

Non-ROV

The non-ROV device that has been designed is the float, Frøya. It has a buoyancy engine, which consists of a vacuum pump and a normally closed solenoid valve. The vacuum pump, pumps air from the inside of the float to an external balloon, while the solenoid valve is closed and unpowered. When the solenoid valve is powered, it opens, and releases the air in the external balloon back to the inside of the float. This system requires atmospheric pressure inside of the float. To ensure that there is atmospheric pressure inside the float, there is a pressure release valve mounted on the top end of the float. This is the red valve from Blue Robotics, which can be seen in figure 1.

The batteries which are used are eight D-type alkaline batteries. Four of them is connected in series, and then two series are connected in parallel. There is a 5 A fuse connected to the batteries, and a switch, which can be toggled from the outside. This switch is used to disconnect the batteries.

To detect when the float should start with the profiles, a Hall effect sensor, DRV5053, is used. It detects a magnetic field from a magnet mounted on the ROV. When the magnetic field is removed, the float senses it has been released from the ROV, and waits 15 seconds before starting the first vertical profile. To detect when the float is at the surface, or at the bottom, the pressure sensor, MS5803-05BA, is used. This is mounted at the bottom of the float, and can be seen in the red penetrator in figure 2. When the float detects zero rate of change in pressure over a period of ten seconds, it inverts the state of the float.

The electronics is mounted a self designed circuit. On the PCB, there are two DC/DC converters, where one converts the voltage from the batteries up to 12 V and the other down to 3.3 V. The 12 V is to power the pump and the solenoid valve, while the 3.3 V is to power the two sensors and the microcontroller.

On the circuit board, there are also two solid state relays, TLP3107A. These are controlled by the microcontroller, and powers the pump or solenoid valve. The valve is mounted at the top with the pump underneath, as shown in figure 1.



Figure 1: The float.

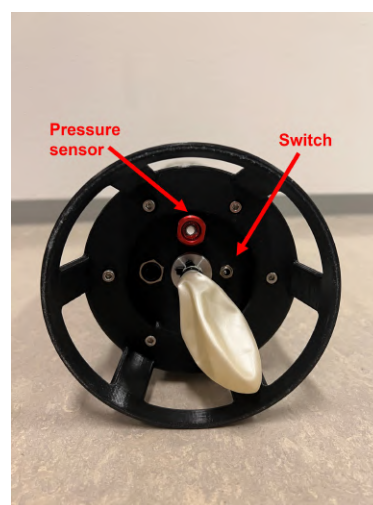


Figure 2: Under the float.