NO:2023.07

CHINT ELECTRICS

NB2LE-40ZT
Residual Current Operated Circuit Breaker

User Instruction

Standard: IEC/EN 61009-1

Safety Warning

1. It is strictly prohibited to install the product in an environment containing flammable and explosive gases, wet condensation, and wet hand operation.
2. It is forbidden to touch the conductive part of the product during the operation of the product.
3. It is forbidden to test the product performance by using the method that the live wire directly touches the grounding device, or the live wire is directly shorted to the neutral wire.
4. When installing, repairing and maintaining the product, it is necessary to ensure that the circuit is powered off.
5. The protection characteristics of the product shall be set by the manufacturer, and it is not allowed to disassemble or adjust at will.
6. The product must be wired and installed by qualified personnel, and checked regularly.
7. Children are not allowed to play with products or packaging.
8. Foreign matters shall be prevented from falling into the product.
9. Do not install it where the gas medium can corrode metal and damage insulation.
10. When the product is installed and used, the wiring screws should be tightened, and the wires are not easy to loosen and pull out. The wires should be selected strictly according to the requirements and matched with the required power supply and load.

11 This product cannot protect the electric shock hazard caused by contacting two wires of the protected circuit at the same time.

12 **Please strictly install the wiring diagram for correct wiring of this product.**

13 **This product is not suitable for direct starting of high inductive and capacitive loads such as fans, motors, electric heating equipment and capacitor cabinets.**

1 Main purpose and scope of application

This product is applicable to the circuit with AC 50Hz, rated voltage of 230V and rated current of 40A. It plays the role of overload, short circuit, overvoltage, undervoltage and leakage protection, and can also be used for infrequent connection and disconnection of the circuit under normal conditions.

The product also has remote control, electrical parameter (voltage, current, power) measurement functions, and can be networked with external devices through RS485 communication interface or Bluetooth.

2 Normal use, installation, transportation and storage conditions

2.1 Service conditions:

- Working environment temperature: - 25 ℃~+70 ℃, and the average working temperature for 24 hours shall not exceed+35 ℃;
- Altitude: the altitude of the installation site shall not exceed 2000m;
- Pollution level: Level 2;
- Protection grade: IP20;
- Installation category: Class II.

2.2 Installation conditions:

The circuit breaker shall be installed vertically without obvious shaking, shock and vibration under the conditions of meeting safety warnings.

2.3 Transportation and storage conditions:

the circuit breaker shall not fall or be attacked by rain or corrosive gas during storage and transportation.

3 Main technical parameters

3.1 Main technical performance indicators

Table 1 Main Technical Performance Indexes

S/N	Parameters or performance		Parameter value or performance value
1	Product model		ZT: with RS485 communication
2	Compliance with standards		IEC/EN 61009-1
3	Rated voltage (Ue)		AC230V
4	Rated current (In)		6A、10A、16A、20A、25A、32A、40A
5	Number of poles		1P+N
6	Instantaneous tripping curve		C
7	type		AC type
8	Rated residual action current (I△n)		0.03A
9	Rated short-circuit capacity (Icn)		6000A
10	Operating short-circuit breaking capacity (Ics)		6000A
11	Rated residual making and breaking capacity (I△m)		500A
12	Electrical life		4000 times
13	Mechanical life		10000 times
14	Reference temperature		30^{+5}_{0}℃
15	Remote control	Closing time (tc)	≤3s
		Opening time (to)	≤2s

