



SF₆ CIRCUIT BREAKER

DEAD TANK TYPE

MODEL: I100-SFMT-50/63F

I120-SFMT-50/63F

I140-SFMT-50/63F



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 mechanism, interphase linkages and the control circuits.



TYPE	100-SFMT-50/63F	120-SFMT-50/63F	140-SFMT-50/63F
Voltage (max kV)	123	145	170
BIL (kV Crest)	550	650	750
60 Hz withstand (kV)	260	310	365
Continuous Current (A)	1200 / 2000 / 3000	1200 / 2000 / 3000	1200 / 2000 / 3000
Interrupting Current (kA)	50 / 63	50 / 63	50 / 63
Interrupting Time (cycles)	3	3	3
Total Weight (lbs / kgs)	8680 / 3937	8680 / 3937	10910 / 4949
Weight of SF ₆ (lbs / kgs)	120 / 55	120 / 55	127 / 58



Revolutionary Performance

The SFMT reflects Mitsubishi Electric's commitment to supply power circuit breakers with extended service lives, and 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 56, 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 the breakers 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 SF₆ for Open Gap Insulation
- No Solid Insulation Bridging the Open Contacts
- Low Operating Pressure (85 psig @ 20°C) for 121kV and 145kV 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

- 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
- Energy Stored in Powerful Torsion Bars
- Universal Type Spring Charging Motor (AC/DC)
- Quick Spring Charging for O-CO-10 sec-CO Duty Cycle

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

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.

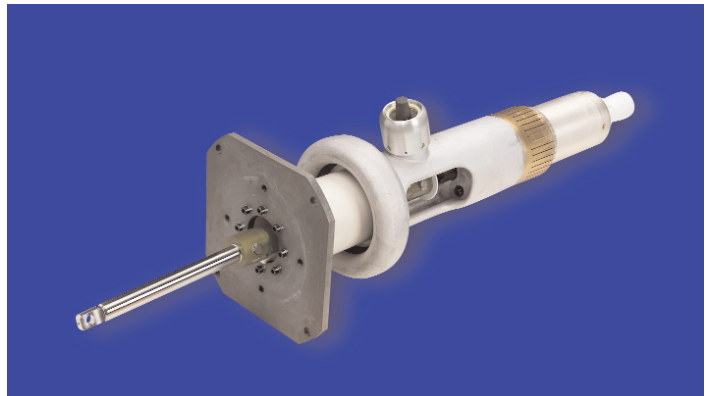
The torsion bar spring mechanism requires no maintenance over the life of the breaker.

Critical interrupter components (stationary and moving arcing contacts and nozzles) need only be inspected after 2000 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.



>> THE DETAILS THAT REDUCE MAINTENANCE COSTS <<

- **A-B:** Stationary arcing contacts, moving arcing contacts and nozzles are easily removed to expedite inspections or replacements.



>> THE DETAILS THAT INHIBIT CORROSION <<

- **C:** Neoprene gasket rings seal glass inspection windows to the control cabinet.



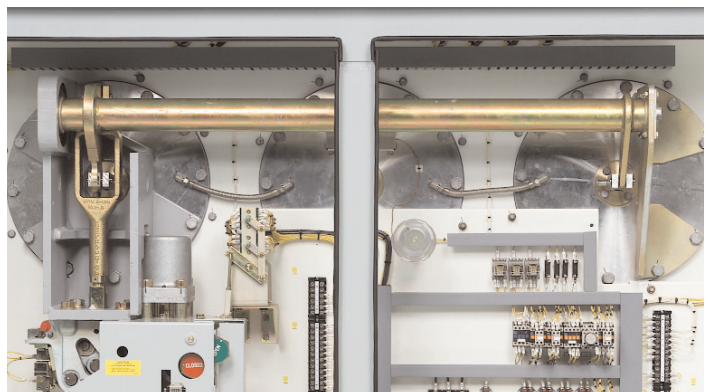
- **D:** Rugged steel frames (upper & lower) are fully galvanized. Interrupter tanks are aluminum. Bushing current transformer covers are aluminum. A special polyurethane enamel protects the control cabinet.



- **E-F:** Two non-conductive vinyl filter systems protect control components from airborne contaminants.



- **G:** The interrupter operating rods, linkages and rotating shaft are fully enclosed to protect components and prevent accidental entry.



>> THE DETAILS THAT EXTEND SERVICE LIFE <<

- **H:** Clear silicon sealant on every piece of exterior hardware assures the breaker remains environmentally robust. Silicon sealant on all flanges provides protection to the O-ring and eliminates future SF₆ gas leaks.



- **I:** Internally glazed porcelains are more electrically track-resistant, provide greater mechanical strength and are easier to clean.



