



Solinst[®]

Groundwater Samplers



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Groundwater Samplers



Selecting the Right Groundwater Sampler

There are many things to consider when selecting a groundwater sampler:

- What you are sampling for: general chemistry, volatiles, metals
- The type of sample needed: low/high volume, purging/grab
- Sampling depth
- Sampling frequency: portable or dedicated equipment
- Monitoring well characteristics: diameter, depth to water, recharge rate
- Ease of sampler operation, repairs in-field, decontamination
- Local regulations, requirements, protocols, SOPs
- Sampling environment/site logistics
- Budget restrictions

Whatever your needs are, Solinst has a groundwater sampler to meet them.



Solinst Groundwater Samplers

Solinst Groundwater Samplers can generally be categorized into five different groups:

Peristaltic Pumps:

- Model 410 Peristaltic Pump
- Samples are obtained using mechanical peristaltic operation: rotating rollers depress silicone tubing, creating a vacuum, displacing any fluid or gas in the chosen direction
- Very portable; use for purging, low flow and regular flow sampling of shallow groundwater

Submersible Pumps:

- Model 415 12V Submersible Pump
- Samples are obtained using a rotating 12V motor impeller; as voltage is increased at the pump's controller at surface, the pump's motor turns faster and increases the flow rate
- Portable and simple to operate; use for high purge and sampling rates

Inertial Pumps:

- Model 404 Inertial Pumps, Mini Inertial Pump
- Sample by repeatedly lowering and raising the footvalve and tubing; water enters the tubing on the downward stroke and is retained as the valve closes on the upward stroke; water gradually rises in the tubing to surface
- Low cost; easy to operate for purging and sampling; ideal for dedication

Pneumatic Pumps:

- Model 407 Bladder Pumps, Model 408 Double Valve Pumps
- Pumps are air/gas driven. Pumps fill when lowered to depth. Air/gas drives the sample out of the pump and up the tubing. A vent cycle refills the pump. Repeated drive/vent cycles bring samples to surface.
- Ideal for low flow sampling; obtaining representative VOC samples; dedicated or portable options

Grab Samplers:

- Model 425 Discrete Interval Samplers, Model 428 Disposable Bailers, Model 429 Point-Source Bailers
- Sampler is lowered to depth; raised to surface; check ball(s) retain the sample as the sampler is lifted
- Use for low, set volume, spot samples; no-purge/passive sampling; easy to dedicate or transport
- 425-D for deep sampling to 1200 m (4000 ft)



Groundwater Samplers

Solinst Peristaltic Pump



The **Model 410 Peristaltic Pump** is made for field use, as it is robust, water-resistant, and simple to use and transport.

For added convenience, it uses alligator clips with a 3 m (10 ft.) power cord to connect to a 12V DC power source to operate, such as a car battery. Optionally, connect a 12V Battery Holder to the pump to easily transport a battery into the field for shorter duration sampling applications. The pump has a quick-reset circuit breaker, and reverse polarity protection to prevent damage to the pump.

It provides vacuum pumping and pressure delivery of liquids and gases, up to the suction lift limit, which could be as much as 10 m (33 ft.) at sea level. It is ideally used to sample shallow groundwater and vapors in wells and Solinst Model 615 Drive-Point Piezometers.

The Peristaltic Pump has one control that allows reversible flow and variable pumping rates. It can be fitted with 2 different sizes of silicone pump-head tubing. The standard 5/8" OD (16 mm) tubing delivers up to 3.2 L/min.

The 3/8" OD (10 mm) tubing adaptor kit allows sample rates as low as 40 ml/min, ideal for low flow sampling and filling smaller sample bottles. The pump head design makes tubing very easy to change or replace.

Model 410 Peristaltic Pump Specifications

Pump Size	33 cm x 13 cm x 17 cm (13" x 5" x 6-1/2")
Pump Weight	3.3 kg (7.2 lbs)
Power Source	12 volt DC
Power Draw	3 - 5 amps max.



Sampling from a Solinst Model 615 Drive-Point Piezometer



12V Submersible Pump

The **Model 415 12V Submersible Pump** provides high purge and sampling rates, making it ideal for sampling when using the 3 well volume protocol, or for use when performing constant head tests in high K (hydraulic conductivity) environments.

The 12V Submersible Pump and Pump Controller are lightweight, portable, and easy to set up, deploy and operate. The Pump's sleek, short design ensures it fits easily down nominal 2" OD monitoring wells without any hang-ups.

