**MODULES FOR VOLTAGE GENERATION**

- **Transformer T** and **Transformer T**

**MECHANICAL MODULES**

- **Junction element KE**

**HIGH VOLTAGE MODULE TEST SYSTEM**

- **Transformer T**

**TECHNICAL PARAMETERS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>135 kV</th>
<th>270 kV</th>
<th>350 kV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rated DC voltage</strong></td>
<td>135 kV</td>
<td>270 kV</td>
<td>350 kV</td>
</tr>
<tr>
<td><strong>Rated AC voltage</strong></td>
<td>100 kV</td>
<td>200 kV</td>
<td></td>
</tr>
<tr>
<td><strong>Rated DC current</strong></td>
<td>14 mA</td>
<td>10 mA</td>
<td>8 mA</td>
</tr>
<tr>
<td><strong>Rated AC current</strong></td>
<td>100 mA</td>
<td>200 mA</td>
<td></td>
</tr>
<tr>
<td><strong>Rated power continuous</strong></td>
<td>5.8 kVA</td>
<td>5.8 kVA</td>
<td>5.8 kVA</td>
</tr>
<tr>
<td><strong>Rated power short time (1 h ON/23 h OFF)</strong></td>
<td>11 kVA</td>
<td>11 kVA</td>
<td>11 kVA</td>
</tr>
<tr>
<td><strong>Rated energy</strong></td>
<td>100 J</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rated charging voltage</strong></td>
<td>135 kV</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Output switching impulse voltage (at no-load)</strong></td>
<td>110 kV LI</td>
<td>110 kV LI</td>
<td>110 kV LI</td>
</tr>
<tr>
<td><strong>Output lightning impulse voltage (at no-load)</strong></td>
<td>110 kV LI</td>
<td>110 kV LI</td>
<td>110 kV LI</td>
</tr>
<tr>
<td><strong>Rated charging voltage</strong></td>
<td>135 kV</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rated energy</strong></td>
<td>100 J</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rated charging voltage</strong></td>
<td>135 kV</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Rated energy</strong></td>
<td>100 J</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Phone +49 351 8425-700

For higher voltages and energies, as necessary for real testing and research work the HIGHVOLT series L of impulse voltage test systems is recommended for both, technical and economic reasons.
MODULES FOR VOLTAGE GENERATION

- Transformer for 100 and 200 kV
- Transformer for 270 kV
- Transformer for 350 kV
- Transformer for 420 kV
- Transformer for 500 kV
- Transformer for 660 kV
- Transformer for 750 kV

- HV rectifier for 135 kV DC
- HV blocking impedance for 150 kV
- HV capacitors for 100 kV AC/135 kV DC
- HV resistors for 140 kV
- HV foils for 140 kV
- HV foils for 150 kV

- Earthing rods ES
- Driven earthing devices (EE 150, ERE 150)
- Earthing device (ED 150)

- Spark gaps for 100 kV AC/135 kV DC
- Spark gap for 135 kV DC
- Spark gap for 250 kV (motor driven)
- Spark gap for 300 kV (motor driven)
- Spark gap for 500 kV

- Coupling: capacitor MCP 100
- Current limiting resistors R 025 to R 5000
- Divider resistor for 135 kV DC

- Divider MRT 250, MRT 500, MRT 750

- Junction element KE

- Test transformers for 100 and 200 kV
- Test transformers for 270 kV
- Test transformers for 350 kV
- Test transformers for 420 kV
- Test transformers for 500 kV
- Test transformers for 660 kV
- Test transformers for 750 kV

