

27 Model Intelligent Circuit Breaker Series

Product specification sheet



Version number	Revision time	Revisionist	Revised content
V1.0			First time writing
V2.0	twenty million two hundred and twenty thousand one hundred and twenty-six	Congratulatory message	Second revision

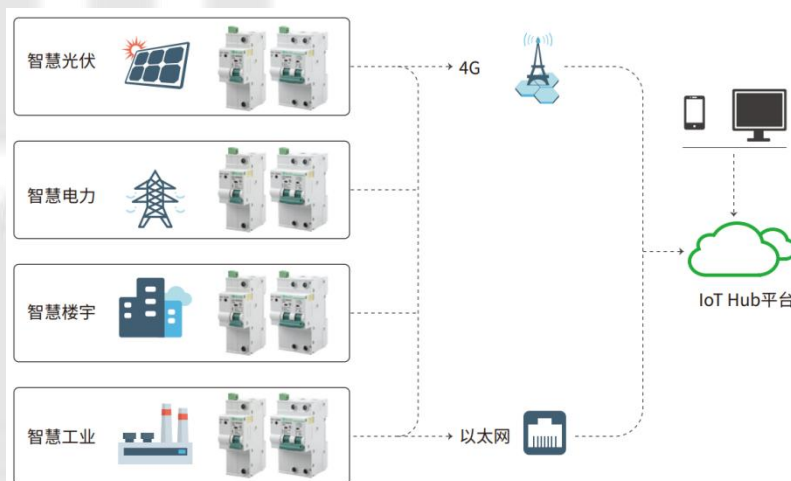


● Product Description

The ELCO IoT 27 model intelligent circuit breaker series equipment is developed using embedded technology and designed based on 4G, CAT1, and Ethernet communication methods. It is equipped with a high-sensitivity on-off switch and a fast response wireless communication module, which can receive instructions and respond instantly, while balancing power safety and energy conservation. The main module gateway and circuit breaker are integrated to fully meet customers' intelligent power needs. It adopts a rail type design and is an ideal product for the construction of power IoT systems.

This product can easily achieve power distribution and line protection, avoiding damage to power equipment from overcurrent, overload, undervoltage, overvoltage, short circuit and other faults. It has intelligent protection, remote on/off, timed on/off, power metering and other functions, improving power supply reliability. It is widely used in the field of Internet of Things, such as monitoring and controlling the electricity consumption of equipment in computer rooms, to achieve intelligent monitoring, electricity management and remote control of energy consumption in computer rooms, smart power, smart buildings, smart communities, smart buildings, smart industries and other fields.

● Application Framework



The 27 mode intelligent circuit breaker series equipment, based on the research and development of energy conservation and emission reduction policies proposed by the state, is closely related to the Outline for the Construction of the Ubiquitous Power Internet of Things proposed by the State Grid, and is widely used in communication systems, smart parks, industrial Internet, smart cities and other scenarios.

This device can be installed at various key nodes of power circulation, uploading real-time information and data from various nodes of the power supply system. It adopts the MQTT universal protocol and can directly connect to the ELCO IoT application platform to expand upper layer applications, or connect to other existing or public cloud platforms to achieve online management of power consumption and meet the requirements of ubiquitous power IoT.

In addition, the device can automatically detect voltage, current, and temperature parameters during line operation, and intelligently protect on/off. Power conservation management in scenarios such as 5G base station power saving, industrial production power saving, and smart agriculture power saving can also be achieved through periodic remote management.



