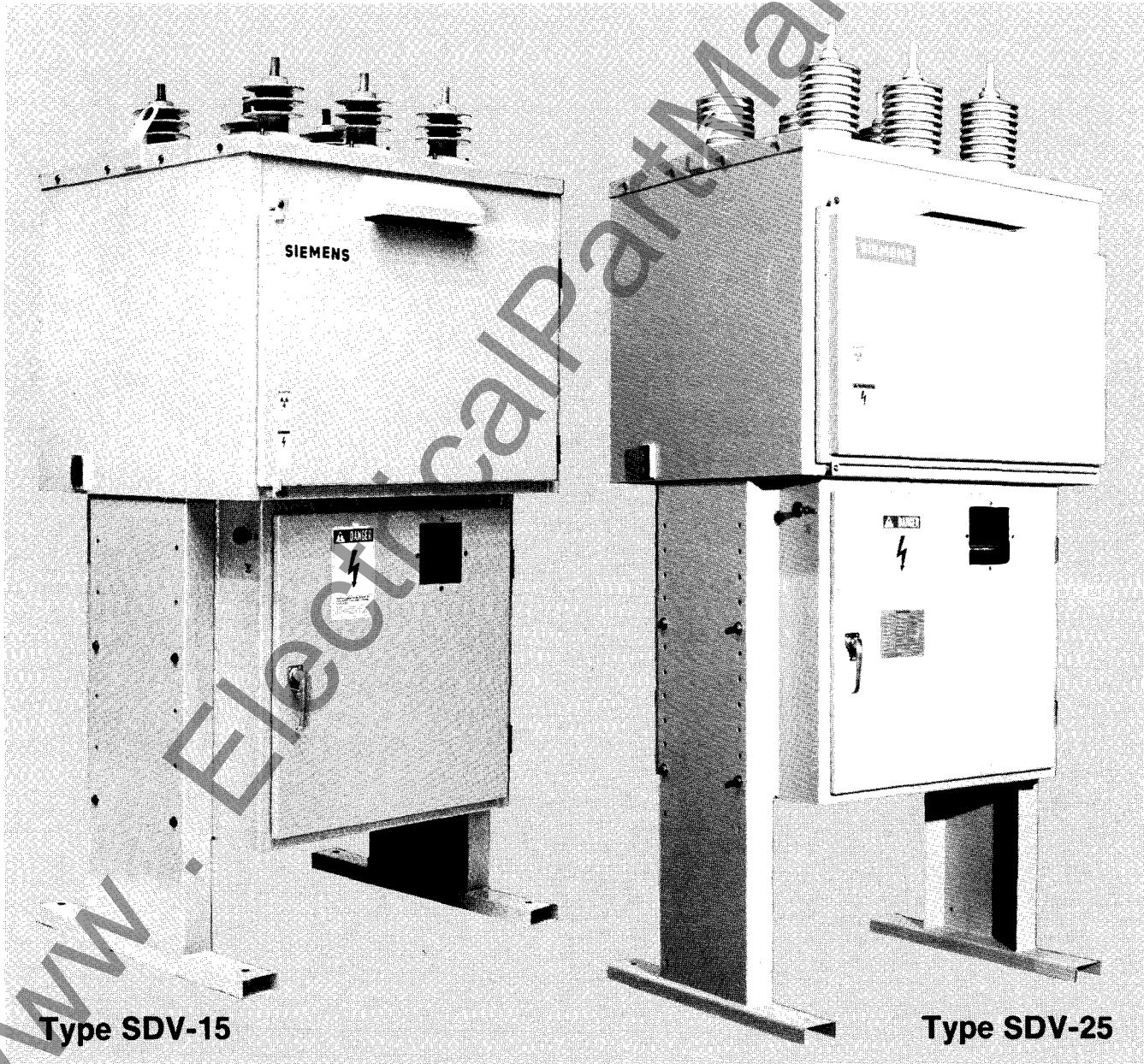


SIEMENS

Type SDV Vacuum Circuit Breakers

15, 25 and 38 kV
3 cycle

1200 and 2000A
12.5, 16, 20 and 25 kA

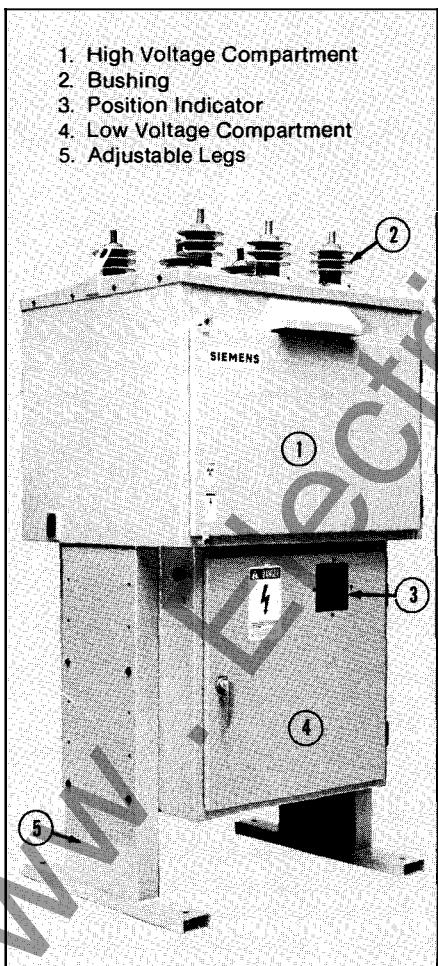


Features

The type SDV is a vacuum-insulated, three cycle, three pole stored energy operated circuit breaker. Available at maximum rated voltages of 15.5, 25.8 and 38 kV, it has current carrying capacities of 1200 and 2000 amperes and interrupting capacities of 12.5, 16, 20 and 25 kA.

Designed and tested in accordance with the latest applicable ANSI and NEMA standards, the SDV design is based on technology field-proven by thousands of interrupter units and operating mechanisms in world-wide service.

Important to the dependability of the type SDV breaker are these



user-accepted and time-proven factors:

- A vacuum interrupter that has the capability to handle the continuous and rated short-time currents without exceeding permissible temperature rise.

