

PRODUCT BROCHURE

VD4 MV Vacuum Circuit Breaker

with modular operating mechanism
12...24 kV, 630...4000 A, 20...40 kA



- Global proven reputation
- Accountable solution for safety and reliability
- Wide range offering, easy business and convenient installation

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Contents

06–09	01. Description
10–27	02. Circuit-breaker selection and ordering
28–29	03. Specific product characteristics
30–45	04. Overall dimensions
46–62	05. Electrical circuit diagram

Description

General

The new VD4 are a synthesis of the renowned technology in designing and constructing vacuum interrupters embedded in resin poles, and of excellency in design, engineering and production of circuit-breakers.

The VD4 medium voltage circuit-breakers use vacuum interrupters embedded in resin poles.

Embedding the interrupter in resin makes the circuit-breaker poles particularly sturdy and protects the interrupter against shocks, accumulation of dust and humidity.

The vacuum interrupter houses the contacts and makes up the interrupting chamber.

Current interruption in vacuum

The vacuum circuit-breaker does not require an interrupting and insulating medium. In fact, the interrupters do not contain ionizable material. In any case, on separation of the contacts an electric arc is generated made up exclusively of melted and vaporized contact material.

The electric arc remains supported by the external energy until the current is cancelled in the vicinity of natural zero. At that instant, the rapid reduction in the load density carried and the rapid condensation of the metallic vapour, leads to extremely rapid recovery of the dielectric characteristics. The vacuum interrupter therefore recovers the insulating capacity and the capacity to withstand the transient recovery voltage, definitively extinguishing the arc.

Since high dielectric strength can be reached in the vacuum, even with minimum distances, interruption of the circuit is also guaranteed when separation of the contacts takes place a few milliseconds before passage of the current through natural zero.

The special geometry of the contacts and the material used, as well as the limited duration and low voltage of the arc, guarantee minimum contact wear and long life. Furthermore, the vacuum prevents their oxidation and contamination.

EL type operating mechanism

The low speed of the contacts, together with the reduced run and low mass, limit the energy required for the operation and therefore guarantee extremely limited wear of the system. The circuit breaker therefore only requires limited maintenance.

The VD4 circuit-breakers use a mechanical operating mechanism, with stored energy and free trip. These characteristics allow opening and closing operations independent of the operator.

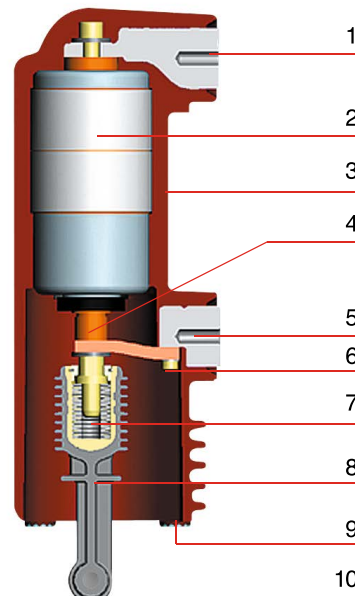
The operating mechanism is of simple conception and use and can be customised with a wide range of accessories which are easy and rapid to install. This simplicity converts into greater reliability of the apparatus.

The structure

The operating mechanism and the poles are fixed to a metal frame which is also the support for the fixed version of the circuit-breaker. The compact structure ensures sturdiness and mechanical reliability.

Apart from the isolating contacts and the cord with plug for connection of the auxiliary circuits, the with drawable version is completed with the truck for racking it into and out of the switchgear or enclosure with the door closed.

- Vacuum interruption technique
- Vacuum contacts protected against oxidation and contamination
- Vacuum interrupter embedded in the resin poles
- Interrupter protected against shocks, dust and humidity
- Sealed-for-life poles
- Operation under different climatic conditions
- Limited switching energy
- Stored energy operating mechanism with anti-pumping device supplied as standard
- Simple customisation with a complete range of accessories
- Fixed and withdrawable version
- Compact dimensions
- Sturdiness and reliability
- Limited maintenance
- Circuit-breaker racking in and racking out with door closed
- Incorrect and hazardous operations are prevented thanks to special locks in the operating mechanism and in the truck
- High environmental compatibility



- 1 Upper terminal
- 2 Vacuum interrupter
- 3 Resin housing
- 4 Stem of moving contact
- 5 Lower terminal
- 6 Flexible connection
- 7 Tie-rod spring fork
- 8 Tie-rod
- 9 Pole fixing
- 10 Connection to operating mechanism

Quenching principle of ABB interrupters

In a vacuum interrupter, the electric arc starts at the moment of contact separation and is maintained until zero current and can be influenced by magnetic fields.

Vacuum arc - diffuse or contracted following contact separation, single melting points form over the entire surface of the cathode, producing metal vapours which support the arc.

The diffuse vacuum arc is characterised by expansion over the contact surface and by an even distribution of thermal stress on the contact surfaces.

At the rated current of the vacuum interrupter, the electric arc is always of the diffuse type. Contact erosion is very limited and the number of current interruptions very high.

As the interrupted current value increases (above the rated value), the electric arc tends to be transformed from the diffuse into the contracted type, due to the Hall effect.

Starting at the anode, the arc contracts and as the current rises further it tends to become sharply defined. Near the area involved there is an increase in temperature with consequent thermal stress on the contact.

To prevent overheating and erosion of the contacts, the arc is kept rotating. With arc rotation it becomes similar to a moving conductor which the current passes through.

The spiral geometry of ABB vacuum interrupter contacts

The special geometry of the spiral contacts generates a radial magnetic field in all areas of the arc column, concentrated over the contact circumferences.

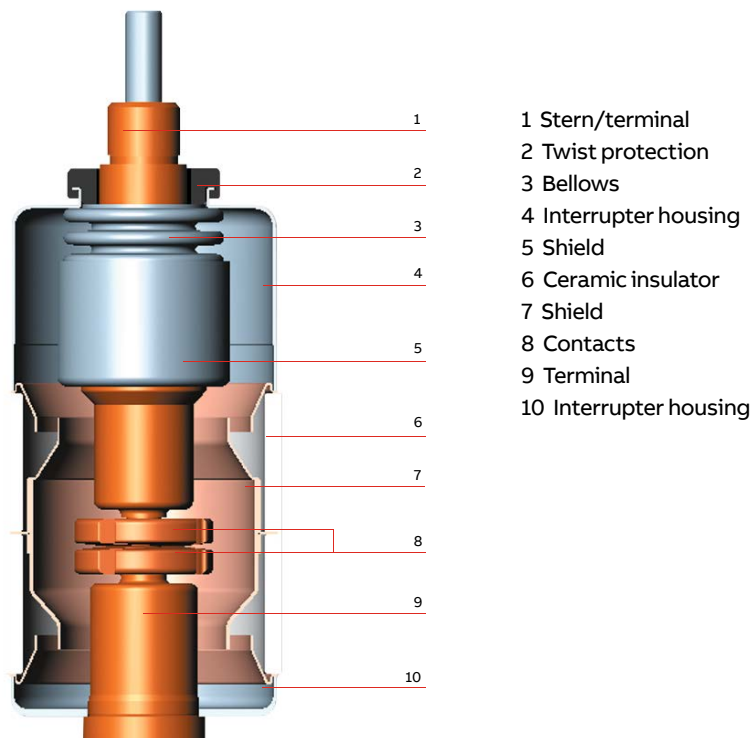
An electromagnetic force is self-generated and this acts tangentially, causing rapid arc rotation around the contact axis.

This means the arc is forced to rotate and to involve a wider surface than that of a fixed contracted arc.

Apart from minimising thermal stress on the contacts, all this makes contact erosion negligible and, above all, allows the interruption process to be controlled even with very high short-circuits.

ABB vacuum interrupters are zero-current interrupters and are free of any re-striking.

Rapid reduction in the current charge and rapid condensation of the metal vapours simultaneously with the zero current, allows maximum dielectric strength to be restored between the interrupter contacts within microseconds.



Versions available

The VD4 circuit-breakers are available in the fixed and withdrawable version with front operating mechanism.

Fields of application

The VD4 circuit-breakers are used in power distribution for control and protection of cables, overhead lines, transformer and motors, transformers, generators and capacitor banks.

Standards and approvals

The VD4 circuit-breakers comply with the GB/T 1984, IEC 62271-100 Standards and with those of the major industrialised countries.

The VD4 circuit-breakers have undergone the tests indicated below and guarantee the safety and reliability of the apparatus in service in any installation.

- Type tests: heating, withstand insulation at power frequency, withstand insulation at lightning impulse, short-time and peak withstand current, mechanical life, short-circuit current making and breaking capacity, and no-load cable interruption.
- Individual tests: insulation of the main circuits with

voltage at power frequency, auxiliary circuit and operating mechanism insulation, measurement of the main circuit resistance, mechanical and electrical operation.

Service safety

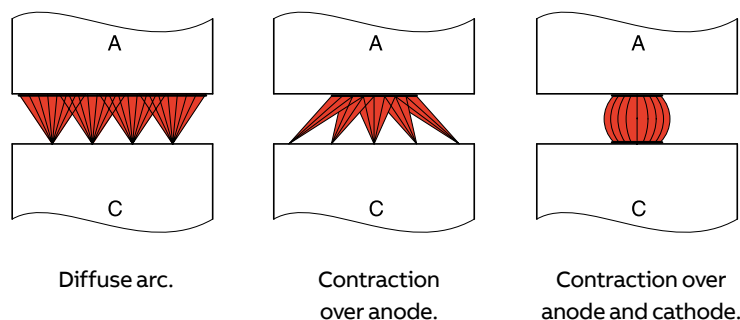
Thanks to the complete range of mechanical and electrical locks (available on request), it is possible to construct safe distribution switchgear with the VD4 circuit-breakers.

The locking devices have been studied to prevent incorrect operations and to inspect the installations whilst guaranteeing maximum operator safety.

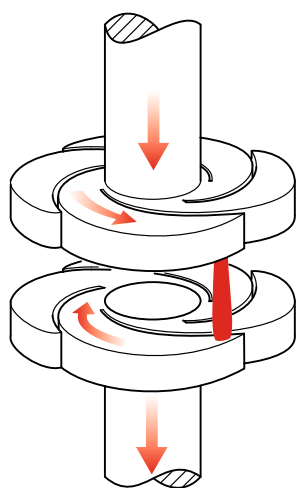
Key locks or padlock devices enable opening and closing operations and/or racking in and racking out.

The racking-out device with the door closed allows the circuit-breaker to be racked into or out of the switchgear only with the door closed.

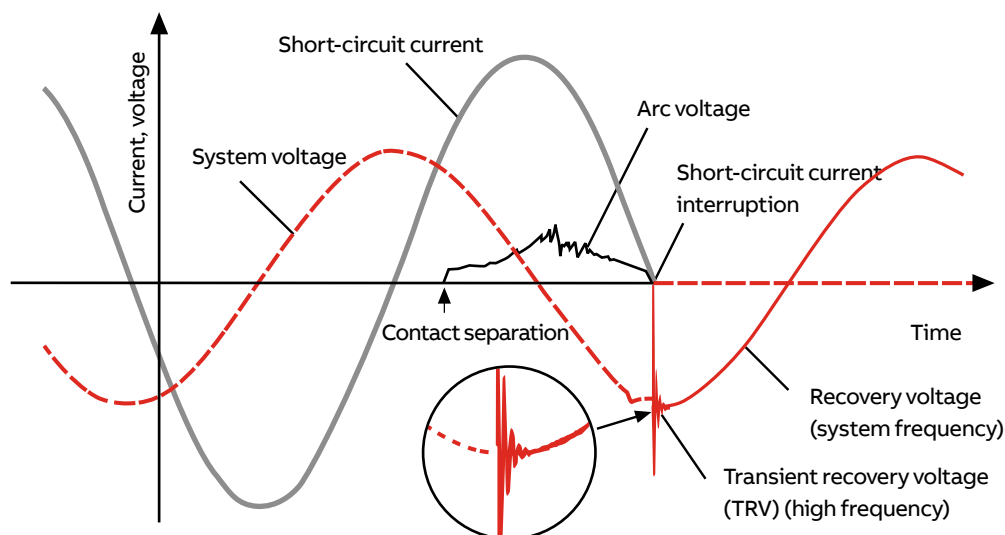
Anti-racking-in locks prevent circuit-breakers with different rated currents from being racked in, and the racking-in operation with the circuit-breaker closed.



Schematic diagram of the transition from a diffuse arc to a contracted arc in a vacuum interrupter.



Radial magnetic field contact arrangement with a rotating vacuum arc.



Schematic diagram of the transition from a diffuse arc to a contracted arc in a vacuum interrupter.

Accessories

The VD4 circuit-breakers have a complete range of accessories to satisfy all installation requirements.

The operating mechanism has a standardized range of accessories and spare parts which are easy to identify and order.

The accessories are installed conveniently from the front of the circuit-breaker. Electrical connection is carried out with plug-socket connectors.

Use, maintenance and service of the apparatus are simple and require limited use of resources.

Operating mechanism

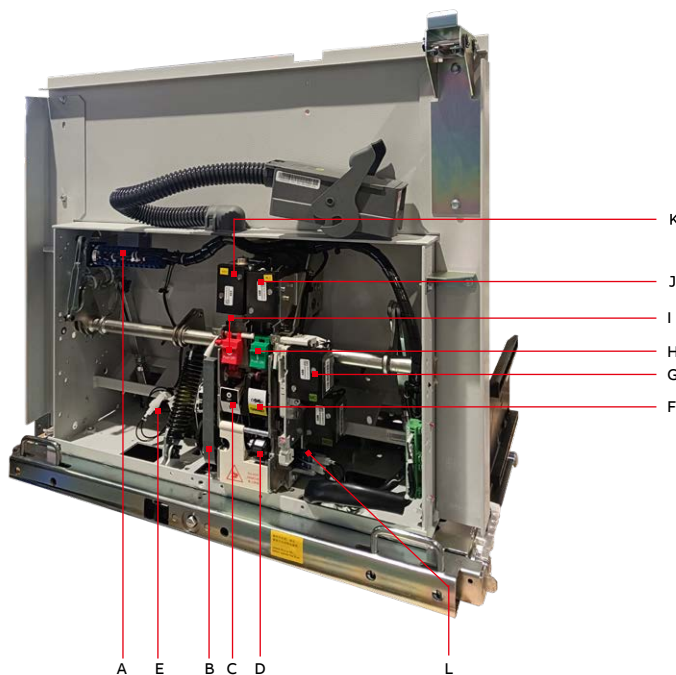
The operating mechanism of VD4 circuit-breakers is of simple conception and use, and can be customised with a wide range of accessories which are easy and rapid to install. This simplicity converts into greater reliability of the apparatus.

The operating mechanism is of the stored energy type, has the anti-pumping device mounted as standard and is fitted with suitable locks to prevent incorrect operations.

Each operation sequence is only enabled if all the conditions ensuring it being carried out correctly are respected.

The accessories are the same for all types of VD4 circuit-breakers.

- Highly reliable operating mechanisms thanks to a low number of components which are manufactured using production systems for large quantities
- Extremely limited and simple maintenance
- The accessories are common to the whole range and are identical for either a.c. or d.c. applications
- The electrical accessories can be installed or replaced easily and rapidly thanks to the cabling which is already prepared with its own plugsocket connectors
- Mechanical anti-pumping device is supplied as standard
- Built-in closing spring charging lever
- Protective covering over the opening and closing pushbuttons to be operated using a special tool
- Padlock device on the operating pushbuttons



- A Open/closed auxiliary contacts
- B Geared motor for closing spring charging
- C Mechanical signaling device for circuit-breaker open/closed
- D Mechanical operation counter
- E Plug-socket connectors of electrical accessories
- F Signaling device for closing springs charged/discharged
- G Service releases
- H Closing pushbutton
- I Opening pushbutton
- J Operating mechanism locking electromagnet
- K Additional shunt opening release
- L Contacts for signaling charged/discharged

Technical documentation

To go into technical and application aspects of the VD4 circuit-breakers in depth, ask for the following publications.

UniGear ZS1 type switchgear	Code: 1YHA000015
REF542 plus	Code: 1YZA000003

Quality system

Complies with ISO 9001: 2015 Standards, certified by an independent organisation.

Environmental management system

Complies with ISO 14001: 2015 Standards, certified by an independent organisation.

Health and safety management system

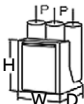
Complies with OHSAS 45001: 2018 Standards, certified by an independent organisation.



Circuit-breaker selection and ordering



General characteristics of fixed circuit-breakers (12 kV)

Circuit-breaker		VD4 12						
Standards	GB/T 1984	•	•	•	•	•	•	
	IEC 62271-100							
Rated voltage	Ur [kV]	12	12	12	12	12	12	
Rated insulation voltage	Us [kV]	12	12	12	12	12	12	
Withstand voltage at 50Hz	Ud (1 min) [kV]	42	42	42	42	42	42	
Impulse withstand voltage	Up [kV]	75	75	75	75	75	75	
Rated frequency	Fr [Hz]	50/60	50/60	50/60	50/60	50/60	50/60	
Rated normal current (40 °C)	Ir [A]	630	630	1250	1250	1250	1250	
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	25	25	25	25	-	-	
		31.5	31.5	31.5	31.5	-	-	
		-	-	-	-	40	40	
Rated short-time withstand current (4 s)	Ik [kA]	25	25	25	25	-	-	
		31.5	31.5	31.5	31.5	-	-	
		-	-	-	-	40	40	
Making capacity	Ip [kA]	63	63	63	63	-	-	
		80	80	80	80	-	-	
		-	-	-	-	100 ³⁾	100 ³⁾	
Operation sequence	[O-0.3 s-CO-15 s-CO]	•	•	•	•	•	•	
Opening time	[ms]	33...60	33...60	33...60	33...60	33...60	33...60	
Arcing time	[ms]	10...15	10...15	10...15	10...15	10...15	10...15	
Total breaking time	[ms]	43...75	43...75	43...75	43...75	43...75	43...75	
Closing time	[ms]	50...80	50...80	50...80	50...80	50...80	50...80	
Maximum overall dimensions		H [mm]	461	461	461	461	589	589
		W [mm]	450	570	450	570	570	570
		D [mm]	424	424	424	424	424	424
Phase space	P [mm]	150	210	150	210	210	275	
Weight	[kg]	73	75	73	75	84	89	
Dimension standardized table		TN7405	TN7406	TN7405	TN7406	TN3282	TN3285	
Operating temperature ²⁾	[°C]	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	15 ... +40	
Tropicalization	IEC 60068-2-30	•	•	•	•	•	•	
	IEC 721-2-1	•	•	•	•	•	•	
Electromagnetic compatibility	GB/T 11022	•	•	•	•	•	•	
	IEC 62271-1	•	•	•	•	•	•	

Note: 1) With forced ventilation.

