

MV Circuit Breaker

VS1i-12 Intelligent Vacuum Circuit Breaker

General

VS1i-12 intelligent medium-voltage vacuum circuit breaker is a new type of vacuum circuit breaker developed by combining traditional vacuum circuit breaker and 'intelligent switch equipment comprehensive monitoring device'. It adopts a new modular mechanism, ensuring stable operation and simple maintenance.

The smart circuit breaker collects data from various sensors to the intelligent processor, which integrates switch mechanical characteristics, temperature data collection, and analysis functions. The display terminal performs on-site analysis of mechanical faults, temperature rise prediction alarms, and edge computing for on-site diagnostics. It supports human-machine interaction, providing strong safeguards for safe equipment operation.

Type designation

VS1i - 12 P / T 630 - 25 HT P210

Product name	Rated voltage(KV)	Pole type	Operating mechanism	Rated current(A)	Rated short-circuit breaking current(KA)	Installation	Phase distance
VS1i	12	P / T	T	630	25	HT	P210
VS1i	12:12KV	P:Solid-sealing type	T: Spring type	630 1250 1600 2000 2500 3150 4000	20 25 31.5 40	HT: Handcart FT: Fixed type	P210 P275

Operating conditions

1. Ambient Temperature: Maximum temperature: +40°C, with an average not exceeding 35°C within 24 hours, Minimum temperature: -20°C.
2. Relative Humidity: Daily average relative humidity: ≤95%, Monthly average relative humidity: ≤90%, Daily average vapor pressure: ≤2.2 kPa, Monthly average vapor pressure: ≤1.8 kPa.
3. Altitude: Not exceeding 2000m.
4. Seismic Intensity: Not exceeding 8 degrees.
5. The surrounding air is not significantly affected by dust, smoke, corrosive, or flammable gases, vapors, or salt spray contamination.

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Features

1. The arc extinguishing chamber and operating mechanism of the circuit breaker are arranged in a front-to-back configuration and connected as a whole through a transmission mechanism.
2. The hermetically sealed pole adopts epoxy resin insulation material to seal the vacuum arc extinguishing chamber and the main circuit conductive components as a whole.
3. The vacuum arc extinguishing chamber utilizes a hermetically sealed pole, enhancing the product's ability to withstand environmental pollution.
4. The operating mechanism adopts a spring-stored energy design, providing both electric and manual energy storage functions.
5. It features an advanced and rational buffer device, ensuring no rebound during disconnection and reducing disconnection impact and vibration.
6. It has advantages such as simple assembly, high insulation strength, high reliability, good product consistency, and maintenance-free operation.
7. The mechanical lifespan can reach up to 20,000 operations.

Technical data

Technical datas are shown in Table 1

Table 1

Item	Unit	Data						
Rated voltage	KV	12						
Rated frequency	HZ	50						
1min	KV	12						
Rated lightning impulse withstand voltage peak	KV	75						
Rated current	A	630	1250	1600	2000	2500	3150	4000
Rated short-circuit breaking current Rated thermal stable current (effective value)	KA	20	20	/	/	/	/	/
		25	25	/	/	/	/	/
		31.5	31.5	31.5	31.5	31.5	/	/
		/	40	40	40	40	40	40
Rated short-circuit making current (peak value) Rated dynamic stable current (peak value)	KA	50	/	/	/	/	/	/
		63	63	/	/	/	/	/
		80	80	80	80	80	/	/
		/	100	100	100	100	100	100
Rated short-circuit breaking current breaking times	Times	30,50						
Rated thermal stability time	s	4						
Rated operating sequence		Opening -0.3s - closing and opening -180s - closing and opening /Opening -180s - closing and opening -180s - closing and opening						
Mechanical life	Times	30000						
Rated single capacitor bank breaking current	A	630						
Rated back to back capacitor bank breaking current	A	400						

Note:

When the rated current is 4000A, the switchgear must be equipped with forced air cooling.

When the rated short-circuit breaking current is $\leq 31.5\text{kA}$, the rated short-circuit breaking times are 50.

When the rated short-circuit breaking current is $\geq 31.5\text{kA}$, the rated short-circuit breaking times are 30.

