

# ELN-12 Series

## Sustainable Air-Insulated Switchgear



Stock Code: 300062

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Innovate in Energy, Serve the Society through Industry





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## Company Introduction

Energy Internet System Solutions Provider

Founded in 1999, Ceepower Co., Ltd.(Ceepower) is one of the leading providers of energy Internet system solutions in China. Listed on the Shenzhen Stock Exchange since March 2010 under Stock Code 300062, Ceepower is the first company from Fuzhou to enter the Growth Enterprise Market.

With over 20 years of dedicated expertise, Ceepower has formed a comprehensive industrial chain in R&D, production, investment, construction, and service, solidifying a strong presence in the electric power sector. Its business scope includes smart grids, rail transit, and renewable energy. Leveraging professional experience and advanced technologies, Ceepower has expanded into an enterprise with multiple wholly -owned and controlled subsidiaries with more than 1,000 employees worldwide. So far, the company holds over 100 patents and software copyrights, and has played a significant role in formulating national and industrial standards.

Currently, Ceepower is aligning with the "Dual-Carbon" strategy, reinforcing its core strength in intelligent electrical equipment and renewable energy manufacturing. The company is committed to innovation and high-quality development, aiming to be at the forefront of the energy Internet solutions industry.

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# Product Introduction

## Overview

Entering the 21st century, environmental preservation has become an urgent global imperative, leading to intensified efforts to regulate greenhouse gas emissions. SF6, a potent greenhouse gas, is increasingly being phased out in favor of environmentally friendly alternatives as China advances its smart grid infrastructure.

ELN Series Box-Type Fixed AC Metal-Enclosed Sustainable Switchgear(short as Sustainable Air-insulated Switchgear) utilizes cutting-edge technologies, such as uniform electric field designs, vacuum arc interruption, and eco-friendly gas-insulated enclosures with atmospheric pressure sealing. This integration enables equipment miniaturization, eliminates maintenance needs, ensures robust environmental adaptability, and achieves zero SF6 emissions, fully adhering to green standards. The ELN series is ideally suited for applications that require high power supply reliability in urban power distribution networks, wind farms, subway systems, airports, and civil infrastructures, contributing to a more sustainable energy future.

## Advantages

### Reliable and Secure

- The switchgear units are designed with complete sealing, unaffected by external conditions, and suitable for all operational states.
- Operates effectively under micro-positive pressure, significantly reducing the risk of gas leaks.
- Grounded gas-sealed metal enclosure, ensuring the safety of O&M personnel.

### Low-Maintenance

- Features a long lifespan, maintenance-free vacuum interrupter.
- High-voltage insulation is unaffected by external.

### Eco-Friendly

- No greenhouse gas emissions.
- No production of difficult-to-decompose waste materials like epoxy resins.
- High recyclability of materials at the end of the product lifecycle.

### Strong Environmental Adaptability

- All high-voltage components are sealed within a pressurized metal casing, making them suitable for harsh environments such as high altitudes, extreme cold, humidity, and contamination.

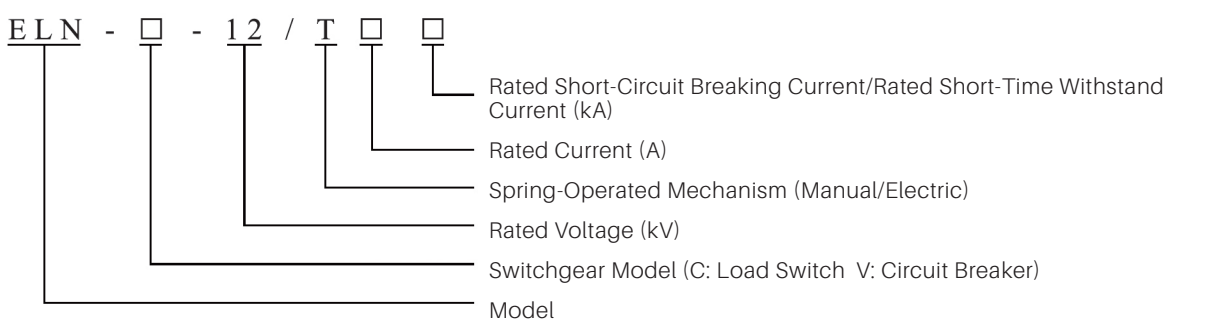
### Visible Break

- The break is visible, utilizing optical imaging principles, ensuring safe and reliable maintenance.

