



SIEMENS

Ingenuity for life



Type TCP breaker maintenance program

Service solutions for your T&D infrastructure

The TCP series SF₆ breaker has offered dependable service for the past 20 years. The pneu-draulically operated TCP was rated from 121 up to 245 kV and up to 63 kA.

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



Type TCP pneu-draulic circuit breaker major maintenance program

Maintenance intervals

Siemens recommends that major maintenance be performed on your TCP breaker after 3,000 operations, accumulated fault duty equal to 20 times the breaker kA rating or 12 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

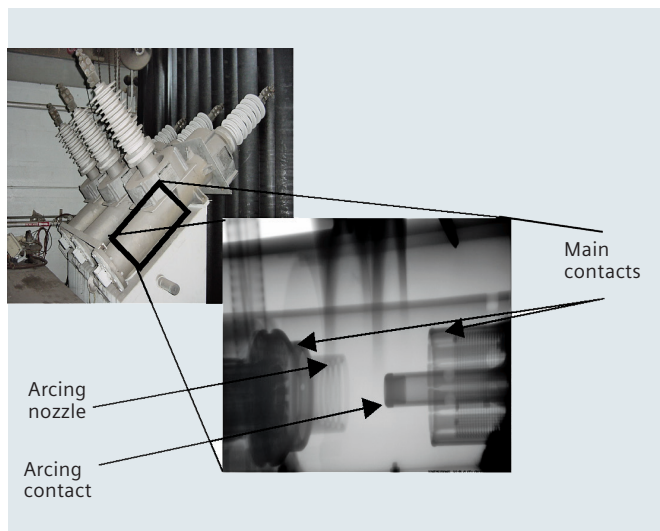
With Siemens services, an experienced, factory-trained engineer who specializes in high-voltage (HV) breaker maintenance will be on-site to assist each step of the way.

Siemens can assist with:

- Technical field assistance
- Turnkey maintenance
- Turnkey breaker replacement

Digital radiography

Digital radiography combined with regular “external” preventive maintenance will improve breaker reliability, ensure internal components are acceptable for continued use and allow for tracking interrupter wear over the life cycle of the breaker. Depending on breaker type and size, digital radiography inspection could be as much as 50 percent less costly than traditional internal inspections.



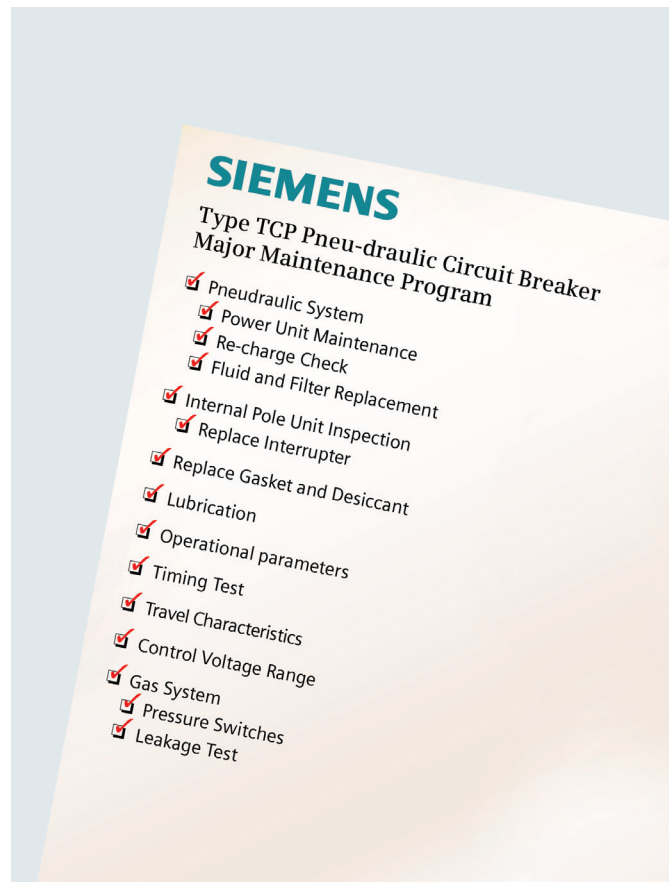
Digital radiography

Siemens power circuit breaker training

The TCP two-day training program is tailored to increase the knowledge of personnel responsible for the maintenance of HV SF₆ 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



Type TCP pneu-draulic circuit breaker renewal parts program

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



State-of-the-art aftermarket parts warehouse

Major inspection kit

All required o-rings, lubricants and consumable materials to replace items subject to wear, adding 15-20 years to equipment life.

Hydraulic drive seal kit

All required o-rings, filter and hoses to address leaks at the hydraulic drive and pressure switch.

