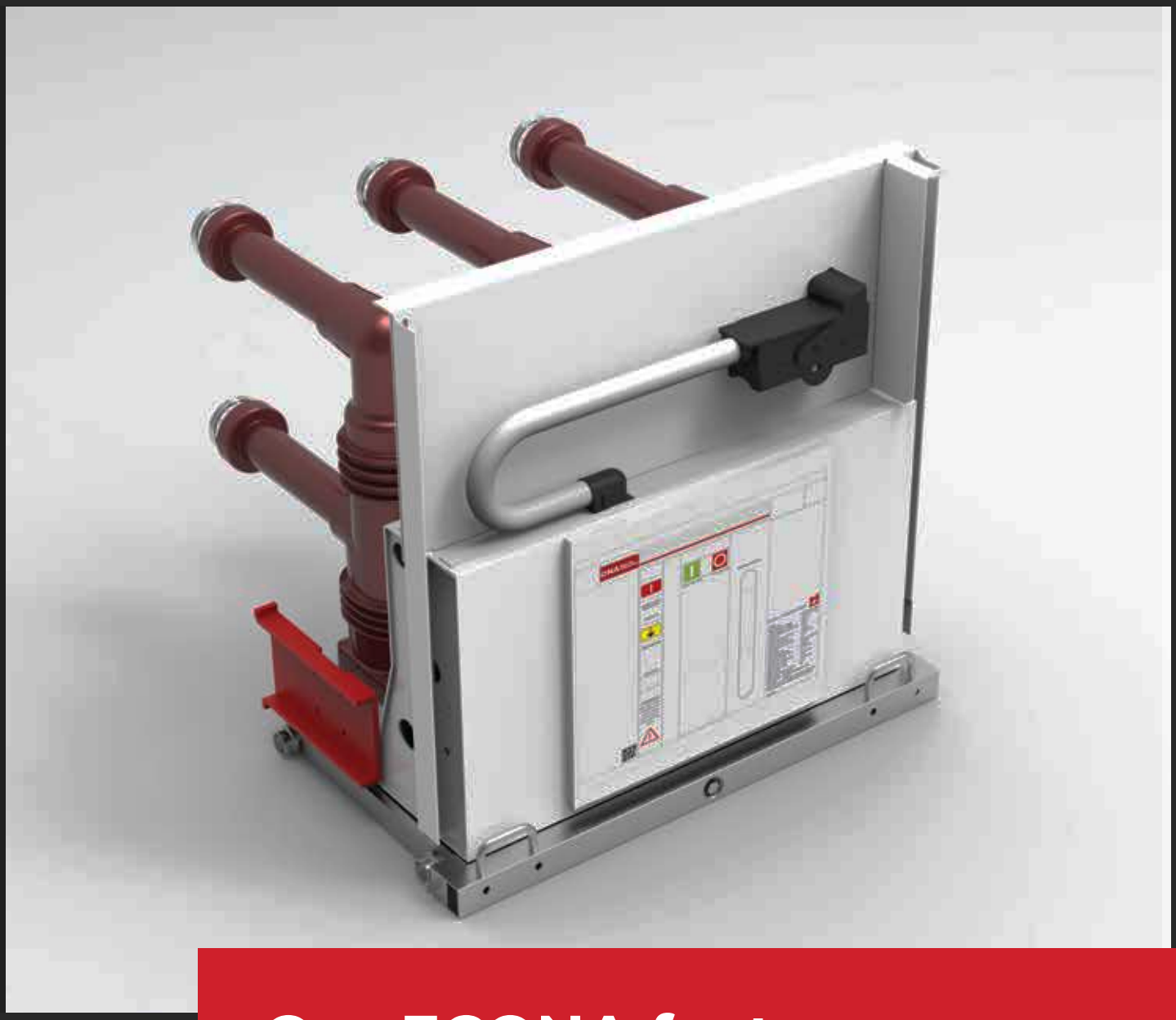
ONA Electric Industries

The Future Is Your's.

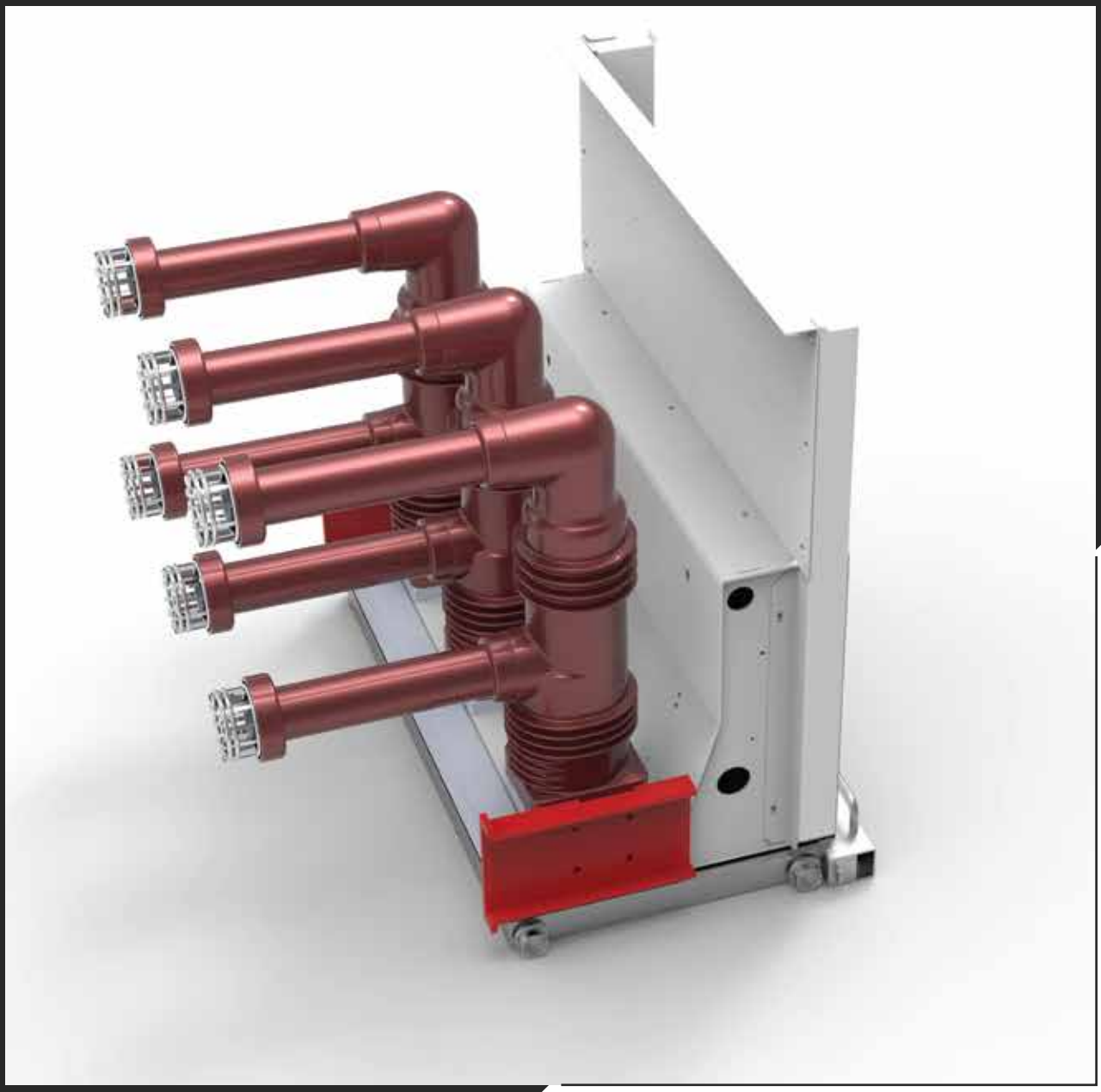
ON Series

ECONA 2

Medium voltage
Vacuum circuit breaker



Our ECONA feature
cutting-edge technology, providing superior performance & efficiency.



