The world’s broadest and most reliable portfolio of transformer components

Transformer insulation and components
We offer a full range of insulation and components for your transformer – all from one supplier. Delivering safety, reliability and fast lead times for you and your customers.
Delivering flawless customer experience

Full portfolio of insulation, components and services

Technical competence and cost consultancy

Local presence with global experience

Pre-sales and after sales customer support

One-stop-shop offering

Most reliable components and service offering throughout the complete transformer life cycle

Highest quality and health & safety standards

Low risk, reliable supplier

Fast delivery

First class project management and logistics

Value-added solutions to optimize performance and lifecycle value

Reducing complexity of your daily business
- Unique “One-stop-shop” offering for customers
- Full engineering-to-order solutions
- Customized bundling solutions
- Simplified and cost-effective customer procurement and logistic processes
- Local presence to support every customer worldwide

Supporting you throughout the complete customer journey
- Technical competence and cost optimization
- Extensive pre-sales and after sales customer support
- Product trainings

Customer Connect Center:
Your single point of entry for any questions on products and services across our wide portfolio
- Available 24/7
- contact-us@hitachienergy.com
Partner of choice for your business with 100+ years of expertise in components

We can support your transformer business with the broadest portfolio of insulation, bushings, tap-changers, measurement and safety devices and solutions for continuous online asset monitoring and services throughout the complete transformer life cycle.

**Scope**
We provide solutions for any transformer design and application all around the world.

**People**
We are committed to serving our customers. This is only possible through our exceptional, highly trained and motivated people.

**Footprint**
We are close to you. Our extensive manufacturing capabilities, coupled with a comprehensive knowledge base, enables us to meet regional/local standards and specifications.

**Lead times**
We continuously improve the process towards faster lead times, as we know, that our components deliveries are critical for your business.

**Technology**
We are active in research and development of competitive products that improve equipment safety, power reliability and efficiency - while at the same time minimizing environmental impact.

**Digital solutions**
Our digital monitoring open platform enables full digitalization of any transformer.

01 Tap-changers

02 Bushings

03 Insulation

04 Measurement and safety and digital devices
Tap-changers are used to change the turn ratio between windings in a transformer. This ratio determines the voltage ratio between the windings and is essential for the stabilization of network voltage under variable load conditions. This adjustment may be made by an on-load tap-changer, or by a de-energized tap-changer, or by the selection of bolted link positions.

We offer a comprehensive portfolio of on-load tap-changers (both the conventional and vacuum type), for high-voltage and low-voltage regulation, with in-tank and on-tank solutions. Our offering includes a wide range of de-energized tap-changers.

Our tap-changers are paired with robust, dependable motor drives that are configurable to meet a wide range of customer specifications.

Our offering:
• Conventional on-load tap-changers (OLTC)
• Vacuum on-load tap-changers (OLTC)
• Motor-drive mechanisms
• De-energized tap-changers (DeTC) and switches
• Solution for continuous tap-changer monitoring
• After sales and customer support
OLTC (On-Load Tap-Changer) portfolio overview — Conventional

<table>
<thead>
<tr>
<th>Product name</th>
<th>UZF</th>
<th>UZE</th>
<th>UBB</th>
<th>UCG short</th>
<th>UCG</th>
<th>UCG/III</th>
<th>UCG/F</th>
<th>UCL/III</th>
<th>UCL/F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max voltage [kV] in delta connection*</td>
<td>145</td>
<td>145</td>
<td>72.5</td>
<td>245</td>
<td>245</td>
<td>245</td>
<td>245</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Max BIL [kV]</td>
<td>650</td>
<td>650</td>
<td>350</td>
<td>1050</td>
<td>1050</td>
<td>1050</td>
<td>1050</td>
<td>1175</td>
<td>1175</td>
</tr>
<tr>
<td>Max current [A]** 3-phase</td>
<td>600</td>
<td>600</td>
<td>500</td>
<td>300</td>
<td>600</td>
<td>925</td>
<td>925</td>
<td>925</td>
<td>925</td>
</tr>
<tr>
<td>Max current [A]** 1-phase</td>
<td>600</td>
<td>600</td>
<td>500</td>
<td>900</td>
<td>1500</td>
<td>1500</td>
<td>1500</td>
<td>2400</td>
<td>2400</td>
</tr>
<tr>
<td>Max positions</td>
<td>33</td>
<td>33</td>
<td>27</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>

* For Δ-connection. Y-connections is restricted by insulation of neutral point to ground.
** Maximum current in Y-connection.

