



Product Brochure

Gas-insulated Switchgear ENK

The Innovative System up to 72.5 kV

From Tradition into the Future

ABB - to the benefit for our customers

ABB is a world leader in gas-insulated switchgear technology with more than 40 years of experience in development, production, engineering and project handling. ABB offers gas-insulated switchgear for voltage ratings from 52 up to 1100 kV.

The gas-insulated switchgear of type ENK represents the ideal solution for a reliable and environmentally friendly energy supply up to a rated voltage of 72.5 kV, a rated normal current up to 2500 A and a rated short circuit current up to 40 kA. The innovative design requires only a minimum of SF₆-gas for insulation of parts exposed by high voltage and as quenching medium to interrupt short circuit currents. In addition, the volume optimized and the standardized design guaranty minimum material and energy effort from the sourcing of raw material up to the final installation.

Since market launch in the year 1980 the gas-insulated switchgear of type ENK provides worldwide a valuable contribution to a reliable energy supply. By that, ENK was continuously further developed during the last years. Therefore the newest ENK series is an intelligent combination of proven and well known technology from ABB. It combines the advantages and the experience of the former ENK series and the product of type ELK-04.

ENK meets a wide variety of technical requirements with a limited number of modules. This applies for all primary technology components (parts under high voltage) as well as for all secondary technology components. Transport, installation and commissioning can be arranged easily and fast due to the pre-manufactured and pre-tested complete bays and the innovative plug-in technology.

Due to the standardized design ENK offers a well-proven versatile substation concept which is open for innovative further developments towards a modern and future proof technology for future SMART grid demands. ENK represents the most economic solution over the entire life-cycle of the substation.

As one of the world's leading engineering companies, we help our customers to use electrical power more effectively, to increase their industrial productivity, to cut their energy consumption and achieve sustained reductions in their environmental impact.



Switchgear Concept

ENK – the design for the future

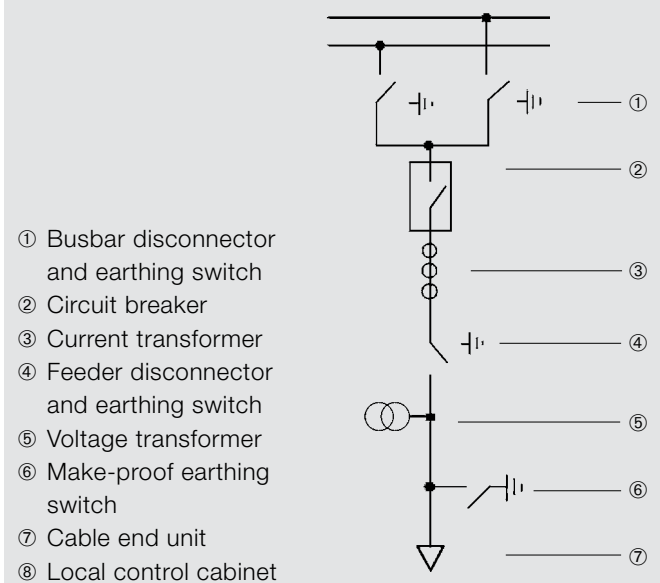
To enable a lean engineering, manufacturing and installation process ENK is composed only by a minimum number of highly integrated functional modules. A reduced order-to-delivery time, commissioning effort and time, low spare part handling and an environmentally friendly design is beneficially for our customers:

- Minimum content of SF₆-gas (up to 50 % less than other comparable products)
- Plug-in technology resulting in drastically reduced handling effort at site
- Standardized design
- Operating mechanisms are accessible from front panel
- Current transformers arranged outside the gas compartment
- 3-phase encapsulated technology
- Compact, low power losses
- Intelligent secondary technology to meet future SMART grid demands
- Shipment of complete, factory tested bays

