

MEDIUM VOLTAGE PRODUCTS

HD4 according to IEC and GOST standards

Gas insulated MV circuit-breakers
up to: 40.5 kV; 3600 A; 50 kA





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1. Description



General information

HD4 medium voltage circuit-breakers use sulphur hexafluoride gas (SF₆) to extinguish the electric arc and as the insulating medium. Breaking in SF₆ gas takes place without any arc chopping and without generation of overvoltages. These characteristics ensure long electrical life of the circuit-breaker and limited dynamic, dielectric and thermal stresses on the installation.



The circuit-breaker poles, which make up the breaking part, are systems with lifelong sealed pressure (IEC 62271-100 Standards) and are maintenance-free.

The ESH type mechanical operating mechanism, with stored energy has free release and allows opening and closing operations independently of the operator's actions.

The operating mechanism and

the poles are fixed to the metal structure which also acts as a support for the kinetics for operating the moving contacts.

Circuit-breakers in the withdrawable version are fitted with a truck to allow racking in and racking out of the switchgear or enclosure.

The light and compact structure of the circuit-breaker ensures great sturdiness and excellent mechanical reliability.



Available versions

HD4 circuit-breakers are available in the fixed and withdrawable version with front operating mechanism.

The withdrawable version is available for PowerCube modules and UniGear type ZS1, ZS2, ZS3.2 switchgears..

Fields of application

HD4 circuit-breakers are used in power distribution to control and protect lines, transformer and distribution substations, motors, transformers, capacitor banks, etc.

Thanks to the SF6 autopuffer breaking technique, the HD4 circuit-breakers do not generate operating overvoltages, and are therefore also highly suitable for retrofitting, upgrading and enlarging older installations where the motor, cable, etc. insulating materials may be particularly sensitive to dielectric stresses.

1. Description

Breaking technique

The breaking technique of HD4 circuit-breakers is based on compression and self-blast techniques to obtain top performances at all service current values, with minimum arc times, gradual arc extinction without chopping, and no restriking or operating overvoltages.

The HD4 series brings to medium voltage the advantages of the "autopuffer" breaking technique already used in high voltage.

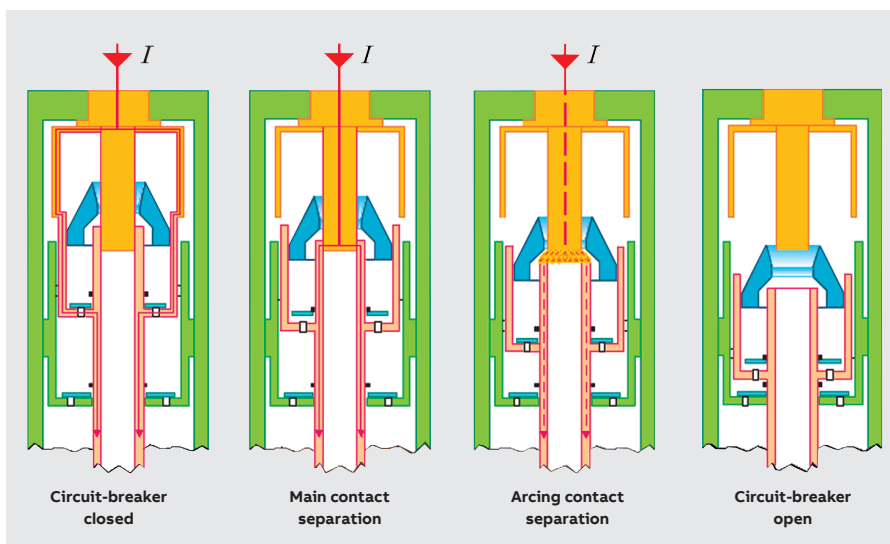
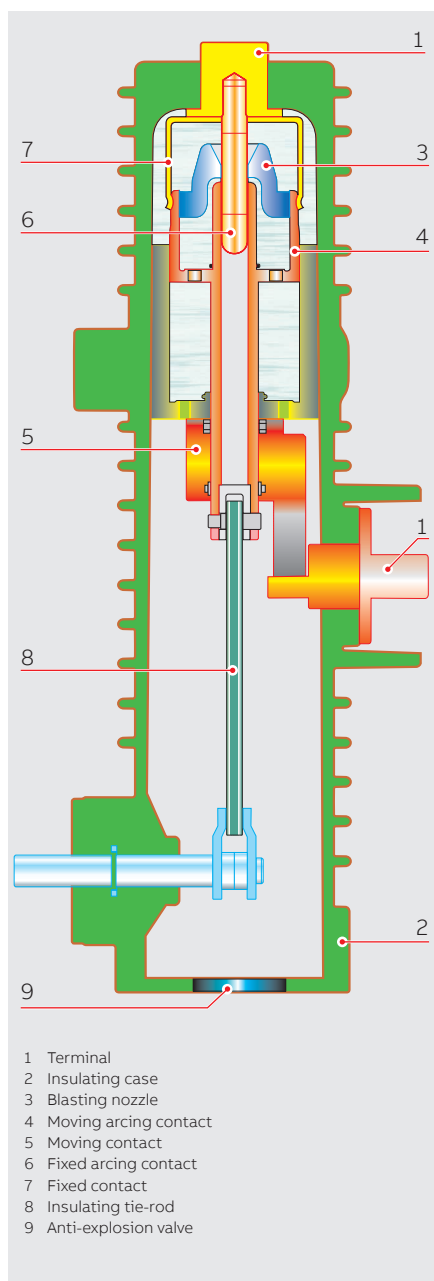
Standards and approvals

HD4 circuit-breakers comply with IEC 62271-100

Standards. Additionally, HD4 breakers are registered in the main naval registers and are therefore suitable for Marine applications.

They have undergone the following tests and guarantee safety and reliability of the apparatus in service in all installations.

- Type tests: heating, withstand insulation at industrial and impulse frequency, short-time and peak withstand current, mechanical duration, making and breaking of short-circuit currents;



Main contact separation

No electric arc strikes as the current flows through the arcing contacts.

During its run downwards, the moving part compresses the gas contained in the lower chamber. The compressed gas flows out of the lower chamber into the upper chamber, taking them both to the same pressure.

Arcing contact separation

The current flows thanks to the electric arc which has struck between the arcing contacts.

The gas cannot get out through the nozzle because the hole is still closed by the fixed arcing contact and cannot get out through the inside of the moving arcing contact either because the electric arc closes this (clogging effect).

- **with low currents**, when the current passes through natural zero and the arc is quenched, the gas flows through the contacts. The low pressure reached cannot chop the current and the modest amount of compressed gas is sufficient to restore dielectric resistance between the two contacts, preventing restriking on the rising front of the return voltage.

- **with high short-circuit currents**, the pressure wave generated by the electric arc closes the valve between the two chambers so that the circuit-breaker starts to operate as a "pure self-blast". The pressure increases in the upper volume thanks to heating of the gas and molecular disassociation due to the high temperature. The increase in pressure generated is proportional to the arc current and ensures quenching on first passage through current zero.

Circuit-breaker open

The arc has been interrupted, the self-generated pressure in the upper volume is reduced because the gas is flowing through the contacts. The valve re-opens and so a new flow of fresh gas comes into the breaking chamber. The apparatus is therefore immediately ready to close and trip again up to its maximum breaking capacity.

- Individual tests: insulation with voltage at industrial frequency in the main circuits and insulation of the auxiliary and control circuits, measurement of the main circuit resistance, mechanical and electrical operation.

The HD4 circuit-breakers are tested according to the requirements of the IEC 62271-100 Standard. GOST versions have been approved by “Scientific and Technical Centre Standartelectro-S of Moscow” (ask ABB for the Declaration of Conformity).

Safety

Safe distribution switchgear can be constructed with HD4 circuit-breakers thanks to the full range of mechanical and electrical locks (available on request).

The locks have been designed to prevent incorrect operations and to allow the installations to be inspected while guaranteeing maximum operator safety.

Key locks or padlocks enable opening and closing and/or racking-in and racking-out operations. The closed door racking-out device only allows the circuit-breaker to be racked in and out of the switchgear when the door is closed.

Anti-racking-in locks prevent circuit-breakers with different rated currents from being racked-in and racked-out when the circuit-breaker is closed.

ESH operating mechanism

- Just one device for the whole series.
- The same set of accessories for all the types of HD4 circuit-breaker.
- Fixed strikers to facilitate assembly or replacement of accessories.
- Accessory cabling with socket and plug.

This is a stored energy mechanical actuator with manual and/or motor-operated loading of the closing spring; the opening spring is loaded by the same actuator during the closing operation. The opening and closing operations take place at speeds that are independent from the operator and the operating mode (manually using local or remote push-buttons or by means of the opening and closing shunt releases). When it is not equipped with a geared motor for loading the closing springs, the operating mechanism can enable the following sequences:

- with c.-breaker open and closing spring loaded: C - O
- with c.-breaker closed and closing spring loaded: O - C - O.

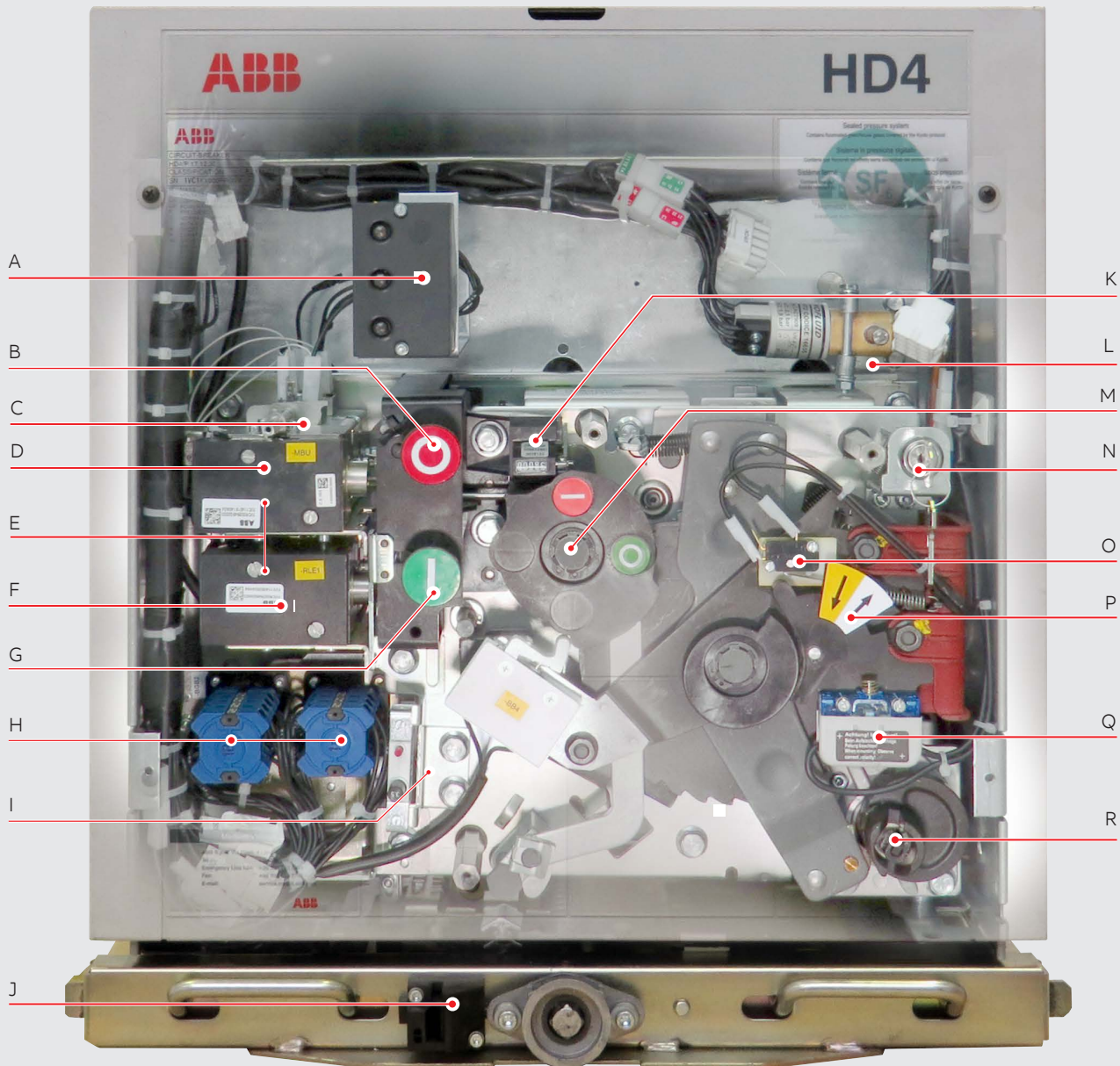
When equipped with a geared motor for loading the closing springs, the operating mechanism can perform repeated re-closing operations thanks to automatic reloading after each closing operation.

- Highly reliable operating mechanisms thanks to a low number of components which are manufactured using production systems for large quantities
- Accessories common to the entire range
- Electrical accessories that can be easily and quickly installed or replaced thanks to wiring pre-engineered with plug-socket connectors
- Mechanical anti-pumping device is supplied as standard
- Built-in closing spring charging lever
- Key lock with circuit-breaker open
- Protective covering over the opening and closing pushbuttons to be operated using a special tool
- Padlock device on the operating pushbuttons



1. Description

Circuit-breaker operating mechanism



- A Gas monitoring device with led
- B Opening pushbutton
- C Mechanical undervoltage override
- D Undervoltage release
- E Service releases (opening and closing)
- F Operating mechanism locking electromagnet
- G Closing pushbutton
- H Open/closed auxiliary contacts
- I Protection circuit-breaker for closing spring loading motor

- J Lock that prevents racking-in when door is open
- K Mechanical operation counter
- L Pressure switch
- M Mechanical signalling device for circuit-breaker open/closed
- N Key lock removed when circuit-breaker is open
- O Contacts for signalling spring charged/discharged
- P Signalling device for closing springs charged/discharged
- Q Closing spring loading motor limit switch
- R Geared motor for closing spring charging

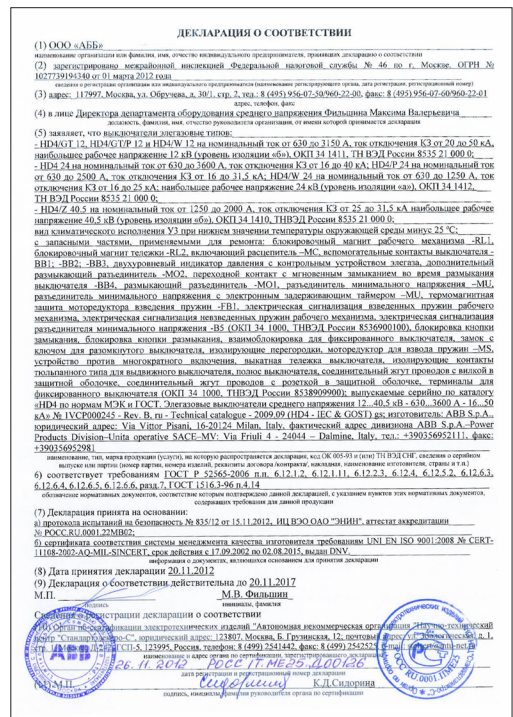
- UniGear ZS2 1YTS030001 Switchgear
- Unigear ZS3.2 1YHA000023 Switchgear
- UniSec 1VFM200003 Switchgear
- REF542plus 1VTA100001 Units
- PowerCare Service 1VCP000486
- HD4 Installation and operating instructions 1VCD601246

Complies with UNI EN ISO 9001 Standards,
certified by an independent organisation.

Complies with UNI CEI EN ISO/IEC 17025 Standards, accredited by an independent organisation.

Complies with UNI EN ISO 14001 Standards,
certified by an independent organisation.

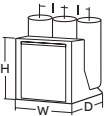
Complies with OHSAS 18001 Standards, certified by an independent organisation.



2. Selection and ordering

General characteristics
of fixed circuit-breakers (12 kV)



Circuit-breaker		HD4/GT 12									
Standards	IEC 62271-100 •										
	GOST R 52565-2006 ⁽⁵⁾ •										
Rated voltage	Ur [kV]	10									
Rated insulation voltage	Us [kV]	12									
Withstand voltage at 50 Hz	Ud (1 min) [kV]	42									
Impulse withstand voltage	Up [kV]	75									
Rated frequency	fr [Hz]	50-60									
Rated normal current (40 °C) ⁽¹⁾	Ir [A]	630	1250	630	1250	1250	1600	2000	2500	3150	
Rated breaking capacity	Isc [kA]	16	16	16	16	—	—	—	—	—	
		—	—	—	—	—	20	—	—	—	
		25	25	25	25	—	25	25	25	25	
		31.5	31.5	31.5	31.5	—	31.5	31.5	31.5	31.5	
		—	—	—	—	40	40	40	40	40	
		—	—	—	—	50	50	50	50	50	
Rated short-time withstand current (3 s)	Ik [kA]	16	16	16	16	—	—	—	—	—	
		—	—	—	—	—	20	—	—	—	
		25	25	25	25	—	25	25	25	25	
		31.5	31.5	31.5	31.5	—	31.5	31.5	31.5	31.5	
		—	—	—	—	40	40	40	40	40	
		—	—	—	—	50	50	50	50	50	
Making capacity	Ip [kA]	40	40	40	40	—	—	—	—	—	
		50	50	50	50	—	50	—	—	—	
		—	—	—	—	—	63	63	63	63	
		80	80	80	80	—	80	80	80	80	
		—	—	—	—	100	100	100	100	100	
		—	—	—	—	125	125	125	125	125	
Operation sequence	[O-0.3s-CO-15s-CO] —										
	[O-0.3s-CO-20s-CO] •										
	[O-0.3s-CO-180s-CO] •										
Opening time	[ms]	35-60									
Arcing time	[ms]	10-15									
Total breaking time	[ms]	45-75									
Closing time	[ms]	<=85									
Overall dimensions		H [mm]	586	586	623	623	655	655	655	655	
		W [mm]	496	496	618	618	618	618	730	730	730
		D [mm]	446	446	446	446	493	493	493	493	493
		Pole centre distance I [mm]	150	150	210	210	210	210	275	275	275
Weight	[Kg]	114	114	114	114	145	145	165	165	165	
Dimension standardization table		1VCD000226	1VCD000226	1VCD000231	1VCD000231	TN 7201	TN 7201	TN 7202	TN 7202	TN 7202	
Absolute SF6 gas pressure ⁽²⁾		[kPa]	380 (430 at 31,5 kA)								
Operating temperature ⁽³⁾		[°C]	-5 ... +40								
Tropicalization	IEC: 60068-2-30, 60721-2-1 •										
Electromagnetic compatibility	IEC 62271-1 •										

(1) Rated interrupted current defined in free air at 40 °C ambient temperature for HD4 17 and 24

(2) Rated service value

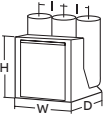
(3) The standard range is -5 °C ... +40 °C; on request it's available also the range -25 °C ... 40 °C with mandatory a special pressure-switch (with temperature compensation). The minimum storage temperature is -25 °C; the minimum transportation temperature is minus -25 °C.

(4) Including insulating shields (available on request).

(5) Declaration of Conformity to GOST R 52565-2006 issued by Autonomous organization "Scientific research

General characteristics of fixed circuit-breakers (17.5 kV)



Circuit-breaker		HD4 17							
Standards	IEC 62271-100	•							
Rated voltage	Ur [kV]	17.5							
Rated insulation voltage	Us [kV]	17.5							
Withstand voltage at 50 Hz	Ud (1 min) [kV]	38							
Impulse withstand voltage	Up [kV]	95							
Rated frequency	fr [Hz]	50-60							
Rated normal current (40 °C) ⁽¹⁾	Ir [A]	630	1250	1600	1600	2000	2500	3150	3600
Rated breaking capacity	Isc [kA]	16	16	16	—	—	—	—	—
		—	—	—	—	—	—	—	—
		25	25	25	—	25	25	25	25
		31.5	31.5	31.5	—	31.5	31.5	31.5	31.5
		—	—	—	40	40	40	40	40
		—	—	—	50	50	50	50	50
Rated short-time withstand current (3 s)	Ik [kA]	16	16	16	—	—	—	—	—
		—	—	—	—	—	—	—	—
		25	25	25	—	25	25	25	25
		31.5	31.5	31.5	—	31.5	31.5	31.5	31.5
		—	—	—	40	40	40	40	40
		—	—	—	50	50	50	50	50
Making capacity	Ip [kA]	40	40	40	—	—	—	—	—
		—	—	—	—	—	—	—	—
		63	63	63	—	63	63	63	63
		80	80	80	—	80	80	80	80
		—	—	—	100	100	100	100	100
		—	—	—	125	125	125	125	125
Operation sequence	[O-0.3s-CO-15s-CO]	–							
	[O-0.3s-CO-20s-CO]	•							
	[O-0.3s-CO-180s-CO]	•							
Opening time	[ms]	35-60							
Arcing time	[ms]	10-15							
Total breaking time	[ms]	45-75							
Closing time	[ms]	<=85							
<div></div> <div>Overall dimensions</div>	H [mm]	623	623	649	655	655	655	655	655
	W [mm]	618	618	618	618	618	730	730	730
	D [mm]	446	446	561	493	493	603	603	603
	Pole centre distance l [mm]	210	210	210	210	210	275	275	275
Weight	[Kg]	114	114	114	145	145	165	165	165
Dimension standardization table		1VCD000231	1VCD000231	TN 7178	TN 7163	TN 7163	TN 7165	TN 7165	TN 7165
Absolute SF6 gas pressure ⁽²⁾	[kPa]	380 (430 at 31,5 kA)							
Operating temperature ⁽³⁾	[°C]	-5 ... +40							
Tropicalization	IEC: 60068-2-30, 60721-2-1	•							
Electromagnetic compatibility	IEC 62271-1	•							

(1) Rated interrupted current defined in free air at 40 °C ambient temperature for HD4 17 and 24

(2) Rated service value

(3) The standard range is -5 °C ... +40 °C; on request it's available also the range -25 °C ... 40 °C with mandatory a special pressure-switch (with temperature compensation). The minimum storage temperature is minus 25 °C; the minimum transportation temperature is minus 25 °C .

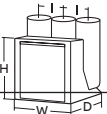
(4) Including insulating shields (available on request).

(5) Declaration of Conformity to GOST R 52565-2006 issued by Autonomous organization "Scientific research

2. Selection and ordering

General characteristics
of fixed circuit-breakers (24 kV)



Circuit-breaker		HD4 24										
Standards	IEC 62271-100 •											
Rated voltage	Ur [kV]	24										
Rated insulation voltage	Us [kV]	24										
Withstand voltage at 50 Hz	Ud (1 min) [kV]	50										
Impulse withstand voltage	Up [kV]	125										
Rated frequency	fr [Hz]	50-60										
Rated normal current (40 °C) ⁽¹⁾	Ir [A]	630	1250	630	1250	1600	1600	2000	2500	3150	3600	
Rated breaking capacity	Isc [kA]	16	16	16	16	16	—	—	—	—	—	
		20	20	20	20	20	—	—	—	—	—	
		25	25	25	25	25	25	25	25	25	25	
		31.5	31.5	31.5	31.5	—	31.5	31.5	31.5	31.5	31.5	
		—	—	—	—	—	40	40	40	40	40	
		—	—	—	—	—	—	—	—	—	—	
Rated short-time withstand current (3 s)	Ik [kA]	16	16	16	16	16	—	—	—	—	—	
		—	—	—	—	20	—	—	—	—	—	
		25	25	25	25	25	25	25	25	25	25	
		—	—	—	—	—	31.5	31.5	31.5	31.5	31.5	
		—	—	—	—	—	40	40	40	40	40	
		—	—	—	—	—	—	—	—	—	—	
Making capacity	Ip [kA]	40	40	40	40	40	—	—	—	—	—	
		—	—	—	—	50	—	—	—	—	—	
		63	63	63	63	63	63	63	63	63	63	
		—	—	—	—	—	80	80	80	80	80	
		—	—	—	—	—	100	100	100	100	100	
		—	—	—	—	—	—	—	—	—	—	
Operation sequence	[O-0.3s-CO-15s-CO]	—										
	[O-0.3s-CO-20s-CO]	•										
	[O-0.3s-CO-180s-CO]	•										
Opening time	[ms]	35-60										
Arcing time	[ms]	10-15										
Total breaking time	[ms]	45-75										
Closing time	[ms]	<=85										
Overall dimensions		H [mm]	818	818	730	730	818	655	655	818 ⁽⁴⁾	818 ⁽⁴⁾	818 ⁽⁴⁾
		W [mm]	618	618	748	748	618	730	730	730	730	730
		D [mm]	600	600	496	496	600	561	561	620 ⁽⁴⁾	620 ⁽⁴⁾	620 ⁽⁴⁾
		Pole centre distance l [mm]	210	210	275	275	210	275	275	275	275	275
Weight	[Kg]	119	119	119	119	114	145	145	165	165	165	
Dimension standardization table		1VCD000231			1VCD000237			TN 7179 TN 7174		TN 7165		
Absolute SF6 gas pressure ⁽²⁾	[kPa]	380 (430 at 31,5 kA)										
Operating temperature ⁽³⁾	[°C]	-5 ... +40										
Tropicalization	IEC: 60068-2-30, 60721-2-1	•										
Electromagnetic compatibility	IEC 62271-1	•										

(1) Rated interrupted current defined in free air at 40 °C ambient temperature for HD4 17 and 24

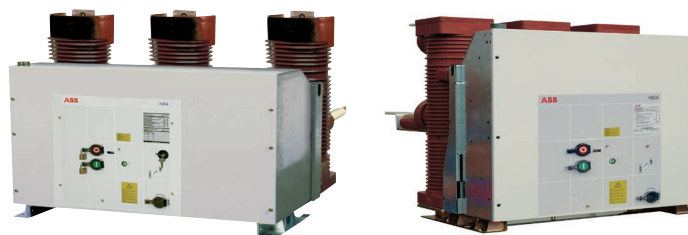
(2) Rated service value

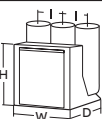
(3) The standard range is -5 °C ... +40 °C; on request it's available also the range -25 °C ... 40 °C with mandatory a special pressure-switch (with temperature compensation). The minimum storage temperature is minus 25 °C; the minimum transportation temperature is minus 25 °C.

