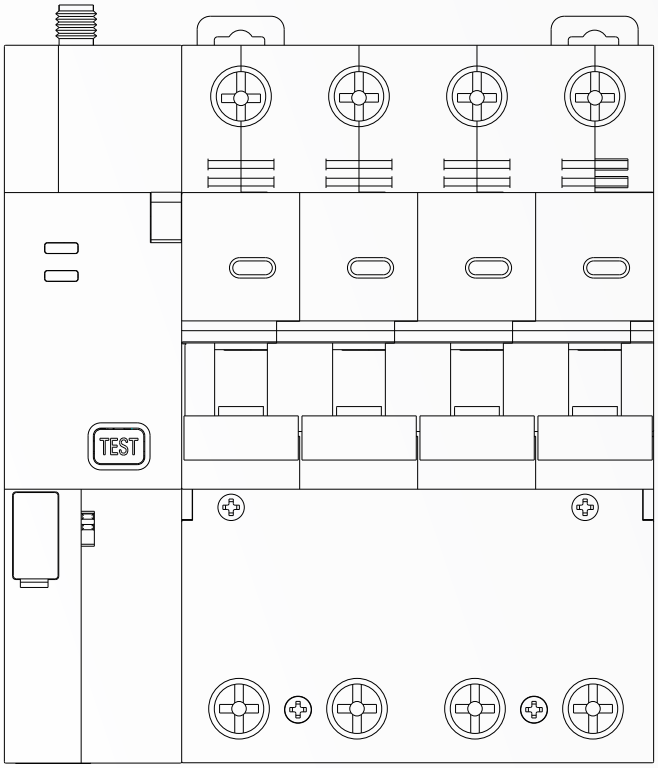
GEYA®



GRD9S Series

IoT Circuit Breaker

Installation and Use Manual V1.0

ZHEJIANG GEYA ELECTRICAL CO.,LTD

Catalogue

1. Summary ---- 1

2. Main product features ---- 1

3. Product Model/Function Description ---- 2

4. technical parameter ---- 3

5. functional parameter ---- 4

6. Product Operation and Installation Instructions ---- 5

6.1 SIM installation instructions ---- 7

7. Connection Instructions ---- 8

7.1 WiFi Device Networking Instructions

7.2 4G Product Connectivity Guide

8. Graffiti APP Instructions ---- 9

9. Product dimensions and exterior design diagram ---- 9

10. Product Installation Wiring and Distribution Network Instructions ---- 10

1. Summary

The GRD9S-F100 IoT Circuit Breaker integrates magnetic modulation technology with microcontroller-based digital processing, featuring a wide frequency range, compact detection units, strong interference resistance, high detection sensitivity, and consistent operating characteristics. Building upon traditional circuit breakers, it incorporates integrated technologies including built-in sensors, remote operation control systems, and instrumentgrade measurement capabilities, creating an innovative IoT circuit breaker with intelligent protection. The device can collect comprehensive data such as current, voltage, temperature, energy consumption, breaker status (open/closed), fault conditions, and alarm signals.

This series of circuit breakers is designed for low-voltage terminal distribution networks in industrial, commercial, residential buildings, and infrastructure facilities within indoor structures and similar environments. The IoT-based leakage protection circuit breaker can be deployed either with smart gateways or standalone, enabling real-time monitoring of critical electrical parameters including voltage, current, power consumption, temperature, leakage current, and energy usage. Key features include remote operation capabilities, manual switching functions, arcing protection mechanisms, abnormality alerts, emergency tripping alarms, energy metering statistics, and fault location systems.

2. Main Product Features

- ☐ Powered by a high-performance 32-bit MCU chip, it performs real-time signal processing and intelligent control.
- ☐ Integrated manual and automatic control with remote and local on/off functionality;
- ☐ Equipped with timing functionality, it allows free setting of on/off times for each circuit;
- ☐ Residual current (leakage current) protection with adjustable residual current levels via online setting and reclosing functionality.
- ☐ Real-time monitoring and tracking of line residual current to ensure product operational rate and reliability.
- ☐ Over/under voltage protection, phase loss protection, phase sequence protection, imbalance protection, and overpower protection;
- ☐ Real-time monitoring of line residual current, three-phase power supply voltage, and load current;
- ☐ Protection functions and parameters can be configured and modified online.
- ☐ Trip types (residual current, lockout, overload, undervoltage, overvoltage, phase loss, zero loss, power
- ☐ overcurrent, short circuit, arcing, total voltage harmonic distortion, total current harmonic distortion) can be identified, stored, queried, and deleted.
- ☐ Real-time measurement of parameters including active power, reactive power, apparent power, power factor, and voltage-current phase angle.
- ☐ Cumulative three-phase active power, reactive power, and apparent power measurements with Class 1 metering accuracy.
- ☐ Real-time temperature monitoring of the output terminal terminal block.
- ☐ Statistical analysis of total harmonic distortion rate for voltage/current harmonics.
- ☐ Equipped with a mechanical maintenance lock. Upon unlocking the lock, the equipment will immediately trip, prohibiting remote and local closing operations to ensure the safety of maintenance personnel.
- ☐ Equipped with fault arc detection (spark) functionality.
- ☐ The device offers diverse communication options, featuring RS485 as the standard interface with optional 4G/WIFI connectivity.

