MEC 700 D-AVR is the newest product and designed to deliver **high performance, reliability and availability** for both of brushless and static excitation system application. It is applicable for upgrading work in existing plants.

**History of MELCO’s AVR**

<table>
<thead>
<tr>
<th>Year</th>
<th>Analogue AVR</th>
<th>VRG-PMH / VRG-STA</th>
<th>DVRG</th>
<th>MEC5000</th>
<th>Digital AVR (D-AVR)</th>
<th>MEC700</th>
</tr>
</thead>
<tbody>
<tr>
<td>1970</td>
<td>MWTA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1980</td>
<td>MEC3000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1990</td>
<td>VRG-PMH / VRG-STA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2000</td>
<td>DVRG</td>
<td>MEC5000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>MEC700</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Upgrade Menu for Brushless/Static Excitation system**

<table>
<thead>
<tr>
<th>OEM</th>
<th>Partial Replace</th>
<th>AVR Cubicle Replace</th>
<th>AVR/EXC Cub. Full Replace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analogue</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>DVRG/VRG-PMH</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Digital (MEC5000)</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Digital (MEC600)</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OEM</th>
<th>Other Vendor Model</th>
<th>Partial Replace</th>
<th>AVR Cubicle Replace</th>
<th>AVR/EXC Cub. Full Replace</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non OEM</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

**: Applicable : Not Applicable : Original Excitation Cubicle will be re-used.**
Protection Relay Upgrade, SFC Upgrade, Improvement of Energy Conservation

Protection Relay System Upgrade — MELPRO HA

- Generator Protection Model: MELPRO – H1A
- Transformer Protection Model: MELPRO – H2A

New models of digital multi function protection relay unit “MELPRO HA series” which provides flexible and reliable protection in a compact unit, and requires minimal maintenance.

Applicable for upgrade/panel replacement work in existing plant provided by Mitsubishi Electric and/or others.

SFC System Upgrade – Advanced Position Sensor (APS) System

APS units calculates rotor position using the generator terminal voltage and armature current. APS output pulse is used for inverter triggering gate signal instead of physical position sensor system.

- No need to be installed near the generator
  (Former mechanical position sensor needs to be installed near the generator with high accuracy)
- Easy maintenance
  (No need to be disassembled)

Improvement of Energy Conservation – Variable Frequency Drive (VFD)

Mitsubishi Electric can offer to apply “Variable Frequency Drive” for large auxiliaries in the existing power station, in order to reduce losses and improve the energy conservation. TMEIC has a line up of VFD with large output range.
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)
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**