(4) Including insulating shields (available on request).

(5) Declaration of Conformity to GOST R 52565-2006 issued by Autonomous organization "Scientific research

General characteristics of fixed circuit-breakers (36 kV)



Circuit-breaker		HD4 36							
Standards	IEC 62271-100	•							
Rated voltage	Ur [kV]	36							
Rated insulation voltage	Us [kV]	36							
Withstand voltage at 50 Hz	Ud (1 min) [kV]	70							
Impulse withstand voltage	Up [kV]	170							
Rated frequency	fr [Hz]	50-60							
Rated normal current (40 °C) ⁽¹⁾	Ir [A]	630	1250	1600	1250 ⁽³⁾	1600 ⁽³⁾	2000 ⁽³⁾	2500 ⁽³⁾	
Rated breaking capacity	Isc [kA]	16	16	16	—	—	—	—	
		20 ⁽⁵⁾	20 ⁽⁵⁾	20 ⁽⁵⁾	—	—	20	20	
		—	—	—	25	25	25	25	
		—	—	—	31.5	31.5	31.5	31.5	
Rated short-time withstand current (3 s)	Ik [kA]	16	16	16	—	—	—	—	
		20	20	20	—	—	20	20	
		—	—	—	25	25	25	25	
		—	—	—	31.5	31.5	31.5	31.5	
Making capacity	Ip [kA]	40	40	40	—	—	—	—	
		50	50	50	—	—	50	50	
		—	—	—	63	63	63	63	
		—	—	—	80	80	80	80	
Operation sequence	[O-0.3s-CO-15s-CO]	—							
	[O-0.3s-CO-3min-CO]	•							
Opening time	[ms]	45							
Arcing time	[ms]	10-15							
Total breaking time	[ms]	55-60							
Closing time	[ms]	80							
Maximum overall dimensions without insulating screens between phases ⁽⁴⁾		H [mm]	730/1060 ⁽⁶⁾	730/1060 ⁽⁶⁾	730/1060 ⁽⁶⁾	790/1123 ⁽⁶⁾	790/1123 ⁽⁶⁾	790/1123 ⁽⁶⁾	790/1123 ⁽⁶⁾
		W [mm]	880/955 ⁽⁶⁾	880/955 ⁽⁶⁾	880/955 ⁽⁶⁾	748/805 ⁽⁶⁾	748/805 ⁽⁶⁾	748/805 ⁽⁶⁾	748/805 ⁽⁶⁾
		D [mm]	695	695	695	833	833	833	833
		Pole centre distance I [mm]	350	350	350	275	275	275	275
Weight	[kg]	124	128	128	175	175	180	190	
Standardised table of dimensions		TN 7241	TN 7241	TN 7241	TN 7268	TN 7268	TN 7268	TN 7315	
Absolute SF ₆ gas pressure ⁽²⁾	[kPa]	380	380	380	450	450	450	450	
Operating temperature	[°C]	- 5 ... + 40							
Tropicalizzazione	IEC: 60068-2-30, 60721-2-1	•							
Electromagnetic compatibility	IEC 62271-1	•							

(1) Rated normal current defined in free air

(2) Rated service value

(3) For these versions, with 275 mm pole centre distance, special insulating partitions are provided (on request)

(4) For the dimensions of the insulating partitions (available on request), see the standardised table in chapter 5

(5) Operation sequence: O - 0.3 min - CO - 3 min - CO

(6) The second distance refers to the circuit-breaker with truck (available on request)

2. Selection and ordering

General characteristics of withdrawable circuit-breakers
for UniGear type ZS1 switchgear (12 kV) ⁽⁵⁾



Circuit-breaker		HD4/GT/P 12						
Standards	IEC 62271-100 •							•
	GOST R 52565-2006 ⁽⁵⁾ •							•
Rated voltage	Ur [kV]	10						10
Rated insulation voltage	Us [kV]	12						12
Withstand voltage at 50 Hz	Ud (1 min) [kV]	42 ⁽⁶⁾						38 ⁽⁶⁾
Impulse withstand voltage	Up [kV]	75						75
Rated frequency	fr [Hz]	50-60						50-60
Rated normal current (40 °C) ⁽¹⁾	Ir [A]	630	1250	1250	1600	2000	2500	3150 ⁽⁴⁾
		16	16	—	—	—	—	—
		—	—	—	20	—	—	—
		25	25	—	25	25	25	25
		31.5	31.5	—	31.5	31.5	31.5	31.5
		—	—	40	40	40	40	40
Rated breaking capacity	Isc [kA]	—	—	—	50	50	50	50
		16	16	—	—	—	—	—
		—	—	—	20	—	—	—
		25	25	—	25	25	25	25
		31.5	31.5	—	31.5	31.5	31.5	31.5
		—	—	40	40	40	40	40
Rated short-time withstand current (3s)	Ik [kA]	—	—	—	50	50	50	50
		16	16	—	—	—	—	—
		—	—	—	20	—	—	—
		25	25	—	25	25	25	25
		31.5	31.5	—	31.5	31.5	31.5	31.5
		—	—	40	40	40	40	40
Making capacity	Ip [kA]	—	—	—	50	50	50	50
		40	40	—	—	—	—	—
		—	—	—	50	—	—	—
		63	63	—	63	63	63	63
		80	80	—	80	80	80	80
		—	—	100	100	100	100	100
Operation sequence	[O-0.3s-CO-15s-CO]							
	[O-0.3s-CO-20s-CO] •							
	[O-0.3s-CO-180s-CO] •							
Opening time	[ms]	35-60						
Arcing time	[ms]	10-15						
Total breaking time	[ms]	45-75						
Closing time	[ms]	≤85						
Overall dimensions		H [mm]	633	633	702	702	702	746
		W [mm]	531	531	682	682	682	882
		D [mm]	661	661	640	640	640	643
		Pole centre distance l [mm]	150	150	210	210	210	275
Weight	[kg]	120	120	177	177	177	220	230
Standardised table of dimensions		1VCD000227	1VCD000227	TN 7350	TN 7350	TN 7351	TN 7352	TN7371
Absolute SF6 gas pressure ⁽²⁾	[kPa]	380 (430 at 31.5 kA)						
Operating temperature ⁽³⁾	[°C]	- 5 ... + 40						
Tropicalization	IEC: 60068-2-30, 60721-2-1 •							
Electromagnetic compatibility	IEC 62271-1 •							

(1) Rated uninterrupted current guaranteed with withdrawable circuit-breaker installed in UniGear type ZS1 switchboard at 40°C ambient temperature externally the panel.

(2) Rated service value.

(3) The standard range is -5 °C ... +40 °C; on request it is also available the range -25 °C ... +40 °C with mandatory a special pressure-switch (with temperature compensation)

(4) Up to 4000 A rated uninterrupted current with forced ventilation.

(5) The locking electromagnet (-RL2) in the truck to prevent the circuit breaker being racked-in with the auxiliary circuits disconnected

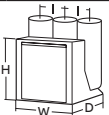
(6) UniGear type ZS1 switchboard with rated insulation voltage 17,5 kV

(7) Rated uninterrupted current in switchboard with forced ventilation. In a switchboard with natural ventilation, the rated current is 2300 A

(8) Declaration of conformity to GOST R 52565-2006 issued by Autonomous organization "scientific research center" Standartelectro-S of Moscow

General characteristics of withdrawable circuit-breakers for UniGear type ZS1 switchgear (17.5 kV) ⁽⁵⁾



Circuit-breaker		HD4/P 17							
Standards	IEC 62271-100 •								
Rated voltage	Ur [kV]	17.5							
Rated insulation voltage	Us [kV]	17.5							
Withstand voltage at 50 Hz	Ud (1 min) [kV]	38							
Impulse withstand voltage	Up [kV]	95							
Rated frequency	fr [Hz]	50-60							
Rated normal current (40 °C) ⁽¹⁾	Ir [A]	630	1250	1250	1600	2000	2500	3150 ⁽⁴⁾	
Rated normal current	Isc [kA]	16	16	—	—	—	—	—	
		—	—	—	—	—	—	—	
		25	25	—	25	25	25	25	
		31.5	31.5	—	31.5	31.5	31.5	31.5	
		—	—	40	40	40	40	40	
		—	—	—	50	50	50	50	
		—	—	—	—	—	—	—	
Rated short-time withstand current (3s)	Ik [kA]	16	16	—	—	—	—	—	
		—	—	—	—	—	—	—	
		25	25	—	25	25	25	25	
		31.5	31.5	—	31.5	31.5	31.5	31.5	
		—	—	40	40	40	40	40	
		—	—	—	50	50	50	50	
		—	—	—	—	—	—	—	
Making capacity	Ip [kA]	40	40	—	—	—	—	—	
		—	—	—	—	—	—	—	
		63	63	—	63	63	63	63	
		—	80	—	80	80	80	80	
		—	—	100	100	100	100	100	
		—	—	—	125	125	125	125	
		—	—	—	—	—	—	—	
Operation sequence	[O-0.3s-CO-15s-CO] •								
Opening time	[ms]	35-60							
Arcing time	[ms]	10-15							
Total breaking time	[ms]	45-75							
Closing time	[ms]	≤85							
Overall dimensions		H [mm]	633	633	702	702	702	746	
		W [mm]	531	531	682	682	682	882	882
		D [mm]	661	661	640	640	640	643	643
		Pole centre distance I [mm]	150	150	210	210	210	275	275
		Weight	[kg]	120	120	177	177	177	220
Standardised table of dimensions	1VCD000227 1VCD000227 TN 7350 TN 7350 TN 7351 TN 7352 TN7371								
Absolute SF6 gas pressure ⁽²⁾	[kPa]	380 (430 at 31.5 kA)							
Operating temperature	[°C]	- 5 ... + 40							
Tropicalization	IEC: 60068-2-30, 60721-2-1 •								
Electromagnetic compatibility	IEC 62271-1 •								

(1) Rated uninterrupted current guaranteed with withdrawable circuit-breaker installed in UniGear type ZS1 switchboard at 40°C ambient temperature externally the panel.

(2) Rated service value.

(3) The standard range is -5 °C ... +40 °C; on request it is also available the range -25 °C ... +40 °C with mandatory a special pressure-switch (with temperature compensation)

(4) Up to 4000 A rated uninterrupted current with forced ventilation.

(5) The locking electromagnet (-RL2) in the truck to prevent the circuit breaker being racked-in with the auxiliary circuits disconnected

(6) UniGear type ZS1 switchboard with rated insulation voltage 17,5 kV

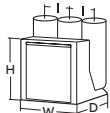
(7) Rated uninterrupted current in switchboard with forced ventilation. In a switchboard with natural ventilation, the rated current is 2300 A

(8) Declaration of conformity to GOST R 52565-2006 issued by Autonomous organization "scientific research center" Standartelectro-S of Moscow

2. Selection and ordering

General characteristics of withdrawable circuit-breakers for UniGear type ZS1 switchgear (24 kV) ⁽⁵⁾



Circuit-breaker		HD4/P 24						
Standards	IEC 62271-100	•						
Rated voltage	Ur [kV]	24						
Rated insulation voltage	Us [kV]	24						
Withstand voltage at 50 Hz	Ud (1 min) [kV]	50						
Impulse withstand voltage	Up [kV]	125						
Rated frequency	fr [Hz]	50-60						
Rated normal current (40 °C) ⁽¹⁾	Ir [A]	630	1250	1250	1600	2000	2500 ⁽⁷⁾	
Rated breaking capacity	Isc [kA]	16	—	—	16	16	—	
		20	20	—	20	20	20	
		25	25	—	25	25	25	
		—	—	31.5	31.5	31.5	31.5	
		—	—	—	—	—	—	
		—	—	—	—	—	—	
Rated short-time withstand current (3s)	Ik [kA]	16	—	—	16	16	—	
		20	20	—	20	20	20	
		25	25	—	25	25	25	
		—	—	31.5	31.5	31.5	31.5	
		—	—	—	—	—	—	
		—	—	—	—	—	—	
Making capacity	Ip [kA]	40	—	—	40	40	—	
		50	50	—	50	50	50	
		63	63	—	63	63	63	
		—	—	80	80	80	80	
		—	—	—	—	—	—	
		—	—	—	—	—	—	
Operation sequence	[O-0.3s-CO-15s-CO]	•						
Opening time	[ms]	35-60						
Arcing time	[ms]	10-15						
Total breaking time	[ms]	45-75						
Closing time	[ms]	≤85						
Overall dimensions		H [mm]	736	736	792	821	821	821
		W [mm]	636	636	653	842	842	842
		D [mm]	799	799	799	788	788	788
		Pole centre distance l [mm]	210	210	210	275	275	275
Weight	[kg]	125	125	177	177	220	220	
Standardised table of dimensions		1VCD000236	1VCD000236	1VCD000099	TN 7355	TN 7356	TN 7356	
Absolute SF6 gas pressure ⁽²⁾	[kPa]	380 (480 at 25 kA and 40 kA)						
Operating temperature	[°C]	- 5 ... + 40						
Tropicalization	IEC: 60068-2-30, 60721-2-1	•						
Electromagnetic compatibility	IEC 62271-1	•						

(1) Rated uninterrupted current guaranteed with withdrawable circuit-breaker installed in UniGear type ZS1 switchboard at 40°C ambient temperature externally the panel.

(2) Rated service value.

(3) The standard range is -5 °C ... +40 °C; on request it is also available the range -25 °C ... +40 °C with mandatory a special pressure-switch (with temperature compensation)

(4) Up to 4000 A rated uninterrupted current with forced ventilation.

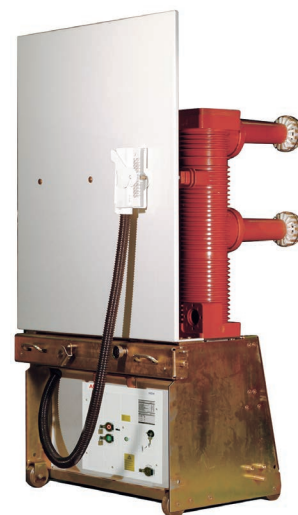
(5) The locking electromagnet (-RL2) in the truck to prevent the circuit breaker being racked-in with the auxiliary circuits disconnected

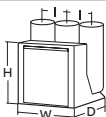
(6) UniGear type ZS1 switchboard with rated insulation voltage 17,5 kV

(7) Rated uninterrupted current in switchboard with forced ventilation. In a switchboard with natural ventilation, the rated current is 2300 A

(8) Declaration of conformity to GOST R 52565-2006 issued by Autonomous organization "scientific research center" Standartelectro-S of Moscow

General characteristics of withdrawable circuit-breakers for UniGear type ZS3.2 switchgear (40.5 kV)



Circuit-breaker		HD4/Z 40.5			
Standards	IEC 62271-100	•			
Rated voltage	Ur [kV]	40.5			
Rated insulation voltage	Us [kV]	40.5			
Withstand voltage at 50 Hz	Ud (1 min) [kV]	95			
Impulse withstand voltage	Up [kV]	185			
Rated frequency	fr [Hz]	50-60			
Rated normal current (40 °C) ⁽¹⁾	Ir [A]	1250	1600	2000	2500 ⁽³⁾
Rated breaking capacity	Isc [kA]	25	25	25	25
		31.5 ⁽⁴⁾	31.5 ⁽⁴⁾	31.5 ⁽⁴⁾	31.5 ⁽⁴⁾
Rated short-time withstand current (3s)	Ik [kA]	25	25	25	25
		31.5	31.5	31.5	31.5
Operation sequence	Ip [kA]	63	63	63	63
		80	80	80	80
Operation sequence	[O-0.3s-CO-15s-CO]	•			
Opening time	[ms]	45			
Arcing time	[ms]	10-15			
Total breaking time	[ms]	55-60			
Closing time	[ms]	80			
<div></div> <div>Overall dimensions</div>	H [mm]	1575			
	W [mm]	850			
	D [mm]	686			
	Pole centre distance l [mm]	280			
Weight	[kg]	280			
Standardised table of dimensions	TN 7227				
Absolute SF6 gas pressure ⁽²⁾	[kPa]	550			
Operating temperature	[°C]	- 5 ... + 40			
Tropicalization	•				
Electromagnetic compatibility	IEC 62271-1	•			

(1) Rated normal current with circuit-breaker in switchgear UniGear ZS3.2 and ambient temperature outside the switchgear 40 °C

(2) Rated service value

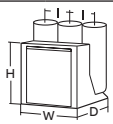
(3) Rated current in ZS3.2 switchgear with forced ventilation; in Powerbloc enclosure the 2500 A rated current is guaranteed with natural ventilation.

(4) The operation sequence becomes O-0.3-CO-3min-CO for the $I_{sc} = 31.5$ kA performance.

2. Selection and ordering

General characteristics of withdrawable circuit-breakers
for PowerCube units (12 kV)



Circuit-breaker		HD4/P 12		HD4/W 12		HD4/P 12						
PowerCube module		PB1	PB1	PB2	PB2	PB2	PB2	PB2	PB3	PB2	PB2	PB3
Standards	IEC 62271-100	•										
Rated voltage	Ur [kV]	12										
Rated insulation voltage	Us [kV]	12										
Withstand voltage at 50 Hz	Ud (1 min) [kV]	28										
Impulse withstand voltage	Up [kV]	75										
Rated frequency	fr [Hz]	50-60										
Rated normal current (40 °C) ⁽¹⁾	Ir [A]	630	1250	630	1250	1250	1600	2000	3150 ⁽³⁾	1600	2000	2500
Rated breaking capacity	Isc [kA]	16	16	16	16	—	16	16	—	—	—	—
		—	—	—	—	—	—	—	—	—	—	—
		25	25	25	25	—	25	25	—	—	—	25
		31.5	31.5	31.5	31.5	—	31.5	31.5	31.5	—	—	31.5
		—	—	—	—	40	—	—	40	40	40	40
		—	—	—	—	50	—	—	50	50	50	50
Rated short-time withstand current (3s)	Ik [kA]	16	16	16	16	—	16	16	—	—	—	—
		—	—	—	—	—	—	—	—	—	—	—
		25	25	25	25	—	25	25	—	—	—	25
		31.5	31.5	31.5	31.5	—	31.5	31.5	31.5	—	—	31.5
		—	—	—	—	40	—	—	40	40	40	40
		—	—	—	—	50	—	—	50	50	50	50
Making capacity	Ip [kA]	40	40	40	40	—	40	40	—	—	—	—
		—	—	—	—	—	—	—	—	—	—	—
		63	63	63	63	—	63	63	—	—	—	63
		80	80	80	80	—	80	80	80	—	—	80
		—	—	—	—	100	—	—	100	100	100	100
		—	—	—	—	125	—	—	125	125	125	125
Operation sequence	[O-0.3s-CO-15s-CO]	•										
Opening time	[ms]	35-60										
Arcing time	[ms]	10-15										
Total breaking time	[ms]	45-75										
Closing time	[ms]	≤85										
Overall dimensions		H [mm]	633	702		702	702	702	742	702	702	702
		W [mm]	531	681		681	681	681	882	682	682	882
		D [mm]	661	640		640	640	640	643	640	640	643
		Pole centre distance I [mm]	150	210		210	210	210	275	210	210	275
Weight	[kg]	120	120		177	177	177	230	177	177	220	
Standardised table of dimensions		1VCD000227		1VCD000228		TN 7421	TN 7239	TN 7239	1VCD000053	TN 7350	TN 7351	TN 7352
Absolute SF6 gas pressure ⁽²⁾	[kPa]	380 (430 at 31.5 kA)										
Operating temperature	[°C]	- 5 ... + 40										
Tropicalization	IEC: 60068-2-30, 60721-2-1	•										
Electromagnetic compatibility	IEC 62271-1	•										

(1) Rated normal current with withdrawable circuit-breaker in switchgear

(2) Rated service value

(3) There are higher currents with forced ventilation: 3600 A with a fan installed in the PB3 and 4000 A with a further fan in the rear of the switchgear (provided by the customer); see the PowerCube Instruction Manual

(4) 2500 A with forced ventilation

(5) 480 to 25 kA and 40 kA

General characteristics of withdrawable circuit-breakers for PowerCube units (17.5 kV)



Circuit-breaker		HD4/P 17		HD4/W 17						HD4/P 17		
PowerCube module		PB1	PB1	PB2	PB2	PB2	PB2	PB2	PB3	PB2	PB2	PB3
Standards	IEC 62271-100	•										
Rated voltage	Ur [kV]	17.5										
Rated insulation voltage	Us [kV]	17.5										
Withstand voltage at 50 Hz	Ud (1 min) [kV]	38										
Impulse withstand voltage	Up [kV]	95										
Rated frequency	fr [Hz]	50-60										
Rated normal current (40 °C) ⁽¹⁾	Ir [A]	630	1250	630	1250	1250	1600	2000	3150 ⁽³⁾	1600	2000	2500
Rated breaking capacity	Isc [kA]	16	16	16	16	—	16	16	—	—	—	—
		—	—	—	—	—	—	—	—	—	—	—
		25	25	25	25	—	25	25	—	—	—	25
		31.5	31.5	31.5	31.5	—	31.5	31.5	31.5	—	—	31.5
		—	—	—	—	40	—	—	40	40	40	40
Rated short-time withstand current (3s)	Ik [kA]	—	—	—	—	50	—	—	50	50	50	50
		16	16	16	16	—	16	16	—	—	—	—
		—	—	—	—	—	—	—	—	—	—	—
		25	25	25	25	—	25	25	—	—	—	25
		31.5	31.5	31.5	31.5	—	31.5	31.5	31.5	—	—	31.5
Making capacity	Ip [kA]	—	—	—	—	40	—	—	40	40	40	40
		—	—	—	—	50	—	—	50	50	50	50
		40	40	40	40	—	40	40	—	—	—	—
		—	—	—	—	—	—	—	—	—	—	—
		63	63	63	63	—	63	63	—	—	—	63
		80	80	80	80	—	80	80	80	—	—	80
		—	—	—	—	100	—	—	100	100	100	100
		—	—	—	—	125	—	—	125	125	125	125
		—	—	—	—	—	—	—	—	—	—	—
Operation sequence	[O-0.3s-CO-15s-CO]	•										
Opening time	[ms]	35-60										
Arcing time	[ms]	10-15										
Total breaking time	[ms]	45-75										
Closing time	[ms]	≤85										
Overall dimensions	H [mm]	633	702	702	702	702	702	702	702	702	702	702
	W [mm]	531	681	682	682	682	682	682	682	682	682	682
	D [mm]	661	640	640	640	640	640	640	640	640	640	640
	Pole centre distance l [mm]	150	210	210	210	210	210	210	210	210	210	210
Weight	[kg]	120	120	177	177	177	177	177	177	177	177	220
Standardised table of dimensions		1VCD000227	1VCD000228	TN 7421	TN 7239	TN 7239	1VCD000053	TN 7350	TN 7351	TN 7352	TN 7352	TN 7352
Absolute SF6 gas pressure ⁽²⁾	[kPa]	380 (430 at 31.5 kA)										
Operating temperature	[°C]	- 5 ... + 40										
Tropicalization	IEC: 60068-2-30, 60721-2-1	•										
Electromagnetic compatibility	IEC 62271-1	•										

(1) Rated normal current with withdrawable circuit-breaker in switchgear

(2) Rated service value

(3) There are higher currents with forced ventilation: 3600 A with a fan installed in the PB3 and 4000 A with a further fan in the rear of the switchgear (provided by the customer); see the PowerCube Instruction Manual

(4) 2500 A with forced ventilation

(5) 480 to 25 kA and 40 kA

2. Selection and ordering

General characteristics of withdrawable circuit-breakers
for PowerCube units (24 kV)



Circuit-breaker		HD4/P 24					
PowerCube module		PB4	PB4	PB4	PB5	PB5	PB5
Standards	IEC 62271-100	•					
Rated voltage	Ur [kV]	24					
Rated insulation voltage	Us [kV]	24					
Withstand voltage at 50 Hz	Ud (1 min) [kV]	50					
Impulse withstand voltage	Up [kV]	125					
Rated frequency	fr [Hz]	50-60					
Rated normal current (40 °C) ⁽¹⁾	Ir [A]	630	1250	1250	1600	2000	2500 ⁽⁴⁾
Rated breaking capacity	Isc [kA]	16	16	—	16	16	16
		20	20	—	20	20	20
		25	25	—	25	25	25
		—	—	31.5	31.5	31.5	31.5
		—	—	40	40	40	40
		—	—	—	—	—	—
Rated short-time withstand current (3s)	Ik [kA]	16	16	—	16	16	16
		20	20	—	20	20	20
		25	25	—	25	25	25
		—	—	31.5	31.5	31.5	31.5
		—	—	40	40	40	40
		—	—	—	—	—	—
Making capacity	Ip [kA]	40	40	—	40	40	40
		50	50	—	50	50	50
		63	63	—	63	63	63
		—	—	80	80	80	80
		—	—	100	100	100	100
		—	—	—	—	—	—
Operation sequence	[O-0.3s-CO-15s-CO]	•					
Opening time	[ms]	35-60					
Arcing time	[ms]	10-15					
Total breaking time	[ms]	45-75					
Closing time	[ms]	≤85					
Maximum overall dimensions	H [mm]	792	792	792	821	821	821
	W [mm]	682	682	641	842	842	842
	D [mm]	799	799	799	788	788	788
	Pole centre distance I [mm]	210	210	210	275	275	275
Weight	[kg]	125	125	177	177	220	220
Standardised table of dimensions		1VCD000236	1VCD000236	1VCD000099	TN 7355	TN 7356	TN 7356
Absolute SF ₆ gas pressure ⁽²⁾	[kPa]	380 (480 at 25 kA and 40 kA)					
Operating temperature	[°C]	- 5 ... + 40		- 5 ... + 40	- 5 ... + 40		
Tropicalization	IEC: 60068-2-30, 60721-2-1	•		•	•		
Electromagnetic compatibility	IEC 62271-1	•		•	•		

