SIEMENS
Ingenuity for life

Type SP breaker maintenance program

Service solutions for your T&D infrastructure

As the supplier of OEM parts for your SP breakers, Siemens is committed to supporting you with qualified parts and factory-trained field service support throughout your breaker's life cycle.

usa.siemens.com/assetservices

Type SP puffer circuit breaker major maintenance program

Maintenance intervals

Siemens recommends that major maintenance be performed on your SP breaker after 2,000 operations, accumulated fault duty equal to 20 times the breaker kA rating or eight years, whichever occurs first. Major maintenance involves an internal inspection of the breaker and requires a major inspection kit that includes all the required gaskets, lubricants and other consumables.

Field service

With Siemens services, an experienced, factory-trained engineer who specializes in high-voltage (HV) breaker maintenance will be on-site to assist each step of the way.

Siemens can assist with:

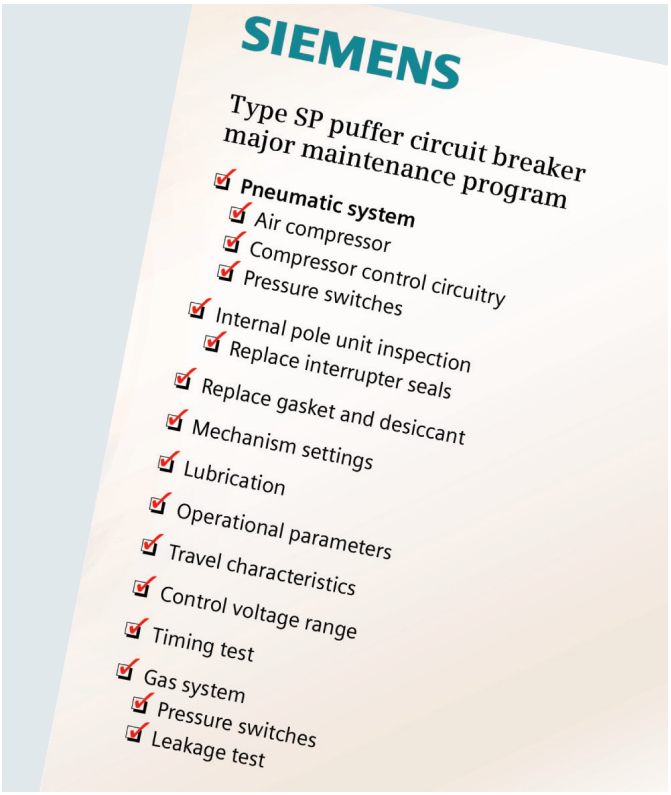
- Technical field assistance
- Turnkey maintenance
- Turnkey breaker replacement

Siemens power circuit breaker training

The SP two-day training program is tailored to increase the knowledge of personnel responsible for the maintenance of HV SF_6 breakers and focuses on hands-on practical, rather than theoretical, training. Your personnel can attend a program conducted at our power circuit breaker factory in Jackson, Mississippi, or training can be combined with technical field assistance during a scheduled outage.

Benefits

- Hands-on experience for the crew
- Maintenance and repair sequencing
- Factory adjustment procedures and tolerances
- Problem analysis
- Final check-out



Digital Radiology

Type SP puffer circuit breaker renewal parts solutions

Renewal parts
Should renewal parts be required during major maintenance, Siemens maintains a multi-million dollar inventory for rapid supply of many key components.

Benefits
- Experienced in-house renewal parts specialists
- Access to OEM engineering departments that understand your equipment design
- Parts manufactured and tested to OEM specifications that include the latest design and material improvements
- 24/7/365 parts availability

Spare interrupters
To reduce outage downtime, particularly when several breakers will be inspected, many customers order spare interrupters to have on hand in the event their inspection reveals the need to replace the existing interrupter.

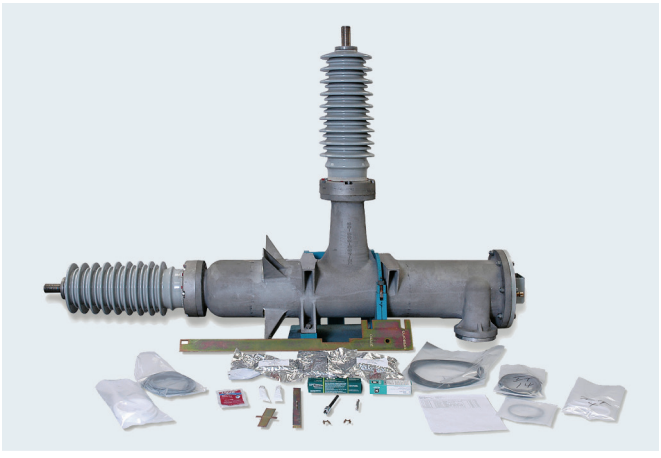
Major inspection kit
We provide all required o-rings, lubricants and consumable materials to replace items subject to wear, thus potentially adding 15 to 20 years to equipment life.