OLTC (On-Load Tap-Changer) portfolio overview — Vacuum

<table>
<thead>
<tr>
<th>Product name</th>
<th>VRLTC</th>
<th>VUBB</th>
<th>VUCG short</th>
<th>VUCG/C</th>
<th>VUCG/III</th>
<th>VUCG/F</th>
<th>VUCL/III</th>
<th>VUCL/F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max voltage [kV] in delta connection*</td>
<td>34.5</td>
<td>72.5</td>
<td>245</td>
<td>245</td>
<td>245</td>
<td>245</td>
<td>300</td>
<td>300</td>
</tr>
<tr>
<td>Max BIL [kV]</td>
<td>200</td>
<td>380</td>
<td>1050</td>
<td>1050</td>
<td>1050</td>
<td>1050</td>
<td>1175</td>
<td>1175</td>
</tr>
<tr>
<td>Max current [A]** 3-phase</td>
<td>2000</td>
<td>600</td>
<td>600</td>
<td>600</td>
<td>800</td>
<td>800</td>
<td>1000</td>
<td>1600</td>
</tr>
<tr>
<td>Max current [A]** 1-phase</td>
<td>N/A</td>
<td>600</td>
<td>1500</td>
<td>1500</td>
<td>1800</td>
<td>1800</td>
<td>2400</td>
<td>2400</td>
</tr>
<tr>
<td>Max positions</td>
<td>33</td>
<td>19</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
<td>35</td>
</tr>
</tbody>
</table>

* For Δ-connection. Y-connections is restricted by insulation of neutral point to ground.
** Maximum current in Y-connection.
DeTC (De-energized Tap-Changer) portfolio overview

<table>
<thead>
<tr>
<th>Product name</th>
<th>KDV</th>
<th>DPC</th>
<th>DT/DV</th>
<th>DTW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max voltage [kV] in delta connection*</td>
<td>24</td>
<td>300</td>
<td>24</td>
<td>300</td>
</tr>
<tr>
<td>Max BIL [kV]</td>
<td>150</td>
<td>1050</td>
<td>150</td>
<td>1050</td>
</tr>
<tr>
<td>Max current [A]</td>
<td>300</td>
<td>3200</td>
<td>150</td>
<td>4000</td>
</tr>
<tr>
<td>Max positions</td>
<td>6</td>
<td>5</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

* For Δ-connection. Y-connections is restricted by insulation of neutral point to ground.

Motor-drive mechanisms
The main objective of an electric motor-drive unit is to drive the connected on-load tap-changer or large de-energized tap-changers to a higher or lower tap of a transformer. From modular BUL and versatile BUE for in-tank on-load tap-changers to the digitally controlled SMD with integrated Tap Logic Monitoring System (TLMS) for the type VRLTC tap changer.
Bushings are critical components in all electrical networks, as their chief role is to bring current at high voltage through a grounded barrier. We offer a broad range of bushing for transformers, reactors, switchgear, breakers, traction and wall applications. Our portfolio, tailored to individual requirements, ensures users can rely on the highest possible safety and reliability.

**Our offering**
- Voltage range from 1 kV to 1,200 kV
- Comply with all national standards, including IEC, IEEE, GB, ANSI and GOST
- AC and DC bushings
- All bushing technologies:
  - Dry type and oil-filled
  - Solution for continuous bushing monitoring
- After sales and customer support

