

Waterra Inertial Pumps

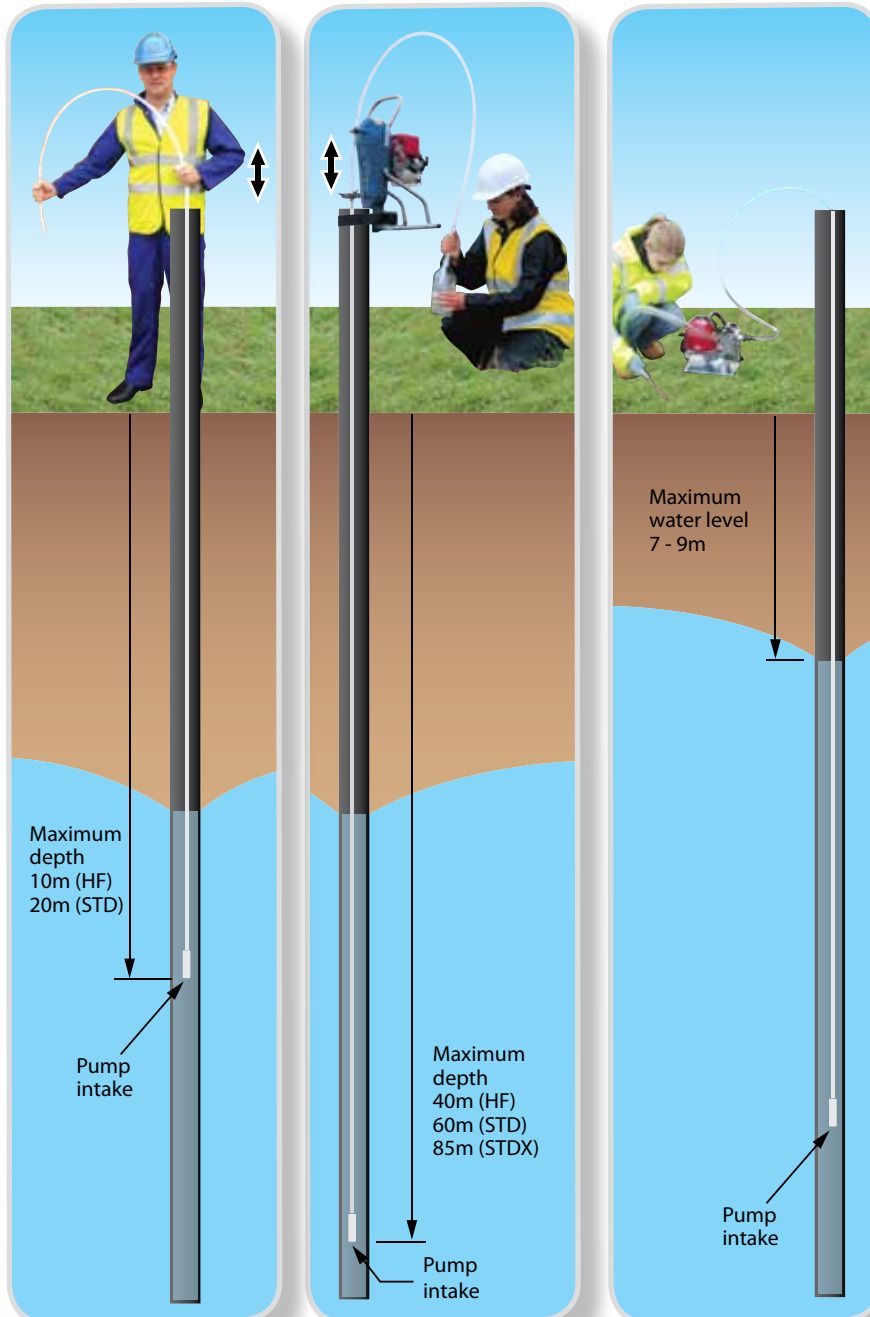
Applications

Manual pumping
See data sheet PR07

PowerPack PP1
See data sheet PR08

SP1 suction pump
See data sheet PR09

6 sampling systems
3 pumping methods



Waterra Inertial Pumps are a simple to use, versatile and economical environmental monitoring pump. They allow pumping at low and high flow rates and are used for purging and sampling of groundwater.

Manual pumping

- One person operation at shallow depths.
- For pumping samples from narrow tubes.
- For sampling at less accessible locations.

PowerPack pumping

- Extends depth range for pumping.
- Removes physical effort from manual pumping.
- Portable light weight (13kg) power actuator.

Suction pumping

- Use where water levels remain within suction depth.
- Significantly speeds up purging process.
- Portable light weight (6kg) suction pump.

See tables overleaf for further details of pumping depths and performance.

Waterra Inertial Pumps Applications

Purging and sampling of monitoring boreholes

Waterra inertial pumps can be used for both purging and sampling small diameter monitoring boreholes (from 10 to 200mm diameter). By dedicating pumps to each borehole, cross-contamination between boreholes can be eliminated. Use the table below to choose the foot valve and tubing best suited to a specific borehole size.