When the rated short-circuit breaking current is $\geq 40\text{kA}$, the rated operation sequence is: Open - 180s - Close Open - 180s - Close Open.

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The mechanical characteristic parameters of the circuit breaker are shown in Table 2

Table 2

Item	Unit	Data
Contact distance	mm	9±1
Contact travel	mm	3.5±0.5
Three phase opening asynchrony	ms	≤2
Contact closing bounce time	ms	≤ 2 (for 1600A and below), ≤ 3 (for 2000A and above)
Average opening speed (contact separation -6mm)	m/s	1.1±0.2
Average closing speed (6mm~contact closed)	m/s	0.7±0.2
Opening time	ms	20~50
Closing time	ms	30~70
Allowable cumulative thickness of wear for moving and stationary contacts	mm	≤3
Main electrical circuit resistance	μΩ	≤50(630A) ≤45(1250~1600A) ≤30(2000A) ≤25(2500~4000A)

Opening and closing coil parameters are shown in Table 3

Table 3

	Closing coil		Opening coil		Locking solenoid		Anti-trip relay
	DC220	DC110	DC220	DC110	DC220	DC110	DC220,DC110
Rated operating voltage (V)	DC220	DC110	DC220	DC110	DC220	DC110	DC220,DC110
Coil power (W)	242	242	151	151	3.2	3.2	1
Rated current	1.1A	2.2A	0.7A	1.3A	29mA	29mA	9.1mA
Normal operating voltage range	85% -110% rated voltage		65% -120% rated voltage		65% -110% rated voltage		

The permanent magnet single-phase DC motor is used, and the operating voltage is allowed to use AC and DC power sources. The technical data are shown in Table 4

Table 4

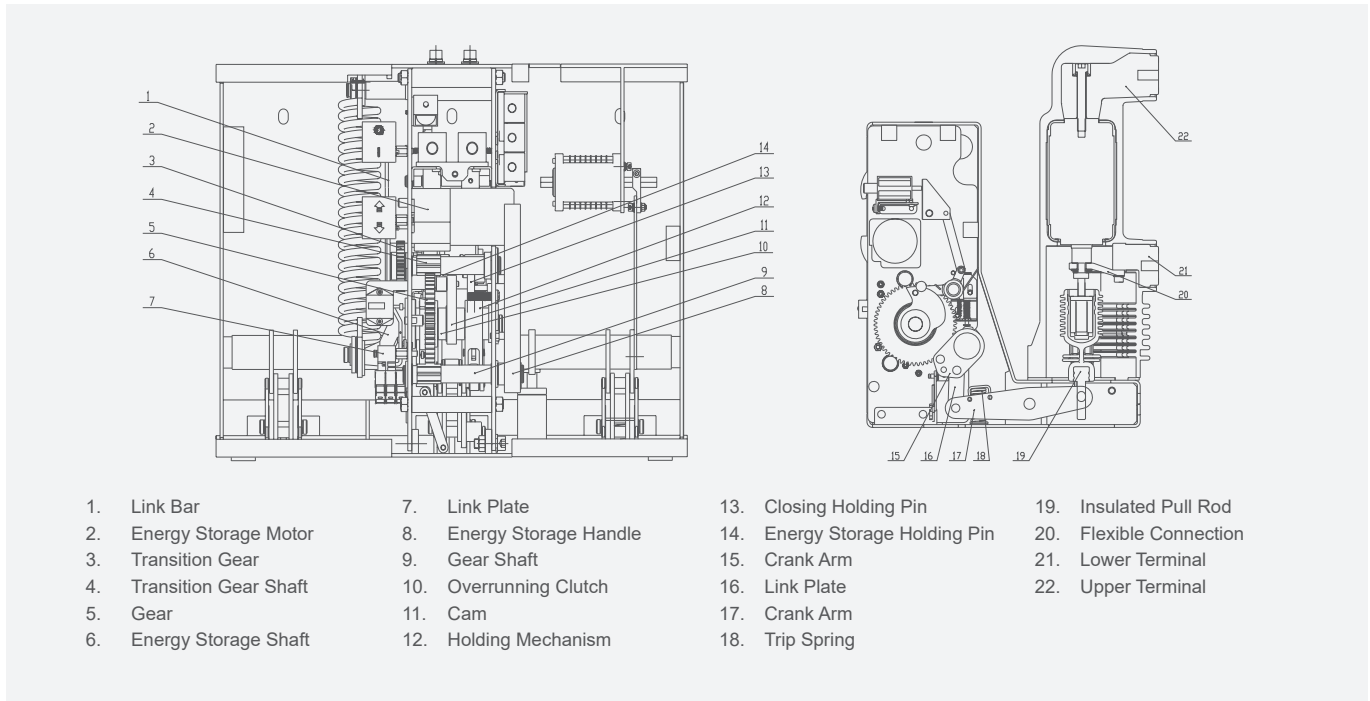
Rated voltage	Rated input power	Normal operating voltage range	Energy storage time at rated voltage
DC110,DC220	90	85%-100%	≤5

