Outdoor Circuit Breaker – Live Tank

Model EDF SK

ABB Power Technologies – bringing power to the people

ABB's Power Technologies Division offers electric, gas and water utilities as well as industrial and commercial customers a wide range of products, system and service solutions for power generation, transmission and distribution including complete electrics, generation plants, utility automation and bulk power transmission.

ABB's power technologies cover the entire voltage range including indoor and outdoor circuit breakers, air and gas insulated switchgear, disconnectors, capacitor banks, reactive power compensators, power and distribution transformers as well as instrument transformers.

Ongoing research and development and constant innovation ensures that ABB products, systems and solutions remain at the cutting edge of technology and at the same time are safe to use and environmentally friendly.

The ABB advantage

- ✓ 120 years of pioneering technology
- ✓ Unparalleled domain competence
- ✓ Vast global experience
- ✓ Total solution provider
- ✓ Large installed base
- ✓ In-depth knowledge of international & local electrical and safety standards
- ✓ Environment-friendly technologies

SF6 Circuit breaker EDF SK with Autopuffer

The EDF SK is a live tank SF6 autopuffer circuit breaker designed for 36 – 84 kV range and with a rated breaking current of 25 – 31.5 kA.

In the most common version, the circuit breaker is operated with one operating mechanism. In case of single pole operation each pole is supplied with its own operating mechanism.

Main features and advantages

The EDF SK circuit breaker is based on the latest developments in arc research and offers the following advantages:

- Restrike-free interruption of capacitive currents due to high inherent dielectric strength of SF6 gas and optimised contact movement
- Low over-voltages when switching inductive currents due to optimum quenching at current zero
- High dielectric strength even when SF6 gas is at atmospheric pressure due to wide contact gap
- Low operating energy - reduced mechanical stress on breaker and low reaction forces on the foundation
- Low noise level - suitable for installation in residential areas
- High making capacity even in the case of parallel connected capacitor banks
- High seismic capability due to optimised pole and structure design
- Easy installation and commissioning. Each circuit breaker is pre-tested and shipped to site in the form of few easily inter-connected units

Rated voltage	36 - 84 kV
Rated current	up to 2500 A
Rated breaking current	25 - 31 kA
Rated frequency	50 and 60 Hz
Installation	Outdoor

Design

The circuit breaker pole includes the breaking unit, the porcelain support insulator and the pole linkage housing. The three poles of the breaker are mounted on a common support frame with the operating mechanism autopuffer arranged below the same frame.

The three breaker poles have a common gas system. For operations up to -30^0 C, the system is filled with SF6 gas at a pressure of 0.7MPa (abs), at a temperature of $+20^0$ C.

