Medium Voltage Products

VD4

Medium voltage vacuum circuit-breaker
12 kV - 1250...4000 A - 63 kA
36/40.5 kV - 630...3150 A - 16...40 kA

Power and productivity
for a better world™

ABB VD4

1

DESCRIPTION

DESCRIPTION

General

The 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 medium voltage circuit-breakers.
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 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

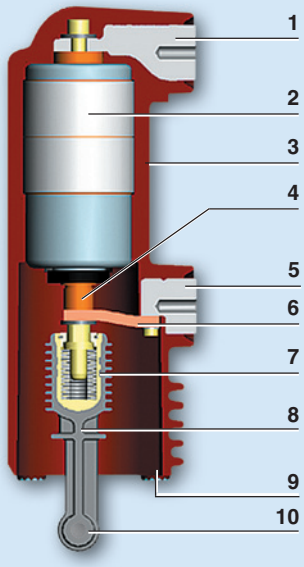
The low speed of the contacts, together with the reduced run and low mass, limit the energy required for the operation and therefore guarantee extremely limited wear of the system. The circuit-breaker therefore only requires limited maintenance.
The VD4 circuit-breakers use a mechanical operating mechanism, with stored energy and free trip. These characteristics allow opening and closing operations independent of the operator.

The 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.

- **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

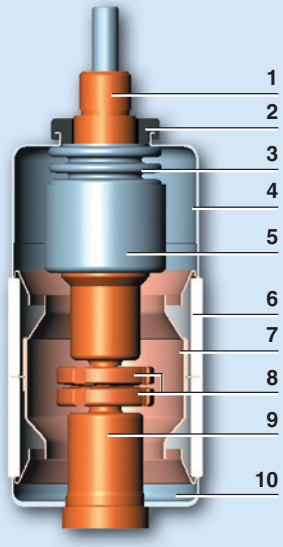


1 Upper terminal
2 Vacuum interrupter
3 Resin housing
4 Stem of moving contact
5 Lower terminal
6 Flexible connection
7 Tie-rod spring fork
8 Tie-rod
9 Pole fixing
10 Connection to operating mechanism

DESCRIPTION

Quenching principle of ABB interrupters

Vacuum interrupter



1 Stem/terminal
2 Twist protection
3 Bellows
4 Interrupter housing
5 Shield
6 Ceramic insulator
7 Shield
8 Contacts
9 Terminal
10 Interrupter housing

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

Vacuum arc – diffuse or contracted

Following contact separation, single melting points form over the entire surface of the cathode, producing metal vapours which support the arc.
The diffuse vacuum arc is characterised by expansion over the contact surface and by an even distribution of thermal stress on the contact surfaces.
At the rated current of the vacuum interrupter, the electric arc is always of the diffuse type. Contact erosion is very limited and the number of current interruptions very high.
As the interrupted current value increases (above the rated value), the electric arc tends to be transformed from the diffuse into the contracted type, due to the Hall effect.
Starting at the anode, the arc contracts and as the current rises further it tends to become sharply defined. Near the area involved there is an increase in temperature with consequent thermal stress on the contact.
To prevent overheating and erosion of the contacts, the arc is kept rotating. With arc rotation it becomes similar to a moving conductor which the current passes through

The spiral geometry of ABB vacuum interrupter contacts

The special geometry of the spiral contacts generates a radial magnetic field in all areas of the arc column, concentrated over the contact circumferences.
An electromagnetic force is self-generated and this acts tangentially, causing rapid arc rotation around the contact axis.
This means the arc is forced to rotate and to involve a wider surface than that of a fixed contracted arc.
Apart from minimising thermal stress on the contacts, all this makes contact erosion negligible and, above all, allows the interruption process to be controlled even with very high short-circuits.
ABB vacuum interrupters are zero-current interrupters and are free of any re-striking.
Rapid reduction in the current charge and rapid condensation of the metal vapours simultaneously with the zero current, allows maximum dielectric strength to be restored between the interrupter contacts within microseconds.

Versions available

The VD4 circuit-breakers are available in the fixed and withdrawable version with front operating mechanism.
The withdrawable version is available for UniGear ZS1/ZS3.2 and ZS8.4 type switchgear, PowerCube and Powerbloc modules.

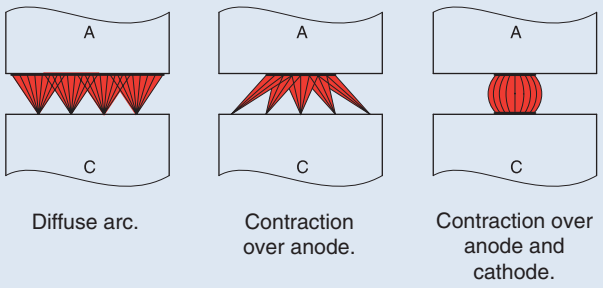
Fields of application

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.

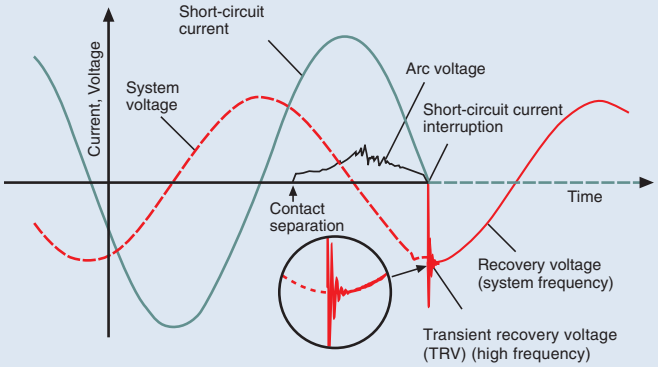
Standards and approvals

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.

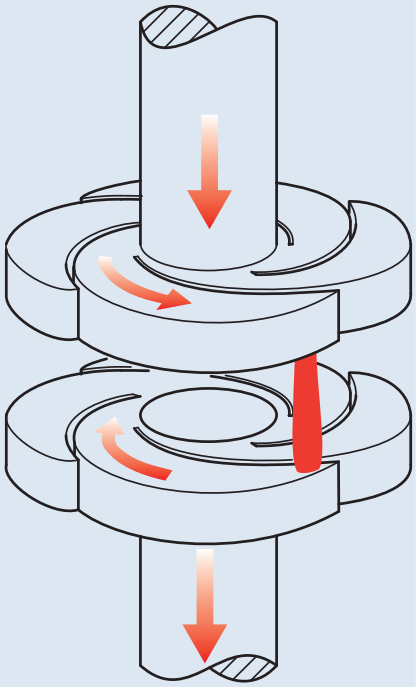
- **Type tests:** temperature rise, withstand insulation at power frequency, withstand insulation at lightning impulse, short-time and peak withstand current, mechanical life, short-circuit current making and breaking capacity, and no-load cable interruption.



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



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



Radial magnetic field contact arrangement with a rotating vacuum arc.

- **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.

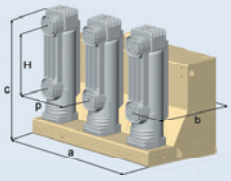
Service safety

Thanks to the complete range of mechanical and electrical locks, 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.

DESCRIPTION

Rated Voltage[1]	kV	12			
Rated frequency	Hz	50 - 60			
Rated normal current	A	630 … 4000[2]			
Rated short-circuit breaking current (symm.)	kA	16 … 31.5	40	50	63
Rated short-circuit making current	kA	40 … 80	100	125[3]	158
Rated duration of short-circuit	s	3	3	3	3
Fixed / withdrawable Version		■ / ■	■ / ■	■ / ■	■ / –
Max. overall dimensions	p (mm)	150 - 275	210 - 275	210 - 275	275
(fixed Version)	H (mm)	205 - 310	310	310	310
	a (mm)	450 - 700	600 - 750	600 - 750	750
	b (mm)	424	424[7]	459	459
	c (mm)	461 - 599[5]	599[5] [7]	608[7]	677
Weight	kg	73 - 105	94 - 180	147 - 260	260
Embedded Pole		■	■	■	
Assembled Pole					■



1) Test voltage according to DIN VDE 0670, - part 1000, list 2
2) 4000 A with forced cooling
3) Higher values on request
4) 360 mm for fixed, 280 mm for withdrawable Version
5) Circuit-breaker with heat sink 616 mm (2500 A)
6) Withdrawable Version
7) Circuit-breaker with heat sink 636 mm (3150 A)
8) 3150 A with assembled poles

For further information on the circuit-breakers with ratings 12 … 24 kV •

17.5		24	36	40.5
50 - 60		50 - 60	50 - 60	50 - 60
630 … 4000[2]		630 … 2500	630 … 3150[8]	630 … 3150[8]
16 … 31.5	40	16 … 25	16 … 40	16… 40
40 … 80	100	40 … 63	40 … 100	40 … 100
3	3	3	3	4
■ / ■	■ / ■	■ / ■	■ / ■	■ / ■
150 - 275	210 - 275	210 - 275	280 / 360[4]	280 / 360[4]
205 - 310	310	310	328	328
450 - 700	600 - 750	570 - 700	895[6] / 1000	895[6] / 1000
424	424[7]	424	555 - 686[6]	555 - 686[6]
461 - 599[5]	599[5] [7]	631 - 661	1575	1575
73 - 105	94 - 180	100 - 110	290 - 350	290 - 350
■	■	■	■	■

630 … 4000 A • 16 … 50 kA, see separate Technical Catalogue 521-01 E.

