



Medium Voltage Products

VD4

Medium voltage vacuum circuit-breakers
12...24 kV - 630...3150 A - 16...40 kA

Index

4	1. Description
12	2. Selection and ordering
54	3. Specific product characteristics
58	4. Overall dimensions
77	5. Electric circuit diagram

1. Description

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

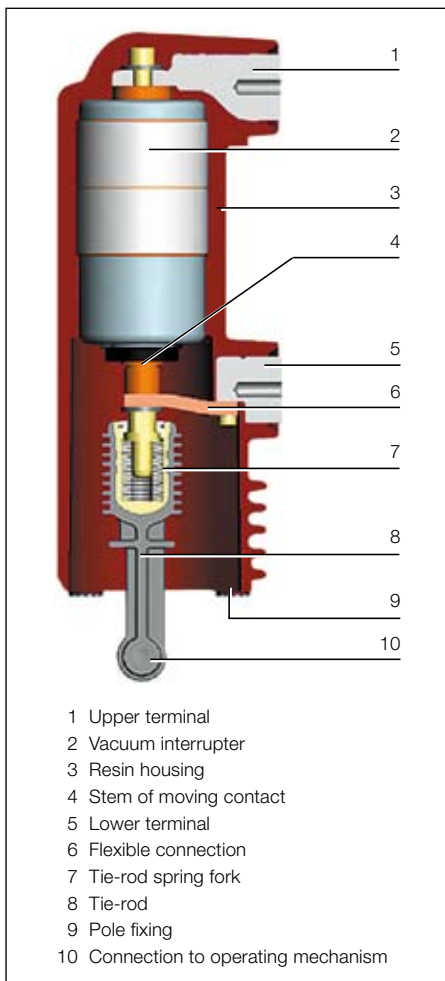
The vacuum circuit-breaker does not require an interrupting and insulating medium. In fact, the interrupters do not contain ionisable material.

In any case, on separation of the contacts an electric arc is generated made up exclusively of melted and vaporised 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



- Vacuum interruption technique
- Vacuum contacts protected against oxidation and contamination
- Vacuum interrupter embedded in the resin poles
- Interrupter protected against shocks, dust and humidity
- 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
- Sealed-for-life poles
- 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

Vacuum interrupter embedded in resin pole

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.

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 withdrawable version is completed with the truck for racking it into and out of the switchgear or enclosure with the door closed.



1. Description

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.

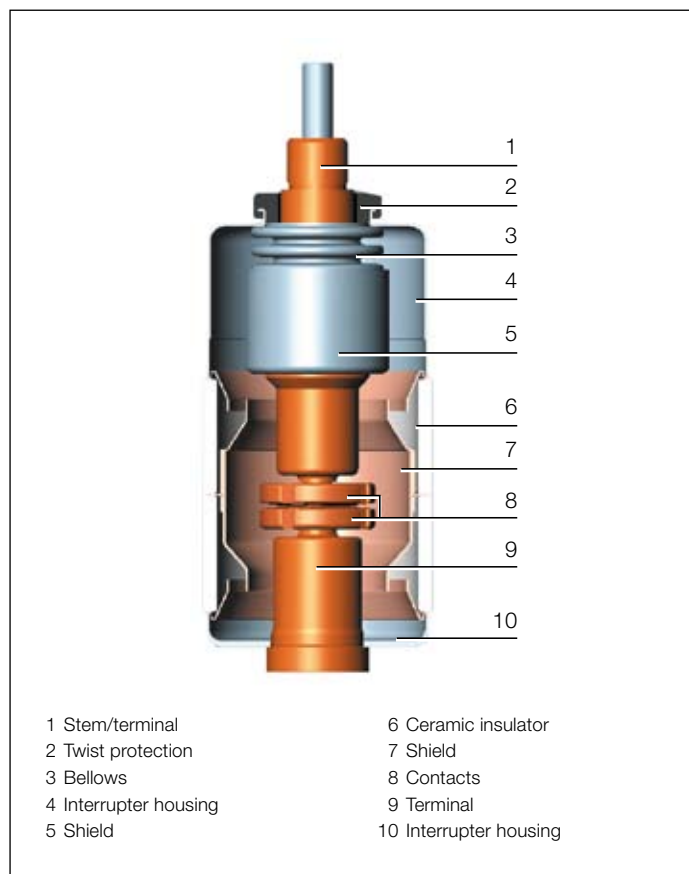
An electromagnetic force is self-generated and this acts tangentially, causing rapid arc rotation around the contact axis.

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

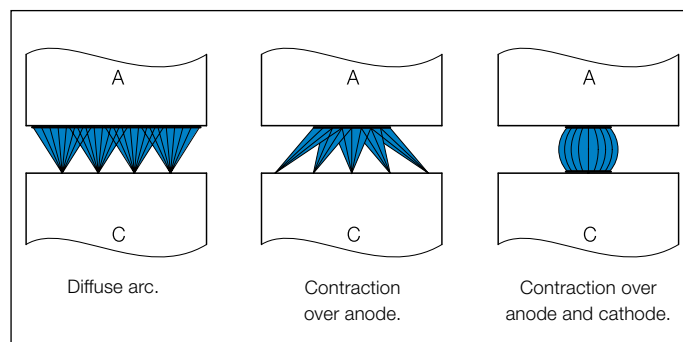
Apart from minimising thermal stress on the contacts, all this makes contact erosion negligible and, above all, allows the interruption process to be controlled even with very high short-circuits.

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.



Vacuum interrupter



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

Versions available

The VD4 circuit-breakers are available in the fixed and withdrawable version with front operating mechanism. The withdrawable version is available for UniGear ZS1 and ZS8.4 switchgear and PowerCube and Powerbloc enclosures.

Fields of application

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

Standards

The VD4 circuit-breakers comply with the IEC 62271-100, VDE 0671-part. 100, CEI 17-1 file 1375 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.

- **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

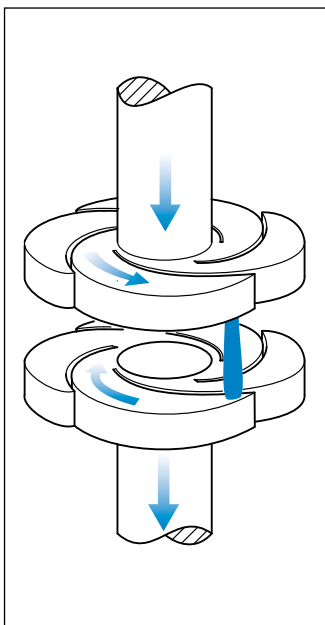
Thanks to the complete range of mechanical and electrical locks (available on request), it is possible to construct safe distribution switchgear with the VD4 circuit-breakers.

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

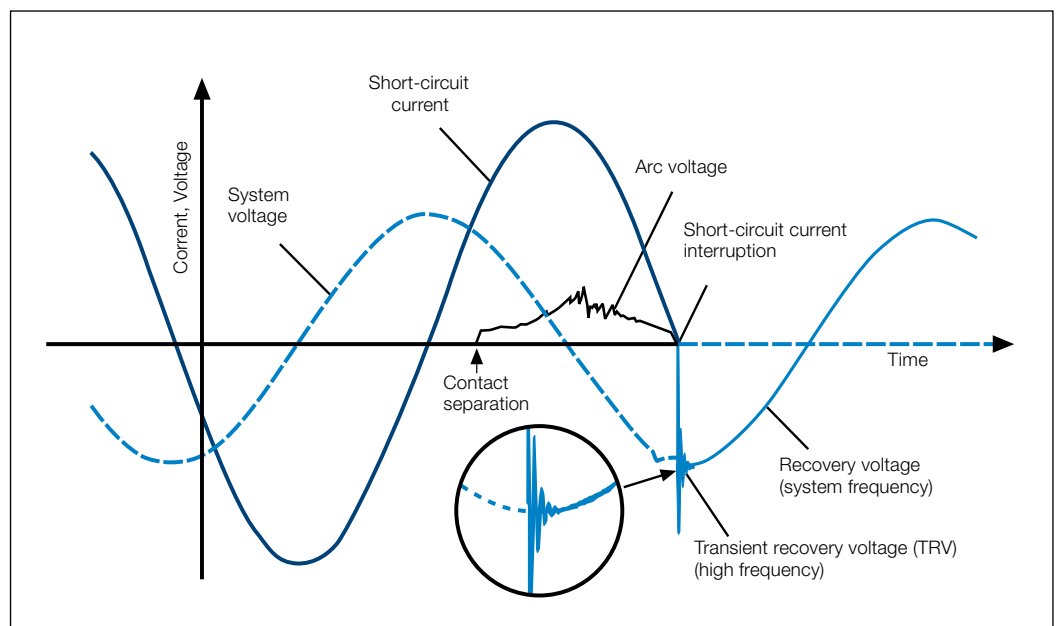
Key locks or padlock devices enable opening and closing operations and/or racking in and racking out.

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.



Radial magnetic field contact arrangement with a rotating vacuum arc.



Development of current and voltage trends during a single phase vacuum interruption process.

1. Description

- 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 plug-socket connectors
- Mechanical anti-pumping device is supplied as standard
- Built-in closing spring charging lever
- Key lock with circuit-breaker open
- Protective covering over the opening and closing pushbuttons to be operated using a special tool
- Padlock device on the operating pushbuttons

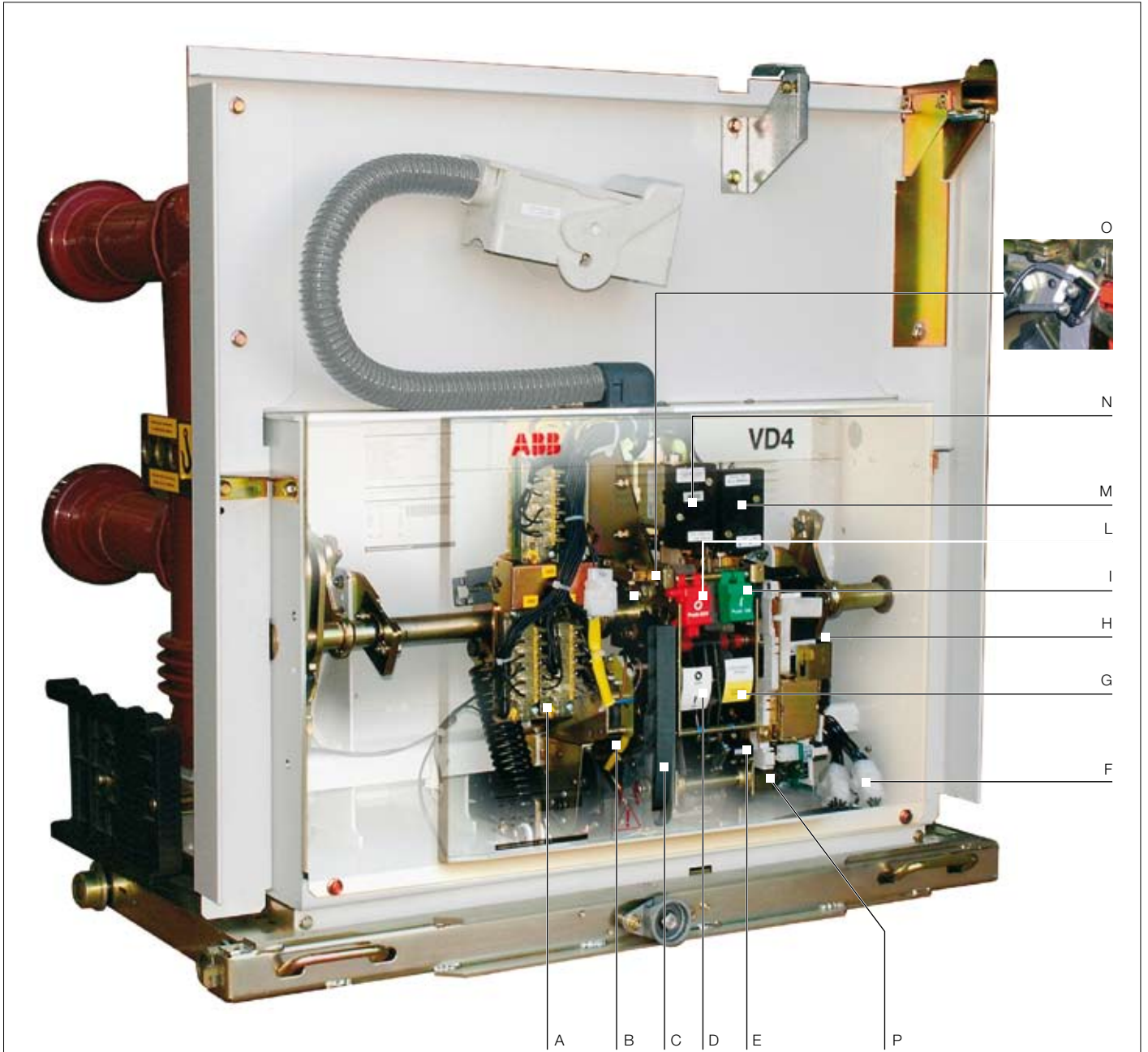
Accessories

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

The operating mechanism has a standardised 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.