Engineered for reliability & performance

TABLE OF **CONTENT**

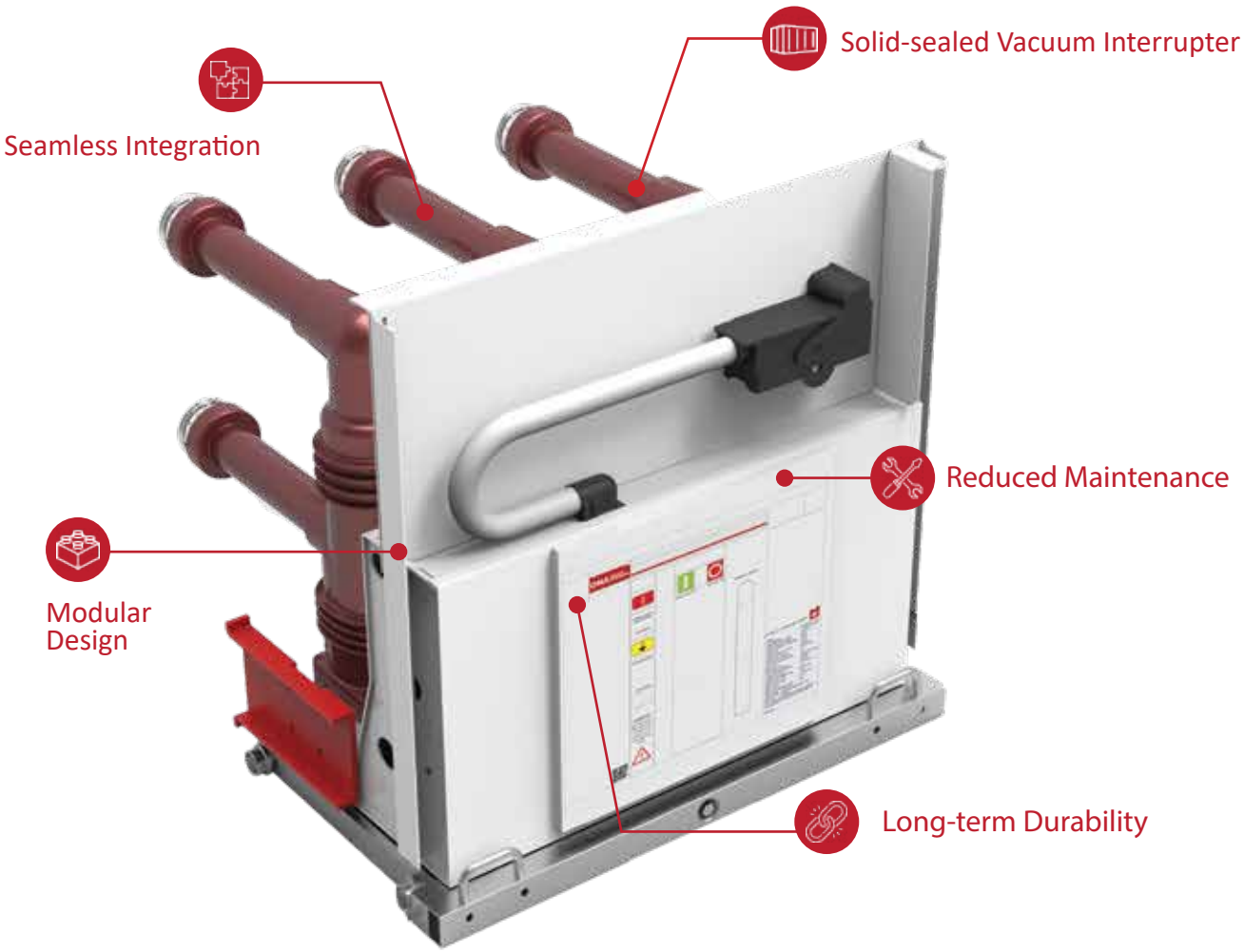
Introduction

01

01. Introduction

The VCBs are designed for exceptional performance in 12kV-24kV power systems.Ideal for power grids, industrial facilities, and frequent switching, they handle diverse loads and interrupt short-circuit currents.

Key Features



ECONA2 deliver robust protection and control with reduced maintenance, making them a reliable and cost-effective solution for medium-voltage applications.

Applicable Standards

02

02. Applicable Standards

Our **ECONA** is designed and manufactured to the highest standards of quality and performance.
With its exceptional performance, you can trust it to deliver reliable and efficient protection for your critical electrical systems.

E2 & M2 Standards

The ECONA is designed with the highest standards of energy efficiency, adhering to both the E2 and M2 standards.

E2 Compliance

The ECONA meets the stringent requirements of the ETSI ES 202 706 E2 standard. This ensures optimal energy consumption, significantly reducing the environmental footprint while delivering top-tier performance and reliability.

M2 Compliance

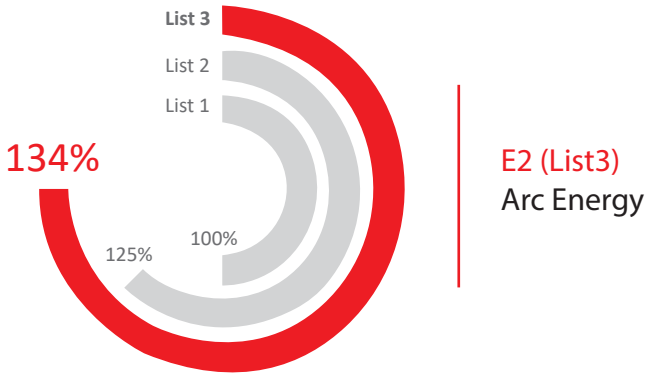
Additionally, our ECONA is complying with the M2 standard by the International Telecommunication Union (ITU). This certification guarantees that our product operates at peak energy efficiency, promoting sustainability and cost-effectiveness in electrical distribution systems.

By adhering to these standards, our ECONA provide superior durability, safety, and efficiency in various applications, from industrial settings to power distribution networks.

02. Applicable Standards

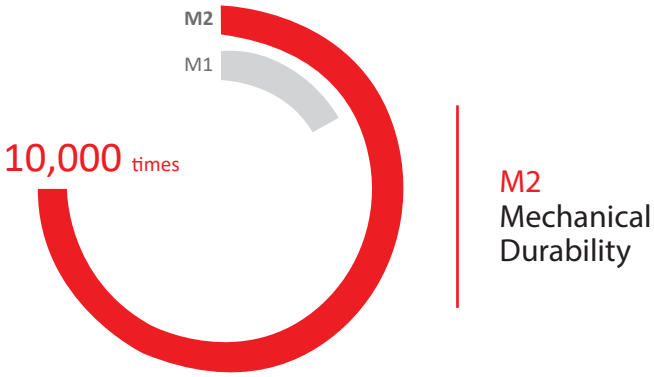
Electrical Endurance Rating：E2 (List3)

The E2 grade, the highest electrical endurance level specified in IEC 62271-100, includes three test categories: List 1, List 2, and List 3. While List 1 is generally recommended, List 3, introduced in 2008, has fewer breaking operations for T10 and T30 but significantly longer T60 test durations. This results in a harsher test environment, with arc energy levels at 100% for List 1, 125% for List 2, and 134% for List 3..



Mechanical Endurance Rating：M2

The IEC standard defines mechanical endurance ratings to guide customers in selecting products based on performance and quality levels. Our HG-Series vacuum circuit breaker adheres to the more stringent M2 mechanical endurance standard.



Environmental Conditions

03

03. Environmental Conditions

Ambient temperature

Maximum temperature: +40℃
Minimum temperature: -15 ℃

Ambient Humidity

Daily average relative humidity: ≤95%
Monthly average relative humidity: ≤90%
Daily average vapor pressure: ≤2.2×10 MPa
Monthly average vapor pressure: ≤1.8×10 MPa

Altitude

No more than 1000m

Seismic intensity

Does not exceed 8 degrees

Surroinding air

Not significantly contaminated by dust, smoke, corrosive and/or flammable gases, vapors or salt spray.

Note

If you exceed the requirements of the above normal environmental conditions, you need to negotiate with the manufacturer.

