

High voltage electrode boiler

Product description: Hot Water generation



PARAT



In 1842, Halvor Sørensen moved to the small coastal town of Flekkefjord and started his own business. This marked the beginning of a 165-year-long history – a history about faith in solid expertise, quality and reliability.

Today, Parat Halvorsen is Norway's leading supplier of steam and heat solutions for both land based industrial and for Marine and offshore applications.

The PARAT High Voltage Electrode boiler (HVEB) is a result of many years of experience with both industrial and marine/offshore steam and hot water boilers and boiler systems. The HVEB was developed in close cooperation with renowned experts in the High Voltage field and has since been thoroughly tested with very positive results. Very low maintenance costs combined with flexible regulation down to 5% output and a stable and reliable operation ensures that the PARAT HVEB is a preferred solution for steam and heat applications where sufficient amounts of electric power is available.

The HVEB is very compact and can therefore significantly reduce installation costs due to optimal space requirements. Another cost saving advantage with the HVEB is the fact that there is no need for a low voltage transformer which enables direct connection to the High Voltage supply grid.

Parat Halvorsen takes pride in every delivery. In order to live up to the company trademark, a team of highly skilled service technicians are ready to dispatch at short notice offering 24-hour worldwide backup to all our customers. In addition to offering commissioning, service, spare parts, modifications and repairs we are also able to service most existing systems delivered by other manufacturers.



1. ELECTRODE BOILER ARRANGEMENT

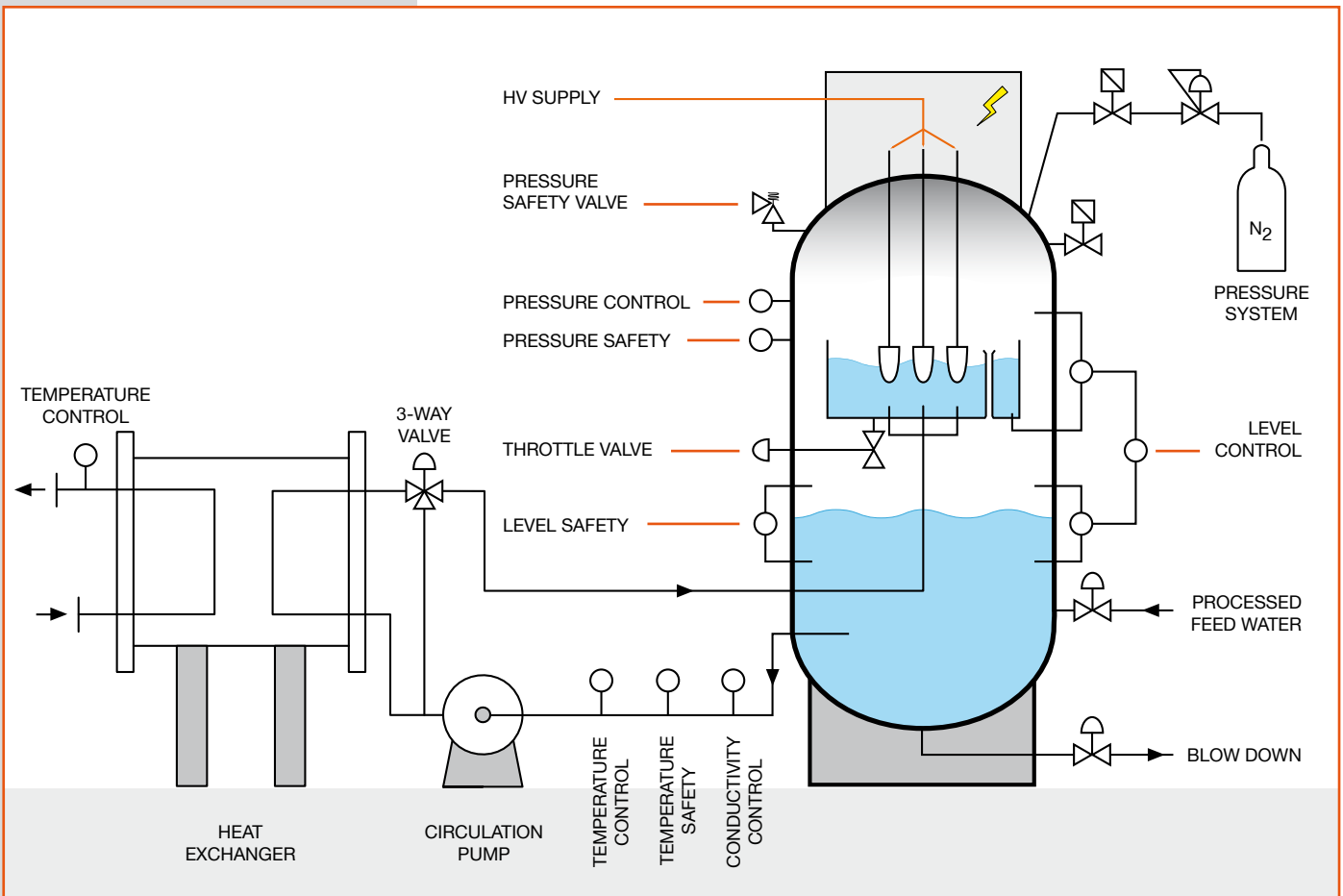
Hot water is generated by circulating the boiler water through the upper chamber where the electrodes are suspended. The boiler vessel is pressurized with nitrogen or a similar inert gas system, and due to the relatively low water volume the boiler also acts as an expansion vessel.

