The Principle of Membrane Electrolysis

The raw material of chlor-alkali electrolysis is common salt (NaCl). An electrochemical reaction according to the formula

\[ 2 \text{NaCl} + 2 \text{H}_2\text{O} \rightarrow \text{Cl}_2 + \text{H}_2 + 2 \text{NaOH} \]

causes Cl- ions to be oxidized to chlorine at the anode, while water is reduced to hydrogen and OH- ions at the cathode. To bring this about, specially prepared pure brine is fed into the anode compartment. A cation-selective membrane separates the cathode compartment from the anode compartment. Only hydrated sodium ions can pass through the membrane. With the aid of the electric field, chloride ions are blocked out very well. As a result, the OH- ions combine with Na+ ions in the cathode compartment to form pure caustic soda.

Green Power Provide the DC Power Supply During Electrolysis with the Membrane Process
Rectifier System Diagram for the Chlor-Alkali Industry

The rectifier system is composed of input high voltage switchgear, voltage regulating transformer for on load tap changer (OLTC), rectifier transformer, rectifier, DC switch, cooling water heat exchanger, power factor & harmonic compensation facility.

To get higher power factor and lower ripple, 12 pulse configuration is commonly adopted.

The system circuit diagram and system block diagram are shown here.
Benefit to User

- High Power Rectifiers ensure your process operating under all conditions
- High performance – the base for your productivity:
  - High Reliability: every measures to ensure the reliability of the system, thyristor N-1 redundancy, heat exchanger redundancy.
  - Power Saving: optimized design, material, craftsmanship to get maximized efficiency
  - High accuracy DC output current control
  - Low output ripple
  - High power factor
  - Friendly HMI
- You achieve lowest total cost:
  - Maximized availability
  - Maximized electrical efficiency
  - Minimized maintenance
  - Highest personnel safety
  - Longest lifetime: properly maintained rectifier system can last more than 25 years.
  - Shortest installation and commissioning
- Smart digital control for immunity to interference, good automatic control system, for your easy operation and control
- Life cycle service – for customer satisfaction: technical training, local service, always online

Why choose us?

- **Rich experience**: More than 20 years design, production and service experience for electrolysis
- **Meet International Standards**: Exported to USA, Canada, Germany more than 40 countries.
- **Strong technical ability**: PhD technical team, more than 20 years technology accumulation.
- **Reliable quality**: Designed, manufactured, tested as per strict reliability standard.
- **Considerate service**: Professional service before, during and after sales. Lifelong after service system. Customer management system
- **High performance price ratio**: With Europe/USA quality, competitive price than Europe.
## Main Parameters

<table>
<thead>
<tr>
<th>Input voltage</th>
<th>AC 3 phase kV level, 50Hz/60Hz</th>
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</thead>
<tbody>
<tr>
<td>Rated output DC voltage</td>
<td>up to DC 1000V</td>
</tr>
<tr>
<td>Rated output DC current</td>
<td>up to DC 100kA</td>
</tr>
</tbody>
</table>
| Design Standard | IEC-60146 Semiconductors converters  
IEC-60076 Power transformers  
IEC-61378 Converters transformers |
| Power factor at input @rated load | Not less than 0.9 through on load tap changer without power factor improving capacitor banks, above 0.97 after compensation |
| Efficiency @ rated load | ≥98% (typically) |
| Stability of output current at set point | Within ±0.5% |
| Type of control | Digital control |
| Ingress protection class of rectifier panel | IP54 |
| Ambient temperature for design purpose | Max. 50℃ |
| Rectifier pulse | Thyristor based 12 or 24 pulse |
| Type and mode of control | Constant current |
| Duties/overload | 150% for 1 minutes, 110% for 5 minutes, 100% long term |
| Rectifier thyristor cooling | Forced water cooled(cooling water is deionized water) |
| Transformer cooling method | OFWF |
| Transformer installation place | Indoor or Outdoor |
| HMI | Color touch panel |
| Remote control interface | 4-20mA signal and dry contacts/Modbus/Profibus/Profinet |
| Thyristor N-1 redundancy | Yes |
| Heat exchanger | Deionized water/raw water exchange, with redundancy |
| Protections | Grounding detection and grounding fault alarm  
Thyristor RC snubber  
Fast action fuses  
Over heat  
Output over voltage  
Output over current  
Water pressure  
Water temperature  
Others required by purchaser |