Type V Outdoor Circuit Breaker

Descriptive Bulletin

Construction

Type V-Vacuum Circuit Breakers

- ABB's Type V-Vacuum Circuit Breaker meets all applicable NEMA & ANSI standards.

The Type V-Vacuum Circuit Breaker is made up of three basic sections: the high voltage compartment, the mounting provisions, and the low voltage compartment.

High Voltage Compartment

- All components at line potential are contained in the high voltage (HV) section and are completely isolated from the control compartment. Insulating entrance bushings are attached to the roof assembly by bolt and compression type clamps. Removal or replacement of the bushing does not disturb existing vacuum bottle adjustments. Bushing current transformers (BCTs) mount inside the HV compartment. BCTs can be used for metering and/or protection applications. The number of BCTs that can be mounted in the HV compartment depends on the ratio and accuracy class.

- ABB Type V-Vacuum Circuit Breakers are equipped with high strike porcelain bushings with optional stud type terminals. Also available are porcelain foam filled bushings. Entrance bushings are attached to the roof using non ferrous corrosion resistant hardware and stainless steel compression type clamps.

Mounting Provisions

- Formed steel supports mount the vacuum breaker to its foundation, and are adjustable in height in three inch (75 mm) intervals.

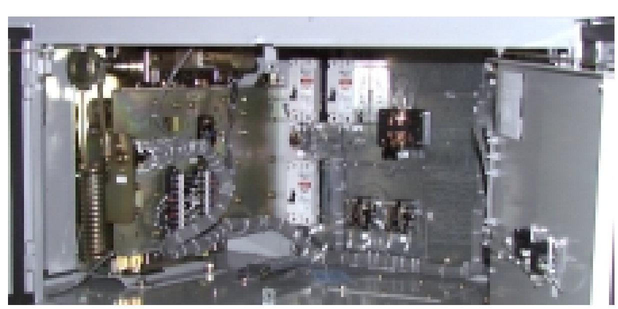
Low Voltage Compartment

- The low voltage compartment houses all of the control components and the operating mechanism. The side panels are used to mount terminal blocks for the BCT circuits. When specified, overcurrent and reclosing devices are mounted on a hinged front panel for easy access. Anti-condensation heaters are provided which also vent into the HV cabinet. All standard control voltage options are available, 120 to 240 VAC and 24 to 125 VDC.

- The stored energy mechanism drives a common crankshaft which operates all three phases. The auxiliary switch which provides 52a and 52b contacts for the control circuits is also driven directly from the crankshaft.

- The control cabinet contains the relays, meters, and switches for the breaker. Typically the panel consists of a microprocessor control that offers three phase overcurrent protection and ground protection and reclose capability. To locally open and close the breaker a control switch is included. Other devices such as meters, test switches and outlets can be provided as options. The current signal for the relays and meters comes from the BCTs in the high voltage compartment. ABB's Type V Breakers are available without control panels. These are known as basic breakers. The control for basic breakers is located in a remote enclosure.

