Dual Range Bladder Pump Controller with Compressor

United States Patent Nos. 6,382,933 and 6,619,931

Operator's Manual

AIR WATER SOIL

Innovative Sampling Systems

Serial #110620905

Description

Thank you for purchasing an Innovative Sampling Systems Dual Range Bladder Pump Controller with Compressor.

Upon receipt, please inspect the package for external damage. Report damage immediately to the freight company and advise Innovative Sampling Systems. After unpacking, open the case and note that an external battery charger and auto power cord are installed inside the lid using Velcro fasteners. A plastic sealing plug is inserted into the "Charger" socket.

The controller is shipped fully assembled with the internal lead-acid gel cell battery charged. You may check electronic operation by placing the Main Power Switch in the "Internal Battery" position and the Controller Switch in the "On" position. You will hear the solenoid clicking and see the "Cycle Status" LED change color at a frequency dependant on the settings for the pressure and exhaust timers. Turn the Compressor Switch to the "On" position and you will hear it operating. The battery status may be checked by depressing the "Test " switch button at any time, causing the dual color, green/orange LED to illuminate, green indicates a satisfactory battery charge, orange indicates that the battery needs recharging.

The controller is designed for use with 1/4-in OD plastic tubing for the bladder pump air line using the black push-to-connect fitting on the controller front panel marked "Output To Pump". A detachable standard "M" type quick connect for the external compressed air supply is already fitted to the brass reducer marked "Compressed Air Source". A pneumatic switch enables you to use either the internal or an external compressed air supply. A gauge on the lower left corner indicates the supply pressure.

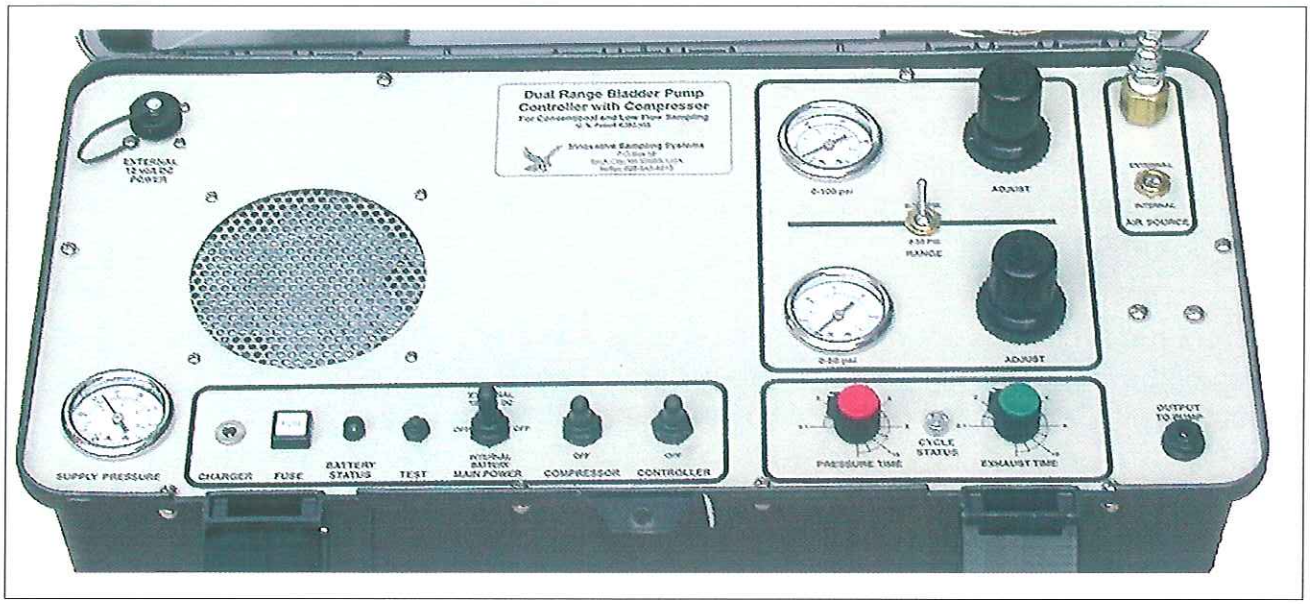
An outlet tube, for the built-in automatic drain filter and the pump exhaust, is located near the circular access port on the lower left side if the case. The liquid drain for the twin receivers is also accessed through this port.

The operating pressure for the bladder pump is controlled by either of the two adjustable pressure regulators which feature a "push-to-lock". To adjust the pressure it is therefore first necessary to pull the regulator knobs out before turning them. The pressure range switch toggle points in the direction of the selected bladder pump operating pressure range.

