VTG-12 Indoor Solid-Sealed Medium-voltage AC Vacuum Circuit Breaker

1 Overview

VTG-12 Indoor high voltage AC vacuum circuit breaker (hereinafter referred to circuit breaker) is used in the three-phase AC 50Hz indoor place with the rated voltage 12kV as the protection and control of the electrical facilities in the industrial mines, enterprises, power plant, and power substation, especially suitable for metallurgy, chemical, and coal industries.

Circuit breaker complies with the GB/T 1984 High Voltage AC Circuit Breaker, GB/T 11022 Common specifications for high-voltage switchgear and controlgear standards, DL/T 402 High Voltage AC Circuit Breaker, and related IEC standards.

The operating mechanism of circuit breaker is of the integrated design type. The operating mechanism and the primary circuit are front and back arranged, and they can be used as fixed installation unit (fixed cabinet) and also form a cart unit (cart cabinet) together with the propulsion mechanism (chassis truck).

2 Type Designation

VTG - 12 / T □ – □

- Rated short-circuit breaking current (kA)
- Rated current (A)
- Spring operating mechanism
- Rated voltage (kV)
- Enterprise model code

3 Technical Parameters

3.1 Main Technical Parameters

No.	Item	Unit	Data		
1	Rated voltage	kV	12		
2	Rated lightning impulse withstand voltage (peak)		Gap 85, interphase, and to earth 75		
3	Rated power frequency withstand voltage (lmin)		Gap 48, interphase, and to earth 42		
4	Secondary circuit power frequency withstand voltage (lmin)		2000		
5	Rated frequency	Hz	50		
6	Rated current	A	630 ~ 1250	630 ~ 4000	1250 ~ 4000
7	Rated short circuit breaking current	kA	20、25	31.5	40
8	Rated short time withstand current		20 25	31.5	40
9	Rated peak withstand current		50 63	80	100
10	Rated short circuit making current (peak)		50 63	80	100
11	Rated operation sequence		O—0.3s—CO—180s—CO		O—180s—CO—180s—CO
12	Rated short circuit duration time	s	4		
13	Rated single/back-to-back capacitor bank breaking current	A	20 ~ 31.5kA		40kA
			630/400		800/400
14	Rated capacitor bank inrush making current	kA	12.2 (frequency not greater than 1000Hz)		
15	Mechanical life	Times	10000/customized		

VTG-12 Indoor Solid-Sealed Medium-voltage AC Vacuum Circuit Breaker

No.	Item	Unit	Data
16	Rated short circuit current switching times	Times	50
17	Allowable wear accumulative thickness of the moving and stationary contact	mm	3
18	Rated closing and opening operating voltage	V	220、110
19	Contact opening distance, overstroke	mm	Opening 9±1 (11±1) Overstroke 3.5±0.5
20	Rated operating voltage: ON/OFF time	ms	ON 30-70 OFF 20-50
21	* Contact closing bounce time		≤2 (1600A and below), ≤3 (2000A and above)
22	Three-phase closing and opening simulataneity		≤2
23	Average opening speed (contact open 6mm)	m/s	0.9~1.3
24	Average closing speed		0.4~0.8
25	Main circuit resistance	μΩ	630A：≤50 1250A≤45 1600、2000A：≤40 2500A and above ≤30
26	Closing contact touch pressure	N	20kA、25kA：2400±150 31.5kA：3200±200 40kA：4500±300

Note: "*" indicates that there may be differences in the type of pole when the contact arm is not installed. Please refer to the technical requirements in the factory report.

3.2 Technical Data of Energy-Saving Motor

This product adopts special reducer used for permanent magnet type single–phase DC motor, and the technical parameters of motor are listed in table below.

