Main Product Lineup for Transmission & Distribution Systems

High-voltage Switchgear

- **Gas Insulated Switchgear (GIS)**
  Rated Voltage: up to 1,100kV

  - Chi Power Station, Kansai Electric Power Co., Inc. Japan
  - Shinharuna Substation, Tokyo Electric Power Co., Inc. Japan
  - The first 500kV full GIS in the world
  - The highest voltage 1,100kV GIS

- **Hybrid Gas Insulated Substation (H-GIS)**
  Rated Voltage: up to 550kV

  - Mao Substation, Guangdong Electric Power Corp. China
  - 550kV H-GIS

- **Other Component**
  - Gas Circuit Breaker (up to 800kV)
  - Partial Discharge Monitoring System
  - Synchronous Switching Controller, etc.

Transformer

- **Oil-immersed Transformer**
  - Type: core & shell type
  - Rated Capacity: up to 3,000MVA
  - Rated Voltage: up to 1,050kV

  - Shinharuna Substation, Tokyo Electric Power Co., Inc. Japan
  - Neikakushu Substation, Kyushu Electric Power Co., Inc. Japan
  - 3,000/3MVA, 1,050kV

- **Gas Insulated Transformer**
  - Type: core type
  - Rated Capacity: up to 86MVA
  - Rated Voltage: up to 275kV

  - Tin Wan Substation, The Hongkong Electric Co., Ltd. Hong Kong
  - 60MVA, 275kV Gas Transformer

- **Other Component**
  - Bushing, OLTC, Cooler Control Panel
  - On-line Gas Monitoring Equipment, etc.

MITSUBISHI ELECTRIC
Changes for the Better
With a constant growing demand for energy, the integration of renewable energy resources and the need to fight climate change, new and efficient solutions become a requisite for power transmission.

Mitsubishi Electric, a leader in the development, design and production of FACTS technology with over 40 years of experience has developed **SVC-Diamond®** as the solution to cope with power transmission challenges.

With its superior features, **SVC-Diamond®** is an innovative and universal MMC VSC solution for grid enhancement.
The world’s largest energy-storage system - **252 units with 50 MW output and 300 MWh rated capacity** - will be installed at the Buzen, Japan, substation, to balance supply and demand when renewable sources are used. Our BLEnDer® RE SCADA achieves efficient operation of multiple-generation sources and batteries to optimize overall control.
MELPRO-D Series Relay

MELPRO-D series provide comprehensive protection for power distribution automation with integration of advanced network systems.

Multi-function
- The MELPRO-D series relay is suitable for feeder protection, motor protection and transformer protection applications.
- Easily configurable, the relay offers multiple step time grading for over-current protection co-ordination.
- Two settings groups offer flexibility for testing purposes or the ability to accommodate different load conditions.
- Remote communications options include IEC 61850 Ethernet communications or Modbus (RS485).
- IEC 61850 communications can be achieved using 1 electrical port or 2 optional ports.
- If 2 optional ports are used, HSR (High-availability Seamless Redundancy) or PRP (Parallel Redundancy Protocol) can be selected through the user interface.
- Up to 5 disturbance recorder fault records can be stored (24 samples/cycle). These fault records can be analyzed using PC Tool software.
- Circuit breakers can be controlled via the HMI or remotely.

GIS/GCB Portable Partial Discharge Monitoring Device PP-100

Insulation diagnosis of gas insulated switchgears with easy operations.
PP-100 supports both the UHF and AE detection methods.

Portable Handsets
(For primary PD diagnostic)

Base Unit
(to be connected with the portable handsets for detailed PD diagnostics)
### Cubicle Type Gas Insulated Switchgear (C-GIS)

<table>
<thead>
<tr>
<th>Standard</th>
<th>IEC62271-200 or IEC60298</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating</td>
<td>Up to 72kV</td>
</tr>
<tr>
<td></td>
<td>Up to 2500A, 31.5kA</td>
</tr>
<tr>
<td>Insulation Medium</td>
<td>Dry Air/SF6-gas</td>
</tr>
<tr>
<td>Features</td>
<td>• Low maintenance</td>
</tr>
<tr>
<td></td>
<td>• SF6-gas free line-up</td>
</tr>
<tr>
<td></td>
<td>• Condition based maintenance</td>
</tr>
</tbody>
</table>