The boiler regulates on constant temperature up to its maximum power setting and continues on constant power above this setting. The output is controlled by a throttle valve that regulates the level in the upper boiler chamber.

An important parameter related to optimal function of the HVEB is the water conductivity. The conductivity is continuously monitored to ensure that the boiler gives the correct output. When the conductivity exceeds the programmed setpoint, automatic blowdown is initiated.

Our delivery includes the piping, control valve and heat exchanger for heat supply to the district heating circuit.

Fig. 1) Simple principle diagram of electrode boiler hot water system

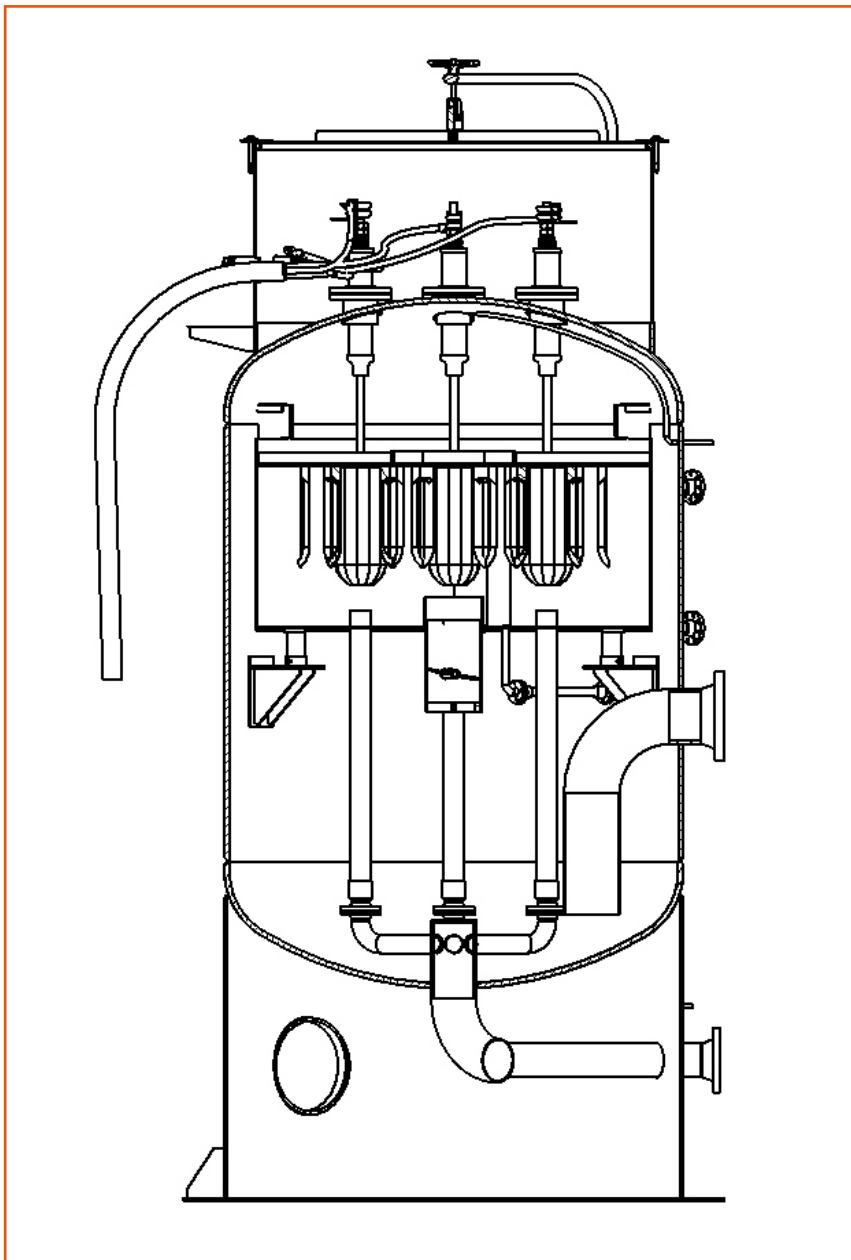


2. ELECTRODE PRINCIPLE

The boiler consists of an outer and an inner container. Inside the inner container, which is electrically insulated from the outer shell, the electrodes are suspended. The boiler is designed for 6.0 or 11.0 kV. Higher voltage can be delivered on request. Heat is generated by ohmic resistance in the water between the electrodes.

