5 kV Vacuum Circuit Breaker
Many Challenges… One Mitsubishi Electric

MITSUBISHI ELECTRIC
Changes for the Better

Legacy Oil Circuit Breaker Replacement Resulting in a Positive Total Cost of Ownership

Mitsubishi Electric's 5 kV Vacuum Circuit Breaker (5DV25) is designed for replacement of legacy oil circuit breakers within power utility distribution substations or industrial applications. This product directly results in significant performance improvements:

- Positive Total Cost of Ownership
- Increased Safety
- Maintenance Friendly
- Improved Efficiency
- Legacy Replacement
- Green Compliance
- Reduced Operating Expenses

The 5 kV Vacuum Circuit Breaker is also unique, in that Mitsubishi Electric Power Products, Inc. (MEPPI) has incorporated several new product features and enhancements that are considered next generation implementations.

- One of the most compact circuit breakers of its class with a 2' x 2' footprint.
- The MEPPI Vacuum Interrupter eliminates much of the maintenance and performance problems associated with legacy oil circuit breakers.
- The 5kV Vacuum Circuit breaker is compliant with ANSI/IEEE C37.06, C37.09, C37.04 standards.
- 6,000 operations per inspection duty cycle maintained over the long-term lifespan of the mechanism.
- The Circuit Breaker control panel provides an ergonomic and easily accessible user interface.

Highly Efficient Enclosure Design Dramatically Reducing Operating Expense

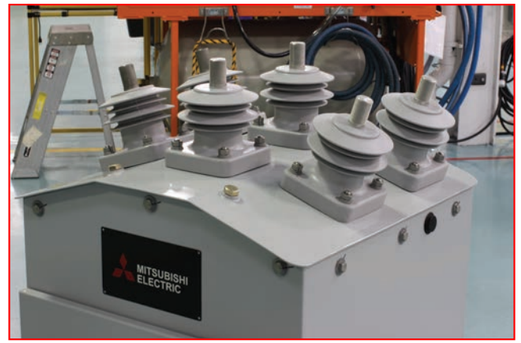
The 4.76 kV, 25 kA, 800 Amp self-contained vacuum circuit breaker is designed for replacement of legacy oil circuit breakers. The key design consideration is that legacy circuit breakers are often mounted in small vaults or other similarly confined locations. To overcome this, **Mitsubishi Electric has achieved a circuit breaker with the most compact physical size!**

As part of this design, the circuit breaker is mounted on four structural legs that run inside the enclosure. They are secured through the side of the enclosure utilizing sealing head screws.

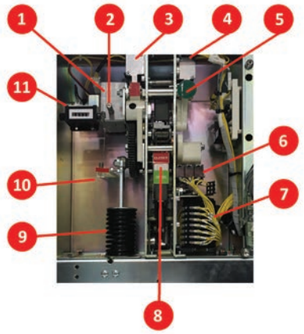
This allows the circuit breaker to maintain an appropriate height and position. The legs are adjustable in 2" [50mm] increments up to 10" maximum, allowing flexibility to match the height of the existing circuit breaker being replaced.

For outdoor installations, an additional and separate pedestal frame can be ordered to reach any "height to live parts" requirement. **Lifting eye bolt provisions are provided for overhead lifting. These features allow for the cost effective replacement of a massive inventory of obsolete oil circuit breakers.**

The 5 kV Vacuum Circuit Breaker is one of the Industry's smallest medium voltage circuit breakers. While replacement of legacy oil circuit breakers is important, there is a larger value. Power substation, industrial power facilities, and other locales are always facing constrained space requirements as power needs grow. The 5 kV Circuit Breaker's compact design is perfect for these applications.



Designed for Reduced Complexity and Lower Maintenance Expense



1. Spring Charge Motor
2. Manual Charge Location
3. Trip Coil
4. Close Coil
5. BH-1H Operating Mechanism
6. Limit Switches
7. Auxiliary Switch (5a/5b)
8. Open/Close Indicators
9. Closing Spring
10. Charge/Discharge Indicator
11. Operation Counter

The 5 kV Circuit Breaker employs Mitsubishi Electric's patented modular switchgear technology. This technology incorporates all high voltage and operational elements into one assembly that has wheels and can easily be slid in and out of the Circuit Breaker. This single critical assembly provides plug N play service capability. While this modular unit is designed for lifetime performance and reliability, this assembly facilitates streamlined field replacement, should the need arise. It can be removed from either the front or the rear of the enclosure. This dramatically improves safety and significantly reduces maintenance expenses when compared to other circuit breakers.

Increased Safety and Improved Performance

With decades of experience and many thousands of installations, Mitsubishi Electric has incorporated three noteworthy safety and performance features. As explained above, the first safety improvement is attributed to the 5 kV Circuit Breaker enclosure ventless NEMA 3RX rated design. Circuit Breaker safety and performance has always been related to the ability to protect internal components from the threat of unwanted dust, water and debris which can negatively impact the high voltage contacts, control panel components, circuit boards and the mechanism itself. Due to our ventless NEMA 3RX design, Mitsubishi Electric has solved this shortcoming.