2) For -25 °C application, please ask ABB.

3) For the 125 kA, please ask ABB.

4) Circuit breaker class: E2, C2, M2.



General characteristics of fixed circuit-breakers (17.5 kV)

Circuit-breaker		VD4 17					
Standards	IEC 62271-100	•	•	•	•	•	•
Rated voltage	Ur [kV]	17.5	17.5	17.5	17.5	17.5	17.5
Rated insulation voltage	Us [kV]	17.5	17.5	17.5	17.5	17.5	17.5
Withstand voltage at 50Hz	Ud (1 min) [kV]	38	38	38	38	38	38
Impulse withstand voltage	Up [kV]	95	95	95	95	95	95
Rated frequency	Fr [Hz]	50/60	50/60	50/60	50/60	50/60	50/60
Rated normal current (40 °C)	Ir [A]	630	630	1250	1250	1250	1250
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	25	25	25	25	-	-
		31.5	31.5	31.5	31.5	-	-
		-	-	-	-	40	40
Rated short-time withstand current (4 s)	Ik [kA]	25	25	25	25	-	-
		31.5	31.5	31.5	31.5	-	-
		-	-	-	-	40	40
Making capacity	Ip [kA]	63	63	63	63	-	-
		80	80	80	80	-	-
		-	-	-	-	100	100
Operation sequence	[O-0.3 s-CO-15 s-CO]	•	•	•	•	•	•
Opening time	[ms]	33...60	33...60	33...60	33...60	33...60	33...60
Arcing time	[ms]	10...15	10...15	10...15	10...15	10...15	10...15
Total breaking time	[ms]	43...75	43...75	43...75	43...75	43...75	43...75
Closing time	[ms]	50...80	50...80	50...80	50...80	50...80	50...80
Maximum overall dimensions	H [mm]	461	461	461	461	589	589
	W [mm]	450	570	450	570	570	570
	D [mm]	424	424	424	424	424	424
	P [mm]	150	210	150	210	210	275
Phase space							
Weight	[kg]	73	75	73	75	84	89
Dimension standardized table		TN7405	TN7406	TN7405	TN7406	TN3282	TN3285
Operating temperature ²⁾	[°C]	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	15 ... +40
Tropicalization	IEC 60068-2-30	•	•	•	•	•	•
	IEC 721-2-1	•	•	•	•	•	•
Electromagnetic compatibility	GB/T 11022	•	•	•	•	•	•
	IEC 62271-1	•	•	•	•	•	•

Note: 1) With forced ventilation.

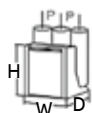
2) For -25 °C application, please ask ABB.

3) Circuit breaker class: E2, C2, M2.



General characteristics of fixed circuit-breakers (24 kV)

Circuit-breaker		VD4 24					
Standards	GB/T 1984	•	•	•	•	•	•
	IEC 62271-100						
Rated voltage	Ur [kV]	24	24	24	24	24	24
Rated insulation voltage	Us [kV]	24	24	24	24	24	24
Withstand voltage at 50Hz	Ud (1 min) [kV]	65	65	65	65	65	65
Impulse withstand voltage	Up [kV]	125	125	125	125	125	125
Rated frequency	Fr [Hz]	50/60	50/60	50/60	50/60	50/60	50/60
Rated normal current (40 °C)	Ir [A]	630	630	630	630	1250	1250
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	20		20		20	
		25		25		25	
			31.5		31.5		31.5
Rated short-time withstand current (4 s)	Ik [kA]	20		20		20	
		25		25		25	
			31.5		31.5		31.5
Making capacity	Ip [kA]	50		50		50	
		63		63		63	
			80		80		80
Operation sequence	[O-0.3 s-CO-15 s-CO]	•	•	•	•	•	•
Opening time	[ms]	33...60	33...60	33...60	33...60	33...60	33...60
Arcing time	[ms]	10...15	10...15	10...15	10...15	10...15	10...15
Total breaking time	[ms]	43...75	43...75	43...75	43...75	43...75	43...75
Closing time	[ms]	50...80	50...80	50...80	50...80	50...80	50...80
Maximum overall dimensions	H [mm]	631	647	631	647	631	647
	W [mm]	570	570	700	700	570	570
	D [mm]	424	424	424	424	424	424
Phase space	P [mm]	210	210	275	275	210	210
Weight	[kg]	100	125	104	130	100	125
Dimension standardized table		TN7409	1YHT340018R0105	TN7410	1YHT340018R0106	TN7409	1YHT340018R0105
Operating temperature ²⁾	[°C]	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40
Tropicalization	IEC 60068-2-30	•	•	•	•	•	•
	IEC 721-2-1	•	•	•	•	•	•
Electromagnetic compatibility	GB/T 11022	•	•	•	•	•	•
	IEC 62271-1	•	•	•	•	•	•



Note: 1) With forced ventilation.

2) For -25 °C application, please ask ABB.

3) Circuit breaker class: E2, C2, M2. Please contact ABB for line system application.

4) For capacitor switching operations at 79kV/145kV, please contact ABB for consultation.

24	24	24	24	24	24	24	24	24
24	24	24	24	24	24	24	24	24
65	65	65	65	65	65	65	65	65
125	125	125	125	125	125	125	125	125
50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60	50/60
1250	1250	1600	1600	2000	2000	2500 ¹⁾	2500 ¹⁾	3150 ¹⁾
20		20		20				
25		25		25		25		25
	31.5		31.5		31.5		31.5	31.5
20		20		20				
25		25		25		25		25
	31.5		31.5		31.5		31.5	31.5
50		50		50				
63		63		63		63		63
	80		80		80		80	80
33...60	33...60	33...60	33...60	33...60	33...60	33...60	33...60	33...60
10...15	10...15	10...15	10...15	10...15	10...15	10...15	10...15	10...15
43...75	43...75	43...75	43...75	43...75	43...75	43...75	43...75	43...75
50...80	50...80	50...80	50...80	50...80	50...80	50...80	50...80	50...80
631	647	647	647	647	647	660	660	660
700	700	700	700	700	700	700	700	700
424	424	424	424	424	424	424	424	424
275	275	275	275	275	275	275	275	275
104	130	110	150	110	150	110	150	150
TN7410	1YHT340018R0106	TN7411	1YHT340018R0107	TN7411	1YHT340018R0107	TN7411	1YHT340018R0107	1YHT340018R0108
-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40



General characteristics of withdrawable version circuit-breakers

VD4/P: for UniGear ZS1 type switchgear (12 kV).

VD4/Z: for OEM switchgear.

Circuit-breaker		VD4/P 12		VD4/Z 12			
Standards	GB/T 1984	•	•	•	•	•	•
	IEC 62271-100						
Rated voltage	Ur [kV]	12	12	12	12	12	12
Rated insulation voltage	Us [kV]	12	12	12	12	12	12
Withstand voltage at 50Hz	Ud (1 min) [kV]	42	42	42	42	42	42
Impulse withstand voltage	Up [kV]	75	75	75	75	75	75
Rated frequency	Fr [Hz]	50/60	50/60	50/60	50/60	50/60	50/60
Rated normal current (40 °C)	Ir [A]	630	630	1250	1250	1250	1250
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	25	25	25	25	-	-
		31.5	31.5	31.5	31.5	-	-
		-	-	-	-	40	40
Rated short-time withstand current (4 s)	Ik [kA]	25	25	25	25	-	-
		31.5	31.5	31.5	31.5	-	-
		-	-	-	-	40	40
Making capacity	Ip [kA]	63	63	63	63	-	-
		80	80	80	80	-	-
		-	-	-	-	100 ³⁾	100 ³⁾
Operation sequence	[O-0.3 s-CO-15 s-CO]	•	•	•	•	•	•
Opening time	[ms]	33...60	33...60	33...60	33...60	33...60	33...60
Arcing time	[ms]	10...15	10...15	10...15	10...15	10...15	10...15
Total breaking time	[ms]	43...75	43...75	43...75	43...75	43...75	43...75
Closing time	[ms]	50...80	50...80	50...80	50...80	50...80	50...80
Maximum overall dimensions	H [mm]	632	632	632	632	690	690
	W [mm]	503	653	503	653	653	853
	D [mm]	664	664	664	664	642	642
Phase space	P [mm]	150	210	150	210	210	275
Weight	[kg]	116	118	116	118	174	176
Dimension standardized table		TN7412	1VCD000061	TN7412	1VCD000061	TN7420	TN3286
Operating temperature ²⁾	[°C]	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	15 ... +40
Tropicalization	IEC 60068-2-30	•	•	•	•	•	•
	IEC 721-2-1	•	•	•	•	•	•
Electromagnetic compatibility	GB/T 11022	•	•	•	•	•	•
	IEC 62271-1	•	•	•	•	•	•

Note: 1) With forced ventilation.

2) For -25 °C application, please ask ABB.

3) For the 125 kA, please ask ABB.

4) Circuit breaker class: E2, C2, M2.



17.5 kV general characteristics of withdrawable version circuit-breakers

VD4/P for UniGear ZS1 type switchgear (17.5 kV).

Note: 17.5 kV is IEC standard voltage. Withstand voltage of VD4/P.

circuit breaker (17.5 kV) at 50 Hz is 38 kV according to IEC standards, it can be up to 42 kV on request.

Circuit-breaker		VD4/P 17					
Standards	IEC 62271-100	•	•	•	•	•	•
Rated voltage	Ur [kV]	17.5	17.5	17.5	17.5	17.5	17.5
Rated insulation voltage	Us [kV]	17.5	17.5	17.5	17.5	17.5	17.5
Withstand voltage at 50Hz	Ud (1 min) [kV]	38	38	38	38	38	38
Impulse withstand voltage	Up [kV]	95	95	95	95	95	95
Rated frequency	Fr [Hz]	50/60	50/60	50/60	50/60	50/60	50/60
Rated normal current (40 °C)	Ir [A]	630	630	1250	1250	1250	1250
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	25	25	25	25	-	-
		31.5	31.5	31.5	31.5	-	-
		-	-	-	-	40	40
Rated short-time withstand current (4 s)	Ik [kA]	25	25	25	25	-	-
		31.5	31.5	31.5	31.5	-	-
		-	-	-	-	40	40
Making capacity	Ip [kA]	63	63	63	63	-	-
		80	80	80	80	-	-
		-	-	-	-	100	100
Operation sequence	[O-0.3 s-CO-15 s-CO]	•	•	•	•	•	•
Opening time	[ms]	33...60	33...60	33...60	33...60	33...60	33...60
Arcing time	[ms]	10...15	10...15	10...15	10...15	10...15	10...15
Total breaking time	[ms]	43...75	43...75	43...75	43...75	43...75	43...75
Closing time	[ms]	50...80	50...80	50...80	50...80	50...80	50...80
Maximum overall dimensions	H [mm]	632	632	632	632	690	690
	W [mm]	503	653	503	653	653	853
	D [mm]	664	664	664	664	642	642
Phase space	P [mm]	150	210	150	210	210	275
Weight	[kg]	116	118	116	118	174	176
Dimension standardized table		TN7412	1VCD000061	TN7412	1VCD000061	TN7420	TN3286
Operating temperature ²⁾	[°C]	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	15 ... +40
Tropicalization	IEC 60068-2-30	•	•	•	•	•	•
	IEC 721-2-1	•	•	•	•	•	•
Electromagnetic compatibility	GB/T 11022	•	•	•	•	•	•
	IEC 62271-1	•	•	•	•	•	•

Note: 1) With forced ventilation.

2) For -25 °C application, please ask ABB.

3) Circuit breaker class: E2, C2, M2.



General characteristics of withdrawable version circuit-breakers (24 kV)

Circuit-breaker		VD4/P 24		VD4/Z 24			
Standards	GB/T 1984	•	•	•	•	•	•
	IEC 62271-100						
Rated voltage	Ur [kV]	24	24	24	24	24	24
Rated insulation voltage	Us [kV]	24	24	24	24	24	24
Withstand voltage at 50Hz	Ud (1 min) [kV]	65	65	65	65	65	65
Impulse withstand voltage	Up [kV]	125	125	125	125	125	125
Rated frequency	Fr [Hz]	50/60	50/60	50/60	50/60	50/60	50/60
Rated normal current (40 °C)	Ir [A]	630	630	630	630	1250	1250
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	20		20		20	
		25		25		25	
			31.5		31.5		31.5
Rated short-time withstand current (4 s)	Ik [kA]	20		20		20	
		25		25		25	
			31.5		31.5		31.5
Making capacity	Ip [kA]	50		50		50	
		63		63		63	
			80		80		80
Operation sequence	[O-0.3 s-CO-15 s-CO]	•	•	•	•	•	•
Opening time	[ms]	33...60	33...60	33...60	33...60	33...60	33...60
Arcing time	[ms]	10...15	10...15	10...15	10...15	10...15	10...15
Total breaking time	[ms]	43...75	43...75	43...75	43...75	43...75	43...75
Closing time	[ms]	50...80	50...80	50...80	50...80	50...80	50...80
Maximum overall dimensions	H [mm]	794	794	794	794	794	794
	W [mm]	653	653	853	853	653	653
	D [mm]	802	802	802	802	802	802
Phase space	P [mm]	210	210	275	275	210	210
Weight	[kg]	140	165	148	170	140	165
Dimension standardized table		TN7413	1YHT340018R0101	TN7414	1YHT340018R0102	TN7413	1YHT340018R0101
Operating temperature ²⁾	[°C]	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40	-15 ... +40
Tropicalization	IEC 60068-2-30	•	•	•	•	•	•
	IEC 721-2-1	•	•	•	•	•	•
Electromagnetic compatibility	GB/T 11022	•	•	•	•	•	•
	IEC 62271-1	•	•	•	•	•	•

Note: 1) With forced ventilation. 2) For -25 °C application, please ask ABB.

3) 2500 A has two Options.

Option A: Tulip diameter is 79 mm with forced ventilation;

Option B: Tulip diameter is 109 mm with natural cooling. Technical data please refer to 24 kV, 3150 A, 31.5 kA.

4) Circuit breaker class: E2, C2, M2. Please contact ABB for line system application.

5) For capacitor switching operations at 79kV/145kV, please contact ABB for consultation.

Optional accessories

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

1. Shunt opening release (-MBO1)

This allows remote opening control of the apparatus.

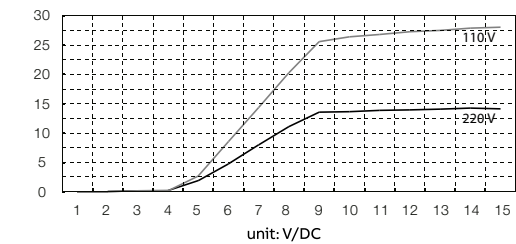
The release can operate both in direct and alternating current. This release is suitable for both instantaneous and permanent service. In the case of instantaneous service, the minimum current impulse time must be 100 ms.

Characteristics	
Un	24-30-48-60-110-125-220-250 V_
Un	24-48-60-110-120...127-220... 240- V~50 Hz
Un	110-120-127-220-240 V~60 Hz
Operating limits	Opening release 65 % (DC) or 8 5% (AC)...110 % Un Closing release 85 %...110 % Un
Power on inrush (Ps)	DC=200 W; AC=200 VA
Inrush duration	approx. 100 ms
Continuous power (Pc)	DC=5 W; AC=5 VA
Opening time	33...60 ms
Closing time	50...80 ms
Insulation voltage	2000 V 50 Hz (1 min)

Note: Monitoring the functions of the shunt closing (-MBC) and opening releases are required: (-MBO1, -MBO2).

- Releases with rated voltage of 110-220 V AC/DC can be monitoring without STU device. Volt-ampere characteristic curve for 110 V-220 V AC/DC is shown below:

Volt-ampere characteristic curve of opening and closing release
unit: mA



For release of 110 V supply voltage, monitoring current should be less than 20 mA. The total resistance of other components in the monitoring circuit, excluding the release, should not be less than 5.5 kΩ.

For release of 220 V supply voltage, monitoring current should be less than 10 mA. The total resistance of other components in the monitoring circuit, excluding the release, should not be less than 20 kΩ.

- For releases with rated voltage range from 24 V to 60 VAC/DC, the only device capable to carry out monitoring of the functions is the STU device. Please consult manufacturer for more information.

2. Additional shunt opening release (-MBO2)

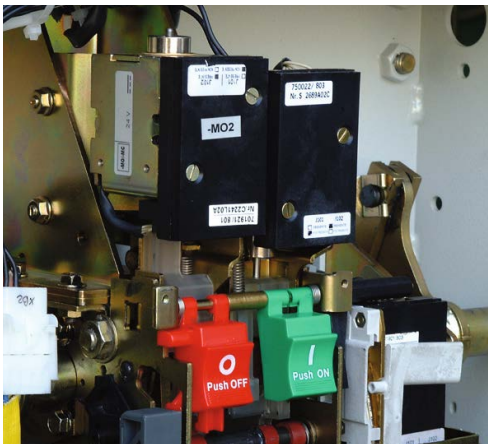
Like the shunt opening release described above, this allows remote opening control of the apparatus and can be supplied by a circuit completely separate from the release (-MBO1).

It keeps all the electrical and operating characteristics of the shunt opening release (-MBO1).

3. Opening solenoid (-MBO3)

The opening solenoid (-MBO3) is a special release with demagnetisation. It is located in the operating mechanism (in the left side piece) and is usually cooperate with self-supplied overcurrent release, ie. REJ603 release manufactured by ABB.

Note: It is not alternative to the additional shunt opening release (-MBO2).



4. Shunt closing release (-MBC)

This allows remote closing control of the apparatus.

The release can operate both in direct and alternating current.

This release is suitable both for instantaneous and permanent service.

In the case of instantaneous service, the minimum current impulse time must be 100 ms. The permanently supplied release carries out the electrical anti-pumping function.

It keeps all the electrical and operating characteristics of the shunt opening release.

5. Undervoltage release (-MBU)

The undervoltage release opens the circuit-breaker when there is notable lowering or lack of its power supply. It can be used for remote trip (by means of normally closed type pushbuttons), lock on closing or to control the voltage in the auxiliary circuits.

The circuit-breaker can only close with the release supplied (the closing lock is made mechanically).

The release can operate both in direct and alternating current.

The undervoltage release is available in the following versions:

5A undervoltage release with power supply branched on the supply side.

5B undervoltage release with electronic time delay - KT (0.5 - 1 - 1.5 - 2 - 3 s) (power supply branched on the supply side). This device is set at 0.5 s (for adjustment, please see the electric circuit diagram chapter).