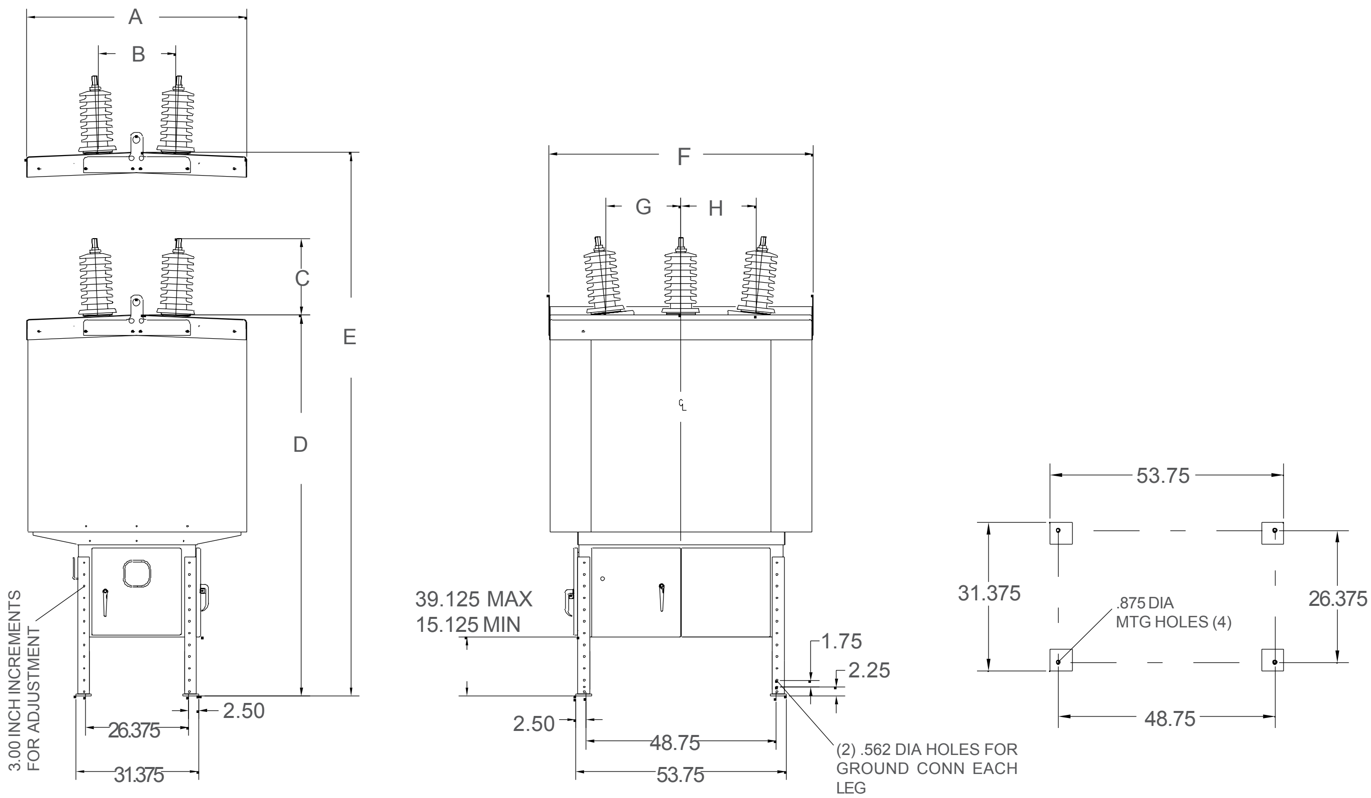
- The low voltage internal circuitry connects the devices in the low voltage compartments with the control power. Some of the devices are the heaters, charging motor, trip and close coils, and relays.



Dimensions

Features

- Line potential components isolated from control compartment
- High strength porcelain bushings
- Heater to reduce corrosion
- Minimized contamination



Dimensional Information

38 kV	A	B	C	D	E	F	G	H
1200 A, 150 kV BIL	47.00	20.00	15.125	85.375	109.375	63.00	16.50	16.50
1200 A, 170/200 kV BIL	56.50	20.00	19.50	97.375	121.375	68.00	21.25	21.25
2000 A, 200 kV BIL	56.50	20.00	20.75	101.625	125.625	68.00	21.375	21.375

Dimensions in inches

Stored Energy Mechanism Control Power Requirements

Rated Control Voltage	Spring Run Amperes	Charge Motor Time Sec.	Close and Trip Coil Resistance Ohms	Close* or Trip Amperes	Voltage Range Close	Voltage Range Trip
48 VDC	9.0	6	3.0	16	36-56	28-56
125 VDC	5.0	6	19.3	6.4	90-140	70-140
250 VDC	5.0	6	71	3.5	180-280	140-280
120 VAC	5.0	6	19.25	6.2**	104-127	Cap Trip
240 VAC	5.0	6	73.5	3.2**	208-254	Cap Trip

