

ISOMEGA® BLADDER PUMPS

INSTRUCTION MANUAL

Complete instructions for operation of Monoflex Isomega® Bladder Pumps, Air/Gas Displacement Pumps and the Monoflex Integrated Vacuum Pressure Controller.



Monoflex Division of Campbell Manufacturing, Inc.

Prairie du Sac, WI • Bechtelsville, PA • Largo, FL

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website: www.campbellmfg.com



Quality groundwater monitoring products since 1973

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Note: Drawings featured here-in are representative of Monoflex products; actual products may differ in appearance. Performance and product specification are correct at time of publication.

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MONOFLEX ISOMEGA® BLADDER PUMP SYSTEM

INTRODUCTION

Monoflex Isomega® Bladder Pumps are available in Stainless Steel, PVC and PTFE. These pumps represent the ultimate device for recovering representative groundwater samples to depths of 250' (77 m) without compromising the chemical integrity of the samples.

It is important that sampling devices faithfully transport representative samples for evaluation, since groundwater generally has temperature, pressure, gas content, and redox potential (oxidation reduction) conditions different than that of surface water. Devices that introduce air or gas into a sample, or cause a sample to undergo significant pressure changes, are less desirable for preserving the chemical integrity of the sample. Sampling systems that obstruct the water flow path by intricate valving can change the pH of the water being sampled by degassing a portion of dissolved carbon dioxide. Further, systems that allow the sample to be agitated with air can also affect the pH of the water through iron hydrolysis reactions, which can have significant impact on both organic and inorganic chemical constituents.

The chemical properties of the liquid in the well may determine which Monoflex pump is best suited for that particular application. Listed below are materials used in the construction of our pumps, in order of their chemical resistance (most inert to least inert).

RIGID MATERIALS

PTFE (most inert)

Stainless Steel

PVC (Polyvinyl Chloride)

FLEXIBLE MATERIALS

PTFE (most inert)

Viton® (a fluoroelastomer)

Note: During the manufacture of Monoflex Isomega® Bladder Pumps, extreme care is taken to avoid contamination. Each pump is packaged to avoid contamination during shipping and handling. It is important to avoid contamination of the pump during installation. Sun tan lotions, insect repellents, and other incidental chemicals can contaminate a pump and affect initial sampling. It is best to not move the pump to a contaminated site until the time of installation.



MONOFLEX ISOMEGA® BLADDER PUMP SYSTEM

ISOMEGA® BLADDER PUMP OPERATION

Monoflex Isomega® Bladder Pumps obtain representative water samples from monitoring wells. Isomega® Bladder Pumps employ a closed collection system that eliminates agitation or air contact with the sample. This, and the use of an inert PTFE bladder, ensures water sample integrity. The closed system provides the best method available for recovering water samples having dissolved organic compounds (VOC's). Isomega® Bladder Pumps may be used as portable or dedicated systems.

Monoflex Isomega® Bladder Pumps should be used with the Monoflex I.V.P. Pump Controller. With the I.V.P. Pump Controller, Isomega® Bladder Pumps can operate with minimal head. A vacuum increases the pumping rates and makes pump operation less dependent upon head.

During operation, the Isomega® Bladder Pump chamber fills with liquid via the bottom screen inlet, past the lower ball valve and into the pump chamber collapsing the bladder. Introduction of gas or air into the bladder causes the bladder to expand, closing the lower ball check to force the contents of the pump past the upper ball check and into the sample discharge line. Venting the bladder allows it to collapse, permitting the pump to refill. A pressure of .45 PSI per foot of depth is required to lift a sample to the surface. Monoflex Isomega® Bladder Pumps are designed to operate up to 250' (75m) of head. The pumping rate will be dependent upon each of the following:

- | | |
|---|---|
| * Controller type | * Depth to the water surface |
| * Pump submergence | * Capacity of the pump body |
| * Adjustment of the cycle time | * Viscosity of the pumped liquid |
| * Inside diameters of tubing lines | * Flow rate of the compressed air or gas |

Monoflex Air/Gas Displacement Pumps are designed for initial well pumping, well purging prior to sampling or to pump contaminant from recovery wells. Monoflex Air/Gas Displacement Pumps have a larger pump chamber than Monoflex Isomega® Bladder Pumps. This makes them ideal for pumping large volumes of water or contaminant. Monoflex Air/Gas Displacement Pumps may be used for sampling if air to water contact is permissible.

Monoflex Isomega® Bladder Pumps can be converted to Air/Gas Displacement pumps with minor modifications. Monoflex Air/Gas Displacement Pumps **CANNOT** be converted to bladder pumps due to pump chamber requirements.

