

# BESST Inline ZIST<sub>(Patented)</sub>

## Zone Isolation Sampling Technology: An elegant addition to well construction that dramatically reduces purge volumes.

Purge volume reduction can be an important consideration for long-term groundwater monitoring programs. Early technical guidance from the US EPA Superfund Program prescribed the concept of 3-5 wet casing volume purging and was quickly adopted by many regulatory agencies throughout the US. This can lead to time, transport and storage problems when purging large volumes of water from a well, especially in remote or hard to reach locations. Isolating the well screen from the rest of the well casing sharply reduces the required volume to be removed.

Instead of using expensive and difficult inflatable packers to isolate the screened interval of a well, the BESST Inline ZIST uses a flush threaded receiver that is installed in-line with the well casing during construction. The receiver features a gentle taper that the Panacea Pump (or a ZIST docking weight attached to a pump) seats against, forming a water-tight seal that isolates the screened section from the rest of the well casing. The receiver also acts to support the pump and the tubing running to the surface. The pump intake is located just below this seal, so that only water from the newly isolated screened section is removed in pumping.

Inline ZIST receivers are available for 1", 1.25", 2" and 4" wells, and are all compatible with BESST's line of Panacea Pumps.

Although the pump is seated at the top of the screen, sample points at different depths within the screen section can be accommodated with optional drop tubes so that the intake is located at any position within the well screen.

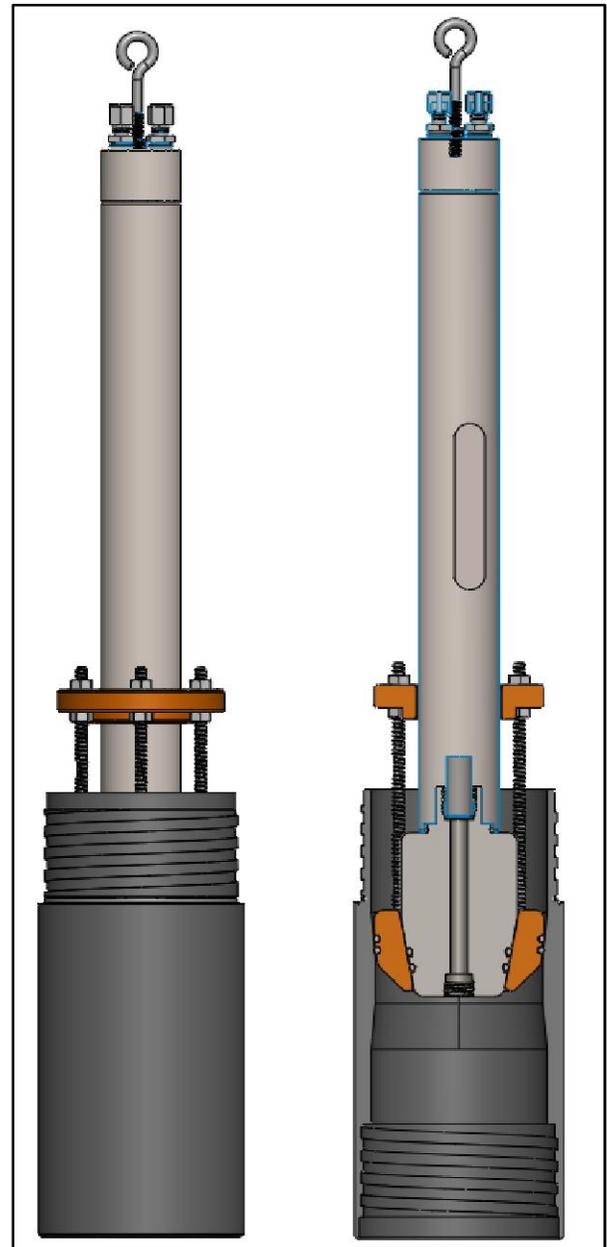


Figure 1 - Diagram of a 4" Inline ZIST receiver with docked Panacea P200 pump. The P200 is modified with a docking weight attachment and a docking cage. The cage enables easy seating and removal of the pump from the receiver.

## Water Level Measurements

Water level measurements are simply accommodated. The pump can be lifted up a few inches off the receiver, allowing groundwater within the well screen to communicate with the atmosphere and adjust to hydrostatic pressure over time. The tubing is attached via a tubing clip located on the underside of the well suspension cap. When the operator opens the well, the first task typically is to obtain a water level measurement. The pump is then reset into the ZIST receiver by lowering it a few inches until it seats – thereby allowing the well screen section to be purged and sampled.

Alternatively, BESST also offers customized Inline transducer integration options so that a transducer can be housed in the isolated section of the well and record pressure and temperature data based on the water from the formation, and not the static water in the casing.

## Case Study

From 2012 to 2014, one hundred Panacea Pumps in 25 nested wells built with Inline ZIST were installed as part of the Groundwater System Improvement Study (GSIS) through the Los Angeles Department of Water and Power. Trichloroethylene (TCE) and tetrachloroethylene (PCE) contamination had threatened regional groundwater supplies, even requiring the deactivation of several water supply wells. The ZIST wells were used to help fully determine the extent of contamination to study treatment options and to gather annual data on water quality. Wells were located on the sidewalk or in the parking lane in the street, limiting space for storing purge water. Deep zone pump depths were in the range of 700 – 800 ft. bgs, with water levels ranging from 250 – 350 ft. bgs. Because the Inline ZIST system was able to completely isolate the screened section from the rest of the casing, purge volumes required prior to sampling were reduced on these deep wells by a factor of more than 10 times!



Figure 2- Stainless Steel Panacea P200 being deployed into a nested monitoring well in North Hollywood, CA. Tubing is 3/8" OD FEP bundled with 3/16" stainless steel support cable. The docking cage is located at the bottom of the photo.