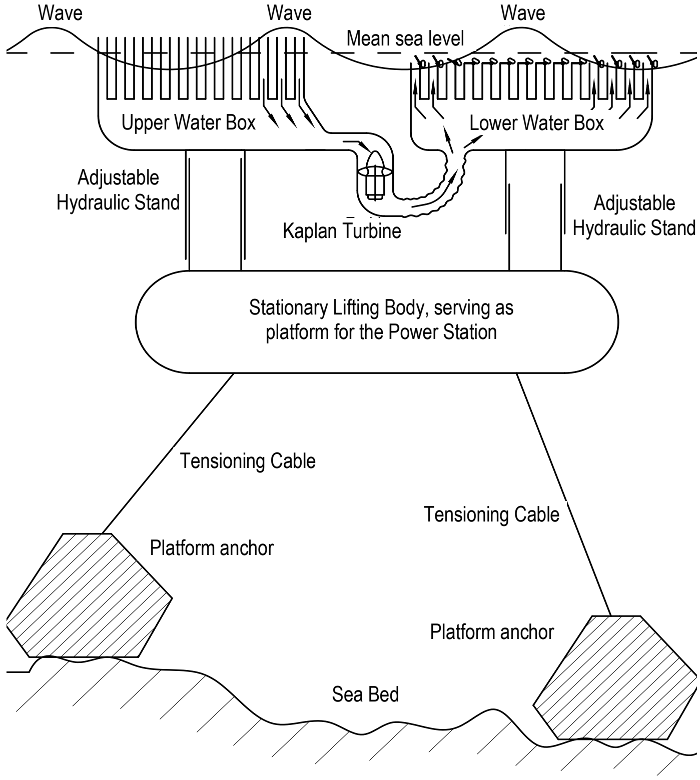
Wave Power Plants

Waves are the energy storage for wind. In contrast to off-shore wind turbines, this energy can still be used for a long time after the wind has paused. Wave power stations use the potential of the level difference between the wave crest and the wave valley.

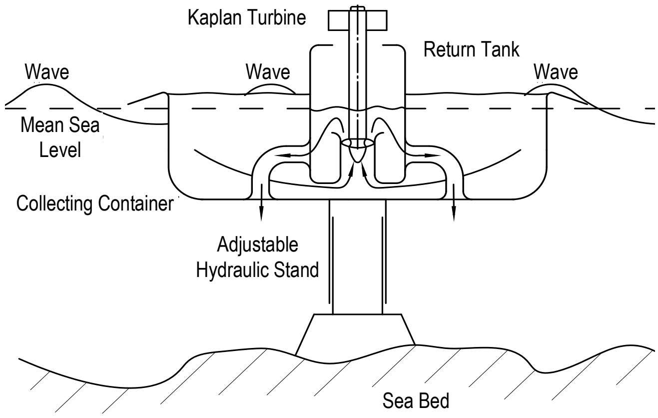


Example 1 (left):

A lifting body is pulled downwards under tension with tensioning cables and thus serves as a power station platform. This allows a stationary positioning in any depth of water, since no base extending to the ground is required. On the platform (left side), a big round water box is mounted below water surface. It has numerous pipes, all of which extend beyond the water surface, so that only water from the wave crests enters the pipes. A second lower positioned round water box (right side), has also numerous tubes ending just above the wave hollow. Their tube openings are provided with float-controlled flaps, which close the respective tubes when they are covered by water and reopen in the wave trough. This results in a pressure difference between the two water boxes, which is used by a Kaplan turbine. Thanks to automatically controlled hydraulic stands, the level of the 2 boxes related to the water surface is always adapted for an optimum water flow.

Since the boxes fitted with pipes are round shaped, it does not matter which direction the waves roll in.

This power plant also works in a simpler version without the lower water box - but only with half power. The water coming from the turbine then flows directly into the sea. In this case, only the level difference between the wave crest and the mean sea level can be used.