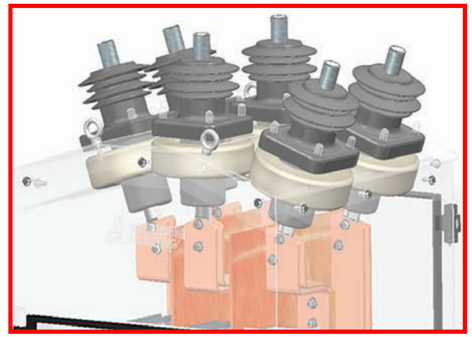
The second noteworthy performance feature is the MEPPI standard operating temperature range of +50° C to -30° C which exceeds ANSI/IEEE specifications. Power substations and industrial environments are often faced with inclement weather. The MEPPI 5 kV Circuit Breaker's superior design is able to better withstand these harsh conditions.

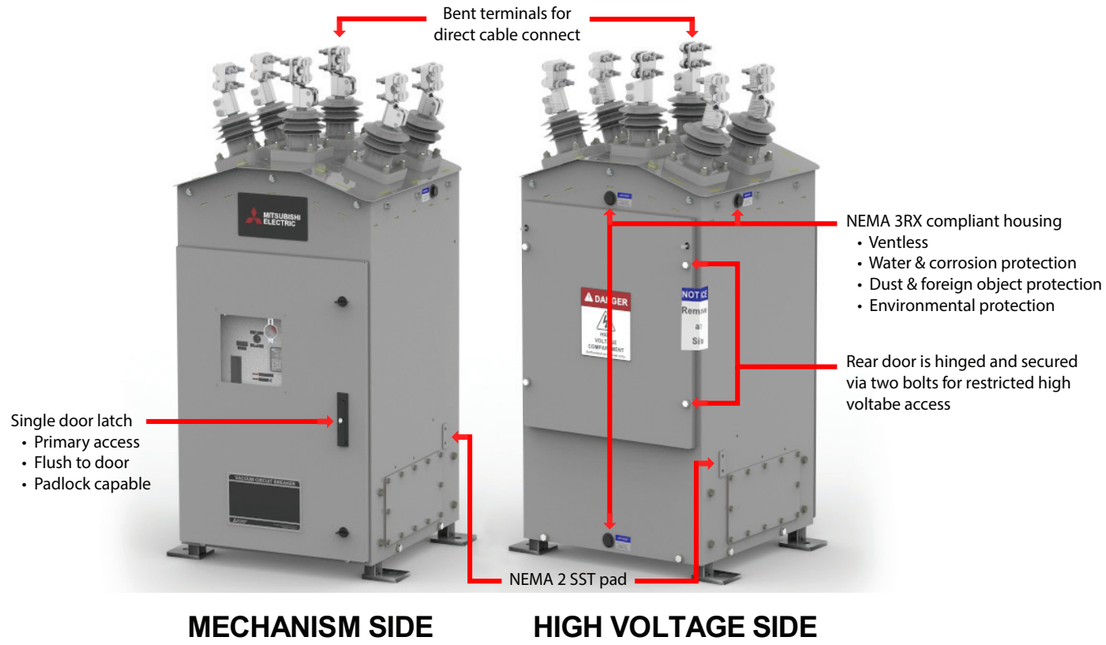
The third improvement is associated with the ways in which a technician gains access to the 5kV Circuit Breaker. The pad-lockable front door allows access to the mechanism interface and low voltage control panel. The door can also be left or right mounted for convenience. The bolted rear door provides restricted access to the high voltage compartment. And finally, the low voltage control panel provides a truly ergonomic and technician-friendly field interface.

New, High Performance Bushings

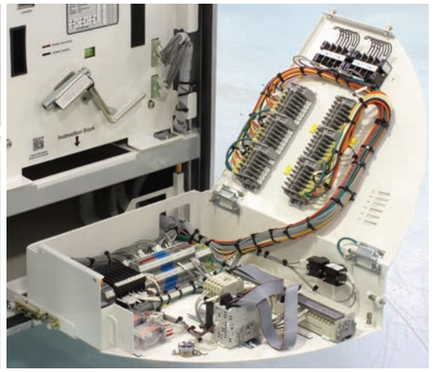
The bushings represent an Industry leading design incorporating an outdoor rated, hydrophobic, cycloaliphatic, epoxy material. This design is superior in weight, tensile strength, UV protection and structural integrity. When compared to porcelain bushings, MEPPI's design provides:

- 30% weight reduction.
- 11 times higher tensile strength.
- 16 times higher flexural strength.
- Improved UV protection.