Specifications

Type V - Vacuum Circuit Breaker Typical Specifications			
Breaker Type	**V**	**V**	**V**
Related Maximum Voltage (kV)	15-38	15-38	15-38
Continuous Current (Amperes RMS)	1200	1200	2000
Voltage Range Factor K***	1	1	1
Frequency (Hertz)	60	60	60
Dielectric Strength			
Low Frequency Withstand kV RMS			
Dry 60 Hertz for 1 minute	80	80	80
Wet 60 Hertz for 1 minute	75	75	75
Full Wave Withstand (BIL kV Crest)	150/170/200	150/170/200	150/200
Chopped Wave (200 kV BIL only)			
2 Microsecond Withstand, kV	258	258	258
3 Microsecond Withstand, kV	238	238	238
Switching Impulse	Not Required	Not Required	Not Required
Minimum Creep to Ground (external)	22"/559mm	22"/559mm	22"/559mm
Operating Duty (Standard Duty Cycle)			
Interrupting Time (cycles) Max.	3.5	3.5	3.5
Permissible Tripping Delay Y (seconds)	2	2	2
Closing time (cycles)	6	6	6
Reclosing Time (seconds)	0.3	0.3	0.3
Short Circuit Interrupting Current			
kA RMS Sym.	25-31.5	25-40	25-40
kA RMS Asym. (1.2 factor)	37.8	48	48
Close and Latch			
Initial Current Loop (kA RMS Asym)	50.4	64	64
Close and Latch (kA Peak)	82	104	104
Short Time Current (3 seconds) kA RMS Sym.	31.5	40	40
Transient Recovery Voltage (kV Peak)			
Time to Peak 63 microsec.	71	71	71
Load Current Switching Capability (amps)	1200	1200	2000
Capacitance Current Switching			
Open Line Charging Switching Current (amps) Max.	Up to 1200	Up to 100	Up to 100
Isolated Cable Charging and Isolated Capacitor			
Bank Switching Current (Amps RMS)	Up to 1200	Up to 1200	Up to 1200
Switching Current (Amps RMS)	1200	1200	1200
Back-to-Back Capacitor Bank			
Switching Current (Amps RMS)	1200	375	375
Transient Overvoltage Factor	2.5	3.0	3.0
Transient Inrush Current (kA Peak)	50	20	20
Transient Inrush Frequency (Hertz)	6800	4240	4240
Interrupting Time (cycles)	3.5	3.5	3.5
Capacitor Switching Life (operations)	1500	2500	2500
Capacitor Bank Grounding (grounded or ungrounded)			
Shunt Reactor Switching Current (Amps RMS)	1200	1200	1200
Line Closing Switching Surge Factor Out-of-phase Switching Current	N/A (not rated for)	N/A (not rated for)	N/A (not rated for)
Number of Operations-Mechanical Life (minimum)	1500	1500	1500
Contact Resistance (micro ohms)	<350	<350	<350

** These are the worst case inrush values for sizing protection or batteries only. Opening time is <.058 seconds from the time the opening coil is energized until main contact break. Closing time is <.1162 seconds from the time the close coil is energized until main contact make.*

*** Closing current only. AC voltage tripping is not recommended. Stored energy capacitor trip devices are used with AC control voltage.*

**** Breaker can be applied on all voltages up to and including the rated maximum voltages.*

Operating Mechanism

- ABB's V-Breaker operating mechanism is a stored energy type, spring close-spring open. A motor driving through a ratchet mechanism is used to charge the main closing springs. Energy is stored in the trip spring during the closing sequence to ensure adequate tripping energy whenever it is required.

The operating mechanism drives directly to the main shaft which connects all three phases. Each phase is operated from this shaft through an independently adjustable linkage.

As a safety feature, a latch check switch located on the mechanism will permit electrical closing only when the mechanism is fully reset.