(1) Rated normal current with withdrawable circuit-breaker in switchgear

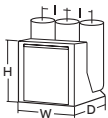
(2) Rated service value

(3) There are higher currents with forced ventilation: 3600 A with a fan installed in the PB3 and 4000 A with a further fan in the rear of the switchgear (provided by the customer); see the PowerCube Instruction Manual

(4) 2500 A with forced ventilation

General characteristics of withdrawable circuit-breakers for PowerCube units (36 kV) and UniGear type ZS2 switchgear (36 kV)



Circuit-breaker		HD4/W 36									
Standards		IEC 62271-100 •									
Rated voltage		Ur [kV]	36								
Rated insulation voltage		Us [kV]	36								
Withstand voltage at 50 Hz		Ud (1 min) [kV]	70								
Impulse withstand voltage		Up [kV]	170								
Rated frequency		fr [Hz]	50-60								
Rated normal current (40 °C) ⁽¹⁾		Ir [A]	1250	1250	1600	1600	2000	2000	2500 ⁽³⁾	2500 ⁽³⁾	
Rated breaking capacity		Isc [kA]	20	—	20	—	20	—	20	—	
			25	—	25	—	25	—	25	—	
			—	31.5	—	31.5	—	31.5	—	31.5	
Rated short-time withstand current (3s)		Ik [kA]	20	—	20	—	20	—	20	—	
			25	—	25	—	25	—	25	—	
			—	31.5	—	31.5	—	31.5	—	31.5	
Making capacity		Ip [kA]	50	—	50	—	50	—	50	—	
			63	—	63	—	63	—	63	—	
			—	80	—	80	—	80	—	80	
Operation sequence	[O-0.3s-CO-3min-CO]	•	•	—	•	—	•	—	•		
	[O-0.3s-CO-15s-CO]	—	—	•	—	•	—	•	—		
Opening time		[ms]	45								
Arcing time		[ms]	10-15								
Total breaking time		[ms]	55-60								
Closing time		[ms]	80								
Maximum overall dimensions 		H [mm]	973	973	973	973	973	973	973		
		W [mm]	882	882	882	882	882	882	882	882	
		D [mm]	788	788	789	789	789	789	789	789	
		Pole centre distance l [mm]	275	275	275	275	275	275	275	275	
Weight		[kg]	130	225	225	225	225	225	270	270	
Standardised table of dimensions			TN 7402	TN 7316	TN 7317	TN 7317	TN 7317	TN 7317	TN 7317	TN 7317	
Absolute SF ₆ gas pressure ⁽²⁾		[kPa]	450								
Operating temperature		[°C]	- 5 ... + 40								
Tropicalization		IEC: 60068-2-30, 60721-2-1 •									
Electromagnetic compatibility		IEC 62271-1 •									

(1) Rated normal current with circuit-breaker in UniGear ZS2 switch-gear and 40 °C ambient temperature outside the switchgear

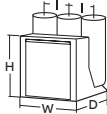
(2) Rated service value

(3) Switchgear with forced ventilation

2. Selection and ordering

General characteristics of withdrawable circuit-breakers
for UniSec (12 -17.5 - 24 kV) type units WBC



Circuit-breaker		HD4/P 12	HD4/P 17	HD4/SEC 24
Standards	IEC 62271-100	•	•	•
Rated voltage	Ur [kV]	12	17.5	24
Rated insulation voltage	Us [kV]	12	17.5	24
Withstand voltage at 50 Hz	Ud (1 min) [kV]	28	38	50
Impulse withstand voltage	Up [kV]	75	95	125
Rated frequency	fr [Hz]	50-60	50-60	50-60
Rated normal current (40 °C) ⁽¹⁾	Ir [A]	630-1250	630-1250	630-1250
Rated breaking capacity	Isc [kA]	16	16	16
		20	20	20
		25	25	—
Rated short-time withstand current	Ik [kA]	16	16	16
		20	20	20
		25	25	—
Making capacity	Ip [kA]	40	40	40
		50	50	50
		63	63	—
Operation sequence	[O-0.3s-CO-15s-CO]	•	•	•
Opening time	[ms]	35-60	35-60	35-60
Arcing time	[ms]	10-15	10-15	10-15
Total breaking time	[ms]	45-75	45-75	45-75
Closing time	[ms]	≤85	≤85	≤85
Maximum overall dimensions		H [mm]	633	800
		W [mm]	531	682
		D [mm]	661	739
		Pole centre distance l [mm]	150	210
Truck run	[mm]	200	200	200
Weight	[kg]	120	120	123
Standardised table of dimensions		1VCD000227	1VCD000227	1VCD000220
Absolute SF ₆ gas pressure ⁽²⁾	[kPa]	380 (480 at 25 kA and 40 kA)		
Operating temperature	[°C]	- 5 ... + 40		
Tropicalization	IEC: 60068-2-30, 60721-2-1	•		
Electromagnetic compatibility	IEC 62271-1	•		

(1) Rated normal current with withdrawable circuit-breaker in switchgear

(2) Rated service value

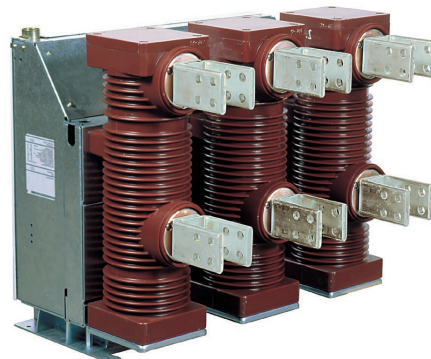
Standard equipment

The basic versions of the circuit-breakers are always three-pole and fitted with:

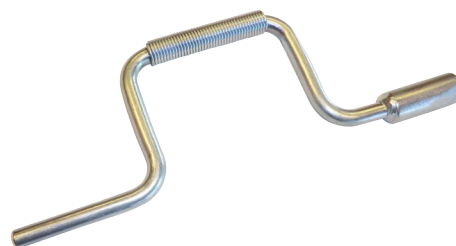
- manual operating mechanism
- mechanical signalling device for closing springs charged/discharged
- mechanical signalling device for circuit-breaker open/closed
- closing pushbutton
- opening pushbutton
- operation counter
- 12 to 36 kV series: set of 14 auxiliary contacts for circuit-breaker open/closed; five closing contacts (circuit-breaker open signalling) and seven opening contacts (circuit-breaker closed signalling) are available for use by the customer if the apparatus is equipped with all the electrical applications
- 40.5 kV series: set of 10 auxiliary contacts for circuit-breaker open/closed; three closing contacts (circuit-breaker open signalling) and four opening contacts (circuit-breaker closed signalling) are available for use by the customer if the apparatus is equipped with all the electrical applications
- lever for manually charging the closing springs (the quantity must be defined according to the number of pieces of apparatus ordered).

Moreover:

- for fixed circuit-breaker
 - connection terminals (not available for low-end circuit-breakers)
 - terminal board for auxiliary circuits;
- for withdrawable circuit-breaker
 - isolating contacts
 - cord with connector (plug only) for auxiliary circuits
 - lock to prevent racking-in of circuit-breaker with different rated current
 - racking-in/out lever (the quantity must be defined according to the number of pieces of apparatus ordered)
 - locking electromagnet in the truck (/P versions).



Terminals for fixed circuit-breaker.



Circuit-breaker racking-out/racking-in lever.



Tulip isolating contacts for withdrawable circuit-breaker.



Manual charging lever of operating mechanism springs.

2. Selection and ordering

Table of availability of accessories

	-MBO1 shunt opening release.	-MBO2 additional shunt opening release.	-MBO3 shunt opening release with demagnetisation.	-MBC shunt closing release.	-MBU undervoltage release (power supply on supply side).	-MBU undervoltage release with electronic time delay device (power supply on supply side).	Mechanical override of undervoltage release trip.	-BGB5 undervoltage release electric signalling (energised or de-energised).	Set of 14 auxiliary contacts: 5 closing contacts for signalling circuit-breaker open and 7 opening contacts for signalling circuit-breaker closed.	Set of 15 auxiliary contacts for the circuit-breaker: 4 for closing and 5 for opening (as an alternative to the standard 10, of which up to 3 for closing and 4 for opening are available, depending on the accessories required).	-BGB4 transient contact.	-BGT3 position contact of the withdrawable circuit-breaker (installed on the truck). It is compulsory if the RLE1 locking magnet is present.	Withdrawable circuit-breaker transmitted contacts (installed in the circuit-breaker truck) -BGT1, -BGT2.	-MAS spring charging geared motor.
	1A	1B	1C	2	3A	3B	4	5	6A	6B	7	8	9	10
Fixed c.-breakers														
HD4/GT 12	•	•	•	•	•	•	•	•	•	—	•	—	—	•
HD4 17	•	•	•	•	•	•	•	•	•	—	•	—	—	•
HD4 24	•	•	•	•	•	•	•	•	•	—	•	—	—	•
HD4 36	•	•	•	•	•	•	•	•	•	—	•	—	—	•
Withdrawable circuit-breakers for UniGear type ZS1 switchgear														
HD4/GT/P 12	•	•	•	•	•	•	•	•	•	—	•	•	•	•
HD4/P 17	•	•	•	•	•	•	•	•	•	—	•	•	•	•
HD4/P 24	•	•	•	•	•	•	•	•	•	—	•	•	•	•
Withdrawable circuit-breakers for UniGear 36 type ZS3.2 switchgear														
HD4/Z 40,5	•	•	•	•	•	•	•	•	•	•	•	—	(1)	•
Withdrawable circuit-breakers for PowerCube modules														
HD4/W 12 - HD/P 12	•	•	•	•	•	•	•	•	•	—	•	•	•	•
HD4/W 17 - HD/P 17	•	•	•	•	•	•	•	•	•	—	•	•	•	•
HD4/P	•	•	•	•	•	•	•	•	•	—	•	•	•	•
HD4/W 36 (5)	•	•	•	•	•	•	•	•	•	—	•	•	•	•
Withdrawable circuit-breakers for UniSec switchgear														
HD4/SEC 24	•	•	•	•	•	•	•	•	•	—	•	•	•	•

(1) Standard fitting: no. 6 auxiliary contacts.

(2) Application of the pressure switch is only possible in the factory.

(3) For this version it is only available without LED.

(4) The locking electro-magnet in the truck (-RLE2) to prevent the circuit-breaker being racked-in with the auxiliary circuits disconnected (plug not inserted in the socket) is included in the standard equipment.

(5) Also suitable for UniGear type ZS2

	-FCM1 thermomagnetic protection of spring charging geared motor.	Electric signalling of springs charged.	Electric signalling of springs discharged.	Opening pushbutton lock.	Closing pushbutton lock.	Open circuit-breaker key lock.	-RLE1 operating mechanism locking magnet.	-RLE2 truck locking magnet.	Interlock for fixed circuit-breaker.	Mechanical isolation interlock with the switchgear door.	Two-level pressure switch ⁽²⁾ .	Two-level pressure switch plus SF ₆ control device with three LEDs ⁽²⁾ .	Insulating partitions.	3-lobed key for manual operation.
	11	12A	12B	13A	13B	14	15	16	17	18	19A	19B-C	20	21
Fixed c.-breakers														
HD4/GT 12	•	•	•	•	•	•	•	–	•	–	•	•	–	
HD4 17	•	•	•	•	•	•	•	–	•	–	•	•	–	
HD4 24	•	•	•	•	•	•	•	–	•	–	•	•	•	
HD4 36	•	•	•	•	•	•	•	–	•	–	•	•	•	
Withdrawable circuit-breakers for UniGear type ZS1 switchgear														
HD4/GT/P 12	•	•	•	•	•	•	•	(4)	•	•	•	•	–	
HD4/P 17	•	•	•	•	•	•	•	(4)	•	•	•	•	–	
HD4/P 24	•	•	•	•	•	•	•	(4)	•	•	•	•	–	
Withdrawable circuit-breakers for UniGear 36 type ZS3.2 switchgear														
HD4/Z 40,5	•	•	•	–	–	•	•	•	–	•	(3)	•	–	•
Withdrawable circuit-breakers for PowerCube modules														
HD4/W 12 - HD/P 12	•	•	•	•	•	•	•	–	–	•	•	•	–	
HD4/W 17 - HD/P 17	•	•	•	•	•	•	•	–	–	•	•	•	–	
HD4/P	•	•	•	•	•	•	•	–	–	•	•	•	–	
HD4/W 36 (5)	•	•	•	•	•	•	•	•	–	–	•	•	–	
Withdrawable circuit-breakers for UniSec switchgear														
HD4/SEC 24	•	•	•	•	•	•	•	•	–	–	•	•	–	

(1) Standard fitting: no. 6 auxiliary contacts.

(2) Application of the pressure switch is only possible in the factory.

(3) For this version it is only available without LED.

(4) The locking electro-magnet in the truck (-RLE2) to prevent the circuit-breaker being racked-in with the auxiliary circuits disconnected (plug not inserted in the socket) is included in the standard equipment.

(5) Also suitable for UniGear type ZS2

2. Selection and ordering

Optional accessories

The accessories identified with the same number are alternative to each other; consult the table at the end of the chapter for the electrical characteristics.

1 Shunt opening release

1A Shunt opening release -MB01

Allows the opening command of the apparatus to be enabled by remote control.

This release is only suitable for instantaneous service; there is always an auxiliary contact -BGB1 to de-energize it after the circuit-breaker has opened. To guarantee the release action, the current impulse must last at least 100 ms. The coil of this release can be controlled by any CCC (Control Coil Continuity) device and TCS (Trip Circuit Supervision) circuit opening supervision device.

1B Additional shunt opening release -MB02

Similarly to shunt opening release -MB01, this allows the opening command of the apparatus to be transmitted by remote control. It can be energized by the same circuit as main shunt opening release -MB01 or by a circuit that is completely separate from release -MB01. This release is only suitable for instantaneous service. There is always an auxiliary contact -BGB1 to de-energize it after the circuit-breaker has opened. To guarantee the release action, the current impulse must last at least 100 ms. The coil of this release can be controlled by any CCC (Control Coil Continuity) device and TCS (Trip Circuit Supervision) circuit opening supervision device.

1C Demagnetizing shunt opening release -MB03

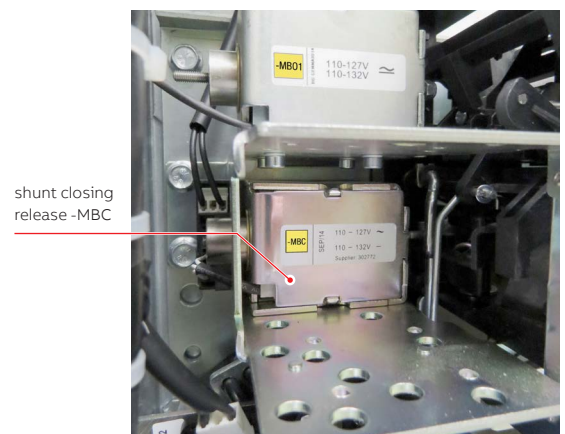
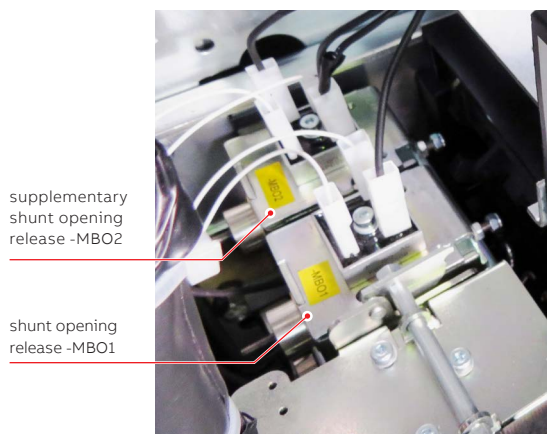
The opening solenoid (-MB03) is a special demagnetizing release for use in conjunction with protection relays against overcurrents of the self-supplied type (e.g. the old ABB PR521 series). It is an alternative to the additional shunt opening release (-MB02).

2 Shunt closing release -MBC

Allows the closing command of the apparatus to be transmitted by remote control.

To guarantee the closing action, the current impulse must last at least 100 ms. This release is suitable for both instantaneous and permanent duty (an auxiliary contact that de-energizes it after the circuit-breaker has closed is not envisaged). Permanently energized, the release provides the electrical anti-pumping function when both the opening and closing remote commands (electrical) are maintained. If shunt closing release -MBC and undervoltage release -MBU are energized by the same supply voltage and automatic closing of the circuit-breaker is required when the auxiliary voltage returns, there must be a delay of at least 50 ms between undervoltage release energizing and energizing of the shunt closing release to allow the closing operation to take place. Release functionality cannot be controlled by CCC and TCS devices.

This can only be done by the ABB STU device (accessory supplied on request).



3 Under-voltage release -MBU

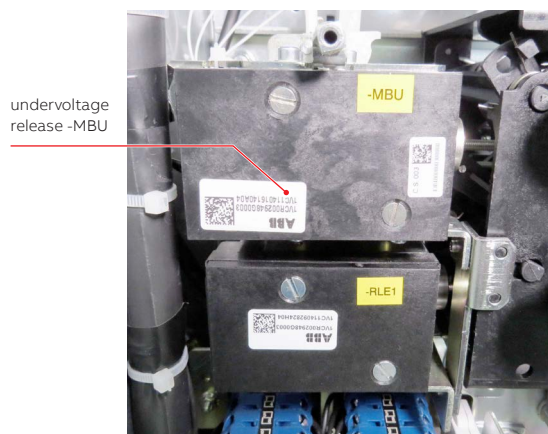
Undervoltage release -MBU opens the circuit-breaker when there is a sensible reduction or lack of the voltage that energizes it. The circuit-breaker can only close when the release is energized (the closing lock is obtained mechanically). It can be used for remote release (by means of a pushbutton of the normally closed type), for locking on automatic closing and/or opening in the absence of voltage in the auxiliary circuits. Energized by means of the secondary output of a voltage transformer, it provides locking upon automatic closing/opening in the absence of voltage in the Medium Voltage main circuit. If shunt closing release -MBC and undervoltage release -MBU are energized by the same supply voltage and automatic closing of the circuit-breaker is required when the auxiliary voltage returns, there must be a delay of at least 50 ms between undervoltage release energizing and energizing of the shunt closing release to allow the closing operation to take place.

3A Undervoltage release -MBU (only for power supply branched on the supply side of the circuit-breaker)

3B Undervoltage release -MBU with electronic time-lag device -KFT (only for power supply branched on the supply side of the circuit-breaker).

Circuit-breaker closing is inhibited when the undervoltage release (equipped with electronic time-lag device -KFT) is not energized. Electronic time-lag device -KFT is only designed to delay the tripping action of undervoltage release -MBU at preset, adjustable times (0.5 - 1 - 1.5 - 2 - 3 s). This device is consigned with the 0.5 s time setting. Consult the Chapter on circuit diagrams, note I, page 67). Electronic time-lag device -KFT must be installed inside the operating enclosure of the circuit-breaker.

To avoid tripping, use of the delayed undervoltage release is convenient when the supply network of release -MBU may often be liable to brief voltage dips or tiny power outages. The voltage of the undervoltage release must be within the operating range of the electronic time-lag device.



electronic time-lag device -KFT

2. Selection and ordering

4 Mechanical override of undervoltage release tripping with “undervoltage excluded” electrical signalling

The mechanical undervoltage override is a manually switched two-position device installed on the front of the circuit-breaker operating mechanism. Its purpose is to prevent the undervoltage release from tripping so that the circuit-breaker can be operated as though it were without an undervoltage release. The undervoltage override is always equipped with an electrical contact for signalling “undervoltage excluded”. The mechanical override is essential when the undervoltage release is supplied by the secondary of a transformer on the load side of the circuit-breaker. In this case, the installation can only be energized by excluding the undervoltage. The mechanical override can be operated after the circuit-breaker has closed so as to restore undervoltage functionality. The mechanical override is useful when inspections/maintenance must be performed with the circuit-breaker withdrawn from the switchgear and with the auxiliary circuits de-energized. Specify when ordering the apparatus if the mechanical override is required since it cannot be installed by the customer at a later date.

5 Electrical signalling of the state of undervoltage release -BGB5

An “undervoltage release energized” or “undervoltage release de-energized” signalling contact can be supplied on request. It must be specified when ordering the apparatus since it cannot be installed by the customer at a later date.

6 Auxiliary and signalling contacts

6A Auxiliary contacts –BGB1,-BGB2 for all 12 kV to 36 kV fixed and withdrawable series

Electrical signalling of circuit-breaker open/closed can be obtained with a set of 14 auxiliary contacts for the fixed version and 14 auxiliary contacts for the plug-in version.

Note

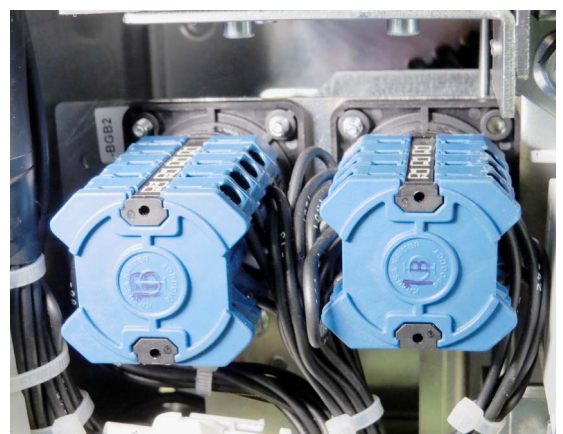
The following contacts are available for the fixed and plug-in circuit-breaker with the standard set of fourteen auxiliary contacts and the maximum number of electrical accessories:

- five closing contacts for signalling circuit-breaker open
- seven opening contacts for signalling circuit-breaker closed.

The auxiliary contacts of fixed circuit-breakers are always wired to the terminal box.

Please refer to the following circuit diagrams:

- 1VCD400192 for fixed circuit-breakers up to 24 kV and 36 kV circuit-breakers with 350 mm pole center-distance
- 1VCD400193 for 36 kV fixed circuit-breakers with 275 mm pole center-distance
- 1VCD400197 for withdrawable circuit-breakers up to 24 kV (with auxiliary contacts -BGB1,-BGB2 independent from connected/isolated signalling contacts -BGT1,-BGT2)
- 1VCD400199 for withdrawable circuit-breakers up to 24 kV (with auxiliary contacts -BGB1,-BGB2 interconnected with connected/isolated signalling contacts -BGT1,-BGT2)
- 1VCD400194 for 36 kV withdrawable circuit-breakers



Note: The main shunt opening release and/or the additional shunt opening release use 1 and/or 2 closing contacts "a", thereby reducing the number of auxiliary contacts available. Always check the maximum number of contacts available with non-standard equipment.

Auxiliary contacts –BGB1 and –BGB2 conform to the following standards/regulations/directives:

- IEC 62271-100
- IEEE C37.54
- EN 61373 cat.1 class B / impact and vibration test
- Germanish Loyd regulation / vibrations envisaged by the shipping registers
- UL 508
- EN 60947 (DC-21A DC-22A DC-23A AC-21A)
- RoHS Directive

General characteristics	
Insulation voltage to standard VDE 0110, Group C	660 V AC 800 V DC
Rated voltage	24 V ... 660 V
Test voltage	2 kV for 1 min
Maximum rated current	10 A - 50/60 Hz
Breaking capacity	Class 1 (IEC 62271-1)
Number of contacts	5
Groups of contacts	10 / 16 / 20
Contact travel	90°
Actuating force	0.66 Nm
Resistance	<6.5 mΩ
Storage temperature	–30 °C ... +120 °C
Operating temperature	–20 °C ... +70 °C (–30° ref. ANSI 37.09)
Contact overtemperature	10 K
Mechanical life	10,000 mechanical operations
Protection class	IP20
Cable section	1 mm²

Electrical characteristics (according to IEC 60947)

Rated current Un		Breaking capacity (10000 interruptions)
220 V AC	Cosφ = 0.70	20 A
220 V DC	Cosφ = 0.45	10 A
24 V DC	1 ms	12 A
	15 ms	9 A
	50 ms	6 A
60 V DC	1 ms	10 A
	15 ms	6 A
	50 ms	4.6 A
110 V DC	1 ms	7 A
	15 ms	4.5 A
	50 ms	3.5 A
220 V DC	1 ms	2 A
	15 ms	1.7 A
	50 ms	1.5 A
250 V DC	1 ms	2 A
	15 ms	1.4 A
	50 ms	1.2 A

6B Auxiliary contacts -BB1-BB2-BB3 for the 40.5 kV withdrawable series only

Electrical signalling of circuit-breaker open/closed includes, as standard equipment, a set of 10 auxiliary contacts for the 40.5 kV withdrawable version.

Set of 10 circuit-breaker open/closed auxiliary contacts. Three closing contacts (circuit-breaker open signalling) and four opening contacts (circuit-breaker closed signalling) are available if the apparatus is equipped with all the electrical applications.