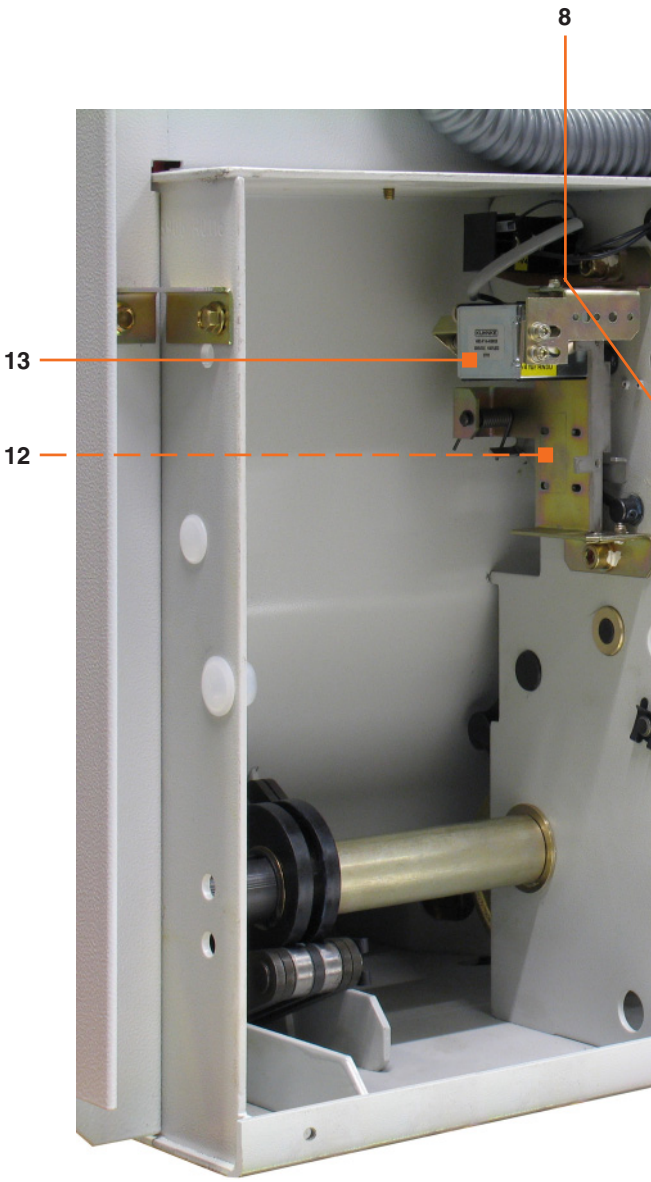
DESCRIPTION

Accessories

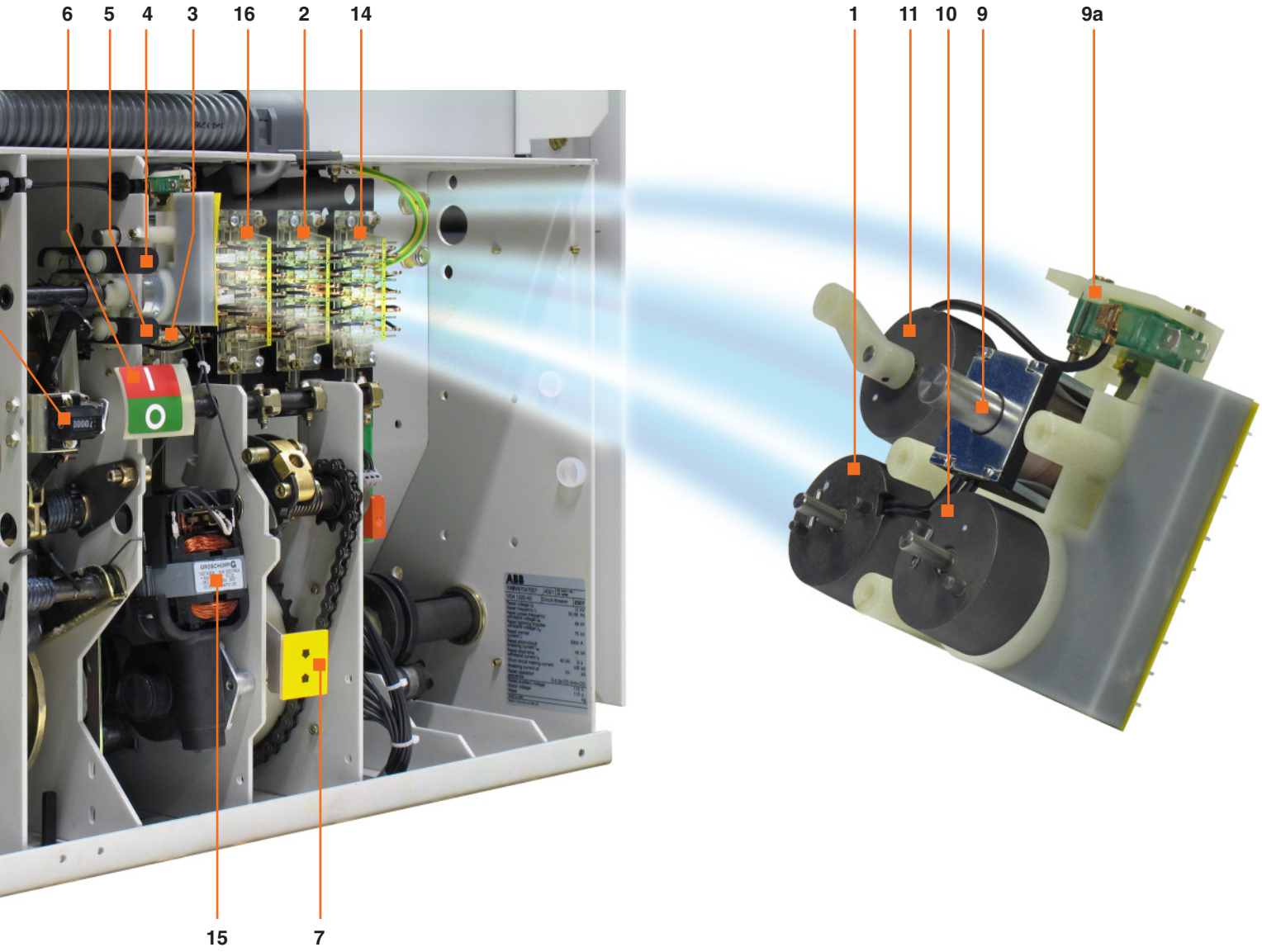
The VD4 circuit-breakers have a complete range of accessories to satisfy all installation requirements.
The operating mechanism has a standardised range of accessories and spare parts which are easy to identify and order.
The accessories are installed conveniently from the front of the circuit-breaker. Electrical connection is carried out with plug-socket connectors.
Use, maintenance and service of the apparatus are simple and require limited use of resources.

Operating mechanism

The operating mechanism is of the stored-energy spring type and acts on the three breaker poles. The necessary operating energy is stored ready for activation by charging the spring energy store.
The stored-energy spring mechanism essentially consists of drum containing the spiral spring, the charging system, the latching and operating mechanism and the linkages which transmit the force to the breaker poles. In addition, there are supplementary components such as the charging motor, releases, auxiliary switches and the controls and instruments located on the front of the mechanism enclosure.
The operating mechanism is fundamentally suitable for auto-reclosing and, due to the short charging times, also for multi-shot auto-reclosing.
The generator breaker have a built-in mechanical delay system with which the opening time is prolonged by approx. 30 ms.
In the basic version of the circuit-breaker, the spring energy store is charged manually. The operating mechanism can optionally be fitted with a charging motor.



- **Very compact dimensions**
- **Fixed and withdrawable versions**
- **Stored energy operating mechanism**
- **Embedded pole technology**
- **Circuit-breaker racking in/out with door closed**
- **Safety locks to prevent incorrect operations**
- **Excellent environmental compatibility**
- **High reliability**



The basic version of the stored-energy spring mechanism is fitted with the following auxiliary equipment:

1 Shunt release OFF -Y2 (-MO1)
2 Five-pole auxiliary switch -S4 (-BB2) for annunciation purposes
3 Auxiliary switch -S7 (-BB4) for fault annunciation
4 Mechanical ON push-button
5 Mechanical OFF push-button
6 Mechanical position indicator
7 Charging condition indicator for the spring energy store
8 Mechanical operating cycle counter

The following additional equipment can be installed:

9 Blocking magnet -Y1 (-RL1) with auxiliary switch **9a** -S2 (-BL1)
10 Shunt release ON -Y3 (-MC)
11 Second shunt release OFF -Y9 (-MO2)
12 Undervoltage release -Y4 (-MU)
13 Indirect overcurrent release -Y7 (-MO3)
14 Five-pole auxiliary switches -S3 (-BB1) and -S5 (-BB3)
15 Charging motor -M0 (-MS)
16 Five-pole auxiliary switch -S1 (-BS1) to switch the charging motor.

DESCRIPTION

Technical documentation

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

– Powerbloc	Code GCEA670498P0102
– UniGear Switchgear	Code 1VCP000138

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.


Deutsche Akkreditierungsstelle Technik (DATech) e.V.
Deutschen AkkreditierungsRat
Akkreditierung


Deutsche Akkreditierungsstelle Technik (DATech) e.V.
Deutschen AkkreditierungsRat
Accreditation

2

CIRCUIT-BREAKER SELECTION AND ORDERING

General characteristics of vacuum circuit-breakers for fixed installation

Circuit-breaker		VD4 12		
Standards	**IEC 62271-100**	■	■	■
Rated voltage	**Ur** [kV]	12	12	12
Rated insulation voltage	**Us** [kV]	12	12	12
Rated power frequency withstand voltage at 50 Hz	**Ud** (1 min) [kV]	28	28	28
Rated lightning impulse withstand voltage	**Up** [kV]	75	75	75
Rated frequency	**fr** [Hz]	50-60	50-60	50-60
Rated normal current (40 °C)	**Ir** [A]	1250	1600	2000
Rated short-circuit breaking current symmetrical	**Isc** [kA]	63	63	63
Rated short-time withstand current (3 s)	**Ik** [kA]	63	63	63
Rated short-circuit making current (peak)	**Ip** [kA]	158	158	158
Rated operating sequence	[O-3min-CO-3min-CO]	■	■	■
Rated operating sequence with auto-reclosing	[O-0.3s-CO-3min-CO]	■	■	■
Opening time	[ms]	≤ 45	≤ 45	≤ 45
Arcing time (at 50 Hz)	[ms]	≤ 15	≤ 15	≤ 15
Total breaking time	[ms]	≤ 60	≤ 60	≤ 60
Closing time	[ms]	approx. 60	approx. 60	approx. 60
Maximum overall dimensions	**H** [mm]	677.5	677.5	677.5
	W [mm]	750	750	750
	D [mm]	459	459	459
Pole centre distance	**p** [mm]	275	275	275
Weight	[kg]	265	265	265
Dimension standardized table		GCEM370562	GCEM370562	GCEM370562
Operating temperature	[°C]	-5 … +40	-5 … +40	-5 … +40
Tropicalization	**IEC 60068-2-30**	■	■	■
	IEC 721-2-1	■	■	■
Electromagnetic compatibility	**IEC 60694**	■	■	■

[1] with fan cooling

■	■	■
12	12	12
12	12	12
28	28	28
75	75	75
50-60	50-60	50-60
2500	3150	4000 [1]
63	63	63
63	63	63
158	158	158
■	■	■
■	■	■
≤ 45	≤ 45	≤ 45
≤ 15	≤ 15	≤ 15
≤ 60	≤ 60	≤ 60
approx. 60	approx. 60	approx. 60
677.5	677.5	677.5
750	750	750
459	459	459
275	275	275
265	265	265
GCEM370562	GCEM700116	GCEM700116
-5 … +40	-5 … +40	-5 … +40
■	■	■
■	■	■
■	■	■

VD4 fixed circuit-breaker without bottom and top terminals

Ur	Isc	Rated normal current (40°C) [A]	
kV	kA	H = 677.5 with heat sinking D = 459 u/l = 310 l/g = 237	Circuit-breaker type
		p = 275 W = 750	
12	63	1250	VD4 12.12.63 p275
	63	1600	VD4 12.16.63 p275
	63	2000	VD4 12.20.63 p275
	63	2500	VD4 12.25.63 p275
	63	3150	VD4 12.31.63 p275
	63	4000 [1]	VD4 12.40.63 p275 [1]

Notes

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

General characteristics of vacuum circuit-breakers for fixed installation

Circuit-breaker		VD4 36					
Standards	**IEC 62271-100**	■	■	■	■	■	■
Rated voltage	**Ur** [kV]	36	36	36	36	36	36
Rated insulation voltage	**Us** [kV]	36	36	36	36	36	36
Rated power frequency withstand voltage at 50 Hz	**Ud** (1 min) [kV]	95	95	95	95	95	95
Rated lightning impulse withstand voltage	**Up** [kV]	185	185	185	185	185	185
Rated frequency	**fr** [Hz]	50-60	50-60	50-60	50-60	50-60	50-60
Rated normal current (40 °C)	**Ir** [A]	630	1250	1600	2000	2500 [2]	3150 [1]
Rated short-circuit breaking current symmetrical	**Isc** [kA]	16 20	16 25 25 31.5 40	25 31.5 40	25 31.5 40	25 31.5 40	25 31.5
Rated short-time withstand current (3 s)	**Ik** [kA]	16 20	16 25 25 31.5 40	25 31.5 40	25 31.5 40	25 31.5 40	25 31.5
Rated short-circuit making current (peak)	**Ip** [kA]	40 50	40 50 63 80 100	63 80 100	63 80 100	63 80 100	63 80
Rated operating sequence	[O-3min-CO-3min-CO]	■	■	■	■	■	■
Rated operating sequence with auto-reclosing	[O-0.3s-CO-3min-CO]	■	■	■	■	■	■
Opening time	[ms]	≤ 45	≤ 45	≤ 45	≤ 45	≤ 45	≤ 45
Arcing time (at 50 Hz)	[ms]	≤ 15	≤ 15	≤ 15	≤ 15	≤ 15	≤ 15
Total breaking time	[ms]	≤ 60	≤ 60	≤ 60	≤ 60	≤ 60	≤ 60
Closing time	[ms]	approx. 60	approx. 60	approx. 60	approx. 60	approx. 60	approx. 60
Maximum overall dimensions	**H** [mm]	1575	1575	1575	1575	1575	1575
	W [mm]	1000	1000	1000	1000	1000	1000
	D [mm]	555	555	555	555	555	555
Pole centre distance	**p** [mm]	360	360	360	360	360	360
Weight	[kg]	320	320	320	355	355	355
Dimension standardized table		GCEM700198	GCEM700198	GCEM700198	GCEM700198	GCEM700198	GCEM700198
Operating temperature	[°C]	-5 … +55	-5 … +55	-5 … +55	-5 … +55	-5 … +55	-5 … +55
Tropicalization	**IEC 60068-2-30**	■	■	■	■	■	■
	IEC 721-2-1	■	■	■	■	■	■
Electromagnetic compatibility	**IEC 60694**	■	■	■	■	■	■