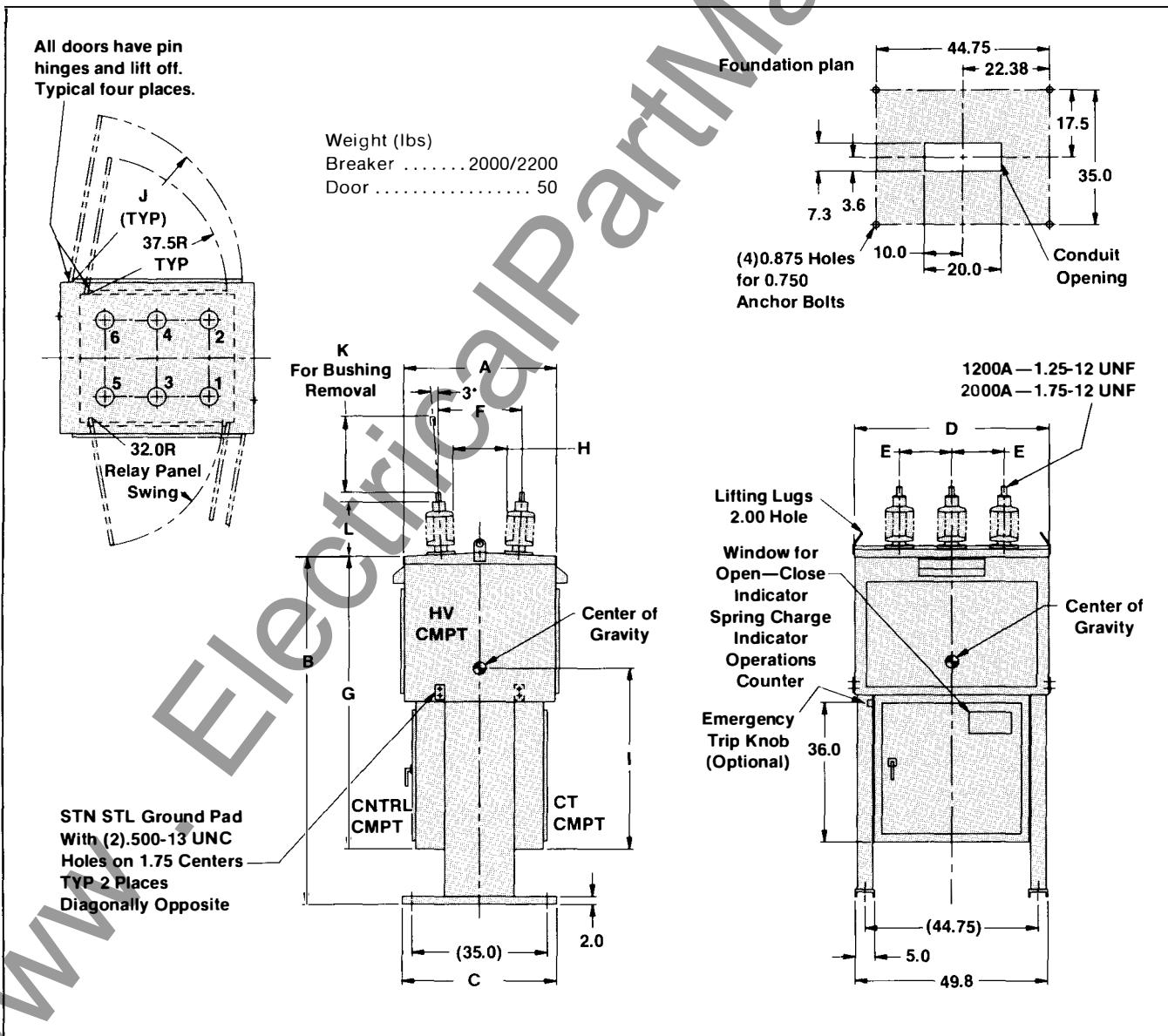
- Contact surfaces, in vacuum, are pure and free from polluting elements, resulting in low contact resistance throughout interrupter life.
- Spring stored energy mechanism assures full speed closing and reclosing operations.

| Feature | Explanation |
|---|--|
| • Reduced size | — Efficient repackaging of breaker components. |
| • Simple construction • Light weight | — Because of the interrupter's high breaking capacity and short gap. |
| • Switching of capacitive currents without re-strike | — High dielectric recovery strength of the breaker minimizes restriking. |
| • Minimum overvoltages during switching of inductive currents | — Due to optimum design of contact surfaces and materials. |
| • Three-cycle interruption at 60 Hz | — Inherent short operating time. |
| • Low noise level | — Arc-quenching system and operating mechanism are completely enclosed. |
| • Safe operation | — No fire hazard. — No formation of toxic gases. |
| • Reduced maintenance • Longer maintenance intervals | — Contacts and operating elements design-tested for long life. |
| • Simple, easy installation | — Factory-assembled and tested when shipped. |
| • Interchangeability of low voltage compartment mechanism parts | — Mechanism parts are interchangeable between all ratings. |
| • Sturdy structural design | — Interactive structure and inner supports for structural strength. |