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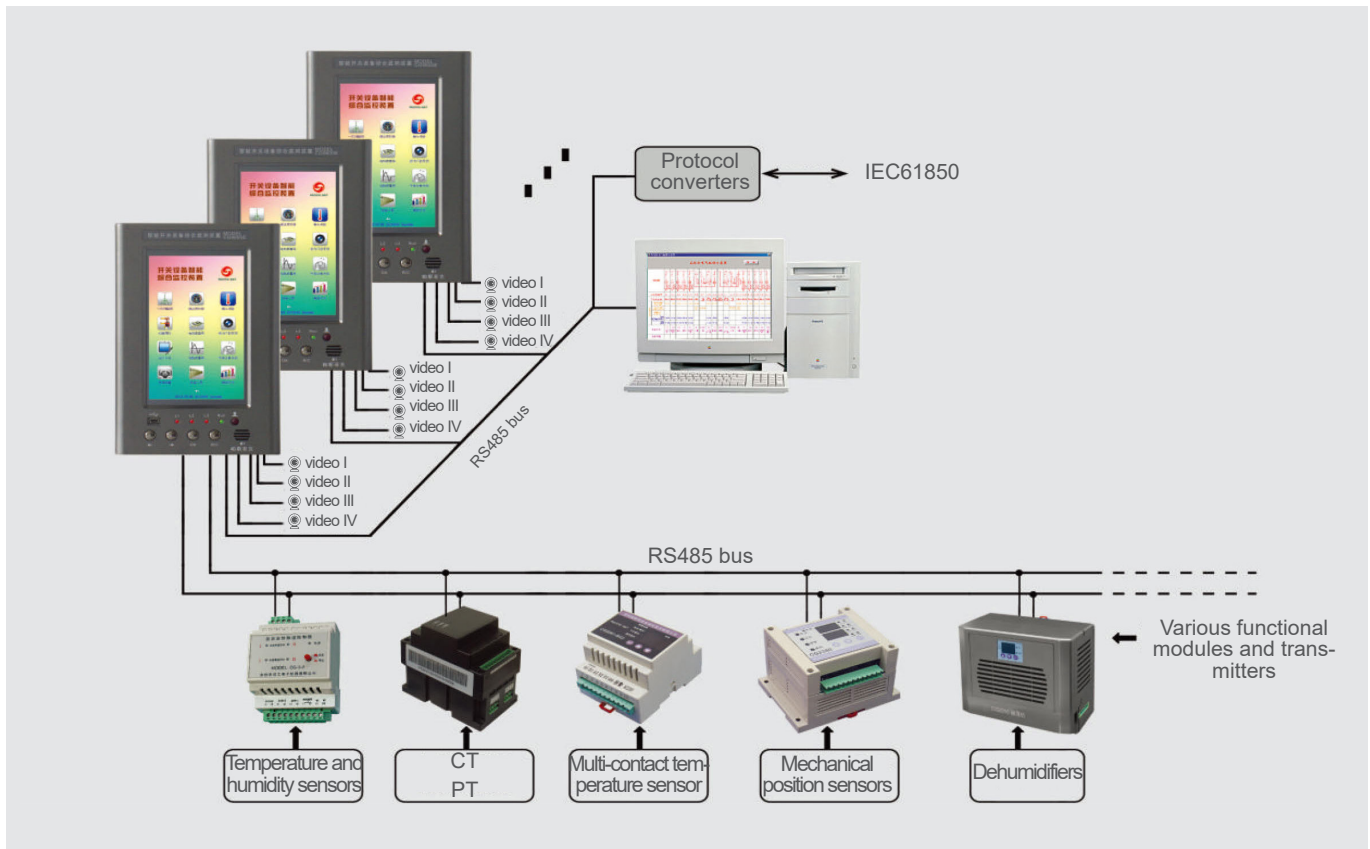
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Main features