Times for the pressure and exhaust cycles are set with two potentiometers. A dual color, red/green LED indicates the cycle status, red for pressure and green for exhaust.

The controller is designed to be splash-proof. All the electronics are potted in a sealed box attached to the back of the front panel. The power switches and potentiometers are provided with boots and seals. Ensure that the charger socket has the sealing plug inserted and the external power socket cover secured when in field use.

Extended operation may require the use of an external 12 volt battery. A cable with clips is provided, this plugs into the socket at the top left of the control panel. The main power switch is placed in the "External Power" position when this feature is used.



Set the pressure gauge to the theoretical pressure plus about 10-20 psi to ensure good flow to start with.

Set the timers to about 2 secs.

Install the pump in the well. Then connect the water delivery tube from the pump to a flow cell, (if used) or into a suitable container and secure.

Start the bladder pump by turning the Controller Switch to on and allow the pump to cycle until water is discharged into the container.

Adjust the pressure time to just allow the charge volume of water from the pump to be expelled into the container. Excess time is not necessary and will reduce the pump rate. Too little time will not fully discharge the pump.

Adjust the exhaust time by evaluating the charge volume. Too little time will not allow the pump to completely fill. Excess time will reduce the pump rate.

At a minimum it will be necessary to purge the pump and tubing of water before samples are collected. The following data is provided for the Innovative Sampling Systems Pumps, Models MBP -1000 and MBP 750 with 1-in and 3/4-in diameters by 17-in long and the MBP-1320 with a 1.32-in diameter by 14-in long . All models are designed to use standard 1/4-in OD Teflon® lined polyethylene or solid Teflon® tubing for the water line.

-MBP-1000 stroke volume 95 ml
-MBP-750 stroke volume 51 ml
-MBP-1320 stroke volume 36 ml
-1/4 in. OD Teflon lined polyethylene tubing- 4 ml per foot

Specifications

The Innovative Sampling Systems Dual Range Bladder Pump Controller with Compressor incorporates the latest available technologies to provide a bladder pump controller capable of purging and sampling wells with a head of up to 200 feet. The custom designed precision electronic timers allow accurate timing of each cycle component. The use of two separate pressure regulator circuits allow close control of the applied air pressure from 2 to 100 psi. The internal 12 volt compressor and lead acid gel cell battery allow it to be used as a stand alone unit for driving a bladder pump for sampling monitoring wells. Accessories are provided for charging the internal battery, connection to an external battery and use of an external compressed air source. These features allow the Controller with Compressor to be used for both conventional and low flow sampling from monitoring wells.

Component Specifications:

Air Contacting Parts

Stainless steel, brass, zinc, aluminum, nylon, nitrile rubber, polyurethane and glass filled nylon.

Pneumatic Components

Regulators:	Adjustable 2-50 psig and 5-100 psig with range switch
Gauges:	0-60, 0-100 and 0-160 psig, 1 ½-in Bourdon type
Solenoid:	Air assisted pilot, 0-150 psig inlet and operating pressure, 12 volt 2 watt solenoid
Filter:	Internal, 5 micron, 18 scfm flow at 100 psig, self draining
Inlet:	1/8-in npt with adapter for ¼-in npt and "M" type quick connect
Outlet:	¼-in OD tube push to connect fitting
Reservoirs:	Two tubular stainless steel, total capacity 1.15 liters with manual liquid drain
Fittings:	Internal unregulated- push to connect, regulated -barb type

Compressor

Motor:	12 volt, 10 amp DC motor with thermal protector
Compressor:	Integral, oil-free piston type. Operating pressure 100 psig. Flow 0.92 cfm at 0 psi, 0.27 cfm at 100 psi. Operation controlled by a pressure switch

Electronic Components

Controller:	Electronic timers for pressure (on) and vent (off) cycles, adjustable from 0.1 to 10 sec ± 10%, repeat accuracy ±0.1% for on and off times. Timer status provided by dual color (red/green) LED indicator
Switch	Pressure switch mounted on reservoir set to operate at 90 psi ±10%
Battery Status	Front panel push button operates a comparator to provide LED indication of voltage. Green 11 to 13.6 volts, Orange below 11 or above 13.6 volts ±5% both ranges

Maintenance

The controller is designed for long term use with minimal maintenance. The case and mylar laminated front panel may be cleaned with a water based detergent. Take care to prevent liquids entering the external power and charger sockets on the front panel. The supplied grey plug should always be inserted in the charger socket when the charger is not being used.