Characteristics	
Un	24-30-48-60-110-125-220-250 V-
Un	24-48-60-110-120...127-220...240- V~50 Hz
Un	110-120...127-220...240 V~60 Hz
Operating limits	circuit-breaker could not close: ≤35 % Un
	circuit-breaker opening: 35-65 % Un
	circuit-breaker closing: 85-110 % Un
Power on inrush (Ps)	DC=200 W; AC = 200 VA
Inrush duration:	about. 100 ms
Continuous power (Pc)	DC=5 W; AC= 5 VA
Insulation voltage	2000 V 50 Hz (1 min)

Electronic time delay device (-KAT)

The electronic time delay device must be mounted externally in relation to the circuit-breaker. It allows release trip delay with established and adjustable times.

The use of the undervoltage release is recommended in order to prevent trips when the power supply network of the release may be subject to cuts or voltage drops of short duration.

If it is not supplied, circuit-breaker closing is disabled.

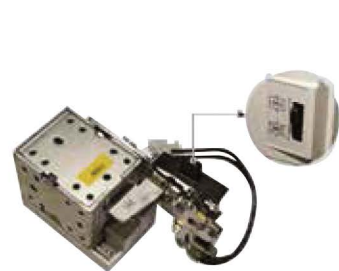
The time delay device must be combined with an undervoltage release with the same voltage as the delay device.

Characteristics of the time-delay device	
Un	24...30-48-60-110...127-220...250 V-
Un	48-60-110...127-220... 240- V~50/60 Hz
Adjustable opening time (release + time delay device)	0.5-1-1.5-2-3 sec



6. Undervoltage release mechanical override

This is a mechanical device which allows the undervoltage release trip to be temporarily excluded. It is always fitted with electrical signalling.



7. Circuit-breaker auxiliary contacts (-BGB0)

Electrical signalling of circuit-breaker open/closed is provided with a standard set of 10 auxiliary contacts.

Characteristics		
Un		24...250 V AC-DC
Rated current		1th2=10 A
Insulation voltage		2000 V 50 Hz (1 min)
Electric resistance		≤6.5 mOhm
Rated current and breaking capacity in category AC-15 and DC-13		
Rated current Un		Breaking capacity
220 V AC	Cosφ = 0.70	20 A
220 V DC	Cosφ = 0.45	10 A
24 V-	1 ms	12 A
	15 ms	9 A
	50 ms	6 A
60 V-	1 ms	10 A
	15 ms	6 A
	50 ms	4.6 A
110 V-	1 ms	7 A
	15 ms	4.5 A
	50 ms	3.5 A
220 V-	1 ms	2 A
	15 ms	1.7 A
	50 ms	1.5 A
250 V-	1 ms	2 A
	15 ms	1.4 A
	50 ms	1.2 A

Note: This can be provided with a maximum set of 14 if there is a clear indication in the order form.



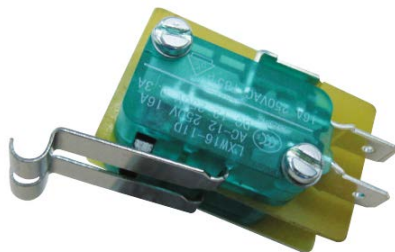
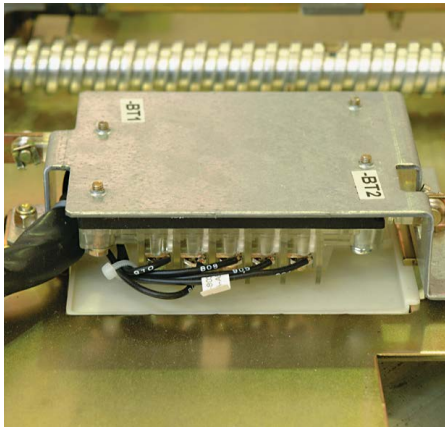
10. Transmitted contacts in the truck (-BGT1; -BGT2)
Transmitted contacts of the withdrawable circuit-breaker are installed in the circuit breaker truck.

11. Motor operator (-MAS)
This carries out automatic charging of the circuit-breaker operating mechanism closing springs. After circuit-breaker closing, the geared motor immediately recharges the closing springs.

In the case of a power cut or during maintenance work, the closing springs can be charged manually in any case (by means of the special crank handle incorporated in the operating mechanism).

Characteristics	
Un	24...30-48-60-110...130-220...250 V-
Un	100-130-220...250 V~50/60 Hz
Operating limits	85...110 % Un
Power on inrush (Ps)	DC=600 W AC=600 VA
Rated power (Pn)	DC=200 W AC =200 VA
Inrush duration	approx.0.2 s
Charging time	6-7 s
Insulating voltage	2000 V 50 Hz (1 min)

12. Contact for signalling closing springs charged/ discharged (-BGS2)
This consists of two micro-switches which allow remote signalling of the state of the circuit-breaker operating mechanism springs. When the spring is discharged, one micro-switches is normally open while the other is normally closed.



13. Opening and closing pushbutton protection

The protection only allows the opening and closing pushbuttons to be operated using a special tool.

14. Opening and closing pushbutton padlocks

The device allows the opening and closing pushbuttons to be locked using a maximum of three padlocks(not supplied): diameter of hole for padlocks Φ 4mm.

15. Key lock in open position

The lock is activated by a special circular lock. Different keys (for a single circuit-breaker) are available, or the same keys (for several circuitbreakers).

16. Locking magnet on the operating mechanism (-RLE1)

This only allows activation of the operating mechanism when the locking magnet is energized.

Characteristics	
Un	24-30-48-60-110-125-127-132-220-240 V
Un	24-30-48-60-110-125...127-220-230...240 V~50/60 Hz
Operating limits	85...110 % Un
Power on inrush (Ps)	DC=250 W; AC=250 VA
Rated power (Pn)	DC=5 W; AC=5 VA
Inrush duration	approx. 150 ms

17. Locking magnet on theezz truck (-RLE2)

This is to prevent circuit-breaker racking into the switchgear with the auxiliary circuit plug disconnected.

The plug realises the anti racking-in lock for different rated current (by means of special pins).

Characteristics	
Un	24-30-48-60-110-125-127-132-220-240 V
Un	24-30-48-60-110-125...127-220-230...240 V~50/60 Hz
Operating limits	85...110 % Un
Power on inrush (Ps)	DC=250 W; AC=250 VA
Rated power (Pn)	DC=5 W; AC=5 VA
Inrush duration	approx. 150 ms



13



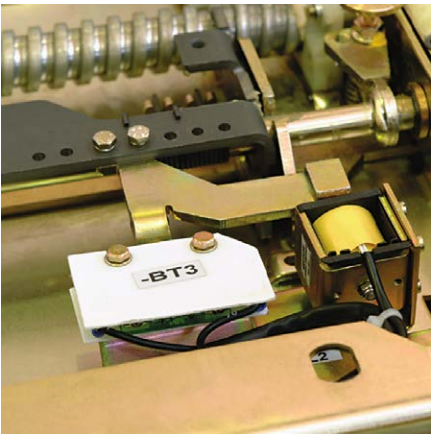
14



15



16



17

20. Motorised truck (-MAT)

This allows remote racking in and out of the circuit-breaker in the switchgear.

Characteristics	
Un	48-110-220 V-
Operating limits	85...110 % Un
Nominal power (Pn)	40 W

Note: need to be combined with MDC2 digital motor driven trolley control unit, to fulfill motor control and protection.

30. Earthing devices on truck

Earthing devices are installed on both sides of the truck. Cooperating with guide rail in switchgear, they keep metallic part of withdrawable circuit breaker earthed in racked-in and isolated position, and in intermediate position.



Specific product characteristics

Resistance to vibrations

VD4 circuit-breakers are unaffected by mechanically generated vibrations.

For the versions approved by the naval registers, please contact us.

Tropicalization

VD4 circuit-breakers are manufactured in compliance with the strictest regulations regarding 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 4520 Standard.

These construction characteristics mean that the whole VD4 series of circuit-breakers and its accessories comply with standards as follows:
IEC 60721-2-1 (climate graph 8)
IEC 60068-2-2 (Test B: Dry Heat)
IEC 60068-2-30 (Test Bd: Damp Heat, cyclic)

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 of the interrupters does not undergo any variations as it is guaranteed by the vacuum).

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.

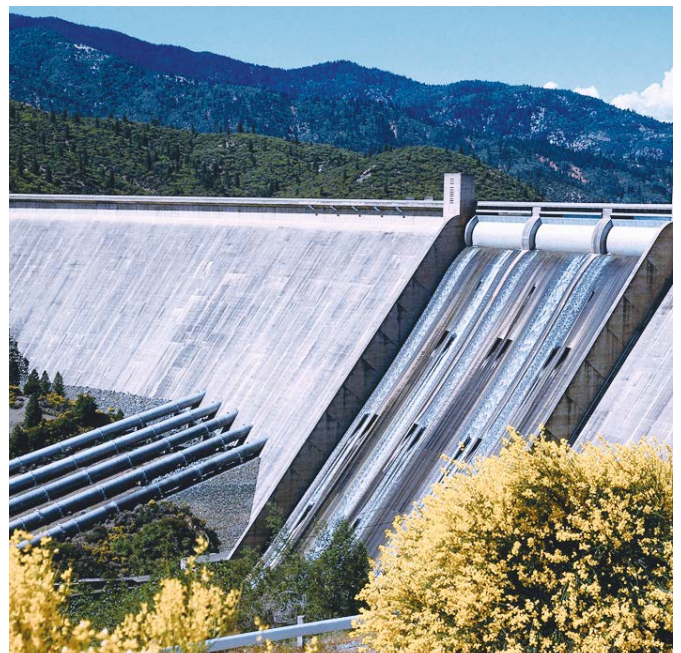
In this case a correction coefficient must be considered, which can be taken from the graph on the next page, built up on the basis of the indications in the IEC 60694 Standards.

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 power frequency and the lightning 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 power frequency 42 kVrms
- Impulse withstand voltage 75 kVp
- K_a factor 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 power frequency equal to:
 $42 \times 1.13 = 47.5 \text{ kVrms}$
- impulse withstand voltage equal to:
 $75 \times 1.13 = 84.7 \text{ kVp}$

From the above, it can be deduced that for installations at high altitude, the circuit breaker has to overpass a insulation test at a higher voltage level at zero altitude.

Please contact ABB for choosing correct type of circuit breakers.

Anti-pumping device

The EL operating mechanism of VD4 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 (local or remote) be active at the same time, there would be a continuous succession of opening and closing commands.

The anti-pumping device avoids this situation, ensuring that each closing operation is only followed by an 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 re-launched.

Furthermore, the anti-pumping device only allows circuit-breaker closure if the following conditions are present at the same time.

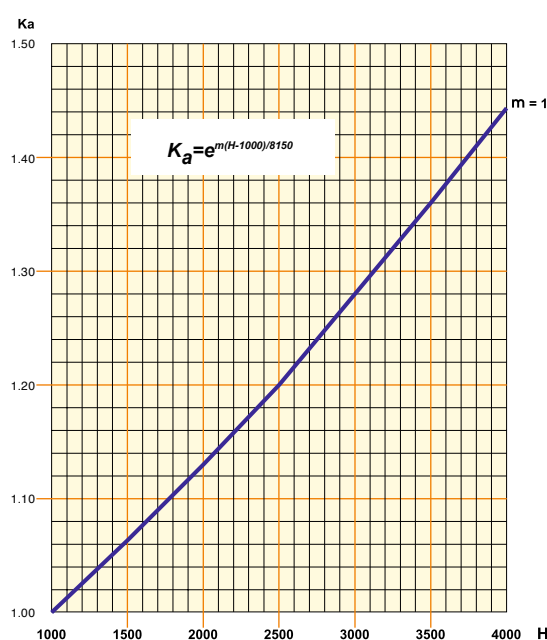
- operating mechanism springs fully charged
- opening pushbutton and/or shunt opening release (-MO1/-MO2) not activated
- circuit-breaker open

Environmental protection programme

VD4 circuit-breakers are manufactured in accordance with the ISO 14000 Standards (Guidelines for environmental management).

The production processes are carried out in compliance with the Standards for environmental protection in terms of reduction in energy consumption as well as in raw materials and production of waste materials. All this is thanks to the medium voltage apparatus manufacturing facility environmental management system.

Assessment of the environmental impact of the life cycle of the product, obtained by minimising energy consumption and overall raw materials of the product, became a concrete matter during the design stage by means of targeted selection of the materials, processes and packing. This is to allow maximum recycling at the end of the useful life cycle of the apparatus.



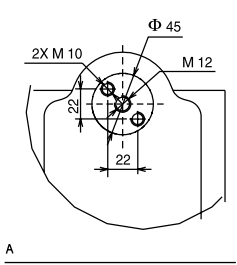
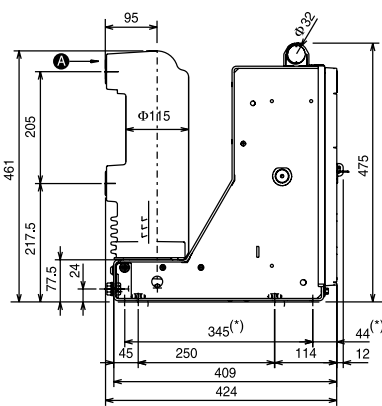
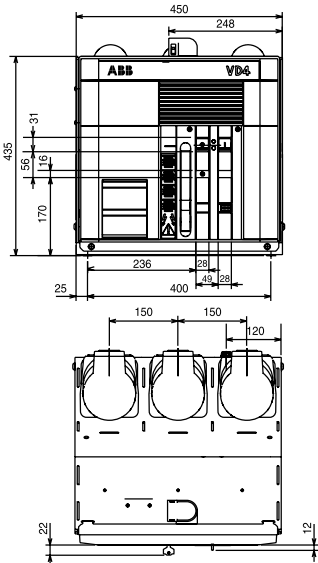
Overall dimensions

Fixed circuit-breakers

VD4	
TN	7405
Ur	12 kV
Ir	630 A
	1250 A
Isc	25 kA
	31.5 kA

VD4	
TN	7405
Ur	17.5 kV
Ir	630 A
	1250 A
Isc	25 kA
	31.5 kA

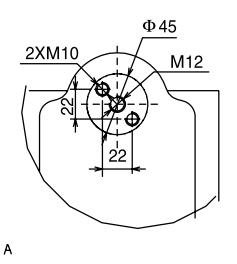
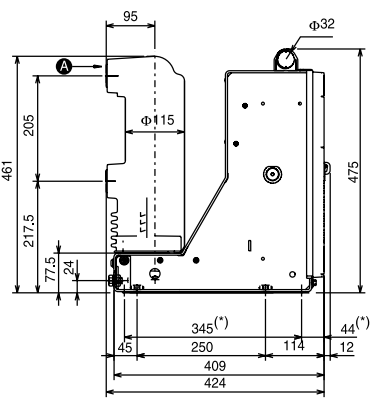
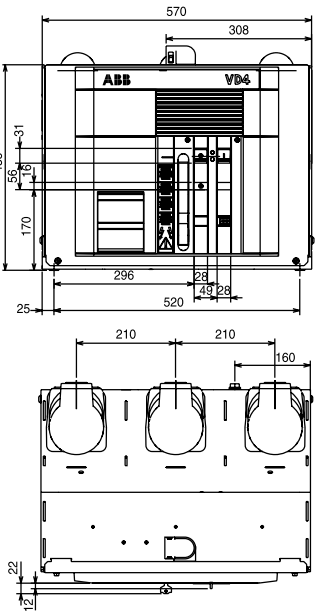
(*) Interchangeability of fixing points with previous series
P210 345x520
P275 345x650



VD4	
TN	7406
Ur	12 kV
Ir	630 A
	1250 A
Isc	25 kA
	31.5 kA

VD4	
TN	7406
Ur	17.5 kV
Ir	630 A
	1250 A
Isc	25 kA
	31.5 kA

(*) Interchangeability of fixing points with previous series
P210 345x520
P275 345x650



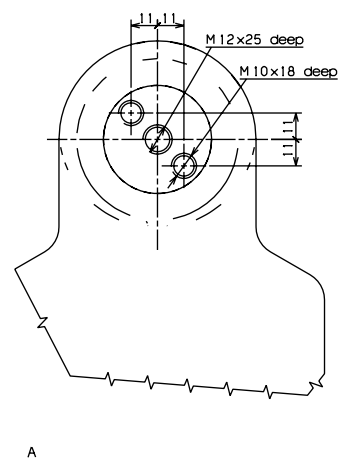
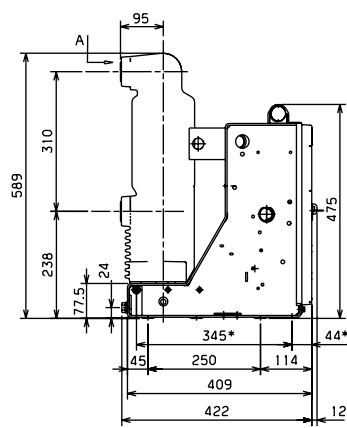
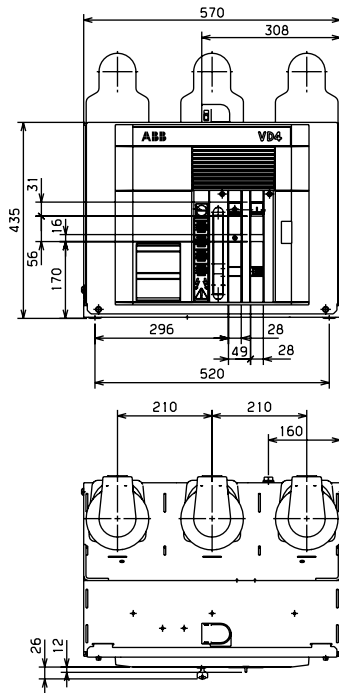
Fixed circuit-breakers**VD4**

TN	3282
Ur	12 kV
Ir	1250 A
	1600 A
Isc	40 kA

VD4

TN	3282
Ur	17.5 kV
Ir	1250 A
	1600 A
Isc	40 kA

(*) Interchangeability
of fixing points with
previous series
P210 345x520
P275 345x650