[1] 3150 A with assembled poles [2] Ambient temperature ≤40° C

	VD4 40.5					
	■	■	■	■	■	■
	40.5	40.5	40.5	40.5	40.5	40.5
	40.5	40.5	40.5	40.5	40.5	40.5
	95	95	95	95	95	95
	200	200	200	200	200	200
	50-60	50-60	50-60	50-60	50-60	50-60
	630	1250	1600	2000	2500 [2]	3150 [1]
	16	16				
	20	20				
		25	25	25	25	25
		31.5	31.5	31.5	31.5	31.5
		40	40	40	40	
	16	16				
	20	20				
		25	25	25	25	25
		31.5	31.5	31.5	31.5	31.5
		40	40	40	40	
	40	40				
	50	50				
		63	63	63	63	63
		80	80	80	80	80
		100	100	100	100	
	■	■	■	■	■	■
	■	■	■	■	■	■
	≤ 45	≤ 45	≤ 45	≤ 45	≤ 45	≤ 45
	≤ 15	≤ 15	≤ 15	≤ 15	≤ 15	≤ 15
	≤ 60	≤ 60	≤ 60	≤ 60	≤ 60	≤ 60
	approx. 60	approx. 60	approx. 60	approx. 60	approx. 60	approx. 60
	1575	1575	1575	1575	1575	1575
	1000	1000	1000	1000	1000	1000
	555	555	555	555	555	555
	360	360	360	360	360	360
	320	320	290	340	340	355
	GCEM700198	GCEM700198	GCEM700198	GCEM700198	GCEM700198	GCEM700198
	-5 … +55	-5 … +55	-5 … +55	-5 … +55	-5 … +55	-5 … +55
	■	■	■	■	■	■
	■	■	■	■	■	■
	■	■	■	■	■	■

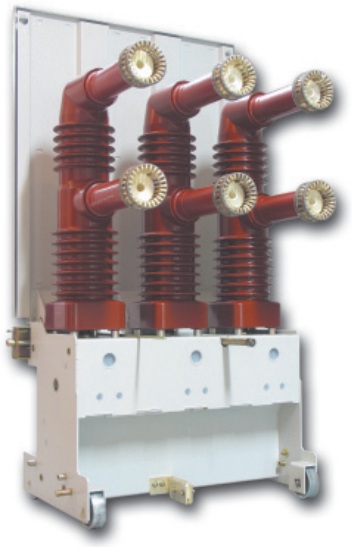
VD4 fixed circuit-breaker without bottom and top terminals

Ur	Isc	Rated normal current (40°C) [A]	
kV	kA	H = 1575 D = 452 u/l = 328 l/g = 900	Circuit-breaker type
		p = 360 W = 1000	
36	16	630	VD4 36.06.16 p360
	20	630	VD4 36.06.20 p360
	16	1250	VD4 36.12.16 p360
	20	1250	VD4 36.12.20 p360
	25	1250	VD4 36.12.25 p360
	31.5	1250	VD4 36.12.31 p360
	40	1250	VD4 36.12.40 p360
	25	1600	VD4 36.16.25 p360
	31.5	1600	VD4 36.16.31 p360
	40	1600	VD4 36.16.40 p360
	25	2000	VD4 36.20.25 p360
	31.5	2000	VD4 36.20.31 p360
	40	2000	VD4 36.20.40 p360
	25	2500	VD4 36.25.25 p360
	31.5	2500	VD4 36.25.31 p360
	40	2500	VD4 36.25.40 p360
	25	3150 [1]	VD4 36.31.25 p360
	31.5	3150 [1]	VD4 36.31.31 p360
40.5	16	630	VD4 40.06.16 p360
	20	630	VD4 40.06.20 p360
	16	1250	VD4 40.12.16 p360
	20	1250	VD4 40.12.20 p360
	25	1250	VD4 40.12.25 p360
	31.5	1250	VD4 40.12.31 p360
	40	1250	VD4 40.12.40 p360
	25	1600	VD4 40.16.25 p360
	31.5	1600	VD4 40.16.31 p360
	40	1600	VD4 40.16.40 p360
	25	2000	VD4 40.20.25 p360
	31.5	2000	VD4 40.20.31 p360
	40	2000	VD4 40.20.40 p360
	25	2500	VD4 40.25.25 p360
	31.5	2500	VD4 40.25.31 p360
	40	2500	VD4 40.25.40 p360
	25	3150 [1]	VD4 40.31.25 p360
	31.5	3150 [1]	VD4 40.31.31 p360

Notes

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

General characteristics of vacuum circuit-breakers on withdrawable part 36 kV / 40.5 kV for UniGear ZS3.2 and Powerbloc



Circuit-breaker		VD4 36					
Standards	**IEC 62271-100**	■	■	■	■	■	■
Rated voltage	**Ur** [kV]	36	36	36	36	36	36
Rated insulation voltage	**Us** [kV]	36	36	36	36	36	36
Rated power frequency withstand voltage at 50 Hz	**Ud** (1 min) [kV]	95	95	95	95	95	95
Rated lightning impulse withstand voltage	**Up** [kV]	185	185	185	185	185	185
Rated frequency	**fr** [Hz]	50-60	50-60	50-60	50-60	50-60	50-60
Rated normal current (40 °C)	**Ir** [A]	630	1250	1600	2000	2500	3150 [1]
Rated short-circuit breaking current symmetrical	**Isc** [kA]	16 20	16 25 25 31.5 40	25 31.5 40	25 31.5 40	25 31.5 40	25 31.5
Rated short-time withstand current (3 s)	**Ik** [kA]	16 20	16 25 25 31.5 40	25 31.5 40	25 31.5 40	25 31.5 40	25 31.5
Rated short-circuit making current (peak)	**Ip** [kA]	40 50	40 50 63 80 100	63 80 100	63 80 100	63 80 100	63 80
Rated operating sequence	[O-3min-CO-3min-CO]	■	■	■	■	■	■
Rated operating sequence with auto-reclosing	[O-0.3s-CO-3min-CO]	■	■	■	■	■	■
Opening time	[ms]	≤ 45	≤ 45	≤ 45	≤ 45	≤ 45	≤ 45
Arcing time (at 50 Hz)	[ms]	≤ 15	≤ 15	≤ 15	≤ 15	≤ 15	≤ 15
Total breaking time	[ms]	≤ 60	≤ 60	≤ 60	≤ 60	≤ 60	≤ 60
Closing time	[ms]	approx. 60	approx. 60	approx. 60	approx. 60	approx. 60	approx. 60
Maximum overall dimensions	**H** [mm]	1575	1575	1575	1575	1575	1575
	W [mm]	840	840	840	840	840	840
	D [mm]	685	685	685	685	685	685
Pole centre distance	**p** [mm]	280	280	280	280	280	280
Weight	[kg]	290	290	290	340	340	
Dimension standardized table		GCEM700198	GCEM700198	GCEM700198	GCEM700198	GCEM700198	GCEM700198
Operating temperature	[°C]	-5 … +55	-5 … +55	-5 … +55	-5 … +55	-5 … +55	-5 … +55
Tropicalization	**IEC 60068-2-30**	■	■	■	■	■	■
	IEC 721-2-1	■	■	■	■	■	■
Electromagnetic compatibility	**IEC 60694**	■	■	■	■	■	■

[1] 3150 A with assembled poles

	VD4 40.5					
	■	■	■	■	■	■
	40.5	40.5	40.5	40.5	40.5	40.5
	40.5	40.5	40.5	40.5	40.5	40.5
	95	95	95	95	95	95
	200	200	200	200	200	200
	50-60	50-60	50-60	50-60	50-60	50-60
	630	1250	1600	2000	2500	3150 [1]
	16	16				
	20	20				
		25	25	25	25	25
		31.5	31.5	31.5	31.5	31.5
		40	40	40	40	
	16	16				
	20	20				
		25	25	25	25	25
		31.5	31.5	31.5	31.5	31.5
		40	40	40	40	
	40	40				
	50	50				
		63	63	63	63	63
		80	80	80	80	80
		100	100	100	100	
	■	■	■	■	■	■
	■	■	■	■	■	■
	≤ 45	≤ 45	≤ 45	≤ 45	≤ 45	≤ 45
	≤ 15	≤ 15	≤ 15	≤ 15	≤ 15	≤ 15
	≤ 60	≤ 60	≤ 60	≤ 60	≤ 60	≤ 60
	approx. 60	approx. 60	approx. 60	approx. 60	approx. 60	approx. 60
	1575	1575	1575	1575	1575	1575
	840	840	840	840	840	840
	685	685	685	685	685	685
	280	280	280	280	280	280
	320	320	290	340		
	GCEM700198	GCEM700198	GCEM700198	GCEM700198	GCEM700198	GCEM700198
	-5 … +55	-5 … +55	-5 … +55	-5 … +55	-5 … +55	-5 … +55
	■	■	■	■	■	■
	■	■	■	■	■	■
	■	■	■	■	■	■

Types of withdrawable circuit-breakers for the UniGear ZS3.2 and Powerbloc

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

Ur	Isc	Rated normal current (40°C) [A]	
kV	kA	H = 1575 D = 685 u/l = 328 l/g = 900	Circuit-breaker type
		p = 280 W = 840	
36	16	630	VD4 36.06.16 p280
	20	630	VD4 36.06.20 p280
	16	1250	VD4 36.12.16 p280
	20	1250	VD4 36.12.20 p280
	25	1250	VD4 36.12.25 p280
	31.5	1250	VD4 36.12.31 p280
	40	1250	VD4 36.12.40 p280
	25	1600	VD4 36.16.25 p280
	31.5	1600	VD4 36.16.31 p280
	40	1600	VD4 36.16.40 p280
	25	2000	VD4 36.20.25 p280
	31.5	2000	VD4 36.20.31 p280
	40	2000	VD4 36.20.40 p280
	25	2500	VD4 36.25.25 p280
	31.5	2500	VD4 36.25.31 p280
	40	2500	VD4 36.25.40 p280
	25	3150	VD4 36.31.25 p280 [1]
	31.5	3150	VD4 36.31.31 p280 [1]
40.5	16	630	VD4 40.06.16 p280
	20	630	VD4 40.06.20 p280
	16	1250	VD4 40.12.16 p280
	20	1250	VD4 40.12.20 p280
	25	1250	VD4 40.12.25 p280
	31.5	1250	VD4 40.12.31 p280
	40	1250	VD4 40.12.40 p280
	25	1600	VD4 40.16.25 p280
	31.5	1600	VD4 40.16.31 p280
	40	1600	VD4 40.16.40 p280
	25	2000	VD4 40.20.25 p280
	31.5	2000	VD4 40.20.31 p280
	40	2000	VD4 40.20.40 p280
	25	2500	VD4 40.25.25 p280
	31.5	2500	VD4 40.25.31 p280
	40	2500	VD4 40.25.40 p280
	25	3150	VD4 40.31.25 p280 [1]
	31.5	3150	VD4 40.31.31 p280 [1]

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

Optional accessories

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

1 Shunt release -MO1 (-Y2)

The shunt release OFF can be used to trip the circuit-breaker by remote control or by means of separately located protection relays. The first shunt release OFF is part of the standard equipment in the panel. Auxiliary switch -BB2 (-S4) is required for disconnection and is always included in the scope of supply.

Properties

U_a: 24 - 30 - 48 - 60 - 110 - 125 - 220 - 240 V-	
U_a: 100 - 110 - 125 - 220 - 230 - 240 V ~ 50 … 60 Hz	
Service tolerances:	DC 70 … 110 % U_a AC 85 … 110 % U_a
Short time power consumption:	approx. DC 250 W; approx. AC 250 VA
Maximum permissible duty time:	8 s

2 Additional shunt release -MO2 (-Y9)

The additional (second) shunt release OFF has the same function as -MO1. The second shunt release OFF is optional and, for disconnection, requires auxiliary switch -BB1 (-S3) which is included in the scope of supply.

Properties

U_a: 24 - 30 - 48 - 60 - 110 - 125 - 220 - 240 V-	
U_a: 100 - 110 - 125 - 220 - 230 - 240 V ~ 50 … 60 Hz	
Service tolerances:	DC 70 … 110 % U_a AC 85 … 110 % U_a
Short time power consumption:	approx. DC 250 W; approx. AC 250 VA
Maximum permissible duty time:	8 s

3 Shunt release ON -MC (-Y3)

The shunt release ON is used for remote controlled closing of the circuit-breaker. Auxiliary switch BS1(S1) enables the release when the spring is charged. Auxiliary switch BB1(S3) is used for disconnection. Both are necessary and are included in the scope of supply. The release is optional on breakers with manual operating mechanisms and included in the scope of supply for breakers with charging motors.
The scope of supply for the closing release also includes antipumping relay -K0. The antipumping relay prevents repeated closing and opening cycles when, for example, the circuit-breaker is tripped by a protection relay in response to a primary circuit fault and a permanent electrical closing command is active at the same time. Closing of the circuit-breaker is then only enabled again when the active closing command has been interrupted.