3. Product Model Description

GRD9S - F 100 W L 2P 63A - TUYA
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

NO.	Meaning	NO.	Meaning
①	Gia high-end reclosing	⑤	No: No leakage current; L: With leakage current; N: With neutral current monitoring R: Leakage current monitoring + neutral line current monitoring
②	Code name	⑥	Number of poles
③	Shell and frame classification	⑦	Rated current
④	No: RS485 communication; W: WiFi + RS485 communication; G: 4G communication + RS485 communication; Z: Zigbee + RS485 communication	⑧	ESP / TUYA IoT

Table 1 Function Description Table of IoT Circuit Breaker

NO.	Meaning	Basic features description
1	GRD9S-F100 (Basic model)	Basic features: Real-time monitoring of voltage, current, power, power factor, electrical energy, and temperature; Overvoltage, undervoltage, overload, short circuit, and overcurrent protection; Local manual/electrical control, remote control, and timed control. Guided track installation, with optional numbers 1 P / 2 P / 3 P /4 P; optional deflection curve types B / C / D, standard RS-485 (MODBUS) communication included
2	GRD9S-F100W	Add Wi-Fi connectivity to the base model
3	GRD9S-F100G	Upgrade the base model with 4G full-network connectivity
4	GRD9S-F100Z	Basic model with Zigbee communication
5	GRD9S-F100N	Add zero-line current detection to the basic model
6	GRD9S-F100WN	Basic model with Wi-Fi functionality and neutral current detection
7	GRD9S-F100GN	Basic model with +4G functionality + zero current detection

NO.	Meaning	Leakage current payment feature description
1	GRD9S-F100L (Leakage current model)	Leakage current payment feature: Real-time monitoring of voltage, current, power, power factor, electrical energy, and temperature; overvoltage, undervoltage, overload, short circuit, and overcurrent protection; local manual/electrical control, remote control, timed control, residual current detection, and leakage current protection. Guided rail installation with optional 2P/3P/4P configurations; tripping curve types B/C/D available as options, standard RS-485 (MODBUS) communication included.
2	GRD9S-F100WL	Add Wi-Fi communication to the leakage payment
3	GRD9S-F100GL	Leakage protection upgrade with +4G full-network compatibility
4	GRD9S-100ZL	For leakage payment, use Zigbee communication
5	GRD9S-F100R	Detection of leakage current and neutral line current
6	GRD9S-F100WR	Leakage current protection + Wi-Fi functionality + Neutral current detection
7	GRD9S-F100GR	Leakage current protection + 4G functionality + Neutral line current detection

Neutral line current detection: Real-time monitoring of current magnitude on the neutral line (N line), with alarm and trip protection functions triggered based on preset thresholds.

Table 1 Description of Intelligent Communication Functions

NO.	Commu-nication Type	Functional description	Concrete operations
1	RS485	Equipped with RS485 communication capabilities, it enables real-time monitoring of operational data including voltage, current, power, energy consumption, temperature, and leakage current across circuits. The system displays real-time fault status and alarms for each circuit while supporting remote control of switch states (RS485/switching signals). It allows parameter configuration for individual circuits and features rail-mounted installation with event logging functionality.(Industrial-grade wired communication offering strong anti-interference performance and up to 1200-meter transmission range, ideal for stable data transfer in fixed equipment rooms. However, requires wiring installation and has limited scalability.)	Connect all A and B communication lines of the circuit breakers in parallel (refer to the wiring diagram on page 11) and connect them to the concentrator/touchscreen/computer/back-end host. View voltage, current, leakage current, temperature, faults, alarms, and switch status in the backend software; perform remote switching and parameter settings (local operation only, no remote mobile phone control).
2	4G	Building upon the existing RS485 protocol, the system incorporates 4G functionality:4G: Wireless, full-network remote access, available with any mobile signal(Based on cellular networks, it offers wide coverage and supports mobile devices, making it suitable for remote monitoring and big data transmission. However, it has higher power consumption and requires continuous data traffic costs.)	A SIM card must be inserted into the device; the cloud platform/App can be accessed via mobile phone or computer in areas with cellular signal; remote data viewing, remote circuit switching, and alarm reception are directly available; no wiring required and no distance restrictions.
3	Wifi	Building upon the existing Rs485 protocol, the system incorporates WiFi functionality:WiFi: Wireless, remote access across the entire network, available with any mobile signal (Wireless communication offers high speed and low cost, making it suitable for short-range, high-speed scenarios (e.g., smart homes). However, it relies on network coverage and is prone to environmental interference, leading to unstable performance.)	The product/phone connects to the on-site router via WiFi (2.4GHz). Within the same network, the graffiti version can be paired using the graffiti app. Successful pairing enables data viewing and remote control (operations remain possible even when the phone is not connected to the same WiFi network).
4	Zigbee	Building upon the existing RS485 protocol, the system incorporates Zigbee functionality: Zigbee: Wireless, low-power, and short-range networking, ideal for small devices (extremely low power consumption ensures long battery life, unlike WiFi's high power consumption; strong anti-interference capability and high stability make it suitable for environments with multiple electrical devices and high interference, such as distribution boxes. A single gateway can support dozens of devices, offering low centralized networking costs and minimal cabling requirements.)	The product itself does not connect directly to the phone and requires gateway control: First configure a Zigbee gateway as a relay station; The product establishes a network through closerange wireless pairing with a Zigbee gateway. The Zigbee gateway then connects to the internet and cloud servers via WiFi or Ethernet cables. Finally, the product is monitored and controlled via cloud servers on mobile devices or computers.

Selection recommendations: RS-485 is recommended for industrial fixed equipment; WiFi for short-range high-speed applications like smart homes; 4G for remote mobility or wide-area coverage; and Zigbee for low-power, short-range networking with multiple nodes.

