Improved employee and environmental safety
• Eco-friendly vacuum interruption with low carbon footprint
• No gas handling equipment required

Preserved investment in existing cubicles
Reduced downtime and minimal changeover time during upgrade

3AH operator features
• Spring charge motor mechanism – lifetime lubricated gear box
• Operating linkages – machine parts versus stamped metal
• Change-out of components – easily accessible
• Vacuum interrupters are maintenance free with available wear indication

3AH vacuum circuit breakers for generator applications
For generator switching applications, the 3AH circuit breakers have been tested according to IEC/IEEE 62271-37-013 for continuous currents up to 12,000 A and short-circuit currents up to 100 kA.

Replacement applications
Siemens replacement GCBs serve all types of generation to increase safety and reliability while reducing expenditures.

Replacement GCB applications include:
• Gas turbines
• Hydro-generators
• Pumped storage
• Concentrated solar
• Biomass

Why upgrade to Siemens vacuum GCBs?
Increased reliability and performance
• Expected life of 30,000 mechanical operations utilizing Siemens 3AH operator
• Up to 50 full-fault interruptions

Reduced operating and maintenance expenditures
• Significantly lower lifecycle cost than gas circuit breakers
• No major maintenance required for 10 years or 10,000 mechanical operations

Siemens replacement generator circuit breakers (GCBs) provide a cost-effective way to upgrade from gas to current vacuum technology while increasing equipment reliability and minimizing downtime.

Siemens offers medium-voltage vacuum replacement GCBs for leading OEM models for voltages up to 24 kV with interrupting capabilities up to 100 kA for both indoor and outdoor applications.

Medium-voltage vacuum replacement circuit breakers for generator applications
Tested to IEC/IEEE 62271-37-013 and suitable for generators up to 400 MW

In many applications, the 3AH is today’s standard for generator switching.
Medium-voltage vacuum GCB overview

Circuit breakers applied to generator switching applications are subject to conditions quite different from those of a normal distribution circuit breaker used in industrial, commercial and utility systems.

Delayed current zeroes

One of the distinguishing characteristics of applications to generator switching is that generators have a limited rotating inertia and slow down during short circuits. This introduces a problem. The AC component is no longer a constant RMS value, but, in fact, decays. This condition is most severe with low inertia machines, such as gas turbines, where the time constant of decay of the AC component can be faster than the corresponding DC decay. Under this condition, the superposition of the DC component on the AC component will result in a potentially long period in which the actual fault current does not pass through zero. This is a problem as circuit breakers, including vacuum circuit breakers, actually interrupt as the current passes through a normal current zero. This phenomenon is referred to in IEEE C37.013 as “delayed current zeroes” and is a condition for which the performance of the generator circuit breaker must be determined by testing.

Transient recovery voltage (TRV)

Another aspect of a GCB application is that the transient recovery voltage (TRV) across the interrupter opens is much greater than for a distribution circuit breaker. For typical 15 kV distribution circuit breakers, the rate of rise of TRV during a symmetrical fault interruption at 100 percent of rating is 0.92 kV/μs. In contrast, for generator circuit breaker applications, the corresponding value is 3.2 to 4.5 kV/μs for systems ranging from 10 MVA up to 400 MVA (based on transformer size).

For an in-depth view of medium-voltage generator applications, please refer to Siemens TechTopics 44, 71, 72 and 73 at www.usa.siemens.com/techtopics.