● Product Features

1. Hardware configuration

- Embedded design, product safety and stability, can work continuously 24/7;
- Up to 32 channels of DC48V, AC220V, and AC380V (mixed series) devices can be supported for expansion;
- DC48V rated working current is less than 80A;
- The rated working current of AC220V and AC380V is less than 100A;
- The local host supports multiple operation buttons, making it easy to control circuit opening and closing, leakage testing, manual and automatic mode selection, etc;
- Support multiple status lights to provide timely feedback on device status, including current device networking status, power status, and other information;
- Support factory prefabricated patch IoT cards to meet various working conditions, environments, and safety protection requirements;
- Choose to configure 4G, CAT1 full network module, or select Ethernet communication version, and support external communication antenna, adjust signal gain to ensure wireless communication network signal security and stability;
- Built in temperature sensor, real-time monitoring of temperature;
- Built in high-performance air switch, precise control of circuit on/off;
- Equipped with high-quality arc extinguishing barriers to ensure circuit safety;
- Equipped with storage function, it automatically saves the frozen electricity of the line within one year, making it easy to query and trace;
- Support factory preset APN, username, and password (multi-level permission management) to meet customer's private network environment requirements;
- Reserve 2PIN DC12V DC power supply interface;
- Capable of high resolution and reliable isolation function;
- Contact opening distance $\geq 5.5\text{mm}$;
- Connection depth $\geq 15\text{mm}$;
- The incoming power supply does not require an external power module for power supply;
- Equipped with surge lightning protection, the maximum discharge current of the surge is 15KA, which can prevent electrical appliances on the line from being damaged by lightning strikes;
- Adopting high melting point silver contact design, high-grade arc extinguishing device, high specification purple copper terminal block, and dual control mode of electronic touch button switch and mechanical handle switch, the structure is safe and reliable.

2. Intelligent on-off

- Support local and remote power on/off control, intelligent power management;
- Support multi-level control logic, easily achieve local/remote free switching control, and improve product safety;
- Support platform to issue timed opening and closing instructions, stored locally, ensuring stable execution of devices both online and offline;
- Support independent/batch control capability, improve user work efficiency, and facilitate emergency and batch on/off management;
- Equipped with intelligent protection mechanism, it can perform protection actions after



overvoltage, undervoltage, overload, overcurrent, overtemperature, short circuit, and leakage (optional);

- Configure default thresholds for intelligent detection, triggering device actions when the specified range is reached;
- Support periodic shutdown and non periodic shutdown to cope with various application scenarios;
- Support automatic detection of switch on/off status, intelligent fitting, to ensure the normal operation of the equipment;
- Equipped with remote manual automatic mode function, the circuit breaker can be operated locally to open and close, but cannot be operated remotely;
- Equipped with a priority closing function, the device will automatically close in case of abnormal 485 communication or other situations. The default communication abnormality lasts for 5 minutes, and the device will automatically close.
- Equipped with opening and closing protection function, non leakage abnormal tripping, capable of remote closing 3 times within 24 hours; The same account cannot remotely power off more than 5 sites within 1 hour, and cannot remotely power off more than 30 sites within 1 day; Rules can be set.
- Equipped with automatic reclosing function, it records abnormal tripping events such as overcurrent or leakage. After tripping, it will automatically close three times within 30 seconds. If it still doesn't work, it will not close again; The automatic closing function can be set to enable or disable.

3. Supporting software

- The factory comes standard with the ELCO IoT Hub platform connection protocol, which supports third-party protocol extensions and application development;
- Supporting standard application management platform, supporting customized application platform development or API interface services;
- Support platform settings for data reporting methods: timer reporting, proactive reporting, daily reporting, monthly reporting, and responsive reporting;
- Support modifying the device's scheduled reporting cycle;
- The device is equipped with an embedded clock recovery function, which includes factory calibration, online calibration, and fixed-point calibration mechanisms to ensure that the device's network time difference is less than 60 seconds;
- Support remote FOTA upgrade and local serial port upgrade;
- Support one click migration function for batch devices, quickly replace terminal docking service platforms;
- Support operation, alarm, device, data and other log generation, as well as exporting at selected times;
- Equipped with overvoltage, undervoltage, overload, overcurrent, short circuit, phase to phase imbalance, over temperature protection (corresponding to terminal temperature of several phases) and alarm functions;
- The platform has rich functional modules such as data dashboard, GIS map display, comprehensive equipment management and monitoring, alarm work order management, user management, and log query and export.



