



INDUSTRIAL SOLUTION SYSTEMS



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NVT-12

Embedded-pole medium voltage vacuum circuit



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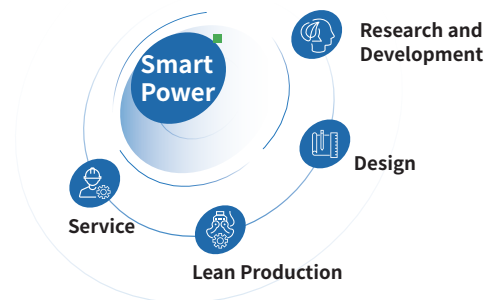
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NATUS ELECTRIC GROUP CO.,LTD.

Group Business



The Group specializes in system integration, EPC turnkey services, and the R&D, production, and sales of core products within the medium and low-voltage power industry. In the field of power equipment, we have deep expertise in intelligent electrical switchgear system, high-end power components, advanced power quality management products, intelligent control instruments, and control systems. Leveraging accumulated expertise in artificial intelligence and big data analytics, we provide comprehensive solutions for meteorological disaster prevention equipment and the safe operation of substations and transmission lines. In the domain of new technologies, we focus on small-area, low-altitude meteorological high-precision prediction technology, offering integrated products and services to support the development of the low-altitude economy.

Group Vision



Natus Electric Group originates from Germany, is firmly rooted in China, and serves the global market. Since its establishment in 1956, the group has built upon German technology deeply integrating Chinese expertise and a global perspective. Supported by a robust Chinese R&D and manufacturing team, we precisely respond to global market demands, delivering professional intelligent power solutions for clients across various industries. Adhering to a customer-centric approach, the group is committed to innovative products, reliable technology, and lean manufacturing.

Working hand-in-hand with global users to build a smarter, more efficient, and sustainable future for the power and energy sector.



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General Information



- The NVT series vacuum circuit breaker is a new-generation product launched by Natuo Company, integrating 50 years of experience in power equipment manufacturing, in compliance with Chinese national and industrial standards. It adopts well-known domestic brand vacuum interrupters and solid-sealed insulation technology, equipped with a mature modular spring operating mechanism, and features interfaces for intelligent upgrade. With a simple structure, the product achieves maintenance-free operation.
- It can be optionally installed in mainstream medium-voltage switchgears at home and abroad, compatible with cabinet types of 650mm, 800mm and 1000mm. Its interface dimensions are interchangeable with mainstream circuit breakers worldwide, and the product has a global application track record.

Operating Conditions

- Ambient air temperature:
not higher than +40°C and not lower than -15°C.
- Altitude:
not exceeding 1000 m.
- Relative humidity of air:
Average relative humidity within 24 hours: not more than 95%
Average water vapor pressure within 24 hours: not more than 2.2 kPa
Monthly average relative humidity: not more than 90%
Monthly average water vapor pressure: not more than 1.8 kPa
Seismic intensity not exceeding 8 degrees.
- The site shall be free from fire hazard, explosion risk, serious pollution, chemical corrosion and severe vibration.



Application Fields

- Power Plant
- Substation
- Petrochemical
- Metallurgy
- Manufacturing
- Airport
- Cement & Paper
- Building ...

Suitable for various applications.

- NVT vacuum circuit breakers are suitable for making and breaking under the following conditions:
- Short-circuit current
- Load or no-load cables and overhead lines
- Load or no-load transformers and generators
- Harmonic control systems
- Capacitor banks
- Motors

