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# SDV7

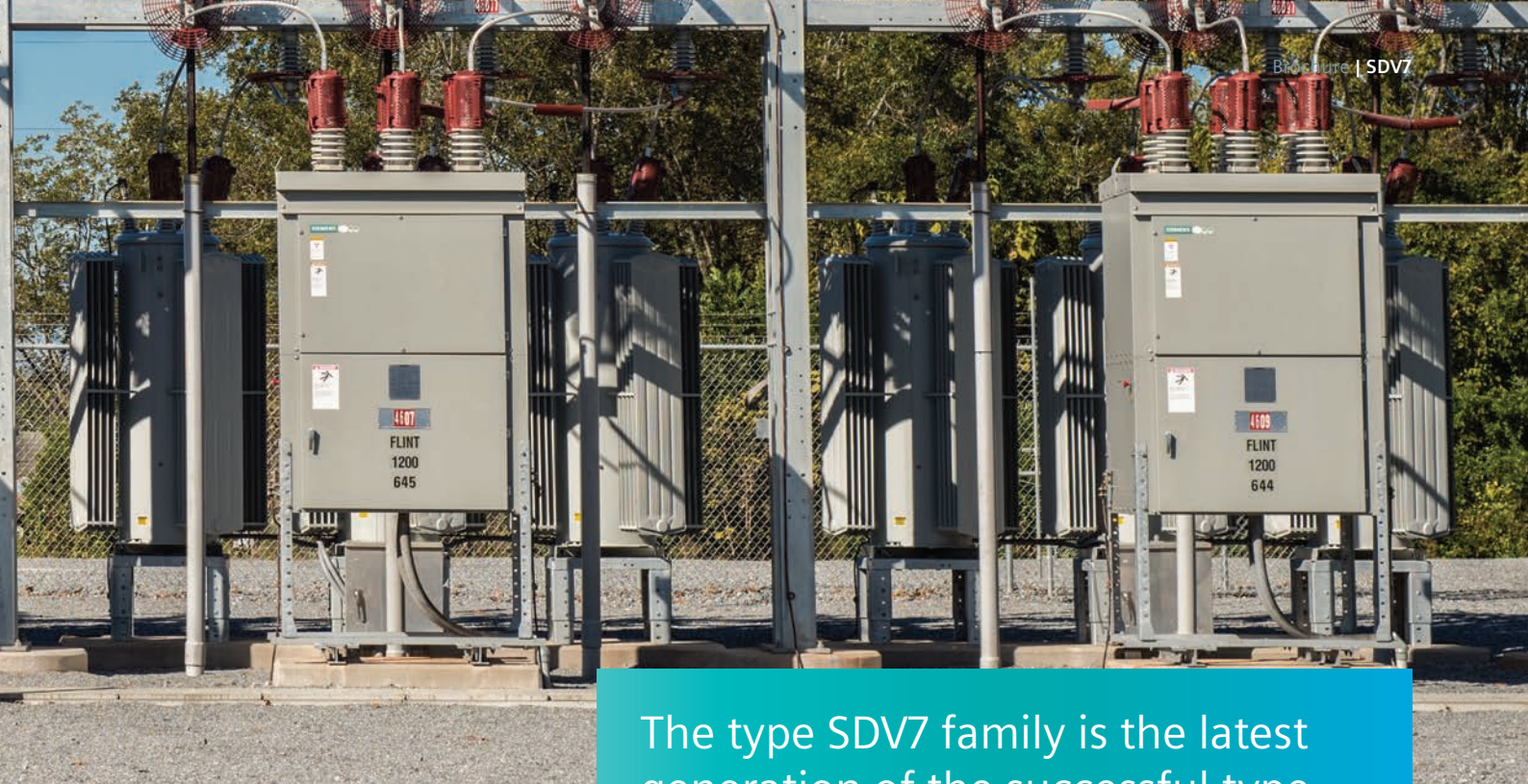
Outdoor distribution circuit  
breaker family

15.5 kV to 38.0 kV

[usa.siemens.com/sdv7](http://usa.siemens.com/sdv7)







The type SDV7 family is the latest generation of the successful type SDV product line.

With over 10,000 type SDV circuit breakers and 350,000 type 3AH operators in service, you can rely on Siemens.

Ratings have been expanded, an option for a magnetic-actuator to the standard stored-energy operator has been introduced, and an arc-resistant option tested to ANSI/IEEE C37.20.7 type 2B.

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# Introduction

## The type SDV7 family is the latest generation of the successful type SDV product line

### Introduction

The type SDV7 family is the latest generation of the successful type SDV product line.

Ratings have been expanded, along with introduction of an option for a magnetic-actuator operator, as an alternate to the standard stored-energy operator. An option for arc-resistant construction, tested to ANSI/IEEE C37.20.7 requirements for accessibility type 2B, is also available.

The magnetic actuator is adapted to the basic high-voltage support structure of the type SDV7 stored-energy operator version. The magnetic-actuator design has been qualified with full short-circuit tests to the same performance levels as with the stored-energy operator design.

The type 3AH35-MA magnetic actuator operator employs long-life, rare-earth permanent magnets to provide the closing force needed for the worst-case closing and latching duty, in combination with the basic kinematic structure used with the entire type SDV7 family for opening operations. The magnetic actuator employs an electronic controller to provide power to close the circuit breaker, as well as to supply the energy to open the circuit breaker.

The type 3AH35-SE stored-energy operator is derived from the highly reliable type 3AH family of operators, with over 30 years of design heritage.

With over 10,000 type SDV circuit breakers and 350,000 type 3AH operators in service, you can rely on Siemens products to meet your distribution system demands.

The type SDV7 family now includes an option for arc-resistant construction. The arc-resistant enclosure has been tested for conditions of internal arcing in accordance with ANSI/IEEE C37.20.7, for accessibility type 2B. The arc-resistant design shares the same footprint dimensions as the non-arc-resistant design, for ease in application.