Dimensions

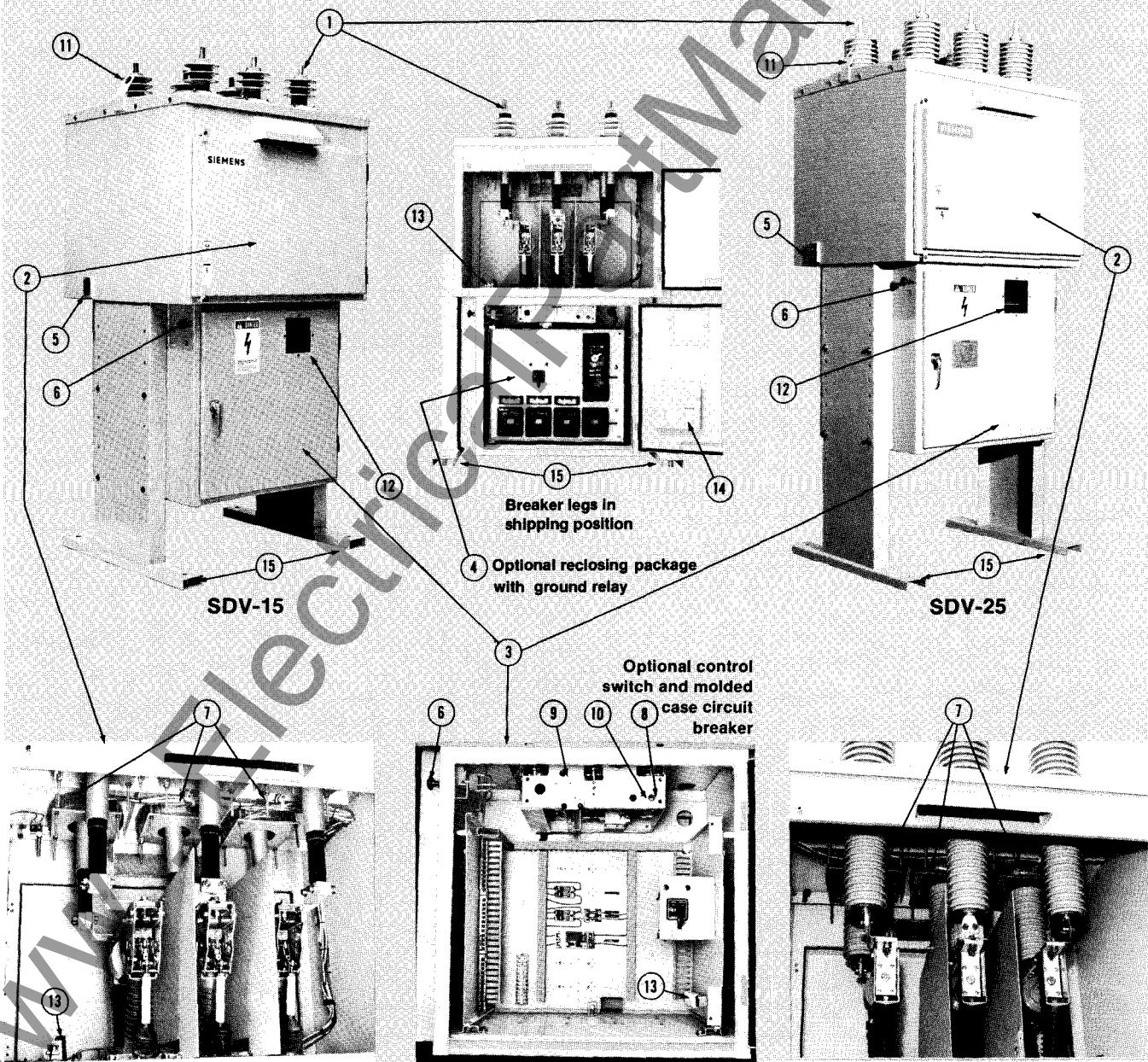
| Type | A | B (Adjustable) | C | D | E | F | G | H | I | J | K | L |
|--------|------|--------------------------------------|----|------|------|----|----|----|----|------|----|------|
| SDV-15 | 39.5 | 90, 93, 96, 99, 102 | 40 | 50.5 | 13.5 | 21 | 76 | 14 | 47 | 45.2 | 20 | 6.5 |
| SDV-25 | 39.5 | 101.5, 104.5, 107.5, 110.5, 113.5 | 40 | 50.5 | 13.5 | 21 | 76 | 14 | 47 | 45.2 | 20 | 8 |
| SDV-38 | 57.6 | 114.5, 117.5, 120.5, 123.5, 126.5 | 40 | 63.4 | 17.5 | 35 | 89 | 27 | 53 | 47.5 | 26 | 14.5 |

