

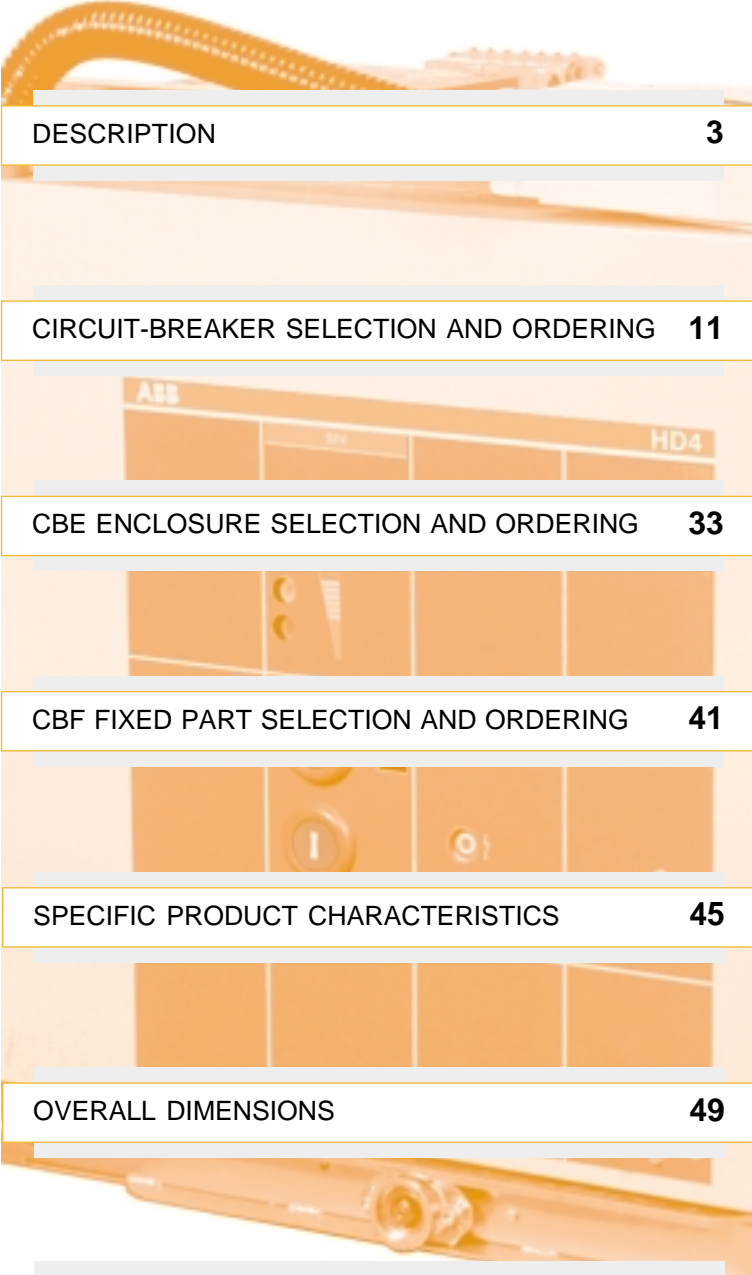
HD4

Gas insulated MV circuit-breakers

12 ... 40.5 kV - 630 ... 3600 A - 16 ... 50 kA



ABB



	1
DESCRIPTION	3
	2
CIRCUIT-BREAKER SELECTION AND ORDERING	11
	3
CBE ENCLOSURE SELECTION AND ORDERING	33
	4
CBF FIXED PART SELECTION AND ORDERING	41
	5
SPECIFIC PRODUCT CHARACTERISTICS	45
	6
OVERALL DIMENSIONS	49
	7
ELECTRICAL CIRCUIT DIAGRAM	75

DESCRIPTION

General information	4
Available versions	4
Fields of application	4
Breaking technique	5
Standards and approvals	6
Service safety	6
Accessories	6
ESH operating mechanism	7
CBE enclosures	8
CBF fixed parts	9
Technical documentation	10
Quality Assurance System	10
Test laboratory	10
Environmental Management System	10

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 and CEI 17-1 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 switchboard 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: CBE enclosures, CBF fixed parts, UniSafe and UniGear type ZS1 switchboards.

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.

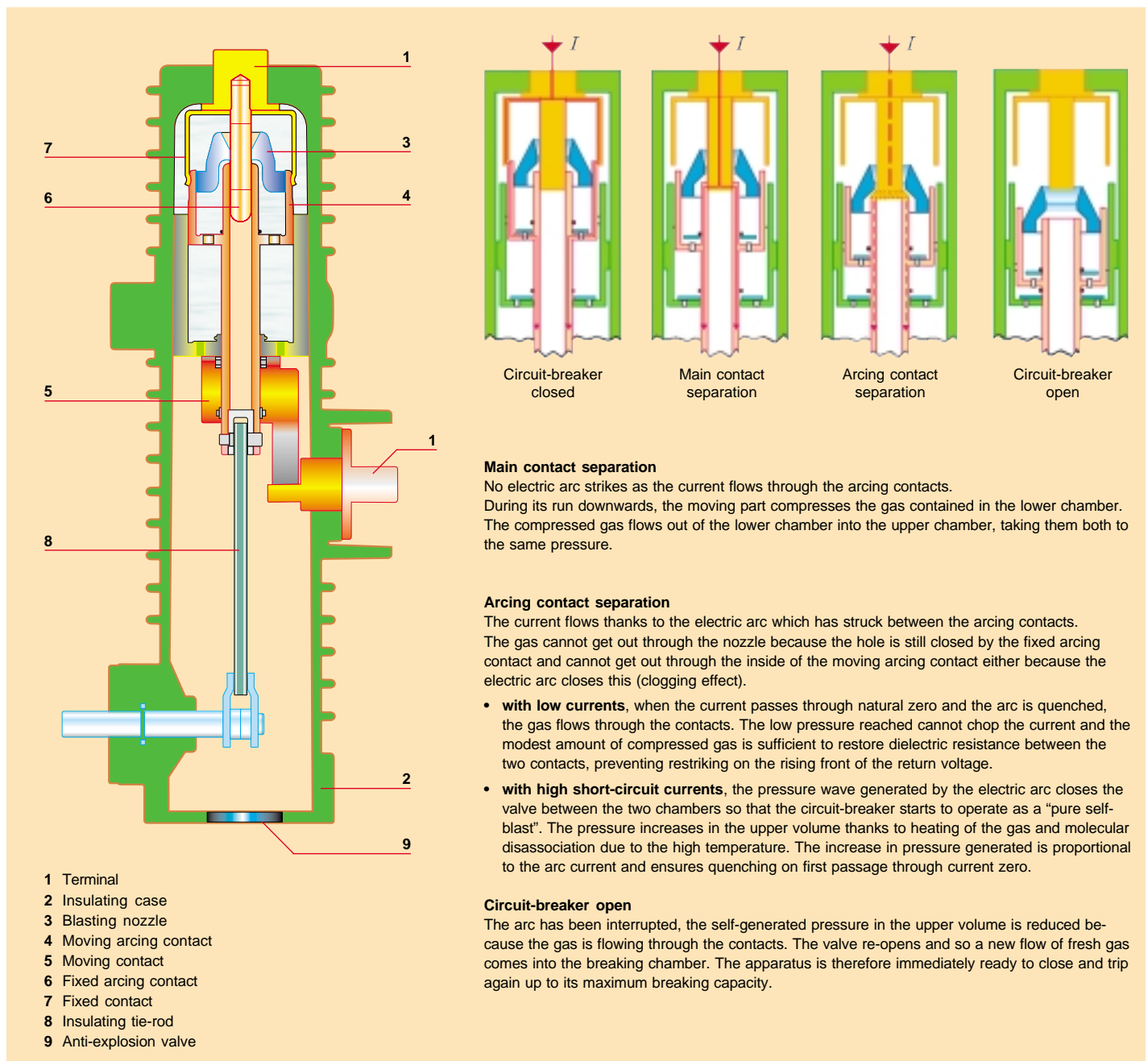
- Autopuffer breaking technique
- Electric arc extinction without chopped current
- No restriking after breaking
- Rapid recovery of the dielectric properties of the means of extinction
- Withstand insulation voltage even at zero relative pressure (*)
- Breaking up to 30% of the rated breaking capacity even at zero relative pressure (*)
- Sealed-for-life poles
- Test for checking gas tightness carried out three times on each piece of apparatus
- Compact dimensions
- Fixed and withdrawable version
- Stored energy operating mechanism with anti-pumping device as standard common to the whole circuit-breaker series
- Mechanical safety locks against incorrect operations
- Simple personalisation thanks to a complete range of accessories
- Maintenance-free
- SF6 gas pressure control device (on request).

(*) Up to 24 kV.

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.



DESCRIPTION

Standards and approvals

HD4 circuit-breakers comply with IEC 62271-100, CEI 17-1 file 1375 Standards and with those of major industrialised countries.

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;
- **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 (class E2 - table 21) and guarantee suitability for use in overhead lines, with rapid reclosing cycle. Versions approved according to the GOST Standard are also available (please contact us).

Service safety

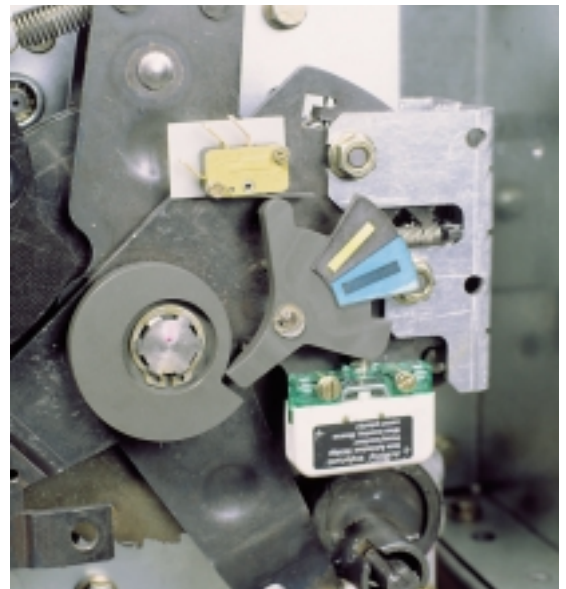
Thanks to the availability of a complete range of mechanical and electrical locks (on request), safe distribution switchboards can be constructed using HD4 circuit-breakers. The locking devices have been designed to prevent incorrect operations and to carry out inspection of the installation, ensuring maximum operator safety.

Accessories

HD4 circuit-breakers have a complete range of accessories which fulfil all installation requirements.

The operating mechanism is the same type for the whole series and has a standardized range of accessories and spare parts which are easy to identify and order.

Apparatus use, maintenance and service have been simplified and require less use of resources.



The terminals and isolating contacts are silver-plated.



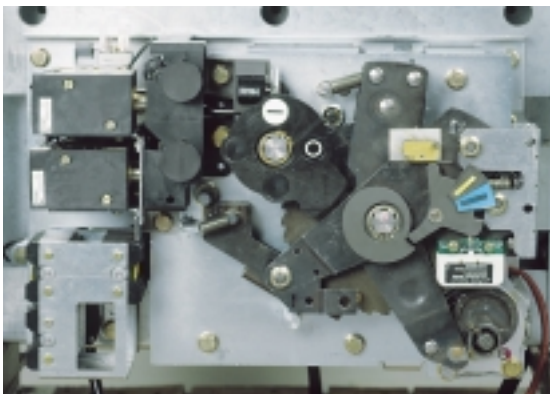
Luminous indicator of SF6 gas present (on request). (Application of the pressure switch is required).

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.



All the control and signalling devices are located on the front of the circuit-breaker. Suitable locks prevent incorrect operations. The antipumping device is always provided on the actuator.



The withdrawable circuit-breakers feature a device enabling them to be racked in/out with the door closed.



The nameplate, located on the front panel, enables all the circuit-breaker characteristics to be identified.



The self-supplied PR512 switchboard release is available for protection of the installations. In its basic version, the PR512 carries out the following functions:

- 50-51-50N-51N protection
- current measurement with display of the maximum value between phases
- dialogue.

For further information about the PR512 release, please consult technical catalogue 649092.

DESCRIPTION

CBE enclosures

The CBE enclosures are suitable for taking withdrawable HD4 circuit-breakers and their use allows medium voltage metal-clad switchboards to be constructed easily.

They comply with IEC 62271-100/CEI 17-1 - file 1375 and IEC 60298/CEI 17-6 file 2056 Standards. They are available for voltage up to 24 kV, rated current up to 3150 A (3150 A with forced ventilation provided by the customer) and rated short-time withstand current up to 50 kA. The CBE enclosures have been studied and constructed to be practical to use and to give the user maximum safety.

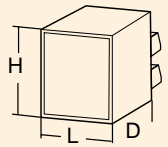
They can be fitted with a complete and functional range of accessories to adapt the switchboard to the installation characteristics.

The main characteristics are as follows:

- standardised construction
- limited dimensions and weights
- preset for all mechanical and electrical couplings
- mechanical and electromechanical locks
- racking in and out with the door closed
- earthing switch with making capacity (on request)
- “Fail-Safe” device which prevents manual operation of the shutters.



	Un [kV]	In [A]	L [mm]	H [mm]	D [mm]
CBE11	12/17,5	630-1250	600	943	752
CBE21	12/17,5	1600	750	1015	752
CBE31	12/17,5	2000-2500-3150(*)	1000	1015	752
CBE41	24	630-1250	750	1125	910
CBE51	24	1600-2000-2500	1000	1125	910



(*) Rated current in switchboard with forced ventilation (to be provided by the customer).



The terminals in the monoblocks are designed for easy connection to the power circuit.



The metal shutters are operated automatically by the movement of the circuit-breaker.



The earthing switch (if provided) is controlled from the front and interlocked with the circuit-breaker.



Special contacts indicate the circuit-breaker connected/isolated position.

CBF fixed parts

The CBF series fixed parts consist of a base with guides for racking-in of the circuit-breaker and a rear wall where the insulating monoblocks with the power contacts are fixed.

The metal shutters on the rear wall are automatically operated by the circuit-breaker during the racking-in operation.

The fixed parts are made without side sheets and protruding screws to allow racking into prefabricated compartments of the same width as that of the fixed part.

The base, guides and rear panel with the monoblocks and shutters are normally packed separately to simplify storage operations. Assembly and installation in the compartments are particularly simple operations described in the special assembly instructions.

The fixed parts are made of galvanized metal sheet.

The various different components can be assembled using normal tools and a limited amount of nuts and screws.

The power contact terminals are silver-plated and ready for connection of the branches by means of bolts (branches and bolts are to be provided by the customer).



	Un [kV]	In [A]	L [mm]	H [mm]	D [mm]	
CBF11	12/17.5	1250	594	863	1022	
CBF21	12/17.5	1600	744	935	1018	
CBF41	24	1250	744	1045	1263	

DESCRIPTION

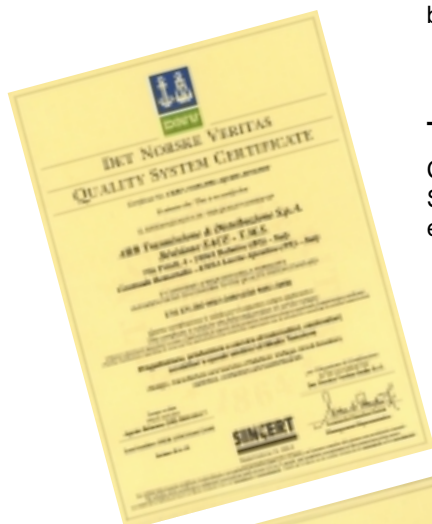
Technical documentation

To obtain in-depth knowledge of technical and application aspects of the HD4 circuit-breakers please ask for the following publications:

- PowerBox modules
- UniSafe switchboards
- UniGear ZS1 type switchboards
- ZS3.2/PowerBloc switchboards
- REF 542plus unit
- PR512 protection device.

Quality Assurance System

Complies with the ISO 9001 Standards, certified by an external independent organisation.



Test laboratory

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



Environmental Management System

Complies with the ISO 14001 Standards, certified by an external independent organisation.

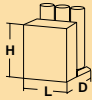
CIRCUIT-BREAKER SELECTION AND ORDERING

General characteristics of fixed circuit-breakers (12 - 17.5 - 24 kV)	12
General characteristics of fixed circuit-breakers (36 kV)	14
General characteristics of withdrawable circuit-breakers for CBE enclosures and CBF fixed parts (12 - 17.5 - 24 kV)	16
General characteristics of circuit-breakers for UniGear type ZS1 switchboards (12 - 17.5 - 24 kV)	18
General characteristics of withdrawable circuit-breakers for UniGear 36 type ZS3.2 switchboards (40.5 kV)	20
General characteristics of withdrawable circuit-breakers for UniSafe switchboards (12 - 17.5 - 24 kV)	22
General characteristics of withdrawable circuit-breakers for UniSafe switchboards (36 kV)	24
Identification of the circuit-breaker type	26
Standard equipment	27
Table of availability of accessories	28
Optional accessories	30
Characteristics of electrical accessories	32

CIRCUIT-BREAKER SELECTION AND ORDERING



General characteristics of fixed circuit-breakers (12 - 17.5 - 24 kV)

Circuit-breaker		
Standards		IEC 62271-100 CEI 17-1 (File1375)
Rated voltage		Ur [kV]
Rated insulation voltage		Us [kV]
Withstand voltage at 50 Hz		Ud (1 min) [kV]
Impulse withstand voltage		Up [kV]
Rated frequency		fr [Hz]
Rated normal current (40 °C) ⁽¹⁾		Ir [A]
Rated breaking capacity		Isc [kA]
Rated short-time withstand current (3 s)		Ik [kA]
Making capacity		Ip [kA]
Operation sequence		[O-0,3s-CO-15s-CO]
Opening time		[ms]
Arcing time		[ms]
Total breaking time		[ms]
Closing time		[ms]
Maximum overall dimensions		H [mm] L [mm] D [mm]
Weight		[Kg]
Absolute SF6 gas pressure SF6 ⁽²⁾		[kPa]
Operating temperature		[°C]
Tropicalization		IEC: 60068-2-30, 721-2-1
Electromagnetic compatibility		IEC: 60694, 61000-6-2, 61000-6-4

- (1) Rated uninterrupted currents defined in free air.
 (2) Rated service value.
 (3) Including insulating shields (available on request).

HD4 12									HD4 17									HD4 24								
■									■									■								
■									■									■								
12									17,5									24								
12									17,5									24								
28									38									50								
75									95									125								
50-60									50-60									50-60								
630	1250	1600	1600	2000	2500	3150	3600		630	1250	1600	1600	2000	2500	3150	3600		630	1250	1600	1600	2000	2500	3150	3600	
16	16	16	-	-	-	-	-	-	16	16	16	-	-	-	-	-	-	16	16	16	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	20	20	-	-	-	-	-	-
25	25	25	-	25	25	25	-	-	25	25	25	-	25	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	31.5	-	31.5	31.5	31.5	31.5	-	-	-	-	31.5	31.5	31.5	31.5	31.5	31.5
-	-	-	40	40	40	40	40	-	-	-	-	40	40	40	40	40	-	-	-	-	40	40	40	40	40	-
-	-	-	50	50	50	50	50	-	-	-	-	50	50	50	50	50	-	-	-	-	-	-	-	-	-	-
16	16	16	-	-	-	-	-	-	16	16	16	-	-	-	-	-	-	16	16	16	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	20	20	-	-	-	-	-	-
25	25	25	-	25	25	25	-	-	25	25	25	-	25	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	31.5	-	31.5	31.5	31.5	31.5	-	-	-	-	31.5	31.5	31.5	31.5	31.5	31.5
-	-	-	40	40	40	40	40	-	-	-	-	40	40	40	40	40	-	-	-	-	40	40	40	40	40	-
-	-	-	50	50	50	50	50	-	-	-	-	50	50	50	50	50	-	-	-	-	-	-	-	-	-	-
40	40	40	-	-	-	-	-	-	40	40	40	-	-	-	-	-	-	40	40	40	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	50	50	-	-	-	-	-	-
63	63	63	-	63	63	63	-	-	63	63	63	-	63	63	63	-	-	63	63	63	-	63	63	63	63	63
80	80	80	-	80	80	80	80	-	80	80	80	-	80	80	80	80	-	-	-	-	80	80	80	80	80	80
-	-	-	100	100	100	100	100	-	-	-	-	100	100	100	100	100	-	-	-	-	100	100	100	100	100	100
-	-	-	125	125	125	125	125	-	-	-	-	125	125	125	125	125	-	-	-	-	-	-	-	-	-	-
■									■									■								
45									45									45								
10-15									10-15									10-15								
55-60									55-60									55-60								
80									80									80								
640			655			655			649			655			655			818 ⁽³⁾			655			818 ⁽³⁾		
493			600			730			600			600			730			600			730			730		
495			561			603			496			561			603			516			561			603		
114			145			165			114			145			165			119			145			165		
380									380									380								
- 5 ... + 40									- 5 ... + 40									- 5 ... + 40								
■									■									■								
■									■									■								

CIRCUIT-BREAKER SELECTION AND ORDERING

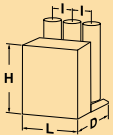


Fixed HD4 36 kV circuit-breaker with 350 mm pole centre distance: $I_r = 630-1250-1600$ A; $I_{sc} = 16-20$ kA.



Fixed HD4 36 kV circuit-breaker with 275 mm pole centre distance: – $I_r = 1250-1600$ A; $I_{sc} = 25-31.5$ kA.
– $I_r = 2000-2500$ A; $I_{sc} = 20-25-31.5$ kA

General characteristics of fixed circuit-breakers (36 kV)

Circuit-breaker		
Standards		IEC 62271-100 CEI 17-1 (File 1375)
Rated voltage		Ur [kV]
Rated insulation voltage		Us [kV]
Withstand voltage at 50 Hz		Ud (1 min) [kV]
Impulse withstand voltage		Up [kV]
Rated frequency		fr [Hz]
Rated normal current (40 °C) ⁽¹⁾		Ir [A]
Rated breaking capacity		Isc [kA]
Rated short-time withstand current (3 s)		Ik [kA]
Making capacity		Ip [kA]
Operation sequence		[O-0,3s-CO-15s-CO] [O-0,3s-CO-3min-CO]
Opening time		[ms]
Arcing time		[ms]
Total breaking time		[ms]
Closing time		[ms]
Maximum overall dimensions of fixed circuit-breakers without truck and without insulating shields between the phases ⁽⁴⁾		H [mm] L [mm] D [mm] I [mm]
Weight		[Kg]
Absolute SF6 gas pressure ⁽²⁾		[kPa]
Operating temperature		[°C]
Tropicalization		IEC: 60068-2-30, 721-2-1
Electromagnetic compatibility		IEC: 60694, 61000-6-2, 61000-6-4

HD4 36							
■							
■							
36							
36							
70							
170							
50-60							
630	1250	1250 ⁽³⁾	1600	1600 ⁽³⁾	2000 ⁽³⁾	2500 ⁽³⁾	
16	16	–	16	–	–	–	
20 ⁽⁵⁾	20 ⁽⁵⁾	–	20 ⁽⁵⁾	–	20	20	
–	–	25	–	25	25	25	
–	–	31.5	–	31.5	31.5	31.5	
16	16	–	16	–	–	–	
20	20	–	20	–	20	20	
–	–	25	–	25	25	25	
–	–	31.5	–	31.5	31.5	31,5	
40	40	–	40	–	–	–	
50	50	–	50	–	50	50	
–	–	63	–	63	63	63	
–	–	80	–	80	80	80	
–	–	■	–	■	■	■	
■	■	■	■	■	■	■	
45							
10-15							
55-60							
80							
712/1060 ⁽⁶⁾	712/1060 ⁽⁶⁾	790/1123 ⁽⁶⁾	712/1060 ⁽⁶⁾	790/1123 ⁽⁶⁾	790/1123 ⁽⁶⁾	790/1123 ⁽⁶⁾	
880/955 ⁽⁶⁾	880/955 ⁽⁶⁾	748/805 ⁽⁶⁾	880/955 ⁽⁶⁾	748/805 ⁽⁶⁾	748/805 ⁽⁶⁾	748/805 ⁽⁶⁾	
695	695	833	695	833	833	883	
350	350	275	350	275	275	275	
124	128	175	128	175	180	190	
380	380	450	380	450	450	450	
– 5 ... + 40							
■							
■							

- (1) Rated uninterrupted currents 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 details of the overall dimensions, see chap. 6.
(5) Operation sequence O-0.3 min - CO - 3 min - CO.
(6) The second distance refers to the version with truck (if provided).