### Modular Design

- Features a modular design for the switchgear modules, including a lower isolation scheme, facilitating easy installation, maintenance, and repairs.
- The switchgear units, insulated busbars, and connection components are all modularized, allowing customized design based on actual requirements.
- Flexible expansion options, with various configurations available to suit different user needs.

## Naming Rule



## Standards Compliance

• GB 1984-2014	High Voltage AC Circuit Breakers (IEC62271-100: 2001, MOD)
• GB 1985-2014	High Voltage AC Isolators and Earthing Switches (IEC 62271-102:2002, MOD)
• GB 3804-2004	3.6kV-40.5kV High Voltage AC Load Switches
• GB 3906-2006	3.6kV-40.5kV Metal-Enclosed Switchgear and Controlgear for AC Systems (IEC 62271-200:2003, MOD)
• GB 9969.1	General Principles for Instruction Manuals of Industrial Products (EQV IEC 60694:1996)
• GB/T 11022-2011	Common Technical Requirements for High Voltage Switchgear and Controlgear Standards
• GB/T 7354-2003	Partial Discharge Measurement
• GB/T 12706.4-2008	Power Cables and Accessories with Extruded Insulation for Rated Voltages from 1kV up to 35kV
• GB/T 13384	General Technical Requirements for Packaging of Electromechanical Products
• GB/T 14436	General Provisions for Guarantee Documents of Industrial Products
• GB/T 191	Packaging, Storage, and Transportation Pictorial Marks (EQV ISO 780:1997)
• GB/T 4205	Human-Machine Interface (MMI) – Operation Guidelines (IEC 60447:1993, IDT)
• GB/T 6388	Shipping and Receiving Marks for Transport Packaging
• JB/8738-2008	Vacuum Interrupters for High Voltage AC Switchgear
• JB/T 8754-1998	Coding System for High Voltage Switchgear Models
• DL/T 404-1997	Technical Specifications for Ordering Indoor AC High Voltage Switchgear (NEQ IEC 60298:1981)
• Q/GDW-10-324-2008	Technical Specifications for 20kV Medium-Voltage Ring Main Unit

## Operating Environment

**Altitude:** ≤4,000 meters above sea level (For installations at elevations above 1,000 meters, please inform sales staff so that adjustments can be made during manufacturing).

**Ambient Temperature:** The equipment operates in ambient temperature ranging from -5°C to +40°C, with a 24-hour average temperature not exceeding 35°C.

**Humidity:** The 24-hour average relative humidity should not exceed 95%, and the monthly average should not exceed 90%.

