Manual of ASCB1 Series of Intelligent Micro-Circuit Breakers
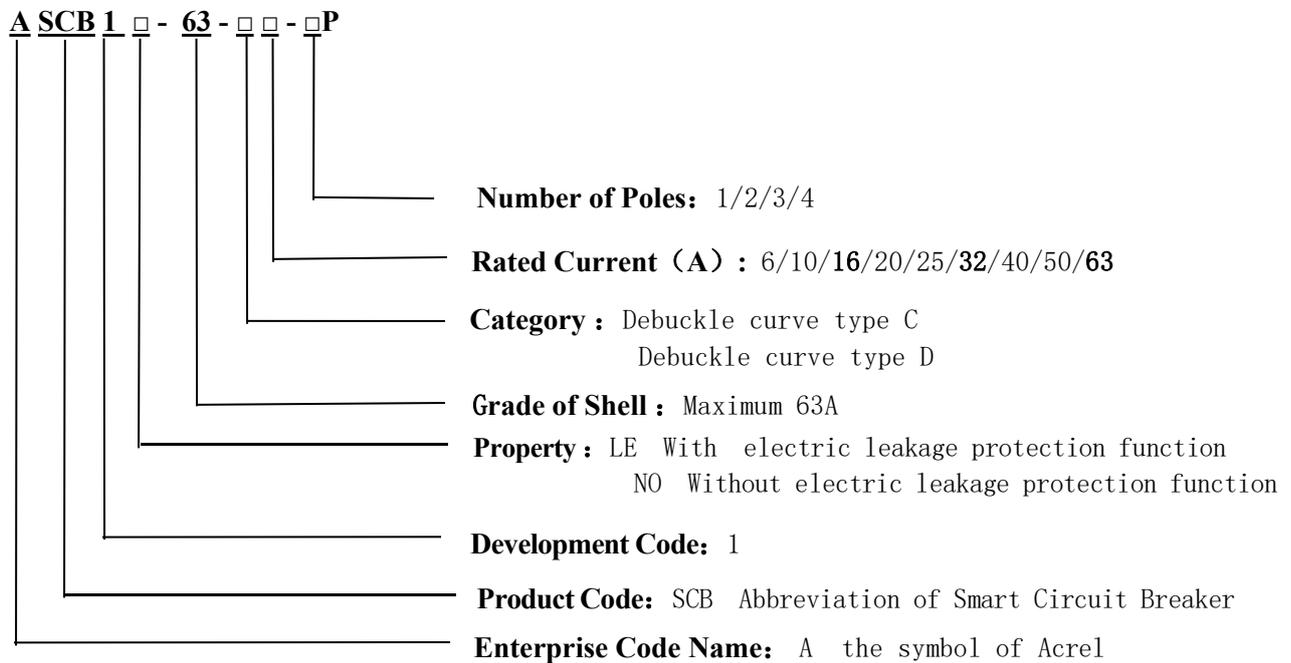
V1.0

Acrel Electric Co., Ltd.

Content

1. General

ASCB1 series intelligent micro circuit breakers (hereinafter referred to as intelligent micro circuit breakers) are applied to low-voltage terminal distribution networks in industrial, commercial, civil buildings and infrastructure fields in residential buildings and similar places.The intelligent micro circuit breaker is used with the intelligent gateway to conduct real-time monitoring of the key electrical parameters of the power line, such as voltage, current, power, temperature, leakage, energy consumption, etc., and has remote control, abnormal warning, accident trip warning alarm, electric energy metering statistics, fault positioning and other functions.

This series of products can be selected from unipole, 2 pole, 3 pole, 4 pole.
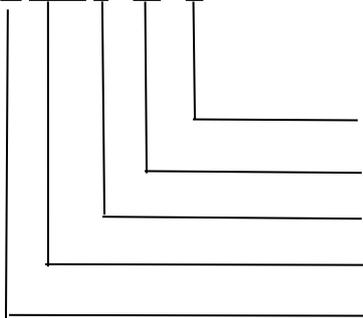
2. Product Model

- Intelligent Micro-circuit Breaker

A SCB 1 □ - **63** - □□ - □**P**

Number of Poles： 1/2/3/4

Rated Current（A）： 6/10/**16**/20/25/**32**/40/50/**63**

Category： Debuckle curve type C
Debuckle curve type D

Grade of Shell： Maximum 63A

Property： LE With electric leakage protection function
NO Without electric leakage protection function