Rated voltage (V)	Rated output power (W)	Normal operating voltage range	Energy storage time under rated voltage (s)
DC220	70/100	85%~110% rated voltage	≤15

3.3 Technical Data of Electromagnet

	Closing electromagnet	Opening electromagnet	Locking electromagnet
Rated operating voltage (V)	DC220	DC220	DC220
Coil power (W)	368	368	4
Resistance (Ω)	131.5±5%（20℃）	131.5±5%（20℃）	13600±5%（20℃）
Operating voltage range	85%~110% rated voltage	65%~120% rated voltage	85%~110% rated voltage

VTG-12 Indoor Solid-Sealed Medium-voltage AC Vacuum Circuit Breaker

4 Operating Conditions

4.1 Normal Working Conditions
4.1.1 Ambient temperature: The max. temperature is +40℃, and the min. temperature is -15℃ (storage and transport at -30℃ are allowed);
4.1.2 Environmental humidity: The daily mean relative humidity is ≤ 95%, the monthly mean relative humidity is ≤ 90%; the daily mean vapor pressure is ≤ 2.2 x 10 – 3MPa, and the monthly mean vapor pressure is ≤ 1.8 x 10 – 3 MPa;
4.1.3 The altitude does not exceed 2000m;
4.1.4 The earthquake intensity does not exceed 8 degrees;
4.1.5 There is no water drops, no flammable materials, no chemical corrosive gas and no severe vibration at the site.
4.2 If the normal working conditions are not met, please contact the manufacturing unit.

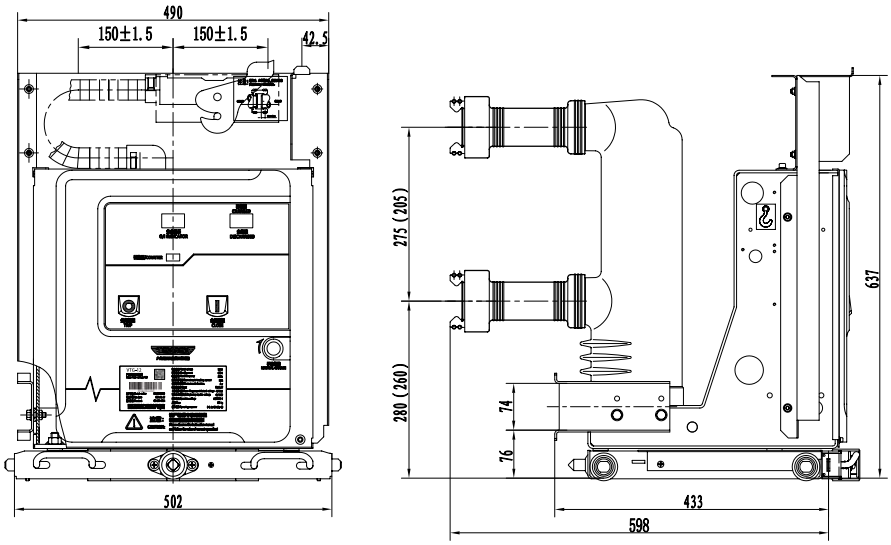
5 Features

5.1 Excellent overall performance of circuit breaker
5.1.1 The solid-sealed pole and operating mechanism of circuit breaker are configured at front and rear, and are connected into a whole through the transmission mechanism.
5.1.2 The mechanical life is 10,000 times and above.
5.2 The advanced vacuum arc extinguish chamber uses copper-chromium alloy contact and longitudinal magnetic field contact structure.
5.3 The integrally cast solid-sealed poles
5.3.1 The solid-sealed pole is formed with new APG process.
5.3.2 The vacuum arc extinguish chamber device is solid-sealed in the pole to efficiently prevent damage and surface contamination due to foreign matters while shortening the overall size of circuit breaker obviously.
5.4 Flexible and simple operating mechanism
5.4.1 The operating mechanism is of the spring energy-storage type with electric and manual energy storage functions.
5.4.2 When the circuit breaker is working, the energy from the energy-storage spring will be transferred to the link mechanism through the output cam and then to the dynamic contact through the link mechanism.
5.4.3 With advanced and reasonable damping device, the break-brake rebound is small.
5.4.4 No adjustment is required with very little maintenance.