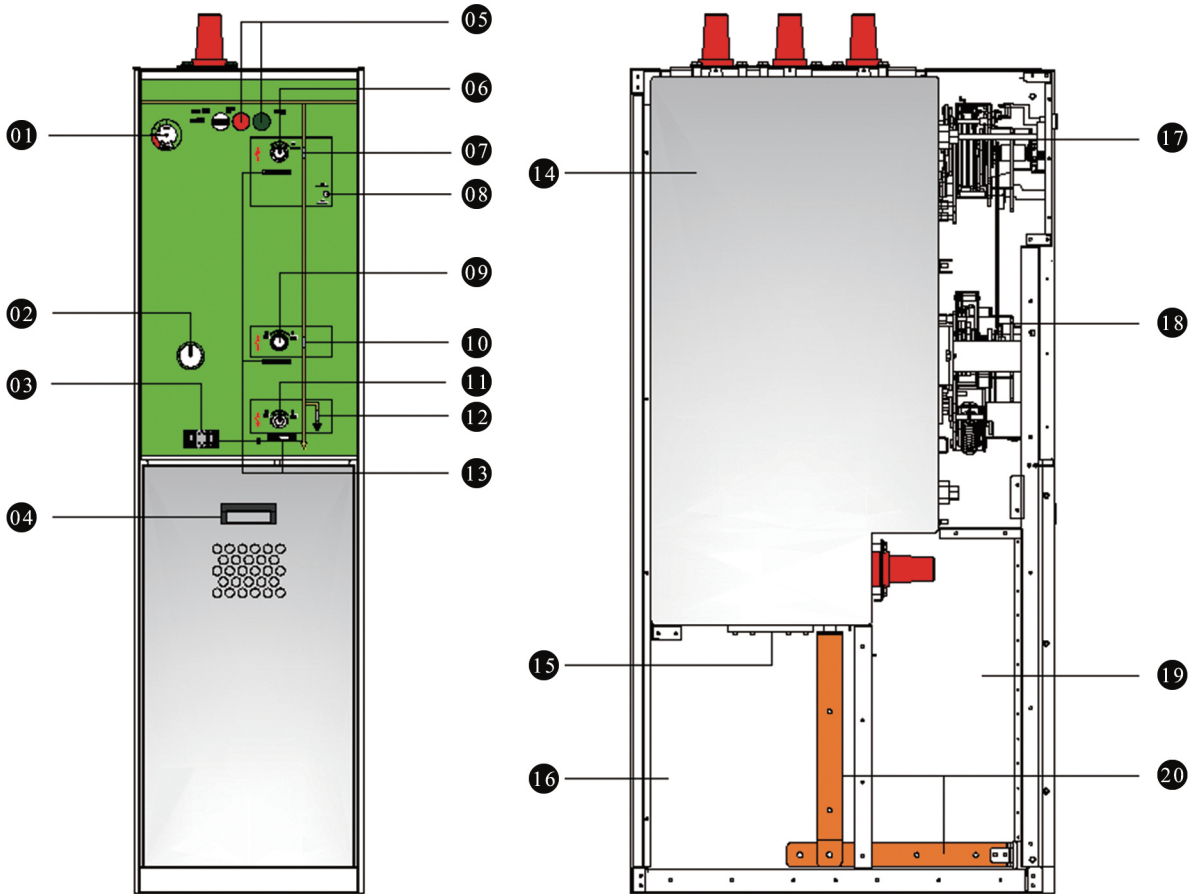
**Installation Environment:** The installation site must be free from fire hazards, explosive atmospheres, corrosive chemicals, and severe vibrations.



# Product Introduction

Specifications					
Indicator			Unit	Load Break Switch Unit	Circuit Breaker Unit
Rated Voltage			kV	12	12
Rated Frequency			Hz	50	50
Rated Current			A	630	630
Rated Insulated Level	1-minute Power Frequency Withstand Voltage	Phase-to-Phase and Phase-to-Ground	kV	42	42
		Break		48	48
	Lightning Impulse Withstand Voltage	Phase-to-Phase and Phase-to-Ground		75	75
		Break		85	85
	Auxiliary and Control Circuit Power Frequency Withstand Voltage			2	2
Rated Short-Time Withstand Current			kA	20	20
Rated Peak Withstand Current				50	50
Rated Short-Circuit Making Current				50	50
Rated Short-Circuit Breaking Capacity				—	20
Rated Short-Circuit Duration			s	4	4
Internal Fault	Cable Chamber		—	20kA/1s	20kA/1s
	Gas-insulated Switching Chamber			20kA/1s	20kA/1s
Mechanical Lifetime	Vacuum Load Switch/ Vacuum Circuit Breaker		Time	10000	10000
	Three-Position Isolating and Grounding Switch			5000	5000
IP Rating	Gas Compartment		—	IP67	IP67
	Cabinet Enclosure		—	IP4X	IP4X
Gas Pressure	Rated Inflation Pressure (at 20°C on the Manometer)		MPa	0.015	0.015
	Minimum Operating Pressure (at 20°C on the Manometer)			0	0
	Pressure Relief Device Activation Pressure (at 20°C on the Manometer)			0.06	0.06
Annual Gas Leakage Rate			%	≤0.01	≤0.01