- **J:** Three point door latches assure tight housing closure.
- Robust hinges, latches, handles and other components withstand repeated rough handling. Door handle and hinges are stainless steel.



>> THE DETAILS THAT EASE INSTALLATION <<

- **K:** Instruction Book in a separate pocket shipped with each breaker
- Bushings shipped installed.
- Integral 4-hole terminal pads are designed for easy connection of power leads.
- Lightweight to reduce foundation size.
- Full factory testing before shipment. Interrupter tanks are shipped with 5 psig SF₆



BM-2 Operating Mechanism

The Type BM-2 operating mechanism is a carefully designed and time proven mechanism that utilizes a slight twist in a pair of torsion bars to store the energy necessary to open and close the puffer interrupter. There is one pair of torsion bars for opening and one pair for closing. This mechanism has been in service since 1988.

A universal motor charges the closing torsion bars and the closing operation charges the tripping torsion bars. Reliability and long service life have been confirmed by testing mechanisms to 50,000 operations and at up to 20% higher loads than normal operating conditions.

No maintenance is required on the BM-2 mechanism for the life of the breaker.

Puffer Interrupter

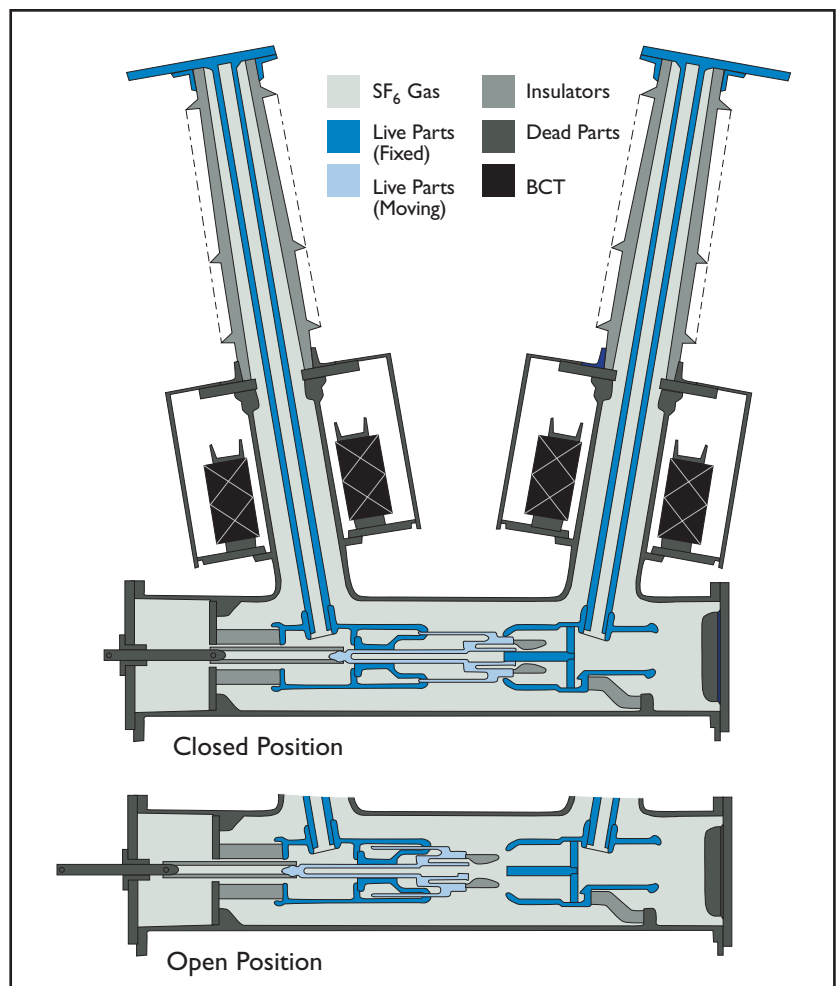
Design of the single-break puffer interrupter is advanced yet simple, a "true" puffer that operates reliably and positively. The interrupter features:

- **Less potential for dielectric failure caused by arc products:** the gap between open contacts is insulated only by SF_6 gas: solid insulation that can degrade over time has been eliminated.
- **Increased interrupting capability:** the interrupter is tested and verified to interrupt 90% short line faults.
- **Less mechanical deterioration:** there are no check valves, seals or screens to wear, fail or maintain.

• **Positive Interruption:** contacts are not delayed and gas flow is unrestrained during interruption.

• **Rapid reclosing:** the interrupter is self-cleaning, with no delay necessary to purge contamination and/or arc products from previous interruptions.

• **Consistent and predictable interrupting:** mechanical springs of known and predictable force, open and close the interrupters.

