shoulder of the fitting.
3. Wrench tighten nut being careful not to over tighten (nut should not come in contact with shoulder of body).
4. If a tubing insert is used, place insert into the tubing I.D. After performing step 1 (above) then follow steps 2-3..





**Pump Type:** Positive Air Displacement

**Materials:** Body & Housings - PVC  
Check Balls - Teflon  
O-Rings - Viton

**Dimensions:**

**Pump O.D.:** 2.88" (7.3 cm)  
**Length:** 19" (48.2 cm)  
**Length w/Screen:** 19-1/4" (48.8 cm)  
**Weight:** 3 lbs. (1.3 kg)

**Fittings:**

Nylon Compression Type  
Air- 1/2" O.D. (12.77 mm)  
Discharge - 3/4" O.D. (19 mm)  
Bubbler Tube - 1/4" O.D. (6.3 mm)

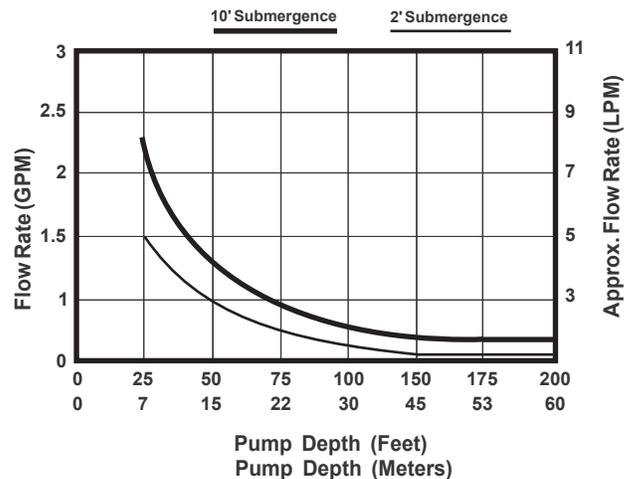
**Pump Volume:**

LITERS	MILILITERS	GALLONS	OUNCES
.55	550	.145	18.6

**Maximum Lift:** 200 Feet (60 m)

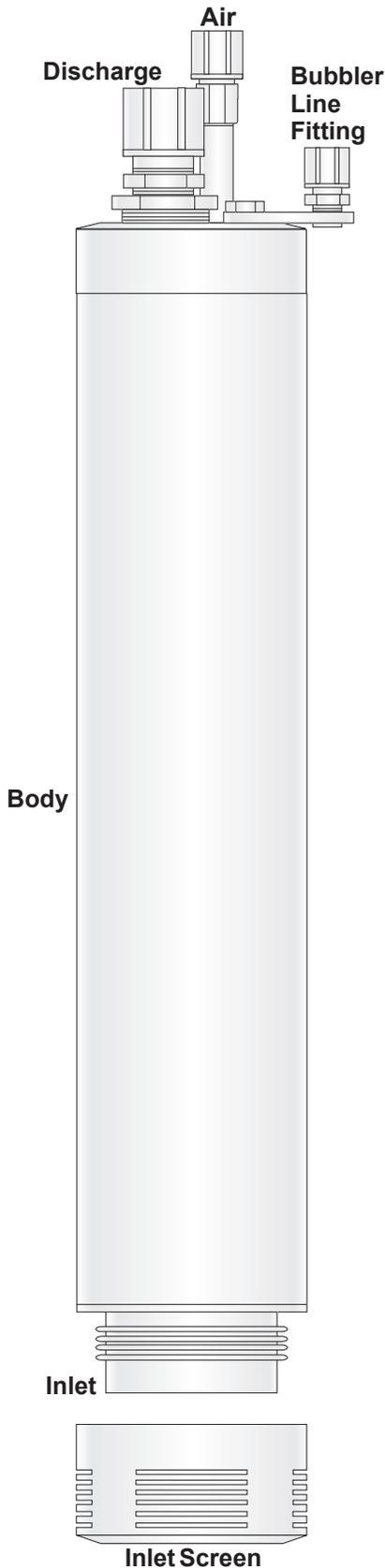
**PUMP FLOW RATES AT:**

PUMP FLOW RATES AT 100 P.S.I. (6.89 Bar):



**ACCESSORIES:**

P/N S1001 Inlet Screen  
P/N C1001 Floating Layer Adapter



**Pump Type:** Positive Air Displacement

**Materials:** Body & Housings - Teflon  
Check Balls - Teflon  
O-Rings - Viton

**Dimensions:**

**Pump O.D.:** 2.88" (7.3 cm)  
**Length:** 19" (48.2 cm)  
**Length w/Screen:** 19-1/4" (48.8 cm)  
**Weight:** 6 lbs. (2.7 kg)

**Fittings:**

Teflon Compression Type  
Air- 1/2" O.D. (12.77 mm)  
Discharge - 3/4" O.D. (19 mm)  
Bubbler Tube - 1/4" O.D. (6.3 mm)

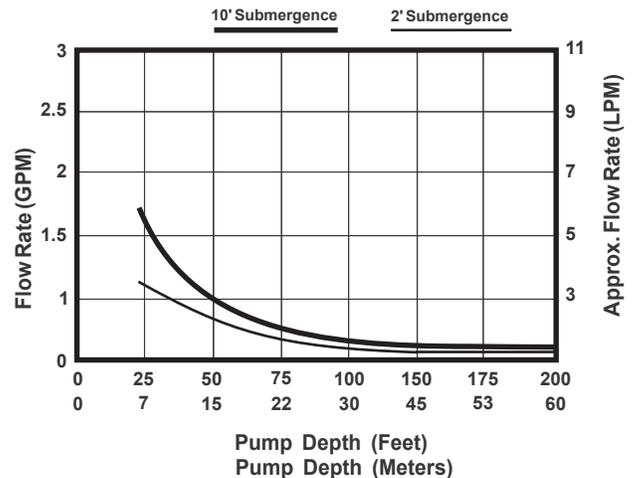
**Pump Volume:**

LITERS	MILILITERS	GALLONS	OUNCES
<b>.40</b>	<b>400</b>	<b>.105</b>	<b>13.5</b>

**Maximum Lift:** 200 Feet (60 m)

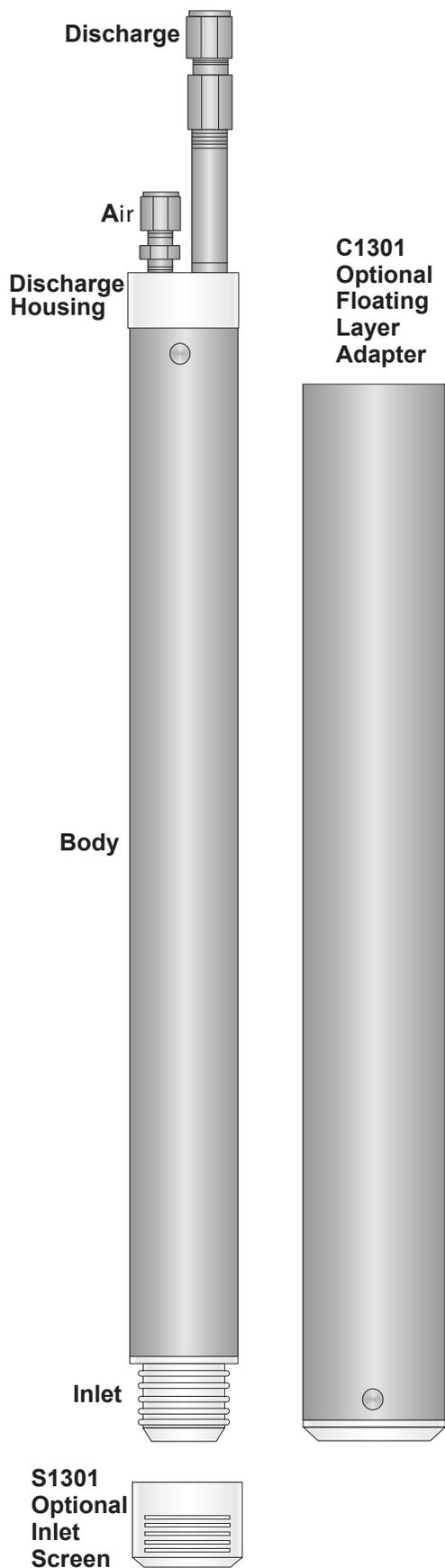
**PUMP FLOW RATES AT:**

PUMP FLOW RATES AT 100 P.S.I. (6.89 Bar):



**ACCESSORIES:**

P/N S1201 Inlet Screen



**Pump Type:** Positive Air Displacement

**Materials:** Body - 316 Stainless Steel  
Housings & Check Balls - Teflon  
O-Rings - Viton

**Dimensions:**  
Pump O.D.: 1.66" (4.2 cm)  
Length: 23" (58.4 cm)  
Length w/Screen: 24" (60.9 cm)  
Weight: 2 lbs. (.9 kg)  
Screen Mesh 50 (.010)

**Fittings:** Stainless Steel Compression Type  
Air- 3/8" O.D. (9.5 mm)  
Discharge - 1/2" O.D. (12.7 mm)

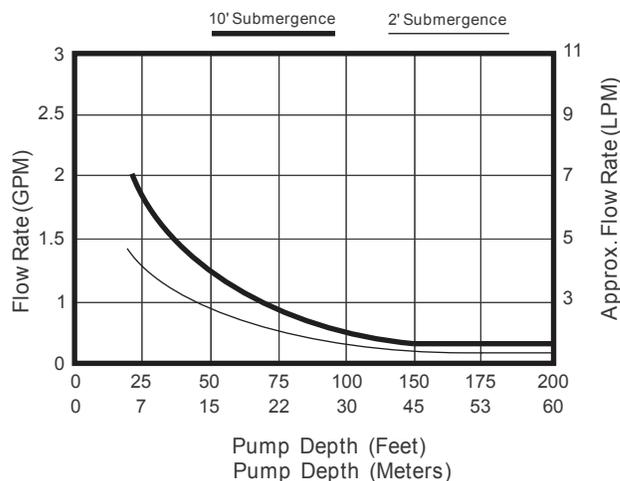
**Pump Volume:**

LITERS	MILILITERS	GALLONS	OUNCES
.35	350	.09	11.8

Maximum Lift: 200 Feet (60 m)