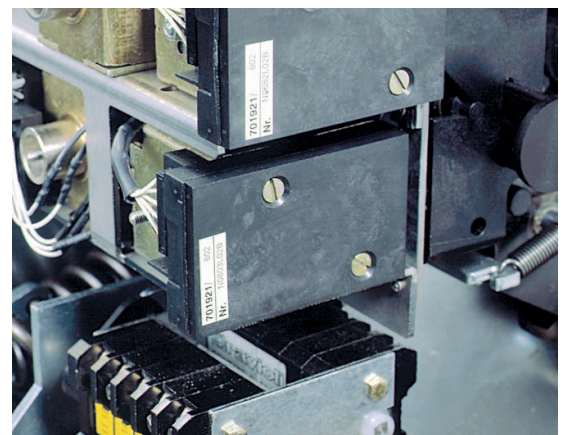
A set of 15 auxiliary contacts for signalling circuit-breaker open/closed can be supplied on request.

Four closing contacts (circuit-breaker open signalling) and four opening contacts (circuit-breaker closed signalling) are available if the apparatus is equipped with all the electrical applications.

Electrical specifications of the auxiliary contacts of the 40.5 kV withdrawable circuit-breaker

Un	=	500 V~	220 V–
Icu	=	15 A	1,5 A
Cosφ	=	0,4	–
T	=	500 V~	10 ms

Un Rated voltage
Cosφ Power factor
Icu Breaking capacity
Ps Inrush power input (inrush duration is given between brackets)
Pc Continuous service power consumption
T Time constant



2. Selection and ordering

7 Transient contact -BGB4 with momentary closing during circuit-breaker opening

This contact closes momentarily (for about 30 ms) when the circuit-breaker opens. The transient contact is activated by the main operating shaft, thus the indication is only provided when the main contacts of the circuit-breaker effectively open.



8 Position contact of withdrawable circuit-breaker -BGT3

Only supplied for withdrawable circuit-breakers for UniGear ZS1 and ZS2 switchgear and PowerCube modules from 12 to 36 kV.

This contact is installed in the truck. It is in the closed state when the truck is fully racked-in or fully racked-out and is in the open state when the truck is being racked-in/racked-out.

It is used in conjunction with the locking magnet in the operating mechanism (-RLE1) to prevent remote closing during movement in the compartment.

It is supplied as standard equipment when locking magnet -RLE1 is installed in the operating mechanism and truck-mounted contacts are not required (-BGT1, -BGT2). It cannot be supplied when truck-mounted contacts are required (-BGT1; -BGT2).

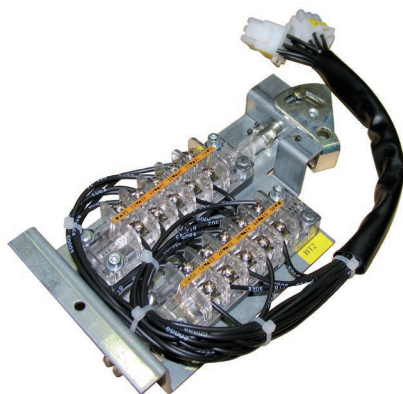


9 Electrical signalling contacts for circuit-breaker connected and isolated (-BGT1; -BGT2)

These contacts are an alternative to the withdrawable circuit-breaker position contact (-BGT3) and are recommended when there are no position contacts on the roof of the circuit-breaker compartment (for signalling circuit-breaker racked-out or racked-in). Contacts -BGT1, -BGT2 are supplied as standard equipment when locking magnet -RLE1 is installed in the operating mechanism and position contact -BGT3 has not been requested. Contacts -BGT1 and BGT2 have the same general and electrical characteristics as auxiliary contacts “7b. -BB1, -BB2, -BB3”.

General characteristics	
Insulation voltage to standard VDE 0110, Group C	660 V a.c. 800 V d.c.
Rated voltage	24 V ... 660 V a.c.
Test voltage	2 kV 50 Hz (for 1 min)
Rated overcurrent	10 A
Number of contacts	5
Contact run	6 mm ... 7 mm
Activation force	26 N
Resistance	3 mΩ
Storage temperature	-20 °C ... +120 °C
Operating temperature	-20 °C ... +70 °C
Contact overtemperature	20 K
Number of cycles	10.000
Unlimited breaking capacity if used with 10 A fuse in series	

Electrical characteristics			
Un		Rated current	Breaking capacity
220 V a.c.	Cosφ = 0.7	2.5 A	25 A
380 V a.c.	Cosφ = 0.7	1.5 A	15 A
500 V a.c.	Cosφ = 0.7	1.5 A	15 A
660 V a.c.	Cosφ = 0.7	1.2 A	12 A
24 V d.c.	1 ms	10 A	12 A
	15 ms	10 A	12 A
	50 ms	8 A	10 A
	200 ms	6 A	7.7 A
60 V d.c.	1 ms	8 A	10 A
	15 ms	6 A	8 A
	50 ms	5 A	6 A
	200 ms	4 A	5.4 A
110 V d.c.	1 ms	6 A	8 A
	15 ms	4 A	5 A
	50 ms	2 A	4.6 A
	200 ms	1 A	2.2 A
220 V d.c.	1 ms	1.5 A	2 A
	15 ms	1 A	1.4 A
	50 ms	0.75 A	1.2 A
	200 ms	0.5 A	1 A



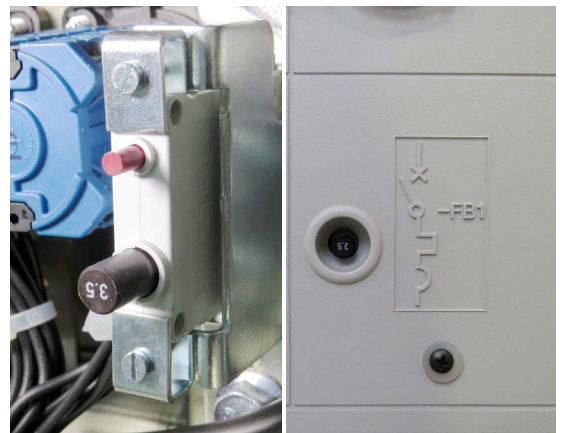
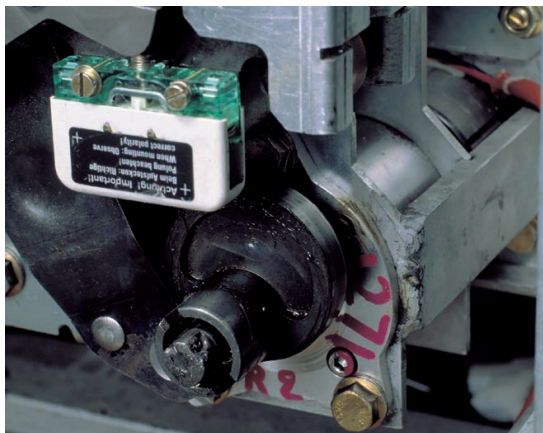
2. Selection and ordering

10 Spring-loading geared motor -MAS

The geared motor automatically loads the closing spring of the circuit-breaker's operating mechanism after the circuit-breaker has closed each time and until the yellow "spring loaded" indicator appears. If a power cut occurs when loading is in progress, the geared motor stops and automatically starts loading the springs again when the power returns. Loading can always be completed in the manual mode (as it is during maintenance work) by means of the dedicated lever supplied. Check the power available in the supply circuit to find out whether several motors for loading the closing springs can operate at the same time. To prevent excessive power consumption, especially when the installation is put into service, it is advisable to load the springs by hand before energizing the auxiliary circuits.

11 Thermal magnetic protection -FCM1 of the closing spring loading motor

Thermal magnetic protection of the closing spring loading motor is supplied as part of the standard equipment for 24 V DC rated voltage while it is available on request for other voltage values. It is always supplied with electrical signalling of thermal magnetic protection tripped.



12 Signalling for closing spring loaded/ discharged

Contact for signalling closing spring loaded/
discharged -BGS2

This consists of a microswitch, which allows
remote signalling of the state of the closing spring
of the circuit-breaker operating mechanism.
One of the following signals can be selected:

**12A contact open: electrical signalling of spring
loaded**

12B contact closed: spring discharged signal

13 Locks and interlocks

13 A Opening pushbutton lock (with or without padlock).

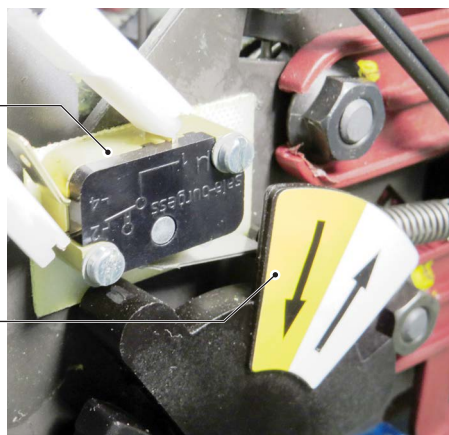
Locks the opening pushbutton with a 4 mm
diameter padlock (not part of the standard
equipment). The padlock is only supplied on
request.

13 B Closing pushbutton lock (with or without padlock).

Locks the closing pushbutton with a 4 mm
diameter padlock (not part of the standard
equipment). The padlock is only supplied on
request.

electrical signalling of spring
loaded/discharged

spring loaded/discharged
mechanical indicator

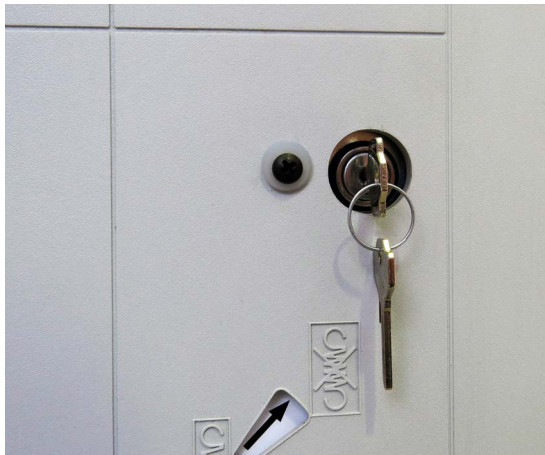


2. Selection and ordering

14 “Circuit-breaker open” key lock (different keys or the same keys)

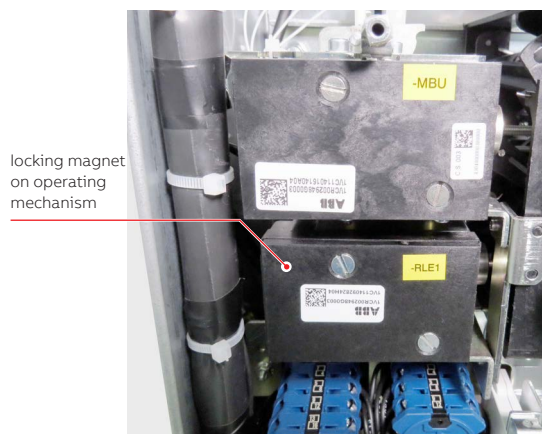
The locking action is performed by a special circular lock.

Can be supplied with different keys or the same keys (for several circuit-breakers). To apply the key lock, press the opening pushbutton, turn the key and remove it. Local manual closing and remote electrical closing are inhibited once the key has been removed.



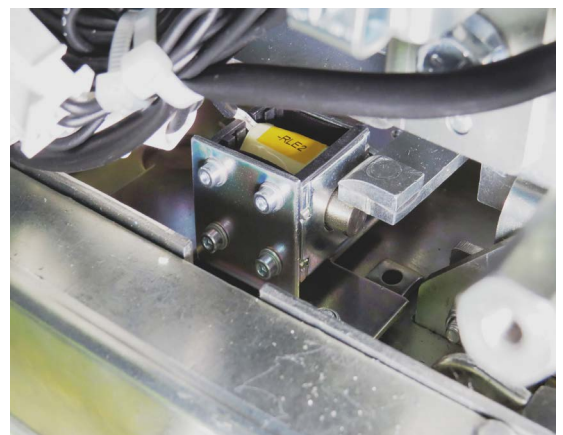
15 Locking magnet -RLE1 on operating mechanism

Local manual closing and remote electrical closing can only be obtained when electromagnet RLE1 is energized. When -RLE1 is requested for a withdrawable circuit-breaker, it comes with contact -BGT2 unless contacts -BGT1, -BGT2 have been requested.



16 Locking magnet -RLE2 on truck

This accessory is mandatory in withdrawable versions for UniGear switchgear type ZS1 and for PowerCube modules so as to prevent the circuit-breaker from being racked into the switchgear when the plug of the auxiliary circuits is disconnected from the switchgear socket. The plug also prevents racking-in if the rated current of the circuit-breaker differs from that of the compartment (dedicated striker pins prevent the plug from being plugged into the socket if the circuit-breaker's rated current is lower than the rated current of the panel).



17 Interlock for fixed circuit-breaker (for fixed apparatus converted to plug-in by the customer)

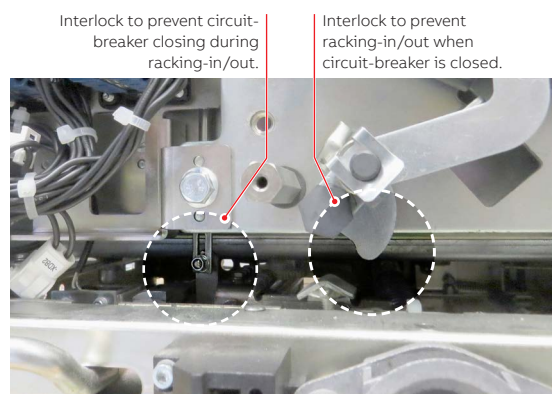
This device can be useful when fixed circuit-breakers are converted into withdrawable ones by the customer.

It allows the customer to create a mechanical lock that inhibits racking-out/racking-in when the circuit-breaker is closed and prevents the circuit-breaker from closing during movement.

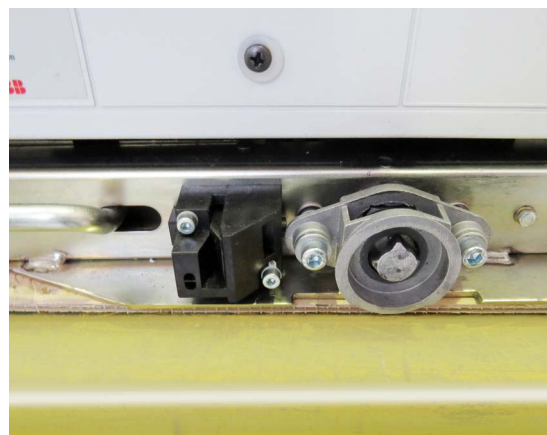
Note. The device must be requested when the order is placed since it must be assembled in the factory.

18 Mechanical isolation interlock with the door of Unigear ZS1, ZS2 switchgear and the PowerCube enclosure

This device prevents the circuit-breaker from being racked-in when the switchgear door is open. It is only intended for circuit-breakers used in UniGear ZS1 and ZS2 switchgear and in PowerCube modules (which must be equipped with a dedicated actuator on the door).



Example of interlock application on a plug-in circuit-breaker with truck for ABB UniGear switchgear or PowerCube enclosure.



2. Selection and ordering

19 Gas monitoring device

Notes:

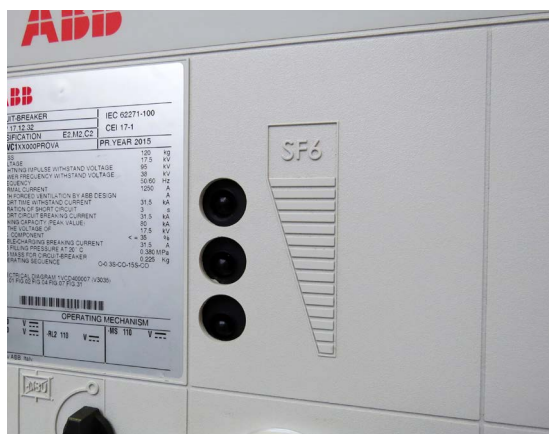
- specify when ordering the apparatus if the pressure switch is required since it cannot be installed by the customer at a later date;
- devices 19B and 19C are supplied without LED for the 40.5 kV HD4/Z series
 - 19A Two-level pressure switch
 - 19B Two-level pressure switch with two-level SF6 monitoring device, three LEDs and supplementary shunt opening release – MBO2: circuit-breaker opening and closing lock
 - 19C Two-level pressure switch with two-level SF6 monitoring device and three LEDs: circuit-breaker locking in the position it has reached

20 Insulating partitions for fixed circuit-breakers

Consult chapter 4 for a list of the circuit-breakers for which the partitions are available (on request. Assembly is at the customer's charge).

21 3-lobed key for manual opening and closing operations

This accessory is only available for the 40.5 kV HD4/Z series.



Characteristics of electrical accessories

Shunt opening release (-MBO1; -MBO2)	Ps	=	125 W/VA (Instantaneous service ≤ 45 ms)
	Un	=	24, 30, 48, 60, 110, 125, 220, 250 V–
	Un	=	48, 110, 120 (127), 230 (220/240) V~ 50 Hz
	Un	=	110 (127), 230 (220/240) V~ 60 Hz
Shunt closing release (-MBC)	Ps	=	250 W/VA (150 ms)
	Pc	=	5 W/VA (antipumping function - continuous service)
	Un	=	24, 30, 48, 60, 110, 125, 220, 250 V–
	Un	=	48, 110, 120 (127), 230 (220/240) V~ 50 Hz
	Un	=	110 (127), 230 (220/240) V~ 60 Hz
Undervoltage release (-MBU)	Ps	=	250 W/VA (150 ms)
	Pc	=	5 W/VA (continuous service)
	Un	=	24, 30, 48, 60, 110, 125, 220, 250 V–
	Un	=	48, 110, 120 (127), 230 (220/240) V~ 50 Hz
	Un	=	110 (127), 230 (220/240) V~ 60 Hz
Spring charging geared motor (-MAS)	Ps	=	1500 W/VA (100 ms)
	Pc	=	400 W/VA (spring charging time: 6 s)
	Un	=	24, 30, 48, 60, 110, 125, 220, 250 V–
	Un	=	48, 110, 120 (127), 230 (220/240) V~ 50 Hz
	Un	=	110 (127), 230 (220/240) V~ 60 Hz
Locking magnets (-RLE1; -RLE2)	Ps	=	250 W/VA (150 ms)
	Pc	=	5 W/VA (continuous service)
	Un	=	24, 30, 48, 60, 110, 125, 220, 250 V–
	Un	=	48, 110, 120 (127), 230 (220/240) V~ 50 Hz
	Un	=	110 (127), 230 (220/240) V~ 60 Hz
Gas control device with 3 LEDs	Un	=	24, 30, 48, 60, 110, 125, 220, 250 V–
	Un	=	48, 110, 120 (127), 230 (220/240) V~ 50 Hz
	Un	=	110 (127), 230 (220/240) V~ 60 Hz
Circuit-breaker auxiliary contacts (only for 40 kV HD4/Z)	Un	=	500 V~ 220 V–
	Icu	=	15 A 1.5 A
	cosφ	=	0.4 –
	T	=	– 10 ms

Un	Rated voltage.
cosφ	Power factor.
Icu	Breaking capacity
Ps	Inrush power consumption (the inrush time is indicated in brackets).
Pc	Continuous service power consumption.
T	Time constant.

3. Specific product characteristics



Resistance to vibrations

HD4 circuit-breakers are unaffected by mechanically generated vibrations. For the versions approved by the naval registers, please contact us.

Tropicalization

HD4 circuit-breakers are manufactured in compliance with the strictest regulations for use in hot-humid-saline climates.

All the most important metal components are treated against corrosive factors according to atmospheric **corrosivity class C5 of standard BS EN 12500**.

Galvanisation is carried out in accordance with UNI ISO 2081 Standards, classification code Fe/Zn 12, with a thickness of 12×10^{-6} m, protected by a conversion layer mainly consisting of chromates in compliance with the UNI ISO 4520 Standards.



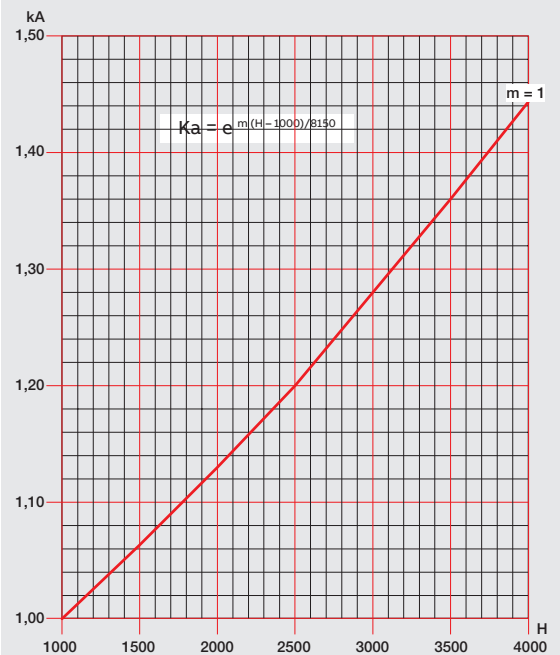


Altitude

The insulating property of air decreases as the altitude increases, therefore this must always be taken into account for external insulation of the apparatus (the internal insulation does not undergo any variations as it is guaranteed by the SF₆ gas).

The phenomenon must always be taken into consideration during the design stage of the insulating components of apparatus to be installed over 1000 m above sea level. In this case a correction coefficient must be considered, which can be taken from the graph to the side, built up on the basis of the indications in the IEC 62271-1 Standards. The following example is a clear interpretation of the indications given above.

Graph for determining the Ka correction factor according to the altitude



Example

- Installation altitude 2000 m
- Operation at the rated voltage of 12 kV
- Withstand voltage at industrial frequency 28 kV rms
- Impulse withstand voltage 75 kVp
- Factor Ka obtained from graph = 1.13.

Considering the above parameters, the apparatus will have to withstand the following values (under test and at zero altitude, i.e. at sea level):

- withstand voltage at industrial frequency equal to:
 $28 \times 1.13 = 31.6 \text{ kVrms}$
- impulse withstand voltage equal to:
 $75 \times 1.13 = 84.7 \text{ kVp}$.

From the above, it can be deduced that for installations at an altitude of 2000 m above sea level, with 12 kV service voltage, apparatus must be provided with 17.5 kV rated voltage, characterised by insulation levels at industrial frequency of 38 kVrms with 95 kVp impulse withstand voltage.

H = altitude in metres;

m = value referred to industrial frequency and the atmospheric impulse withstand voltages and those between phase and phase.

3. Specific product characteristics

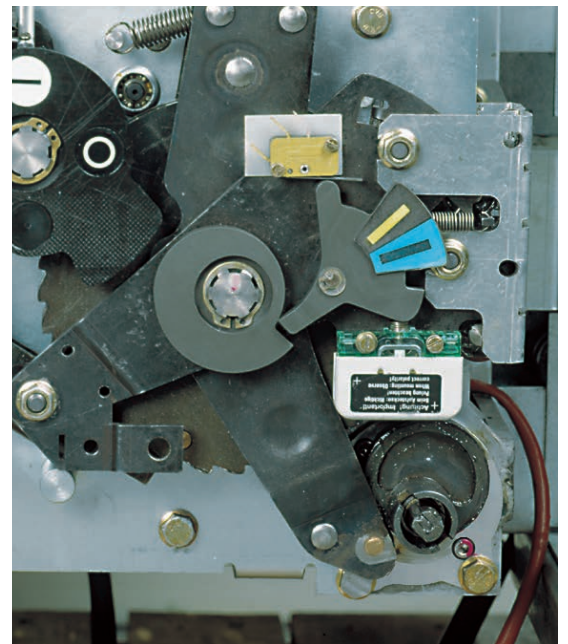
Environmental protection programme

HD4 circuit-breakers are manufactured in accordance with the ISO 14000 Standards (Guidelines for environmental management). The production processes are carried out in compliance with the Standards for environmental protection in terms of reduction in energy consumption as well as in raw materials and production of waste materials. All this is thanks to the medium voltage apparatus manufacturing facility environmental management system. Assessment of the environmental impact of the life cycle of the product, obtained by minimising energy consumption and overall raw materials of the product, became a concrete matter during the design stage by means of targeted selection of the materials, processes and packing. This is to allow maximum recycling at the end of the useful life cycle of the apparatus.

Anti-pumping device

The ESH operating mechanism on HD4 circuit-breakers (in all versions) is fitted with a mechanical anti-pumping device which prevents re-closing due to either electrical or mechanical commands. Should both the closing command and any one of the opening commands be active at the same time, there would be a continuous succession of opening and closing operations. The anti-pumping device avoids this situation, ensuring that each closing operation is only followed by a single opening operation and that there is no closing operation after this. To obtain a further closing operation, the closing command must be released and then relaunched. Furthermore, the anti-pumping device only allows circuit-breaker closure if the following conditions are present at the same time:

- operating mechanism springs fully charged
- opening pushbutton and/or opening release (-MBO1/-MBO2) not enabled
- main circuit-breaker contacts open.



Spare parts

Replacement can only be carried out by trained personnel and/or in our workshops:

- opening springs
- closing springs
- complete pole
- basic operating mechanism
- bushings, terminals and insulating protections.

Replacement which can be carried out by the customer:

- isolating contacts
- geared motor limit switch contact
- KFA1 instantaneous relay
- KFA2 instantaneous relay.