Properties

U_a: 24 - 30 - 48 - 60 - 110 - 125 - 220 - 240 V-	
U_a: 100 - 110 - 125 - 220 - 230 - 240 V ~ 50 … 60 Hz	
Service tolerances:	DC; AC 70 … 110 % U_a
Short time power consumption:	approx. DC 250 W; approx. AC 250 VA
Maximum permissible duty time:	8 s

4 Blocking magnet -RL1 (-Y1) with auxiliary switch -BL1 (-S2)

When de-energized, the blocking magnet prevents closing of the circuit-breaker. A voltage must be applied to the blocking magnet for at least 100 ms in advance of the closing command. Auxiliary switch -BL1(-S2) is necessary and included in the scope of supply.

Properties

U_a: 24 - 30 - 48 - 60 - 110 - 125 - 220 - 240 V-	
U_a: 100 - 110 - 125 - 220 - 230 - 240 V ~ 50 … 60 Hz	
Service tolerances:	DC; AC 85 … 110 % U_a
Short time power consumption:	approx. DC 10 W; approx. AC 10 VA
Maximum permissible duty time:	unlimited

5 Undervoltage release -MU (-Y4)

The undervoltage release switches the circuit-breaker off on failure of the corresponding supply voltage. It trips at the earliest as soon as the rated voltage falls below 70% of its rated level, and at the latest when the voltage is 30% of the rated level. The circuit-breaker can only be closed again when the voltage has risen to 85% of its rated level. The undervoltage release normally functions instantaneously, but can also be fitted with an electronic delay.

Properties of the undelayed version

U_a: 24 - 30 - 48 - 60 - 110 - 125 - 220 V-	
U_a: 100 - 110 - 125 - 220 V ~ 50 … 60 Hz	
Power consumption:	approx. DC 10 W; approx. AC 11 VA
Maximum service tolerance:	110 % U_a
Voltage for closing readyness:	> 85 % U_N
Tripping voltage:	30 … 70 % U_a
Operate time:	immediate
Maximum permissible duty time:	any

Electronic delay system -KT (-RN3U)

If opening of the circuit-breaker during brief voltage fluctuations or interruptions is to be prevented, the undervoltage release can be connected to a time-delay undervoltage relay (-RN3U). The undervoltage relay is to be mounted outside the circuit-breaker and connected to the voltage to be monitored. The supply voltage is 100-110V, 50/60 Hz. For other supply voltages, a matching transformer is to be connected in series.
If the voltage transformer intended for supply of the -RN3U is installed in the outgoing feeder of the circuit-breaker, the undervoltage release must be supplied with a battery voltage of 110V DC as a closing aid.

Properties

U_a: 100 - 110 V ~ 50 … 60 Hz	
Power consumption:	approx. AC 10 VA
Service tolerance:	… 110 % U_a
Voltage for closing readyness:	> 70 % U_a
Tripping votage:	< 70 % U_a
a) Standard:	Operate time 0,5…4 s, adjustable in steps of 0,5s
b) When closing aid is used:	Operate time 0,5…2 s, adjustable in steps of 0,5s with adapted coil
Maximum permissible duty time:	any

6 Indirect overcurrent release -MO3 (-Y7)

The use of indirect overcurrent releases can be provided for in switchgear systems without a reliable auxiliary power supply. They receive their tripping current from the secondary winding of the main current transformer via an intermediate current transformer or an overvoltage time delay relay.
In continuous operation, the secondary winding of the indirect overcurrent release is short-circuited by auxiliary switches.

Properties

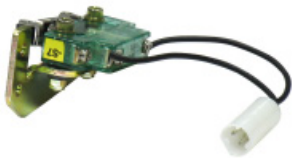
Power consumption in continuous:	Connection to two phases 3,5 VA Connection to three phases 2 VA
Power consumption on tripping:	approx. 15 VA
Tripping readyness:	70 % I_N
Power consumption of the intermediate current transformer at I_N = 5 A and continuous operation (secondary winding short-circuited):	Winding A 1 VA Winding B 1 VA Winding C 1,5 VA
Power consumption of the intermediate current transformer at I_N = 5 A and continuous operation (secondary winding open):	Winding A 15 VA Winding B 15 VA Winding C 25 VA
Primary current of the intermediate current transformer:	3 x 5 A
Secondary current of the intermediate current transformer:	~ 0,4 A

7 Auxiliary switch arrangement -BS1 -BB1 -BB2 -BB3 (-S1 -S3 -S4 -S5)

The circuit-breakers can be equipped with 5-pole auxiliary switches for control, interlock and signaling purposes. Auxiliary switch -BB2(-S4) belongs to the basic equipment for all breakers. Auxiliary switches -BS1(-S1) and -BB1 (-S3) belong to the basic equipment for breakers with motorized operating mechanisms. Auxiliary switch -BB3(-S5) is optional. See also the circuit diagrams.

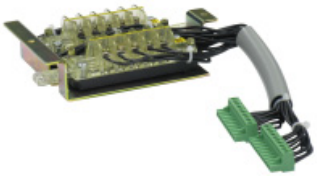
Properties

U_a:	24 … 250 V
Test voltage:	2,5 kV
Rated current:	I_{th2} = 10 A



8 Auxiliary switch for fault indication -BB4 (-S7)

Auxiliary switch–BB4(-S7), also known as a fleeting contact, belongs to the basic equipment for all circuit-breakers. It is used to signal that the breaker has tripped (fleeting signal 30ms).



9 Contacts in the withdrawable assembly -BT1 -BT2 (-S8 -S9)

The auxiliary contacts signal whether the circuit-breaker is in the test position or service position. In intermediate positions, the breaker is mechanically blocked.

Properties

U_a:	24 … 250 V
Test voltage:	2,5 kV
Rated current:	I_{th2} = 10 A

10 Motorized mechanism -MS (-M0)

On circuit-breakers with motorized mechanisms, the spiral spring is automatically charged by the electric motor installed in the mechanism enclosure after each closing operation.

Properties of Groschopp-Motor

U_a:	24 - 30 - 48 - 60 - 110 - 125 - 220 - 240 V-
U_a:	110 - 240 V ~ 50 … 60 Hz
Charging time:	max. 15 s
Recharging time:	max. 15 s
Service tolerances:	85 … 110 % U_a
Power consumption during charging:	approx. DC 230 … 260 W ; approx. AC 260 VA
Weight:	1,5 kg

Motor fuses:

	Rated supply voltage V	Power consumption VA/W	Motor fuse (ABB-Stotz mcb) A	Charging time (maximum) S
AC	110	260	1,6 S 281 UC-K	10
	220	260	0,75	10
	240	260	0,75	10
DC	110	230	1,60	10
	125	260	1,60	10
	220	240	0,75	10
	240	260	0,75	10
	24			15
	30			15
	48			15
	60			15

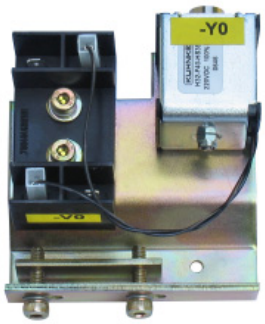
Properties of Gefeg-Motor

U_a:	24 - 48 - 60 - 110 - 125 - 220 - 240 V-
U_a:	110 - 240 V ~ 50 … 60 Hz
Charging time:	max. 15 s
Recharging time:	max. 15 s
Service tolerances:	85 … 110 % U_a
Power consumption during charging:	app. DC 130 … 140 W ; app. AC 150 – 170 VA
Weight:	1,5 kg

Motor fuses:

	Rated supply voltage V	Power consumption VA/W	Motor fuse (ABB-Stotz mcb) A	Charging time (maximum) S
AC	110	150	1,6 S 281 UC-K	15
	220	150	0,75	15
	240	170	0,75	15
DC	24	130	4,0 S 282 UC-K	15
	48	130	3,00	15
	60	130	2,00	15
	110	140	1,00 / 1,60 *	10
	125	160	1,00 / 1,60 *	15
	220	140	0,75	15
	240	150	0,75	15

* VD4 63 kA motor



11 Blocking magnet on the withdrawable part -RL2 (-Y0)

The blocking magnet on the withdrawable part prevents movement of the circuit-breaker without auxiliary voltage applied.

Properties

U_a:	24 - 30 - 48 - 60 - 110 - 125 - 220 - 240 V-
U_a:	100 - 110 - 125 - 220 - 230 - 240 V ~ 50 … 60 Hz
Service tolerances:	DC; AC 85 … 110% U_a
Power consumption:	approx. DC 10 W; approx. AC 10 VA
Maximum permissible duty time:	unlimited

12 Motorized withdrawable assembly -MT (-M1)

The motorized withdrawable assembly permits electrical insertion and withdrawal of the circuit-breaker both locally and by teleservicing commands.

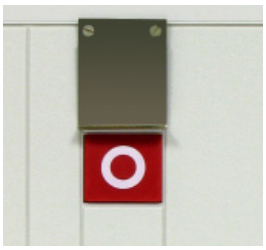
Properties

U_a:	24 - 30 - 48 - 60 - 110 - 220 V-
Insertion/withdrawal running time:	approx. 20 s
Weight:	approx. 0,8 kg

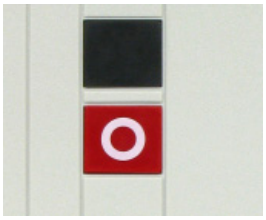
13 ON and OFF buttons (Standard)

14 ON lock switch (also available in opposite closing direction)

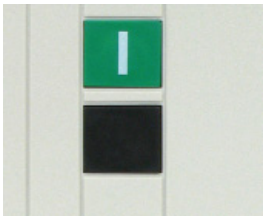
15 ON blanking cap



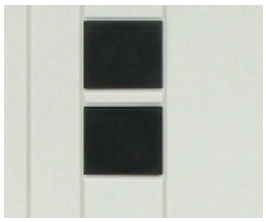
16 Dummy ON button



17 Dummy OFF button

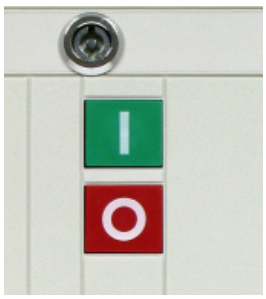


18 Dummy ON and OFF buttons

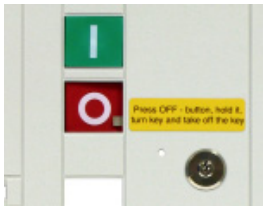


19 Blocking magnet deactivator

When the blocking magnet deactivator is used, the circuit-breaker can be operated even without auxiliary voltage applied.



20 Cover with closing lock-out



21 Position signaling contact -BT3 (-S6) – non-standard!

The position signaling contact is used for circuit-breakers on withdrawable assemblies to prevent closing of the circuit-breaker by remote control during insertion.

3

Resistance to vibrations

VD4 circuit-breakers are unaffected by mechanically generated vibrations.
For the versions approved by the naval registers, please contact us.

Tropicalization

VD4 circuit-breakers are manufactured in compliance with the strictest regulations regarding use in hot-humid-saline climates.
All the most important metal components are treated against corrosive factors according to UNI 3564-65 Standards environmental class C.
Galvanisation is carried out in accordance with UNI ISO 2081 Standards, classification code Fe/Zn 12, with a thickness of $12x10^{-6}$ 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 Bd: Damp Heat, cyclic) Standards.

Altitude

The insulating property of air decreases as the altitude increases, therefore this must always be taken into account for external insulation of the apparatus (the internal insulation of the interrupters does not undergo any variations as it is guaranteed by the vacuum).
The phenomenon must always be taken into consideration during the design stage of the insulating components of apparatus to be installed over 1000 m above sea level.
In this case a correction coefficient must be considered, which can be taken from the graph on the next page, built up on the basis of the indications in the IEC 60694 Standards.
The following example is a clear interpretation of the indications given above.

Graph for determining the Ka correction factor according to the altitude

H = altitude in metres;
m = value referred to power frequency and the lightning impulse withstand voltages and those between phase and phase.