- LV rectifier for 280/18 kV

- Insulating and connecting elements

- Module Test Systems

== TECHNICAL PARAMETERS ==

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Standard</th>
<th>I 0.8s-10/350</th>
<th>I 1.2/50</th>
<th>I 250/2500</th>
<th>I 350/3500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output switching impulse voltage (1-stage)</td>
<td>110 kV LI</td>
<td>130 kV LI</td>
<td>110 kV LI</td>
<td>100 kV LI</td>
<td>100 kV LI</td>
</tr>
<tr>
<td>Output lightning impulse voltage (1-stage)</td>
<td>110 kV LI</td>
<td>130 kV LI</td>
<td>110 kV LI</td>
<td>100 kV LI</td>
<td>100 kV LI</td>
</tr>
<tr>
<td>Rated energy</td>
<td>100 J</td>
<td>100 J</td>
<td>100 J</td>
<td>100 J</td>
<td>100 J</td>
</tr>
<tr>
<td>Rated charging voltage</td>
<td>135 kV</td>
<td>135 kV</td>
<td>135 kV</td>
<td>135 kV</td>
<td>135 kV</td>
</tr>
<tr>
<td>Rated DC current</td>
<td>14 mA</td>
<td>10 mA</td>
<td>8 mA</td>
<td>8 mA</td>
<td>8 mA</td>
</tr>
<tr>
<td>Rated AC voltage</td>
<td>100 kV</td>
<td>200 kV</td>
<td>300 kV</td>
<td>250 kV</td>
<td>350 kV</td>
</tr>
<tr>
<td>Rated power short time (1 h ON/23 h OFF)</td>
<td>11 kVA</td>
<td>11 kVA</td>
<td>11 kVA</td>
<td>11 kVA</td>
<td>11 kVA</td>
</tr>
<tr>
<td>Rated power continuous</td>
<td>5.8 kVA</td>
<td>5.8 kVA</td>
<td>5.8 kVA</td>
<td>5.8 kVA</td>
<td>5.8 kVA</td>
</tr>
<tr>
<td>Rated power continuous (1 h ON/23 h OFF)</td>
<td>11 kVA</td>
<td>11 kVA</td>
<td>11 kVA</td>
<td>11 kVA</td>
<td>11 kVA</td>
</tr>
<tr>
<td>Alternating voltages, type WGBS</td>
<td>(Data Sheet 4.03)</td>
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<tr>
<td>Direct voltages, type WBS</td>
<td>(Data Sheet 4.01)</td>
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</tbody>
</table>

HIGH VOLTAGE MODULE TEST SYSTEM

- AC, DC, and impulse testing
- Factory testing
- R&D
- Education / training

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4.0/4 Module Test Systems
**MODULES FOR VOLTAGE GENERATION**

- Test transformers for 110 and 230 kV
  - The standard transformer 110/3 kV is not destroyable, what makes it suitable for sensitive measurements. The transformer is designed for continuous power of 6.6 kVA and has a short-time power of 11 kVA for one hour per day.

- HV separators for 100 kV DC to 50 kV DC
  - The separators 100 kV DC to 50 kV DC are designed to separate high-voltage circuits on both sides.

- HV washers for 75 kV AC
  - The washers 75 kV AC are designed for repetitive tests on the same sample with limited voltage and current limit.

- HV switching equipment for 135 kV
  - The switching equipment 135 kV is designed for switching high voltages and currents.

- Spark gaps for 100 kV AC/135 kV DC
  - The spark gaps are designed for impulse generation, current limitation, protection or discharging.

- HV capacitors for 100 kV AC/135 kV DC
  - The HV capacitors are used for impulse generation, coupling, DC and impulse voltage generation.

- HV resistors for 140 kV
  - The resistors are used for resistive voltage generation.

- HV impedance
  - The HV impedance is used for sensitive PD-measurements.

- Elements for earthing and discharge
  - Elements for earthing and discharge are available. The components are connected to the junction element by the combined insulating/connecting element VES, which is in the design of the HV circuit. An additional LV measuring branch MC including Base elements (FE 1) and base connecting elements (FV 1) ensures the stable assembly of the modules and the reliable earthing.

- Junction elements
  - Junction elements are used for connecting different modules or elements.

**MECHANICAL MODULES**

- Test transformers for 110 and 230 kV
  - The standard transformer 110/3 kV is not destroyable, what makes it suitable for sensitive measurements. The transformer is designed for continuous power of 6.6 kVA and has a short-time power of 11 kVA for one hour per day.

- HV separators for 100 kV DC to 50 kV DC
  - The separators 100 kV DC to 50 kV DC are designed to separate high-voltage circuits on both sides.