4.Technical Parameter

NO.	Project	Basic Model	Leakage current type
1	Meet a criterion	GB/T 10963	GB/T 16917.1 CQC1149
2	Rated voltage	AC230V(1P/2P) AC400V(3P/4P) 50/60Hz	AC230V(1P/2P) AC400V(3P/4P) 50/60Hz
3	Number of poles	1P/2P/3P/4P	2P/3P/4P
4	Rated current	Preferred models include 20A,32A, and 63A; other shell frames are available for customization.	
5	Tripping type	Type B, Type C, Type D	Type B, Type C, Type D
6	Ambient temperature	-5°C~70°C	-5°C~70°C
7	Short circuit breaking capacity	Standard type: Icu=Ics=6000A	Standard type: Icu=Ics=6000A, H type
8	Mechanical life	More than 15,000 times	More than 15,000 times
9	Electrical life	More than 6000 times	More than 6000 times
10	Closing time	<1.5s	<1.5s
11	Opening time	<1.0s	<1.0s
12	Measuring accuracy	1	1
13	Communication mode	RS485/4G/Wifi/Zigbee optional	RS485/4G/Wifi/Zigbee optional
14	Way to install	Guide rail installation	Guide rail installation
15	Leakage current threshold	/	Adjustable range: 30mA to 500mA

5. Functional Parameter

NO.	Defencive function	Trip type	Basic type	Leakage current type	Parameter setting	Set value	Windows default
1	Overvoltage crowbar	Close/Alarm/Trip	Trip	Trip	Overvoltage setting	250-350V	280V
					Over rolling delay	0-10S	3s
2	Undervoltage protection	Close/Alarm/Trip	Alarm	Alarm	Under-voltage setting	110-200V	165V
					Undervoltage delay	0-10S	3s
3	Overload protection	Close/Alarm/Trip	Trip	Trip	Overload setting	0.6In-In	In
					Overload delay	0-10s	3s
4	High-temperature protection	Close/Alarm/Trip	Trip	Trip	High temperature setting	60-100°C	80°C
					High temperature delay	0-10s	5s
5	Overpower protection	Close/Alarm/Trip	Close	Close	Overpower value	50W-50Kw	2Kw
					Overpower delay	0-10s	5s
6	Phase loss protection (3 P/4P)	Close/Alarm/Trip	Close	Close	Phase lag tuning	10-100V	30V
					Phase lag delay	0-10s	5s
7	Earth leakage protection	Close/Alarm/Trip	—	Trip	Leakage current level	30~500mA	100mA
					Leakage current delay	Non-delay 0. 06/0. 1/0. 2	Non-delay
8	Allow alarm	Turn off/turn on	Open	Open	---	---	---
9	Automatic closing	Turn off/turn on	Close	Close	---	---	---
10	On state	Opening/closing/ memory	Memory	Memory	---	---	---
11	Power outage trip	Turn off/turn on	Close	Close	---	---	---
12	Zero loss protection	Close/Alarm/Trip	Close	Close	---	---	---
13	Manual and Automatic Integrated Control	/	Have	Have	---	---	---
14	Mechanical maintenance lock	/	Have	Have	---	---	---

Note: "-----" indicates no such parameter
Trip type annotation:
Off: Disable this feature. When the real-time value reaches the protection threshold, the product will not provide protection. Alarm: When the real-time value reaches the protection threshold, the product will only trigger an alarm without taking any action.
Trip: When the real-time value reaches the protection action threshold, the device trips.

Tripping characteristics

NO.	Tripping type	Test current	Start stare	Trip/Non-trip Time Limit	Result
1	B、C、D	1.13In	Cold position	t≤1h（In≤63A）t≤2h（In＞63A）	No tripping
2	B、C、D	1.45In	Next test	t≤1h（In≤63A）t≤2h（In＞63A）	Trip
3	B、C、D	2.55In	Cold position	1＜t＜60s（In≤32A）1＜t＜120s（In＞32A）	Trip
4	B、C、D	3In/5In/10In	Cold position	t≤0.1s	No tripping
5	B、C、D	5In/10In/20In	Cold position	t＜0.1s	Trip

Residual Current Operation Characteristics

Parameter	Characteristic			
Rated non-operating current	0.7 IΔn			
Rated operating current	≥0.8 IΔn			
Performance characteristic	Break-time			
	IΔn	2 IΔn	5 IΔn	10 IΔn
	≤0.1s	≤0.1s	≤0.04s	≤0.04s

Overvoltage/Undervoltage Protection Characteristics

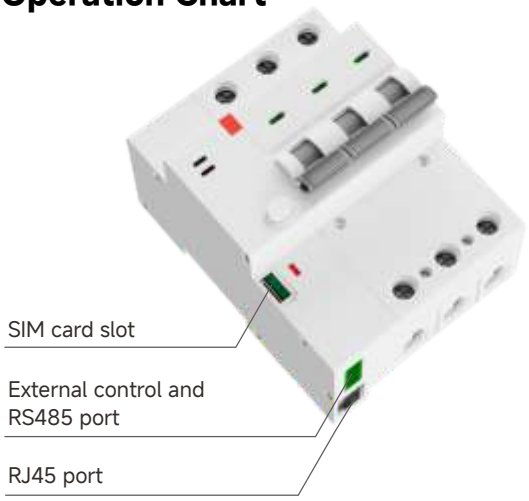
When the line phase voltage exceeds the overvoltage protection set value, the circuit breaker protection trips. Once the line voltage returns to normal levels, the circuit breaker can automatically close and resume operation. The overvoltage protection set value ranges from 253V to 300V, with a factory default setting of 280V. Users may configure or disable the protection as needed.

