Benefits of the Constant Flow Bubbler with FastTrack Capability

White Paper

Benefits

- **Field-Tested Accuracy, Dependability & Efficiency**
  Unlike standard bubblers of yesteryear that required large tanks of air to work, Sutron's Constant Flow Bubblers efficiently operate using a small battery-operated compressor combined with advanced capabilities such as automatic purges and blockage detection.

  The Constant Flow Bubbler measures water level using Sutron's Accubar® Pressure Sensor that has an impressive 15 year track record of high accuracy measurements. The Accubar® is fully compensated for temperature to maintain an accuracy of better than *0.05% no matter what the water level is or the temperature is outside,* an accuracy better than 0.01 feet at 20 feet, the USGS Office of Surface Water requirement.

- **Long-Term Reliability**
  While most submersible pressure sensors last only a year or two, bubbler stations are known to operate for many years with a minimum of service. Sutron's Constant Flow Bubbler with automatic purge and blockage detection basically needs only an inexpensive orifice line running into the water, anchored to a fixed location in the area being measured. Sutron-manufactured instruments are built to last a decade or longer, with proper maintenance. Many Sutron Bubblers worldwide have continuously operated for over 20 years.

- **No Structure Needed Over the Body of Water**
  Because the CF Bubbler does not require a mounting structure over a body of water, it offers far broader site selection than radar sensors or submersibles. Moreover, since the CF Bubbler is able to continue giving peak performance with over 1000 feet of tubing, it can be installed at a considerable distance from the water being measured.

Advanced Features

- **Built-in keypad & display** make site setup and maintenance an easy task.
- **Data Back-Up Assurance** - Built-in logger that automatically records data and provides redundancy even if the station logger fails.
- **Built-in SD slot** for easy download of data - When iit is necessary just insert an SD card and download all the data.
- **Dual orifice model to measure two water levels or two separate bodies of water simultaneously** – the second level can be a redundant sensor or a sensor located in a nearby area.
- **Density & suspended sediment model** that allows you to correct for the true density of the water/fluid being measured. Plus advanced built-in computation software in the bubbler to automatically calculate suspended sediment for heavily loaded streams/ponds (>5,000 mg/l).
- **FastTrack Mode** for collecting data from fast rising streams – Standard Bubblers take time to respond to changes in water level. The CF Bubbler's FastTrack mode speeds up the sensors' response to precisely measure levels in rapidly changing conditions.

Compact Constant Flow Bubbler
Big Performance - Smaller Package

Dual Orifice Constant Flow Bubbler
Redundant Data Collection Using Two Orifices

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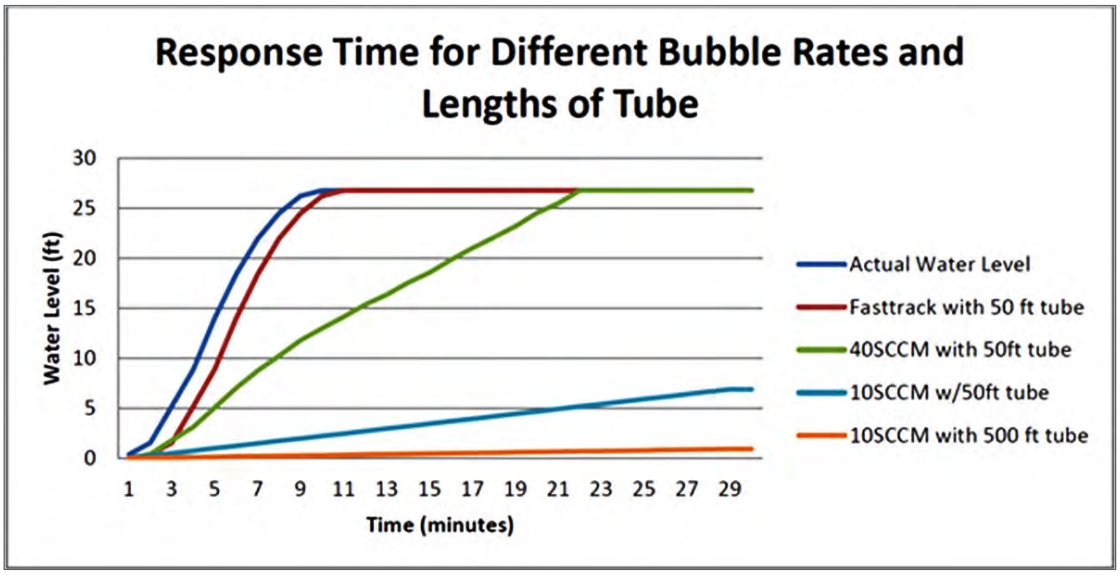

FastTrack - *Really* Real-Time

Sutron first recognized the need for FastTrack while working at the site of a lock/dam where the water levels change rapidly due to the opening and closing of gates. When the downstream gate was closed, the water level in the canal rose quickly but the reading from the bubbler lagged behind by more than 30 minutes. We first tried faster bubble rates which helped speed the response but did not reduce the lag time to acceptable levels.

We developed FastTrack to enable the bubbler to record actual water levels with just a one-minute delay.

The above graph is based on actual data from that lock/dam. You can see in the dark blue trace that the water level rises rapidly for 27 ft. A bubbler set at 10 SCCM and 50 ft. tube would only show a 7ft change after 30 minutes (light blue trace). If the bubbler tube were 500ft long, the bubbler would only show a 0.91 foot change (orange trace).

The response time gets better if you increase the bubble rate to the 40 SCCM, the max possible, as shown in the green trace. However, the response time is still too long and a fast bubble rate of 40 SCCM will also cause a shift in measurements when the level is static.

Now take a look at the FastTrack response in red. You can see that it easily tracks the actual water level with only a one minute lag between the values. And it accomplishes this feat without resorting to high sustained flow rates. With FastTrack enabled, the system will continuously monitor the system and operate to increase the flow when necessary to track fast changing levels.

For FastTrack to work, the bubbler must know the Tube ID and Tube Length of the orifice tubing. You will find these settings along with FastTrack Enable in the Station Setup->Bubbler Setup menu.

If Log Diagnostics is enabled and FastTrack operates, you'll see messages in the log concerning FastTrack Down and FastTrack Up events. Use the front panel Diagnostics interface or type DIAG on the command line to get diagnostics details about FastTrack.

FastTrack also allows the bubbler to make accurate measurements if the bubbler restrictor is clogged. The restrictor is the device that is used to help regulate the flow of air down the tube. Were the restrictor to become clogged, the bubbler would no longer be able to track the water level. With FastTrack enabled, the bubbler also checks for a clogged restrictor in addition to the fast changing water levels. If it finds the restrictor blocked, it will automatically to pressurize the line again so that accurate pressure measurements can be made.

FastTrack is a necessity for any site that can experience a rapid change in water level. This includes gauges for locks/dams, tidal areas, flood prone areas, sites downstream of dams and so on. And with its ability to continue operation when the restrictor is clogged, FastTrack ensures that you'll get data from the station when other gauges would have failed.

FastTrack is exclusive to Sutron's Constant Flow Bubblers. Using FastTrack, you have the confidence that the level reported by the gauge will accurately track the actual water level.