

## VTG-24 Indoor Medium-voltage AC Vacuum Circuit Breaker

### 1 Overview



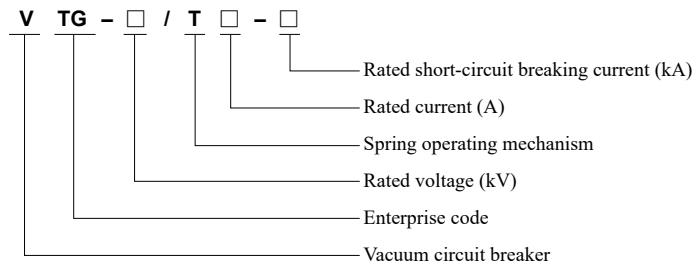
VTG-24 indoor high voltage AC vacuum circuit breaker (hereinafter referred to circuit breaker) is used in the three-phase AC 50Hz indoor place with the rated voltage 24kV as the protection and control of the electrical facilities in the industrial mines, enterprises, power plant, and power substation, 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



### 3 Technical Parameters

#### 3.1 Main technical parameters of circuit breaker

No.	Name	Unit	Value		
1	Rated voltage	kV	24		
2	Rated power frequency withstand voltage (1 minute)		65		
3	Rated lightning impulse withstand voltage (peak)		125		
4	Rated frequency	Hz	50		
5	Rated current	A	630 1250	630 1250 1600 2000 2500 3150	1250 1600 2000 2500 3150
6	Rated short-circuit breaking current	kA	20、25	31.5	40
7	Rated short-circuit making current (peak)		50、63	80	100
8	Rated short-time withstand current		20、25	31.5	40
9	Rated peak withstand current		50、63	80	100
10	Rated short-circuit duration		s	4	
11	Rated operation sequence		O-0.3s-CO-180s-CO	O-180s-CO-180s-CO	
12	Rated short-circuit breaking current ON/OFF times	Times	50	30	
13	Mechanical life		10,000/customized		
14	Rated operating voltage	V	220/110		
15	Allowable cumulative wear thickness of moving and fixed contacts	mm	3		

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### 3.2 Mechanical characteristics parameters of circuit breaker

No.	Name	Unit	Value
1	Clearance between open contacts	mm	13±1
2	Overtravel		4±1
3	Contact closing bounce time	ms	1600A and below ≤ 2, 2000A and above ≤ 3
4	Three-phase closing and opening synchronization		≤ 2
5	Average opening speed	m/s	1.4±0.2
6	Average closing speed		0.8±0.2
7	Closing time	ms	30 ~ 70
8	Opening time		20 ~ 50
9	Main circuit resistance	μΩ	630A ≤ 65, 1250A ≤ 60 1600A ~ 2000A ≤ 55 2500A and above ≤ 45
10	Contact pressure of closing contact	N	20kA, 25kA: 2500±1300 31.5kA: 3200±300 40kA: 4500±300

### 3.3 Technical data of energy storage motor

This product has a permanent magnet single-phase DC motor equipped with a special reducer. The technical parameters of the motor are listed in table below.

Rated voltage (V)	Rated output power (W)	Normal operating voltage range	Energy storage time at rated voltage (S)
DC220	70	85% to 110% of rated voltage	≤ 15

### 3.4 Technical parameter of coil

	Closing coil	Opening coil	Locking coil
Rated operating voltage (V)	DC220	DC220	DC220
Coil Power (W)	368	368	4
Resistance (Ω)	131.5±5% (20°C)	131.5±5% (20°C)	13600±5%(20°C)
Working voltage range	85% to 110% of rated voltage	65% to 120% of rated voltage	85% to 110% of rated voltage

## 4 Operating Conditions

### 4.1 Normal Working Conditions

4.1.1 Ambient temperature: The max. temperature is +40°C, and the min. temperature is -15°C (storage and transport at -30°C 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<sup>-3</sup> MPa, and the monthly mean vapor pressure is ≤ 1.8 x 10<sup>-3</sup> MPa;

4.1.3 The altitude does not exceed 1000m (customization is required if greater than 1000m);

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.