Continued Table 2

S/N	Parameters or performance		Parameter value or performance value
16	Overvoltage protection (can be opened and closed)	Setting value of overvoltage action (Uvo)	The default value is AC280V, which can be set
		Overvoltage recovery value (Uvor)	The default value is AC250V, which can be set
		Minimum non driving time of overvoltage	The default value is 3s, which can be set in the third column of Table 2
		Automatic closing delay time after voltage returns to normal (tvd)	The default value is 10s, which can be set
17	Under voltage protection (can be opened and closed)	Under voltage action setting value (Uvu)	The default value is AC165V , which can be set
		Undervoltage recovery value (Uvur)	The default value is AC190V, which can be set
		Minimum under voltage non driving time	The default value is 3s, which can be set
		Automatic closing delay time after voltage returns to normal (tvd)	The default value is 10s, which can be set
18	Electrical parameter Accuracy	Voltage	Level 1.0
		electric current	Level 1.0
		power	Level 2.0
19	Leakage self inspection	Continuous self-test	Check whether zero sequence transformer and circuit board leakage module work normally
		Power off self inspection, self inspection completed automatic reclosing	Check whether zero sequence transformer, circuit board leakage module and circuit breaker tripping mechanism work normally

Continued Table 2

Note: "Can be opened or closed" means that the function can be set to be opened or closed.

Table 2 Maximum Action Time and Minimum Non Drive Time of Overvoltage

1	2	3	4
Overvoltage action characteristics	≤Uvor	Uvo	≥300V
Maximum action time	Inaction	5s	3s
Minimum non driving time		3s	1s

3.2 Basic error of voltage and current measurement

Table 3 Basic error limits of current under reference voltage

Direct input current value	power factor	Percentage error limit	
		Level 1.0	Level 2.0
0.05 In≤I < 0.1In	1.0	±1.5%	±2.5%
0.1In≤I≤In	1.0	±1.0%	±2.0%

Table 4 Basic Error Limits of Voltage

Direct input current value	power factor	Percentage error limit	
		Level 1.0	Level 2.0
0.9Ue≤U≤1.1Ue	1.0	±0.7%	±1.0%

4 Communication function

4.1 Communication interface

The circuit breaker has one RS485 communication interface and Bluetooth interface.

RS485 interface:

-Support baud rate 1200,2400,4800,9600,19200;

-Verification method: no verification/even verification;

-Default configuration: 19200, even parity check.

4.2 communication protocol

The circuit breaker adopts Modbus RTU communication protocol. The default communication address of the circuit breaker is 03.

5 Remote control function

When the mode selection switch is set to the "Manual" position, normal manual closing and opening can be performed, and at the same time, the remote closing and opening control functions exit.

When the mode selection switch is set to the "Automatic" position, normal remote closing and opening can be performed. When the circuit breaker is in the closing state, it shall be opened after receiving the remote opening command, and the moving contact is in the open position. At this time, it can be closed and opened manually. When the circuit breaker is in the opening state, the circuit breaker shall be closed after receiving the remote closing command. At this time, it can be opened and closed manually.

Regardless of whether the mode selection switch is set to the "Manual" or "Automatic" position, when the circuit breaker receives the command of remote closing not allowed, the circuit breaker will be in the opening and not allowing closing state, and at this time, manual or remote control cannot be closed. Only when the circuit breaker receives the command of remote closing allowed, the circuit breaker will be in the opening and allowing closing state, and at this time, manual or remote control can be closed.

See Table 5 for the control signal and action status of the circuit breaker.

Table 5 Control Signal and Status Control Table of Circuit Breaker

S/N	Mode selection switch position	Phase line voltage	control signal	Initial state	Status after action	remarks
1	automatic	Ue	Send closing command	Opening and allowing closing	Closing	

Continued Table 5

S/N	Mode selection switch position	Phase line voltage	control signal	Initial state	Status after action	remarks
2	automatic	Ue	nothing	Closing	Opening and allowing closing	Manual opening
3	automatic	Ue	nothing	Opening and allowing closing	Closing	Manual closing
4	automatic	Ue	Send the closing command	Closing	Opening and allowing closing	
5	Automatic or manual	Ue	Send the command of not allowing closing	Opening and allowing closing	Opening and not allowing closing	
				Closing	Opening and not allowing closing	
6	Automatic or manual	Ue	nothing	Opening and not allowing closing	Opening and not allowing closing	Unable to close manually
7	automatic	Ue	Send closing command	Opening and not allowing closing	Opening and not allowing closing	Remote control fails to close
8	Automatic or manual	Ue	Send the command of allowing closing	Opening and not allowing closing	Opening and allowing closing	