### Vacuum Circuit Breakers and Contactors

<table>
<thead>
<tr>
<th>Standard</th>
<th>IEC62271-100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating</td>
<td>Up to 24kV, 2500A</td>
</tr>
<tr>
<td></td>
<td>Up to 12kV, 3150A</td>
</tr>
<tr>
<td>Operating Medium</td>
<td>Spring Mechanism</td>
</tr>
<tr>
<td>Features</td>
<td>• Low maintenance</td>
</tr>
<tr>
<td></td>
<td>• Next generation type 6kV</td>
</tr>
<tr>
<td></td>
<td>• VCB will be launched in 2012</td>
</tr>
<tr>
<td></td>
<td>• Worldwide experience</td>
</tr>
</tbody>
</table>

### Medium-voltage Switchgears

<table>
<thead>
<tr>
<th>Standard</th>
<th>IEC62271-200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating</td>
<td>Up to 15kV</td>
</tr>
<tr>
<td></td>
<td>Up to 3150A</td>
</tr>
<tr>
<td></td>
<td>Up to 40kA</td>
</tr>
<tr>
<td>Features</td>
<td>• Type tested by KEMA.</td>
</tr>
<tr>
<td></td>
<td>• IAC: AFLF 40kA, 1sec</td>
</tr>
<tr>
<td></td>
<td>• 2-tier application available</td>
</tr>
</tbody>
</table>

### Low-voltage Switchgears and Motor Control Center

<table>
<thead>
<tr>
<th>Standard</th>
<th>IEC61439</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating</td>
<td>690VAC, 4000A, 85kA</td>
</tr>
<tr>
<td>Features</td>
<td>• Arc proof type (IEC TR 61641)</td>
</tr>
<tr>
<td></td>
<td>• Easy maintenance</td>
</tr>
<tr>
<td></td>
<td>• Mitsubishi multi-motor controller (Type EMC) is available</td>
</tr>
</tbody>
</table>

Technical Partner in Indonesia, P.T. UNI MAKMUR ELEKTRIKA (UME) manufactures Medium & Low Voltage Switchgears
Generator Main Circuit Breaker (GMCB)

- Features
  - Integrating CB, DS, ES, CT and VT&SA into one common unit
  - Lower arrangement (VT&SA Equipment)
  - Self-standing design (High-seismic design)
  - All housing LCP
  - Covering all connecting mechanism

- Merits
  - Plant Design
    - Free design for IPB and VT&SA equipment
    - Low required capacitance for interrupting capability
  - Erection
    - Reduce Erection and Commissioning period
    - Easy and Quick access for VT&SA Equipment
  - Maintenance
    - High performance and Low-maintenance operating mechanism (Torsion bar spring type)
    - Easy and Quick access for VT&SA Equipment

- Series
  - Rated continuous current (kA)
    | 8 | 11-13 | 15-18 | 22 |
    |---|-------|-------|----|
  - Rated short-circuit current (kA)
    - 100: In case of applied forced air cooling, the maximum current capacity will be 20kA, and depends on the cooling system design.
    - 130: In case of applied forced-air cooling, the maximum current capacity will be 32kA, and depends on the cooling system design.

MITSUBISHI ELECTRIC
Changes for the Better
Retrofit VCB for Replacement of Existing VCB

Features of New 11kV VCB compared with existing VCB

- Improved insulated frame: Outstanding reliability (Used in MELCO’s latest VCB)
- Greaseless of the gears: Maintenance free of the gears
- Single levering and interlock: Simple and safe operation
- Complete interchangeability: Saving replacement work (No need long shutdown)

Retrofit VCB for Replacement of Existing GCB

Features of New 11kV VCB compared with existing GCB

- Simple mechanism: Outstanding reliability
- Low maintenance: Saving running cost
- SF6 gas free: Environmental
- Complete interchangeability: Saving replacement work (No need long shutdown)
Automatic Dissolved Gas Analyzer for Transformer Monitoring

Analysis of gases dissolved in transformer oil (DGA) is recognized as the most useful tool for early detection of incipient fault in transformers, thereby the prevention at an incipient stage of critical accidents and reducing the maintenance cost of transformer. MITSUBISHI ELECTRIC offers three types of DGA equipment having the following features.

Features

PORTABLE TYPE EQUIPMENT
Model: PGA-300
- 6 components gas analysis
- Quick measurement
- Small amount of oil sample
- Easy operation

ON-LINE TYPE EQUIPMENTS
- Automatic operation at the preset interval
- Easy installation because of the small and light weight equipment
- No consumption of transformer oil
Model: N-TCG
- TCG (Total Combustible Gas) analysis
Model: N-TCG-6C
- 6 components gas analysis
Model: N-TCG-6CM
- 6 components gas analysis with moisture in oil

LABORATORY USE EQUIPMENT
Model: FAF
- Capability of 12 oil samples loading
- Fully automatic unmanned operation
- High sensitive and accurate analysis
- 9 components gas analysis
- 11 components gas analysis (Option)

Construction of Online Type Equipment