Modular mechanism



The smart circuit breaker collects data from various sensors to the intelligent processor, which integrates switch mechanical characteristics, temperature data collection, and analysis functions. The display terminal performs on-site analysis of mechanical faults, temperature rise prediction alarms, and edge computing for on-site diagnostics. It supports human-machine interaction, providing strong safeguards for safe equipment operation.



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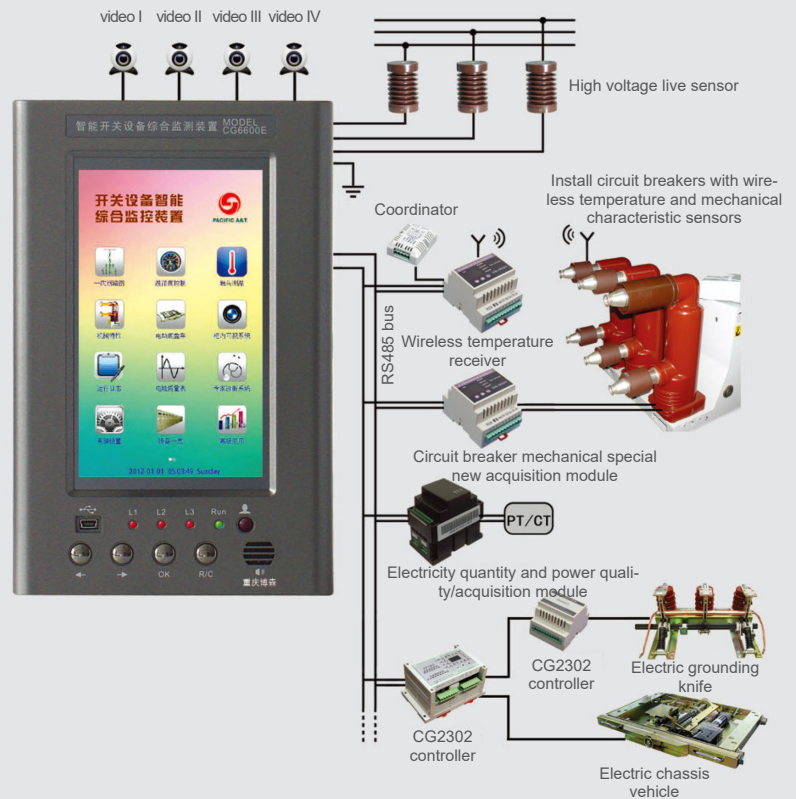
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Structure	Functions	Functional detailed description
Human-machine interface	7-inch true color LCD touch screen	The core uses the Linux embedded operating system
		7-inch true color LCD touch screen with 800*480 resolution, icon-based display of various function menus, user-friendly human-machine interface, easy operation.
		The interface of the primary loop simulation diagram is intuitive and clear, displaying all actions in real time and allowing for real-time recording in the background.
		The human body automatic sensing function activates the LCD backlight when a person enters (<2m), keeping the backlight constantly on; after the person leaves, there is an automatic delay of about 1 minute before the LCD backlight turns off.
		System parameter setting allows users to adjust the operating parameters of relevant devices according to their own needs
	High voltage live indication	High-voltage live online monitoring, displaying the live function of the three-phase system.
	Cabinet temperature and humidity monitoring with automatic heating dehumidification	Equipped with two temperature and humidity sensors and control circuits
		Equipped with two 100W heaters and one 50W heater
		Collect and display current temperature data in real time, and realize automatic heating and dehumidification functions according to the parameters set by the user
	Video online monitoring	Selectable 1~4 channels of video monitoring, with significant audio and video effects.
		All actions are accompanied by corresponding audio prompts in the background, with a configuration of four USB cameras that can be freely switched between different video screens using software, providing wide monitoring coverage.
	Communication	Supports the standard MODBUS communication protocol, with a standard RS485 communication interface.
All real-time data can be uploaded to the backend terminal via the RS485 interface, enabling real-time data collection and monitoring of the devices by the backend.		
Intelligent monitoring function	Circuit breaker mechanical characteristics monitoring	Configured with a displacement terminal for online detection of the mechanical operation performance of high-voltage circuit breakers.
		Online monitoring of circuit breaker travel displacement curve, operation time, synchronization, speed, and other mechanical characteristics.
		Fully display the equipment configuration list, recording relevant information of various equipment materials.
	Opening and closing coil, motor current monitoring	Configuring current sampling sensors for monitoring the opening and closing of the breaker coil, motor switching, and current online.
	Opening and closing coil anti-burning function	Realize the protection of opening and closing coils
	Wireless temperature measurement function	Supporting 3 channels, 6 channels, 9 channels, 12 channels for temperature measurement.
		Realize online measurement and display of the temperature and temperature rise (including cables) of the upper and lower contacts of the high-voltage switch, and implement over-temperature alarm and over-temperature event recording functions.
	Voice broadcast function	Language announcement function for the circuit breaker test position and working position rocking in and out.
Electric chassis vehicle control module	Configuring chassis vehicle control module to achieve fully electric operation of handcart in and out in both remote and local modes, realizing five-protection work, while retaining the original manual function.	
Smart switch configuration	Electric grounding knife control module	Realize fully electric operation of grounding switch in remote and local modes, implementing five-protection functions, while retaining the original manual function.
	Power reading function	Read detection data from comprehensive protection/multifunctional meters via the RS485 communication interface.
		Display data including three-phase current, phase voltage, line voltage, active power, reactive power, apparent power, power factor, frequency, energy, etc.
Power quality	Measurement and analysis functions for electricity quantity and power quality, capable of real-time measurement and display of various phase voltages, currents, active power, reactive power, energy, and other data.	
	Statistical analysis of phase current data, displaying the harmonic content rate of each phase current in the form of a bar chart.	

