

1. CURRENT TRANSFORMERS

Oil-paper insulation

Gas insulation

Dry insulation



› 420 kV Current transformers with gray silicone rubber insulator. Statnett (Norway).

1. CURRENT TRANSFORMERS > Oil-paper, gas and dry insulation

INTRODUCTION

Current transformers are designed to provide a scaled down replica of the current in the HV line and isolate the measuring instruments, meters, relays, etc., from the high voltage power circuit.

Oil-paper insulation:
model CA up to 800 kV,
model LB up to 362 kV.

Gas insulation:
model CG up to 550 kV.

Dry insulation:
model CX up to 72.5 kV.



> Model CA



> Model LB



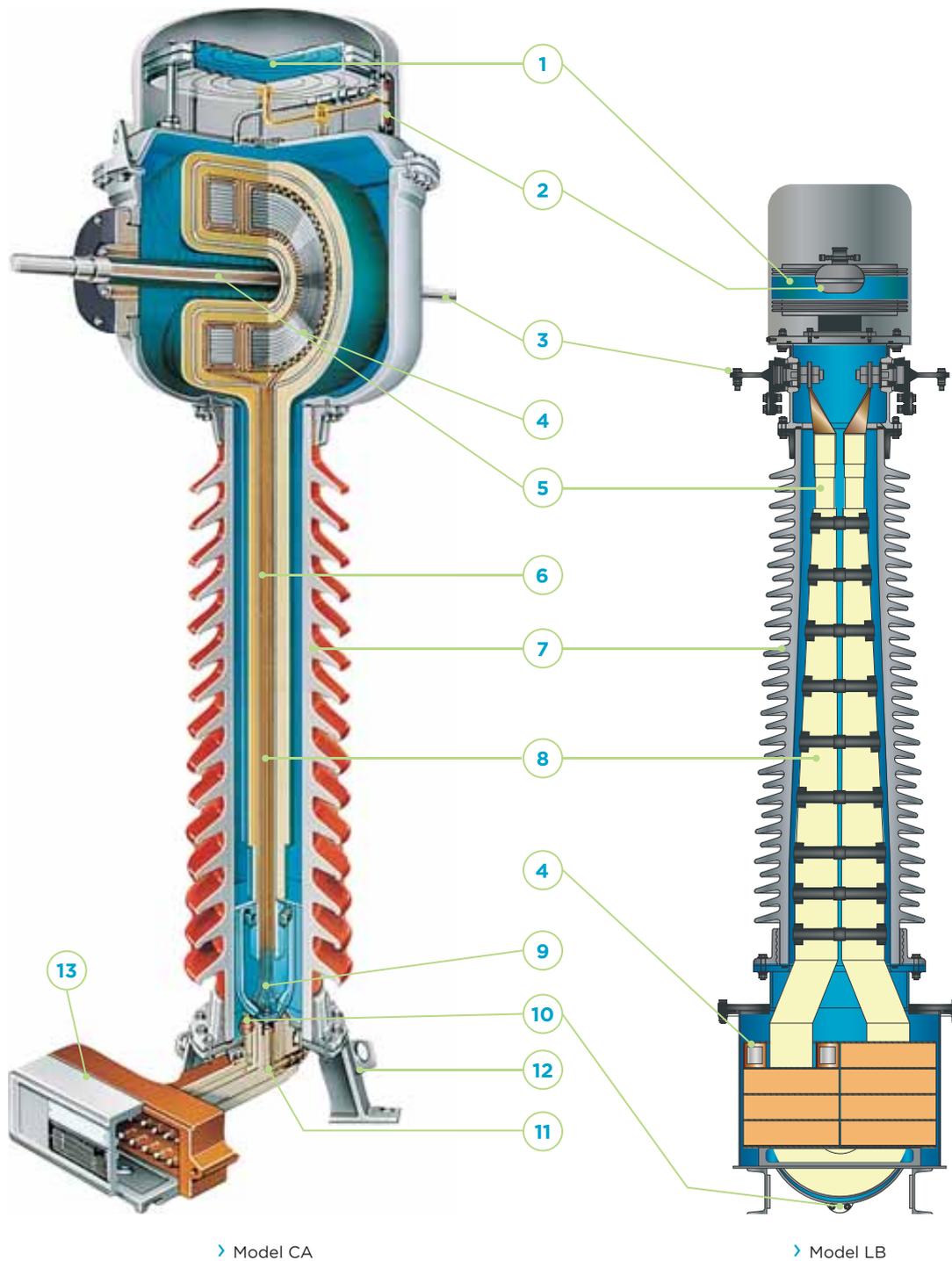
> Model CG



> Model CX

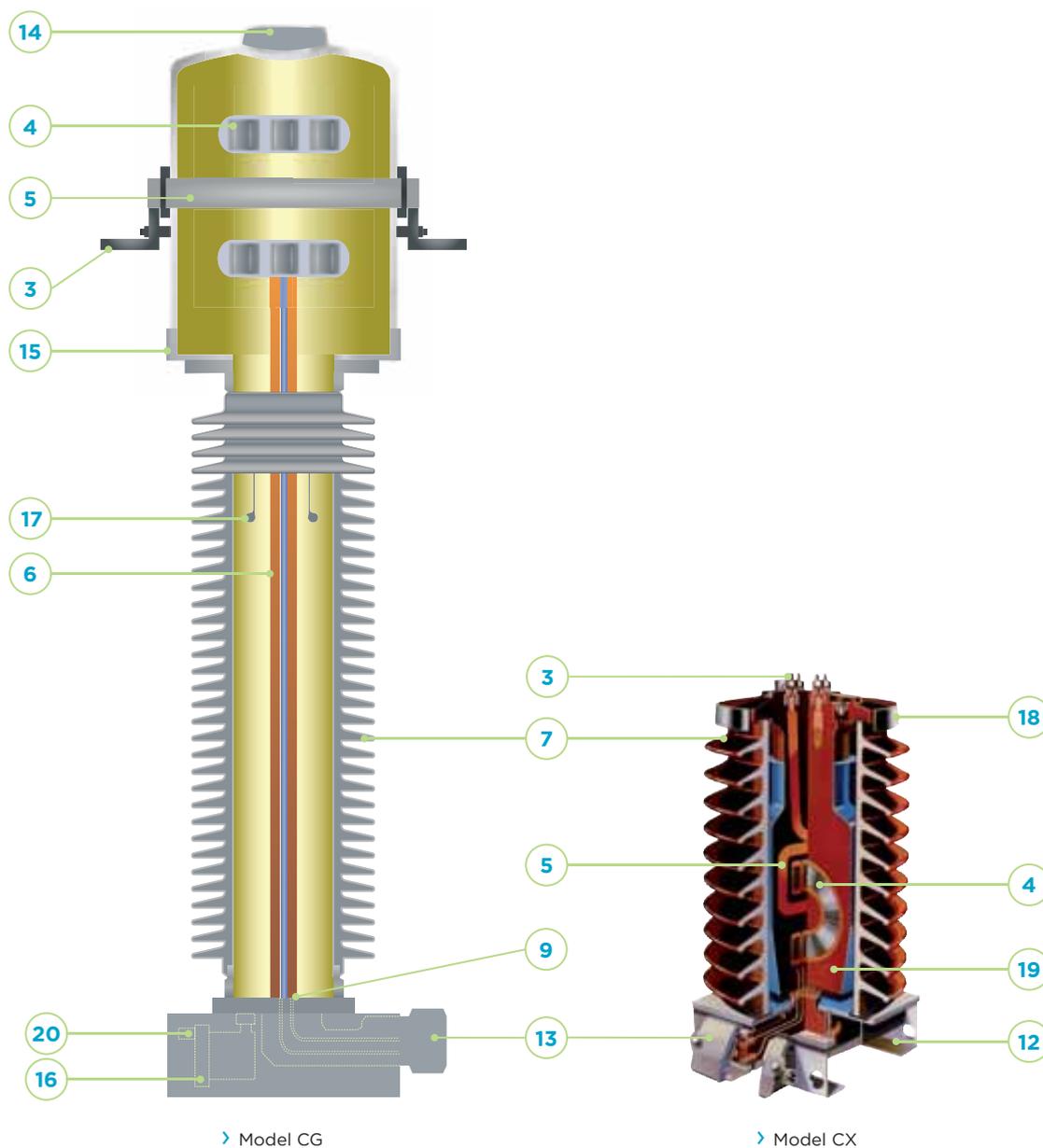
SECTIONS

- | | |
|---|--|
| <ul style="list-style-type: none"> 1. Oil volume compensating system 2. Oil level indicator 3. Primary terminal 4. Cores and secondary windings 5. Primary winding | <ul style="list-style-type: none"> 6. Secondary conductors 7. Insulator (porcelain or silicone rubber) 8. Capacitive bushing 9. Reinforced ground connection 10. Oil sampling valve |
|---|--|



1. CURRENT TRANSFORMERS > Oil-paper, gas and dry insulation

- 11. Tangent delta tap
- 12. Grounding terminal
- 13. Secondary terminal box
- 14. Pressure relief device
- 15. Head
- 16. Manometer
- 17. HV electrode
- 18. Equipotential ring
- 19. Resin insulation
- 20. Gas filling valve