Development Code： 1

Product Code： SCB Abbreviation of Smart Circuit Breaker

Enterprise Code Name： A the symbol of Acrel

Table 1 Function Description of Intelligent Micro Circuit Breaker

Product Model	Description OF Functional
ASCB1-63	➢ Can monitor voltage, current, power, power and temperature in real time ➢ with overpressure, underpressure, overload, short circuit, overcurrent, and overtemperature and other protection functions ➢ With local manual lever, local electric control, local lock, remote control, timing control and other control function ➢ Guide rail type installation, optional pole number 1P / 2P / 3P / 4P ➢ Standard RS-485 (MODBUS) communication; optional buckle curve type C / D

ASCB1LE-63	➢ Real-time monitoring of voltage, current, power, electric energy, temperature and leakage and other parameters ➢ With overvoltage, undervoltage, overload, short circuit, overcurrent, ultra-moderate leakage and other protection functions ➢ With local manual lever, local electric control, local lock, remote control, timing control and other control functions ➢ Guide rail type installation, optional pole number 2P / 4P; standard RS-485 (MODBUS) communication; optional buckle curve type C / D type.

● Smart Gateway

A SCB 1 - M - □

Communication Protocol：CE/Ethernet /4G

Category the Product：Smart gateway

Development Code：1

Product Code：SCB Abbreviation of Smart Circuit Breaker

Enterprise Code Name： A the symbol of Acrel

Table 2 Intelligent Gateway Function Description Table

ASCB1-M-CE	➢ Can connect to up to 16 intelligent micro circuit breakers ➢ See, the real-time data of voltage, current, power, power, temperature and leakage of each intelligent micro circuit breaker ➢ You can view the fault, alarm and separation status of each intelligent micro circuit breaker ➢ It can set and control the parameters for each intelligent micro circuit breaker ➢ Din rail type installation, LCD LCD display ➢ Support event logging; support RS485 communication ➢ Support for Ethernet communication.
ASCB1-M-4G	➢ It can connect to up to 16 smart micro circuit breakers ➢ Can see the real-time data of voltage, current, power, power, temperature and leakage of each intelligent micro circuit breaker ➢ Can view the fault, alarm and separation status of each intelligent micro circuit breaker ➢ It can set and control the parameters for each intelligent micro circuit breaker ➢ Din rail type installation; LCD LCD display ➢ Support event logging; support RS485 communication ➢ Support for 4G network communication

3. Technical Parameter

Table 3. Technical parameters table of intelligent micro circuit breaker

Model		ASCB1-63	ASCB1LE-63
Pole		1P/2P/3P/4P	2P/4P
Grade of Shell		63A	
Rated Voltage		230V（1P/2P）、400V(3P/4P)	
Rated Current		6A, 10A, **16A**, 20A, 25A, **32A**, 40A, 50A, **63A**	
Instantaneous Unbuckle Type		C/D	
Rated Short-circuit Breaking Capacity		6000A	
Protect	Over-current Protection	Default 100% rated current alert, 110% Rated current trip with adjustable threshold	
	Short-circuit Protection	5-10 Rated current for 0.04 seconds for circuit break protection	
	Overload Protection	Default 100% rated power alert, 110% Rated power trip with adjustable threshold	
	Over-voltage Protection	Default 110% rated voltage alert, 120% rated voltage trip with adjustable threshold	
	Under-voltage Protection	Default 90% rated voltage alert, 80% rated voltage trip with adjustable threshold	
	Over-temperature Protection	Default 80℃ alert, 100℃ trip, the threshold is adjustable	
	Leakage Protection	No	Default 20mA alert, 30mA trip, the threshold is adjustable
Leakage self-Inspection		No	Manual button self-inspection
Mechanical Life		20000次	
Electrical Life		6000次	
Levels of Protection		IP20	
Connection Capacity		1-35mm²	
Elevation Requirements		2000m	
Ambient Temperature		-10℃～55℃, the average temperature at 24h was no higher than 40℃	
Environmental Requirements		No explosion hazard, no conductive dust, no sufficient corrosion of metal and damaged insulation, no significant vibration	

Relative Humidity	At + 40℃, the relative humidity of the air is 50% and can have high relative humidity at lower temperatures
Storage Temperature	-20℃-70℃
Class of Pollution	II
Installation Type	III
Way to Installation	Standard 35mm guide rail installation