CIRCUIT-BREAKER SELECTION AND ORDERING



General characteristics of withdrawable circuit-breakers for CBE enclosures and CBF fixed parts (12 - 17.5 - 24 kV)

Circuit-breaker		
Standards		IEC 62271-100 CEI 17-1 (File 1375)
Rated voltage		Ur [kV]
Rated insulation voltage		Us [kV]
Withstand voltage at 50 Hz		Ud (1 min) [kV]
Impulse withstand voltage		Up [kV]
Rated frequency		fr [Hz]
Rated normal current (40 °C) ⁽¹⁾		Ir [A]
Rated breaking capacity		Isc [kA]
Rated short-time withstand current (3 s) ⁽⁴⁾		Ik [kA]
Making capacity		Ip [kA]
Operation sequence		[O-0,3s-CO-15s-CO]
Opening time		[ms]
Arc time		[ms]
Total breaking time		[ms]
Closing time		[ms]
Overall dimensions		H [mm] L [mm] D [mm]
Weight		[Kg]
Absolute SF6 gas pressure ⁽²⁾		[kPa]
Operating temperature		[°C]
Tropicalization		IEC: 60068-2-30, 721-2-1
Electromagnetic compatibility		IEC: 60694, 61000-6-2, 61000-6-4

- (1) Rated uninterrupted currents guaranteed with withdrawable circuit-breaker installed in a switchboard (40 °C).
- (2) Rated service value.
- (3) Current in switchboard with forced ventilation.
- (4) Please consult the specific catalogue for the short-time withstand current of the switchboard/enclosure/ fixed part. For combination with CBE enclosures and CBF fixed parts, see pages 36 and 43 respectively.

HD4/C 12								HD4/C 17								HD4/C 24						
■								■								■						
■								■								■						
12								17,5								24						
12								17,5								24						
28								38								50						
75								95								125						
50-60								50-60								50-60						
630	1250	1250	1600	2000	2500	3150	⁽³⁾	630	1250	1250	1600	2000	2500	3150	⁽³⁾	630	1250	1250	1600	2000	2500	
16	16	-	-	-	-	-	-	16	16	-	-	-	-	-	16	16	-	-	-	-		
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	20	-	-	-	-		
25	25	-	25	25	25	25	25	25	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	-	31.5	31.5	31.5	31.5	-	-	31.5	31.5	31.5	31.5		
-	-	40	40	40	40	40	40	-	-	40	40	40	40	40	-	-	40	40	40	40		
-	-	50	50	50	50	50	50	-	-	50	50	50	50	50	-	-	-	-	-	-		
16	16	-	-	-	-	-	-	16	16	-	-	-	-	-	16	16	-	-	-	-		
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	20	-	-	-	-		
25	25	-	25	25	25	25	25	25	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	-	31.5	31.5	31.5	31.5	-	-	31.5	31.5	31.5	31.5		
-	-	40	40	40	40	40	40	-	-	40	40	40	40	40	-	-	40	40	40	40		
-	-	50	50	50	50	50	50	-	-	50	50	50	50	50	-	-	-	-	-	-		
40	40	-	-	-	-	-	-	40	40	-	-	-	-	-	40	40	-	-	-	-		
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	50	-	-	-	-		
63	63	-	63	63	63	63	63	63	63	-	63	63	63	63	63	63	-	63	63	63		
80	80	-	80	80	80	80	80	80	80	-	80	80	80	80	-	-	80	80	80	80		
-	-	100	100	100	100	100	100	-	-	100	100	100	100	100	-	-	100	100	100	100		
-	-	125	125	125	125	125	125	-	-	125	125	125	125	125	-	-	-	-	-	-		
■								■								■						
45								45								45						
10-15								10-15								10-15						
55-60								55-60								55-60						
80								80								80						
636	702		702					636	702		702					792	792		838		838	
532	682		882					532	682		882					682	682		882		882	
659	640		640					659	640		640					799	799		788		771	
120	177		220					120	177		220					125	177		177		220	
380								380								380						
- 5 ... + 40								- 5 ... + 40								- 5 ... + 40						
■								■								■						
■								■								■						

CIRCUIT-BREAKER SELECTION AND ORDERING



General characteristics of withdrawable circuit-breakers for UniGear type ZS1 switchboards (12 - 17.5 - 24 kV) ⁽⁴⁾

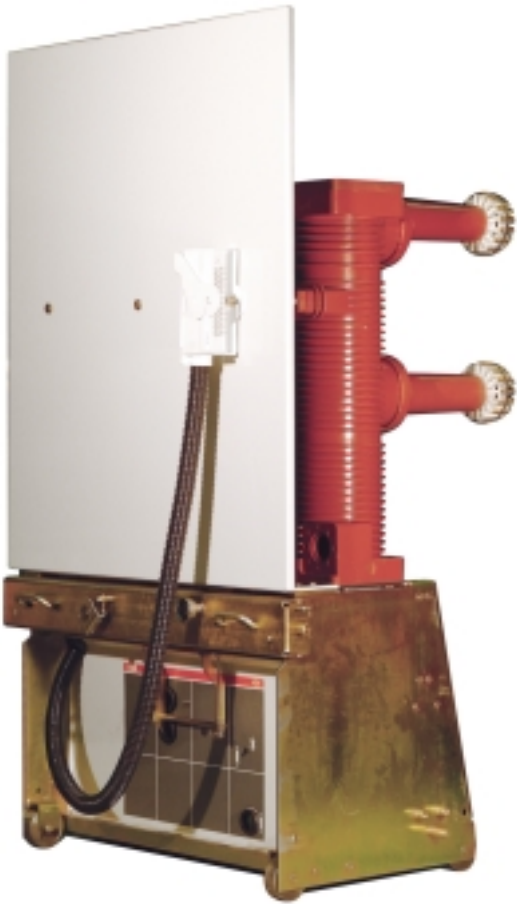
Circuit-breaker		
Standards		IEC 62271-100 CEI 17-1 (File 1375)
Rated voltage		Ur [kV]
Rated insulation voltage		Us [kV]
Withstand voltage at 50 Hz		Ud (1 min) [kV]
Impulse withstand voltage		Up [kV]
Rated frequency		fr [Hz]
Rated normal current (40 °C) ⁽¹⁾		Ir [A]
Rated breaking capacity		Isc [kA]
Rated short-time withstand current (3 s)		Ik [kA]
Making capacity		Ip [kA]
Operation sequence		[O-0,3s-CO-15s-CO]
Opening time		[ms]
Arc time		[ms]
Total breaking time		[ms]
Closing time		[ms]
Overall dimensions		H [mm] L [mm] D [mm]
Weight		[Kg]
Absolute SF6 gas pressure ⁽²⁾		[kPa]
Operating temperature		[°C]
Tropicalization		IEC: 60068-2-30, 721-2-1
Electromagnetic compatibility		

- (1) Rated uninterrupted currents guaranteed with withdrawable circuit-breaker installed in a switchboard (40 °C).
- (2) Rated service value.
- (3) The circuit-breaker can reach rated currents higher than 3150 A with suitable forced ventilation of the switchboard (for further information, consult the UniGear type ZS1 switchboard technical catalogue).
- (4) The locking electro-magnet in the truck (-RL2) 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) Rated current in a switchboard with forced ventilation. In a switchboard with natural ventilation, the rated current is 2300 A.

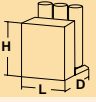


HD4/P 12							HD4/P 17							HD4/P 24				
■							■							■				
■							■							■				
12							17.5							24				
12							17.5							24				
28							38							50				
75							95							125				
50-60							50-60							50-60				
630	1250	1250	1600	2000	2500	3150 ⁽³⁾	630	1250	1250	1600	2000	2500	3150 ⁽³⁾	630	1250	1600	2000	2500 ⁽⁵⁾
16	16	-	-	-	-	-	16	16	-	-	-	-	-	16	16	16	16	16
-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	20	20	20	20
25	25	-	25	25	25	25	25	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	31.5	31.5	31.5	-	-	-	-	-
-	-	40	40	40	40	40	-	-	40	40	40	40	40	-	-	-	-	-
-	-	-	50	50	50	50	-	-	-	50	50	50	50	-	-	-	-	-
16	16	-	-	-	-	-	16	16	-	-	-	-	-	16	16	16	16	16
-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	20	20	20	20
25	25	-	25	25	25	25	25	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	31.5	31.5	31.5	-	-	-	-	-
-	-	40	40	40	40	40	-	-	40	40	40	40	40	-	-	-	-	-
-	-	-	50	50	50	50	-	-	-	50	50	50	50	-	-	-	-	-
40	40	-	-	-	-	-	40	40	-	-	-	-	-	40	40	40	40	40
-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	50	50	50	50
63	63	-	-	63	63	63	63	63	-	63	63	63	63	63	63	63	63	63
80	80	-	80	80	80	80	80	80	-	80	80	80	80	-	-	-	-	-
-	-	100	100	100	100	100	-	-	100	100	100	100	100	-	-	-	-	-
-	-	-	125	125	125	125	-	-	-	125	125	125	125	-	-	-	-	-
■							■							■				
45							45							45				
10-15							10-15							10-15				
55-60							55-60							55-60				
80							80							80				
628	695		695		746		628	695		695		746		736	821		821	
532	636		882		882		532	636		882		882		636	842		842	
659	640		643		643		659	640		643		643		802	788		788	
120	177		220		230		120	177		220		230		125	177		220	
380							380							380				
- 5 ... + 40							- 5 ... + 40							- 5 ... + 40				
■							■							■				
■							■							■				

CIRCUIT-BREAKER SELECTION AND ORDERING



General characteristics of withdrawable circuit-breakers for UniGear 36 type ZS3.2 switchboards (40.5 kV)

Circuit-breaker		
Standards		IEC 62271-100 CEI 17-1 (File 1375) (4)
Rated voltage		Ur [kV]
Rated insulation voltage		Us [kV]
Withstand voltage at 50 Hz		Ud (1 min) [kV]
Impulse withstand voltage		Up [kV]
Rated frequency		fr [Hz]
Rated normal current (40 °C) ⁽¹⁾		Ir [A]
Rated breaking capacity		Isc [kA]
Rated short-time withstand current (3 s)		Ik [kA]
Making capacity		Ip [kA]
Operation sequence		[O-0,3s-CO-15s-CO]
Opening time		[ms]
Arc time		[ms]
Total breaking time		[ms]
Closing time		[ms]
Overall dimensions		 H [mm] L [mm] D [mm]
Weight		[Kg]
Absolute SF6 gas pressure ⁽²⁾		[kPa]
Operating temperature		[°C]
Tropicalization		IEC: 60068-2-30, 721-2-1
Electromagnetic compatibility		IEC: 60694, 61000-6-2, 61000-6-4

HD4/Z 40,5				
■				
■				
■				
40,5				
40,5				
95				
185				
50-60				
1250	1600	2000	2500 ⁽³⁾	
25	25	25	25	
31.5 ⁽⁵⁾	31.5 ⁽⁵⁾	31.5 ⁽⁵⁾	31.5 ⁽⁵⁾	
25	25	25	25	
31.5	31.5	31.5	31.5	
63	63	63	63	
80	80	80	80	
■				
45				
10-15				
55-60				
80				
1575	1575	1575	1575	
895	895	895	895	
686	686	686	686	
280	280	300	300	
550				
- 5 ... + 40				
■				
■				

- (1) Rated uninterrupted currents guaranteed with withdrawable circuit-breaker installed in a switchboard.
- (2) Rated service value.
- (3) Rated current in switchboard with forced ventilation. In loose Powerbloc enclosure, the rated current of 2500 A is guaranteed with natural ventilation.
- (4) These circuit-breakers also comply with the following Chinese Standards:
 - GB 1984-1989 National Standard
 - DL/T402-1999 National Power Company Standard
 - JB/T9694-1999 Machinery/Electricity Ministry Standard.
- (5) The operation sequence is O-0.3s-CO-3min-CO for the rated breaking capacity $I_{sc} = 31.5$ kA.

CIRCUIT-BREAKER SELECTION AND ORDERING



General characteristics of withdrawable circuit-breakers for UniSafe switchboards (12 - 17.5 - 24 kV) ⁽³⁾

Circuit-breaker		
Standards		IEC 62271-100 CEI 17-1 (File 1375)
Rated voltage		Ur [kV]
Rated insulation voltage		Us [kV]
Withstand voltage at 50 Hz		Ud (1 min) [kV]
Impulse withstand voltage		Up [kV]
Rated frequency		fr [Hz]
Rated normal current (40 °C) ⁽¹⁾		Ir [A]
Rated breaking capacity		Isc [kA]
Rated short-time withstand current (3 s)		Ik [kA]
Making capacity		Ip [kA]
Operation sequence		[O-0,3s-CO-15s-CO]
Opening time		[ms]
Arc time		[ms]
Total breaking time		[ms]
Closing time		[ms]
Overall dimensions		H [mm] L [mm] D [mm]
Weight		[Kg]
Absolute SF6 gas pressure ⁽²⁾		[kPa]
Operating temperature		[°C]
Tropicalization		IEC: 60068-2-30, 721-2-1
Electromagnetic compatibility		IEC: 60694, 61000-6-2, 61000-6-4

(1) Rated uninterrupted currents guaranteed with withdrawable circuit-breaker installed in a switchboard

(2) Rated service value.


(3) The locking electro-magnet in the truck (-RL2) 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.

HD4/W 12					HD4/W 17					HD4/W 24			
■					■					■			
■					■					■			
12					17.5					24			
12					17.5					24			
28					38					50			
75					95					125			
50-60					50-60					50-60			
630	1250	1600	2000	2500	630	1250	1600	2000	2500	630	1250	1600	2000
16	16	16	16	16	16	16	16	16	16	16	16	16	16
-	-	-	-	-	-	-	-	-	-	20	20	20	20
25	25	25	25	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	31.5	-	-	-	-
16	16	16	16	16	16	16	16	16	16	16	16	16	16
-	-	-	-	-	-	-	-	-	-	20	20	20	20
25	25	25	25	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	31.5	-	-	-	-
40	40	40	40	40	40	40	40	40	40	40	40	40	40
-	-	-	-	-	-	-	-	-	-	50	50	50	50
63	63	63	63	63	63	63	63	63	63	63	63	63	63
80	80	80	80	80	80	80	80	80	80	-	-	-	-
■					■					■			
45					45					45			
10-15					10-15					10-15			
55-60					55-60					55-60			
80					80					80			
636/702		702			636/702		702			792/838		838	
532/682		682			532/682		682			682/882		882	
640		640			640		640			799		788	
120		177			120		177			125		177	
380					380					380			
- 5 ... + 40					- 5 ... + 40					- 5 ... + 40			
■					■					■			
■					■					■			

CIRCUIT-BREAKER SELECTION AND ORDERING



General characteristics of withdrawable circuit-breakers for UniSafe switchboards 36 kV

Circuit-breaker		
Standards		IEC 62271-100 CEI 17-1 (File 1375)
Rated voltage		Ur [kV]
Rated insulation voltage		Us [kV]
Withstand voltage at 50 Hz		Ud (1 min) [kV]
Impulse withstand voltage		Up [kV]
Rated frequency		fr [Hz]
Rated normal current (40 °C) ⁽¹⁾		Ir [A]
Rated breaking capacity		Isc [kA]
Rated short-time withstand current (3 s)		Ik [kA]
Making capacity		Ip [kA]
Operation sequence		⁽⁵⁾ [O-0,3s-CO-15s-CO]
Opening time		[ms]
Arc time		[ms]
Total breaking time		[ms]
Closing time		[ms]
Overall dimensions		 H [mm] L [mm] D [mm]
Weight		[Kg]
Absolute SF6 gas pressure SF6 ⁽²⁾		[kPa]
Operating temperature		[°C]
Tropicalization		IEC: 60068-2-30, 721-2-1
Electromagnetic compatibility		IEC: 60694, 61000-6-2, 61000-6-4

HD4/W 36				
■				
■				
36				
36				
70				
170				
50-60				
1250	1600	2000	2500 ⁽³⁾	
20	20	20	20	
25	25	25	25	
31,5	31,5	31,5	31,5	
20	20	20	20	
25	25	25	25	
31.5 ⁽⁴⁾	31.5 ⁽⁴⁾	31.5 ⁽⁴⁾	31.5 ⁽⁴⁾	
50	50	50	50	
63	63	63	63	
80	80	80	80	
■				
45				
10-15				
55-60				
80				
973	973	973	973	
882	882	882	882	
788	788	789	789	
225	235	270	270	
450				
- 5 ... + 40				
■				
■				

- (1) Rated uninterrupted currents guaranteed with withdrawable circuit-breaker installed in a switchboard.
- (2) Rated service value.
- (3) Rated current in switchboard with forced ventilation.
- (4) $I_k = 31.5 \text{ kA} \times 1 \text{ s}$.
- (5) The sequence of operations becomes O-0.3s-CO-3min-CO for the following performances:
 - $I_r = 1250 \text{ A}$ and $I_{sc} = 20 \text{ kA}$
 - $I_r = 1250 \text{ A} \dots 2500 \text{ A}$ and $I_{sc} = 31.5 \text{ kA}$.

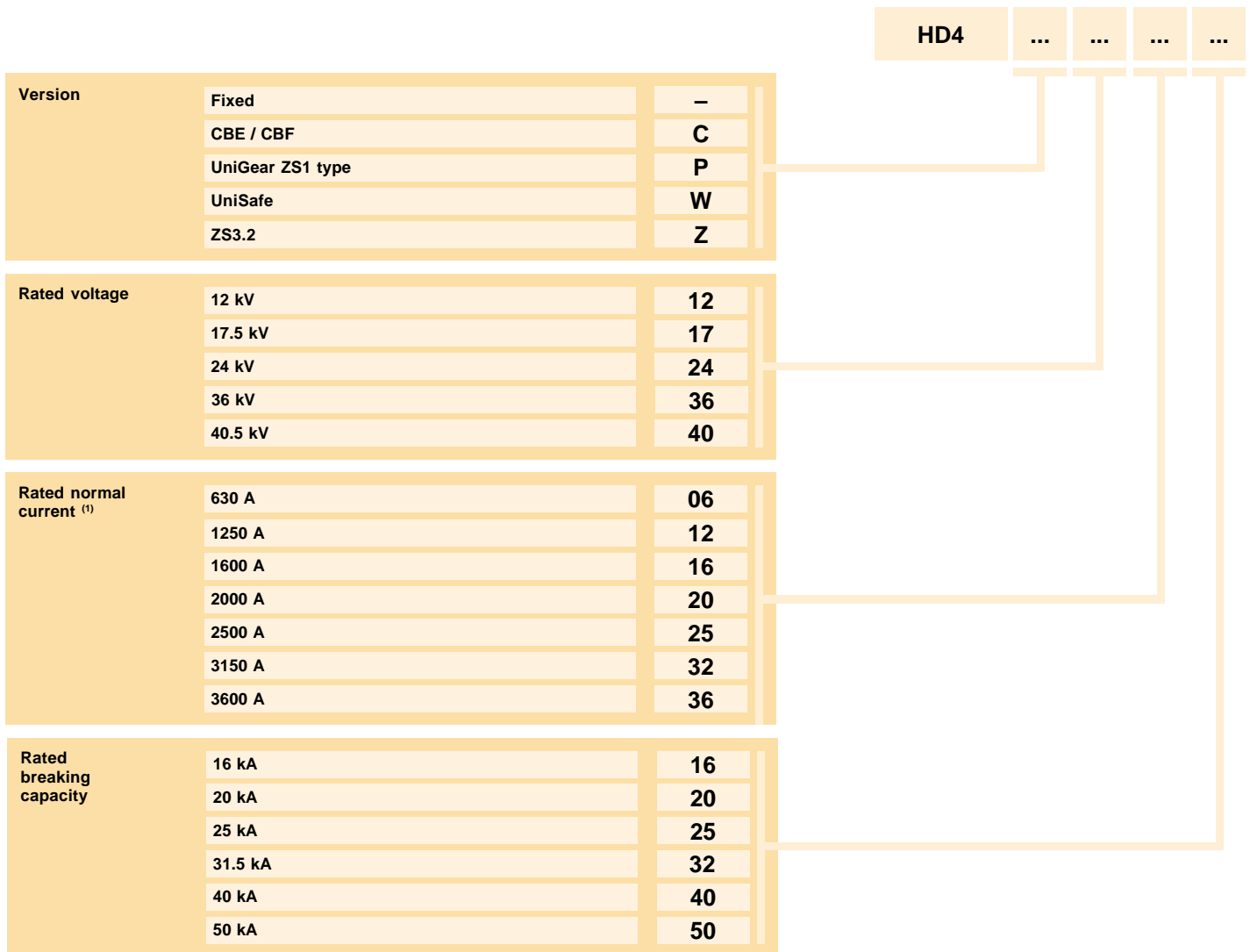
CIRCUIT-BREAKER SELECTION AND ORDERING

Identification of the circuit-breaker type

The identification code of a circuit-breaker is made up with the elements from the table below. For correct identification of a circuit-breaker, it is necessary to refer to the characteristics tables on pages 12 to 25. The selected circuit-breaker can then be completed with the optional accessories indicated on the following pages.

Examples of identification

- The code **HD4/C 12.16.25** identifies a withdrawable circuit-breaker for CBE enclosure or CBF fixed part with 12 kV rated voltage, 1600 A rated normal current and 25 kA breaking capacity.
- The code **HD4/W 24.20.25** identifies a withdrawable circuit-breaker for UniSafe switchboard with 24 kV rated voltage, 2000 A rated normal current and 25 kA breaking capacity.



(1) Rated uninterrupted current defined in free air for fixed circuit-breaker. For the withdrawable version, see the previous pages.

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
- set of ten open/closed circuit-breaker auxiliary contacts (four opening (NC) and three closing (NO) available, according to the applications requested)
- 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
 - terminal board for auxiliary circuits;
- for withdrawable circuit-breaker
 - isolating contacts
 - cord with connector (plug only) for auxiliary circuits
 - earthing contact on truck (only for CBE, CBF)
 - 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 and /W versions).



Terminals for fixed circuit-breaker.



Tulip isolating contacts for withdrawable circuit-breaker.



Plier isolating contacts for withdrawable circuit-breaker.



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



Manual charging lever of operating mechanism springs.

CIRCUIT-BREAKER SELECTION AND ORDERING

Table of availability of accessories

	-MO1 shunt opening release.	-MO2 additional shunt opening release.	-MO3 shunt opening release with demagnetisation.	-MC shunt closing release.	-MU undervoltage release (power supply on supply side).	-MU undervoltage release with electronic time delay device (power supply on supply side).	Mechanical override of undervoltage release trip..	-BB5 undervoltage release electric signalling (energised or de-energised)..	
	1	2A	2B	3	4A	4B	5	6	
Fixed circuit-breakers									
HD4 12	■	■	■	■	■	■	■	■	
HD4 17	■	■	■	■	■	■	■	■	
HD4 24	■	■	■	■	■	■	■	■	
HD4 36	■	■	■	■	■	■	■	■	
Withdrawable circuit-breakers for CBE enclosures and CBF fixed parts									
HD4/C 12	■	■	■	■	■	■	■	■	
HD4/C 17	■	■	■	■	■	■	■	■	
HD4/C 24	■	■	■	■	■	■	■	■	
Withdrawable circuit-breakers for UniGear type ZS1 switchboards									
HD4/P 12	■	■	■	■	■	■	■	■	
HD4/P 17	■	■	■	■	■	■	■	■	
HD4/P 24	■	■	■	■	■	■	■	■	
Withdrawable circuit-breakers for UniGear 36 type ZS3.2 switchboards									
HD4/Z 40.5	■	■	■	■	■	■	■	■	
Withdrawable c.-bs. for UniSafe switchboards									
HD4/W 12	■	■	■	■	■	■	■	■	
HD4/W 17	■	■	■	■	■	■	■	■	
HD4/W 24	■	■	■	■	■	■	■	■	
HD4/W 36	■	■	■	■	■	■	■	■	

(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 electromagnet in the truck (-RL2) 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.

	7	8	9	10	11	12	13A	13B	14	15	16	17	18	19	20	21	22A	22 B/C/D	23
Group of 15 auxiliary circuit-breaker contacts: 4 make and 5 break (alternative to the 10 provided as standard, of which a maximum of 3 make and 4 break are available depending on the accessories requested).	■	■	-	-	■	■	■	■	■	■	■	■	-	■	-	-	■	■	-
-BB4 transient contact.	■	■	-	-	■	■	■	■	■	■	■	■	-	■	-	-	■	■	-
-BT3 position contact of the withdrawable circuit-breaker (installed on the truck). It is compulsory if the RL1 locking magnet is present.	■	■	-	-	■	■	■	■	■	■	■	■	-	■	-	-	■	■	-
Withdrawable circuit-breaker transmitted contacts (installed in the circuit-breaker truck).	■	■	-	-	■	■	■	■	■	■	■	■	-	■	-	-	■	■	-
-MS spring charging geared motor.	■	■	-	-	■	■	■	■	■	■	■	■	-	■	-	-	■	■	-
-FB1 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.	■	■	-	-	■	■	■	■	■	■	■	■	-	■	-	-	■	■	-
-RL1 operating mechanism locking magnet.	■	■	-	-	■	■	■	■	■	■	■	■	-	■	-	-	■	■	-
-RL2 truck locking magnet.	■	■	-	-	■	■	■	■	■	■	■	■	-	■	-	-	■	■	-
Interlock for fixed circuit-breaker.	■	■	-	-	■	■	■	■	■	■	■	■	-	■	-	-	■	■	-
Mechanical isolation interlock with the switchgear door..	■	■	-	-	■	■	■	■	■	■	■	■	-	■	-	-	■	■	-
Earthing contact on the truck.	■	■	-	-	■	■	■	■	■	■	■	■	-	■	-	-	■	■	-
Two-level pressure switch ⁽²⁾ .	■	■	-	-	■	■	■	■	■	■	■	■	-	■	-	-	■	■	-
Two-level pressure switch plus SF6 control device with three LEDs ⁽²⁾ .	■	■	-	-	■	■	■	■	■	■	■	■	-	■	-	-	■	■	-
Insulating partitions.	■	■	-	-	■	■	■	■	■	■	■	■	-	■	-	-	■	■	-

CIRCUIT-BREAKER SELECTION AND ORDERING

Optional accessories

The accessories identified with the same number are alternative to each other.