- HV washers for 75 kV AC
  - The washers 75 kV AC are designed for repetitive tests on the same sample with limited voltage and current limit.

- HV switching equipment for 135 kV
  - The switching equipment 135 kV is designed for switching high voltages and currents.

- Spark gaps for 100 kV AC/135 kV DC
  - The spark gaps are designed for impulse generation, current limitation, protection or discharging.

- HV capacitors for 100 kV AC/135 kV DC
  - The HV capacitors are used for impulse generation, coupling, DC and impulse voltage generation.

- HV resistors for 140 kV
  - The resistors are used for resistive voltage generation.

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- Test transformers for 110 and 230 kV
  - The standard transformer 110/3 kV is not destroyable, what makes it suitable for sensitive measurements. The transformer is designed for continuous power of 6.6 kVA and has a short-time power of 11 kVA for one hour per day.

- HV separators for 100 kV DC to 50 kV DC
  - The separators 100 kV DC to 50 kV DC are designed to separate high-voltage circuits on both sides.

- HV washers for 75 kV AC
  - The washers 75 kV AC are designed for repetitive tests on the same sample with limited voltage and current limit.

- HV switching equipment for 135 kV
  - The switching equipment 135 kV is designed for switching high voltages and currents.

- Spark gaps for 100 kV AC/135 kV DC
  - The spark gaps are designed for impulse generation, current limitation, protection or discharging.

- HV capacitors for 100 kV AC/135 kV DC
  - The HV capacitors are used for impulse generation, coupling, DC and impulse voltage generation.

- HV resistors for 140 kV
  - The resistors are used for resistive voltage generation.

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**HIGH VOLTAGE MODULE TEST SYSTEM**

- **Technological Parameters**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated AC voltage</td>
<td>100 kV</td>
</tr>
<tr>
<td>Rated DC voltage</td>
<td>135 kV</td>
</tr>
<tr>
<td>Rated energy</td>
<td>100 J</td>
</tr>
<tr>
<td>Rated charging voltage</td>
<td>135 kV</td>
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<td>11 kVA</td>
</tr>
<tr>
<td>Rated power continuous</td>
<td>5.8 kVA</td>
</tr>
</tbody>
</table>

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Fax +49 351 8425-679
Web www.highvolt.de
E-mail sales@highvolt.de
The high voltage module test system is designed for a wide range of applications such as AC, DC, and impulse testing voltages. It offers a variety of advantages as semi- or fully-automatic test procedures and integration elements for plug-in. As a single earthing module, it allows convenient handling, and reporting. Furthermore, additional measuring devices such as plug-in can be connected to a simple 230 V CE socket.

The core of the control of the HV module test system is the programmable logic controllers (PLC), type SIMATIC S7. It can be connected via fibre-optic cables to avoid electromagnetic interferences. The corresponding status messages are indicated on the display. Most operator functions, such as start, stop, or change of parameters, can be processed using a computer control.

Application

The high voltage module test system allows a wide range of applications and can be extended by additional measuring devices such as plug-in or connection boxes for measuring cables. The basic control can be improved by a computer control and measuring system CMS to allow fully-automatic operation. This control can be expanded by a computer control that allows automatic testing, easy data handling, and reporting. The manual or simple automatic control by the operator can be completed by an industrial PC to a complete computer control system.

In R&D, where very often a large number of tests with specific conditions and subsequent statistical evaluations have to be performed, the HV module test system is your first choice. Diagnostic on-site testing or combined measurements of voltage and PD, we recommend the HV module test system. Factory testing of equipment for the distribution network is integrated.

Benefits

- Easy handling
- Wide range of applications from factory testing to RED
- Many test arrangements for AC, DC, and impulse voltages
- Fast realignment without special skills
- Standardized component grid dimensions
- Optional computer control for fast and fully-automatic testing
- Optional integration of other measurement systems (for RED measurements)

System and Components

The HV module test system is designed and controlled by a power module including peak voltmeter. The power module is a unit for rack or desk installation. It can be connected via fibre-optic cables to avoid electromagnetic interferences. The basic control can be improved by a computer control and measuring system CMS to allow fully-automatic operation. This control can be expanded by a computer control that allows automatic testing, easy data handling, and reporting. The manual or simple automatic control by the operator can be completed by an industrial PC to a complete computer control system.