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- Primary circuit simulation indication
- Circuit breaker handcart position indication
- High voltage live and lockout indication
- Spring energy storage ground knife position indication
- Electricity quantity and power quality testing
- Online monitoring of temperature rise of contact points
- Temperature and humidity monitoring inside the cabinet
- Number of on-off cycles and fault records
- Equipment configuration and historical data recording
- Online monitoring of mechanical characteristics
- Electric ground knife and chassis vehicle handling
- Multi channel video online monitoring

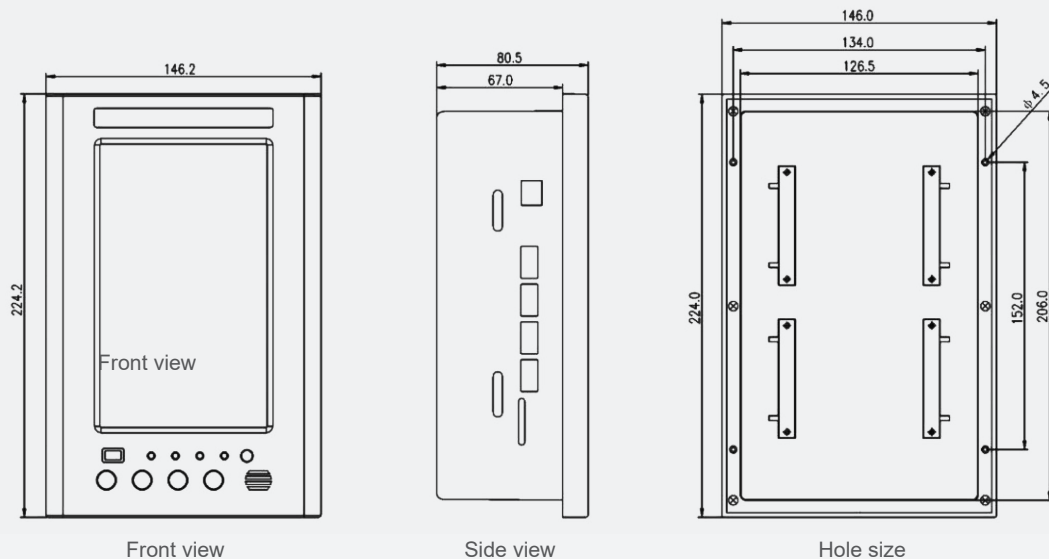


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Overall dimension of the controller

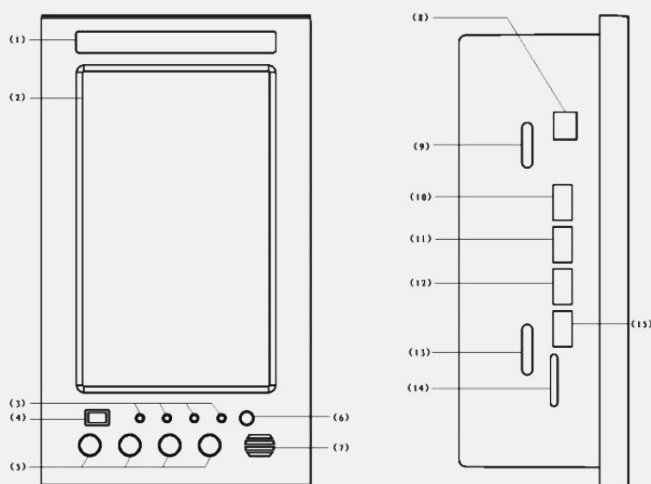
CG660OE verall dimensions and installation dimensions of the host



Installation method 1: Fix through the upper and lower installation holes and the provided installation components
 Installation method 2: Use 4-MAX screws to fix through a round hole of $\varnothing 4.5$