Key Specifications & Model Designation

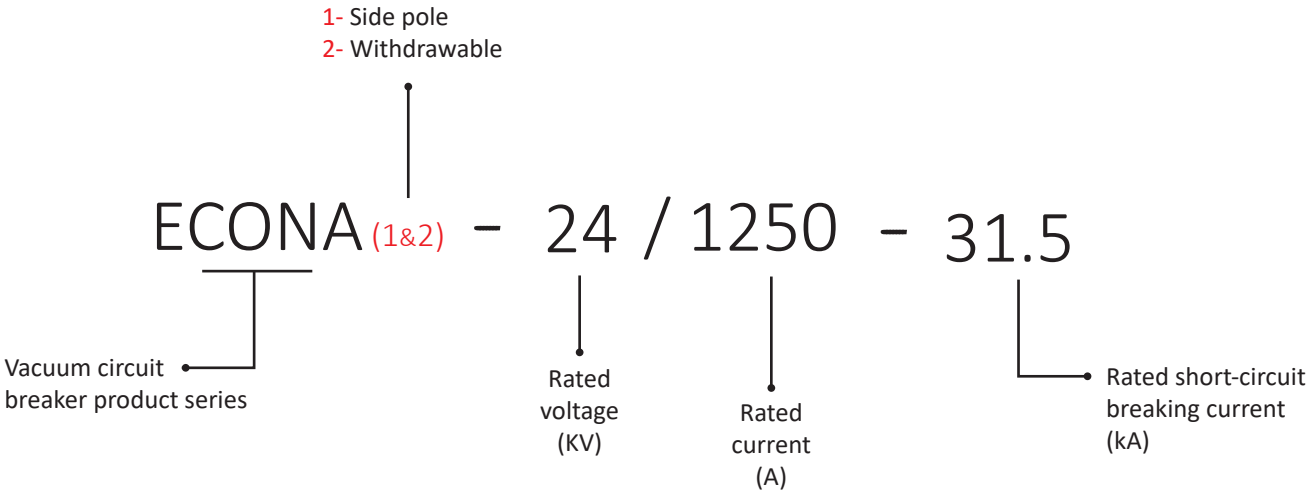
04

04. Key Specifications & Model Designation

Item	Unit	Parameters		
Rated voltage	kv	24		
Rated short-time power frequency withstand voltage (1 min)		42		
Rated lightning impulse withstand voltage (peak)		75		
Rated frequency	HZ	50		
Rated current		630 1250	630 1250 1600 2000 2500 3150	630 1600 2000 2500 3150
Rated short-circuit breaking current	KA	25	31.5	40
Rated short-time withstand current		25	31.5	40
Rated short circuit duration	S	3		
Rated peak withstand current	KA	63	80	100
Rated short-circuit closing current		63	80	100
Secondary circuit power frequency withstand voltage (1 min)	V	2000		
Rated single/back-to-back capacitor bank breaking current	A	630/400 (40 KA Is 800/400)**		
Opening time	ms	20 - 50		
Closing time		35 - 70		
Mechanical life	Times	M 2 level 30000 (630 ~ 1250/20 ~ 31.5) 20000 (1600 ~ 4000/31.5 ~ 40)		
Electrical life		E2 Class		
Allowable wear accumulative thickness of dynamic and static contacts	mm	3		
Rated closing operating voltage	V	AC 110, AC220 DC110, DC220		
Rated opening operating voltage				
Rated voltage of energy storage motor				
Rated power of energy storage motor	W	90		
Energy storage time	S	<=15		
Contact opening distance	mm	90		
Overtravel		90		
Rated power of energy storage motor	W	90		
Energy storage time	S	<=15		
Contact opening distance	mm	12 ± 1		
Overtravel		3 ± 1		
Contact closing bounce time	ms	<=2		
Three phase division and closing are different		<=2		
Average opening speed	m/s	The contact is just separated ~ 6mm	0.9 ~ 1.7	0.9 ~ 1.7
Average closing speed		6mm ~ The contact is just separated	0.6 ~ 1.0	0.6 ~ 1.0
Opening rebound amplitude	mm	<=3		
Main circuit resistance	μΩ	≤ 45 (630) ≤ 35 (1250 ~ 2000 A) ≤ 25 (2500 A or higher)		
Contact closing contact pressure	N	2500 ~ 3500	3500 ~ 4800	
Rated operating sequence		O-0.3s-CO-180s-CO		

04. Key Specifications & Model Designation

The expression of the model



Designed According to IEC 62271 for High-Voltage Safety

Circuit breakers comply with IEC62271-00:2001 related requirements.

Design & Operating Principle

01

05. Design & Operating Principle

Main structure

The ECONA2 features a separate operating mechanism for smooth control and a three-phase primary part for optimal current flow. These components are housed in a durable structure that protects the critical arc extinguishing chamber.
A special sealing process keeps dust and dirt out, ensuring reliable operation even in harsh environments. For a detailed view of the current path when the circuit breaker closes, refer to Figure 2.

Features :

- Separate operating mechanism for smooth control
- Three-phase primary part for efficient current flow
- Sealed arc extinguishing chamber for durability in harsh environments

Operating mechanism (see Figure 1, Figure 2)

The ECONA2's operating mechanism is like a control center.
It's built in sections (modular) for easy customization and uses spring energy to operate.
This control center combines several key functions :

- **Opening and Closing :** It controls both opening and closing the circuit breaker.
- **Safety Trip :** It can automatically shut off the circuit if it detects too much current (overcurrent trip electromagnets).
- **Extra Control :** An auxiliary switch allows for additional control options.
- **Status Indicators :** It shows the circuit breaker's status (on/off) and the spring energy storage level.
- **User-Friendly Controls :** The front panel has buttons for opening and closing, a handle for manual energy storage, and indicators for both functions.

05. Design & Operating Principle

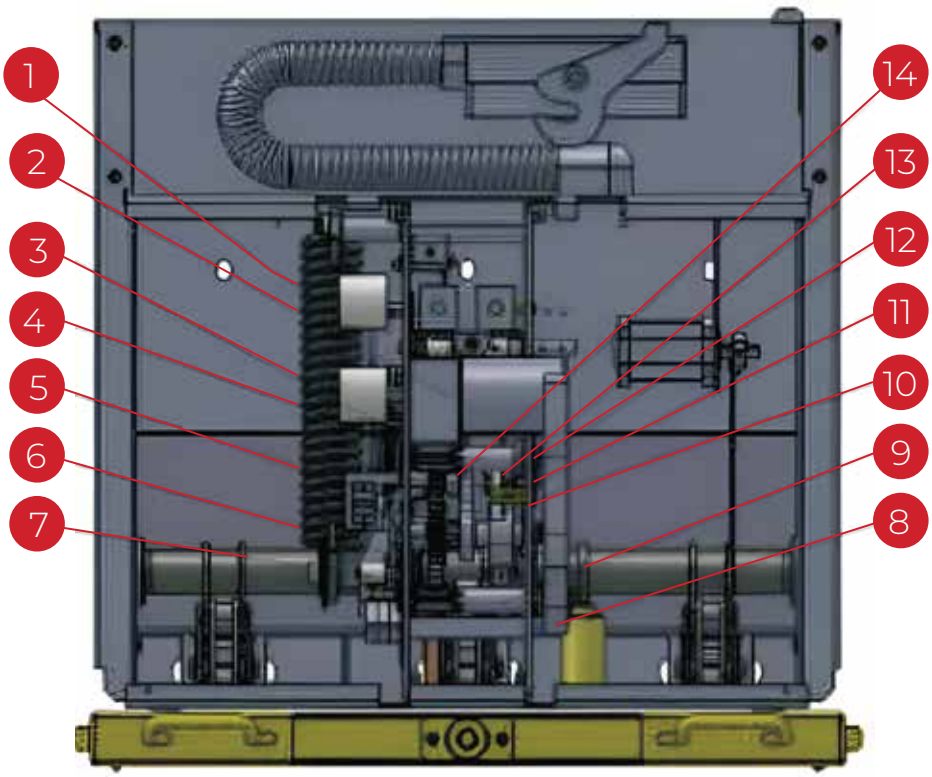
Anti-false interlocking

The ECONA2 incorporates a comprehensive anti-misoperation function to ensure safe and reliable operation. Here's a breakdown of the key features:

- **Closing Interlock :**
  Following a successful closing operation, the closing interlock bend plate (1) automatically rises, locking the closing bend plate (2) on the closing holding shaft. This prevents reclosing until the breaker is opened.
- **Anti-Reclosing Circuit :**
  If the closing electrical signal persists after the breaker closes, the internal anti-jump control loop automatically cuts off the closing circuit, preventing unintended reclosures.
- **Positional Interlocking :**
  When the breaker is not in the designated "test" or "working" position, the interlocking bending plate (1) is engaged by plate (3). This action simultaneously buckles the closing bend plate (2) on the closing holding shaft and cuts off the closing circuit, preventing accidental closure while the breaker is not in the load area.