**Bushing technologies**

<table>
<thead>
<tr>
<th></th>
<th>OIP</th>
<th>RIP</th>
<th>RIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year of market introduction</td>
<td>1920 – present</td>
<td>1960 – present</td>
<td>2012 – present</td>
</tr>
<tr>
<td>Main insulation</td>
<td>Oil Impregnated Paper</td>
<td>Resin Impregnated Paper</td>
<td>Resin Impregnated Synthetics</td>
</tr>
<tr>
<td>Oil-free</td>
<td>No</td>
<td>Yes</td>
<td>500</td>
</tr>
<tr>
<td>Paper-free</td>
<td>No</td>
<td>No</td>
<td>500</td>
</tr>
<tr>
<td>Moisture resistance</td>
<td>No</td>
<td>No</td>
<td>27</td>
</tr>
<tr>
<td>Easy storage</td>
<td>No</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>IEC 60137 (2017)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tan delta</td>
<td>&lt; 0.7%</td>
<td>&lt; 0.40%</td>
<td>&lt; 0.40%</td>
</tr>
<tr>
<td>PD at 2xUm/√3</td>
<td>&lt; 10 pC</td>
<td>&lt; 5 pC</td>
<td>&lt; 5 pC</td>
</tr>
<tr>
<td>Temperature class</td>
<td>105°C</td>
<td>120°C</td>
<td>120°C</td>
</tr>
</tbody>
</table>
### Oil Impregnated Paper (OIP) – Power transformer outdoor bushings

<table>
<thead>
<tr>
<th>Product name</th>
<th>GOH (CN TOB)</th>
<th>GOB (CN TOE)</th>
<th>GOE (CN-TOE)</th>
<th>GOM (CN-TOM)</th>
<th>GOEK</th>
<th>Type-T</th>
<th>O Plus C (II)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage [kV]</td>
<td>36</td>
<td>52-245 (72.5 - 170)</td>
<td>52-1200</td>
<td>245 (252)</td>
<td>245-800</td>
<td>25-46</td>
<td>15-550</td>
</tr>
<tr>
<td>Max. current [A]</td>
<td>25000</td>
<td>1250 (3150)</td>
<td>5000</td>
<td>1600 (3150)</td>
<td>5000</td>
<td>21500</td>
<td>3000</td>
</tr>
<tr>
<td>Application</td>
<td>Transformer-high current (oil/air)</td>
<td>Transformer (oil/air)</td>
<td>Transformer (oil/air)</td>
<td>Transformer (oil/air)</td>
<td>Transformer-high current (oil/air)</td>
<td>Transformer (oil/air)</td>
<td></td>
</tr>
</tbody>
</table>

### DRY - Resin Impregnated Paper (RIP)/Resin Impregnated Synthetics (RIS) – Power transformer outdoor bushings

<table>
<thead>
<tr>
<th>Product name</th>
<th>RTXF (HiRIP)</th>
<th>RTKF (AirRIP)</th>
<th>GSA-OA (directly molded)</th>
<th>GSB</th>
<th>BRIT/BRIT-S</th>
<th>EasyDRY (directly molded)</th>
<th>O Plus Dry (directly molded)</th>
<th>AirRIP-flex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage [kV]</td>
<td>24-52</td>
<td>24-550</td>
<td>52-245</td>
<td>245-800</td>
<td>110-220</td>
<td>24-245</td>
<td>25-230</td>
<td>245-550</td>
</tr>
<tr>
<td>Max. current [A]</td>
<td>40000</td>
<td>5000</td>
<td>2000</td>
<td>2500</td>
<td>2000</td>
<td>2500</td>
<td>3000</td>
<td>5000</td>
</tr>
<tr>
<td>Application</td>
<td>Transformer-high current (oil/air)</td>
<td>Transformer (oil/air)</td>
<td>Transformer (oil/air)</td>
<td>Transformer (oil/air)</td>
<td>Transformer (oil/air)</td>
<td>Transformer (oil/air)</td>
<td>Transformer (oil/air)</td>
<td></td>
</tr>
</tbody>
</table>

### Non condenser (bulk) transformer bushings

<table>
<thead>
<tr>
<th>Product name</th>
<th>Cast resin bulk</th>
<th>Porcelain bulk</th>
<th>DRY NC</th>
<th>Type RJ and LCRJ</th>
<th>Type A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage [kV]</td>
<td>1-34</td>
<td>1-52</td>
<td>12-72.5</td>
<td>1-34.5</td>
<td>1 – 34.5</td>
</tr>
<tr>
<td>Max. current [A]</td>
<td>5400</td>
<td>6500/3150</td>
<td>6300</td>
<td>23000</td>
<td>18000</td>
</tr>
<tr>
<td>Application</td>
<td>Transformer/Switchgear (oil/air) + (oil/gas)</td>
<td>Transformer (oil/air)</td>
<td>Transformer (oil/air)</td>
<td>Transformer (oil/air)</td>
<td>Transformer (oil/air)</td>
</tr>
</tbody>
</table>
DRY - Resin Impregnated Paper (RIP)/Resin Impregnated Synthetics (RIS) – Power transformer outdoor bushings