Example

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

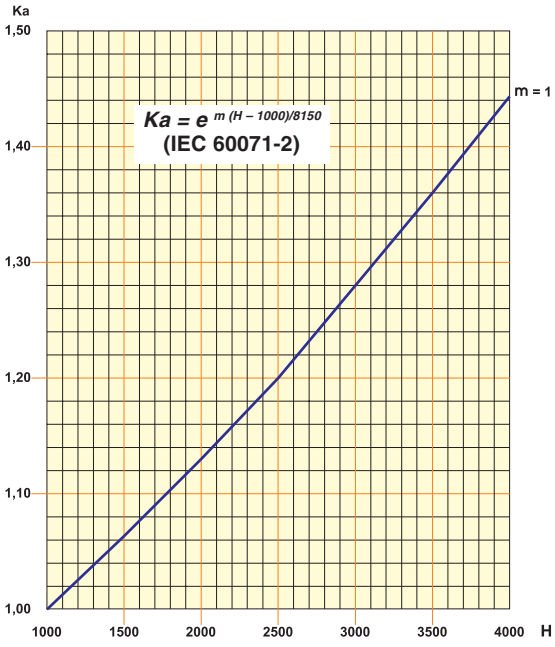
Considering the above parameters, the apparatus will have to withstand the following values (under test and at zero altitude, i.e. at sea level):
– withstand voltage at power frequency equal to:

28 x 1.13 = 31.6 kVrms

– impulse withstand voltage equal to:

75 x 1.13 = 84.7 kVp.

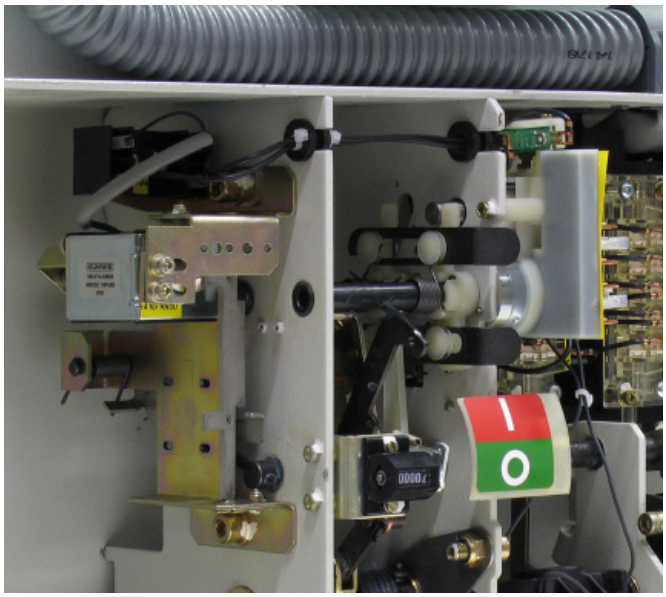
From the above, it can be deduced that for installations at an altitude of 2000 m above sea level, with 12 kV service voltage, apparatus must be provided with 17.5 kV rated voltage, characterised by insulation levels at power frequency of 38 kVrms with 95 kVp impulse withstand voltage.

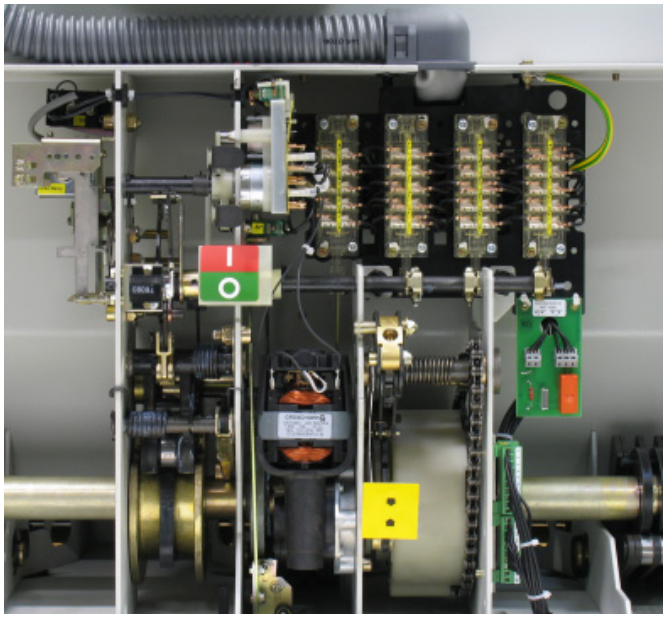


Function of the spring energy store

Charging of the spring energy store

To provide the necessary motive energy, the spring energy store, either charged automatically by a charging motor or manually in a vertical pumping action with charging lever, depending on the equipment fitted to the circuit-breaker. The current charging condition is shown at charging condition indicator.
As a precondition for an auto-reclosing sequence, the operating mechanism is either (re-)charged after a closing operation automatically by the charging motor, or it requires (re-)charging by hand if the operating mechanism is of the manual type.





Closing procedure

The closing process is started by the mechanical ON push-button, or by activation of shunt release ON -Y3 (-MC1). The release mechanism then permits drive shaft to be rotated by the (previously) charged spiral spring. The moving contact in vacuum interrupter is moved until the contacts touch by cam disk and further kinematic links. In the further sequence of motion, spring arrangement is tensioned and the appropriate amount of contact force thus applied. The available overtravel is higher than the maximum value of contact erosion during lifetime of the interrupter. During the closing process, opening springs are simultaneously tensioned.

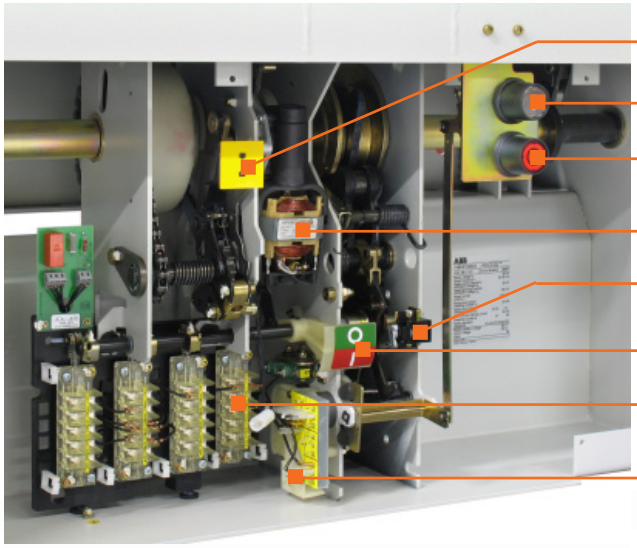
Opening procedure

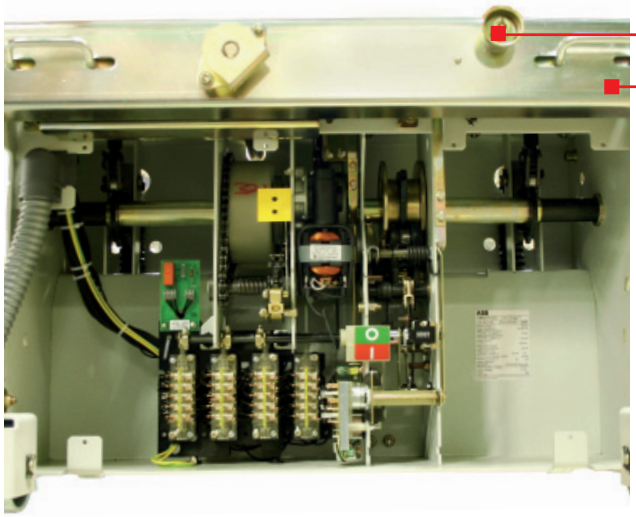
The opening procedure is initiated by mechanical OFF push-button or by activation of one of releases -Y2 (-MO1), -Y4 (-MU), -Y7 (-MO3) or -Y9 (-MO2). Observe the notes in section 3.2.1 on control of the releases. Release mechanism then permits drive shaft to be turned further by the spring energy store, which is still sufficiently charged. Opening spring , which is thus released, moves contact into the open position at a defined speed.

Auto-reclosing sequence

An OFF-ON or OFF-ON-OFF auto-reclosing sequence is activated and checked by the protection system. It is necessary for the spiral spring in the operating mechanism to be in the (re-)charged condition, with the circuit-breaker in the closed position. The (re-)charging process is carried out automatically after closing of the breaker on breakers with motor charging mechanisms, but must be carried out manually on breakers without charging motors (or when the charging motor has broken down). Opening of the breaker is also possible during the (re-)charging process, but subsequent closing of the breaker is however blocked until the charging process has been completed.

Vacuum circuit-breaker for fixed installation and withdrawable parts 36 kV / 40.5 kV





Spare parts

– Block Magnet on truck with rectifier -TR5 (-V0)
– Closing block magnet with rectifier -TR4 (-V1)
– 1. Shunt release OFF with rectifier -TR1 (-V2)
– Closing release with rectifier -TR3 (-V3)
– Undervoltage release U< with rectifier -TR6 (-V4)
– Indirect overcurrent release
– 2. Shunt release OFF with rectifier -TR2 (-V9)
– Charging motor
– Antipumping relay
– Auxiliary switch on mechanism
– Auxiliary switch on block magnet -RL1 (-Y1)
– Auxiliary switch on switch shaft
– Auxiliary switch on switch shaft
– Auxiliary switch on switch shaft
– Auxiliary switch at c.b.-unit
– Fleeting contact 35 ms for c.b. tripped indication
– Limit switch test position
– Limit switch service position

Ordering

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

4

OVERALL DIMENSIONS

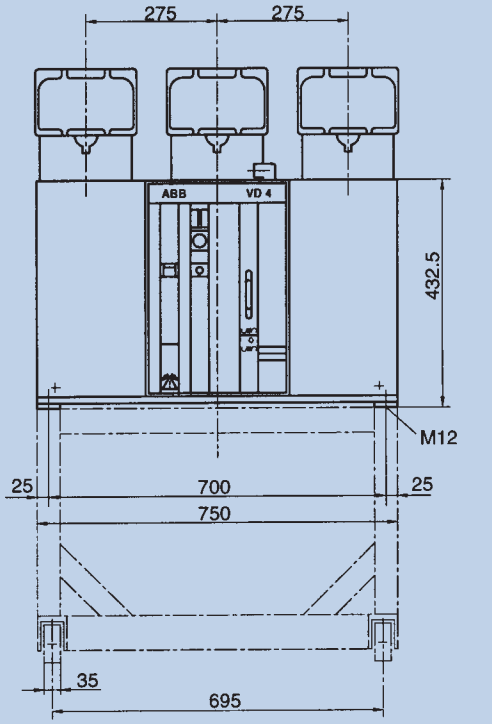
OVERALL DIMENSIONS

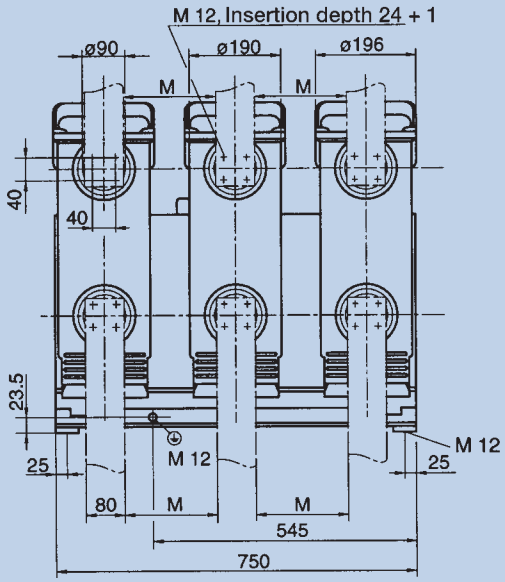
Vacuum circuit-breakers for fixed installation 12 kV

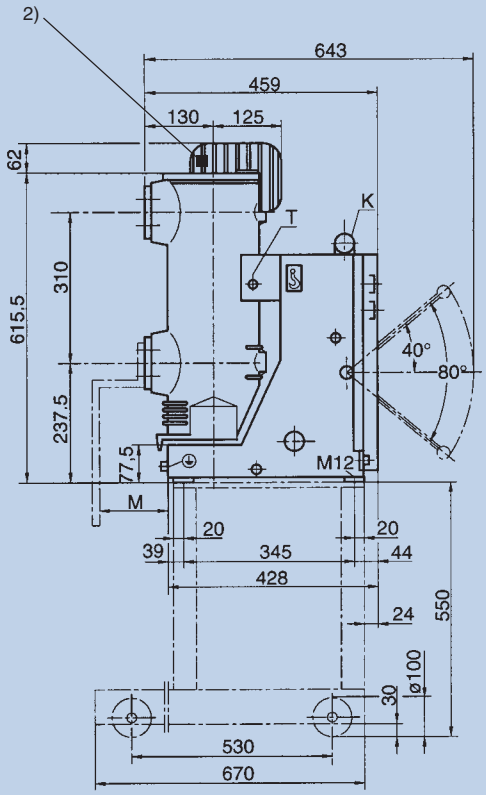
VD4		
GCEM370562		
Ur	12	kV
Ir	1250	A
	1600	A
	2000	A
	2500	A
Isc	63	kA