Upgrades

- **Interrupting rating**
Many 121 145 kV TCP breakers were originally designed for 40 kA. Siemens can increase this rating to 50 kA by adding line to ground capacitors. Many 169 245 kV TCP breakers were originally designed for 50 kA. Siemens can increase this rating to 63 kA by adding line to ground capacitors

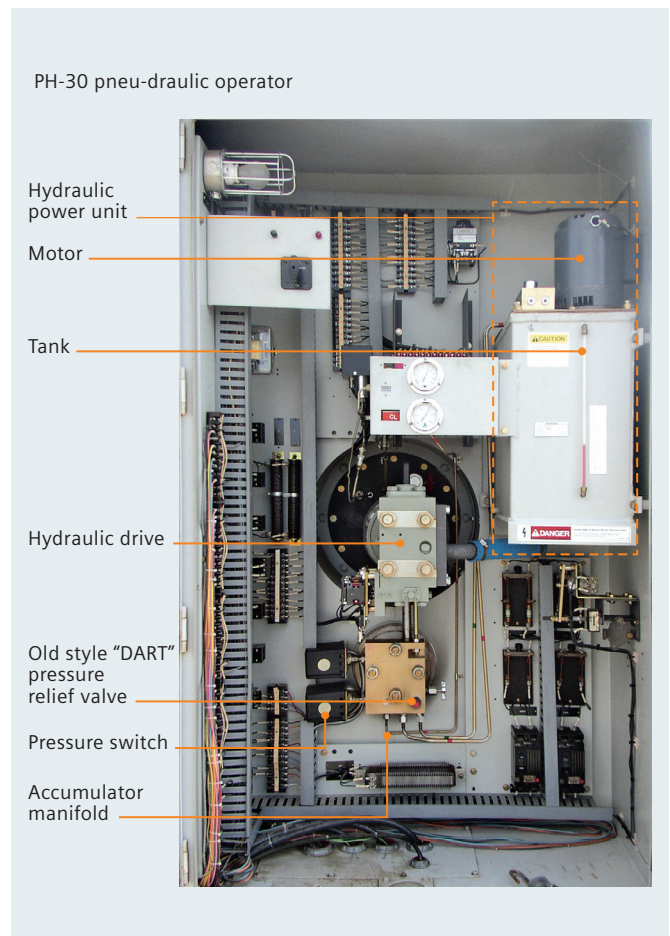


Siemens TCP145 kV 40 kA SF₆ circuit breaker

Upgrades

The following upgrades are available:

- **Pressure relief valve**
Prevent leakage by replacing "dart" type relief valve with direct acting "ball" type
- **Power unit modification**
Replace out-of-production Barnes pump with modern design
- **Dual trip coils**
Additional trip coils provide redundancy
- **Current transformer (CT) covers**
Prevent corrosion by replacing original steel plate with aluminum
- **-40 °F temperature operation**
Improve operating temperature to -40 °F by adding tank heaters
- **Seismic rating**
Upgrade breaker to meet seismic zone 3 or 4
- **SF₆ manifold**
Upgrade SF₆ manifold with sampling valve



Maintenance tips

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

Pressure relief valve

Type TCP breakers built before January of 1992 had a “dart” type relief valve that was occasionally sensitive to foreign material. The valve could begin to leak high pressure to low pressure and would not reseal. As a result, the pump motor might run continuously causing breaker damage. The problem is most common in locations where there are large daily temperature changes. The dart valve was changed in January of 1992 to a direct acting “ball” type (part # W43840801) and will fit directly into the cavity of the earlier valve. The new valve uses crushable copper washers as a means of sealing to atmosphere. These washers should be replaced if the cover is removed or the valve adjusted. Use care on torquing the cover and locknut to 13 ft-lbs.

Pressure switches

Hydraulic leaks have been reported at the adapter nipple used to connect the pressure switch to the manifold. This can normally be corrected by disassembling and retightening with Loctite 567-65 hydraulic sealant, which is Teflon filled. Let it harden for 16 hours before reinstalling. New breakers no longer use this pipe nipple but will have a ring seal only. A kit that will convert the pipe thread seal system to the ring system is available (part # 72-182-158-801).

Pressure gauge fitting

Some hydraulic leaks may develop at the back of the pressure gauge fitting. Due to its location, it is difficult to center the seal ring before tightening this fitting. A new usit ring (part # W37000613) has proven very easy to install and effective in solving leaks.

Rusting CT covers

On some type TCP breakers built before June of 1993, we have received reports of rusting on the CT can coverplate, typically in high humidity, salt-contaminated areas such as near sea coasts. The coverplate is a split-ring zinc dichromate-coated steel plate attached and sealed to the porcelain flange and the aluminum CT spinning with the screw and silicone rubber (RTV). This rust can be repaired in the following ways:

1. Light rust – wire brush, touch up with primer and paint.
2. Severe cases – wire brush, coat with Loctite Extend (let dry) and paint.

Note: Touch up paint and Loctite Extend may not stick to the RTV, but should help prevent rusting under the RTV.

At the time of breaker major maintenance, steel plates can also be changed out to aluminum.

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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