Ordering

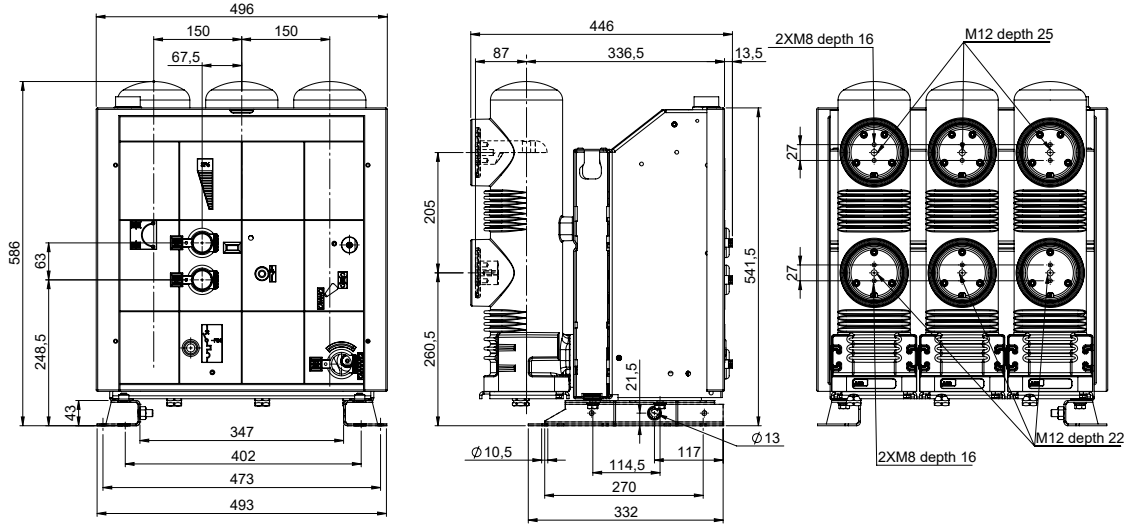
For availability and ordering of spare parts, please contact our Service, specifying the circuit-breaker serial number.



4. Overall dimensions

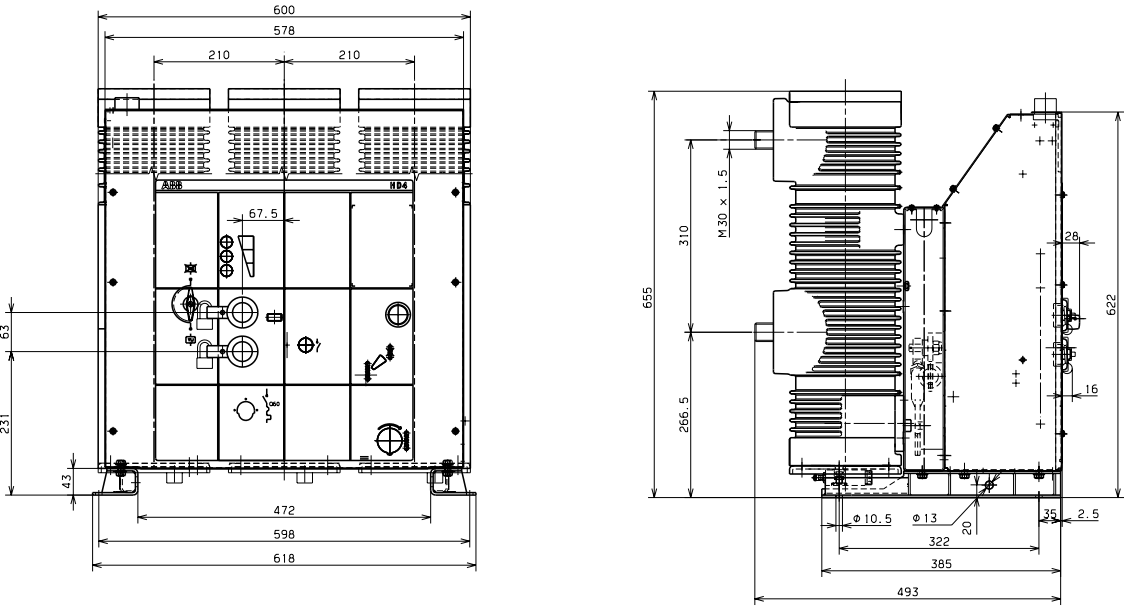
Fixed circuit-breakers

HD4/GT		
TN	1VCD000226	
Ur	12	kV
Ir	630	A
	1250	A
Isc	16	kA
	25	kA
	31.5	kA



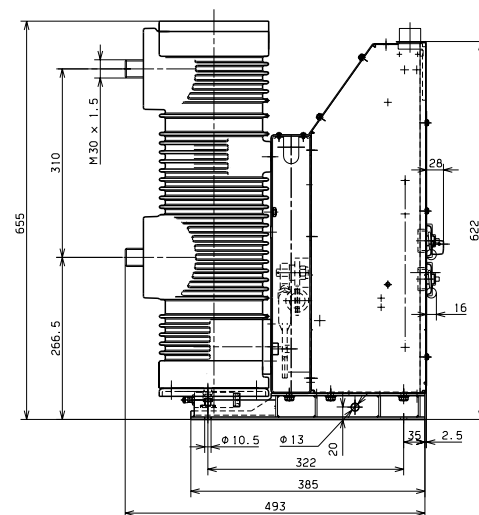
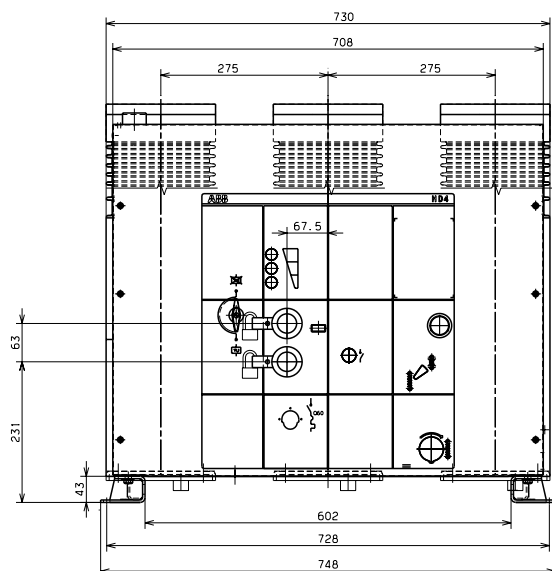
Fixed circuit-breakers

HD4/GT		
TN	TN 7201	
Ur	12	kV
Ir	1250	A
	1600	A
Isc	up to 50 kA	



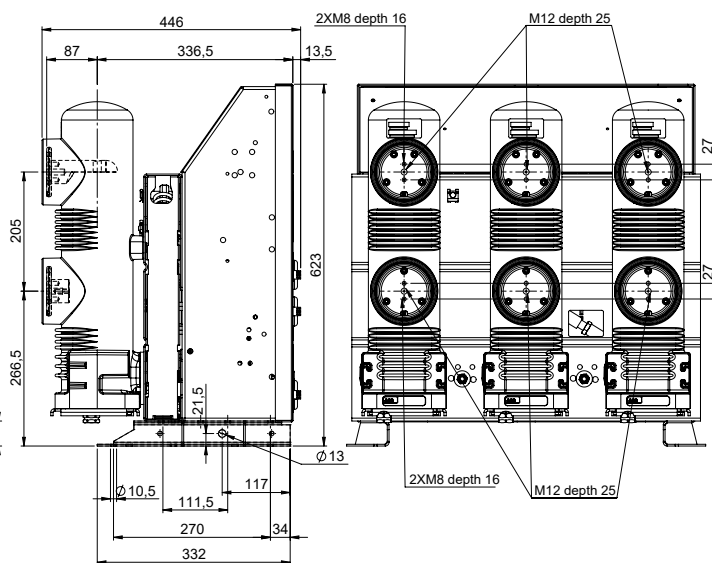
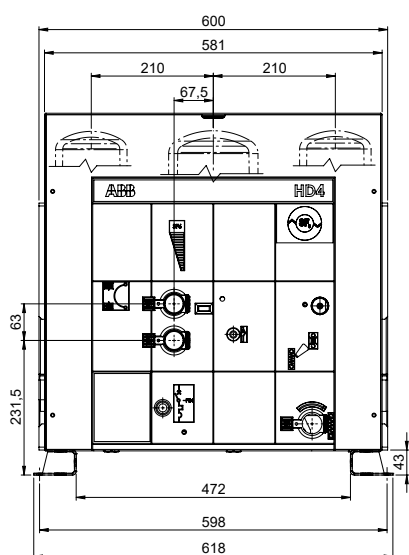
Fixed circuit-breakers

HD4/GT		
TN	TN 7202	
Ur	12	kV
Ir	2000	A
	2500	A
	3150	A
Isc	up to 50 kA	



Fixed circuit-breakers

HD4		
TN	1VCD000231	
Ur	12	kV
	17.5	kV
Ir	630	A
	1250	A
	16	kA
Isc	25	kA
	31.5	kA

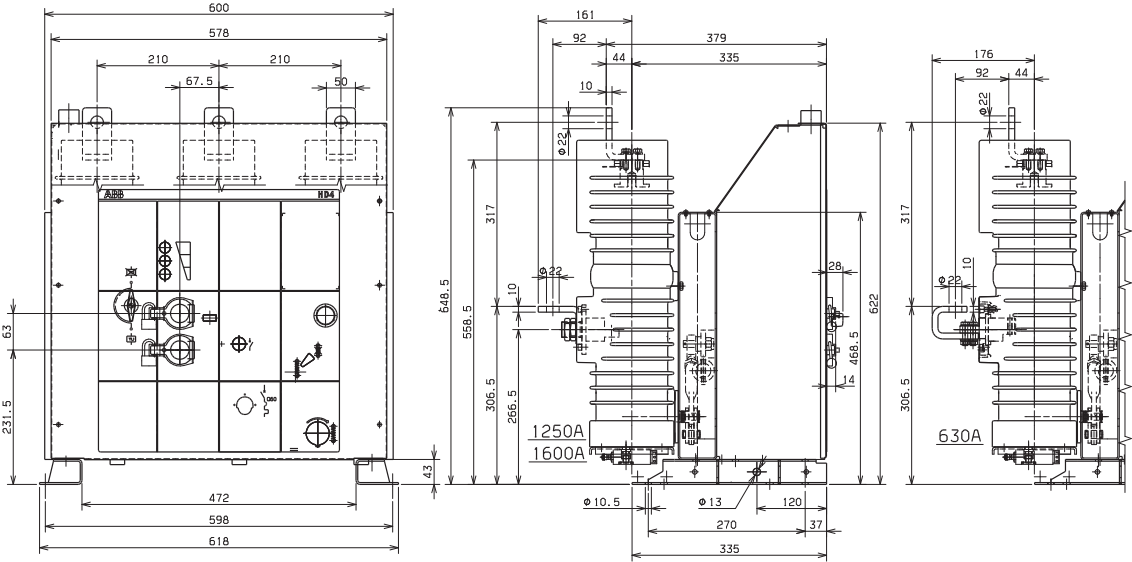




4. Overall dimensions

Fixed circuit-breakers

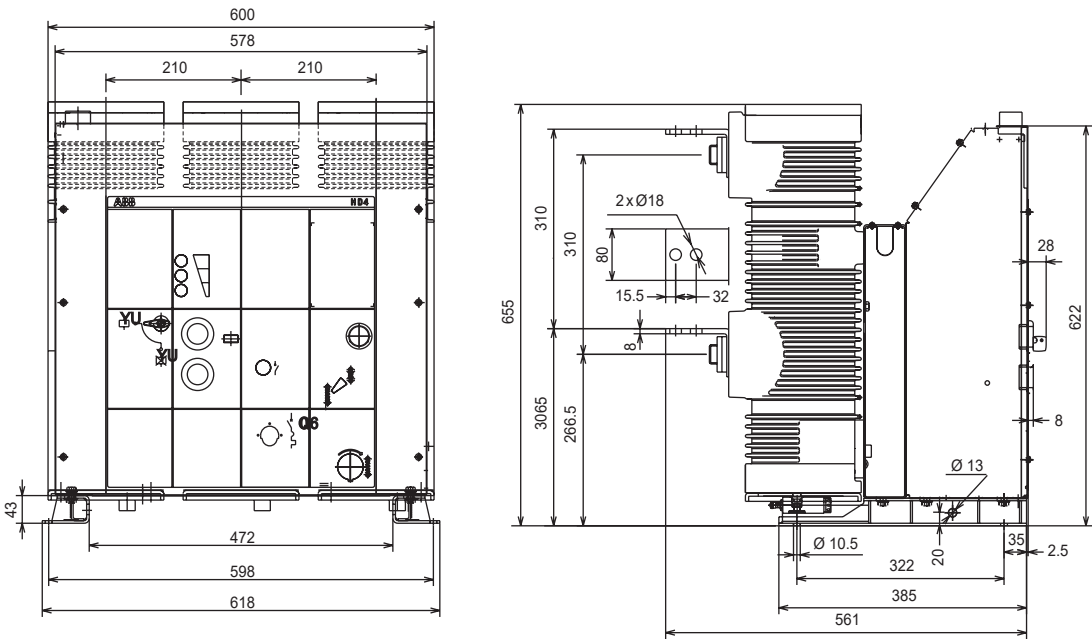
HD4		
TN	7178	
Ur	17	kV
Ir	1600	A
Isc	16	kA
	25	kA
	31.5	kA



Fixed circuit-breakers

HD4		
TN	7163	
Ur	17.5	kV
Ir	1600	A
Isc	40	kA
	50	kA

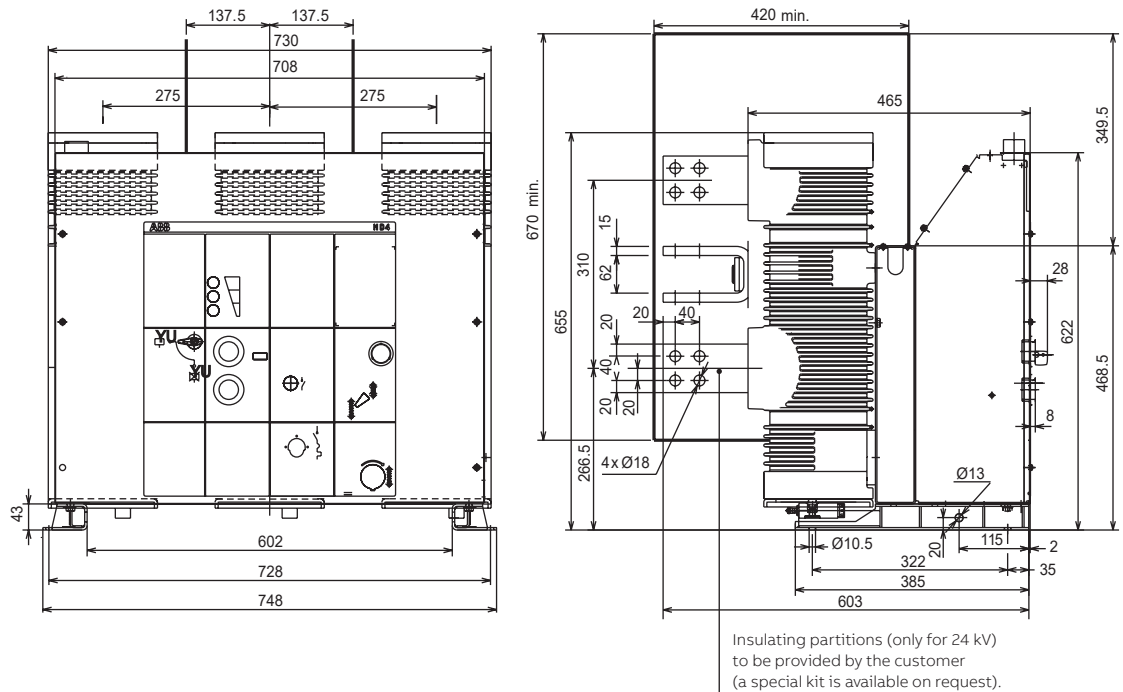
HD4		
TN	7163	
Ur	12	kV
Ur	17.5	kV
Ir	2000	A
Isc	25	kA
	31.5	kA
	40	kA
	50	kA



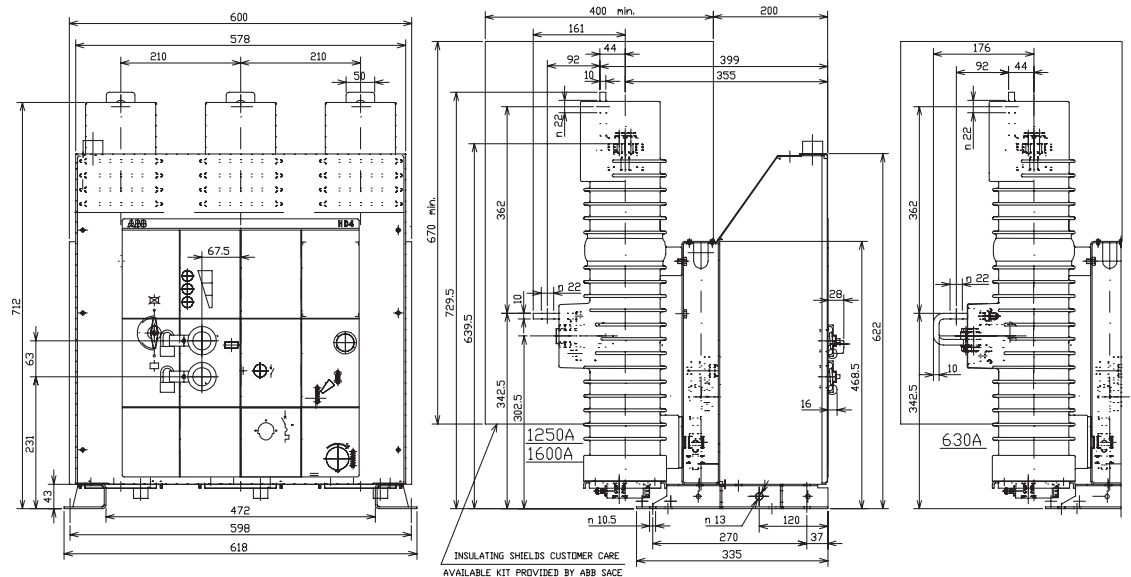
Fixed circuit-breakers

HD4			
TN	7165		
Ur	17.5	kV	
Ir	2500	A	
	3150	A	
	3600	A	
Isc	25	kA	
	31.5	kA	
	40	kA	
	50	kA	

HD4			
TN	7165		
Ur	24	kV	
Ir	2500	A	
	3150	A	
	3600	A	
Isc	25	kA	
	31.5	kA	
	40	kA	

**Fixed circuit-breakers**

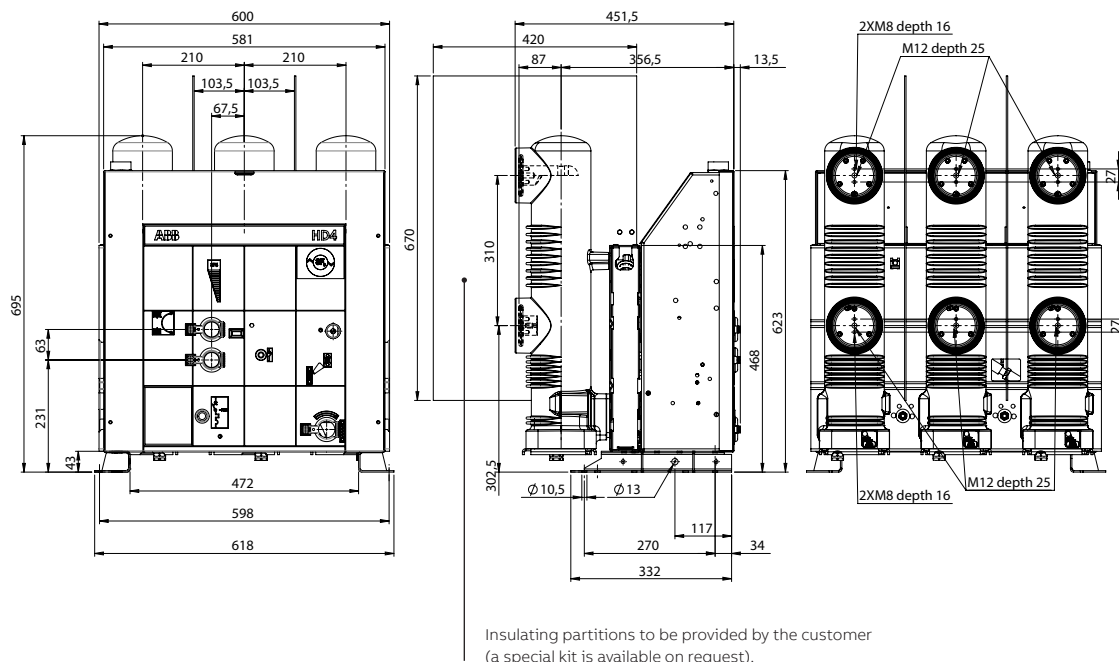
HD4			
TN	7179		
Ur	24	kV	
Ir	1600	A	
Isc	16	kA	
	20	kA	
	25	kA	



4. Overall dimensions

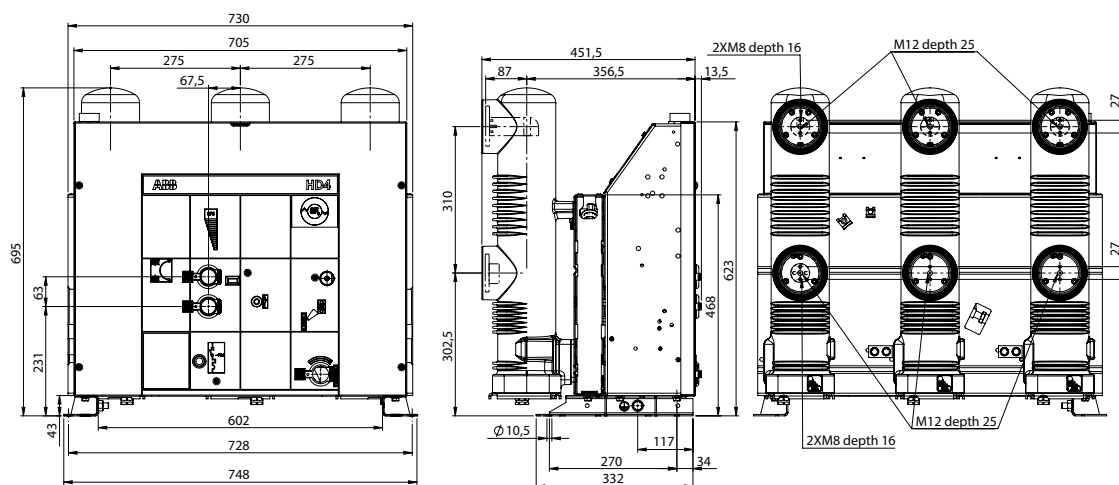
Fixed circuit-breakers

HD4		
TN	1VCD000235	
Ur	24	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA



Fixed circuit-breakers

HD4		
TN	1VCD000237	
Ur	24	kV
Ir	630	A
	1250	A
Isc	16	kA
	20	kA
	25	kA

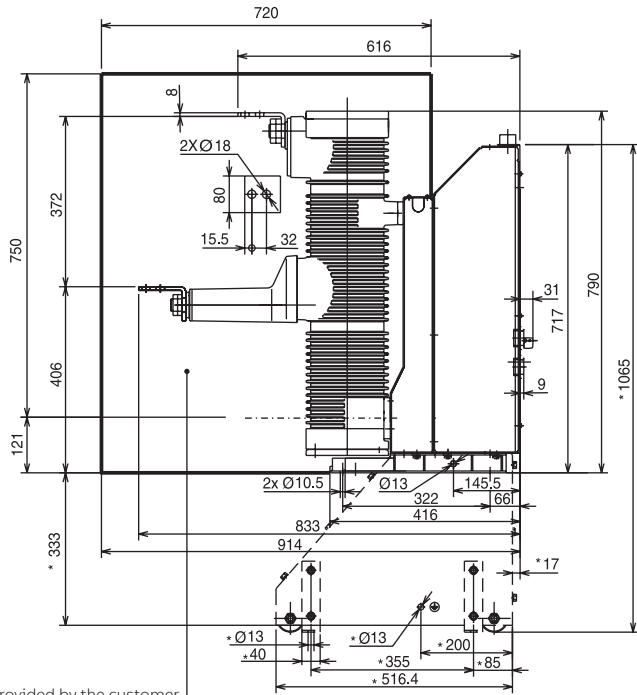
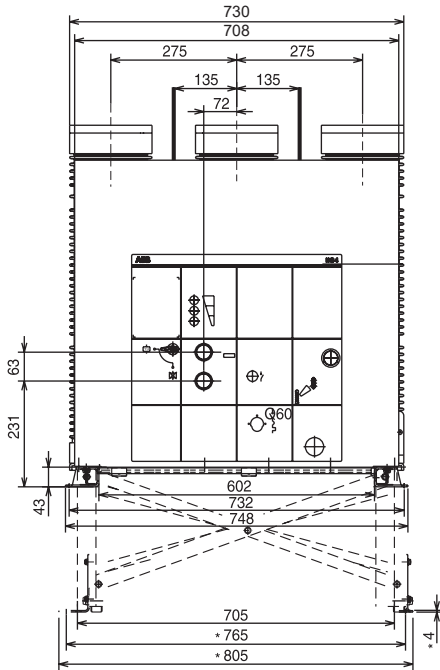


4. Overall dimensions

Fixed circuit-breakers

HD4		
with truck (on request)		
TN	7268	
Ur	36	kV
	1250	A
Ir	1600	A
	25	kA
Isc	31.5	kA

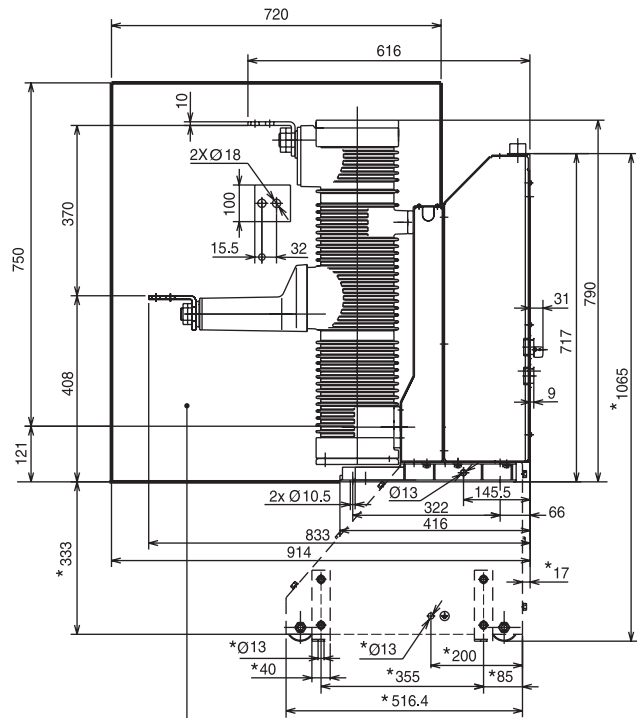
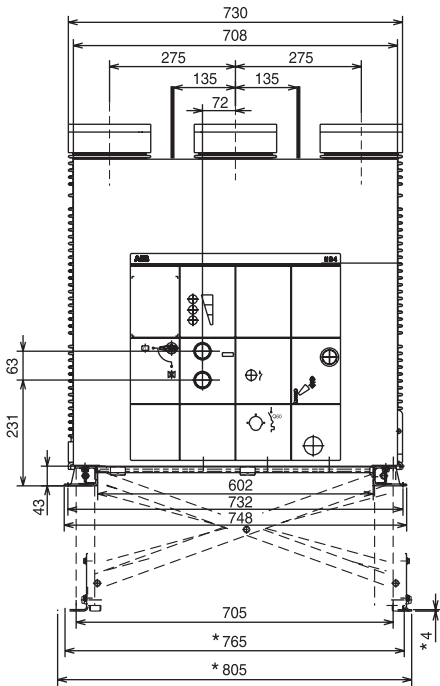
HD4		
with truck (on request)		
TN	7268	
Ir	2000	A
	20	kA
Isc	25	kA
	31.5	kA



Insulating partitions to be provided by the customer
(a special kit is available on request).
* Distance with truck (if provided).