Circuit-breaker operating mechanism

- A Open/closed auxiliary contacts
- B Geared motor for closing spring charging
- C Built-in closing spring charging lever
- D Mechanical signalling device for circuit-breaker open/closed
- E Mechanical operation counter
- F Plug-socket connectors of electrical accessories in the truck

- G Signalling device for closing springs charged/discharged
- H Service releases
- I Closing pushbutton
- L Opening pushbutton
- M Operating mechanism locking electromagnet
- N Additional shunt opening release
- O Transient contact
- P Contacts for signalling spring charged/discharged

1. Description

General characteristics of the complete VD4 series (*)

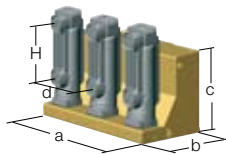
The VD4 series of vacuum circuit-breakers conform to the specifications of the following standards:

- VDE 00670, part 1000 IEC 62271-1
- VDE 00671, part 100 IEC 62271-100
- CEI 17-1 File 1375

(*) For information about the 12 kV • 1250 ... 4000 A • 50/63 kA and 36/40.5 kV • 630 ... 2500 A • 16 ... 40 kA circuit-breakers, please see technical catalogue GCBAS20PO102.



Rated voltage ⁽¹⁾	kV	12			
Rated frequency	Hz	50 - 60			
Rated normal current	A	630 . . . 4000 ⁽²⁾			
Rated short-circuit current	kA	16 ... 31.5	40	50	63
Rated short-time withstand current	kA	40 ... 80	100	125 ⁽³⁾	158
Rated short-circuit duration	s	3	3	3	3
Fixed / withdrawable version		•/•	•/•	•/•	• / -
Maximum overall dimensions (fixed version)	d (mm)	150 - 275	210 - 275	210 - 275	275
	H (mm)	205 - 310	310	310	310
	a (mm)	450 - 700	570 - 700	600 - 750	750
	b (mm)	424	424	459	459
	c (mm)	461 - 599	599 ⁽⁵⁾	608 ⁽⁷⁾	677
Weight	kg	73 - 105	94 - 180	147 - 260	260
Embedded poles		•	•	•	-
Assembled poles		-	-	-	•



Technical documentation

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

- PowerCube modules code 1VCP000091
- Powerbloc modules code BA441/03E
- UniGear ZS1 switchgear code 1VCP000138
- ZS8.4 switchgear code L2288
- REF542plus unit code 1VTA100001
- PR512 protection unit code 1VCP000055





	17.5	24	36	40.5
	50 - 60	50 - 60	50 - 60	50 - 60
	630 ... 4000 ⁽²⁾	630 ... 2500 ⁽²⁾	630 ... 3150 ⁽⁶⁾	630 ... 3150 ⁽⁶⁾
	16 ... 31.5	40	16 ... 25	16 ... 40
	40 ... 80	100	40 ... 63	40 ... 100
	3	3	3	4
	•/•	•/•	•/•	•/•
	150 - 275	210 - 275	210 - 275	280 - 360 ⁽⁴⁾
	205 - 310	310	310	328
	450 - 700	570 - 700	570 - 700	895 ⁽⁶⁾ / 1000
	424	424	424	555 - 686 ⁽⁶⁾
	461 - 599 ⁽⁵⁾	599 ^{(5) (7)}	631 - 661	1575
	73 - 105	94 - 180	100 - 110	290 - 350
	•	•	•	•
	-	-	-	•

- ⁽¹⁾ Test voltage according to IEC 62271-1 Standards table 1a, VDE 0670, - part 1000, list 2
- ⁽²⁾ 4000 A with forced ventilation
- ⁽³⁾ Higher values on request
- ⁽⁴⁾ 360 mm for fixed version, 280 mm for withdrawable version
- ⁽⁵⁾ Circuit-breaker with eat sink 616 mm (2500 A)
- ⁽⁶⁾ Withdrawable version
- ⁽⁷⁾ Circuit-breaker with eat sink 634 mm (3150 A)
- ⁽⁸⁾ 3150 A with assembled poles

Quality System

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

Test Laboratory

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

Environmental Management System

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

Health and Safety Management System

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



2. Selection and ordering

Fixed circuit-breakers

Fixed VD4 circuit-breaker (12 kV)



Circuit-breaker		VD4 12								
Standards	IEC 62271-100	•								
	VDE 0671; CEI 17-1 (File 1375)	•								
Rated voltage	Ur [kV]	12								
Rated insulation voltage	Us [kV]	12								
Withstand voltage at 50 Hz	Ud (1 min) [kV]	28								
Impulse withstand voltage	Up [kV]	75								
Rated frequency	fr [Hz]	50-60								
Rated normal current (40 °C)	Ir [A]	630	630	630	1250	1250	1250	1250	1250	
		16	16	16	16	16	16	—	—	
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	20	20	20	20	20	20	—	—	
		25	25	25	25	25	25	—	—	
		31.5	31.5	31.5	31.5	31.5	31.5	—	—	
		—	—	—	—	—	—	40	40	
Rated short-time withstand current (3 s)	Ik [kA]	16	16	16	16	16	16	—	—	
		20	20	20	20	20	20	—	—	
		25	25	25	25	25	25	—	—	
		31.5	31.5	31.5	31.5	31.5	31.5	—	—	
Making capacity	Ip [kA]	—	—	—	—	—	—	40	40	
		40	40	40	40	40	40	—	—	
		50	50	50	50	50	50	—	—	
		63	63	63	63	63	63	—	—	
		80	80	80	80	80	80	—	—	
		—	—	—	—	—	—	100	100	
Operation sequence	[O-0.3 s-CO-15 s-CO]	• • • • • • • • •								
Opening time	[ms]	33 ... 60								
Arcing time	[ms]	10 ... 15								
Total breaking time	[ms]	43 ... 75								
Closing time	[ms]	60 ... 80								
Maximum overall dimensions		H [mm]	461	461	461	461	461	461	589	589
		W [mm]	450	570	700	450	570	700	570	700
		D [mm]	424	424	424	424	424	424	424	424
		Pole centre distance P [mm]	150	210	275	150	210	275	210	275
Weight	[kg]	73	75	79	73	75	79	84	84	
Standardized table of dimensions	TN	7405	7406	—	7405	7406	—	—	—	
	1VCD	—	—	000051	—	—	000051	003282	003285	
Operating temperature	[°C]	- 5 ... + 40								
Tropicalization	IEC: 60068-2-30, 60721-2-1	•								
Electromagnetic compatibility	IEC: 62271-1	•								

•										
•										
12										
12										
28										
75										
50-60										
1600	1600	1600	1600	1600	2000	2000	2500	2500	3150	
—	—	—	—	—	—	—	—	—	—	—
20	20	20	—	—	20	20	20	20	20	20
25	25	25	—	—	25	25	25	25	25	25
31.5	31.5	31.5	—	—	31.5	31.5	31.5	31.5	31.5	31.5
—	—	—	40	40	40	40	40	40	40	40
—	—	—	—	—	—	—	—	—	—	—
20	20	20	—	—	20	20	20	20	20	20
25	25	25	—	—	25	25	25	25	25	25
31.5	31.5	31.5	—	—	31.5	31.5	31.5	31.5	31.5	31.5
—	—	—	40	40	40	40	40	40	40	40
—	—	—	—	—	—	—	—	—	—	—
50	50	50	—	—	50	50	50	50	50	50
63	63	63	—	—	63	63	63	63	63	63
80	80	80	—	—	80	80	80	80	80	80
—	—	—	100	100	100	100	100	100	100	100
•	•	•	•	•	•	•	•	•	•	•
599	599	599	589	589	599	599	599	599	635	
450	570	700	570	700	570	700	570	700	700	
424	424	424	424	424	424	424	424	424	424	
150	210	275	210	275	210	275	210	275	275	
93	98	105	84	84	98	105	98	105	140	
—	7407	7408	—	—	7407	7408	7407	7408	—	
000050	—	—	003282	003285	—	—	—	—	000149	
-5...40										
•										
•										

2. Selection and ordering

Fixed circuit-breakers

Fixed VD4 circuit-breaker (17.5 kV)



Circuit-breaker		VD4 17								
Standards	IEC 62271-100	•								
	VDE 0671; CEI 17-1 (File 1375)	•								
Rated voltage	Ur [kV]	17.5								
Rated insulation voltage	Us [kV]	17.5								
Withstand voltage at 50 Hz	Ud (1 min) [kV]	38								
Impulse withstand voltage	Up [kV]	95								
Rated frequency	fr [Hz]	50-60								
Rated normal current (40 °C)	Ir [A]	630	630	630	1250	1250	1250	1250	1250	
		16	16	16	16	16	16	—	—	
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	20	20	20	20	20	20	—	—	
		25	25	25	25	25	25	—	—	
		31.5	31.5	31.5	31.5	31.5	31.5	—	—	
		—	—	—	—	—	—	40	40	
Rated short-time withstand current (3 s)	Ik [kA]	16	16	16	16	16	16	—	—	
		20	20	20	20	20	20	—	—	
		25	25	25	25	25	25	—	—	
		31.5	31.5	31.5	31.5	31.5	31.5	—	—	
Making capacity	Ip [kA]	—	—	—	—	—	—	40	40	
		40	40	40	40	40	40	—	—	
		50	50	50	50	50	50	—	—	
		63	63	63	63	63	63	—	—	
		80	80	80	80	80	80	—	—	
		—	—	—	—	—	—	100	100	
Operation sequence	[O-0.3 s-CO-15 s-CO]	• • • • • • • • •								
Opening time	[ms]	33 ... 60								
Arcing time	[ms]	10 ... 15								
Total breaking time	[ms]	43 ... 75								
Closing time	[ms]	60 ... 80								
Maximum overall dimensions		H [mm]	461	461	461	461	461	461	589	589
		W [mm]	450	570	700	450	570	700	570	700
		D [mm]	424	424	424	424	424	424	424	424
		Pole centre distance P [mm]	150	210	275	150	210	275	210	275
Weight	[kg]	73	75	79	73	75	79	84	84	
Standardized table of dimensions	TN	7405	7406	—	7405	7406	—	—	—	
	1VCD	—	—	000051	—	—	000051	003282	003285	
Operating temperature	[°C]	- 5 ... + 40								
Tropicalization	IEC: 60068-2-30, 60721-2-1	•								
Electromagnetic compatibility	IEC: 62271-1	•								

•								
•								
17,5								
17,5								
38								
95								
50-60								
1600	1600	1600	1600	2000	2000	2500	3150	
—	—	—	—	—	—	—	—	
20	20	—	—	20	20	20	20	
25	25	—	—	25	25	25	25	
31.5	31.5	—	—	31.5	31.5	31.5	31.5	
—	—	40	40	40	40	40	40	
—	—	—	—	—	—	—	—	
20	20	—	—	20	20	20	20	
25	25	—	—	25	25	25	25	
31.5	31.5	—	—	31.5	31.5	31.5	31.5	
—	—	40	40	40	40	40	40	
—	—	—	—	—	—	—	—	
50	50	—	—	50	50	50	50	
63	63	—	—	63	63	63	63	
80	80	—	—	80	80	80	80	
—	—	100	100	100	100	100	100	
•	•	•	•	•	•	•	•	
599	599	589	589	599	599	599	635	
570	700	570	700	570	700	700	700	
424	424	424	424	424	424	424	424	
210	275	210	275	210	275	275	275	
98	105	84	84	98	105	105	140	
7407	7408	—	—	7407	7408	7408	—	
—	—	003282	003285	—	—	—	000149	
- 5 ... + 40								
•								
•								

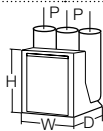
2. Selection and ordering

Fixed circuit-breakers

Fixed VD4 circuit-breaker (24 kV)



Circuit-breaker	VD4 24							
Standards	IEC 62271-100	•						
	VDE 0671; CEI 17-1 (File 1375)	•						
Rated voltage	Ur [kV]	24						
Rated insulation voltage	Us [kV]	24						
Withstand voltage at 50 Hz	Ud (1 min) [kV]	50						
Impulse withstand voltage	Up [kV]	125						
Rated frequency	fr [Hz]	50-60						
Rated normal current (40 °C)	Ir [A]	630	630	1250	1250	1600	2000	2500
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	16	16	16	16	16	16	—
		20	20	20	20	20	20	—
		25	25	25	25	25	25	25
Rated short-time withstand current (3 s)	Ik [kA]	16	16	16	16	16	16	—
		20	20	20	20	20	20	—
		25	25	25	25	25	25	25
Making capacity	Ip [kA]	40	40	40	40	40	40	—
		50	50	50	50	50	50	50
Operation sequence	[O-0.3 s-CO-15 s-CO]	•	•	•	•	•	•	•
Opening time	[ms]	33 ... 60						
Arcing time	[ms]	10 ... 15						
Total breaking time	[ms]	43 ... 75						
Closing time	[ms]	60 ... 80						
Maximum overall dimensions	H [mm]	631	631	631	631	642	642	642
	W [mm]	700	570	700	700	700	700	700
	D [mm]	424	424	424	424	424	424	424
	Pole centre distance P [mm]	210	275	210	275	275	275	275
Weight	[kg]	100	104	100	104	110	110	110
Standardized table of dimensions	TN	7406	7410	7409	7410	7411	7411	7411
	1VCD	—	—	—	000051	003285	—	—
Temperatura di funzionamento	[°C]	- 5 ... + 40						
Operating temperature	IEC: 60068-2-30, 60721-2-1	•						
Electromagnetic compatibility	IEC: 62271-1	•						



Types of fixed version circuit-breakers available

Complete the circuit-breaker selected with the optional accessories indicated on the following pages.