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The low voltage module test system allows a wide range of applications and can be extended by additional measuring devices such as plug-in. As a single earthing module, it allows convenient handling, and reporting. Furthermore, additional measuring devices such as plug-in can be connected to a simple 230 V CE socket.
The high voltage module test system is designed to handle AC, DC, and electrostatic discharge (ESD) voltages. It is versatile and can accommodate different voltages and current levels, making it suitable for various applications such as AC, DC, and impulse testing.

### FACTS IN BRIEF

- **Wide Range of Applications**: From factory testing to R&D research works, training, and education.
- **Easy Handling**: The HV module system is very well suited for student training and is already considered an essential part of teaching HV engineering.
- **Modular Design**: Due to its modular design and high flexibility, it is not only suitable for factory and on-site testing but also for research, development, and education.

### SYSTEM AND COMPONENTS

The HV module test system is designed and controlled for a power module with the following specifications:

- **Power Module**:
  - **AC/DC Peak Voltmeter**: Indicated on the display. Most operator functions, such as test procedures, can be arranged in a touch panel connected by fibre-optic ETHERNET to the PLC computers.
  - **Operator Device**: The operator device (see above) can be simply operated using a computer control. The manual or simple automatic control by the operator device can be completed by an industrial PC to a complete computer system.
  - **PLC Control**: Mainly arranged in the power module (see above).
  - **Computer Control**: The computer control and measuring system can be handled by a computer system.

### BENEFITS

- **Easy Handling**
- **Wide Range of Applications**: From factory testing to R&D research works, training, and education.
- **Fast Interconnection without Special Skills**: The computer control, measuring system, and computer system are handled by a computer system.
FACTS IN BRIEF

The high voltage module test system is adapted to generate AC, DC and impulse voltages up to 660, 250, 120 and 110 kV. The system has a modular design, its main component is the kV LI, and 100 kV SI. DC, and impulse test voltages up to 200 kV AC, 350 kV DC, 110 kV and even higher voltages can be supplied. The rearrangement of the test system, for example from AC test setup into impulse testing, requires only minimal adjustments without changing the test system. In case of frequent measurements especially during training and education. The easy modification, fast rearrangement without special skills and the possibility of the HV module test system being charged and controlled by a power module and HV transformer is the basic components for higher AC voltages or even different voltage shapes such as DC or impulse.

APPLICATIOn

The high voltage module test system offers a wide range of applications. The system can be expanded to a complete high voltage test area. Due to its modular design and high flexibility it is not only suitable for universities and simple testing in universities or electrical engineering schools, but also for research, development, and contract testing.

Applications of the core of the HV module test system in the domestic environment can be expanded to the industrial environment. The HV module test system is able to generate voltages that are necessary to simulate automatic operation of the test system. It can be improved by a computer control that allows automatic testing, easy test handling, and reporting. Furthermore, automatic measuring and evaluation of the test results are performed via a computer control.

APPLICATIONS

- Factory testing of equipment for the distribution network
- Diagnostic on-site testing
- Education
- Training

SYSTEM AND COMPONENTS

The HV module test system is charged and controlled by a power module (see Fig. 2). Power module and HV transformer are the basic components for higher AC voltages or even different voltage shapes such as DC or impulse. The HV module test system is charged and controlled by a power module and HV transformer is the basic components for higher AC voltages or even different voltage shapes such as DC or impulse.

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SYSTEM AND COMPONENTS

The HV module test system is charged and controlled by a power module (see Fig. 2). Power module and HV transformer are the basic components for higher AC voltages or even different voltage shapes such as DC or impulse. The HV module test system is charged and controlled by a power module and HV transformer is the basic components for higher AC voltages or even different voltage shapes such as DC or impulse.
The high voltage module test system is designed to generate AC, DC, and impulse test voltages up to 100 kV, 200 kV, 350 kV, DC, and impulse test voltages up to 200 kV AC, 350 kV DC, 110 kV DC. It can effortlessly be extended by additional components for higher AC voltages or even different voltage shapes such as DC or impulse.