Continued Table 5

S/N	Mode selection switch position	Phase line voltage	control signal	Initial state	Status after action	remarks
9	automatic	Ue→0V	nothing	Opening and allowing closing	Opening and allowing closing	The line is powered down and remains in the original state
				Opening and allowing closing	Opening and not allowing closing	
				Closing	Closing	
10	Automatic or manual	Ue	nothing	Closing	Opening and allowing closing	In case of overload, short circuit and other faults, the circuit breaker acts to open

Continued Table 5

S/N	Mode selection switch position	Phase line voltage	control signal	Initial state	Status after action	remarks
11	Automatic or manual	Ue→≥ Uvo or Ue→≤ Uvu	nothing	Closing	Opening and allowing closing	In case of overvoltage/ undervoltage fault, the circuit breaker acts to open. If the overvoltage/ undervoltage fault occurs 3 times continuously within 10 minutes, it will enter the opening/not allowing closing state
12	automatic	≥Uvo→ Uvor Or ≤ Uvu→ Uvur	nothing	Opening and allowing closing	Closing	Following No. 11, when the power supply voltage recovers, the circuit breaker automatically closes
13	Manual	Ue	Send closing command	Opening and allowing closing	Opening and allowing closing	Remote control fails to close

Continued Table 5

S/N	Mode selection switch position	Phase line voltage	control signal	Initial state	Status after action	remarks
14	Manual	Ue	Send the opening command	Closing	Closing	Remote control fails to open
15	Auto → Manual or Manual → Automatic	Ue or 0 V	nothing	Opening and allowing closing	Opening and allowing closing	Keep the original state
				Opening and not allowing closing	Opening and not allowing closing	
				Closing	Closing	

6 Indicator status

The front of the circuit breaker is equipped with indicator lights to indicate different states, as shown in Table 6.

Table 6 Status of Mode Selection Switch Indicator

Status of circuit breaker after energization	Indicator light display
The mode selector switch is set to the "Manual" position	Always bright blue
The mode selector switch is set to the "Automatic" position	Red is always on
Overload, overvoltage and undervoltage faults	Flashing red
After tripping due to overload, overvoltage, undervoltage, phase failure and underfrequency fault	Flashing red
When operating the test button and tripping due to leakage current	Flashing red

7 Outline and installation dimensions

■ Overall dimensions (unit: mm)