For operating instructions, please see the Monoflex Air/Gas Displacement Pump Operation Instructions located in this manual.



MONOFLEX ISOMEGA® BLADDER PUMP SYSTEM

ISOMEGA® BLADDER PUMP OPERATION (continued)

Monoflex Isomega® Bladder Pumps are designed for long term efficient use. These pumps include Viton® O-rings in all flush threaded body joints ensuring leak free seals while permitting easy disassembly for decontamination. A ball check valve is used in the sample discharge fitting to prevent the pumped sample from re-entering the pump chamber. Another ball check is located at the bottom of the sample chamber to prevent the captured sample from re-entering the well while the pump is pressurized.

Monoflex Isomega® Bladder Pumps are available in PVC, grades 304 or 316 Stainless Steel and PTFE. Optional Electropolishing is available for Stainless Steel pumps. Stainless Steel pumps with 316 material are available as a special order. All Stainless Steel pumps are supplied with a .020 slot wire-wrapped inlet screen.

Please see the following page for an example of the components used in a Monoflex Isomega® Bladder Pump system. All of the items shown are available from Monoflex.

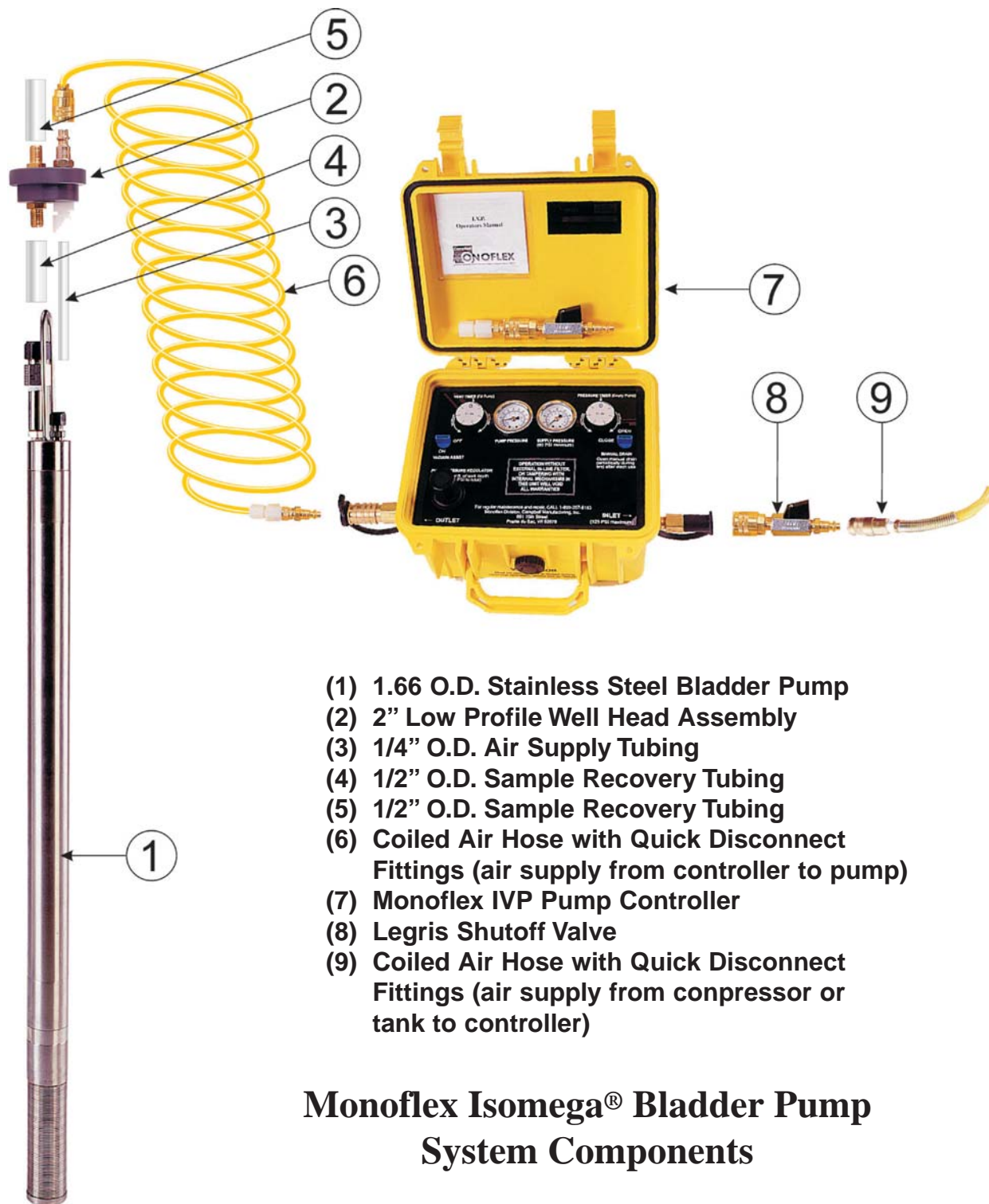
Monoflex Isomega® Bladder Pump Specifications and Performance Chart