The boiler acts as a pure ohmic resistance in the main circuit. Parat Halvorsen AS have used this concept in our electrode boilers since 1993. The output from the boiler is directly related to the immersion of the electrodes into the water volume in the upper chamber. This enables seamless regulation from 100% to 5% output. The water/container forms an insulated zero point in the star connection between the electrodes.

Fig. 2) Section showing internal arrangement in the electrode boiler

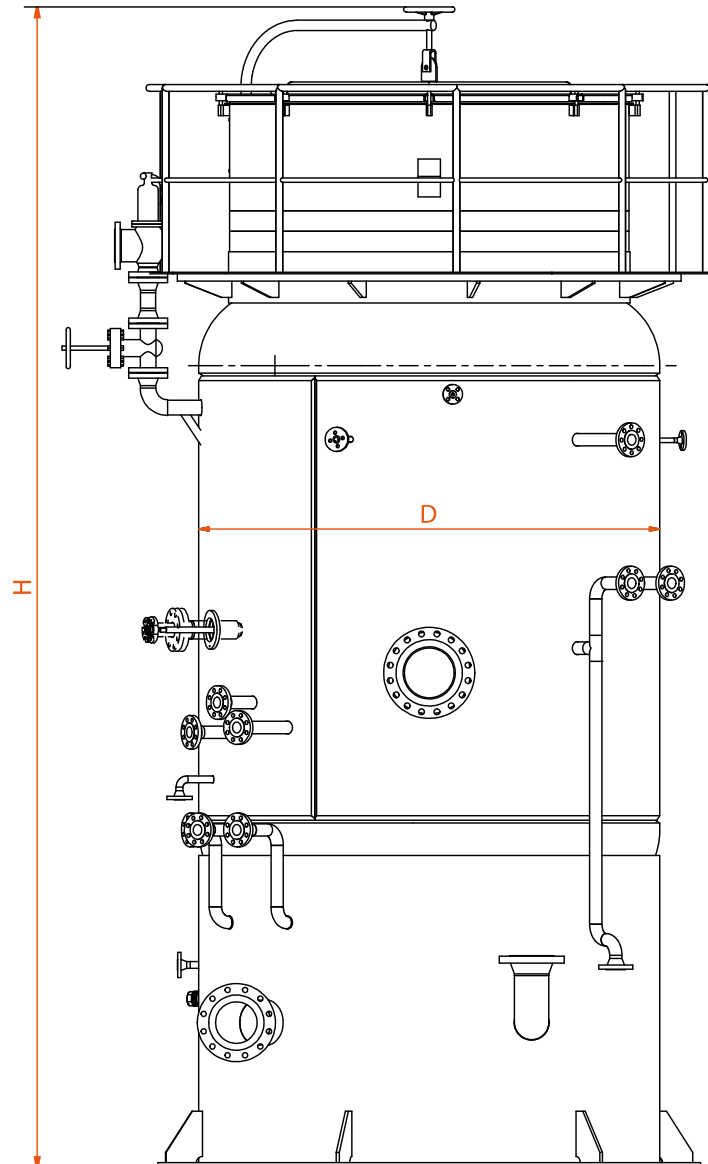




3. BOILER DIMENSIONS

The electrode boiler is a very compact unit. Due to the fast start up time with close to instant hot water generation there is no need for a large water volume in the boiler. Hot water is generated in the upper container by ohmic resistance between the electrodes which again requires a relatively small heat surface.

The boiler shell is insulated with 2x75mm Rockwool and clad with aluminum or galvanized steel plates. The dimensions in table 1 are included the insulation mantle.