Hole size: 127.5x207.0
 Four round hole: $\varnothing 4.5$

CG660OE verall dimensions and installation dimensions of the host



Front view:

1. Labeling
2. 7-inch LCD color touch screen
3. Equipment operation indicator light. From left to right are L1, L2, L3, and Run. L1, L2, and L3 correspond to the ABC three-phase high voltage live indication, while Run corresponds to the equipment being powered on.
4. USB data cable socket
5. Press the button. From left to right are "←", "→", "OK", "R/C". The "←" controls the cursor to move forward, the "→" controls the cursor to move backward, the "OK" confirms, and the "R/C" is determined by the internal jumper to reset R or control C. It is generally used as a backup key and has no function.
6. Human body sensing probe
7. Audio output small window

Side view:

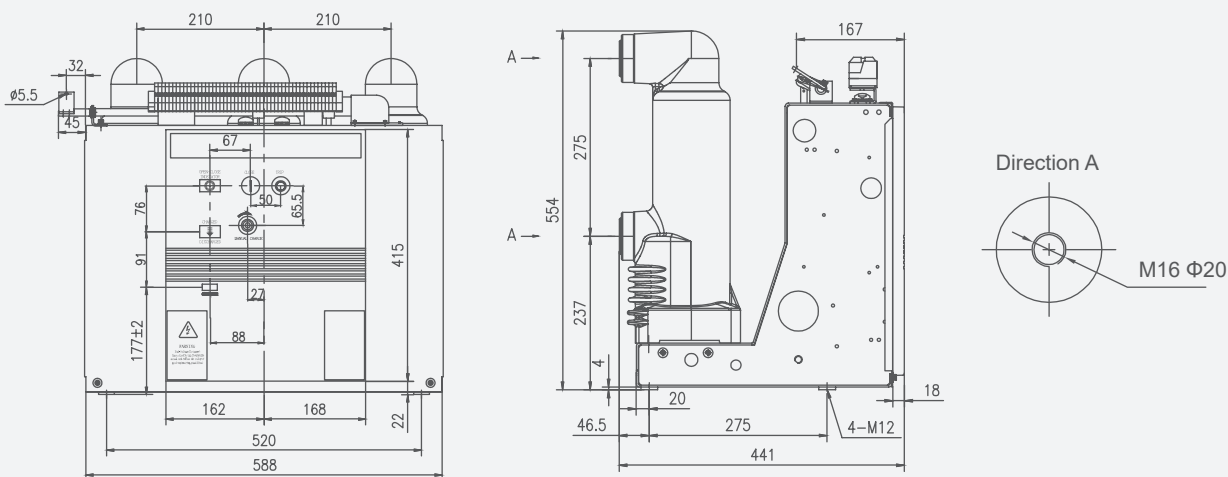
1. Ethernet interface
2. 3 # Video Interface
3. Upper installation hole
4. Lower installation hole
5. 1 # Video Interface
6. Ventilation and heat dissipation outlet
7. 2 # Video Interface
8. 4 # Video Interface