4. Communication method

- 4G, CAT1, Ethernet communication methods;
- Equipped with network diagnostic function, supporting disconnection reconnection and retransmission;
- Support 485 connection to expand sub circuit breaker devices;
- Support customized extension of DL645 protocol;
- Support MQTT protocol, integrate with IoT Hub, and achieve real-time uploading and parsing of data information;

5. Monitoring project

- Support watchdog mechanism to prevent device downtime;
- Support voltage, current, power, short circuit, and leakage monitoring, with threshold values that can be set for exceeding limits;
- The accuracy of electric energy measurement can reach 1%;
- Support temperature monitoring of power lines to ensure electrical safety;
- Can detect voltage, current, temperature, leakage, short circuit, active/reactive power, power factor, electrical energy, opening and closing status, statistics of opening times, automatic reclosing times, and can determine the reason for opening and closing

6. Security certification

- Having product performance CQC testing certification; (CMA/CNAS)
- Equipped with third-party testing and certification for product high and low temperature, humidity, temperature rise, power consumption, success rate of opening and closing, mechanical and electrical lifespan, protection level, vibration, overvoltage and undervoltage, and measurement. (CMA/CNAS)

● Product specifications

Interface parameters	
Wiring terminals	two
RS485*1	Electrical isolation: supported, baud rate: 9600bps, data bits: 8-bit Stop bit: 1 bit, verification method: none; (Supports extending 32 channels)
RJ45*1	Transmission rate: 10/100M adaptive, default IP: 192.168.1.17
SMA*1	External screw internal hole antenna wiring terminal Rod antenna: optional support; Suction cup antenna: standard support
SIM card slot * 1	Communication mode: full network connection; SIM card size: 25mm x 15mm
indicator light	PWR power indication, NET network communication
Key parameters	
Test button	1 (Quick testing of opening and closing actions)
RST	1 (Reset button)
Leakage detection	1 (Test whether the circuit leakage detection is normal)
Control switch gate	one
Network parameters	
Wireless Communication Standard 1 (optional)	4G
Wireless Communication Standard 2 (optional)	CAT1
Wired communication (optional)	Ethernet
485 protocol support	DL/T645





(standard)

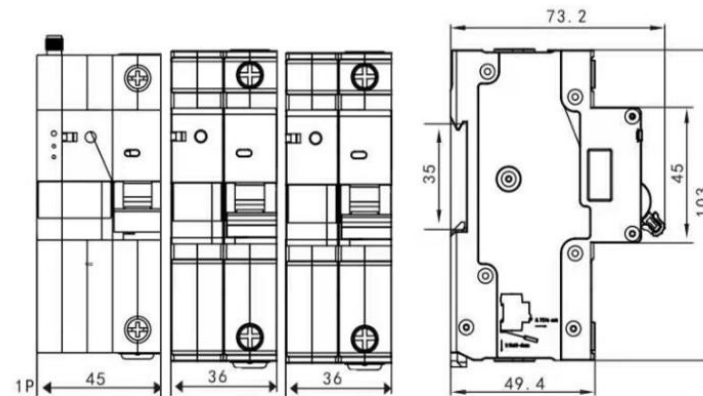
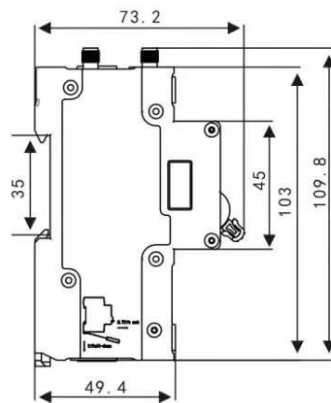
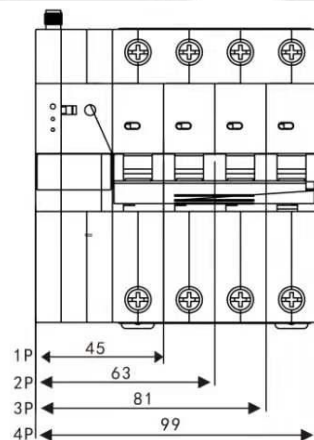
● **Indicator light status description**

Symbol	Function definition	Indicate status	Color description of indicator lights
PWR	Power indicator (yellow)	Chang Liang	Normal work
		-	abnormal
NET	Network indication (yellow)	Chang Liang	Normal work
		Extinguish	No network