APPLICATIONS

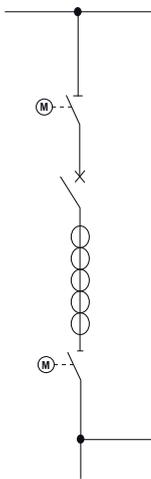
Ideal for installation at metering points due to its very high accuracy.

Excellent frequency response; ideal for monitoring power quality and measuring harmonics.

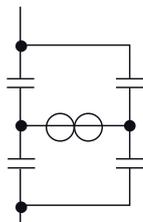
Suitable for installation in AC and DC filters in converter substations for HVDC projects.

Examples of applications:

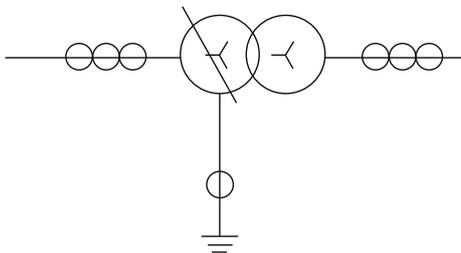
1. Protection for high voltage lines and substations.



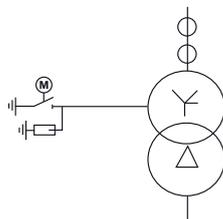
2. Protection for capacitor banks.



3. Protection for power transformers.



4. Revenue metering.



1. 765 kV Current transformer. RAO-FSK (Russia).



2. 245 kV Current transformer protecting capacitor bank (India).



3. 420 kV Current transformers. National Grid (UK).



4. 420 kV Current transformers. Rede Eléctrica Nacional (Portugal).

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DESIGN AND MANUFACTURE

The current transformer consists of one or several cores with their corresponding secondary windings (active parts).

CA RANGE:

The active parts are located in the top section of the CT inside a hermetically sealed metal box that acts as a low-voltage shield; the main oil-paper insulation is wrapped around, ending up with a high-voltage shield. The primary conductor can be a pass-through bar (with or without external reclosings) or a winding, depending on the case. The secondary cables run through an oil-paper insulated capacitive bushing with several shields for proper electrical field distribution.

LB RANGE:

The active parts are located in the bottom section. The primary conductor is hairpin shaped and the main oil-paper insulation is wrapped around it, including several intermediate capacitive shields so that the electrical field is properly distributed.

CG RANGE:

The active parts are located in the top section, inside a hermetically sealed metal box that acts as a low-voltage shield surrounded by SF₆ gas insulation. The primary conductor can be a pass-through bar with or without external reclosings. The secondary conductors run through a low voltage tube to the secondary terminal block. High voltage electrode uniformly surrounds this metal tube allowing the electrical field to be properly distributed.

CX RANGE:

The active parts are located approximately in the center of the resin body, vacuum cast with epoxy resin, which fixes and isolates the active parts, creating a rigid body with high mechanical resistance, excellent thermal performance and dielectric withstand capability.

This resin body is inside a hollow porcelain or silicone rubber insulator. The chamber between the resin body and the insulator is hermetically sealed with nitrile rubber gaskets; this space is filled with oil for insulation levels above 36 kV.