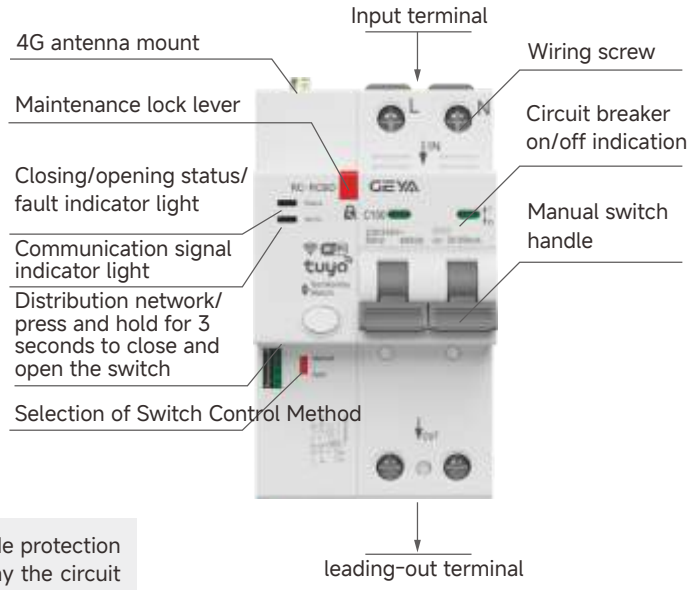
When the line phase voltage falls below the undervoltage protection set point, the circuit breaker protection trips. Once the line voltage recovers to normal levels, the circuit breaker can automatically close and resume operation. The undervoltage protection set point ranges from 110V to 200V, with a factory default setting of 165V. Users may configure or disable the protection as needed.

Other protective features

Phase loss protection: When a phase is lost at the line power supply terminal, the circuit breaker trips. Upon restoration of normal voltage to the line, automatic reclosing and operation can be initiated. Users may configure or disable the protection as needed.
Overpower protection: The circuit breaker trips when the single-phase power on the line exceeds the set value of overpower protection. The set value range for overpower protection is 50W to 50kW, with a factory default setting of 2000W. Users may adjust or disable the protection as needed.
High-temperature protection: When the line temperature exceeds the over-power protection set point, the circuit breaker protection trips. The high-temperature protection set point range is 60°C to 100°C, with a factory default setting of 80°C. Users may adjust or disable the protection as needed.
Zero-line loss protection: The circuit breaker will trip when the neutral line is absent. Users can configure or disable this protection function. 4 P products are equipped with this feature.
Power failure protection: When a power outage occurs on the supply side, the circuit breaker protection trips. Users can configure or disable the protection as needed.

6. Operation Chart



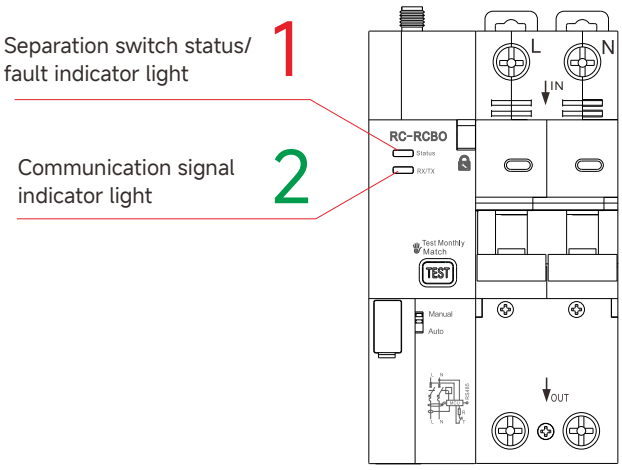


Circuit breaker body: serves to interrupt current flow and provide protection against short circuits and overloads;Operation indicators: Display the circuit breaker status. Red: Closed; Green: Open.Operating handle: Manually push the handle to control the circuit breaker's on/off status.4G gain antenna: Enhances 4G signal strength to ensure stable network connectivity for devices; Manual/automatic switching: Auto mode allows remote or local button operation for automatic power on/off.Manual: Manual mode, only manual operation for switching on/off; SIM card and programming port: Port for SIM card installation and replacement, as well as program programming; RS485/ external control interface: RS485 communication interface and external control switch interface

Action button:
Click to check if the leakage current detection function is disabled. It is recommended to perform self-inspection once per month.
Double-click: Perform open/close operation;
Long press: Wi-Fi device enters distribution network mode.

Action button:

Click to check if the leakage current detection function is disabled.
It is recommended to perform self-inspection once per month.
Double-click: Perform open/close operation;
Long press: Wi-Fi device enters distribution network mode.



Status indicator light:
Persistent blue light: Product tripping;
Red light always on: Product closed

Signal indicator light:

Communi-cation mode	Product status	Status Light 2
RS485	No communication	Not bright
	Communication	The blue light is blinking

Communi-cation mode	Product status	Status Light 2
Wifi Zigbee	Unconnected network	Red light flashing slowly
	In the distribution network	Red light flashing fast
	Distribution network completed	The blue light is blinking
	485 Communication	Purple light flashing

Communication mode	Product status	Status Light 1
RS485 Wifi 4G Zigbee	Tripping	Blue light on steady
	Closing	Red light on steady
	Maintenance Lock	Purple light on steady
	Hardware Fault485	Purple light blinking
	RS485 Address Configuration*	Blue light blinking

*Red light stays on after configuration.