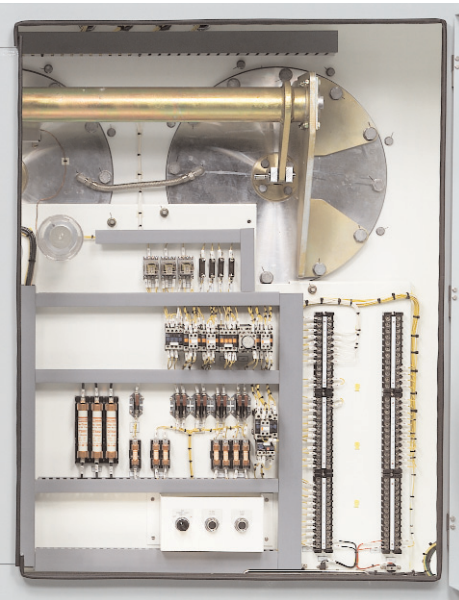
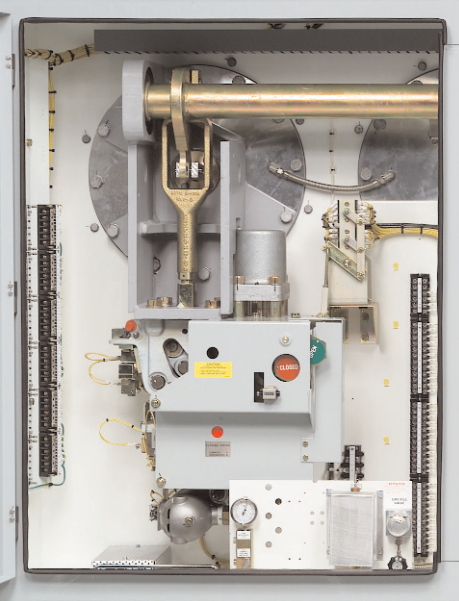


SF₆ Gas System

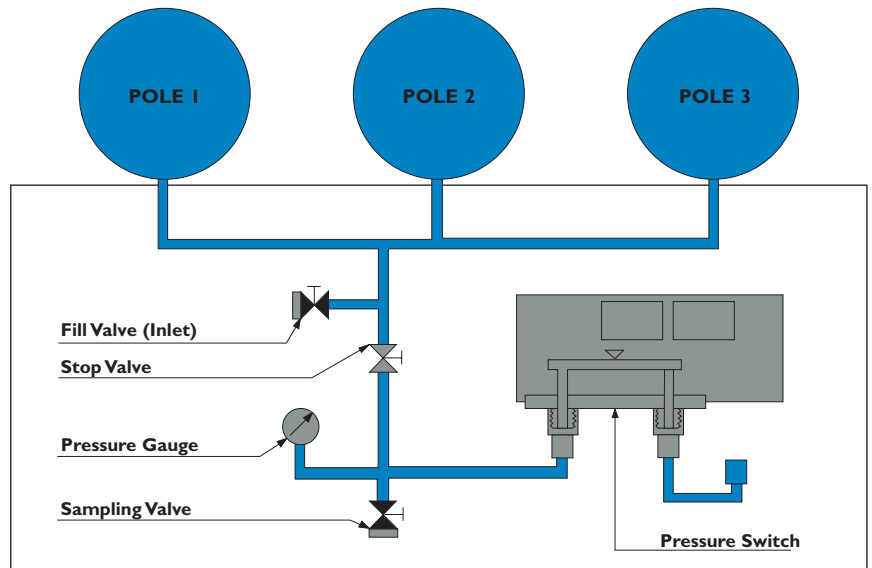
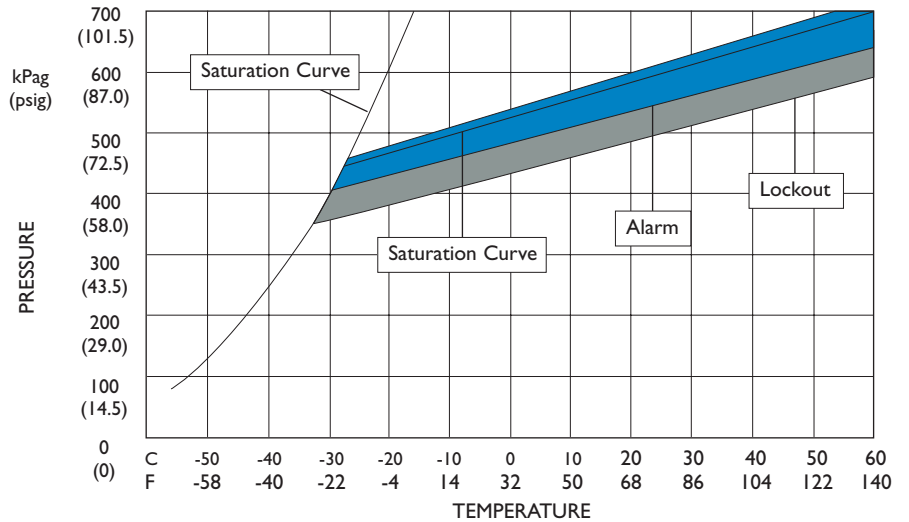
A common SF₆ gas system serves all three pole units. Located in the control cabinet, the precise yet simple arrangement of the system eases filling, evacuation, inspection

