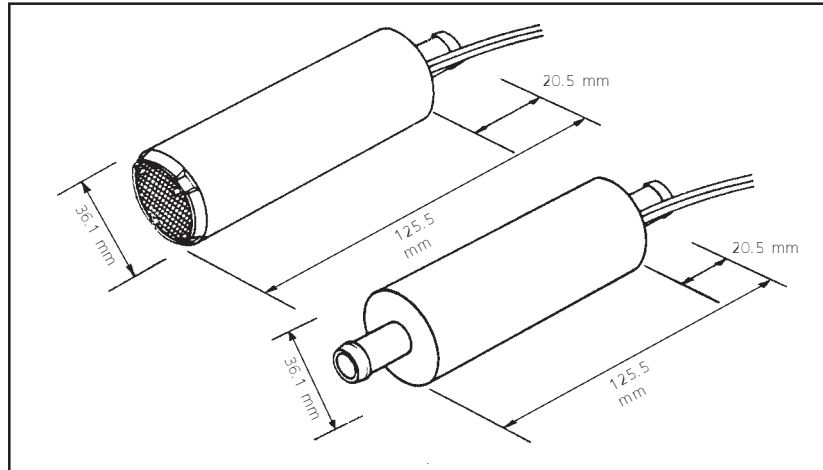


OPERATING INSTRUCTIONS

12.12 SUBMERSIBLE PUMPS



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On these operating instructions



If the text follows a mark (as shown on the left), this means that an important instruction follows.



If the text follows a mark (as shown on the left), this means that an important warning follows relating to danger to the user or damage to the apparatus.

1. Description and use of the submersible pumps



Do not use the pumps until first reading these instructions. Keep these instructions in a place accessible to all users.

The Gigant and Booster pumps are very small submersible centrifugal pumps. They have a very strong ABS housing and a stainless steel impeller and axle. A small yet powerful motor rotates the impeller. Centrifugal action then pressurizes the water. The water moves upward alongside the ABS motor-housing to the tubing-nipple on top of the pump. The pump can be applied in wells as small as 38 mm in diameter.

The Gigant pump can be used to pump water from a depth of maximum 9 meter pressure height. If the water table is deeper you may place a Gigant pump in-line with one, two or maximum three Booster in-line pumps. By doing this, the pressure head lift will be 18, 27 or 36 m respectively. Simply fit a tube on the Gigant pump then

connect this tubing to the bottom nipple of a Booster in-line pump. Subsequently fit a tube to the top nipple of the in-line pump to reach the earth's surface. If pressure height is still insufficient, add more in-line pumps.

The Gigant and Booster pumps may be used to develop and purge small wells. Pinched off to a low flow rate the pumps may be used for sampling too (use adjustable pinch clamp 12.20.97). Till a depth of 11 m with max. two pumps the external pump connection of the 12.25 peristaltic pump can be used. In this way the rate of revolutions can be adjusted electronically.

Centrifugal pumps should not be used for in-line filtration with filters of 0.45 micron.

This pump has a powerful yet very small motor (that is why you can put it in a very small well). At the same time it is very cheap so that you may dispose of the pump after a sampling event, thus avoiding the risk of cross-contamination.

The relative simple construction brings some limitations:

- ❑ This pump is meant for use with water. Chemicals may attack the ABS housing, the stainless steel axle and impeller, the PVC cable, or the tiny nitrile seal. If pumping (water with) other liquids, check for chemical compatibility. Especially the ABS housing does not resist most types of fuel.
- ❑ The pump has been run for days continuously, but it is recommended that running periods should be restricted to a maximum of 15 minutes and then switched off for 15 minutes.
- ❑ Always keep a spare pump in reserve.
- ❑ Do not run dry. Immerse in-line pump in water, before use.
- ❑ Do not place the pumps on a distance of more than 1 meter of each other (see figure 1).
- ❑ Before starting pumping all pumps must be below the water level. While pumping be sure that the lowest pump is always under water. When the lowest pump is drawing air one has to stop pumping until the water level has reached a sufficient height.
- ❑ Avoid using these pumps with a voltage on the pump lower than 12 Volt. The pump does not perform as it should and the lifecycle is shortened or the pump will burn out. A direct current motor is able to resist overvoltage better than undervoltage!
- ❑ Avoid using the pump very deep under the water table (high pressures will cause water to enter the motor-housing). If you would like to sample very deep under the groundwater level you should replace the lowest (Gigant) pump by a Booster pump with a very long tube attached (see figure 2).
- ❑ Avoid pumping water with a high percentage of sand. Sand may clog the pump. Gravel will block the impeller. Always use the sieve (at the bottom of the Gigant pump) and keep it clean.
- ❑ Do not block the water flow by kinking or plugging the tubing or connecting an in-line filter (the water flow cools the pump motor). It is however possible to diminish the water flow temporary by partially squeezing the tube.