The 12V Submersible Pump cable connects to the 12V Pump Controller, which then clips to a 12V power source. Simply turn the dial on the 12V Pump Controller clockwise to increase the voltage to the Controller, which turns the Pump's motor faster and increases the flow rate.

The Solinst 12V Submersible Pump is capable of pumping groundwater from 36.5 m (120 ft) below ground surface, with flow rates up to 13.5 L/min (3.6 US gpm) in shallow conditions.



Inertial Pumps

The **Model 404 Inertial Pumps** are a simple and inexpensive option for groundwater sampling, purging and monitoring well development. Pumps are able to handle very silty water. They are ideal for dedication.

The Inertial Pump consist of a length of riser tubing, LDPE or PTFE, with a one-way footvalve connected to the end. Various diameters are available, and stainless steel or Delrin® footvalves are offered. Sizes range from a Mini 1/4" (6 mm) OD Inertial Pump to a 1" (25 mm) OD Delrin footvalve. The sizes allow options for 0.4" - 6" ID wells. When operated by hand, depths of 30 m (100 ft.) can be reached.

The 1/4" (6 mm) OD Mini Inertial Pump (MIP) is made for sampling from the narrow channels of a Solinst Model 403 CMT System.

Model 404 Inertial Pump Specifications

Pump Assembly	Footvalve	Footvalve Dia.	Tubing Selection
	403 MIP	1/4" (6 mm)	1/4" x 0.17" (10 mm x 6 mm)
	D16	5/8" (16 mm)	5/8" x 1/2" 16 mm x 12.5 mm)
	SS16	5/8" (16 mm)	5/8" x 1/2" (16 mm x 12.5 mm)
	SS19	3/4" (19 mm)	5/8" x 1/2" (16 mm x 12.5 mm)
	D25	1" (25 mm)	5/8" x 1/2" (16 mm x 12.5 mm)

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Solinst Bladder Pumps and Double Valve Pumps

Model 407 Bladder Pumps & Model 408 Double Valve Pumps are each available in two sizes. The stainless steel Pumps are ideal for applications where VOC analysis of the sample is important. They are excellent for most municipal, industrial, and general environmental sampling purposes. The lower cost 1.66" PVC pumps are ideal for metals sampling and highly-corrosive environments.

With the Model 407, the bladder does not allow any air to contact the sample water, as such, representative samples are always obtained. PFAS-free Santoprene® bladders are standard and are ideal for long-term, dedicated use. The easy-to-replace bladder cartridges also make them convenient for short-term or one-time use applications.

Double Valve Pumps operate without a bladder, allowing for higher flow rates, and easy disassembly for decontamination. If operated with precision, air will never contact the sample water, producing repeatable, representative samples.

With tubing reels and wells caps, both the Bladder Pumps and Double Valve Pumps have portable and dedicated installation options. Operating these pneumatic Pumps is easy using a 12V Compressor and the custom or pre-set sampling modes built into the Model 464 Electronic Pump Control Unit.

The Model 408M Micro Double Valve Pump is only 3/8" (9.5 mm) in diameter. It is constructed from very flexible coaxial PFAS-free PTFE tubing, with stainless steel fittings and a filter that is simple to clean and replace. This Pump provides low flow sampling from 20 ml/min to 200 ml/min, to depths of 73 m (240 ft.).

The Pump fits in 1/2" (13 mm) ID tubing, making it ideal for sampling in the narrow channels of a Solinst Model 403 CMT® Multilevel System and the 5/8" (16 mm) open tubes of a Model 401 Waterloo Multilevel System.



	Bladder Pump	Double Valve Pump
Pump Material	Pump Diameter	
316 Stainless Steel	1" and 1.66" (25 mm and 42 mm)	5/8" and 1.66" (16 mm and 42 mm)
PVC	1.66" (42 mm)	1.66" (42 mm)
Pump Material	Maximum Depth	
316 Stainless Steel	150 m (500 ft.)	150 m (500 ft.)
PVC	30 m (100 ft.)	30 m (100 ft.)
Pump Type	Minimum Flow Rate	
All	100 ml/min or less	100 ml/min or less
Pump Diameter	Maximum Flow Rate	
5/8" (16 mm)	N/A	700 ml/min
1" (25 mm)	400 ml/min	N/A
1.66" (42 mm)	1000 ml/min	1500 ml/min

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Pneumatic Pump Accessories

The **Model 464 Electronic Pump Control Unit** provides options for automatic and manual operation of pneumatic pumps. It is available in 125 psi and 250 psi versions. Automatic operation includes sampling pre-sets for low, medium, and high flow rates. The Control Unit is also capable of saving up to 99 custom flow rates, created by the user to suit specific applications.