● **Product interface and size**



27mm 1P主断路器、子断路器产品尺寸
通讯方式选择范围 RS485+以太网+4G (全网通)、RS485+以太网+Wifi

Product size





Working parameters	Direct Current (DC)	AC 220V communication	Communication AC380V
working voltage	48 (-36V-72V, error<1%)	220 (175~280V, error<1%)	380 (320-440V, error<1%)
Working current	63A and below, 80A	63A and below, 80A, 100A	
Rated frequency	——	50/60Hz	
Rated insulation voltage (UI)	——	500V	
Rated impulse withstand voltage (UIMP)	——	≥6kV	
Breaking capacity (rated short-circuit capacity)	——	6KA	
Extreme numbers	1P, 2P	1P, 2P, 3P, 4P	
Opening action time (s)	≤2s		
Closing action time (s)	≤3s		
Power on delay time	≥4s		
Working temperature and humidity	-20 °C~+55 °C, 0~95% RH without condensation, error ± 5 °C		
Storage temperature and humidity	-40 °C~+85 °C, 0~95% RH, no condensation, error ± 5 °C		
Maximum power consumption	Less than 10W		
standby power	Less than 200mW		
Mechanical and electrical lifespan	Mechanical 10000, Electrical 6000		
Technical requirements related to action function and power supply voltage	The equipment should operate correctly at any power supply voltage between 0.85 and 1.1 times the rated voltage (Un)		
Protection level	IP20		
Product size	1P: 73.6*45*103mm 2P: 73.6*63*103mm	1P: 73.6*45*103mm 2P: 73.6*63*103mm 3P: 73.6*81*103mm 4P: 73.6*99*103mm	3P: 73.6*81*103mm 4P: 73.6*99*103mm
Measurement ability (Level 2, Level 1)	Voltage, current, power, and	Single phase voltage, single-phase	Three phase voltage, three-phase current,





	electricity consumption	current, power, electricity consumption	total power, total electricity consumption
Overvoltage protection and action time	$\geq 65V$, protection time $\leq 3s$. Recovery value $\leq 60V$, recovery time $\leq 30s$.	Alarm $\geq 265V$, action $\geq 275V$, protection time $\leq 3s$. Recovery value $\leq 245V$, recovery time $\leq 30s$.	Protection value: $435V \pm 5V$; Recovery value: $400V \pm 5V$, protection time $\leq 30s$.
Undervoltage protection and action time	$\leq 35V$, protection time $\leq 3s$ Recovery value $\geq 45V$, protection time $\leq 30s$.	Alarm $\leq 175V$, action $\leq 165V$, protection time $\leq 3s$. Recovery value $\geq 185V$, protection time $\leq 30s$.	Protection value: $325V \pm 5V$; Recovery value: $345V \pm 5V$, protection time $\leq 30s$.
Overload protection and action time	When the input power is greater than the set power, the device output should be disconnected, and the protection time should be less than 300ms		
Over temperature action range	≥ 75 alarm, ≥ 85 action (60~90 can be set)		
Overtemperature action time	Action $\leq 1s$, alarm $\leq 3s$		
Leakage action current (for 2P and 4P)	0.03A, 0.05A, 0.1A, 0.3A (adjustable)		
Leakage non operating current (for 2P and 4P)	$0.5I_{\Delta n}$		
Leakage action time (for 2P and 4P)	Maximum breaking time 0.03s		
Short circuit current protection type	_____	Type C: 5-10 In, Type D: 10-14 In	
Institution type	_____	C65	
Short circuit inactive current (A)/time t (s)	_____	$5.0I_n / t \leq 0.1s$	
Short circuit action current (A)/time t (s)	_____	$10I_n / t < 0.1s$	
Residual current action	_____	30mA	
Overcurrent without action current (A)/time t (h)	_____	$1.13I_n / t \leq 1h$	