Physical dimensions

Waterra Tubing System	Tubing Code	Tubing ID	Tubing OD	Tubing volume ml/m	Foot valve	Valve OD	Use in borehole dia*.
High Flow	HF	21	25	346	VS5	25	35, 50 , 100, 150, 200
					D32	32	40, 50 , 100, 150, 200
Standard	STD	13	16	79	VS4	16	25, 35, 50 , 100
					D25	25	35, 50 , 100
Standard X	STDX	10	16	133	VS3	13	50
					D25	25	50
Low Flow	LF	10	13	79	VS3	13	19
Micro Flow	MF	6	10	28	VS2	10	13 , 19
Super Micro	SMF	4	6	13	VS1	6	10

* Figures in **bold** show most typical.

Technical data for operation of Waterra Inertial Pumps is provided in the table below. Manual operation is possible at depths indicated, but we recommend the use of a mechanical actuator (PowerPack PP1) or suction pump (Waterra SP1) for consistent and easier pumping performance.

Performance

Waterra Tubing System	Max. depth of operation		Maximum pumping rate (litres/min.)	Pumping using SP1
	Manual* (metres)	With PP1 (metres)		
High Flow	5 (10)	40	10 - 15	✓
Standard	10 (20)	60	6 - 8	✓
Standard X	N/A	85	0.5 - 2	✗
Low Flow	30	40+	1.5	✗
Micro Flow	30	40+	0.5	✗
Super Micro Flow	30	40+	0.3	✗

Actual performance varies depending on depth to water, length of tubing used, diameter of borehole, friction (in narrow tubes), sediment content in water.

* **Bold** figures indicate recommended maximum depth.

Surface extension tubing

Use a short length of Waterra PVC surface extension tube to provide a flexible discharge hose. This is attached by simply push fitting over the inertial pump tubing. The extension tube is normally cut 2 to 3m in length. Essential when using with High Flow Tubing and where water level is close to the base of the borehole.

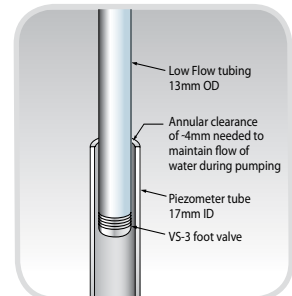
- STX-1 Standard PVC 22mm OD extension tube (per m)
- HFX-1 High Flow PVC 30mm OD extension tube (per m)
- LFX-1 Low Flow PVC 18mm OD extension tube (per m)



Applications

Sampling narrow diameter piezometers or multi-level tubes

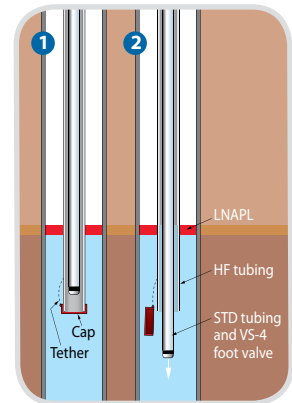
With a wide choice of small diameter systems available from Waterra, sampling from narrow tubes and piezometers could not be easier. Simply select a Waterra system with an overall diameter of ~4mm or less than the internal diameter of the tubing to be sampled.



Graphic illustrates sampling from a 19mm OD piezometer tube (17mm ID) using LF tubing and a VS-3 foot valve.

Sampling below LNAPL layer

1. HF tubing with a cap covering its base is lowered into borehole and positioned below the LNAPL layer within the water column. Cap is retained by a short tether.



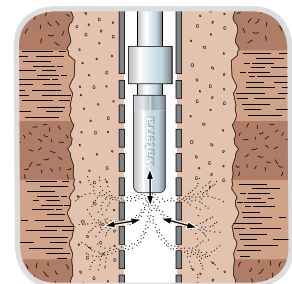
2. STD tubing with a VS-4 foot valve is fed through the HF tubing. The STD tubing is used to push out the end cap. The STD tubing is then lowered to the required sampling depth before pumping to obtain a sample uncontaminated by floating product.

3. Alternatively:

- Use LF tubing with a VS3 foot valve in place of STD tubing
- Insert either SMF or MF tubing (VS1, or VS2 foot valves) inside STD tubing fitted with an end cap.

Well development / sediment removal

The ideal well development tool is one that surges and pumps the monitoring well simultaneously. The Waterra inertial pump does exactly this. Through a combination of mechanical surging and high volume pumping, the Waterra inertial pump is capable of removing water with very high concentrations of silt, clay and fine sand.



Sampling for volatile organic compounds (VOC's)

Inertial pumps can be used to sample for VOC's by using a siphon tube which minimises air contact at the point of discharge.

Method: Cut a 2.5m length of 6mm SMF tubing and insert into the discharge end of the Waterra tube, leaving approximately 10 cm protruding. Pump as normal gripping both tubes and forming an arc above your head. Stop pumping. Water will continue as a laminar flow through the SMF tubing and can be collected into the mouth of a sample bottle or VOC vial.

