

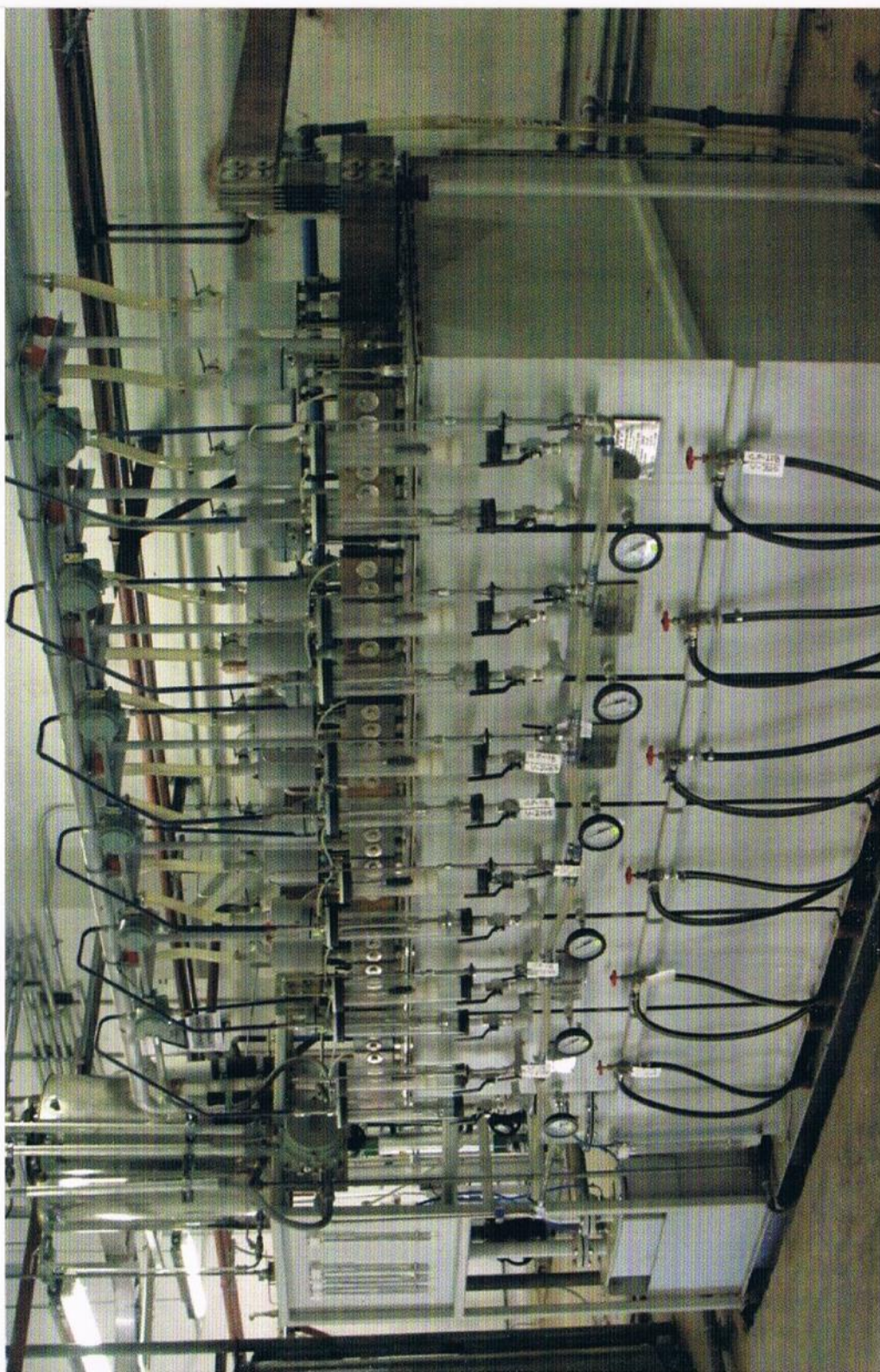


Spirare Energy



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PIONEERS IN UNIPOLAR HYDROGEN GAS GENERATORS



THE "SEALED UNIPOLAR CELL" FEATURES

Spirare Energy manufactures Low pressure cells known as the "Sealed Unipolar Cell" in their manufacturing works in India. A summary of the major advantages of the "Sealed Unipolar Cell" is as follows:

Design

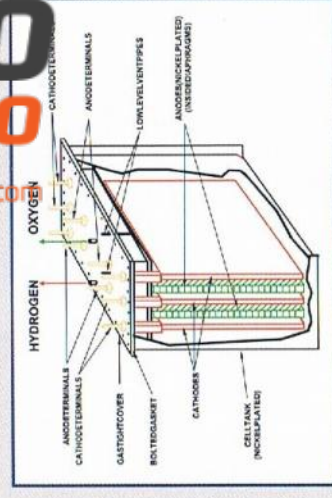
- No contact of electrolyte with atmosphere. Due to its sealed design, there is no loss of Hydrogen Gas or electrolyte during operation.
- The Gap between the Electrodes (in Unipolar cell) is minimal as the cell is very efficient. Even though Cathode and Anode are separate plates, Sealed Unipolar cell design makes it possible to reduce space between Anode and Cathode electrode surface similar to Bipolar. This design makes it possible to service Unipolar Cells in the field.

Modular Construction

- In the event that maintenance is required in the Sealed Unipolar cell, a single cell can be removed from the line and production continued on the balance of the plant.

Efficiency

- Even when Sealed Unipolar Cell plant is switched off, no eddy currents flow in the system. This ensures sustained efficiency and no change in power consumption even after several years of use.
- The Sealed Unipolar cell operates at lower current densities of 150 mA/in² & thus operates for longer periods of time without overhaul. No auxiliary pumps & filters/electrolyte recirculation system is required.
- Purity is achieved within 5 minutes of start up, even in very cold conditions



DESCRIPTION & OPERATION OF UNIPOLAR ELECTROLYTIC HYDROGEN GAS GENERATION SYSTEM

The Gas Generation System is designed to meet the following requirements:

- To deliver continuously the stated flow of electrolytic hydrogen at purity of 99.9%, and of electrolytic oxygen at a purity of 99.7%. The principal impurity in the hydrogen is oxygen. Since purified water only is used for electrolysis, carbon monoxide, sulphur compounds or other deleterious impurities are not present.
- To operate automatically, requiring only periodic inspection.
- AC power is supplied to a silicon rectifier which provides DC power to operate a battery of Unipolar Cells, producing hydrogen and oxygen by electrolysis of water. The rate of gas output is directly proportional to operating current, and therefore may be adjusted as desired by operating the rectifier voltage control. The silicon rectifier is of heavy industrial design for continuous duty and includes complete protective devices.

- Unipolar Cells operate without regular attendance and the Cells are supplied automatically with purified feed water (maximum conductivity 500,000 micro-Seimens/cm) to be provided by the purchaser. The water is stored in tanks sufficient in size to contain approximately ten hours consumption. Feed water purity is checked at intervals by means of a conductivity meter.

On start-up, hydrogen is vented to atmosphere for approximately five minutes and then is directed by the operator into the gas holder main. The oxygen passes through the water seal and is vented to atmosphere unless it is to be used. The plant may be started and stopped or the rate of output varied as frequently as may be necessary by operation of the rectifier voltage control. Gas output may be maintained at any level between 20% and 100% of capacity. On start-up, hydrogen purity is obtained within five minutes.