VD4		
GCEM700116		
Ur	12	kV
Ir	3150	A
	4000	A [1]
Isc	63	kA

[1] with fan cooling
[2] for rated current 3150/4000 A







K = Cable entry
M = Minimum distance, corresponding to dimension a to DIN VDE 0101
T = Bore for handling, both sides
⏚ = Earthing conductor connection - use contact washer

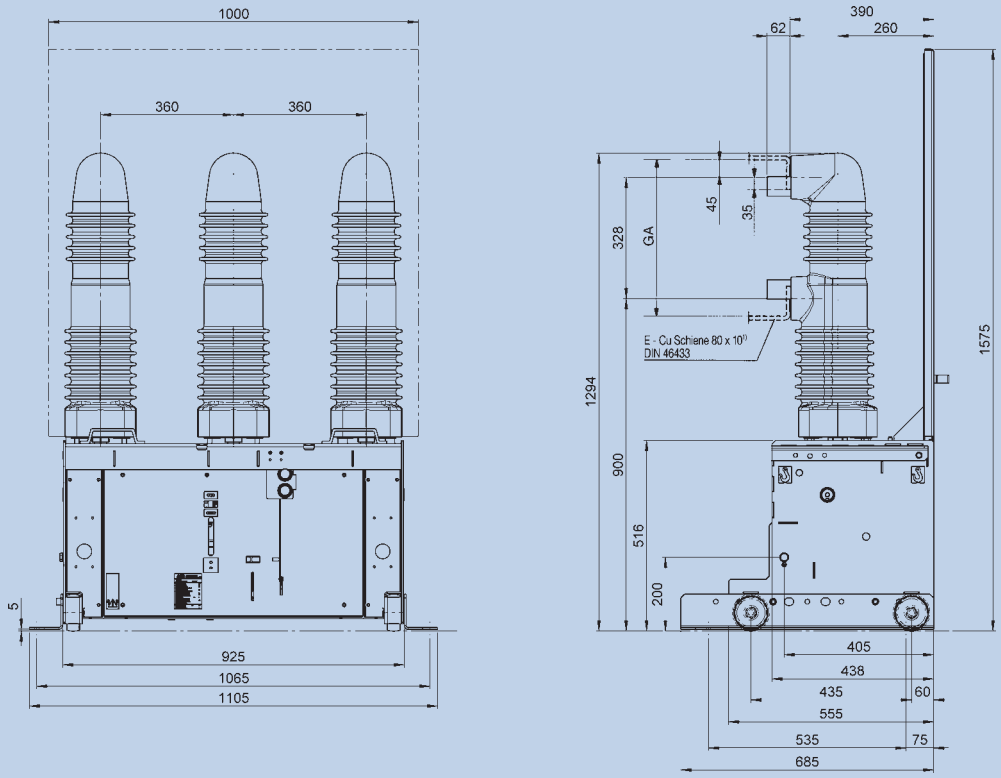
Note:
Lifting lug T only fitted for transport, remove prior to commissioning and store.

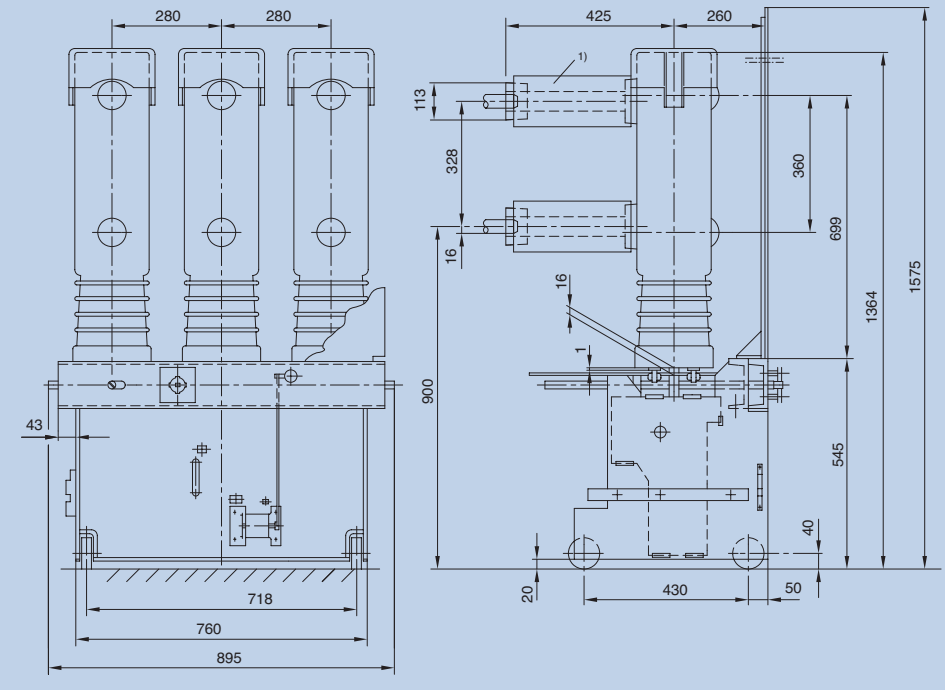
Vacuum circuit-breakers for fixed installation 36 kV / 40.5 kV

VD4

Ur	36/40.5	kV
Ir	630	A
	1250	A
	1600	A
	2000	A
	2500	A
	3150	A [1]
Isc	16	kA
	20	kA
	25	kA
	31.5	kA
	40	kA [2]

[1] with assembled poles
[2] 40 kA only up to 2500 A



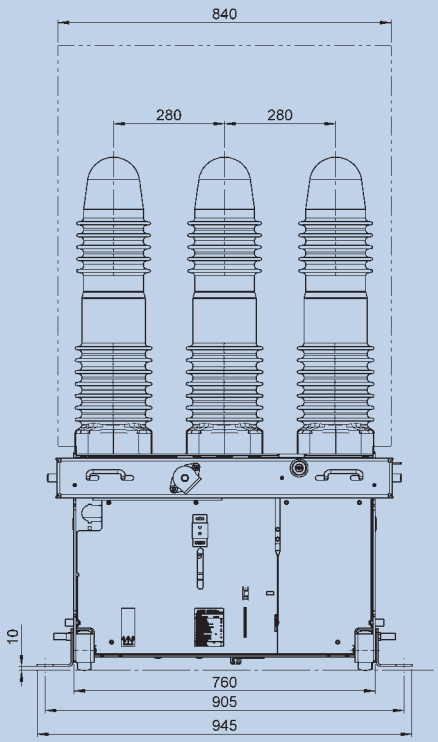


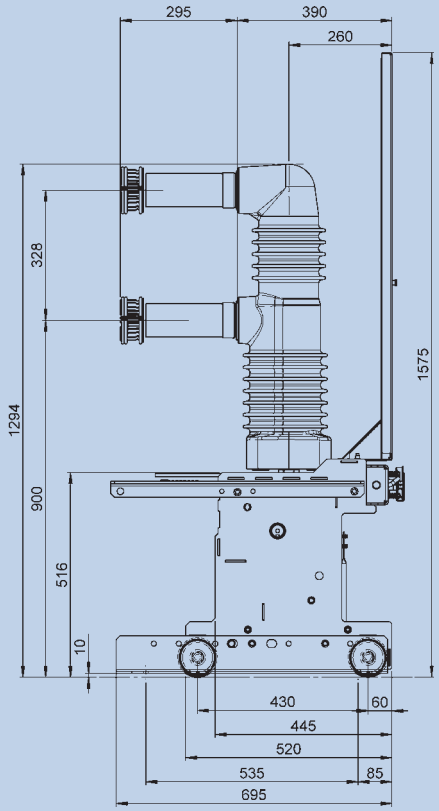
OVERALL DIMENSIONS

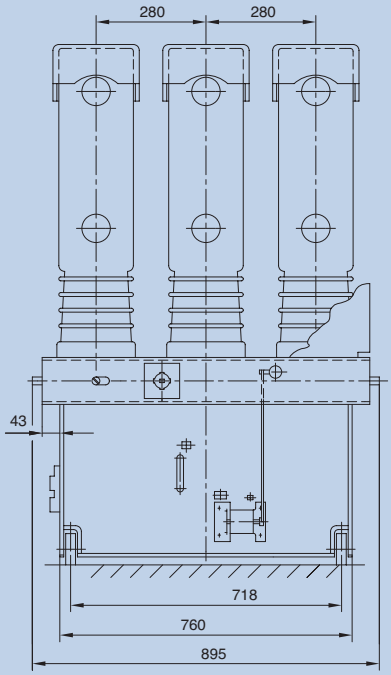
Vacuum circuit-breakers on withdrawable part 36 kV / 40.5 kV for UniGear ZS3.2 and Powerbloc

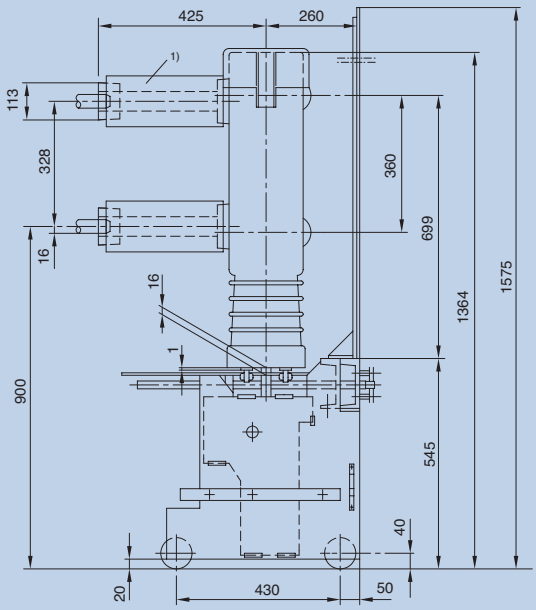
VD4		
Ur	36/40.5	kV
Ir	630	A
	1250	A
	1600	A
	2000	A
	2500	A
	3150	A [1]
Isc	16	kA
	20	kA
	25	kA
	31.5	kA
	40	kA [2]