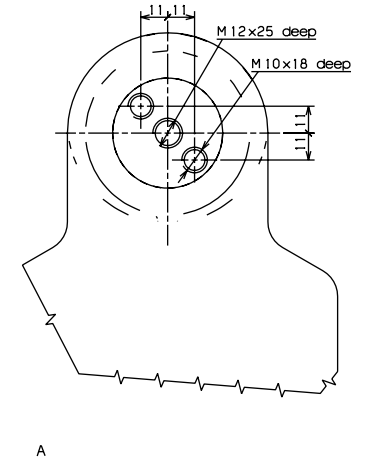
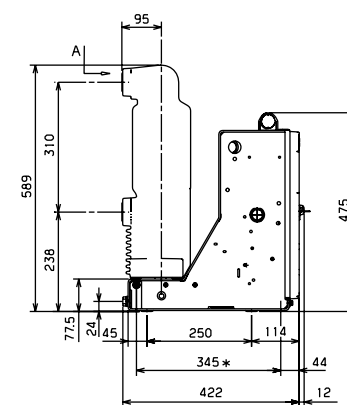
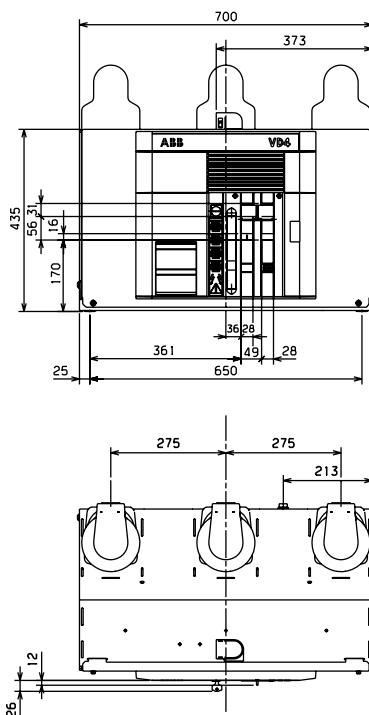
**VD4**

TN	3285
Ur	12 kV
	1250 A
Ir	1600 A
Isc	40 kA

VD4

TN	3285
Ur	17.5 kV
Ir	1250 A
	1600 A
Isc	40 kA

(*) Interchangeability
of fixing points with
previous series
P210 345x520
P275 345x650



Fixed circuit-breakers

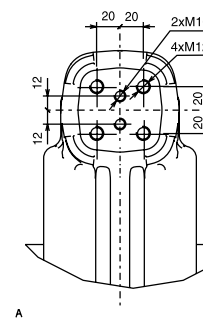
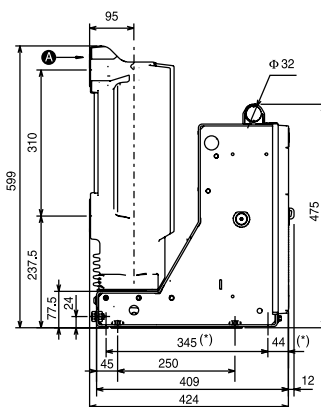
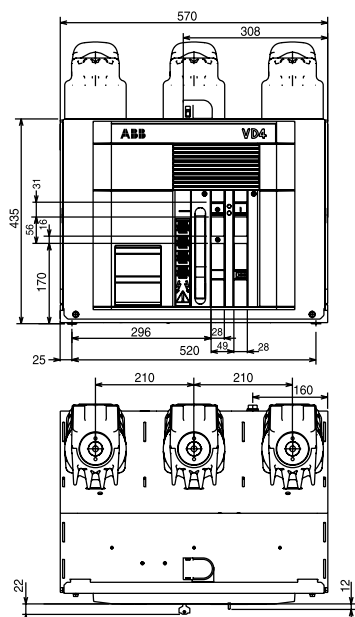
VD4

TN	7407
Ur	12 kV
	17.5 kV
I _r	1600 A
I _{sc}	25 kA
	31.5 kA

VD4

TN	7407
Ur	12 kV
	17.5 kV
I _r	2000 A
I _{sc}	25 kA
	31.5 kA
	40 kA

(*) Interchangeability of fixing points with previous series
P210 345x520
P275 345x650

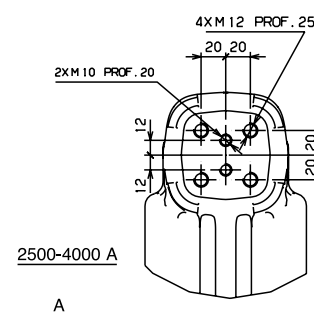
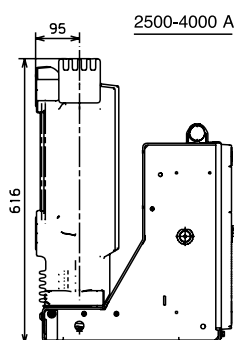
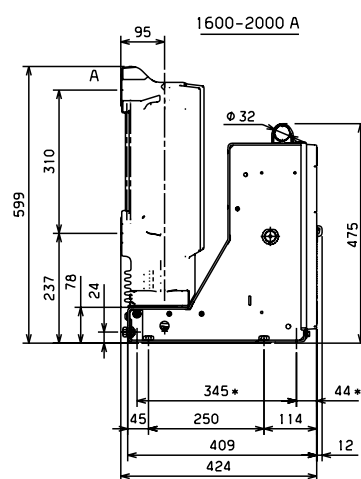
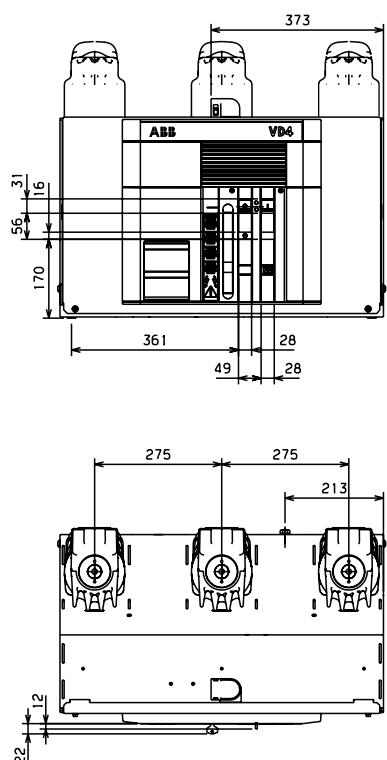
**VD4**

TN	7408
Ur	12 kV
	17.5 kV
I _r	1600 A
I _{sc}	25 kA
	31.5 kA

VD4

TN	7408
Ur	12 kV
	17.5 kV
I _r	2000 A
	2500 A
	3150 A
	4000 ¹⁾ A
I _{sc}	25 kA
	31.5 kA
	40 kA

1) with forced ventilation.
(*) Interchangeability of fixing points with previous series
P210 345x520
P275 345x650



Fixed circuit-breakers**VD4**

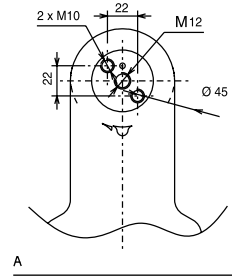
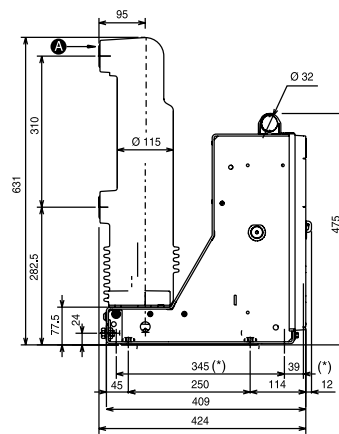
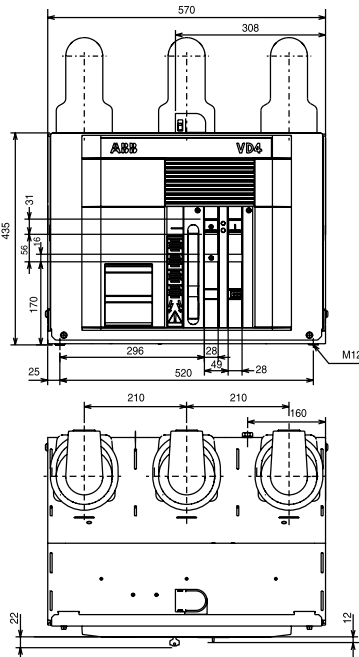
TN	7409
Ur	24 kV
Ir	630 A
	1250 A
Isc	20 kA
	25 kA

1) with forced ventilation.

(*) Interchangeability of fixing points with previous series

P210 345x520

P275 345x650

**VD4**

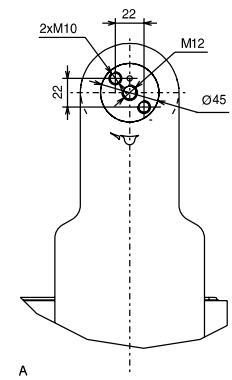
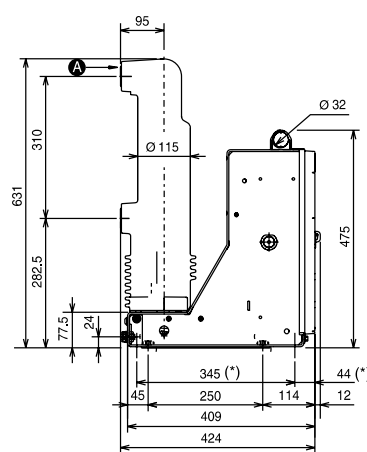
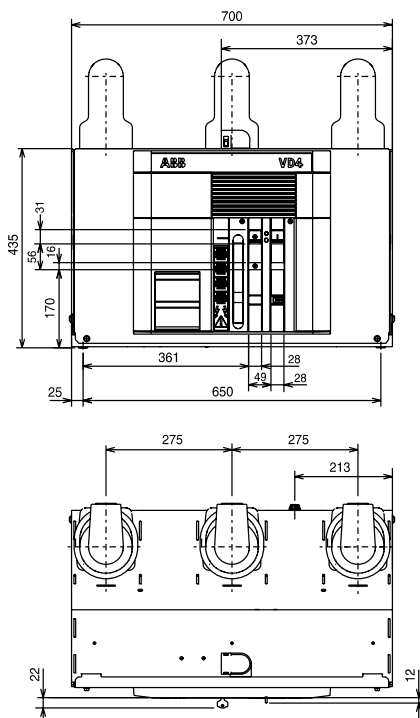
TN	7410
Ur	24 kV
Ir	630 A
	1250 A
Isc	20 kA
	25 kA

1) with forced ventilation.

(*) Interchangeability of fixing points with previous series

P210 345x520

P275 345x650



Fixed circuit-breakers

VD4

1YHT340018R0105

Ur 24 kV

Ir 630 A

1250 A

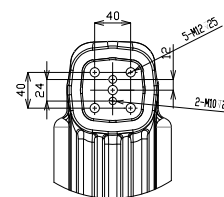
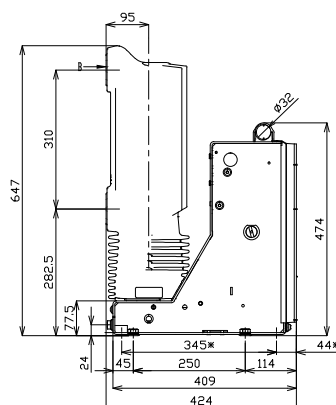
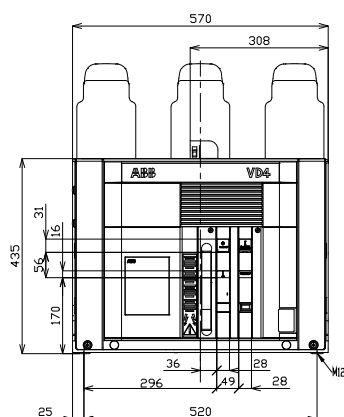
Isc 31.5 kA

1) with forced ventilation.

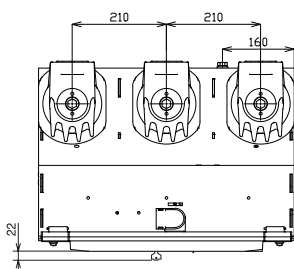
(*) Interchangeability of
fixing points with
previous series

P210 345x520

P275 345x650



B 2 : 5



VD4

1YHT340018R0106

Ur 24 kV

Ir 630 A

1250 A

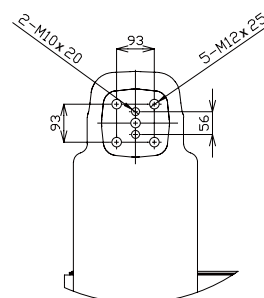
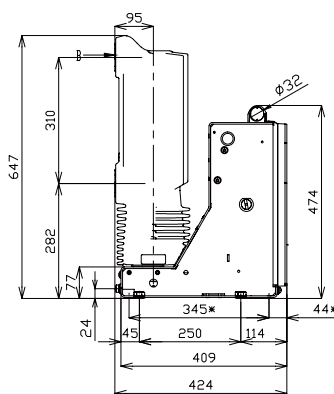
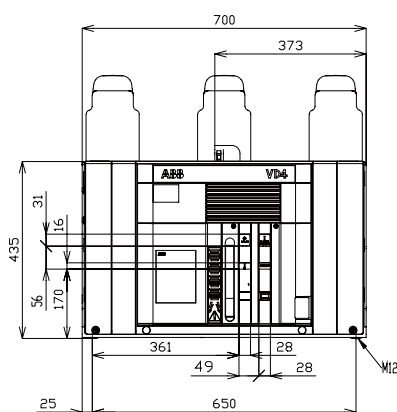
Isc 31.5 kA

1) with forced ventilation.

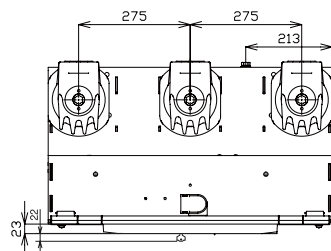
(*) Interchangeability of
fixing points with
previous series

P210 345x520

P275 345x650



B 1 : 3



Fixed circuit-breakers**VD4**

TN	7411
Ur	24 kV
Ir	1600 A
	2000 A
Isc	20 kA
	25 kA

VD4

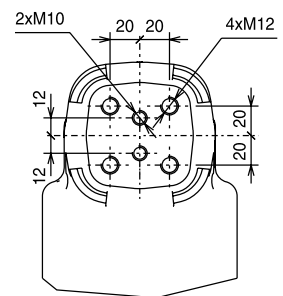
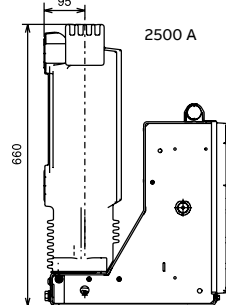
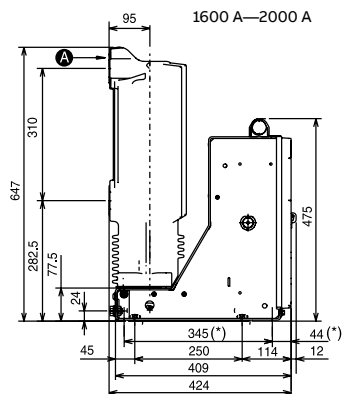
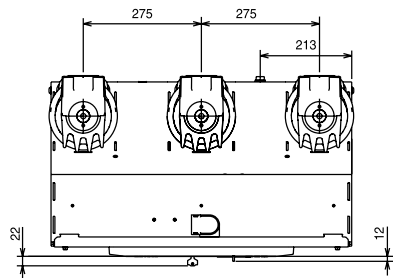
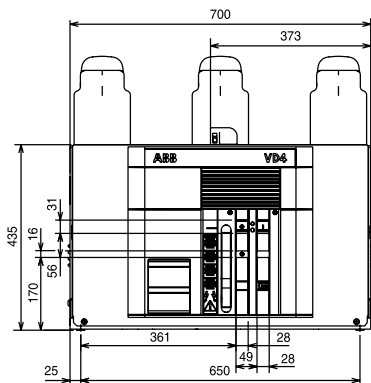
TN	7411
Ur	24 kV
Ir	2500 A
Isc	25 kA

1) with forced ventilation.

(*) Interchangeability of fixing points with previous series

P210 345x520

P275 345x650



A

VD4**1YHT340018R0107**

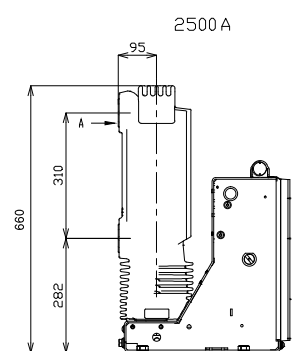
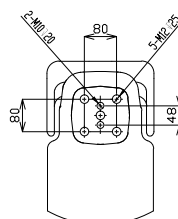
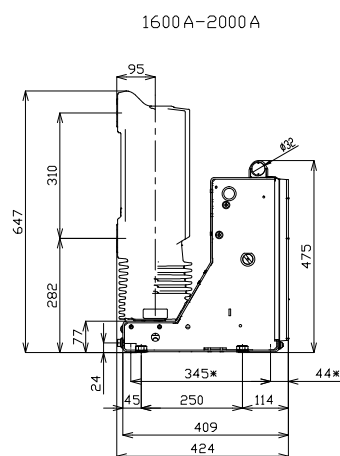
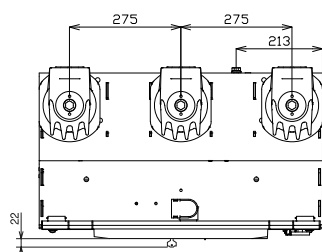
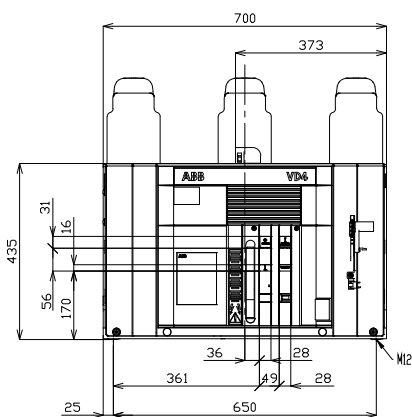
Ur	24 kV
Ir	1600 A
	2000 A
	2500 A
Isc	31.5 kA

1) with forced ventilation.

