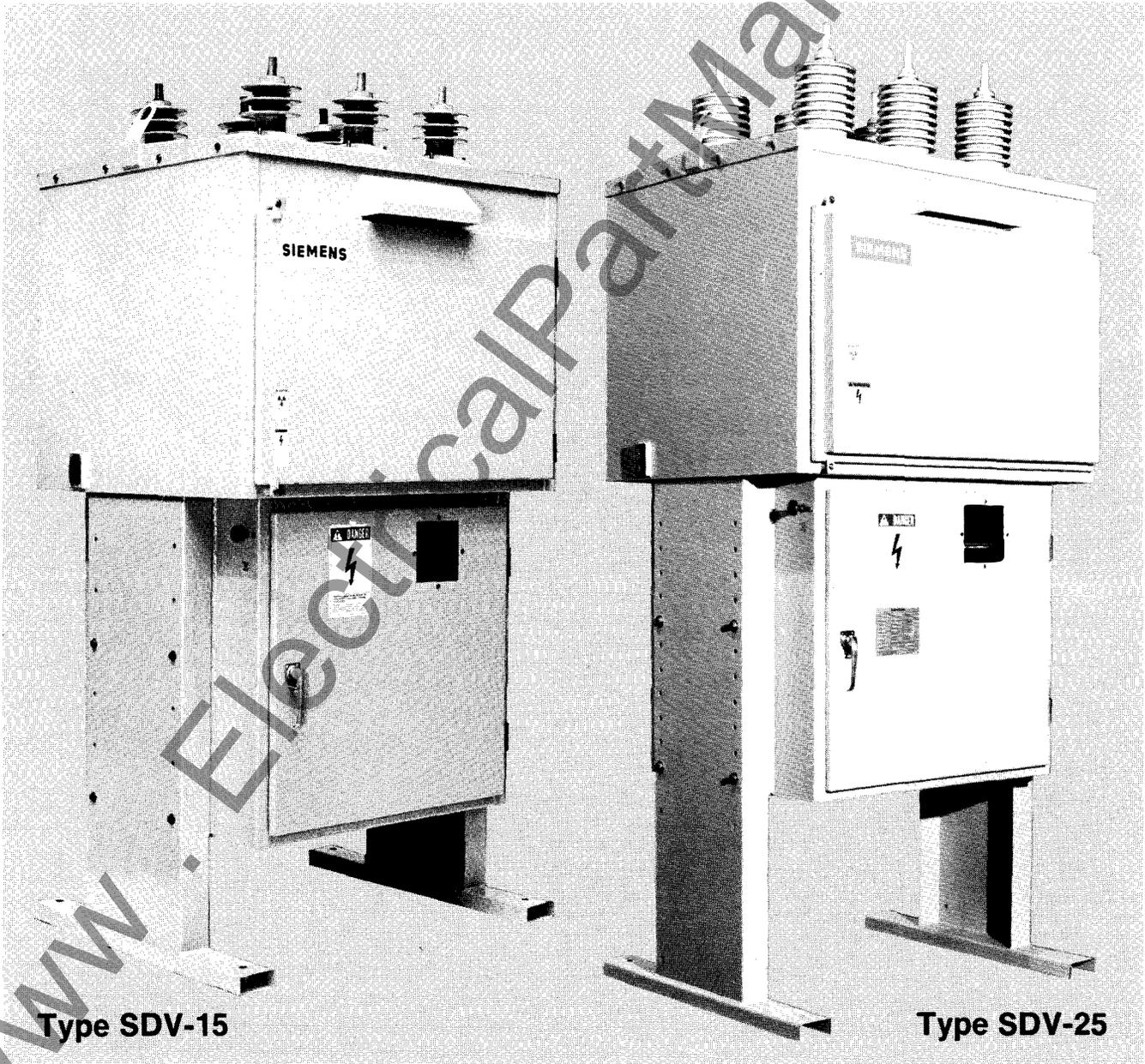


SIEMENS

Type SDV Vacuum Circuit Breakers

15, 25 and 38 kV
3 cycle

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



Type SDV-15

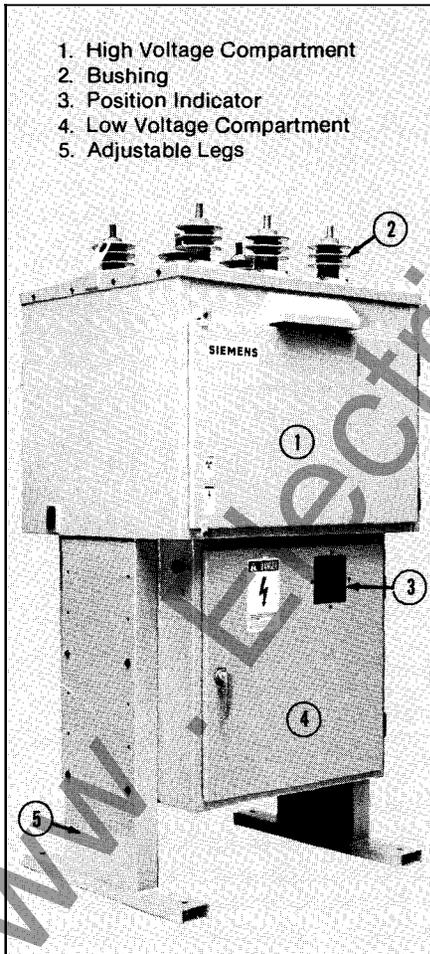
Type SDV-25

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



1. High Voltage Compartment
2. Bushing
3. Position Indicator
