



Westinghouse Electric Corporation  
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Bloomington, Indiana 47401

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Ratings:  
27 kV, 1200 Amps  
12.5 and 16 kA  
Capacitor or Reactor Switching

## Type R Vacuum Circuit Breakers 27 kV Maximum



### Advantages of Vacuum Interruption

The design of Westinghouse R Series Vacuum Circuit Breakers brings together all the advantages of the relatively new technology of power arc interruption in vacuum.

**Maintenance** — The absence of oil as an insulating and interrupting medium minimizes the maintenance and servicing required.

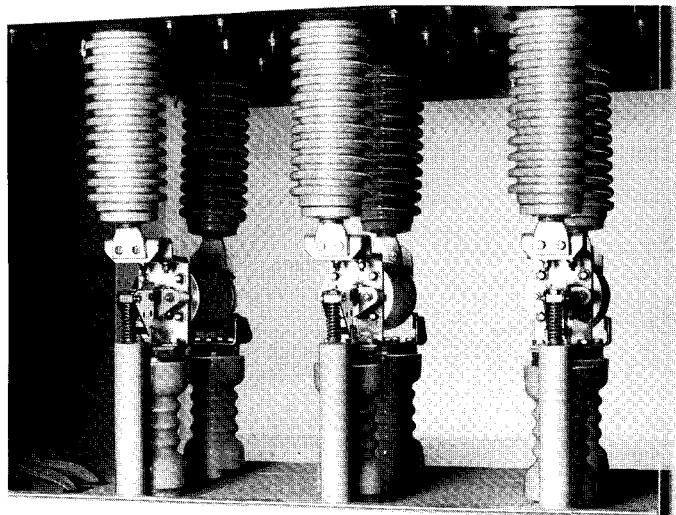
**Installation** — The forces generated during interruption are only those of the operating mechanism. This greatly simplifies foundation requirements.

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

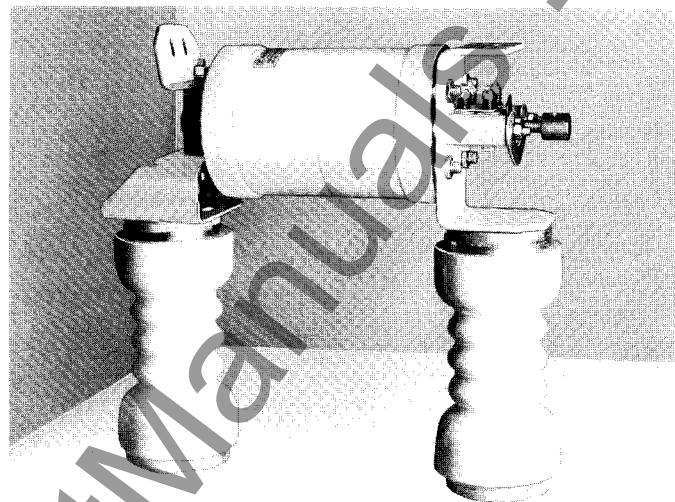
**Safety** — The use of air as the primary insulation minimizes the hazard from fire or explosion.