VD4 fixed circuit-breaker without bottom and top terminals

Ur	Isc	Rated uninterrupted current (40°C) [A]										Circuit-breaker type
		H=461 D=424 u/l=205 l/g=217,5			H=589 D=424 u/l=310 l/g=238		H=599 D=424 u/l=310 l/g=237,5			H=635 D=424 u/l=310 l/g=237		
kV	kA	P=150	P=210	P=275	P=210	P=275	P=150	P=210	P=275	P=275		
		W=450	W=570	W=700	W=570	W=700	W=450	W=570	W=700	W=700		
12	16	630									VD4 12.06.16 p150	
	20	630									VD4 12.06.20 p150	
	25	630									VD4 12.06.25 p150	
	31.5	630									VD4 12.06.32 p150	
	16	1250									VD4 12.12.16 p150	
	20	1250									VD4 12.12.20 p150	
	25	1250									VD4 12.12.25 p150	
	31.5	1250									VD4 12.12.32 p150	
	20							1600			VD4 12.16.20 p150	
	25							1600			VD4 12.16.25 p150	
	31.5							1600			VD4 12.16.32 p150	
	16		630								VD4 12.06.16 p210	
	20		630								VD4 12.06.20 p210	
	25		630								VD4 12.06.25 p210	
	31.5		630								VD4 12.06.32 p210	
	16		1250								VD4 12.12.16 p210	
	20		1250								VD4 12.12.20 p210	
	25		1250								VD4 12.12.25 p210	
	31.5		1250								VD4 12.12.32 p210	
	40					1250					VD4 12.12.40 p210	
20								1600		VD4 12.16.20 p210		
25								1600		VD4 12.16.25 p210		
31.5								1600		VD4 12.16.32 p210		
40					1600					VD4 12.16.40 p210		
20								2000		VD4 12.20.20 p210		
25								2000		VD4 12.20.25 p210		
31.5								2000		VD4 12.20.32 p210		
40								2000		VD4 12.20.40 p210		
20								2500		VD4 12.25.20 p210		
25								2500		VD4 12.25.25 p210		
31.5								2500		VD4 12.25.32 p210		

Notes

- H = Circuit-breaker height
- W = Circuit-breaker width
- D = Circuit-breaker depth
- u/l = Distance between bottom and top terminal
- l/g = Distance between bottom terminal and circuit-breaker resting surface
- P = Horizontal centre distance between poles

2. Selection and ordering

Fixed circuit-breakers

VD4 fixed circuit-breaker without bottom and top terminals

Ur	Isc	Rated uninterrupted current (40°C) [A]								Circuit-breaker type	
		H=461		H=589		H=599		H=635			
kV	kA	D=424		D=424		D=424		D=424			
		u/l=205		u/l=310		u/l=310		u/l=310			
		l/g=217,5		l/g=238		l/g=237,5		l/g=237			
		P=150	P=210	P=275	P=210	P=275	P=150	P=210	P=275		P=275
		W=450	W=570	W=700	W=570	W=700	W=450	W=570	W=700	W=700	
12	16			630							VD4 12.06.16 p275
	20			630							VD4 12.06.20 p275
	25			630							VD4 12.06.25 p275
	31.5			630							VD4 12.06.32 p275
	16			1250							VD4 12.12.16 p275
	20			1250							VD4 12.12.20 p275
	25			1250							VD4 12.12.25 p275
	31.5			1250							VD4 12.12.32 p275
	40					1250					VD4 12.12.40 p275
	20								1600		VD4 12.16.20 p275
	25								1600		VD4 12.16.25 p275
	31.5								1600		VD4 12.16.32 p275
	40					1600					VD4 12.16.40 p275
	20								2000		VD4 12.20.20 p275
	25								2000		VD4 12.20.25 p275
	31.5								2000		VD4 12.20.32 p275
	40								2000		VD4 12.20.40 p275
	20								2500		VD4 12.25.20 p275
	25								2500		VD4 12.25.25 p275
	31.5								2500		VD4 12.25.32 p275
40								2500		VD4 12.25.40 p275	
20									3150	VD4 12.32.20 p275	
25									3150	VD4 12.32.25 p275	
31.5									3150	VD4 12.32.32 p275	
40									3150	VD4 12.32.40 p275	

Notes

- H = Circuit-breaker height
- W = Circuit-breaker width
- D = Circuit-breaker depth
- u/l = Distance between bottom and top terminal
- l/g = Distance between bottom terminal and circuit-breaker resting surface
- P = Horizontal centre distance between poles

VD4 fixed circuit-breaker without bottom and top terminals

Ur	Isc	Rated uninterrupted current (40°C) [A]								Circuit-breaker type
		H=461			H=589		H=599		H=635	
kV	kA	D=424			D=424		D=424		PD	
		u/l=205			u/l=310		u/l=310		u/l=310	
		l/g=217.5			l/g=238		l/g=237.5		l/g=237	
		P=150	P=210	P=275	P=210	P=275	P=150	P=210	P=275	P=275
	W=450	W=570	W=700	W=570	W=700	W=450	W=570	W=700	W=700	
	16	630								VD4 17.06.16 p150
	20	630								VD4 17.06.20 p150
	25	630								VD4 17.06.25 p150
	31.5	630								VD4 17.06.32 p150
	16	1250								VD4 17.12.16 p150
	20	1250								VD4 17.12.20 p150
	25	1250								VD4 17.12.25 p150
	31.5	1250								VD4 17.12.32 p150
	20					1600				VD4 17.16.20 p150
	25					1600				VD4 17.16.25 p150
	31.5					1600				VD4 17.16.32 p150
17.5	16		630							VD4 17.06.16 p210
	20		630							VD4 17.06.20 p210
	25		630							VD4 17.06.25 p210
	31.5		630							VD4 17.06.32 p210
	16		1250							VD4 17.12.16 p210
	20		1250							VD4 17.12.20 p210
	25		1250							VD4 17.12.25 p210
	31.5		1250							VD4 17.12.32 p210
	40				1250					VD4 17.12.40 p210
	20							1600		VD4 17.16.20 p210
	25							1600		VD4 17.16.25 p210
	31.5							1600		VD4 17.16.32 p210
	40				1600					VD4 17.16.40 p210
	20							2000		VD4 17.20.20 p210
	25							2000		VD4 17.20.25 p210
	31.5							2000		VD4 17.20.32 p210
	40							2000		VD4 17.20.40 p210
	20							2500		VD4 17.25.20 p210
	25							2500		VD4 17.25.25 p210
	31.5							2500		VD4 17.25.32 p210

Notes
H = Circuit-breaker height
W = Circuit-breaker width
D = Circuit-breaker depth
u/l = Distance between bottom and top terminal
l/g = Distance between bottom terminal and circuit-breaker resting surface
P = Horizontal centre distance between poles

2. Selection and ordering

Fixed circuit-breakers

VD4 fixed circuit-breaker without bottom and top terminals

Ur	Isc	Rated uninterrupted current (40°C) [A]								Circuit-breaker type	
		H=461		H=589		H=599		H=635			
kV	kA	D=424		D=424		D=424		D=424			
		u/l=205		u/l=310		u/l=310		u/l=310			
		l/g=217.5		l/g=238		l/g=237.5		l/g=237			
		P=150	P=210	P=275	P=210	P=275	P=150	P=210	P=275	P=275	
	W=450	W=570	W=700	W=570	W=700	W=450	W=570	W=700	W=700		
17.5	16			630							VD4 17.06.16 p275
	20			630							VD4 17.06.20 p275
	25			630							VD4 17.06.25 p275
	31.5			630							VD4 17.06.32 p275
	16			1250							VD4 17.12.16 p275
	20			1250							VD4 17.12.20 p275
	25			1250							VD4 17.12.25 p275
	31.5			1250							VD4 17.12.32 p275
	40					1250					VD4 17.12.40 p275
	20								1600		VD4 17.16.20 p275
	25								1600		VD4 17.16.25 p275
	31.5								1600		VD4 17.16.32 p275
	40					1600					VD4 17.16.40 p275
	20								2000		VD4 17.20.20 p275
	25								2000		VD4 17.20.25 p275
	31.5								2000		VD4 17.20.32 p275
	40								2000		VD4 17.20.40 p275
	20								2500		VD4 17.25.20 p275
	25								2500		VD4 17.25.25 p275
	31.5								2500		VD4 17.25.32 p275
40								2500		VD4 17.25.40 p275	
20									3150	VD4 17.32.20 p275	
25									3150	VD4 17.32.25 p275	
31.5									3150	VD4 17.32.32 p275	
40									3150	VD4 17.32.40 p275	

Notes

H = Circuit-breaker height

W = Circuit-breaker width

D = Circuit-breaker depth

u/l = Distance between bottom and top terminal

l/g = Distance between bottom terminal and circuit-breaker resting surface

P = Horizontal centre distance between poles

VD4 fixed circuit-breaker without bottom and top terminals

Ur	Isc	Rated uninterrupted current (40°C) [A]			Circuit-breaker type	
		H=631 D=424 u/l=310 l/g=282.5	H=642 D=424 u/l=310 l/g=282.5	H=631 D=424 u/l=310 l/g=282.5		
kV	kA	P=210	P=275	P=275	VD4 24.06.16 p210 VD4 24.06.20 p210 VD4 24.06.25 p210 VD4 24.12.16 p210 VD4 24.12.20 p210 VD4 24.12.25 p210	
		W=570	W=700	W=700		
		16	630			
		20	630			
		25	630			
		16	630			
	24	kA				VD4 24.12.16 p275 VD4 24.12.20 p275 VD4 24.12.25 p275 VD4 24.06.16 p275 VD4 24.06.20 p275 VD4 24.06.25 p275
			16	1250		
			20	1250		
			25	1250		
			16	630		
24	kA				VD4 24.06.16 p275 VD4 24.06.20 p275 VD4 24.06.25 p275 VD4 24.12.16 p275 VD4 24.12.20 p275 VD4 24.12.25 p275	
		16	1250			
		20	1250			
		25	1250			
		16	1600			
24	kA				VD4 24.12.16 p275 VD4 24.12.20 p275 VD4 24.12.25 p275 VD4 24.20.16 p275 VD4 24.20.20 p275 VD4 24.20.25 p275	
		16	2000			
		20	2000			
		25	2000			
		16	2500			

Notes

- H = Circuit-breaker height
- W = Circuit-breaker width
- D = Circuit-breaker depth
- u/l = Distance between bottom and top terminal
- l/g = Distance between bottom terminal and circuit-breaker resting surface
- P = Horizontal centre distance between poles

Standard fittings of fixed circuit-breakers

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

- EL type manual operating mechanism
- mechanical signalling device for closing springs charged/discharged
- mechanical signalling device for circuit-breaker open/closed
- closing pushbutton, opening pushbutton and operation counter
- set of ten auxiliary circuit-breaker break/make contacts

Note: with the group of ten auxiliary contacts supplied as standard and the maximum number of electrical applications, three break contacts (signalling circuit-breaker open) and five make contacts (signalling circuit-breaker closed) are available.

- lever for manually charging the closing springs
- auxiliary circuit support terminal board.