(*) Interchangeability of fixing points with previous series

P210 345x520

P275 345x650



Fixed circuit-breakers

VD4

1YHT340018R0108

Ur 24 kV

Ir 3150 A

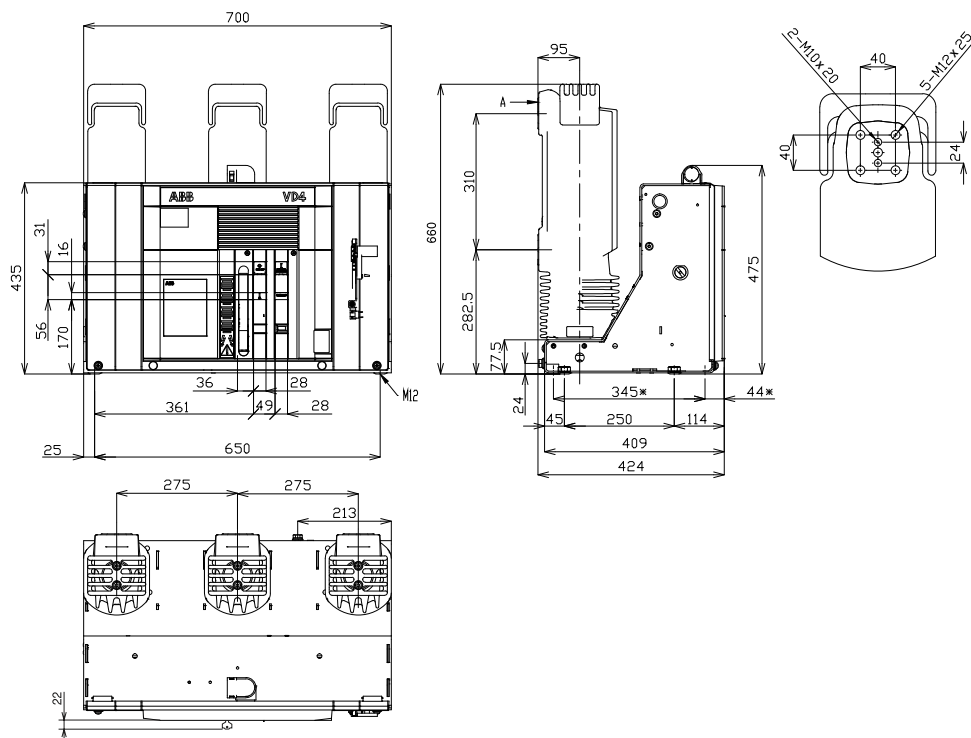
Isc 31.5 kA

1) with forced ventilation.

(*) Interchangeability of
fixing points with
previous series

P210 345x520

P275 345x650

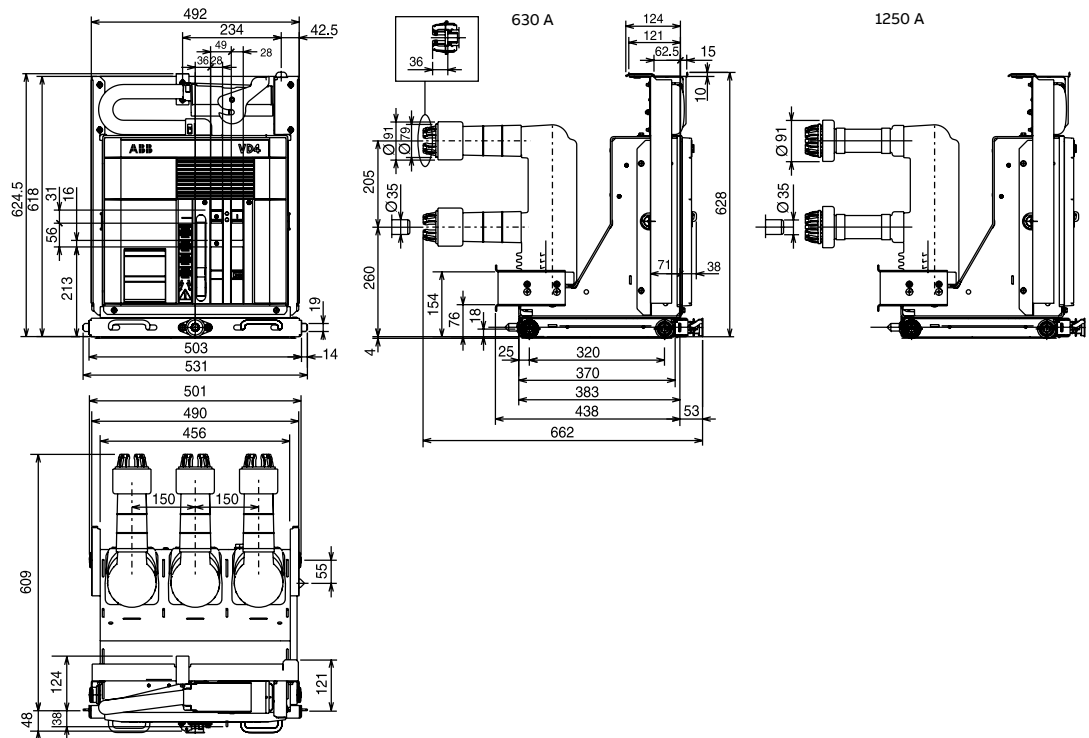


Withdrawable circuit-breakers**VD4/P, VD4/Z**

TN	7412
Ur	12 kV
Ir	630 A
	1250 A
Isc	25 kA
	31.5 kA

VD4/P, VD4/Z

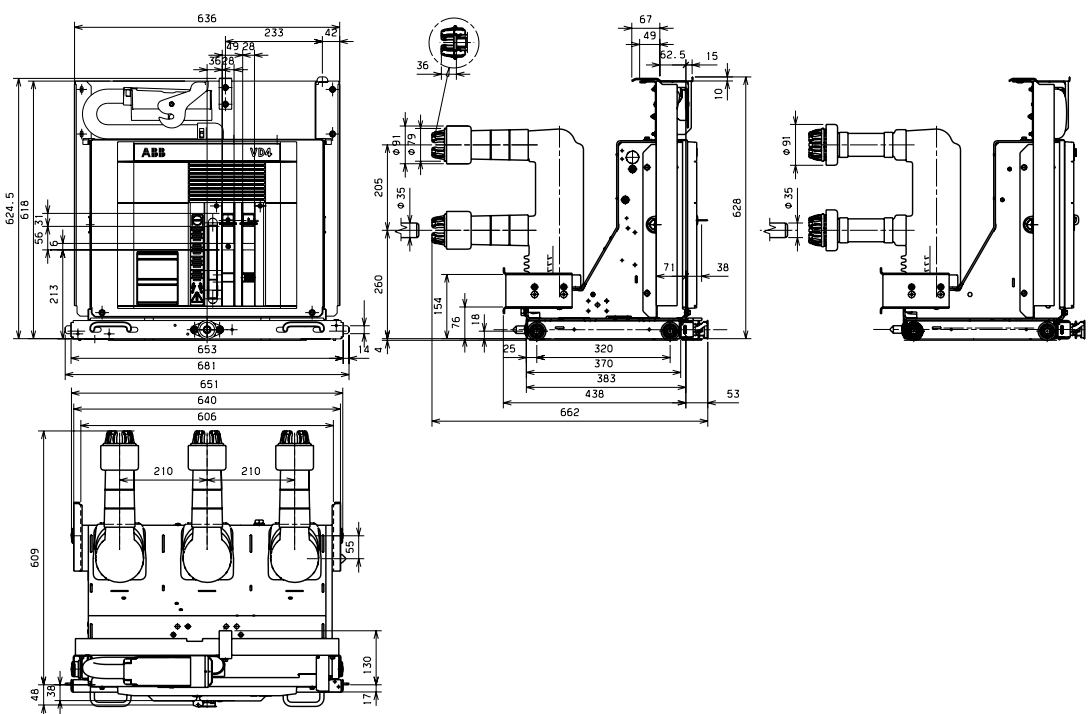
TN	7412
Ur	17.5 kV
Ir	630 A
	1250 A
Isc	25 kA
	31.5 kA

**VD4/P, VD4/Z**

TN	1VCD000061
Ur	12 kV
Ir	630 A
	1250 A
Isc	25 kA
	31.5 kA

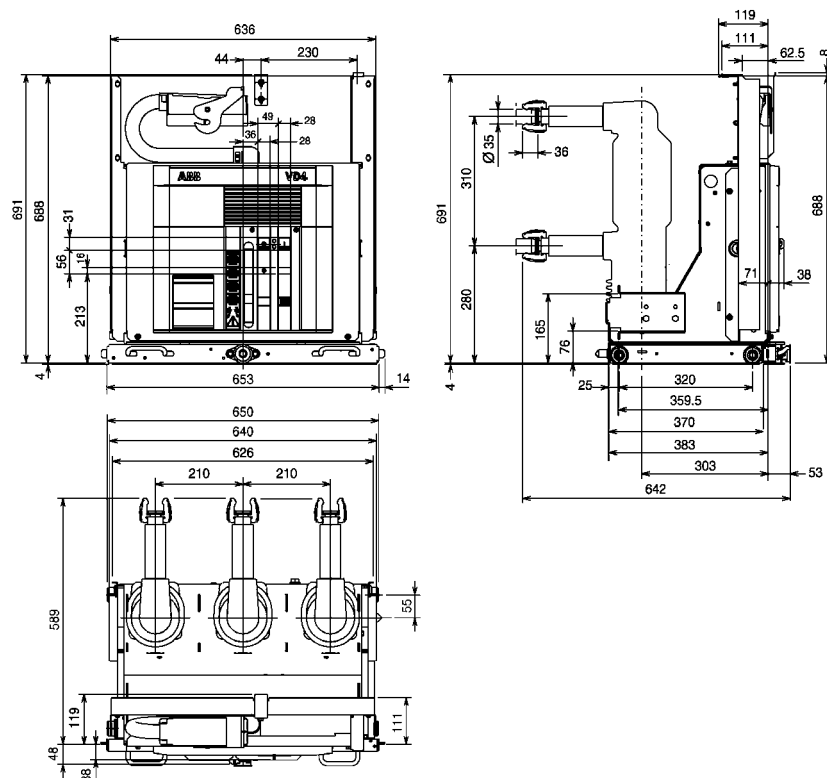
VD4/P, VD4/Z

TN	1VCD000061
Ur	17.5 kV
Ir	630 A
	1250 A
Isc	25 kA
	31.5 kA

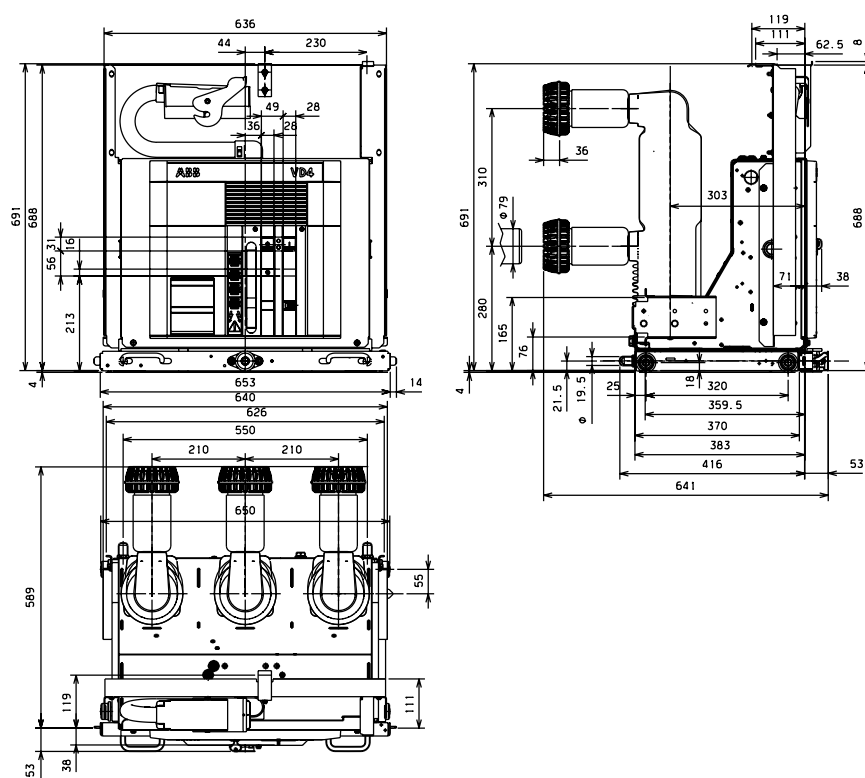


Withdrawable circuit-breakers**VD4/P, VD4/W**

TN	7420
Ur	12 kV
	17.5 kV
I _r	1250 A
I _{sc}	40 kA

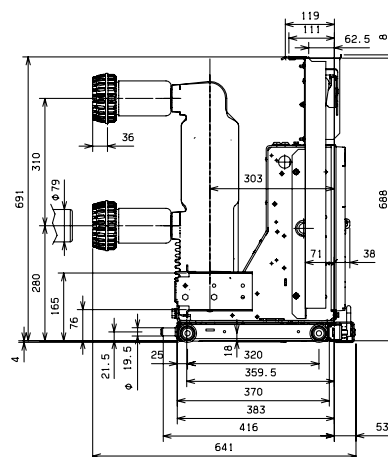
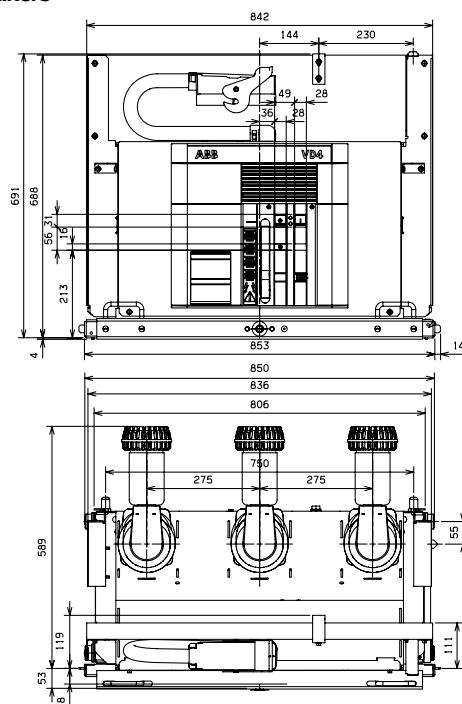
**VD4/P, VD4/Z**

TN	3284
Ur	12 kV
	17.5 kV
I _r	1600 A
I _{sc}	40 kA



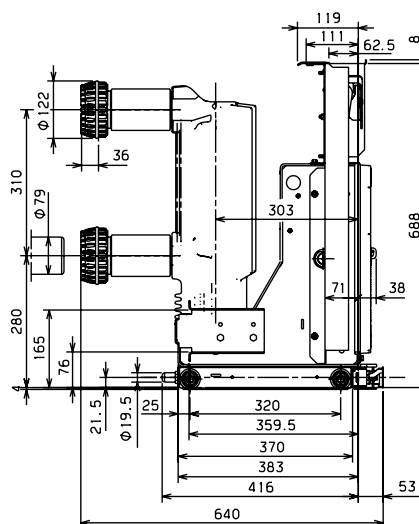
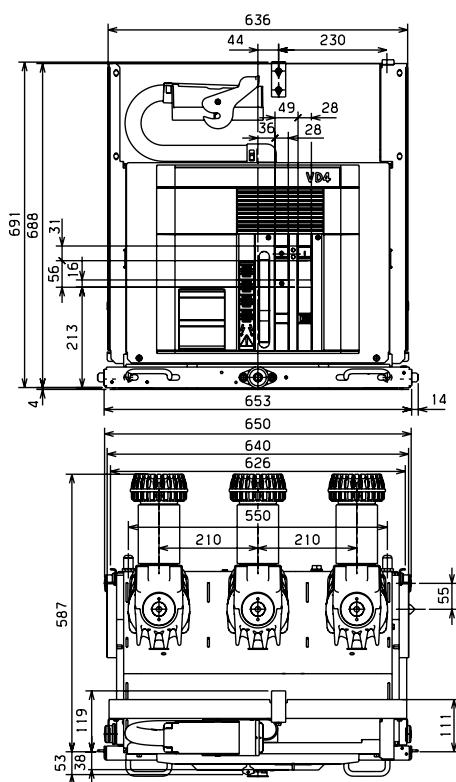
VD4/P, VD4/Z

TN	3286
Ur	12 kV
	17.5 kV
Ir	1250 A
	1600 A
Isc	40 kA



VD4/P, VD4/Z	
TN	7415
Ur	12 kV
	17.5 kV
Ir	1600 A
Isc	25 kA
	31.5 kA
	40 kA

VD4/P, VD4/Z	
TN	7415
Ur	12 kV
	17.5 kV
Ir	2000 A
Isc	25 kA
	31.5 kA
	40 kA

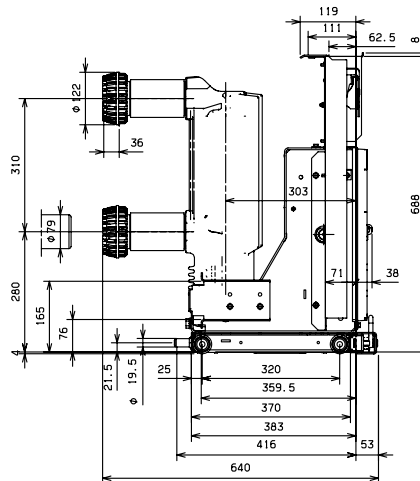
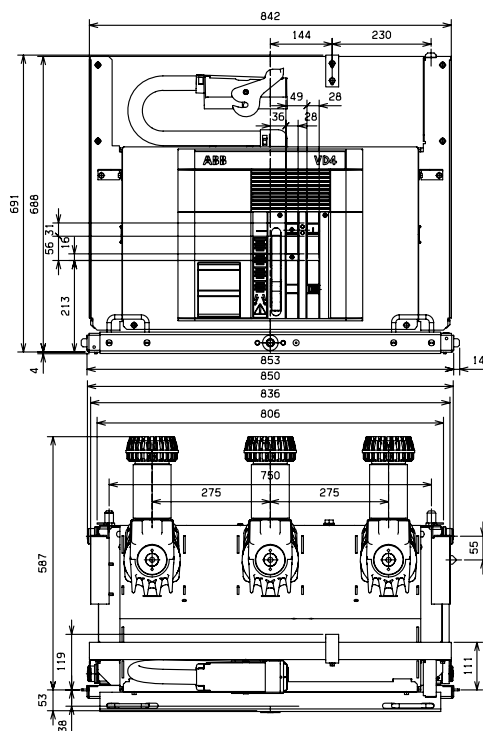