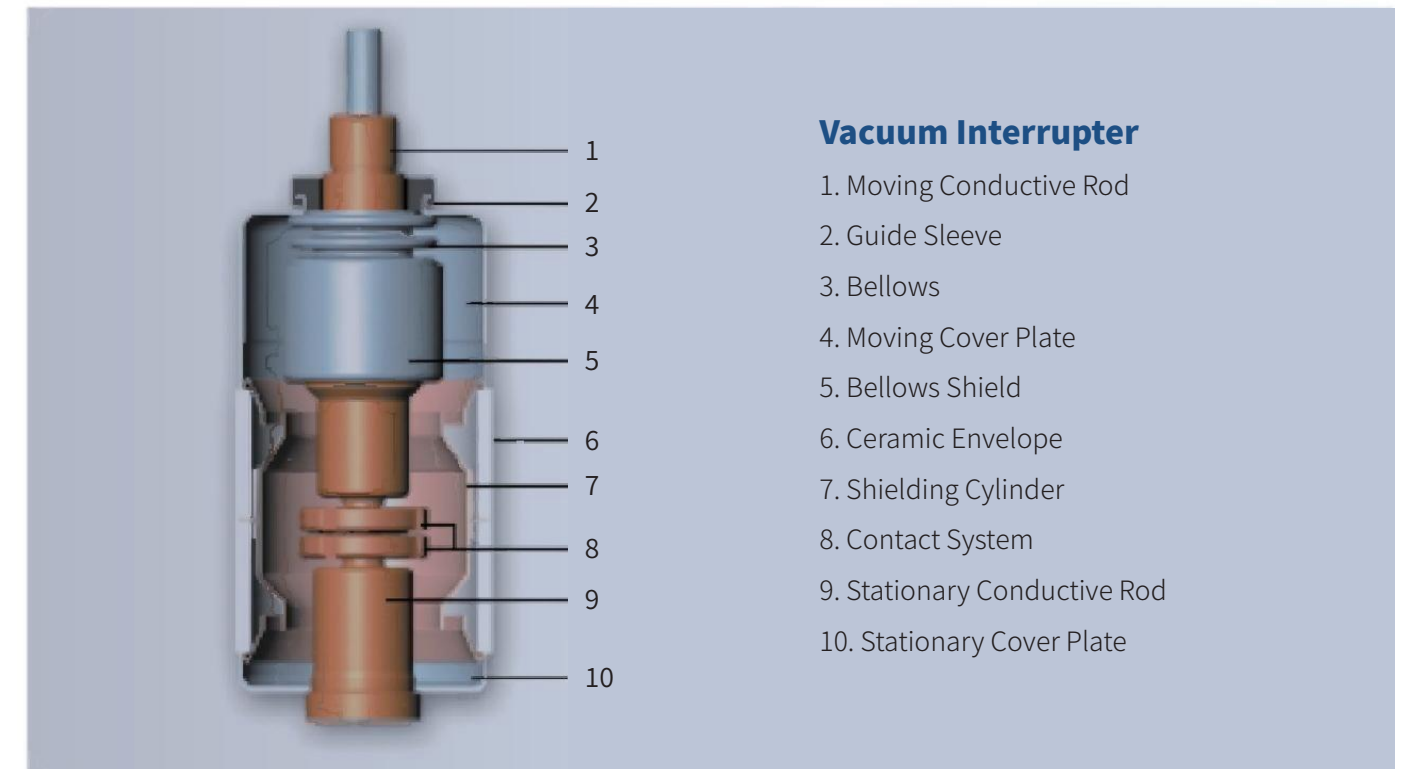


Description of Model

NVT-12 □ □

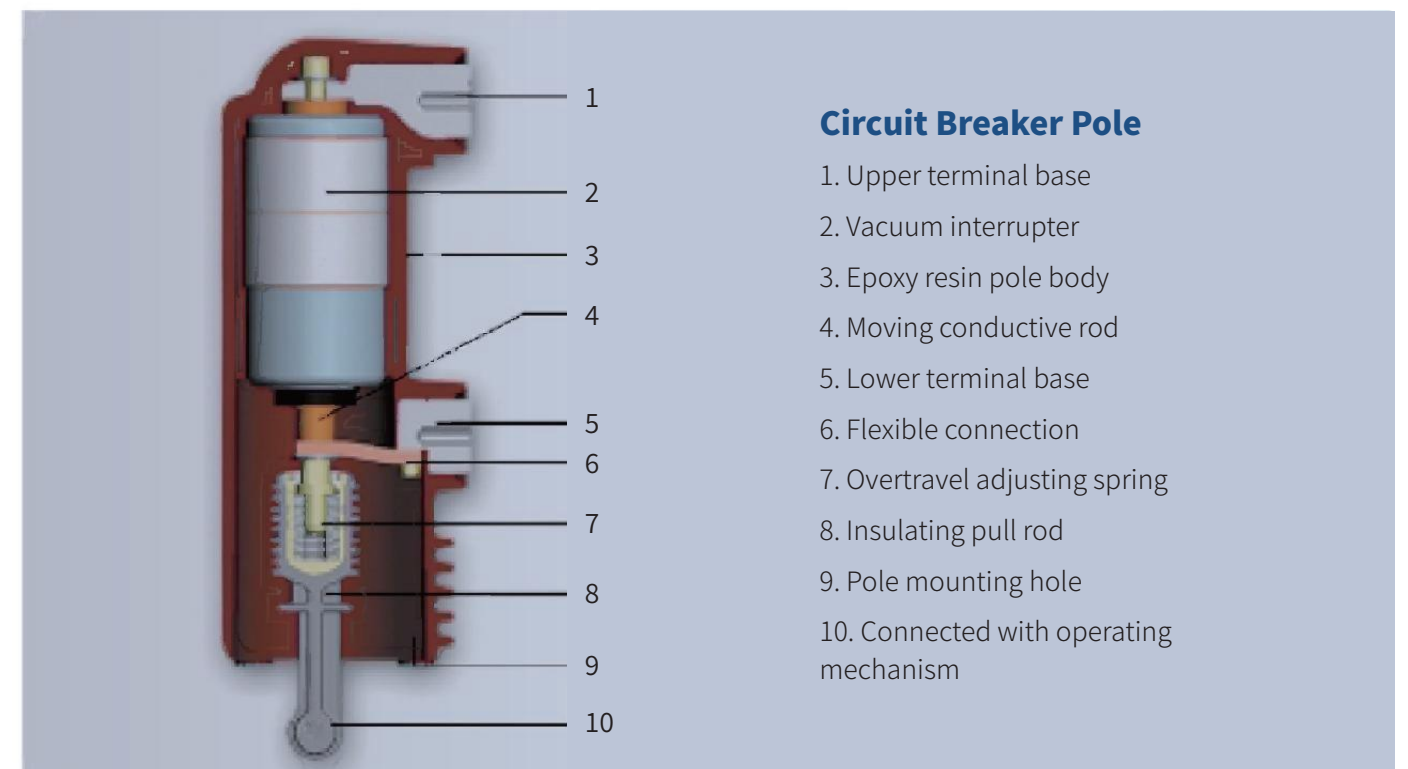
- Rated short-circuit breaking current (kA): 25, 31.5, 40, 50
- Rated current (A): 630, 1250, 1600, 2000, 2500, 3150, 4000
- Rated voltage (kV)
- Circuit breaker model: NVT - NATUS Vacuum Technology

Product Structure and Features



Vacuum Interrupter

1. Moving Conductive Rod
2. Guide Sleeve
3. Bellows
4. Moving Cover Plate
5. Bellows Shield
6. Ceramic Envelope
7. Shielding Cylinder
8. Contact System
9. Stationary Conductive Rod
10. Stationary Cover Plate



Circuit Breaker Pole

1. Upper terminal base
2. Vacuum interrupter
3. Epoxy resin pole body
4. Moving conductive rod
5. Lower terminal base
6. Flexible connection
7. Overtravel adjusting spring
8. Insulating pull rod
9. Pole mounting hole
10. Connected with operating mechanism



1. Closing Unit

The closing unit features a simple structure and reliable operating principle. It not only fundamentally eliminates faults such as failure to maintain after closing and refusal to open, but also reduces the tripping power required for opening.