**Dimensions (In Inches)
for Reference Only**



Construction Features

- | | | |
|------------------------------|---|-------------------------------|
| 1. Bushings | 6. External manual pull-to-trip handle (optional) | 11. Lifting eyes (2) |
| 2. H.V. compartment | 7. Bushing current transformers | 12. Position indicator window |
| 3. L.V. compartment | 8. Position indicator | 13. Heaters |
| 4. Swingout panel (optional) | 9. Operating mechanism | 14. Instruction book pocket |
| 5. Ground pad (2) | 10. Closing spring position indicator | 15. Adjustable legs |



Breaker Construction

The **SDV** breaker consists of three vacuum interrupter tubes, their supports and the operating mechanism.

When the contacts separate, the current to be interrupted initiates a metal vapor arc discharge and flows through this plasma until the next current zero. The arc is then extinguished and the conductive metal vapor condenses on the metal surfaces within micro-seconds. As a result, the dielectric strength in the break builds up very rapidly.

The contacts are designed so that the self-generated field causes the arc root to travel. This prevents overheating when interrupting large currents.

The metal vapor arc discharge can only be maintained if a certain minimum current flows. A current that does not attain this level is chopped prior to current zero. This chopping current must be kept to a minimum in order to

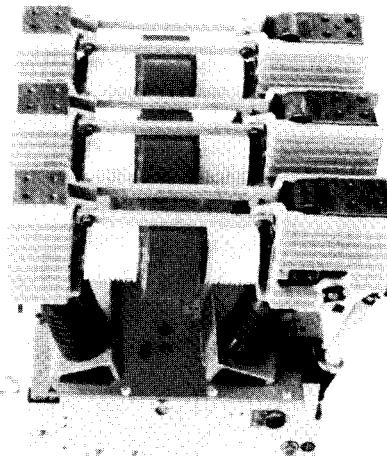
prevent unduly high overvoltages building up when inductive circuits are switched.

The use of a special contact material ensures that current chopping is limited to 4-5A.

The rapid build-up of the dielectric strength in the break enables the arc to be extinguished even if contact separation occurs immediately prior to current zero. The maximum arcing time for the last-pole-to-clear is therefore only 11 ms.

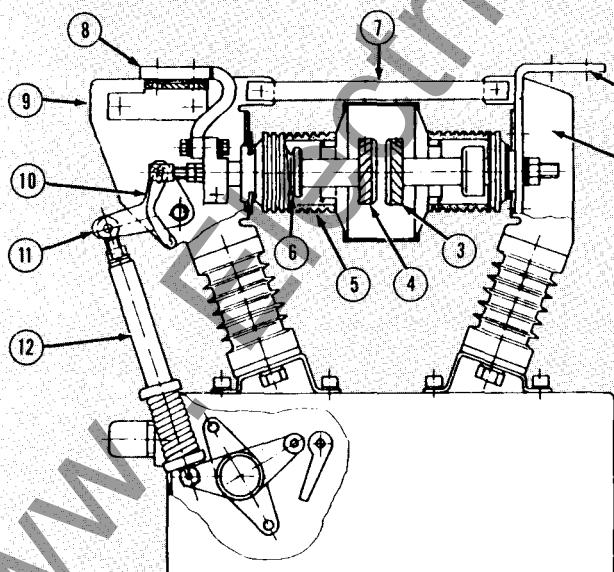
The purpose of the arc-quenching device of a-c breakers is to deionize the break immediately after current zero. For all conventional arc-quenching methods this means that the arc has to be cooled even before the contacts have reached the minimum quenching distance and before the next current zero, a fact which automatically increases the arc energy. The arc

drawn in the vacuum breaker, on the other hand, is not cooled since the metal vapor plasma is highly conductive and the resulting arc voltage only attains values between 20 and 200 V. For this reason, and because of the short arcing times, the arc energy developed in the break is very small. This also accounts for the long electrical life of the vacuum breaker. For instance, it has been tested and has interrupted the rated short-circuit current 100 times and the rated normal current 20,000 times.

