



## How Solinst Vented Datalogger Hydrophobic Filters Work

Solinst designs dataloggers to be as low maintenance as possible. When developing the LevelVent and AquaVent vented water level dataloggers, hydrophobic filters were selected as an alternative to consumable desiccants.

Hydrophobic filters are designed to protect the vent tube from moisture for the lifetime of the instrument—no replacements required.

Hydrophobic filters are located inside the LevelVent and AquaVent Wellheads

where they are vented to the atmosphere. Hydrophobic filters are also located in the LevelVent and AquaVent loggers where the Vented Cable connects.

The hydrophobic filters used in the LevelVent and AquaVent systems are expanded polytetrafluoroethylene (ePTFE) membranes.

ePTFE membranes have pores that are greater in size than air, but much smaller than a drop of water. As such, they are naturally hydrophobic and repel water. Along with



moisture, they ensure no contaminants such as salts or dirt enter the instruments.

While the ePTFE membranes provide a moisture and contaminant barrier, they do allow air to flow freely in both directions, at a rapid rate.

As air pressure changes, the fluctuations are transmitted through to the vent tube down

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## Solinst Bladder Pumps The Solution In PCE Vertical Distribution Investigation

Gruppo Egeo, the exclusive distributor of Solinst products in Italy, recently worked with a client with very specific groundwater sampling requirements.

Their client Tecno Habitat, an engineering company specializing in the environment, has the task of investigating the vertical distribution of tetrachloroethylene (PCE) in the groundwater at an abandoned industrial site.

PCE is a moderately toxic chemical that is most commonly used in dry-cleaning and degreasing products. It is classified as a volatile organic compound (VOC). PCE is mobile in groundwater, and in sufficient quantities is found as a dense non-aqueous phase liquid (DNAPL).

Three main factors were considered when selecting the appropriate groundwater sampling pump.



### 1. Flow Rate

When sampling for VOCs, an important goal is to minimize the disturbance of groundwater in order to reduce off-gassing of VOCs.

Low flow sampling is a widely accepted sampling protocol, especially when VOCs are involved. Low flow sampling involves extracting groundwater at rates comparable to ambient groundwater flow.

Drawdown, mixing, and turbulence are minimized, allowing a sample that is representative of actual in-situ conditions.

A pump that provides a low flow rate of 100 ml/min was deemed ideal in this case for minimizing off-gassing. As such, traditional

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## Solinst Water Level Meter Helps Characterize Habitat of Endangered Snake

Long Point Basin Land Trust (LPBLT) is a charitable, non-government organization located in Port Rowan, Ontario, Canada. They work to establish and maintain areas of ecological importance and promote conservation throughout the Long Point Basin community. A major focus of LPBLT is the preservation of Carolinian reptile populations.

This past winter, LPBLT teamed up with environmental consulting firm Natural Resource Solutions Inc. and two other conservation organizations, 8Trees Inc. and Ontario Nature, to study critical Gray Ratsnake habitat.



Endangered Carolinian Gray Ratsnake  
Photo Credit: Jessica Ferguson

Both the Ontario and Canadian governments list the Carolinian population of Gray Ratsnake as Endangered. This species is at risk largely due to fragmentation, degradation, and loss of habitat, including their overwintering sites. These hibernacula are key to the Gray Ratsnake surviving the harsh winter months in Ontario.

The first phase of the study used radiotelemetry to track the snakes to their hibernacula. Fortunately, one of the major hibernation sites is located within property protected by the Nature Conservancy of Canada. This site, along with several constructed hibernacula

previously established by LPBLT, were the focus of the study. In total, seven sites were identified for monitoring.

Wintering sites for the Gray Ratsnake are located in the subsurface, below the frost line, and above the water table. As such, monitoring wells were constructed at each site to help characterize the subterranean conditions of the hibernacula. Each well was installed to a depth of 7 ft. Many of the sites are located on the Norfolk Sand Plain, which is fairly dry, so not all the wells hit groundwater; the sites that did measured the water table at approximately 3–3.5 ft.

To aid the subsurface investigation, Solinst donated a Model 102M Mini Water Level Meter to measure the depth to groundwater in the monitoring wells. Water level measurements were collected once each week throughout the monitoring period. Other parameters monitored included frost depth, groundwater temperature, and underground air temperature.

