



Outdoor live tank SF₆ circuit breaker Type OHB for 24/36/40.5 kV applications

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The Power Technologies business offers electric, gas and water utilities as well as industrial and commercial customers a wide range of products, systems and services for power generation, transmission and distribution. ABB's turnkey solution capabilities in the sector range from bulk power transmission, turnkey substations and complete electrification to utility automation and distribution systems.

The product offering covers a wide spectrum of technologies across the entire voltage range including indoor and outdoor circuit breakers, air and gas insulated switchgear, instrument transformers, disconnectors, capacitor banks, reactive power compensators, power and distribution transformers and a range of power distribution products like Compact Secondary Substations (CSS) and Ring Main Units (RMU).

Advantage ABB

- 120 years of technology and innovation
- Unparalleled domain competence
- Vast global experience
- Total solution provider
- Large installed base
- Environment-friendly technologies

Commitment to quality and sustainability

All manufacturing facilities of ABB India conform to the highest quality standards and environment norms. All are ISO 9001 and ISO 14001 compliant and are certified by leading international authorities.



Description

General information

OHB medium voltage circuit-breakers for outdoor installation use sulphur hexafluoride gas (SF_6) to extinguish the electric arc and as the insulating medium.

Breaking in SF_6 gas takes place without current chopping or generation of overvoltages.

These characteristics guarantee a long electrical life for the circuit-breaker and limited dynamic, di-electric and thermal stresses on the installation.

The stored energy and free release mechanical operating mechanism allows opening and closing operations through local and remote control.

The operating mechanism, the activating kinematics of the moving contacts and the anti-condensation heater are located inside a tight metal enclosure which also acts as the support for the poles.

The above-mentioned structure is supported by a frame made of metal sections, to mount the circuit breaker on foundation.

The circuit-breaker is compact and ensures a high level of sturdiness and excellent mechanical reliability.

The enclosure is made out of a steel plate with adequate surface protection by a special metalising and painting process. The support structures are hot dip galvanised.

Fields of application

OHB circuit-breakers are used in power distribution for control and protection of lines and for control and protection of transformers, rectifier units, capacitor banks, etc.

Due to the SF_6 autopuffer breaking technique, the OHB circuit-breakers do not generate overvoltage during switching, and are therefore also highly suitable for retrofitting, upgrading and enlarging older installations where the insulating materials of the cables and apparatus may have already been stressed during service.

Standards and approvals

The OHB circuit-breakers comply with the IEC 62271-100 standard as well as of other major industrialised countries. They have undergone the tests indicated below and ensure service safety and reliability of the apparatus in all installations.

Type tests:

- Temperature rise test
- Di-electric test
- Short circuit test duties
- Short time current test
- Mechanical endurance test

Routine tests:

- Power frequency voltage with stand test
- Insulation test on auxiliary and control circuits
- Measurement of main circuit resistance
- Mechanical and electrical operation test