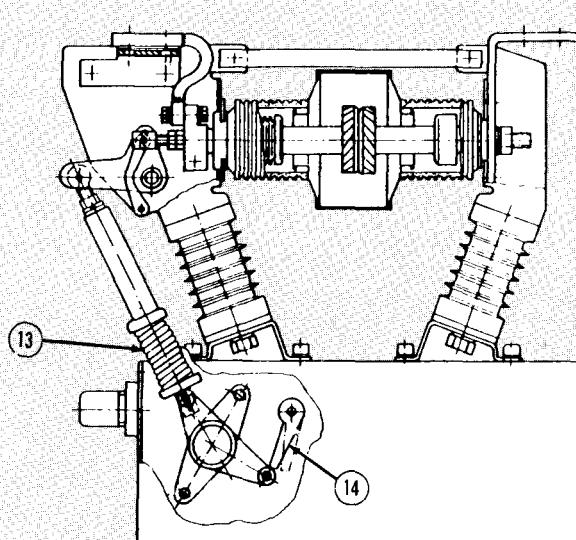


Typical SDV
15.5 kV, 2000 Amp
Vacuum Breaker

- | | |
|------------------------------|------------------------------|
| 1. Upper interrupter support | 8. Lower breaker terminal |
| 2. Upper breaker terminal | 9. Lower interrupter support |
| 3. Fixed contact | 10. Guide lever |
| 4. Moving contact | 11. Angled lever |
| 5. Interrupter housing | 12. Insulated coupler |
| 6. Bellows | 13. Contact pressure spring |
| 7. Insulating struts | 14. Release latch |



open position



closed position

Operating Mechanism

Type SDV vacuum breakers are equipped with a spring stored energy mechanism.

In the closed state of the breaker, spring energy for open-close-open duty is stored.

Charging of the closing spring

The closing spring of the motor mechanism is automatically recharged after closing, but it can also be recharged by hand in the event of a supply failure. The switching sequence referred to above can then be carried out.

Maintenance

Only the operating mechanism need be lubricated. The vacuum interrupters and their supports are maintenance-free.

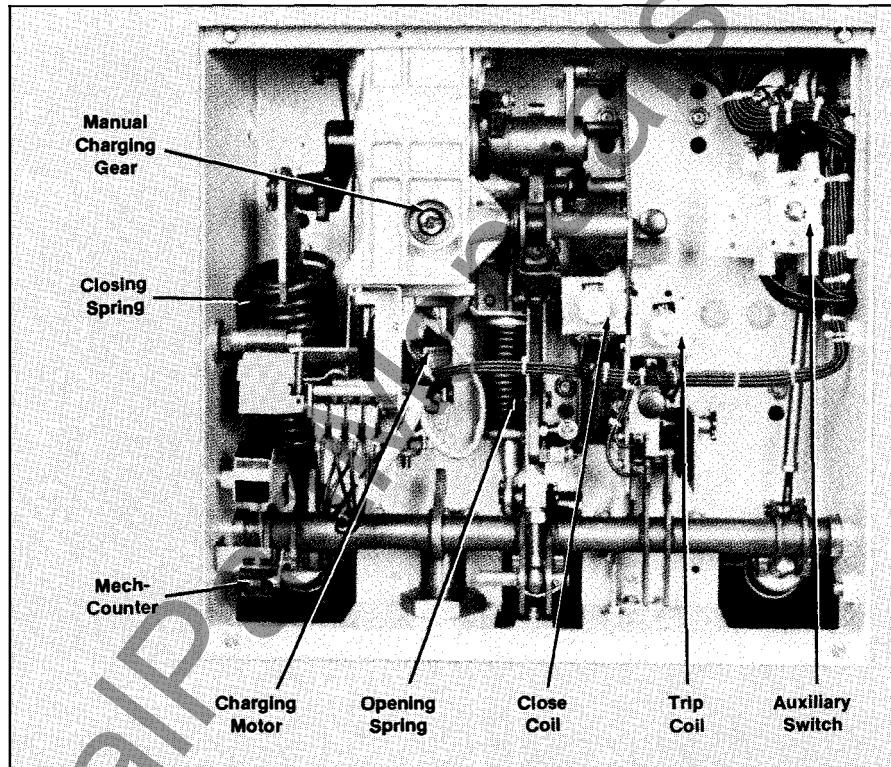
The contacts can be easily checked by looking at wear markings on the interrupters.