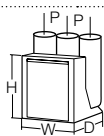


2. Selection and ordering

Withdrawable circuit-breakers

Withdrawable version circuit-breakers for UniGear ZS1 switchgear (12 kV)



Circuit-breaker		VD4/P 12				
Standards	IEC 62271-100 • VDE 0671; CEI 17-1 (File 1375) •					
Rated voltage	Ur [kV]	12				
Rated insulation voltage	Us [kV]	12				
Withstand voltage at 50 Hz	Ud (1 min) [kV]	28				
Impulse withstand voltage	Up [kV]	75				
Rated frequency	fr [Hz]	50-60				
Rated normal current (40 °C) (1)	Ir [A]	630	1250	1250	1250	
		16	16	—	—	
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	20	20	—	—	
		25	25	—	—	
		31.5	31.5	—	—	
		—	—	40	40	
		16	16	—	—	
Rated short-time withstand current (3 s)	Ik [kA]	20	20	—	—	
		25	25	—	—	
		31.5	31.5	—	—	
		—	—	40	40	
		40	40	—	—	
Making capacity	Ip [kA]	50	50	—	—	
		63	63	—	—	
		80	80	—	—	
		—	—	100	100	
Operation sequence	[O-0.3 s-CO-15 s-CO]	•	•	•	•	
Opening time	[ms]	33 ... 60				
Arcing time	[ms]	10 ... 15				
Total breaking time	[ms]	43 ... 75				
Closing time	[ms]	60 ... 80				
Maximum overall dimensions		H [mm]	631	631	631	642
		W [mm]	700	700	700	700
		D [mm]	424	424	424	424
		Pole centre distance P [mm]	210	210	275	275
Weight	[kg]	100	100	104	110	
Standardized table of dimensions	TN	7406	7409	7410	7411	
	1VCD	—	—	000051	003285	
Operating temperature	[°C]	- 5 ... + 40				
Tropicalization	IEC: 60068-2-30, 60721-2-1	•				
Electromagnetic compatibility	IEC: 62271-1	•				

(1) Rated uninterrupted currents guaranteed with withdrawable circuit-breaker installed in UniGear ZS1 switchgear with air temperature of 40 °C
(2) Rated current up to 4000 A in UniGear ZS1 switchgear with forced ventilation

•								
•								
12								
12								
28								
75								
50-60								
1600	1600	1600	1600	2000	2000	2500	3150 (2)	
—	—	—	—	—	—	—	—	
20	20	—	—	20	20	20	20	
25	25	—	—	25	25	25	25	
31.5	31.5	—	—	31.5	31.5	31,5	31.5	
—	—	40	40	40	40	40	40	
—	—	—	—	—	—	—	—	
20	20	—	—	20	20	20	20	
25	25	—	—	25	25	25	25	
31.5	31.5	—	—	31.5	31.5	31,5	31.5	
—	—	40	40	40	40	40	40	
—	—	—	—	—	—	—	—	
50	50	—	—	50	50	50	50	
63	63	—	—	63	63	63	63	
80	80	—	—	80	80	80	80	
—	—	100	100	100	100	100	100	
•	•	•	•	•	•	•	•	

691	691	691	691	691	691	691	730
653	853	653	853	653	853	853	853
642	642	641	642	642	642	640	640
210	275	210	275	210	275	275	275
160	166	174	176	160	166	186	221
7415	7416	—	—	7415	7416	7417	—
—	—	003284	003286	—	—	—	000153

- 5 ... + 40

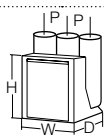
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2. Selection and ordering

Withdrawable circuit-breakers

Withdrawable version circuit-breakers
for UniGear ZS1 switchgear (17.5 kV)



Circuit-breaker		VD4/P 17				
Standards	IEC 62271-100	•				
	VDE 0671; CEI 17-1 (File 1375)	•				
Rated voltage	Ur [kV]	17.5				
Rated insulation voltage	Us [kV]	17.5				
Withstand voltage at 50 Hz	Ud (1 min) [kV]	38				
Impulse withstand voltage	Up [kV]	95				
Rated frequency	fr [Hz]	50-60				
Rated normal current (40 °C) (1)	Ir [A]	630	1250	1250	1250	
		16	16	—	—	
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	20	20	—	—	
		25	25	—	—	
		31.5	31.5	—	—	
		—	—	40	40	
		16	16	—	—	
Rated short-time withstand current (3 s)	Ik [kA]	20	20	—	—	
		25	25	—	—	
		31.5	31.5	—	—	
		—	—	40	40	
		40	40	—	—	
Making capacity	Ip [kA]	50	50	—	—	
		63	63	—	—	
		80	80	—	—	
		—	—	100	100	
Operation sequence	[O-0.3 s-CO-15 s-CO]	• • • •				
Opening time	[ms]	33 ... 60				
Arcing time	[ms]	10 ... 15				
Total breaking time	[ms]	43 ... 75				
Closing time	[ms]	60 ... 80				
Maximum overall dimensions		H [mm]	632	632	691	691
		W [mm]	503	503	653	853
		D [mm]	664	664	641	642
		Pole centre distance P [mm]	150	150	210	275
Weight	[kg]	115	115	174	176	
Standardized table of dimensions	TN	7412	7412	—	—	
	1VCD	—	—	003284	003286	
Operating temperature	[°C]	- 5 ... + 40				
Tropicalization	IEC: 60068-2-30, 60721-2-1	•				
Electromagnetic compatibility	IEC: 62271-1	•				

(1) Rated uninterrupted currents guaranteed with withdrawable circuit-breaker installed in UniGear ZS1 switchgear with air temperature of 40 °C.
(2) Rated current up to 4000 A in UniGear ZS1 switchgear with forced ventilation

•								
•								
17,5								
17,5								
38								
95								
50-60								
1600	1600	1600	1600	2000	2000	2500	3150 (2)	
—	—	—	—	—	—	—	—	
20	20	—	—	20	20	20	20	
25	25	—	—	25	25	25	25	
31.5	31.5	—	—	31.5	31.5	31.5	31.5	
—	—	40	40	40	40	40	40	
—	—	—	—	—	—	—	—	
20	20	—	—	20	20	20	20	
25	25	—	—	25	25	25	25	
31.5	31.5	—	—	31.5	31.5	31.5	31.5	
—	—	40	40	40	40	40	40	
—	—	—	—	—	—	—	—	
50	50	—	—	50	50	50	50	
63	63	—	—	63	63	63	63	
80	80	—	—	80	80	80	80	
—	—	100	100	100	100	100	100	
•	•	•	•	•	•	•	•	

691	691	691	691	691	691	691	730
653	853	653	853	653	853	853	853
642	642	641	642	642	642	640	640
210	275	210	275	210	275	275	275
160	166	174	176	160	166	186	221
7415	7416	—	—	7415	7416	7417	—
—	—	003284	003286	—	—	—	000153

-5...+40
•
•

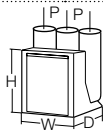
2. Selection and ordering

Withdrawable circuit-breakers

Withdrawable version circuit-breakers for UniGear ZS1 switchgear (24 kV)



Circuit-breaker	VD4/P 24							
Standards	IEC 62271-100	•						
	VDE 0671; CEI 17-1 (File 1375)	•						
Rated voltage	Ur [kV]	24						
Rated insulation voltage	Us [kV]	24						
Withstand voltage at 50 Hz	Ud (1 min) [kV]	50						
Impulse withstand voltage	Up [kV]	125						
Rated frequency	fr [Hz]	50-60						
Rated normal current (40 °C) ⁽¹⁾	Ir [A]	630	630	1250	1250	1600	2000	2500 (2)
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	16	16	16	16	16	16	—
		20	20	20	20	20	20	—
		25	25	25	25	25	25	25
Rated short-time withstand current (3 s)	Ik [kA]	16	16	16	16	16	16	—
		20	20	20	20	20	20	—
		25	25	25	25	25	25	25
Making capacity	Ip [kA]	40	40	40	40	40	40	—
		63	63	63	63	63	63	63
Operation sequence	[O-0.3 s-CO-15 s-CO]	•	•	•	•	•	•	•
Opening time	[ms]	33 ... 60						
Arcing time	[ms]	10 ... 15						
Total breaking time	[ms]	43 ... 75						
Closing time	[ms]	60 ... 80						
Maximum overall dimensions	H [mm]	794	794	794	794	838	838	838
	W [mm]	653	853	653	853	853	853	853
	D [mm]	802	802	802	802	790	790	790
	Pole centre distance P [mm]	210	275	210	275	275	275	275
Weight	[kg]	140	148	140	148	228	228	228
Standardized table of dimensions	TN	7313	7314	7313	7314	7418	7418	7418
Operating temperature	[°C]	- 5 ... + 40						
Tropicalization	IEC: 60068-2-30, 60721-2-1	•						
Electromagnetic compatibility	IEC: 62271-1	•						



(1) Rated currents guaranteed with circuit-breaker installed in UniGear ZS1 switchgear with air temperature of 40 °C.

(2) The 2300 A rated normal current is guaranteed with natural ventilation. The 2500 A rated normal current is guaranteed with forced ventilation.

Types of withdrawable version circuit-breakers available for UniGear ZS1 switchgear

Complete the circuit-breaker selected with the optional accessories indicated on the following pages.

VD4/P withdrawable circuit-breaker for UniGear ZS1 switchgear						
Ur	Isc	Rated uninterrupted current (40°C) [A]				Circuit-breaker type
kV	kA	W=650	W=800	W=1000	W=1000	
		P=150	P=210	P=275	P=275	
		u/l=205	u/l=310	u/l=310	u/l=310	
		ø=35	ø=79	ø=79	ø=109	
12	16	630				VD4/P 12.06.16 p150
	20	630				VD4/P 12.06.20 p150
	25	630				VD4/P 12.06.25 p150
	31,5	630				VD4/P 12.06.32 p150
	16	1250				VD4/P 12.12.16 p150
	20	1250				VD4/P 12.12.20 p150
	25	1250				VD4/P 12.12.25 p150
	31,5	1250				VD4/P 12.12.32 p150
	40		1250			VD4/P 12.12.40 p210
	20		1600			VD4/P 12.16.20 p210
	25		1600			VD4/P 12.16.25 p210
	31,5		1600			VD4/P 12.16.32 p210
	40		1600			VD4/P 12.16.40 p210
	20		2000			VD4/P 12.20.20 p210
	25		2000			VD4/P 12.20.25 p210
	31,5		2000			VD4/P 12.20.32 p210
	40		2000			VD4/P 12.20.40 p210
	40			1250		VD4/P 12.12.40 p275
	20			1600		VD4/P 12.16.20 p275
	25			1600		VD4/P 12.16.25 p275
	31,5			1600		VD4/P 12.16.32 p275
	40			1600		VD4/P 12.16.40 p275
	20			2000		VD4/P 12.20.20 p275
	25			2000		VD4/P 12.20.25 p275
	31,5			2000		VD4/P 12.20.32 p275
	40			2000		VD4/P 12.20.40 p275
	20				2500	VD4/P 12.25.20 p275
	25				2500	VD4/P 12.25.25 p275
	31,5				2500	VD4/P 12.25.32 p275
	40				2500	VD4/P 12.25.40 p275
	20				3150	VD4/P 12.32.20 p275
	25				3150	VD4/P 12.32.25 p275
31,5				3150	VD4/P 12.32.32 p275	
40				3150	VD4/P 12.32.40 p275	

Notes
W = Width of the UniGear ZS1 switchgear
P = Horizontal centre distance between poles
u/l = Distance between bottom and top terminal
Ø = Diameter of isolating contact

2. Selection and ordering

Withdrawable circuit-breakers

VD4/P withdrawable circuit-breaker for UniGear ZS1 switchgear						
Ur	Isc	Rated uninterrupted current (40°C) [A]				Circuit-breaker type
kV	kA	W=650	W=800	W=1000	W=1000	
		P=150	P=210	P=275	P=275	
		u/l=205	u/l=310	u/l=310	u/l=310	
		ø=35	ø=79	ø=79	ø=109	
17.5	16	630				VD4/P 17.06.16 p150
	20	630				VD4/P 17.06.20 p150
	25	630				VD4/P 17.06.25 p150
	31.5	630				VD4/P 17.06.32 p150
	16	1250				VD4/P 17.12.16 p150
	20	1250				VD4/P 17.12.20 p150
	25	1250				VD4/P 17.12.25 p150
	31.5	1250				VD4/P 17.12.32 p150
	40		1250			VD4/P 17.12.40 p210
	20		1600			VD4/P 17.16.20 p210
	25		1600			VD4/P 17.16.25 p210
	31.5		1600			VD4/P 17.16.32 p210
	40		1600			VD4/P 17.16.40 p210
	20		2000			VD4/P 17.20.20 p210
	25		2000			VD4/P 17.20.25 p210
	31.5		2000			VD4/P 17.20.32 p210
	40		2000			VD4/P 17.20.40 p210
	40			1250		VD4/P 17.12.40 p275
	20			1600		VD4/P 17.16.20 p275
	25			1600		VD4/P 17.16.25 p275
	31.5			1600		VD4/P 17.16.32 p275
	40			1600		VD4/P 17.16.40 p275
	20			2000		VD4/P 17.20.20 p275
	25			2000		VD4/P 17.20.25 p275
	31.5			2000		VD4/P 17.20.32 p275
	40			2000		VD4/P 17.20.40 p275
	20				2500	VD4/P 17.25.20 p275
	25				2500	VD4/P 17.25.25 p275
	31.5				2500	VD4/P 17.25.32 p275
	40				2500	VD4/P 17.25.40 p275
	20				3150	VD4/P 17.32.20 p275
	25				3150	VD4/P 17.32.25 p275
31.5				3150	VD4/P 17.32.32 p275	
40				3150	VD4/P 17.32.40 p275	

Notes

- W = Width of the UniGear ZS1 switchgear
- P = Horizontal centre distance between poles
- u/l = Distance between bottom and top terminal
- Ø = Diameter of isolating contact