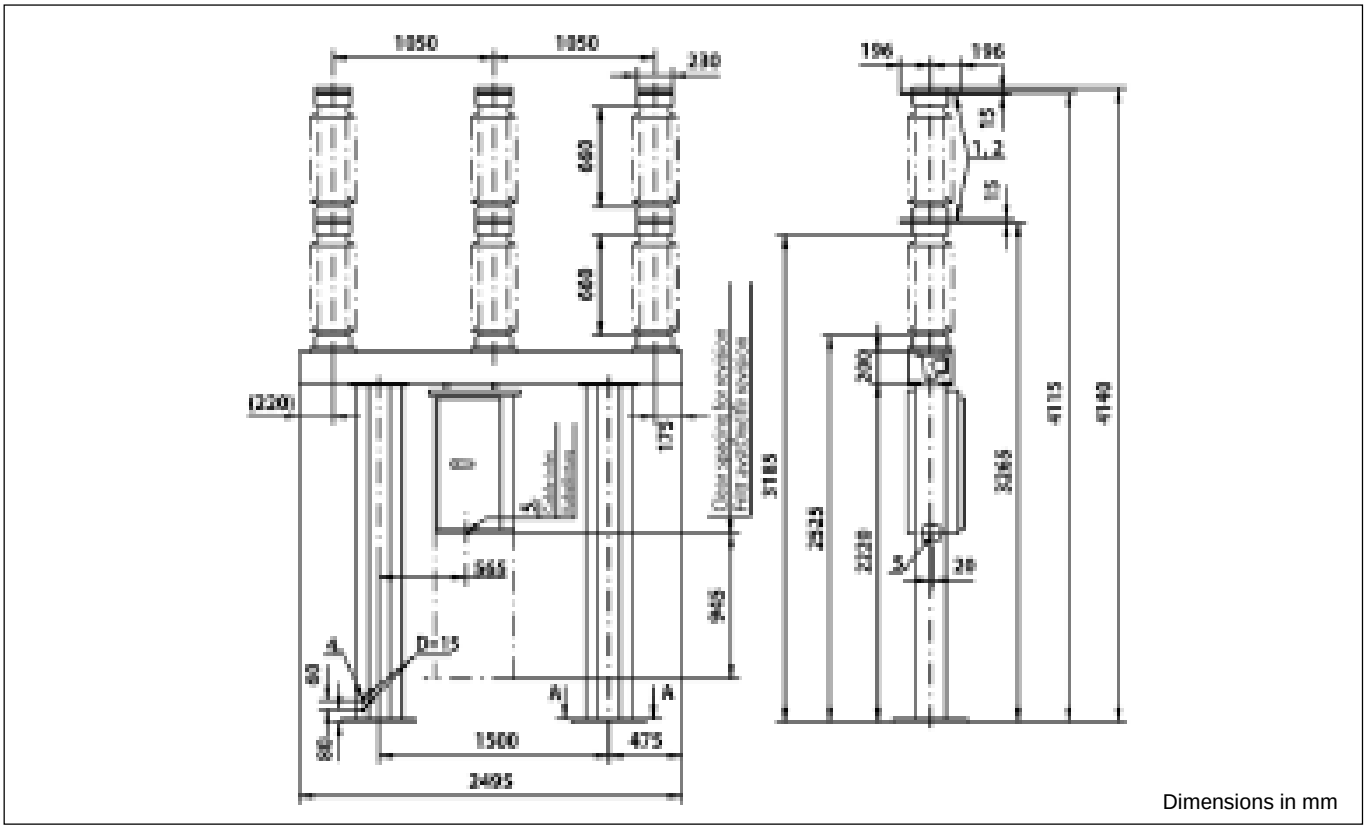
For applications where temperatures is as low as -50^0 C the common gas system is filled with a mixture of SF6 gas and Nitrogen gas. When the SF6 and Nitrogen gas mixture is used the breaking capacity is normally reduced one IEC step i.e. from 31.5 to 25kA.

The operating reliability and service life of an SF6 circuit breaker is dependent on the maintenance of SF6 gas pressure and neutralisation of the effects of moisture and decomposed products in the gas. The above is achieved by:

- Double O-rings of Nitrite rubber used for sealing purposes with excellent results.
- Each breaking unit is provided with an absorber that absorbs moisture and gaseous decomposed products.
- Interruption capability is a function of SF6 gas density. A density monitor consisting of a temperature-independent pressure switch is provided in the circuit breaker.
- Temperature-dependent pressure variations of SF6 gas are compensated by hermetically sealed reference gas volume. An alarm signal is triggered when pressure drops due to leakage.

Dimensions

EDF SK 1–1, 36 to 84 kV, 2 column stand, 3 pole operation



Dimensions in mm

Operating mechanism, type FSA

The circuit breaker is operated by a motor charged spring operating mechanism, which is installed in a splash-proof aluminium sheet cubicle.

- One FSA is used for three-pole operation.
- Three FSAs are used when single pole operation is required.

Options

- Silicon rubber insulators (Max. rated current 2000 A).
- Grey insulators.
- For installation of current transformers, type IMB:
  - Brackets for IMB.
  - Primary connection between CT and the EDF SK.
- Special connectors (standard is flat terminals):
  - Bolt 40/125 mm, tinned copper.

Transportation and erection

The EDF SK circuit breaker is transported as a complete unit filled with SF6 gas to a slight overpressure. As the circuit-breaker is assembled and routine tested in the factory, the erection work at site is minimal and can easily be done in a day.

Filling of the SF6 gas to specified working pressure can be facilitated by using the following pressurising equipment:

- A special control valve for connection of SF6 gas bottle, and a 20 m long hose with connector.
- Complementary control valve for connection to Nitrogen gas (bottle for mixed gas filling).

Please note that deviation for gas connection may occur based on local standards.

