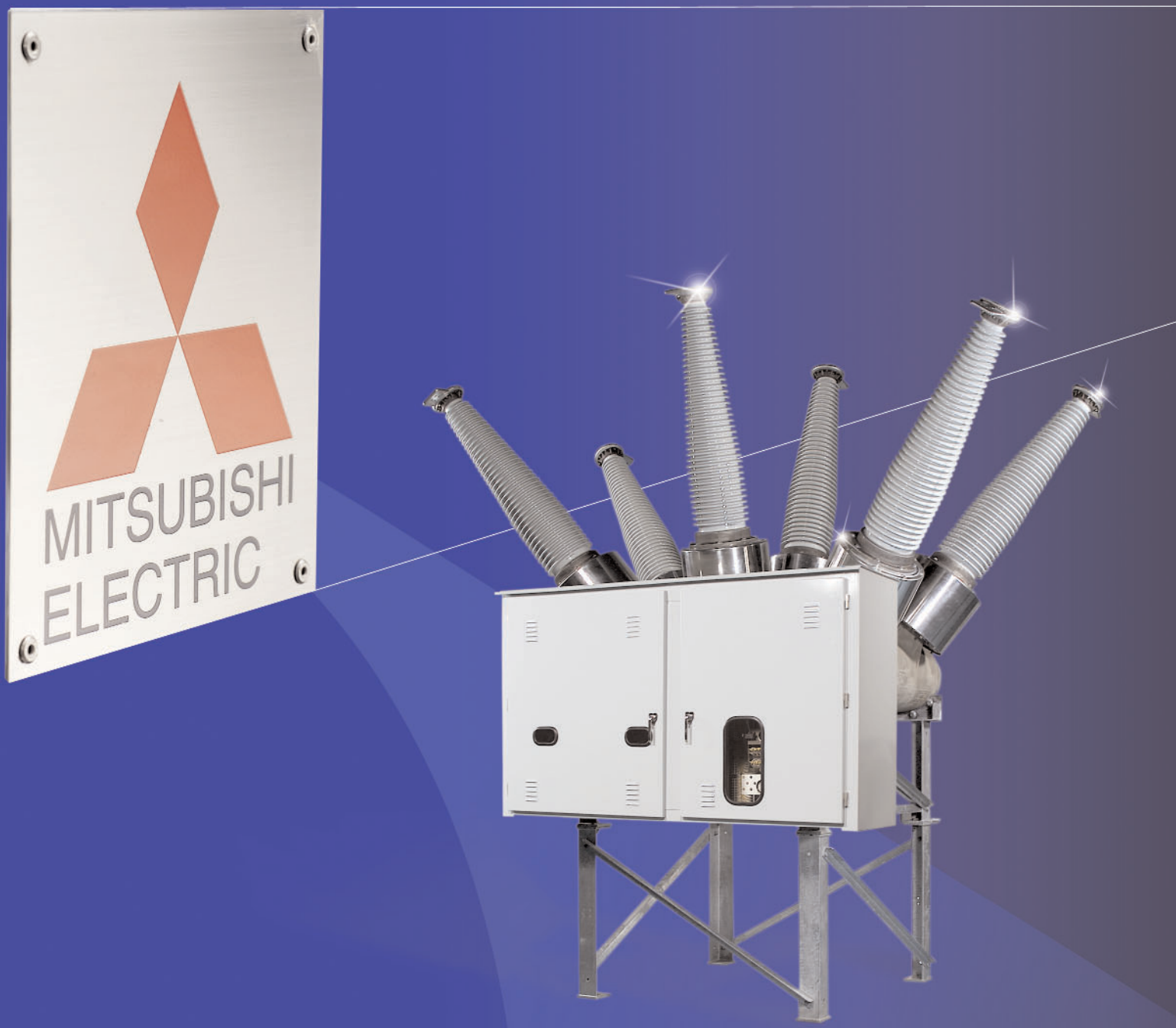
MITSUBISHI ELECTRIC
POWER PRODUCTS, INC.

SF_6 CIRCUIT BREAKER

DEAD TANK TYPE

MODEL: 200-SFMT-40SE
200-SFMT-50SE



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, along with an office in Los Angeles, California, serves as 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 breaker features 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 spring-type operating mechanisms, linkages and the control circuits.

TYPE	200-SFMT-40SE	200-SFMT-50SE
Voltage (max kV)	245	245
BIL (kV Crest)	900	900
60 Hz withstand (kV)	425	425
Continuous Current (A)	1200 / 2000 / 3000	1200 / 2000 / 3000
Interrupting Current (kA)	40	50
Interrupting Time (cycles)	3	3
Total Weight (lbs / kgs)	10,550 / 4,785	10,550 / 4,785
Weight of SF_6 (lbs / kgs)	126 / 57	126 / 57

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 C.37 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 Insulation

- Dead Tank Construction
- Only SF_6 for Open Gap Insulation
- No Solid Insulation Bridging the Open Contacts
- Low Operating Pressure (71 psig @ 20°C)

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

- 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 O-CO-10 sec-CO Duty Cycle

Synchronous Opening at Maximum Arcing Time

- Controlling of Instant of Contact Separation During Re-Ignition-Free, Time Window 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 Minimum Two 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 standards 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, screens to inspect, or bushings to be removed.

Solutions for Surge Elimination by Conventional GCB vs. Synchronous Switching GCB

Load	Conventional Practice	Synchronous Switching
Transformer	Closing Resistor	Synchronous Closing (Peak Voltage Point)
Line	Closing Resistor Surge Arrester	Synchronous Closing (Zero Voltage Point)
Shunt Capacitor	Closing Resistor Series Reactor	Synchronous Closing (Zero Voltage Point)
	Surge Arrester	Synchronous Opening (Maximum Arcing Time)
Shunt Reactor	Opening Resistor Surge Arrester	Synchronous Opening (Maximum Arcing Time)