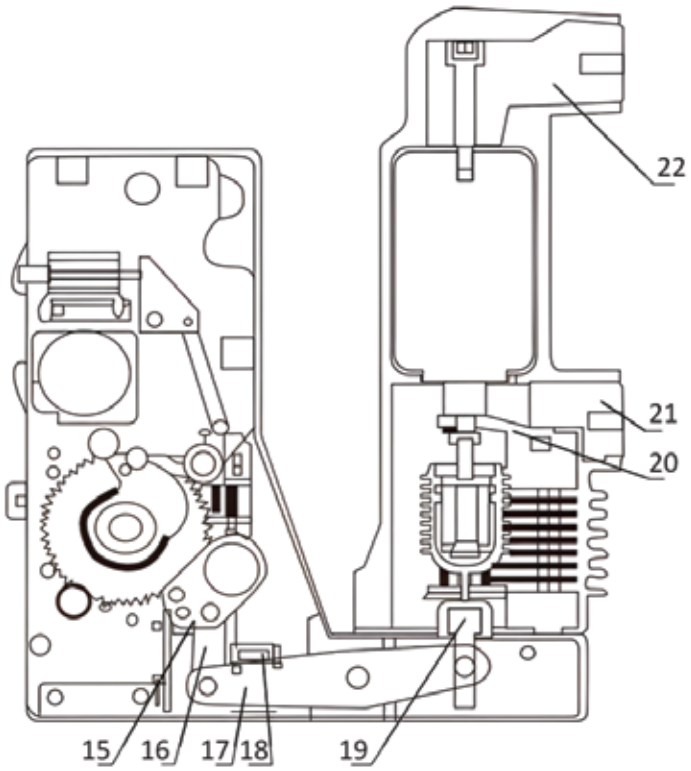
- **Handcart Locking Mechanism** (Figure 4) : Once the breaker closes in the working or test position, roller (4) activates the pushing mechanism to lock plate (5). This secures the handcart, preventing accidental movement (pulling or pushing) within the load area while closed.
- **Optional Electric Closing Lock** : The option for an electric closing lock can be added. This feature prohibits closing operations until the locking device is unlocked.
  (Note: Power consumption of the closing and locking device is 3.2W, with an operating voltage range of 0.65-1.1 times the rated voltage.)

05. Design & Operating Principle



1- Connecting rod
2- Energy storage motor
3- Transition gear
4- Transition gear shaft
5- Gear wheel
6- Energy storage shaft
7- Connecting plate
8- Energy storage handle
9- Gear shaft
10- Overrunning clutch
11- Cam
12- Holding mechanism
13- Closing hold switch
14- Energy storage holding switch

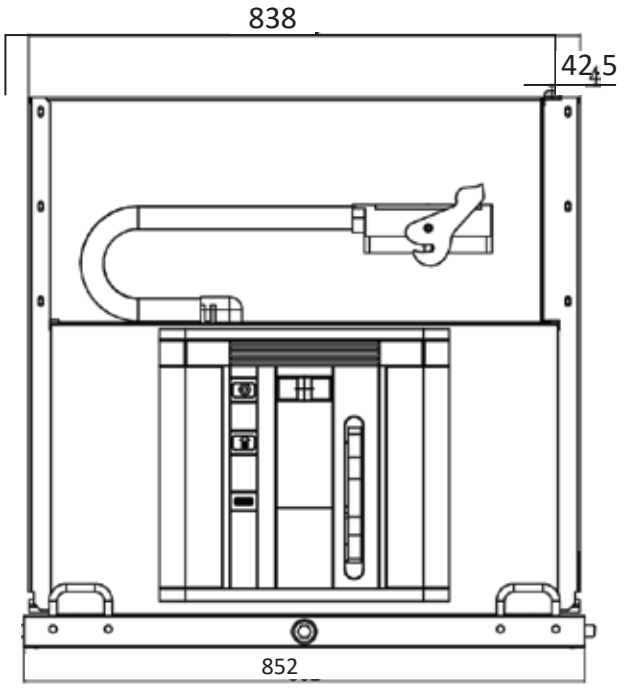
05. Design & Operating Principle

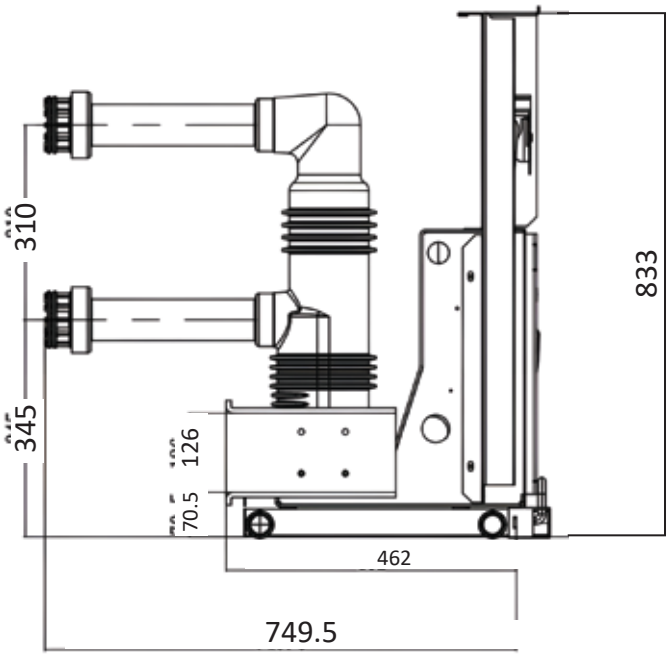


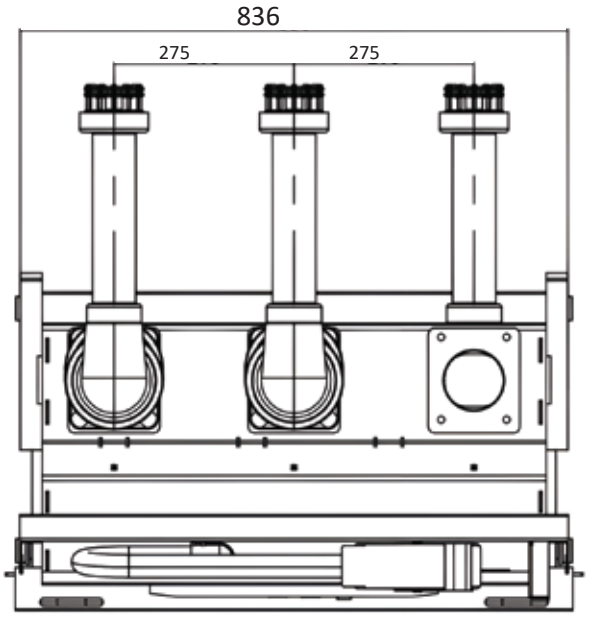
15- Crank arm
16- Connecting plate
17- Crank arm
19- Insulating tie rod
21- Lower outlet seat
18- Separating spring
20- Flexible connection
22- Upper outlet seat