VD4/P withdrawable circuit-breaker for UniGear ZS1 switchgear

Ur	Isc	Rated uninterrupted current (40°C) [A]			Circuit-breaker type
		W=800	W=1000	W=1000	
kV	kA	P=210	P=275	P=275	
		u/l=310	u/l=310	u/l=310	
		ø=79	ø=79	ø=109	
24	16	630			VD4/P 24.06.16 p210
	20	630			VD4/P 24.06.20 p210
	25	630			VD4/P 24.06.25 p210
	16	1250			VD4/P 24.12.16 p210
	20	1250			VD4/P 24.12.20 p210
	25	1250			VD4/P 24.12.25 p210
	16		630		VD4/P 24.06.16 p275
	20		630		VD4/P 24.06.20 p275
	25		630		VD4/P 24.06.25 p275
	16		1250		VD4/P 24.12.16 p275
	20		1250		VD4/P 24.12.20 p275
	25		1250		VD4/P 24.12.25 p275
	16			1600	VD4/P 24.16.16 p275
	20			1600	VD4/P 24.16.20 p275
	25			1600	VD4/P 24.16.25 p275
	16			2000	VD4/P 24.20.16 p275
	20			2000	VD4/P 24.20.20 p275
	25			2000	VD4/P 24.20.25 p275
	16			2300	VD4/P 24.25.16 p275
	20			2300	VD4/P 24.25.20 p275
	25			2300	VD4/P 24.25.25 p275

Notes

- W = Width of the UniGear ZS1 switchgear
- P = Horizontal centre distance between poles
- u/l = Distance between bottom and top terminal
- Ø = Diameter of isolating contact

Standard fittings of withdrawable circuit-breakers for UniGear ZS1 switchgear and similar panels

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

- EL type 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 circuit-breaker open/closed auxiliary contacts
- Note: with the group of ten auxiliary contacts supplied as standard and the maximum number of electrical applications, three break contacts (signalling circuit-breaker open) and four make contacts (signalling circuit-breaker closed) are available.
- lever for manually charging the closing springs
 - isolating contacts
 - cord with connector (plug only) for auxiliary circuits, with striker pins which does not allow the plug to be inserted into the socket if the rated current of the circuit-breaker is lower than the rated current of the panel
 - racking-out/in lever (the quantity must be defined according to the number of pieces of apparatus ordered)
 - locking electromagnet in the truck (compulsory for ABB switchgear). This device prevents racking the circuit-breaker into the switchgear with the auxiliary circuits disconnected (plug not inserted in the socket)
 - door interlock (compulsory for ABB switchgear); this device prevents racking the circuit-breaker into the switchgear when the switchgear door is open.



2. Selection and ordering

Withdrawable circuit-breakers

Withdrawable version circuit-breakers
for PowerCube modules (12 kV)



Circuit-breaker	VD4/P 12		VD4/W 12			
	PowerCube module	PB1	PB1	PB2	PB2	
Standards	IEC 62271-100	•	•	•	•	
	VDE 0671; CEI 17-1 (File 1375)	•	•	•	•	
Rated voltage	Ur [kV]	12	12	12	12	
Rated insulation voltage	Us [kV]	12	12	12	12	
Withstand voltage at 50 Hz	Ud (1 min) [kV]	28	28	28	28	
Impulse withstand voltage	Up [kV]	75	75	75	75	
Rated frequency	fr [Hz]	50-60	50-60	50-60	50-60	
Rated normal current (40 °C) (1)	Ir [A]	630	1250	630	1250	
		16	16	16	16	
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	20	20	20	20	
		25	25	25	25	
		31.5	31.5	31.5	31.5	
		—	—	—	—	
Rated short-time withstand current (3 s)	Ik [kA]	16	16	16	16	
		20	20	20	20	
		25	25	25	25	
		31.5	31.5	31.5	31.5	
Making capacity	Ip [kA]	—	—	—	—	
		40	40	40	40	
		50	50	50	50	
		63	63	63	63	
Operation sequence	[O-0.3 s-CO-15 s-CO]	80	80	80	80	
		—	—	—	—	
		•	•	•	•	
		•	•	•	•	
Opening time	[ms]	33 ... 60	33 ... 60	33 ... 60	33 ... 60	
Arcing time	[ms]	10 ... 15	10 ... 15	10 ... 15	10 ... 15	
Total breaking time	[ms]	43 ... 75	43 ... 75	43 ... 75	43 ... 75	
Closing time	[ms]	60 ... 80	60 ... 80	60 ... 80	60 ... 80	
Maximum overall dimensions		H [mm]	628	628	691	691
		W [mm]	503	503	653	853
		D [mm]	662	662	642	642
		Pole centre distance P [mm]	150	150	210	210
Weight	[kg]	116	116	135	135	
Standardized table of dimensions	TN	7412	7412	7420	7420	
		1VCD	—	—	—	—
Operating temperature	[°C]	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40	
Tropicalization	IEC: 60068-2-30, 60721-2-1	•	•	•	•	
Electromagnetic compatibility	IEC: 62271-1	•	•	•	•	

(1) Rated currents guaranteed with withdrawable circuit-breaker installed in PowerCube enclosure and with air temperature of 40 °C.

(2) Rated current up to 4000 A in PowerCube module with forced ventilation.

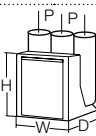
VD4/P 12					VD4/W12
PB2	PB2	PB2	PB2	PB3	PB3
•	•	•	•	•	•
•	•	•	•	•	•
12	12	12	12	12	12
12	12	12	12	12	12
28	28	28	28	28	28
75	75	75	75	75	75
50-60	50-60	50-60	50-60	50-60	50-60
1250	1600	1600	2000	2500	3150 (2)
—	—	—	—	—	—
—	20	—	20	20	20
—	25	—	25	25	25
—	31.5	—	31.5	31.5	31.5
40	—	40	40	40	40
—	—	—	—	—	—
—	20	—	20	20	20
—	25	—	25	25	25
—	31.5	—	31.5	31.5	31.5
40	—	40	40	40	40
—	—	—	—	—	—
—	50	—	50	50	50
—	63	—	63	63	63
—	80	—	80	80	80
100	—	100	100	100	100
•	•	•	•	•	•
33 ... 60	33 ... 60	33 ... 60	33 ... 60	33 ... 60	33 ... 60
10 ... 15	10 ... 15	10 ... 15	10 ... 15	10 ... 15	10 ... 15
43 ... 75	43 ... 75	43 ... 75	43 ... 75	43 ... 75	43 ... 75
60 ... 80	60 ... 80	60 ... 80	60 ... 80	60 ... 80	60 ... 80
691	691	691	691	691	730
653	653	653	653	853	853
641	642	641	642	640	640
210	210	210	210	275	275
174	160	174	160	186	221
—	7415	—	7415	7417	—
003284	—	003284	—	—	000152
- 5 ... + 40	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40
•	•	•	•	•	•
•	•	•	•	•	•

2. Selection and ordering

Withdrawable circuit-breakers

Withdrawable version circuit-breakers
for PowerCube modules (17.5 kV)



Circuit-breaker	PowerCube module	VD4/P 17		VD4/W 17		
		PB1	PB1	PB2	PB2	
Standards	IEC 62271-100 VDE 0671; CEI 17-1 (File 1375)	•	•	•	•	
Rated voltage	Ur [kV]	17.5	17.5	17.5	17.5	
Rated insulation voltage	Us [kV]	17.5	17.5	17.5	17.5	
Withstand voltage at 50 Hz	Ud (1 min) [kV]	38	38	38	38	
Impulse withstand voltage	Up [kV]	95	95	95	95	
Rated frequency	fr [Hz]	50-60	50-60	50-60	50-60	
Rated normal current (40 °C) (1)	Ir [A]	630	1250	630	1250	
		16	16	16	16	
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	20	20	20	20	
		25	25	25	25	
		31.5	31.5	31.5	31.5	
		—	—	—	—	
Rated short-time withstand current (3 s)	Ik [kA]	16	16	16	16	
		20	20	20	20	
		25	25	25	25	
		31.5	31.5	31.5	31.5	
Making capacity	Ip [kA]	—	—	—	—	
		40	40	40	40	
		50	50	50	50	
		63	63	63	63	
Operation sequence	[O-0.3 s-CO-15 s-CO]	80	80	80	80	
		—	—	—	—	
		•	•	•	•	
		•	•	•	•	
Opening time	[ms]	33 ... 60	33 ... 60	33 ... 60	33 ... 60	
Arcing time	[ms]	10 ... 15	10 ... 15	10 ... 15	10 ... 15	
Total breaking time	[ms]	43 ... 75	43 ... 75	43 ... 75	43 ... 75	
Closing time	[ms]	60 ... 80	60 ... 80	60 ... 80	60 ... 80	
Maximum overall dimensions		H [mm]	628	628	691	691
		W [mm]	503	503	653	853
		D [mm]	662	662	642	642
		Pole centre distance P [mm]	150	150	210	210
Weight	[kg]	116	116	135	135	
Standardized table of dimensions	TN	7412	7412	7420	7420	
	1VCD	—	—	—	—	
Operating temperature	[°C]	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40	
Tropicalization	IEC: 60068-2-30, 60721-2-1	•	•	•	•	
Electromagnetic compatibility	IEC: 62271-1	•	•	•	•	

(1) Rated currents guaranteed with withdrawable circuit-breaker installed in PowerCube enclosure and with air temperature of 40 °C.

(2) Rated current up to 4000 A in PowerCube module with forced ventilation.

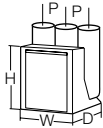
VD4/P 17				VD4/W17	
PB2	PB2	PB2	PB2	PB3	PB3
•	•	•	•	•	•
•	•	•	•	•	•
17.5	17.5	17.5	17.5	17.5	17.5
17.5	17.5	17.5	17.5	17.5	17.5
38	38	38	38	38	38
95	95	95	95	95	95
50-60	50-60	50-60	50-60	50-60	50-60
1250	1600	1600	2000	2500	3150 (2)
—	—	—	—	—	—
—	20	—	20	20	20
—	25	—	25	25	25
—	31.5	—	31.5	31.5	31.5
40	—	40	40	40	40
—	—	—	—	—	—
—	20	—	20	20	20
—	25	—	25	25	25
—	31.5	—	31.5	31.5	31.5
40	—	40	40	40	40
—	—	—	—	—	—
—	50	—	50	50	50
—	63	—	63	63	63
—	80	—	80	80	80
100	—	100	100	100	100
•	•	•	•	•	•
33 ... 60	33 ... 60	33 ... 60	33 ... 60	33 ... 60	33 ... 60
10 ... 15	10 ... 15	10 ... 15	10 ... 15	10 ... 15	10 ... 15
43 ... 75	43 ... 75	43 ... 75	43 ... 75	43 ... 75	43 ... 75
60 ... 80	60 ... 80	60 ... 80	60 ... 80	60 ... 80	60 ... 80
691	691	691	691	691	730
653	653	653	653	853	853
641	642	641	642	640	640
210	210	210	210	275	275
174	160	174	160	186	221
—	7415	—	7415	7417	—
003284	—	003284	—	—	000152
- 5 ... + 40	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40
•	•	•	•	•	•
•	•	•	•	•	•

2. Selection and ordering

Withdrawable circuit-breakers

Withdrawable version circuit-breakers
for PowerCube modules (24 kV)



Circuit-breaker	PowerCube module	VD4/P 24					
		PB4	PB4	PB5	PB5	PB5	
Standards	IEC 62271-100	•	•	•	•	•	
	VDE 0671; CEI 17-1 (File 1375)	•	•	•	•	•	
Rated voltage	Ur [kV]	24	24	24	24	24	
Rated insulation voltage	Us [kV]	24	24	24	24	24	
Withstand voltage at 50 Hz	Ud (1 min) [kV]	50	50	50	50	50	
Impulse withstand voltage	Up [kV]	125	125	125	125	125	
Rated frequency	fr [Hz]	50-60	50-60	50-60	50-60	50-60	
Rated normal current (40 °C) ⁽¹⁾	Ir [A]	630	1250	1600	2000	2500 ⁽²⁾	
		16	16	16	16	16	
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	20	20	20	20	20	
		25	25	25	25	25	
Rated short-time withstand current (3 s)	Ik [kA]	16	16	16	16	16	
		20	20	20	20	20	
Making capacity	Ip [kA]	25	25	25	25	25	
		40	40	40	40	40	
Operation sequence	[O-0.3 s-CO-15 s-CO]	50	50	50	50	50	
		63	63	63	63	63	
Opening time	[ms]	33 ... 60	33 ... 60	33 ... 60	33 ... 60	33 ... 60	
Arcing time	[ms]	10 ... 15	10 ... 15	10 ... 15	10 ... 15	10 ... 15	
Total breaking time	[ms]	43 ... 75	43 ... 75	43 ... 75	43 ... 75	43 ... 75	
Closing time	[ms]	60 ... 80	60 ... 80	60 ... 80	60 ... 80	60 ... 80	
Maximum overall dimensions		H [mm]	794	794	838	838	838
		W [mm]	653	653	853	853	853
		D [mm]	802	802	790	790	790
		Pole centre distance P [mm]	210	210	275	275	275
Weight	[kg]	140	140	228	228	228	
Standardized table of dimensions	TN	7313	7313	7418	7418	7418	
Operating temperature	[°C]	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40	
Tropicalization	IEC: 60068-2-30, 60721-2-1	•	•	•	•	•	
Electromagnetic compatibility	IEC: 62271-1	•	•	•	•	•	

(1) Rated currents guaranteed with withdrawable circuit-breaker installed in PowerCube enclosure and with air temperature of 40 °C.
(2) 2300 A rated current guaranteed with natural ventilation; 2500 A rated current with forced ventilation.