A routine inspection should be made after 500 operations or a service time of 10 years.

The inspection requires only a small amount of time and can be carried out by the customer's personnel.

Vacuum tube life

The vacuum interrupters have to be replaced after 30,000 mechanical operations or after the rated short-circuit current has been interrupted 100 times or the rated normal current 20,000 times.



Control Power Requirements

| Rated Voltage | Volts* DC | 48 | 125 | 250 | Volts* AC | 115 | 230 |
|---------------|--------------|-----|-----|-----|--------------|-------------------|-----|
| Trip Coil | Amp | 8.2 | 5.4 | 2.0 | Amp | Capacitor Trip | |
| Closing Coil | Amp | 2.0 | 1.0 | 0.5 | Amp | 2.0 | 2.0 |

* Voltage range in accordance with ANSI.

Ratings and Specifications

Ratings

| Identification | | Ratings | | | | | | Related Capabilities | | | |
|----------------|------|---------|------------------|------------------|------------------------------|------------------------------|---------------------|---------------------------|-------------------------------------|-----------------------|---|
| | | Voltage | | Insulation Level | | Current — Amp. | | | | | |
| | | Type | Nominal kV Class | Rated Max. kV | Rated Voltage Range Factor K | Rated Withstand Test Voltage | | Rated Cont. at 60 Cycles* | Rated S.C. Current at Rated Max. kV | Interr. Time (Cycles) | Max. Symmetrical Interr. Capability RMS |
| | | | | | | Low Freq. (kV, RMS) | Impulse (kV, Crest) | | | | |
| SDV-15-12.5 | 14.4 | 14.4 | 14.4 | 15.5 | 1.0 | 50 | 110 | 1200/2000 | 12,500 | 3 | 12,500 |
| SDV-15-16 | 14.4 | 14.4 | 14.4 | 15.5 | 1.0 | 50 | 110 | 1200/2000 | 16,000 | 3 | 16,000 |
| SDV-15-20 | 14.4 | 14.4 | 14.4 | 15.5 | 1.0 | 50 | 110 | 1200/2000 | 20,000 | 3 | 20,000 |
| SDV-15-25 | 14.4 | 14.4 | 14.4 | 15.5 | 1.0 | 50 | 110 | 1200/2000 | 25,000 | 3 | 25,000 |
| SDV-25-16 | 23 | 23 | 23 | 25.8 | 1.0 | 60 | 150 | 1200/2000 | 16,000 | 3 | 16,000 |
| SDV-25-20 | 23 | 23 | 23 | 25.8 | 1.0 | 60 | 150 | 1200/2000 | 20,000 | 3 | 20,000 |
| SDV-25-25 | 23 | 23 | 23 | 25.8 | 1.0 | 60 | 150 | 1200/2000 | 25,000 | 3 | 25,000 |
| SDV-38-16 | 34.5 | 34.5 | 34.5 | 38 | 1.0 | 80 | 170 | 1200/2000 | 16,000 | 3 | 16,000 |
| SDV-38-20 | 34.5 | 34.5 | 34.5 | 38 | 1.0 | 80 | 170 | 1200/2000 | 20,000 | 3 | 20,000 |

* Refer to factory for other available ratings.