Withdrawable circuit-breakers**VD4/P, VD4/Z**

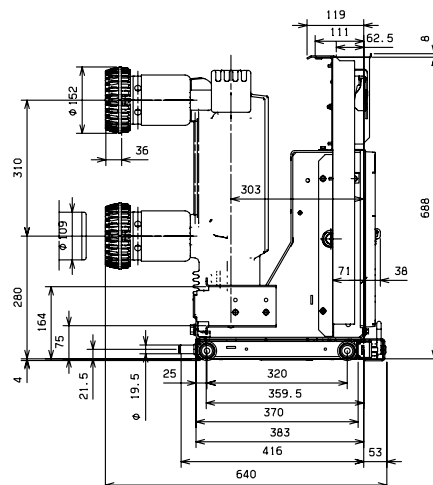
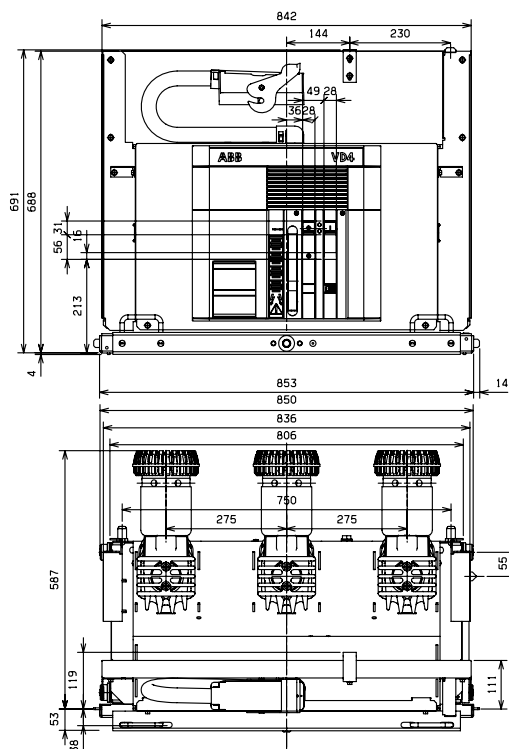
TN	7416
Ur	12 kV
	17.5 kV
Ir	1600 A
Isc	25 kA
	31.5 kA

VD4/P, VD4/Z

TN	7416
Ur	12 kV
	17.5 kV
Ir	2000 A
Isc	25 kA
	31.5 kA
	40 kA

**VD4/P, VD4/Z**

TN	7417
Ur	12 kV
	17.5 kV
Ir	2500 A
Isc	25 kA
	31.5 kA
	40 kA

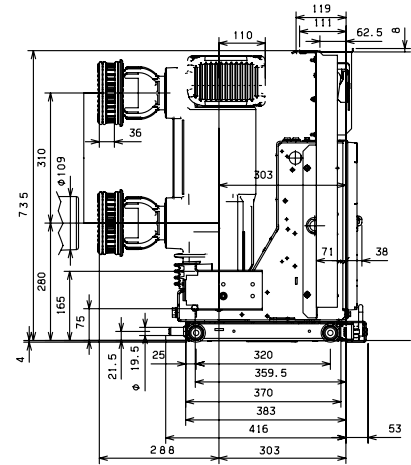
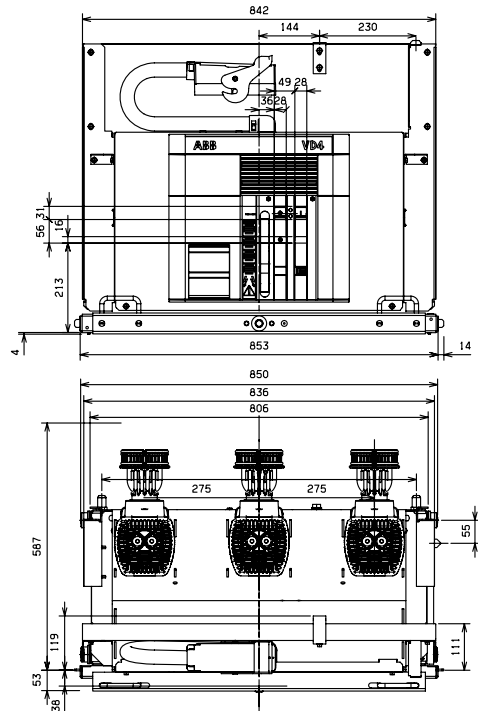


Withdrawable circuit-breakers**VD4/P, VD4/Z**

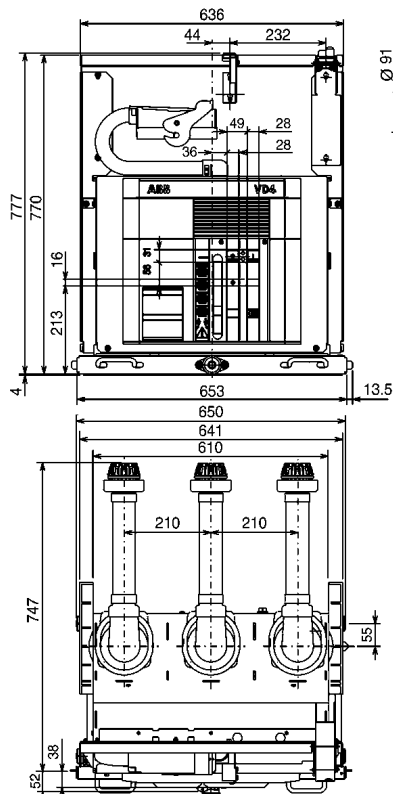
1VCD000153

Ur	12 kV
	17.5 kV
Ir	3150 A
	4000 ¹⁾ A
Isc	25 kA
	31.5 kA
	40 kA

1) with forced ventilation.

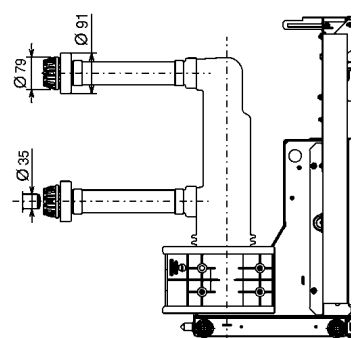
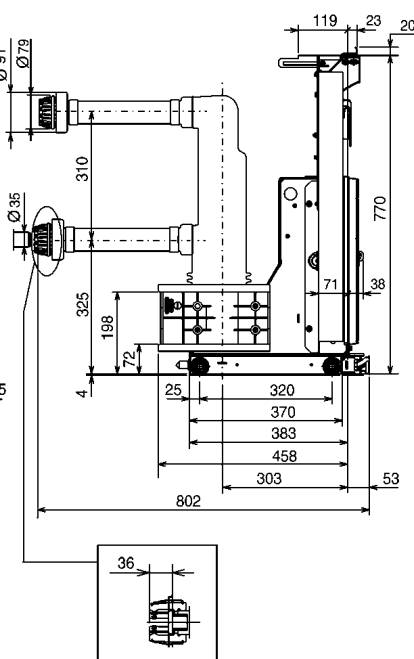
**VD4/P, VD4/Z**

TN	7413
Ur	24 kV
Ir	630 A
	1250 A
Isc	20 kA
	25 kA



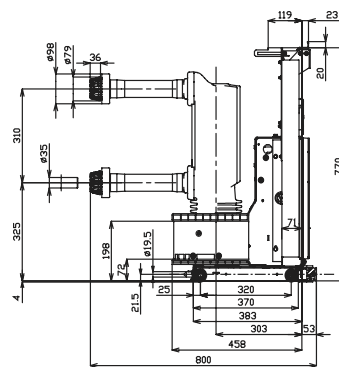
630 A

1250 A

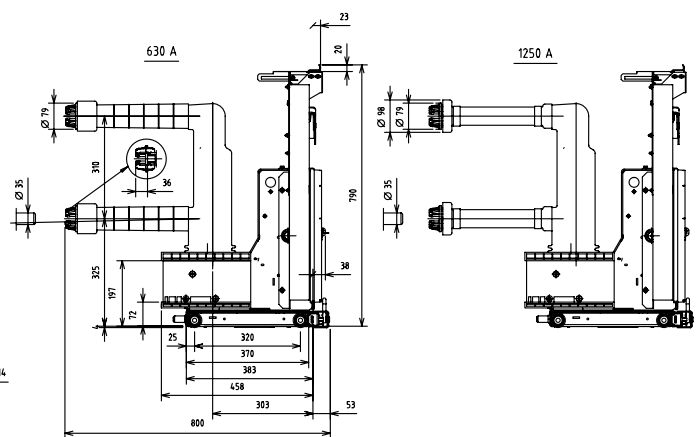
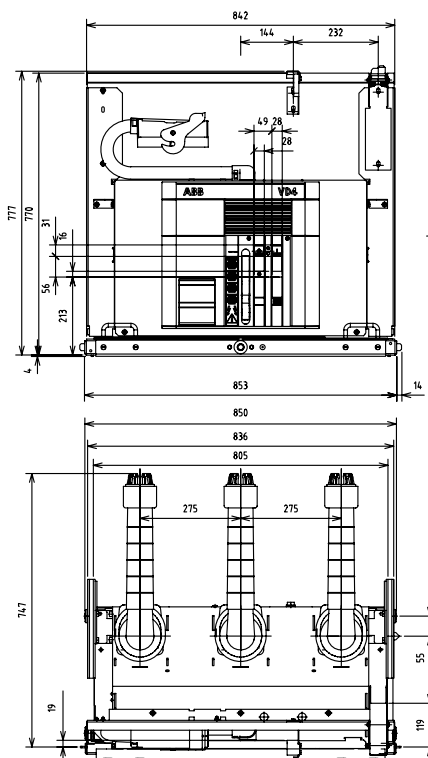


VD4/P, VD4/Z

Isc	31.5 kA
-----	---------



25 kA



Withdrawable circuit-breakers**VD4/P, VD4/Z**

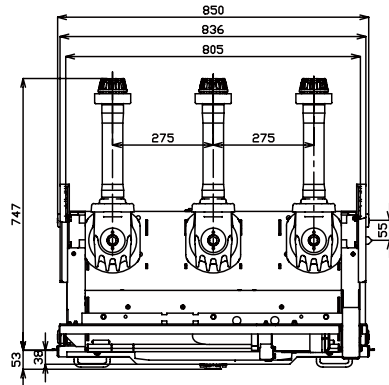
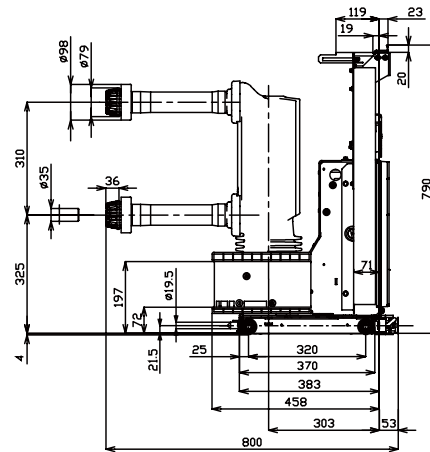
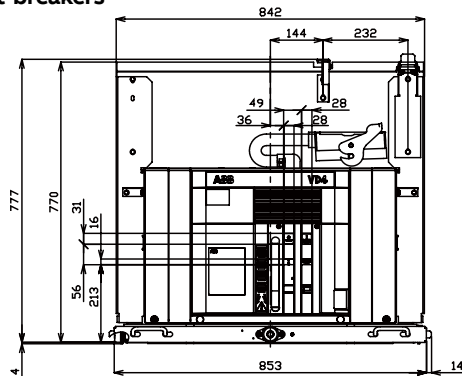
1YHT340018R0102

Ur 24 kV

Ir 630 A

1250 A

Isc 31.5 kA

**VD4/P, VD4/Z**

TN 7418

Ur 24 kV

Ir 1600 A

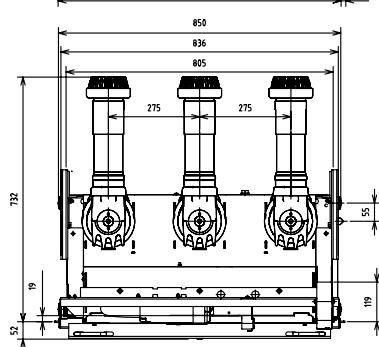
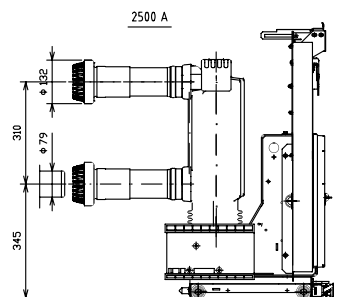
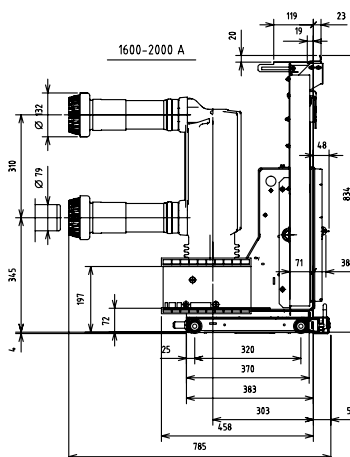
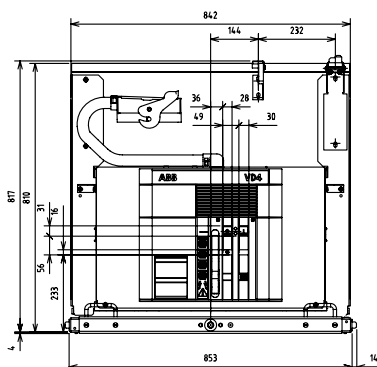
2000 A

2500¹⁾ A

Isc 20 kA

25 kA

1) with forced ventilation.

**Withdrawable
circuit-breakers****VD4/P, VD4/Z**

TN 7418

Ur 24 kV

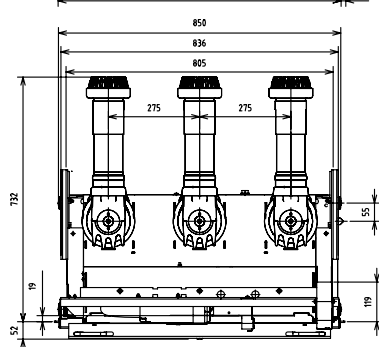
Ir 1600 A

2000 A

2500¹⁾ A

Isc 31.5 kA

1) with forced ventilation.



Withdrawable circuit-breakers

VD4/P, VD4/Z

1YHT340018R0104

Ur 24 kV

Ir 3150 A

Isc 25 kA

31.5 kA

1) with forced ventilation.

VD4/P, VD4/Z

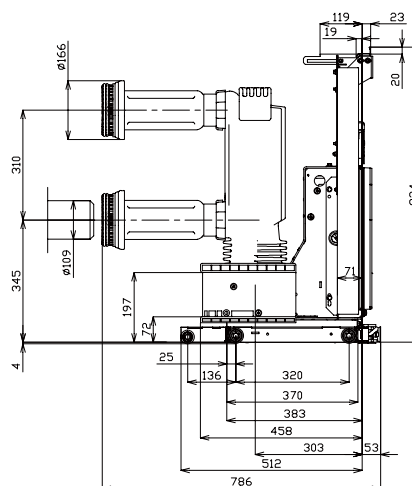
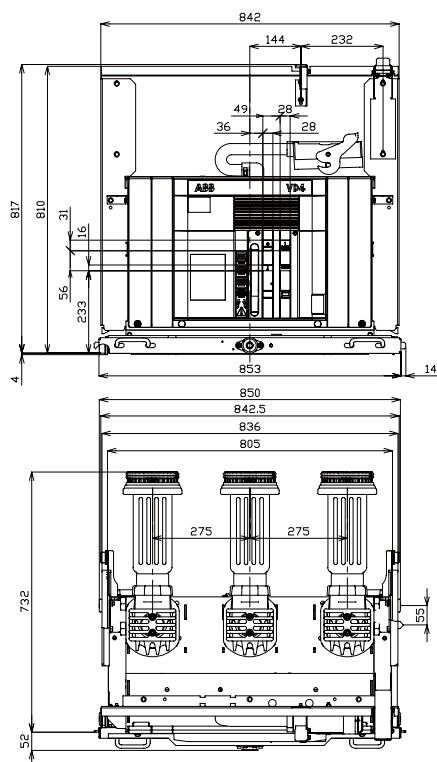
1YHT340018R0104

Ur 24 kV

Ir 2500 A

Isc 31.5 kA

1) with natural cooling



Electrical circuit diagram

Fixed VD4 Circuit Breaker Electrical Schematic Table

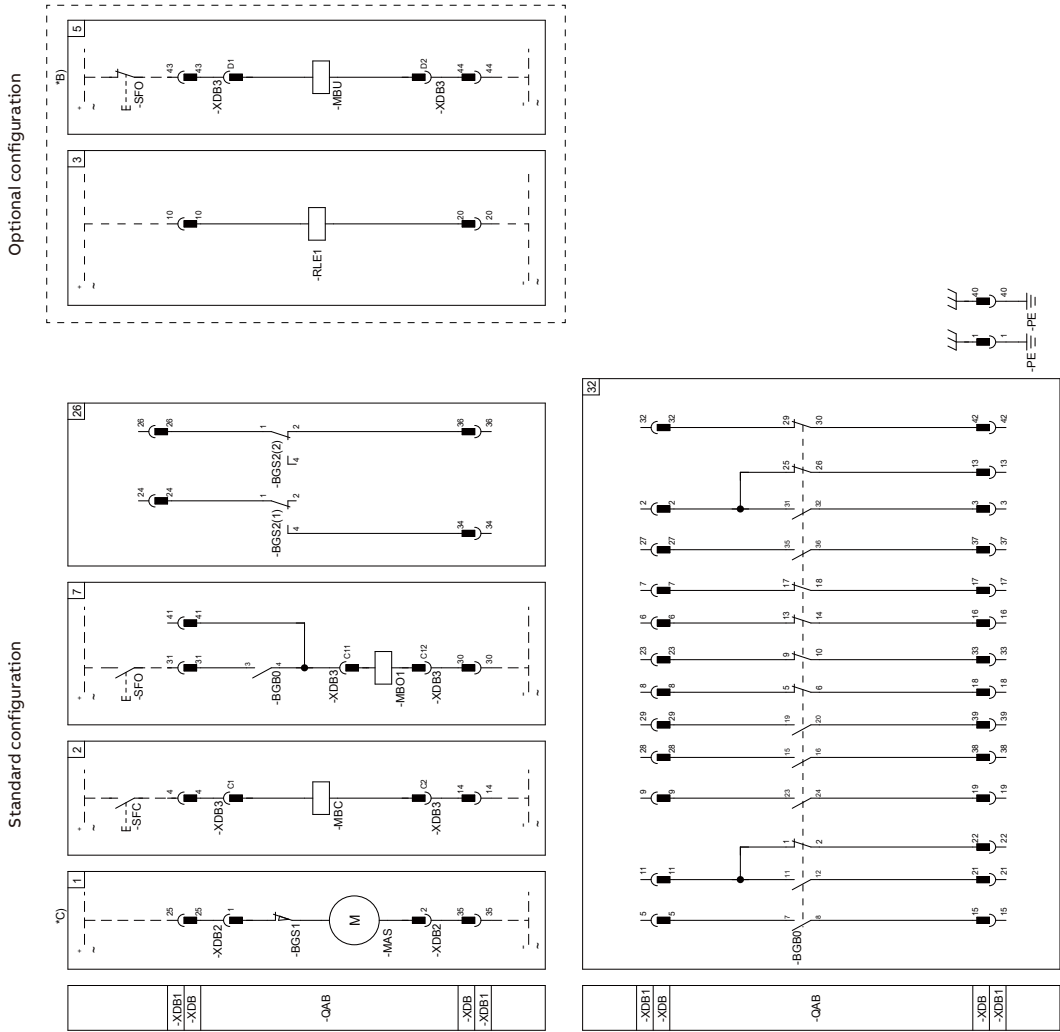
Note: The electrical schematic diagrams in the manual are common configurations. For other configurations, please consult ABB.

