HIGH VOLTAGE PRODUCTS | GAS-INSULATED SWITCHGEAR

ELK-04 up to 170 kV
Modular solution for reliable energy supply
ABB and 50 years of gas-insulated switchgear innovation

Continuing more than a 125-year history of innovation, ABB today is writing the future of industrial digitalization and driving the Energy and Fourth Industrial Revolutions. ABB operates in more than 100 countries with about 147,000 employees.

ABB offers a wide range of high-voltage products up to 1200 kilovolt (kV) that help enhance the reliability, efficiency and quality of power in transmission and distribution grids, power plants and industries while minimizing environmental impact.

In a power system, switchgear controls, protects and isolates electrical equipment to boost the reliability of power supply. With gas-insulated switchgear (GIS) technology, key components including breakers, switches, contacts and conductors are protected with insulating gas. ABB has always been and continues to drive innovation in GIS technology in ratings, operations, switching technology, smart control and supervision, and compactness.

ABB provides a complete range of GIS for all ratings and applications from 72.5 kV to 1200 kV matching current and future requirements for modern switchgears. As a market leader in high-voltage GIS technology, ABB has a global installed base of more than 35,000 bays.

GIS is a compact metal-encapsulated switchgear consisting of high-voltage components such as circuit-breakers and disconnectors.

GIS type ELK-04 is the ideal solution for reliable energy supply up to a rated voltage of 170 kV. Based on a few building blocks with standardized dimensions, its space saving and modular design offers a small footprint and easy operation at high performance ratings. The ELK-04 offers high level of flexibility for optimizing substation layouts.
ABB is a pioneering technology leader that works closely with utility, industry, transportation and infrastructure customers to write the future of industrial digitalization and realize value.
ELK-04 up to 170 kV
Modular solution for reliable energy supply

ELK-04 is designed to reduce complexity and lifecycle costs, while offering outstanding flexibility for optimizing layouts.

Benefits
- Well proven and reliable technology
- High performance ratings up to 170 kV
- High availability
- Compact footprint
- Highest product quality
- Ideal solutions for all applications
- Low environmental impact
- Maximum flexibility
- Advanced features for digital substations
Well proven and reliable technology
ELK-04 has seen continuous upgrades and improvements since its introduction in the nineties. All functional modules are type tested in independent laboratories according to international standards (IEC/ANSI).

High performance ratings
The combination of innovation and highest product quality have given ABB's GIS international reputation.
- ELK-04 for up to 145 kV, 3150 A and 40 kA
- ELK-04 for up to 170 kV, 4000 A and 63 kA

High availability
A segregation concept separates gas-tight compartments, which limits impact on other modules to ensure highest availability during maintenance and repair.

Highest product quality
Fully assembled and tested in ABB’s state-of-the-art manufacturing facilities that utilize flow production system according to highest quality manufacturing procedures. All shipping units are produced and tested under stringent supervision.

Compact footprint and short installation time
Three-phase encapsulation based on a few building blocks with standardized dimensions. Its space saving and modular design offers a small footprint and easy operations. Factory assembled, fully tested, and shipped as one bay with secondary cabling and local control cubicle (LCC) in a container instead of many assembly units. This provides reduced installation and commissioning time.

Ideal solutions for all applications
The modular system assures maximum flexibility in switchgear configuration and is suitable for indoor and outdoor installation. An ideal solution when reduced space availability is a key selection criterion. Moreover, the ELK-04 can be integrated with all primary and secondary equipment in a container or a prefabricated housing.

Low environmental impact
ELK-04 is designed to enhance eco-efficiency. Reduced SF₆ insulation gas due to optimized and lean enclosures. The reduced amount of sealing, flange connections and support structures makes efficient use of resources by reducing thermal losses and infrastructure costs. The use of less packing material and streamlined transportation lower your carbon footprint.

Maximum flexibility
Full sets of standardized connection elements allow for all possible configurations and building optimization, including integration into existing buildings, providing utmost flexibility in the shortest possible delivery time, while reducing operating and maintenance costs at the same time.