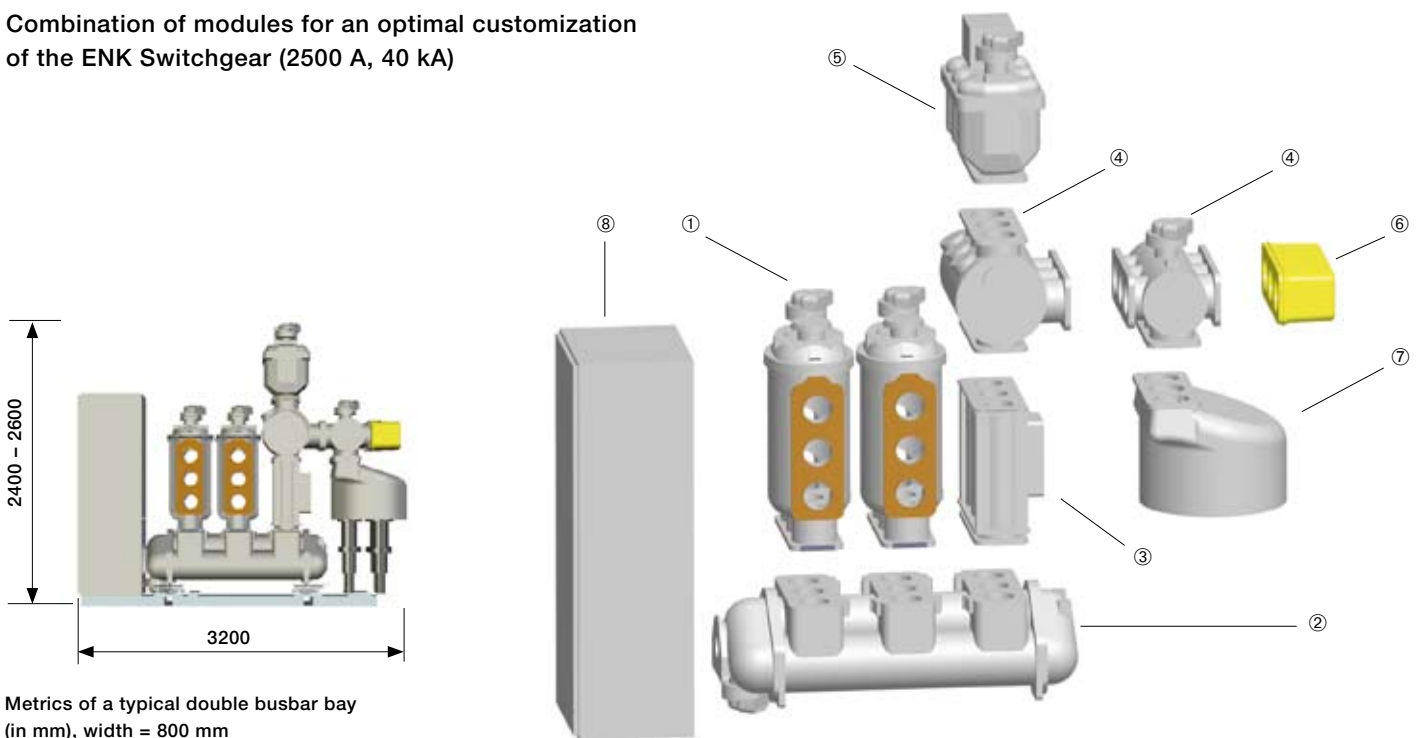
The complete pre-assembled and pre-tested bay together with the local control cabinet forms a rugged and freestanding shipping unit for mounting on a simple concrete foundation. This plug-in and switch technology is unique in the high voltage gas-insulated switchgear technologies.

ENK – the innovative and environmentally friendly solution to meet the requirements of the future.

Single line of a double busbar bay



Combination of modules for an optimal customization of the ENK Switchgear (2500 A, 40 kA)



Functional Modules

Circuit breaker

The horizontal arranged circuit breaker is a highly standardized module. It fits for all layouts, for all feeder bays and for all couplers. All connectable modules are fixed with plug-in barrier insulators. Due to the arrangement of the interrupters in a triangle form the conductors are as short as possible. In addition, the innovative form of the circuit breaker enclosure reduces the SF₆ content to a minimum.