## Type R Vacuum Circuit Breakers – 27 kV Maximum

### High Voltage Compartment



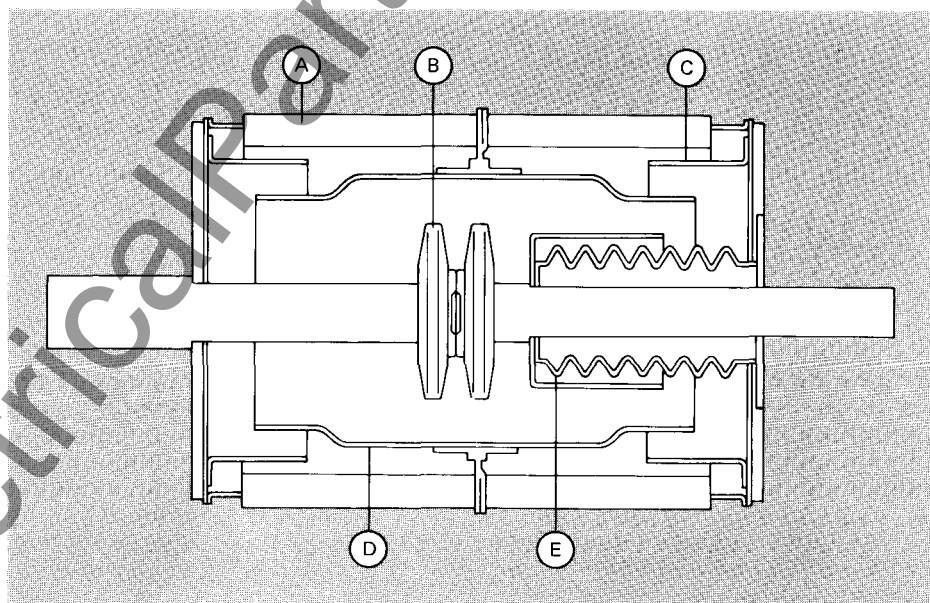
### Interrupter Assembly



All components at line potential are contained in the high voltage section and are completely isolated from the control compartment. Porcelain entrance bushings are attached to the roof assembly by bolt and compression type clamps. Removal or replacement does not disturb existing breaker adjustments. Bushing current transformers mount on the entrance bushings. The accuracy class required determines the number that may be mounted.

### Internal Vacuum Interrupter Construction

- A Ceramic Envelope
- B Butt Type Contacts
- C Voltage Grading Shield
- D Main Shield – Suspended from the center seal, the metal shield provides a condensing surface for the vaporized contact material generated during the arcing period. This action prevents contamination of the internal ceramic surface.
- E Bellows – Brazed to the moving contact stem and end plate, the flexible stainless steel bellows allows the contact to move during operation while maintaining a perfect seal.



### Vacuum Interrupter

The Westinghouse vacuum interrupter utilizes a ceramic envelope because of its high strength, good thermal properties and high density. The use of ceramic allows higher temperature processing during the brazing and degassing operation. The entire brazing and sealing operation is completed within the vacuum furnace assuring a high degree of reliability and longevity for the interrupter.

Two standoff insulators provide a rugged mounting for the interrupter and operating linkage.

Roller contacts transfer the current from the moving contact stem to the entrance bus.

The most effective way to switch an electrical circuit is to do it in vacuum. In normal operation the contacts of this alternating current vacuum interrupter are closed. Under fault conditions, an interruption is required and the contacts are quickly separated. An arc is established between the two contact faces. Current flows between the contacts through ionized vapor until the alternating current passes through zero. Almost instantaneously, the vapor condenses and the dielectric between the contacts recovers to levels above the transient recovery voltage applied by the circuit. Such fast,

reliable interruption has important advantages over other methods of circuit breaking.

Over 150,000 Westinghouse vacuum interrupters are now in successful operation. This represents only a small fraction of the new AC and DC applications potentially available to industry. A continuing research and development effort which started in 1960, has resulted in improvements in metallurgical, vacuum processing and ceramic technologies which are steadily expanding the ratings and capabilities of Westinghouse Vacuum Interrupters. The range of ratings available from Westinghouse is one of the largest in the world.