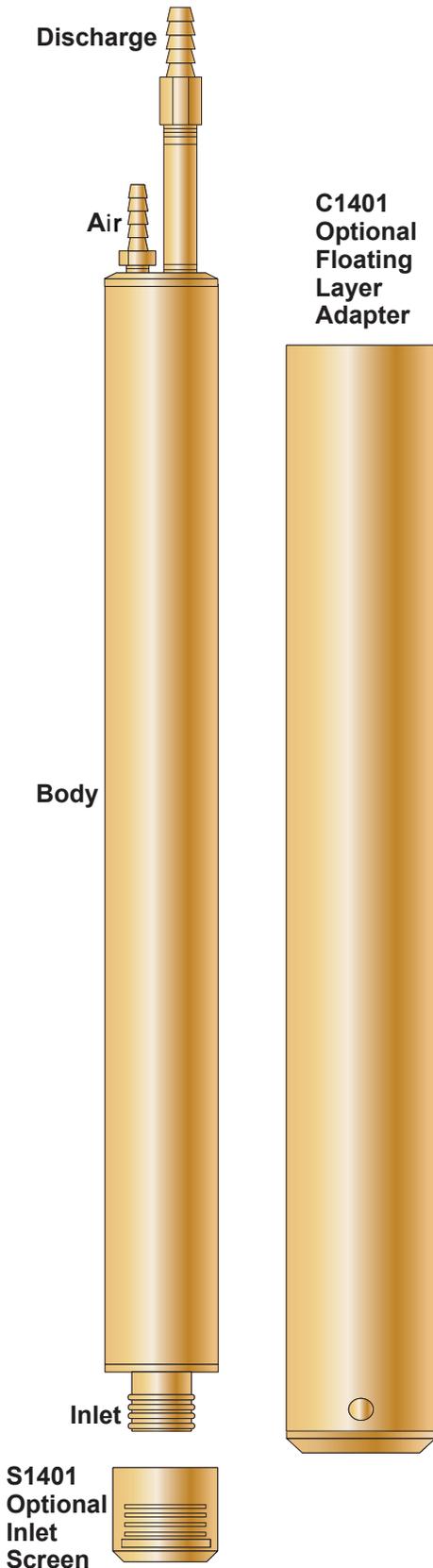
**PUMP FLOW RATES AT:**

PUMP FLOW RATES AT 100 P.S.I. (6.89 Bar):



**ACCESSORIES:**

- P/N S1001 Inlet Screen
- P/N C1301 Floating Layer Adapter
- P/N 35635 Stainless Steel Probe Extender



**Pump Type:** Positive Air Displacement

**Materials:** Body & Housings - Brass  
Check Balls - Teflon  
O-Rings - Viton

**Dimensions:**

Pump O.D.: 1.25" (3.1 cm)  
Length: 19-1/4" (48.8 cm)  
Length w/Screen: 20" (50.8 cm)  
Weight: 1.5 lbs. (.67 kg)

**Fittings:**

Brass Barb Type  
Air- 3/8" O.D. (9.5 mm)  
Discharge- 1/2" O.D. (12.7 mm)

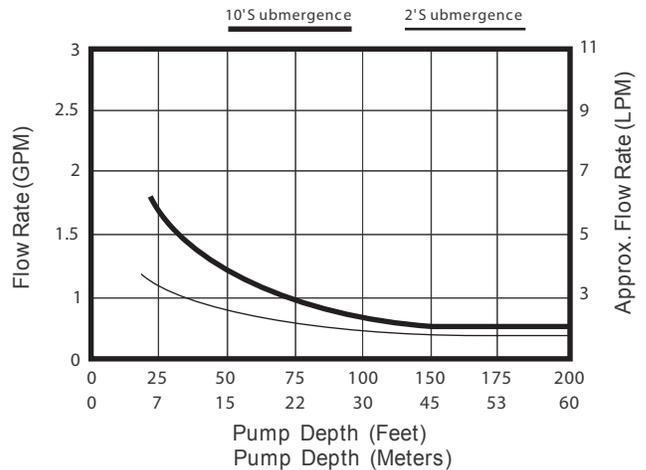
**Pump Volume:**

LITERS	MILILITERS	GALLONS	OUNCES
<b>.30</b>	<b>300</b>	<b>.07</b>	<b>10.1</b>

Maximum Lift: 200 Feet (60 m)

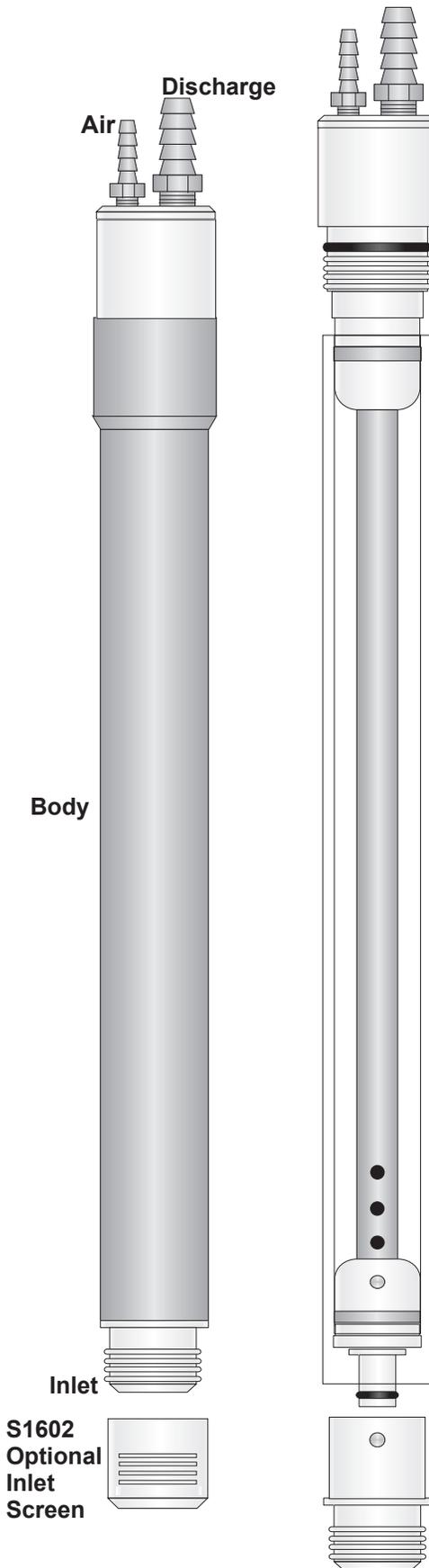
**PUMP FLOW RATES AT:**

PUMP FLOW RATES AT 100 P.S.I. (6.89 Bar):



**ACCESSORIES:**

- P/N S1401 Inlet Screen
- P/N C1401 Floating Layer Adapter
- P/N 35635S Stainless Steel Probe Extender



**Pump Type:** Positive Air Displacement  
Dual Sleeve Bladder Pump

**Materials:** Body - 316 Stainless Steel  
Bladder, Bladder Sleeve, &  
Check Balls - Teflon  
Housings - Teflon  
O-Rings - Viton

**Dimensions:**

**Pump O.D.:** 1.75" (4.4 cm)  
**Length:** 23.62" (59.9 cm)  
**Length w/Screen:** 24" (60.9 cm)  
**Weight:** 3.5 lbs. (1.58 kg)

**Fittings:**

Stainless Steel Barb Type  
Air- 3/8" O.D. (9.5 mm)  
Discharge - 1/2" O.D. (12.7 mm)

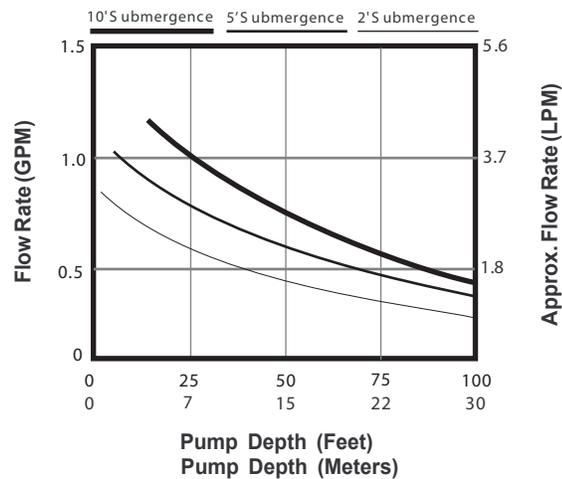
**Pump Volume:**

LITERS	MILLILITERS	GALLONS	OUNCES
.18	180	.047	6.01

**Maximum Lift:** 200 Feet (60 m)

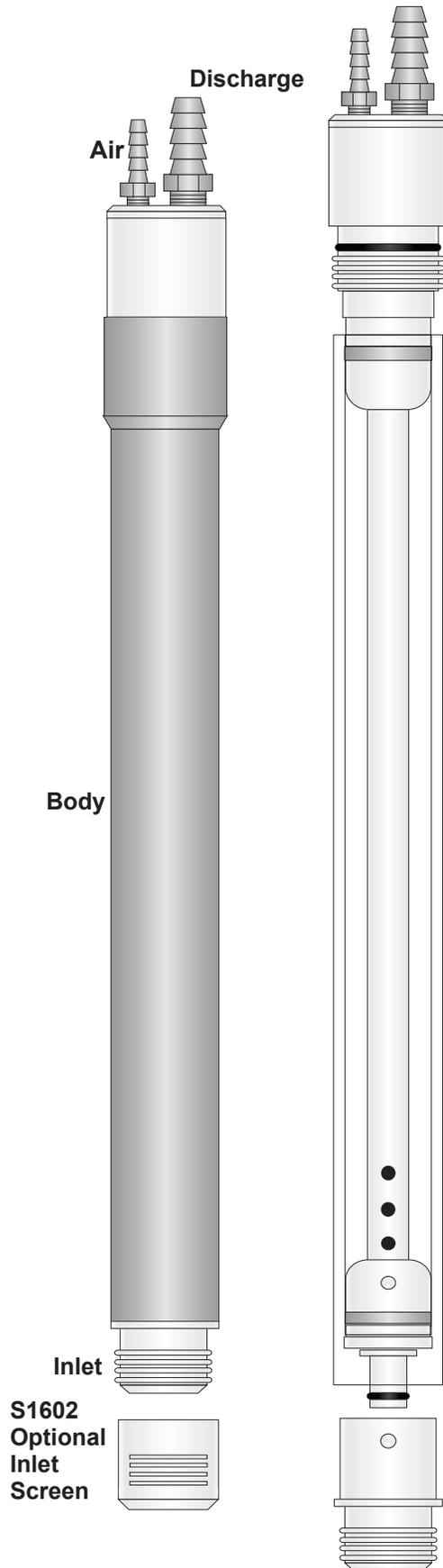
**PUMP FLOW RATES AT:**

PUMP FLOW RATES AT 100 P.S.I. (6.89 Bar):