Communi-cation mode	Product status	Status Light 2
4G	No SIM card	Purple light on steady
	No service	Red light blinking
	Failed to connect to service	Red light fast blinking
	Platform connected successfully	Blue light blinking
	RS485 communication	Purple light blinking

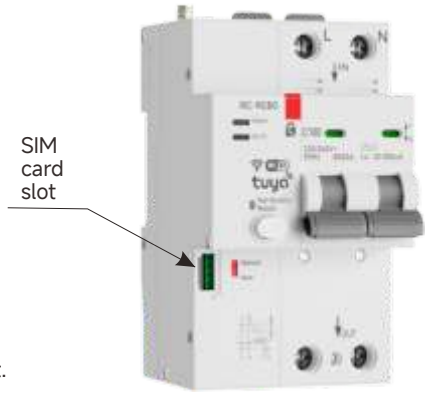
Product Installation

1.This device is designed for standard 35mm rail-mounted installation. During installation, simply insert the device into the rail and secure it with the snap-fit mechanism.
2.Select and use IoT modules and electrical cabinet specifications that meet actual distribution management and line installation design requirements, and install them according to the diagrams.
3.The circuit breaker shall be installed vertically. When the handle is in the "OFF" position, the contacts are in an open state. As the handle moves upward, the contacts move toward the closed position.
4.The nominal cross-sectional area of connecting copper wires matching the circuit breaker's rated current is listed in the table below:

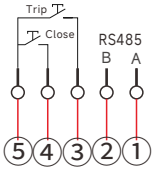
Rated current（A）	10	16~20	25	32	40~50	63	80	100
Wire cross-sectional area(mm^2)	1.5	2.5	4	6	10	16	25	35
Torque(N.m)	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5

6.1 Card Installation Instructions (4G Communication Products)

1.Locate the SIM card slot
Locate the SIM card installation position on the front of the circuit breaker and remove the adhesive label from the installation area.
2.Confirm SIM card orientation
Place the SIM card with its metal chip side facing left and the angled edge facing the inside of the slot.
3.Insert SIM card
Gently push it into the card slot until you hear a 'click' sound indicating proper installation.
4.Check installation status
Ensure the SIM card is fully inserted without any protrusion, then reinsert the card slot sticker.
2.Matters need attention：
Disconnect the circuit breaker power supply before installation.
Use a standard Nano SIM card
Avoid excessive force to prevent damage to the card slot contacts.
If the device cannot recognize the SIM card, check whether the SIM card orientation is correct.
If the network connection fails, check if the SIM card is functioning properly and contact your local carrier to determine if APN settings are required.



9、External control port:



Ports 1 and 2 are RS485 communication interfaces.
Shorting Ports 3 and 5 will trip the circuit breaker; these are passive nodes.
Shorting Ports 4 and 5 will trip the circuit breaker; these are passive nodes.
Note: Long-term shorting of Ports 5 and 3 will keep the device in a tripped state continuously.

10. Product Usage and Precautions:

1)This product is equipped with a standard RS485 communication port, which can be connected to a computer and various other communication devices via an RS485 to USB converter to realize information exchange and control.
2)The default baud rate of the device is 9600 bps. The required baud rate can be viewed and set through a PC.
3)Installation and commissioning of the product must be carried out by a professional electrician.
4)After the product is put into normal operation, a test shall be performed monthly with proper test records kept.
5)This product can be customized according to user requirements. Please contact relevant technical personnel for details.
6)For overseas use of 4G products, communication shall be made in advance, and local carrier APN information shall be provided; otherwise, network connection failure may occur.
7)The device supports Tuya API docking service. Please contact Tuya staff or our sales personnel for specific costs.
8)In addition to the Tuya platform, the product can be connected to third-party platforms via the MQTT protocol. Please consult our sales staff before purchase for details.

7、Connection Note:

7.1 Wi-Fi Product Networking Instructions
Note: Before configuring the network, turn on Bluetooth on your phone and connect it to Wi-Fi on the 2.4 GHz band.

01 Product wiring

Connect the power cord properly to the product's incoming terminal and power on. Press and hold the network configuration button for 5 seconds, then release. Wait for the red light to flash rapidly to enter network configuration mode.

02 Install Graffiti Intelligence

1. For Android phones, search for the "Tuya Smart" app in major app stores and click to download and install.
2. For iPhones, search for the "Tuya Smart" app in the App Store and click to download and install. (Open the app after downloading completes.)

03 Sign in to Graffiti AI

Please operate in the following order:
1.Register an account
2.Enter the registered account
3.Enter the registered password
4.Login successful

04 Add device

Click “+” to add a device.After the device is found, tap “Add”.Enter the current Wi-Fi password.Wait for the device to be added successfully.

05 Control Equipment

After the device has been successfully added, enter the control interface. You can control the device to trip or close, view real-time device data, and perform parameter settings.

06 Schedule Settings

Enter cloud timing, you can freely set the device turn-on and turn-off time.

7.2 4. Product Networking Guide for 4G Devices
Note: Before configuring the network, ensure the SIM card is inserted and the device has a stable network connection.

01 Product wiring

Connect the power cord properly to the product's incoming terminal and power on. Press and hold the network configuration button for 5 seconds, then release. Wait for the red light to flash rapidly to enter network configuration mode.

02 Install Graffiti Intelligence

1. For Android phones, search for the "Tuya Smart" app in major app stores and click to download and install.
2. For iPhones, search for the "Tuya Smart" app in the App Store and click to download and install. (Open the app after downloading completes.)

03 Sign in to Graffiti AI

Please operate in the following order:
1.Register an account
2.Enter the registered account
3.Enter the registered password
4.Login successful

04 Add device

Click “+”, select "Scan",and scan the networking QR code on the device.

05 Control Equipment

After the device has been successfully added, enter the control interface. You can control the device to trip or close, view real-time device data, and perform parameter settings.

06 Schedule Settings

Enter cloud timing, you can freely set the device turn-on and turn-off time.

8. Graffiti APP Interface Operation Guide

1 Main interface

Main operation interface

Trip/Close Control Button
Total Electricity Statistics
Fault Event Log
Voltage, Current & Power Display
Menu Options

2 Power Usage Interface

Data Statistics Function

Hourly, Daily, Monthly and Yearly Electricity Statistics & Electricity Data Export

3 Delay parameter settings interface

Delay parameter configuration

Overvoltage Delay, Undervoltage Delay, Overpower Delay, and Overtemperature Delay Time Settings

4 Function threshold settings interface

Protection feature configuration

Residual current, over-temperature protection, over-power protection, overload protection and other functions as well as threshold setting.