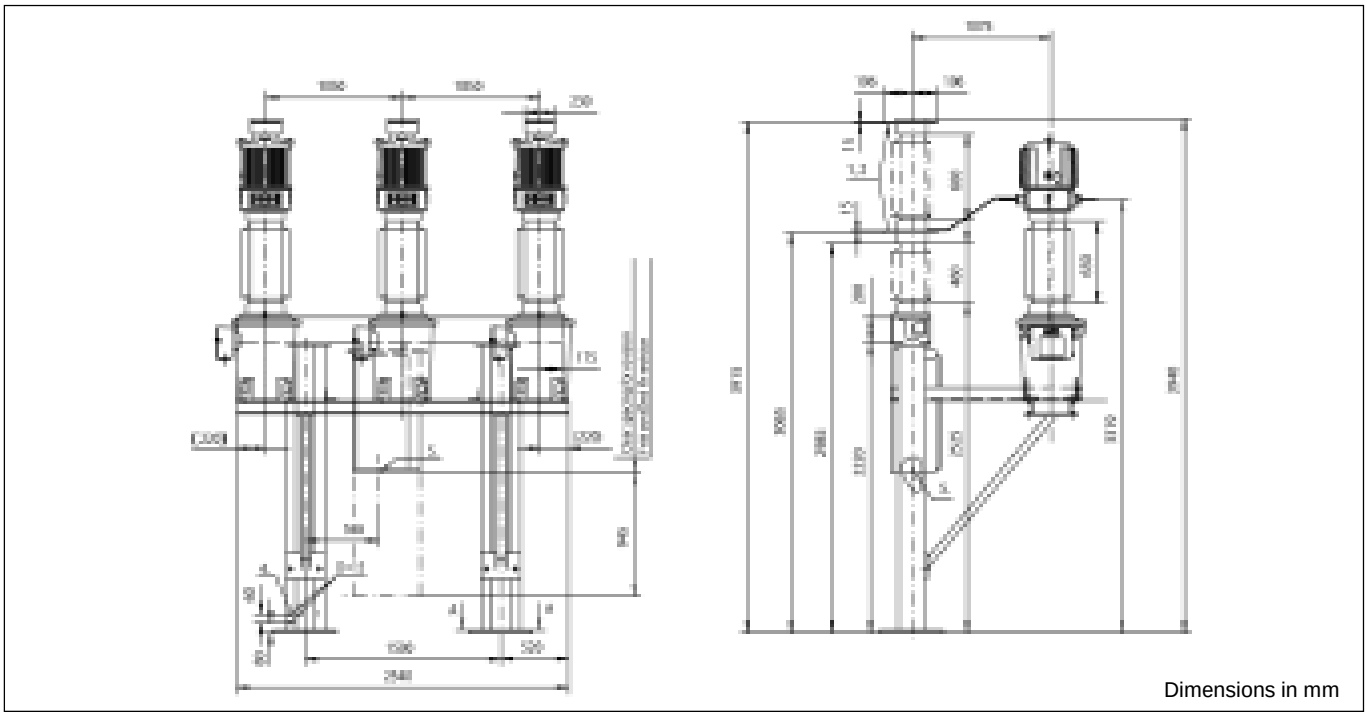
Quality and sustainability

To ensure consistent and high product quality all components are subjected to stringent quality tests prior to manufacturing. To guarantee trouble-free functioning, comprehensive electrical and mechanical routine tests are carried out on the poles and operating mechanism after the product is fully assembled.

All ABB India manufacturing facilities are ISO 9001 and ISO 14001 certified.