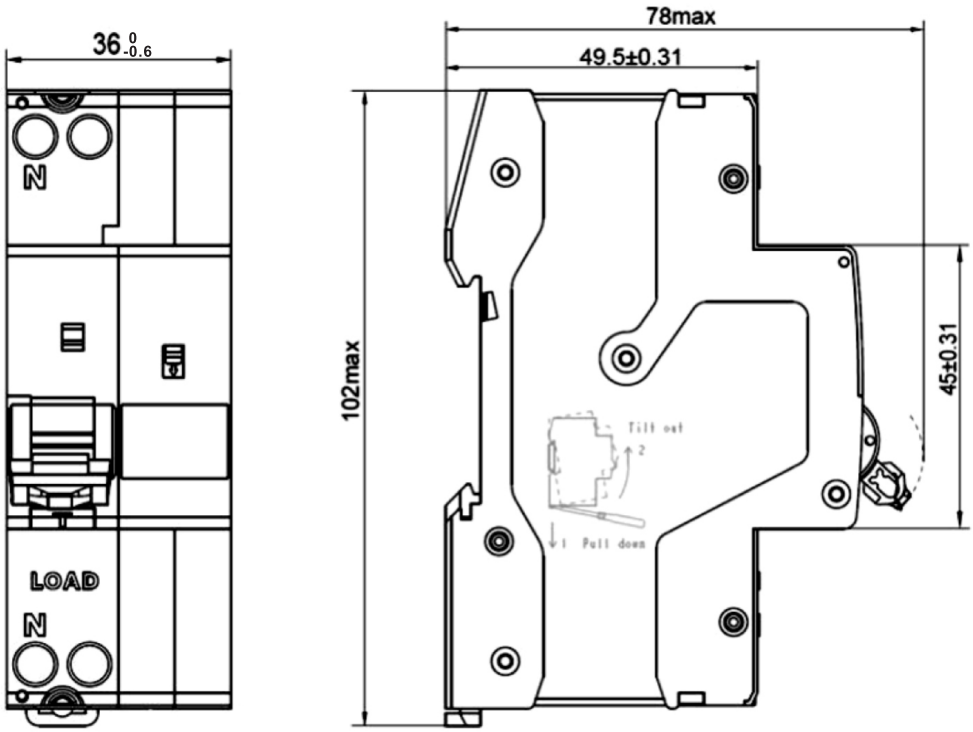


Figure 1 Boundary Dimensions of Circuit Breaker

■ Communication port

Communication wire

RS485 Communication port

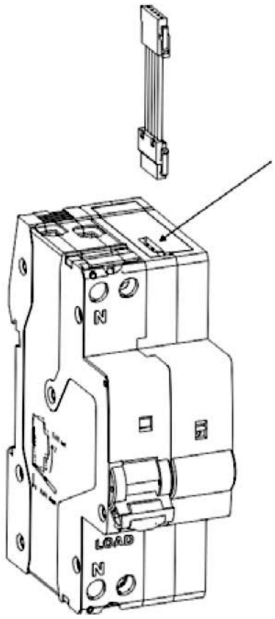


Figure 2 Installation Position of Communication Interface

8 Installation, commissioning and operation

8.1 Before installation and use: check whether the circuit breaker mark is consistent with the working conditions used;Before power on, the circuit breaker shall be operated several times, and its mechanism action shall be flexible, reliable, and free of blocking.See Figure 3 for the circuit breaker closing/opening status indication and the "Automatic"/"Manual" position of the mode selection switch.

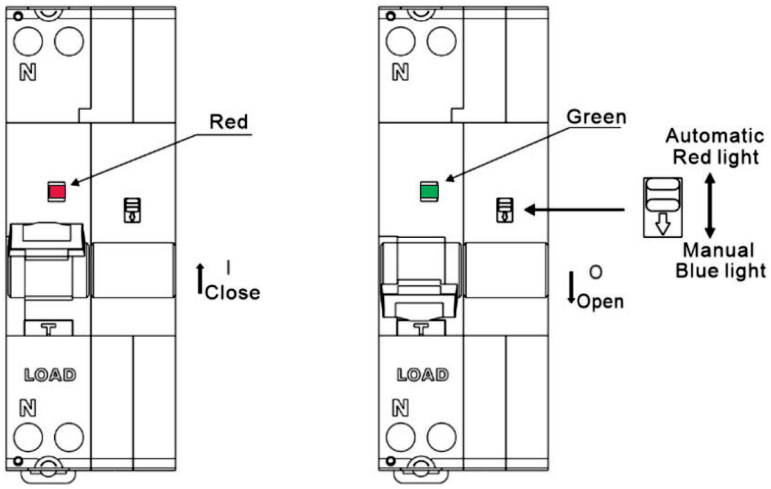


Figure 3 Circuit breaker closing/opening status indication, mode selection switch "Automatic" and "Manual" positions

Note: When the product leaves the factory, it defaults to disconnected status and "automatic" mode.

8.2 Installation mode

TH35-7.5 mounting rail is used for installation, as shown in Figure 4.