05. Design & Operating Principle

Outline dimensional drawing







Note

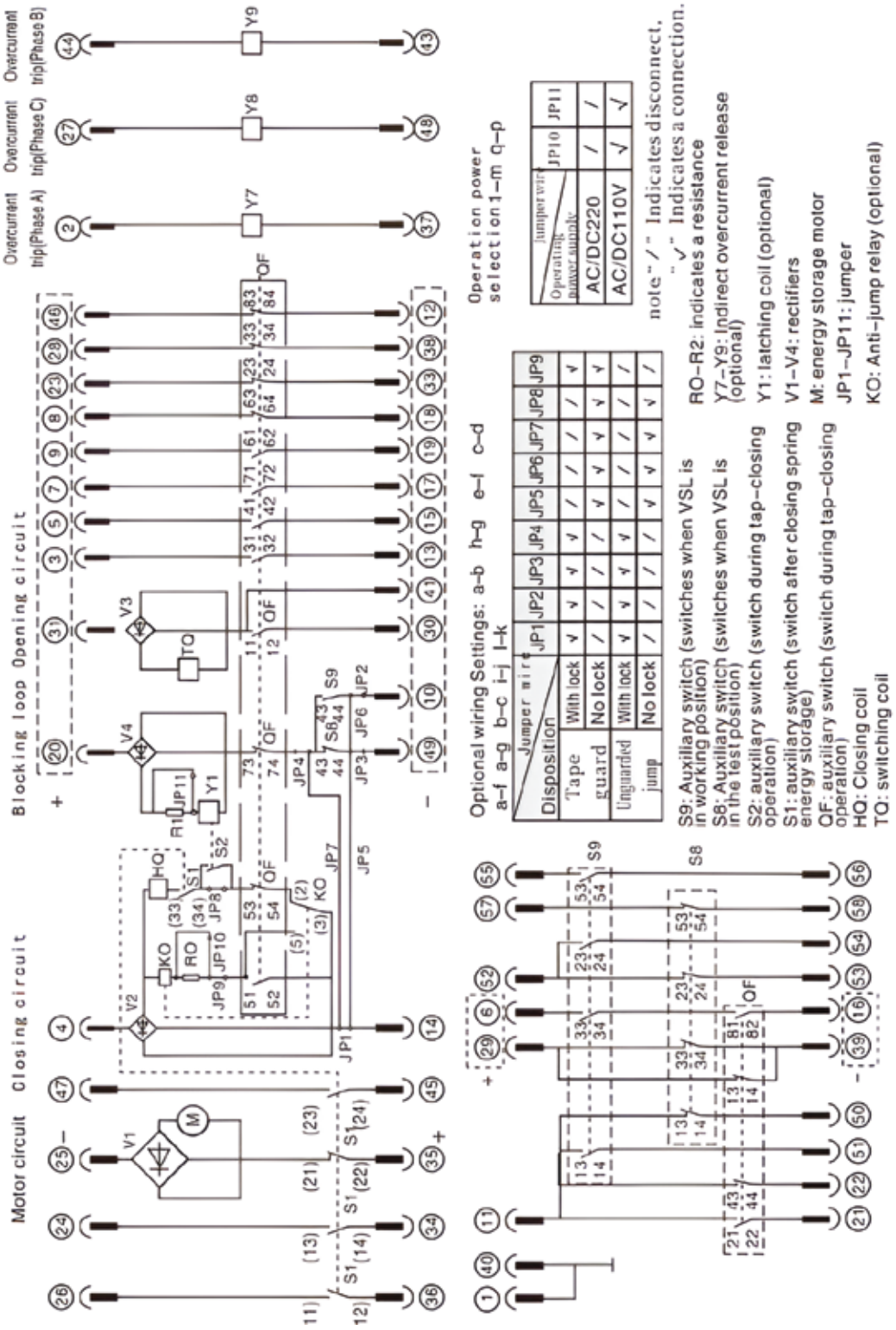
For optimal performance, ensure the copper bar is positioned freely within the circuit breaker outlet. The contact surface between the copper bar and the outlet should be clean and secure. Avoid using excessive force to adjust the copper bar during installation.

05. Design & Operating Principle

ECONA2 internal electrical wiring schematic

Handcart ECONA2 internal electrical wiring schematic

The diagram shows ECONA2 in the test position, with the switch off and no energy storage

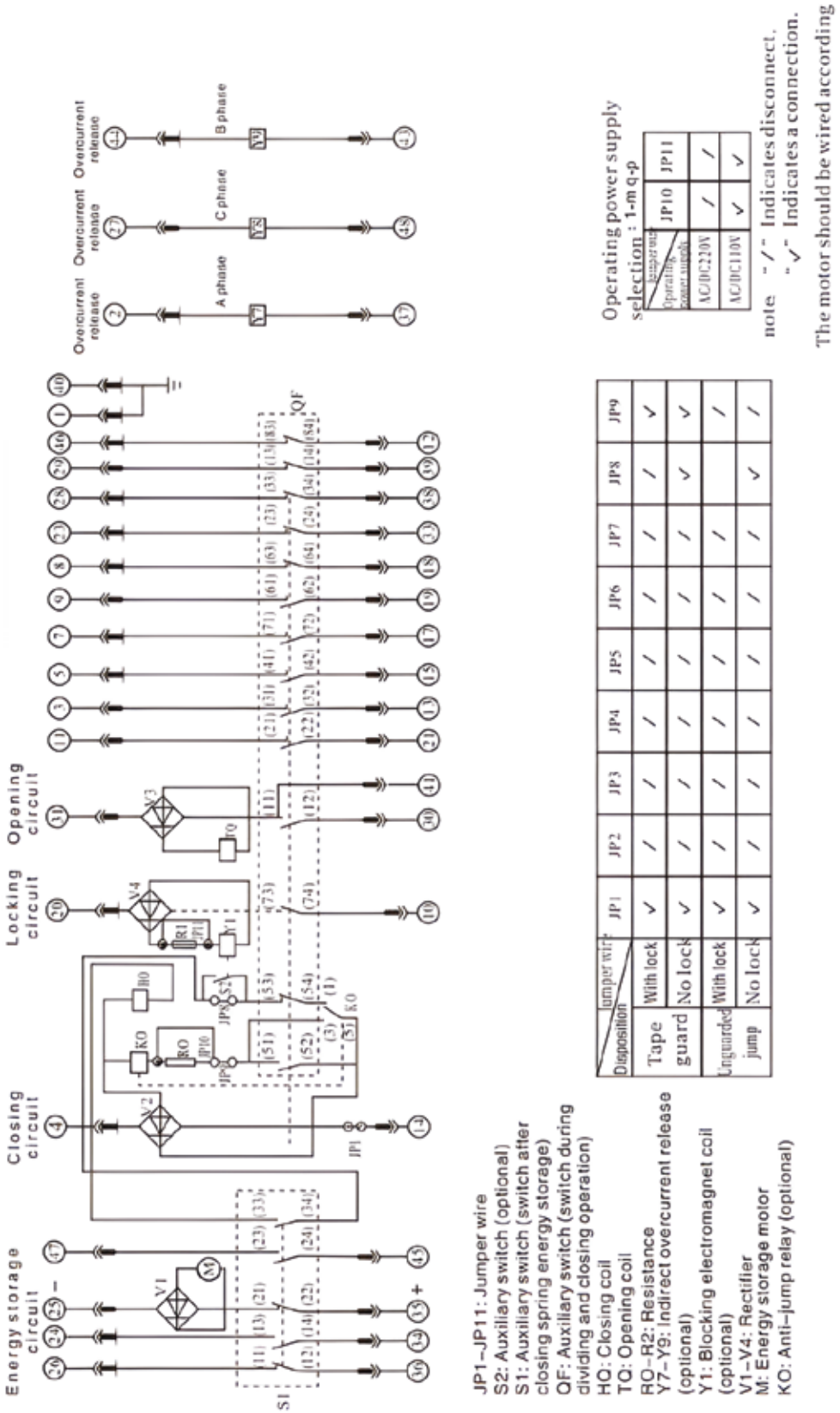


Note: When the operation is DC power supply, it must be connected according to the polarity in the dotted box, and the motor should be connected according to the polarity shown in the figure.

05. Design & Operating Principle

Internal electrical wiring schematic diagram of fixed ECONA2

The diagram shows that ECONA2 is in a switched, non-stored state



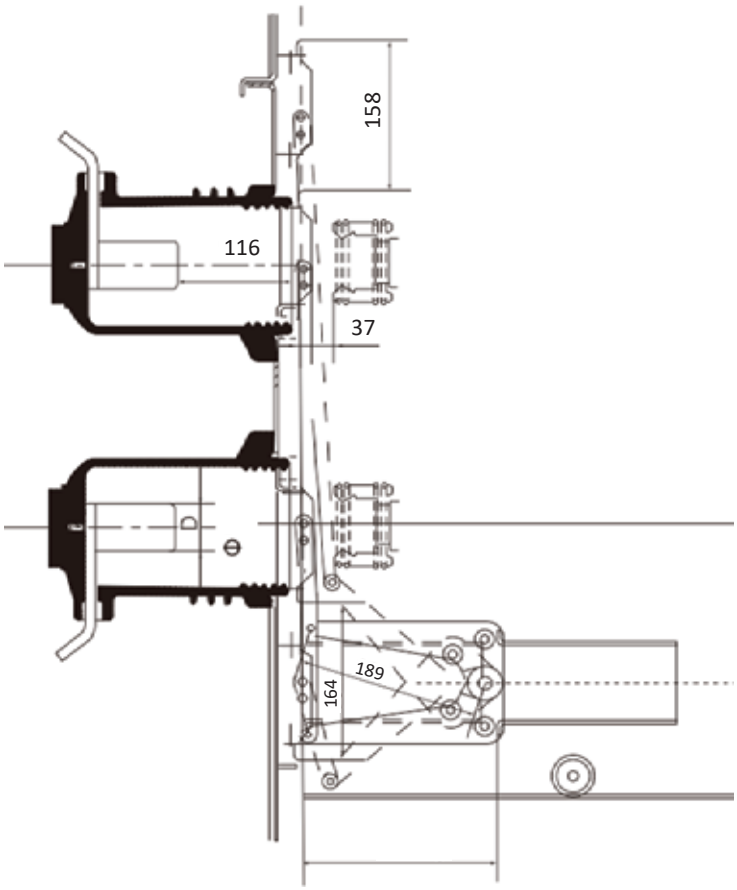
Disposition / Jumper wire		JP1	JP2	JP3	JP4	JP5	JP6	JP7	JP8	JP9
Tape guard	With lock	√	/	/	/	/	/	/	/	√
	No lock	√	/	/	/	/	/	/	√	√
Unguarded jump	With lock	√	/	/	/	/	/	/		/
	No lock	√	/	/	/	/	/	/	√	/