Types of withdrawable version circuit-breakers available for PowerCube modules

Complete the circuit-breaker selected with the optional accessories indicated on the following pages.

VD4/P - VD4/W withdrawable circuit-breaker for PowerCube modules

Ur	Isc	Rated uninterrupted current (40°C) [A]				Circuit-breaker type
		W=600 P=150 u/l=205 ø=35	W=750 P=210 u/l=310 ø=35	W=750 P=210 u/l=310 ø=79	W=1000 P=275 u/l=310 ø=109	
kV	16	630				VD4/P 12.06.16 p150
	20	630				VD4/P 12.06.20 p150
	25	630				VD4/P 12.06.25 p150
	31.5	630				VD4/P 12.06.32 p150
	16	1250				VD4/P 12.12.16 p150
	20	1250				VD4/P 12.12.20 p150
	25	1250				VD4/P 12.12.25 p150
	31.5	1250				VD4/P 12.12.32 p150
	16		630			VD4/W 12.06.16 p210
	20		630			VD4/W 12.06.20 p210
	25		630			VD4/W 12.06.25 p210
	31.5		630			VD4/W 12.06.32 p210
12	16		1250			VD4/W 12.12.16 p210
	20		1250			VD4/W 12.12.20 p210
	25		1250			VD4/W 12.12.25 p210
	31.5		1250			VD4/W 12.12.32 p210
	40			1250		VD4/W 12.12.40 p210
	20			1600		VD4/P 12.16.20 p210
	25			1600		VD4/P 12.16.25 p210
	31.5			1600		VD4/P 12.16.32 p210
	40			1600		VD4/P 12.16.40 p210
	20			2000		VD4/P 12.20.20 p210
	25			2000		VD4/P 12.20.25 p210
	31.5			2000		VD4/P 12.20.32 p210
	40			2000		VD4/P 12.20.40 p210
	20				2500	VD4/P 12.25.20 p275
	25				2500	VD4/P 12.25.25 p275
	31.5				2500	VD4/P 12.25.32 p275
	40				2500	VD4/P 12.25.40 p275
	20				3150	VD4/W 12.32.20 p275
	25				3150	VD4/W 12.32.25 p275
	31.5				3150	VD4/W 12.32.32 p275
40				3150	VD4/W 12.32.40 p275	

Notes

W = Width of the switchgear

P = Horizontal centre distance between poles

u/l = Distance between bottom and top terminal

Ø = Diameter of isolating contact

2. Selection and ordering

Withdrawable circuit-breakers

VD4/P - VD4/W withdrawable circuit-breaker for PowerCube modules							
Ur	Isc	Rated uninterrupted current (40°C) [A]				Circuit-breaker type	
kV	kA	W=600	W=750	W=750	W=1000		
		P=150	P=210	P=210	P=275		
		u/l=205	u/l=310	u/l=310	u/l=310		
		ø=35	ø=35	ø=79	ø=109		
17.5	16	630				VD4/P 17.06.16 p150	
	20	630				VD4/P 17.06.20 p150	
	25	630				VD4/P 17.06.25 p150	
	31.5	630				VD4/P 17.06.32 p150	
	16	1250				VD4/P 17.12.16 p150	
	20	1250				VD4/P 17.12.20 p150	
	25	1250				VD4/P 17.12.25 p150	
	31.5	1250				VD4/P 17.12.32 p150	
	16		630			VD4/W 17.06.16 p210	
	20		630			VD4/W 17.06.20 p210	
	25		630			VD4/W 17.06.25 p210	
	31.5		630			VD4/W 17.06.32 p210	
	16		1250			VD4/W 17.12.16 p210	
	20		1250			VD4/W 17.12.20 p210	
	25		1250			VD4/W 17.12.25 p210	
	31.5		1250			VD4/W 17.12.32 p210	
	40				1250	VD4/W 17.12.40 p210	
	20				1600	VD4/P 17.16.20 p210	
	25				1600	VD4/P 17.16.25 p210	
	31.5				1600	VD4/P 17.16.32 p210	
	40				1600	VD4/P 17.16.40 p210	
	20				2000	VD4/P 17.20.20 p210	
	25				2000	VD4/P 17.20.25 p210	
	31.5				2000	VD4/P 17.20.32 p210	
	40				2000	VD4/P 17.20.40 p210	
	20					2500	VD4/P 17.25.20 p275
	25					2500	VD4/P 17.25.25 p275
	31.5					2500	VD4/P 17.25.32 p275
	40					2500	VD4/P 17.25.40 p275
	20					3150	VD4/W 17.32.20 p275
	25					3150	VD4/W 17.32.25 p275
	31.5					3150	VD4/W 17.32.32 p275
40					3150	VD4/W 17.32.40 p275	

Notes
W = Width of the switchgear
P = Horizontal centre distance between poles
u/l = Distance between bottom and top terminal
Ø = Diameter of isolating contact

VD4/P - VD4/W withdrawable circuit-breaker for PowerCube modules

Ur	Isc	Rated uninterrupted current (40°C) [A]		Circuit-breaker type
		W=800	W=1000	
kV	kA	P=210	P=275	
		u/l=310	u/l=310	
		ø=35	ø=79	
24	16	630		VD4/P 24.06.16 p210
	20	630		VD4/P 24.06.20 p210
	25	630		VD4/P 24.06.25 p210
	16	1250		VD4/P 24.12.16 p210
	20	1250		VD4/P 24.12.20 p210
	25	1250		VD4/P 24.12.25 p210
	16		1600	VD4/P 24.16.16 p275
	20		1600	VD4/P 24.16.20 p275
	25		1600	VD4/P 24.16.25 p275
	16		2000	VD4/P 24.20.16 p275
	20		2000	VD4/P 24.20.20 p275
	25		2000	VD4/P 24.20.25 p275
	16		2300	VD4/P 24.25.16 p275
	20		2300	VD4/P 24.25.20 p275
	25		2300	VD4/P 24.25.25 p275

Notes

- W = Width of the switchgear
- P = Horizontal centre distance between poles
- u/l = Distance between bottom and top terminal
- Ø = Diameter of isolating contact

Standard fittings of withdrawable circuit-breakers for PowerCube modules

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

- EL type 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 circuit-breaker open/closed auxiliary contacts
- Note: with the group of ten auxiliary contacts supplied as standard and the maximum number of electrical applications, three break contacts (signalling circuit-breaker open) and four make contacts (signalling circuit-breaker closed) are available.
- lever for manually charging the closing springs
 - isolating contacts
 - cord with connector (plug only) for auxiliary circuits, with striker pin which does not allow the plug to be inserted into the socket if the rated current of the circuit-breaker is different from the rated current of the panel
 - racking-in/out lever (the quantity must be defined according to the number of pieces of apparatus ordered)
 - locking electromagnet in the truck. This prevents the circuit-breaker being racked into the panel with the auxiliary circuits disconnected (plug not inserted in the socket).



2. Selection and ordering

Withdrawable circuit-breakers

Withdrawable circuit-breakers for ZS8.4 type switchgear (12 - 17.5 - 24 kV)



Circuit-breaker		VD4/Z8					
	Panel without partitions	•	•	•	•	•	•
	Panel with partitions	–	–	–	–	–	–
	Preussen Elektra - EON (2)	–	–	–	–	–	–
	Width [mm]	650	650	650	650	800	800
	Depth [mm]	1000	1000	1000	1000	1200	1200
Standards	IEC 62271-100	•	•	•	•	•	•
	CEI 17-1 (File 1375)	•	•	•	•	•	•
Rated voltage	Ur [kV]	12	12	17.5	17.5	24	24
Rated insulation voltage	Us [kV]	12	12	17.5	17.5	24	24
Withstand voltage at 50 Hz	Ud (1 min) [kV]	28	28	38	38	50	50
Impulse withstand voltage	Up [kV]	75	75	95	95	125	125
Rated frequency	fr [Hz]	50-60					
Rated normal current (40 °C) (1)	Ir [A]	630	1250	630	1250	630	1250
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	–	–	–	–	16	16
		20	20	20	20	20	20
Rated short-time withstand current (3 s)	Ik [kA]	25	25	25	25	25	25
		–	–	–	–	16	16
Making capacity	Ip [kA]	20	20	20	20	20	20
		25	25	25	25	25	25
Operation sequence	[O-0.3s-CO-15s-CO]	–	–	–	–	40	40
		50	50	50	50	50	50
Opening time	[ms]	63	63	63	63	63	63
Arcing time	[ms]	33...60	33...60	33...60	33...60	33...60	33...60
Total breaking time	[ms]	10...15	10...15	10...15	10...15	10...15	10...15
Closing time	[ms]	43...75	43...75	43...75	43...75	43...75	43...75
Maximum overall dimensions	H [mm]	60...80	60...80	60...80	60...80	60...80	60...80
	W [mm]	579	579	579	579	680	680
	D [mm]	503	503	503	503	653	653
	Pole centre distance P [mm]	548	548	548	548	646	646
Weight	[kg]	150	150	150	150	210	210
Standardized table of dimensions	1VCD	116	116	116	116	140	140
Operating temperature	[°C]	000092	000137	000137	000137	000089	000138
Tropicalization	IEC: 60068-2-30	– 5 ... + 40	– 5 ... + 40	– 5 ... + 40	– 5 ... + 40	– 5 ... + 40	– 5 ... + 40
Electromagnetic compatibility	60721-2-1	•	•	•	•	•	•
	IEC 62271-1	•	•	•	•	•	•

⁽¹⁾ Rated uninterrupted currents guaranteed with withdrawable circuit-breaker installed in switchgear with air temperature of 40 °C.

⁽²⁾ Special version with rotary closing spring charging and charging lever outside the operating mechanism.

VD4/ZT8							VD4/ZS8			
-	-	-	-	-	-	-	-	-	-	-
•	•	•	•	•	•	•	-	-	-	-
-	-	-	-	-	-	-	•	•	•	•
650	650	650	650	800	800	650	650	800	800	800
1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	•
12	12	17.5	17.5	24	24	12	12	24	24	24
12	12	17.5	17.5	24	24	12	12	24	24	24
28	28	38	38	50	50	28	28	50	50	50
75	75	95	95	125	125	75	75	125	125	125
50-60							50-60			
630	1250	630	1250	630	1250	630	1250	630	1250	1250
-	-	-	-	16	16	-	-	16	16	16
20	20	20	20	20	20	20	20	20	20	20
25	25	25	25	25	25	25	25	25	25	25
-	-	-	-	16	16	-	-	16	16	16
20	20	20	20	20	20	20	20	20	20	20
25	25	25	25	25	25	25	25	25	25	25
-	-	-	-	40	40	-	-	40	40	40
50	50	50	50	50	50	50	50	50	50	50
63	63	63	63	63	63	63	63	63	63	63
•	•	•	•	•	•	•	•	•	•	•
33...60							33...60			
10...15							10...15			
43...75							43...75			
60...80							60...80			
579	579	579	579	680	680	579	579	680	680	680
503	503	503	503	653	653	503	503	653	653	653
638	638	638	638	646	646	638	638	646	646	646
150	150	150	150	210	210	150	150	210	210	210
116	116	116	116	140	140	116	116	140	140	140
000093	000134	000134	000134	000090	000136	000091	000133	000088	000135	000135
- 5 ... + 40							- 5 ... + 40			
•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•	•	•	•

2. Selection and ordering

Withdrawable circuit-breakers

Types of withdrawable version circuit-breakers available for ZS8.4 switchgear

Complete the circuit-breaker selected with the optional accessories indicated on the following pages.

VD4/ZS8 - VD4/ZT8 - VD4/Z8 withdrawable circuit-breaker for ZS8.4 switchgear

Ur	Isc	Rated uninterrupted current (40°C) [A]						Circuit-breaker type
		Panel with partition		Panel without partition		Special panel EON		
kV	kA	W = 650	W = 800	W = 650	W = 800	W = 650	W = 800	
		P = 150	P = 210	P = 150	P = 210	P = 150	P = 210	
		u/l = 205	u/l = 310	u/l = 205	u/l = 310	u/l = 205	u/l = 310	
		ø = 35	ø = 35	ø = 35	ø = 35	ø = 35	ø = 35	
12	20	630						VD4/ZS8 12.06.20 p150
	25	630						VD4/ZS8 12.06.25 p150
	20	1250						VD4/ZS8 12.12.20 p150
	25	1250						VD4/ZS8 12.12.25 p150
	20			630				VD4/ZT8 12.06.20 p150
	25			630				VD4/ZT8 12.06.25 p150
	20			1250				VD4/ZT8 12.12.20 p150
	25			1250				VD4/ZT8 12.12.25 p150
	20					630		VD4/ZS8 12.06.20 p150
	25					630		VD4/ZS8 12.06.25 p150
	20					1250		VD4/ZS8 12.12.20 p150
	25					1250		VD4/ZS8 12.12.25 p150
17.5	20	630						VD4/Z8 17.06.20 p150
	25	630						VD4/Z8 17.06.25 p150
	20	1250						VD4/Z8 17.12.20 p150
	25	1250						VD4/Z8 17.12.25 p150
	20			630				VD4/ZT8 17.06.20 p150
	25			630				VD4/ZT8 17.06.25 p150
	20			1250				VD4/ZT8 17.12.20 p150
	25			1250				VD4/ZT8 17.12.25 p150
24	16		630					VD4/ZS8 24.06.16 p210
	20		630					VD4/ZS8 24.06.20 p210
	25		630					VD4/ZS8 24.06.25 p210
	16		1250					VD4/ZS8 24.12.16 p210
	20		1250					VD4/ZS8 24.12.20 p210
	25		1250					VD4/ZS8 24.12.25 p210
	16				630			VD4/ZT8 24.06.16 p210
	20				630			VD4/ZT8 24.06.20 p210
	25				630			VD4/ZT8 24.06.25 p210
	16				1250			VD4/ZT8 24.12.16 p210
	20				1250			VD4/ZT8 24.12.20 p210
	25				1250			VD4/ZT8 24.12.25 p210
16						630	VD4/ZS8 24.06.16 p210	
20						630	VD4/ZS8 24.06.20 p210	
25						630	VD4/ZS8 24.06.25 p210	
16						1250	VD4/ZS8 24.12.16 p210	
20						1250	VD4/ZS8 24.12.20 p210	
25						1250	VD4/ZS8 24.12.25 p210	

Notes

- W = Width of the switchgear.
- P = Horizontal centre distance between poles.
- u/l = Distance between bottom and top terminal.
- Ø = Diameter of isolating contact.