Table 4 ASCB1 Intelligent Gateway

Product Model	ASCB1-M-4G	ASCB1-M-CE
Power Supply	AC 220V	
Consumption	≤30W	
Communication	4G	Ethernet
Display	LCD dot-matrix	
Incident Record	Up to 20 alarm, fault and action records each	
Protocol	Modbus、MQTT and so on	
Elevation Requirements	2000m	
Ambient Temperature	-10℃-55℃，24h the average temperature is not higher than 40℃	
Environmental Requirements	No explosion hazard, no conductive dust, no sufficient corrosion of metal and damaged insulation, no significant vibration	
Relative Humidity	At + 40℃, the relative humidity of the air is 50% and can have high relative humidity at lower temperatures	
Storage Temperature	-20℃-70℃	
Levels of Protection	IP20	
Way to Installation	Standard 35mm guide rail installation	

4. Installation and wiring

4.1. Outline and Installing Dimensions （unit：mm）
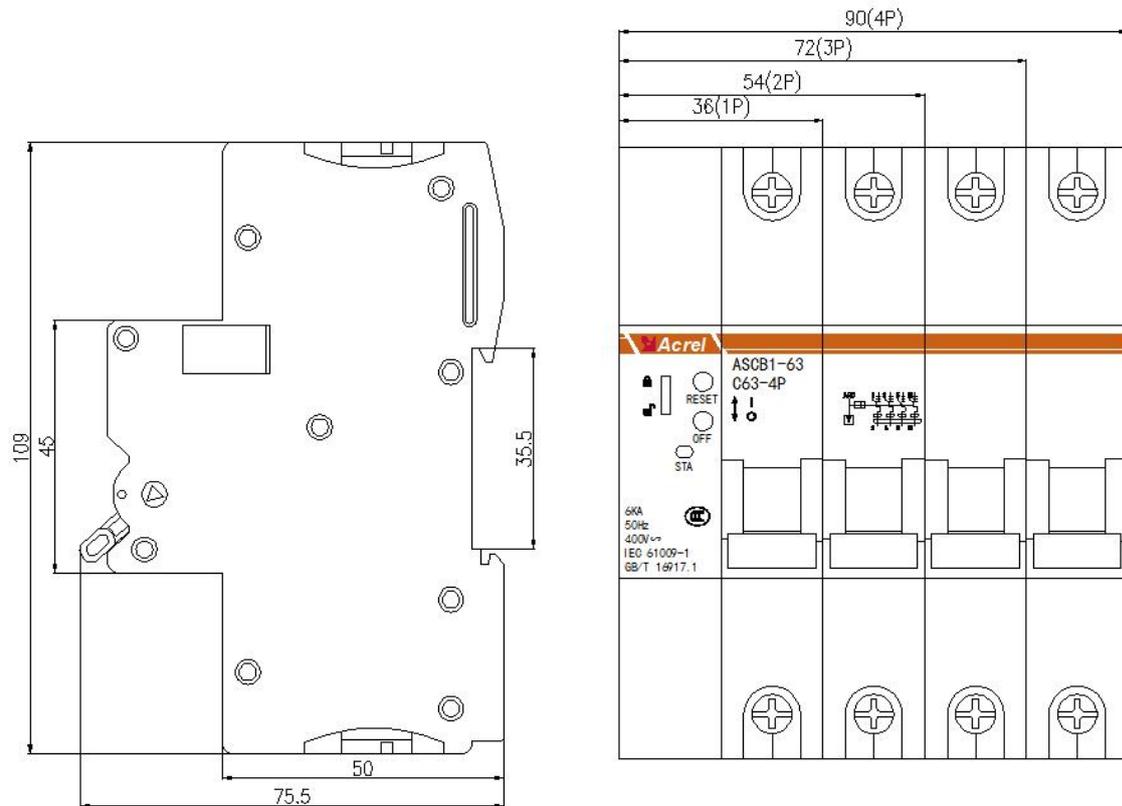
● Intelligent micro-circuit breaker