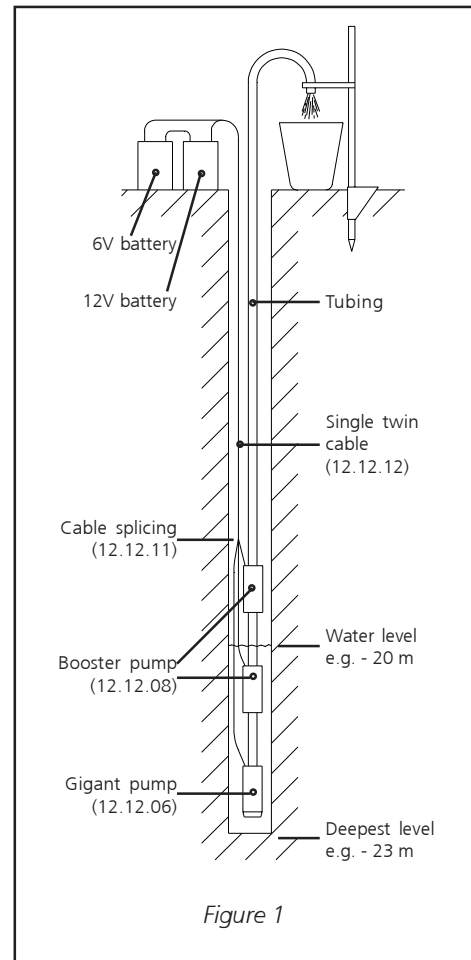


Figure 1

2. Tubes

- ❑ The nipple(s) on the pump normally takes tubes with an inside diameter of 10 mm.
- ❑ **Inside** the nipple you may use tube with an outside diameter of 8 mm (not recommended; too loose for pulling).
- ❑ With the small adapter fitted you can use a garden hose (13 mm inside diameter) or PE tube 12 x 16 mm (art. no.: 12.20.16). You can use a cigarette lighter or flame at a distance to soften the end of the PE tube.

The flow capacity may be optimized by using large diameter tube. We measured the following performances:

- ❑ With 4 meters of 6 mm tube and 2 m pressure head lift, the flow rate was only 3.5 l/min.
- ❑ With 10 mm tube 7 l/min.
- ❑ With 12 mm tube 9 l/min!

3. Performances

Tests resulted in the following:

- ❑ Two pumps with 25 m cable on a peristaltic pump 12.25 has a maximum pressure head lift of 11.5 m (the cable must be shortened because this points to a too low voltage at the pumps).
- ❑ The same pumps directly powered by a 12 V battery gives a (still too low) pressure head lift of 15 m.
- ❑ The same pumps on a 18 V battery gives a pressure head lift of 23 m!



The performance and service life of the pump is strongly affected by the power supply. The power consumption is 12 Volt 3 Amps (36 Watt) per pump.

- ❑ A long thin extension cable will severely diminish performance. When using two or more pumps this must be compensated. The pumps must receive at least 10 Volts. Use a thick extension cable with PVC coating (minimal 2 x 1.5 mm²).
- ❑ When using two pumps or more with more than 15 m cable it is necessary to connect a 12 Volt and a 6 Volt battery in series (or with 4 pumps two 12 Volts batteries!). In this way you are capable of sending 18 (or 24) Volts to the pump. When reaching the pumps a gentle but effective 12 to 15 Volt will remain at the pump and they will perform well.
- ❑ If you use the peristaltic pump 12Vdc with flow rate controller for external pumps (article no.: 12.25) the performance of the pump will decrease with about 30%. Due to losses in electronic circuitry. Only two pumps can be connected to the peristaltic pump with art. no.: 12.25.