5 Other settings interface

System Settings

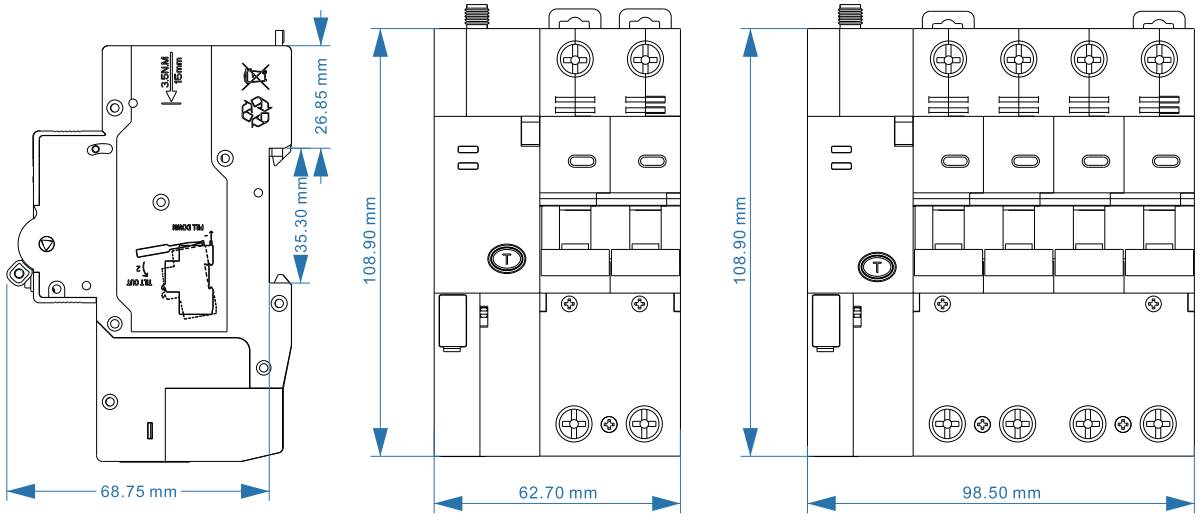
Timer setting, leakage self-test setting, automatic closing function setting, and restore factory parameters.

6 Timer settings interface

Schedule Task Configuration

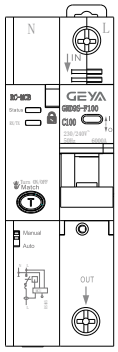
Timer control function setting

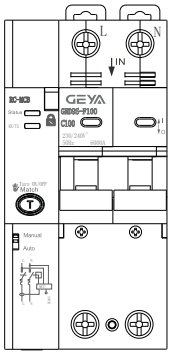
9. Product Dimensions and Shape Diagram (unit: mm)

