

Compact Hydro-Electric Power Plant

This hydro-electric power plant is designed to generate electricity using a micro-hydro turbine without the use of the typical stream, river, or waterfall. The key to the operation is the pressure differential across the nozzle. High pressure is created on the pump side via the pump and nozzle with zero pressure on the turbine side.

Components:

- Water supply – water is supplied to the water tank from a stable source, such as City water or well.

- Float valve – The water level in the tank is maintained at the desired level by the float valve and compensates for leaks, evaporation, etc.
- Water tank – Holds a supply of water for the pump.
- High volume pump – Supplies water under pressure to the nozzle.
- High-pressure nozzle – Provides a high-pressure stream of water to the micro-hydro turbine.

- Gearbox – Contains reduction gears that transform rotation of the turbine into work on the flywheel.
- Flywheel – Stores and releases kinetic energy to assist in maintaining rotational speed of the generator.
- Clutch – Allows the turbine to spin the flywheel up to sufficient speed without the frictional load of the generator.

- Generator – Supplies electricity to the inverter/control panel.
- Inverter/Control panel – Converts generated DC voltage into 120 volt AC, provides 14 vdc to charge the battery, provides 12 vdc to run the pump, contains assorted controls and meters.
- Battery – Provides initial source of 12 vdc to power the starter and the pump.
- Starter – Provides initial rotation of the flywheel to alleviate some of the initial start-up load placed

on the turbine.

Operation:

1. A master switch is thrown to connect the battery to the system.
2. An automotive type ignition switch or equivalent is used to start the system. In the on position, power is supplied to the pump only. In the start position power is supplied to the pump, starter, and clutch solenoid.

3. Holding the switch in the start position disengages the clutch via the solenoid and causes the starter to rotate the flywheel. Simultaneously, the pump is supplying high-pressure water to turn the turbine.

4. Once sufficient rotational speed has been reached, the switch is released to the on position which disengages the starter and engages the clutch.

5. The pump, turbine, and flywheel will now all turn the generator.

6. The generator, now in turn, supplies electricity to the inverter and charging circuit.

7. Water used to turn the turbine, is returned back to the storage tank.