With more than 65 years of experience, ARTECHE guarantees the performance of its transformers under challenging operating conditions such as extreme temperature, salty or polluted environment, seismic hazard areas, violent winds or high altitude.



- > Detail of a rupture disc in a CG head.
- > Metallic bellows in a CA.

1. CURRENT TRANSFORMERS > Oil-paper, gas and dry insulation

ADVANTAGES

- › Variety of designs and technologies of insulation for greater adaptation to client needs.
- › Robust mechanical strength and reduced size due to a compact design that is easy to transport, store and install, and which reduces visual impact.
- › Hermetically sealed to guarantee complete water tightness with the minimum volume of oil or gas (Each unit is tested individually).
- › Excellent response under extreme weather conditions (Oil-paper insulation from -55°C; up to +55°C; gas insulation from -45°C up to +55°C), altitudes over 1,000 m.a.s.l., seismic hazard areas, violent winds, etc.
- › Maintenance-free throughout their lifespan.
- › Very high and invariable accuracy (up to 0.1%).
- › Protection for the secondary windings in the terminal block.
- › Wide range of primary and secondary terminals.
- › Different cable glands and accessories available.
- › Each transformer is routine tested for partial discharges, tangent delta (DDF), insulation and accuracy and designed to withstand all the type tests included in the standards.
- › Compliance to any international standards: IEC, IEEE, UNE, BS, VDE, SS, CAN/CSA, AS, NBR, JIS, GOST, NF...
- › Officially homologated in-house testing facilities.
- › May be transported and stored horizontally or vertically.

- › 420 kV Current transformers, model CA. CFE, Chicoasén (Mexico).



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OIL-PAPER INSULATION:

Wide range of primary currents: from 1 to 5,000 A.

Oil level compensating system that effectively regulates changes in oil volume mainly caused by temperature.

Oil sampling valve for periodic analysis.

The materials used for construction are recyclable and resistant to the elements. Its advanced design adheres to environmental regulations through the use of high quality insulating oils, free of PCB.

Top-core Type:

- › All types of measurement and protection cores: multi-ratio, linear...
- › Very high rated currents and short-circuit currents.
- › Reinforced safety design, resistant to internal arc.
- › Metallic oil bellows and tangent delta measurement tap.

Hairpin Type:

- › Excellent seismic performance.
- › Good heat dissipation in the primary conductor.
- › Reduced size makes it extremely easy to handle.
- › Metallic oil bellows and tangent delta measurement tap.

OPTIONS:

- › Silicone rubber insulator.
- › Capacitive voltage tap.

GAS INSULATION:

- › Total safety in case of internal arc: overpressure is relieved by the pressure relief device (rupture disc) in the top part of the head.
- › The silicone rubber insulator guarantees safety during transportation and service.
- › Online monitoring of the insulation status with a manometer alarm.
- › Compact and very light design.
- › Designed to minimize gas volume, pressure and leaks, thus reducing its environmental impact.

DRY INSULATION:

- › Cast in high dielectric strength resin.
- › Primary winding with spark gap for over-voltage protection.
- › Compact design for easy handling.
- › May be transported, stored and installed vertically or horizontally.
- › Porcelain or silicone rubber insulators.

Innovations in transformers in recent years have made them more efficient with compact designs, making them easy to transport, store and install; minimizing visual impact.



ARTECHE transformers
are installed in over 150
countries.

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RANGE

ARTECHE current transformers are named with the letters CA (top-core type, oil-paper), LB (hairpin type, oil-paper), CG (gas type) or CX (dry type) followed by 2 or 3 numbers indicating the maximum service voltage for which they have been designed.

The table on the next page shows the range manufactured by ARTECHE. These characteristics are merely indicative; ARTECHE can manufacture transformers to comply with any domestic or international standard.

Winding ratios: all types of combinations possible in a single device.