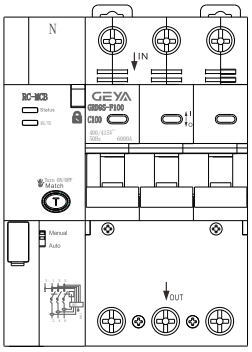


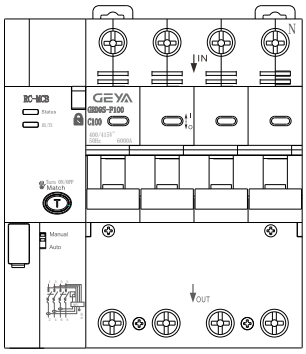
Standard Version

RS485 Communication Method GRD9S-F100

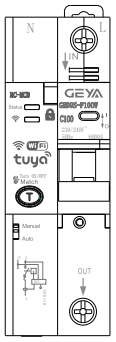

1P

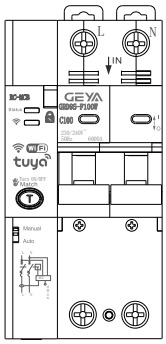

2P

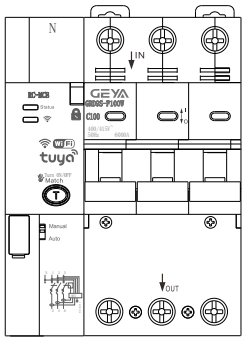

3P

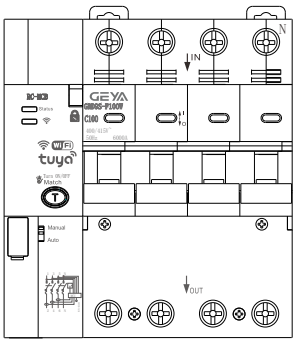

4P

WIFI+RS485 Communication Method GRD9S-F100W


1P


2P

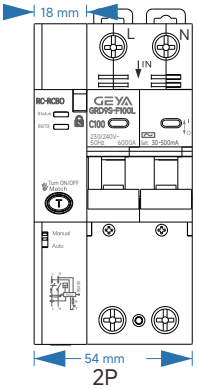

3P


4P

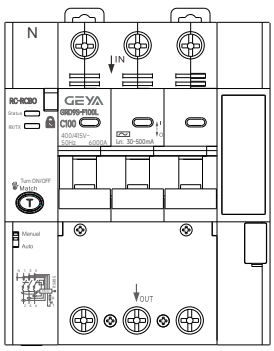
Leakage Protection Version

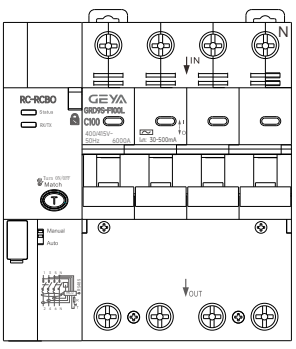
RS485 Communication Method

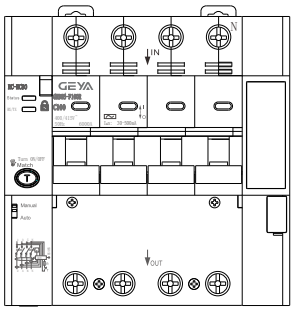
GRD9S-F100L



2P

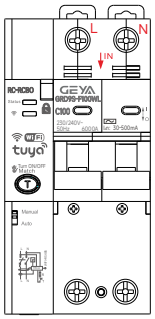

3P


4P

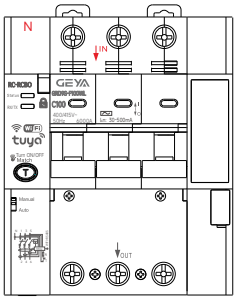

4P Neutral pole with neutral current

WIFI+RS485 Communication Method

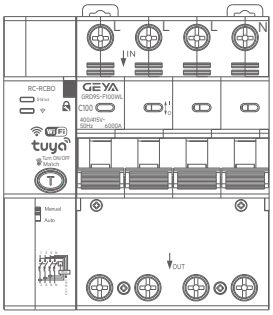
GRD9S-F100WL



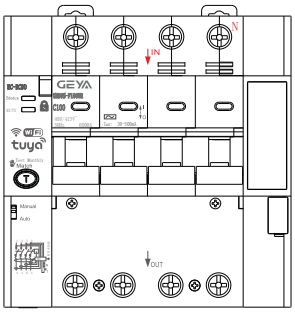
2P



3P



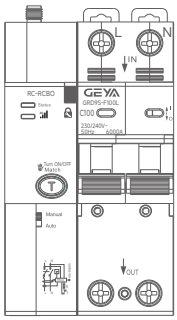
4P



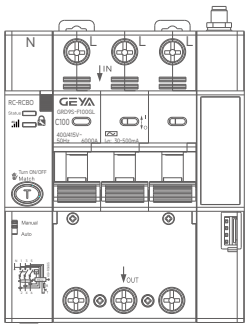
4P N pole with neutral current monitoring

4G+RS485 Communication Method

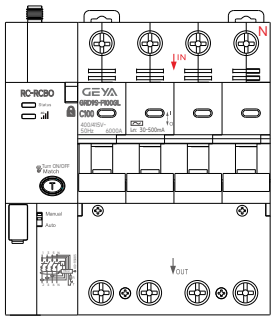
GRD9S-F100GL



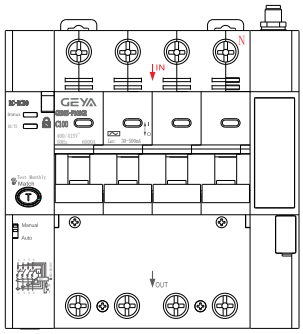
2P



3P



4P



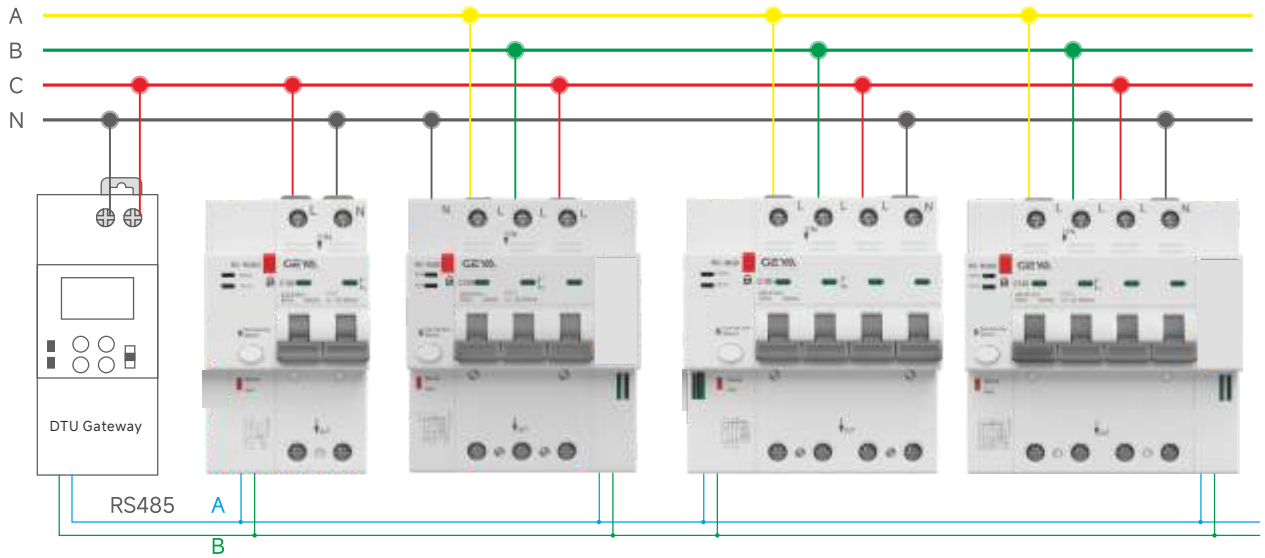
4P N pole with neutral current monitoring

Note: Other communication methods such as Zigbee, RJ45, LoRa, etc. can be customized. The actual appearance shall be subject to the final design.