The design of the type SDV7 features significant reduction in enclosure size; and, consequently, in the overall footprint. The type SDV7 product line encompasses the voltage groups 15.5 kV, 27.6 kV and 38.0 kV. Each group is specifically designed to optimize space and material for the voltage class while retaining common features across the entire product line.

| Rating  | Ratings availability |               |                        |                            |
|---|----------------------|---------------|------------------------|----------------------------|
|   | Non-arc-resistant    | Arc-resistant | Stored-energy operator | Magnetic-actuator operator |
| 15.5 kV; 20 kA/25 kA; 1,200 A/2,000 A           | Available            | Available     | Available              | Available                  |
| 15.5 kV; 31.5 kA/40 kA; 1,200 A/2,000 A/3,000 A | Available            | Available     | Available              | Future                     |
| 27.6 kV; 20 kA/25 kA; 1,200 A/2,000 A           | Available            | Available     | Available              | Available                  |
| 38.0 kV; 20 kA/25 kA; 1,200 A/2,000 A           | Available            | Available     | Available              | Future                     |
| 38.0 kV; 31.5 kA/40 kA; 1,200 A/2,000 A/2,500 A | Available            | Available     | Available              | Future                     |

### Vacuum interrupters

The heart of the medium-voltage circuit breaker is the time-proven Siemens vacuum interrupter. Siemens vacuum interrupters use chrome-copper contact material, which keeps the chopping current to five amperes or less and thereby keeps overvoltages to a minimum.

The contact configuration employs axial-magnetic field geometry to maintain the arc in diffuse mode and minimize contact erosion, and provide a capability of up to 100 full-rated fault interruptions (depending on rating) before replacement is necessary.

A contact-wear indicator is provided to directly determine the wear of the contacts within the vacuum interrupter.

### Simple current path

The type SDV7 configuration is extremely simple. The vacuum interrupters are located so that the connections between bushings and vacuum interrupters are short and direct. The current path uses a flexible shunt connection between the vacuum interrupter moving contact and the adjacent bushing terminal, rather than using sliding contacts or other moving elements in the current circuit.

The type SDV7 distribution circuit breaker enclosure includes bolted, hinged doors on the front and rear of the high-voltage compartment, as well as hinged, latched doors for the operator compartment as well as the relay and control compartment. Access to internal components, whether high voltage or low voltage, is very convenient.

### Low-maintenance requirements

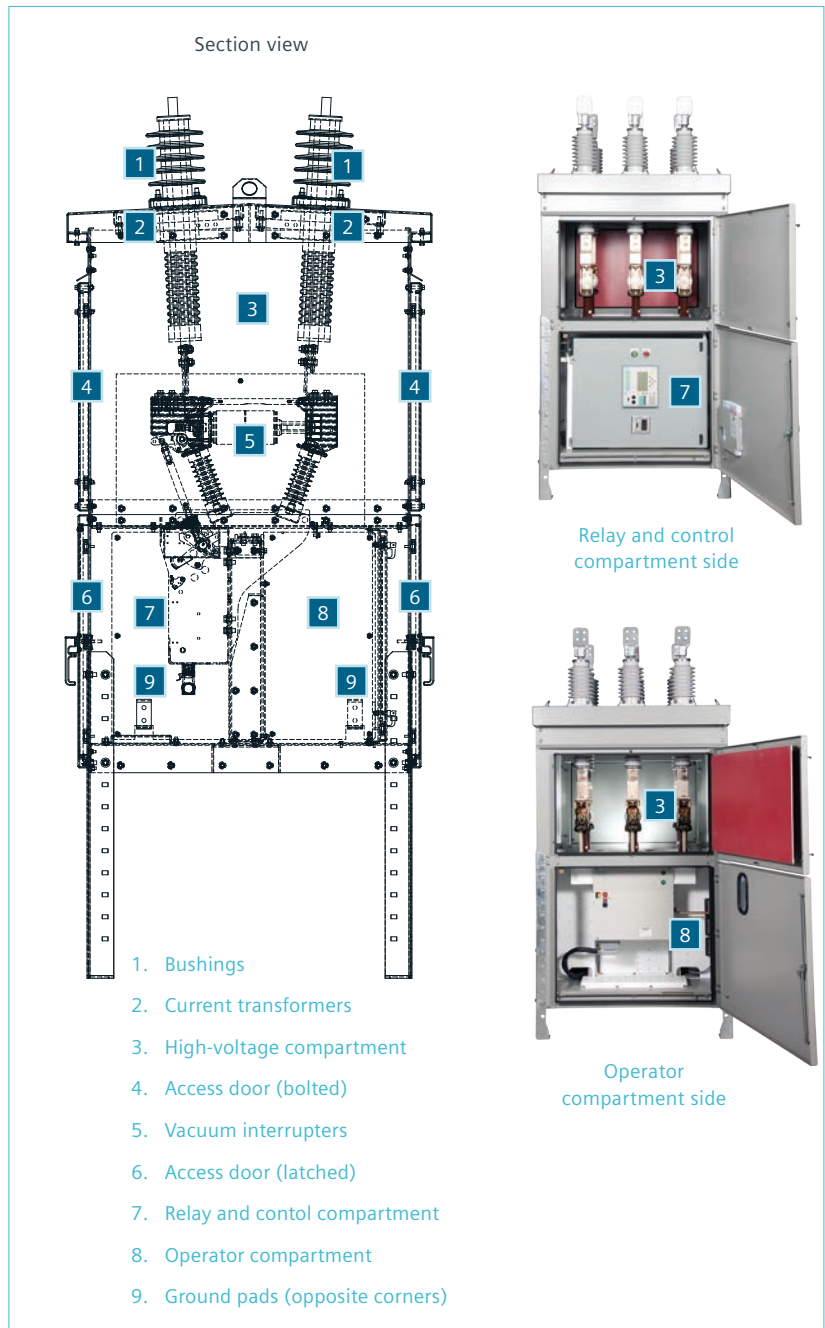
The vacuum interrupter is a sealed unit so the only maintenance typically required on the interrupter is to remove contaminants and check the vacuum integrity. The vacuum interrupters can be disconnected from the operating mechanism quickly, without tools, to check vacuum integrity. Other maintenance requirements on the circuit breaker include lubrication of moving parts and cleaning of insulation, at recommended intervals of five years or 10,000 operations.

### Enclosure

The configuration of the circuit breaker is very compact, resulting in a small footprint, allowing the SDV7 circuit breaker to fit into many existing installations that earlier design circuit breakers could not.

The enclosure is robust, with the adjustable legs located at the corners of the enclosure rather than recessed under the enclosure. Ground pads are stainless steel pads welded on diagonally opposite corners of the enclosure, a better arrangement than designs that incorporate the ground pads into removable legs. All exterior hardware, hinges, and latches are stainless steel for long life.

| Enclosure type    | Stored-energy operator | Magnetic-actuator operator |
|-------------------|------------------------|----------------------------|
| Non-arc-resistant | SDV7-SE                | SDV7-MA                    |
| Arc-resistant     | SDV7-SE-AR             | SDV7-MA-AR                 |



# Type 3AH35-SE

## Stored-energy operator



Type 3AH35-SE stored-energy operator removed from enclosure

### Type 3AH35-SE stored-energy operator

The type 3AH35-SE circuit breaker operator is a durable and reliable stored-energy mechanism. This operator is designed to perform up to 10,000 operations before overhaul, and the basic operator in the 3A family has a mean time before failure (MTBF) of over 23,000 years (as of 2014).

