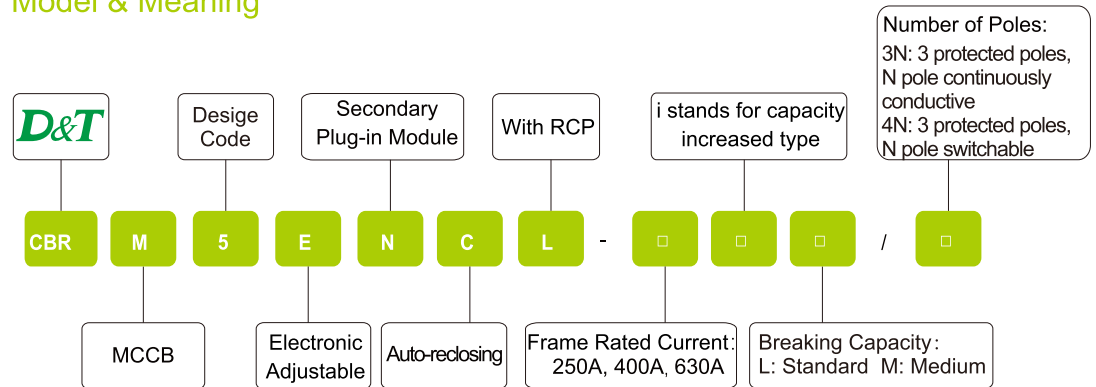




## Model & Meaning



## Application

CBRM5ENCL Series Residual Current Protected Circuit Breaker is a new intelligent low-voltage switching device integrating high-precision current sensing, measurement and protection. It adopts a modular, primary-secondary separated design with hot-swappable secondary modules for easy replacement and maintenance. Besides conventional overload, undervoltage and short-circuit protection, it also supports energy metering, contact temperature monitoring, topology signal detection, voltage qualification statistics, power quality analysis and event recording with real-time reporting. Equipped with an industrial-grade high-performance MCU, high-precision ADC and miniaturized power line carrier module, the circuit breaker features strong data processing, sampling and communication capabilities (RS485 & PLC). Working with intelligent transformer area terminals, it enables advanced distribution IoT applications for the new power system. Suitable for 50 Hz AC low-voltage networks with rated insulation voltage 1000 V, rated operating voltage up to 400 V and rated current 100 A–630 A. With an intelligent release, it provides a wide current setting range and three-stage protection: long-time overload delay, short-time short-circuit delay and instantaneous short-circuit protection.

## Operating Environment

### Normal Operating Conditions

- ◆ Ambient temperature: Maximum +40°C, Minimum -5°C; 24-hour average temperature ≤ +35°C;
- Note: For use above +40°C or below -5°C, consult the manufacturer.
- ◆ Altitude: Installation altitude ≤ 2000m.

### Normal Installation Condition

- ◆ Installation category: Main circuit - Category III; Control and auxiliary circuits - Category II;
- ◆ Installation method: Generally vertical installation (preferred), also available for horizontal (side) installation;
- ◆ Pollution degree: Grade 3;
- ◆ External magnetic field: External magnetic field nearby shall not exceed 5 times the geomagnetic field in any direction.

## Main Functions & Features

### Core Features

- High-performance 32-bit ARM processor for real-time signal processing and intelligent control.
- Chinese LCD HMI for intuitive operation.
- Plug-and-play secondary module for easy maintenance and replacement.
- Electronic trip unit with long-time delay, short-time delay and instantaneous protection, independent of supply voltage.
- High breaking capacity ensures reliable short-circuit protection.

### Protection Functions

- Comprehensive protection: overload, overvoltage, undervoltage, phase loss, residual current.
- Online configurable protection parameters and residual current settings, with auto-reclosing.
- Fault data storage and reporting; event records (current, voltage, phase loss, etc.) are queryable, storable and deletable.
- Local protection via RS485 interface.