## Product Structure



- |  |  |   |
|--|--|---|
| 01 Pressure Gauge                        | 02 Visible Break                                 | 03 Voltage Indicator                    |
| 04 Cable Chamber Door Handle             | 05 Close/Open (Trip/Close) Button                | 06 Vacuum Switch Operating Aperture     |
| 07 Vacuum Switch Open/Close Indicator    | 08 Energy Storage Indicator                      | 09 Isolating Switch Operating Aperture  |
| 10 Isolating Switch Open/Close Indicator | 11 Earthing Switch Operating Aperture            | 12 Earthing Switch Open/Close Indicator |
| 13 Padlock Device                        | 14 Gas-insulated Switching Chamber               | 15 Pressure Relief Device               |
| 16 Pressure Relief Chamber               | 17 Vacuum Switch/Load Switch Operating Mechanism | 18 Three-Position Switch Mechanism      |
| 19 Cable Chamber                         | 20 Earthing Busbar                               |   |



# Basic Unit

## C Unit

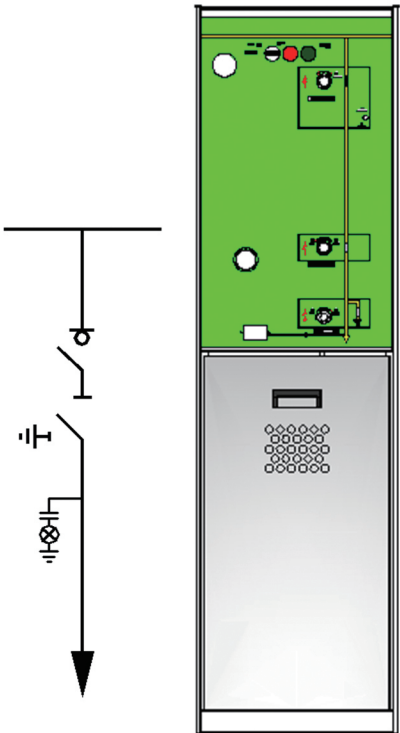
The load switch unit utilizes a vacuum load switch combined with a three-position switch, primarily designed for the connection, branching, and control of cables in ring network systems.

### Standard Components

- 630A Busbar
- Vacuum Load Switch + Three-Position Switch
- Manual-Operated Mechanism
- Indicator Plate for Load Switch and Three-Position Switch
- Capacitive Voltage Indicator with Indicative Shroud for Live Tubing (including Phase Verification Test Ports)
- Gas Pressure Gauge (one per gas tank)
- Cabinet Enclosure
- Earthing Busbar
- Operating Handle (one per gas tank)
- Cable Connection Sleeves
- Break Viewing Window

### Optional Components

- Motor-Operated Mechanism
- Short Circuit & Earth Fault Indicator
- Detachable Cable Connectors (Cable Couplings)
- Surge Arrester
- Live Line Grounding Interlock Device
- Key Interlock Mechanism
- Reserved Expansion Sleeve
- Busbar Extension
- Ring Type Current Transformer
- Auxiliary Switch



Product Dimensions (Length x Width x Height)  
440mm x 860mm x 1670mm

## V Unit

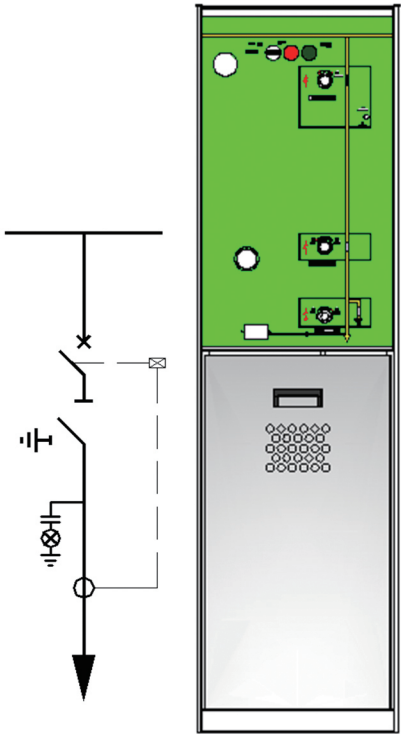
The circuit breaker unit features a combination of vacuum circuit breakers and three-position switches, primarily for controlling, connecting, branching, and protecting cable lines, as well as managing and safeguarding high-capacity transformers. It includes a robust mechanical interlock between the vacuum circuit breaker and the disconnecter, ensuring the safe interruption and restoration of load currents by the circuit breaker. Enhanced with current transformers and digital protection relays, the unit guarantees superior safety and protection capabilities.