2. Closing and Opening Coil

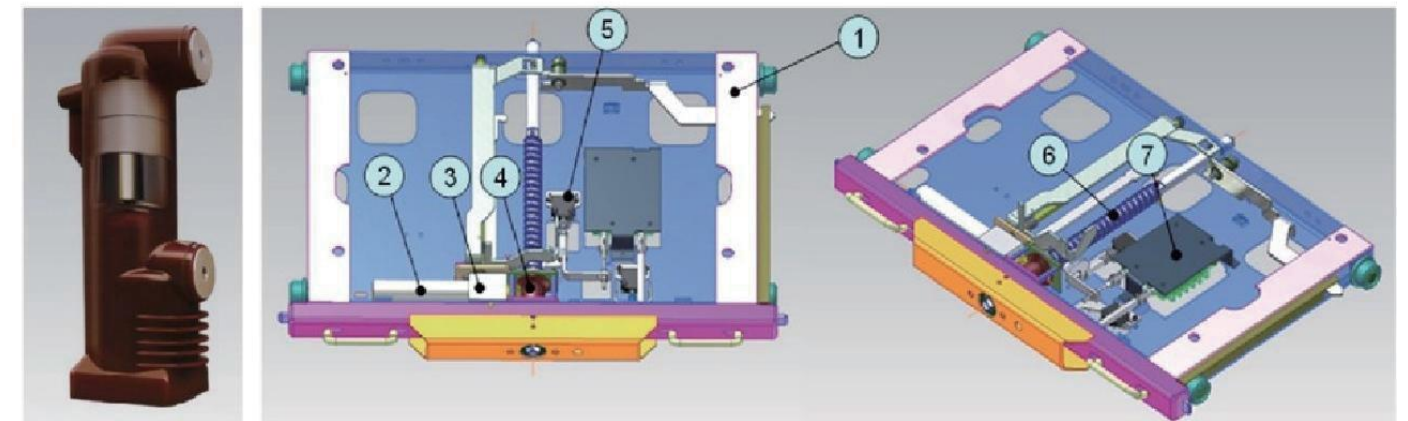
It adopts a fully enclosed structure to ensure immunity to humid air.

3. Opening Buffer

High-performance opening oil buffer can reduce the overshoot and rebound amplitude of the moving contact during circuit breaker opening, lower the probability of arc reignition when the circuit breaker is opening, and ensure the mechanical life of the bellows in the vacuum interrupter.

4. Surface Treatment

80% of the mechanism components are treated with nickel-phosphorus alloy plating, which greatly improves the corrosion resistance of parts and ensures consistent and stable mechanical performance.



1. Fully Modular Mechanism

The fully modular structural design gives the NVT circuit breaker a clear overall functional configuration, simple operation and maintenance, and reliable operation.

Modular components that can be quickly replaced without affecting product performance:

- Motor
- Closing and opening coil
- Over-current trip coil
- Latching coil

Secondary control components for easy maintenance:

- Energy storage position auxiliary switch
- Open/close position auxiliary switch
- Secondary control module

Our design gives full consideration to convenient and efficient user operation and maintenance. Vulnerable components such as closing and opening coils, motors, over-current trip coils, etc., can all be replaced very conveniently and quickly, making the product more user-friendly.

2. Compatible with Advanced Motorized Chassis

With the continuous development of intelligence, we provide users with programmed switching-in and switching-out schemes according to requirements during the design process. The adoption of the motorized chassis enables remote control. The sophisticated control module, combined with sensor technology, provides more accurate position feedback for the circuit breaker, and is equipped with over-travel protection and misoperation prevention functions.

3. Optimally Designed Opening Buffer

Complete absorption of opening energy ensures more stable mechanism characteristics.

The unique opening buffer guarantees stable opening performance under various temperature conditions.

4. Scientifically Designed & Strictly Validated Embedded Pole

The application of embedded-pole technology enables maintenance-free operation of the main circuit and avoids interference from external environments (humidity, dust, etc.).

Scientific design minimizes the internal electric field intensity, ensuring long-term stable operation of the product.

Strict validation guarantees that the product can adapt to various climatic conditions.

5. High Reliability

Compared with the traditional assembled pole, the NVT adopts an embedded pole. The number of components and connectors of the embedded pole is greatly reduced, thus simplifying the assembly process of the main circuit, reducing the circuit resistance and improving the reliability of the main circuit connection.

6. Stable Insulation Performance

By embedding the vacuum interrupter in solid epoxy resin material, the impact of the external environment on the vacuum interrupter is minimized, protecting it from dust, moisture, condensation and pollution. Meanwhile, it fully meets the creepage distance requirements for Class II pollution areas specified in GB/DL standards.