The type 3A operator family has over 1,000,000 units in service worldwide in vacuum circuit breakers. Over 120,000 type 3AH3 operators are in service.

Improvements in the operator have been incorporated to enhance service life and simplify maintenance.

Newer lubricants and alternative bearing materials have been selected to reduce the chance for interaction between the lubricants and the metals to ensure long service life. Mounting provisions for devices, such as the opening latch, closing latch and similar items, are designed for one-person removal and installation.

Reusable spring clips are used for pivot pins, avoiding the need for special removal tools or a supply of special purpose retainers during maintenance.

The spring charging mechanism is a gear-drive design. Compared to a ratchet-and-pawl mechanism, the type 3AH35 operator is quieter and exhibits longer mechanical life.

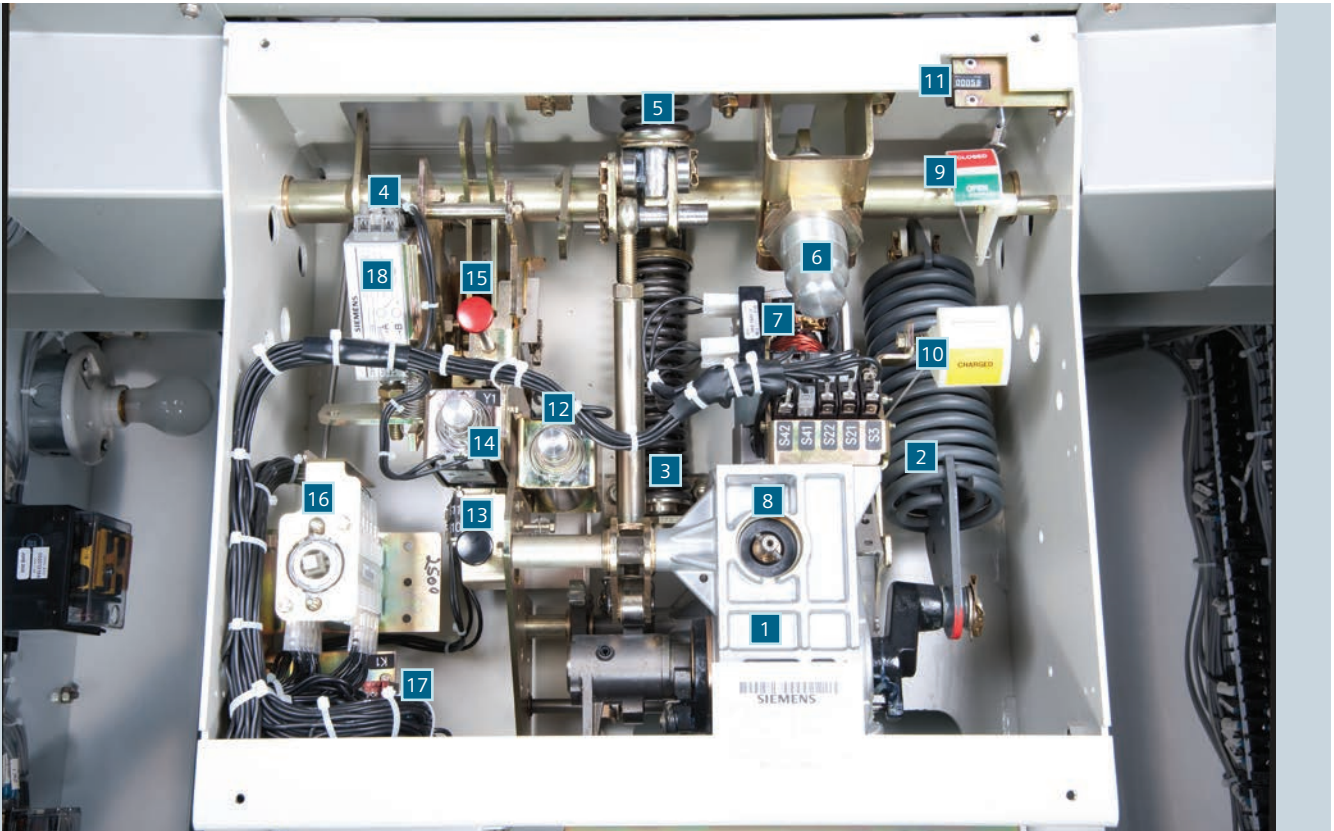
The type 3AH35-SE stored-energy operator includes provisions for manual operation, such as during maintenance. The closing spring can be manually charged with a spring-charging crank. The spring-charging crank includes a coupling that automatically disengages in the event that the spring-charging motor begins to operate.

The operating mechanism also includes pushbuttons for manually closing or opening the circuit breaker. The buttons are recessed to avoid inadvertent operation.

The estimated total mechanical endurance of the operator is 60,000 operations with overhaul and vacuum interrupter replacement at 10,000 operation intervals.

The entire type SDV7 family, from 15.5 kV through 38.0 kV, uses the same basic type 3AH35 operating mechanism. The operators differ only in elements related to the design voltage or interrupting rating of the circuit breaker.

The components that differ according to rating include: the main rotating shaft, contact pressure springs, closing spring, opening spring and pushrods, as well as the high-voltage elements, such as the interrupter, standoff insulators and similar items.