[1] with assembled poles
[2] … 2500 A







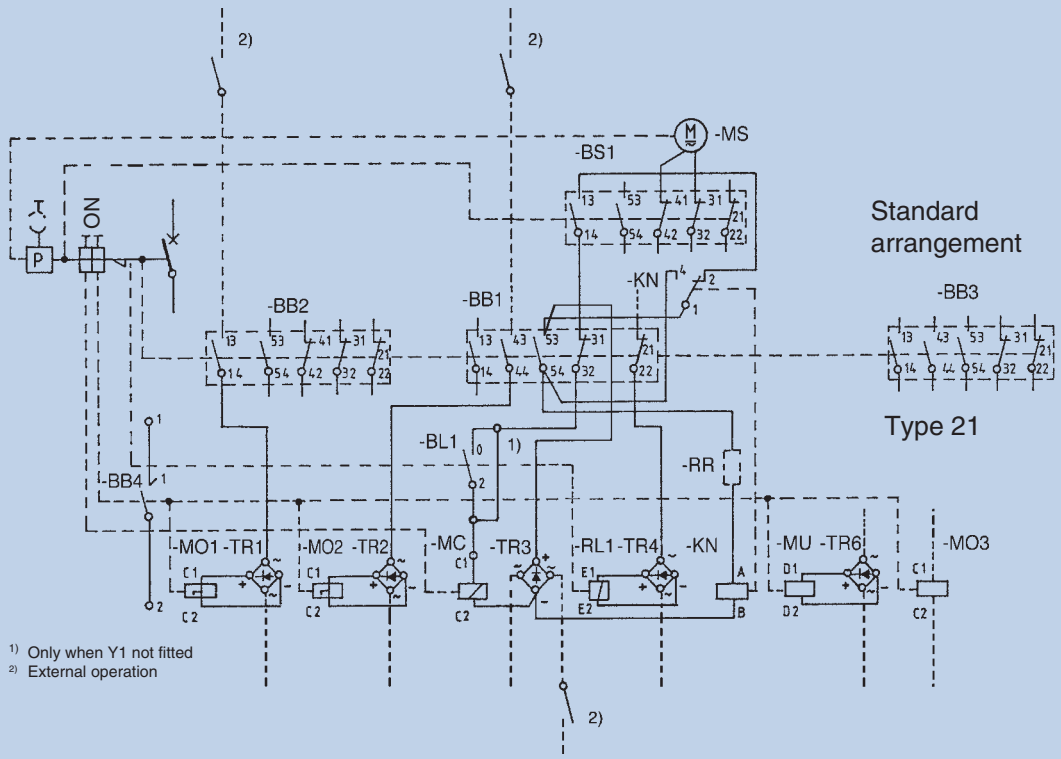


5

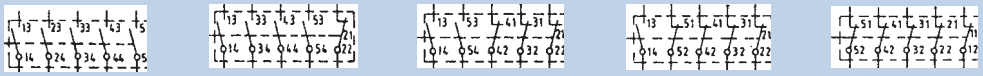
ELECTRICAL CIRCUIT DIAGRAM

ELECTRICAL CIRCUIT DIAGRAM

Basis diagram for vacuum circuit-breaker for fixed installation



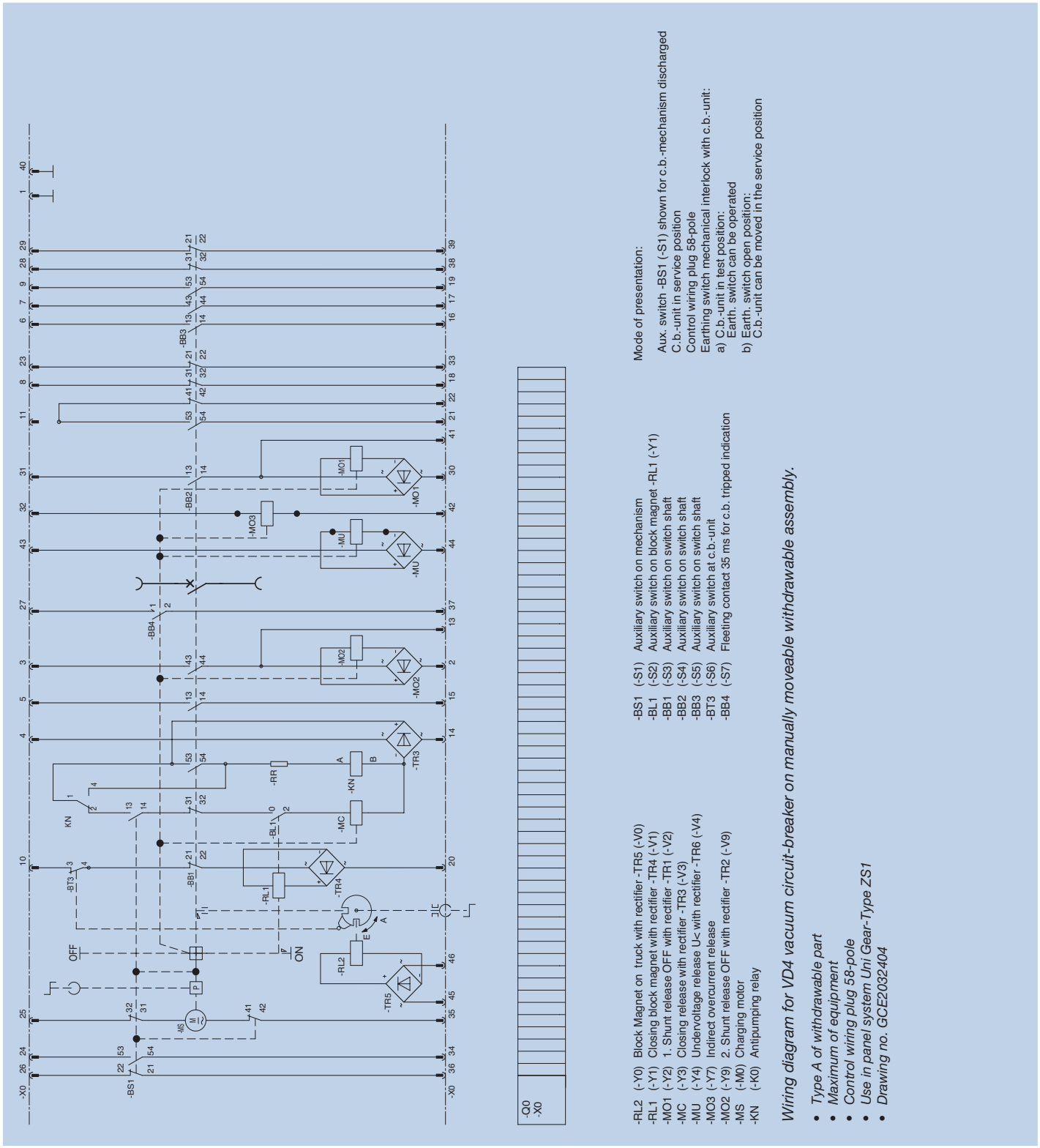
Special arrangement for: – S5:



Type 19 Type 20 Type 22 Type 23 Type 24

-RL1 (-Y1) Closing block magnet
-MO1 (-Y2) 1. Shunt release OFF
-MC (-Y3) Closing release
-MU (-Y4) Undervoltage release
-MO3 (-Y7) Indirect overcurrent release
-MO2 (-Y9) 2. Shunt release OFF
-MS (-M0) Charging motor
-KN (-K0) Antipumping relay
-RR (-R0) Series resistor
-BS1 (-S1) Auxiliary switch on mechanism
-BL1 (-S2) Auxiliary switch on block magnet -RL1 (-Y1)
-BB1 (-S3) Auxiliary switch on switch shaft
-BB2 (-S4) Auxiliary switch on switch shaft
-BB3 (-S5) Auxiliary switch on switch shaft
-BB4 (-S7) Reeting contact 30 ms for c.b. tripped indication
-TR4 (-V1) Series rectifier for -RL1 (-Y1)
-TR1 (-V2) Series rectifier for -MO1 (-Y2)
-TR3 (-V3) Series rectifier for -MC (-Y3)
-TR6 (-V4) Series rectifier for -MU (-Y4)
-TR2 (-V9) Series rectifier for -MO2 (-Y9)

Wiring diagram for vacuum circuit-breaker on withdrawable part



-RL2 (-Y0) Block Magnet on truck with rectifier -TR5 (-V0)
-RL1 (-Y1) Closing block magnet with rectifier -TR4 (-V1)
-MO1 (-Y2) 1. Shunt release OFF with rectifier -TR1 (-V2)
-MC (-Y3) Closing release with rectifier -TR3 (-V3)
-MU (-Y4) Undervoltage release U< with rectifier -TR6 (-V4)
-MO3 (-Y7) Indirect overcurrent release
-MO2 (-Y9) 2. Shunt release OFF with rectifier -TR2 (-V9)
-MS (-M0) Charging motor
-KN (-K0) Antipumping relay

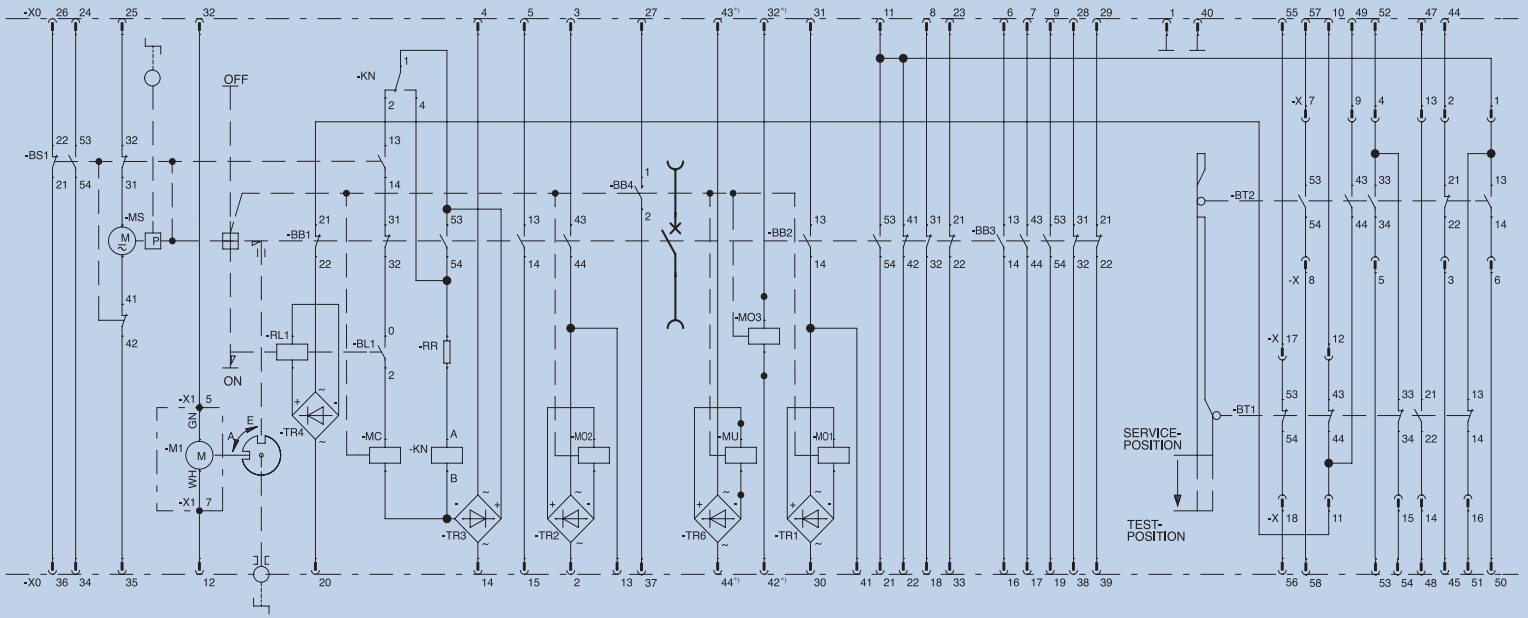
-BS1 (-S1) Auxiliary switch on mechanism
-BL1 (-S2) Auxiliary switch on block magnet -RL1 (-Y1)
-BB1 (-S3) Auxiliary switch on switch shaft
-BB2 (-S4) Auxiliary switch on switch shaft
-BB3 (-S5) Auxiliary switch on switch shaft
-BT3 (-S6) Auxiliary switch at c.b.-unit
-BB4 (-S7) Fleeting contact 35 ms for c.b. tripped indication

Mode of presentation:

Aux. switch -BS1 (-S1) shown for c.b.-mechanism discharged
C.b.-unit in service position
Control wiring plug 58-pole
Earthing switch mechanical interlock with c.b.-unit:
a) C.b.-unit in test position:
Earth. switch can be operated
b) Earth. switch open position:
C.b.-unit can be moved in the service position

Wiring diagram for VD4 vacuum circuit-breaker on manually moveable withdrawable assembly.