Auxiliary contacts	Closing spring charging motor	Shunt closing release	First shunt opening release	Locking magnet	Under-voltage release	Second shunt opening release	Opening solenoid for release MBO3	Drawing
BGB0	MAS	MBC	MBO1	RLE1	MBU	MBO2	■	
5NC&5NO	■	■	■	■	■	■	-	1YHT340337D0001
	■	■	■	■	■	■	■	
	■	■	■	■	■	-	■	
	■	■	■	■	-	■	-	
	■	■	■	■	■	-	-	
	■	■	■	■	-	■	■	
	■	■	■	■	-	-	-	
	■	■	■	■	-	-	■	
	■	■	■	-	■	■	-	
	■	■	■	-	■	■	■	
	■	■	■	-	■	-	■	
	■	■	■	-	-	■	-	
	■	■	■	-	■	-	-	
	■	■	■	-	-	■	■	
	■	■	■	-	-	-	-	
	■	■	■	-	-	-	-	
7NC&7NO	■	■	■	■	■	-	-	1YHT340338D0001
	■	■	■	■	-	-	-	
	■	■	■	-	■	-	-	
	■	■	■	-	-	-	-	
8NC&8NO	■	■	■	■	-	-	-	1YHD000000A1658
	■	■	■	-	-	-	-	

Diagrams for fixed circuit breaker 7NC-7NO

VD4	
Drawing	1YHT340337D0001
Configuration	7NC-7NO+RLE1+MBU

Note: The electrical schematic diagrams in the manual are common configurations. For other configurations, please consult ABB.

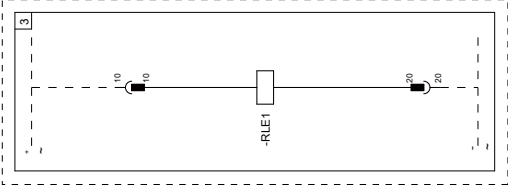


Diagrams for fixed circuit breaker 8NC-8NO

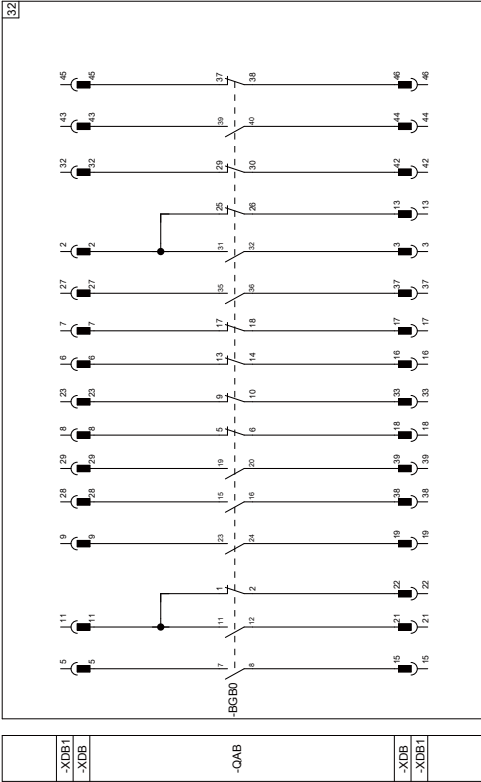
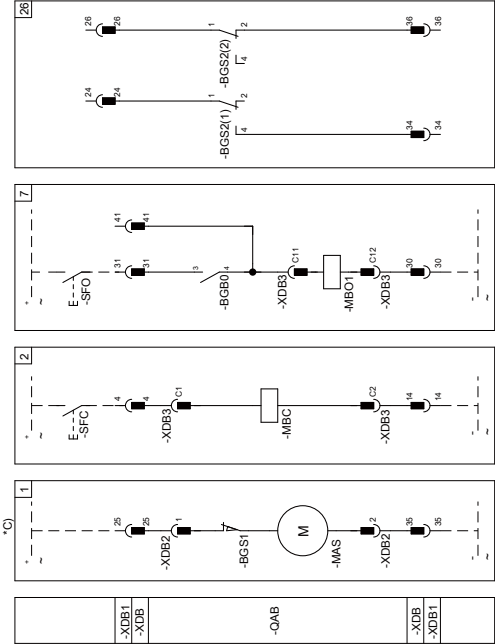
VD4	
Drawing	1YHD000000A1658
Configuration	8NC-8NO+RLE1

Note: The electrical schematic diagrams in the manual are common configurations. For other configurations, please consult ABB.

Optional configuration



Standard configuration



State of circuit breaker

The diagram indicates the following conditions:

- circuit-breaker open and racked-in
- circuits de-energized
- closing springs discharged

Caption

- =Number of diagram figure
- * =See note indicated by the letter
- QAB =Circuit-breaker applications
- MAS =Closing spring charging motor (see note C)
- BGB0 =Circuit-breaker auxiliary contacts
- BGS1 =Spring charging motor limit contact
- BGS2 =Contact for signalling closing springs charged/discharged
- SFC =Pushbutton or contact for circuit- breaker closing
- SFO =Pushbutton or contact for circuit- breaker opening
- XDB =Connector of the circuit-breaker circuits
- XDB2...11 =Application connectors
- XDB1 =Terminal box in the switchgear (outside the circuit breaker)
- RLE1 =Locking magnet. When de-energised it mechanically prevents circuit-breaker closing.
- MBC =Shunt closing release
- MBO1 =First shunt opening release
- MBO2 =Second shunt opening release
- MBO3 =Opening solenoid, triggered by specific release REJ603 outside the circuit-breaker
- MBU =Under-voltage release (see note B)

Description of figures

- Fig. 1 =Closing spring charging motor circuit (see note C)
- Fig. 2 =Shunt closing release (anti-pumping is carried out mechanically)
- Fig. 3 =Locking magnet. When de-energised it mechanically prevents circuit- breaker closing.
- Fig. 5 =Instantaneous undervoltage release (see note B)
- Fig. 7 =First shunt opening release circuit with possibility of continuous control of the winding
- Fig. 8 =Locking magnet. The mechanism locked when de-energized to prevent the rack-in/out operation of circuit breaker.
- Fig. 9 =Second shunt opening release circuit with possibility of continuous control of the winding
- Fig. 10 =Opening solenoid, triggered by specific release outside the circuit-breaker (see note I)
- Fig. 26 =Electrical signalling for closing spring charged and discharged
- Fig. 32 =Circuit-breaker auxiliary contacts

Standard configuration

- Fig. 1 -MAS Closing spring charging motor
- Fig. 2 -MBC Shunt closing release
- Fig. 7 -MBO1 First shunt opening release
- Fig. 26 -BGS2 Contact for signalling closing springs charged/discharged
- Fig. 32 -BGB0 Circuit-breaker auxiliary contacts

Optional configuration

- Fig. 3 -RLE1 Locking magnet
- Fig. 5 -MBU Under-voltage release
- Fig. 9 -MBO2 Second shunt opening release
- Fig. 10 -MBO3 Opening solenoid for release outside the circuit-breaker

Notes

A) The circuit-breaker is only fitted with the accessories specified in the order confirmation. To make out the order, please consult the catalogue of the apparatus. In any case, considering the possibility of different configuration of the circuit breaker, or the circuit breaker itself might be updated, the actual control circuit might be updated.

B) The undervoltage release can be supplied for power supply with voltage branched on the supply side of the circuit-breaker or from an independent source. Circuit-breaker closing is only allowed with the release energised (the lock on closing is made mechanically). Should there be the same power supply for the shunt closing and undervoltage releases and automatic circuitbreaker closing on return of the auxiliary voltage is required, it is necessary to introduce a delay of 50 ms between the moment of undervoltage release consent and energisation of the shunt closing release.

C) Check the power available in the auxiliary circuit to verify the possibility of starting several motors at the same time to recharge the closing springs. To prevent excessive absorption, the springs must be charged manually before energising the auxiliary circuit.

 Withdrawable VD4 Circuit Breaker Electrical Schematic Table

Note: The electrical schematic diagrams in the manual are common configurations. For other configurations, please consult ABB.

Auxiliary contacts	Closing spring charging motor	Shunt closing release	First shunt opening release	Locking magnet	Under-voltage release	Second shunt opening release	Opening solenoid for release	Locking magnet	Truck driving motor	Drawing
BGB0	MAS	MBC	MBO1	RLE1	MBU	MBO2	MBO3	RLE2	MAT	
5NC&5NO	■	■	■	■	■	■	-	■	■	1YHD000000A3788
	■	■	■	■	■	-	-	■	■	
	■	■	■	■	■	■	-	-	■	
	■	■	■	■	-	■	-	■	■	
	■	■	■	■	■	-	-	-	■	
	■	■	■	■	-	-	-	■	■	
	■	■	■	■	-	■	-	-	■	
	■	■	■	■	-	-	-	-	■	
	■	■	■	■	■	■	-	■	-	
	■	■	■	■	■	-	-	■	-	
	■	■	■	■	■	■	-	-	-	
	■	■	■	■	-	■	-	■	-	
	■	■	■	■	■	-	-	-	-	
	■	■	■	■	-	-	-	■	-	
	■	■	■	■	-	■	-	-	-	
	■	■	■	■	■	■	■	■	-	
	■	■	■	■	■	-	■	■	-	
	■	■	■	■	■	■	■	-	-	
	■	■	■	■	-	■	■	■	-	
	■	■	■	■	■	-	■	-	-	
	■	■	■	■	-	■	■	-	-	
	■	■	■	■	-	■	■	-	-	
	■	■	■	■	-	-	■	-	-	
	■	■	■	■	-	-	■	-	-	
7NC&7NO	■	■	■	■	■	-	-	■	-	1YHT340336D0001
	■	■	■	■	■	-	-	-	-	
	■	■	■	■	-	-	-	■	-	
	■	■	■	■	-	-	-	-	-	
	■	■	■	■	■	-	■	-	-	1YHD000000A3789
	■	■	■	■	-	-	■	-	-	
	■	■	■	■	■	-	-	-	■	1YHD000000A3170
	■	■	■	■	-	-	-	■	■	
	■	■	■	■	-	-	-	-	■	1YHD000000A3790
	■	■	■	■	-	■	-	-	-	
8NC&8NO	■	■	■	■	-	-	-	-	-	1YHD000000A1631
10NC+10NO	■	■	■	■	-	-	-	■	-	1YHT340340D0001
	■	■	■	■	-	-	-	-	-	
	■	■	■	■	-	-	■	-	-	1YHD000000A3791
	■	■	■	■	-	-	-	-	■	

VD4/P, VD4/Z

Configuration	5NC-5NO+MBU+RLE2+MBO2+MBO3+MAT (Choose between MBO3 and MAT.)
---------------	---

Standard configuration

Optional configuration

Choose one

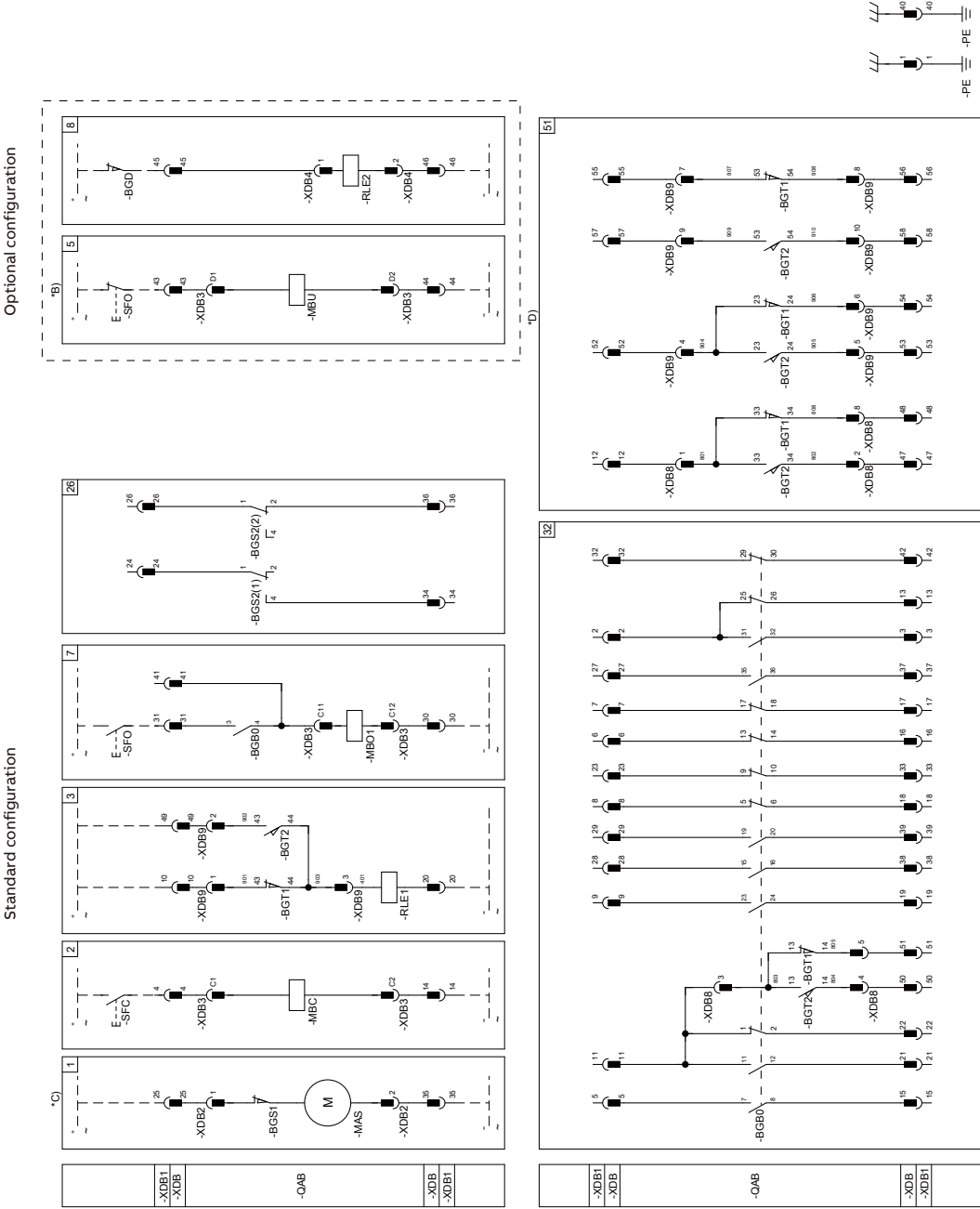
Diagrams for withdrawable circuit breaker 7NC-7NO (1)

VD4/P, VD4/Z	
Drawing	1YHT340336D0001
Configuration	7NC-7NO+MBU+RLE2

Note: The electrical schematic diagrams in the manual are common configurations. For other configurations, please consult ABB.

Noted: This drawing only applies to below configuration.

- 7NC-7NO
- 7NC-7NO+MBU+RLE2
- 7NC-7NO+MBU
- 7NC-7NO+RLE2



VD4/P, VD4/Z

Drawing 1YHD000000A3789

Configuration	7NC-7NO+MBU+MBO3+MAT (Choose between MBO3 and MAT.)
---------------	--

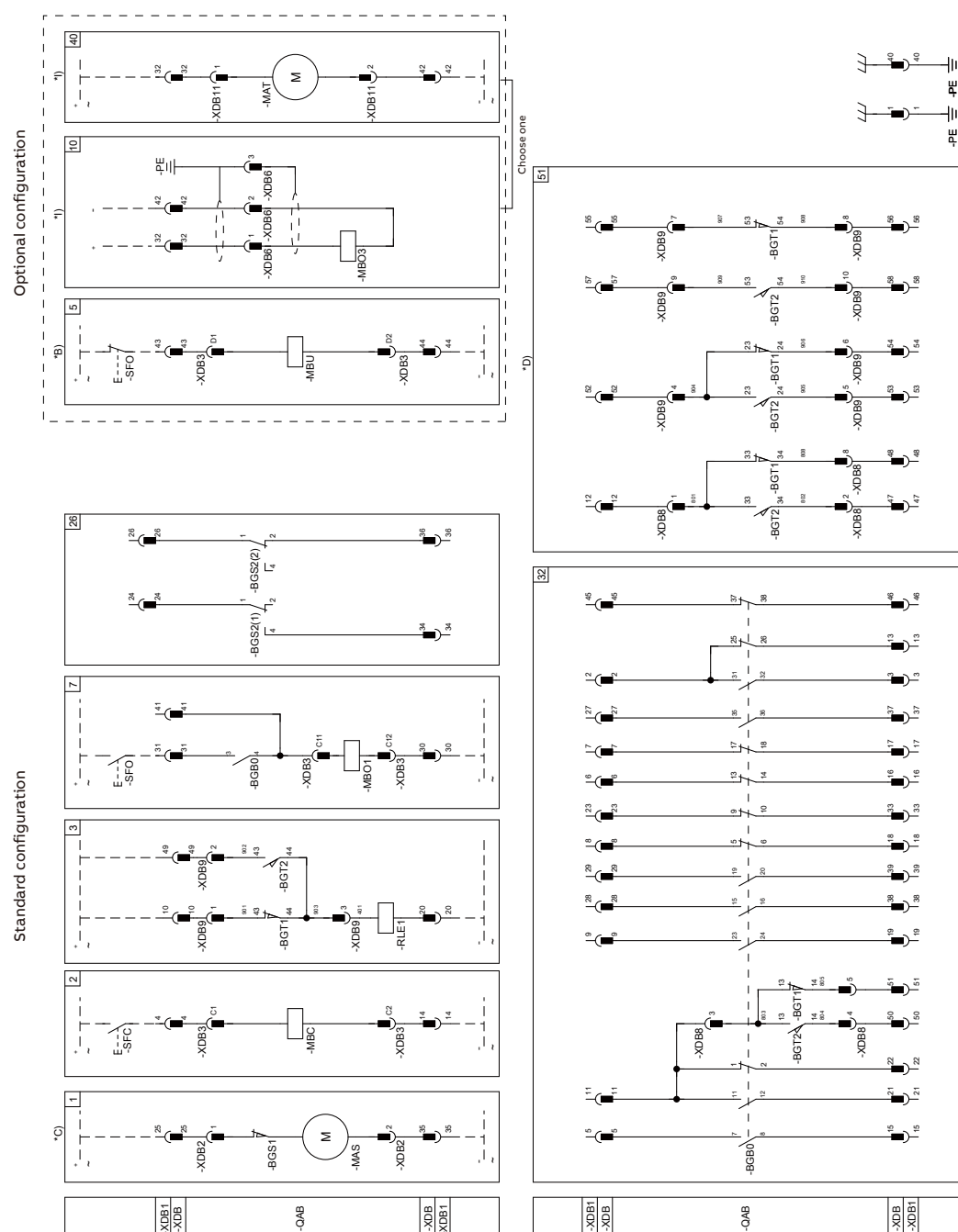
Note: The electrical schematic diagrams in the manual are common configurations. For other configurations, please consult ABB.