Monoflex Isomega® Bladder Pump Specifications					Estimated Gallons Per Minute at Various Pump Cycles Per Minute (CPM)					
Pump Outside Diameter	Pump Total Length	Pump Body Material	Chamber Length	Chamber Capacity	4 CPM	6 CPM	8 CPM	10 CPM	12 CPM	14 CPM
1.660 (42.16mm)	52" (132cm)	PVC	30" (76.2cm)	.109 gal (413 ml)	.436 gpm 1.65 l/min	.654 gpm 2.48 l/min	.872 gpm 3.30 l/min	1.09 gpm 4.13 l/min	1.31 gpm 4.96 l/min	1.53 gpm 5.79 l/min
1.660 (42.16mm)	45" (114cm)	304 Stainless Steel	30" (76.2cm)	.133 gal (504 ml)	.532 gpm 2.01 l/min	.798 gpm 3.02 l/min	1.06 gpm 4.01 l/min	1.33 gpm 5.04 l/min	1.60 gpm 6.06 l/min	1.86 gpm 7.04 l/min
1.660 (42.16mm)	45" (114cm)	Teflon®	30" (76.2cm)	.117 gal (443 ml)	.468 gpm 1.77 l/min	.702 gpm 2.66 l/min	.936 gpm 3.54 l/min	1.17 gpm 4.43 l/min	1.40 gpm 5.30 l/min	1.64 gpm 6.21 l/min

NOTE: Tubing sizes for all Monoflex Pneumatic Pumps are
Air Supply: 1/4" O.D. Sample Recovery: 1/2" O.D.
Other sizes are available, consult factory for pricing and availability

NOTE: Other pump lengths are available, consult factory for pricing and availability.

MONOFLEX ISOMEGA® BLADDER PUMP SYSTEM

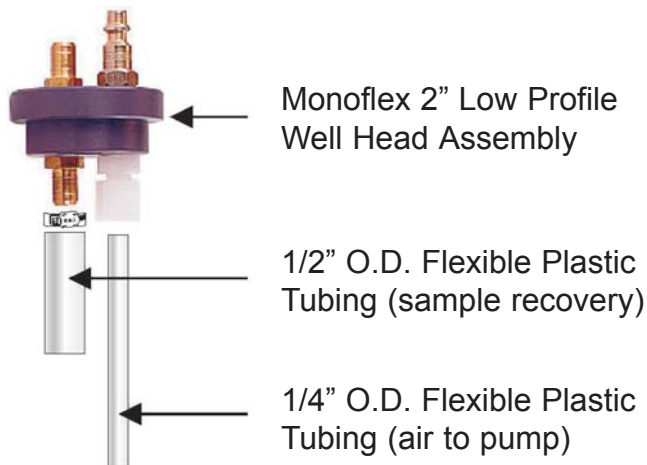


Monoflex Isomega® Bladder Pump System Components

MONOFLEX ISOMEGA® BLADDER PUMP SYSTEM

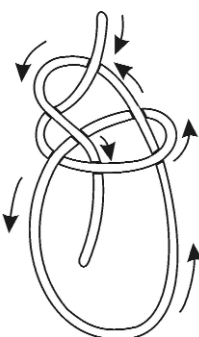
ISOMEGA® BLADDER PUMP INSTALLATION

1. Check the static water level in the well to ensure that the pump is submerged when placed in the well. Peak pumping efficiency will be achieved by using the **Monoflex I.V.P. Controller** with vacuum assist engaged regardless of pumping depth. See notations for Air/Gas pump use located in this manual.