Capacity (MW)	0-10	11-15	16-20	21-30	31-45
D (mm)	2100	2100	2550	3000	3100
H (mm)	4900	4900	5400	5800	6000

Table 1: Boiler outer dimensions including insulation mantle

4. CONTROL SYSTEM

The High Voltage Electrode Boiler system is controlled by a PARAT PLC control panel.

The control panel includes a Siemens S7 PLC and a Beijer Touch panel. Communication between the control panel and top systems is by Profibus / Modbus / Ethernet communication.

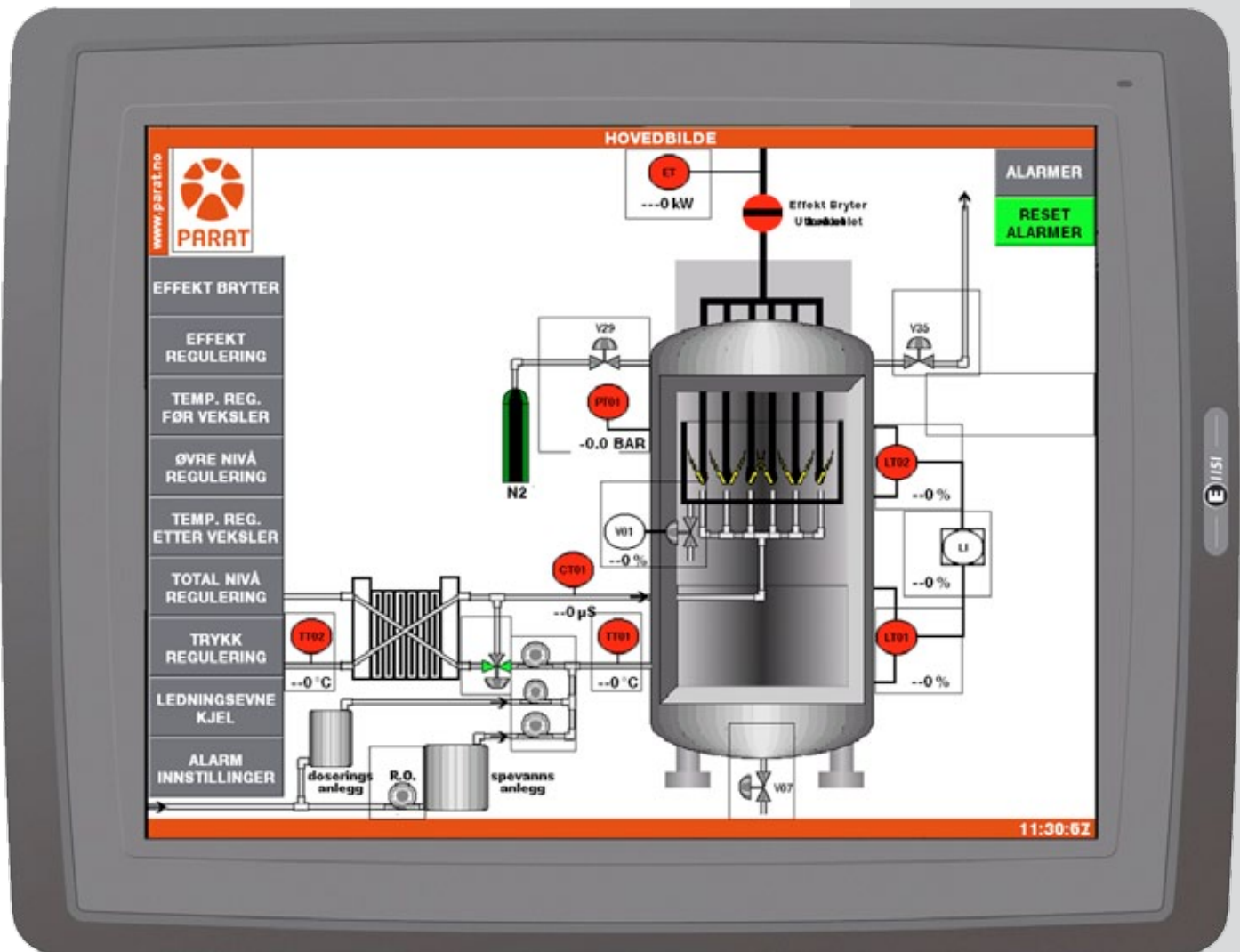


Figure shows typical front page of the touch panel.



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