### Metering & Monitoring

- Real-time measurement: 3-phase voltage/current, split-phase current, active/reactive/apparent power, power factor.
- Bi-directional active energy metering (split-phase), accuracy: current/voltage class 0.5S, active/reactive class 1.
- Freezing functions: minute, hour, daily and monthly freezing; data reset supported.
- Power quality analysis: 2nd–21st harmonic measurement, harmonic ratio statistics, voltage qualification rate statistics.
- Optional temperature monitoring: inlet/outlet terminal temperature ( $-25^{\circ}\text{C}\sim 120^{\circ}\text{C}$ ).
- Measuring range: voltage  $0.7U_e\sim 1.15U_e$ , current  $0.004I_n\sim 1.2I_n$ , frequency 45Hz~55Hz, power factor 0.500~1.000.

### Communication & IoT

- Four remote functions: remote signaling, remote metering, remote control, remote regulation.
- Supports DL/T645 and Modbus protocols with auto-detection.
- Remote firmware upgrade (online/compressed/uncompressed).
- Data encryption for secure power information exchange.
- Active reporting via HPLC: event, status change, and power failure reporting (within 60s after outage).
- Time synchronization: local/broadcast time alignment with master station.

## Operating Environment

- ◆ Ambient air temperature: -5℃ to +40℃, with the average temperature not exceeding +35℃ within 24 hours.
- ◆ Altitude: The installation site shall not exceed 2000 m above sea level.
- ◆ Atmospheric conditions: The relative humidity shall not exceed 50% at the maximum ambient temperature of +40℃. At the monthly average minimum temperature of +25℃ in the wettest month, the monthly average maximum relative humidity shall be 90%. Condensation on the product surface caused by temperature fluctuations shall be taken into consideration.
- ◆ Installation category: III.
- ◆ Pollution degree: Pollution degree 3.
- ◆ Installation conditions: The switch shall be installed in a location free from explosion hazards, conductive dust, corrosive agents and substances that may impair insulation, as well as protection against rain and snow.
- ◆ Connection: Screw terminals for conductor clamping.