Advanced features for digital substations
ELK-04 can be equipped with monitoring, measurement, control, protection and communication features for smooth integration into substation automation system using IEC 61850. Point-on-wave switching is available for multiple applications using ABB’s Switchsync controller portfolio for highest operation precision and flexibility.
Circuit-breaker with operating mechanism
See page 8

Local control cubicle (LCC)
See page 12

Disconnector/earthing switch (busbar)
See page 9
Circuit-breaker and operating mechanism

Reliable, well-proven technology
At the core of the GIS is the circuit-breaker with self-blast interrupter technology. The three-phase circuit-breaker is equipped with one self-blast interrupter unit per pole, providing a two-stage blast volume. They require a low amount of switching energy and minimum maintenance. During overhauls, the interrupter unit can be removed easily from the enclosure or be replaced by a new unit.

Compact operating mechanism is available with single- and triple-pole operation and attached to the interrupting unit.

Point-on-wave switching provides the highest operating precision for the operating mechanisms of circuit-breakers.
Convenient operations and operational safety

The disconnector/earthing switch combines two functions – a disconnector and a maintenance earthing switch – in one common enclosure, sharing one common operating mechanism.

The modular design provides highest flexibility with lowest number of parts.

Manual operation of the disconnector/earthing switch and the fast-acting earthing switch is possible via crank handle.

The disconnector/earthing switch module is available with a fast disconnection function for higher bus transfer current switching ratings.

The fast-acting or make-proof earthing switch safely switches against full short-circuit current. Spring operated mechanism ensures very fast switching.
Voltage and current transformers

**Metering, control and protection functions**
The maintenance-free voltage and current transformers provide highly reliable metering, control, and protection functions. Used for system protection that offers years of trouble-free service even for heavy-duty applications.

**Non-conventional instrument transformer (NCIT)**
Provides additional safety, late customization, high availability, ease of engineering and maintenance based on Rogowski coils. Depending on the protection concept, they can be arranged in front or at the back of the circuit-breaker’s interrupting unit. While current transformers are normally integrated into the flanges of the circuit-breaker enclosure, separate enclosures are also available.
Maximum flexibility
Our versatile terminal and connecting elements enable customization to fit project requirements. A compensator module absorbs heat expansion and vibrations during operation. Lateral dismantling units guarantee hassle-free assembly and dismantling.

Ratings and discharge classes can be tailored in the gas-insulated metal-oxide surge arresters to limit switching and lightning over voltages.

A complete range of connecting elements for peripherals such as SF₆-air bushings, cable terminations and transformer connections are available. Lightweight SF₆-air bushings are maintenance-free with self-cleaning silicon sheds.
Advanced features to enable digital substations

The local control cubicle (LCC)
The LCC is integrated in the ELK-04, factory-tested and shipped as one transport unit. This reduces installation and commissioning time to a minimum and eliminates errors during site installation.

All monitoring features are integrated into the LCC to provide guided local control of all motorized switching objects via HMI of ABB’s Relion® series bay control IED, or via conventional control mimic. ABB’s Relion® series of protection and control IEDs allows flexible combination of control and protection functionality in one device.

Benefits
• Integration into substation automation systems, using IEC 61850 interface to non-conventional instrument transformers (NCIT) via IEC 61850-9-2LE process bus
• All monitoring features are integrated into the local control cubicle to provide guided local control of all motorized switching objects via HMI of ABB’s Relion® series bay control IED, or via conventional control mimic. ABB’s Relion® series of protection and control IEDs allows flexible combination of control and protection functionality in one device
• Modular Switchgear Monitoring (MSM) supervises SF6 density within the GIS
• Primary and secondary system status supervision and alarm visualization
• Station wide interlocking and double-operation interlocking is implemented via fail-safe IEC 61850 GOOSE, or via parallel wiring
• Point-on-wave controller PWC600 for highest operation precision
Configurations

01  Double busbar arrangement ELK-04, 145 kV
02  Double busbar arrangement ELK-04, 170 kV
03  Double busbar arrangement: Circuit-breaker and feeders with 3150 A (ELK-04, 145 kV) busbar with 4000 A (ELK-04, 170 kV)
04  H-arrangement ELK-04, 145 kV
05  1½-breaker arrangement ELK-04, 145 kV
Dimensions

ELK-04, 145 kV
(Dimensions in mm)

ELK-04, 170 kV
(Dimensions in mm)
# Ratings

<table>
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<th>ELK-04, 145 kV</th>
<th>ELK-04, 170 kV</th>
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<td>kV</td>
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