10. Product Installation Wiring and Distribution Network Instructions

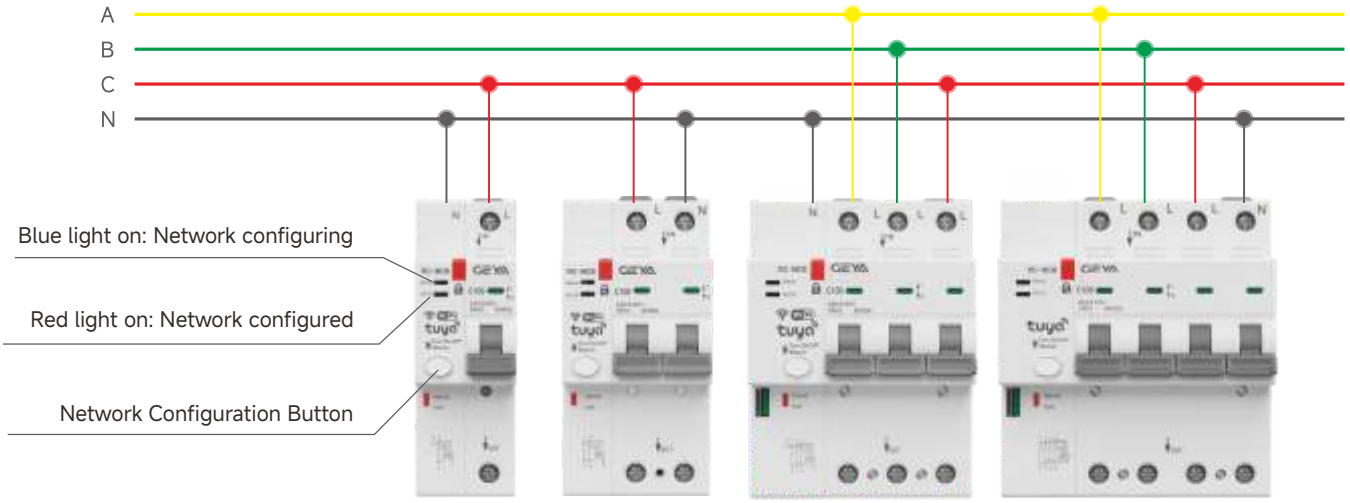
Wire Harnessing and Distribution Network for RS485 Products

Note: The gateway can pair up to 16 sub-devices!



1.When entering gateway distribution mode (host mode), the RX/TX indicator light of the sub-device remains blue, signaling the device has entered distribution mode.
2.Select the sub-device pairing network button to configure the network. The sub-device RX/ TX indicator light remains red after successful pairing.
3.Pair sub-devices sequentially;
4.After all subdevices are paired, press the "Menu" button on the gateway to confirm, exit the pairing mode, and complete the network configuration.
5.Scan the QR code to add a device

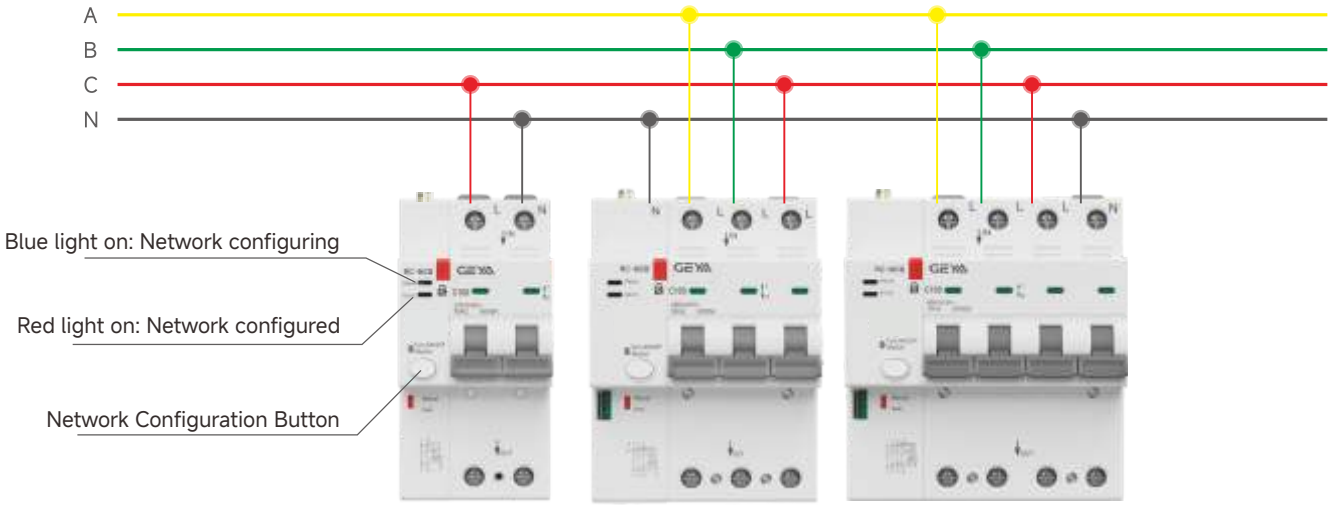
WIFI Product Wiring and Network Configuration



Note: Do not connect more than 20 devices on the same router network, as this may cause disconnections.

1.Hold the distribution network button for 3 seconds until the RX/TX indicator light turns blue and remains on, indicating the device has entered distribution network mode.
2.Turn on Bluetooth on your phone, then open the app to search for devices. Once you find the current device, tap Connect.
3.After successful connection, the device's RX/TX indicator light remains red, indicating successful network pairing.
4.Access the APP menu to control the device or view its parameters.

4G Product Wiring and Distribution Network



1.Open the mobile app, scan the QR code on the device, and add the device;
2.After successful connection, the device's RX/TX indicator light stays red, confirming network connectivity.
3.Access the APP menu to control the device or view its parameters.