Operating power supply / Jumper wire	JP10	JP11
AC/DC220V	/	/
AC/DC110V	√	√

05. Design & Operating Principle

Recommended size of circuit breaker and cabinet

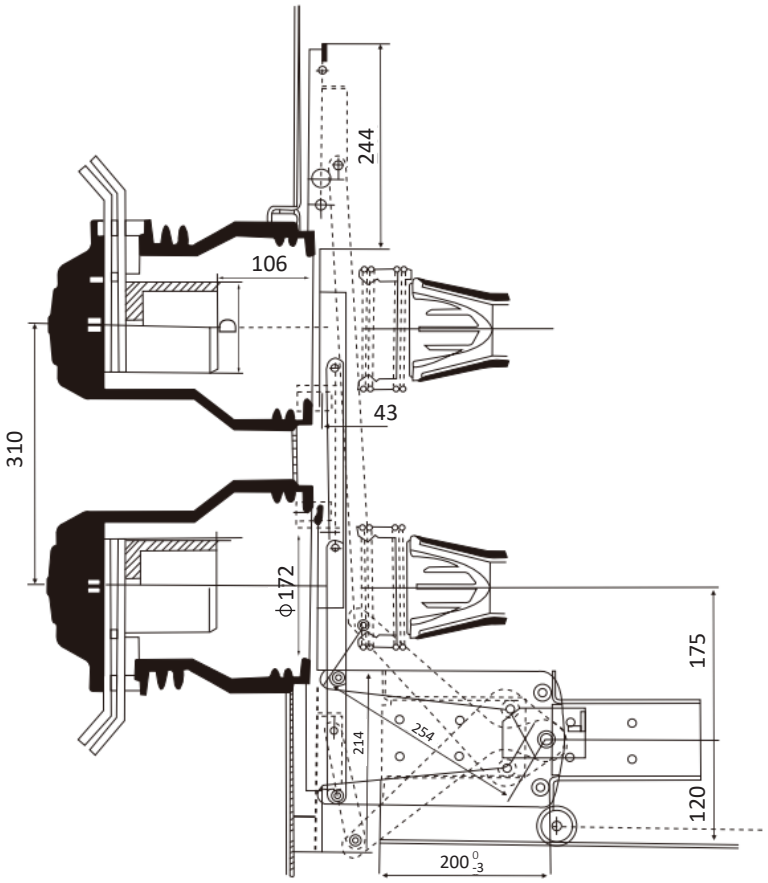
ECONA2 (800) and cabinet (800) recommended size diagram



Rated current (A)	630	1250
Rated short-circuit breaking current (kA	25,31.5	25,31.5
Match the static contact size (mm)	35	49

05. Design & Operating Principle

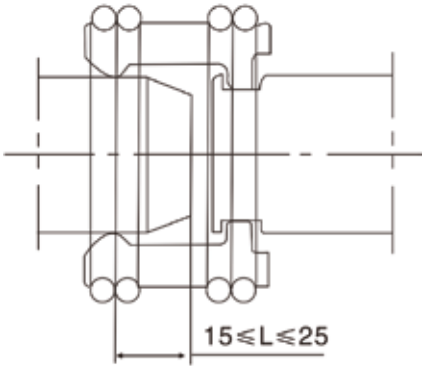
ECONA2 (1000) and cabinet (1000) recommended size diagram



Rated current (A)	1600	2000	2500	3150
Rated short-circuit breaking current (kA	31.4,40	31.4,40	31.4,40	31.4,40
Match the static contact size (mm)	ϕ 79		ϕ 109	

05. Design & Operating Principle

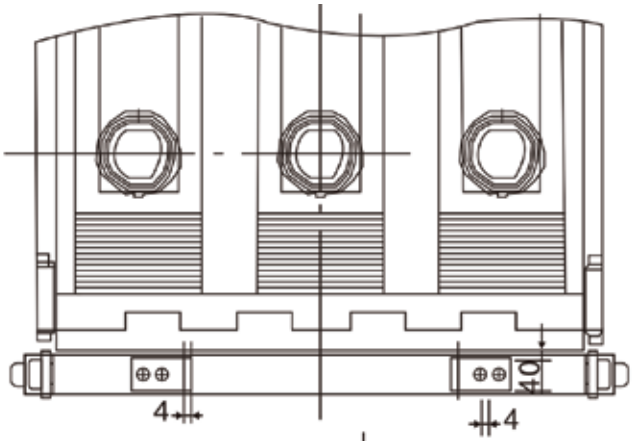
Dynamic and static contacts with dimensional drawings

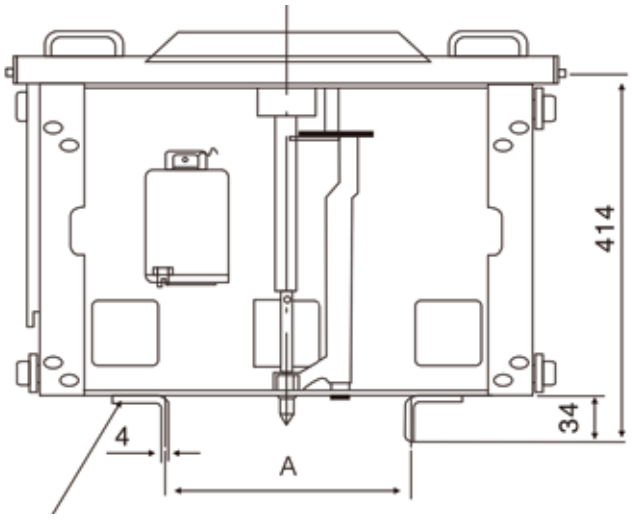


Dynamic and static contacts with dimensional drawings

ECONA2 (800) grounding device assembly dimensions

	A
ECONA2(800)	296

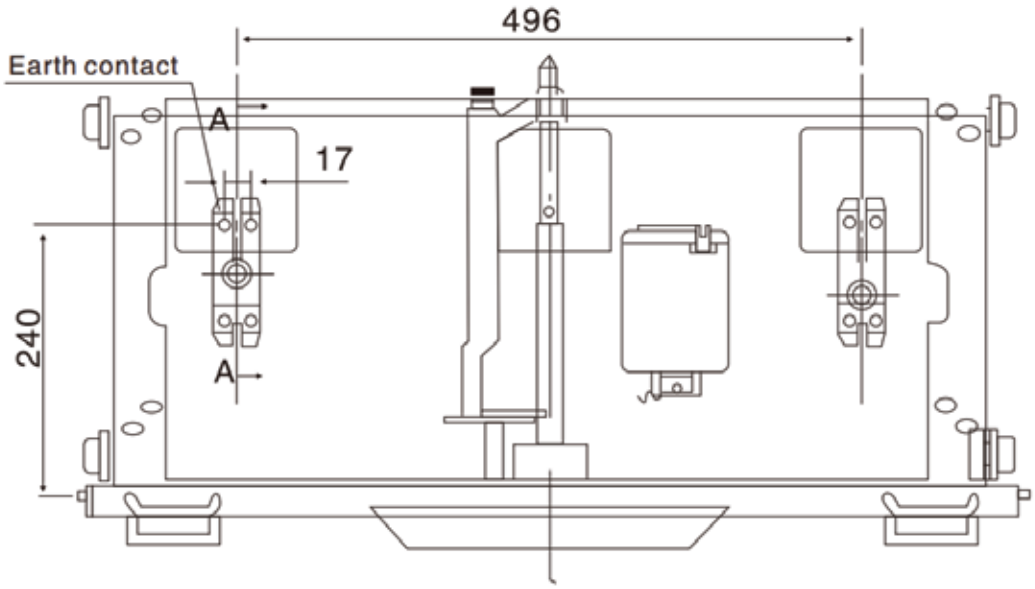




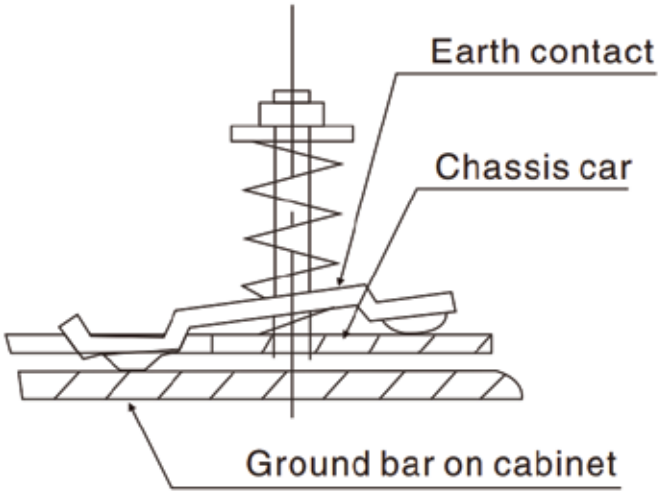
Ground bar (4 x 40 copper bar)