**ACCESSORIES:**

- P/N S1602 Inlet Screen
- P/N C1602 Floating Layer Adapter
- P/N 35639 Stainless Steel Probe Extender



**Pump Type:** Positive Air Displacement  
Dual Sleeve Bladder Pump

**Materials:** Body - 316 Stainless Steel  
Bladder, Bladder Sleeve, &  
Check Balls - Teflon  
Housings - Teflon  
O-Rings - Viton

**Dimensions:**

**Pump O.D.:** 1.75" (4.4 cm)  
**Length:** 23.62" (59.9 cm)  
**Length w/Screen:** 24" (60.9 cm)  
**Weight:** 3.5 lbs. (1.58 kg)

**Fittings:**

Stainless Steel Barb Type  
Air- 3/8" O.D. (9.5 mm)  
Discharge - 1/2" O.D. (12.7 mm)

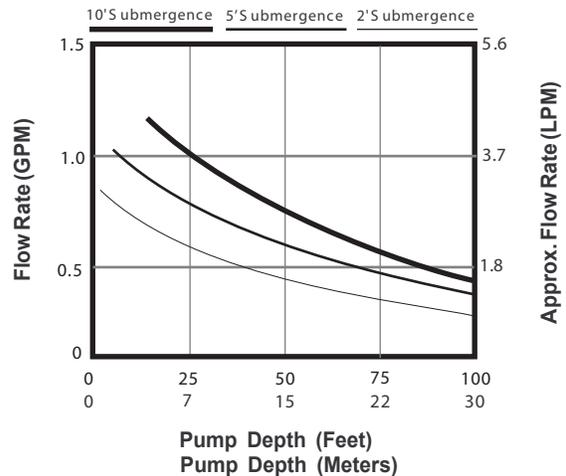
**Pump Volume:**

LITERS	MILLILITERS	GALLONS	OUNCES
.18	180	.047	6.01

**Maximum Lift:** 200 Feet (60 m)

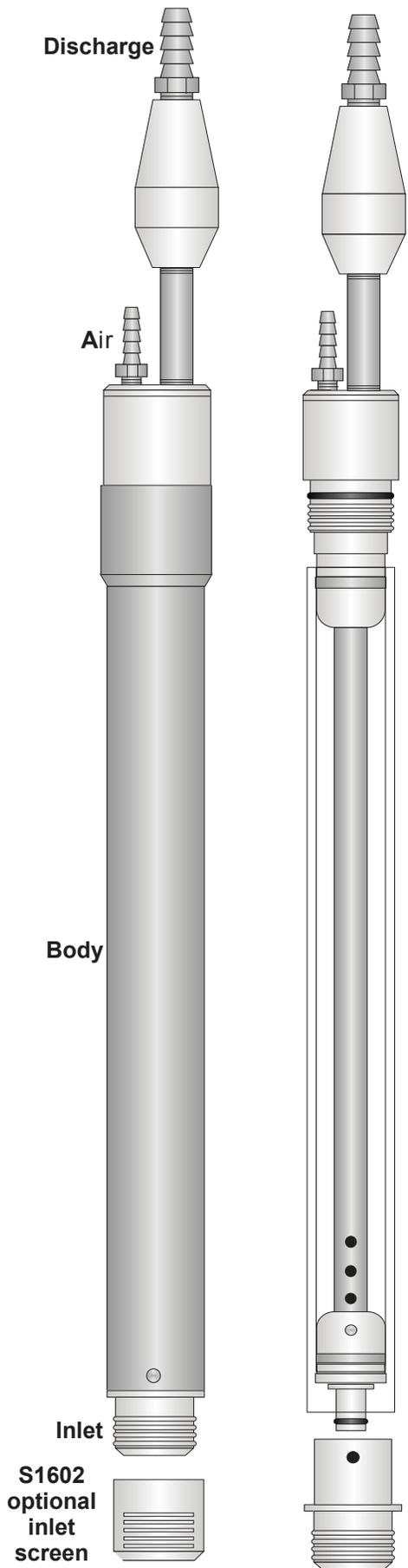
**PUMP FLOW RATES AT:**

PUMP FLOW RATES AT 100 P.S.I. (6.89 Bar):



**ACCESSORIES:**

- P/N S1602 Inlet Screen
- P/N C1602 Floating Layer Adapter
- P/N 35639 Stainless Steel Probe Extender



**Pump Type:** Positive Air Displacement  
Dual Sleeve Bladder Pump

**Materials:** Body - 316 Stainless Steel  
Bladder, Bladder Sleeve, &  
Check Balls - Teflon  
Housings - Teflon  
O-Rings - Viton

**Dimensions:** Pump O.D.: 1.75" (4.4 cm)  
Length: 27.5" (70 cm)  
Length w/Screen: 28.2" (72 cm)  
Weight: 13.9 lbs. (6.3 kg)

**Fittings:** Stainless Steel Barb Type  
Air-3/8" O.D. (9.5 mm)  
Discharge - 1/2" O.D. (12.7 mm)

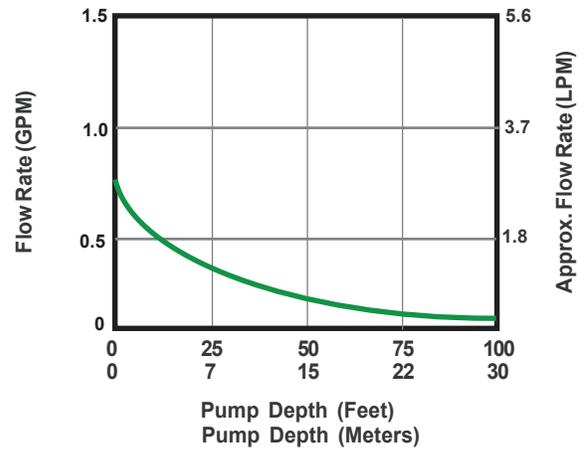
**Pump Volume:**

Liters	Milliliters	Gallons	Ounces
.19	190	.05	6.42

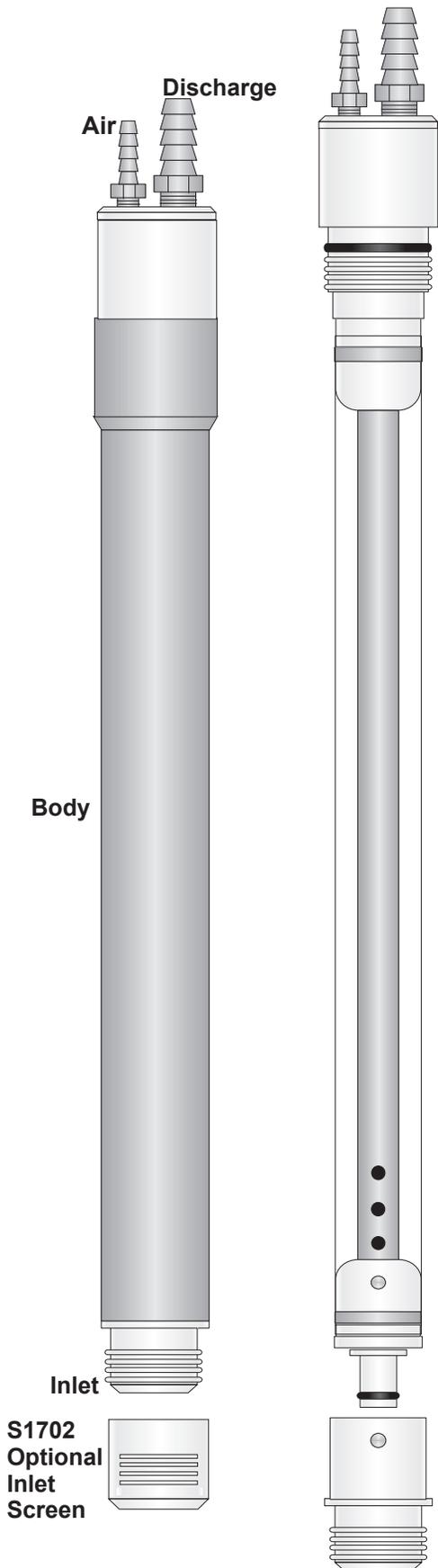
**Maximum Lift:** 200 Feet (60 m)

**Pump Flow Rates At:**

Pump Flow Rates At 100 P.S.I. (6.89 Bar):



**Accessories:** P/N **S1602** Inlet Screen  
P/N **C1602** Floating Layer Adapter  
P/N **35639** Stainless Steel Probe Extender



**Pump Type:** Positive Air Displacement

**Materials:** Body - 316 Stainless Steel  
Bladder - GeoLast  
Check Balls - Teflon  
Housings - Nylon  
O-Rings - Viton

**Dimensions:**

**Pump O.D.:** 3" (7.6 cm)  
**Length:** 40" (101.6 cm)  
**Length w/Screen:** 41" (104.1 cm)  
**Weight:** 11.5 lbs. (5.2 kg)

**Fittings:**

Stainless Steel Barb Type  
Air- 1/2" O.D. (12.7 mm)  
Discharge - 3/4" O.D. (19.0 mm)

