VON ARDENNE develops and manufactures industrial equipment for vacuum coatings on materials such as glass, wafers, metal strip and polymer films. These coatings give the surfaces new functional properties and can be between one nanometre and a few micrometres thin, depending on the application.

Our customers use these materials to make high-quality products such as architectural glass, displays for smartphones and touchscreens, solar modules and heat protection window film for automotive glass.

We supply our customers with technologically sophisticated vacuum coating systems, extensive expertise and global service. The key components are developed and manufactured by VON ARDENNE itself.

Systems and components made by VON ARDENNE make a valuable contribution to protecting the environment. They are vital for manufacturing products which help to use less energy or to generate energy from renewable resources.
VON ARDENNE develops and manufactures electron beam systems which are used for melting, refining, evaporation or heat treatment. The first electron beam gun was developed in 1959 at the Manfred von Ardenne Research Institute. Our 60 years of experience are reflected in over 400 electron beam systems installed worldwide.

Our current EH150V, EH300V and EH800V electron beam guns are the most powerful in the world. We work on the continuous improvement of our key components at our development center for electron beam technologies. This is where we produce and test all our high-quality electron beam guns.

**FEATURES**
- Power control by means of a patented VARIOCATHODE
- High degree of pressure decoupling
- Internal valve to separate EB gun from process chamber
- Quick and simple changing of cathode plug

**BENEFITS**
- Easy handling and maintenance
- High reliability
- High acceleration voltage up to 60 kV
- Magnetically self-focusing beam

**TECHNICAL DATA**

<table>
<thead>
<tr>
<th></th>
<th>EH150V</th>
<th>EH300V</th>
<th>EH800V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum beam power</td>
<td>150 kW</td>
<td>300 kW</td>
<td>800 kW</td>
</tr>
<tr>
<td>Beam power control range</td>
<td>— Power control by VARIOCATHODE 20 % to 100 % 20 % to 100 % 20 % to 100 % — Power control by bombardment power (temperature limited mode) 0 % to 20 % 0 % to 20 % 0 % to 20 %</td>
<td>20 % to 100 % 20 % to 100 % 20 % to 100 %</td>
<td></td>
</tr>
<tr>
<td>Max. acceleration voltage</td>
<td>35 kV</td>
<td>45 kV</td>
<td>60 kV</td>
</tr>
<tr>
<td>Average life time of cathodes at maximum beam power</td>
<td>100 h to 200 h</td>
<td>100 h to 200 h</td>
<td>100 h to 300 h</td>
</tr>
<tr>
<td>Magnetic lenses</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Number of X/Y coils</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Maximum deflection angle</td>
<td>± 40º</td>
<td>± 40º</td>
<td>± 40º</td>
</tr>
<tr>
<td>1 kHz system (coil/amplifier)</td>
<td>± 35º</td>
<td>± 25º</td>
<td>± 25º</td>
</tr>
<tr>
<td>20 kHz system</td>
<td>± 40º</td>
<td>± 40º</td>
<td>± 40º</td>
</tr>
<tr>
<td>Minimum spot diameter (at distance of 1 m, maximum beam power and maximum acceleration voltage)</td>
<td>0.5 mm</td>
<td>0.5 mm</td>
<td>0.5 mm</td>
</tr>
<tr>
<td>At process pressure of 5 x 10⁻¹ Pa</td>
<td>— At process pressure of 5 x 10⁻¹ Pa</td>
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<td>— At process pressure of 5 x 10⁻¹ Pa</td>
</tr>
<tr>
<td>Maximum process pressure</td>
<td>5 Pa</td>
<td>5 Pa</td>
<td>2 Pa</td>
</tr>
</tbody>
</table>

**BEAM CONTROL SYSTEM**

The beam guidance system is an electronic unit for controlling and monitoring the electron beam of an electron beam gun by means of electromagnetic lenses and deflection coils. It consists of an industrial PC, a beam guidance base unit, a control console and associated beam guidance software.

**VA BCOS** is MS Windows-based beam guidance software and performs the following tasks:
- Control of max. 8 electron beam guns
- Generation of deflection figures to realize the electron beam distribution required at the process location
- Generation of deflection sequences by means of the pre-installed figure library, or based on coordinate lists generated with customary software (e.g. MS Excel)
- Management of technological process sequences (recipes)
- Continuous beam deflection with simultaneous adaptation of form, position, size and dwell time of the individual deflection figures during operation, by means of operator control actions or a connection to the automatic process control
- Adaptation of the electron beam focusing within the electron beam gun and at the process location, including monitoring of the focusing state by evaluating the temperature increase of the cooling water in the electron beam gun
- Display and data recording of all process-relevant operating parameters such as power, power distribution and acceleration voltage
- Data transfer
- Interface for external access via internet connection

**FEATURES**
- Freely programmable time & power based beam scanning sequences
- Comprehensive scanning figure library
- Signal processor-based calculation of all dynamic functions
- Tracks automatically moving scanning figures
- Online geometrical and dynamic correction of scanning sequences
- Synchronization of scanning sequences of multiple EB guns
- User permissions management
- Latest software technology and architecture
- Integration of various process control modules - VA BCOS / VA PROCESS MASTER / customer controllers

**BENEFITS**
- Reliable process control for certified products
- Flexible adaptation to VON ARDENNE or customer machines
- Controlled continuous beam scan despite digital figure coordinate definition
- Open customer interface
- Easy and flexible operator interaction as well as automatic process control
- Implementation on standard industrial hardware components