■ Shunt opening release

- 1 **-MO1** shunt opening release.

■ Additional shunt opening release

- 2A Additional **-MO2** shunt opening release
 2B **-MO3** opening solenoid with demagnetisation.

■ Shunt closing release

- 3 **-MC** shunt closing release.

■ Undervoltage release

- 4A **-MU** undervoltage release (power supply branched on the supply side).
 4B **-MU** undervoltage release with electronic delay device (0.5 – 1 – 1.5 – 2 – 3 s) (power supply branched on the supply side). This device is delivered set to 0.5 s see the Electric Diagram chapter - note I on page 82).

- 5 Mechanical override of undervoltage release trip with electrical signalling.

- 6 **-BB5** undervoltage release electric signalling (energised or de-energised).

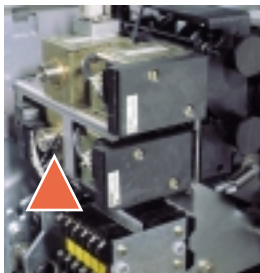
■ Auxiliary and signalling contacts

- 7 Group of 15 auxiliary circuit-breaker contacts: 4 make and 5 break (alternative to the 10 provided as standard, of which a maximum of 3 make and 4 break are available depending on the accessories requested).

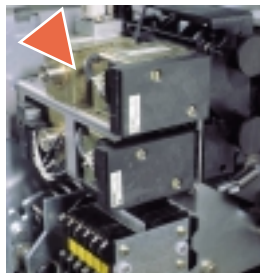
- 8 **-BB4** transient contact with momentary closing during circuit-breaker opening.

- 9 **-BT3** position contact of the withdrawable circuit-breaker (installed on the truck, only available for the /C, /P, /W version when the locking magnet is not provided; mounted as standard when the **-RL1** locking magnet is provided on the operating mechanism).

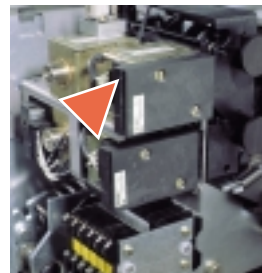
- 10 Transmitted contacts of the withdrawable circuit-breaker (installed in the circuit-breaker truck - only for withdrawable circuit-breaker).



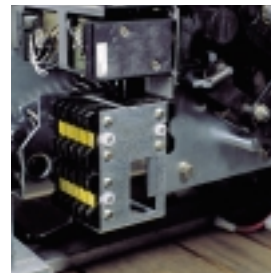
Shunt opening release.



Shunt closing release.



Undervoltage release.



Auxiliary contacts

■ **Motor operator**

- 11 **-MS** spring-charging geared motor.
- 12 **-FB1** thermomagnetic protection of the spring-charging geared motor (mounted as standard for 24 V d.c. geared motors) complete with electrical signalling of thermomagnetic protection trip.
- 13A Electrical signalling of operating mechanism springs charged.
- 13B Electrical signalling of operating mechanism springs discharged.

■ **Locks and interlocks**

- 14 Opening pushbutton lock (with or without padlock).
- 15 Closing pushbutton lock (with or without padlock).
- 16 Key lock for circuit-breaker open (different keys or the same keys).
- 17 **-RL1** operating mechanism locking magnet.
- 18 **-RL2** truck locking magnet. Compulsory accessory for the withdrawable versions for UniSafe and UniGear ZS1 type switchboards, to prevent racking-in of the circuit-breaker into the switchboard with the auxiliary circuit plug disconnected. The plug makes the anti-racking-in lock for different rated current (by means of a special pin).



Spring charging geared motor.



Geared motor protection.

- 19 Interlock for fixed circuit-breaker (for fixed apparatus converted into withdrawable type by the customer).
- 20 Mechanical isolation interlock with the door of the switchboard (not provided for HD4/Z and HD4/W).

■ **Withdrawable circuit-breaker earthing**

- 21 Earthing contact on the truck (compulsory for circuit-breaker with CBE enclosure and for CBF fixed part; not available for UniSafe and UniGear ZS1 type switchgear).

■ **Gas control device**

Notes:

- **should application of the pressure switch be required, specify the request at the time of order since subsequent application by the customer is not possible.**
- **devices 22B and 22C are supplied without LEDs for the HD4/Z 40.5 kV series.**

22A Two-level pressure switch.

22B Two-level SF6 pressure switch control device with three LEDs and **-MO2** additional shunt opening release: circuit-breaker opening and lock on closing

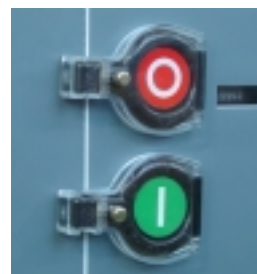
22C Two-level SF6 pressure switch control device with three LEDs: circuit-breaker locking in the position it is found in.

■ **Insulating partitions**

- 23 Insulating partitions.



SF6 control device with 3 LEDs.



Opening and closing pushbutton locks.

CIRCUIT-BREAKER SELECTION AND ORDERING

Characteristics of electrical accessories

Shunt opening release (-MO1; -MO2)	Ps = 125 W/VA (Instantaneous service \leq 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 (-MC)	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 (-MU)	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 (-MS)	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 (-RL1; -RL2)	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	Un = 500 V– 220 V–
	Icu = 15 A 1,5 A
	cos φ = 0,4 –
	T = – 10 ms


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

CBE ENCLOSURE SELECTION AND ORDERING

General characteristics	34
Standard equipment	35
Circuit-breaker – enclosure combination table	36
Notes for ordering enclosures	38
Optional accessories	38
Characteristics of electrical accessories	40

CBE ENCLOSURE SELECTION AND ORDERING

General characteristics

Enclosure		CBE11	CBE21	CBE31	CBE41	CBE51
Standards		IEC publ. 60056 / 298 CEI 17-1 (file 1375) / 17-6 (file 2056)				
Rated voltage	Ur [kV]	12 17.5	12 17.5	12 17.5	24	24
Rated insulation voltage	Ui [kV]	12 17.5	12 17.5	12 17.5	24	24
Withstand voltage at 50 Hz	Ud (1 min) [kV]	28 38	28 38	28 38	50	50
Impulse withstand voltage	Up [kV]	75 95	75 95	75 95	125	125
Rated frequency	fr [Hz]	50-60	50-60	50-60	50-60	50-60
Rated current ⁽¹⁾	Ir (40 °C) [A]	630 1250 – – – –	– – 1600 – – –	– – – 2000 2500 3150 ⁽²⁾	630 1250 – – – –	– – 1600 2000 2500 –
Rated admissible short-time current	Ik [kA]	31.5	50	50	40	40
Dimensions (monoblocs excluded)	 L [mm] H [mm] D [mm]	600 943 752	750 1015 752	1000 1015 752	750 1125 910	1000 1125 910
Weight	[kg]	120	200	320	225	370
Tropicalization		IEC 721-2-1				
Electromagnetic compatibility		EN 50081.../50082...				
Degree of protection		IP 3X				

(1) Rated current of the CBE enclosure installed in a switchboard.

(2) With forced ventilation (provided by the customer).

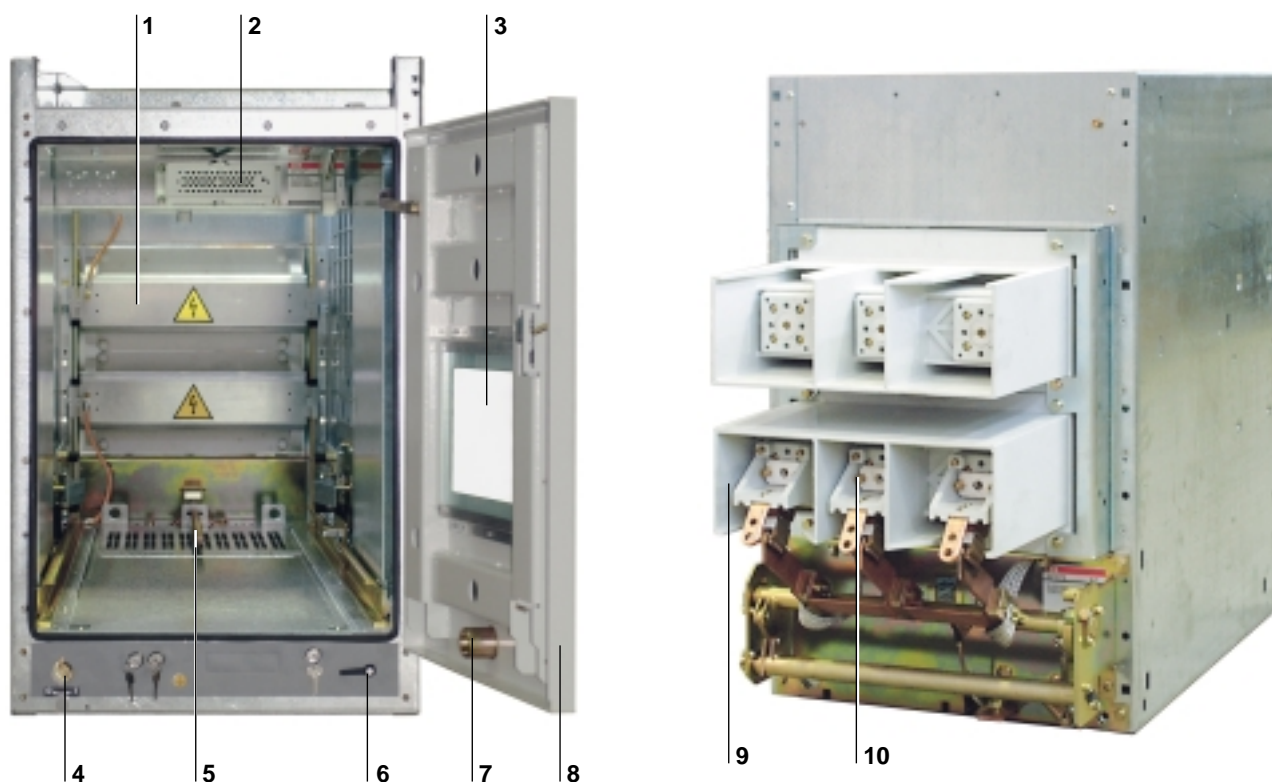
Standard equipment

The basic coded versions of CBE enclosures are always provided with degree of protection IP3X with the door closed, IP2X with the door open and are made up as follows:

- unpainted galvanised sheet structure
- door painted RAL 7035. On request, it is possible to supply the door dismantled and protected against corrosion (painting by the customer) with kit of accessories for completing the door (handle for door without lock, window and hinges; on request, the handle with lock is available).

- insulating monoblocs with medium voltage contacts
- automatic metal segregation shutters of the M.V. contacts with “fail safe” device which prevents manual operation of the shutters themselves
- sliding earthing contact
- connector (socket)
- anti-racking-in lock for different rated currents
- nameplate in the language of chosen.

The earthing switch (if requested) is controlled from the front and is interlocked with the circuit-breaker to prevent the power circuit being earthed with the circuit-breaker connected.



- 1 Segregation shutters
- 2 Socket connector
- 3 Inspection window
- 4 Earthing switch operating mechanism
- 5 Sliding earthing contact
- 6 Earthing switch release lever

- 7 Bush for passage of connected/isolated operating lever
- 8 Internal arc-proof door
- 9 Insulating monoblocs
- 10 Main circuit contacts

CBE ENCLOSURE SELECTION AND ORDERING

Circuit-breaker – enclosure combination table

HD4 circuit-breaker					Enclosure
Ur (kV)	Isc (kA)	Ir (A)			
12	16	630	HD4/C	12.06.16	CBE11
		1250	HD4/C	12.12.16	
	25	630	HD4/C	12.06.25	
		1250	HD4/C	12.12.25	
	31.5	630	HD4/C	12.06.32	
		1250	HD4/C	12.12.32	
17	16	630	HD4/C	17.06.16	CBE11
		1250	HD4/C	17.12.16	
	25	630	HD4/C	17.06.25	
		1250	HD4/C	17.12.25	
	31.5	630	HD4/C	17.06.32	
		1250	HD4/C	17.12.32	
12	25	1600	HD4/C	12.16.25	CBE21
	31.5	1600	HD4/C	12.16.32	
	40	1250	HD4/C	12.12.40	
		1600	HD4/C	12.16.40	
	50	1250	HD4/C	12.12.50	
		1600	HD4/C	12.16.50	
17	25	1600	HD4/C	17.16.25	CBE21
	31.5	1600	HD4/C	17.16.32	
	40	1250	HD4/C	17.12.40	
		1600	HD4/C	17.16.40	
	50	1250	HD4/C	17.12.50	
		1600	HD4/C	17.16.50	
12	25	2000	HD4/C	12.20.25	CBE31
		2500	HD4/C	12.25.25	
		3150 ⁽¹⁾	HD4/C	12.32.25	
	31.5	2000	HD4/C	12.20.32	
		2500	HD4/C	12.25.32	
		3150 ⁽¹⁾	HD4/C	12.32.32	
	40	2000	HD4/C	12.20.40	
		2500	HD4/C	12.25.40	
		3150 ⁽¹⁾	HD4/C	12.32.40	
	50	2000	HD4/C	12.20.50	
		2500	HD4/C	12.25.50	
		3150 ⁽¹⁾	HD4/C	12.32.50	

(1) With forced ventilation (provided by the customer).

HD4 circuit-breaker					Enclosure
Ur (kV)	Isc (kA)	Ir (A)			
17	25	2000	HD4/C	17.20.25	CBE31
		2500	HD4/C	17.25.25	
		3150 ⁽¹⁾	HD4/C	17.32.25	
	31.5	2000	HD4/C	17.20.32	
		2500	HD4/C	17.25.32	
		3150 ⁽¹⁾	HD4/C	17.32.32	
	40	2000	HD4/C	17.20.40	
		2500	HD4/C	17.25.40	
		3150 ⁽¹⁾	HD4/C	17.32.40	
	50	2000	HD4/C	17.20.50	
		2500	HD4/C	17.25.50	
		3150 ⁽¹⁾	HD4/C	17.32.50	
24	16	630	HD4/C	24.06.16	CBE41
		1250	HD4/C	24.12.16	
	20	630	HD4/C	24.06.20	
		1250	HD4/C	24.12.20	
	25	630	HD4/C	24.06.25	
		1250	HD4/C	24.12.25	
	32	1250	HD4/C	24.12.32	
	40	1250	HD4/C	24.12.40	
24	25	1600	HD4/C	24.16.25	CBE51
		2000	HD4/C	24.20.25	
		2500	HD4/C	24.25.25	
	31.5	1600	HD4/C	24.16.32	
		2000	HD4/C	24.20.32	
		2500	HD4/C	24.25.32	
	40	1600	HD4/C	24.16.40	
		2000	HD4/C	24.20.40	
		2500	HD4/C	24.25.40	

(1) With forced ventilation (provided by the customer).

CBE ENCLOSURE SELECTION AND ORDERING

Notes for ordering enclosures

The CBE enclosures are available in five different sizes as shown in the table on page 26. Each enclosure is available in two versions:

- enclosure without earthing switch
- enclosure with earthing switch.

The earthing switch is not an accessory and cannot be applied at a later date.

For this reason, when ordering, the actual installation requirements must be assessed in advance. The CBE11 and CBE21 enclosures are also available in the version with earthing switch preset for current transformer:

- CT type IBR10L for CBE11
- CT type IBR20L for CBE21.

Please consult us for any applications.

Optional accessories

- Notes**
- The accessories identified with the same number are alternative to each other.
 - For selection of the accessories, always specify the type of enclosure.

■ Circuit-breaker position contacts

CBE 11-21-31 enclosures

- 1A** Group of twelve contacts signalling circuit-breaker isolated (six closing + six opening).
- 1B** Group of twenty contacts signalling circuit-breaker isolated (ten closing + ten opening).
- 2A** Group of twelve contacts signalling circuit-breaker connected (six closing + six opening).
- 2B** Group of twenty contacts signalling circuit-breaker connected (ten closing + ten opening).

CBE 41-51 enclosures

- 3A** Group of six contacts signalling circuit-breaker isolated (two closing + four opening).
- 4A** Group of six contacts signalling circuit-breaker connected (two closing + four opening).

■ Anti-condensation heater

- 5A** 150 W - 110/220/380 V a.c. or d.c. anti-condensation heater for CBE 11.
- 5B** 150 W - 110/220/380 V a.c. or d.c. anti-condensation heater for CBE 21-31-41-51.



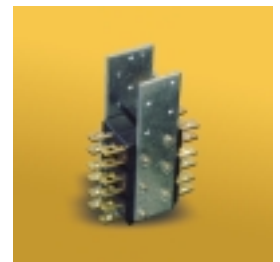
Anti-condensation heater.



Voltage signalling device.



Electrical door interlock (IP30).



Circuit-breaker auxiliary position contacts.

■ Voltage signalling device

- 6** Device for signalling voltage present (VIS type) to be used with current transformers with capacitive socket or with a set of three insulators with capacitive socket (to be provided by the customer). For the capacity values, ask for document T38152.

■ Interlocks

- 7** Mechanical door interlock.
8 Electrical door interlock.

■ Key locks

- 9A** Key lock for anti-racking-in circuit-breaker for CBE 11-21-31.
9B Key lock for anti-racking-in circuit-breaker for CBE 41-51.

■ Accessories for handling the circuit-breakers

- 10A** Lifting truck for CBE 11-21-41.
10B Lifting truck for CBE 31-51.
11A Plate for truck for CBE 11.
11B Plate for truck for CBE 21-41.
11C Plate for truck for CBE 31-51.

Accessories for earthing switch (only for enclosures with earthing switch)

■ Auxiliary contacts

- 12A** Group of five signalling contacts.
12B Group of ten signalling contacts.

■ Key lock

- 13A** Key lock in open position. Can be activated with earthing switch open and prevents its closure. In this situation, the key can be removed.
13B Key lock in closed position. Can be activated with earthing switch closed and prevents its opening. In this situation, the key can be removed.
13C Key lock in open and closed position. Made of locks 13A + 13B.

■ Electromechanical lock

- 14A** Electromechanical lock on de-energisation for CBE 11-21-31 enclosure.
14B Electromechanical lock on de-energisation for CBE 41-51 enclosure.

■ Rear door-isolator interlock

- 15** Allows a lock to be made which only permits the rear door to be opened with the earthing switch closed (*).

■ Lever

- 16** Operating lever.



Mechanical door interlock.



Auxiliary open/closed contacts for earthing switch.



Key lock for earthing switch.



Electro-mechanical lock on de-energisation for earthing switch.

(*) The rear door is the one of the switchboard constructed using the CBE enclosure. Lock transmission is provided by the customer and varies according to the depth of the switchboard.

CBE ENCLOSURE SELECTION AND ORDERING

Characteristics of electrical accessories

Earthing switch

Earthing switch	ST/ZC 12-31/K80	ST/ZC 17.5-31/K80	ST/ZC 12/17.5-50/K125	ST/ZC 24-40/K100
For enclosure	CBE11 - 12 kV	CBE11 - 17.5 kV	CBE21-31 - 12/17.5 kV	CBE41-51 - 24 kV
Rated voltage	12 kV	17.5 kV	17.5 kV	24 kV
Short time current	31.5 kA	31.5 kA	50 kA	40 kA
Making capacity	80 kA	80 kA	125 kA	100 kA

Earthing switch auxiliary contacts

Open/Closed	Un	= 500 V~	220 V~	220 V –
	Icu	= 5 A	10 A	1 A
	cos φ	= 0.4	0.4	–
	T	= –	–	10 ms

Auxiliary signalling contacts for CBE 11, 21, 31

Connected/Isolated	Un	= 250 V~	220 V~	110 V~	48 V –
	Icu	= 5 A	0.5 A / 0.3 A	0.8 A / 0.5 A	3 A / 1.5 A
	cos φ	= –	–	–	–
	T	= –	– / 5 ms	– / 5 ms	– / 5 ms

Auxiliary signalling contacts for CBE 41, 51

Connected/Isolated	Un	= 500 V~	220 V~	48 V~	240 V –
	Icu	= 0.5 A	1.5 A	3 A	2 A
	cos φ	= 0.7	0.7	0.7	–
	T	= –	–	–	20 ms

CBF FIXED PART SELECTION AND ORDERING

General characteristics	42
Standard equipment	42
Notes for ordering	42
Circuit-breaker – fixed part combination table	43
Accessories on request	43

CBF FIXED PART SELECTION AND ORDERING

General characteristics

Enclosure		CBF 11		CBF 21		CBF 41
Standards	IEC 60298 (1)	■		■		■
Rated voltage	[kV]	12	17.5	12	17.5	24
Rated insulation voltage	[kV]	12	17.5	12	17.5	24
Withstand voltage at 50 Hz	[kV]	28	38	28	38	50
Impulse withstand voltage	[kV]	75	95	75	95	125
Rated frequency	[Hz]	50-60		50-60		50-60
Rated normal current (40 °C) (2)	[A]	1250		1600		1250
Rated admissible short-time current	[kA]	31,5		31,5		25
Overall dimensions	H [mm]	863		935		1045
	L [mm]	594		744		744
	D [mm]	1022		1018		1263
Weight	[kg]	64		87		88
Tropicalization	IEC 60721-2-1	■		■		■
Degree of protection	IP	2X		2X		2X

(1) It can be applied to the fixed part installed in a switchboard

(2) Rated uninterrupted currents in free air (with CBF not installed in a switchboard).

Standard equipment

The basic coded versions of CBF fixed parts are made up as follows:

- unpainted galvanised sheet structure
- insulating monoblocs with medium voltage contacts
- automatic metal segregation shutters of the M.V. contacts.

Notes for ordering

To order CBF fixed parts always specify:

- type
- rated voltage
- rated current.



CBF 11



CBF 21



CBF 41

Circuit-breaker - fixed part combination table

HD4 circuit-breaker	Fixed part	HD4 circuit-breaker	Fixed part	HD4 circuit-breaker	Fixed part
HD4/C 12.06.16	CBF 11	HD4/C 12.16.25	CBF 21	HD4/C 24.06.16	CBF 41
HD4/C 12.12.16		HD4/C 12.16.32		HD4/C 24.12.16	
HD4/C 12.06.25		HD4/C 17.16.25		HD4/C 24.06.20	
HD4/C 12.12.25		HD4/C 17.16.32		HD4/C 24.12.20	
HD4/C 12.06.32			HD4/C 24.06.25		
HD4/C 12.12.32			HD4/C 24.12.25		
HD4/C 17.06.16					
HD4/C 17.12.16					
HD4/C 17.06.25					
HD4/C 17.12.25					
HD4/C 17.06.32					
HD4/C 17.12.32					

Accessories on request

For selection of the accessories, always specify the type of fixed part. The following accessories are available.

- **Connector**
 - 1 Socket connector (installation in the switch-board to be carried out by the customer).
- **Earthing contact**
 - 2 Earthing contact for use in circuits with fault currents higher than 20 kA, or lower than 20 kA but with duration higher than 1s.
- **Jointed lever**
 - 3 Jointed lever for circuit-breaker racking in/ racking out in the case of assembly of the fixed part on the floor (in replacement of the lever supplied with the circuit-breaker).

SPECIFIC PRODUCT CHARACTERISTICS

Resistance to vibrations	46
Tropicalization	46
Altitude	46
Switching special loads	47
Environmental protection programme	47
Anti-pumping device	47
Spare parts	48

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 UNI 3564-65 Standards environmental class C. 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 5420 Standards.

These construction characteristics mean that the whole HD4 series of circuit-breakers and its accessories comply with climate graph 8 of the IEC 60721-2-1 and IEC 60068-2-2 (Test B: Dry Heat / IEC 60068-2-30 (Test Bd: Damp Heat, cyclic) 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 60694 Standards.

The following example is a clear interpretation of the indications given above.