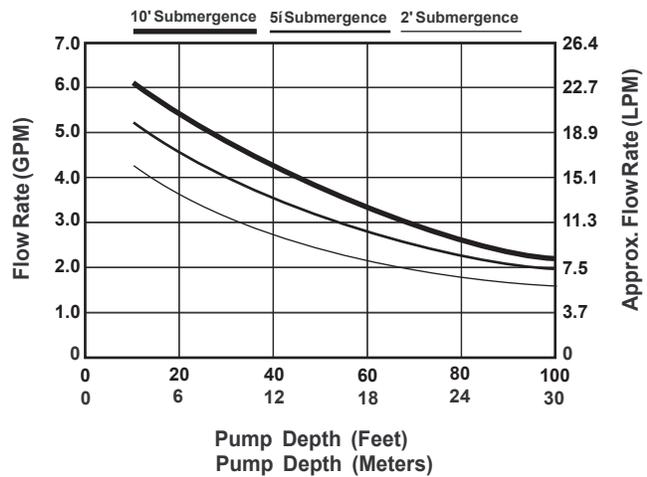
**Pump Volume:**

LITERS	MILLILITERS	GALLONS	OUNCES
<b>2</b>	<b>2000</b>	<b>.528</b>	<b>67.5</b>

**Maximum Lift:** 200 Feet (60 m)

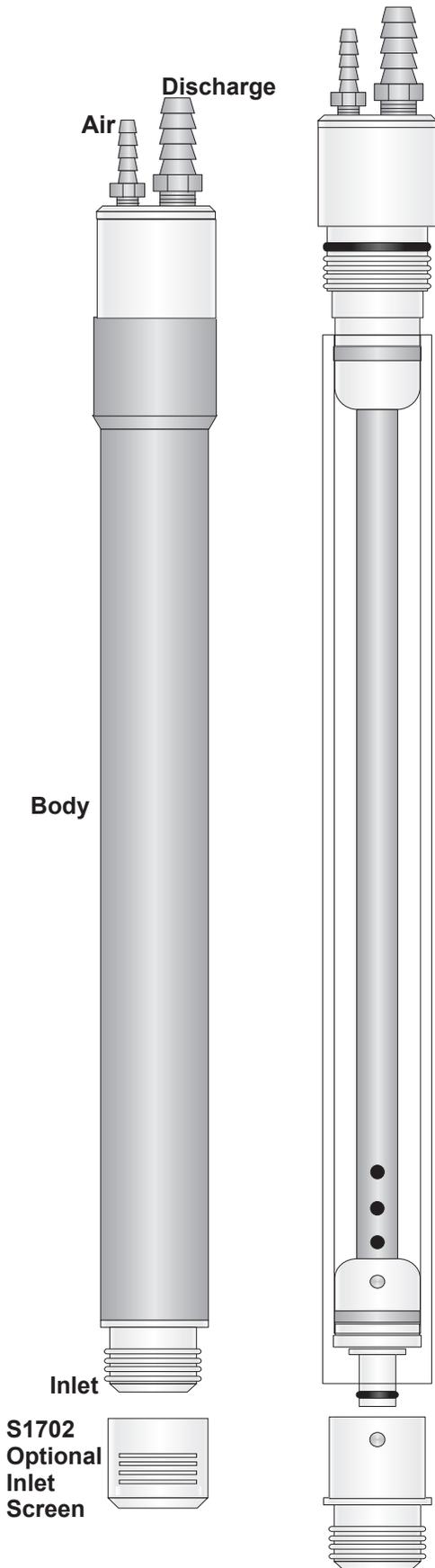
**PUMP FLOW RATES AT:**

PUMP FLOW RATES AT 100 P.S.I. (6.89 Bar):



**ACCESSORIES:**

- P/N S1702 Inlet Screen
- P/N C1702 Floating Layer Adapter
- P/N 35639 Stainless Steel Probe Extender



**Pump Type:** Positive Air Displacement  
Dual Sleeve Bladder Pump

**Materials:** Body - 316 Stainless Steel  
Bladder, Bladder Sleeve, &  
Check Balls - Teflon  
Housings - Teflon  
O-Rings - Viton

**Dimensions:**  
**Pump O.D.:** 3" (7.6 cm)  
**Length:** 40" (101.6 cm)  
**Length w/Screen:** 41" (104.1 cm)  
**Weight:** 11.5 lbs. (5.2 kg)

**Fittings:** Stainless Steel Barb Type  
 Air- 1/2" O.D. (12.7 mm)  
 Discharge - 3/4" O.D. (19.0 mm)

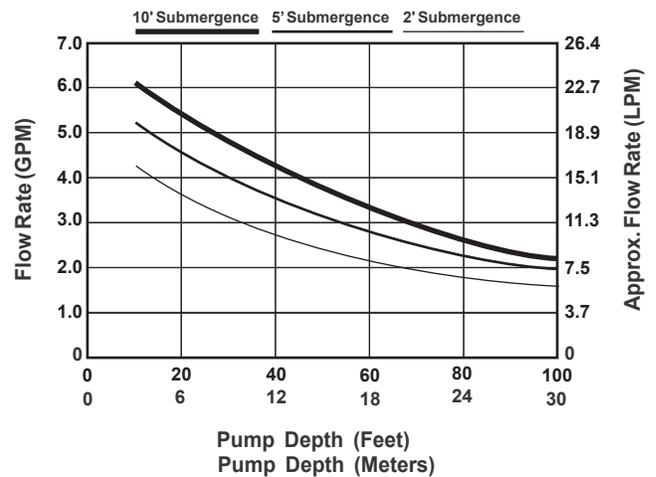
**Pump Volume:**

LITERS	MILLILITERS	GALLONS	OUNCES
<b>2</b>	<b>2000</b>	<b>.528</b>	<b>67.5</b>

**Maximum Lift:** 200 Feet (60 m)

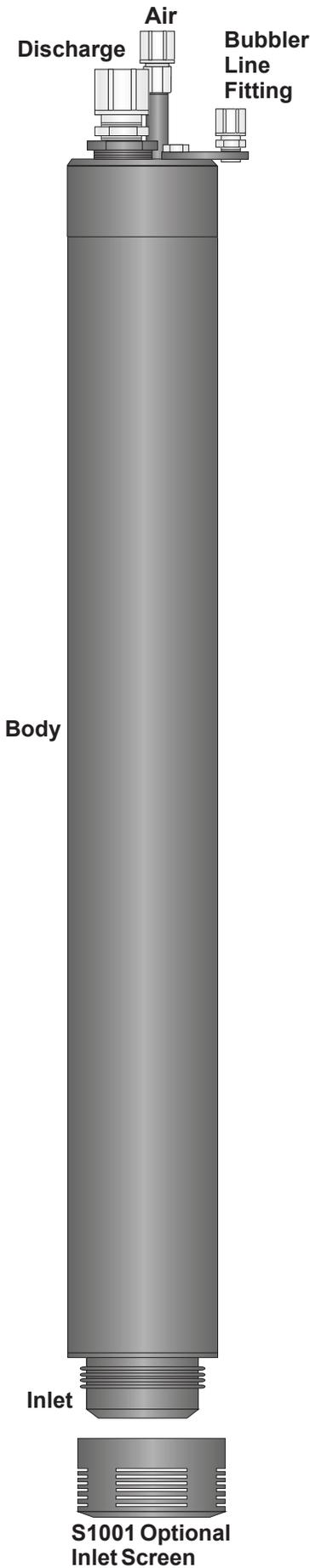
**PUMP FLOW RATES AT:**

PUMP FLOW RATES AT 100 P.S.I. (6.89 Bar):



**ACCESSORIES:**

- P/N S1705 Inlet Screen
- P/N C1702 Floating Layer Adapter
- P/N 35639 Stainless Steel Probe Extender



**Pump Type:** Positive Air Displacement

**Materials:** Body & Housings - PVC  
Check Balls - Teflon  
O-Rings - Viton

**Dimensions:**

**Pump O.D.:** 2.88" (7.3 cm)  
**Length:** 49-1/2" (125.7 cm)  
**Length w/Screen:** 49-3/4" (126.3 cm)  
**Weight:** 8 lbs. (3.6 kg)

**Fittings:**

Nylon Compression Type  
Air- 1/2" O.D. (12.77 mm)  
Discharge - 3/4" O.D. (19 mm)  
Bubbler Tube - 1/4" O.D. (6.3 mm)

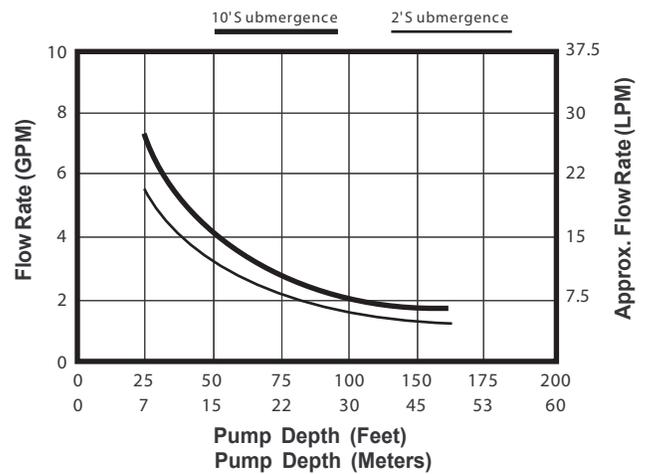
**Pump Volume:**

LITERS	MILILITERS	GALLONS	OUNCES
<b>3.5</b>	<b>3500</b>	<b>.92</b>	<b>118.2</b>

**Maximum Lift:** 200 Feet (60 m)

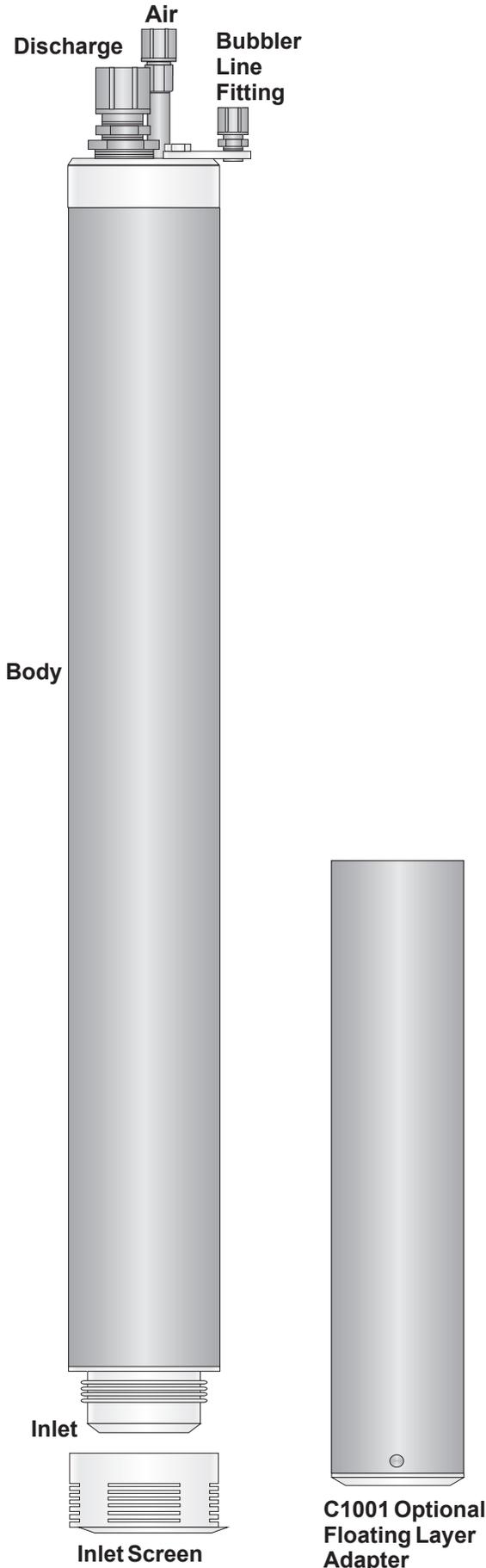
**PUMP FLOW RATES AT:**

PUMP FLOW RATES AT 100 P.S.I. (6.89 Bar):