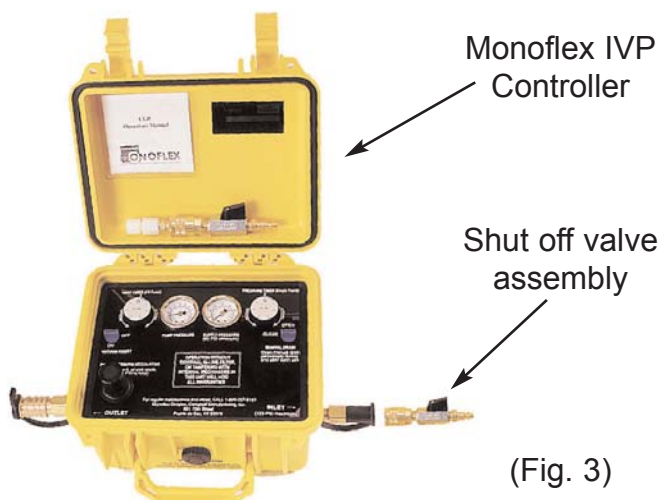
(Fig.1)

2. Attach the air supply tubing and the sample recovery tubing to the corresponding fittings on the pump. Using a Monoflex low profile well head assembly, attach the air supply and sample recovery tubing to the corresponding marked fittings on the bottom of the well head assembly. **(Fig. 1) (On the top of the well head assembly, the coupler plug quick disconnect fitting is the air supply connection; the barb fitting is the sample recovery line.)**



Bowline style knot
(Fig. 2)

3. Use a bowline style knot to secure the pump safety line to the pump bail hook. **(Fig. 2)**
4. Lower the pump into the well.
5. Connect the quick disconnect on the shut-off valve assembly, (from the Controller Accessory Kit), to the coupler plug quick disconnect on the **INLET** on the **Monoflex I.V.P. Controller**. **(Fig. 3)**

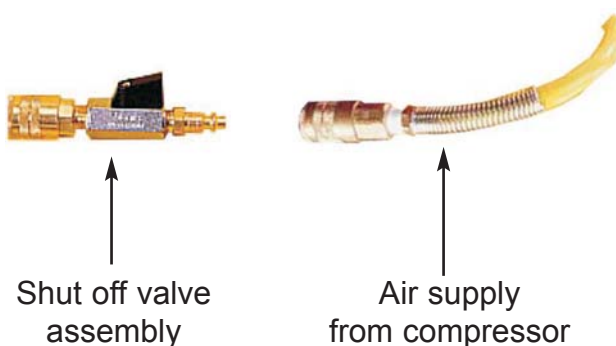


(Fig. 3)

MONOFLEX ISOMEGA® BLADDER PUMP SYSTEM

ISOMEGA® BLADDER PUMP INSTALLATION (continued)

6. Connect the air/gas supply from a oil-less compressor or tank to the coupler plug quick disconnect on the shut-off valve assembly. **Note:** Closing the valve on the shut off valve assembly will stop the air flow to the controller, turning the controller off, and on when the valve is in the open position. (Fig. 4)

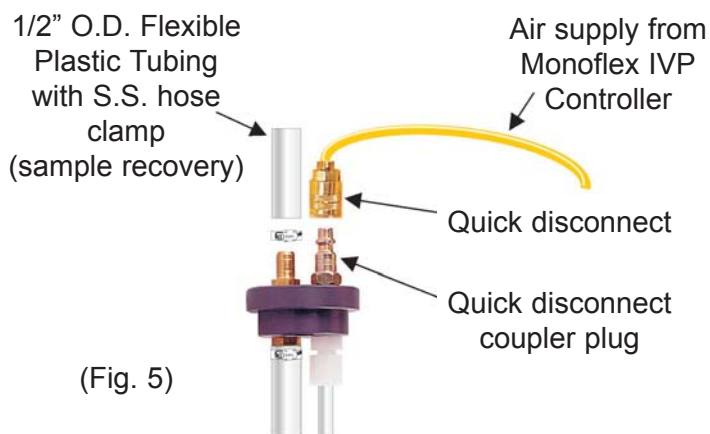


(Fig. 4)

7. Start you compressor.
8. Attach the air supply line from the **Monoflex I.V.P. Controller** using the coupler plug quick disconnect on the top of the well head assembly. Attach sample recovery tubing to the barb fitting on the top of the well head assembly.

Note: When using a barb fitting with PTFE tubing, use of a stainless steel hose clamp to secure the tubing is mandatory, either above or below the well head assembly. (Fig. 5)

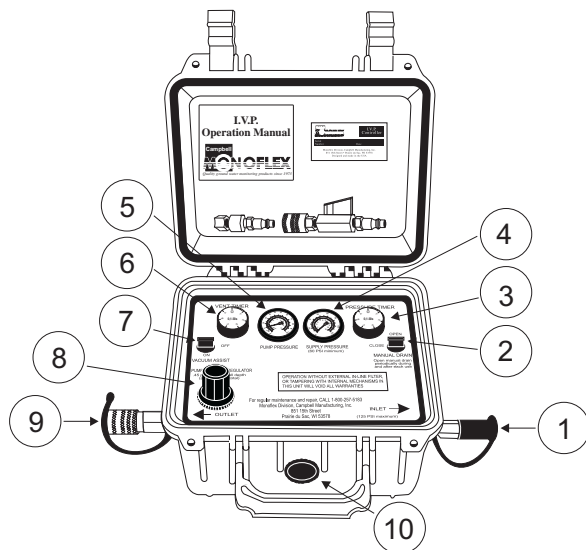
Note: Please see page eight of this manual for complete operating instructions for the **Monoflex I.V.P. Controller**.