### Standard Components

- 630A Busbar
- Vacuum Circuit Breaker + Three-Position Switch
- Motor-Operated Circuit Breaker
- Manual-Operated Three-Position Switch
- Indicator Plate for Circuit Breaker and Three-Position Switch
- Capacitive Voltage Indicator with Indicative Shroud for Live Tubing (including Phase Verification Test Ports)
- Gas Pressure Gauge (one per gas tank)
- Cabinet Enclosure
- Earthing Busbar
- Operating Handle (one per gas tank)
- Cable Connection Sleeves
- Current Transformer (Protection Dedicated)
- Digital Protection Relay
- Break Viewing Window

### Optional Components

- Motor-Operated Isolator Switch
- Short Circuit & Earth Fault Indicator
- Detachable Cable Connectors (Cable Couplings)
- Surge Arrester
- Live Line Grounding Interlock Device
- Key Interlock Mechanism
- Reserved Expansion Sleeve
- Busbar Extension
- Ring Type Current Transformer
- Auxiliary Switch



Product Dimensions (Length x Width x Height)  
440mm x 860mm x 1670mm



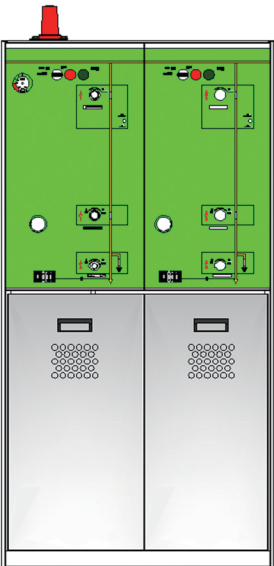
# Standard Configuration Plan

## Dual-Unit Enclosure

### Configuration Form

- ELN - CC - 12
- ELN - CV - 12
- ELN - VC - 12
- ELN - VV - 12

Product Dimensions (Length x Width x Height) :  
840mm x 860mm x 1670mm



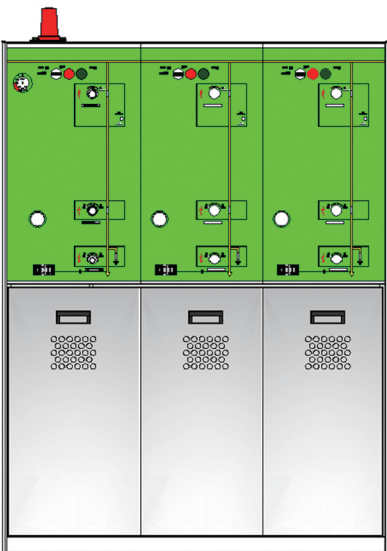
## Triple-Unit Enclosure

### Configuration Form

- ELN - CCC - 12
- ELN - CVV - 12
- ELN - VCC - 12
- ELN - VVV - 12

Product Dimensions (Length x Width x Height) :  
1240mm x 860mm x 1670mm

**Note:**  
The standard configuration currently supports a maximum of three units in a common enclosure. For any other requirements, please contact our sales staff for more information.



# Technical Highlights

## Technical Highlights

### Advanced Welding and Sealing Technology

The leakage rate of gas-insulated compartments is a key concern for manufacturers and users. We use laser cutting and CNC punching, shearing, and folding equipment to ensure precise and consistent weld sizes. Welding robots ensure high-quality welds, effectively preventing insulating gases from escaping and moisture from entering the compartment.