Graph for determining the Ka correction factor according to the altitude

H = altitude in metres;

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

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):

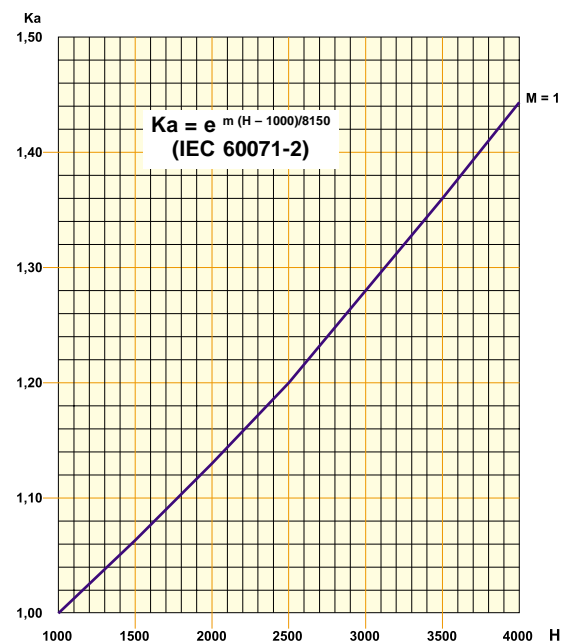
– withstand voltage at industrial frequency equal to:

$$28 \times 1.13 = 31.6 \text{ kVrms}$$

– 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.



Switching special loads

The table indicates the breaking capacities which can be guaranteed for switching special loads.

Circuit-breaker		HD4							
Rated normal current for fixed circuit-breaker	In [A]	630	1250	1600	2000	2500	3150	3600	
No-load MV/LV transformer breaking	Isc [A]	10	10	10	10	10	10	10	10
No-load cable breaking	Isc [A]	12 kV	25	25	25	25	25	25	25
		17.5 - 24 kV	31.5	31.5	31.5	31.5	31.5	31.5	31.5
		36 - 40.5 kV	50	50	50	50	50	–	–
Capacitive current breaking (C2 class)	Isc [A]	400	630	1000	1250	1250	1250	1250	
Reactance compensation current breaking	Isc [A]	630	630	1250	1250	1250	1250	1250	
Breaking of rated motor currents	Isc [A]	630	630	1250	1250	1250	1250	1250	



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.

Production techniques which prepare the products for simple dismantling and separation of the components are used during manufacture of the circuit-breakers. 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 (-MO1/-MO2) not enabled
- main circuit-breaker contacts open.



SPECIFIC PRODUCT CHARACTERISTICS

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
- KA1 instantaneous relay
- KA2 instantaneous relay.

Ordering

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

OVERALL DIMENSIONS

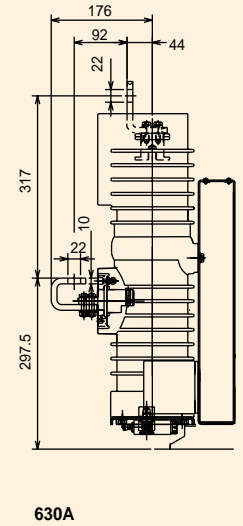
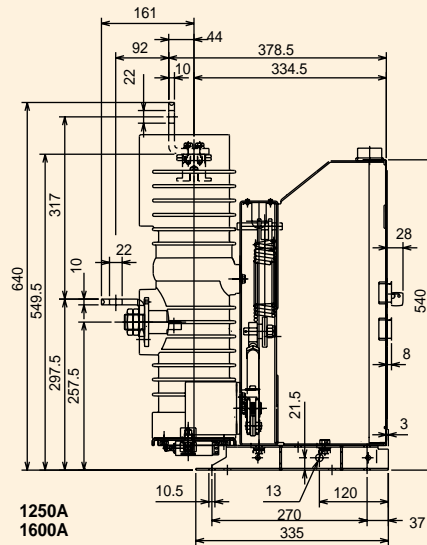
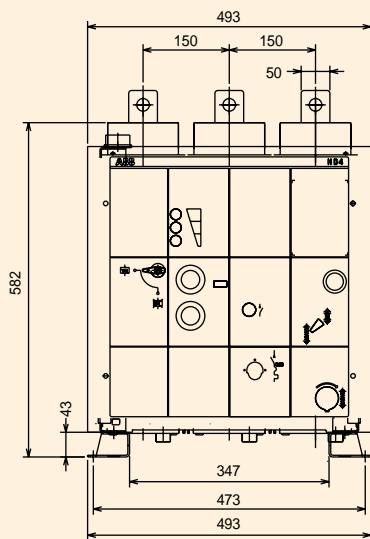
Fixed circuit-breakers	50
HD4/C withdrawable circuit-breakers for CBE enclosures and CBF fixed parts	55
HD4/P withdrawable circuit-breakers for UniGear type ZS1 switchboards	60
HD4/W withdrawable circuit-breakers for UniSafe switchboards	64
HD4/Z withdrawable circuit-breakers for UniGear type ZS3.2 40.5 kV switchboards	69
CBE enclosures without earthing switch for HD4/C circuit-breakers	70
CBE enclosures with earthing switch for HD4/C circuit-breakers	71
CBF 11 fixed parts	72
CBF 21 fixed parts	73
CBF 41 fixed parts	74

OVERALL DIMENSIONS

Fixed circuit-breakers

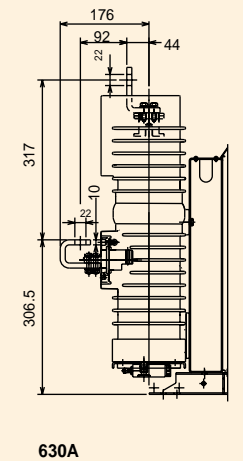
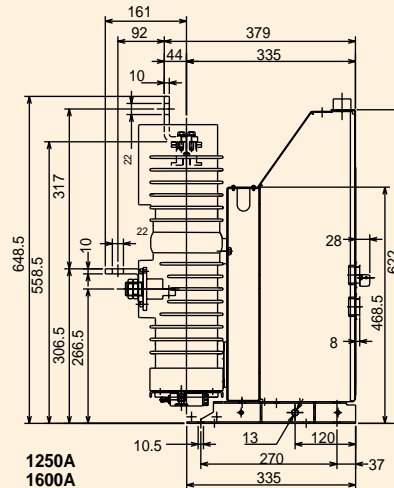
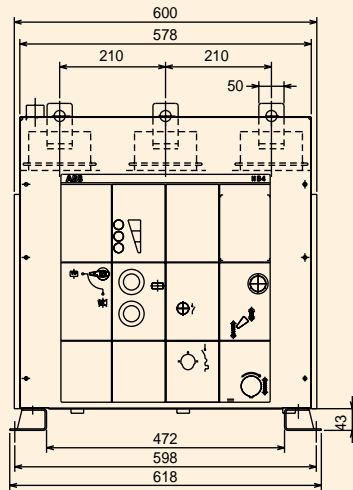
HD4

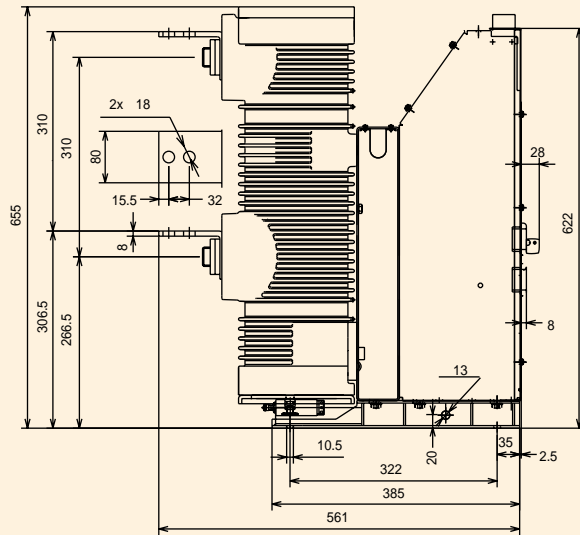
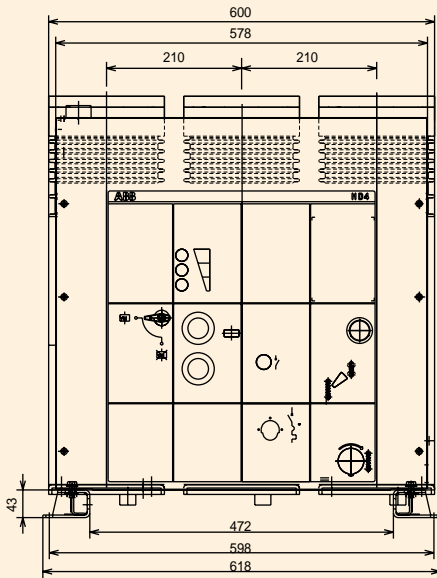
TN	7177
Ur	12 kV
Ir	630 A
	1250 A
	1600 A
Isc	16 kA
	25 kA
	31.5 kA



HD4

TN	7178
Ur	12 kV
	17.5 kV
Ir	630 A
	1250 A
	1600 A
Isc	16 kA
	25 kA
	31.5 kA



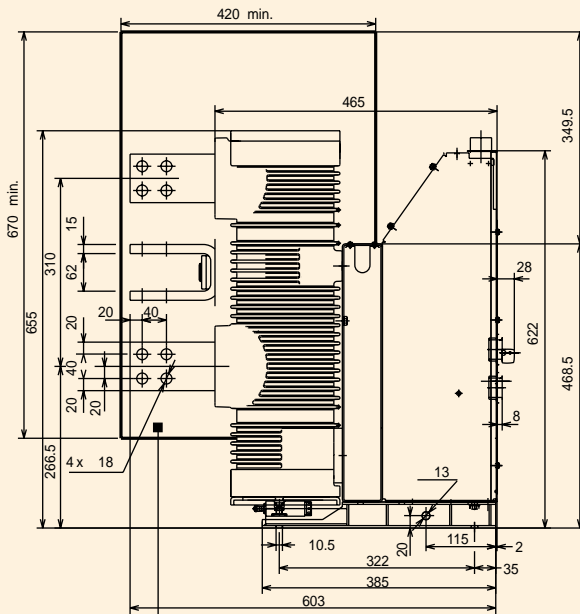
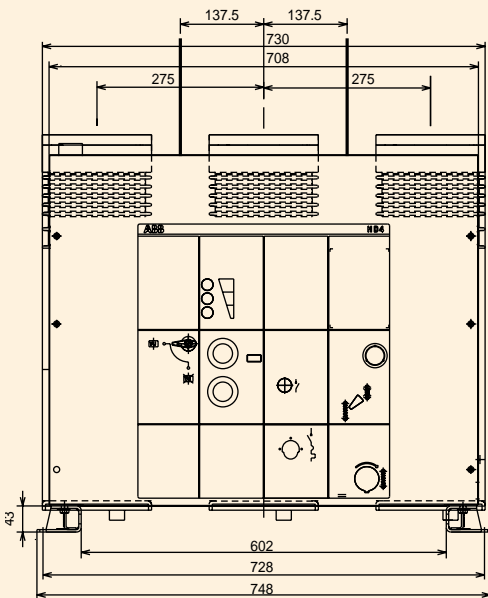


HD4

TN	7163
Ur	12 kV 17.5 kV
Ir	1600 A
Isc	40 kA 50 kA

HD4

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



Insulating partitions (only for 24 kV) to be provided by the customer (a special kit is available on request).

HD4

TN	7165
Ur	12 kV 17.5 kV
Ir	2500 A 3150 A 3600 A
Isc	25 kA 31.5 kA 40 kA 50 kA

HD4

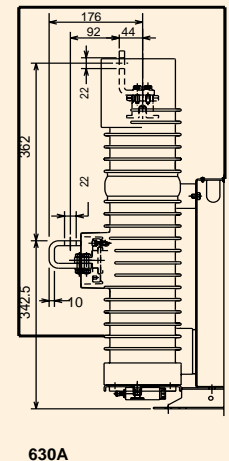
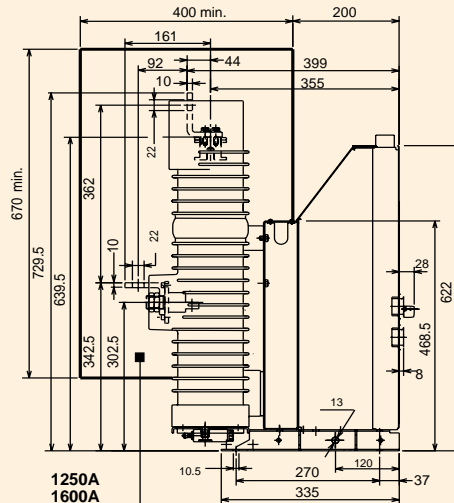
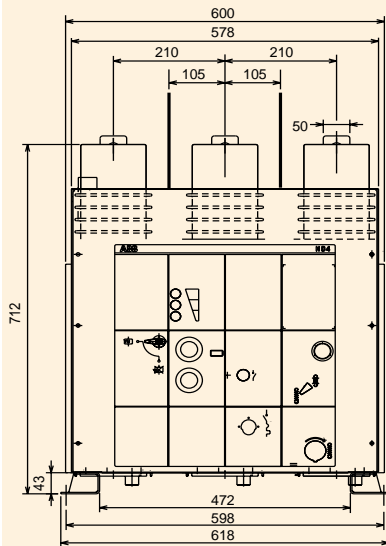
TN	7165
Ur	24 kV
Ir	2500 A 3150 A 3600 A
Isc	25 kA 31.5 kA 40 kA

OVERALL DIMENSIONS

Fixed circuit-breakers

HD4

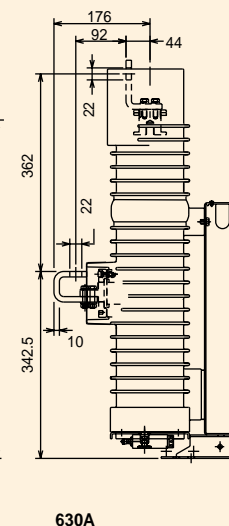
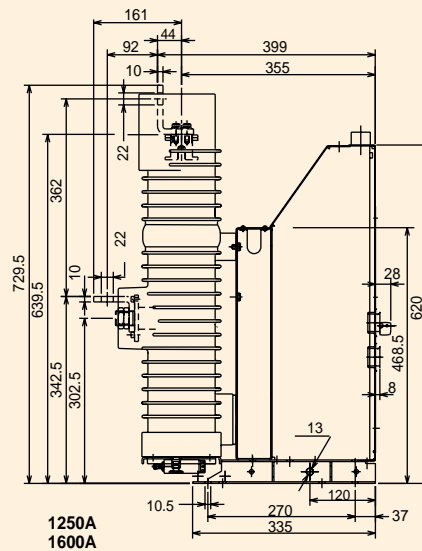
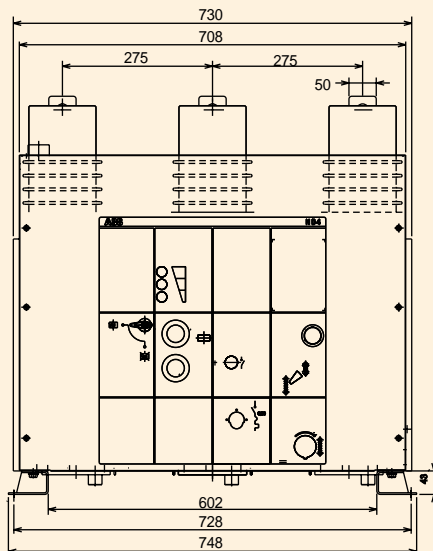
TN	7179
Ur	24 kV
Ir	630 A
	1250 A
	1600 A
Isc	16 kA
	20 kA
	25 kA

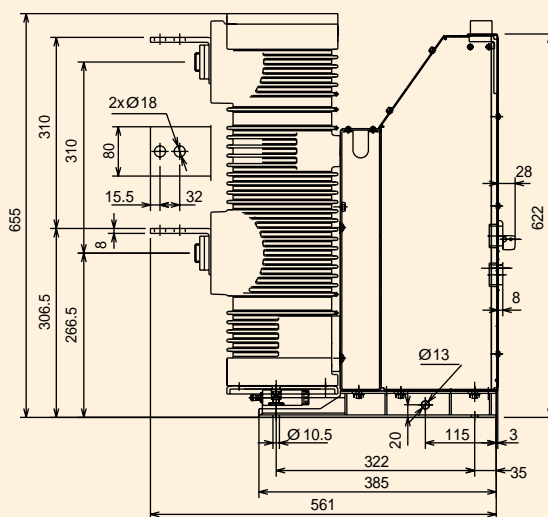
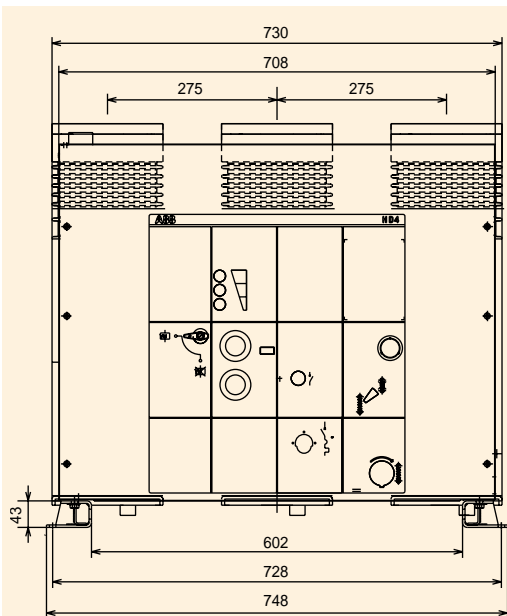


Insulating partitions to be provided by the customer (a special kit is available on request).

HD4

TN	7242
Ur	24 kV
Ir	630 A
	1250 A
	1600 A
Isc	16 kA
	20 kA
	25 kA



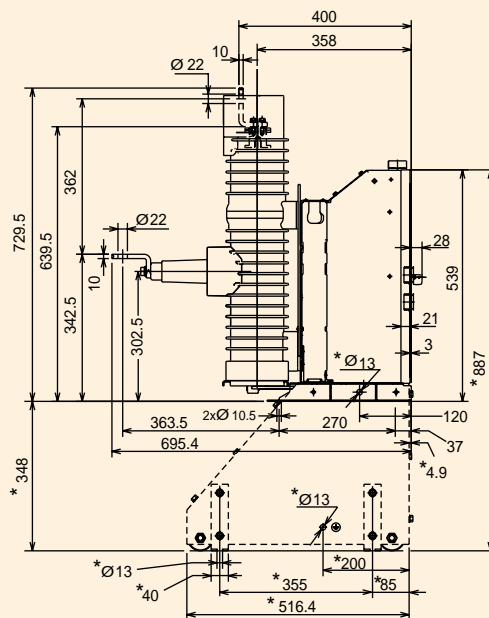
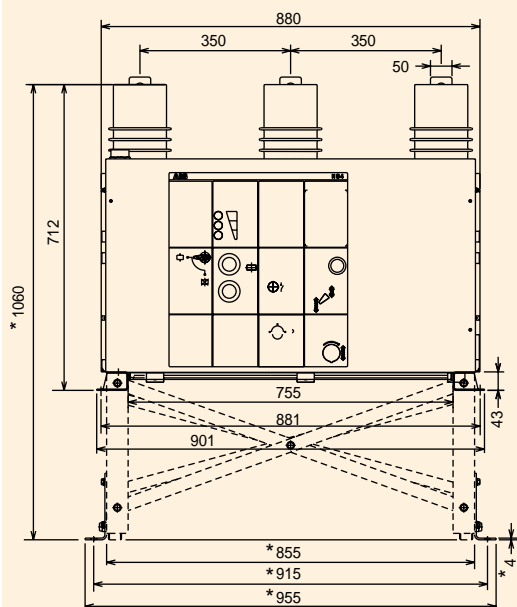


HD4

TN	7174
Ur	24 kV
Ir	1600 A
Isc	31.5 kA
	40 kA

HD4

TN	7174
Ur	24 kV
Ir	2000 A
Isc	25 kA
	31.5 kA
	40 kA



HD4

with truck
(on request)

TN	7241
Ur	36 kV
Ir	630 A
	1250 A
	1600 A
Isc	16 kA
	20 kA

* Distance with truck (if provided).

OVERALL DIMENSIONS

Fixed circuit-breakers

HD4

with truck
(on request)

TN 7268

Ur 36 kV

Ir 1250 A

1600 A

Isc 25 kA

31.5 kA

HD4

with truck
(on request)

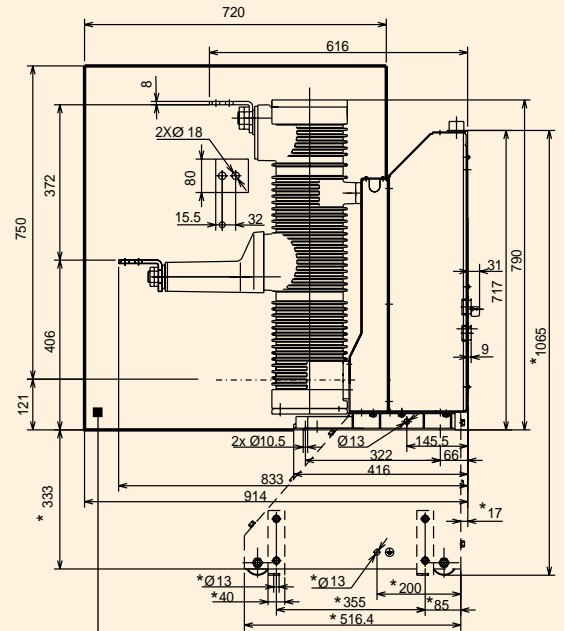
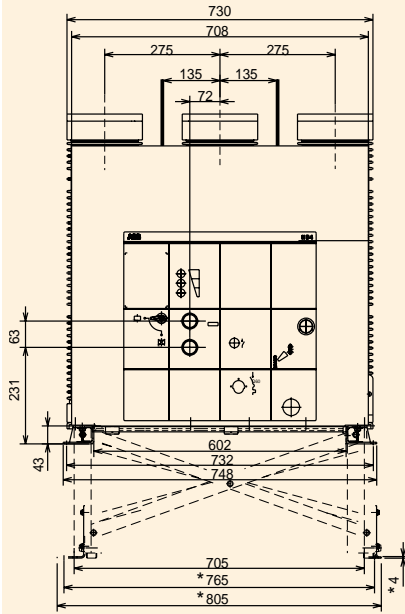
TN 7268

Ir 2000 A

Isc 20 kA

25 kA

31.5 kA



* Distance with truck
(if provided).

Insulating partitions to be provided
by the customer (a special kit is
available on request).

HD4

with truck
(on request)

TN 7315

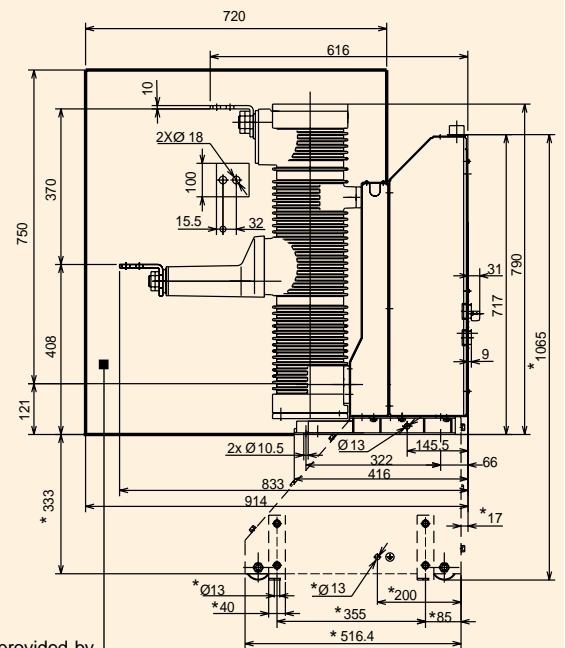
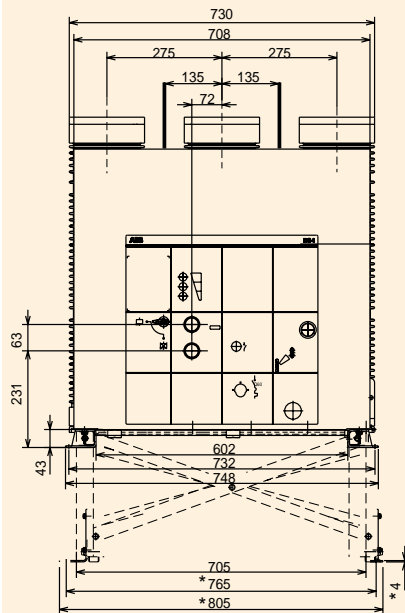
Ur 36 kV

Ir 2500 A

Isc 20 kA

25 kA

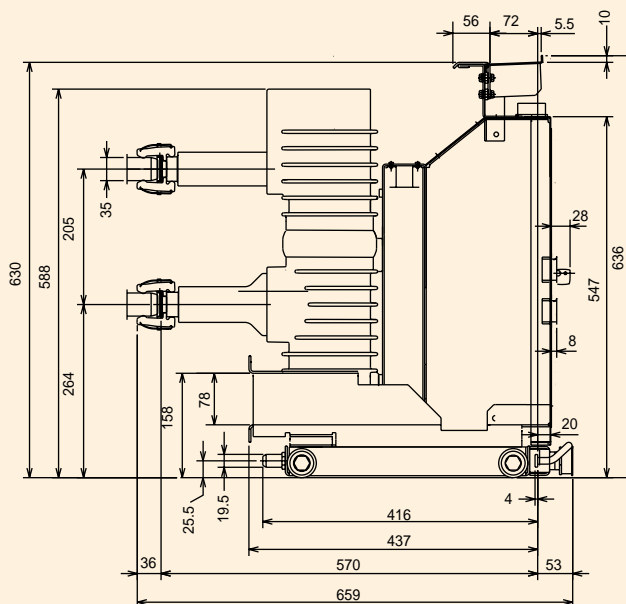
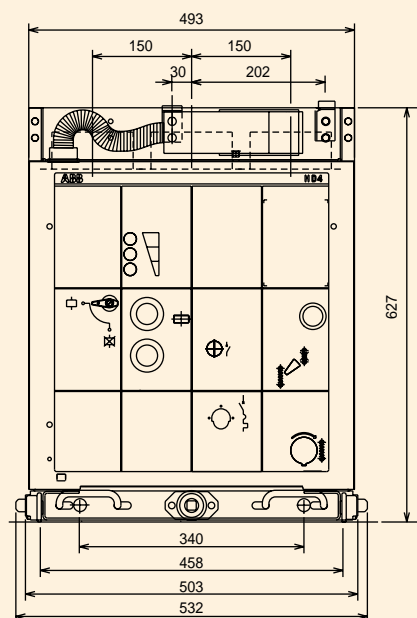
31.5 kA



* Distance with truck
(if provided).