7. Compact Design

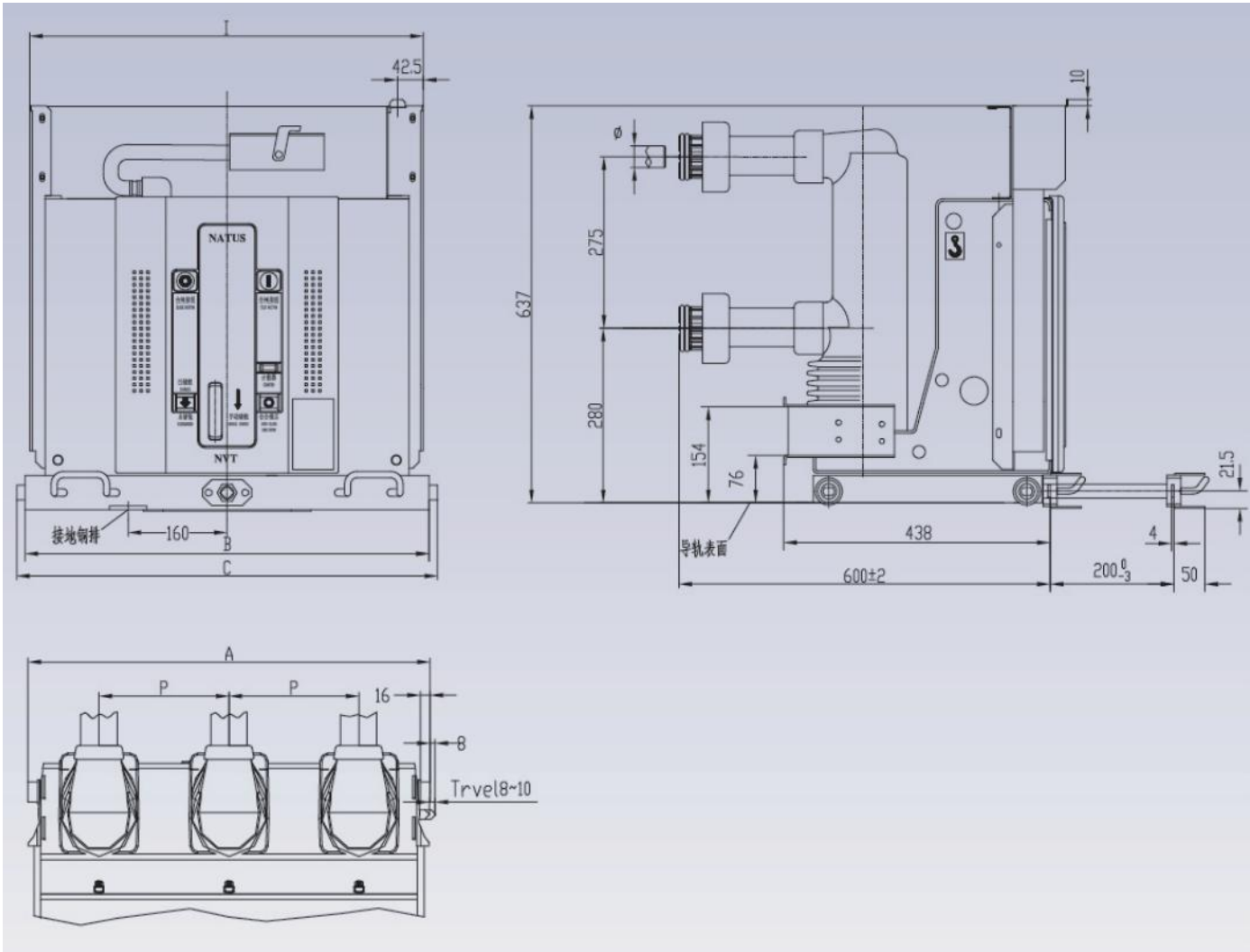
By using epoxy resin as the insulation medium, the phase-to-phase distance is reduced, resulting in a smaller size for both the circuit breaker and the switchgear.

Rated Voltage						
Rated Voltage		Ur[kV]	12			
Power Frequency Withstand Voltage(1 min)	Between phases and to earth	Ud(1min)[kV]	42			
	Between breaks		48			
Lightning Impulse Withstand Voltage	Between phases and to earth	Up[kV]	75			
	Between breaks		85			
Control Circuit Power Frequency Withstand Voltage (1 min)		[V]	2000			
Control circuit supply voltage		[V]	AC 110/220、DC 110/220			
Rated frequency		Fr[Hz]	50/60			
Rated operating sequence			20kA-40kA:O-0.3s-CO-180s-CO 50kA:0-180s-CO-180s-CO			
Rated current						
Rated current		Ir[A]	630	1250 1600	2000 2500	3150 4000①
Rated short-circuit breaking current		Ics[kA]	20	20	31.5	31.5 40
			25	25	40	40 50
			31.5	31.5		50
				40		
Rated short-time withstand current (4 s)		Ik[kA]	20	20	31.5	31.5 40
			25	25	40	40 50
			31.5	31.5		50
				40		
Rated peak withstand current		Ip[kA]	50	50	80	80 100
			63	63	100	100 125
			80	80		125
				100		
Rated capacitor bank breaking current		[A]	400			
Rated capacitor bank making inrush current		[kA](4250Hz)	20			
Mechanical Characteristics						
Mechanical endurance		Times	30000/20000② Class M2			
Electrical endurance			E2			
Opening time		[ms]	20-50			
Arcing time		[ms]	10-15			
Total breaking time		[ms]	30-65			
Closing time		[ms]	35-70			

① Forced air cooling is required for 4000 A.