The circuit breaker is equipped with one interrupter unit per pole. This common ABB design is applied in several other high voltage applications, it is therefore multifold proved and together with the hydromechanical spring operating mechanism of type HMB-1 very reliable. The current transformers are arranged outside the gas compartment. They can be placed either on the feeder side or on the busbar side.

The hydromechanical spring operating mechanism of type HMB is an integrated part of the local control cabinet, easy accessible from the front.

Disconnecter and earthing switches

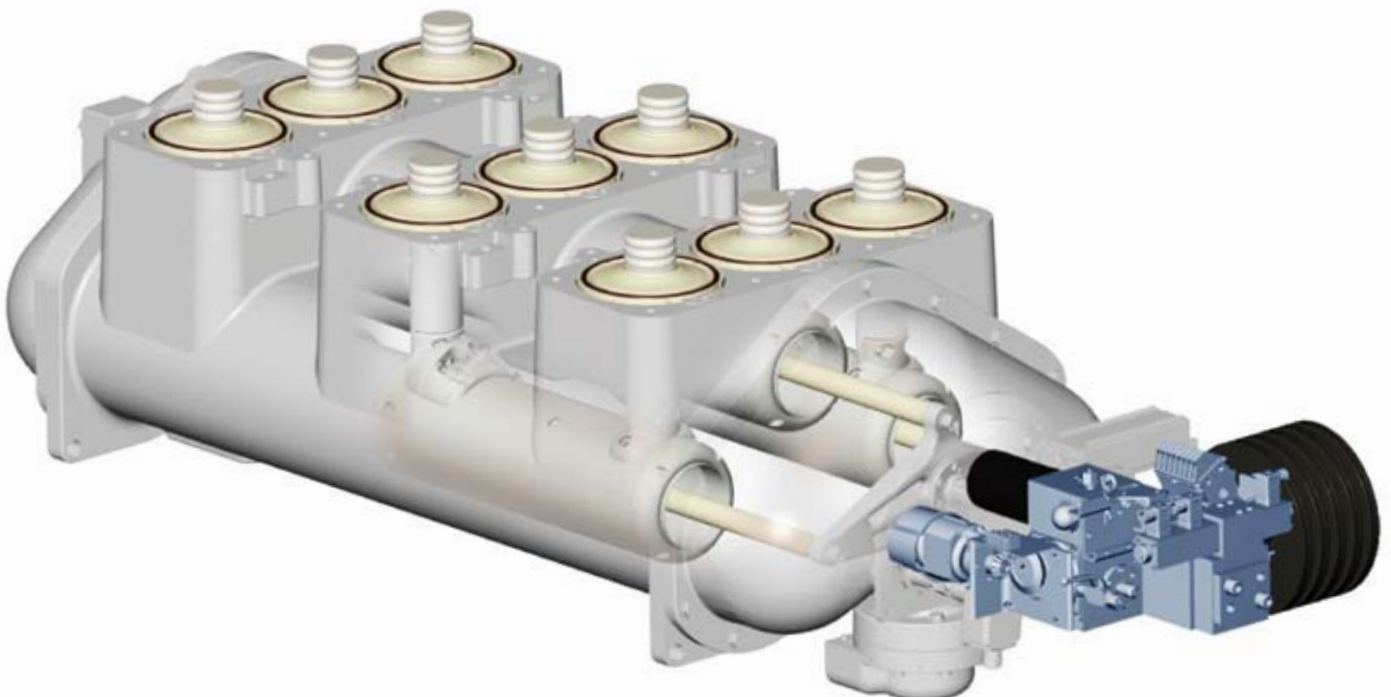
Two different types of enclosures are available to integrate the combined disconnector and earthing switch into the building block system. The busbar module of the combined disconnector and earthing switch contains the flat busbar conductors and in addition thereto a transversal arranged three position switch. The innovative oval design with the plug-in connectors guarantees a volume optimized arrangement and a fast coupling of the different bays at site.