VTG-12 Indoor Solid-Sealed Medium-voltage AC Vacuum Circuit Breaker

6 Outline and Installation Dimensions

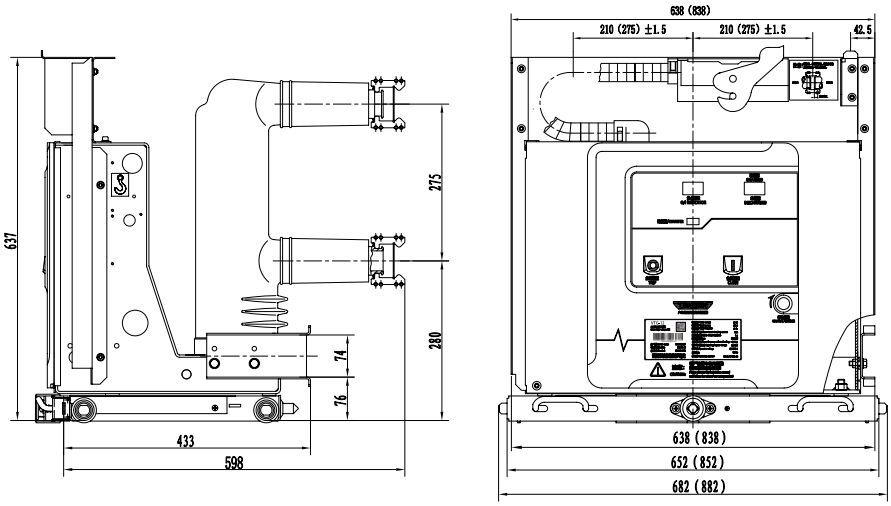
6.1 Outline dimensions of handcart type circuit breaker(Phase distance 150)



Note: The handcart stroke is 200 ± 2mm, the dimension in the bracket is the pole distance 205mm

Rated current (A)	630	1250
Rated short-circuit breaking current (kA)	20/25/31.5	20/25/31.5
Mating fixed contact size (mm)	Φ35	Φ49

6.2 Outline dimensions of handcart type circuit breaker(Phase distance 210, pole distance 275)

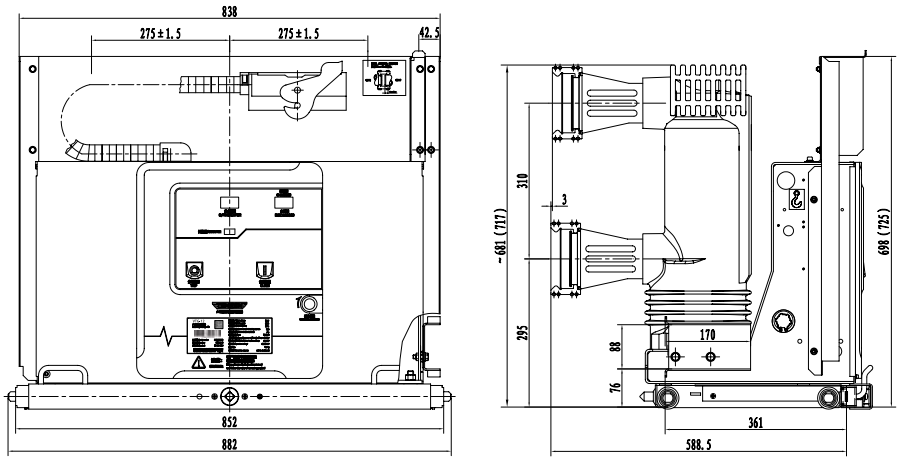


Note: The handcart stroke is 200 ± 2mm, and the size in brackets is 1,000mm wide cabinet.

Rated current (A)	630	1250	1600
Rated short-circuit breaking current (kA)	20/25/31.5	20/25/31.5/40	31.5/40
Mating fixed contact size (mm)	Φ35	Φ49	Φ55

VTG-12 Indoor Solid-Sealed Medium-voltage AC Vacuum Circuit Breaker

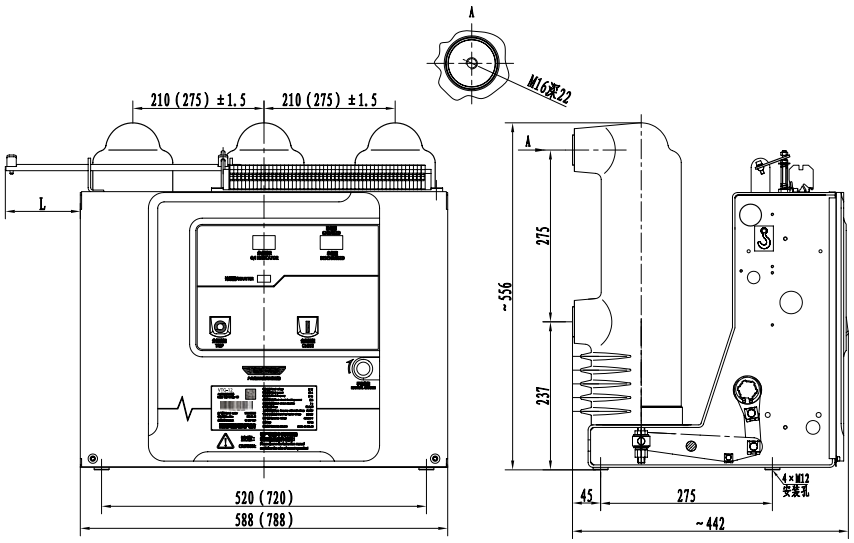
6.3 Outline dimensions of handcart type circuit breaker(Phase distance 275, pole distance 310)