Figure 1 Outline dimensions of the intelligent micro circuit breaker
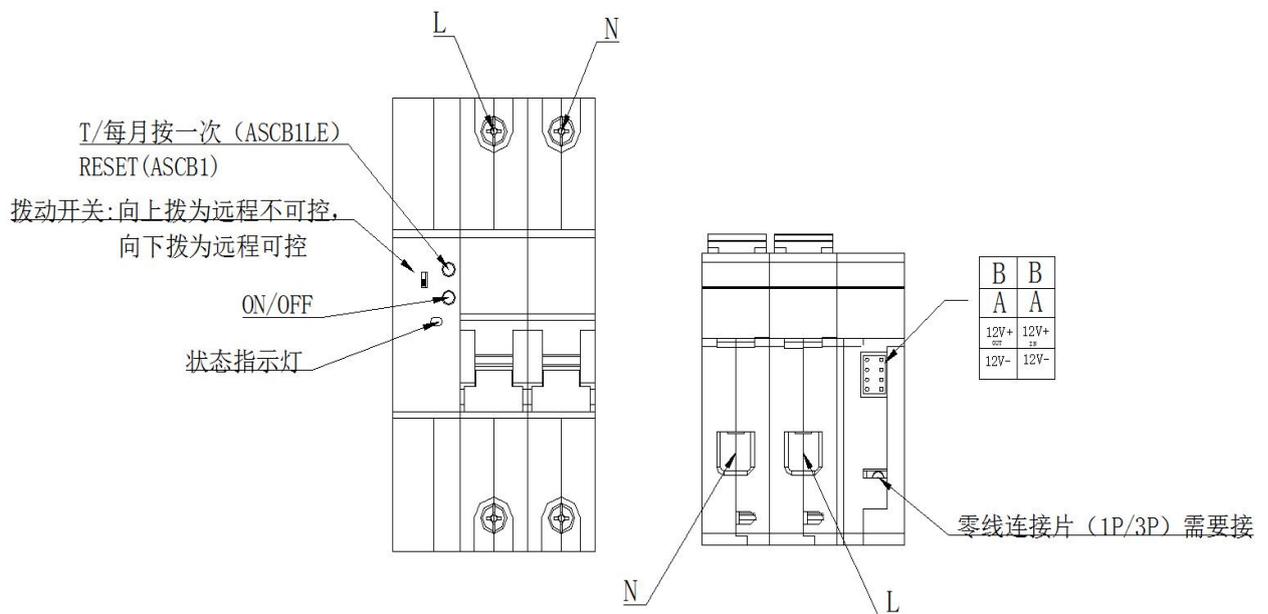

Figure 2 Schematic diagram of intelligent micro circuit breaker terminals
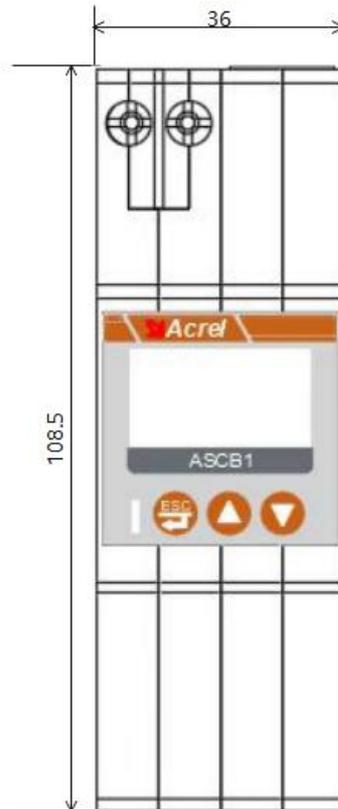
- Smart Gateway

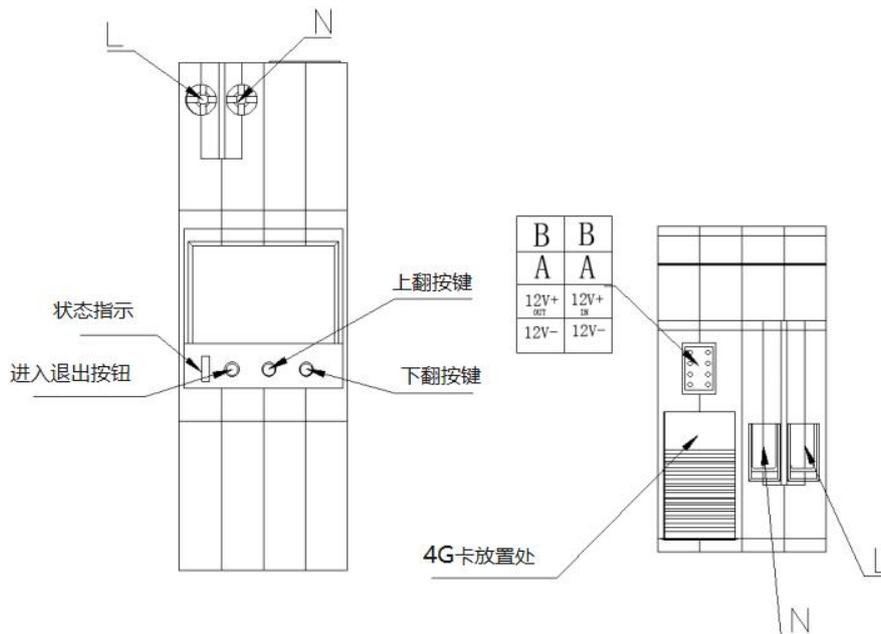Figure 3 Dimension of intelligent gateway

Figure 4 Schematic diagram of the intelligent gateway wiring terminals

4.2. Installation

1）This equipment is suitable for the standard 35mm guide rail type installation, when the installation is only need to card the equipment into the track and can be fixed with the buckle.