The Model 464 can also be operated manually, without batteries. A Manual Control Valve is pushed to create a drive cycle, then release to allow the system to vent. The Control Unit comes with all fittings and tubing required for connection to the pump and to an air compressor or gas cylinder.

The **12V Low Flow Compressor** is lightweight (9.5 kg (21 lbs)) and easy to transport. It is oil-less and uses a 12 V DC power source to operate, such as a car battery. Alligator clips are used to simply connect to a power source. The Compressor uses a 2 US gallon (7.6 L) tank, rated to 175 psi. It operates at up to 150 psi, as such, it is useful for low flow sampling applications to depths of 30 m (100 ft.).



Locking Well Caps are a convenient option for dedicating pumps for long-term projects. The Model 407/408 Dedicated 2" Well Cap Assembly has built-in quick-connect fittings to attach 1/4" or 3/8" drive and sample lines. There is an additional access hole for monitoring equipment such as a Water Level Meter or datalogger. The suspension hook on the underside of the cap provides pump support. A Reducer Assembly is available to fit the cap to a 4" well.

Tubing Reels make transporting Bladder Pumps and Double Valve Pumps very convenient. This is ideal for less frequent sampling, and allowing access to multiple monitoring wells and hard to reach or remote locations. The tubing fittings on the front of the free-standing reel make connection to the drive and sample lines easy.



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Discrete Interval Sampling

The **Model 425-D Deep Sampling Discrete Interval Sampler** allows no-purge samples to be obtained from submerged depths as much as 1200 m (4000 ft).

The 1.66" sampler is stainless steel and is connected to a length of LDPE tubing, which is wound onto a reel. The reel has a connection for a high pressure hand pump and a pressure/vent switch. To overcome buoyancy, weights are connected to the Discrete Interval Sampler before lowering.

Once the sampler reaches the desired sampling depth, it is pressurized. Using the basic principles of hydraulics, the pressure acts on the top of a piston (larger surface area) inside the sampler, overcoming the hydrostatic pressure acting on the bottom of the piston (smaller surface area) to allow sample water to enter.

As sample water fills the sampler, air from the sampler is vented through holes (covered with a Vyon® filter) on the side of the sampler, which are also opened with the applied pressure.

After the sample is collected, the pressure is released, allowing the piston to reseal at the bottom of the sampler. The sealed sampler is then retrieved to surface, maintaining chemical stability of the sample.

At surface, the sample is collected by reapplying pressure to the Discrete Interval Sampler. The flow of the sample is regulated by the amount of pressure applied.

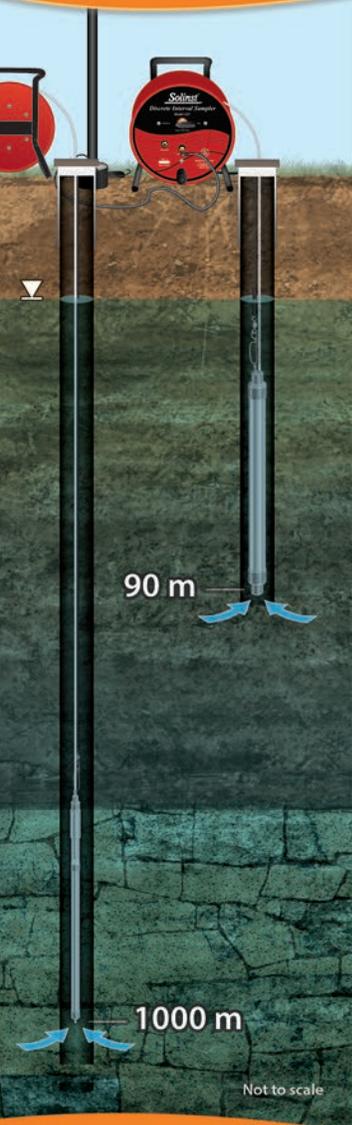


The **Model 425 Discrete Interval Sampler** provides a no-purge sampling option for collecting groundwater samples from discrete levels, and points of inflow, in wells and boreholes. It can also be used for profiling open water bodies, and for sampling above and below oil/product layers, as well as the actual product (e.g. LNAPL and DNAPL).