Note:
1. The handcart stroke is 200 ± 2mm, and forced air cooling is required for rated current 3150A and above;
2. The dimension in bracket is the reference dimensions of rated current 3150A and above.

Rated current (A)	1600	2000	2500/3150/4000
Rated short-circuit breaking current (kA)	31.5/40		31.5/40
Mating fixed contact size (mm)	Φ79		Φ109

6.4 Outline dimensions of fixed type circuit breaker(Phase distance 210, pole distance 275)

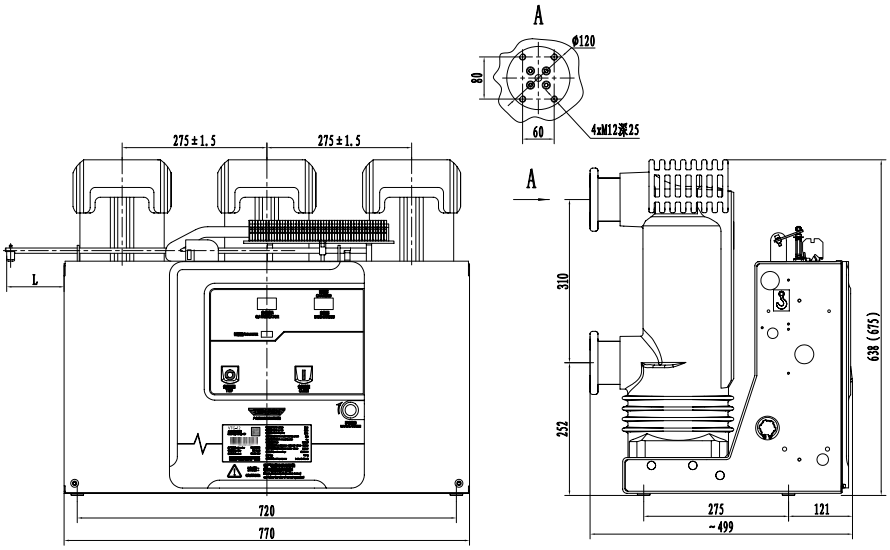


Note: The dimension in bracket is phase distance 275mm.

Rated current (A)	630	1250	1600
Rated short-circuit breaking current (kA)	20/25/31.5	20/25/31.5/40	31.5/40
Mechanism top interlock L (mm)	The interlock can be extended left or right(Standard configuration: left extension 50mm), and the length can be customized according to customer requirements		