2）Select and use suitable Internet of Things modules and electric boxes according to the actual distribution management and line laying design requirements The specifications of the box are installed in combination and installed in sequence according to the illustrated

modules, and each module is connected with the 8PIN data cable specially made by the manufacturer.

3）The circuit breaker should be installed vertically, and the contact is disconnected when the handle is in "/ OFF". When the handle moves upward, the contact moves in the closed direction;

4）The nominal cross-sectional area of the connecting copper wire matching the circuit breaker rated current is shown in Table 5.

Table 3. Matching table of rated current and wire cross-sectional area

Rated Current （A）	10	16～20	25	32	40～50	63
Cable Section Area （mm²）	1.5	2.5	4	6	10	16
Torsion （N.m）	3.5	3.5	3.5	3.5	3.5	3.5

5） During installation, please tighten the copper wire with the torque specified in Table 5. After installation, check the copper wire as a shaking wire, and tighten the copper wire again with the specified torque.

Figure 5 is an example of intelligent micro circuit breaker installation wiring, for reference only.
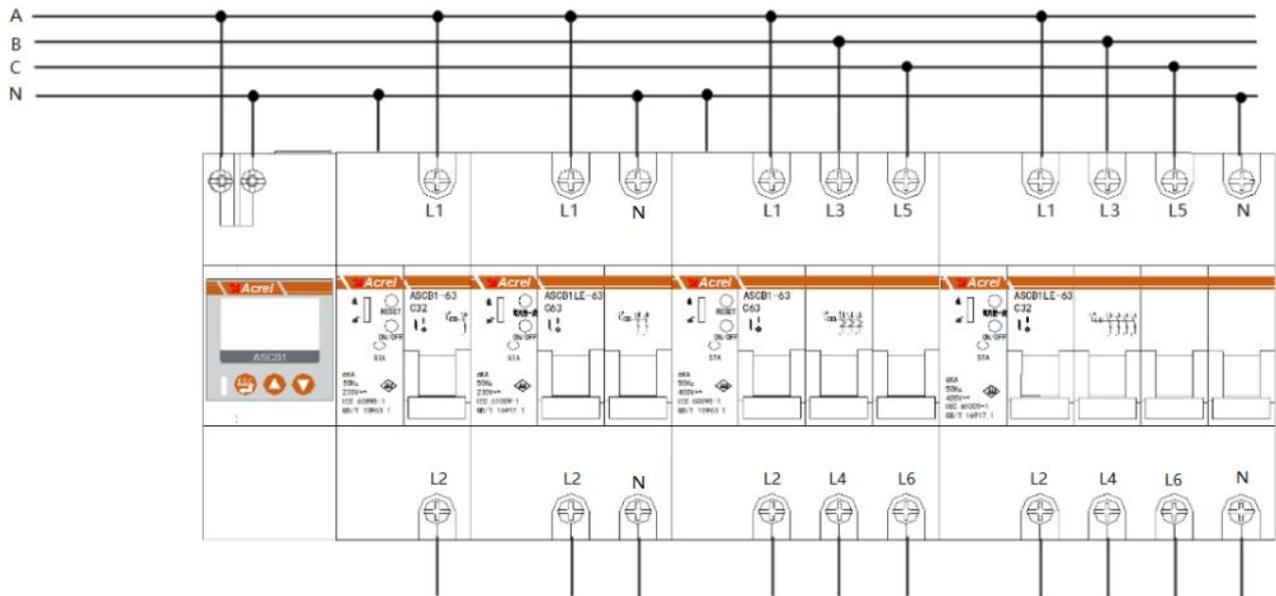
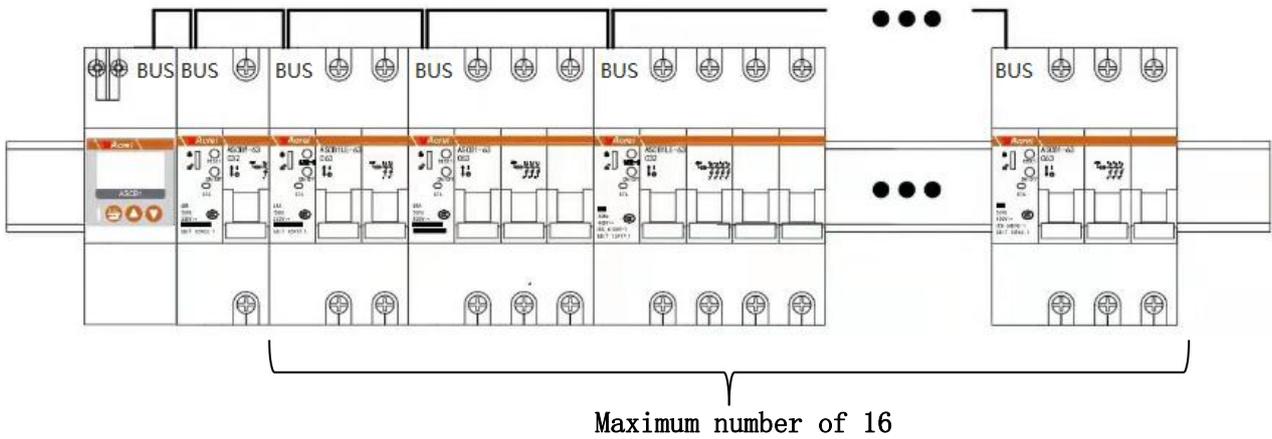Figure 5 Installation wiring example diagram