**ACCESSORIES:**

P/N S1001 Inlet Screen  
P/N C1001 Floating Layer Adapter



**Pump Type:** Positive Air Displacement

**Materials:** Body - 316 Stainless Steel  
Housings and Check Balls - Teflon  
O-Rings - Viton

**Dimensions:**

**Pump O.D.:** 3.0" (7.6 cm)  
**Length:** 41" (104.1 cm)  
**Length w/Screen:** 41-1/4" (104.7 cm)  
**Weight:** 10 lbs. (4.5 kg)

**Fittings:**

Stainless Steel Compression Type  
Air- 1/2" O.D. (12.77 mm)  
Discharge - 3/4" O.D. (19 mm)  
Bubbler Tube - 1/4" O.D. (6.3 mm)

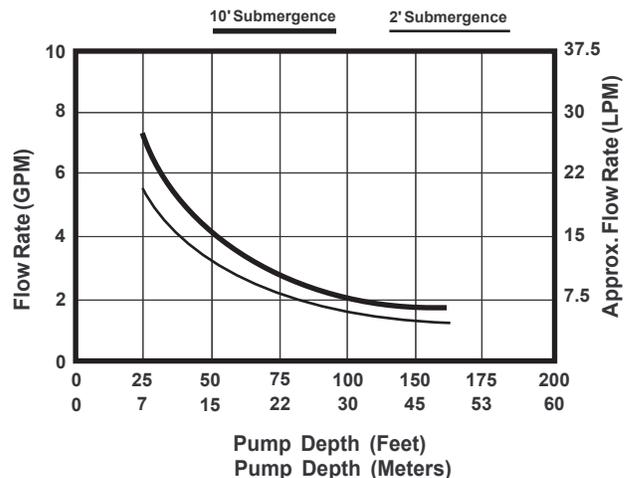
**Pump Volume:**

LITERS	MILILITERS	GALLONS	OUNCES
<b>3.5</b>	<b>3500</b>	<b>.92</b>	<b>118.2</b>

**Maximum Lift:** 200 Feet (60 m)

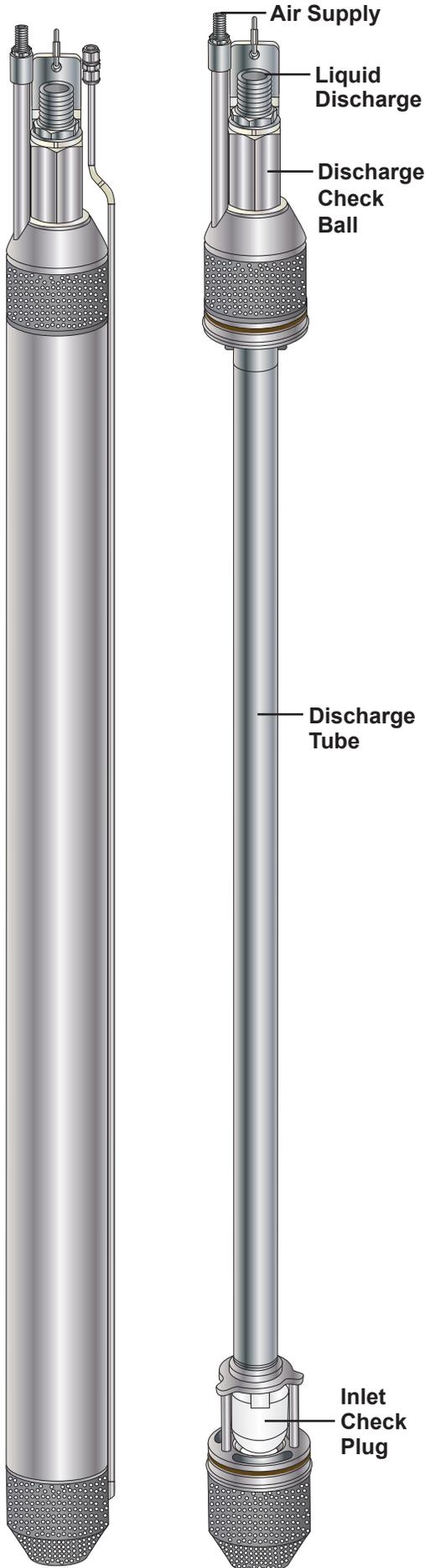
**PUMP FLOW RATES AT:**

PUMP FLOW RATES AT 100 P.S.I. (6.89 Bar):



**ACCESSORIES:**

P/N C1001 Floating Layer Adapter



**Pump Type:** Angle-Independent Positive Air Displacement

**Dimensions:** Outside Diameter = 3.8" (9.7 cm)  
Length = 59.5" (151.1 cm)  
Weight = 29.2 lbs. (13.2 kg)

**Materials:** Stainless Steel, Teflon, UHMWPE, Viton

**Fittings:** Discharge = Stainless Steel Barb Type  
Air Supply = Stainless Steel Barb Type  
Bubbler = Stainless Steel Compression Type

**Tubing:** Discharge Size = 1-1/4" (32 mm) O.D.  
Air Supply Size = 1/2" (13 mm) O.D.  
Bubbler Size = 1/4" (6 mm) O.D.

**Maximum Pump Stroke:** 1.28 Gallons (4.8 liters)

**Operating Pressure Range:** 0-100 P.S.I (0-700 kPa).

**Maximum Lift:** 200 Feet (62 meters)

**Maximum Drawdown (on 3:1 slope):** 12 inches (304.8 ml)

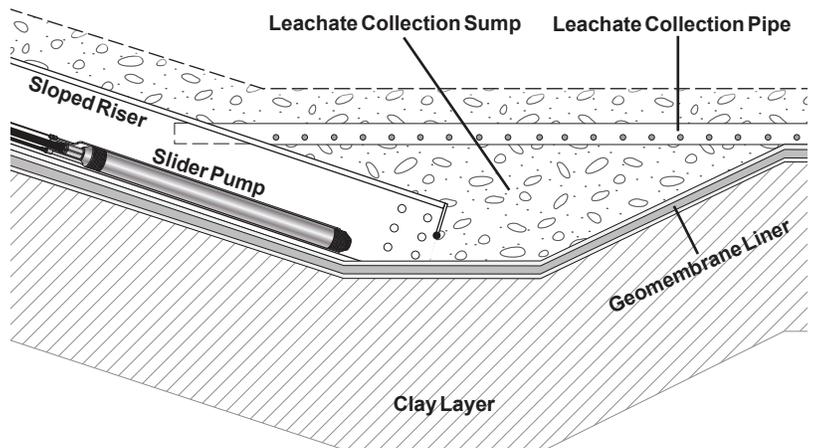
**Maximum Vertical Flow Rate at 70 Ft (21.3 m) Pump Depth with 2 ft (.6 m) Submergence:** 2 GPM (7.5 LPM) (Consult factory for other conditions)

**Cap Sizes:** 4" (150 mm) and up (The Slider pump cannot be used in wells with smaller I.D. than 4" schedule 40).

**Pump Volume:**

Liters	Milliliters	Gallons	Ounces
4.843	4843	1.28	163.84

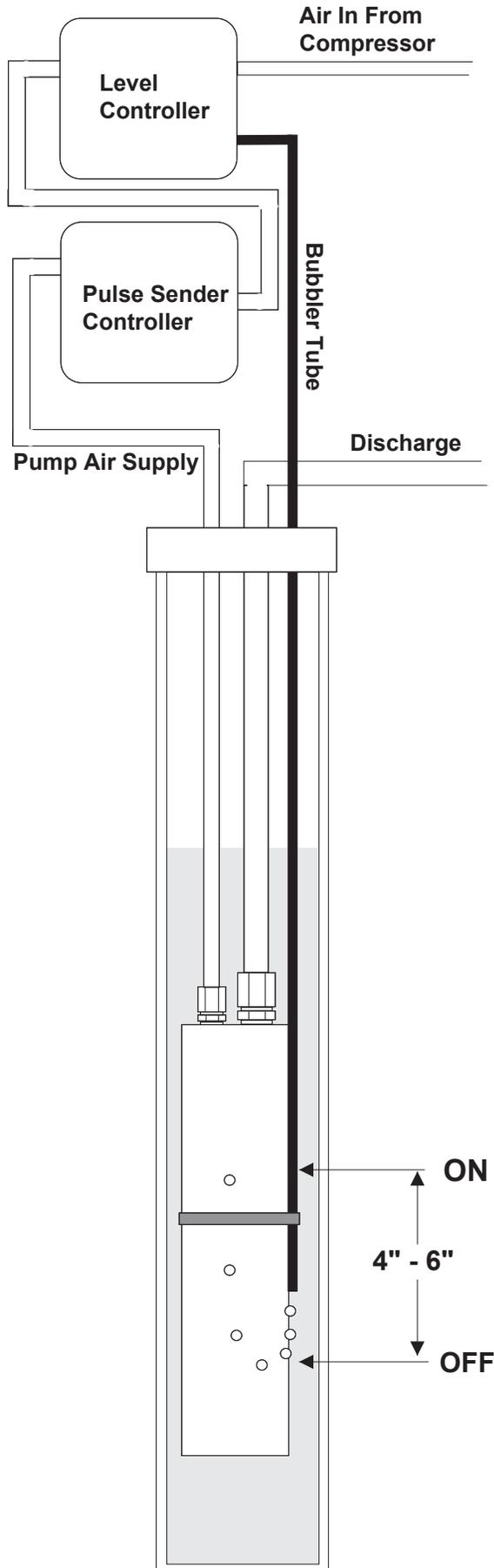
**Typical Application:** Landfill sloped riser - pump inlet placed at the bottom of the leachate drainage sump.