The rearrangement of the test system, for example from AC testing to impulse testing, requires only minimal adjustments without special skills. The advantages of the simple and modular design will stand out even more under practical conditions and subsequent statistical evaluations have to be performed. The HV module test system is your first choice.

**APPLICATION**

The high voltage module test system allows a wide range of applications. It offers a variety of advantages, such as easy automatic testing of industrial test sequences, data storage, and input/output. The test system has a modular design, its main component is a DC, and impulse test voltage. It can be improved by a computer control that allows easy operation, simple testing, and handling. The interconnection between the HV components and the junctions is realized by union nuts fixed by hand. This results in a much more stable arrangement in comparison to other solutions.

The HV components of the module test system have a standardized length to ensure a fast and easy rearrangement of the test system. It can be improved by a computer control which allows easy operation, simple testing, and handling. The interconnection between the HV components and the junctions is realized by union nuts fixed by hand. This results in a much more stable arrangement in comparison to other solutions.

**SYSTEM AND COMPONENTS**

The HV module test system is designed and controlled for a maximum of 100 kV AC, 200 kV AC, 350 kV DC, and impulse test voltages up to 110 kV DC. It can be improved by a computer control which allows easy operation, simple testing, and handling. The interconnection between the HV components and the junctions is realized by union nuts fixed by hand. This results in a much more stable arrangement in comparison to other solutions.

**FACETS IN BRIEF**

- **WIDE RANGE OF APPLICATIONS FROM FACTORY TESTING TO R&D**
- **MANY TEST ARRANGEMENTS AS FOR AC, DC, AND IMPULSE VOLTAGES**
- **FAST REARRANGEMENT WITHOUT SPECIAL SKILLS**

**APPLICATION**

The high voltage module test system allows a wide range of applications. It offers a variety of advantages, such as easy automatic testing of industrial test sequences, data storage, and input/output. The test system has a modular design, its main component is a DC, and impulse test voltage. It can be improved by a computer control that allows easy operation, simple testing, and handling. The interconnection between the HV components and the junctions is realized by union nuts fixed by hand. This results in a much more stable arrangement in comparison to other solutions.

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**FACETS IN BRIEF**

- **WIDE RANGE OF APPLICATIONS FROM FACTORY TESTING TO R&D**
- **MANY TEST ARRANGEMENTS AS FOR AC, DC, AND IMPULSE VOLTAGES**
- **FAST REARRANGEMENT WITHOUT SPECIAL SKILLS**
MODULES FOR VOLTAGE GENERATION

- **Test transformers for 110 and 250 kV**
  - The standard rated power 250 kVA is non-regulating. The transformers are suitable for use at 110 kV and 250 kV. The transformer is designed for continuous power of 40 kVA 250 Vac per phase.

- **Diode rectifiers for 135 kV DC**
  - The controllers with A/D converter (350 kVA) are designed for the control of power systems with A/D converter (350 kVA). The controllers with A/D converter (350 kVA) are designed for the control of power systems with A/D converter (350 kVA).

- **HV switching branch**
  - The test transformers are equipped with a trigger generator. The drive (Type TF) and alternatively as a manually adjusted type VF. Both units are equipped with a trigger generator.

- **HV rectifier for 135 kV DC**
  - The HV rectifier is used for the generation of 135 kV DC voltage.

- **HV blocking impedance for 150 kV**
  - The HV blocking impedance is used for sensitive PD-measurements.

- **HV capacitors for 100 kV AC/135 kV DC**
  - The capacitors C01 to C10 (0.1 to 10 nF) of liquid-impregnated glass reinforced tube with steel covers. Two transformers T100 are available. The components are connected to the junction elements by the combined insulating/connecting element VES, which is in-service with a spacer (up to 270 kV peak). The connecting element is applied for impulse generation, current limitation, protection or discharging.

- **HV resistors for 140 kV**
  - The resistors R025 to R5000 (0.25 to 5000 kΩ) are used for impulse generation, current limitation, protection or discharging.