4. Low Voltage Compartment
5. Adjustable Legs

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.

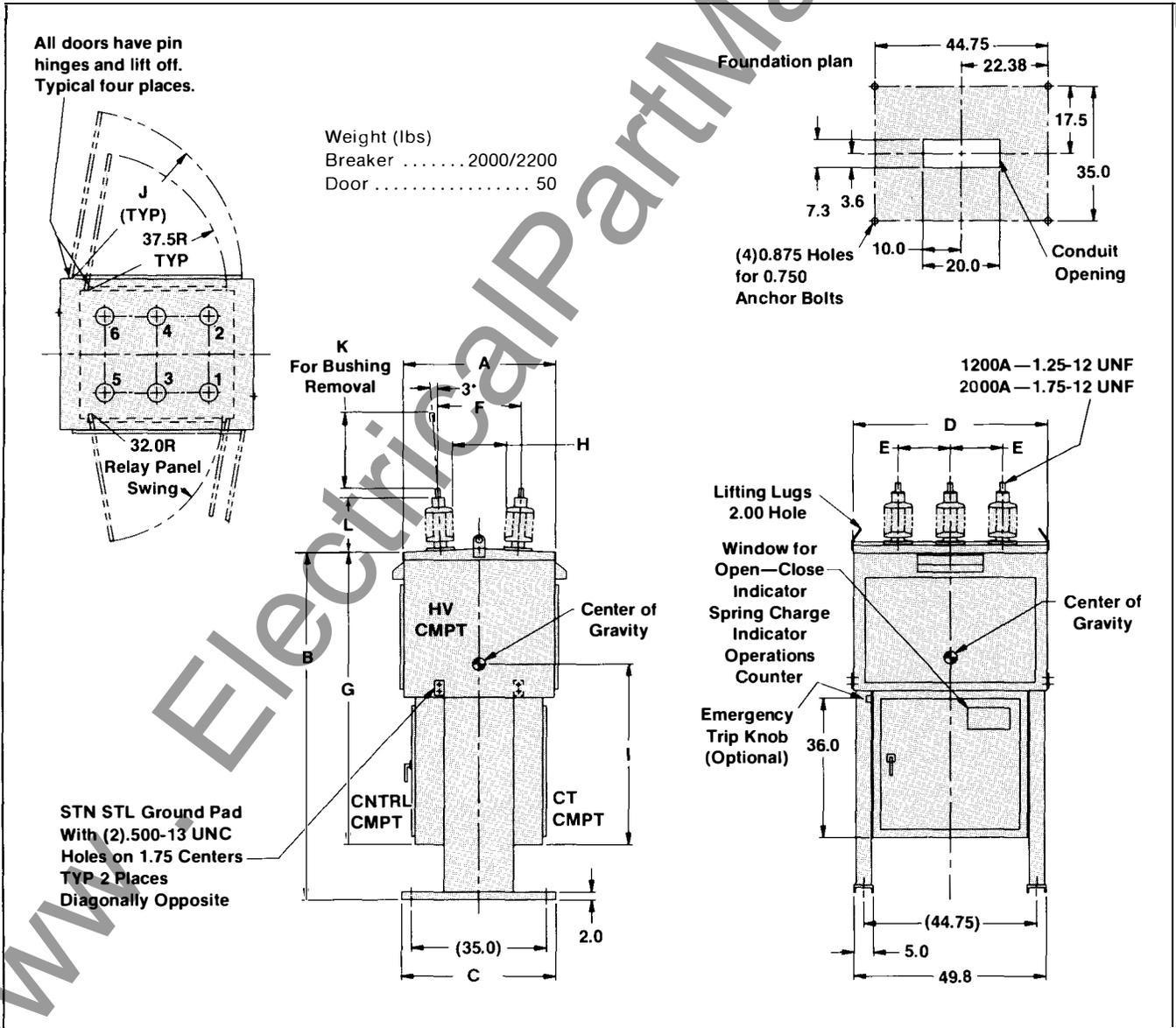
- Contact surfaces, in vacuum, are pure and free from polluting elements, resulting in low contact resistance throughout interrupter life.
- Spring stored energy mechanism assures full speed closing and reclosing operations.