## Main Technical Parameters

| Specification                                                                          | CBRM5ENCL-250                                                                                    |                                                                                                                               | CBRM5ENCL-400                     |      | CBRM5ENCL-630i                    |      | CBRM5ENCL-630                     |       |
|----------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|------|-----------------------------------|------|-----------------------------------|-------|
| Frame current I <sub>nm</sub> (A)                                                      | 250                                                                                              |                                                                                                                               | 400                               |      | 630                               |      | 630                               |       |
| Rated current I <sub>n</sub> (A)                                                       | 250A<br>(63A-250A)<br>Adjustable                                                                 |                                                                                                                               | 400A<br>(160A-400A)<br>Adjustable |      | 630A<br>(250A-630A)<br>Adjustable |      | 630A<br>(250A-630A)<br>Adjustable |       |
| Rated operating voltage U <sub>e</sub> (V)                                             | AC400                                                                                            |                                                                                                                               |                                   |      |                                   |      |                                   |       |
| Rated insulation voltage U <sub>i</sub> (V)                                            | 1000                                                                                             |                                                                                                                               |                                   |      |                                   |      |                                   |       |
| Rated impulse withstand voltage U <sub>imp</sub> (kV)                                  | 8                                                                                                |                                                                                                                               |                                   |      |                                   |      |                                   |       |
| Number of poles                                                                        | 4P、3P+N                                                                                          |                                                                                                                               |                                   |      |                                   |      |                                   |       |
| Breaking capacity                                                                      | L                                                                                                | M                                                                                                                             | L                                 | M    | L                                 | M    | L                                 | M     |
| Ultimate short-circuit breaking capacity I <sub>cu</sub> (kA)                          | 36                                                                                               | 50                                                                                                                            | 50                                | 70   | 50                                | 70   | 65                                | 85    |
| Rated service short-circuit breaking capacity I <sub>cs</sub> (kA)                     | 25                                                                                               | 35                                                                                                                            | 35                                | 50   | 35                                | 50   | 42                                | 55    |
| Rated residual short-circuit making and breaking capacity I $\Delta$ <sub>m</sub> (kA) | 9                                                                                                | 12.5                                                                                                                          | 12.5                              | 17.5 | 12.5                              | 17.5 | 16.25                             | 21.25 |
| Rated short-time withstand current I <sub>cw</sub> (kA)s                               | 3                                                                                                |                                                                                                                               | 5                                 |      | 8                                 |      |                                   |       |
| Utilization category                                                                   | A                                                                                                |                                                                                                                               | B                                 |      |                                   |      |                                   |       |
| Flashover distance (mm)                                                                | 50                                                                                               |                                                                                                                               | 100                               |      |                                   |      |                                   |       |
| Residual current operating characteristics                                             | Type AC                                                                                          |                                                                                                                               |                                   |      |                                   |      |                                   |       |
| Rated residual operating current I $\Delta$ <sub>n</sub> (mA)                          | 30mA (non-delay only) ~ 1000mA continuously adjustable                                           |                                                                                                                               |                                   |      |                                   |      |                                   |       |
| Residual operating time characteristics                                                | Delayed/Instantaneous                                                                            |                                                                                                                               |                                   |      |                                   |      |                                   |       |
| Time-delayed type ultimate non-tripping time (s)                                       | 0.06/0.1/0.2                                                                                     |                                                                                                                               |                                   |      |                                   |      |                                   |       |
| Breaking time (s)                                                                      | Time-delayed                                                                                     | I $\Delta$ <sub>n</sub> ≤0.5; 2I $\Delta$ <sub>n</sub> ≤0.2; 5I $\Delta$ <sub>n</sub> ≤0.15; 10I $\Delta$ <sub>n</sub> ≤0.15  |                                   |      |                                   |      |                                   |       |
|                                                                                        | Instantaneous                                                                                    | I $\Delta$ <sub>n</sub> ≤0.3; 2I $\Delta$ <sub>n</sub> ≤0.15; 5I $\Delta$ <sub>n</sub> ≤0.04; 10I $\Delta$ <sub>n</sub> ≤0.04 |                                   |      |                                   |      |                                   |       |
| Auto-reclosing time (s)                                                                | 20-60                                                                                            |                                                                                                                               |                                   |      |                                   |      |                                   |       |
| Operating cycles (times)                                                               | With current                                                                                     | 1000                                                                                                                          |                                   | 1000 |                                   |      |                                   |       |
|                                                                                        | Without current                                                                                  | 7000                                                                                                                          |                                   | 4000 |                                   |      |                                   |       |
|                                                                                        | Total                                                                                            | 8000                                                                                                                          |                                   | 5000 |                                   |      |                                   |       |
| Overload and short-circuit characteristic                                              | Three-stage protection, electronically adjustable. See "Protection Characteristics" for details. |                                                                                                                               |                                   |      |                                   |      |                                   |       |
| Overvoltage protection value (V)                                                       | Setting value (240~322) ±5%                                                                      |                                                                                                                               |                                   |      |                                   |      |                                   |       |
| Undervoltage protection value (V)                                                      | Setting value(88~220)±5%                                                                         |                                                                                                                               |                                   |      |                                   |      |                                   |       |
| Interlock delay time (ms)                                                              | ≤40ms                                                                                            |                                                                                                                               |                                   |      |                                   |      |                                   |       |
| Communication delay time (ms)                                                          | ≤200ms                                                                                           |                                                                                                                               |                                   |      |                                   |      |                                   |       |

## Protection Characteristics

### ◆ Overload long-time delay parameter setting

Setting range of overload long-time delay operating value

Table 1

| Parameter           | Frame Current | Setting value            | Factory Default |
|---------------------|---------------|--------------------------|-----------------|
| Trip value Ir1      | 250           | 63-250A adjustable       | 250A            |
|                     | 400           | 160-400A adjustable      | 400A            |
|                     | 630i, 630     | 250-630A adjustable      | 630A            |
| Time delay value tL |               | 3s ~ 18s, OFF adjustable | 3s              |