Overcurrent action current (A)/time t (h)	——	$1.45I_n/t \leq 2h$ /protection time less than 300ms.
Phase loss protection and action time	——	It has a phase loss protection function. The protection time is less than 60 seconds.
Phase imbalance protection and action time	——	The judgment value is 2%. The protection time is less than 60 seconds.
Product performance		
Performance of equipment under surge current	Apply a combined wave of 1.2/50us (8/20us) and 2kV between power lines (L-N), Apply a 1.2/50us, 4kV impulse voltage to the power line (L-N), When the power line L flows through N with a lightning current of 8/20us and 20kA, and an additional surge protector is installed.	
Electrostatic discharge disturbance test	The experiment shall be conducted in accordance with GB/T 17626.2 under the following conditions: --Test voltage, 8kV-- Discharge frequency: 10 (with the most sensitive polarity);	
Conducted disturbance immunity test induced by radio frequency field	The test shall be conducted in accordance with GB/T 17626.6 under the following conditions: --Frequency range: 150kHz~80MHz, voltage level: 10V. Severity level: 10V/m During the experiment, the condition of the equipment should not be disturbed and the change in error should be less than 1%.	
Fast transient burst test	The experiment should be conducted in accordance with GB/T 17626.4, --Test voltage on current and voltage lines: 4kV-- Dielectric voltage of the main circuit: 2kV; --Test voltage on auxiliary lines with reference voltage exceeding 40V: 2kV-- Test time: 60s for each polarity. In the experiment, a brief decrease or loss of functionality or performance is allowed, and the change in error should be less than 2%.	
Radio interference suppression	The test results should comply with the requirements of GB 9254 Class B equipment.	
Release characteristics	1.13I _n , cold state, t ≤ 1h (for I _n ≤ 63A), t ≤ 2h (for I _n >63A), not tripped 1.45I _n , followed by the experiment, t ≤ 1h (for I _n ≤ 63A), t ≤ 2h (for I _n >63A), trip 2.55I _n , cold state, 1s<t<60s (for I _n ≤ 32A), 1s<t<120s (for I _n >32A), trip 5I _n , cold state, t ≤ 0.1s, no trip 10I _n , cold state, t<0.1s, trip	
Shell safety	Shell fire hazard: Terminal block: 960 °C± 10 °C; Shell: 650 °C± 10 °C; The action time is 30s ± 1s.	
Dielectric properties	Insulation resistance: After applying a test voltage of 500VDC for 5 seconds, the insulation resistance shall not be less	





	than 5M Ω. The insulation resistance after constant humidity test shall not be less than 2M Ω. Voltage withstand test: Apply a 2000V/50Hz power frequency test voltage for 1 minute without any flashover or breakdown phenomenon. The leakage current action value is set to 100mA.
temperature rise	60K wiring terminal for connecting external conductors External components that are easily accessible during manual operation of equipment, including operating parts made of insulating materials and metal parts connecting the insulating operating parts of each pole, 40K External metal components of operating parts 25K Other external components, including surfaces in direct contact with the installation plane, 60K
Environmental adaptability (high and low temperature, humid heat)	Low temperature test: The test shall be conducted in accordance with GB/T 2423.1 under the following conditions: --The instrument is in a non working state-- Temperature: $-25^{\circ}\text{C} \pm 3^{\circ}\text{C}$, indoor instrument- Test cycle: 16 hours, indoor instruments; After the experiment, the change in error should be less than 2%. High temperature test: The test shall be conducted in accordance with GB/T 2423.2 under the following conditions: --The instrument is in a non working state-- Temperature: $+70^{\circ}\text{C} \pm 2^{\circ}\text{C}$-- Test time: 72 hours; After the experiment, the change in error should be less than 2%. Damp heat test: The test shall be conducted in accordance with GB/T 2423.4 under the following conditions: --Reference voltage for voltage lines and auxiliary lines-- The current circuit has no current-- Alternating mode: 1; --Upper limit temperature: $+40^{\circ}\text{C} \pm 2^{\circ}\text{C}$, indoor instrument-- Not taking special measures to eliminate surface moisture-- Test duration: 6 cycles; After the experiment, there should be no corrosion marks that may affect the functional characteristics of the instrument, and the change in error should be less than 2%.