and monitoring while increasing safety. This monitoring system uses few components that can misoperate or fail causing false alarms. This monitoring system which incorporates the fewest possible seal

points in combination with low static pressure, potential leak paths are greatly reduced.

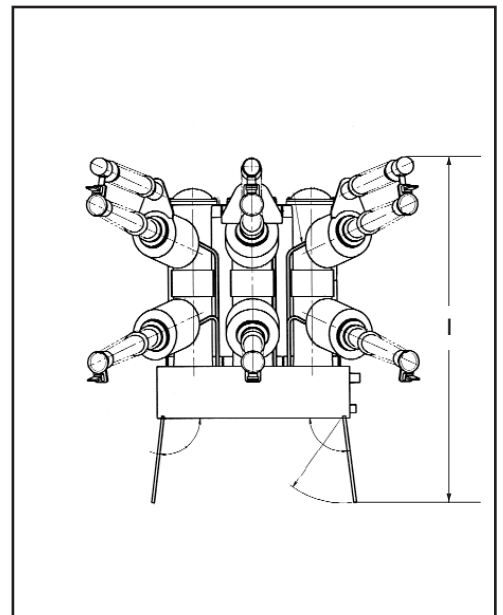
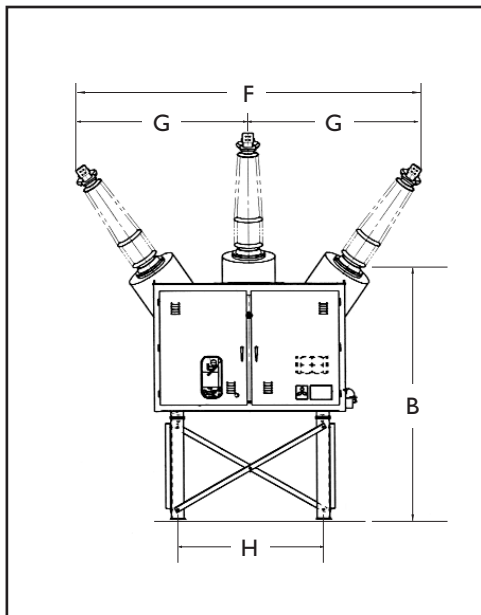
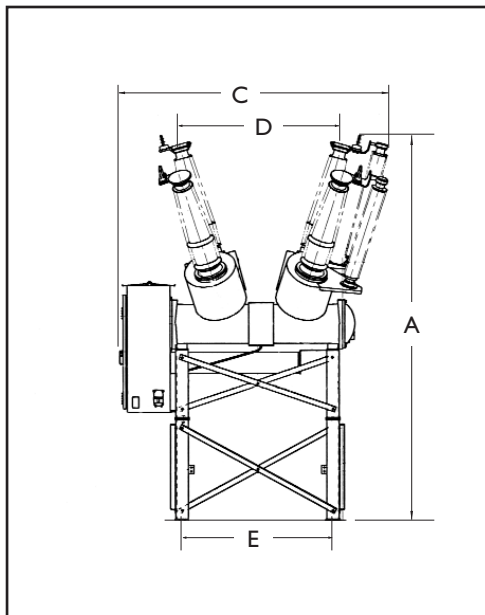


PRESSURE VERSUS TEMPERATURE FOR NORMAL PRESSURE OF 586 kPag SF₆ GAS



SF₆ Gas Monitoring System

>> DIMENSIONS IN INCH / MM <<



Dimensions in inch / mm

TYPE	100-SFMT-50/63F	120-SFMT-50/63F	140-SFMT-50/63F
A	168 / 4275	168 / 4275	177 / 4503
B	107 / 2723	107 / 2723	108 / 2754
C	126 / 3196	126 / 3196	131 / 3317
D	77 / 1952	77 / 1952	82 / 2082
E	71 / 1793	71 / 1793	71 / 1793
F	162 / 4118	162 / 4118	173 / 4406
G	77 / 1952	77 / 1952	82 / 2082
H	68 / 1717	68 / 1717	68 / 1717
I	125 / 3171	125 / 3171	170 / 4313



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