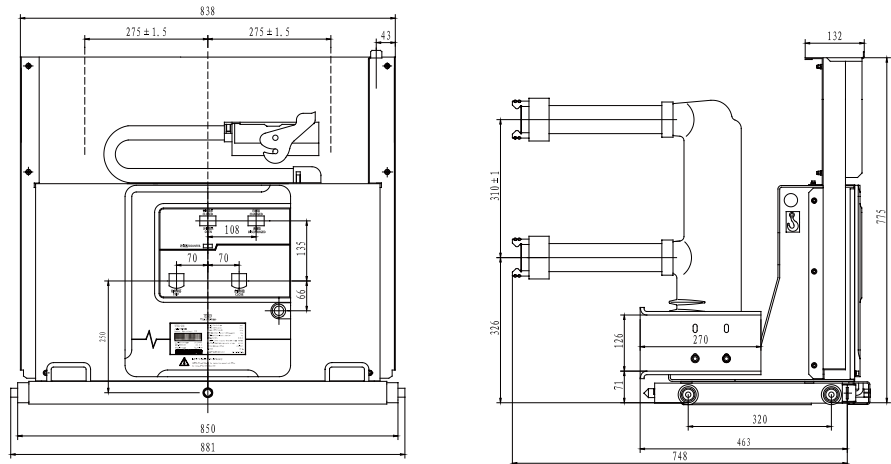
## VTG-24 Indoor Medium-voltage AC Vacuum Circuit Breaker

### 5 Features

- 5.1 Excellent overall performance of circuit breaker
  - 5.1.1 The arc extinguish chamber and operating mechanism of circuit breaker are configured at front and rear, and are connected as a whole structure through the transmission mechanism;
  - 5.1.2 The mechanical life is up to 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 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 is solid-sealed in the pole to effectively prevent damage and surface contamination due to other objects, and to significantly reduce the overall size of circuit breaker.
- 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 During the operation of circuit breaker, the energy of the energy storage spring is transferred to the link gear through output cam, and then to the moving contact part through the link gear;
  - 5.4.3 With advanced and reasonable damping device, the opening rebound force is small.
  - 5.4.4 No adjustment is required with very little maintenance.

### 6 Outline and Installation Dimensions

- 6.1 Outline and installation dimensions of handcart-type circuit breaker

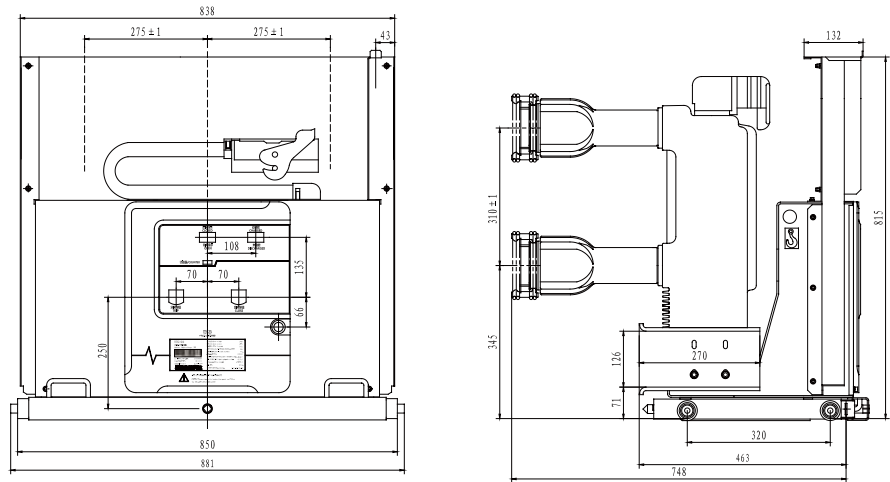


Note: The stroke of the handcart is 300±2mm.