(Fig. 5)

MONOFLEX ISOMEGA® BLADDER PUMP SYSTEM

I.V.P. CONTROLLER OPERATION INSTRUCTIONS



- (1) Air Inlet - Supply from compressor, 125 PSI maximum.
- (2) Manual Drain - Used to drain internal water trap. Open periodically during and after each use.
- (3) Pump Pressure Timer - Adjusts how long the pump is pressurized during sample retrieval.
- (4) Supply Pressure Gauge - 60 PSI minimum required to operate controller.
- (5) Pump Pressure Gauge - Monitors pressure to the pump.
- (6) Pump Vent Timer - Adjust the length of time the pump body fills with liquid.
- (7) Vacuum Assist Switch - When turned on, the controller “deflates” the bladder during the vent cycle to maximize the amount of sample entering the pump chamber.
- (8) Pump Pressure Regulator - For adjusting the amount of pressure sent to the pump.
- (9) Air Outlet - Air supply to the pump.
- (10) Vent Knob - Must be opened if the lid is closed during controller operation, allows box to “breathe”.

The following are the operating instructions for the **Monoflex I.V.P. Controller**. This section will refer to the drawing and parts listing shown above.

Follow the directions one through eight of the “**PUMP INSTALLATION**” located on pages six and seven of this manual. The following procedures will assist in timer and pressure settings for the **Monoflex I.V.P. Controller**.

Once all the tubing and air supply connections are secure and the air supply is functional, open the shutoff valve connected to the **AIR INLET** and note the reading on the **SUPPLY PRESSURE GAUGE**. A minimum of 60 PSI is required to operate the controller.

Note: The maximum working pressure of the controller is 125 PSI.

Set the **PUMP PRESSURE REGULATOR** by pulling up on the knob, turning the knob and then pressing the knob down to lock once the proper pump pressure is set. Note the pressure reading on the **PUMP PRESSURE GAUGE**.

To determine proper pump pressure, multiply the vertical distance to the pump by .45 PSI (.03 bar), then add 10 to 20 PSI (.7 - 1.4 bar), to that amount.

Example:

Sample to be evacuated at 100 feet (30.5m)

100' x .45 = 45 PSI (3 bar) of lift + 10 PSI (.7 bar) = 55 PSI total pressure needed.

MONOFLEX ISOMEGA® BLADDER PUMP SYSTEM

I.V.P. CONTROLLER OPERATION INSTRUCTIONS (continued)

Once the pump pressure is set, the controller will cycle the pump but the timers will need adjustment to maximize the pumping rate. As the pump is cycling, the **PUMP PRESSURE GAUGE** will read either the pump pressure you have set, zero, or a vacuum, provided the **VACUUM ASSIST SWITCH** is in the “ON” position.

Keep in mind, when the **PUMP PRESSURE GAUGE** reads “pressure” the pump is pushing the sample to the surface. When the gauge reads a vacuum or zero, the pump chamber is filling with the sample fluid. This action is also called “venting”.

TIMER ADJUSTMENTS

PUMP PRESSURE TIMER: This dial controls the amount of time the pump is allowed to push the sample to the surface. Note that too little time will not allow the pump to empty completely, and too much time is unnecessary because the pump has been emptied.

PRESSURE ADJUSTMENTS: When the controller is operating, you will hear the valves inside “click” when switching operations from vacuum to pressure and then back to vacuum. During the pressure cycle, the fluid will empty through the discharge line of the pump. If the sample is flowing steadily out of the discharge tubing and suddenly stops when you hear the valves “click”, then the pressure cycle is too short. On the other hand, if the flow stops before you hear the “click” in the controller, then the cycle is too long.

Note the increase and decrease directional lines on the timer dials. It is best to make only slight adjustments to the dials. Note the pump depth, static water level, and the letters on the dial for your future reference.

PUMP VENT TIMER: This dial controls the amount of time the pump is allowed to vent, or fill the sample chamber. Note that too little time will not allow the pump to fill completely, and too much time is unnecessary because the pump is full.