05. Design & Operating Principle

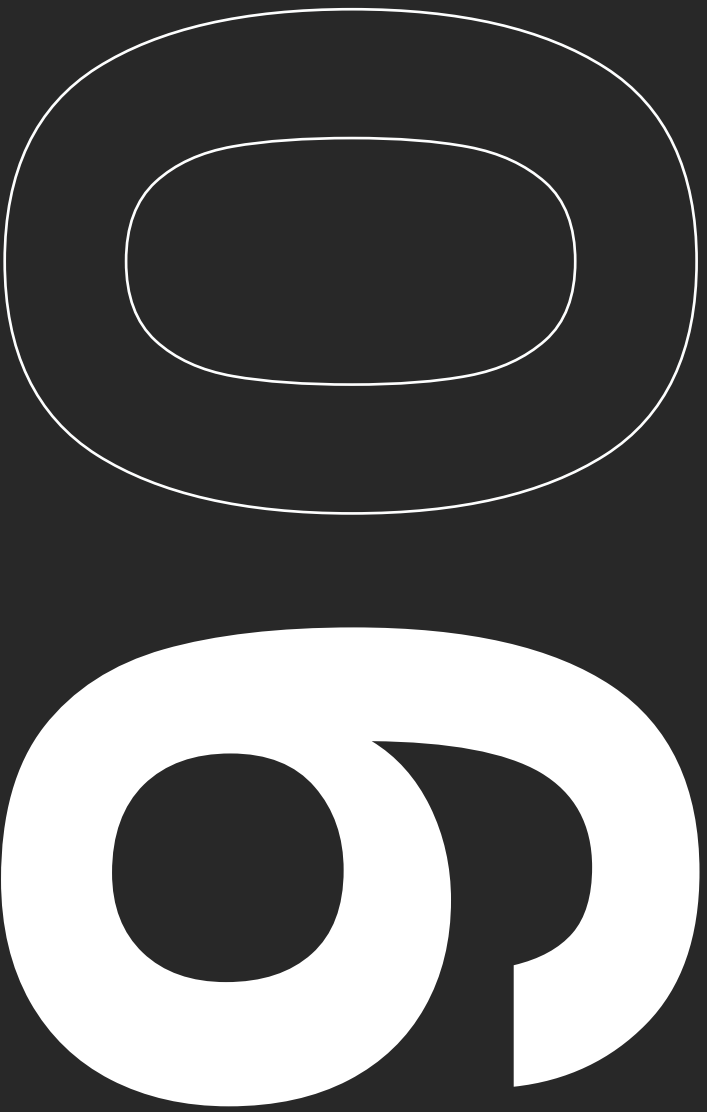
ECONA2 (1000) grounding device assembly dimensions



A-A Rotation amplification



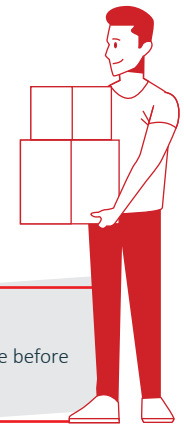
Installation & commissioning



06. Installation & commissioning

Lifting and moving

Do : Use the designated lifting hole for safe lifting.
Don't : Apply stress to the outlet arms or subject the breaker to strong vibrations.



Note

Remove the lifting device before final installation

Pre-Powering Up

Before energizing the circuit breaker, follow these steps:

- ☐ **Inspect for Damage**
  Check for any physical damage to the breaker. If damaged, don't use it.
- ☐ **Cleanliness**
  Remove any dirt, especially on insulated surfaces, to ensure proper insulation performance.
- ☐ **Manual Operation**
  Manually operate the breaker (energy storage, closing, opening) and check if the energy storage and closed position indicators function normally.
- ☐ **Power Operated Test**
  Repeat step 3 using the operating power to verify normal energy torage and closed position indication.

06. Installation & commissioning

☐ Hand-Operated Circuit Breaker (if applicable) :

- **Insert** the handle into the proper hole.
- **Turn** clockwise to store energy,counter clockwise to release.
- **Push** the handle the full travel distance (199-201mm).
- **In the open state**, smoothly move to the working test position.
- **Turn the handle** at moderate speed 20 times until you hear a "click" (indicating proper engagement). Avoid excessive force.
- **Verify** the corresponding position indicator (S8, S9) shows the circuit is connected.

☐ Power frequency voltage insulation test.

Phenomenon		Phenomenon
1	Failure to close	In the unstored state.
		It is in the closing position
		The circuit breaker has not fully entered the working position or test position
		Closing mechanism chosen, but auxiliary power missing or inadequate.
		The secondary line is inaccurate
2	Failure to proceed with exit	The circuit breaker is on
		The thrust handle is not fully inserted into the thrust hole
		The propulsion mechanism is not fully in the test position, so that the tongue plate cannot be unlocked with the cabinet
		The grounding interlock of the cabinet is not unlocked

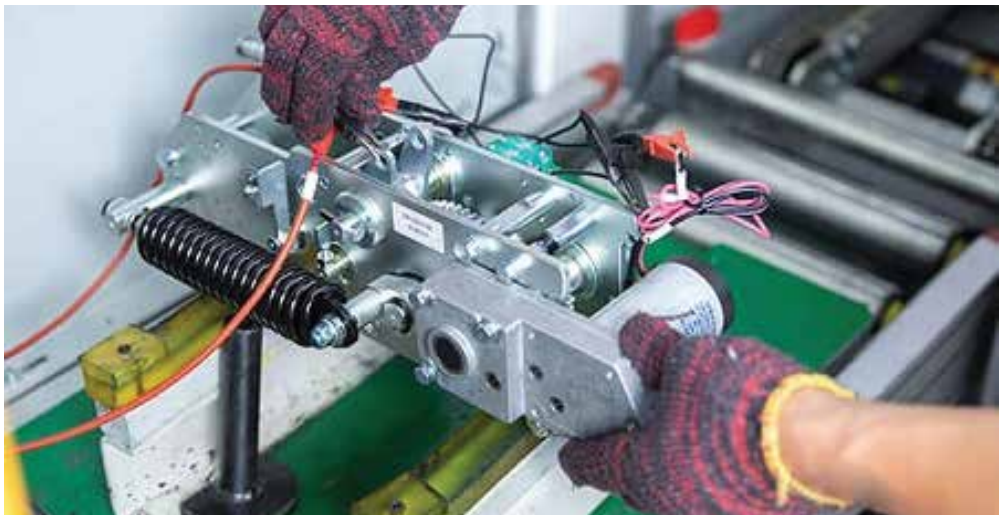
Circuit breaker maintenance

07

07. Circuit breaker maintenance

Our circuit breakers utilize special, long-life sliding bearings and a unique rust prevention treatment.
Under normal conditions, they require minimal maintenance (every 10-20 years).
However, to ensure optimal performance, **we recommend the following inspections:**

- **Visual Inspection (every 6-12 months):**
  - Inspect the circuit breaker body for any damage or contamination.
  - Clean any dirt or moisture with a dry cloth.
  - Use a lint-free cloth dampened with a cleaning agent suitable for plastics to remove any remaining residues.
- **Operational Check (at least annually) :**
  - If the breaker has been inactive for a long period, perform at least 5 opening and closing cycles to ensure proper operation.
- **Insulation Testing (at least annually):**
  - Conduct an insulation test to verify the integrity of the vacuum chamber and overall insulation strength.