**Accessories:**

- Standard Well Caps or Custom Flanges
- 37060** Cable- 3/16" (5 mm) Stainless Steel
- L350** Exhaust Valve
- 35097** 1/2" (13 mm) O.D. Nylon Air Supply Tubing
- 38882** 1-1/4" (32 mm) O.D. Nylon Discharge Tubing
- 35715** 1/4" (6 mm) O.D. Nylon Bubbler Tube

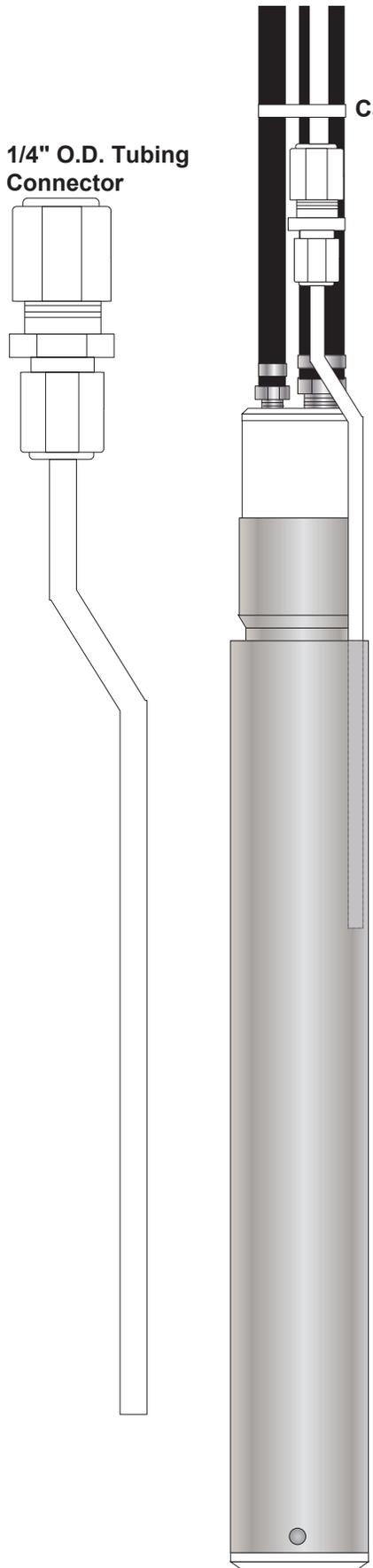
# BUBBLER TUBES



The bubbler line signals a valve in the level controller to either prevent or allow air to pass through the valve and on to the pump. Air from the controller is pulsed down through the bubbler line at a low rate ( 30 cc per minute at 5-10 P.S.I. ) and "bubbles" out the end of the bubbler line down in the well. The bubbler line requires at least 4" of liquid in order to operate. When water pressure rises against the end of the bubbler line, it makes it more difficult for the bubbles of air to emerge and causes the air pressure to start backing up the bubbler line causing a back pressure to build up back up to the valve which either allows or prevents air to pass on to the pump. When the back pressure builds up enough it pushes the valve into the open position which allows air to pass on to the pump and the pump starts pumping. As the pump pumps the liquid level down in the well the water pressure in the well decreases which then begins to decrease the back pressure up the bubbler line and the air bubbles have less resistance to escape out the end of the bubbler line. As this back pressure is decreased the valve allowing air to the pump moves itself back into the closed position preventing any air to pass onto the pump and the pump stops pumping. This pressure differential occurs in an range of about 4 - 6".

Normally the bubbler line is cable tied to the pump at a point at which the customer would like the liquid level kept at in the well. In 2" diameter wells or when a floating layer adapter is used with a pump it may be necessary to use a bubbler tube extension (as shown).

# BUBBLER TUBE EXTENSIONS



Cable Tie

## Models 35635 (Stainless Steel) & 35639 (Brass)

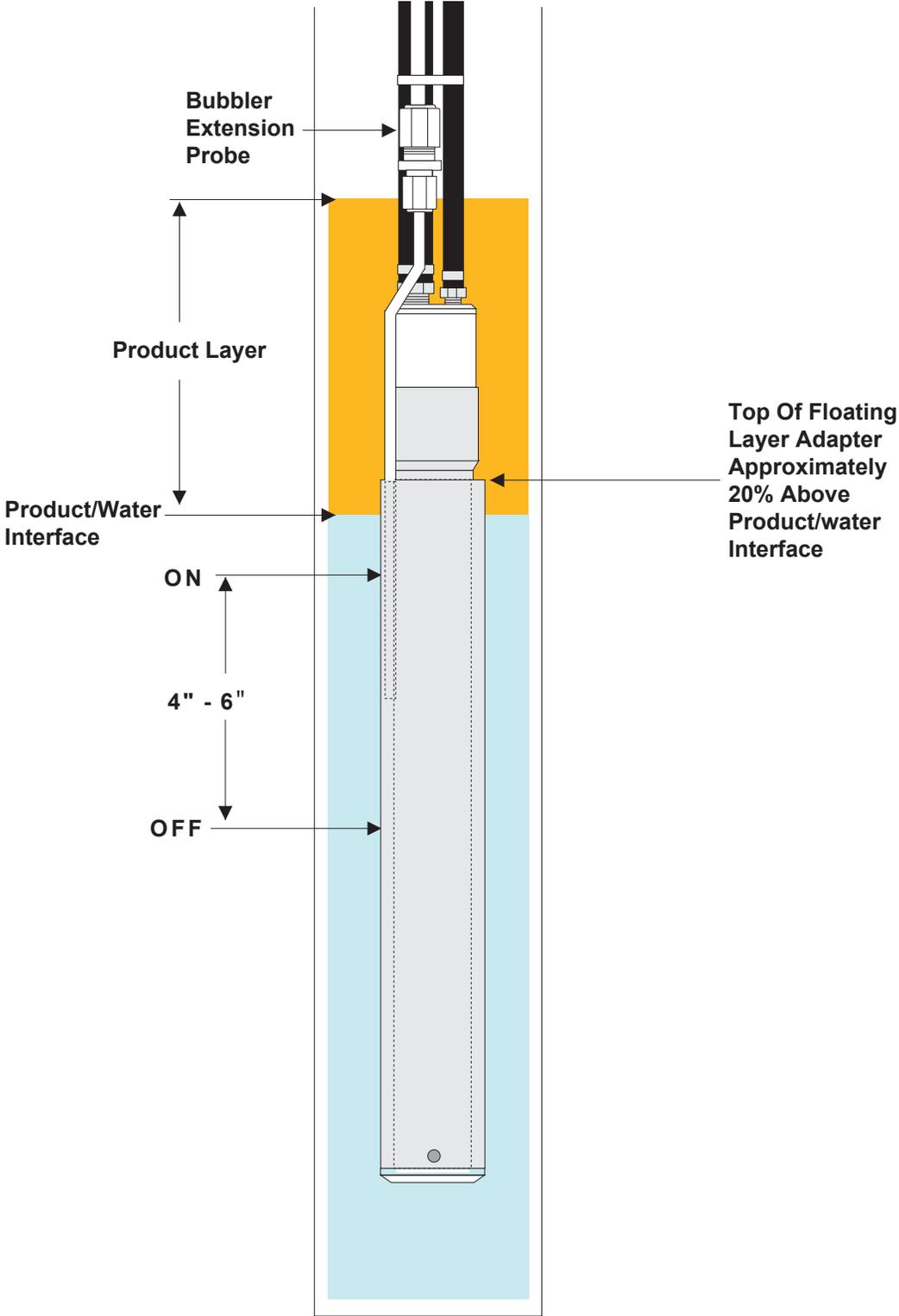
### Connection:

1. Fully insert the 1/4" O.D. bubbler tubing into the 1/4 O.D. tubing connector at the top of the BUBBLER TUBE EXTENSION and tighten fitting securely
2. Push extension tube into the space between the floating layer adapter and the pump's body. The bubbler probe extension should be positioned 6-7" into the floating layer adapter
3. Cable tie the 1/4" O.D. bubbler probe tubing to the pump tubing, (near the top of the pump), to prevent the extension from being accidentally pulled out.

6-7"

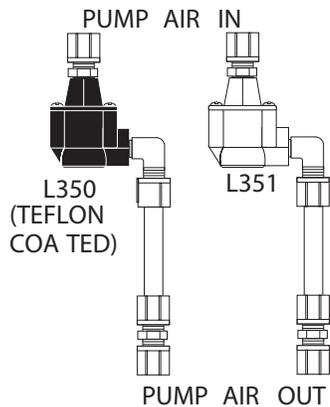
Floating Layer Adapter

# FLOATING LAYER ADAPTERS



# EXHAUST VALVES

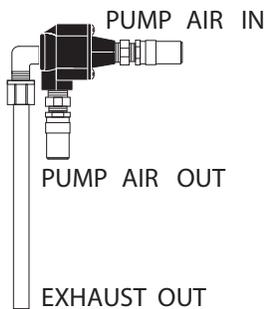
## Models L350 & L351



### Connection:

1. Separate pump tubing to allow access to 1/2" O.D. air tubing just below the well cap. (5' below is a typical location as long as the valve is in a position where it will not become submerged.)
2. Cut 1/2" O.D. air tubing and connect "PUMP AIR IN" of valve. ("PUMP AIR IN" must point up toward the well cap, "EXHAUST OUT" must point down toward the pump.)
3. Cut out just enough of the 1/2" O.D. air tubing to allow connection of "PUMP AIR OUT" on valve.
4. Insert tubing fully into the proper compression fitting and tighten fitting securely.

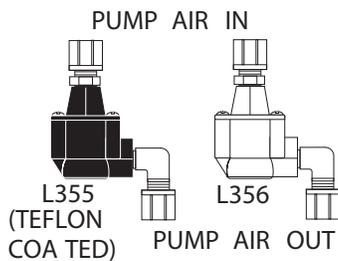
## Model L353 External Pump Exhaust Valve



### Connection:

1. Connect "PUMP AIR OUT" quick disconnect to mating fitting on the well cap.
2. Connect "PUMP AIR IN" on the valve to "PUMP AIR OUT" hose on the L360 or L380 controller module.
3. Position the "EXHAUST OUT" port so it vents back down in the well. A longer length of 1/2" O.D. tubing can be used to direct the exhaust back downwell, if required.