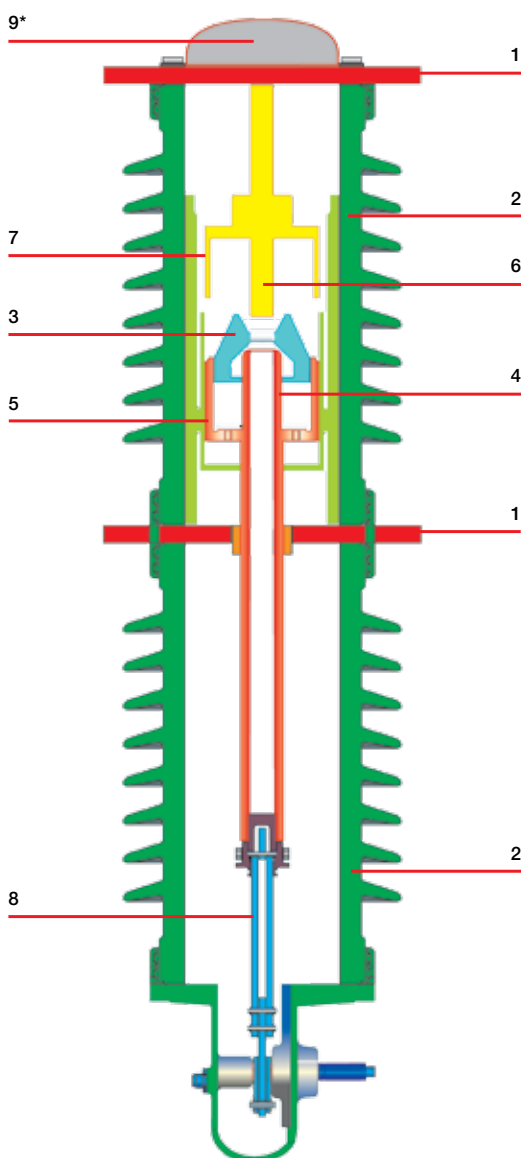
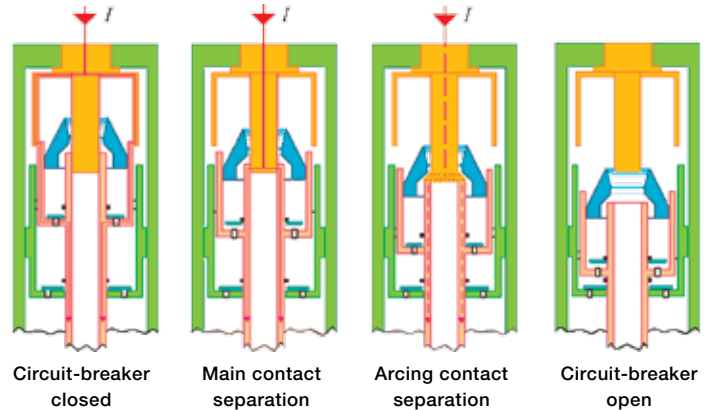
Service safety

The mechanical and electrical locking devices have been provided to prevent incorrect operations and to carry out inspection of the installations while guaranteeing maximum operator safety.



Breaking technique

The breaking principle of OHB circuit-breakers is based on compression and self-blast technique to obtain top performances at all breaking current values, with minimum arc times, gradual arc extinction without chopping, and no restriking or switching overvoltages. This breaking technique - already widely appreciated and used in high voltage circuit-breakers, has been introduced into medium voltage with the HD4 series circuit-breakers for indoor installation.



- 1 Terminal
- 2 Insulating enclosure
- 3 Blasting nozzle
- 4 Moving arcing contact
- 5 Moving contact
- 6 Fixed arcing contact
- 7 Fixed contact
- 8 Insulating tie-rod
- 9* Cap with bursting valve (upon request)

Main contact separation

No electric arc is struck because the current flows through the arcing contacts. During its run downwards, the moving apparatus compresses the gas in the lower chamber. The compressed gas flows from the lower to the upper chamber, thereby taking both the chambers to the same pressure.

Arcing contact separation

The current flows due to the electric arc which has struck between the arcing contacts. The gas cannot escape through the nozzle because the hole is still closed by the fixed arcing contact and cannot even escape through the inside of the arcing contact, because of the clogging effect of the electric arc.

- at low current values, the arc is extinguished when the current passes through its natural zero and the gas flows through the contacts. The low pressure level cannot chop the current and the modest amount of gas which "escapes" is sufficient to restore di-electric resistance between the two contacts, preventing restriking on the rising front of the recovery voltage.
- at high short-circuit values, the pressure wave generated by the electric arc closes the valve between the two chambers so that the circuit-breaker starts to operate as "pure self-blast" apparatus. The pressure increases in the upper volume due to the gas heating and molecular dissociation due to the high temperature. The pressure increase is proportional to the arc current and ensures arc extinction during the first passage through zero current.

Circuit-breaker open

The arc has been extinguished, the self-generated pressure in the upper volume decreases because the gas is flowing through the contacts. The valve re-opens and a new jet of fresh gas flows in and "washes" the chamber. This means the apparatus is immediately ready to close and trip again up to its maximum breaking capacity.