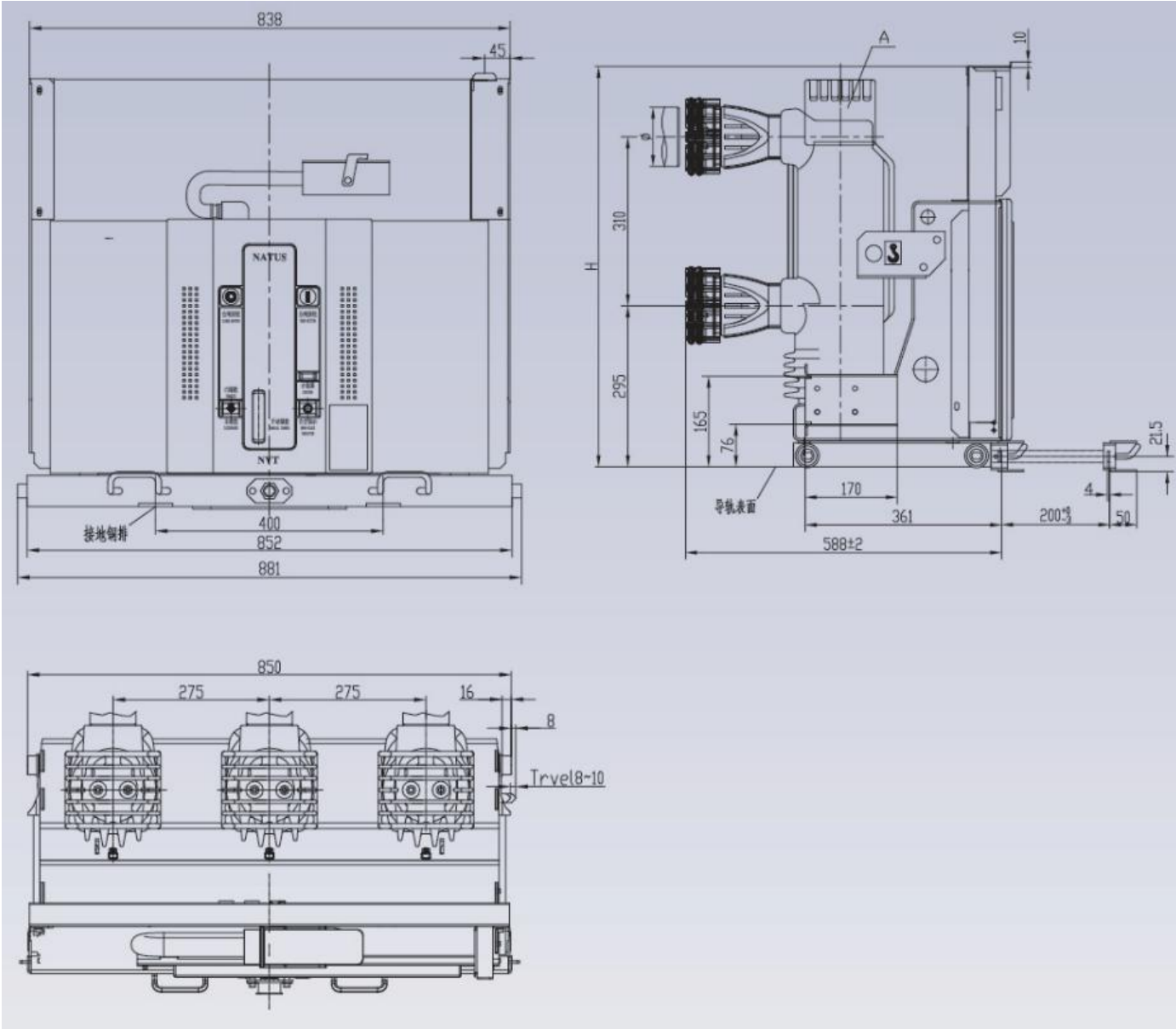
② When the rated short-circuit breaking current is 40 kA or 50 kA, the mechanical endurance is 20000 times.

Overall Dimensions (Withdrawable Type)



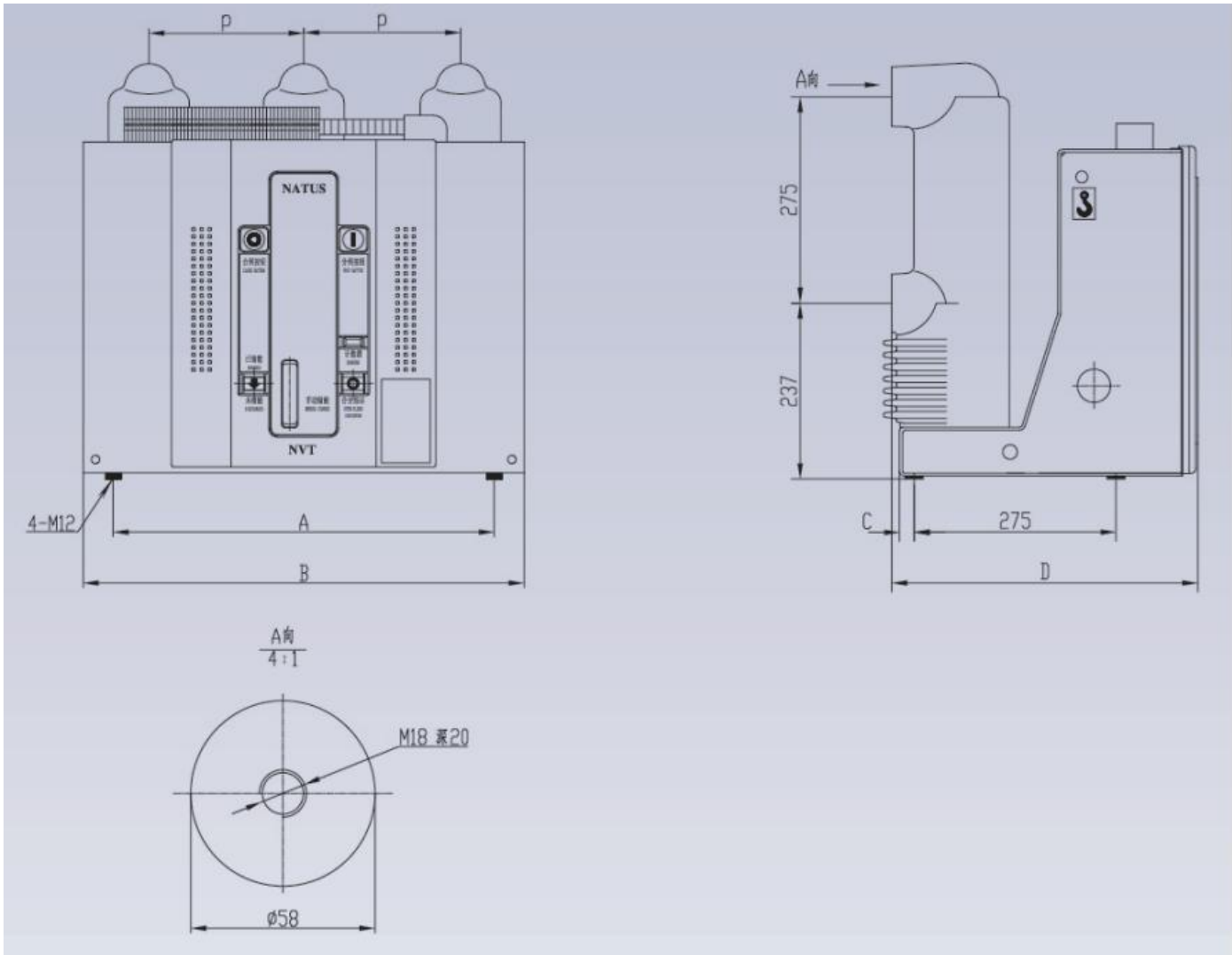
Rated current (A)	630	1250	630	1250	1250	1600
Rated short-circuit breaking current (kA)	20/25/31.5				40	40
Matching size of static contact Ø (mm)	Ø35	Ø49	Ø35	Ø49	Ø49	Ø55
Matching cabinet width (mm)	650		800			
P(mm)	150		210			
A(mm)	502		650			
B(mm)	503		652			
C(mm)	531		681			
I(mm)	492		648			