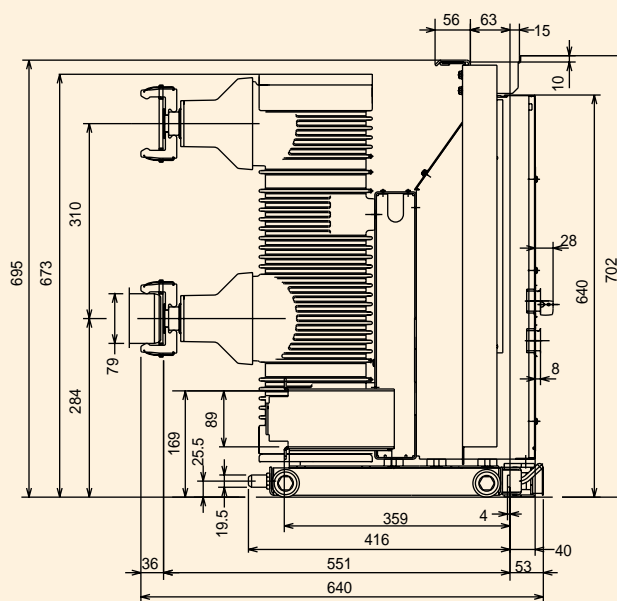
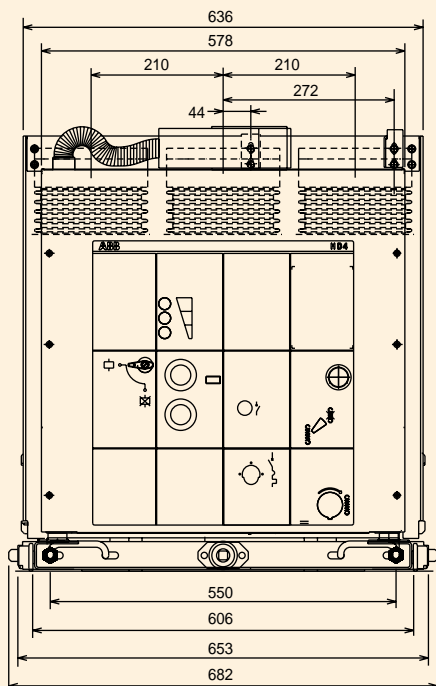
Insulating partitions to be provided
by the customer (a special kit is available
on request).

HD4/C withdrawable circuit-breakers for CBE enclosures and CBF fixed parts



HD4/C

TN	7184
For	CBE11 CBF11
Ur	12 kV 17.5 kV
Ir	630 A 1250 A
Isc	16 kA 25 kA 31.5 kA



HD4/C

TN	7151
For	CBE21
Ur	12 kV 17.5 kV
Ir	1250 A
Isc	40 kA 50 kA

HD4/C

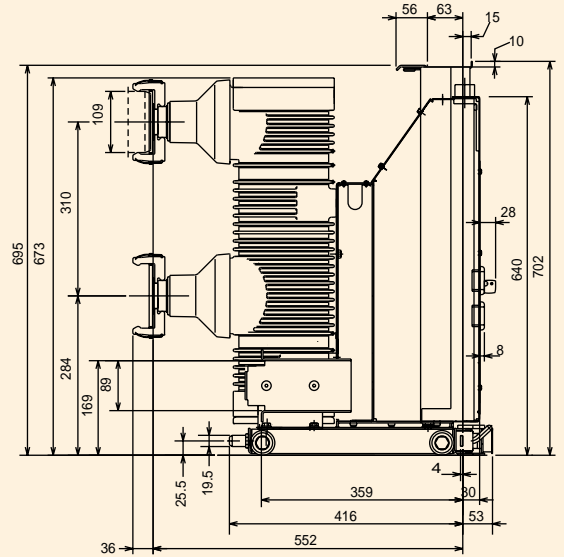
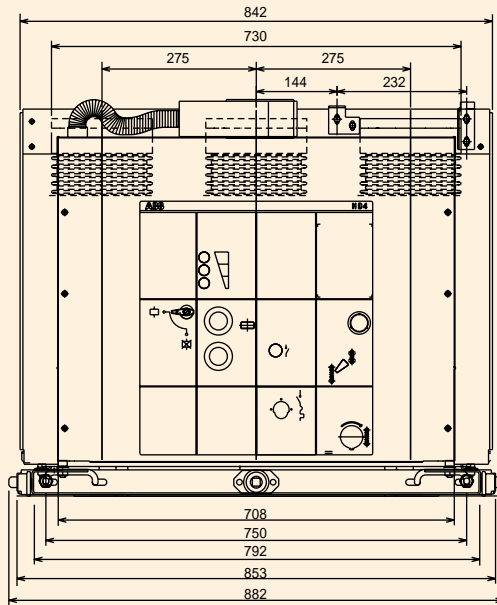
TN	7151
For	CBE21 CBF21 (31.5 kA)
Ur	12 kV 17.5 kV
Ir	1600 A
Isc	25 kA 31.5 kA 40 kA 50 kA

OVERALL DIMENSIONS

HD4/C withdrawable circuit-breakers for CBE enclosures and CBF fixed parts

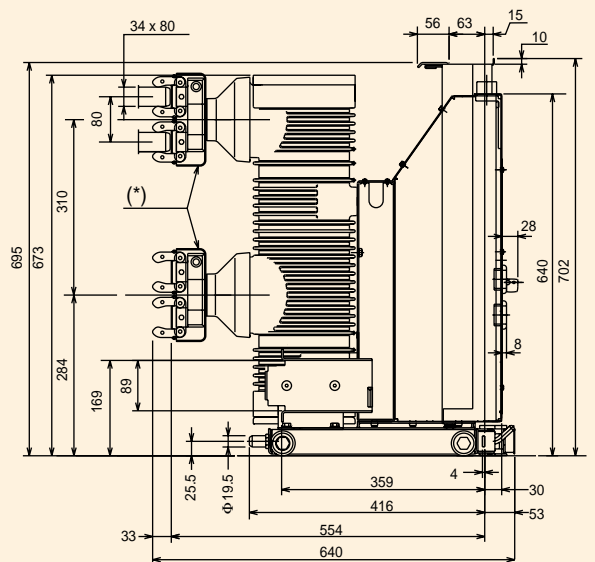
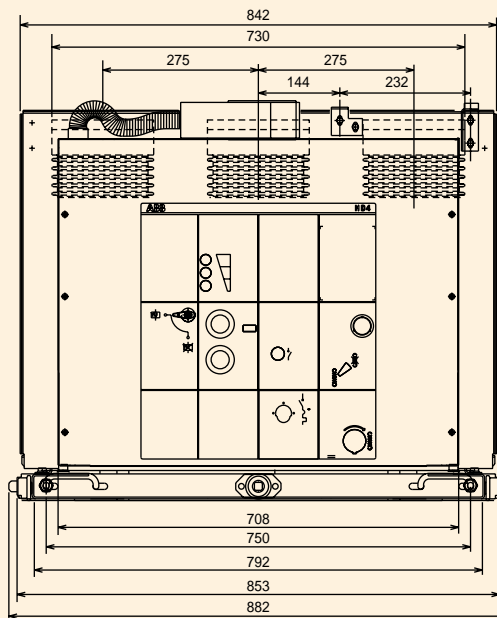
HD4/C

TN	7153
For	CBE31
Ur	12 kV 17.5 kV
Ir	2000 A
Isc	25 kA 31.5 kA 40 kA 50 kA

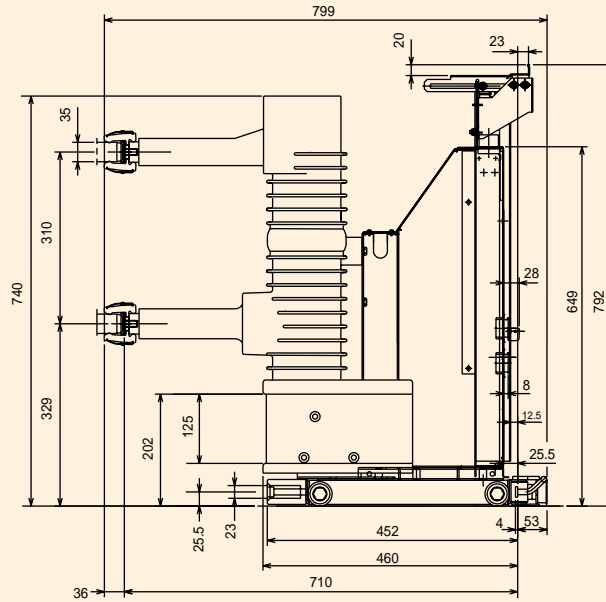
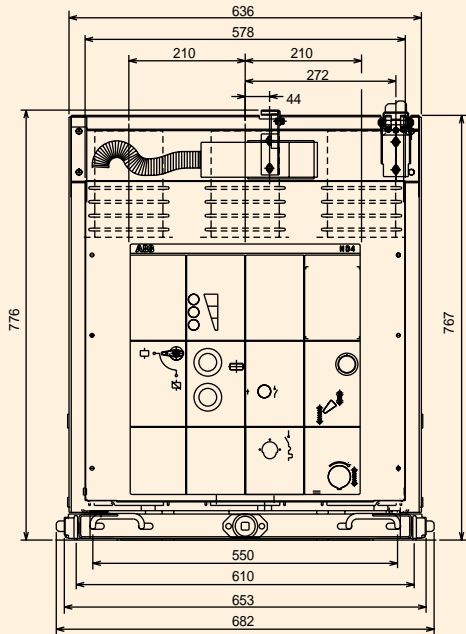


HD4/C

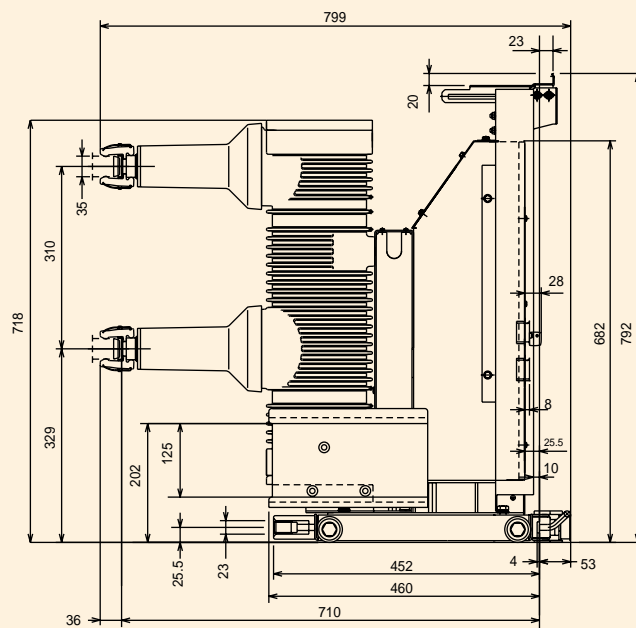
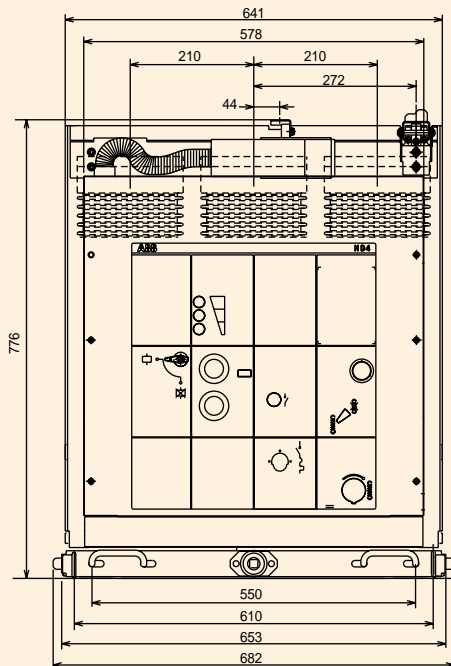
TN	7155
For	CBE31
Ur	12 kV 17.5 kV
Ir	2500 A
Isc	25 kA 31.5 kA 40 kA 50 kA



(*) Only for 17.5 kV.

**HD4/C**

TN	7186
For	CBE41 CBF41
Ur	24 kV
Ir	630 A 1250 A
Isc	16 kA 20 kA 25 kA

**HD4/C**

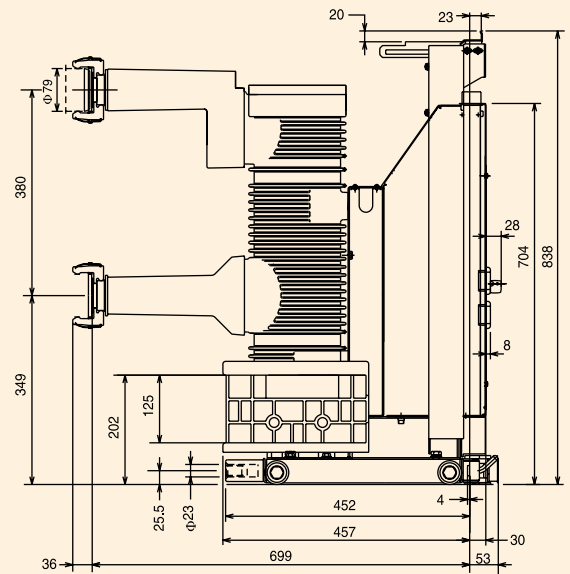
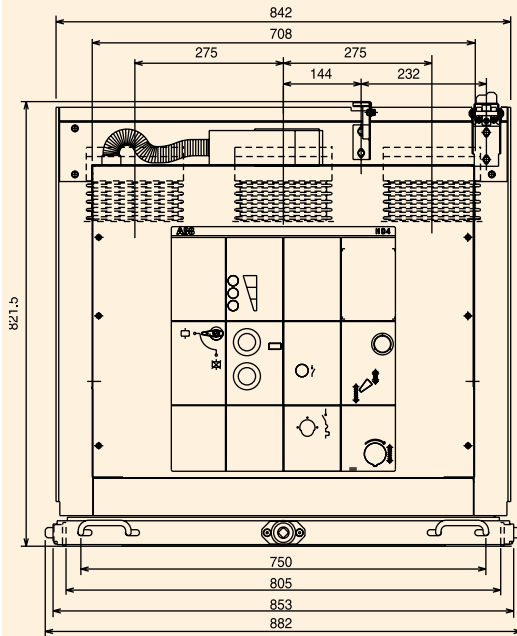
TN	7156
For	CBE41
Ur	24 kV
Ir	1250 A
Isc	31.5 kA 40 kA

OVERALL DIMENSIONS

HD4/C withdrawable circuit-breakers for CBE enclosures and CBF fixed parts

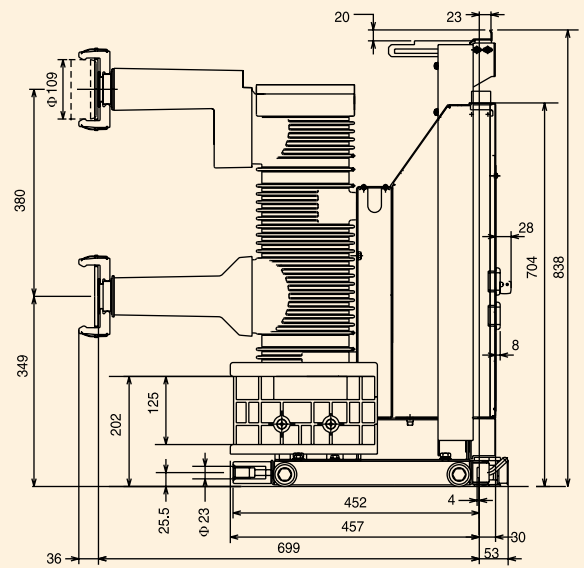
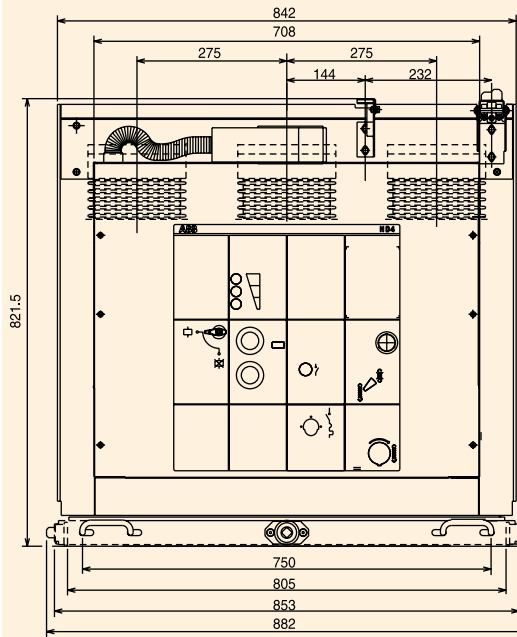
HD4/C

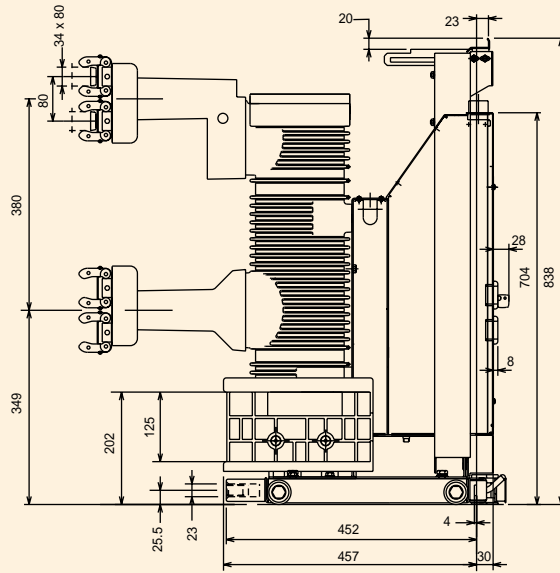
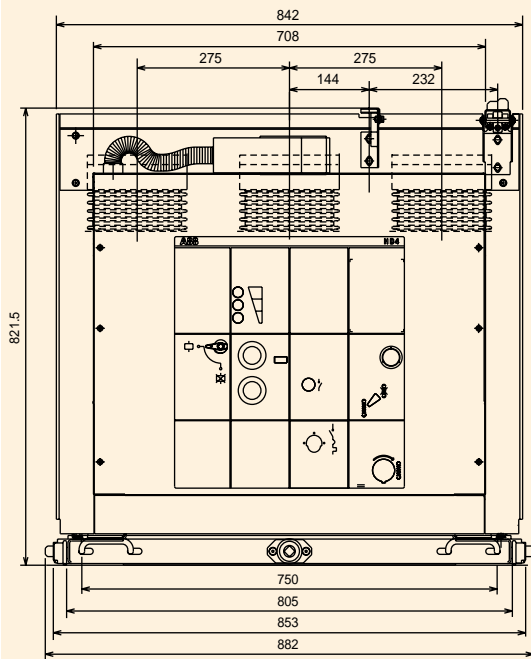
TN	7157
For	CBE51
Ur	24 kV
Ir	1600 A
Isc	25 kA
	31.5 kA
	40 kA



HD4/C

TN	7158
For	CBE51
Ur	24 kV
Ir	2000 A
Isc	25 kA
	31.5 kA
	40 kA



**HD4/C**

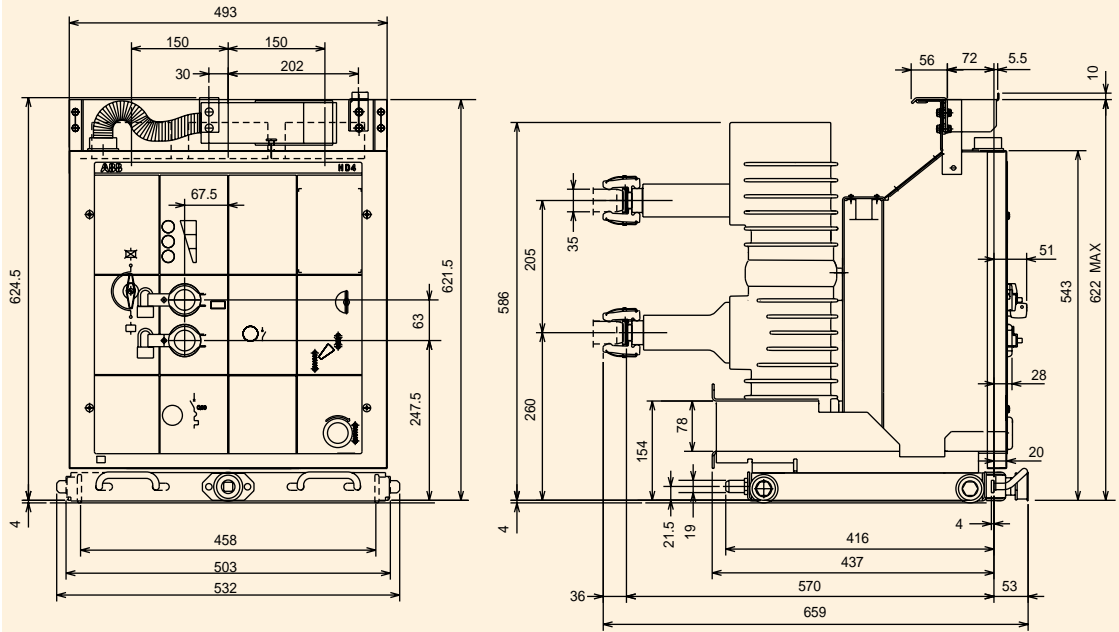
TN	7159
For	CBE51
Ur	24 kV
Ir	2500 A
Isc	25 kA
	31.5 kA
	40 kA

OVERALL DIMENSIONS

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

HD4/P

TN	7286
Ur	12 kV 17.5 kV
Ir	630 A 1250 A
Isc	16 kA 25 kA 31.5 kA



HD4/P

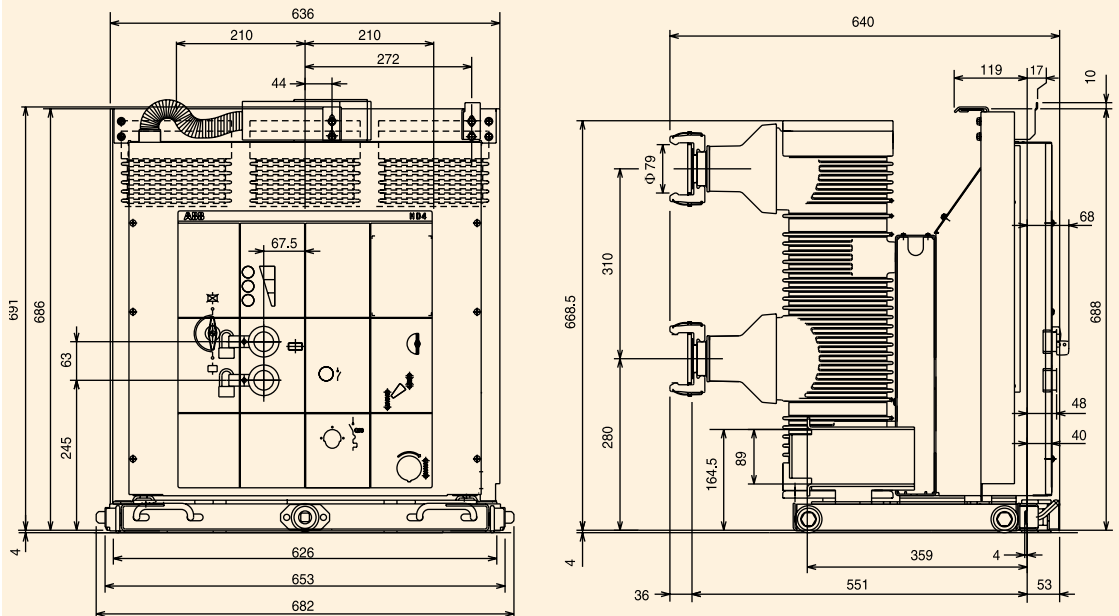
TN	7350
Ur	12 kV 17.5 kV
Ir	1250 A
Isc	40 kA