Fixed circuit-breakers

HD4		
with truck (on request)		
TN	7315	
Ur	36	kV
Ir	2500	A
	20	kA
Isc	25	kA
	31.5	kA

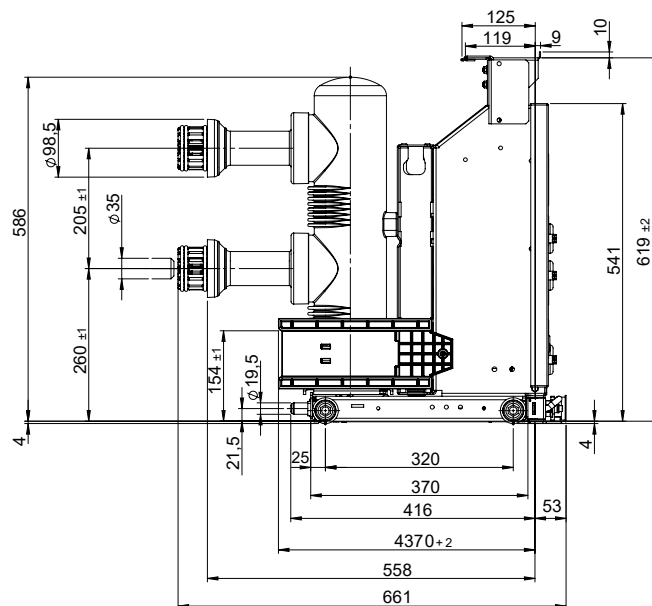
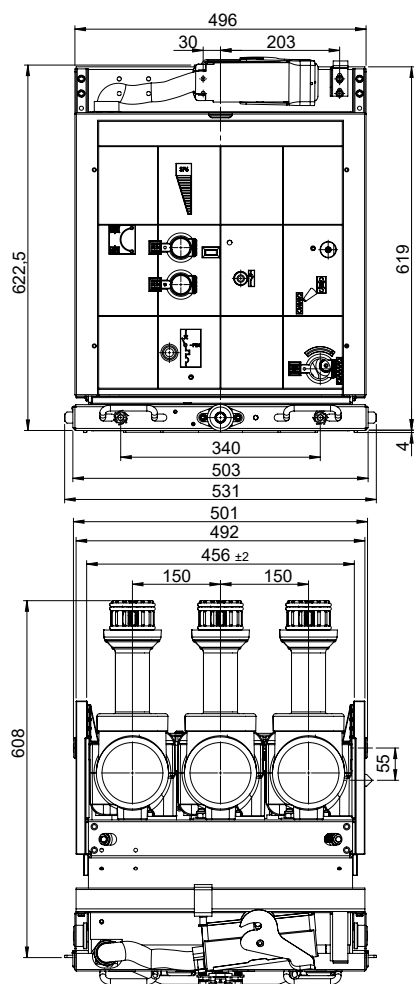


Insulating partitions to be provided by the customer
(a special kit is available on request).
* Distance with truck (if provided).

HD4/P withdrawable circuit-breakers for UniGear type ZS1 switchgears**HD4/P**

TN	1VCD000227	
Ur	12	kV
	17.5	A
Ir	630	A
	1250	A
Isc	16	kA
	25	kA
	31.5	kA

Also suitable for
PowerCube PB1



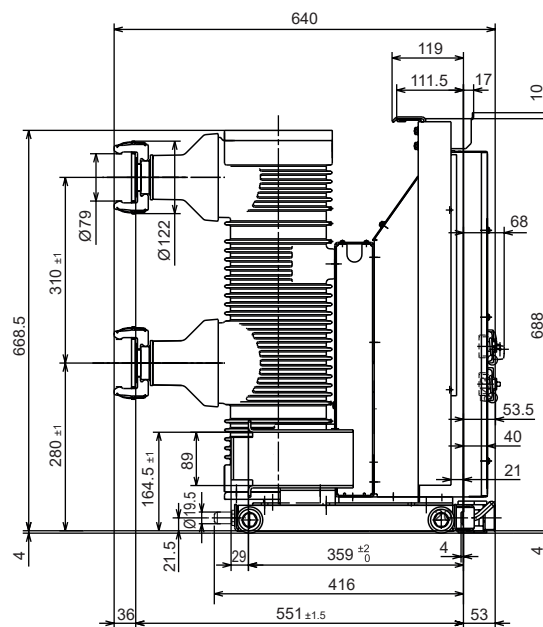
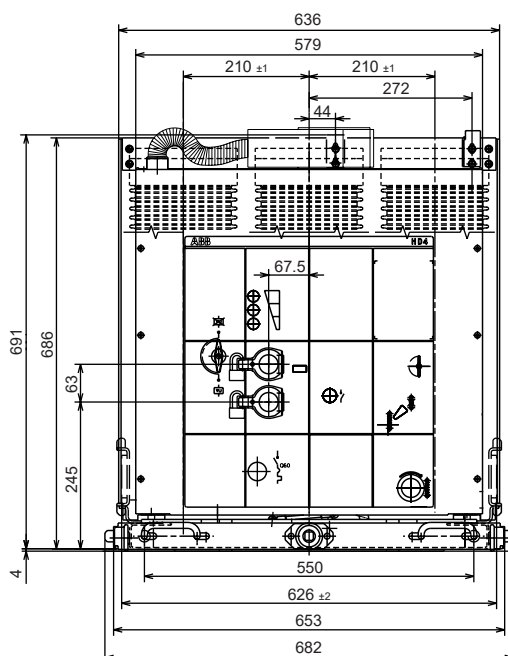
4. Overall dimensions

HD4/P withdrawable circuit-breakers for UniGear type ZS1 switchgears

HD4/P		
TN	7350	
Ur	12 kV	
	17.5 kV	
Ir	1250 A	
Isc	40 kA	

HD4/P		
TN	7350	
Ur	12 kV	
	17.5 kV	
Ir	1600 A	
	25 kA	
	31.5 kA	
Isc	40 kA (*)	
	50 kA (*)	

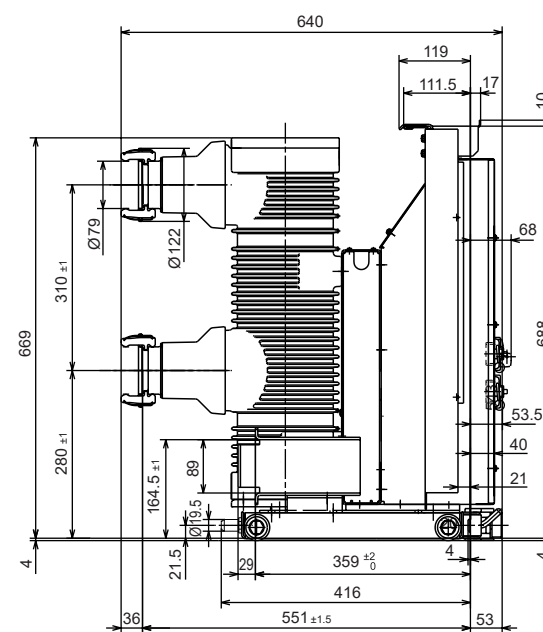
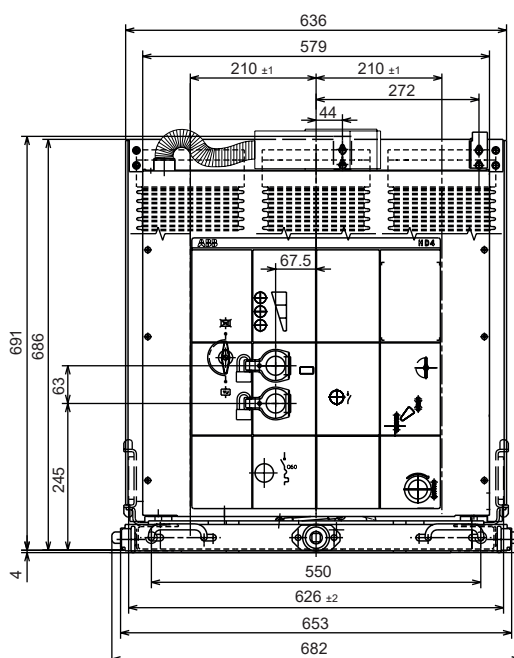
(*) Also suitable for PowerCube PB2.



HD4/P withdrawable circuit-breakers for UniGear type ZS1 switchgears

HD4/P		
TN	7351	
Ur	12 kV	
	17.5 kV	
Ir	2000 A	
	25 kA	
	31.5 kA	
Isc	40 kA (*)	
	50 kA (*)	

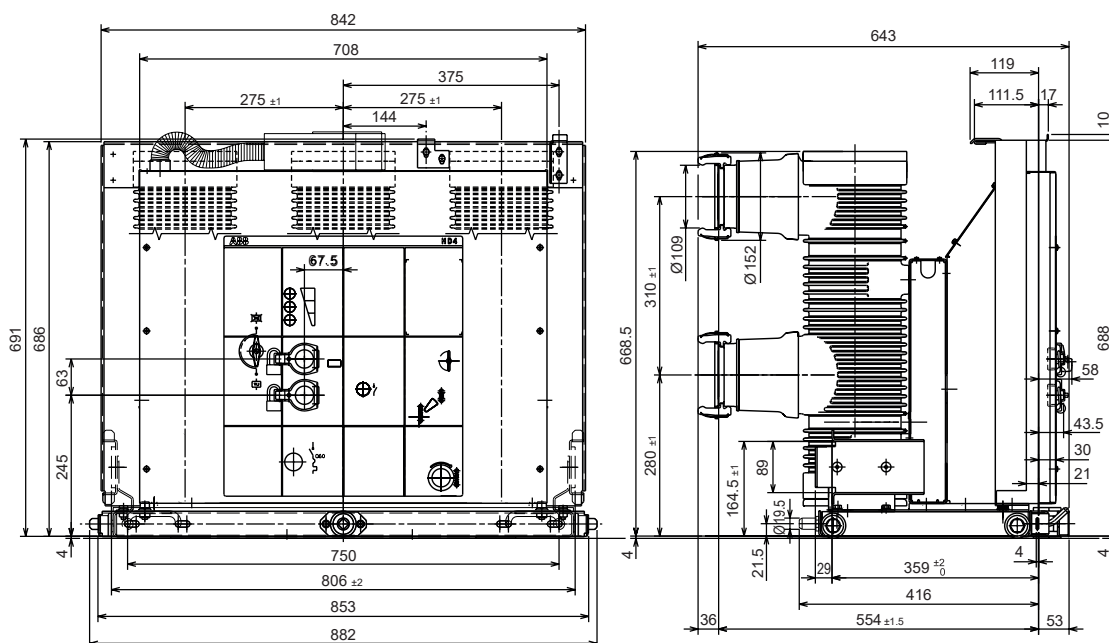
(*) Also suitable for PowerCube PB2.



HD4/P withdrawable circuit-breakers for UniGear type ZS1 switchgears

HD4/P		
TN	7352 (*)	
Ur	12	kV
	17.5	kV
Ir	2500	A
	25	kA
Isc	31.5	kA
	40	kA
	50	kA

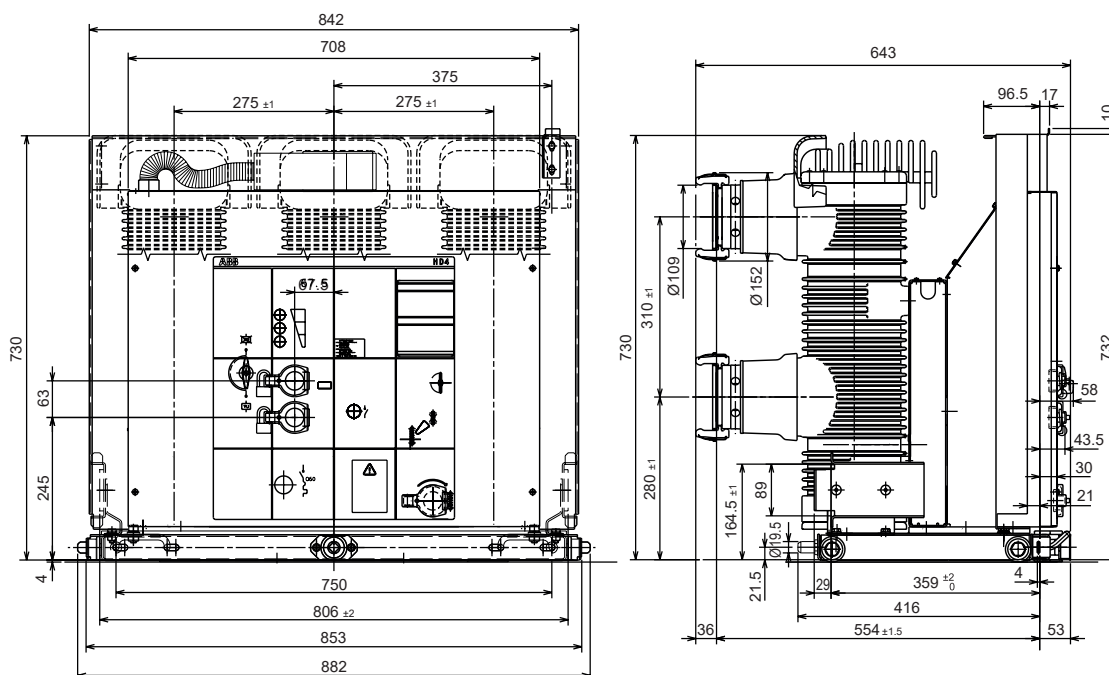
(*) Also suitable for PowerCube PB3.



HD4/P withdrawable circuit-breakers for UniGear type ZS1 switchgears

HD4/P		
TN	7371	
Ur	12	kV
	17.5	kV
Ir	3150 A (*)	
	25	kA
Isc	31.5	kA
	40	kA
	50	kA

(*) 3150 A with forced switchgear ventilation (consult the UniGear type ZS1 switchgear technical catalogue).

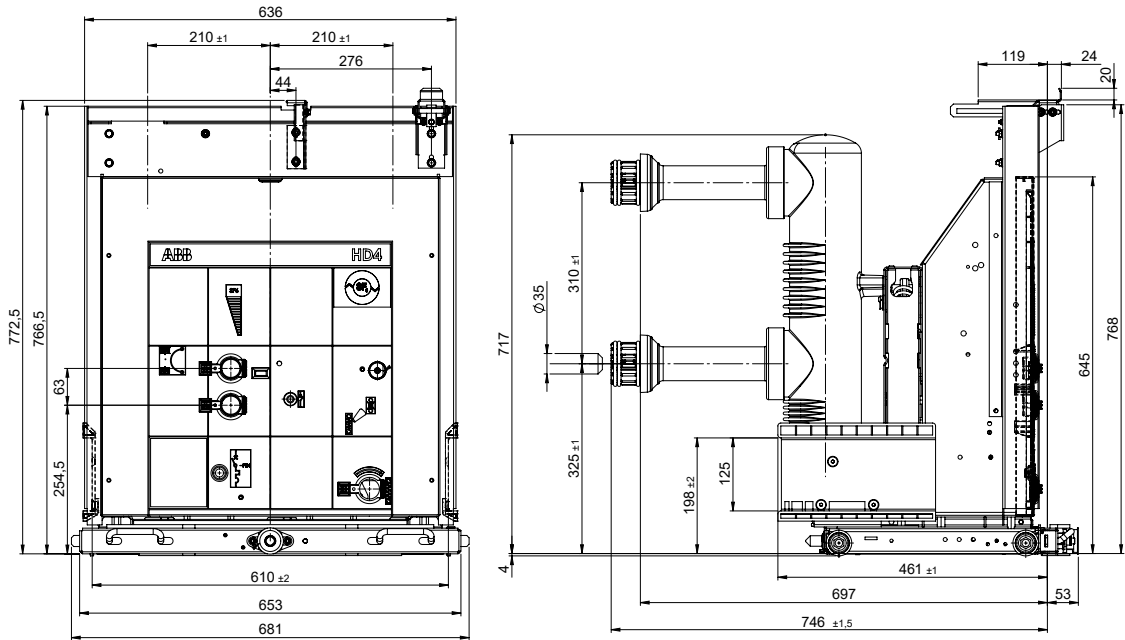


4. Overall dimensions

HD4/P withdrawable circuit-breakers for UniGear type ZS1 switchgears

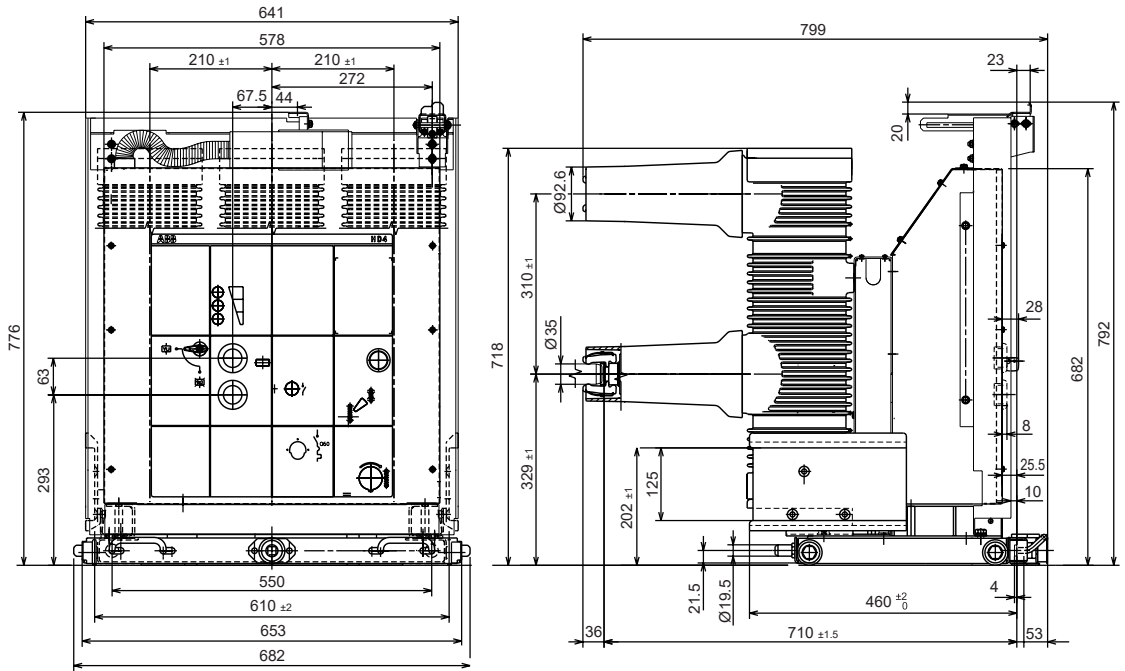
HD4/P		
TN	1VCD00236	
Ur	24	kV
Ir	630	A
	1250	A
Isc	16	kA(*)
	20	kA
	25	kA

(*) 630 A only.



HD4/P withdrawable circuit-breakers for UniGear type ZS1 switchgears

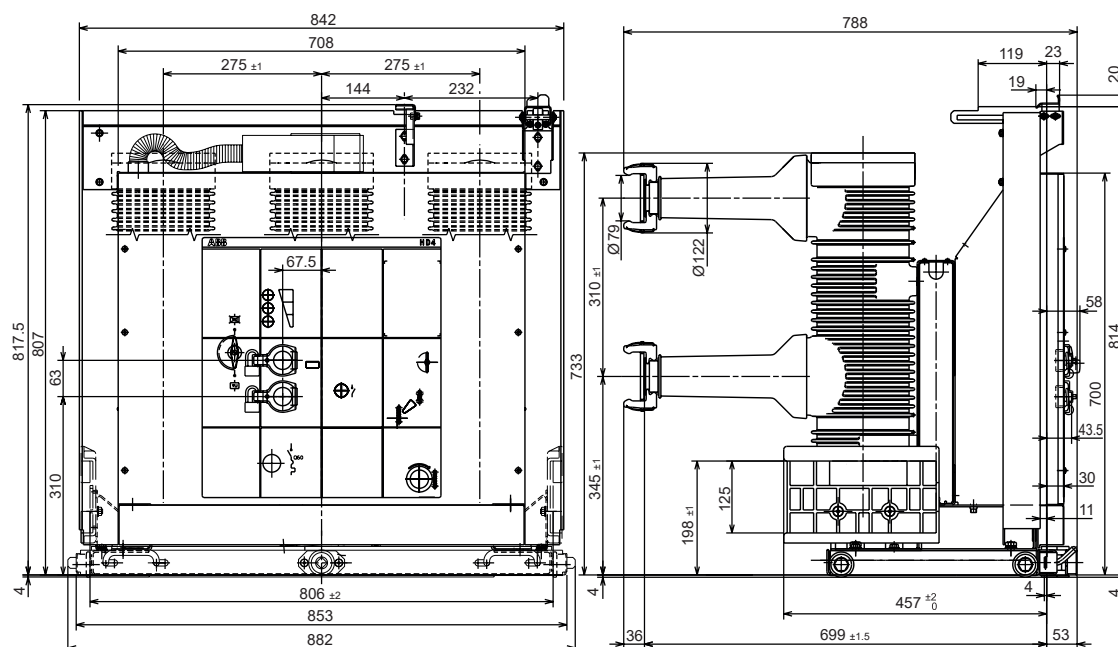
HD4/P		
TN	1VCD000099	
Ur	24	kV
Ir	1250	A
Isc	31.5	kA



HD4/P withdrawable circuit-breakers for UniGear type ZS1 switchgears

HD4/P		
TN	7355 (*)	
Ur	24	kV
Ir	1600	A
Isc	16	kA
	20	kA
	25	kA
	31.5	kA

(*) Also suitable for PowerCube PB5.

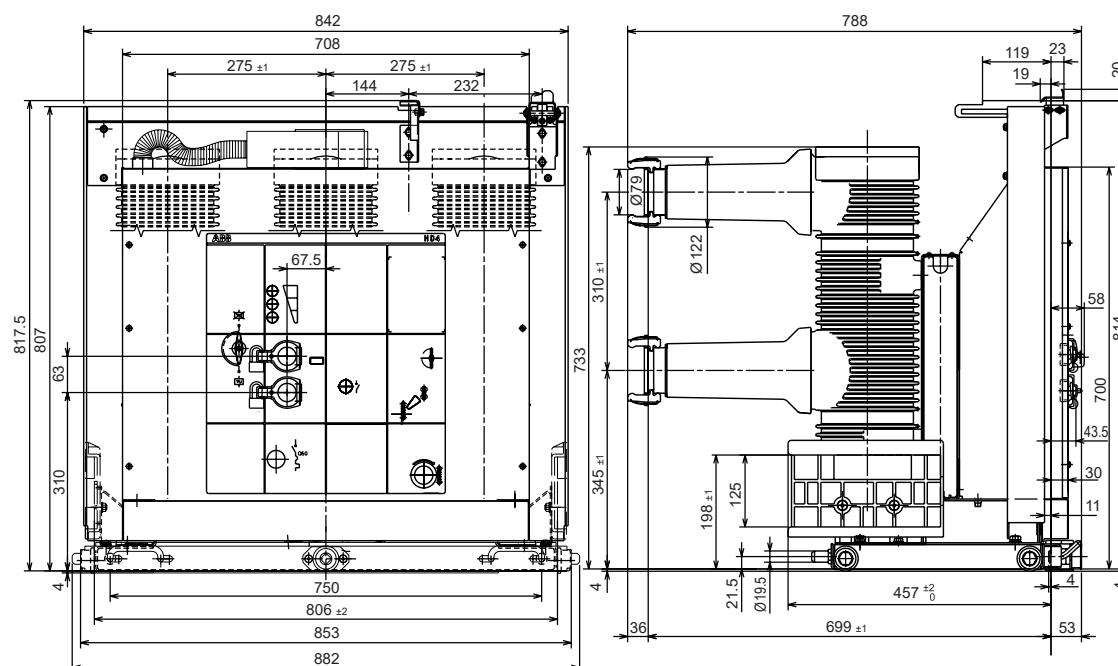
**HD4/P withdrawable circuit-breakers for UniGear type ZS1 switchgears**

HD4/P		
TN	7356 (**)	
Ur	24	kV
Ir	2000	A
Isc	16	kA
	20	kA
	25	kA
	31.5	kA

HD4/P		
TN	7356 (**)	
Ur	24	kV
Ir	2500 A (*)	
Isc	20	kA
	25	kA
	31.5	kA

(*) 2500 A with forced ventilation; 2300 A with natural ventilation.