VENT ADJUSTMENTS: During the vent cycle, the sample is entering the pump body collapsing the bladder inside. In order to know if the pump body is as full as possible, the amount discharged during the pressure cycle must be measured and compared to the stated pump body capacity. Considering the many variables such as pump depth and friction loss through the tubing, you should expect some slight variance in sample amount.

MONOFLEX ISOMEGA® BLADDER PUMP SYSTEM

I.V.P. CONTROLLER OPERATION INSTRUCTIONS (continued)

To increase the sample size per pump cycle, adjust the **PUMP VENT TIMER** *slightly* until you notice an increase in the sample size. If no noticeable increase is achieved, set the dial back to the previous mark on the dial. The general idea of adjusting the dials is to achieve the maximum sample size with a minimal cycle time.

Note: For **low-flow sampling**, such as for VOC's, decrease the pump pressure and increase the duration on the **PUMP VENT TIMER** to allow the pump adequate time to empty.

Note: For **well purging** applications, the **VACUUM ASSIST** feature should be used while operating the Monoflex I.V.P. Controller. In situations where there is a minimal amount of head above the pump or partial pump submergence, use of the **VACUUM ASSIST** feature can substantially increase the pumping results. See notations for Air/Gas pump use located in this manual.

TROUBLESHOOTING

- * A short vent time will not allow the pump chamber to fill completely.
- * A short pressure time will not completely evacuate the pump chamber.
- * Sudden appearance of air in the sample fluid is a sign of slow well recovery.
- * Progressively reduced recovery volume is a sign of slow well recovery.

MAINTENANCE

Although we strongly recommend that any Monoflex I.V.P. Controller repairs be performed by Monoflex, please follow these maintenance tips to ensure top performance.

- * Remove and rinse the particle filters located in the shutoff valve and in the quick disconnect fitting on the **AIR OUTLET** with distilled water after each use.
- * When using an air compressor to operate the Monoflex I.V.P. Controller, use only an "oil-less" type compressor. This is very important if using an Air/Gas pump, as the drive air will come in contact with the water in the pump. This could cause oil to migrate from inside the pump to the well.
- * Open the **MANUAL DRAIN** switch during and after each use, (while the controller is pressurized), to drain the internal water trap.

PLEASE READ **WARNINGS** ***PLEASE READ***

- * When operating the controller with the lid closed, the vent knob must be open.
- * Maximum inlet pressure for the controller is 125 PSI (8.6 bar).
- * Controller operation without external in-line filters, or tampering with any of the mechanisms will void all warranties.

MONOFLEX ISOMEGA® BLADDER PUMP SYSTEM

STORAGE

PTFE devices should be stored lying flat on a level surface or suspended from a cord to avoid warping. Avoid storing PTFE beneath or against other objects. Never store PTFE in high temperature environments.

CLEANING PROCEDURES

The **Monoflex** Isomega® Bladder Pump was designed to be easily disassembled, requiring few tools and minimal time.

Step 1: To clean the inside sample chamber, unscrew the top plug assembly (right hand threads), and lift the bladder assembly out of the sample chamber. Thoroughly clean the top assembly and external surface of the bladder by scrubbing with a soft brush. **Exercise care during this procedure so as to not kink or puncture the bladder!**

Step 2: Unscrew the bottom section and bottom ball check assembly. With a soft brush, scrub the internal sample chamber and wash the ball check assembly thoroughly.

Step 3: To clean the top recovery ball check, unscrew the fitting extension. Tip the top plug until the ball falls out. Scrub with a soft brush and re-install.

PUMP DECONTAMINATION

- Disassemble the pump carefully. All O-rings and ball checks must be cleaned and re-installed after the pump is cleaned/decontaminated.
- Do not use N Hydrochloric Acid on Stainless Steel; use extreme care when using on PVC.
- Use extreme care when using Sodium Hypochlorite or Ethyl Alcohol on PVC.
- Water based detergent (e.g. Liqui-Nox®), 20% Nitric Acid, 50% Hydrogen Peroxide, Sodium Hypochlorite, Isopropyl Alcohol, Ethyl Alcohol, and Hexane may be used to clean stainless steel.
- Water based detergent (e.g. Liqui-Nox®), N Hydrochloric Acid, 20% Nitric Acid, 50% Hydrogen Peroxide, Sodium Hypochlorite, Isopropyl Alcohol, Ethyl Alcohol, and Hexane may be used to clean PTFE .

MAINTENANCE

Controller unit repairs are best performed at **Monoflex**. Please call **(800) 523-0224** for repair estimate information.