4.3. Schematic Diagram of Wiring

Maximum number of 16

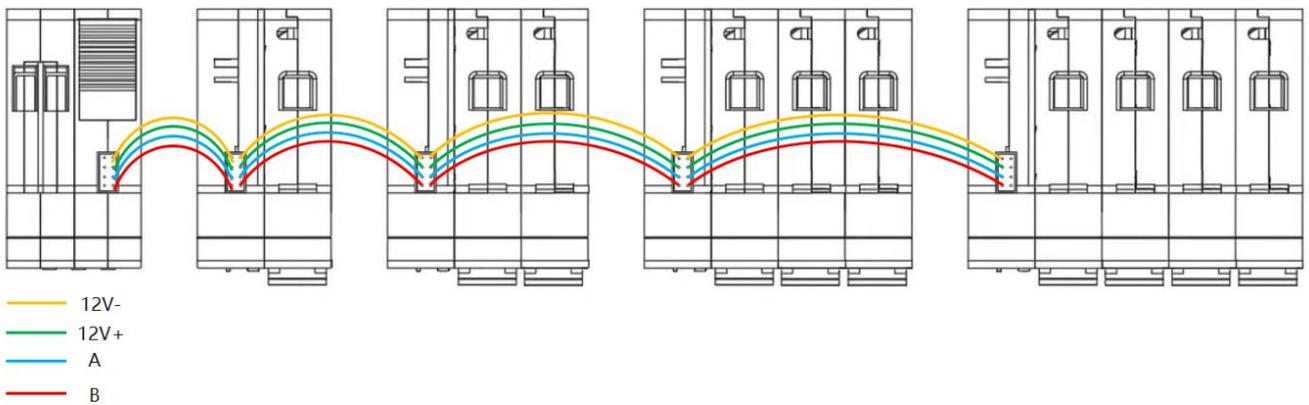Figure 6 Example of wiring diagram of intelligent micro circuit breaker

12V-
12V+
A
B

Figure 7 4pin terminal wiring diagram (top view)

Note: Each type of intelligent micro circuit breakers can be installed in any combination, one gateway can connect up to 16 intelligent micro circuit breakers.

5. Operational Guidelines
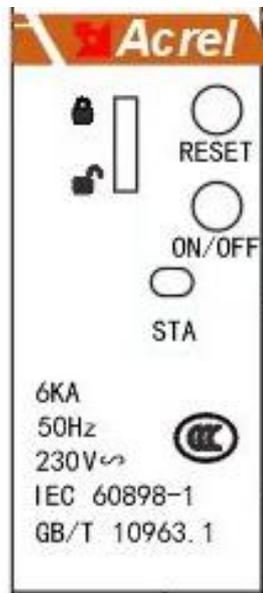5.1. Description of Button Panel and Indicator of Intelligent Miniature Circuit Breaker

Figure 8 Description of the Button in the Panel of Smart Miniature Circuit Breaker

Button description:
- ON/OFF：Short press：Split and close button. Long press3S：The maintenance status enters and exits
- T/Press once a month or RESET：Short press leakage test jump button. Long press3S：The number of alarm resets and recloses is zeroed
- Lock：Local lock on and off

Indicator Description:
- Green：If it is off for 2s, it flashes for 0.1s, and it is in normal operation state
- Green：If the interval of 0.5s flashes, it indicates that the circuit breaker is in maintenance state (local closing and remote closing cannot be carried out)
- Red：If it is normally on, it means that the circuit breaker is in the closing state
- Red：If it is off for 2s, it flashes for 0.1s, and the circuit breaker fails
- Red：If the interval of 0.5s flashes, the circuit breaker will alarm
- After entering the automatic address assignment, the traffic light flashes for 0.5s, and after the address assignment is completed, it is displayed according to the actual status