Rated current (A)	630	1250	1600
Rated short-circuit breaking current (kA)	20, 25	25/31.5/40	31.5/40
Size of matching fixed contact (mm)	φ35	φ49	φ55

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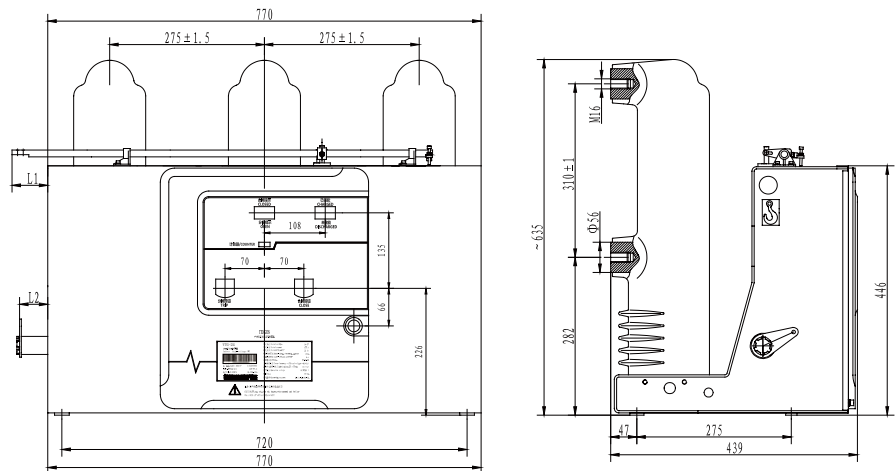
### 6.2 Outline and installation dimensions of handcart-type circuit breaker



Note: The stroke of the handcart is 300mm.

Rated current (A)	1600, 2000	2500, 3150	4000
Rated short-circuit breaking current (kA)	31.5/40		40
Size of matching fixed contact (mm)	φ79		φ109

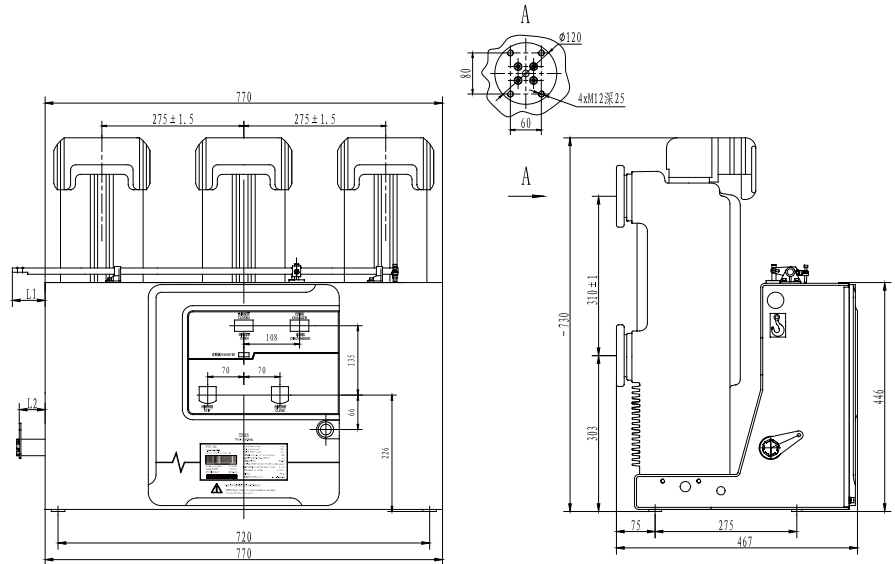
### 6.3 Outline and installation dimensions of fixed circuit breaker



Rated current (A)	630	1250	1600
Rated short-circuit breaking current (kA)	20, 25	25/31.5/40	31.5/40
Mechanism top interlock L1 (mm)	The interlock has left extension and right extension (left extension 50 as standard configuration), the length can be customized according to customer requirements		
Spindle extension L2 (mm)	Left extension or right extension (no extension as standard configuration), the length can be customized according to customer requirements		

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### 6.4 Outline and installation dimensions of fixed circuit breaker