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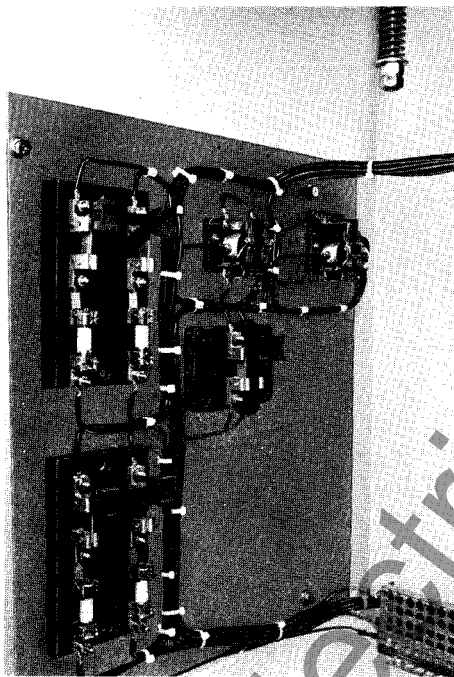
## Type R Vacuum Circuit Breakers, 27 kV Maximum

### Low Voltage Compartment

The low voltage compartment contains all relay, metering and mechanical functions and is completely insulated from the high voltage section.

### Control Wiring

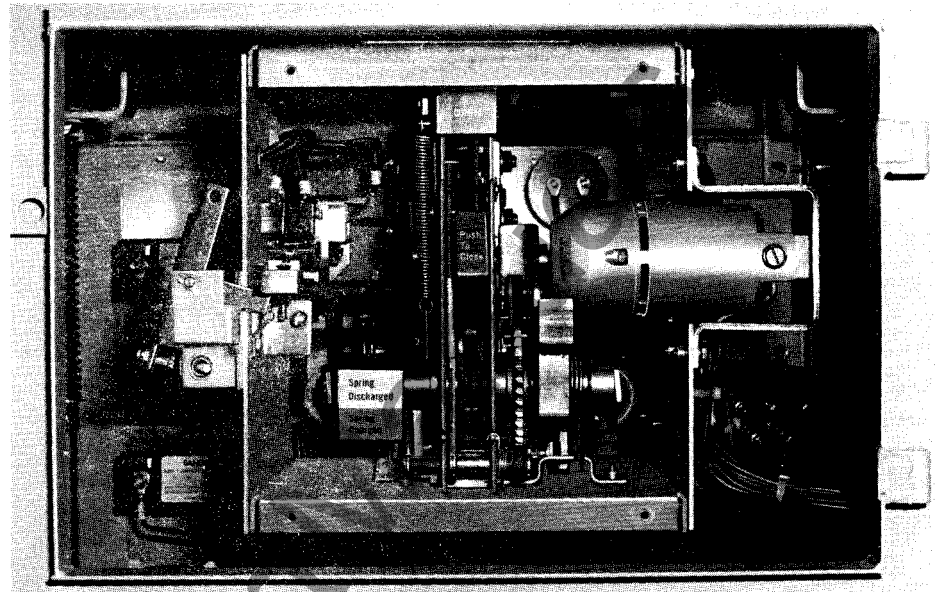
Panels located in the low voltage compartment are used to mount terminal blocks and the 52X and 52Y control relays. Secondary voltage circuits are normally wired through fused knife switches for circuit protection and easy disconnect. The trip circuit is connected through a knife switch, but is not normally fused. Bushing current transformer leads are brought from the high voltage compartment and connected to shorting type terminal blocks.



### Operating Mechanism

The operating mechanism is the 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 tripping spring during the closing sequence to ensure adequate tripping energy whenever it is required. The mechanism is electrically and mechanically trip free.

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.



A latch check switch, located on the mechanism, is provided as a standard feature to 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. Stored energy makes the operating speed independent of operating personnel. This feature benefits the user in that the breaker can be manually closed into 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.

As an added safety feature, a 69 device blocks automatic reclosing after manual trip by opening the electrical reclosing circuit. An external reset device is provided for restoring the normal reclosing 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 without having to incur the added labor cost of removing the housing door.

### Relay Control

Design of all relay control functions is very flexible and is normally tailored to meet the required specification. A standard relay package mounted on the hinged relay panel would normally include: phase and ground overcurrent relays, a reclosing relay and a control switch with red and green indicating lights.