5.2. Description of Smart Gateway Button Panel and Indicator Light

Figure 9 Description of Smart Gateway Button Panel

Button description:
- ESC/↵ ：Confirm or return
- ▲：Page up
- ▼：Page down

Indicator Description:
- green light：Off for 2s, flashing for 0.1s, running state (normal state)
- red light：If it is off for 2s, it flashes for 0.1s, and there is a circuit breaker fault
- red light：If the interval of 0.5s flashes, there is a circuit breaker alarm；

5.3. Interface Operation

5.3.1. Device Status Display

After the intelligent miniature circuit breaker is powered on，Use the ▲ key and ▼ key to turn the page to query the device status of each device number, and the device status interface is displayed as follows.

```
03:ASCB1-63-3P
设备号：1
报警：○   预警：○
故障：○   检修：○
手柄：●   锁定：●
控制：本地&云端
```
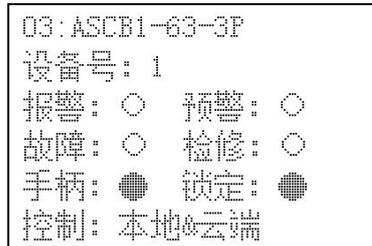
Note: The status definition table is as follows.

Definition Symbol	○	●
alarm	no alarms	alarms
early warning	no early warning	there is an early warning
fault	trouble-free	faulty
overhaul	not overhauled	overhaul
achievement	opened	closed
lock	local unlock, remote controllable	local locked, remote cannot be controlled

5.3.2. Display of Current Equipment Electrical Parameter Data

Press the Enter key on the main interface, select "Equipment List", and then select the circuit breaker to view the data. Press the Enter key, and you can use ▲ and ▼ keys to turn pages to query the equipment electrical parameter data display interface. The following figure shows the electrical parameter data display interface.

```
03: ASCB1-63-3P
EPI:0.150      KWh
EPE:0.050      KWh
EQL:0.280      kvarh
EQC:0.080      kvarh
```
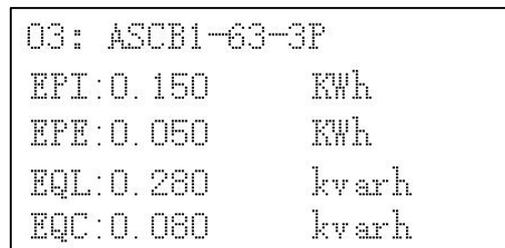
EPI represents the absorbed active energy value, EPE represents the released active energy value, EQL represents the inductive reactive energy value, and EQC represents the capacitive reactive energy value.

5.3.3. Display and Setting of Device Protection Parameters

Press Enter on the main interface, select "Equipment List", press Enter to select the circuit breaker to set protection parameters, such as "03: ASCB1-63-3P", press Enter twice, select "Parameter Setting", press Enter, enter the password "0001", select "Protection

Setting", and press Enter to select all protection parameters for viewing.
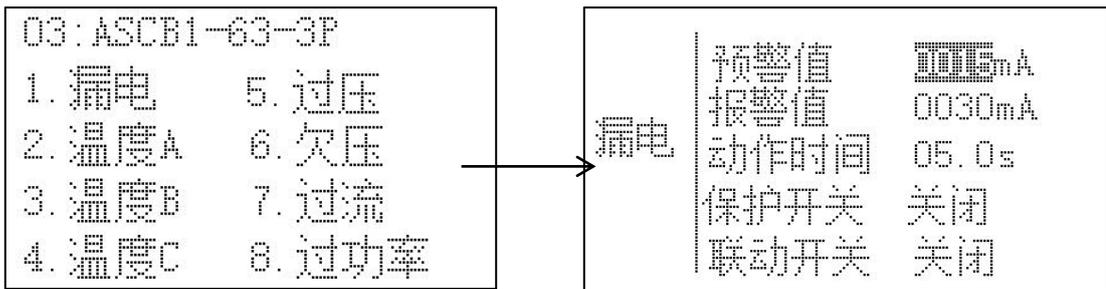
Note:

1、Use ▲ and ▼ to modify or set leakage, temperature, overvoltage, undervoltage, overcurrent, and overpower.

2、Temperature：Detect the temperature in a short period of time. If it exceeds the alarm value, it will alarm. The time and threshold can be adjusted according to the actual situation.