Feature	Explanation
<ul style="list-style-type: none"> • Reduced size 	— Efficient repackaging of breaker components.
<ul style="list-style-type: none"> • Simple construction • Light weight 	— Because of the interrupter's high breaking capacity and short gap.
<ul style="list-style-type: none"> • Switching of capacitive currents without re-strike 	— High dielectric recovery strength of the breaker minimizes restriking.
<ul style="list-style-type: none"> • Minimum overvoltages during switching of inductive currents 	— Due to optimum design of contact surfaces and materials.
<ul style="list-style-type: none"> • Three-cycle interruption at 60 Hz 	— Inherent short operating time.
<ul style="list-style-type: none"> • Low noise level 	— Arc-quenching system and operating mechanism are completely enclosed.
<ul style="list-style-type: none"> • Safe operation 	<ul style="list-style-type: none"> — No fire hazard. — No formation of toxic gases.
<ul style="list-style-type: none"> • Reduced maintenance • Longer maintenance intervals 	— Contacts and operating elements design-tested for long life.
<ul style="list-style-type: none"> • Simple, easy installation 	— Factory-assembled and tested when shipped.
<ul style="list-style-type: none"> • Interchangeability of low voltage compartment mechanism parts 	— Mechanism parts are interchangeable between all ratings.
<ul style="list-style-type: none"> • Sturdy structural design 	— Interactive structure and inner supports for structural strength.