Standard fittings of withdrawable circuit-breakers for ZS8.4 switchgear

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

- EL type 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 circuit-breaker open/closed auxiliary contacts
- Note: with the group of ten auxiliary contacts supplied as standard and the maximum number of electrical applications, three break contacts (signalling circuit-breaker open) and four make contacts (signalling circuit-breaker closed) are available.
- lever for manually charging the closing springs incorporated in the operating mechanism for VD4/Z8 and VD4/ZT8, external with rotary movement for VD4/ZS8
 - isolating contacts
 - racking in/out lever (the quantity must be defined according to the number of pieces of apparatus ordered)

VD4/ZS8 (Preussen Elektra-EON version)

- device for closing spring charging, with the door closed, by means of a removable rotary crank handle outside the operating mechanism and the switchgear
- Harting 64-pin socket with mechanical interlock which prevents traverse of the circuit-breaker when the plug is not inserted in the socket
- interlock with the door which prevents the spring charging lever when the circuit-breaker is closed
- interlock with the door and Harting 64 pin socket which prevents door closing when the plug is not inserted in the socket.

VD4/Z8 - VD4/ZT8

- Harting 64-pin socket with mechanical interlock which prevents traverse of the circuit-breaker when the plug is not inserted in the socket.



Caption

- 1) Spring charging device with rotary crank handle
- 2) Harting 64 plus socket with mechanical interlock which prevents traverse when the socket is not inserted
- 3) Door - socket - spring charging device interlock (only VD4/ZS8 version)

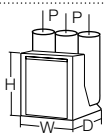
2. Selection and ordering

Withdrawable circuit-breakers

Withdrawable circuit-breakers for UniSwitch switchgear (CBW type unit) and UniMix switchgear P1/E type unit) (24 kV)



Circuit-breaker		VD4/US 24 ⁽³⁾		VD4/US 24 ⁽⁴⁾	
	UniSwitch (CBW type unit)	•	•		
	UniMix (P1/E type unit)			•	•
Standards	IEC 62271-100	•		•	
	VDE 0671; CEI 17-1 (File 1375)	•		•	
Rated voltage	Ur [kV]	24		24	
Rated insulation voltage	Us [kV]	24		24	
Withstand voltage at 50 Hz	Ud (1 min) [kV]	50		50	
Impulse withstand voltage	Up [kV]	125		125	
Rated frequency	fr [Hz]	50-60		50-60	
Rated normal current (40 °C) ⁽¹⁾	Ir [A]	630	1250	630	1250
		16 (20) ⁽⁵⁾	16 (25) ⁽⁵⁾	16	16
Rated breaking capacity (rated symmetrical short-circuit current)	Isc [kA]	20 (25) ⁽⁵⁾	20 (25) ⁽⁵⁾	20	20
		–	–	25	25
Rated short-time withstand current (3 s) ⁽²⁾	Ik [kA]	16 (20) ⁽⁵⁾	16 (25) ⁽⁵⁾	16	16
		20 (25) ⁽⁵⁾	20 (25) ⁽⁵⁾	20	20
Making capacity	I _p [kA]	–	–	25	25
		40 (50) ⁽⁵⁾	40 (63) ⁽⁵⁾	40	40
		40 (63) ⁽⁵⁾	40 (63) ⁽⁵⁾	50	50
		–	–	63	63
Operation sequence	[O-0.3s-CO-15s-CO]	•	•	•	•
Opening time	[ms]	33 ... 60		33 ... 60	
Arcing time	[ms]	10 ... 15		10 ... 15	
Total breaking time	[ms]	43 ... 75		43 ... 75	
Closing time	[ms]	60 ... 80		60 ... 80	
Maximum overall dimensions	H [mm]	680	680	680	680
	W [mm]	653	653	653	653
	D [mm]	742	742	742	742
	Pole centre distance P [mm]	210	210	210	210
Weight	[kg]	125	125	125	125
Standardized table of dimensions	1VCD	000047	000047	000047	000047
Operating temperature	[°C]	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40	- 5 ... + 40
Tropicalization	IEC: 60068-2-30, 60721-2-1	•	•	•	•
Electromagnetic compatibility	IEC: 62271-1	•	•	•	•



(1) Rated current guaranteed with withdrawable circuit-breaker installed in switchgear with air temperature of 40 °C

(2) The value and duration of the short-time withstand current depend on the switchgear. Please see the specific catalogues of the UniSwitch and UniMix switchgear

(3) The wheels for activating the top shutter of the UniSwitch switchgear (CBW unit) are mounted and adjusted by the manufacturer of the UniSwitch switchgear

(4) The wheels for activating the top shutter of the UniMix switchgear (P1/E unit) are available on request

(5) The values in brackets refer to 12 kV rated voltage.

Withdrawable c.-breaker for UniSwitch switchgear (CBW type unit) and UniMix switchgear (P1/E type unit)

Ur	Isc	Rated uninterrupted current (40°C) [A]		Circuit-breaker type
		UniSwitch CBW	UniMix P1/E	
kV	kA	P=210	P=210	
		u/l=310	u/l=310	
		ø=35	ø=79	
24	16	630 ⁽¹⁾	630	VD4/US 24.06.16 p210
	20	630 ⁽¹⁾	630	VD4/US 24.06.20 p210
	25	—	630	VD4/US 24.06.25 p210
	16	1250 ⁽¹⁾	1250	VD4/US 24.12.16 p210
	20	1250 ⁽¹⁾	1250	VD4/US 24.12.20 p210
	25	—	1250	VD4/US 24.12.25 p210

Notes

⁽¹⁾ Isc 25 kA at 12 kV

P = Horizontal centre distance between poles

u/l = Distance between top and bottom terminal

Ø = Diameter of the isolating contacts

Standard fittings of withdrawable circuit-breakers for UniSwitch and UniMix switchgear

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

- EL type 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 circuit-breaker open/closed auxiliary contacts
 - Note: with the group of ten auxiliary contacts supplied as standard and the maximum number of electrical applications, three break contacts (signalling circuit-breaker open) and four make contacts (signalling circuit-breaker closed) are available.
- lever for manually charging the closing springs
- isolating contacts
- cord with connector (plug only) for auxiliary circuits, with striker pin which does not allow the plug to be inserted into the socket if the rated current of the circuit-breaker is different from the rated current of the panel
- racking-in/out lever (the quantity must be defined according to the number of pieces of apparatus ordered)
- locking electromagnet in the truck. This prevents the circuit-breaker being racked into the panel with the auxiliary circuits disconnected (plug not inserted in the socket).

2. Selection and ordering

Optional accessories

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

1 Shunt opening release (-MO1)



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.

Checking functionality and continuity is only possible using the STU device (accessory 21).

Characteristics

Un	24 - 30 - 48 - 60 - 110 - 125 - 220 - 250 V-
Un	48 - 60 - 110 - 120...127 - 220...240 - V ~ 50 Hz
Un	110 - 120 - 127 - 220 - 240 - V ~ 60 Hz
Operating limits	70 ... 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 ⁽¹⁾	40...60 ms
Closing time ⁽²⁾	40...80 ms
Insulation voltage	2000 V 50 Hz (for 1 min)

⁽¹⁾ Valid for -MO1 e -MO2.

⁽²⁾ Valid for -MC.

2 Additional shunt opening release (-MO2)



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 (-MO1). It keeps all the electrical and operating characteristics of the shunt opening release.

Checking functionality and continuity is only possible using the STU device (accessory 21).

3 Opening solenoid (-MO3)



The opening solenoid (-MO3) is a special release with demagnetisation.

It is located in the operating mechanism (in the left side piece) and is not alternative to the additional shunt opening release (-MO2).

Not available for 40 and 50 kA circuit-breakers.

Should the application of this accessory be required, specify the request at the time of order since subsequent application by the customer is not possible.

4 Shunt closing release (-MC)



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.

Checking functionality and continuity is only possible using the STU device (accessory 21).

5 Undervoltage release (-MU)



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 - 3s) (power supply branched on the supply side). This device is set at 0.5s (for adjustment, please see the Electric Circuit Diagram chapter).

Characteristics

Un	24 - 30 - 48 - 60 - 110 - 125 - 220 - 250 V-
Un	48 - 60 - 110 - 120 - 127 - 220...240 V ~ 50 Hz
Un	110 - 120...127 - 220...240 V ~ 60 Hz
Operating limits	- circuit-breaker opening: 35-70% Un - circuit-breaker closing: 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	60...80 ms
Insulation voltage	2000 V 50 Hz (for 1 min)

2. Selection and ordering

Optional accessories

5a Electronic time delay device (-KT)



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 for d.c.

Rated voltage of the undervoltage release must be within the selected range of working of the time-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.

Should the application of this accessory be required, specify the request at the time of order since subsequent application by the customer is not possible.

7 Circuit-breaker auxiliary contacts (-BB1; -BB2; -BB3)



Electrical signalling of circuit-breaker open/closed can be provided with a set of 15 auxiliary contacts as an alternative to the 10 provided as standard.

Note

With the group of ten auxiliary contacts supplied as standard and the maximum number of electrical applications, three break contacts (signalling circuit-breaker open) and five make contacts (signalling circuit-breaker closed) are available.

With the group of 15 auxiliary contacts, according to the electrical applications required, the following are available:

- for fixed circuit-breakers: thirteen auxiliary contacts, differently divided between break contacts and make contacts according to the figure selected of the electrical diagram;
- for withdrawable circuit-breakers, since the plug of the auxiliary circuits has a limited number of poles: five break contacts (signalling circuit-breaker open) and five make contacts (signalling circuit-breaker closed).

General characteristics

Insulation voltage according to VDE 0110 standard. Group C	660 V a.c. 800 V d.c.
Rated voltage	24 V ... 660 V a.c.
Test voltage	2 kV 50 Hz (for 1 min)
Rated overcurrent	10 A
Number of contacts	5
Contact run	6 mm ... 7 mm
Activation force	26 N
Resistance	3 mΩ
Storage temperature	-20 °C ... +120 °C
Operating temperature	-20 °C ... +70 °C
Contact overtemperature	20 K
Number of cycles	30.000
Unlimited breaking capacity if used with 10 A fuse in series	

Electrical characteristics

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

2. Selection and ordering

Optional accessories

8 Transient contact (-BB4)



This contact closes momentarily (duration ≤ 35 ms) on circuit-breaker opening controlled remotely with a shunt opening release.

The indication is not provided when opening is manual and local. In fact, a contact (-BB11) is activated by the manual pushbutton and cuts off the transient contact closure (-BB4). The transient contact is activated directly from the main operating shaft when the indication is provided only on actual opening of the main circuit-breaker contacts.

10 Transmitted contacts in the truck (-BT1; -BT2)



Transmitted contacts of the withdrawable circuit-breaker (installed in the circuit-breaker truck - only for VD4/P withdrawable circuit-breaker).

These contacts are either in addition or as an alternative to the position contacts (for signalling circuit-breaker racked out) located in the unit. They also carry out the function of the position contact **(-BT3)**.

9 Position contact (-BT3)



This contact is used, together with the locking magnet in the operating mechanism **(-RL1)** to prevent remote closing during traverse into the unit.

It is only supplied for the withdrawable version circuit-breakers for UniGear ZS1 type switchgear and PowerCube modules.

In the UniGear ZS1 type switchgear, it is not supplied when the transmitted contacts in the truck are required **(-BT1; -BT2)**.

11 Motor operator (-MS)



This carries out automatic charging of the circuit-breaker operating mechanism closing spring. 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 spring 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 40 kA
Power on inrush (Ps)	DC = 600 W; AC = 600 VA
Rated power (Pn)	DC = 200 W; AC = 200 VA
Inrush duration	0.2 s
Charging time	6-7 s
Insulating voltage	2000 V 50 Hz (for 1 min)

12 Contact for signalling closing spring charged/discharged (-BS2)



This consists of a microswitch which allows remote signalling of the state of the circuit-breaker operating mechanism closing spring.