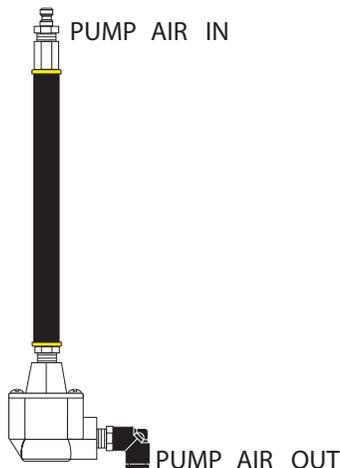
## Models L355 & L356



### Connection:

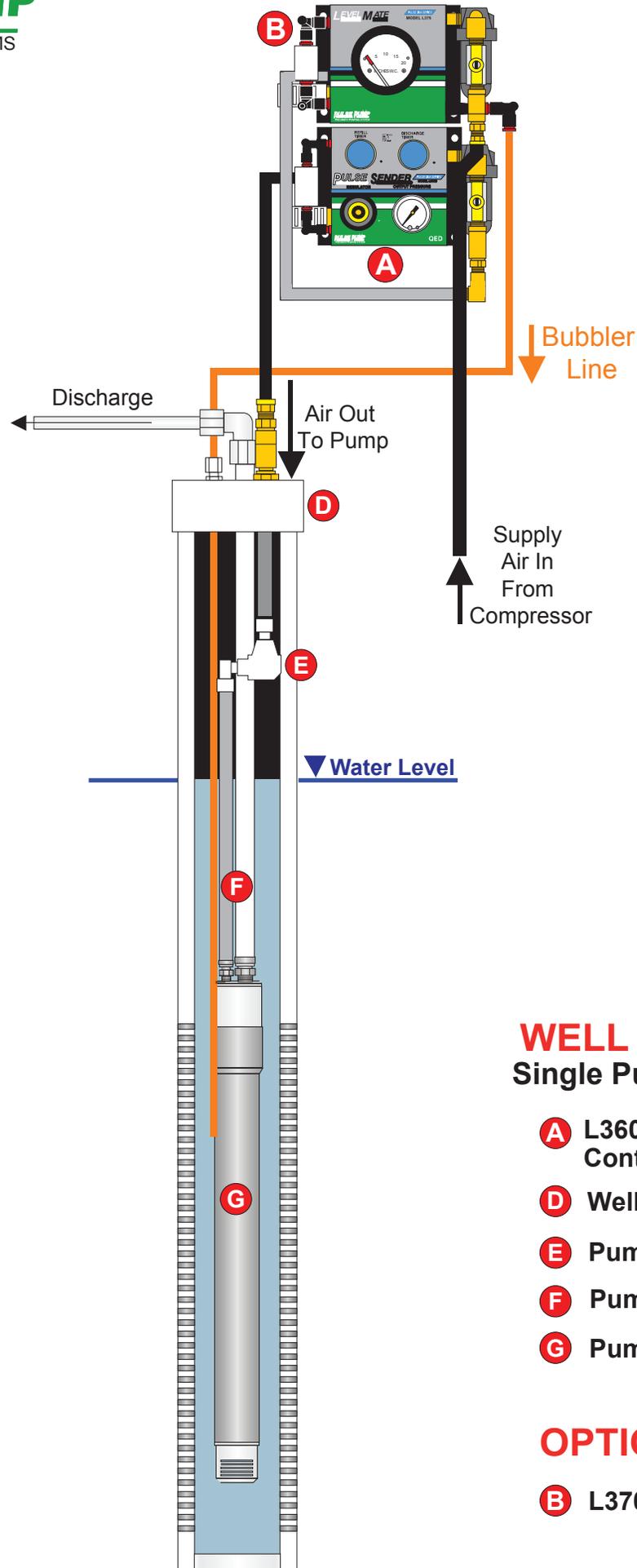
1. Separate pump tubing to allow access to 3/8" O.D. air tubing just below the well cap. (5' below is a typical location as long as the valve is in a position where it will not become submerged.)
2. Cut 3/8" O.D. air tubing and connect "PUMP AIR IN" of valve. ("PUMP AIR IN" must point up toward the well cap, "EXHAUST OUT" must point down toward the pump.)
3. Cut out just enough of the 3/8" O.D. air tubing to allow connection of "PUMP AIR OUT" on valve.
4. Insert tubing fully into the proper compression fitting and tighten fitting securely.

## Model L358



### Connection:

1. Remove 5' black hose from the L360 control module "CONTROL AIR OUT" quick disconnect.
2. Connect "CONTROL AIR IN" to L360 "CONTROL AIR OUT" via quick disconnect.
3. Connect 1/4" O.D. tubing from "CONTROL AIR OUT" on L358 to "CONTROL AIR IN" on L354, L600 or L380 at well(s).

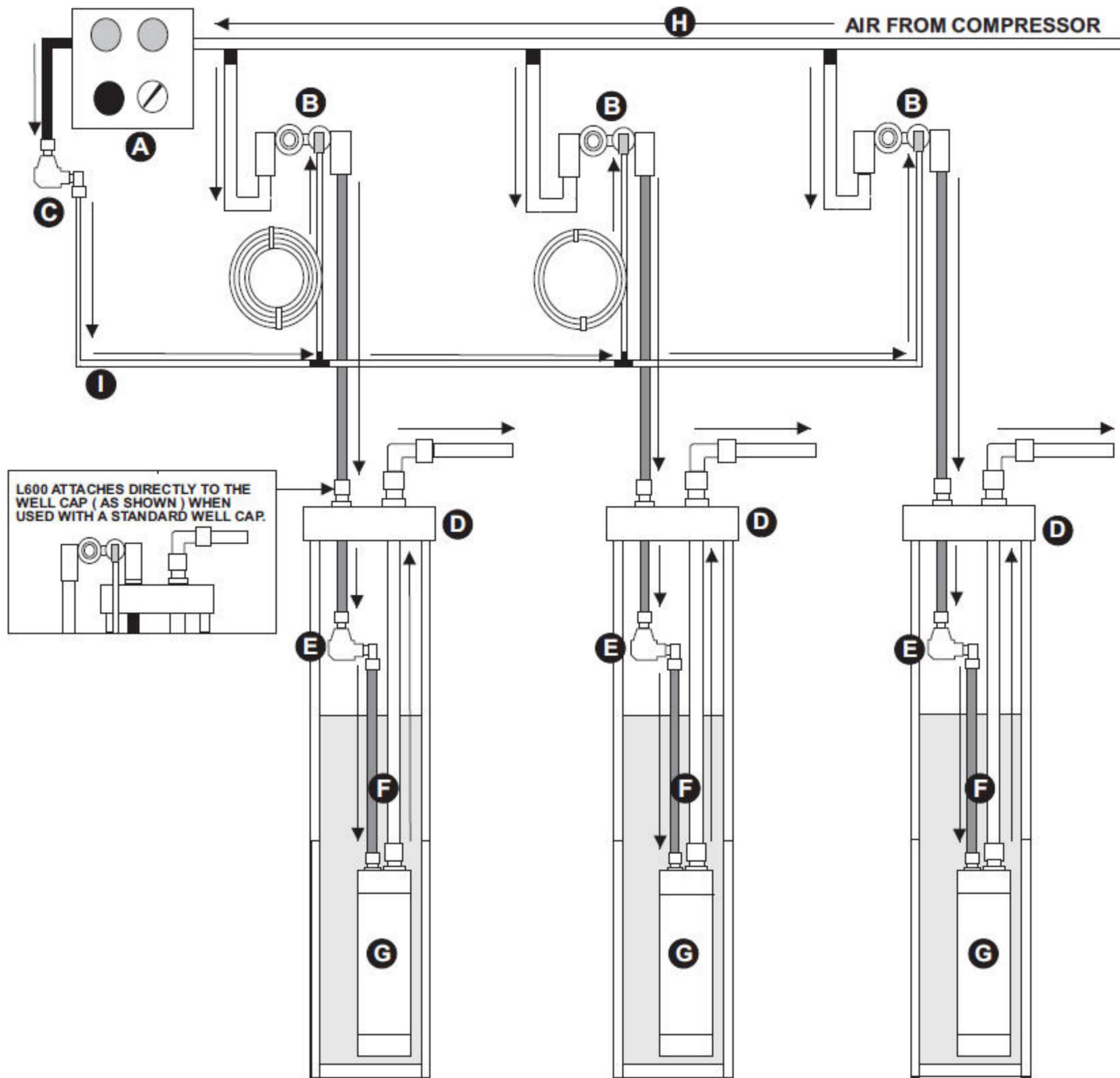


**WELL SYSTEM "A"**  
Single Pump - Total Fluids

- A** L360 Pulse Sender Controller
- D** Well Cap
- E** Pump Exhaust Valve
- F** Pump Tubing
- G** Pump