Circuit-Breaker selection and ordering

Circuit-breaker on Column		OHB 24		OHB 36		OHB 40	
Standard	IEC 62271-100	■		■		■	
Rated voltage	Ur [kV]	24		36		40.5	
Rated insulation voltage	Us [kV]	24		36		40.5	
Withstand voltage at 50 / 60 Hz	Ud (1 min) [kV]	70 (dry) / 60 (wet)		95 (dry) / 80 (wet)		95 (dry) / 80 (wet)	
Impulse withstand voltage	Up [kV]	150		170/200		200	
Rated frequency	fr [Hz]	50-60		50-60		50-60	
Rated normal current (400C)	Ir [A]	1250	2500	1250	2500	1250	2500
Rated breaking capacity	Isc [kA]	25	25	25	25	25	25
		31.5	31.5	31.5	31.5	31.5	31.5
Rated short-time withstand current (3 s)	Ik [kA]	25	25	25	25	25	25
		31.5	31.5	31.5	31.5	31.5	31.5
Making capacity	Ip [kA]	63	63	63	63	63	63
		80	80	80	80	80	80
Operation sequence	[0-0.3s-CO-3min-CO]	■		■		■	
Opening time	[ms]	45±10		45±10		45±10	
Arcing time	[ms]	10-15		10-15		10-15	
Total breaking time	[ms]	55-60		55-60		55-60	
Closing time	[ms]	<85		<85		<85	
Overall dimensions	on frame						
	H [mm]	3090 – 3840		3090 – 3840		3090 – 3840	
	L [mm]	900		900		900	
	P [mm]	686		686		686	
Weight	[Kg]	900		900		900	
SF ₆ gas absolute pressure	Rated service value [kPa]	380		380		550	
Operating temperature ⁽¹⁾	[°C]	-25...+40		-25...+40		-25...+40	
Tropicalisation	IEC: 60068-2-30, 721-2-1	■		■		■	
Electromagnetic compatibility	IEC: 60694, 61000-6-2, 61000-6-4	■		■		■	
Solar radiation	[W/m ²]	1000		1000		1000	
Presence of pollution	IEC 815 - table 1	Level III		Level III		Level III	
Creepage distance	[cm/kV]	2.5		2.5		2.75	
Ice coating	[mm]	10		10		10	
Wind speed	[m/s]	34		34		34	
Earthquake resistance	[g]	0.3		0.3		0.3	
Static force on the terminals	Longitudinal [N]	750		750		750	
	Transversal [N]	500		500		500	
	Vertical [N]	750		750		750	

(1) For lower operating temperatures, please consult us.

Equipment

Standard Equipment

- 1) ESH operating mechanism, complete with manual opening and closing push buttons, mechanical indicators for circuit-breaker “open or closed” and for springs “charged or discharged”
- 2) Shunt opening release
- 3) Shunt closing release
- 4) Spring-charging geared motor
- 5) Lever for manual spring charging
- 6) Pressure switch with two levels (one per pole); suitable for operation down to -25°C . For lower service temperatures, please contact us
- 7) Locking circuit for insufficient gas pressure (automatic opening with additional shunt opening release and lock in the open position by means of closing circuit interruption)
- 8) Electrical contacts signalling: springs charged
- 9) Auxiliary contacts (13 NO + 13 NC) including those used for internal breaker-control circuit
- 10) Anti-condensation/heating circuit for low temperatures with armoured anti-condensation heating elements and thermostat; solution provided for operation down to -25°C
- 11) The cabinet is fitted with cable gland plate for control, cables and with padlockable front door