There have been several design improvements in the SP breaker since its introduction by Westinghouse in 1980. The following improvements, depending on your breaker, can be field installed.

Uprates
- **Interrupting rating**
  Many SP breakers were originally designed for 23 kA. Siemens can increase this rating to 31.5 kA by replacing the interrupter and adding a tank liner. Siemens can further increase this rating to 40 kA by adding line to ground capacitors.
- **Continuous circuit**
  Many SP breakers were originally designed for 1,200 amperes. Siemens can increase this rating to 2,000 or 3,000 amperes by changing a bushing component and possibly the current transformers.
- **Voltage rating**
  It is possible to increase the voltage rating to 72 kV by adding voltage shields.

Upgrades
- **SF_6 pressure monitoring**
  Several methods were applied to monitor gas pressure. The later design incorporated a temperature compensated pressure switch in conjunction with a lockout relay that prevents the breaker from operating while the pressure is below safe operating levels. Breakers with other methods can be upgraded to this functionality.
- **Control cabinet anti-condensation**
  Prevent corrosion in the control cabinet by adding an anti-condensation heater assembly
- **-40 °F temperature operation**
  Improve operating temperature to -40 °F by adding tank heaters
- **Replacement porcelain bushings**
  SP breakers manufactured prior to 1988 utilized epoxy bushings. Siemens can field install replacement porcelain bushings.
- **Manifold assembly**
  Prevent corrosion and leakage on the manifold by replacing the original stainless steel tubing with new copper tubing

State-of-the-art aftermarket parts warehouse for quick shipment



SP interrupters and major inspection kits are available from stock to support your upcoming maintenance activities

Maintenance tips

The following tips are useful during major maintenance, troubleshooting and long-term maintenance planning.

Mechanism hints

- **Air valve leaks**
  Temperature plays a critical role in hardening air valve o-rings, which may result in leaks. A contributing factor is the air valve heater used to prevent condensation inside the mechanism and prevent ice from freezing the valve during operation when the ambient temperature is 45 °F and below. Siemens has developed an alternate heater arrangement, which consists of energizing another heater continuously to control condensation and controlling the air valve heater with a thermostat to be on only when needed. Upgrade kits include new valve o-rings, thermostat, heater and installation drawings.
- **Pneumatic mechanism slow reset on trip-free latch**
  Siemens has received reports of type SP breakers with slow reset times on the trip-free latch or the mechanism going trip-free on a close-open operation. Check that the breaker lever system is set correctly using the horizontal linkage system setting gauge (part 7358D12H14). Trip-free latch problems may be caused by slight changes in the open position stop bolt setting.
- **Mechanism linkage lubrication**
  Frequently operated type SP breakers should be checked and lubricated with Molykote at the following points:
  1. Horizontal linkage pins, particularly where the horizontal tie pipe connects to the drive levers
  2. Hydraulic shock absorber plunger nose that makes contact with the bell crank lever
  3. Rollers that move vertically in operating mechanism guide rails (on ends of A and B pins)

Interrupter bushing maintenance hints

- **Loose moving contact nuts**
  Frequently operated type SP breakers built before January of 1988 have occasionally experienced loose nuts where the moving contact attaches to the interrupter tube and should be checked at the next major maintenance. Nuts should be cleaned with Loctite Primer, and a couple drops of Loctite 242 (blue) should be applied to the nut thread before retightening to 25 ft-lbs torque.
- **Interrupter lubrication**
  In warmer climates, the Molykote lubrication in the interrupter may dry out. Re-lubricate with Beacon 325. The resistance (100A flowing) should be less than 40 microhms.
- **Leaking bushings at top**
  When installing terminal pads, make sure that the terminal pad and bushing stud threads are free of burrs as they should screw on easily. If not, it may be possible to overcome the 100 ft-lbs torque used during bushing assembly, which may result in a loose stud and leaking bushing.

Contact us

To find out how these services may give you a competitive advantage, please contact your local Siemens sales representative or +1 (800) 347-6659.

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