Newly Designed Control Panel Provides for an Improved Ergonomic User Interface



One of the most important challenges was in shrinking the 5kV Circuit Breaker to 2' by 2', and expanding the control panel capabilities at the same time. Mitsubishi Electric provides a clamshell-designed control panel can be extended, swung open and unfolded to provide an ergonomic interface. The panel conveniently pulls out 1" to clear the enclosure, and then swivels 90° to provide full access for the technician.

In a closed position, this is flush with the remaining cabinet. If the cabinet is mounted at the appropriate height, this eliminates the need to work "inside" the enclosure. It brings all control features away and outside of the direct contact with the high voltage aspect of the cabinet. It allows for optimal overhead illumination of the control panel.

This unit provides all controls, relays, customer connections and other required operational devices without having to reach into any awkward enclosure. **This ergonomically designed assess solution will save significant technician time and expense.**

When finished, the entire control panel folds and slides back into place. There is a convenient handle, locking pins and bolts to secure this unit back into storage.

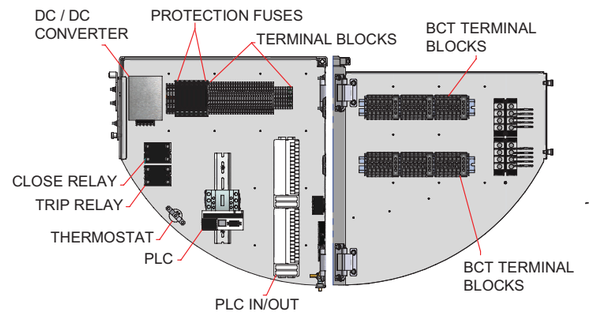
Specifications

Mitsubishi Electric 5 kV Vacuum Circuit Breaker
Technical Specifications

Vacuum Circuit Breaker Specifications		
Breaker Designation		5DV25
Rated Maximum Voltage Input		4.76 kVolts
Compliance		IEEE C37 & IEC 62271-100
Operation Duty Cycle		O-0.3s-CO-10s-CO
Instalation Location		Outdoor or Indoor
Rated Maximum Continous Current		
	Dual Bus	800 Amps
	Single Bus	600 Amps
	Busbar Material	Copper; Silver Plated
Rated Frequency		60 Hz
Short Time Current Duration		2 Seconds
Short Circuit Current Rating (SCCR)		25 kAmps
Rated Dry Withstand Voltage (60 Hz)		19 kVolts
Rated Interrupting Time		3 Cycles
Rated Full Wave Impulse Voltage		60 kVolts
Out of Phase Switching Current		65 kAmps
Percent DC Voltage - X/R		57%-20
Mechanism Endurance		10,000 ops; M2 per IEC
Load Current Operations		25,000 ops
Full Current Faults		10 ops
Time to First Routine Maintenance		6 Years
Ambient Operation Temperature		-30°C to +50°C
Capacitive Current Switching		10A Cable Charging, Class C2
Motor Control Voltage		90-140 VDC @125V (1)
Motor Current at Rated Voltage (AC)		
	Start	1.9 Amps @125V (1)
	Run	0.4 Amps @125V (1)
Closing Control Voltage Range		90-140 VDC @125V (1)
Tripping Control Voltage Range		70-140 VDC @125V (1)
Closing Current at Rated Voltage		6.0 Amps @125V (1)
Tripping Current at Rated Voltage		6.0 Amps @125V (1)

Notes:
(1) 48V Control Option also available
(2) Other colors available on request

Enclosure Specifications		
Breaker Weight (Approximate)		800 Lbs.
Support Structure		Hot Dipped Galvanized
Enclosure Housing		Powder Coated
Color		ANSI 70 Light Grey (2)
Environmental Protection Rating		Ventless NEMA 3RX
Dynamic Loading		
	Horizontal (Acting along C/L)	0.33 kN [74 Lbs]
	Vertical Up (Acting Through CG)	1.62 kN [385 Lbs]
	Vertical Down (Acting Through CG)	2.10 kN [472 Lbs]
Bushing Specifications		
Material		E07-CYCLOALIPHATIC
Conductor		6061-T6511 Aluminum, Tin Plated
Voltage Class		5 kVolts
BIL		60 kVolts
Minimum Creepage Distance		254 mm [10 inches]
Pollution Class		Very Heavy
Temperature Classification		-50°C to +105°C
Approximate weight		5.45 kGrams [12 Lbs]
Static Horizontal Longitudinal Force (Inline)		750 N [169 Lbs]
Static Horizontal Transverse Force (Right Angle to Axis)		500 N[112 Lbs]
Static Vertical Force (Upwards and Downwards)		750 N [169 Lbs]



MITSUBISHI ELECTRIC

Changes for the Better

Corporate Headquarters, Thorn Hill Industrial Park,
530 Keystone Drive, Warrendale, PA 15086
Phone: (724) 772-2555 | www.5kvcircuitbreaker.com