Secondary windings for:

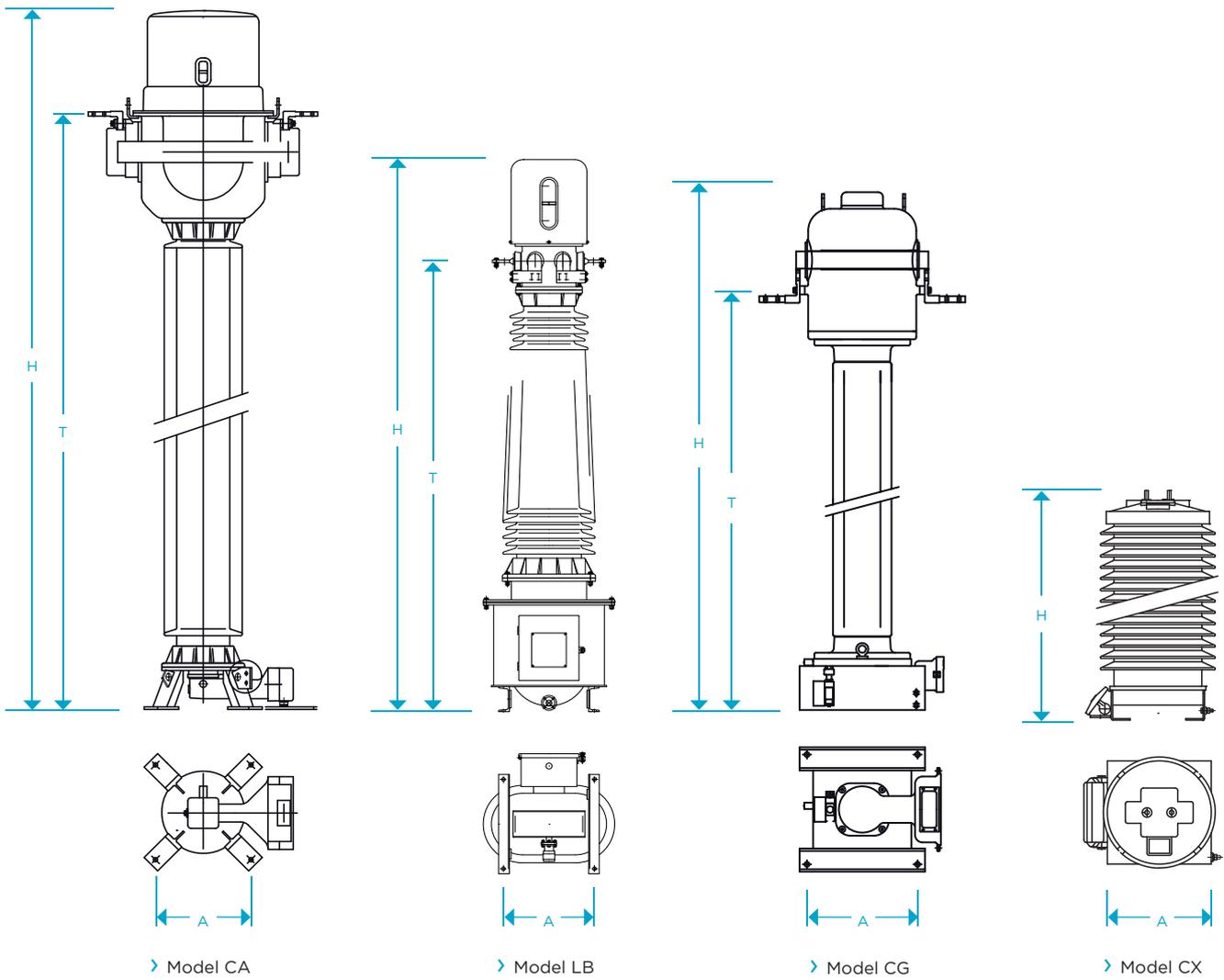
- › Protection: all possible types, including linear cores, low induction, etc.
- › Metering: accuracy classes for any metering/billing need (including high accuracy class 0.1 / 0.15 with extended range in current).

Number of secondary windings: as per customer needs, up to 10 secondary windings (or more) are possible in a single device.



- › 420 kV Current transformers. Tennet (The Netherlands).
- › 245 kV Current transformers. SECO (Sudan).

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> Type test performed on a CG 245 kV.
 > 36 kV Current transformers. Fingrid, Kimy (Finland).