<table>
<thead>
<tr>
<th>Product name</th>
<th>RTKK (OIRIP)</th>
<th>GSA-OO</th>
<th>GSBK</th>
<th>RTKG (GaRIP)</th>
<th>RM/ RMFF</th>
<th>GSA-AA</th>
<th>BRIL/ BRIL-S</th>
<th>RAKF</th>
<th>BRIB</th>
<th>RM/ RMII</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage [kV]</td>
<td>72.5 - 550</td>
<td>52-245</td>
<td>245-550</td>
<td>36-550</td>
<td>24-300</td>
<td>52-123</td>
<td>110</td>
<td>245-550</td>
<td>35-110</td>
<td>12-36</td>
</tr>
<tr>
<td>Max. current [A]</td>
<td>4000</td>
<td>2500</td>
<td>2500</td>
<td>4000</td>
<td>5000</td>
<td>4000</td>
<td>2000</td>
<td>4000</td>
<td>2000</td>
<td>3000</td>
</tr>
<tr>
<td>Application</td>
<td>Transformer (oil/oil)</td>
<td>Transformer (oil/oil)</td>
<td>Transformer (oil/SF₆)</td>
<td>Transformer (oil/SF₆)</td>
<td>Wall (air/air)</td>
<td>Wall (air/air)</td>
<td>Wall (air/air)</td>
<td>Switchgear (SF₆/air)</td>
<td>Breaker (oil/air)</td>
<td>Traction (oil/air) (oil/air)</td>
</tr>
<tr>
<td>Standard</td>
<td>IEC</td>
<td>IEC</td>
<td>IEC</td>
<td>IEC</td>
<td>IEC</td>
<td>IEC</td>
<td>GOST</td>
<td>IEC</td>
<td>GOST</td>
<td>IEC</td>
</tr>
</tbody>
</table>

HVDC transformer and wall bushings

<table>
<thead>
<tr>
<th>Product name</th>
<th>GGF</th>
<th>GSC</th>
<th>GSD</th>
<th>GGFL</th>
<th>GSCL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rated voltage [kV]</td>
<td>200-1100</td>
<td>500</td>
<td>600</td>
<td>200-1100</td>
<td>320</td>
</tr>
<tr>
<td>Max. current [A]</td>
<td>6250</td>
<td>5000/3150</td>
<td>3000</td>
<td>6250</td>
<td>2500</td>
</tr>
<tr>
<td>Application</td>
<td>Transformer (oil/air)</td>
<td>Transformer (oil/air)</td>
<td>Transformer (oil/air)</td>
<td>Wall (air/air)</td>
<td>Wall (air/air)</td>
</tr>
</tbody>
</table>

Scan to know more

![QR Code]
Insulation components and materials

Electrical insulation is a vital part of transformers, helping them withstand the high temperatures and electric fields that occur during the transformer’s operating life. The lifetime of a transformer depends on the reliability of the insulation used.

Hitachi Energy pays close attention to the systems and processes used in manufacturing transformer insulation, and continues to improve product quality and reliability by continuously investing in modern equipment and experienced people.

From replacements to upgrades we have been the supplier of choice providing quality insulation materials for over 100 years by meeting the diverse needs of an evolving industry.