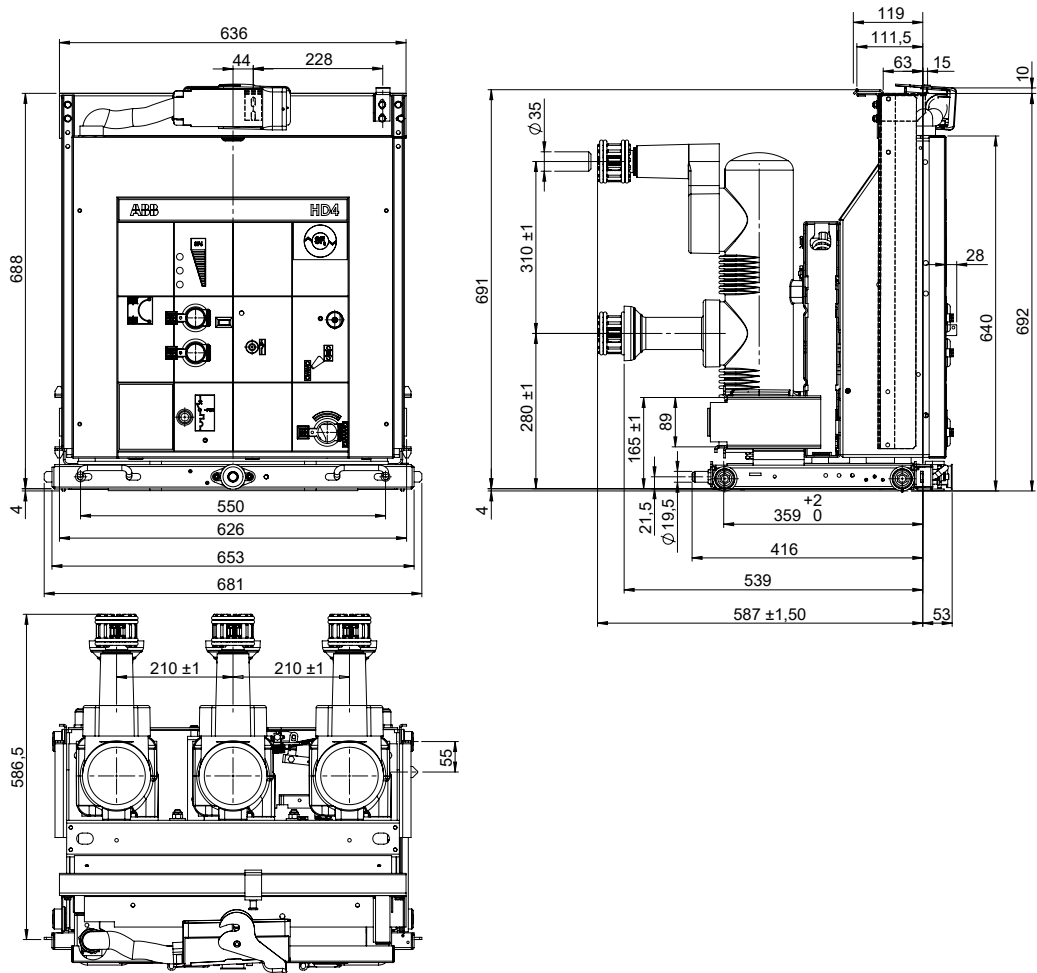
(**) Also suitable for PowerCube PB5.



4. Overall dimensions

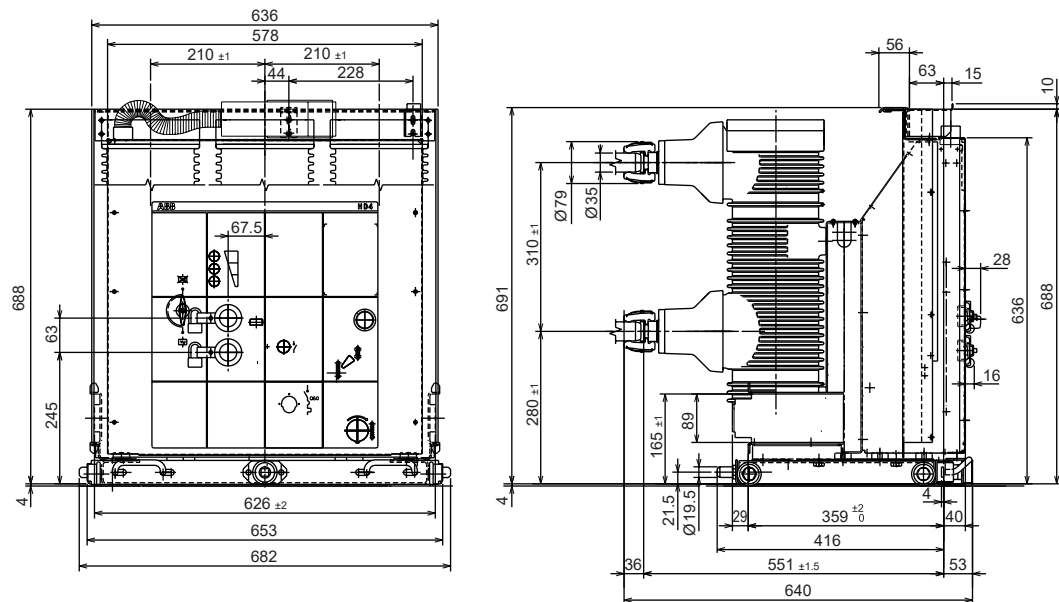
HD4/W withdrawable circuit-breakers for PowerCube modules

HD4/W	
TN	1VCD000228
Ur	12 kV
	17.5 kV
Ir	630 A
	1250 A
Isc	16 kA
	25 kA
	31.5 kA

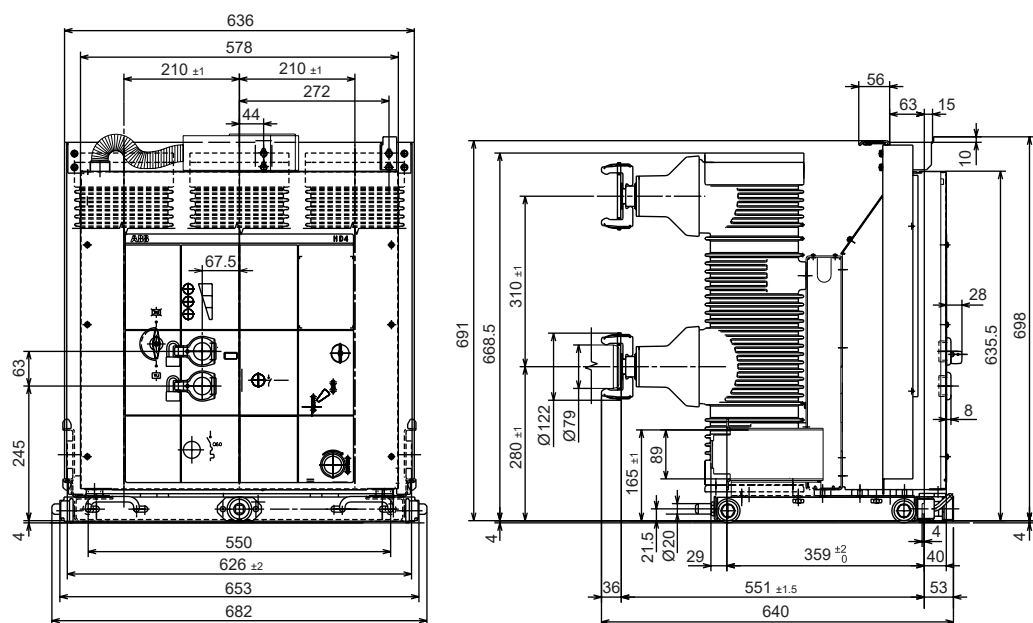


HD4/W withdrawable circuit-breakers for PowerCube modules

HD4/W		
TN	7421	
Ur	12	kV
	17.5	kV
Ir	1250	A
Isc	40	kA
	50	kA

**HD4/W withdrawable circuit-breakers for PowerCube modules**

HD4/W		
TN	7239	
Ur	12	kV
	17.5	kV
Ir	1600	A
	2000	A
Isc	16	kA
	25	kA
	31.5	kA

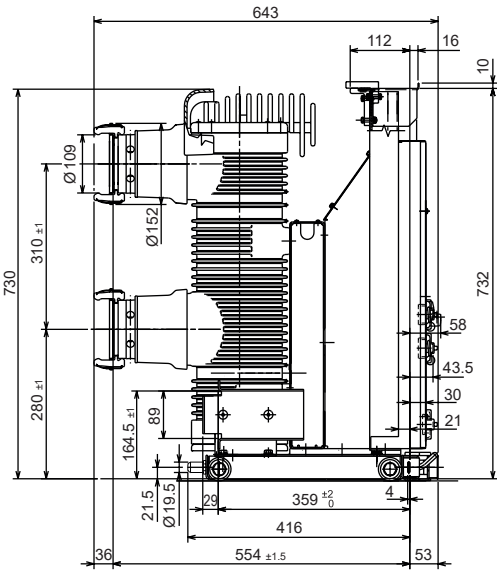
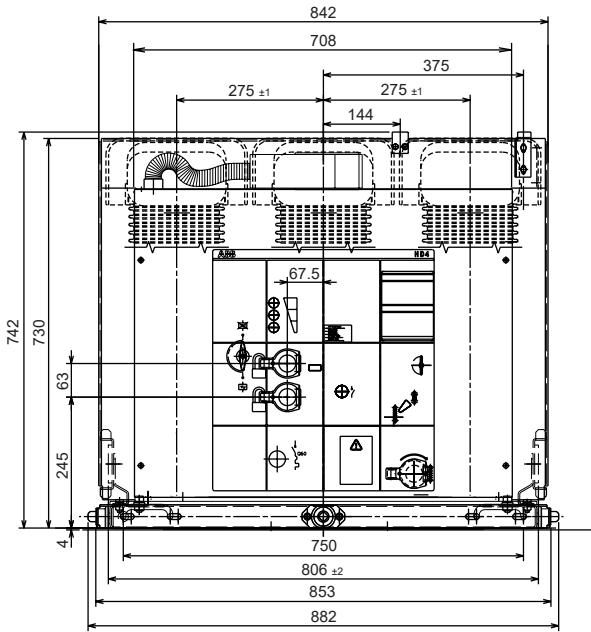




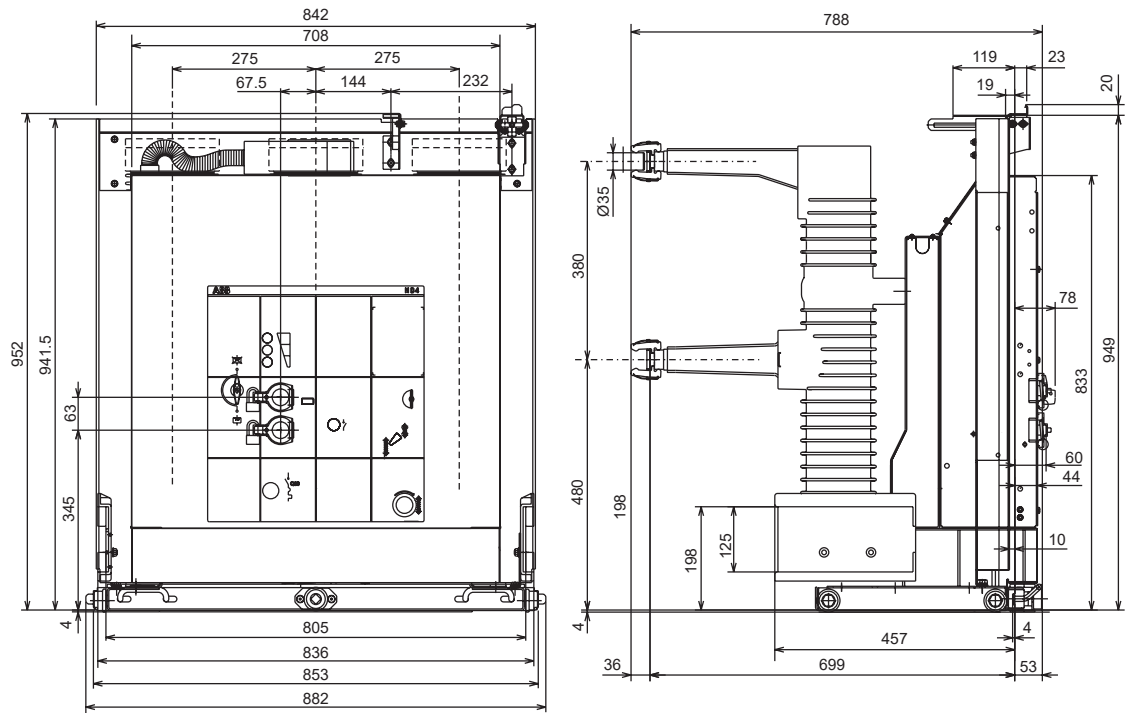
4. Overall dimensions

HD4/W withdrawable circuit-breakers for PowerCube modules

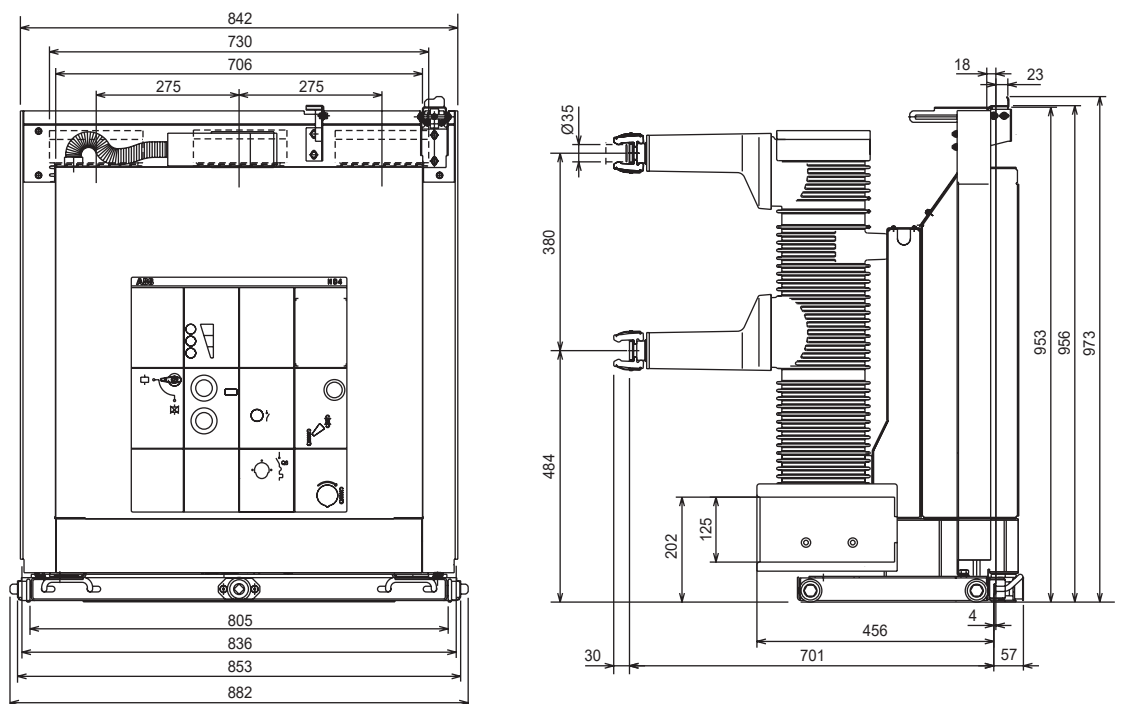
HD4/W		
TN	1VCD000053	
Ur	12	kV
	17.5	kV
Ir	3150	A
Isc	31.5	kA
	40	kA
	50	kA



HD4/W		
TN	7402	
Ur	36	kV
I _r	1250	A
I _{sc}	20	kA
	25	kA



HD4/W		
TN	7316	
Ur	36	kV
Ir	1250	A
Isc	31.5	kA



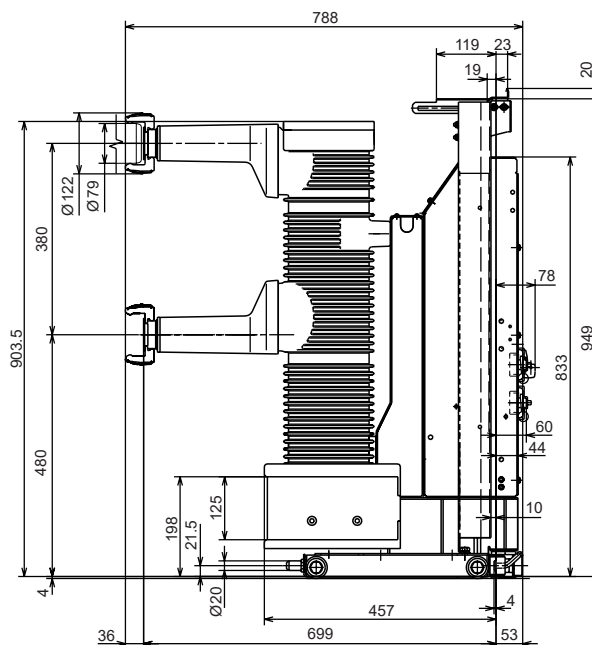
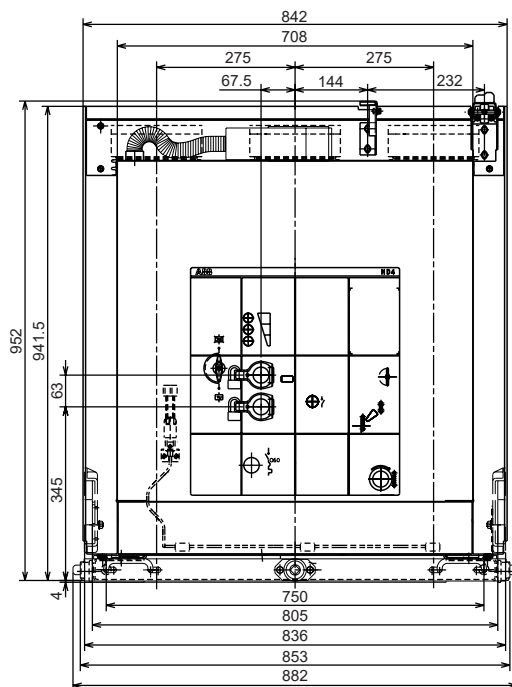
4. Overall dimensions

Withdrawable circuit-breakers HD4/W for UniGear type ZS2 switchgear and for PowerCube module

HD4/W

TN	7317
Ur	36 kV
	1600 A
Ir	2000 A
	2500 A (*)
	20 kA
Isc	25 kA
	31.5 kA

(*) With forced ventilation.

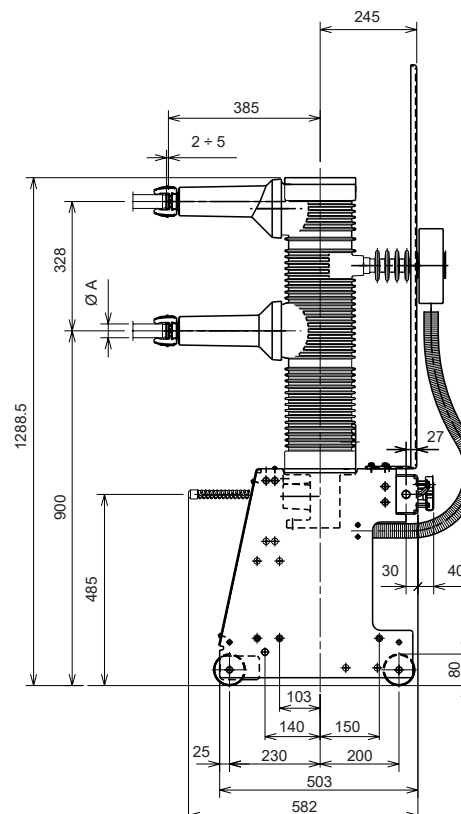
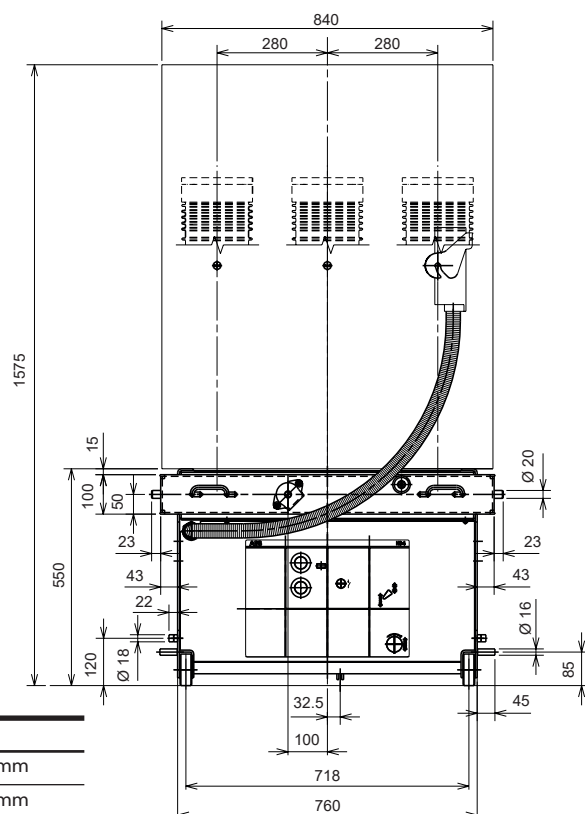


HD4/Z withdrawable circuit-breakers for UniGear type ZS3.2 - 40.5 kV switchgears

HD4/Z/40,5 kV

TN	7227
Ur	40.5 kV
	1250 A
	1600 A
Ir	2000 A
	2500 A (*)
Isc	25 kA
	31.5 kA

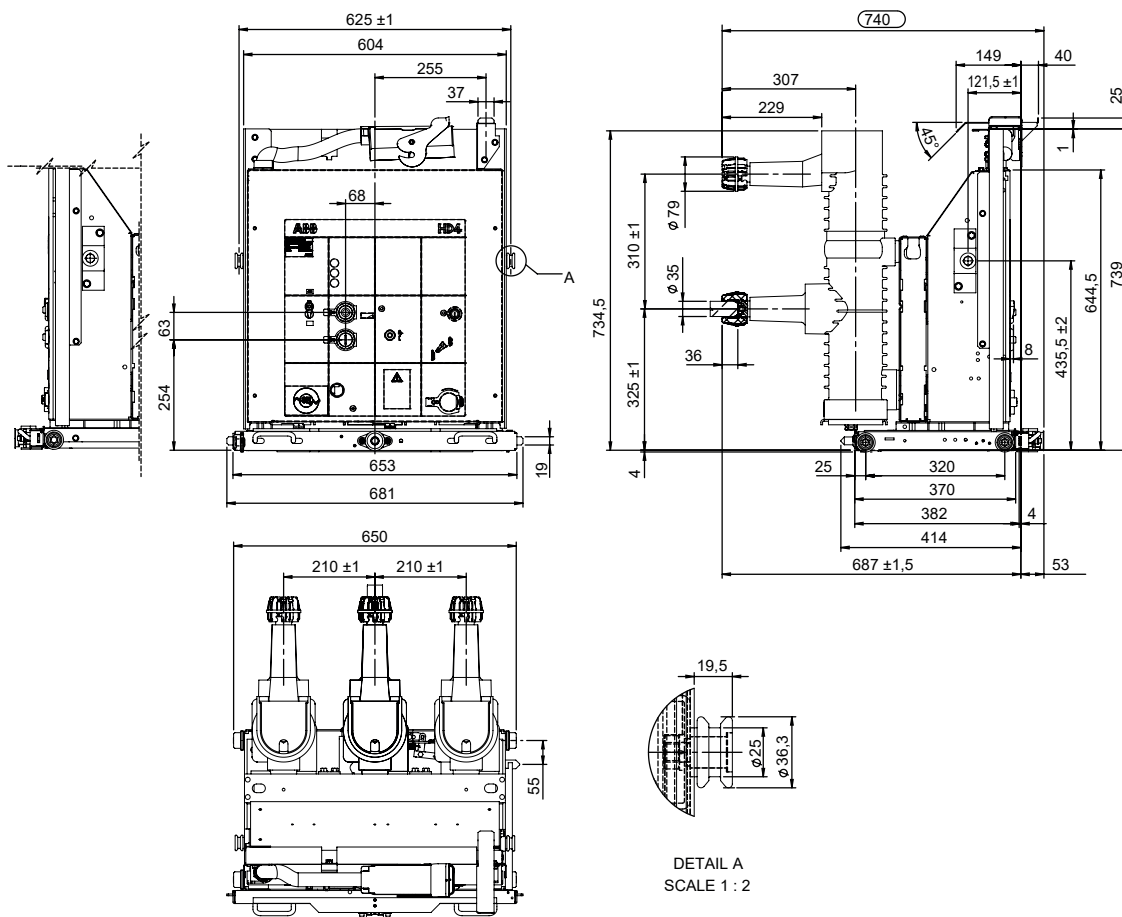
(*) With natural ventilation in loose enclosure type Powerbloc; with forced ventilation in switchgear type ZS3.2.