For elastic seals in components like high-voltage bushings, pressure gauges, and switch operation shafts, we carefully control material properties with multiple technologies to ensure integrity. X-ray non-destructive testing ensures there are no air bubbles or impurities in the materials, helium mass spectrometry leak detection ensures the sealing performance of component assemblies, and partial discharge testing verifies the electrical performance of key components. Our rigorous processes and strict assembly standards ensure that the product maintains reliable sealing performance throughout its design life.

Moisture content in the gas compartment is critical for switch quality, as it affects insulation. We bake all components within the sealed switch compartment to strictly control moisture and the packaging time and finally verify the sealing with dew point analyzers.

### High Precision Manufacturing for Sealed Compartments

We utilize advanced laser cutting and CNC punching, shearing, and folding equipment to ensure high dimensional accuracy and stable quality of the sealed compartments.

### Advanced Welding Equipment and Processes

We import advanced welding robots and employ fully automated welding processes, which guarantee stable weld quality, minimal heat-affected zones, no deformation, and clean welds. This setting ensures high welding precision and the aesthetic appearance of the welded compartments.

### Reliable Component Quality

High-quality sealing components such as bushings, pressure gauges, and switch operation shafts undergo 100% helium mass spectrometry leak detection and X-ray non-destructive testing. Insulators are also subjected to partial discharge testing to ensure component reliability.

### Elite Technical Standards

Our gas compartments meet an annual gas leakage rate standard of  $\leq 0.01\%$ , surpassing national standards. The switches maintain their electrical performance even under slight positive or zero gauge pressure.

### Comprehensive Inspection Procedures

From parts to assemblies, whether in-house or outsourced, we follow stringent inspection standards. Each assembly stage, including switch component run-in, in-compartment assembly, and pre-sealing inspection, undergoes rigorous process inspections. After the final cabinet assembly, we conduct strict final inspections to ensure product reliability.



Sheet Metal Flexible Line Processing System



Laser Cutter



Welding Robot



Vacuum Chamber Helium Leak Detection System



# Technical Highlights

## Technical Highlights

### ● Stable and Reliable Operating Mechanism

According to statistical analysis by power departments, 30% to 70% of the failures in medium and high voltage switchgear are due to the operating mechanism such as the region, type of switchgear, and voltage level. Therefore, the operating mechanism is a crucial indicator of the fully insulated and fully sealed network switchgear.

The ELN series sustainable air-insulated switchgear utilizes a mature spring-operated mechanism that has been tested over decades in the switchgear industry, ensuring stable and reliable performance. The motor-operated mechanism comprises a mechanical module and an electric module, the latter including pre-connected wires and a controller. This design facilitates easy upgrades from manual to electric operation, as well as the replacement of wires and controllers, ensuring convenient maintenance. Each mechanism undergoes over a hundred cycles of switch operation during factory testing, ensuring optimal coordination between the switch body and the operating mechanism.

### Reliable Spring-Operated Mechanism

Features a planar spiral spring design for enhanced stability.

### Compact and Reliable Structure

Optimized for switchgear performance and size, requiring low maintenance, compact, reliable, and long lifespan.

### Full Control of the Core Technology

The core technology and processing of the operating mechanism are independently managed by Ceepower, ensuring stable quality.

### Low-Energy Trip Device

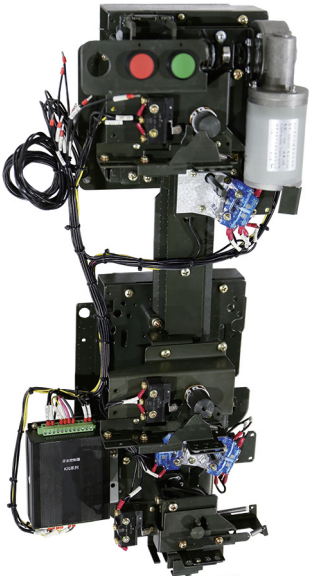
The mechanism includes a bistable electromagnetic trip device activated by a low-energy voltage pulse, ensuring fast and accurate breaker tripping during faults.

### Strong Environmental Adaptability

All components of the operating mechanism undergo 96-hour salt spray and low-temperature tests, ensuring reliable operation under harsh conditions.