The investigation will identify any differences, as well as characteristics shared, between the natural and installed hibernacula. This will provide insight into what features make up an effective hibernation site and assist in future



Groundwater Monitoring Wells Installed at Hibernaculum

expansion and development of suitable habitats. In addition, it will help determine if any existing installations could benefit from changes or upgrades.

Dependant on funding, LPBLT plans to continue monitoring this coming winter. Ultimately, the study will expand on the current understanding of the Carolinian Gray Ratsnake and further support the conservation efforts of this Endangered population.

*Solinst thanks Kristyn Richardson for providing the details of this project.*

## NEW LevelVent Vented Water Level Datalogger!

The LevelVent is designed to provide instantly accurate water level data. Without the need for barometric compensation, the data is 2x more accurate than our Levellogger water level dataloggers. The LevelVent features hydrophobic filters that ensure the vent tube remains dry—no need for replacement!

- Vented version of our popular Levellogger®
- Accurate (0.05%FS) water level data
- Battery lasts up to 10 years (1 reading/min)
- No desiccants to replace
- Solinst 3 year warranty
- Extremely durable vented cable
- Custom blowout fitting for vented cable maintenance
- Complete compatibility with Levellogger accessories and Solinst telemetry systems



## How Hydrophobic Filters Work

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to the sensor. This results in the cancellation effect of barometric pressure on the transducer. This high rate of airflow also enables short response times, preventing inaccuracy and delays in measurement results.

Continuous equalization of pressure and temperature also eliminates any vacuum effect, which could pull moisture into the instrument.

There may be concerns when using a vented water level datalogger in prolonged hot, humid conditions, as traditional vented systems require on-going maintenance to ensure the vent tube remains dry.

However, ePTFE membranes in the Solinst vented systems have been tested in-depth under a number of different environmental conditions, including high heat and humidity. The membranes passed humidity testing for vent durability using industry recognized methods. Testing was conducted at 85°C and 85% relative humidity for 1000 hours.

For more details, read the full technical bulletin in our **ON THE LEVEL Blog**.



## Supporting Water For Life's Well Drilling Efforts In Haiti

Water For Life in Haiti is a non-profit organization that has been providing safe freshwater supplies to rural communities for over 30 years.

To date, over 1700 working wells have been drilled in southern Haiti, supplying clean drinking water and water for raising livestock. In addition, six irrigation wells have been installed to help support local agricultural efforts.

Water For Life oversees the maintenance of each well; they also provide training to locals to assist in the operation and service of the well pumps. Currently, they have two drilling teams and two pump teams.

Recently, Solinst donated three Model 102 Water Level Meters to help with their well drilling and pump installation projects.



These Water Level Meters were first used in the village of Malette, Camp Perrin Haiti. Previously in this community, children and women had the tough task of supplying water to the village. They would walk an hour to nearby mountains to gather freshwater.

Now, Water For Life has installed a drinking water well right in the village. Solinst Water Level Meters were used to monitor water levels during installation and helped ensure the proper placement of the hand pump.

Thanks to Water For Life, the new well provides potable water and will help "protect against the deadly waterborne diseases and allow children to spend more time getting an education."



Solinst thanks Vadna Georges and Leon Miller for providing information about this project.

## 5 Reasons To Add The LevelSender To Your Levelloggers

Do you have a network of groundwater monitoring wells? Are the wells equipped with Levellogger water level data loggers? Are you frequently traveling long distances to collect the data?

These are all reasons you need LevelSender telemetry! The Model 9500 LevelSender uses a GSM cellular modem to send water level data from remote Levelloggers in the field to a Home Station computer and smart devices via email and SMS.

Here are five more reasons you should consider adding LevelSender telemetry to your Levelloggers:

### 1 – It's Easy

The LevelSender simply connects to your Levellogger's Direct Read Cable using a Reader Cable.

The LevelSender can be used with your existing Levelloggers (even Gold versions) as long as they are using the most up-to-date firmware.

### 2 – It's Compact

A LevelSender is able to fit inside a 2" well!

So, you can fit a LevelSender with a Levellogger and Barologger inside the same well. This allows for discrete and secure deployment. You most likely won't have to make too many adjustments to your existing well installation.

### 3 – It's Efficient

Once you have all of the required equipment, programming and getting your LevelSender up and running is really fast.