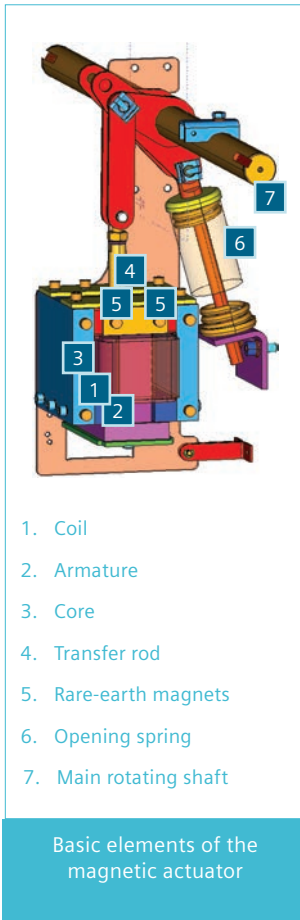
- |                                     |                                       |   |
|-------------------------------------|---------------------------------------|---|
| 1. Spring charging gearbox          | 8. Manual spring charging access port | 13. Manual close pushbutton             |
| 2. Closing spring                   | 9. OPEN-CLOSE indicator               | 14. Trip coil                           |
| 3. Opening spring                   | 10. CHARGED-DISCHARGED indicator      | 15. Manual open (trip) pushbutton       |
| 4. Main rotating shaft              | 11. Mechanical operation counter      | 16. Auxiliary switch                    |
| 5. Contact pressure spring          | 12. Spring release (close) coil       | 17. Anti-pump relay                     |
| 6. Opening operation shock absorber |                                       | 18. Undervoltage trip device (optional) |
| 7. Spring charging motor            |                                       |   |



Type 3AH35-SE operator compartment

# Type 3AH35-MA

## Magnetic-actuator operator



### Type 3AH35-MA magnetic-actuator operator

The type SDV7 distribution circuit breaker is available with a magnetic-actuator operator. The basic configuration of the circuit breaker is the same as for the stored-energy version, including the high-voltage elements and the vacuum interrupters, with only the operating mechanism replaced.

The type 3AH35-MA magnetic-actuator operator employs rare-earth magnets (neodymium-iron-boron) to maintain a stable CLOSED position, in combination with an electromagnetic coil structure to change from the OPEN position to the CLOSED position. The magnetic actuator uses a single coil design, providing a stable OPEN and a stable CLOSED position without supplemental energy input. The electronic controller provides a substantial current to the electromagnetic coil for closing operation, so that the electromagnetic force adds to the magnetic force provided by the rare-earth magnets.

For opening, only a modest electromagnetic force is needed, in the reverse direction, to offset the magnetic force provided by the rare-earth magnets. In effect, the electromagnetic force cancels the magnetic force during opening operations.

The force for opening primarily is provided by the contact pressure springs on each phase (not shown) with an assist from the opening spring. The opening spring is the same as used on the stored-energy version, and its primary function is to provide the force to oppose the force of atmospheric pressure on the vacuum interrupter bellows, which would otherwise cause the contacts of the open circuit breaker to close.

The field diagrams of the magnetic actuator illustrate the combined magnetic and electromagnetic field conditions in the various circuit breaker positions.

### Magnetic-actuator electronic controller

The operation of the magnetic actuator is controlled by an electronic module. The electronic module receives power from a 24 Vdc power supply, stores energy in capacitors on several printed circuit boards, and provides a variety of functions, including:

- Closing, upon remote (or relay) command or from local pushbutton
- Opening, upon remote (or relay) command or from local pushbutton
- Capacitor control, including charging, monitoring, and periodic condition checking.

The electronic controller allows for circuit breaker reclosing according to the standard reclosing duty sequence in ANSI/IEEE C37.04, O – 0.3 s – CO – 15 s – CO. The capacitors used to power circuit breaker opening and closing actions recharge following operations as follows:

- After a C operation  $\approx 10$  s
- After an O operation  $\approx 2-5$  s
- After a CO operation  $\approx 12-15$  s.

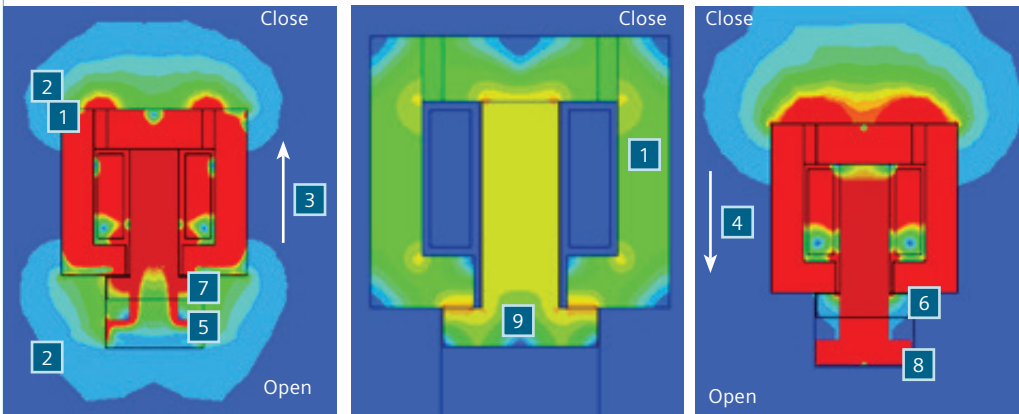
When first energized, the capacitors require approximately 35 s to obtain full charge.

The electronic controller is designed for harsh environments and long life. The estimated life of the electronic controller is approximately 20 years with an ambient environment outside the circuit breaker enclosure of 50 °C or less.

In an environment less harsh than this, the expected life is well in excess of 20 years.

The capacitors used have a life expectancy of 45 years with an ambient environment at the capacitors of 70 °C (3% of total hours), 50 °C (40% of total hours), with the remaining 57% of total hours in an ambient of 40 °C or less. In an environment less harsh than this, the expected life is well in excess of 45 years.

Electromagnetic and magnetic fields condition in various circuit breaker positions



Fields during closing - electromagnetic and magnetic fields additive

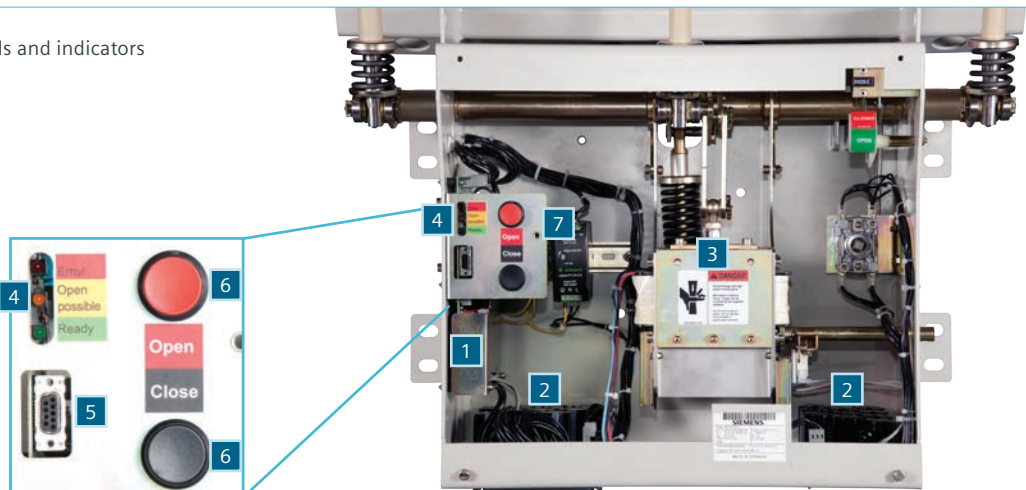
Fields while circuit breaker closed - magnetic field maintains CLOSED position