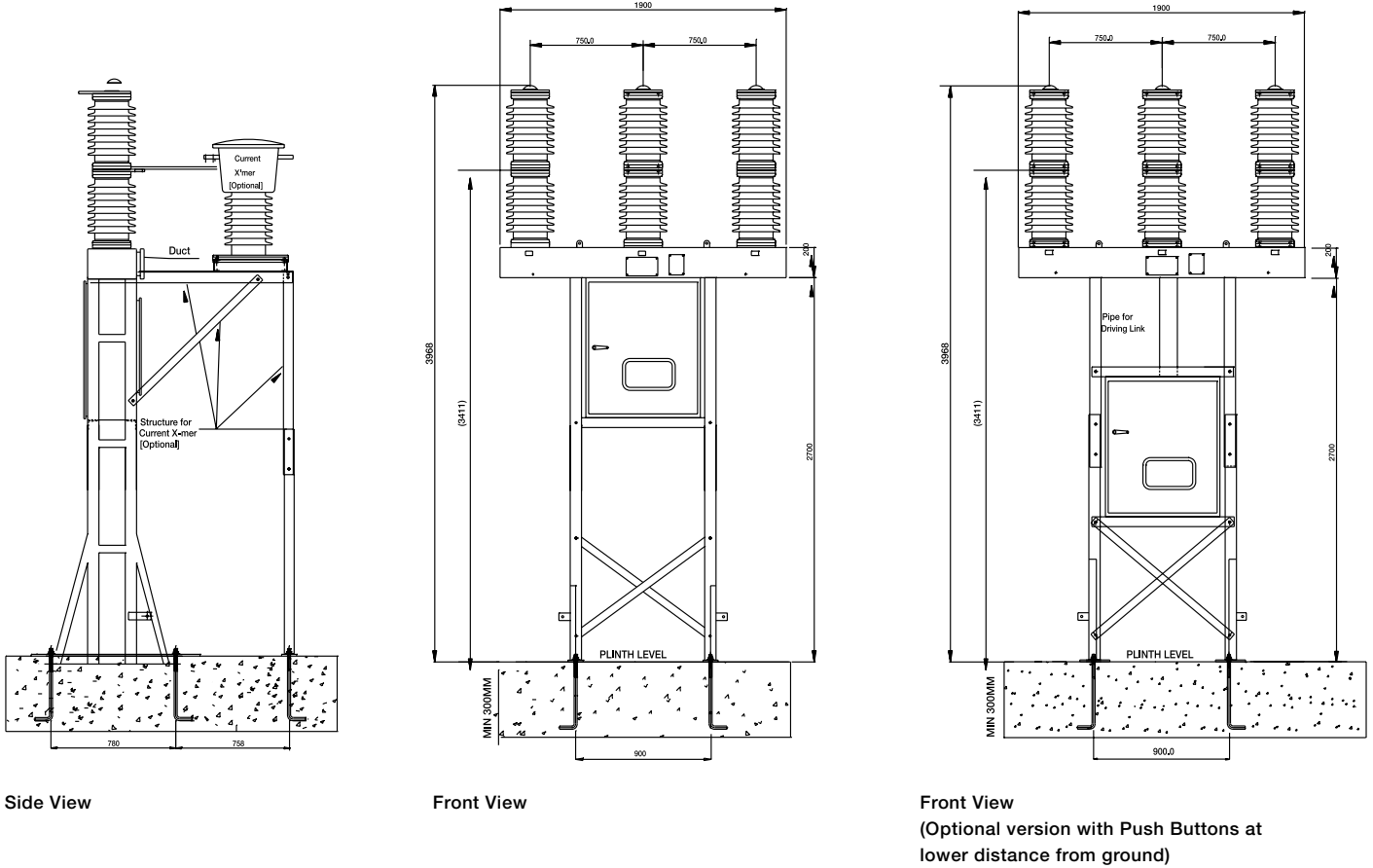
The circuit-breaker is supplied with asymmetrical terminal connections on one side of the poles only and with 4 holes as per NEMA form 4 Standards. The lower terminal is turned towards the rear of the apparatus, the upper terminals are provided as standard turned towards the front of the apparatus but, on request, it can be turned towards the rear of the apparatus

The structures and framework are always made of hot galvanised steel.

Equipment supplied on request

- 12) MCB for geared motor protection
- 13) Signalling lamps placed inside the cabinet, in a position visible from the inspection window on the door. A single solution with 4 lamps is provided for:
 - signalling circuit-breaker closed (red lamp)
 - signalling circuit-breaker open (green lamp)
 - signalling springs charged (yellow lamp)
 - signalling insufficient gas pressure (white/amber lamp)
- 14) Selector switch for local/remote control
- 15) Control switch for local ON/OFF electrical operation through shunt closing and opening releases
- 16) YU undervoltage release
- 17) Electrical signalling of YU undervoltage release energised (or de-energised)
- 18) Single-phase socket
- 19) Illumination lamp which automatically switches on by means of a limit switch when the door is opened
- 20) Telescope metal structure to vary mounting height and arrangement of CT/PT mounting

Overall Dimensions



Side View

Front View

Front View
(Optional version with Push Buttons at lower distance from ground)

Standard feature is of Fixed height structure. Optional version of telescopic structure to vary mounting height and CT or PT mounting arrangement can be provided on request.

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