Noted: This drawing only applies to below configuration.

7NC-7NO+MBU+MBO3

$$7\text{NC} - 7\text{NO} + \text{MBO}_3$$

7NC-7NO+MBU+MAT



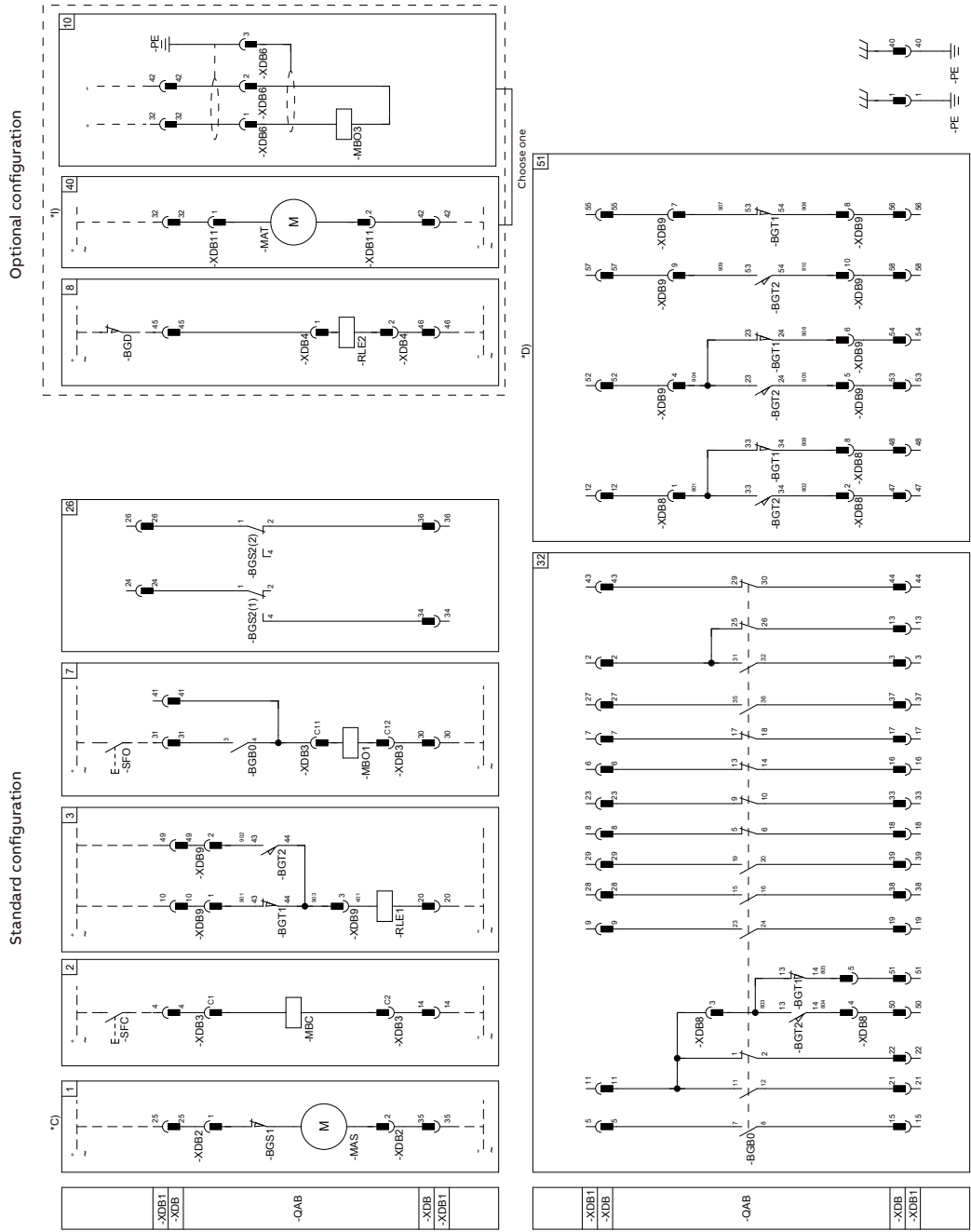
Diagrams for withdrawable circuit breaker 7NC-7NO (4)

VD4/P, VD4/Z	
Drawing	1YHD000000A3790
Configuration	7NC-7NO+RLE2+MBO3+MAT (Choose between MBO3 and MAT.)

Note: The electrical schematic diagrams in the manual are common configurations. For other configurations, please consult ABB.

Noted: This drawing only applies to below configuration.

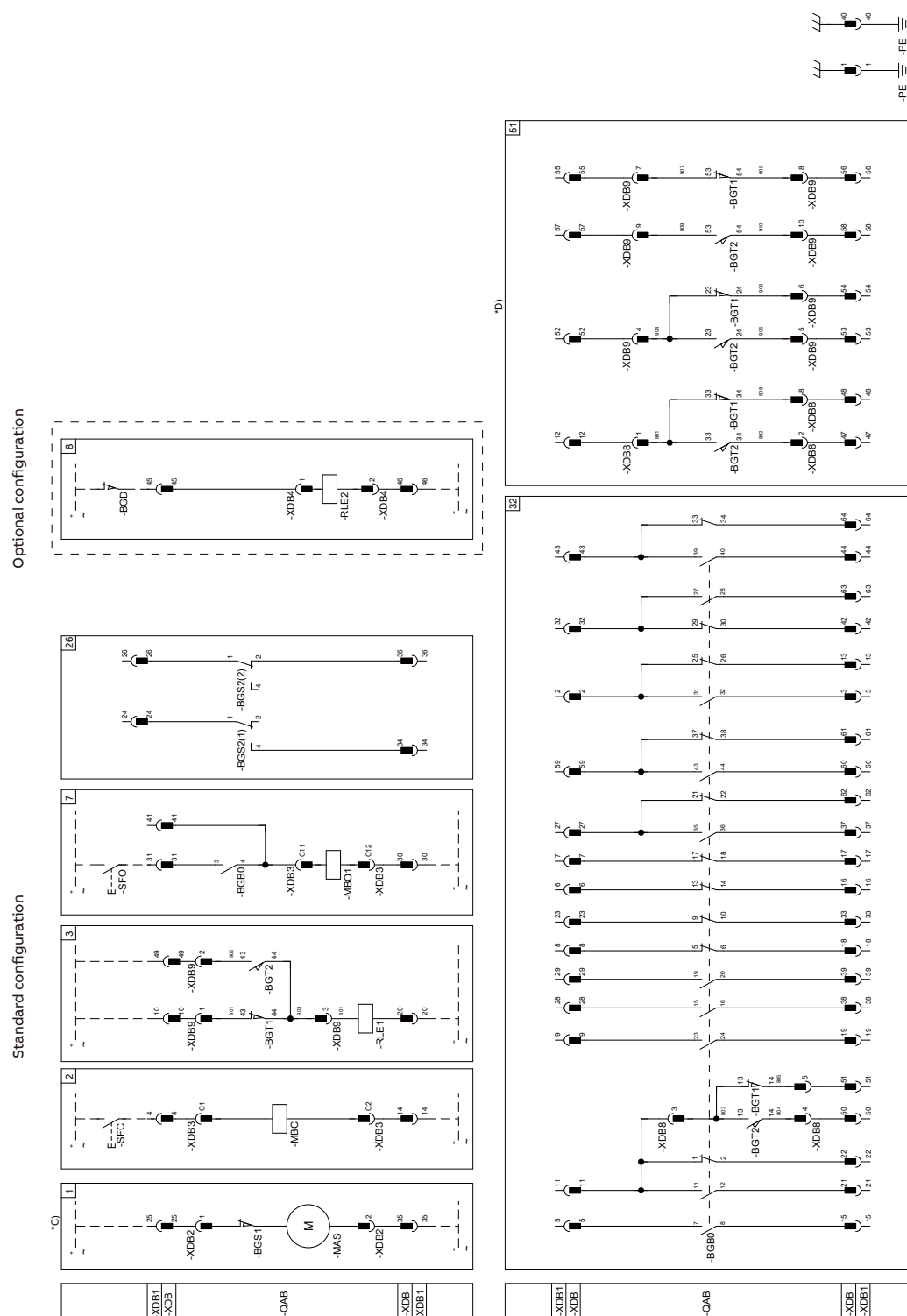
- 7NC-7NO+RLE2+MBO3
- 7NC-7NO+MAT
- 7NC-7NO+RLE2+MAT



VD4/P, VD4/Z

Drawing	1YHT340340D0001
Configuration	10NC-10NO+RLE2

Noted: This drawing only applies to below configuration.
10NC-10NO+RLE2
10NC-10NO

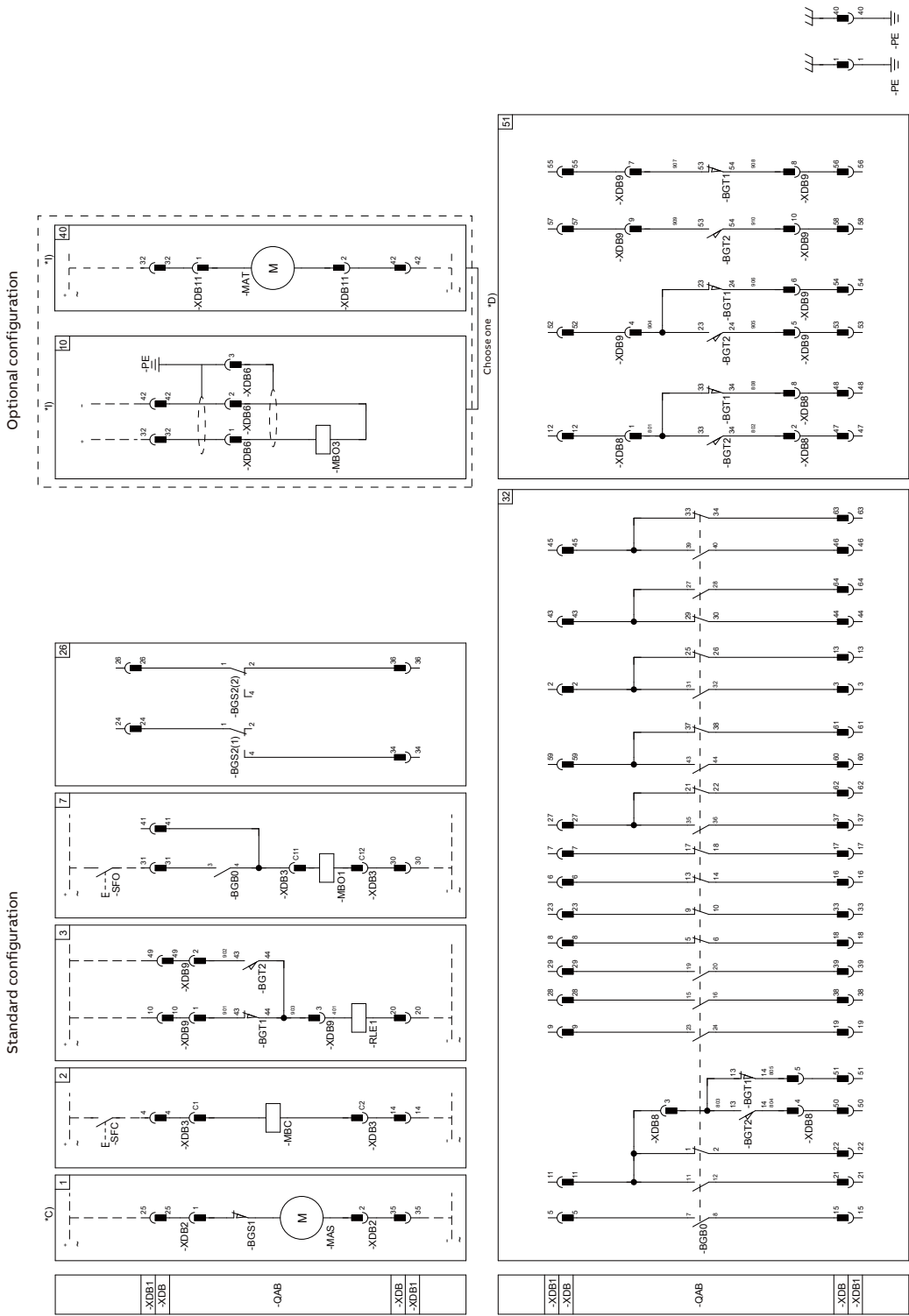


Diagrams for withdrawable circuit breaker 10NC-10NO (2)

VD4/P, VD4/Z	
Drawing	1YHD000000A3791
Configuration	10NC-10NO+MBO3+MAT (Choose between MBO3 and MAT.)

Note: The electrical schematic diagrams in the manual are common configurations. For other configurations, please consult ABB.

Noted: This drawing only applies to below configuration.
10NC-10NO+MBO3
10NC-10NO+MAT



State of circuit breaker

The diagram indicates the following conditions:

- circuit-breaker open and racked-in
- circuits de-energized
- closing springs discharged

Caption

- =Number of diagram figure
- * =See note indicated by the letter
- QAB =Circuit-breaker applications
- MAS =Closing spring charging motor (see note C)
- MAT =Truck driving motor. (see note I)
- BGB0 =Circuit-breaker auxiliary contacts
- BGS1 =Spring charging motor limit contact
- BGS2 =Contact for signalling closing springs charged/discharged
- BGD =Position contact of the enclosure door
- BGT2 =Contacts for electrical signalling of circuit-breaker in isolated position (see note E)
- BGT1 =Contacts for electrical signalling of circuit-breaker in racked-in position (see note E)
- SFC =Pushbutton or contact for circuit-breaker closing
- SFO =Pushbutton or contact for circuit-breaker opening
- XDB =Connector of the circuit-breaker circuits
- XDB2...11 =Application connectors
- XDB1 =Terminal box in the switchgear (outside the circuit breaker)
- RLE1 =Locking magnet. When de-energised it mechanically prevents circuit-breaker closing.
- RLE2 =Locking magnet. When de-energised it mechanically prevents circuit-breaker connection and isolation.
- MBC =Shunt closing release
- MBO1 =First shunt opening release
- MBO2 =Second shunt opening release
- MBO3 =Opening solenoid, triggered by specific release REJ603 outside the circuit-breaker
- MBU =Under-voltage release (see note B)

Description of figures

- Fig. 1 =Closing spring charging motor circuit (see note C)
- Fig. 2 =Shunt closing release (anti-pumping is carried out mechanically)
- Fig. 3 =Locking magnet. When de-energised it mechanically prevents circuit-breaker closing.
- Fig. 5 =Instantaneous undervoltage release (see note B)
- Fig. 7 =First shunt opening release circuit with possibility of continuous control of the winding
- Fig. 8 =Locking magnet. The mechanism locked when de-energized to prevent the rack-

in/out operation of circuit breaker.

- Fig. 9 =Second shunt opening release circuit with possibility of continuous control of the winding
- Fig. 10 =Opening solenoid, triggered by specific release outside the circuit-breaker (see note I)
- Fig. 26 =Electrical signalling for closing spring charged and discharged
- Fig. 40 =Electric drive circuit for truck. (see note I)
- Fig. 32 =Circuit-breaker auxiliary contacts
- Fig. 51 =Contacts for electrical signalling of circuit breaker in the racked-in and isolated positions, located on the circuit-breaker.

Incompatibility

The circuits indicated by the following figures cannot be supplied at the same time in the same circuit-breaker: 10 - 40.

Standard configuration

- Fig. 1 -MAS Closing spring charging motor
- Fig. 2 -MBC Shunt closing release
- Fig. 3 -RLE1 Locking magnet
- Fig. 7 -MBO1 First shunt opening release
- Fig. 26 -BGS2 Contact for signalling closing springs charged/discharged
- Fig. 32 -BGB0 Circuit-breaker auxiliary contacts
- Fig. 51 -BGT1, -BGT2
Contacts for signaling circuit breaker's position, racked-in or racked-out

Optional configuration

- Fig. 5 -MBU Under-voltage release
- Fig. 8 -RLE2 Locking magnet for rack-in/out operation.
- Fig. 9 -MBO2 Second shunt opening release
- Fig. 10 -MBO3 Opening solenoid
- Fig. 40 -MAT Truck driving motor

Notes

A) The circuit-breaker is only fitted with the accessories specified in the order confirmation. To make out the order, please consult the catalogue of the apparatus. In any case, considering the possibility of different configuration of the circuit breaker, or the circuit breaker itself might be updated, the actual control circuit might be updated.

B) The undervoltage release can be supplied for power supply with voltage branched on the supply side of the circuit-breaker or from an independent source. Circuit-breaker closing is only allowed with the release energised (the lock on closing is made mechanically). Should there be the same power supply for the shunt closing and undervoltage releases and automatic circuitbreaker closing on return of the auxiliary

voltage is required, it is necessary to introduce a delay of 50 ms between the moment of undervoltage release consent and energisation of the shunt closing release.

C) Check the power available in the auxiliary circuit to verify the possibility of starting several motors at the same time to recharge the closing springs. To prevent excessive absorption, the springs must be charged manually before energising the auxiliary circuit.

D) The contacts for electrical signalling of circuitbreaker in the racked-in and isolated position (-BGT1 and -BGT2) shown in figs. 51 are located on the circuit-breaker (moving part).

I) Fig. 10 and Fig. 40 can not be chosen simultaneously, that is, truck driving motor -MAT and Opening solenoid -MBO3 should not be chosen at the same time.

Graphical symbols for electrical diagrams (IEC 60617 standard)

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



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