Overall Dimensions (Withdrawable Type)



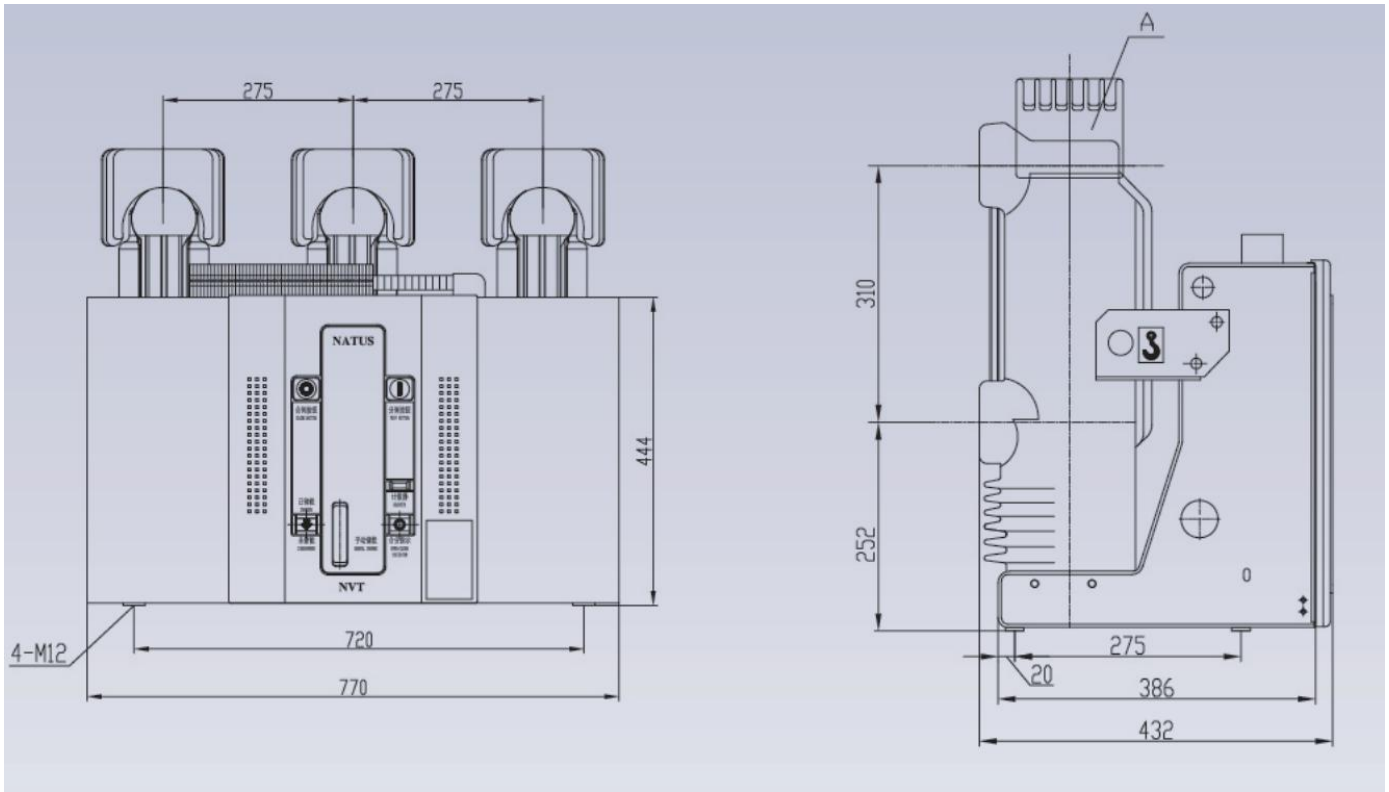
Rated current (A)	1250	1600/2000	2500/3150/4000※
Rated short-circuit breaking current (kA)	31.5/40		
Matching fixed contact diameter Ø (mm)	Ø55	Ø79	Ø109
H(mm)	694	694	735
Matching cabinet width (mm)	1000		

Overall Dimensions (Fixed Type)



Rated current (A)	630/1250	
Rated short-circuit breaking current (kA)	20/25/31.5	
P(mm)	150	210
A(mm)	400	520
B(mm)	460	588
C(mm)	45	20
D(mm)	432*	432*