- **Base and base connecting elements**
  - The junction element KE is a PD-free polygon electrode of six plates that are screwed into an internal cross. The KE 1 with plates of 125 mm diameter can be used up to 240 kV peak. For higher voltages up to 350 kV peak, the KE 2 with 250 mm plates is available. The KE 2 and KE 1 are PD-free and connected to the junction element by the combined insulating/connecting element VES, which is in-service with a spacer (up to 270 kV peak).

- **Base and base connecting elements**
  - The insulating element IE serves as a support insulator (up to 140 kV peak) or a spacer (up to 270 kV peak). The connecting element is applied for impulse generation, current limitation, protection or discharging.

- **Includes and controlling elements**
  - The controllers with A/D converter (350 kVA) are designed for the control of power systems with A/D converter (350 kVA).

- **Spheres for 100 kV AC/135 kV DC**
  - The two spheres of the spark gap are arranged in an insulating element.

- **Spark gap for 110 kV AC/135 kV DC**
  - The spark gap is for impulse voltage test systems. The items are available. The components are connected to the insulating element.

- **Compressed-gas capacitor for 100 kV AC**
  - The compressed-gas capacitor is for 100 kV AC applied for precise voltage and dielectric loss measurements.

- **HN capacitor for 135 kV DC/140 kV**
  - The HN capacitor is for 135 kV DC applied for precise voltage and dielectric loss measurements. The components are connected to the insulating element.

MECHANICAL MODULES

- **Base and base connecting elements**
  - The base and base connecting elements are equipped with an electric magnet that is actuated by the control.

- **Earthing rods ES**
  - Earthing rods ES are available for voltages up to 200 kV AC. For automatic or damped earthing up to 150 kV peak, magnetic-earthing rods are applicable up to 350 kV DC.

- **VV and VE**
  - VE is an electrical connection. Both functions can be performed by the combined insulating/connecting element VES, which is in-service with a spacer (up to 270 kV peak) or a spacer (up to 270 kV peak). The connecting element is applied for impulse generation, current limitation, protection or discharging.

- **Storage trolley**
  - The trolley LW is intended to store up to six HV modules that are not in use in the HV test circuit.

- **Gravity**
  - The gravity is switched on for de-earthing, but for earthing it is switched off and the rod moves into the correct position by the magnet.

HIGH VOLTAGE MODULE TEST SYSTEM

**TECHNICAL PARAMETERS**

<table>
<thead>
<tr>
<th>Test voltage</th>
<th>135 kV</th>
<th>270 kV</th>
<th>350 kV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated DC voltage</td>
<td>135 kV</td>
<td>270 kV</td>
<td>350 kV</td>
</tr>
<tr>
<td>Rated power short time (1 h ON/23 h OFF)</td>
<td>11 kVA</td>
<td>11 kVA</td>
<td>11 kVA</td>
</tr>
<tr>
<td>Rated power continuous</td>
<td>5.8 kVA</td>
<td>5.8 kVA</td>
<td>5.8 kVA</td>
</tr>
<tr>
<td>Rated AC voltage</td>
<td>100 kV</td>
<td>200 kV</td>
<td>350 kV</td>
</tr>
</tbody>
</table>

**HIGH VOLTAGE MODULE TEST SYSTEM**

- AC, DC, and impulse testing
- Factory testing
- R&D
- Education / training

**HIGHVOLT Prüftechnik Dresden GmbH**

- **Web** www.highvolt.de
- **E-mail** sales@highvolt.de
- **Fax** +49 351 8425-679

**TECHNICAL PARAMETERS**

- **Rated DC voltage**
  - 135 kV
  - 270 kV
  - 350 kV
- **Rated DC current**
  - 14 mA
  - 10 mA
  - 8 mA
- **Rated power short time (1 h ON/23 h OFF)**
  - 11 kVA
  - 11 kVA
- **Rated power continuous**
  - 5.8 kVA
  - 5.8 kVA
- **Rated AC voltage**
  - 100 kV
  - 200 kV
- **Rated energy**
  - 100 J
- **Rated charging voltage**
  - 135 kV

**HIGH VOLTAGE MODULE TEST SYSTEM**

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