Ø A	
1250-1600 A	35 mm
2000-2500 A (*)	79 mm

HD4/SEC withdrawable circuit-breakers for UniSec switchgears**HD4/SEC 24 kV**

TN	1VCD000220
Ur	24 kV
	630 A
I _r	1250 A
	16 kA
I _{sc}	20 kA



5. Electric circuit diagram

Application diagrams

The following diagram (No. 1VCD400197) shows the circuits of the withdrawable circuit-breakers up to 24 kV type HD4/P, HD4/W, HD4/SEC, delivered to the customer by means of connector "X".

Specific diagrams are available for other types of circuit-breakers:

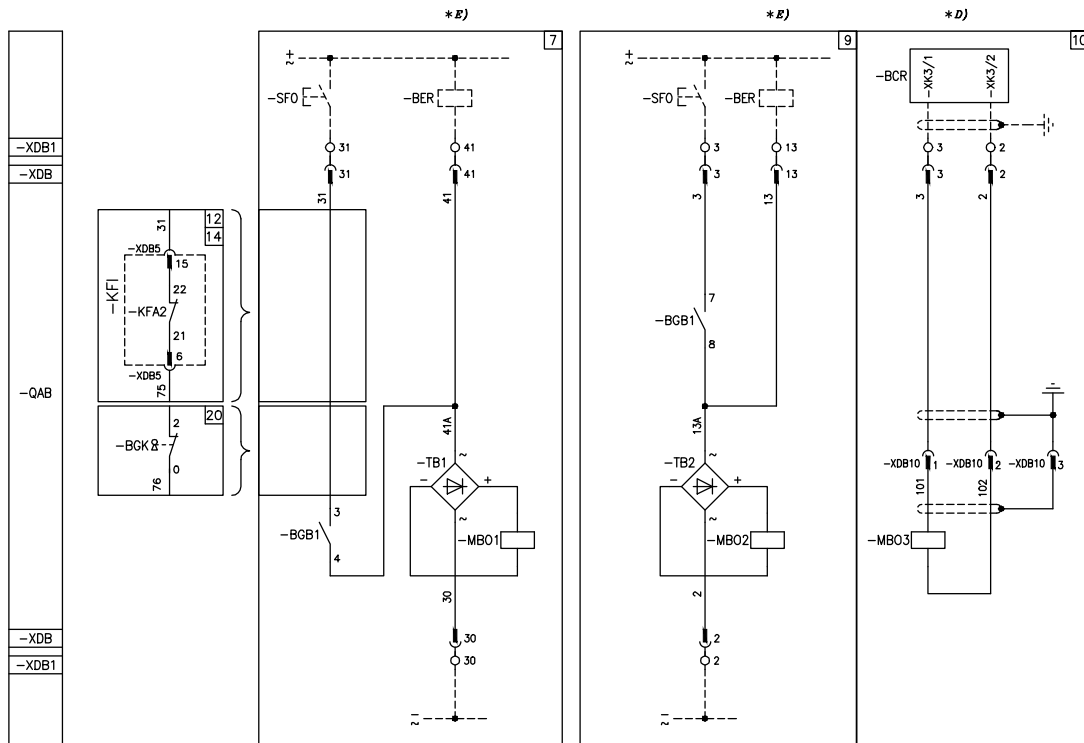
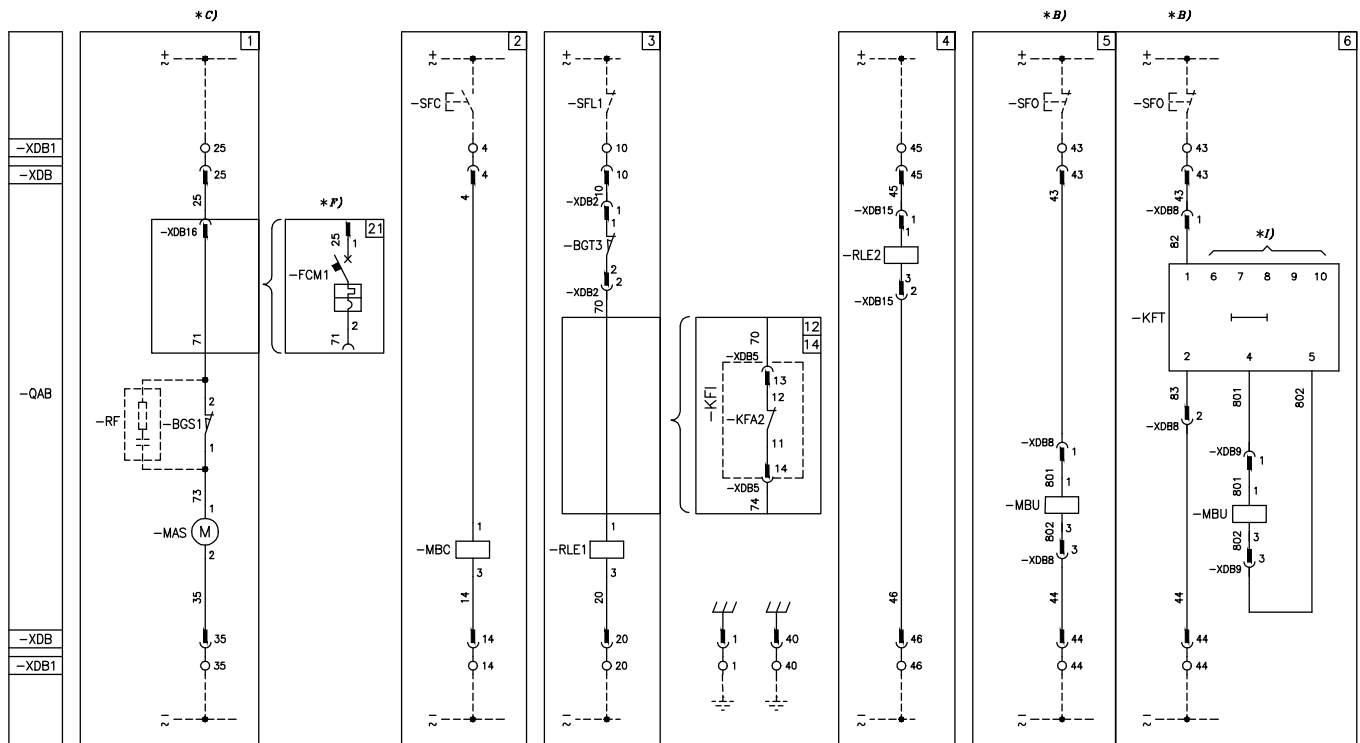
- fixed circuit-breakers up to 24 kV - No. 1VCD400192

- fixed circuit-breakers 36 kV, 275 mm pole centre distance No. 1VCD400193
- fixed circuit-breakers up to 36 kV, 350 mm pole centre distance - No. 1VCD400192
- withdrawable circuit-breakers for PowerCube PB6 and UniGear type ZS2 - No. 1VCD400194
- HD4/Z 40.5 kV - No. 1VCD400013

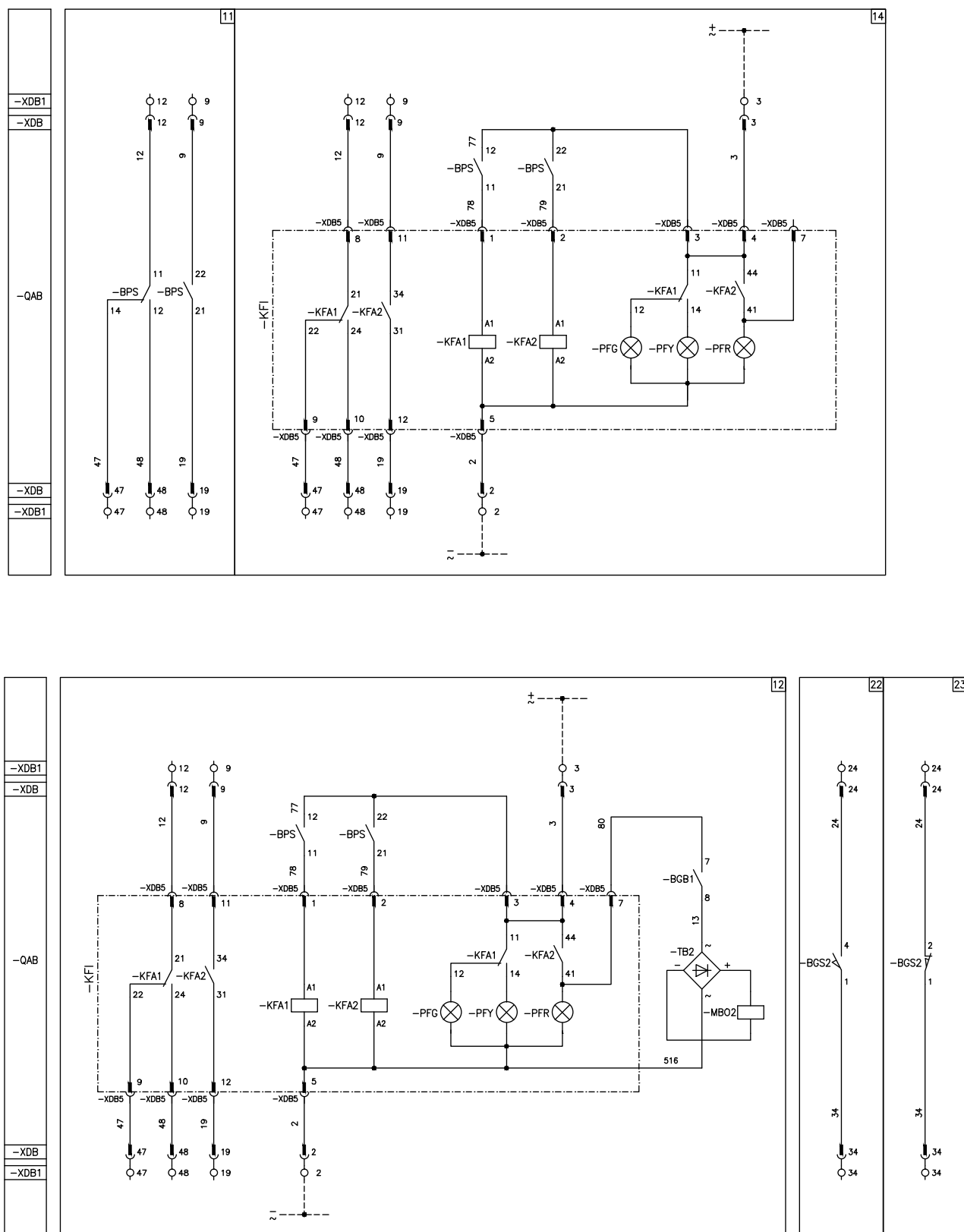
In any case, to take into account the evolution of the product, it is always useful to refer to the circuit diagram provided with each circuit-breaker.

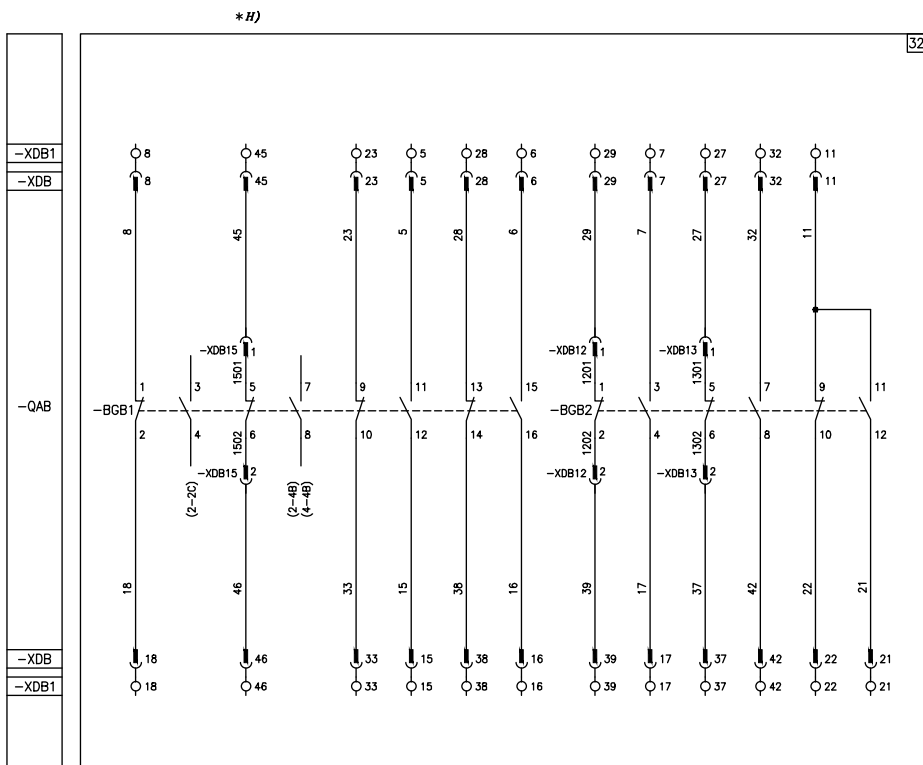
Graphical symbols for electrical diagrams (IEC 60617 Standards)

	Thermal effect		Mass, frame		Capacitor (general symbol)		Passing make contact closing momentarily during release
	Electromagnetic effect		Conductors in shielded cable (two conductors shown)		Motor (general symbol)		Closing position contact (limit switch)
	Timing		Connections of conductors		Rectifier with two half-waves (bridge)		Opening position contact (limit switch)
	Pushbutton control		Terminal or clamp		Make contact		Power circuit-breaker with automatic opening
	Operated by key		Socket and plug (female and male)		Break contact		Control coil (general symbol)
	Earth (general symbol)		Resistor (general symbol)		Change-over break before make contact		Lamp (general symbol)

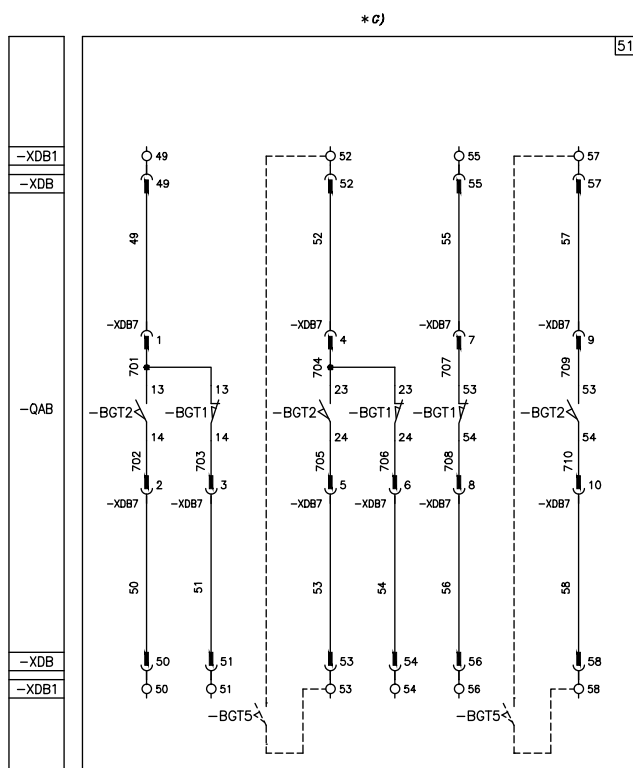


5. Electric circuit diagram





5. Electric circuit diagram



State of operation shown

The diagram indicates the following conditions:

- circuit-breaker open and connected
- circuits de-energized
- closing springs discharged
- key lock with key inserted and held
- SF6 gas pressure at rated service value (level A).

Caption

□	= Number of diagram figure	-BGB5	= Contacts for electrical signalling of undervoltage release energised/de-energised
*	= See note indicated by the letter	-BKG	= Contact operated by the key lock preventing electrical opening with earthing truck connected (compulsory accessory for earthing trucks with making capacity)
-BCR	= Overcurrent release with microprocessor type PR512 outside the circuit-breaker (see note D)	-BGS1	= Limit contacts of the spring charging motor
-BER	= Device for continuous control of shunt opening release coil continuity (see note E)	-BGS2	= Contact for signalling closing springs loaded-discharged
-BGB1, -BGB2	= Circuit-breaker auxiliary contacts		
-BGB4	= Auxiliary passage contact (with momentary closing during circuit-breaker opening)		

- BGT1 = Contacts electrically signalling circuit-breaker in the connected position (see note G)
- BGT2 = Contacts electrically signalling circuit-breaker in the isolated position (see note G)
- BGT3 = Circuit-breaker position contact, open during the isolating travel
- BGT5 = Position contacts signalling circuit-breaker in the racked-out position (these are contacts signalling circuit-breaker isolated located in the enclosure, in the fixed part: see contacts -BGT2 in diagram 1VCP400036 figures 5-6)
- BPS = Pressure-switch with two intervention thresholds:
 - intervention for low gas pressure. Contact 11-12-14 changes over, in relation to the position indicated in the diagram, when the gas pressure drops from level A to a value below level B. If rated pressure is restored, this contact changes over again when, starting from a value below level B, the value of level D is reached.
 - intervention for insufficient gas pressure. Contact 21-22-24 changes over when the gas pressure at level A reaches a value below level C. If rated pressure is restored, this same contact changes over again when, starting from a value below level C, the value of level B is reached.
- FCM1 = Thermomagnetic circuit-breaker for protection of the spring-charging motor (see note F)
- MAS = Motor for loading closing springs (see note C)
- MBC = Shunt closing release
- MBO1 = First shunt opening release (see note E)
- MBO2 = Second shunt opening release (see note E)
- MBO3 = Opening solenoid for microprocessor release PR512 outside circuit-breaker (see note D)
- MBU = Instantaneous undervoltage release or undervoltage release with electronic time-delay device (see note B)
- KFI = Integrated circuit for gas pressure control, including:
- PFG = Green lamp indicating normal gas pressure
- PFR = Red lamp indicating insufficient gas pressure
- PFY = Yellow lamp indicating low gas pressure
- KFA1 = Auxiliary relay to double the -BP pressure-switch contacts with intervention for low gas pressure
- KFA2 = Auxiliary relay to double the contacts of pressure switch -BPS with intervention for insufficient gas pressure
- XDB5 = Connector
- KFT = Undervoltage release electronic time-delay device (see note I)
- QAB = Main circuit-breaker
- SFC = Pushbutton or contact for circuit-breaker closing
- SFO = Pushbutton or contact for circuit-breaker opening
- SFL1 = Contact for circuit-breaker closing lock
- TB1,-TB2 = Rectifiers for -MBO1 and -MBO2 releases
- RF = Filter (only provided with 220V d.c. voltage supply)
- RLE1 = Locking magnet. If de-energized it mechanically prevents circuit-breaker closing
- RLE2 = Locking magnet. If de-energized it mechanically prevents circuit-breaker racking-in and isolation (it is possible to limit its consumption by connecting a delayed pushbutton in series to enable the operation)
- XDB = Circuit-breaker circuit connector
- XDB1 = Switchgear terminal board (outside the circuit-breaker)
- XDB2... -XDB62 = Accessory connectors

Rated absolute service value [kPa] (A*)	Pressure level [kPa] (B)	Pressure level [kPa] (C)	Pressure level [kPa] (D)
380	310	280	340
430	360	330	390
480	410	380	440

(*) According to circuit-breaker rating plate

5. Electric circuit diagram

Description of figures

Fig. 1 = Closing spring charging motor circuit (see note C).

Fig. 2 = Shunt closing release (antipumping is carried out mechanically).

Fig. 3 = Locking magnet on operating mechanism. If energized, mechanically prevents circuit-breaker from closing. Exclusion from permanent service of the magnet that provides a locking action upon circuit-breaker closing is only permitted with a delay of at least 0.5 s.

Fig. 4 = Locking magnet. If de-energized it mechanically prevents circuit-breaker racking-in and isolation (it is possible to limit its consumption by connecting a time-delay pushbutton in series for enabling the operation) (see note H).

Fig. 5 = Instantaneous undervoltage release (see note B)

Fig. 6 = Undervoltage release with electronic time-lag device (see notes B and I).

Fig. 7 = First shunt opening release circuit with possibility of continuous control of the winding (see note E).

Fig. 9 = Second shunt opening release circuit with possibility of continuous control of the winding (see note E).

Fig. 10 = Opening solenoid for microprocessor release PR512 outside circuit-breaker (see note D)

Fig. 11 = Gas pressure control circuit.

It includes:

- contacts for remote indication of normal, low and insufficient gas pressure.

For -BPS pressure switch intervention values see the caption.

Fig. 12 = Integrated gas pressure monitoring circuit.

It includes:

- intervention for insufficient gas pressure with circuit-breaker opening by means of the -MBO2 release and lock on closing and opening by means of a -KFA2 relay auxiliary contact (provide the locking magnet in fig. 3)
- 3 lamps for local indication of normal, low and insufficient gas pressure
- contacts for remote indication of normal, low and insufficient gas pressure.

For pressure switch pressure values please refer to circuit-breaker electrical diagram.

Fig. 14 = Gas pressure control circuit. It includes:

- intervention for insufficient gas pressure with lock on circuit-breaker closing and opening by means of the -KFA2 relay auxiliary contacts (provide the locking magnet in fig. 3)
- 3 lamps for local indication of normal, low and insufficient gas pressure
- contacts for remote indication of normal, low and insufficient gas pressure.

For -BPS pressure switch intervention values see the caption.

Fig. 20 = Contact operated by the key lock “in closed position” to prevent electrical opening of the earthing truck with making capacity “racked-in” (compulsory accessory for earthing trucks with making capacity when the -MBO1 shunt opening release is provided).

Fig. 21 = Thermomagnetic circuit-breaker for protection of the spring-charging motor (see note F).

Fig. 22 = Contact for electrically signalling closing springs charged.

Fig. 23 = Contact for electrically signalling closing springs discharged.

Fig. 24 = Contact for electrically signalling undervoltage release energized (see note B).

Fig. 25 = Contact for electrically signalling undervoltage release de-energized (see note B).

Fig. 26 = Contact for electrically signalling motor protection circuit-breaker closed.

Fig. 27 = Contact for electrically signalling motor protection circuit-breaker open.

Fig. 30 = Auxiliary passing contact with momentary closing during circuit-breaker opening (intervention of -MBO1, -MBO2, -MBO3 and -MBU).

Fig. 32 = Circuit-breaker auxiliary contacts available.

Fig. 51 = Contact for electrically signalling circuit-breaker in the racked-in and isolated positions located on the circuit-breaker, supplied on request (see note G).

Incompatibility

The circuits indicated by the following figures cannot be supplied at the same time on the same circuit-breaker:

**5 - 6 - 14 | 9 - 10 - 12 - 14 | 11 - 12 - 14 |
22 - 23 | 24 - 25 | 26 - 27 | 5 - 6 - 20 |
9 - 10 - 12 - 20**

Notes

- A) The circuit-breaker is only fitted with the accessories listed in the order confirmation. To make out the order, please consult the catalogue of the apparatus.
- B) The undervoltage release can be provided for power supply with voltage branched on the supply side of the circuit-breaker or from an independent source.
Either the instantaneous undervoltage release or the one with electronic delay device can be used (delay can be selected between 0.5 ... 3 s; see note G). Circuit-breaker closing is only possible with the release energised (the closing lock is made mechanically).
The contact in fig. 24 or the one in fig. 25 is available on request.
A delay of 50 ms between the moment of consent of the undervoltage release and energisation of the shunt closing release must be inserted when there is the same power supply for the shunt closing and undervoltage releases and automatic circuit-breaker closing on return of the auxiliary power supply is required. This can be carried out by means of a circuit outside the circuit-breaker, including a permanent closing contact, the contact indicated in fig. 24 and a time-delay relay.
- C) Check the power available on the auxiliary circuit to verify the possibility of starting several motors for charging the closing springs at the same time. To avoid excessive consumption, it is necessary to charge the springs manually before supplying the auxiliary circuit with voltage.
- D) Consult diagram 401530 for connections between the auxiliary circuits of the circuit-breaker and the overcurrent release with microprocessor type PR512 installed in the switchgear.
- E) The circuit for controlling continuity of the shunt opening release winding must only be used for this function.
At a power supply lower than 220 V, connect the "Control Coil Continuity" device, or a relay or a signalling lamp which consumes a current not exceeding 20 mA.
At a power supply equal to or higher than 220 V, connect a delay or signalling lamp which consumes a current not exceeding 10 mA.
Other uses might jeopardise release functionality.
- F) The -FCM1 circuit-breaker in fig. 21 must always be provided when there is a 24 kV d.c. spring charging motor.
In case of opening caused by a fault in the motor, before carrying out manual resetting, recharge the springs by means of the special handle.
- G) The contacts (-BGT1 and -BGT2) shown in fig. 51 for signalling the circuit-breaker status are located on the circuit-breaker (moving part) and are available on request. However, application of these contacts on the enclosure is usually foreseen (fixed part): see diagram 1VCD400036.
- H) When fig. 4 is requested, the contact of pack -BGB1 to terminals 5-6 in fig. 32 is not available.
When figs. 26-27 are requested, the -BGB2 contact to terminals 1-2 of fig. 32 is not available.
When fig. 30 is required, the contact of pack -BGB2 to terminals 5-6 of fig. 32 is not available.
- I) Make one of the following bridges to select the delay required (see diagram 1VCD400062):
0.5 s: terminals 6-7
1 s: terminals 6-8
1.5 s: terminals 6-9
2 s: terminals 6-10
3 s: no bridge.

For more information please contact:



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