Specifications

| ITEM | UNIT | SDV-15 | SDV-25 | SDV-38 |
|---|--------|---------------|--------|--------|
| Lightning Impulse Withstand Voltage | | | | |
| Full Wave 1.2/50 μ s | kV | 110 | 150 | 170 |
| *Chopped Wave 2 μ s | kV | 142 | 194 | 258 |
| *Chopped Wave 3 μ s | kV | 126 | 172 | 230 |
| Rated Making Current | KA | 12.5/16/20/25 | 16/20 | |
| Closing and Latching Capability | | | | |
| RMS | KA | 40 | 32 | |
| Peak | KA | 63 | 54 | |
| Normal Frequency | Cycles | 60 | | |
| Capacitance Switching | | | | |
| Overhead Line Isolated Current Back to Back | A | 100 | | |
| A | A | 400 | | |
| A | A | 400 | | |
| Closing Time (total) | ms | 83 | | |
| Rated Permissible Tripping Delay (Y) | sec | 2 | | |
| Normal Operating Temperature Range | °C | -30 | | |
| Standard | °C | -40 | | |
| Phase Spacing | in | 13.5 | 13.5 | 17.5 |
| Contact Gap | in | 0.63 | 0.63 | 0.78 |
| Breaks Per Phase | — | 1 | | |

| ITEM | UNIT | SDV-15 | SDV-25 | SDV-38 |
|---|--------|---------------|--------|--------|
| External Creep Std. | in | 11 | 17 | 26 |
| External Creep Special | in | 17 | 26 | ** |
| External Strike To Ground | | | | |
| Std. | in | 6 | 7.5 | 10.5 |
| Special | in | 7.5 | 10.5 | ** |
| Breaks Per Phase | — | 1 | | |
| Auxiliary Voltage | Vdc | 48/125/250 | | |
| | Vac | 115/230 | | |
| Dual Trip Coils (mech. and elec. independent) | — | Optional | | |
| Trip and Close Coil Rating | | | | |
| Vdc | — | 48/125/250 | | |
| Vac | — | 115/230 | | |
| Operating Mechanism | — | Stored Energy | | |
| Interrupting Medium | — | Vacuum | | |
| Emergency Trip | — | Optional | | |
| Rated Reclosing Time | Cycles | 20 | | |
| RIV 1000 kHz | μV | 500 | | |
| Rated Duty Cycle | — | CO-15 Sec-CO | | |
| Seismic Withstand | | | | |
| Standard | g | 0.2 | | |
| Optional | g | 0.5 Horiz. | | |
| Optional | g | 0.375 Vert. | | |
| Rated Voltage Range Factor (k) | — | 1.0 | | |
| Assymetrical Int. Capability Ratio (S) | — | 1.2 | | |

* Breaker in closed position only.

** Refer to factory.

Type SDV Vacuum Circuit Breakers

When ordering a Type SDV vacuum circuit breaker, specify the following:

1. Breaker type and rating.
2. Trip voltage; refer to page 6.
3. Close voltage; refer to page 6.
4. Motor voltage; 48 Vdc, 115 Vac/125 Vdc or 230 Vac/250 Vdc.
5. Heater voltage; 115, 230 volts ac.
6. BCTs; type, ratio, number, location
7. Terminals; specify in detail if desired
8. Relays; specify in detail if desired.
9. Include specifications covering special equipment, accessories, tests, etc.

Standard Breaker

1. Three pole power circuit breaker.
2. Painted steel, adjustable underframe.
3. Light gray standard color.
4. Three metering accuracy BCTs mounted on the left-hand side of the breaker.
5. Trip-free, motor charged, spring stored energy operating mechanism.
6. Trip coil and close coil.
7. 10 stage auxiliary switch — 7 stages for customer use.
8. Heaters — one 100 watt and one 200 watt.
9. Maintenance closing device and spring charging handle for manual operation.
10. Necessary terminal blocks and wiring.
11. Operations counter.
12. Fused pull-outs.
13. Six, light gray, bushings.
14. Provision for travel recorder attachment.
15. Grounding pad.

Optional Modifications

1. Extra BCTs.
2. Metering accuracy BCTs.
3. Extra creepage bushings.
4. Capacitor trip.
5. Relays for reclosing or non-reclosing breaker application.
6. External manual pull to trip handle.

Refer to your Siemens representative for other modifications.

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