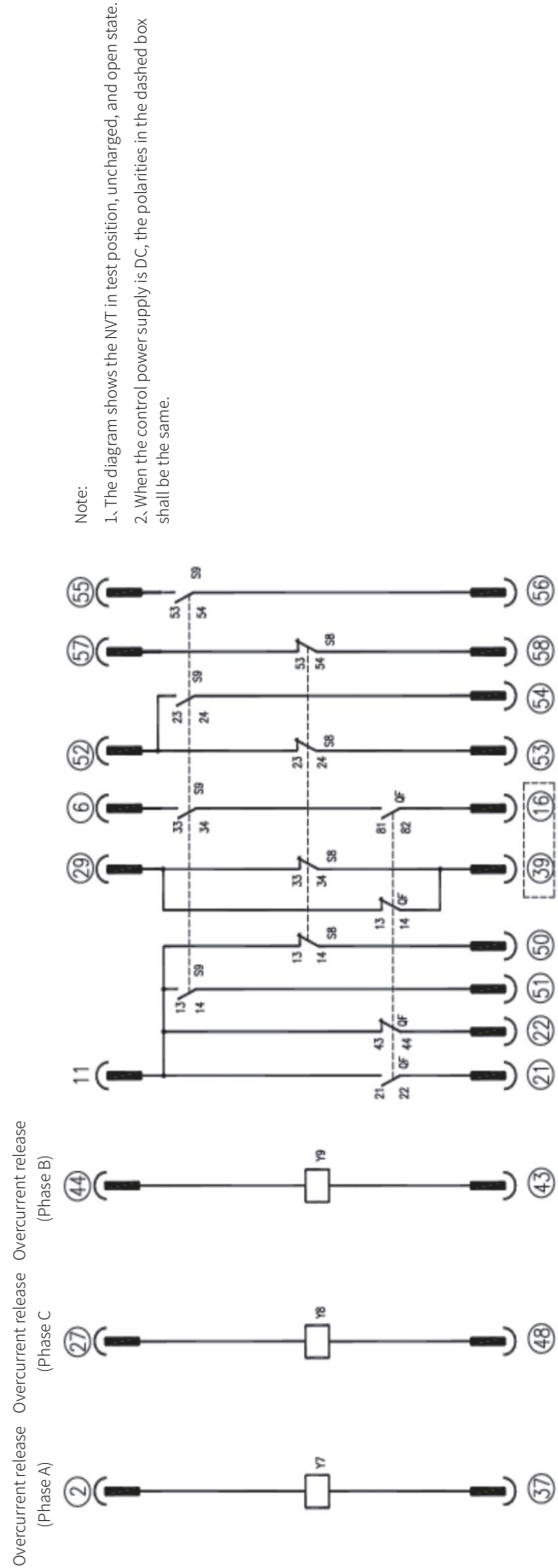
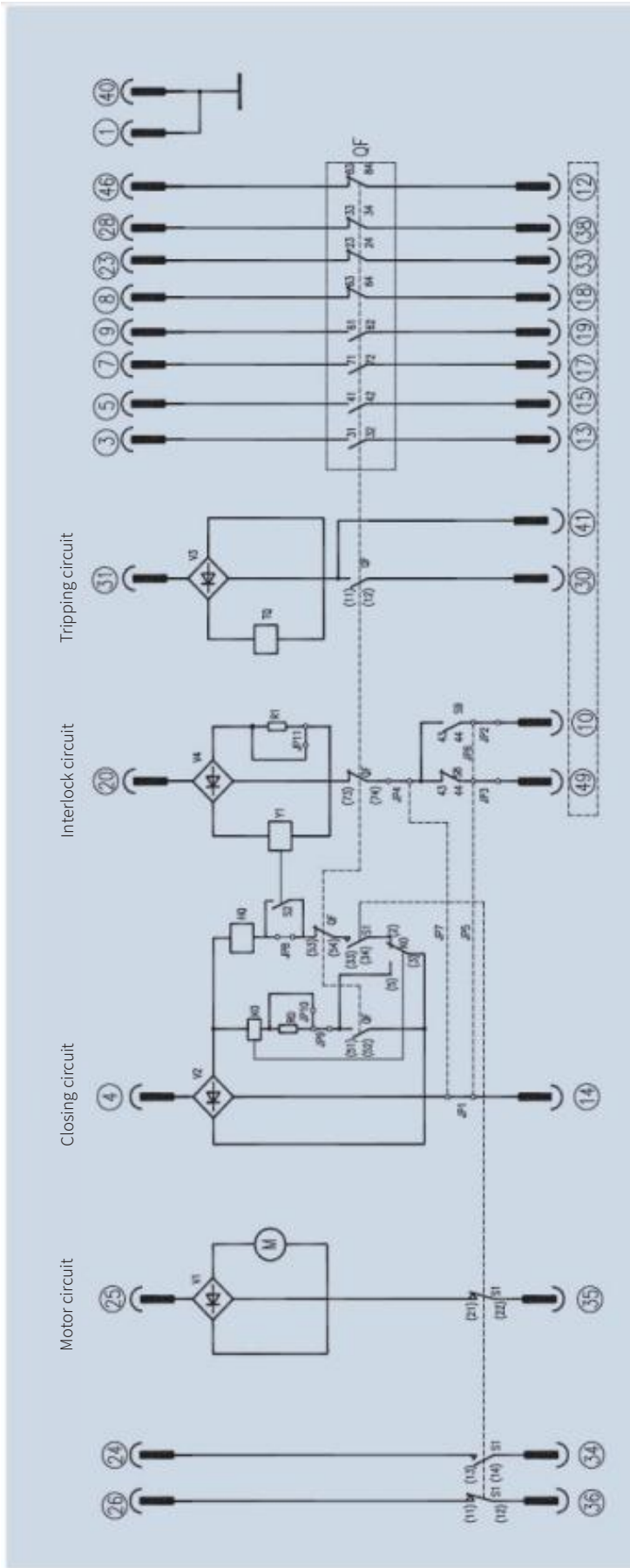
Overall Dimensions (Fixed Type)



Rated current (A)	1250/1600/2000/2500	3150/4000*
Rated short-circuit breaking current (kA)	31.5/40	
Outlet seat diameter Ø (mm)	Ø70	Ø80
Matching cabinet width (mm)	1000	

Note:

- 1、The circuit breaker shall be equipped with cooling cover A when the rated current exceeds 2500 A.
- 2、*When forced air cooling is adopted, the rated current can reach 4000 A.



Optional wiring settings

Jumper status		Jumper								
Configuration		JP1	JP2	JP3	JP4	JP5	JP6	JP7	JP8	JP9
With anti-pumping	With interlock	√	√	√	√	/	/	/	/	√
	Without interlock	/	/	/	/	√	√	√	√	√
Without anti-pumping	With interlock	√	√	√	√	/	/	/	/	/
	Without interlock	/	/	/	/	√	√	√	√	/

Operation power supply selection

Jumper		JP10	JP11
Control power supply			
AC/DC 220V		/	/
AC/DC 110V		√	√

Note:

"/" indicates open;
"√" indicates connected.