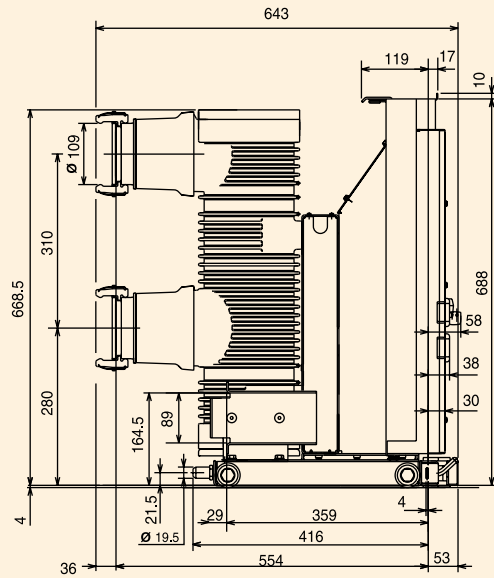
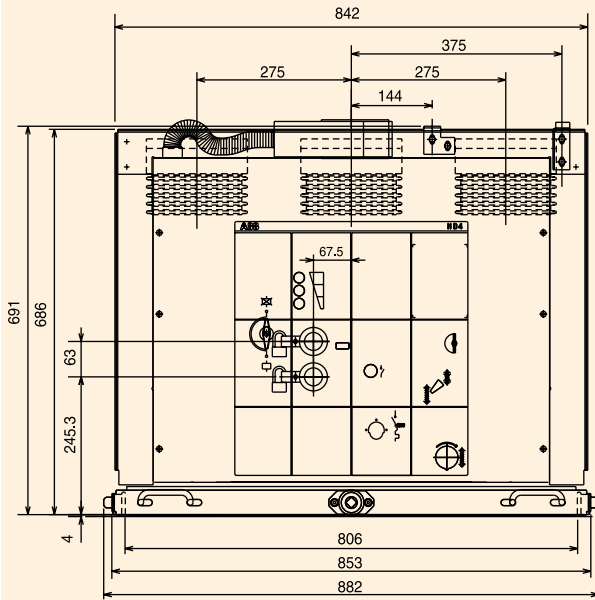
HD4/P

TN	7350
Ur	12 kV 17.5 kV
Ir	1600 A
Isc	25 kA 31.5 kA 40 kA 50 kA

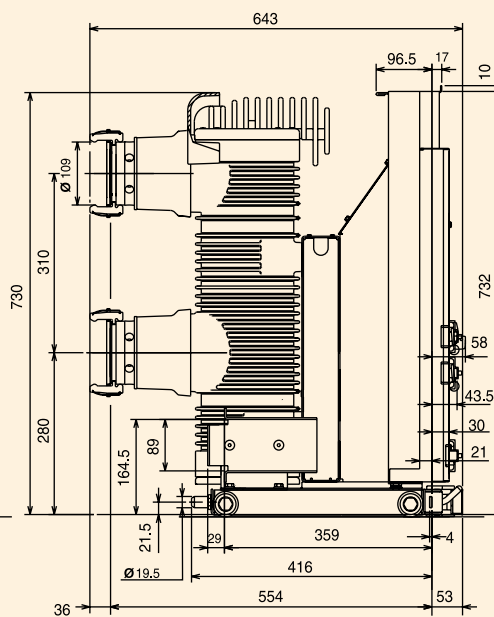
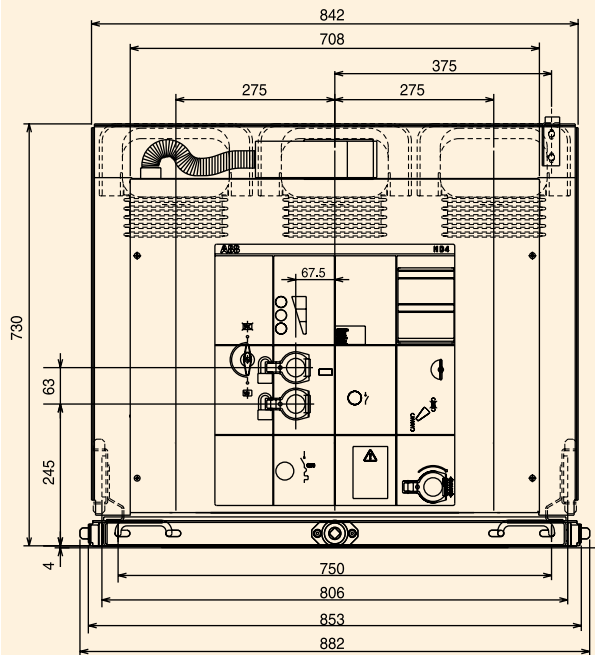
HD4/P

TN	7351
Ur	12 kV 17.5 kV
Ir	2000 A
Isc	25 kA 31.5 kA 40 kA 50 kA



**HD4/P**

TN	7352
Ur	12 kV 17.5 kV
Ir	2500 A
Isc	25 kA 31.5 kA 40 kA 50 kA

**HD4/P**

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

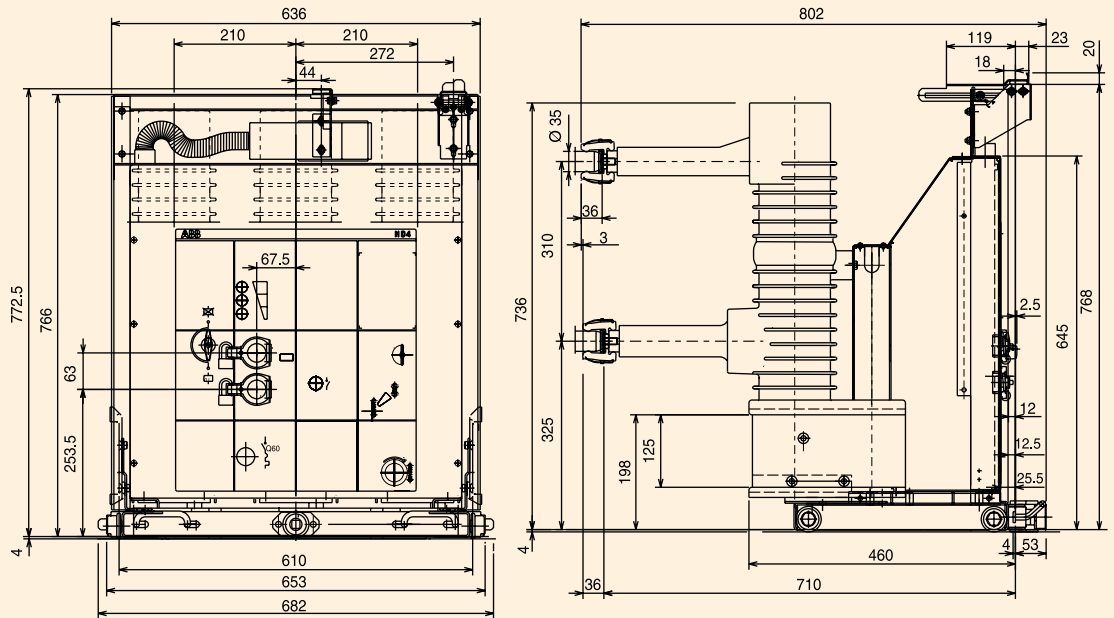
(*) 3600 - 4000 A with forced switchboard ventilation (consult the UniGear type ZS1 switchboard technical catalogue).

OVERALL DIMENSIONS

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

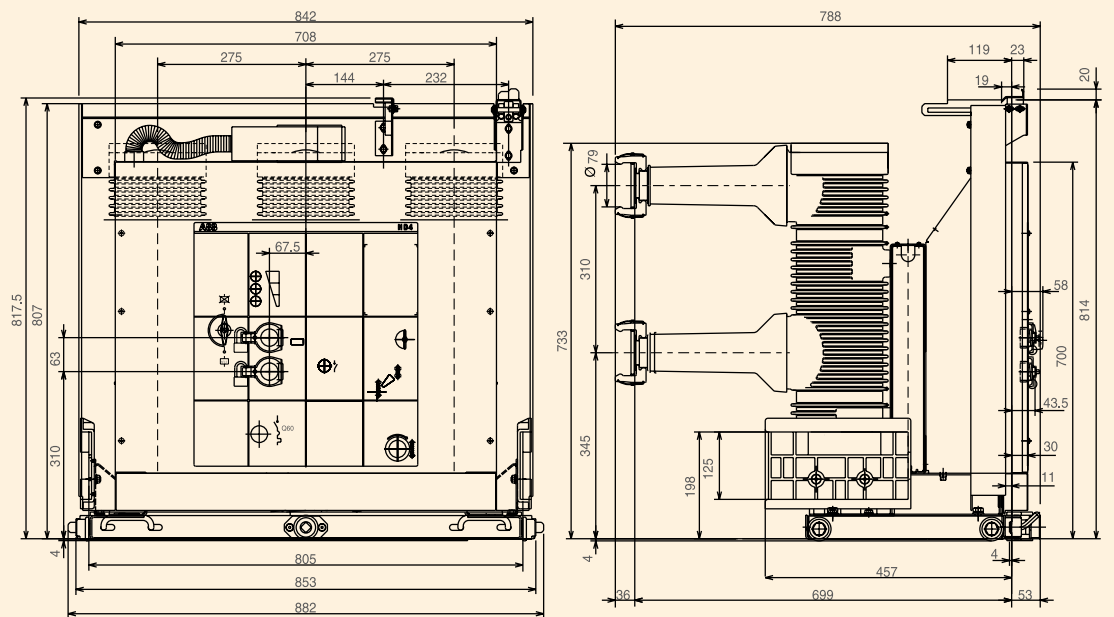
HD4/P

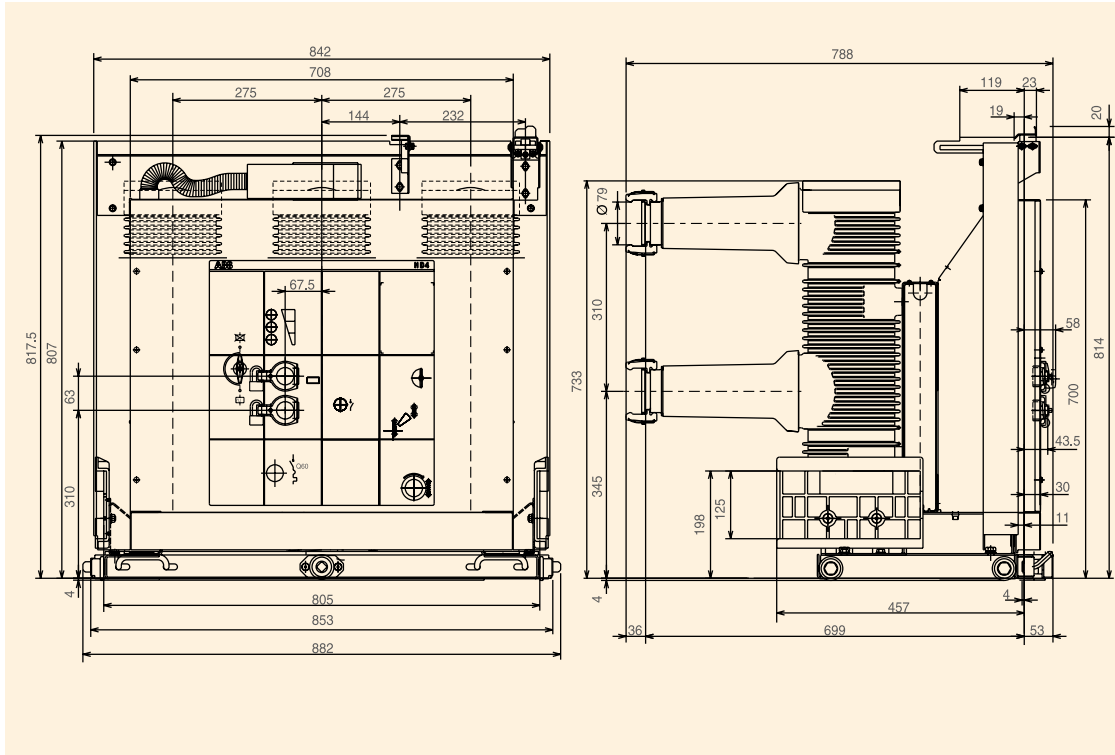
TN	7354
Ur	24 kV
Ir	630 A
	1250 A
Isc	16 kA
	20 kA
	25 kA



HD4/P

TN	7355
Ur	24 kV
Ir	1600 A
Isc	16 kA
	20 kA
	25 kA



**HD4/P**

TN	7356
Ur	24 kV
Ir	2000 A
Isc	16 kA
	20 kA
	25 kA

HD4/P

TN	7356
Ur	24 kV
Ir	2500 A (*)
Isc	20 kA
	25 kA

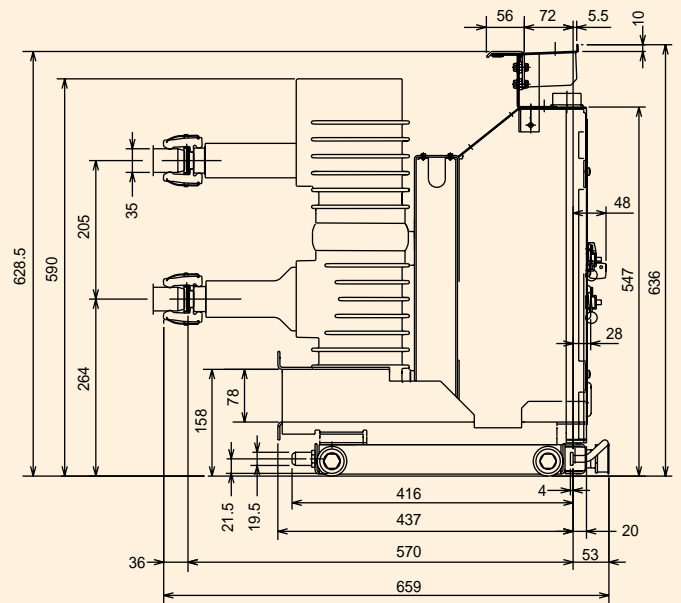
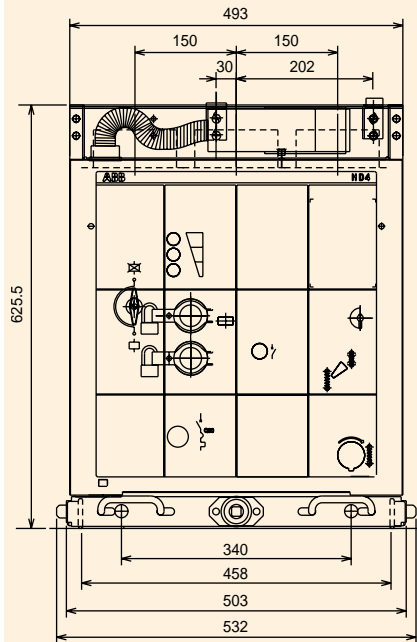
(*) 2500 A with forced ventilation; 2300 A with natural ventilation.

OVERALL DIMENSIONS

HD4/W withdrawable circuit-breakers for UniSafe switchboards

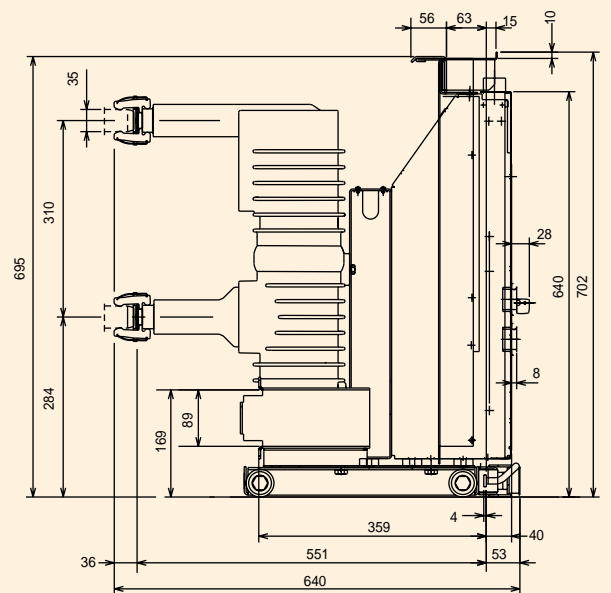
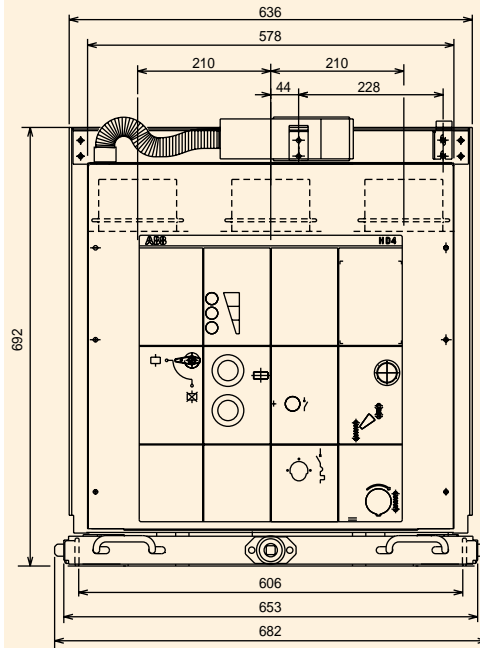
HD4/W

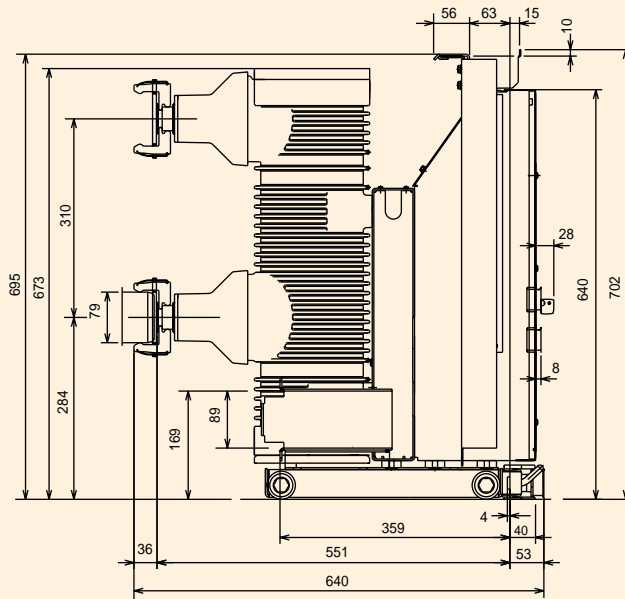
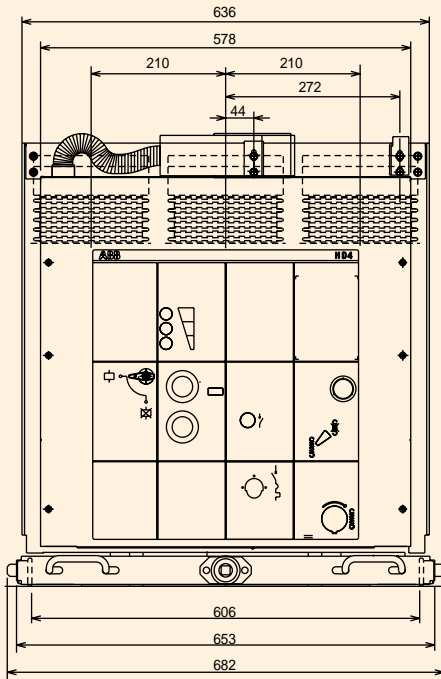
TN	7229
Ur	12 kV 17.5 kV
Ir	630 A 1250 A
Isc	16 kA 25 kA 31.5 kA



HD4/W

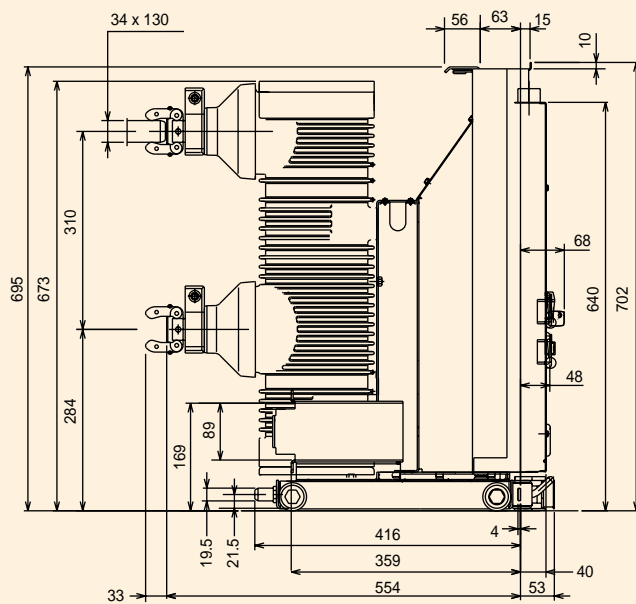
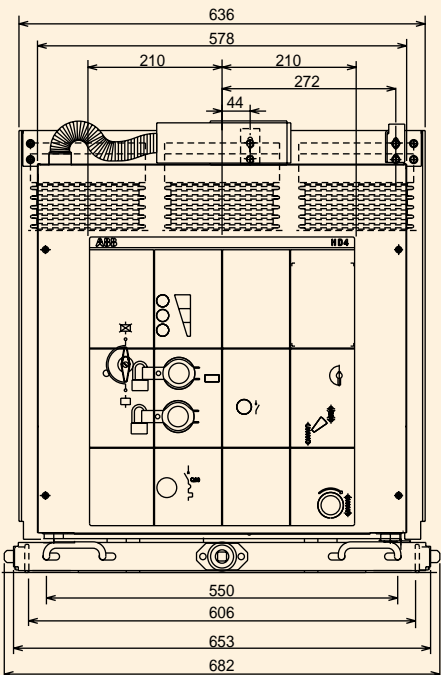
TN	7182
Ur	12 kV 17.5 kV
Ir	630 A 1250 A
Isc	16 kA 25 kA 31.5 kA





HD4/W

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



HD4/W

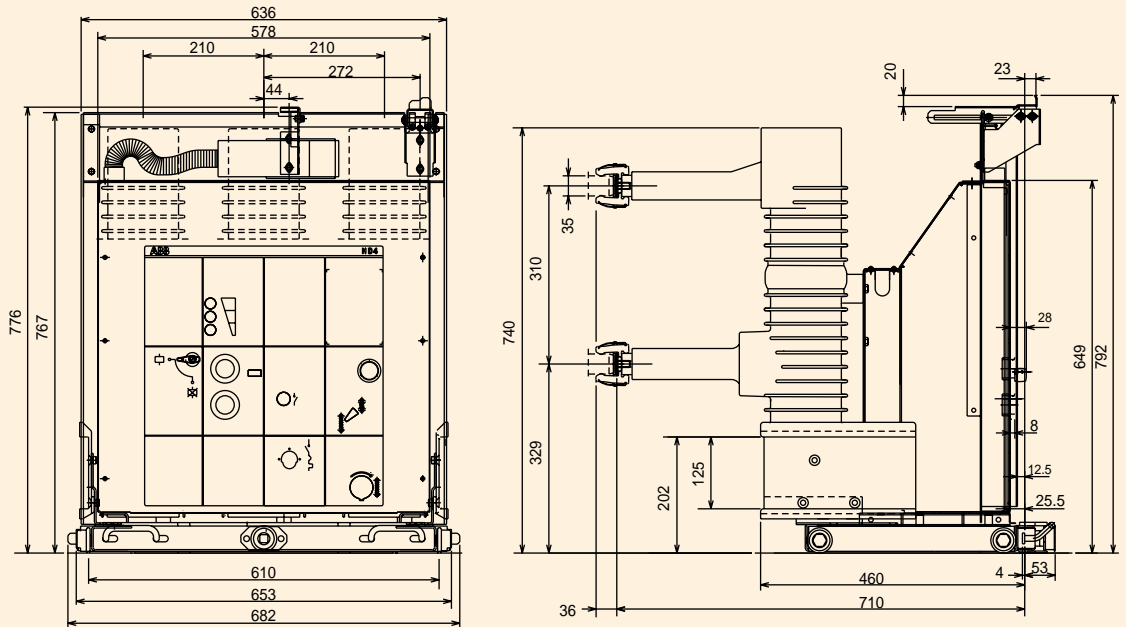
TN	7154
Ur	12 kV 17.5 kV
Ir	2500 A
Isc	16 kA 25 kA 31.5 kA