VTG-12 Indoor Solid-Sealed Medium-voltage AC Vacuum Circuit Breaker

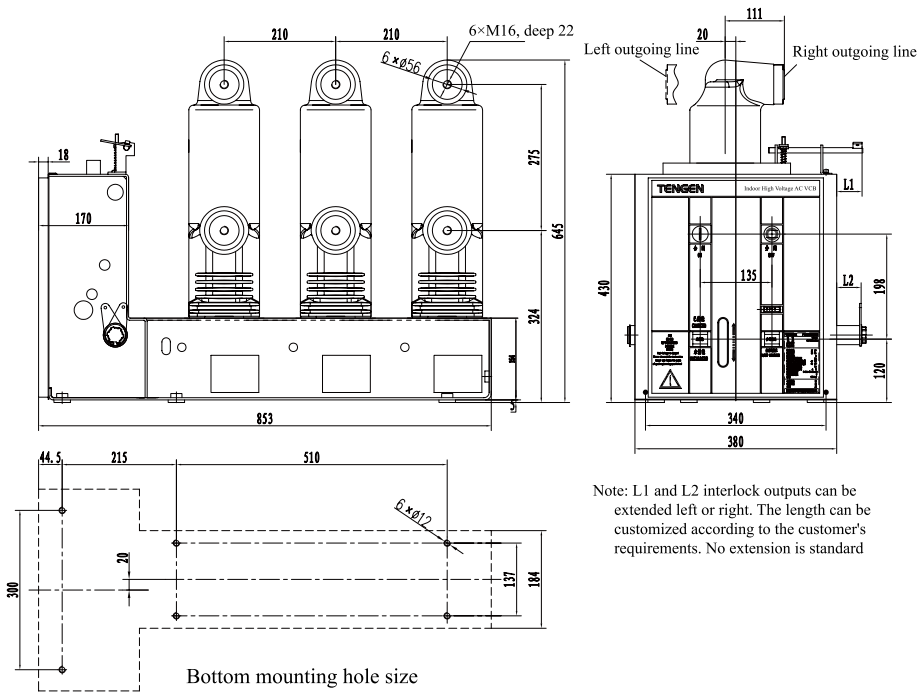
6.5 Outline dimensions of fixed type circuit breaker(Phase distance 275, pole distance 310)



Note: The dimension in bracket is phase distance 275mm.

Rated current (A)	1600/2000/2500/3150/4000
Rated short-circuit breaking current (kA)	31.5/40
Mechanism top interlock L (mm)	The interlock can be extended left or right(Standard configuration: left extension 50mm), and the length can be customized according to customer requirements