- S9: Auxiliary switch (switches when NVT is in service position)
- S8: Auxiliary switch (switches when NVT is in test position)
- S2: Auxiliary switch
- S1: Auxiliary switch (switches after closing spring is charged)
- QF: Auxiliary switch (switches during closing/opening operation)
- HQ: Closing coil
- TQ: Tripping coil
- R0~R1: Resistor
- Y7~Y9: Indirect overcurrent release coil (optional)
- Y1: Interlock coil (optional)
- V1~V4: Bridge rectifier (to be omitted for DC)
- M: Energy storage motor
- JP1~JP11: Jumpers
- KO: Anti-pumping relay (optional)

Optional wiring settings

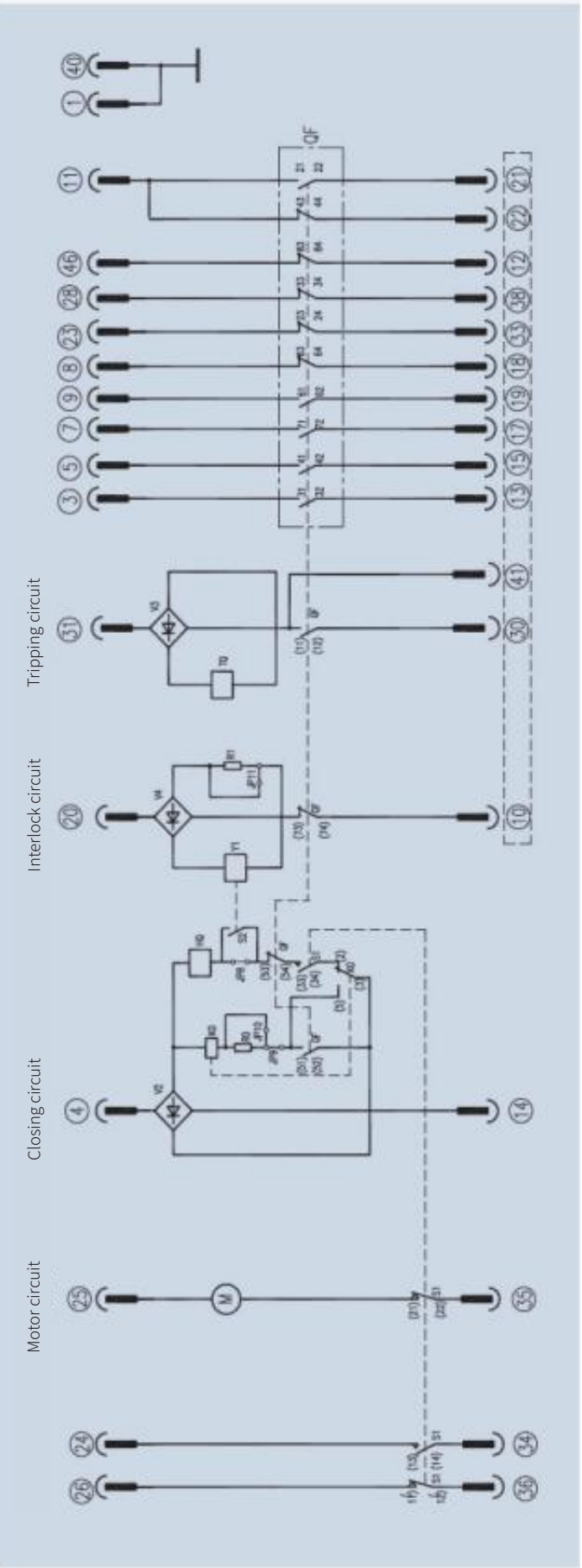
Jumper status		Jumper	
Configuration		JP8	JP9
With anti-pumping	With interlock	/	√
	Without interlock	√	√
Without anti-pumping	With interlock	/	/
	Without interlock	√	/

Operation power supply selection

Control power supply	JP10	JP11
AC/DC 220V	/	/
AC/DC 110V	√	√

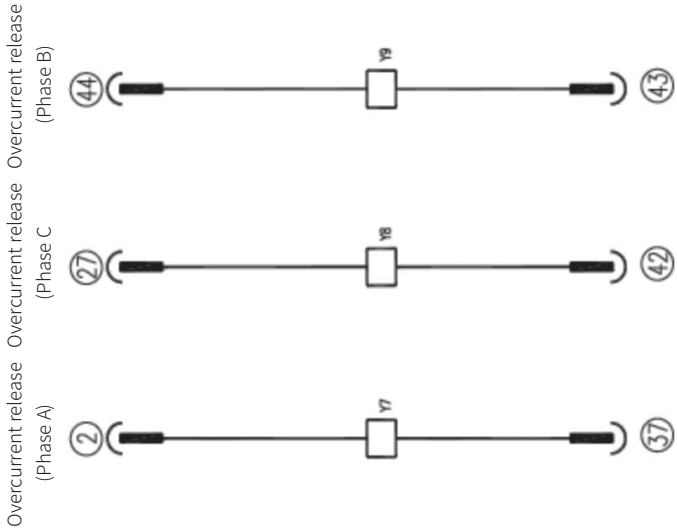
Note:
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- HQ: Closing coil
TQ: Tripping coil
M: Energy storage motor
S2: Auxiliary switch
S1: Auxiliary switch (switches after closing spring is charged)
QF: Auxiliary switch (switches during closing/opening operation)
JP8-JP11: Jumpers
KO: Anti-pumping relay (optional)
R0~R1: Resistors
Y7~Y9: Indirect overcurrent release coil (optional)
Y1: Interlock coil (optional)
V2~V4: Rectifiers



Note:

The diagram shows NVT(G) in uncharged and open state.
When the operating power supply is DC, the polarities in the dashed box must be consistent.





PRECISION IN DETAIL