Fields during opening - electromagnetic field opposes (cancels) magnetic field

1. Magnetic field from rare-earth magnets
2. Electromagnetic field due to current coil
3. Direction of armature movement during closing
4. Direction of armature movement during opening
5. Armature at start (in OPEN position)
6. Armature at start (in CLOSED position)
7. Armature at end (in CLOSED position)
8. Armature at end (in OPEN position)
9. Armature in CLOSED position

Operator elements, controls and indicators

1. Electronic controller
2. Capacitor board
3. Magnetic actuator
4. LED
5. RS-232 PC interface
6. Local pushbuttons (black-close, red-open)
7. Green LED (power supply behind front cover)



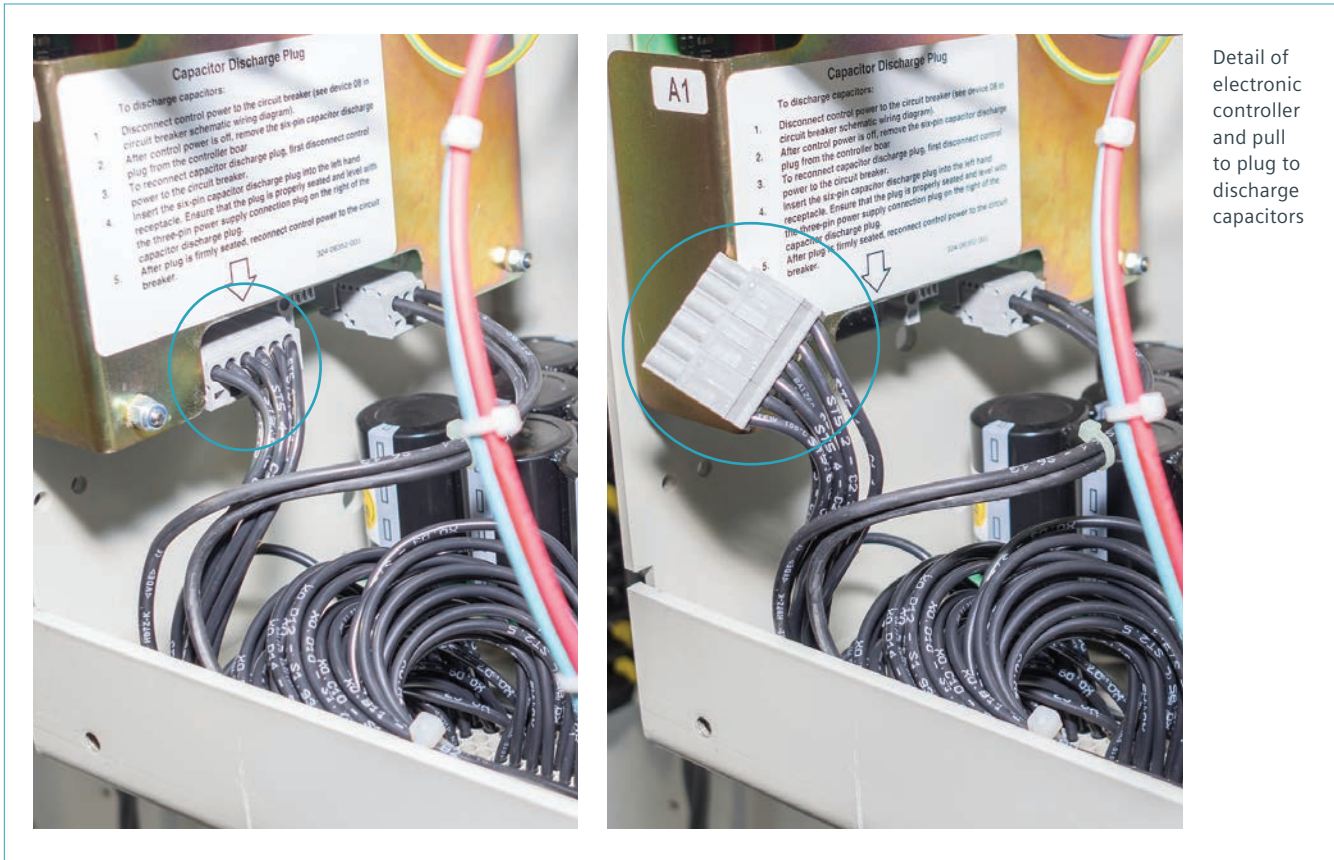
The capacitor boards are generously sized, with energy storage above the level needed to operate the circuit breaker. In fact, the system is able to open and close the circuit breaker if as much as 20% of the capacitors are disabled.

The capacitors have reserve energy such that the circuit breaker can be electrically opened using the pushbuttons on the operator for at least 300 seconds after control power is lost.

The power supply for the electronics circuits accommodates a wide range of input voltages. The high-range power supply accepts any voltage in the range of 110 Vac to 240 Vac or 110 Vdc to 250 Vdc. The low-range power supply accepts voltage in the range of 28 Vdc to 56 Vdc..

Electrical close and open commands operate through binary inputs, with the high-range command input version requiring input of at least 68 Vac or 68 Vdc for operation, while the low-range command input version requires input of at least 17 Vac or 17 Vdc for operation.





Detail of electronic controller and pull to plug to discharge capacitors

### Automatic monitoring

The electronic controller includes monitoring and self-test functions, among which are these:

- Failure to close on command (after 100 ms)
- Excessive coil current
- Capability of capacitors
  - Initial charging of capacitors on energization
  - Periodic charging test cycle to verify energy storage capacity (performed weekly)
- Power supply (24 Vdc) failure
- Overcharging of capacitors (excess voltage)
- Coil circuit integrity
- Interlock check (lockout).

The electronic controller also maintains a log, which includes details of the last 32 operations and results of capacitor capability tests.

### Built-in fast-discharge circuit for capacitors

The controller system design includes built-in means to discharge the capacitors if maintenance is to be performed. There is no need for the user to provide jumper wires or loading resistors to discharge the capacitors – simply disconnect the plug between the electronic controller board and the capacitor boards, and the discharge circuit is automatically enabled, discharging the capacitors to a low level to enable maintenance. The NEC (NFPA 70) requires discharge to below 50 Vdc within five minutes, but the system incorporated in the type SDV7-MA magnetic actuator design discharges to less than 5 Vdc in approximately 90 seconds.