6.6 Outline dimension drawing of side mounted fixed circuit breaker

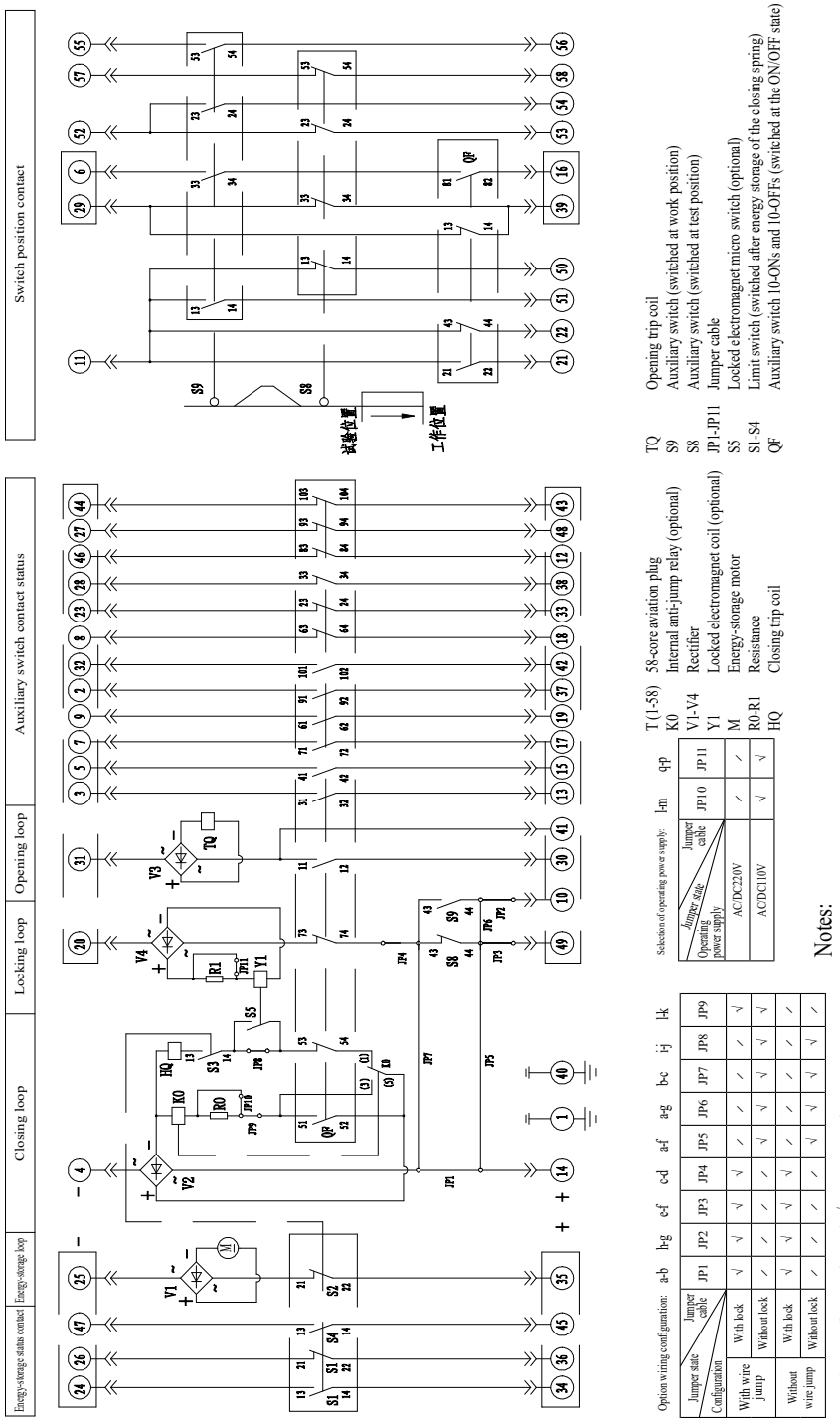


Note: L1 and L2 interlock outputs can be extended left or right. The length can be customized according to the customer's requirements. No extension is standard

VTG-12 Indoor Solid-Sealed Medium-voltage AC Vacuum Circuit Breaker

7 Secondary Scheme Schematic Diagram

7.1 Handcart type scheme



Selection of operating power supply:

Operating power supply \ Jumper state	Jumper cable	JP10	JP11
AC/DC220V		/	/
AC/DC110V		√	√

Option wiring configuration:

Configuration \ Jumper state	Jumper cable	a-b JP1	b-g JP2	c-f JP3	c-d JP4	a-f JP5	a-g JP6	b-c JP7	i-j JP8	h-k JP9
With wire jump	With lock	√	√	√	√	/	/	/	/	√
	Without lock	/	/	/	/	√	√	√	√	√
Without wire jump	With lock	√	√	√	√	/	√	/	/	/
	Without lock	/	/	/	/	√	√	√	√	/

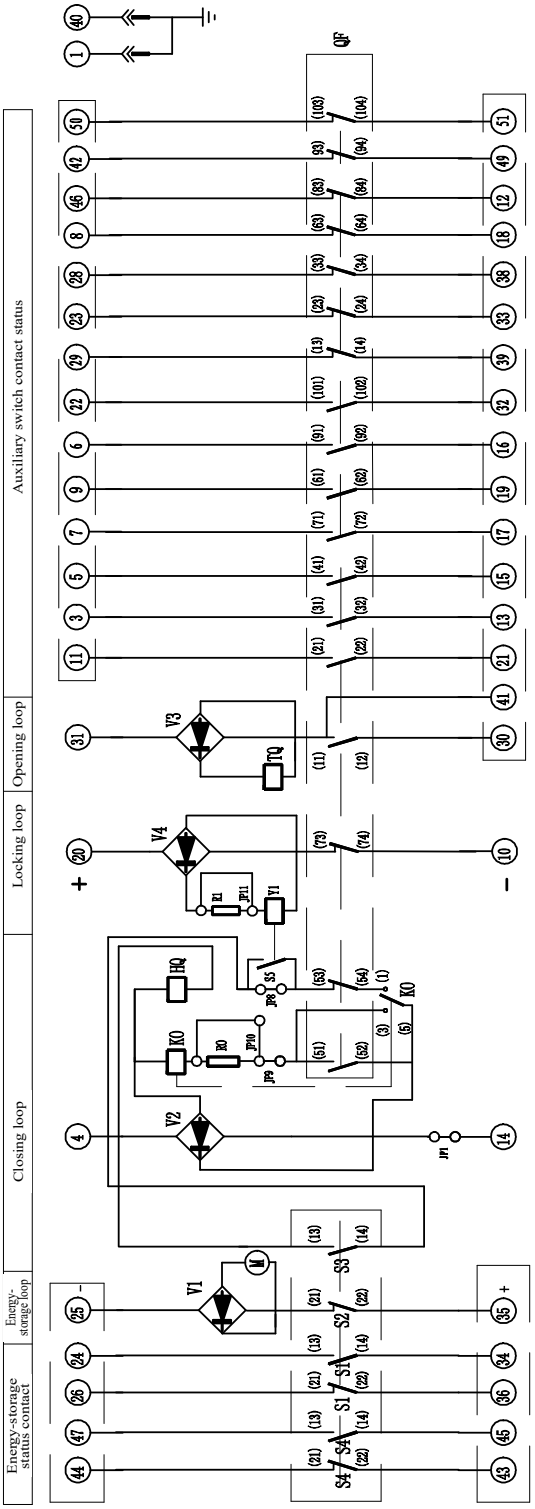
Note: "/" means disconnection, and "√" means connection