Dimensions

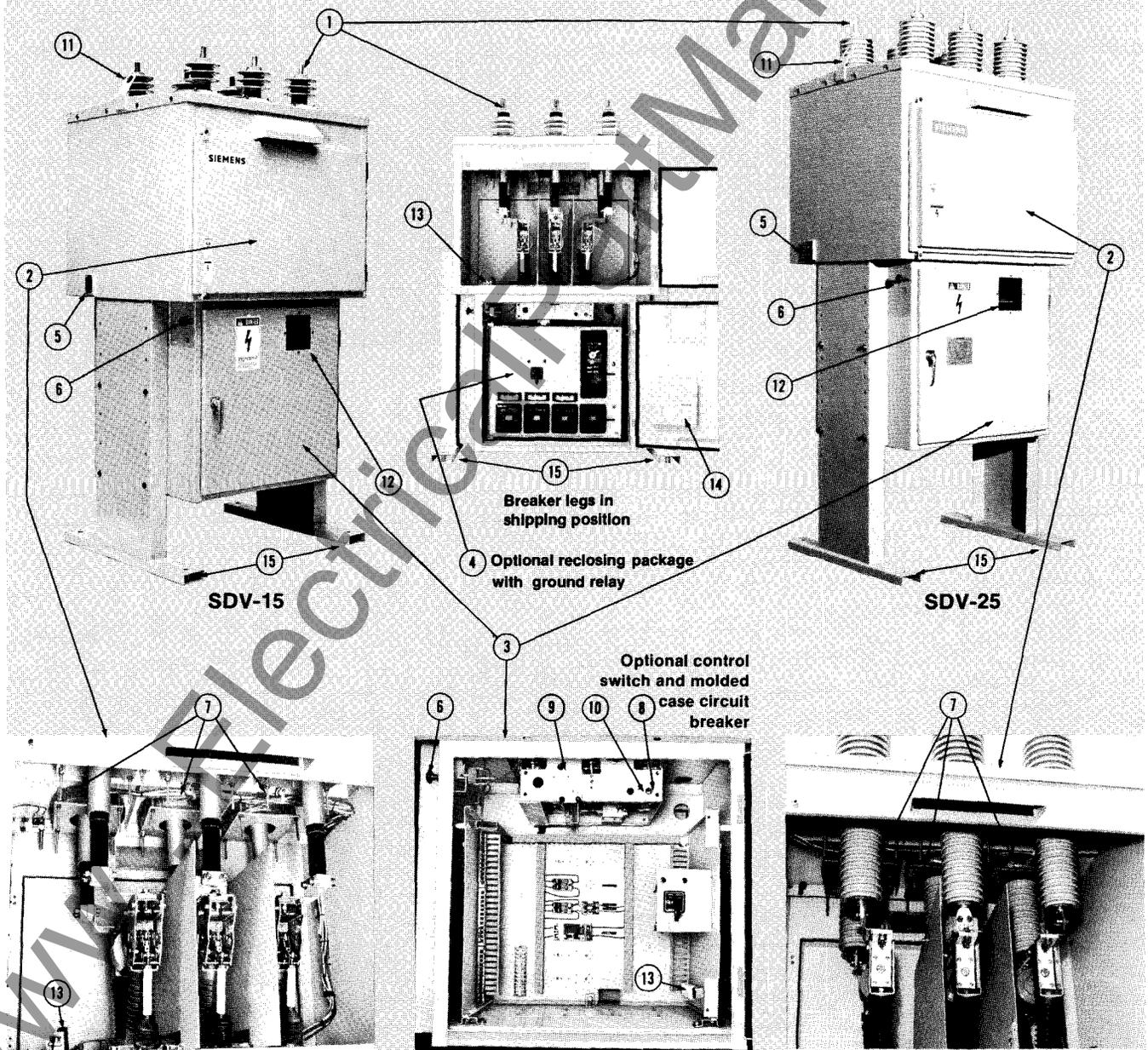
Type	A	B (Adjustable)	C	D	E	F	G	H	I	J	K	L
SDV-15	39.5	90, 93, 96, 99, 102	40	50.5	13.5	21	76	14	47	45.2	20	6.5
SDV-25	39.5	101.5, 104.5, 107.5, 110.5, 113.5	40	50.5	13.5	21	76	14	47	45.2	20	8
SDV-38	57.6	114.5, 117.5, 120.5, 123.5, 126.5	40	63.4	17.5	35	89	27	53	47.5	26	14.5

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

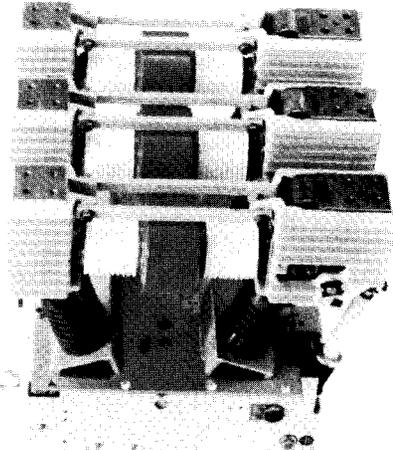
prevent unduly high overvoltages building up when inductive circuits are switched.