**Our offering:**
For distribution and power transformers, whether it be liquid-filled, dry-type or traction we offer a complete range of insulation products for transformers from 11 kV up to 1,200 kV AC and 800 kV DC:
- Pressboard and transformer insulation paper
- Power transformer winding and active part kits
- Fiber composite laminates and components
- Flexible laminates
- Polymeric insulators
- Machined and molded power transformer components
- High voltage lead exits

**Product applications**

- **Dry type transformers, electrical drives**
- **HVDC – transformers**
- **Distribution and Power transformers**
- **Electric vehicles**
- **Generators, dry type transformers**
- **Generators, electrical drives**
- **Traction drives, traction transformers**
- **Electrical drives, niche products**
- **Dry type transformers, capacitors, oil transformers**
- **Power tools**
Measurement, monitoring and safety devices

To secure reliable and safe service conditions of the a transformer, we provide a comprehensive range of measurement and safety devices including digital transformer monitoring open platform solutions.

Our portfolio includes the new generation of sensors and smart devices for all types of transformers. These cost-effective complete solutions that monitor transformer health and improve safety, reliability and efficiency, while minimizing environmental impact.

Our local and global after-sales and service teams and knowledgeable customer support network offers expert support to help select the right device for your application. From replacements to upgrades and conventional to digital devices, we offer the most complete portfolio in the industry.

Our offering:
- eDevices Measurement & Monitoring Accessories
- TXpert Hub, including Thermal, DGA, Bushing and Tap Changer monitoring
- CoreSense HM, single gas analyzer
- CoreSense M10, multi-gas analyzer
- Lumada APM Edge
- Liquid temperature indicators
- General Purpose Thermometers
- Liquid Level indicators
- Liquid Level Relay for Hermetically sealed transformers
- Gas Detecting Devices for Sealed tanks
- Sudden Pressure
- Relays
- Bushings Potential Apparatus Devices
- Integrated Measurement Relay for distribution transformers

Preservation Accessories
- Conventional breathers
- Self-dehydrating breathers
- Air venting devices
- Ball valves
- Butterfly valves
- Shutter valves
- Liquid draining valves
- Plugs
- Transformer wheels
- General mechanical parts
- other

Digitalization is helping enterprises make better and faster decisions through enhanced asset performance visibility. Monitoring improves the reliability of the assets by constantly keeping a watchful eye on the most critical transformer components. TXpert, our digital monitoring open platform represents a comprehensive solution that enables continuous monitoring of the most valuable transformer’s parameters like:
- Gas accumulation
- Liquid level
- Winding and liquid temperature
- Internal pressure
- Air humidity
- Liquid dissolved gas and moisture levels
- Bushing insulation and Tap-changer operational performance
- Ageing and overloading

CoreTec™ 4, the TXpert Hub is a truly scalable transformer monitoring platform. It is modular, expandable and can integrate a variety of digital sensors and devices into one unique eco-system.

Through remote access, the status of the equipment can be evaluated with Asset Performance Management, the APM Edge, a new software solution which delivers unique, real-time data to power producers and users on the current and future operational health of their transformer assets.
TXpert monitoring system – open digital platform

Digitalization is helping enterprises make better and faster decisions through enhanced asset performance visibility. Monitoring improves the reliability of the assets by constantly keeping a watchful eye on the most critical transformer components.

TXpert, our digital monitoring open platform represents a comprehensive solution that enables continuous monitoring of the most valuable transformer’s parameters like:
- Gas accumulation
- Liquid level
- Winding and liquid temperature
- Internal pressure
- Air humidity
- Liquid dissolved gas and moisture levels
- Bushing insulation and tap-changer operational performance
- Bushing capacitance and loss factor

CoreTec™ 4, the TXpert Hub, is a truly scalable transformer monitoring platform. It is modular, expandable and can integrate a variety of digital sensors and devices into one unique eco-system.

Through remote access, the status of the equipment can be evaluated with Asset Performance Management, the Lumada APM Edge, a new software solution which delivers unique, real-time data to power producers and users on the current and future operational health of their transformer assets.
CoreTec™ 4 enables real-time management of a transformer by monitoring its key parameters and warns the operator of any changes in a transformer’s condition using live and off-line data and transformer models based on IEC and IEEE standards.

**Benefits:**
- Modular
- Configurable and expandable
- Plug and play
- Integrates DGA, bushing & tap-changer monitoring and accessory monitoring into the same platform

**Cyber Security within Transformers**
We are committed to providing our customers with products, systems and services that clearly address cyber security. Proper and timely handling of cyber security incidents and software vulnerabilities is one important factor in helping our customers minimize risks associated with cyber security.