OVERALL DIMENSIONS

HD4/W withdrawable circuit-breakers for UniSafe switchboards

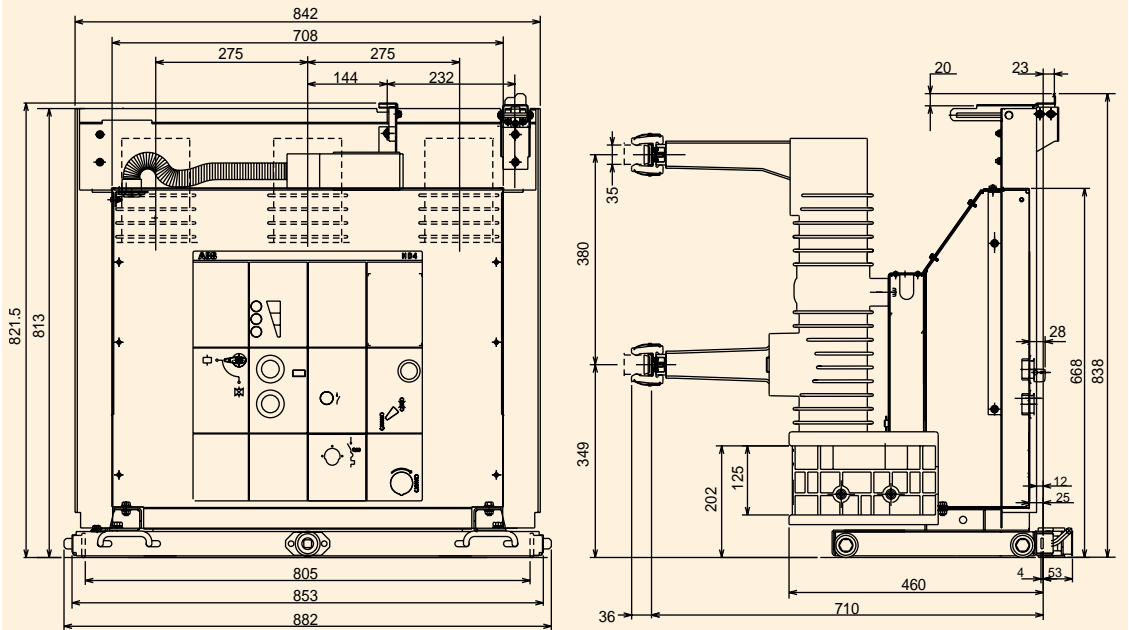
HD4/W

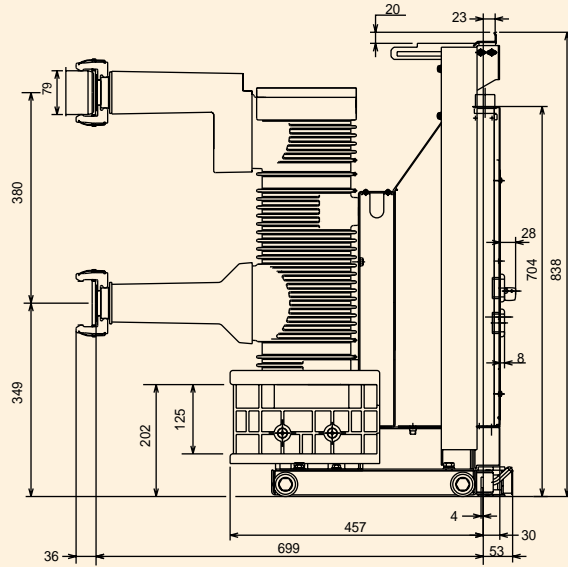
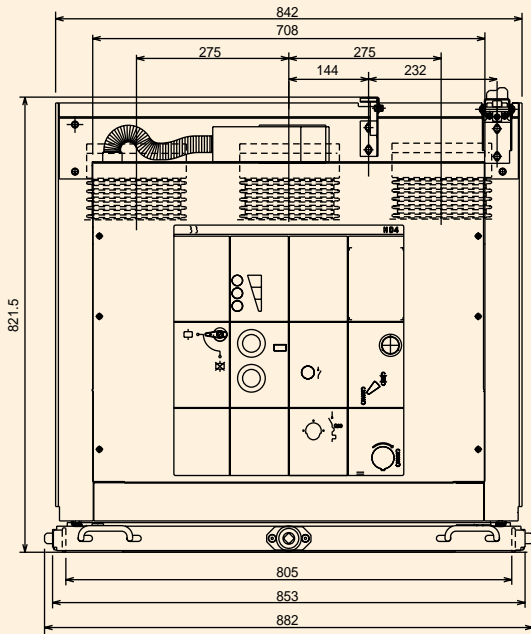
TN	7183
Ur	24 kV
Ir	630 A
	1250 A
Isc	16 kA
	20 kA
	25 kA



HD4/W

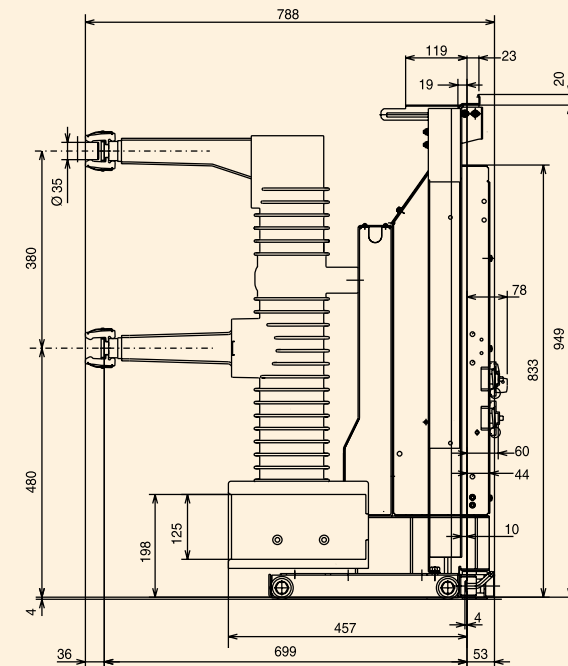
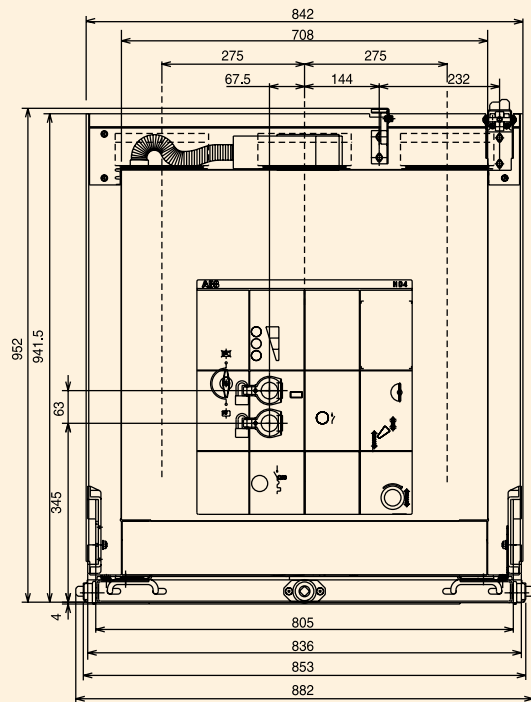
TN	7217
Ur	24 kV
Ir	630 A
	1250 A
Isc	16 kA
	20 kA
	25 kA





HD4/W

TN	7240
Ur	24 kV
Ir	1600 A 2000 A
Isc	16 kA 20 kA 25 kA



HD4/W

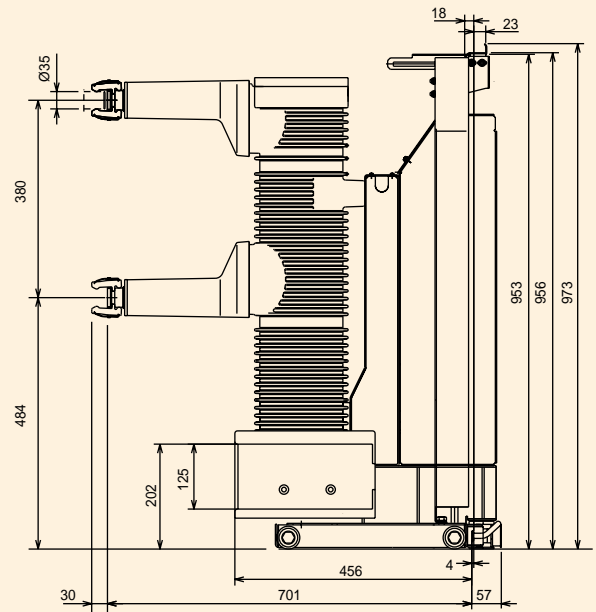
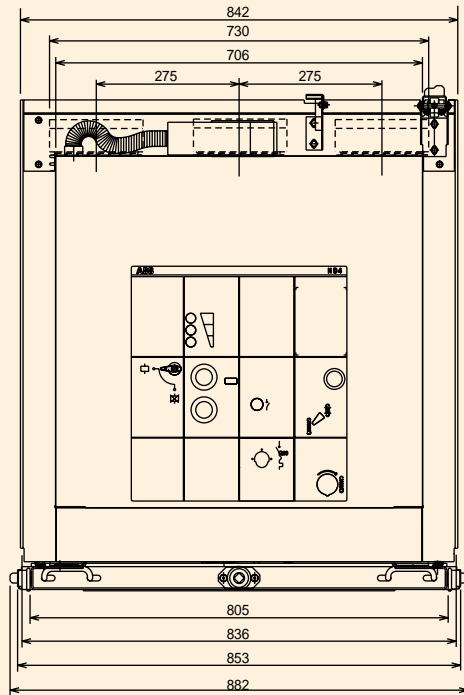
TN	7402
Ur	36 kV
Ir	1250 A
Isc	20 kA

OVERALL DIMENSIONS

HD4/W withdrawable circuit-breakers for UniSafe switchboards

HD4/W

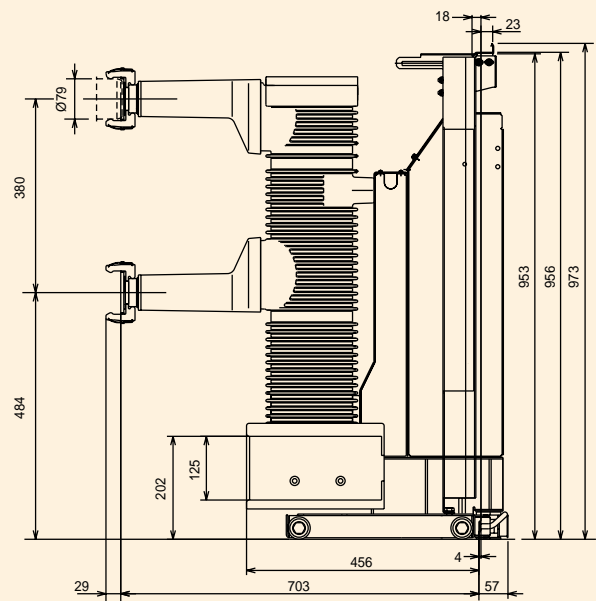
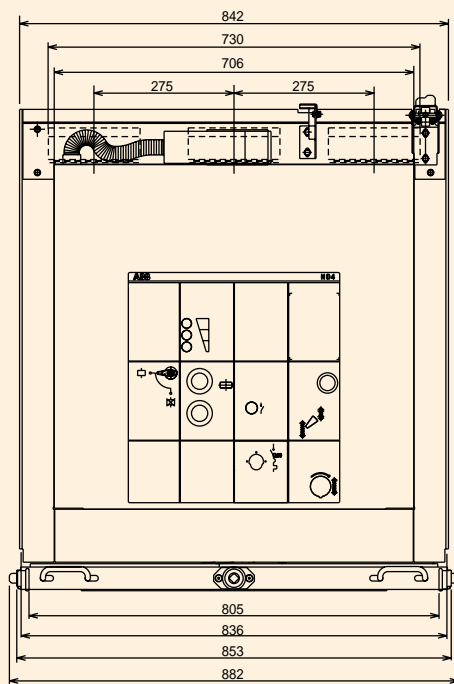
TN	7316
Ur	36 kV
Ir	1250 A
Isc	25 kA
	31.5 kA



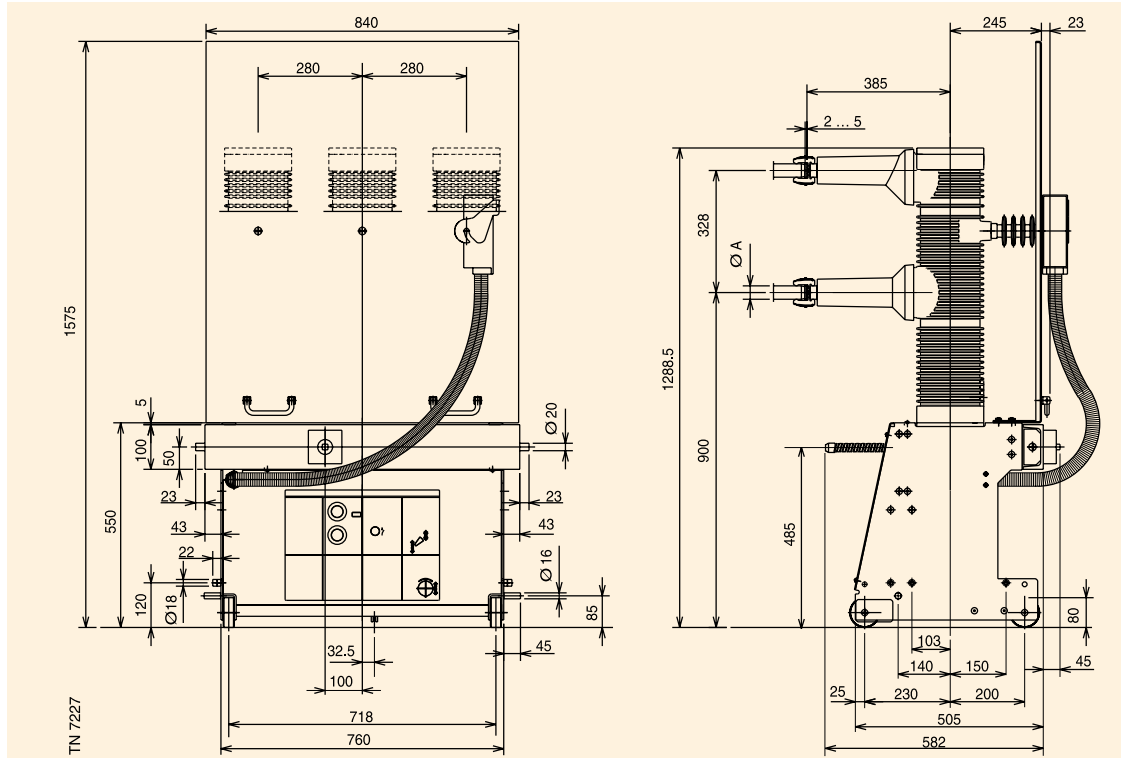
HD4/W

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

(*) With forced ventilation.



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



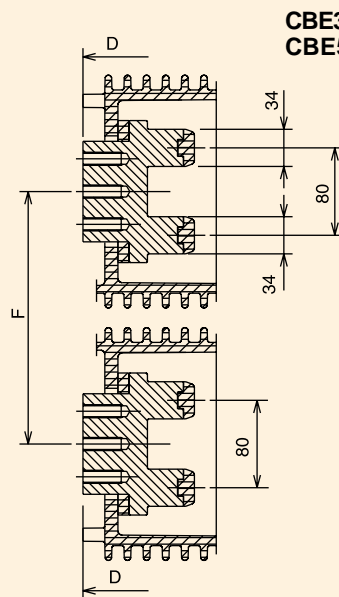
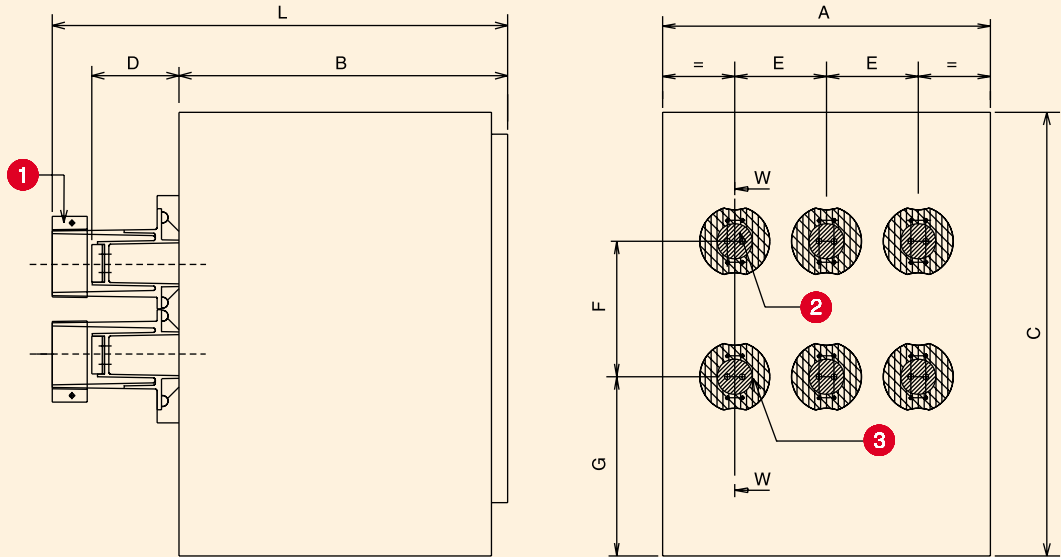
HD4/Z 40.5 kV	
TN	7227
Ur	40.5 kV
I _r	1250 A
	1600 A
	2000 A
	2500 A (*)
I _{sc}	25 kA
	31.5 kA

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

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

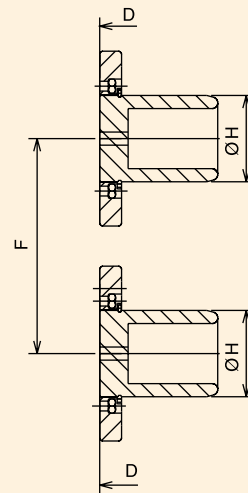
OVERALL DIMENSIONS

CBE enclosure without earthing switch for HD4/C circuit-breakers



CBE31 2500 A - 3150 A ⁽²⁾
CBE51 2500 A

CBE11 630-1250 A
CBE21 1600 A
CBE31 2000 A
CBE41 630-1250 A
CBE51 1600-2000 A



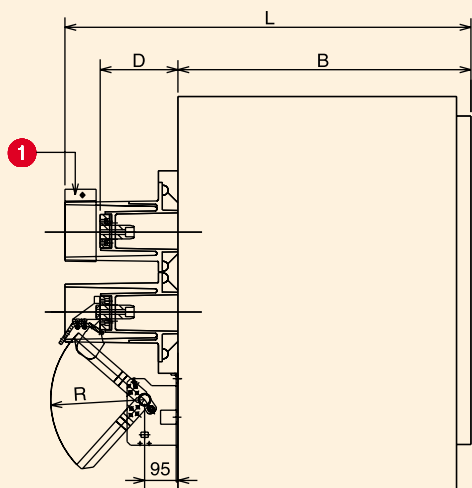
- 1 Cover (only for 24 kV).
- 2 Silver-plated copper contact surface. Silver-plated copper contact surface.
- 3 Insulating support surface.

N.B. The overall dimensions and assembly items are given in detail in the documents accompanying the enclosure. The detailed drawing can be requested in advance of the supply, so that the metal-work parts for completion of the switchboard can be prepared.

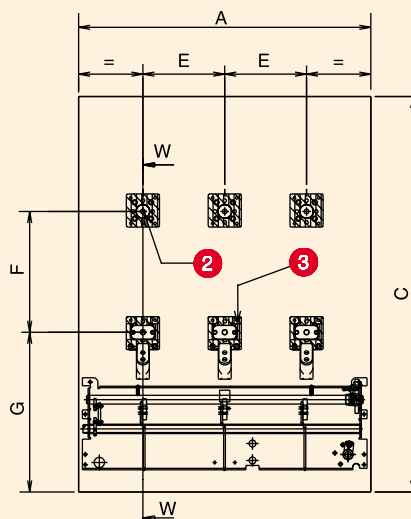
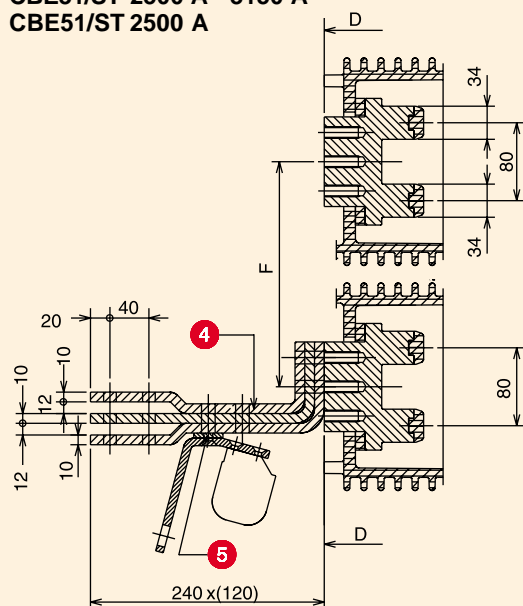
	U [kV]	In [A]	A	B	C	D	E	F	G	H	L
CBE11	12-17.5	630-1250	600	752	943	200	150	205	390	35	1043
CBE21	12-17.5	1600	750	752	1015	196	210	310	410	79	1044
CBE31	12-17.5	2000	1000	752	1015	196	275	310	410	109	1058
CBE31	12-17.5	2500-3150 ⁽²⁾	1000	752	1015	196	275	310	410	(1)	1058
CBE41	24	630-1250	750	910	1125	275.5	210	310	455	35	1282
CBE51	24	1600	1000	910	1125	275.5	275	380	475	79	1296
CBE51	24	2000	1000	910	1125	275.5	275	380	475	109	1296
CBE51	24	2500	1000	910	1125	275.5	275	380	475	(1)	1296

(1) Double pliers; (2) 3150 A with forced ventilation.

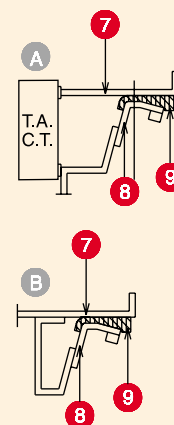
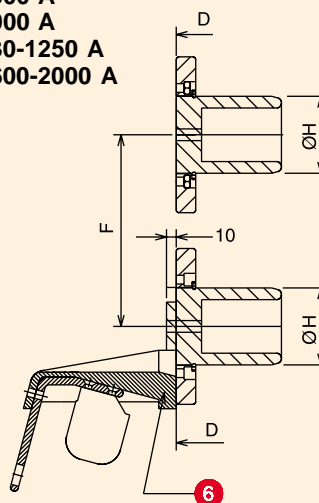
CBE enclosure with earthing switch for HD4/C circuit-breakers



CBE31/ST 2500 A - 3150 A ⁽²⁾
CBE51/ST 2500 A



CBE11/ST 630-1250 A
CBE21/ST 1600 A
CBE31/ST 2000 A
CBE41/ST 630-1250 A
CBE51/ST 1600-2000 A



- A** Connection to the current transformer (CT) placed in the rear part of the switchboard.
- B** Connection to be made when there is no current transformer (CT) to guarantee the earthing switch making capacity.

