Grid Solutions

GL309g, GL310g, GL311g, GL312g

SF_6-free Live Tank Circuit Breakers from 72.5 kV to 145 kV

The SF_6-free Circuit Breaker built on 50+ years of expertise

More and more electrical grid operators are taking action against climate change and are setting ambitious goals to cut their greenhouse gas emissions. As one of the major grid original equipment manufacturers, Grid Solutions, a GE Vernova business, is in an excellent position to support them in moving a step closer to reaching their carbon reduction targets by building the transmission infrastructure necessary to connect and transport renewable energy, while avoiding the addition of tons of CO_2 equivalent to their grid. To help achieve this target, we are developing a range of SF_6-free products using our g^3 technology.

Our g^3 solution is a game-changing gaseous alternative to sulphur hexafluoride (SF_6) as an insulating and switching medium in high-voltage equipment. g^3 products feature the same high performance and reliability as SF_6 equipment but with a greatly reduced impact on global warming over their lifetime. The CO_2 equivalent impact of g^3 gas in the equipment is reduced by 99% compared to SF_6. According to a life-cycle assessment (LCA), because g^3 products have the same compact dimensions as SF_6 products, there is no increase in carbon emissions during the product manufacturing process due to the use of additional raw material.

GL309g, GL310g, GL311g and GL312g circuit breakers belong to our g^3 live tank portfolio for applications within networks ranging from 72.5 kV to 145 kV rated voltages. They are designed for outdoor installation. They have the same footprint as SF_6 solutions, which means that they can be installed in place of SF_6 circuit breakers. Their composite insulators allow higher dielectric withstand under pollution and provide higher safety for employees at substation. GL309g, GL310g, GL311g and GL312g feature the latest double-motion interrupting technology and three-pole or single-pole spring-operated mechanisms while benefiting from our latest development in SF_6-free solutions. Moreover, the same monitoring solutions are used as for SF_6 circuit breakers.

The Right Choice for Temperatures down to -30°C

Even under extreme conditions and climates or in highly active seismic areas, customers can rely on live tank circuit breakers made by Grid Solutions. Like SF_6 circuit breakers, GL309g, GL310g, GL311g and GL312g using g^3 gas are designed for temperatures down to -30°C and up to 40°C.

Quality and Testing

Our live tank circuit breakers meet the latest versions of national and international standards, such as IEC 62271-100. The entire development and production procedures are fully compliant with the latest ISO 9001, ISO 14001 and OHSAS 18001 quality standards.

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The Path to Decarbonization

- GL SF_6-free Live Tank circuit breakers are part of GRiDEA, our portfolio of solutions designed to accelerate the decarbonization of the grid
- Contribution to GWP of the gas embedded in the circuit breaker reduced by 99% using g^3 gas instead of SF_6

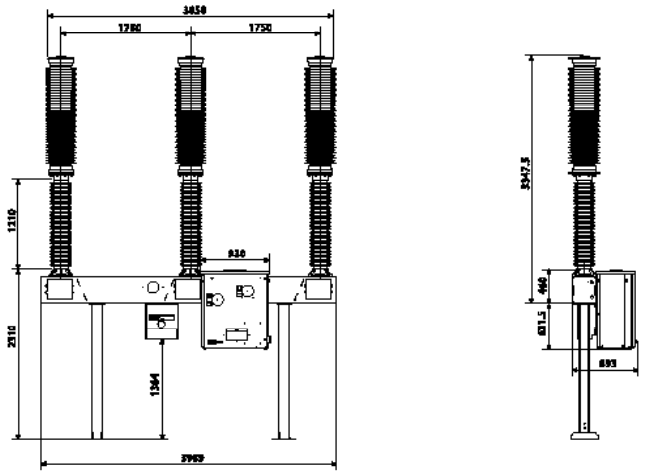
High Safety Level

- Pressure relief device prevents from injuries and damages in case of over-pressure within the circuit breaker
- Similar pressure range as SF_6 circuit breakers
- Support frame design ensures personnel cannot be injured by cinematic moving parts
- Dedicated tools available to assemble and disassemble circuit breaker parts in safe condition
- No X Ray emission

Easy Installation and Light Maintenance

- Spring-operated mechanism preset at factory - no adjustments necessary during installation and commissioning
- g^3 circuit breaker pre-filled at factory before shipping
- Similar fill-in and same top-up procedures as SF_6 circuit breakers
- g^3-specific fill-in valve design to ensure proper use of g^3 gas
- Specific tools for leakage detection and gas quality checks at site
- Easy access to the molecular sieves and simple inspections
- Two-stage transducer densimeters are within easy reach, on the front side of the circuit breaker, for periodic/regular check

Dimensions



(Dimensions in mm)

Specifications

BREAKER TYPE	GL309g, GL310g, GL311g, GL312g
Switching and insulating medium	g^3 gas
Rated voltage	72.5 kV to 145 kV
Rated frequency	50 Hz
Rated normal current	up to 3150 A
Rated short-circuit breaking current	up to 40 kA
Rated short-circuit making current	104 kA
Rated duration of short-circuit	3 s
First Pole to clear factor	1.3 / 1.5
Opening time	27-33 ms
Break time	60 ms
Closing time	<100 ms
Average ambient temperature	-30 °C up to +40 °C
Pollution level*	25-31 mm/KV
Design altitude*	1,000 m.a.s.l.

**Standard values according to IEC; Higher design altitudes available on request*

Dimensions (mm)	GL309c	GL310c	GL311c	GL312c
Voltage level	72.5 kV	100 kV	123 kV	145 kV
Phase distance	1050/1300	1300/1750	1750	1750*
Column height	710	1210	1210	1210

**Other distances available on request*

Components

- Interrupter chamber with self-blast system and reliable double motion technology
- Reliable spring-operated mechanism with position indicator clearly visible from outside
- Pressure-relief system for passive protection of substation and personnel
- Field-proven, temperature-compensated density monitor with two-stage transducer and three-color dial
- Easy access to the g^3 filling connection
- g^3 non-return (check) valve on each pole column
- Opening and closing spring in drive
- Steel support frame design prevents corrosion issues and provides high safety for employees and high protection against environmental ingress (e.g., ice)
- Optimum designed cinematic between mechanism and interrupting chamber to increase mechanical energy efficiency and mechanical moving parts reliability

Technical Characteristics

- **Spring-operated mechanism / degree of protection:** FK 3-2 / IP 55
- **Rated operating sequence:** O-0.3s-CO-3min-CO resp. CO-15s-CO
- **Rated supply voltage:** From 24 V up to 250 V dc/ac

Product Options

- **CBWatch monitoring system**

Gas Data*

The functioning of this equipment relies upon SF_6 or a gas mixture based on CO_2/O_2 and 5% of an additive, C_4F_7N (also known as C4-FN or Iso-C_3F_7CN), a fluorinated greenhouse gas, which helps preserve dimensions and performance equivalent to those of SF_6 equipment while reducing the gas carbon footprint.

	SF_6	g^3	
		C_4F_7N additive**	g^3 gas mixture
Average mass of gas/mixture in the equipment (kg)*	10	0.8	5.5
GWP_{100} of gas/mixture (CO_2-equivalent)	24,300	2,750	419
CO_2-eq of gas/mixture in the equipment ($t_{co2\text{-}eq}$)*	243	2.3	2.3

**For information purposes only. Values are given for the 145 kV GL312g. It can vary a bit depending on the equipment considered.*

***This component's physical properties are essential to g^3.*

For more information, visit
gevernova.com/grid-solutions

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English
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