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 nanometer and a few micrometers 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 ideal for manufacturing products which help to use less energy or to generate energy from renewable resources.
**QUALITY ASSURANCE, QUALITY MONITORING FOR COATINGS ON GLASS**

- Functional coatings for PV
- Optical coatings, low emissivity coatings
- Optical characterisation and sheet resistance measurement

**ENHANCE YOUR QUALITY BY EASIER QUALITY CONTROL (QC)**

- See the real quality parameters online already during production
- Check your insulating glass parameters in real-time
- Reduce your efforts in dummy sample handling and laboratory measurements

**ENHANCE YOUR QUALITY BY BETTER QUALITY ASSURANCE (QA)**

- Fully traceable operation and administration of quality criteria and measurement recipes for QA/QC acc. to ISO 9001

**MAKE IT YOUR OWN**

- Software is expandable with your own customer specific sensors
- Open for integration of your own customer-specific sensors

---

**TECHNICAL DATA**

Subject to change without notice due to technical improvement.

**TRAVERS VARIANTS/TYPES**

Only valid for VON ARDENNE Software Package "ExSitu-Monitor V12.x".

**Measurements installed**

<table>
<thead>
<tr>
<th>Ex-Situ-Monitor V12.x</th>
<th>S</th>
<th>M</th>
<th>L</th>
<th>XL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrow sensor setup</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Patented spectral haze measurement for PV applications</td>
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<td>yes</td>
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<tr>
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<tr>
<td>Automatic glass and gap detection (up to 10 mm accuracy)</td>
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<td>yes</td>
<td>yes</td>
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</tr>
<tr>
<td>Flexible interface to coater and transport PLC for pane specific data handling and quality feedback</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

**Database capacity limit**

- No data capacity is limited by available and reserved hard disk space only.

**Color calculations**

- (acc. to CIE, Hunter-Lab, DIN99) Yes
- (acc. to CIE15 and DIN EN ISO 11664) Yes
- (acc. to DIN6176, Hunter-L,a,b) Yes

**Different displays**

- Lateral distributions, spectra, trends, value tables
- General colour rendering index Ra

**Options**

- Export to MES (optional software module)
- Optional automatic data export to Manufacturing Execution System (MES)

---

**DATA EVALUATION/PROCESSING**

**Configuration**

<table>
<thead>
<tr>
<th>Standard</th>
<th>Premium</th>
</tr>
</thead>
<tbody>
<tr>
<td>VIS:</td>
<td>VISNIR:</td>
</tr>
<tr>
<td>380 nm - 980 nm</td>
<td>380 nm - 1780 nm / 380 nm - 2180 nm</td>
</tr>
</tbody>
</table>

**Measurement range for sheet resistance**

- 2 Ω - 200 Ω
- Database capacity is limited by available and reserved hard disk space only.

**Color calculations**

- (acc. to CIE, Hunter-Lab, DIN99) Yes
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**Different displays**

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**QUALITY ASSURANCE AND QUALITY MONITORING FOR COATINGS ON GLASS**

The VON ARDENNE Ex-Situ GC Measuring System is designed for quality assurance and quality monitoring for coatings on glass such as functional coatings for photovoltaics applications, optical coatings and low emissivity (low-E) coatings. It is also suited for optical characterisation and sheet resistance measurement.

Ex-situ measuring systems measure the properties of the whole layer stack, such as reflectance, transmittance and sheet resistivity, but also color or other quality parameters.

The VON ARDENNE Ex-Situ Measuring System for Low-E coated glass goes beyond the mere optical measurement of the coated glass pane. They can predict the appearance technical parameters, emissivity, U-value or Rd(%) of double or triple insulating glazing units made of panes from the current production.

- Narrow sensor setup suited for standard conveyor systems
- ■ Patent spectral haze measurement especially for PV applications
- ■ Intelligent motion control for fast cycle times down to 20 s
- ■ Automatic glass and gap detection (up to 10 mm accuracy)
- ■ Flexible interface to coater and transport PLC for pane specific data handling and quality feedback
- ■ Use of industry standards: Ethernet, TCP/IP, SQL (open database)
- ■ Forecast of coating glass unit (IGU) parameters of the coated Low-E glass (emissivity, thermal transmittance, solar heat gain, shading coefficient...)
- Calculation of color values and related values of the single pane of IGU
  - CIEYxy, CIELab, CIELCh, CIELuv
  - „DINP9“ (acc. to DIN4176, Hunter-L,a,b)
- Different displays for results: lateral distributions, spectra, trends, value tables
- General colour rendering index Ra
  - (acc. to CIE15.3 and DIN EN 410 / ISO 9050)
- Automatic export of data to file system (customizable) or central MES
- Client-server software architecture for easy remote handling, sensor upgrading, expandability and maintenance

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**TECHNICAL DATA**

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**TRAVERS VARIANTS/TYPES**

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**Different displays**

- Lateral distributions, spectra, trends, value tables

**Options**

- Export to MES (optional software module)
- Optional automatic data export to Manufacturing Execution System (MES)

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