When control power is initially energized, the controller executes a start-up routine, after which charging of the capacitors begins.

When control power is first applied, a green LED on the power supply (item 7 on page 9) is illuminated.

The controller includes LEDs to indicate the energy status of the capacitor bank.

From complete discharge, approximately 25 seconds after control power is applied, a yellow LED lights, and approximately 5 to 10 seconds later, the yellow LED goes off and a green LED illuminates. The LEDs indicate status as follows:

- Green LED on power supply illuminated (visible with operator cover removed) indicates control power is available
- Green LED (adjacent to pushbuttons) illuminated indicates the operator is ready and is capable of Open-Close-Open sequence
- Yellow LED (adjacent to pushbuttons) illuminated indicates the operator is capable of an Open operation
- Red LED (adjacent to pushbuttons) illuminated indicates error and the energy is not sufficient for operation.

The controller includes output terminals corresponding to the LEDs so that status can be monitored from remote locations.

#### External manual trip handle

An external manual trip handle is provided as standard on the type SDV7-MA and type SDV7-MA-AR with magnetic-actuator operator. The external manual trip handle requires only a modest force to operate it, and once the circuit breaker is opened, the handle can be padlocked to provide a lockout function and prevent closing of the circuit breaker either by electrical means or by manual means.

External manual trip handle



Handle in normal position



Handle in lockout position



Interlock not blocked  
(cover removed for photo)



Interlock blocked  
(cover removed for photo)

# Arc-resistant enclosure option



## Arc-resistant enclosure option

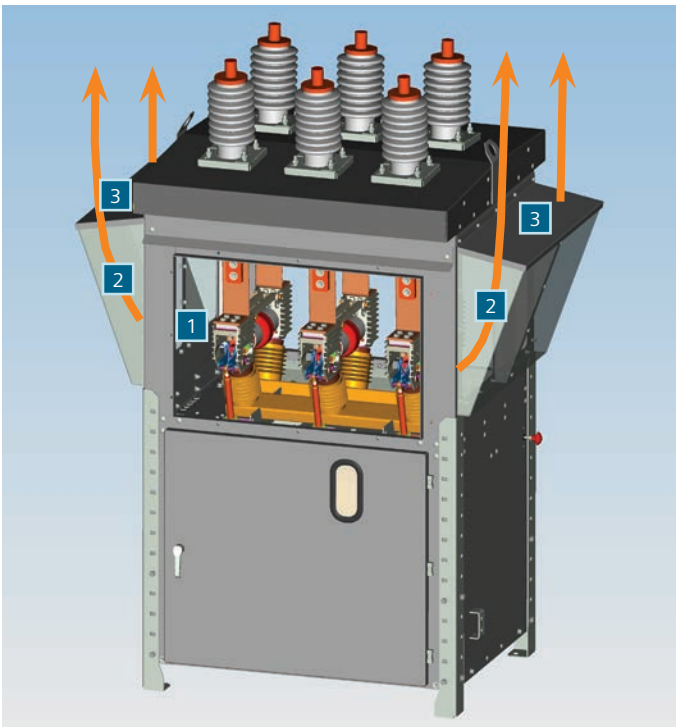
The SDV7 family is available with an option for arc-resistant construction.

For arc-resistant capability, the basic type SDV7 enclosure is modified to include relief openings, along with exhaust channels on the sides of the enclosure to route the exhaust gases associated with an internal arcing event to the sides of the enclosure and thence to exhaust flaps located on the top of the side exhaust channels.

The modifications also include pressure-actuated flaps to close ventilation openings between the low-voltage compartments and the high-voltage compartment when an arcing event occurs.

The design has been successfully tested for resistance to internal arcing in accordance with ANSI/IEEE C37.20.7 for accessibility type 2B. Accessibility type 2B means that a degree of protection is provided on all four sides of the enclosure, and this protection is provided even if a low-voltage compartment door is open. The rated arcing current is equal to the rated short-circuit current of the circuit breaker as shown on page 13, and the rated arcing current duration is 0.5 s, in accordance with ANSI/IEEE C37.20.7.

The basic enclosure dimensions and footprint are unchanged from the non-arc-resistant version, simplifying application. The exhaust channels add to the overall space occupied by the enclosure, as shown in the dimensional figures on page 14.



1. Relief opening
2. Exhaust channel
3. Exhaust flap on top of exhaust channel

# Technical ratings and dimensions

| Technical ratings         |                       |                                      |                 |  |                                      |                          |   |                             |   |                                    |
|---------------------------|-----------------------|--------------------------------------|-----------------|--|--------------------------------------|--------------------------|---|-----------------------------|---|------------------------------------|
| Circuit breaker type SDV7 | Rated maximum voltage | Rated withstand voltages             |                 | Rated short-circuit and short-time current | Rated interrupting time <sup>2</sup> | Rated continuous current | Rated transient recovery voltage <sup>3</sup> |                             | Rated permissible tripping delay time Y | Rated closing and latching current |
|                           |                       | Lightning impulse (BIL) <sup>1</sup> | Power frequency |  |                                      |                          | $u_c$ TRV peak value                          | $t_3$ time to voltage $u_c$ |   |                                    |
|                           | kV, rms               | kV <sup>3</sup>                      | kV              | kA, rms                                    | ms/cycles                            | A, rms                   | kV  | $\mu$ s                     | sec                                     | kA, peak                           |
| 15.5-20                   | 15.5                  | 110/142                              | 50              | 20   | 50/3                                 | 1,200, 2,000             | 29.2  | 32                          | 2                                       | 52                                 |
| 15.5-25                   | 15.5                  | 110/142                              | 50              | 25   | 50/3                                 | 1,200, 2,000             | 29.2  | 32                          | 2                                       | 65                                 |
| 15.5-31.5 <sup>4</sup>    | 15.5                  | 110/142                              | 50              | 31.5                                       | 50/3                                 | 1,200, 2,000, 3,000      | 29.2  | 32                          | 2                                       | 82                                 |
| 15.5-40 <sup>4</sup>      | 15.5                  | 110/142                              | 50              | 40   | 50/3                                 | 1,200, 2,000, 3,000      | 29.2  | 32                          | 2                                       | 104                                |
| 27.6-20                   | 27.6                  | 150/194                              | 60              | 20   | 50/3                                 | 1,200, 2,000             | 52.1  | 45                          | 2                                       | 52                                 |
| 27.6-25                   | 27.6                  | 150/194                              | 60              | 25   | 50/3                                 | 1,200, 2,000             | 52.1  | 45                          | 2                                       | 65                                 |
| 38.0-20 <sup>4</sup>      | 38.0                  | 200/258                              | 80              | 20   | 50/3                                 | 1,200, 2,000             | 71.7  | 59                          | 2                                       | 52                                 |
| 38.0-25 <sup>4</sup>      | 38.0                  | 200/258                              | 80              | 25   | 50/3                                 | 1,200, 2,000             | 71.7  | 59                          | 2                                       | 65                                 |
| 38.0-31.5 <sup>4</sup>    | 38.0                  | 200/258                              | 80              | 31.5                                       | 50/3                                 | 1,200, 2,000, 2,500      | 71.7  | 59                          | 2                                       | 82                                 |
| 38.0-40 <sup>4</sup>      | 38.0                  | 200/258                              | 80              | 40   | 50/3                                 | 1,200, 2,000, 2,500      | 71.7  | 59                          | 2                                       | 104                                |