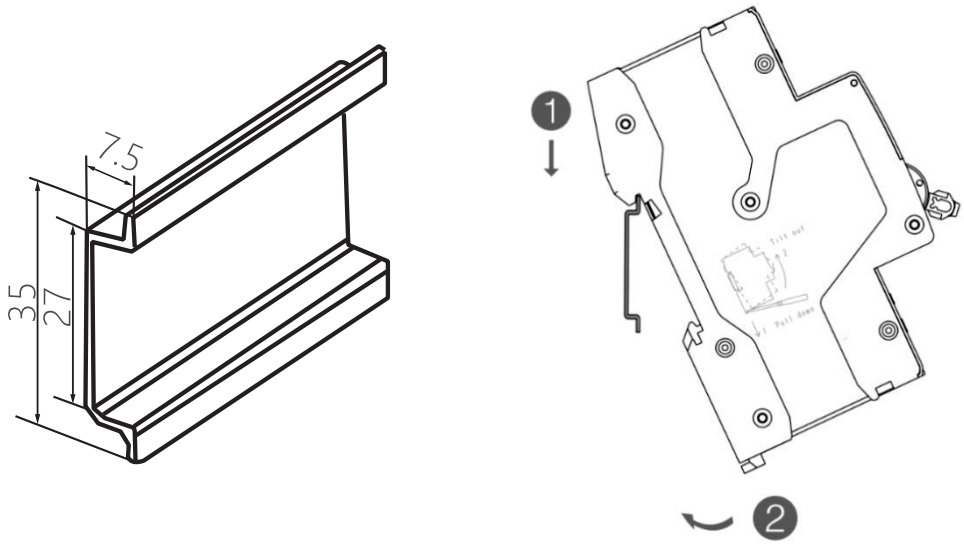


Fig. 4 Installation Diagram

8.3 Disassembly Diagram

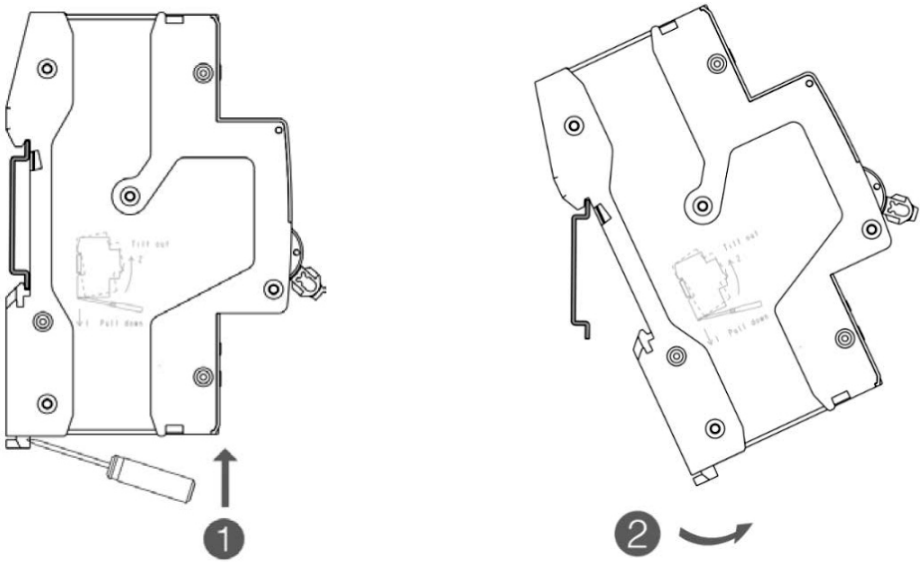


Fig. 5 Disassembly Diagram

8.4 It is applicable to copper wire connection. See Table 7 for wire selection and Figure 6 for wiring mode and stripping length.