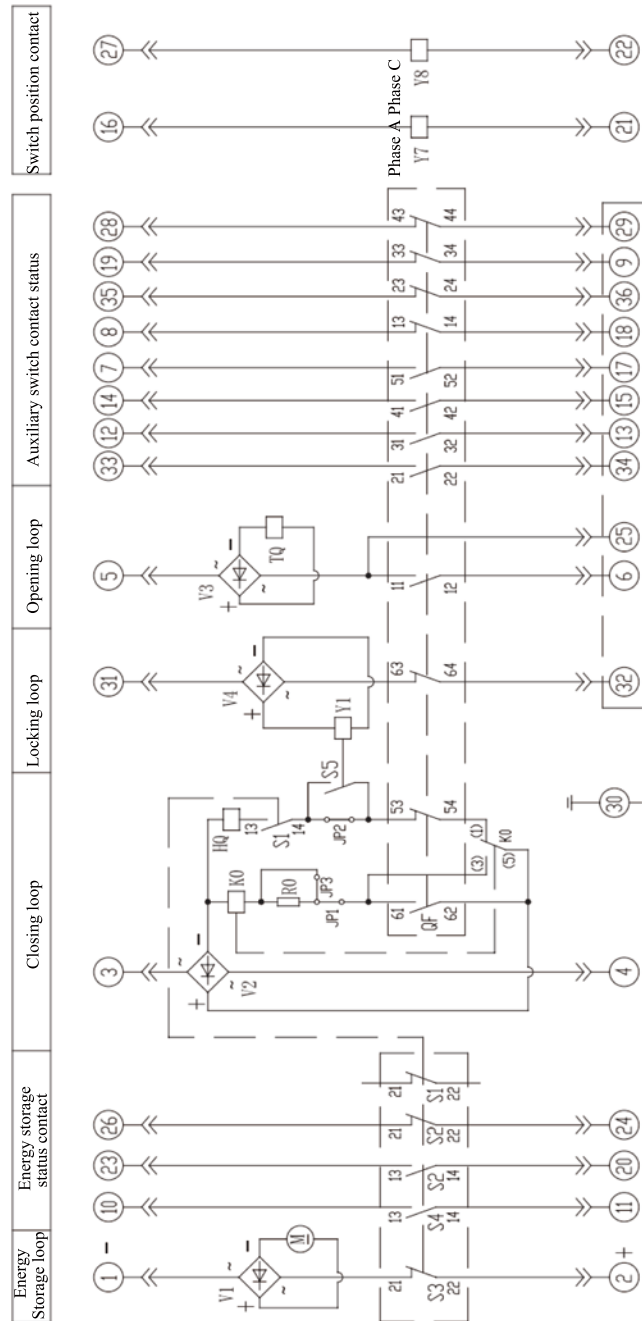
Note: Forced air-cooled is required for 4000A.

Rated current (A)	1600, 2000	2500, 3150	4000
Rated short-circuit breaking current (kA)	31.5/40		40
Size of matching fixed contact (mm)	φ79	φ109	
Mechanism top interlock L1 (mm)	The interlock has left extension and right extension (left extension 50 as standard configuration), the length can be customized according to customer requirements		
Spindle extension L2 (mm)	Left extension or right extension (no extension as standard configuration), the length can be customized according to customer requirements		

# VTG-24 Indoor Medium-voltage AC Vacuum Circuit Breaker

## 7 Electrical Schematic Diagram

### 7.1 Secondary Schematic Diagram for Fixed Type



Notes: 1. The circuit breaker is in the test position at the opening and discharged state.  
2. When operating under the DC power supply, the polarities in the dashed box shall be same, and the motor shall be wired according to the polarity shown in figure

Operating power selection:

Jumper	JP3
Jumper-status	JP3
Operating power	AC/DC220V / AC/DC110V

Notes: "-" indicates disconnection; "-" indicates connection

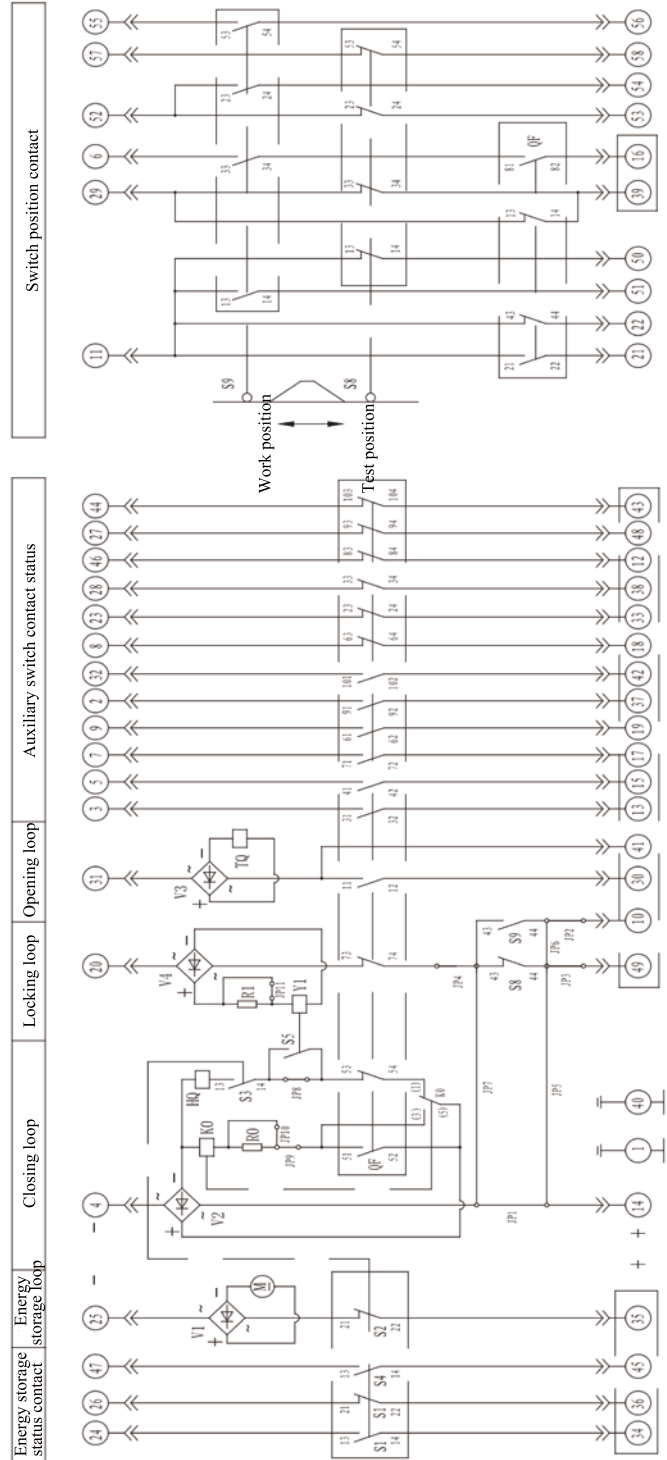
Option wiring layout: a-b-e-f

Jumper	JP1	JP2
Jumper-status	JP1	JP2
Configuration		
With anti-jump	With lockout	With lockout
Without anti-jump	Without lockout	Without lockout

Operating power selection:  
T(1-36) 2.5 Wiring terminal  
K0 Internal anti-jump relay (optional) Y7-Y8 Overcurrent release (optional)  
V1-V4 Rectifier  
Y1 Locking electromagnet coil (optional) S5 Locking electromagnet microswitch (optional)  
M Energy storage motor S1-S4 Travel switch (switched after energy storage of closing spring)  
RO Resistance QF Aux. switch 6-NO and 6-NC (switched when opening or closing)  
HQ Closing trip coil

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## 7.2 Secondary Schematic Diagram for Handcart Type



Operating power selection:

Jumper configuration	JP10
Operating power	AC/DC220V
	AC/DC110V

Notes: 1. The circuit breaker is in the test position at the opening and discharged state.  
2. When operating under the DC power supply, the polarities in the dashed box shall be same, and the motor shall be wired according to the polarity shown in figure.

Option wiring layout:

Jumper state	JP1	JP2	JP3	JP4	JP5	JP6	JP7	JP8	JP9
With lockout	✓	✓	✓	✓	✓	✓	✓	✓	✓
With anti-jump lockout	✓	✓	✓	✓	✓	✓	✓	✓	✓
Without lockout	✓	✓	✓	✓	✓	✓	✓	✓	✓
Without anti-jump lockout	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: “✓” indicates disconnection; “-” indicates connection

Operating power selection:

Jumper state	JP10
Operating power	AC/DC220V
	AC/DC110V

Notes: 1. The circuit breaker is in the test position at the opening and discharged state.  
2. When operating under the DC power supply, the polarities in the dashed box shall be same, and the motor shall be wired according to the polarity shown in figure.