Notes:

1. The circuit breaker is at the test position, is opened and at the non-energy-storage state.
2. The polarities marked in the dashed box shall be the same during the DC power operation, and the motor shall be wired according to the polarity shown in figure.

VTG-12 Indoor Solid-Sealed Medium-voltage AC Vacuum Circuit Breaker

7.2 Fixed scheme



Notes:
1. The polarities marked in the dashed box are the same when the DC power supply is used.
2. As shown in figure, the circuit breaker is at the open and non-energy-storage state; the motor is wired according to the polarity shown in figure.

Option wiring setting:

Jumper state / Configuration		Jumper cable	JP1 (a-b)	JP2 (h-g)	JP3 (e-f)	JP4 (c-d)	JP5 (a-f)	JP6 (a-g)	JP7 (b-c)	JP8 (i-j)	JP9 (l-k)
With wire jump	With lock		√	/	/	/	/	/	/	/	√
	Without lock		√	/	/	/	/	/	/	√	√
Without wire jump	With lock		√	/	/	/	/	/	/	/	/
	Without lock		√	/	/	/	/	/	/	√	/

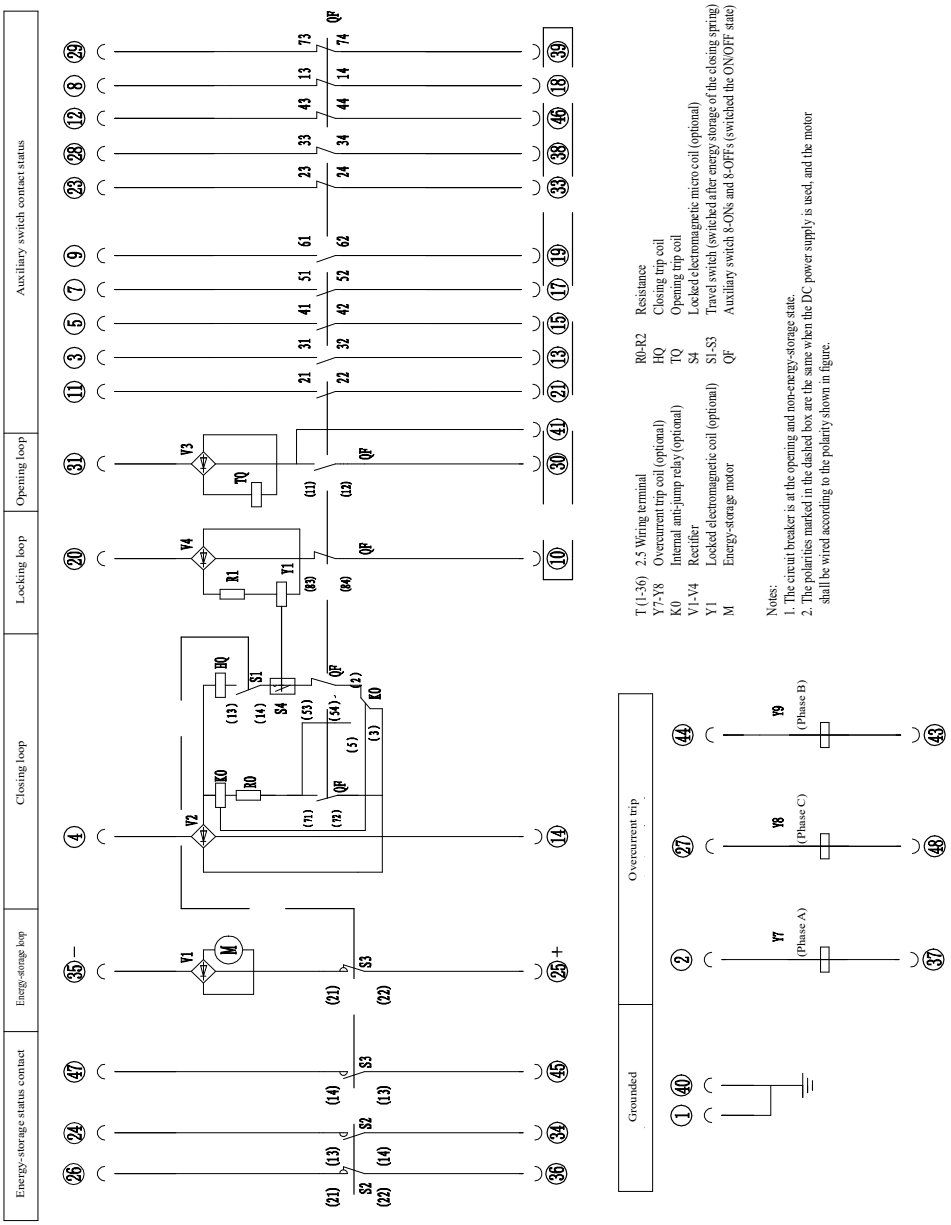
Selection of operating power supply:

Operating power supply	Jumper cable	JP10 (l-m)	JP11 (q-p)
AC/DC220V		/	/
AC/DC110V		√	√

Note: "/" means disconnection, and "√" means connection

VTG-12 Indoor Solid-Sealed Medium-voltage AC Vacuum Circuit Breaker

7.3 Side-mounted fixed scheme



VTG-12 Indoor Solid-Sealed Medium-voltage AC Vacuum Circuit Breaker

8 Ordering Technical Confirmation Form

Technical Confirmation Form for Ordering VTG-12 Indoor Solid-Sealed Medium-voltage AC Vacuum Circuit Breaker

Determine your requirements according to the items listed in table below:

Product structure	□Cart type □Fixed type □Side-mounted fixed type (□Left outlet □Right outlet)		
Order qty. (unit)		Primary structure	Insulated cylinder type air insulation
Rated current (A)	□630 □1250 □Others_____		
Rated short circuit breaking current (kA)	□20 □25 □31.5 □40		
Phase distance (mm)	□150 □210 □275 Note: The phase distance is the center distance between the A and B phase or between the B and C phases.		
Inter-electrode distance (mm)	□205 □275 □310 Note: Inter-electrode distance is the center distance between the top and bottom outlet terminals.		
Operating voltage (V)	OFF, ON: □AC220 □DC220 □Others_____ Stored energy: □AC220 □DC220 □Others_____		
Anti-bounce device	□No anti-bounce (standard) □With anti-bounce		
Locking device (fixed type non-cart locking)	Closing lock: □No lock (standard) □With lock, operating voltage_____V		
	Cart lock: □No lock (standard) □With lock, operating voltage_____V		
Overcurrent device	□No overcurrent (standard) □A and C two-phase overcurrent □A, B, C three-phase overcurrent Note: The operating current of the standard overcurrent coil is 5A.		
Undervoltage trip device	□No (standard) □ Yes		
Cart type option (This option is not available for fixed type)	Earth: □Bottom friction earth (standard) □ Rails earthed on both sides Program lock: □No (standard) □Lock chassis cart (key hole on cabinet door) □Lock mechanism □Lock circuit breaker baffle Cabinet door interlock: □No (standard) □With door closing operation interlock function		
Fixed type circuit breaker interlock output (mm) (This option is not available for cart type)	Top opening interlock extended: □Left (standard 50)____ □Right____ □No		
	Spindle extended: □ No (standard) □Left_____ □Right_____		
Secondary wiring plan	□Tengen standard plan (see catalog) □Non-standard plan (with attached figure)		
Outline dimensions	□Tengen standard outline (see catalog) □Non-standard plan (with attached figure)		
Standard accessories	Cart type: one energy-storing handle, one cart handle (length 80mm), one aviation plug female connector (58 core with 40 pieces of 1.5mm2 pins), one coiled pipe (about 300mm length); 1250A and below standard Al contact arm contact surface is coated with common silver, and 1600A and above standard copper contact arm is coated with common silver. Fixed type: one energy-storing handle		
Other special requirements		Ordering unit (seal) Signature: _____ Confirmation date:_____ Tel:_____	

Note: If not ticked, all options shall be manufactured according to the TENGEN's standard configurations.