## Footnotes:

<sup>1</sup> First value is full-wave impulse withstand circuit breaker open or closed. Second value is chopped-wave impulse withstand, applicable only with circuit breaker closed.

<sup>2</sup> 50 ms interrupting time standard. 83 ms interrupting time optional with stored-energy operator only.

<sup>3</sup> TRV values are in accordance with ANSI/IEEE C37.06-2009 TRV peak value  $u_c$  roughly equal to historic  $E_2$  value in ANSI/IEEE C37.06-2000. Value  $t_3$ , time to voltage  $u_c$  is approximately 1/1.138 times  $T_2$  value in ANSI/IEEE C37.06-2000.

<sup>4</sup> Availability of this rating with magnetic-actuator operator to be announced. Consult factory.

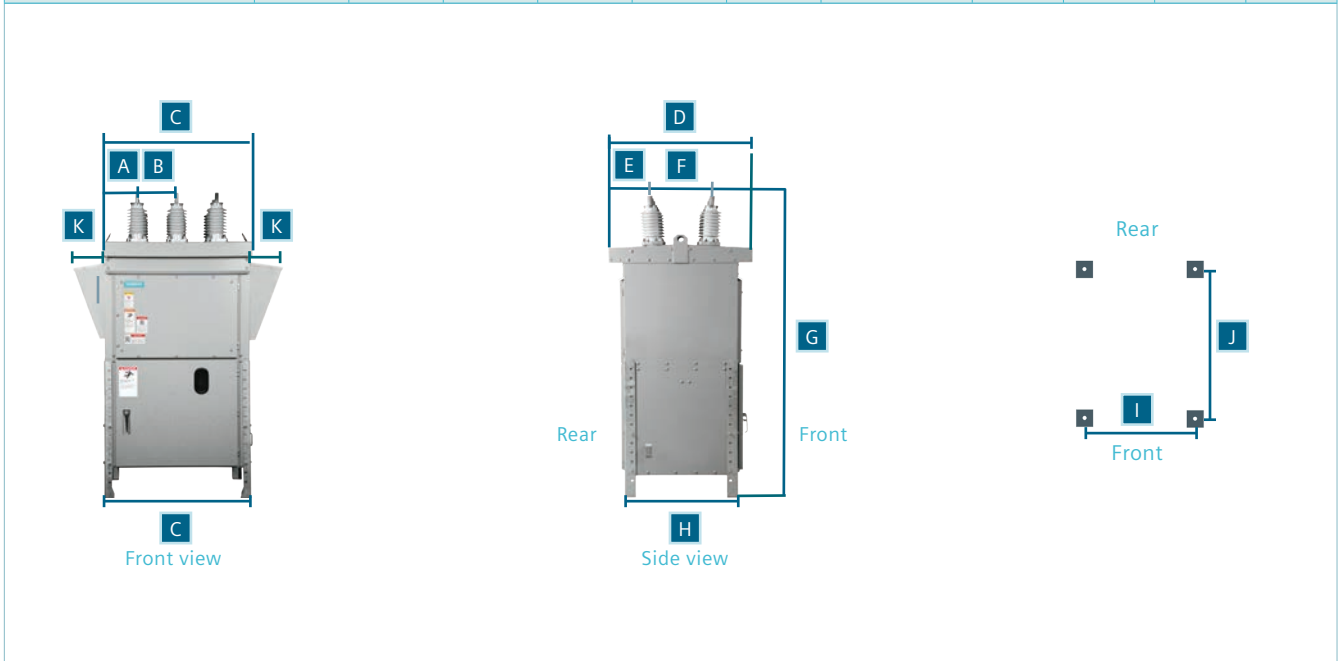
| Control data for stored-energy operator |         |         |            |                        |                       |                  |
|---|---------|---------|------------|------------------------|-----------------------|------------------|
| Nominal                                 | Range   |         | Close coil | Trip coil <sup>1</sup> | Spring charging motor |                  |
|   | Close   | Trip    | A          | A                      | Amperes run (avg.)    | Charging seconds |
| 48 Vdc                                  | 36-56   | 28-56   | 11.4       | 30/11.4                | 8                     | 10               |
| 125 Vdc                                 | 90-140  | 70-140  | 2.1        | 7.4/4.8                | 4                     | 10               |
| 250 Vdc                                 | 180-280 | 140-280 | 2.1        | 9.6/4.2                | 2                     | 10               |
| 120 Vac                                 | 104-127 | 104-127 | 2.0        | ---                    | 6                     | 10               |
| 240 Vac                                 | 208-254 | 208-254 | 2.0        | ---                    | 3                     | 10               |

| Control data for magnetic-actuator operator |                     |                            |                        |                   |                                    |
|---|---------------------|----------------------------|------------------------|-------------------|------------------------------------|
| Electronic controller                       | Input voltage range | Input power                | Controller output      |                   | Capacitor voltage <sup>2,3,4</sup> |
|   |                     |                            | Close                  | Open              |                                    |
|   |                     | 95-250 Vdc/<br>100-254 Vac | 60 W/60 V <sup>5</sup> | 40-55 A           | 10-15 A                            |
|   | 28-56 Vdc           | 80 W <sup>5</sup>          | 40-55 A                | 10-15 A           | 160 Vdc                            |
| Binary inputs (close and open commands)     | Low-range model     | ≥ 17 Vdc or 17 Vac         |                        | Duration ≥ 100 ms |                                    |
|   | High-range model    | ≥ 69 Vdc or 53 Vac         |                        | Duration ≥ 100 ms |                                    |