The standardized operating mechanism of the disconnector and earthing switch modules contains all components needed to ensure safe mechanical movement as well as interlocking.

Make-proof earthing switch

The make-proof earthing switch can be placed on the feeder side or on the busbar side. The module with linear arranged poles is equipped with a spring operating mechanism to ensure very fast switching.

Standardized circuit breaker with operating mechanism of type HMB



Local control cabinet

All electrical components for control, signalization, interlocking etc. are located within the local control cabinet. In addition, as it is usual in medium voltage equipment, the local control cabinet contains the operating mechanisms for the disconnector and earthing switches as well as the circuit breaker operating mechanism. Hence, these operating mechanisms are accessible from the front panel. Either the conventional or the digital control technology is completed by a modular digital monitoring system. This system operates as an add-on to the existing control technology and does not interact with the switchgear protection.

The communication of this modern, future proof control and monitoring system applies the new standardized protocol IEC 61850. However, other communication protocols like IEC 60870/5-103, Modbus or Profibus are supported as well. Therefore ENK provides the right and flexible "plug" for the future SMART grid already today.

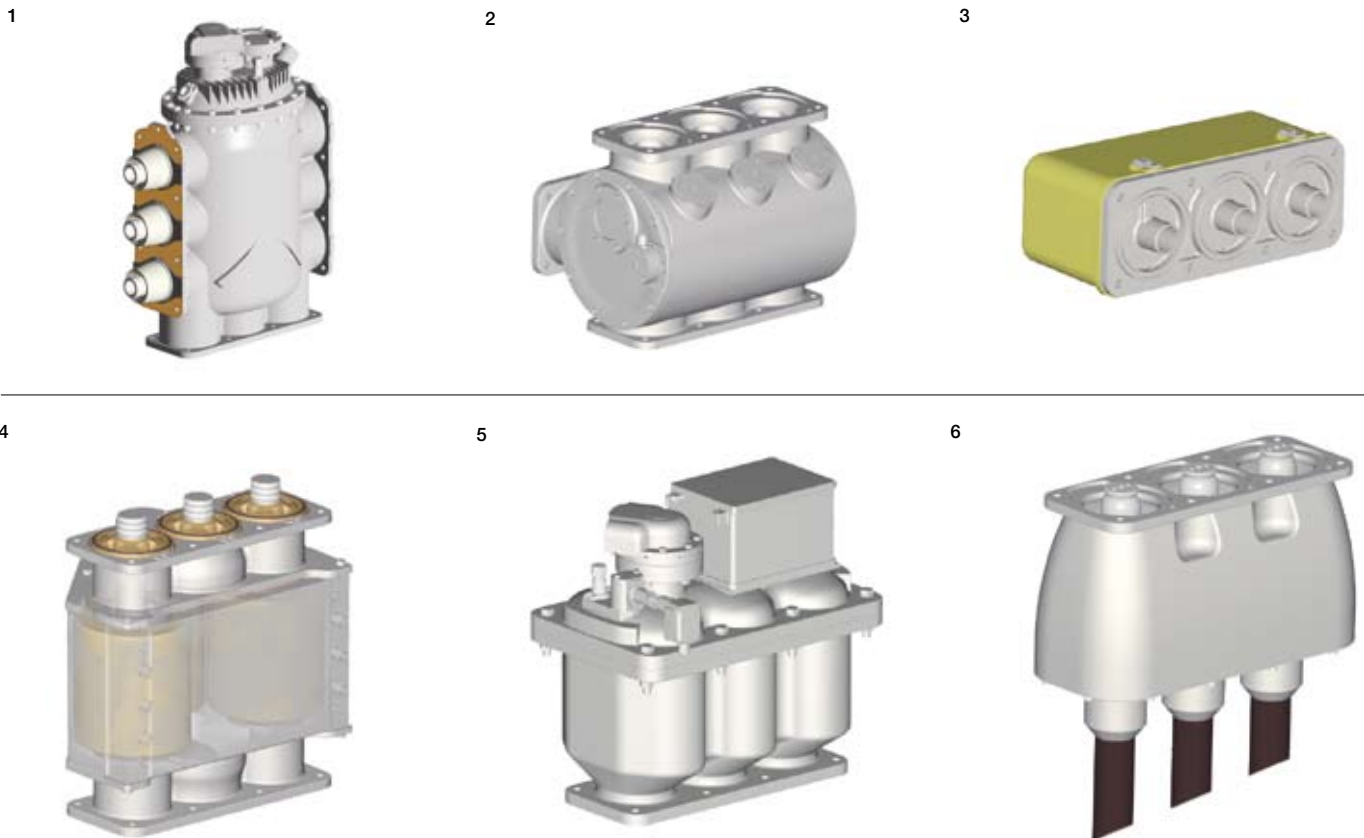
Current and voltage transformers

The innovative design of the ENK allows the easy integration of conventional inductive current and voltage transformers as well as current and voltage sensors. All types are pluggable. This guarantees a high flexibility during the project execution.

Other completion modules

In addition to the functional modules described, ENK comprises of course all other modules, required for a typical substation layout. These are e.g. different versions of the cable end units, gas-to-air bushings and adapters.

1 Busbar disconnector and earthing switch | 2 Feeder disconnector and earthing switch | 3 Make-proof earthing switch | 4 Current transformer
5 Voltage transformer | 6 Cable end unit (Plug-in cable connection)



Layouts and Bay Arrangements

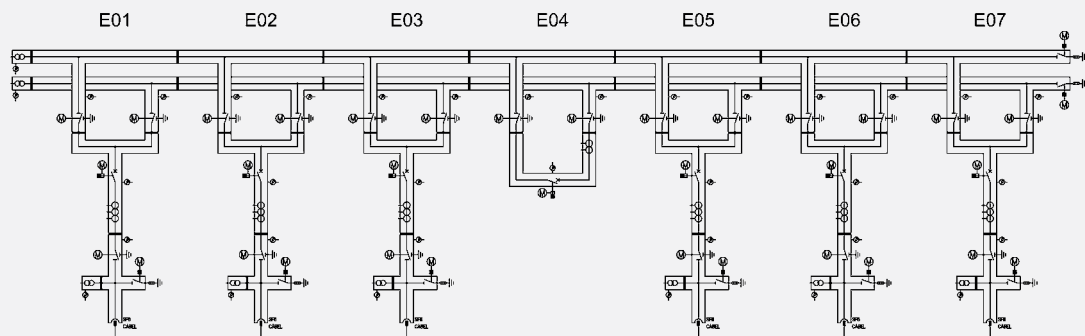
Combination of modules

Because of the modular and flexible design with standardized modules double and single busbar arrangements can be realized in an optimum way. ENK switchgear is shipped as complete factory tested package unit, filled with SF₆-gas at atmospheric pressure. Erection of ENK itself consists mainly of setting up, aligning and coupling the individual bays to form a complete in-line arrangement. It includes assembly of the busbar sections, connecting up the auxiliary supplies and terminating the bays to the grid either through cable end units or gas-to-air bushings.