MONOFLEX Air/GAS DISPLACEMENT PUMP SYSTEM

OPERATION INSTRUCTIONS AND NOTATIONS

Monoflex Air/Gas Displacement Pumps are designed for initial well pumping, well purging prior to sampling or pumping contaminant from recovery wells. Monoflex Air/Gas Displacement Pumps have a larger pump chamber than Monoflex Isomega® Bladder Pumps. This makes them ideal for pumping large volumes of water or contaminant. Monoflex Air/Gas Displacement Pumps may be used for sampling if air to water contact is permissible.

Advantages of Monoflex Air/Gas Displacement Pumps are their ability to safely pump turbid water and their dry run capability. With only two moving parts, a check ball beneath the pump chamber and in the sample discharge fitting, Monoflex Air/Gas Displacement Pumps can safely pump turbid water. In the event of slow well recovery, Monoflex Air/Gas Displacement Pumps can run dry without damage to the pump.

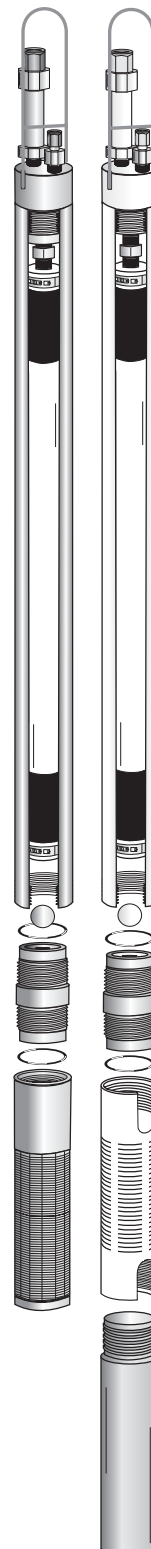
As with Monoflex Isomega® Bladder Pumps, Monoflex Air/Gas Displacement Pumps should be operated with the Monoflex I.V.P. Pump Controller. While the operating principles are the same with bladder and air/gas pumps, (venting, discharge, etc), please see the following notations to ensure maximum performance of your Monoflex Air/Gas Displacement Pump System.

* **NOTE:** Monoflex Air/Gas Displacement Pumps contain only two moving parts. A check ball is located at the bottom of the pump chamber to prevent the captured water from re-entering the well when the pump is pressurized. Another check ball is located in the sample recovery discharge fitting to prevent water in the discharge line from re-entering the pump on the subsequent vent (fill) cycle. All pumps should be disassembled and decontaminated after each use, (particularly if used in a monitoring well), and rinsed to remove any sand particles. Replacement PVC and Stainless Steel check balls and seats are available in the event of wear from long term use.

* **NOTE:** If the vertical distance from the I.V.P. Pump Controller to the static water level in the well is less than 35 feet, **DO NOT** use the vacuum assist feature while operating Monoflex Air/Gas Displacement Pumps. This will pull water into the I.V.P. Pump Controller that *may cause damage to the controller and will void the warranty.*

* **NOTE:** With as little as one foot submergence, Monoflex Air/Gas Displacement Pumps will fill without use of the vacuum assist feature under most conditions. Likewise, Monoflex Isomega® Bladder Pumps will fill to nearly 100% capacity if the top of the pump is submerged five feet below the static water line in the well before pumping. If the installation requires only partial submergence of the Monoflex Isomega® Bladder Pump, the vacuum assist feature should be used to maximize the sample volume.

* **NOTE:** For pump longevity and maximum efficiency, do not use Monoflex pumps when the intake (slot) size of the well is larger than .020 inches. Also, if sand or small particles are trapped underneath either of the check balls during a cycle, the amount of water discharged may decrease from the previous cycle.



MONOFLEX ISOMEGA® BLADDER PUMP SYSTEM

PUMP SYSTEM ACCESSORIES

I.V.P. Pump Controller

The Monoflex Integrated Vacuum/Pressure Controller is designed to operate pumps and samplers with a maximum operating pressure of 125 PSI (8.6 bar). The Monoflex I.V.P. Controller is supplied in a waterproof case with quick disconnect air fittings. An accessory kit and operation manual is supplied with each controller.



PTFE Bladder Assembly

Designed for sample purity and durability, the Monoflex PTFE Bladder Assembly makes field repairs simple. Fully assembled and ready to use, the PTFE Bladder Assembly features a Stainless Steel male nipple for connection to any 1.660 O.D. Monoflex Isomega® Bladder Pump. All bladder assemblies are air tested before shipment. Available for 20", 30" and 40" pump chamber lengths.