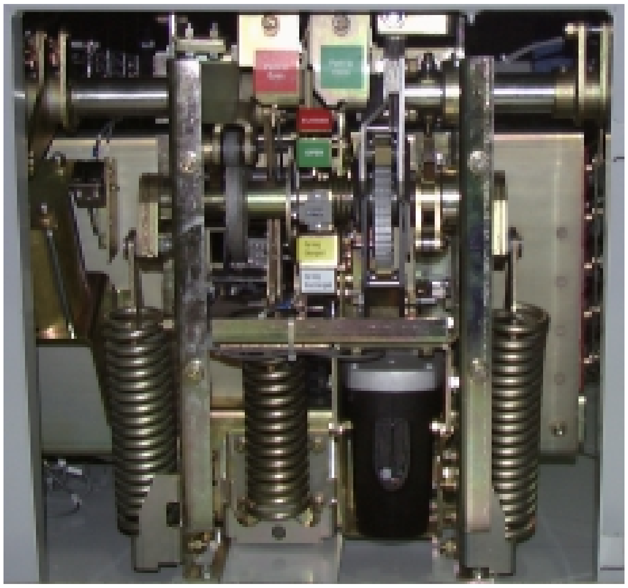
A visible flag on the mechanism front cover plate indicates the spring condition as "SPRING CHARGED" or "SPRING DISCHARGED." This positive indication tells operating personnel whether the mechanism has properly stored the energy required to close the breaker during maintenance operations.

The operator can manually close the breaker by actuating the "PUSH TO CLOSE" button which discharges the closing springs. This feature benefits the user in that the breaker can be manually closed in to an energized circuit for load pickup when control power is not available.

A manual trip lever allows the breaker to be tripped quickly under emergency conditions from the exterior of the cabinet.

As an added safety feature, a 69 device blocks electric closing after manual trip. An external reset device is provided for restoring the normal electric closing function.

A cyclometer operations counter, which indicates the number of trip operations, is located behind the window in the mechanism cabinet, permitting the user to determine if operations have occurred, saving the time of opening the housing door.



Microprocessor Control

- Design of all functions is very flexible and normally tailored to meet the required specification. A typical control package mounted on the hinged panel might include: multifunction microprocessor relay with phase and ground overcurrent protection, reclose and a control switch with red and green indicating lights. The microprocessor control eliminates the need for multiple electromechanical devices providing fewer wires and less maintenance. This simplifies the design and improves the reliability of the breaker and the distribution system.

DPU2000R

MSOC

Advantages of Vacuum Interruption

Maintenance
The absence of oil as an insulating and interrupting medium minimizes the maintenance and servicing required. The mechanical life is 2,500 operations.

Installation
The forces generated during interruption are only those of the operating mechanism. This greatly simplifies foundation requirements.

Duty Cycle
No derating of interrupting capability is required, regardless of the reclosing duty cycle.

Safety
The use of air as the primary insulation minimizes the hazard from fire or explosion.

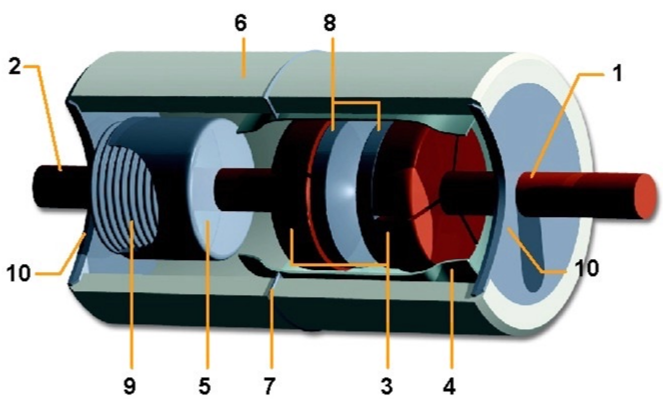
Environment
Arc extinction is silent and the sound level of the mechanism is low. Quiet operation is particularly desirable near hospitals, residential areas and shopping centers.

No oil or gas to be handled or disposed.

Ratings*
- 15 through 38 kV
- 1200 through 2000 Amps
- 25 through 40 kA
- Capacitor and Reactor Switching
- 150 / 170 / 200 kV BIL

* see specification table for specific ratings

Typical Vacuum Interrupter Design (contacts shown in the open position)



1 Fixed contact stem
2 Moving contact stem
3 Fixed and moving contact subsystems
4 Vapor (or ion) shield
5 Bellow shield
6 Ceramic enclosure (envelope) shown as two ceramic cylinders joined in the middle
7 Metal-to-ceramic sealed joints
8 Contacts
9 Metal bellows
10 Metal end plates

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