Important Note:

For frequently operated breakers, strictly adhere to the manufacturer's specified operation limits. Exceeding these limits may compromise performance and lifespan.
This revised version simplifies the language, clarifies the purpose of each step, and emphasizes key points for professional communication.

Disposition

08

08. Disposition

Secondary Control

1) Secondary Control Voltage

- DC220V
- AC220V
- DC110V
- AC110V

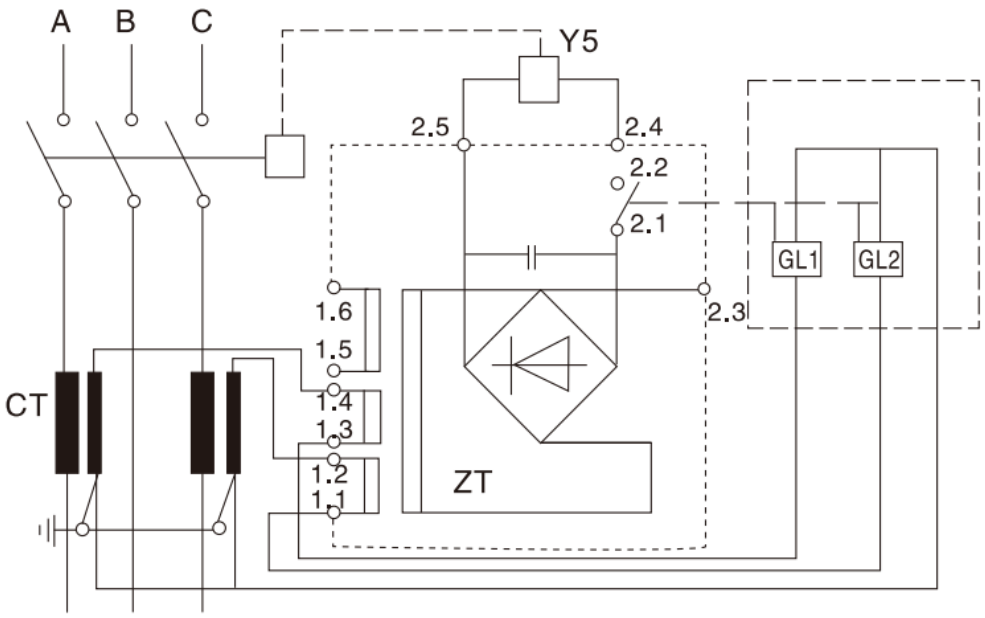
2) Optional Secondary Control Configurations

Feature	Function	Avalable options
Anti-jump Device	Prevents closing when secondary control voltage is off or low.	—
Overcurrent Device pen_spark	Opens the circuit breaker in case of overload or short circuit.	A, C phases, 3 phases (3.5A or 3.5A)

Selection Considerations

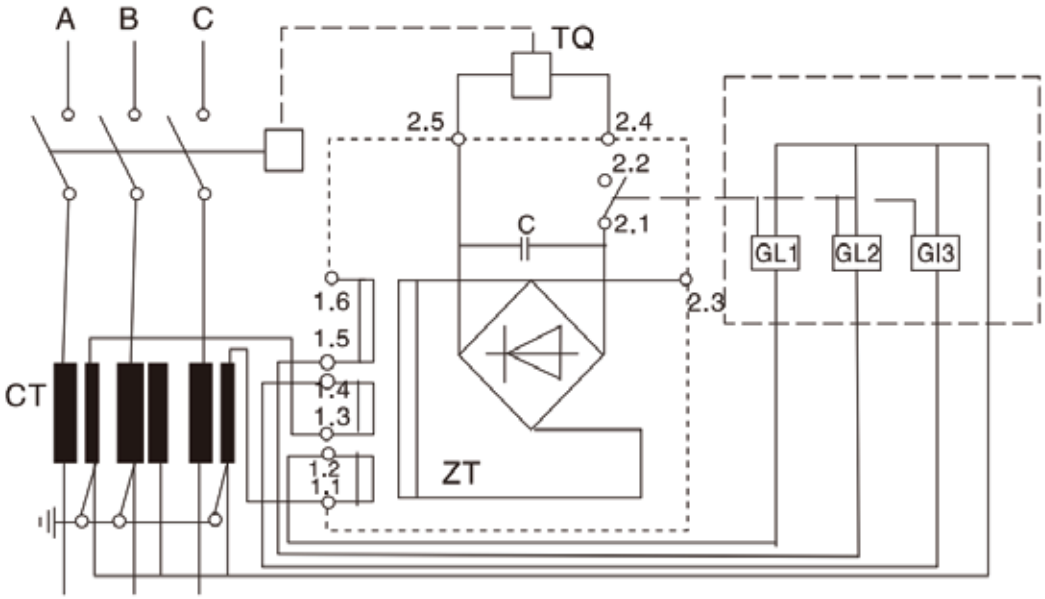
- Sufficient Capacity : If the capacity is sufficient, the indirect overcurrent trip scheme (3.5A or 3.5A) is chosen.
- Insufficient Capacity : If the capacity is insufficient, the intermediate transformer scheme is selected. Terminals 2.4 and 2.5 of the intermediate transformer connect to the overcurrent trip electromagnets on the circuit breaker.

08. Disposition



Y5 : Overcurrent trip electromagnet
ZT : Intermediate transformer
CT : Current transformer (primary element)

GL 1-2 : Overcurrent relay
C : Capacitance



Y5 : Overcurrent trip electromagnet
ZT : Intermediate transformer
CT : Current mutual inductor (primary element)

GL 1-2 : Overcurrent relay
C : Capacitance

08. Disposition

Grounding device

According to the circuit breaker cabinet width can be divided into:
650, 800, 1000 screen grounding scheme, specific grounding assembly size diagram see 6.7

Electrical parameter table of secondary components

Operating voltage 220V	Closing electromagnet	Switching electromagnet	Blocking electromagnet	Anti-Jump relay
Loop current	1.0 A	0,9 A	29 mA	9.1 mA
Power	220	198	3.2	1.0

Operating voltage 220V	Closing electromagnet	Switching electromagnet	Blocking electromagnet	Anti-Jump relay
Loop current	2.0 A	1.8 A	29 mA	9.1 mA
Power	220	198	3.2	1.0

Attention

Anti-Jump Device:
The circuit breaker incorporates an internal anti-jump mechanism that prevents multiple reclosures by interrupting the closing circuit if the closing signal persists after successful closure.

Redundancy Consideration:
When a comprehensive protection device is already present in the cabinet alongside the anti-jump device, evaluate whether installing the anti-jump device is necessary to avoid potential redundancy within the system.

In order to prevent accidents, when greasing the operating mechanism and other work, should be carried out in the state of no energy storage.

1. The fault maintenance of the circuit breaker should be carried out by professionally trained personnel or service personnel of the manufacturer to make correct adjustments
2. The vacuum break of the circuit breaker shall not be used for isolating the break for a ong time

Order technical requirements list

09. Order technical requirements list

Type specification

Cabinet width (mm)	Phase distance (mm)	Polar distanceH (mm)	Rated current (A)	Short-circuit breaking current (KA)	Quantity (machine)	Remark
650	150	275				
800	210	275				
800	210	275				
1000	275	275				
1000	275	310				

Note

If you order 4000A products, you need to strengthen the air cooling device

09. Order technical requirements list

1) Classification

Handcart type

Fixed type

If fixed, please indicate whether interlocking and other requirements

2) Disposition

Standard configuration:

According to the standard wiring diagram, including anti-jump device (K0), no locking device (Y1+S2), no over current Device (Y7, Y8, Y9), no undervoltage device, no grounding device

Operating voltage	AC 220		DC 220		Dispsosition	Standard configuration	
	AC 110		DC 110			Non-standard configuration	

If the configuration is non-standard, please continue to fill in the following form:

Blocking device	Without		Overcurrent device	Without		Grounding device	Without		Under-voltage device	Without	
	Have			2 overcurrent	A						
				3 overcurrent	A		Have			Have	
				Intermediate transformer scheme							

Note

For faster order processing, include: phase spacing, pole spacing, model info, operating voltage & configuration when requesting a quote or ordering.
Alternatively, complete the table above.

ONA Electric Industries

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