The stainless steel Discrete Interval Sampler is available in 1", 1.66", and 2" diameters. Operation is up to 90 m (300 ft.) below water level. The samplers are connected to a length of LDPE tubing, which is wound onto a reel. The reel has a connection for a high pressure hand pump and a pressure/vent switch.

The pump is used to apply pressure and seal the Discrete Interval Sampler before it is lowered. This prevents water from filling the sampler, until it reaches the chosen depth. Once the sampler reaches depth, the pressure is vented and hydrostatic pressure fills the sampler. Before retrieval, the sampler is repressurized to ensure there is no mixing of water from different levels on the way up.

At surface, the pressure is released to allow the sample to be decanted using the sample release device. This regulates flow and minimizes sample degassing, suitable for VOC sampling.



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Easy-to-Use Bailers

The Model 429 Point-Source Bailer is ideal for obtaining high quality, representative “grab” samples of groundwater from specific depths. Sampling can be done without purging.

The Point-Source Bailer is stainless steel with PFAS-free PTFE check balls. It comes in 0.5, 1, 1.5, or 2" (12.7, 24.5, 38.1, or 50.8 mm) diameters, and 2, 3, or 4 ft. (61, 91, or 122 cm) lengths.

It can be used in an open borehole or screened well, providing a simple, cost effective device for aquifer profiling. Because there are check balls at the top and bottom of the bailer, minimum water enters the sampler during retrieval. The 0.5" (12.7 mm) OD miniature model is made for use in narrow tubes and direct push devices.

The Model 428 BioBailer™ is a low cost, disposable PVC bailer. It has a rigid design, tapered ends, and a sturdy handle for easy deployment. Its dense construction means there is no need to use weights for deployment. The 1.5" x 3 ft. (38 mm x 91.5 cm) version has capacity for over 1 litre of sample water (1025 mL), the 3/4" x 3 ft. (19 mm x 91.5 cm) version holds 200 mL.

The clear PVC allows the sample water to be examined before being decanted using the sample release device. The sample release device, all components of the bailer body, and the packaging are all biodegradable when disposed of in a landfill.



™BioBailer is a trademark of Environmentally Suitable Products (ESP) Ltd.



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Groundwater Sampling Accessories



The Model 800 Low Pressure Packers are convenient and easy to use. They are ideal for isolating discrete zones for various groundwater sampling and monitoring applications.

The Packers are designed for pneumatic inflation at pressures from 20 - 50 psi; inflatable with a hand pump. Single or Straddle Packers are available in two sizes, primarily used in 2" and 4" monitoring wells, or in smooth boreholes and wells with 1.9" - 5" inside diameters.

Solinst Packers consist of a gland of black carbon reinforced rubber (BCR) on a Sch 80 PVC body. They are lowered with little effort using flexible low-density polyethylene (LDPE) tubing or rigid PVC drop pipe; a Model 103 Tag Line can be used for extra support and for accurate deployment. The inflation line is easily attached using the barb fittings on each packer.

Model **800M Mini Packers** are 1 ft. (305 mm) in length and 1.8" (46 mm) in diameter. They are designed for falling head tests, and work easily with the Solinst Model 415 12V Submersible Pump to isolate groundwater sampling zones and reduce purge volumes in nominal 2" OD wells.



The Model 103 Tag Line was originally designed for use during the construction of monitoring wells, to measure the depth of a well or to tag a backfill layer of sand or bentonite.

The Solinst Tag Line uses a weight clipped to a PVDF coated, laser marked, stainless steel cable or laser marked flat tape. The cable/tape is mounted on a sturdy free-standing reel.

Because the weight is easily clipped off, the Tag Line can be used to deploy a number of different instruments, and because the cable/tape is marked, you can ensure you are getting your instruments to the proper depth.

This is excellent for bailer deployment. The Solinst Model 428 Disposable Bailers, Model 429 Point Source Bailers, and the Model 425 Discrete Interval Samplers, all have a convenient connector to securely attach a Tag line. Tag Lines can also be used to install Packers, and are great safety supports for downhole Bladder Pumps or Double Valve Pumps.



Model 860 Disposable Filters meet filtration requirements and provide a quick and safe method for preparing groundwater samples for metals analysis and for filtering large volumes of turbid water. They have 650 cm² of effective filtration area and use a 45 µm membrane. The polypropylene filter is disposable, saving the need to decontaminate or replace filter discs. The filters have a 3/8" (9.5 cm) hose barb inlet and outlet, and a 1/8" NPTM vent/drain connection.



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