3、Creepage：Detect the residual current in a short time, and give an alarm if it exceeds the alarm value. The time and threshold can be adjusted according to the actual situation.

4、Overvoltage, undervoltage：Detect the voltage in a short time, exceed the alarm value for alarm, and the time and threshold can be adjusted with the actual situation.

5、Overcurrent：Detect the current in a short time, exceed the alarm value for alarm, and the time and threshold can be adjusted with the actual situation.

6、Over power：Detect power, alarm when the alarm value is exceeded, and the time and threshold can be adjusted with the actual situation.

5.3.4. How to set up Automatic Device Addressing

Return to the home page of the intelligent gateway, select "5. Local Settings", enter, enter the password "0001", select "4. Other Settings", select "Automatic Addressing:", press the Enter key, change "No" to "Yes", press and hold the Enter key to return to the previous interface, and then press and hold the Enter key to pop up "Save Data", press ▲ and ▼ keys to select Yes.
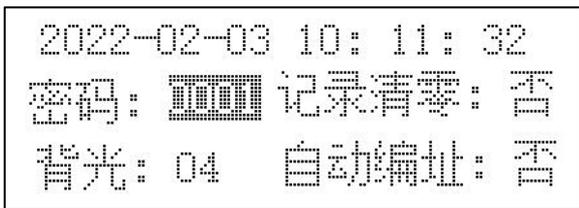
5.3.5. A Query for Device Event Logging

Return to the home page of the intelligent gateway, select "Equipment List", select the circuit breaker to view the event record, such as "03: ASCB1-63-3P", press Enter twice, select "Event Record" and press Enter to view the alarm, fault and switch records.
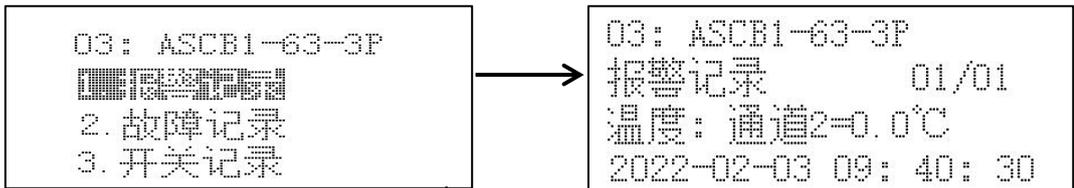
Note：

1）The data "01" in the upper right corner of the alarm record represents the first data, and the subsequent alarm records can be "02, 03... 20" in sequence (20 at most).

2）The data "01" in the upper right corner of the fault record represents the first data, and the subsequent alarm records can be "02, 03... 20" in sequence (20 at most).

3）The data "01" in the upper right corner of the switch record represents the first data, and the subsequent alarm records can be "02, 03... 20" in sequence (20 at most).

4）Press ▲ left key and ▼ right button to switch the interface for data recording.

5.3.6. Display of Device Network Information

Return to the home page of the intelligent gateway, and select "3. Network information" as shown in the figure.

```
2022-02-03 10: 09: 30
State:0
Tx:0
Rx:0
Rssi:0
```

（1）

There are four values displayed in the information interface (1), and the meanings are as follows:

- **Rssi：** The current signal value is displayed after Rssi
- **State：** The state displayed after the state is the state of the current module.

There are ten states from 0 to 9, of which the corresponding numbers of 0 to 9 are as follows

- ◆ **0** Initialization
- ◆ **1** Obtain IMEI serial number
- ◆ **2** Check the SIM card to get the card number
- ◆ **3** Set network mode
- ◆ **4** Waiting for GPRS to attach
- ◆ **5** Check signal value
- ◆ **6** Set networking mode
- ◆ **7** Connect server
- ◆ **8** Server connected
- ◆ **9** Close server connection

- TX: The number of data sent is displayed after TX
- Rx: Rx displays the number of received data

```
2022-02-03 10:09:27
域名: 101.37.151.118
端口号: 21885
```

（2）

In the information interface (2), the first line displays the domain name (no display if no domain name is set), The second line shows the port number of the connection server.

```
2022-02-03 10:09:27
软件编号: 9999
版本号: V1000
序列号: ASCB1TEST0003
```

（3）

The information interface (3) displays the software number, version number and serial number.

6. Matters Needing Attention

● Before using the product, please check whether the appearance is in good condition. If there is any damage, find the seller to replace it in time.

● Make correct wiring according to the operating instructions, and carefully check after wiring to ensure correct wiring

Amendment record

Revised edition	Revision time	Revised terms
V1.0	2023.2.8	The new version was released