Table 7 Requirements for Cross sectional Area of Copper Conductor

Rated current In(A)	Cross sectional area of copper conductor (mm^2)
6	1
10	1.5
16、20	2.5
25	4
32	6
40	10

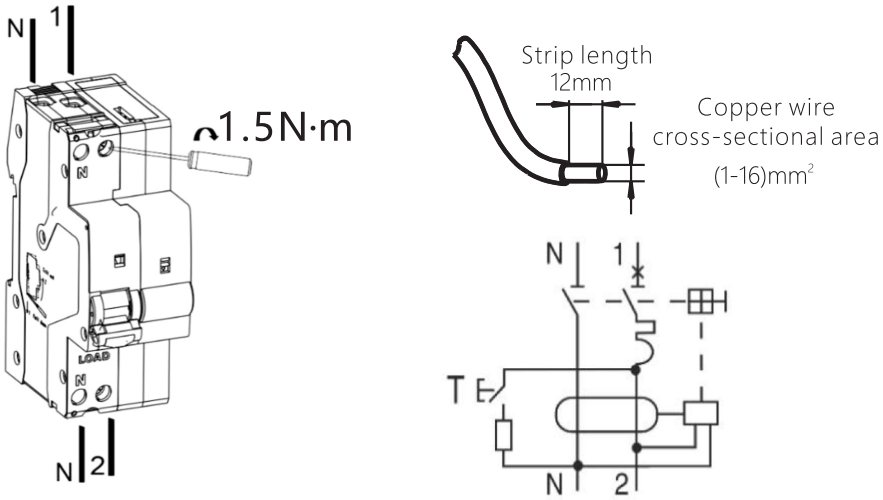


Figure 6 Wiring Mode and Stripping Length

Note: Before power on, check whether the wiring is correct and firm, verify the flexibility of the handle action, and detect the status indication modes of manual and automatic.

9 Maintenance

The circuit breaker shall be checked regularly during operation.

When the circuit breaker fails to trip and open (such as overload, short circuit, overvoltage, undervoltage, phase loss, underfrequency, etc.), the fault shall be eliminated first, and then the circuit breaker shall be closed manually to restore power supply

10 Fault Analysis and Troubleshooting

Table 8 Example of Fault Analysis and Troubleshooting

Fault phenomenon	Cause analysis	Exclusion method
The handle cannot be closed	Whether there is short circuit at the load end	Troubleshooting
	Failure of operating mechanism	Replace product
	The rated current of the circuit breaker does not match the load current	Replace product specifications

Continued Table 5

Fault phenomenon	Cause analysis	Exclusion method
The handle cannot be closed	Overvoltage/undervoltage in the line	Observe whether the indicator light flashes red and automatically switches on after voltage recovery
	When over/under voltage faults occur for more than 3 times in a row within 10 minutes	Unlock after confirming the line status
	When the remote command of closing is not allowed	Unlock after confirming the line status
Remote closing is not possible	Communication line is not connected	Correct wiring
	The product is in manual mode	Turn the mode selector switch to the "Automatic" position
	Overvoltage and undervoltage exist in the line	Confirm line status
High temperature	The wiring screw does not compress the wire or is loose	Tighten the wiring screws
	The sectional area of selected conductor is too small	Replace wire specification
Fail to open in case of short circuit	The selected circuit breaker does not match the working conditions of the load	Replace product specifications
No power	Wire stripping is too short	Re stripping
	The wiring screw does not compress the wire or is loose	Tighten the wiring screws
Press the test button and the product does not act	Button failure	Replace product
	Leakage protection function fails	Replace product

11 Warranty period, environmental protection and other legal provisions

11.1 Warranty period

Under the normal storage and transportation conditions, and the product package or product itself is in good condition, the warranty period of the product is 36 months from the date of production.

The following conditions are not covered by the warranty:

1) Damage caused by improper use, storage and maintenance of users;

2) Damage caused by organizations or personnel not designated by the company, or self disassembly and

maintenance;

3) The product exceeds the warranty period;

4) Damage caused by force majeure

11.2 Environmental protection

To protect the environment, when this product or its components are scrapped, please properly treat them as industrial wastes; Or it can be delivered to the recycling station for classified disassembly, recycling and reuse according to relevant national regulations.

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User Instruction

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