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.

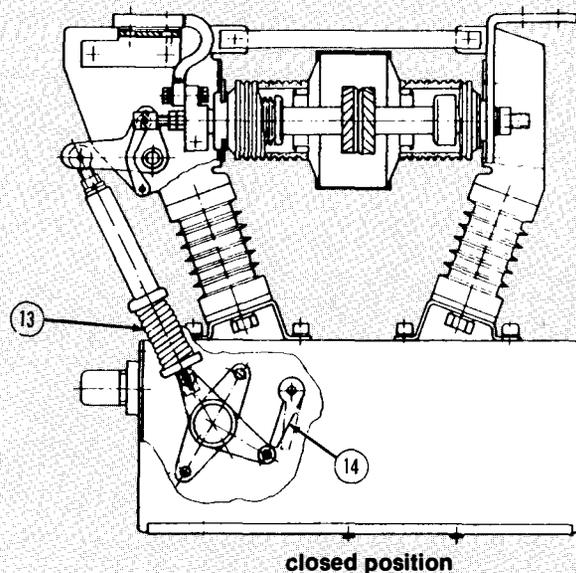
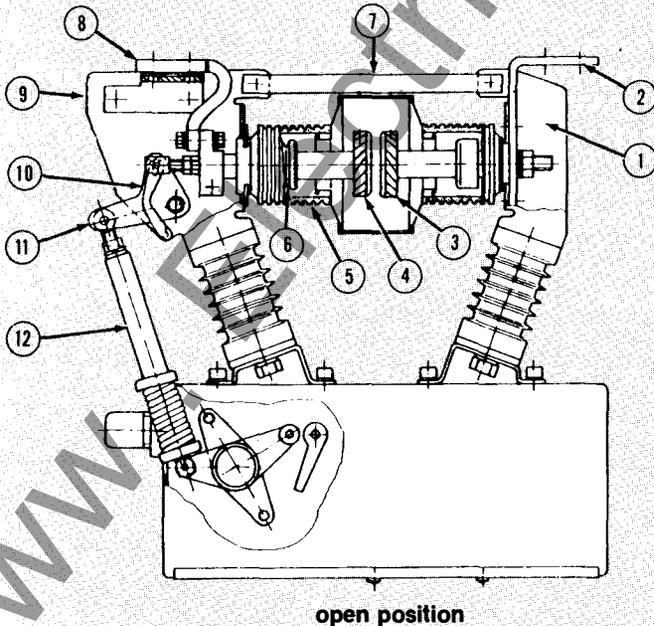
The purpose of the arc-quenching device of a-c breakers is to deionize the break immediately after current zero. For all conventional arc-quenching methods this means that the arc has to be cooled even before the contacts have reached the minimum quenching distance and before the next current zero, a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



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.

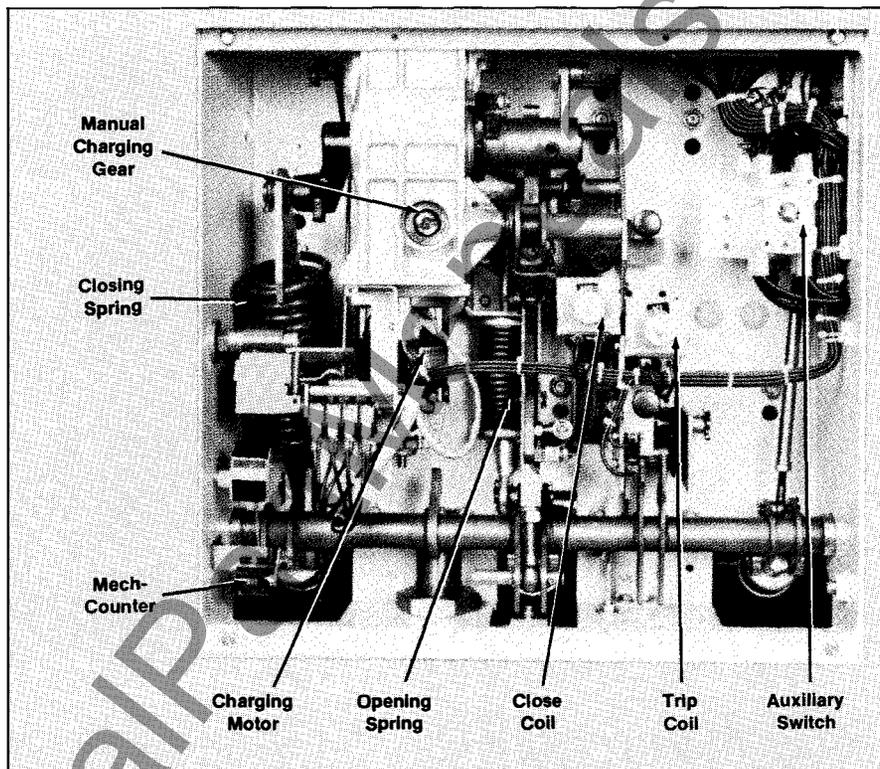
The contacts can be easily checked by looking at wear markings on the interrupters.