- *Type A of withdrawable part*
- *Maximum of equipment*
- *Control wiring plug 58-pole*
- *Use in panel system Uni Gear-Type ZS1*
- *Drawing no. GCE2032404*



-RL1 (-Y1) Closing block magnet with rectifier -TR4 (-V1)
-MO1 (-Y2) 1. Shunt release OFF with rectifier -TR1 (-V2)
-MC (-Y3) Closing release with rectifier -TR3 (-V3)
-MU (-Y4) Undervoltage release U< with rectifier -TR6 (-V4)
-MO3 (-Y7) Indirect overcurrent release
-MO2 (-Y9) 2. Shunt release OFF with rectifier -TR2 (-V9)
-MS (-M0) Charging motor
-KN (-K0) Antipumping relay

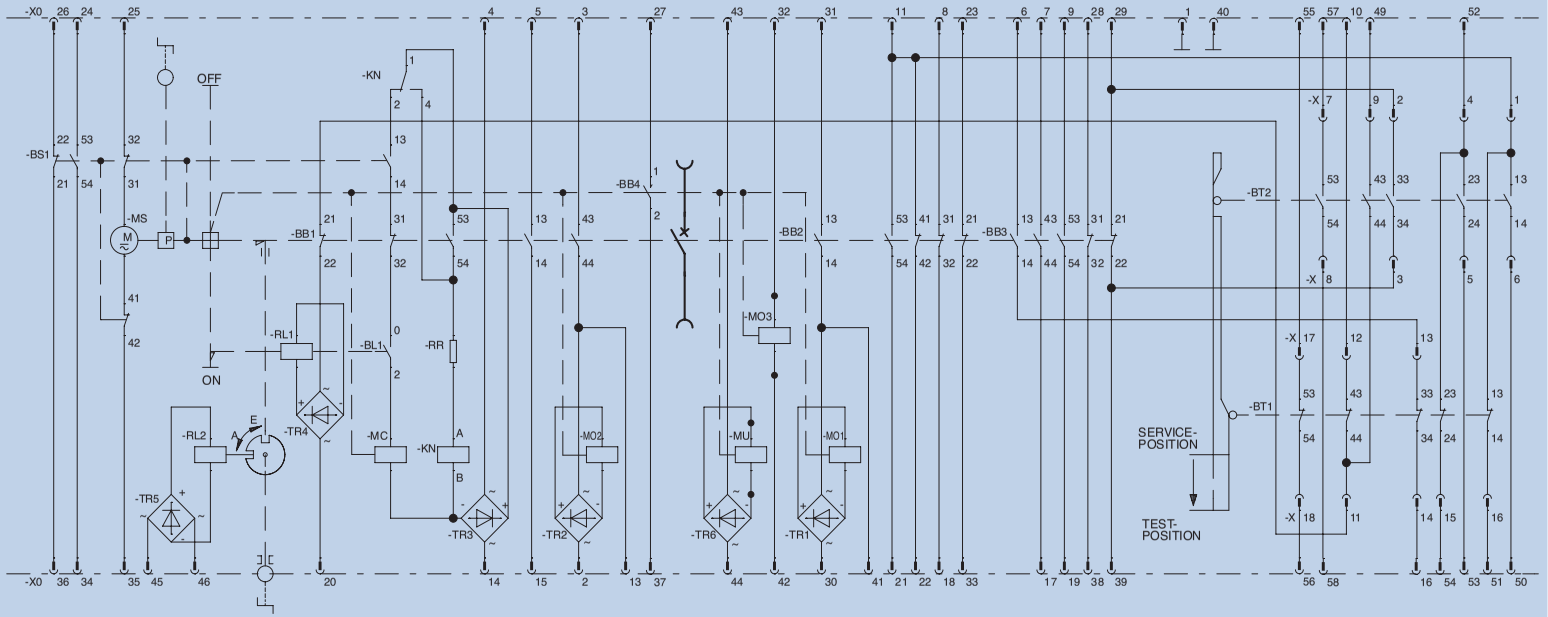
-BS1 (-S1) Auxiliary switch on mechanism
-BL1 (-S2) Auxiliary switch on block magnet -RL1 (-Y1)
-BB1 (-S3) Auxiliary switch on switch shaft
-BB2 (-S4) Auxiliary switch on switch shaft
-BB3 (-S5) Auxiliary switch on switch shaft
-BB4 (-S7) Fleeting contact 35 ms for c.b. tripped indication
-BT2 (-S8) Limit switch test position
-BT1 (-S9) Limit switch service position
-MT (-M1) Motor drive for drawout

Mode of presentation:

- Aux. switch -BS1 (-S1) shown for c.b.-mechanism discharged
- C.b.-unit in service position
- Control wiring plug 58-pole
- Earthing switch mechanical interlock with c.b.-unit:
  a) C.b.-unit in test position:
  Earth. switch can be operated
  b) Earth. switch open position:
  C.b.-unit can be moved in the service position

*) Connection points when undervoltage release -MU (-Y4) or indirect overcurrent release -MO3 (-Y7) are fittet:
-MU (-Y4) : 42-43
-MO3 (-Y7) : 42-43

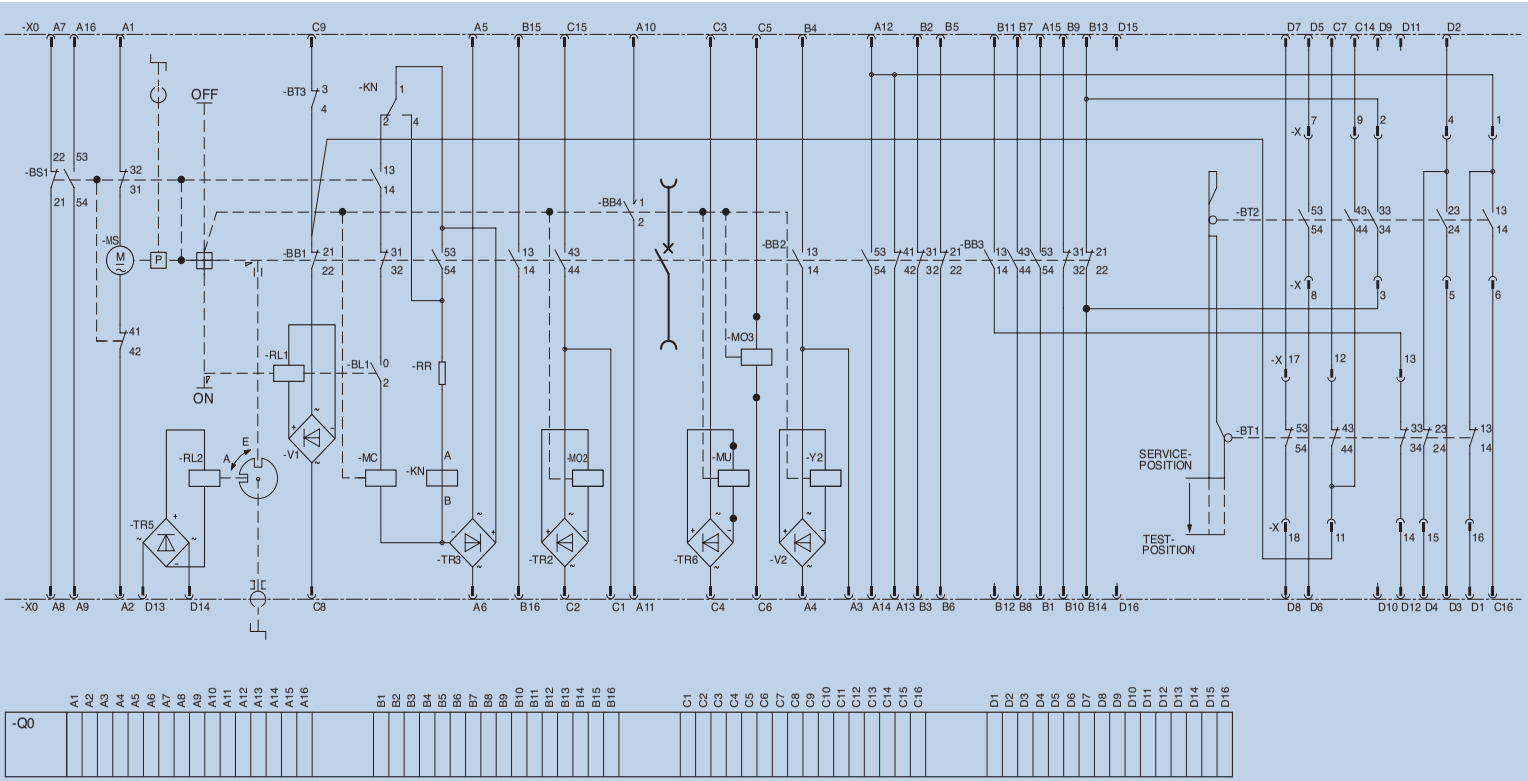
Wiring diagram for VD4 vacuum circuit-breaker on motordriven withdrawable assembly.



-RL2	(-Y0)	Block Magnet on truck with rectifier -TR5 (-V0)	-BS1	(-S1)	Auxiliary switch on mechanism	Mode of presentation:	
-RL1	(-Y1)	Closing block magnet with rectifier -TR4 (-V1)	-BL1	(-S2)	Auxiliary switch on block magnet -RL1 (-Y1)		
-MO1	(-Y2)	1. Shunt release OFF with rectifier -TR1 (-V2)	-BB1	(-S3)	Auxiliary switch on switch shaft	Aux. switch -BS1 (-S1) shown for c.b.-mechanism discharged	
-MC	(-Y3)	Closing release with rectifier -TR3 (-V3)	-BB2	(-S4)	Auxiliary switch on switch shaft	C.b.-unit in service position	
-MU	(-Y4)	Undervoltage release U< with rectifier -TR6 (-V4)	-BB3	(-S5)	Auxiliary switch on switch shaft	Control wiring plug 58-pole	
-MO3	(-Y7)	Indirect overcurrent release	-BT3	(-S6)	Auxiliary switch at c.b.-unit	Earthing switch mechanical interlock with c.b.-unit:	
-MO2	(-Y9)	2. Shunt release OFF with rectifier -TR2 (-V9)	-BT2	(-S8)	Limit switch test position	a) C.b.-unit in test position: Earth. switch can be operated	
-MS	(-M0)	Charging motor	-BB4	(-S7)	Fleeting contact 35 ms for c.b. tripped indication	b) Earth. switch open position: C.b.-unit can be moved in the service position	
-KN	(-K0)	Antipumping relay					

Wiring diagram for VD4 vacuum circuit-breaker on manually moveable withdrawable assembly.

- *Type B of withdrawable part*
- *Maximum of equipment*
- *Auxiliary switch -BB3 (-S5) wired*
- *Control wiring plug 58-pole*
- *Use in panel system Uni Gear-Type ZS1*
- *Drawing no. GCE2132701P0101*



-RL2	(-Y0)	Block magnet on truck with rectifier -TR5 (-V0)
-RL1	(-Y1)	Closing block magnet with rectifier -TR4 (-V1)
-MO1	(-Y2)	1. Shunt release OFF with rectifier -TR1 (-V2)
-MC	(-Y3)	Closing release with rectifier -TR3 (-V3)
-MU	(-Y4)	Undervoltage release U< with rectifier -TR6 (-V4)
-MO3	(-Y7)	Indirect overcurrent release
-MO2	(-Y9)	2. Shunt release OFF with rectifier -TR2 (-V9)
-MS	(-M0)	Charging motor
-KN	(-K0)	Antipumping relay

-BS1	(-S1)	Auxiliary switch on mechanism
-BL1	(-S2)	Auxiliary switch on block magnet -RL1 (-Y1)
-BB1	(-S3)	Auxiliary switch on switch shaft
-BB2	(-S4)	Auxiliary switch on switch shaft
-BB3	(-S5)	Auxiliary switch on switch shaft
-BT3	(-S6)	Auxiliary switch at c.b.-unit
-BB4	(-S7)	Fleeting contact 35 ms for c.b. tripped indication
-BT2	(-S8)	Limit switch test position
-BT1	(-S9)	Limit switch service position

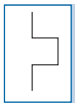
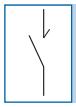
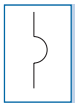
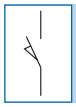
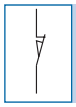
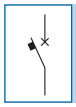
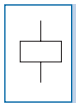
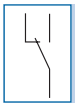
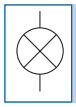
Mode of presentation:

Aux. switch -BS1 (-S1) shown for c.b.-mechanism discharged
C.b.-unit in service position
Control wiring plug 64-pole
Earthing switch mechanical interlock with c.b.-unit:
a) C.b.-unit in test position:
Earth. switch can be operated
b) Earth. switch open position:
C.b.-unit can be moved in the service position

Wiring diagram for VD4 vacuum circuit-breaker on manually moveable withdrawable assembly.

ELECTRICAL CIRCUIT DIAGRAM

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

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

Contact us

ABB AG
Calor Emag Medium Voltage Products
Oberhausener Strasse 33
40472 Ratingen
GERMANY

Petzower Strasse 8
14542 Werder (Havel) OT Glindow
GERMANY

Phone: +49 2102 12-0
Fax: +49 2102 12-17 77
E-Mail: powertech@de.abb.com

ABB S.p.A.
Power Products Division
Unità Operativa Sace-MV
Via Friuli, 4
I-24044 Dalmine
Tel.: +39 035 6952 111
Fax: +39 035 6952 874
E-Mail: sacetms.tipm@it.abb.com

www.abb.com

Technical catalogue **No. GCBA 520PO102** Printed in Germany (10.09 - 100 AMC)

Power and productivity
for a better world™