**OPTIONS:**

- B** L370 or L375 Level Mate



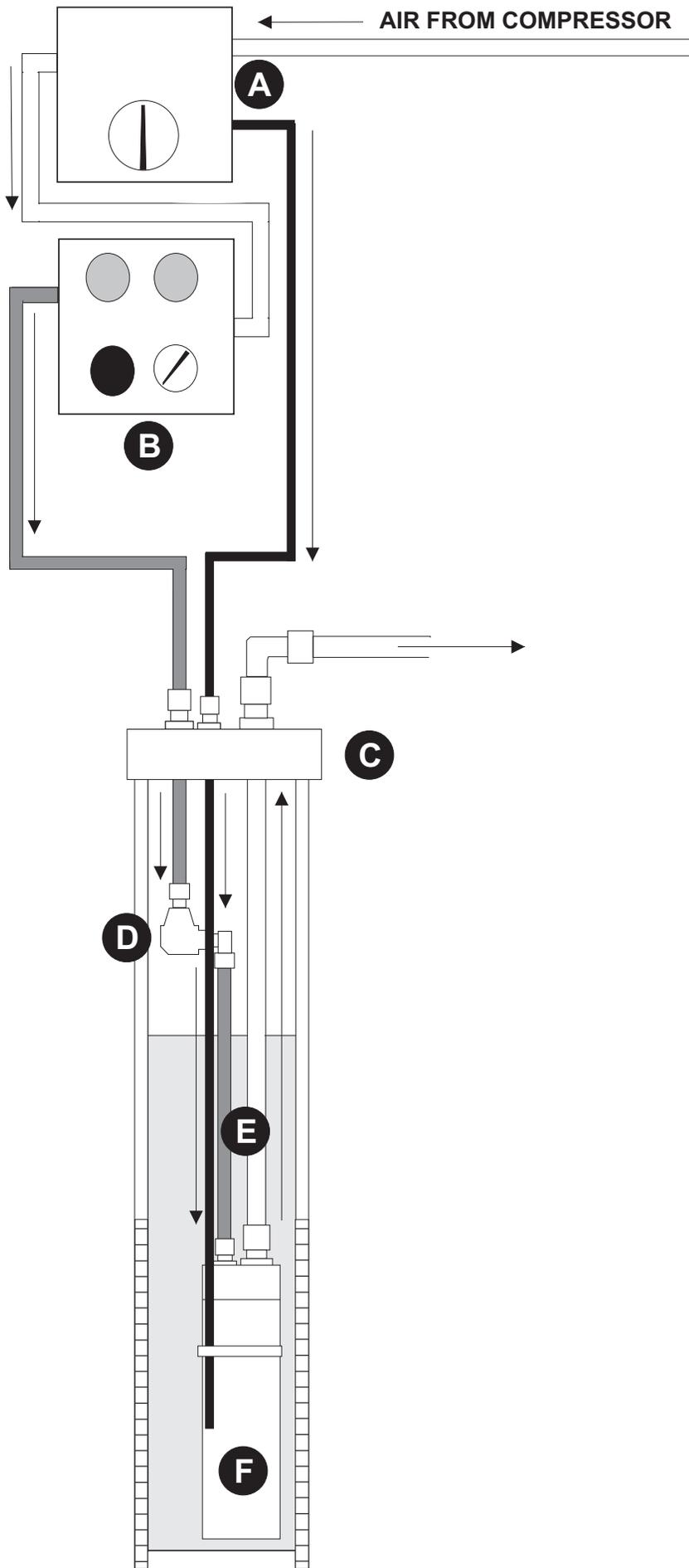
**WELL SYSTEM "B"**  
 Single Controller Multiple  
 Pumps  
 Total Fluids  
 Continuous Pumping

- A** L360 Controller
- B** L600 Remote Well Operator
- C** Controller Exhaust Valve
- D** Well Cap
- E** Pump Exhaust Valve
- F** Pump Tubing
- G** Pump
- H** 1/2" Air Supply Tubing
- I** 1/4" Logic Tubing

**OPTIONS:**

- Pump Inlet Screen
- Floating Layer Adapter
- Module Enclosure
- Cycle Counter
- Filter Package

L600 ATTACHES DIRECTLY TO THE WELL CAP (AS SHOWN) WHEN USED WITH A STANDARD WELL CAP.



**WELL SYSTEM "C"**  
**Single Pump**  
**Total Fluids**  
**Level controlled**

- (A)** L370-L375 Level Controller
- (B)** L360 Pulse Sender Controller
- (C)** Well Cap
- (D)** Pump Exhaust Valve
- (E)** Pump Tubing
- (F)** Pump

**OPTIONS:**

- Pump Inlet Screen
- Floating Layer Adapter
- Module Enclosure
- Cycle Counter
- Filter Package

# WELL SYSTEM "D"

Single Controller  
Multiple Pumps  
Total Fluids  
Level controlled

**A** L360 Controller

**B** L380 Remote Well  
Level Controller

**C** Controller Exhaust Valve

**D** Well Cap

**E** Pump Exhaust Valve

**F** Pump Tubing

**G** Pump

**H** 1/2" Air Supply Tubing

**I** 1/4" Logic Tubing

## OPTIONS:

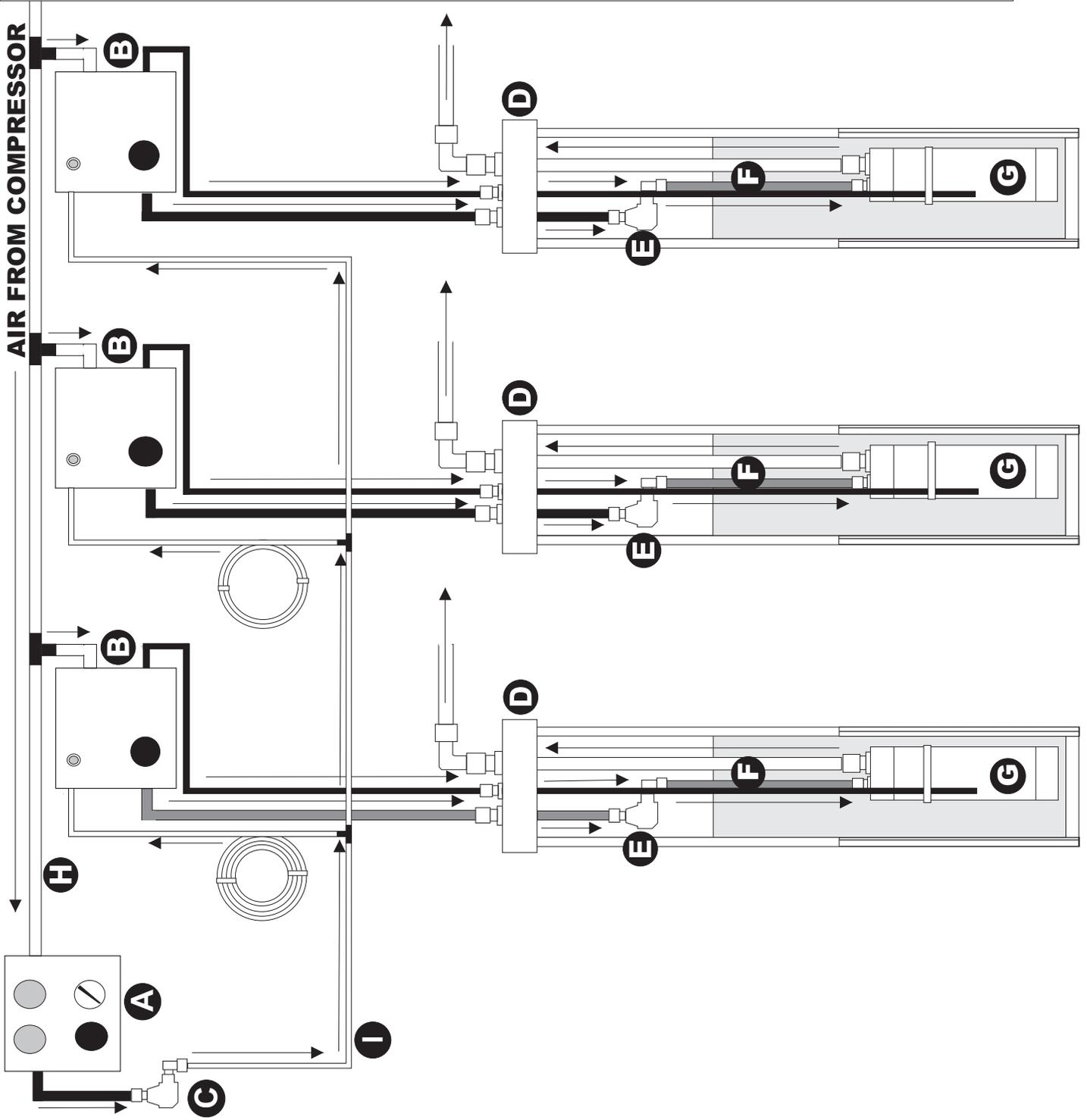
Pump Inlet Screen

Floating Layer Adapter

Module Enclosure

Cycle Counter

Filter Package



## WARRANTY INFORMATION

QED Environmental Systems, Inc. (QED) warrants to the original purchaser of its products that, subject to the limitations and conditions provided below, the products, materials and/or workmanship 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 QED 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. Liquid contacting equipment (including pumps), tubing, liquid contacting supplies and flow totalization equipment are warranted for 1 year.
2. Control devices, control device mounting, and surface air supply hose are warranted for 1 year.
3. Separately sold parts and spare parts kits are warranted for ninety (90) days.
4. Repairs performed by QED are warranted for ninety (90) days from date of repair or for the full term of the original warranty, whichever is longer.

Buyer's exclusive remedy for breach of said warranty shall be as follows: if, and only if, QED is notified in writing within the applicable warranty period of the existence of any such defects in the said products, and QED upon examination of any such defects, shall find the same to be within the term of and covered by the warranty running from QED to buyer, QED will, at its option, as soon as reasonably possible, replace or repair any such product, without charge to the buyer. If QED 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 QED's sole responsibility shall be, at its option, either 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 QED without its consent, and QED's obligations of repair, replacement or refund are conditioned upon the Buyer's return of the defective product to QED.

IN NO EVENT SHALL QED ENVIRONMENTAL SYSTEMS, INC. BE LIABLE FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES FOR BREACH OF SAID WARRANTY.

The foregoing warranty does not apply to major subassemblies and other equipment, accessories, and other parts manufactured by others, and such other parts, accessories, and equipment are subject only to the warranties, if any, supplied by their respective manufacturers. QED makes no warranty concerning products or accessory, QED will give reasonable assistance to 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 QED, and QED neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with said products, materials and/or workmanship. It is understood and agreed that QED 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.

## WARRANTY INFORMATION

Chemical attack to liquid contacting equipment and supplies shall not be covered by this warranty. A range of materials is available from QED and it is the Buyer's responsibility to select materials to fit the Buyer's application. QED will only warrant that the supplied liquid contacting materials will conform to published QED specifications and generally accepted standards for that particular material.

QED shall be released from all obligations under all warranties if any product covered hereby is repaired or modified by persons other than QED's service personnel unless such repair by others is made with the written consent of QED. If any product covered hereby is actually defective within the terms of this warranty, Purchaser must contact QED for determination of warranty coverage. If the return of a component is determined to be necessary, QED 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.

The original Purchaser's sole responsibility in the instance of a warranty claim shall be to notify QED 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 QED and:

1. Identifying the product involved (by model or serial number or other sufficient description that will allow QED 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 QED to:

**QED Environmental Systems Inc.**  
**2355 Bishop Circle West**  
**Dexter, MI 48130**

**Telephone: 1-734-995-2547**  
**1-800-624-2026**  
**1-519-485-0290 (Canada)**  
**1-734-995-1170 (Fax)**



**PULSE PUMP**®



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