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*	48	125	250	Volts*	115	230
	DC				AC		
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	Type	Ratings				Current — Amp.			Related Capabilities		
		Voltage		Insulation Level		Rated Cont. at 60 Cycles*	Rated S.C. Current at Rated Max. kV	Interr. Time (Cycles)	Current Values — Amp.		
		Rated Max. kV	Rated Voltage Range Factor K	Rated Withstand Test Voltage	Max. Symmetrical Interr. Capability RMS				3-Sec. Short-Time Current Carrying Capability RMS	Closing and Latching Capability RMS	
Nominal kV Class	Low Freq. (kV, RMS)	Impulse (kV, Crest)	Rated Cont. at 60 Cycles*	Rated S.C. Current at Rated Max. kV	Interr. Time (Cycles)	Max. Symmetrical Interr. Capability RMS	3-Sec. Short-Time Current Carrying Capability RMS	Closing and Latching Capability RMS			
SDV-15-12.5	14.4	15.5	1.0	50	110	1200/2000	12,500	3	12,500	12,500	20,000
SDV-15-16	14.4	15.5	1.0	50	110	1200/2000	16,000	3	16,000	16,000	25,600
SDV-15-20	14.4	15.5	1.0	50	110	1200/2000	20,000	3	20,000	20,000	32,000
SDV-15-25	14.4	15.5	1.0	50	110	1200/2000	25,000	3	25,000	25,000	40,000
SDV-25-16	23	25.8	1.0	60	150	1200/2000	16,000	3	16,000	16,000	25,600
SDV-25-20	23	25.8	1.0	60	150	1200/2000	20,000	3	20,000	20,000	32,000
SDV-25-25	23	25.8	1.0	60	150	1200/2000	25,000	3	25,000	25,000	40,000
SDV-38-16	34.5	38	1.0	80	170	1200/2000	16,000	3	16,000	16,000	25,600
SDV-38-20	34.5	38	1.0	80	170	1200/2000	20,000	3	20,000	20,000	32,000

*Refer to factory for other available ratings.

Specifications

ITEM	UNIT	SDV-15	SDV-25	SDV-38
Lighting 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	A	100		
Isolated Current	A	400		
Back to Back	A	400		
Closing Time (total)	ms	83		
Rated Permissible Tripping Delay (Y)	sec	2		
Normal Operating Temperature Range				
Standard	°C	-30		
Special	°C	-40		
Phase Spacing	in	13.5	13.5	17.5
Contact Gap	in	0.63	0.63	0.78
Breaks Per Phase		1		

*Breaker in close position only.

ITEM	UNIT	SDV-15	SDV-25	SDV-38
External Creep				
Std	in	11	17	26
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	μ V	500		
Rated Duty Cycle		CO-15 Sec-CO		
Seismic Withstand				
Standard	g	0.2		
Optional	g	0.5 Horiz.		
		0.375 Vert.		
Rated Voltage Range Factor (k)		1.0		
Assymetrical Int. Capability Ratio (S)		1.2		

** 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 relaying 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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and products shown herein, or to add
improvements, at any time, without notice or
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