SF₆ CIRCUIT BREAKER
DEAD TANK TYPE
MODEL: 100-SFM T-40SE
120-SFM T-40SE
**Introduction**
Mitsubishi Electric Power Products, Inc. is an affiliate of Mitsubishi Electric Corporation.

**Factory**
Mitsubishi Electric Power Products Manufacturing facility is located in Warrendale, Pennsylvania, a suburb of Pittsburgh. This location also serves as the center for product service and training.

**Evolutionary Design**
Thousands of SFMT breakers rated at transmission voltages through 1100kV have been installed and are operating reliably on T&D systems worldwide. Introduced in 1974, the design is based on proven engineering principals and extensive development and testing.

The SFMT features gang-operated, isolated phase dead tanks supported by a galvanized steel frame. Each tank houses a single-break puffer interrupter and supports two porcelain or composite bushings. The tanks and bushings are pressurized with SF₆ gas.

The frame also supports the control cabinet. It houses a spring-type operating mechanisms, linkages and the control circuits.

<table>
<thead>
<tr>
<th>TYPE</th>
<th>100-SFMT-40SE</th>
<th>120-SFMT-40SE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage (max kV)</td>
<td>123</td>
<td>145</td>
</tr>
<tr>
<td>BIL (kV Crest)</td>
<td>550</td>
<td>650</td>
</tr>
<tr>
<td>60 Hz withstand (kV)</td>
<td>260</td>
<td>310</td>
</tr>
<tr>
<td>Continuous Current (A)</td>
<td>1200 / 2000 / 3000</td>
<td>1200 / 2000 / 3000</td>
</tr>
<tr>
<td>Interrupting Current (kA)</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Interrupting Time (cycles)</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Total Weight (lbs / kgs)</td>
<td>7155 / 3252</td>
<td>7155 / 3252</td>
</tr>
<tr>
<td>Weight of SF₆ (lbs / kgs)</td>
<td>58 / 26</td>
<td>58 / 26</td>
</tr>
</tbody>
</table>
Revolutionary Performance

The SFMT breaker reflects Mitsubishi Electric’s commitment to supply power circuit breakers with extended service lives, that meet or exceed the most demanding specifications for interrupting, insulating and current-carrying capabilities. The design and performance of all breakers are fully verified in accordance with the procedures of ANSI C37 and IEC 62271-100, and by procedures at Mitsubishi’s laboratories that subject the breakers to conditions that are considerably more comprehensive and severe.

These procedures have confirmed the safety and ruggedness of Mitsubishi breakers. For example, tests confirm Mitsubishi breakers withstand 10,000 mechanical operations and severe seismic forces, and that they operate reliably in extremely low or high temperatures. Users also report extraordinarily low cost of ownership based on exceptional reliability, application flexibility, safety, and ease of maintenance.

Features of the SFMT Design

- Dead Tank Construction
- Only SF6 for Open Gap Insulation
- No Solid Insulation Bridging the Open Contacts
- Low Operating Pressure (71 psig @ 20˚C) for 121kV and 145kV, 40kA ratings

Primary Electrical Parts/Interrupters

- True Puffer Interrupters
- Contacts Easily Accessible for Inspection and Changeout
- Verified Full Dielectric and Interrupting Rating at Lockout Pressure
- High Strength Porcelain or Composite Bushings
- Integral NEMA 4-hole bushing terminal

Application Flexibility

- -35˚C Application without Tank Heaters for 121 and 145kV, 40kA ratings
- Mechanically Tested and Verified to -50˚C with tank heaters
- Definite Purpose Capacitive Current Switching Capability
- Reactor Switching Capability
- Tested and Verified for Seismic Applications
- Quiet Operation; Suitable for Urban Installations

Mechanical Operations

- Spring Type Operating Mechanism
- Universal Type Spring Charging Motor (AC/DC)
- Quick Spring Charging for 0 to -10 sec CO Duty Cycle

Synchronous Opening at Maximum Arcing Time

- Controlling of Instant of Contact Separation During Re-Ignition-Free Time Windows Prevents:
  - Re-Ignition
  - Severe Overvoltages

Synchronous Closing

- Zero Voltage Closing Can Reduce:
  - Amplitude of Inrush Current
  - Damaging Transients in Components and Control Circuits
- Elimination of Surge Arrester
- Peak Voltage Closing Can Reduce:
  - Amplitude of Inrush Current
  - Damaging Transients

Rapid Installation

- Bushings Shipped Installed
- Integral NEMA 4-Hole Bushing Terminals
- Complete Breaker Factory Assembled and Production Tested
- Lightweight to Minimize Foundation Size

Controls

- Space for Two or More BCTs per Bushing
- Synchronous Controlled Open and/or Close

Proof

- Tested and Verified for 90% Short Line Fault
- Tested and Verified to Exceed ANSI and IEC Standards
- Verified in Environmental Test Lab
- Production Tested as a Fully Assembled Breaker

Options

- Tank Heaters for Low Temperature Applications
- High Altitude
- Composite Insulators

Features to Reduce Installation and Maintenance

All SFMT breakers are fully assembled, pressurized and tested to ANSI or IEC and Mitsubishi standards prior to shipment. Each breaker is shipped with 5 psig of SF6 gas. Installation is completed rapidly and easily. Site work is limited to removing all packing, bolting the sub-frame to the foundation and bolting the breaker to the sub-frame. Then, using bottled SF6 gas, the interrupter tanks and bushings are filled to operating pressure, and the control and power leads are connected. The breaker is then ready for final inspection and any field testing required by the user.

The SFMT breaker operates with virtually no maintenance; scheduled inspections are completed quickly and easily. For example, the mechanism must be lubricated only every six years during normal inspections.

Critical interrupter components (stationary and moving arcing contacts and nozzles) need only be inspected after 2000 operations at rated load current. In the event of back-to-back capacitive switching application, the critical interrupter components need to be inspected after 1000 operations at rated load current. The components are removed easily by simply unbolting the tank inspection cover. Unlike other designs, there are no interrupter valves, seal rings, solid insulation or screens to inspect.

<table>
<thead>
<tr>
<th>Load</th>
<th>Conventional Practice</th>
<th>Synchronous Switching</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformer</td>
<td>Closing Resistor</td>
<td>Synchronous Closing</td>
</tr>
<tr>
<td>Line</td>
<td>Closing Resistor</td>
<td>Synchronous Closing</td>
</tr>
<tr>
<td></td>
<td>Surge Arrester</td>
<td>(Peak Voltage Point)</td>
</tr>
<tr>
<td>Shunt Capacitor</td>
<td>Closing Resistor</td>
<td>Synchronous Closing</td>
</tr>
<tr>
<td></td>
<td>Series Reactor</td>
<td>(Zero Voltage Point)</td>
</tr>
<tr>
<td></td>
<td>Surge Arrester</td>
<td>(Zero Voltage Point)</td>
</tr>
<tr>
<td>Shunt Reactor</td>
<td>O-pening Resistor</td>
<td>Synchronous O-pening (Maximum Arcing Time)</td>
</tr>
<tr>
<td></td>
<td>Surge Arrester</td>
<td>(Maximum Arcing Time)</td>
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