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Overall and mounting dimensions(mm)

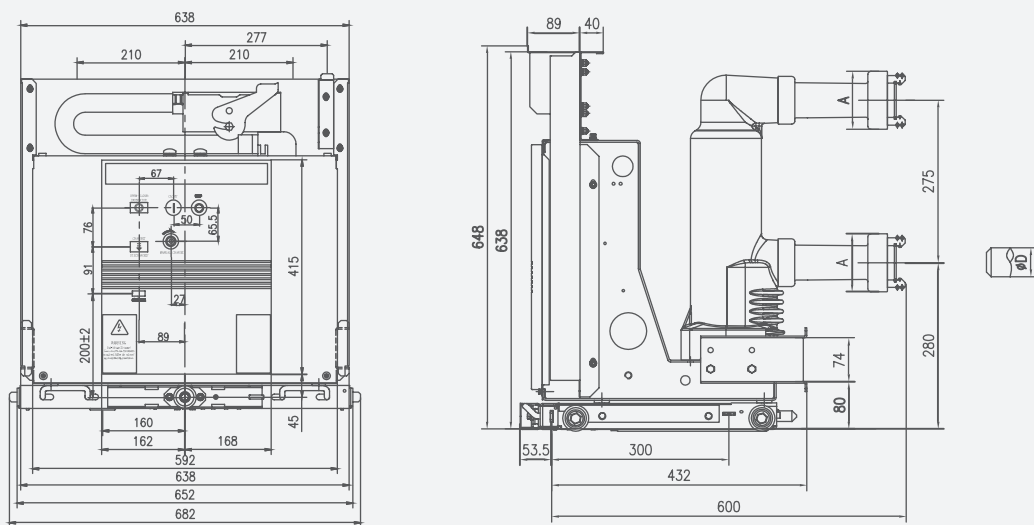
VS1i-12 630~1600A Fixed installation



Rated current(A)	630	1250	1600
Rated short-circuit breaking current(kA)	20,25,31.5	20,25,31.5,40	31.5,40

Note: The top interlock and spindle extension direction and length are made according to user requirements