You just need to download the LevelSender PC Software from the Solinst Downloads page on your Home Station computer (it's free!). Connect the LevelSender to your PC using a mini USB cable.

A Software Setup Wizard guides you through each step required to program your LevelSender, including your GSM modem SIM card setup, email setup, data collection and reporting schedule, and data recipients.



It is also effortless to make remote changes to the data collection schedule after the LevelSender is deployed. You can also remotely set the Levelloggers to record independently in their own memory as a back-up.

### 4 – It's Convenient

You get water level data without having to go out and collect it!

The remote water data is sent to you in various ways, ensuring you are covered. And access to remote real time data on multiple devices helps you make accurate decisions more quickly.

First, data is sent to the Home Station PC.

You can view each data report sent to the Home Station email using the LevelSender Software. You can also export and save Levellogger data files. The data files are opened in Levellogger Software for barometric compensation or other data adjustments.

Also at the Home Station, data from each report is placed in an SQLite database. The database is appended with each report. The database can be queried by your own macros or applications to automatically check for updates and display the data on your own website or another custom setup of your choosing.

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# Bladder Pumps The Solution In PCE Vertical Distribution Investigation



sampling systems such as bailers and inertial pumps were eliminated as options.

## 2. Sampling Depth

Next, the required sampling depths had to be taken into account. The four monitoring wells being sampled have static water level at 37.5 m below ground surface. Samples are required from 42, 46, and 48 m below the surface.

This ruled out the use of low flow sampling options, such as a peristaltic pump, which is designed for shallow groundwater sampling scenarios.

## 3. Water Temperature Stability

The concentration of PCE in groundwater is highly sensitive to variations in temperature. Therefore, this excluded the use of samplers that use submersible motors.

The use of down-well motors could potentially raise the temperature of the groundwater, causing the concentration of PCE to change and become unrepresentative of the actual conditions.

## The solution...

Solinst Bladder Pumps were selected as they meet and exceed the criteria for this sampling project.

**Flow rate:** when using a Solinst Electronic Pump Control Unit, the Bladder Pump can be adjusted to provide a continuous output of 100 ml/min or less.

**Sampling depth:** Solinst Bladder Pumps can lift from depths up to 150 m (500 ft) below grade.

**Water temperature stability:** Solinst Bladder Pumps are operated using an Electronic Pump Control Unit and an air compressor or compressed gas source at the surface. There are no components that would introduce a temperature change down-well.

In addition to providing low flow rates, Solinst Bladder Pumps have other characteristics that make them ideal for VOC sampling.

The pump tubing and bladder ensure there is no air/water contact during operation, reducing the risk of the sample being aerated.

During operation there is slow, steady compression of the bladder, minimizing off-gassing and turbulence, allowing undisturbed VOC samples.

*Solinst thanks, Claudio Zalunardo of Gruppo Egeo for providing the details of this project.*

## Redesigned Model 410 Peristaltic Pump



Built for fieldwork, the redesigned Peristaltic Pump's upgrades make it even more durable and handy for vapour or water sampling from shallow groundwater or surface water.

The new pump head is clear, allowing quick, convenient inspection of the pump head tubing before and during operation. The pump head cover is easy to remove for faster cleaning or replacement of the tubing. The Peristaltic Pump also features a new easy-to-reset circuit breaker, which protects the pump's electronics. There is no fuse to replace.

## 5 Reasons to Add LevelSender Telemetry

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In addition to the Home Station email, you can program five other email addresses to receive data reports. So, you can get data on your smartphone and set up your colleagues to get data as well.

Finally, you can get the data sent to your smartphone via text messages.

### 5 – It's Inexpensive

To start, purchasing a LevelSender itself is fairly reasonable—remember, you probably already have some of the equipment you need. (Plus, LevelSender Software is free!)

The LevelSender has very low power needs. It uses three 1.5V AA lithium batteries to operate. And depending on your data



sampling and reporting rates, they can last up to four years without replacement.

LevelSender telemetry also has low monthly data plan requirements.

In general, telemetry provides the means to access remote site data, cutting out the need to travel to the site. This means travel and labour costs are reduced and project costs can be minimized.

Another great feature of the LevelSender system is that each data report contains diagnostic information including battery level and system status. This means you can keep an eye on things, and only go out to the field when you need to.

For more details, read the full article in our **ON THE LEVEL Blog**.