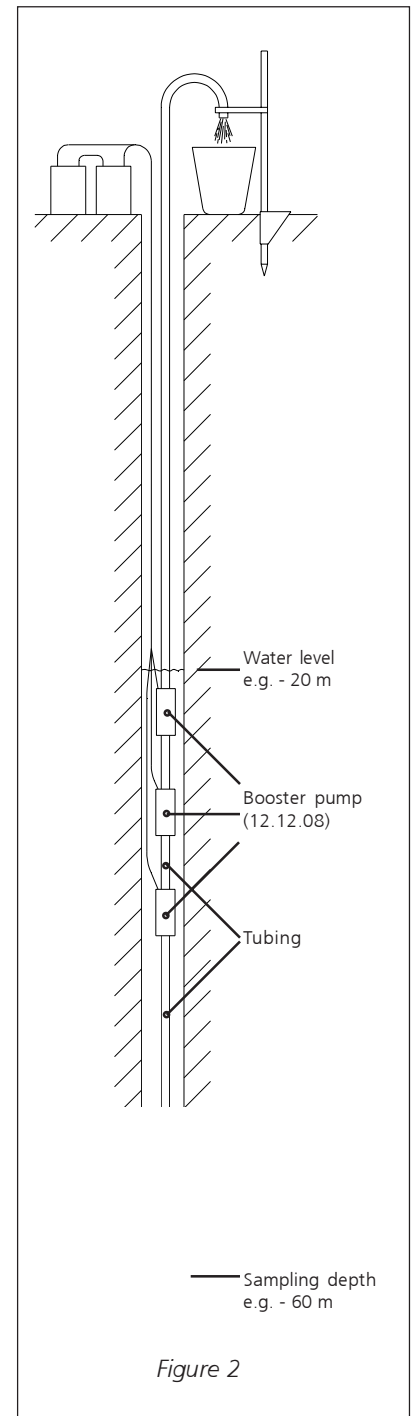


Figure 2

- Extension cables are available with a length of 100 m (2 x 1.5 mm²). Water tight crimp splices are available to connect cables.
- Polarity does not influence the performance of the pumps. Irrespective of the direction of turning the pumps will perform well.

4. Decontamination and maintenance



After use, the pumps can be decontaminated with warm water and a detergent (art. no.: 20.05.29). Always give the pump a final rinse with clean water.

Penetrated volatile components in the synthetic material of the pumps will only disappear after a long period of storage of the pumps in a ventilated, heated room. Do not heat the pump above 60 °C. When storing the pump in a closed container (e.g. a plastic bag) dry the pump thoroughly.



If in doubt, renew pump. Analysis costs are much higher than the price of a pump with tube ! Do not store the pumps near apparatus or jerrycans with fuel. Benzene, toluene xylene etc. are easily sorbed and will influence analysis results.

The Gigant pump is fitted with a strainer to filter out larger particles. Please check for clogging to prevent performance loss. No further maintenance is required.

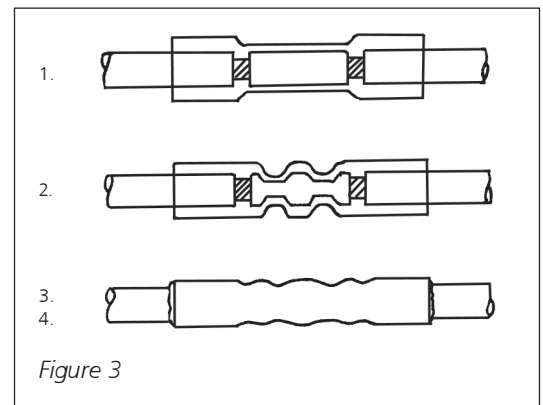
The pumps have been tested as sampling tools for organics and inorganics. When decontaminated in water prior to use, they are found to be effective and reliable sampling pumps.

- They lift the water, instead of applying suction, thus reducing the risks of loss of volatiles and alteration of the pH.
- The Gigant and Booster pumps are easy to install. They do not need a compressor or generator and are so cheap that they do not need to be re-used. In this way the risk of cross-contamination to other wells can be eliminated. Decontamination procedures between samplings are avoided.
- 12 Volt is safe, even in combination with water.
- The pump and tube can stay in the monitoring well. (However no full long term test results are available to this subject). When, after a sampling procedure, you want to dedicate the pump and tube to the well, it is advised to lift the pump, ply the tube and re-insert the pump together with the tube into the well in such a way that the pump will be positioned just above the waterlevel. In this way long term contact between the well water and the pump housing is avoided. You may also store pumps and tubes in labelled bags.

5. Use of crimp splices and extension cables

When installing the sealed crimp splices (art. no.: 12.12.11) on the extension cable (art. no.: 12.12.12) proceed as follows:

1. Strip wires 7.5 mm and insert into crimp barrel.
2. Match the colour of the splice with the colour of the crimp cavity on the crimping tool.
3. Crimp.
4. Heat crimped splice with heat gun until tubing recovers and adhesive melts and flows.



6. Sampling limitations

The insulation of the connection wire contains di-isononylphtalate or di-isodecylphtalate. This may interfere with analyses performed to determine the concentration of these plasticizers in e.g groundwater.

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