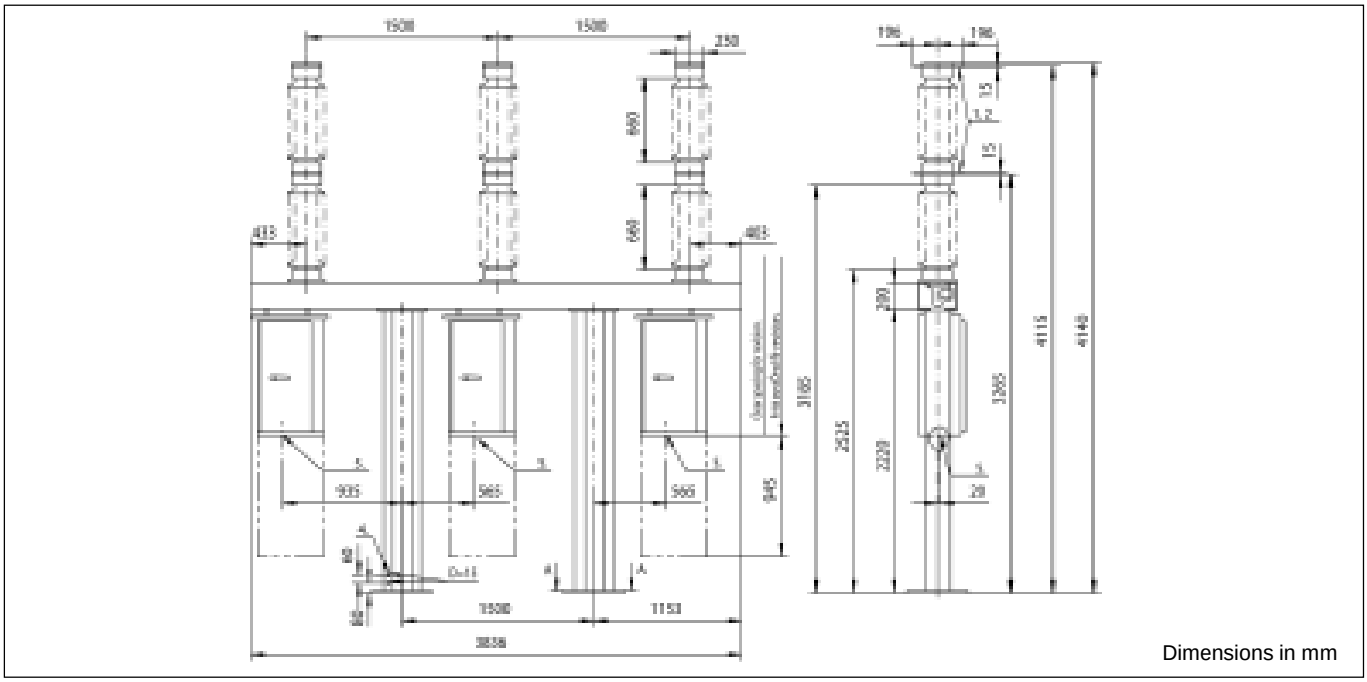
Dimensions

EDF SK 1-1 36 to 84kV 2 column stand 3 pole operation



Dimensions in mm

EDF SK 1-1 36 to 84kV 2 column stand 1 pole operation



Dimensions in mm

Shipping data

Type	Number of cases	Total Volume m ³	Total Gross weight kgs	Total Net weight kgs
EDF SK 36 - 84 kV three pole operation, incl. one op. mechanism and support columns	2	3.8	1123	873
EDF SK 36 - 84 kV single pole operation, incl. three op. mechanism and support columns	2	4.9	1490	1190

Technical data

Values complying with IEC 62271-100 (50 Hz) and ANSI C37 (60 Hz)

	EDF SK 1 – 1		36	52	72.5	84
Rated Voltage	IEC	kV	36	52	72.5	84
	ANSI	kV	38		72.5	84
Power frequency withstand voltage						
– 1 min dry	IEC	kV	70	95	140	140
– 1 min wet	IEC	kV	70	95	140	140
– 1 min dry	ANSI	kV	105		160	
– 10 sec wet	ANSI	kV	105		140	
Lightning impulse withstand voltage (LIWL)	IEC	kV	170	250	325	325
– Full wave 1,2/50 µs	ANSI	kV	200		250	
– Chopped wave 2 µs	ANSI	kV	258		452	
– Chopped wave 3 µs	ANSI	kV	230		402	
Creepage distance to earth[1) 2)]		mm	1390	1390	1995	1995
Creepage distance across break[1) 2)]		mm	1995	1995	1995	1995
Rated normal current		A	2500	2500	2500	2500
Rated breaking current [3)]	at 50 Hz	kA	31.5	31.5	31.5	25
	at 60 Hz	kA	25	25	25	-
First pole to clear factor				1.5		
Making current / peak [3)]		kA	62.5/79.0	62.5/79.0	62.5/79.0	62.5
Duration of short circuit		s		3		
Closing time		ms		60		
Opening time		ms		35		
Total break time		ms		60		
Dead time		ms		300		
Rated reclosing time, 60 Hz	ANSI cycles			20		
Rated operating sequence	IEC and ANSI			O – 0.3 sec – CO – 3 min – CO		
	ANSI			CO – 15 sec – CO		

1) Other values on request. 2) Tolerance according to IEC 233. 3) 100% SF6 gas.

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