Operating power selection:

Jumper state	JP10
Operating power	AC/DC220V
	AC/DC110V

Notes: 1. The circuit breaker is in the test position at the opening and discharged state.  
2. When operating under the DC power supply, the polarities in the dashed box shall be same, and the motor shall be wired according to the polarity shown in figure.

## VTG-24 Indoor Medium-voltage AC Vacuum Circuit Breaker

### 8 Ordering Technical Confirmation Form

#### Technical Confirmation Form for Ordering VTG-24 Indoor Medium-voltage AC Vacuum Circuit Breaker

Please determine your requirements according to the items listed in table below:

Product structure	<input type="checkbox"/> Cart type <input type="checkbox"/> Fixed type <input type="checkbox"/> Side-mounted fixed type ( <input type="checkbox"/> Left outlet <input type="checkbox"/> Right outlet)		
Order qty. (unit)		Primary structure	Insulated cylinder type air insulation
Rated current (A)	<input type="checkbox"/> 630 <input type="checkbox"/> 1250 <input type="checkbox"/> Others _____		
Rated short circuit breaking current (kA)	<input type="checkbox"/> 20 <input type="checkbox"/> 25 <input type="checkbox"/> 31.5 <input type="checkbox"/> 40		
Phase distance (mm)	<input type="checkbox"/> 150 <input type="checkbox"/> 210 <input type="checkbox"/> 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)	<input type="checkbox"/> 205 <input type="checkbox"/> 275 <input type="checkbox"/> 310 Note: Inter-electrode distance is the center distance between the top and bottom outlet terminals.		
Operating voltage (V)	OFF, ON: <input type="checkbox"/> AC220 <input type="checkbox"/> DC220 <input type="checkbox"/> Others _____ Stored energy: <input type="checkbox"/> AC220 <input type="checkbox"/> DC220 <input type="checkbox"/> Others _____		
Anti-bounce device	<input type="checkbox"/> No anti-bounce (standard) <input type="checkbox"/> With anti-bounce		
Locking device (fixed type non-cart locking)	Closing lock: <input type="checkbox"/> No lock (standard) <input type="checkbox"/> With lock, operating voltage _____ V		
	Cart lock: <input type="checkbox"/> No lock (standard) <input type="checkbox"/> With lock, operating voltage _____ V		
Overcurrent device	<input type="checkbox"/> No overcurrent (standard) <input type="checkbox"/> A and C two-phase overcurrent <input type="checkbox"/> A, B, C three-phase overcurrent Note: The operating current of the standard overcurrent coil is 5A.		
Undervoltage trip device	<input type="checkbox"/> No (standard) <input type="checkbox"/> Yes		
Cart type option (This option is not available for fixed type)	Earth: <input type="checkbox"/> Bottom friction earth (standard) <input type="checkbox"/> Rails earthed on both sides Program lock: <input type="checkbox"/> No (standard) <input type="checkbox"/> Lock chassis cart (key hole on cabinet door) <input type="checkbox"/> Lock mechanism <input type="checkbox"/> Lock circuit breaker baffle Cabinet door interlock: <input type="checkbox"/> No (standard) <input type="checkbox"/> 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: <input type="checkbox"/> Left (standard 50) _____ <input type="checkbox"/> Right _____ <input type="checkbox"/> No		
	Spindle extended: <input type="checkbox"/> No (standard) <input type="checkbox"/> Left _____ <input type="checkbox"/> Right _____		
Secondary wiring plan	<input type="checkbox"/> Tengen standard plan (see catalog) <input type="checkbox"/> Non-standard plan (with attached figure)		
Outline dimensions	<input type="checkbox"/> Tengen standard outline (see catalog) <input type="checkbox"/> 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 1.5mm <sup>2</sup> 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.