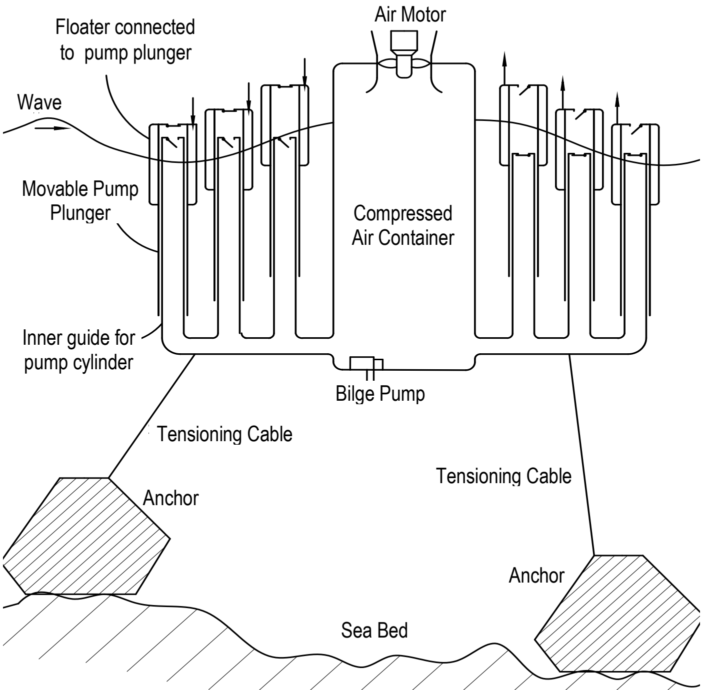
Example 3 (above):

A round collecting container is moved by its hydraulic stand to such an extent that only the water of the wave crests can sweep into the container and fills this up to the edge. In the middle of this container there is another container, which has a drain into the sea. Since no waves can be swept into this return tank, its water level corresponds to the mean sea level. The difference of the water levels is used for power generation by a turbine. At the edge of the collecting container there is a flat surface which increases the height of rolling in waves. Again, because of the round shape of the collecting container, the system works with waves from all directions.

Example 2 (below):

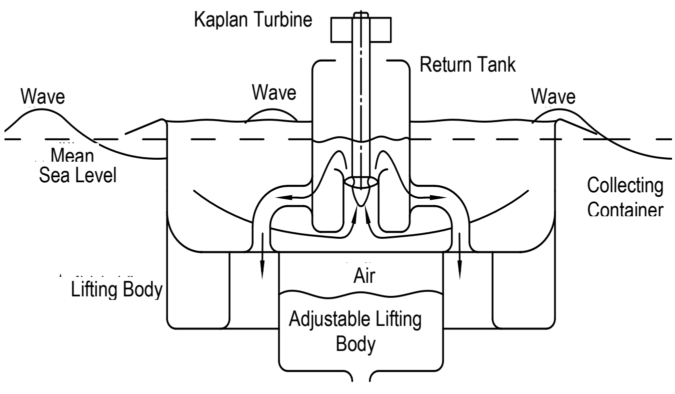
A big tank for compressed air is plunged down with tensioning cables and anchors, so that the uplift forces are sufficient for a static position of the system, even at high waves. Big tubes are designed like air pumps and controlled by check valves. They are arranged around the air container, each of which is composed like a piston which is moved up and down with the waves by a lifting body and is guided on a pipe connected to the air tank. In the picture below all the pistons on the rear flank (left side) of a wave sink downwards by their weight and pump air into the tank. Right in the picture all the pistons on the front of a wave flank are driven upwards by their lifting bodies and aspirate fresh air delivering it to the tank. The stored compressed air is used by an air turbine for power generation.

Water spray or rain reaching the tank is disposed of by a bilge pump.



Example 4 (below):

The same installation according to Example 3 can also be operated as a floating power station, e.g. if rapid and non-stationary electricity generation on the open seas is required. Lifting bodies underneath the collecting container ensure that this cannot sink. Furthermore, in order to raise it beyond the median sea level with its edge, a further lifting body for adaption is provided, into which air is blown depending on the wave height. The system must be large enough in dimensions to allow its position to be as horizontal as possible even at high waves, so that not too much water is tipped from the tank. Or it must be stabilized horizontally by counter-weights in a very deep position.



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