**Footnotes:**

- <sup>1</sup> First value is for standard 50 ms/three-cycle interrupting time. Second value is for optional 83 ms/five-cycle interrupting time (stored-energy operator only).
- <sup>2</sup> If controller power fails, capacitors retain sufficient charge to open circuit breaker within 300 seconds, with minimum open command duration 100 ms.
- <sup>3</sup> Capacitors discharge to 10 V or less within five minutes after disconnecting plug.
- <sup>4</sup> Capacitor charging time approximately 30-35 seconds from complete discharge, approximately 12 seconds after OPEN-CLOSE-OPEN sequence.
- <sup>5</sup> On initial energization, power demand is approximately 100 W, declining to approximately 20 W when capacitors are fully charged. When the circuit breaker operates (open or close), power demand again increases to approximately 100 W, declining to approximately 20 W when capacitors are fully charged.

| Dimensions in inches (mm)              |               |               |                 |                 |               |               |                                |                 |                 |                 |                |
|--|---------------|---------------|-----------------|-----------------|---------------|---------------|--------------------------------|-----------------|-----------------|-----------------|----------------|
| Rating                                 | A             | B             | C               | D               | E             | F             | G                              | H               | I               | J               | K <sup>5</sup> |
| 15.5 kV,<br>1,200 A-2,000 A            | 10.7<br>(272) | 13.0<br>(330) | 47.1<br>(1,197) | 44.5<br>(1,130) | 12.4<br>(315) | 19.8<br>(503) | 92.0-116.0<br>(2,337)-(2,945)  | 36.1<br>(918)   | 31.3<br>(794)   | 42.7<br>(1,084) | 10.3<br>(260)  |
| 15.5 kV,<br>3,000 A                    | 12.3<br>(312) | 16.0<br>(406) | 56.5<br>(1,435) | 52.8<br>(1,340) | 15.9<br>(403) | 21.0<br>(534) | 96.0-120.0<br>(2,438)-(3,048)  | 44.2<br>(1,123) | 39.4<br>(1,001) | 52.0<br>(1,321) | 11.4<br>(290)  |
| 27.6 kV,<br>1,200 A-2,000 A            | 12.3<br>(312) | 16.0<br>(406) | 56.5<br>(1,435) | 49.8<br>(1,265) | 14.4<br>(366) | 21.2<br>(538) | 96.0-120.0<br>(2,438)-(3,048)  | 44.2<br>(1,123) | 39.4<br>(1,001) | 52.0<br>(1,321) | 11.4<br>(290)  |
| 38.0 kV,<br>1,200 A, 2,000 A, 2, 500 A | 13.4<br>(340) | 19.5<br>(495) | 67.8<br>(1,723) | 63.0<br>(1,600) | 20.4<br>(518) | 22.2<br>(563) | 120.5-144.5<br>(3,060)-(3,670) | 55.6<br>(1,413) | 50.9<br>(1,294) | 63.1<br>(1,604) | 16.7<br>(424)  |



# Features and benefits

## Standard features for all types include:

- Visual circuit breaker status window
- Operations counter
- Mechanical position indicator
- External manual trip means
- Generous relay and metering space
- Hinged panel for relays or devices
- Necessary terminal blocks and wiring
- Fused knife-switch control voltage disconnects
- Porcelain dry-type roof bushings
- Bolted cabinet construction
- Permanent lifting eyes (2)
- Adjustable galvanized legs (4)
- Corrosion resistant powder paint finish (ANSI-61 light gray with white for interior panels of the low-voltage relay and control compartment)
- Stainless steel external ground pads (2)
- Stainless steel external hardware
- Cabinet heaters to prevent condensation
- Filtered ventilation
- ANSI/IEEE rain-tested design (per ANSI/IEEE C37.20.2)
- Reduced footprint from previous models.

## Options available for all types include:

- Terminal connectors for bushings
- Terminal connectors for ground
- Current transformers (up to two per bushing)
- Siemens protective relays
- Other protective relays
- Local/remote or toggle switches
- Additional heaters for -40 °C application (consult factory for -50 °C application)
- Heaters applied at ½ voltage
- Adjustable thermostat

- Seismic capability (IEEE 693 high level, UBC zones 1-4 or IBC-2006)
- Interior convenience outlet (GFCI)
- Interior light with switch
- Molded-case circuit breakers in lieu of fused knife switches
- Wire markers
- Arc-resistant construction accessibility type 2B (to ANSI/IEEE C37.20.7, 0.5 s duration).

## Stored-energy operating mechanism type 3AH35-SE:

- Close and trip coil
- Options available:
  - Capacitor trip unit for alternating current (ac) tripping supply
  - Second trip coil
  - Undervoltage trip device
  - Additional auxiliary switch contacts
  - Circuit breaker control switch with indicating lights.

## Magnetic-actuator operating mechanism type 3AH35-MA

- Pushbuttons for local close and open
- Options available:
  - Additional auxiliary switch contacts
  - Binary input voltage:
    - High range  $\geq 68$  Vdc or 68 Vac
    - Low range  $\geq 17$  Vdc or 17 Vac.
  - Electronic power supply:
    - 28-56 Vdc
    - 95-250 Vdc / 100-254 Vac.

## Maintenance interval

If applied under ANSI usual service conditions, maintenance is only needed at intervals of five years/10,000 operations on any circuit breaker in an outdoor application.

## Standards

The type SDV7 meets the following standards:

- ANSI/IEEE C37.04 rating structure for ac high-voltage circuit breakers
- ANSI/IEEE C37.09 test procedure for ac high-voltage circuit breakers
- ANSI/IEEE C37.06 preferred ratings ac high-voltage circuit breakers
- NEMA SG-4 ac high-voltage circuit breakers.

## Arc-resistance

- ANSI/IEEE C37.20.7 Testing for internal arcing faults (for arc-resistant units)

## Seismic

When specified, the distribution vacuum circuit breaker can be provided with the capability of maintaining structural integrity during and following a seismic disturbance, as appropriate for the specified UBC zones 1-4, IBC-2006 or IEEE 693 levels.

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Siemens Industry  
7000 Siemens Road  
Wendell, North Carolina 27591

For more information, please contact our Customer Support Center.  
Phone: +1 (800) 347-6659

[www.usa.siemens.com/sdv7](http://www.usa.siemens.com/sdv7)

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