The contact is available in the following versions:

- contact open: signalling spring charged
- contact closed: signalling spring discharged.

2. Selection and ordering

Optional accessories

Protections and locks

Various mechanical and electromechanical locking and protection devices are available.

13 Opening and closing pushbutton protection



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

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 circuit-breakers).

14 Opening and closing pushbutton padlock



The device allows the opening and closing pushbuttons to be locked using a maximum of three padlocks (not supplied): \varnothing 4 mm. Also prevents closing using remote control.

16 Locking magnet on the operating mechanism (-RL1)

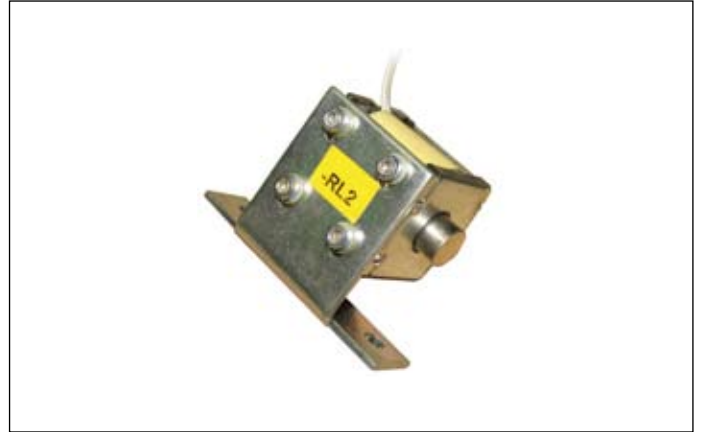


This only allows activation of the operating mechanism when the lock is energized.

Characteristics

Un	24 - 30 - 48 - 60 - 110 - 132 - 220 - 250 V-
Un	48 - 60 - 110 - 120 ... 127 - 220 ... 240 V~ 50/60 Hz
Operating limits	85 ... 110% Un
Power on inrush (Ps)	DC 250 W; AC = 250 VA
Continuous power (Pc)	DC = 5 W; AC = 5 VA
Inrush duration	150 ms
Insulating voltage	2000 V 50 Hz (for 1 min)

17 Locking magnet on the truck (-RL2)



Compulsory accessory for the withdrawable versions for UniGear ZS1 switchgear and PowerCube modules, 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).

Note: on request, a specific version for the circuit-breakers for ZS8.4 switchgear is available.

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
Continuous power (Pc)	DC = 5 W; AC = 5 VA
Inrush duration	150 ms
Insulating voltage	2000 V 50 Hz (for 1 min)

2. Selection and ordering

Optional accessories

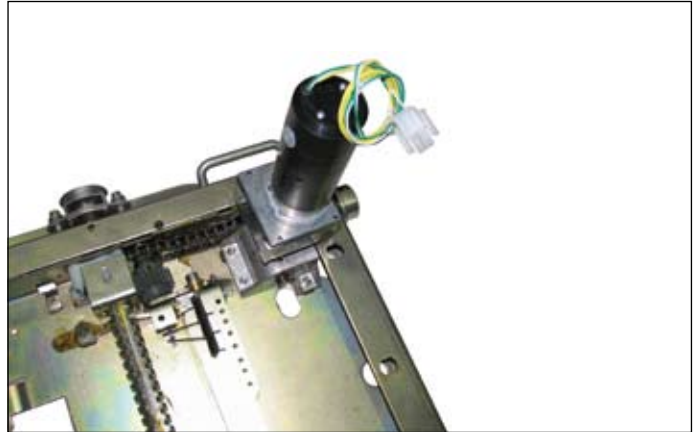
18 Interlock for fixed circuit-breaker



Device for fixed circuit-breakers which are converted into withdrawable ones by the customer. It allows a mechanical lock to be made, by the customer, which prevents racking-out/in with the circuit-breaker closed.

NOTE: The device must be requested when ordering since it must be assembled and tested in the factory.

20 Motorised truck (-MT)



It allows racking-in and racking-out of the circuit-breaker in the switchgear to be carried out remotely, (only for circuit-breaker in withdrawable version for UniGear ZS1 and ZS8.4 switchgear and PowerCube modules).

Characteristics

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

19 Mechanical interlock with the door



This device prevents circuit-breaker racking-in when the switchgear door is open. It is only provided for circuit-breakers used in switchgear UniGear ZS1 and PowerCube modules, fitted with a special actuator on the door.

21 STU Shunt Test Unit



Due to the particular construction of these releases, checking the functionality of the shunt closing (-MC) and opening (-MO1, -MO2) releases is not possible with dedicated relays (e.g. TCS Test Control Supervision, CCC Control Coil Continuity) or with the REF control and protection unit. The only device able to carry out a check of the functionality is the STU device. Please contact us if you want to carry out this control with devices other than STU.

This device can be combined with the shunt opening release **(-MO1; -MO2)** or with the shunt closing release **(-MC)** to check functionality and continuity.

The control/monitoring Shunt Test Unit allows the continuity of releases with a rated operating voltage between 24 V and 250 V (AC and DC) to be checked, as well as the functionality of the electronic circuit of the release.

Checking continuity is carried out cyclically with an interval of 20 seconds between one test and the next.

The unit has optical signals by means of LEDs on the front. In particular the following information is indicated:

- POWER ON: power supply present
- (-MO) TESTING: test being carried out
- TEST FAILED: signal following a failed test or in the absence of auxiliary power supply
- ALARM: signal after three failed tests.

Two relays and a changeover are also available on board the unit, which allow remote signalling of the following two events:

- failure of a test (resetting is carried out automatically when the alarm stops)
- failure of three tests (resetting is only carried out by means of the manual - RESET – from the front of the unit).

There is also a manual - RESET – button on the front of the unit.

Characteristics

Un	24 ... 250 V AC/DC
Maximum interrupted current	6 A
Maximum interrupted voltage	250 V AC

3. 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 EN 12500 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 climate graph 8 of the IEC 60721-2-1 and IEC 60068-2-2 (Test B: Dry Heat / IEC 60068-2-30 (Test Db: 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 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 62271-1 Standards. The following example is a clear interpretation of the indications given above.

Graph for determining the Ka correction factor according to the altitude

Example

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

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

– withstand voltage at power frequency equal to:

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

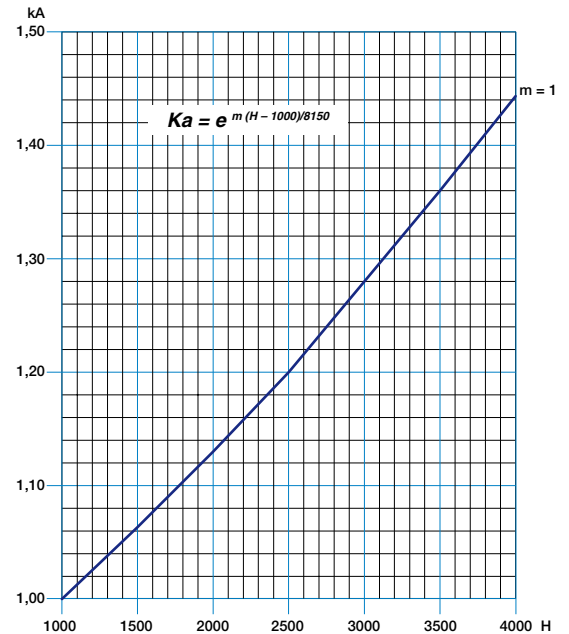
– impulse withstand voltage equal to:

$$75 \times 1.13 = 84.7 \text{ kVp.}$$

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 power frequency of 38 kVrms with 95 kVp impulse withstand voltage.

H = altitude in metres;

m = value referred to power frequency and the lightning impulse withstand voltages and those between phases.



Anti-pumping device

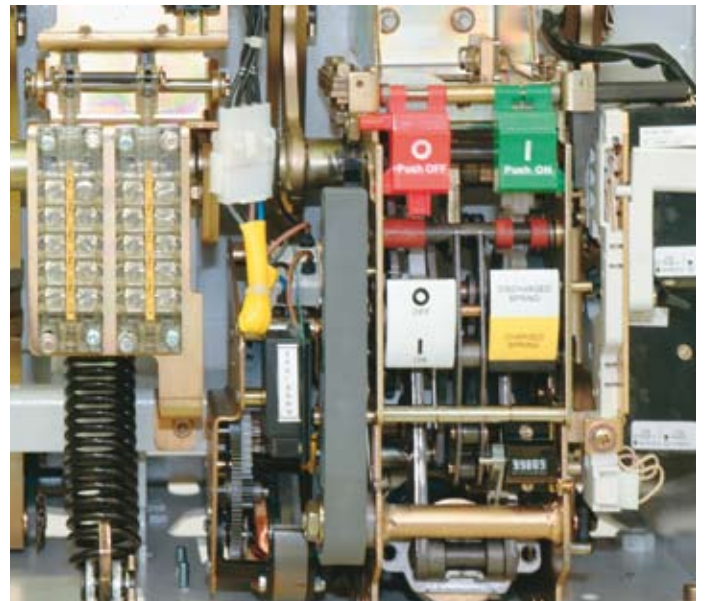
The EL operating mechanism of VD4 circuit-breakers (in all versions) is fitted with a mechanical anti-pumping device which prevents re-closing due to either electrical or mechanical commands.

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 other 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 spring fully charged
- opening pushbutton and/or shunt opening release (-MO1/-MO2) not activated
- circuit-breaker open.



3. Specific product characteristics

REF 601 protection Device



On request, the REF 601 switchgear protection device is available for protection of the installations, which requires an auxiliary power supply for its operation unlike the previous PR512 which was a self-supplied release.

The REF 601 has protections and trip curves in accordance with the IEC 255-3 Standard. It sees to the protection function against overload (51), against instantaneous and delayed short-circuit (50-51) and against instantaneous and delayed homopolar ground fault (50N and 51N). It also detects the second harmonic component to prevent unwarranted tripping on connection of a transformer (68).

The unit has 3 inputs from current sensors of the type with Rogowsky coil, one input from external toroidal CT and from the keyboard 4 rated currents can be set: 40, 80, 250 and 1250 A.

If the unit is connected to 3 current sensors, the 50N and 51N protection functions are carried out with the vectorial sum of the phase currents; if only 2 current sensors are used, then the external toroidal current transformer must be provided for functions 50N and 51N.

The external toroidal current transformer can be with openable core or closed and with any transformation ratio as long with a 1 A secondary current.

The ABB current sensors of the type with Rogowsky coil provided for REF 601, are only suitable for installation on MV insulated cables.

The characteristics of the device are:

- precision of trips
- wide adjustment ranges
- single and simultaneous adjustment of the three phases
- no limitation (due to the current sensors) to the rated breaking capacity and at the short-time withstand current of the circuit-breaker
- pushbuttons for local electrical operation of the circuit-breaker (opening and closing pushbutton)
- 5 distinct indicators: "relay in operation", "relay in trip threshold", "relay tripped", "relay tripped due to exceeding phase current", "relay tripped due to exceeding ground fault current"
- interface consisting of an LCD display and of "arrow" keys, "enter" and "esc" for easier navigation inside the "measurement", "data recording", "event recording", "settings", "configuration" and "test" menus
- three user levels: "operator" (only display, with free access, by keeping this key pressed for at least 5 sec.), "configurator" (like the previous one, but also with permission to set the protection parameters, i.e. times and thresholds, and communication, if present - access limited by a password), "administrator" (like the previous ones, but also with permission to set the password and configure the basic settings of the device, such as the rated current - access limited by a password)
- continual display of the current on the most highly loaded phase and of the round current
- recording of the value of the currents which caused the device to trip
- storage of the number of openings carried out by the device
- event register (storage of the parameters described above in the last 5 trips of the device) in a non-volatile memory
- curves " $\beta = 1$ " or " $\beta = 5$ " and curve "RI" specific for the Belgian market (only REF 601 IEC)
- circuit-breaker opening by means of an undervoltage release (only REF 601 CEI)
- version, on request, with RS485 4-wire serial communication
- MODBUS RTU full duplex protocol
- multi-voltage feeder 24 ... 240 V a.c. - d.c.

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.

Spare parts

- Shunt opening release
- Additional shunt opening release
- Undervoltage release
- Time delay device for undervoltage release
- Shunt closing release
- Spring charging geared motor with electrical signalling of spring charged
- Contact signalling geared motor protection circuit-breaker open/closed
- Contact signalling closing spring charged/discharged
- Transient contact with momentary closing during circuit-breaker opening
- Circuit-breaker auxiliary contacts
- Locking electromagnet on the operating mechanism
- Position contact of the withdrawable truck
- Contacts signalling connected/isolated
- Opening solenoid
- Key lock in open position
- Isolation interlock with the door
- Protection for opening pushbutton
- Protection for closing pushbutton
- Locking electromagnet on the withdrawable truck
- Set of six isolating contacts.

Ordering

For availability and to order spare parts, please contact our Service department, specifying the circuit-breaker serial number.