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Oil-paper insulation > Model CA

Model	Highest voltage (kV)	Rated insulation level			Standard creepage distance (mm)	Dimensions			Weight (kg)
		Power frequency (kV)	Lightning impulse (BIL) (kVp)	Switching impulse (kVp)		A (mm)	T (mm)	H (mm)	
CA-36	36	70	170	-	900	350	1185	1625	250
CA-52	52	95	250	-	1300	350	1185	1625	260
CA-72	72.5	140	325	-	1825	350	1335	1775	280
CA-100	100	185	450	-	2500	350	1335	1775	290
CA-123	123	230	550	-	3075	350	1665	2095	300
CA-145	145	275	650	-	3625	350	1665	2095	310
CA-170	170	325	750	-	4250	350	1895	2335	330
CA-245	245	460	1050	-	6125	450	2755	3055	560
		395	950						
CA-300	300	460	1050	850	7500	450	3170	3580	650
CA-362	362	510	1175	950	9050	600	3875	4355	870
CA-420	420	630	1425	1050	10500	600	3875	4355	920
		575	1300						
CA-525	(525) 550	680	1550	1175	13125	600	4530	5365	1200
CA-550	(525) 550	800	1800	1175	13750	600	5205	5960	1700
CA-765	(765) 800	880	1950	1425	15300	600	5770	6590	2050
		975	2100	1550					

Approximate dimensions and weights. For special requirements, please consult.

Primary currents: from 1 A to 5000 A. Short circuit currents: up to 120 kA/1 s.

Oil-paper insulation > Model LB

Model	Highest voltage (kV)	Rated insulation level			Standard creepage distance (mm)	Dimensions			Weight (kg)
		Power frequency (kV)	Lightning impulse (BIL) (kVp)	Switching impulse (kVp)		A (mm)	T (mm)	H (mm)	
LB-36	36	70	170	-	1260	660x490	1405	1710	173
LB-72.5	72.5	140	325	-	2250	775x650	1360	1810	470
LB-145	123	230	550	-	3906	775x550	2380	2825	670
		145	275						
LB-245	245	460	1050	-	7810	790x605	3440	3890	1150
LB-362	362	510	1175	950	11260	910x750	3550	4100	1380

Approximate dimensions and weights. For special requirements, please consult.

Primary currents: from 1 A to 4000 A. Short circuit currents: up to 50 kA/1 s.

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Gas insulation > Model CG

Model	Highest voltage (kV)	Rated insulation level			Standard creepage distance (mm)	Dimensions			Weight (kg)
		Power frequency (kV)	Lightning impulse (BIL) (kVp)	Switching Impulse (kVp)		A (mm)	T (mm)	H (mm)	
CG-145	123	230	550	-	3625	450x450	1895	2330	205
CG-145	145	275	650	-	3625	450x450	1895	2330	205
CG-170	170	325	750	-	4250	450x450	2070	2505	235
CG-245	245	395	950	-	6125	450x450	2795	3370	400
		460	1050	-					
CG-300	300	460	1050	850	7500	450x450	3180	3755	430
CG-362	362	510	1175	950	11222	600x600	4400	5080	1650
CG-420	420	630	1425	1050	13020	800x800	4900	5580	1700
CG-550	550	680	1550	1175	17050	800x800	5900	6580	1800

Approximate dimensions and weights. For special requirements, please consult.

Primary currents: up to 5000 A. Short circuit currents: up to 120 kA/1 s.

Dry insulation > Model CX

Model	Highest voltage (kV)	Rated insulation level		Standard creepage distance (mm)	Dimensions		Weight (kg)
		Power frequency (kV)	Lightning impulse (BIL) (kVp)		A (mm)	H (mm)	
CXD-24	24	50	125	744	210	462	43
CXE-24	24	50	125	744	250	480	72
CXE-36	36	70	170	900	250	532	80
CXG-36	36	70	170	900	250	670	150
CXE-52	52	95	250	1440	250	712	111
CXG-52	52	95	250	1560	250	798	186
CXH-52	52	95	250	1560	330	800	263
CXG-72	72.5	140	325	1860	250	918	190
CXH-72	72.5	140	325	1860	330	920	305

Approximate dimensions and weights. For special requirements, please consult.

Primary currents: from 1 A to 2400 A. Short circuit currents: up to 120 kA/1 s.



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project.