### ● Flexible Assembly and Expansion Options

The ELN series sustainable air-insulated switchgear can achieve busbar connections and flexible expansions through shielded busbar connectors without opening the gas-insulated compartment. The top expansion connection allows for easy dismantling and expansion of the busbar without handling underground cables or moving the switchgear if the operation mode changes or equipment is replaced. Additionally, a side expansion option is available for the ELN ring main unit upon customer request.



Operating Mechanism

# Intelligent Protection Device

## Structure

The ELN series circuit breaker unit (V unit) can be equipped with the STR1000 intelligent (self-powered) protection device or other types of protection devices, providing current protection for high-capacity transformers and lines.

### Device Features

- Compact and flexible, easy to install, and ideal for the installation of ring main units.
- Features three-stage phase overcurrent protection and two-stage zero-sequence current protection.
- Inrush current lockout function prevents false tripping caused by transformer inrush currents.
- Highly versatile, accommodating current transformers with secondary rated currents of both 1A and 5A.
- Supports recording up to 256 historical events and retains data even when powered off.
- Equipped with RS485 interface to enable SCADA functionality.
- The pulse trip output can deliver short-term pulse energy, which is preset to ensure the circuit breaker trips correctly.

### Note:

*Please contact the sales staff for a detailed manual.*



STR1000 Intelligent Protection Device

# Auxiliary Components



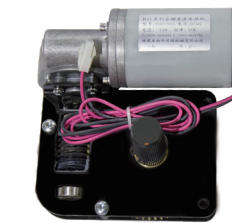
Potential Transformer Connection Section



Rectifier Power Module



Storage Battery



Worm Gear Reducer Motor

## Power Supply

- The secondary side of the voltage transformer directly provides a 220VAC power supply.
- An additional UPS on the secondary side ensures an uninterrupted 220VAC power supply for the ring main unit's motor-operated mechanism, supplying power during high-voltage outages.
- An additional rectifier switch power module provides DC power to the motor-operated mechanism of the ring main unit.
- Additionally, a high-frequency rectifier switch power module and valve-regulated sealed lead-acid battery can be installed to provide DC operating power and manage the battery, which supplies power during high voltage outages.

Specifications			
Voltage Transformer	JDZ12 - 10(20)	Turns Ratio: 10(20)/0.2kV	Accuracy Class: 0.5
	Rated Output: 80VA	Maximum Output: 500VA	
Current-Limiting Fuse	XRNP - 12(24)	Rated Voltage: 12(24)kV	
	Rated Current: 0.5A	Breaking Current: 50VA	
UPS	clks	Input Voltage: 220VAC	
		Output Voltage: 220VAC	Rated Output Capacity: 1000VA
Rectifier Power Module	LCA220 (110) D24(48) W300	Input Voltage: 220VAC	
	Output Voltage: 220VDC(48VDC)(110VDC)	Rated Output Capacity: 300W	
Storage Battery	LC - R12	Rated Voltage: 12V	
	Nominal Capacity (Optional): 7Ah, 10Ah, 17Ah, 24Ah, 40Ah		

## Motor-Operated Module

The manual-operated mechanism is a standard option for load switch units (C units), while a motor-operated mechanism is also supported. For circuit breaker units (V units), the standard setup includes a motor-operated mechanism for the vacuum switch and a manual mechanism for the isolating switch.

The DC motor reduction mechanism and control unit are modular, allowing for factory or customer installation. All functional units can be integrated into remote control and distribution automation systems once they're installed.

All earthing switches are capable of handling fault currents, and they can only be operated manually.

DC Motor Specifications		
220VDC	65W	200r/min
110VDC	65W	200r/min
48VDC	65W	200r/min
24VDC	65W	200r/min



Trip Device



Pressure Gauge



Split-Core Current Transformer



Busbar-Type Current Transformer

## Trip Device

The trip device on the operating mechanism is a bistable, low-energy pulse-triggered trip device, working with protection relays to enable breaker unit protection tripping.