- 1 Cover (only for 24 kV).
2 Silver-plated copper contact surface.
3 Insulating support surface.
4 Copper connections
5 Insulating spacer.
6 Insulating support.
7 Lower terminal.
8 ST/ZC fixed contact.
9 Insulating item

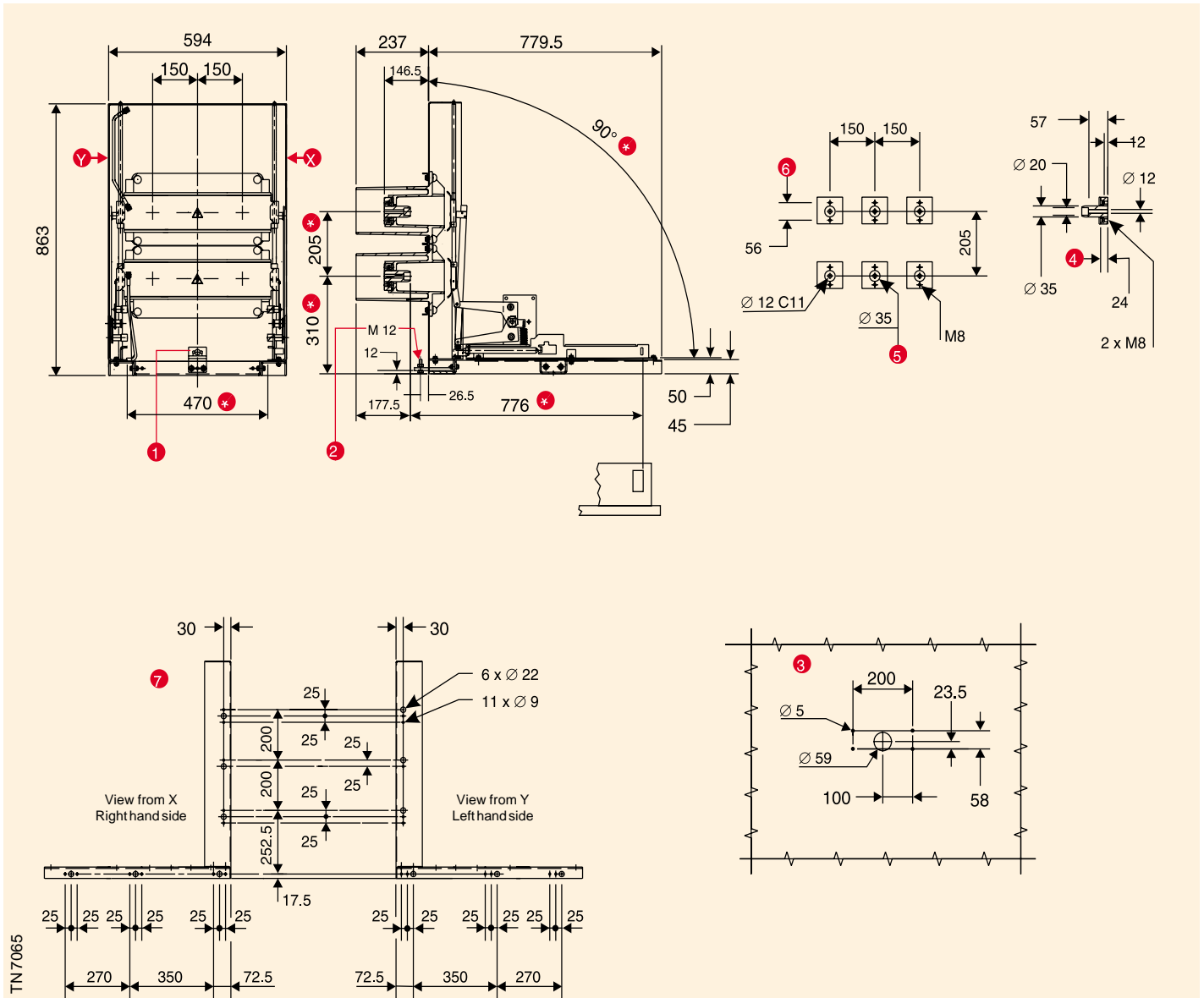
	U [kV]	I _n [A]	A	B	C	D	E	F	G	H	L	R
CBE11/ST	12-17.5	630-1250	600	752	943	200	150	205	390	35	1043	205
CBE21/ST	12-17.5	1600	750	752	1015	196	210	310	410	79	1044	235
CBE31/ST	12-17.5	2000	1000	752	1015	196	275	310	410	109	1058	235
CBE31/ST	12-17.5	2500-3150 ⁽²⁾	1000	752	1015	196	275	310	410	(1)	1058	235
CBE41/ST	24	630-1250	750	910	1125	275.5	210	310	455	35	1282	285
CBE51/ST	24	1600	1000	910	1125	275.5	275	380	475	79	1296	285
CBE51/ST	24	2000	1000	910	1125	275.5	275	380	475	109	1296	285
CBE51/ST	24	2500	1000	910	1125	275.5	275	380	475	(1)	1296	285

(1) Double pliers; (2) 3150 A with forced ventilation.

N.B. The overall dimensions and assembly items are given in detail in the documents accompanying the enclosure. The detailed drawing can be requested in advance of the supply, so that the metalwork parts for completion of the switchboard can be prepared.

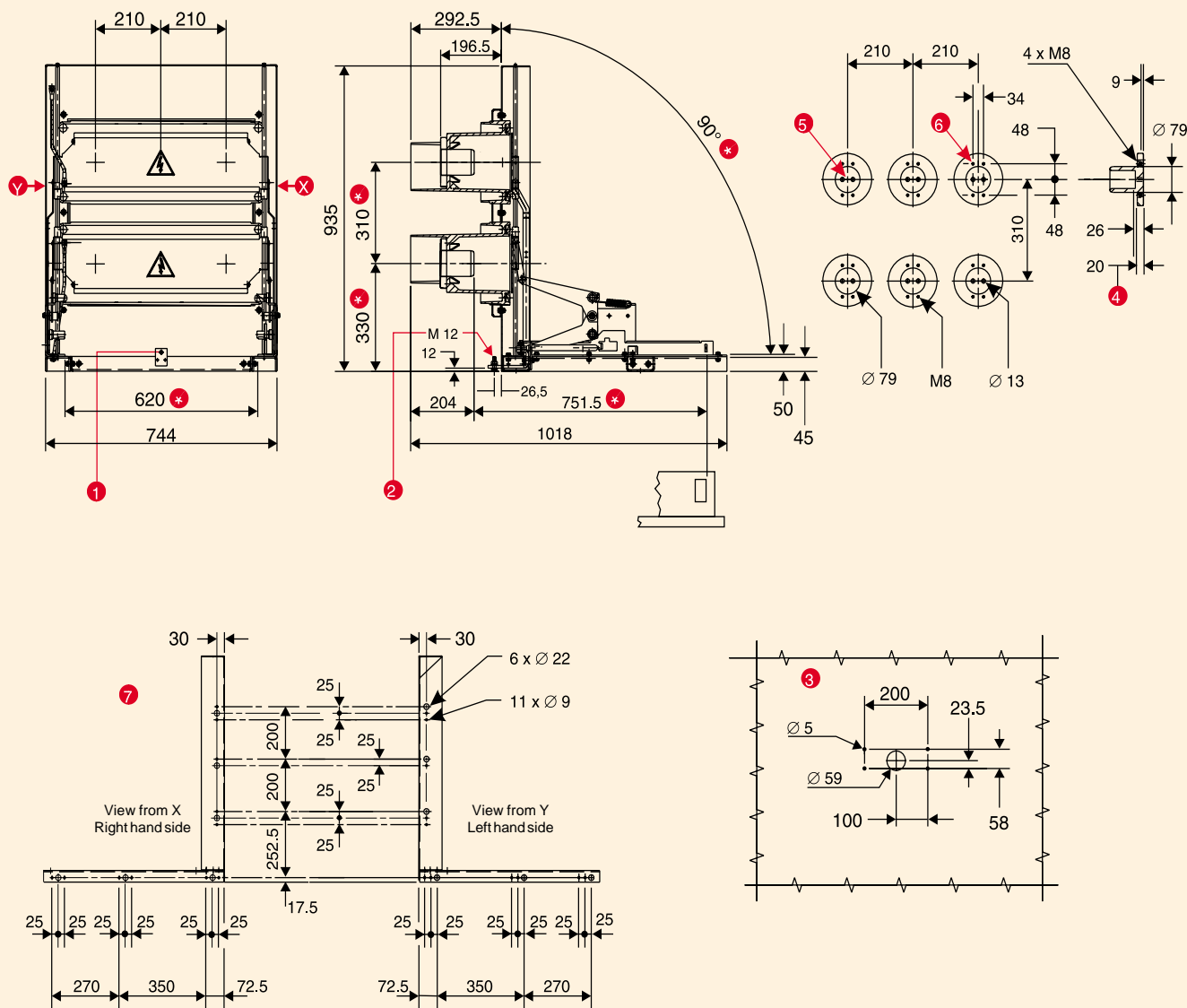
OVERALL DIMENSIONS

CBF11 fixed part - 12-17.5 kV - A - 31.5 kA



TN7065

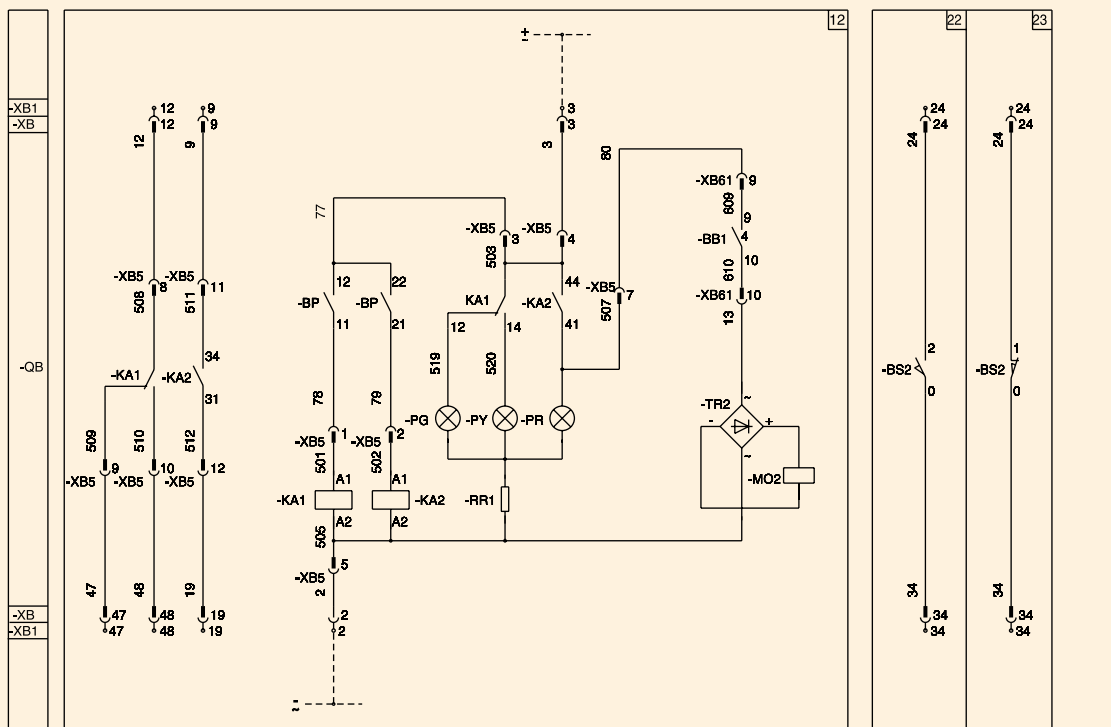
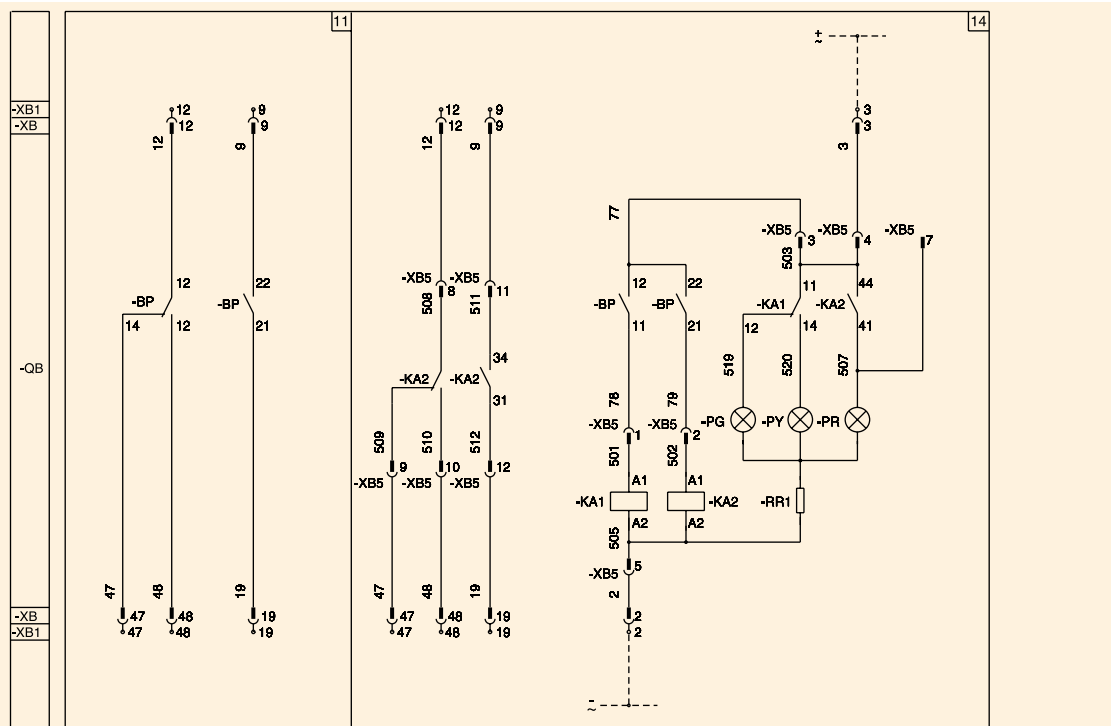
CBF21 fixed part - 12-17.5 kV - 1600 A - 31.5 kA



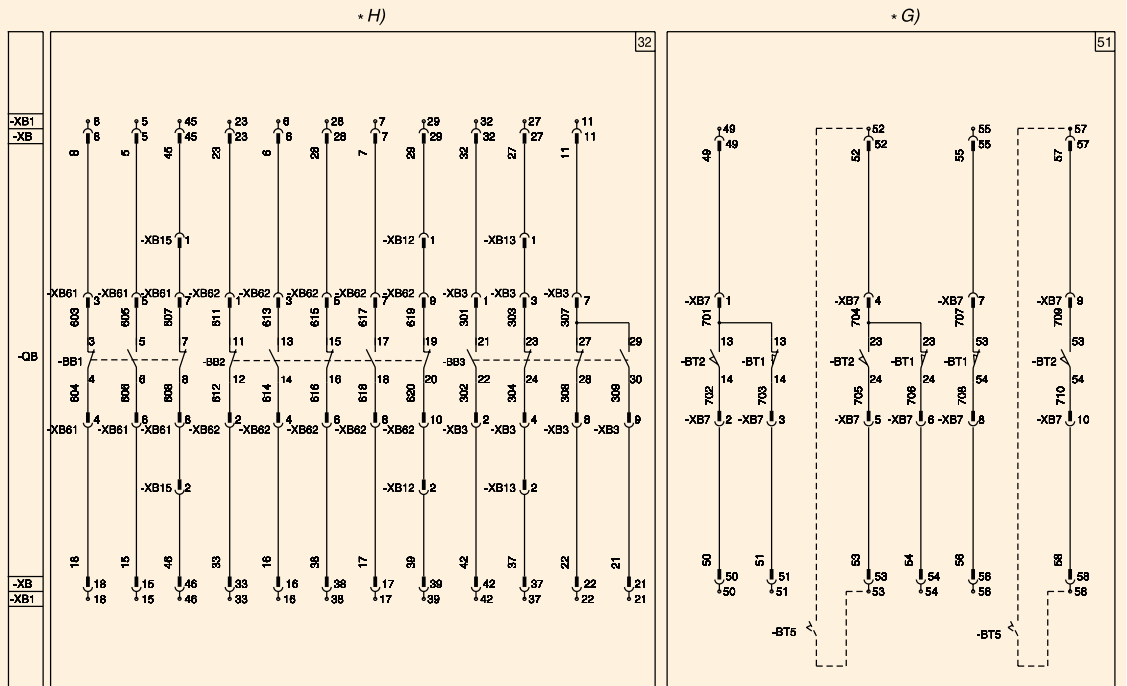
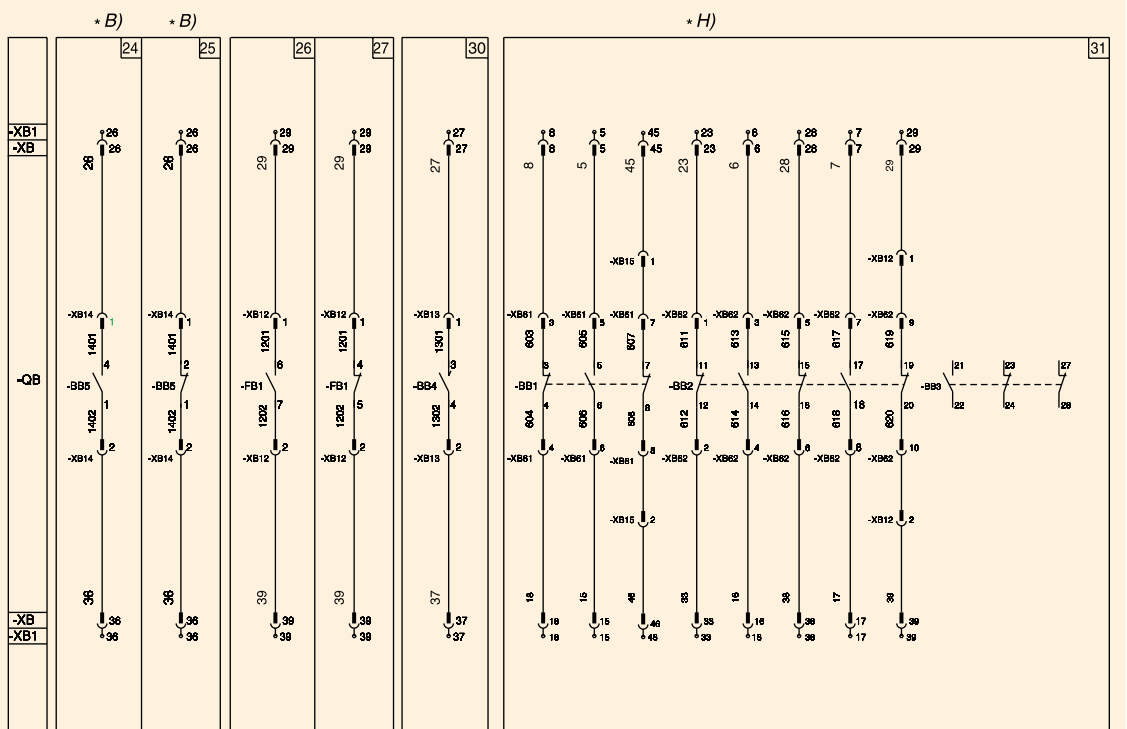
- 1 Circuit-breaker earthing contact (optional accessory)
 2 Fixed part earthing
 3 Drilling template for fixing socket in switchboard (on request)
 4 Maximum protrusion of the branch fixing screws
 5 Silvered copper contact area
 6 Fixing of branches to the insulating support
 7 Drillings for fixing to side sheets
 * Control dimensions (to be verified after assembly).

ELECTRICAL CIRCUIT DIAGRAM

Application diagrams	76
State of operation shown	79
Caption	79
Description of figures	80
Incompatibility	81
Notes	82
Graphical symbols for electrical diagrams	83



ELECTRICAL 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
- gas pressure at rated service value (380 kPa absolute).

Caption

- = Number of diagram figure
- * = See note indicated by the letter
- BM = Device for continuous control of shunt opening release coil continuity (see note E)
- BP = Pressure-switch with two intervention thresholds:
 - intervention for low gas pressure. Contacts 11-12-14 change over, in relation to the position indicated in the diagram, when the gas pressure reaches a value of less than 310 kPa absolute from 380 kPa absolute. If rated pressure is restored, these contacts change over again when, starting from a value of less than 310 kPa absolute, the value of 340 kPa absolute is reached.
 - intervention for insufficient gas pressure. Contacts 21-22-24 change over when the gas pressure reaches a value of less than 280 kPa absolute from 380 kPa absolute. If rated pressure is restored, these contacts change over again when, starting from a value of less than 280 kPa absolute, the value of 310 kPa absolute is reached.
- KT = Undervoltage release electronic time-delay device (see note I)
- PG = Green lamp indicating normal gas pressure
- PR = Red lamp indicating insufficient gas pressure
- PY = Yellow lamp indicating low gas pressure
- BR51 = Microprocessor-based overcurrent release type PR512 outside the circuit-breaker (see note D)
- KA1 = Auxiliary relay to double the -BP pressure-switch contacts with intervention for low gas pressure
- KA2 = Auxiliary relay to double the -BP pressure-switch contacts with intervention for insufficient gas pressure
- MS = Motor for the closing spring charging (see note C)
- QB = Main circuit-breaker
- BB1 = Circuit-breaker auxiliary contacts (no. 3 packs of 5 contacts)
- ...-BB3
- BB4 = Auxiliary passage contact (with momentary closing during circuit-breaker opening)
- BB5 = Contacts for electrical signalling of undervoltage release energised/de-energised
- FB1 = Thermomagnetic circuit-breaker for protection of the spring-charging motor (see note F)
- RR1 = Resistors (not provided with 24V voltage supply)
- BS1...2 = Limit contacts of the spring charging motor
- BT1 = Contacts electrically signalling circuit-breaker in the connected position (see note G)
- BT2 = Contacts electrically signalling circuit-breaker in the isolated position (see note G)
- BT3 = Circuit-breaker position contact, open during the isolating travel
- BT5 = 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 -BT2 in diagram 401693 figures 5-6)
- SC = Pushbutton or contact for circuit-breaker closing
- BK = Contact operated by the key lock preventing electrical opening with earthing truck connected (compulsory accessory for earthing trucks with making capacity)
- SL1 = Contact for circuit-breaker closing lock
- SO = Pushbutton or contact for circuit-breaker opening
- TR1, -TR2 = Rectifiers for -MO1 and -MO2 releases
- XB = Circuit-breaker circuit connector
- XB1 = Switchgear terminal board (outside the circuit-breaker)
- XB2 = Accessory connectors
- ...-XB62

ELECTRICAL CIRCUIT DIAGRAM

-MC	= Shunt closing release
-RL1	= Locking magnet. If de-energized it mechanically prevents circuit-breaker closing
-ML2	= 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)
-MO1	= First shunt opening release (see note E)
-MO2	= Second shunt opening release (see note E)
-MO3	= Opening solenoid for the PR512 microprocessor-based release outside the circuit-breaker (see note D)
-MU	= Instantaneous undervoltage release or undervoltage release with electronic time-delay device (see note B)
-VF	= Filter (only provided with 220V d.c. voltage supply)

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. If de-energized it mechanically prevents circuit-breaker closing.
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).
Fig. 5	= Instantaneous undervoltage release (see note B)
Fig. 6	= Undervoltage release with electronic time-delay 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 PR512 microprocessor-based release outside the circuit-breaker (see note D).
Fig. 11	= Gas pressure control circuit. This includes the contacts for remote indication of normal, low and insufficient gas pressure. For -BP pressure switch intervention values see the caption.
Fig. 12	= Gas pressure control circuit. It includes: <ul style="list-style-type: none"> – intervention for insufficient gas pressure with circuit-breaker opening by means of the -MO2 release and lock on closing and opening by means of a -KA2 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 -BP pressure switch intervention values see the caption.

- 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 -KA2 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 -BP 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 -MO1 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 -MO1, -MO2, -MO3 and -MU).
- Fig. 31 = Circuit-breaker auxiliary contacts available.
- 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 with HD4/C - HD4/P circuit-breakers (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 - 20	24 - 25
5 - 6 - 20	11 - 12 - 14	26 - 27
9 - 10 - 12 - 14	22 - 23	31 - 32

ELECTRICAL CIRCUIT DIAGRAM

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 I). 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) Please see diagram 401530 for the connections between the circuit-breaker auxiliary circuits and the PR512 type of microprocessor-based over-current release located in the switchboard.
- 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 220V, 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 220V, connect a delay or signalling lamp which consumes a current not exceeding 10 mA.
Other uses might jeopardise release functionality.
- F) The -FB1 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 (-BT1 and -BT2) 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 401693 for CBE 11 - 21 - 31 and diagram 401526 for CBE 41 - 51.
- H) When fig. 9 is requested, the contact of pack - BB3 to terminals 29-30 in fig. 32 is not available.
When figs. 26-27 are requested, the -BB2 contact to terminals 29-30 of figs. 31-32 is not available.
When fig. 30 is requested, the contact of pack - BB3 to terminals 23-24 in fig. 32 is not available.
- I) Make one of the following bridges to select the delay required:
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.
- J) When fig. 4 is requested, the contact of pack - BB1 to terminals 7-8 in figs. 31-32 is not available.

Graphical symbols for electrical diagrams (IEC 60617 and CEI 3-14 ... 3-26 Standards)

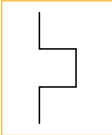
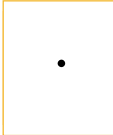
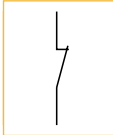
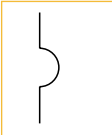
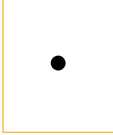
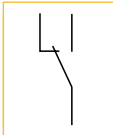
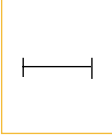
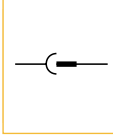

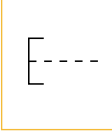
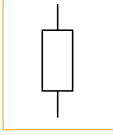
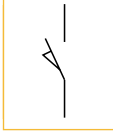

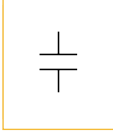


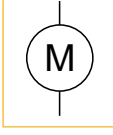
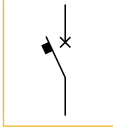

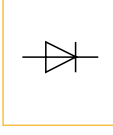
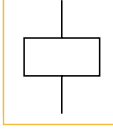
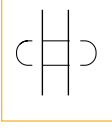

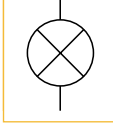
	Thermal effect		Connections of conductors		Break contact
	Electromagnetic effect		Terminal or clamp		Change-over break before make contact
	Timing		Socket and plug (female and male)		Passing make contact closing momentarily during release
	Pushbutton control		Resistor (general symbol)		Closing position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



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The data and illustrations are not binding. We reserve the right to make changes in the course of technical development of the product.
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