VS1i-12 630~1600A Hand cart style



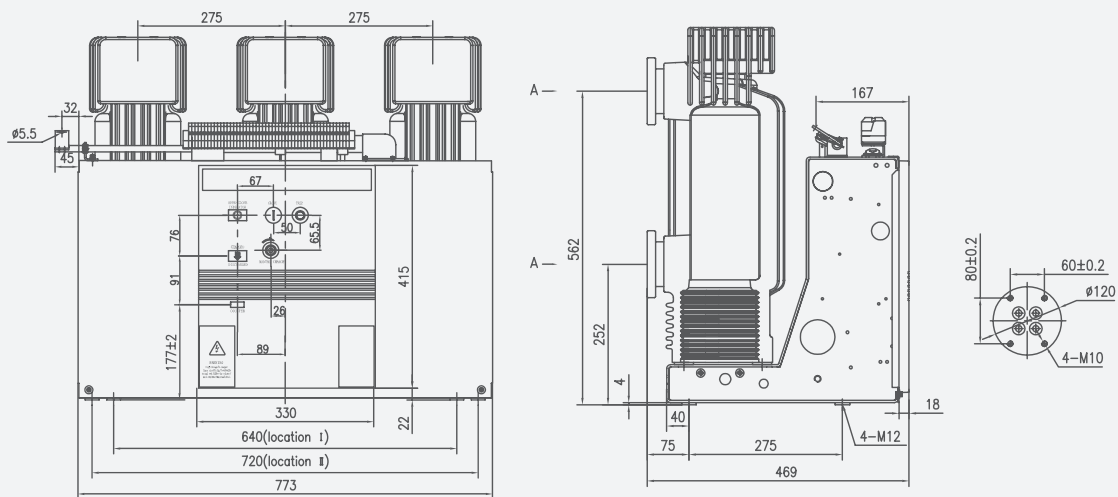
Rated current(A)	630	1250	1600
Rated short-circuit breaking current(kA)	20,25,31.5	20,25,31.5,40	31.5,40
Coordinate with the size of the static contact(mm)	Ø35	Ø49	Ø55
Match the size of the silicone sleeve(mm)	Ø98	Ø98	Ø105

The tooth size of the dynamic and static contact shall not be less than 15-25mm, the phase spacing shall be 210mm, and the travel of the trolley in the cabinet shall be 200mm.

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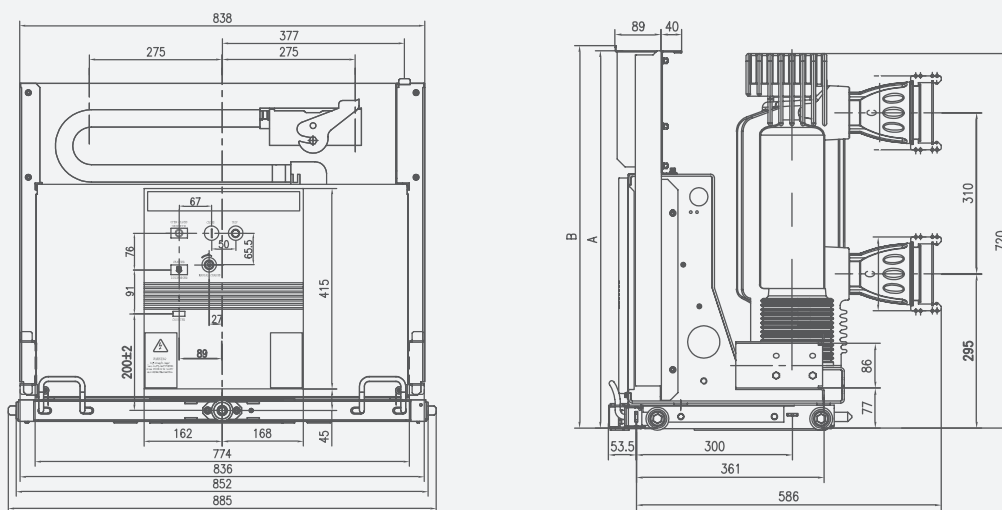
VS1i-12 1600~4000A Fixed installation



Rated current(A)	1600	2000	2500	3150	4000
Rated short-circuit breaking current(kA)	31.5,40	31.5,40	31.5,40	31.5,40	31.5,40

Note: The top interlock and spindle extension direction and length are made according to user requirements

VS1i-12 1600~4000A Hand cart style



Rated current(A)	1600	2000	2500	3150	4000
Rated short-circuit breaking current(kA)	31.5,40	31.5,40	31.5,40	31.5,40	31.5,40
Coordinate with the size of the static contact(mm)	Ø35,Ø79	Ø79		Ø109	
Coordinate with the size of the static contact(mm)		698		725	
Coordinate with the size of the static contact(mm)		708		735	
Match the size of the silicone sleeve(mm)		129		159	

The tooth size of the dynamic and static contact shall not be less than 15-25mm, the phase spacing shall be 210mm, and the travel of the trolley in the cabinet shall be 200mm.