## Pressure Gauge

To monitor operational safety, the gas chamberis equipped with a gas pressure gauge, detecting the rated operating pressure. The green zone indicates normal pressure, while the red zone indicates alarm conditions. An optional density relay with contact points is available for low-pressure alarms.

## Current Measurement Equipment

Busbar-type or split-core transformers can be installed on each circuit power cable or incoming/outgoing bushing for current measurement and fault current detection.

Current Transformer Specifications						
Model	CTR		Measurement Winding		Protection Winding	
	Primary Current(A)	Secondary Current(A)	Accuracy Class	Rated Load cosΦ=0.8	Accuracy Class	Rated Load cosΦ=0.8
LZCT1-10 Φ1×Φ2×h 117×78×35	75	5	0.5	1.5VA		Data can be supplied to various devices such as ammeters, RTUs, and FTUs
	100			3.75VA		
	150		0.2	5VA		
	200			10VA		
	400					
	600					
LZCT1-10P Φ1×Φ2×h 117×78×35	100	5			10P10	2.5VA
	200				10P15	3.75VA
	400					3.75VA
	600					5VA
	800					10VA



# Auxiliary Components

## Auxiliary Contacts

Auxiliary contacts are used to indicate the status changes of functional units or auxiliary components through the position of micro switch contacts, serving as status monitoring and control signals in the electrical control circuit.

The secondary side of the voltage transformer can be equipped with a high-frequency rectifier switch power supply and a valve-regulated sealed lead-acid battery to provide DC operating power to the ring main unit's motor-operated mechanism and manage the battery. In case of high-voltage power failure, the battery supplies the operating voltage.

- Each load switch or circuit breaker can have up to 6 auxiliary contacts: 3 normally open and 3 normally closed.
- Each earthing switch can have up to 4 auxiliary contacts: 2 normally open and 2 normally closed.
- Each circuit breaker unit can have one fault indication auxiliary contact.

Contact Capacity		
AC12	22A	380VAC
AC15	6A	380VAC
DC12	5A	250VDC

## Short Circuit and Earth Fault Indicator

The DJD-1 short circuit and earth fault indicator consists of three short circuit fault sensors, one earth fault sensor, and a display unit mounted on the switchgear panel. When any path experiences a fault current, the indicator emits an alarm, helping staff quickly locate the fault. The device can be manually reset (with a reset button on the display unit) or automatically reset at preset times (1, 4, 8, 12, 16, 24, and 48 hours are selectable).

Specifications	
Ground Fault Alarm Current	3 – 200A ±10%
Short Circuit Alarm Current	150 – 1500A±10%
Operating Environment	–18℃ – +60℃
Operating Current	3.6V Lithium Battery (Lifespan of 5 years or more)
Automatic Reset Time	1, 4, 8, 12, 16, 24, and 48 hours are selectable (12h by default)
IP Rating	IP54
Remote Relay Output Capacity	220VAC/0.3A; 30VDC/1A
Indicator Full Machine Standby Current	≤10μA
Indicator Indication Current	≤0.8mA
Maximum Rated Current for Short Circuit Current Sensor	20kA, 3s

## Interlocking Device

Mechanical interlocks exist between the vacuum switch and the three-position switch: when the vacuum switch is closed, the three-position isolating switch cannot be tripped; when the vacuum switch is open, the isolating switch can be tripped. Mechanical interlocks also connect the isolating switch, earthing switch, and cable chamber door: when the isolating switch is closed, the earthing switch cannot be closed, and the cable chamber door cannot be opened; only when the isolating switch is open can the earthing switch be closed and the cable chamber door opened, effectively preventing misoperations.

The ELN series switchgear can be equipped with an energized incoming line earthing interlock device, which locks the earthing switch's operating hole when the incoming line cable is energized, preventing the operation handle from being inserted into the earthing switch operating hole. This prevents misoperation and ensures the safety of personnel and equipment.

**Note:**  
The interlocking device needs a separate power supply and can connect to a high-voltage indicator to check if the incoming cable is live.



Micro Switch Assembly



DJD-1 Short Circuit and Earth Fault Indicator