Before each use check to ensure that the receivers are drained of liquid. Raise the right side of the case, open the drain valve on the lower left side of the case, inside the access port. Turn on the compressor to expel liquid and excess moisture. Ensure that the drain is closed after completing this procedure.

In the event of water being pumped into the controller from either the compressed air supply or by mis-connecting the pump tubing, the following steps should be taken:

Turn off the controller power switch.

Disconnect the controller from the air supply and the pump.

Connect a source of clean compressed air to the controller.

Connect a short, 1-3 ft. , tube to the pump output connector and secure the distal end away from personnel.

Turn on the controller and allow it to cycle for a few minutes at short cycle times to remove the water from the controller.

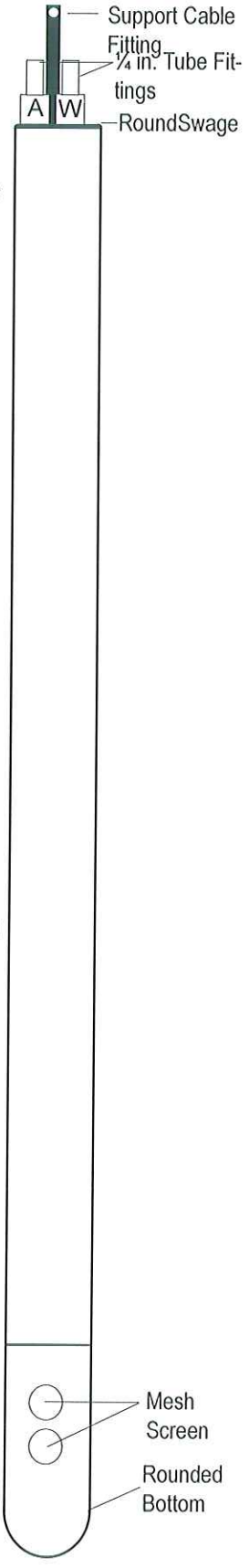
The fuse provided with the controller may be replaced as follows using a fuse with a rating of 25 amps or less:

Use a Phillips head screwdriver to remove the fuse as indicated on the fuse holder. The spring loaded fuse will be ejected for examination or replacement.

In the event that the controller does not operate correctly please contact Innovative Sampling Systems for advice, using the contact information on the inside front cover (page 2).

MBP Series Mini Bladder Pumps

Description



The new MBP Series of bladder pumps,U.S. Patent No 6,382,923, use the squeeze operating principle for gentle purging and sampling. They feature either all stainless steel and Teflon® or PVC, Delrin® and Teflon® construction for durability and lack of effect on the sample or the matrix.

The designs provide new concepts in ground water sampling:

The stainless steel models feature a short, 17-in long and slim, 1-in (MBP-1000) or 3/4-in. (MBP-750) diameter, body which makes them ideally suited for use in small diameter monitoring wells and piezometers. Additional features include rounded ends to assist in preventing hang up, and a detachable bottom with a point source intake that is only 1¼-in. long. Pump efficiency is enhanced with the new flow-through design. The pump incorporates standard ¼-in. diameter barbed fittings suitable for bonded or regular ¼-in. tubing. A fitting is also provided to allow attachment of a support cable.

The small physical size of these pumps permits a stroke volume of between 51 and 95 ml. When used with the new Dual Range Controller pump rates of up to 1.75 l (0.46 g) per minute are possible. with the 1- in. model and 1.45 l (0.38g) per minute with the3/4-in. model. For these tests the pump was positioned about 8 feet below the water surface.

The all plastic model, (MBP-1320) is just 14-in long and 1.32-in diameter. It is made from PVC and Delrin® with a Teflon® bladder. The point source inlet is 0.5-in long and is protected by a plastic mesh screen. The removable bottom is weighted to ensure easy submergence. The take-apart design allows both the upper and lower check valves as well as the pump inlet screen to be accessed for maintenance. The pump is provided with push-to-connect fittings for standard ¼-in diameter tubing and a fitting for the attachment of a support cable. This model has a working stroke volume of 36 ml and a maximum pump rate of 1.2 l (0.32 g) per minute using the Dual Range Controller.

The pumps are equally suited to applications where low flow purging and sampling is required from wells of any diameter. Flow rates as low as a few milliliters per minute are easily attained when used with the Dual Range Controller. The special flexible Teflon® bladder used in the MBP series pumps also make them suitable for use in shallow submergence situations, 1-3 feet below the water surface.