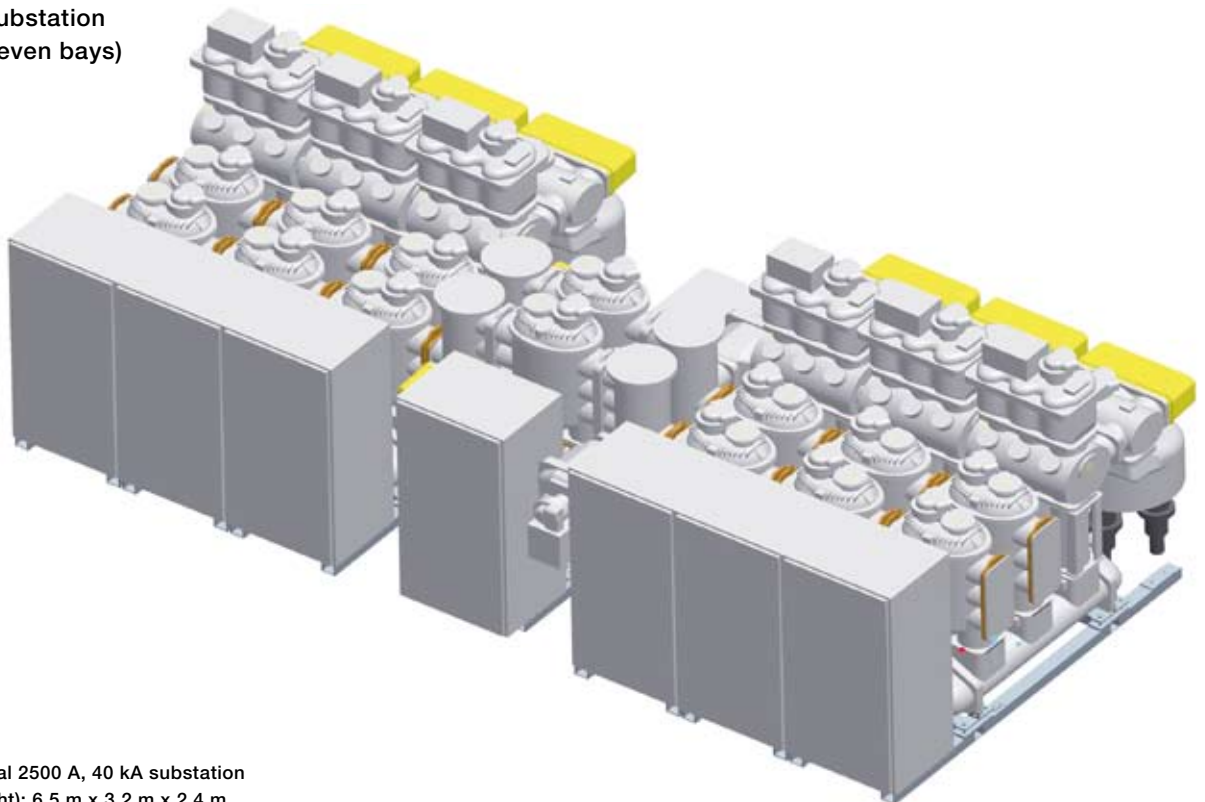
After completing the erection at site, the bays are filled up with SF₆-gas only until the gas-filling pressure is reached. The sum of the advantages are reflected in an effective reduction of the efforts for site erection and commissioning.

Compact dimensions together with numerous outstanding advantages – ENK is the right future-proof decision for substations up to 72.5 kV, 2500 A and 40 kA.

Gas scheme and single line for double busbar arrangement



ENK for 72.5 kV substation (Double busbar, seven bays)



Dimensions for a typical 2500 A, 40 kA substation
(Width x Depth x Height): 6.5 m x 3.2 m x 2.4 m

Technical Data

Rated values according to IEC		
Operating voltage	kV	72,5
Operating frequency	Hz	50/60
Lightning impulse withstand voltage		
against earth	kV	325
across isolating distance	kV	375
Power frequency withstand voltage		
against earth	kV	140
across isolating distance	kV	160
Normal current	A	1250–2500
Peak withstand current	kA	80–104
Short circuit breaking current	kA	31.5–40
Minimum insulating gas pressure at 20 °C	kPa	420
Minimum quenching gas pressure at 20 °C	kPa	420
Permissible ambient temperature	°C	-30/+40
Encapsulation		three-phase
Location of installation		indoor
Expected lifetime		> 50 years
Dimensions	m	0.8 x 3.2 x 2.4
		(for single/double busbar bay with integrated local control cabinet and voltage transformer)
Weight	kg	approx. 1900 (for single busbar bay)
Circuit breaker operating mechanism		hydromechanical, with energy storage in springs

The above data should not be understood as limiting values. Further data upon request.

Contact us

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