I.V.P. Controller Accessory Kit

Each accessory kit contains one each of the following items. These items are used for attaching the air compressor or tank to the I.V.P. controller and for connecting the I.V.P. controller to the pump when a low profile well head assembly is not used.

1/4" compression fitting with a male air coupler plug for connecting the I.V.P. Controller directly to the pump.



Shut off valve assembly for the I.V.P. Controller air inlet, with quick disconnect air fittings.



Low Profile

Well Head Assembly

Monoflex Well Head Assemblies are designed for the limited space between the well casing and protective well cover. All assemblies are flush with the outside diameter of the well casing. Stocked for 2" Schedule 40 wells with corrosion resistant brass and nylon fittings. Other sizes, fitting materials such as Stainless Steel, and water level indicator holes are optional. Monoflex also offers PTFE coated Stainless Steel wire for pump suspension from the well head assembly.



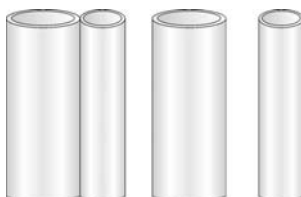
Quick Recoil Air Line

Designed to provide easy attachment from the controller to the well head assembly. Available with or without quick disconnect air line fittings. Stainless Steel quick disconnect fittings are available.



Flexible Plastic Tubing

Monoflex supplies tubing in various sizes and materials suitable for use with pumps and lysimeter systems. Materials include PTFE, Polyethylene, PTFE lined Polyethylene and Nylon. Available in sizes from 1/4" O.D. and larger.



Steel Well Protector with Angle Cut Lid

Angle cut steel well protectors provide vandal proof protection for pump and lysimeter installations. The angle cut lid and the 6.625 inch inside diameter provides easy access to the low profile well head assembly. Wide hinges secure the lid and precisely aligned tabs make them easy to lock. Angle cut steel well protectors are painted red, other colors are available upon request. Stocked in 34 inch lengths, other lengths are available as a special order. **Padlocks sold separately.**



MONOFLEX ISOMEGA® BLADDER PUMP SYSTEM

MONOFLEX TOP-ENTRY ISOMEGA® BLADDER PUMPS

Monoflex Top-Entry Isomega® Bladder Pumps utilize a weir to allow recovery of primarily floating product in monitoring or remediation applications.

Top-Entry Isomega® Bladder Pumps are available in either PVC or 304 Stainless Steel.

Note: These pumps do not automatically adjust to fluctuations of the static water level.

Note: The outside diameter of the PVC or 304 Stainless Steel weir is 2.375" (6.03 cm).



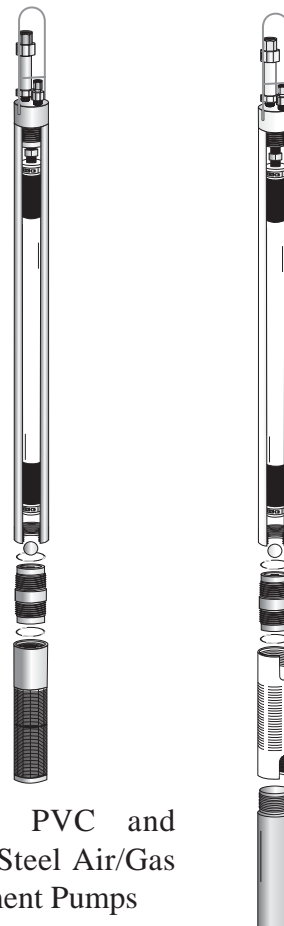
Monoflex Top-Entry
 Isomega® Bladder Pump

MONOFLEX AIR/GAS DISPLACEMENT PUMPS

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Monoflex Air/Gas Displacement Pumps are available in PVC and 304 Stainless Steel. Optional Electropolishing is available for Stainless Steel pumps. Stainless Steel pumps with 316 material are available as a special order. All Stainless Steel pumps are supplied with a .020 slot wire-wrapped inlet screen.

For more information, please see the Monoflex Air/Gas Displacement Pump Operation Instructions located in this manual.



Monoflex PVC and
 Stainless Steel Air/Gas
 Displacement Pumps



ADDITIONAL PRODUCTS AVAILABLE FROM MONOFLEX

Porous Ceramic Cup Lysimeters

Air/Gas Displacement Pumps

StrataSamplers™

Disposable PVC and HDPE Bailers

PVC, Stainless Steel, and PTFE Bailers

Flush Thread PVC Screens & Casings

Well Completion Products

Injection Molded Well Accessories

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