Overload long-time delay operating characteristics

Table2

| Ambient temperature | Current Type                      | Current | Time |
|---------------------|-----------------------------------|---------|------|
| +40℃                | Conventional non-tripping current | 1.05Ir1 | ≥ 2h |
|                     | Conventional tripping current     | 1.3Ir1  | < 2h |

### ◆ Time-delay Characteristic

Overload protection follows the inverse time characteristic:

$$T = (6Ir1/I)^2 tL \quad \text{Delay accuracy: } \pm 10\%$$

Where T is the tripping time value, Ir1 is the long-time delay protection setting value, I is the fault current, and tL is the long-time delay setting value.

### ◆ Short-circuit Short-time Delay Protection

Short-circuit short-time delay protection prevents resistive short circuits in the power distribution system, and tripping delay is implemented to achieve selective protection.

Short-circuit Short-time Delay Parameter Setting

Table3

| Parameter setting                    | Setting Value       | Factory Default |
|--------------------------------------|---------------------|-----------------|
| Short-time delay setting current Ir2 | 2-12Ir1 adjustable  | 6Ir1            |
| Short-time delay setting timer(ts)   | 0.1-1.0s adjustable | 0.4s            |

Operating characteristics of short-time delay protection

Table4

| Ir2                     | Fault current multiple | (2.0 ~ 12) xIr1 adjustable |                     |
|-------------------------|------------------------|----------------------------|---------------------|
| Tripping characteristic | $1.05Ir1 \leq I < Ir2$ | t2 (s)                     | 0.1-1.0S adjustable |
|                         |                        | T (s)                      | $T = (6Ir1/I)^2 tL$ |
|                         | $Ir2 \leq I < Ii$      | t2 (s)                     | 0.1-1.0S adjustable |
|                         |                        | Accuracy (%)               | ±10(error: ±40 ms)  |

### ◆ Instantaneous protection

Setting of parameters related to short-circuit instantaneous protection

Table5

| Parameter setting                           |                    | Factory Default |
|---------------------------------------------|--------------------|-----------------|
| Instantaneous operating current setting Ir3 | 4-14Ir1 adjustable | 10Ir1           |

Operating characteristics of short-circuit instantaneous protection

Table6

| Characteristics             | Current multiple(I/Ir3) | Tripping characteristic | Tripping time |
|-----------------------------|-------------------------|-------------------------|---------------|
| Non-tripping characteristic | ≤0.85                   | Non-operation           | ≥ 200ms       |
| Tripping characteristic     | > 1.15                  | Operation               | < 200ms       |

## ◆Automatic reclosing

After the circuit breaker trips due to residual current exceeding the set operating current threshold, it will perform automatic reclosing after a delay of 20~60 seconds. Manual closing is not subject to this time limit. If the fault current is cleared within 5 seconds after closing, the breaker will close successfully and operate normally. If the fault current persists, the breaker will trip again and enter a lockout state, prohibiting automatic reclosing. Only manual closing is allowed thereafter.

## ◆Overvoltage protection function

When the line phase voltage exceeds the overvoltage protection setting value, the circuit breaker will trip for protection. When the line voltage returns to normal, the circuit breaker can be closed manually for operation. The setting range of overvoltage protection is 231 V ~ 330 V, and the tripping time setting range is 0 ~ 999s. The factory default setting is 282 V with a tripping time of 2s. Users can set or disable the protection function as required.

## ◆Undervoltage protection function

When the line phase voltage drops below the undervoltage protection setting, the circuit breaker will trip for protection. When the line voltage returns to normal, the circuit breaker can be closed manually for operation. The setting range of undervoltage protection is 101V ~ 209V, and the tripping time setting range is 0 ~ 999s. The factory default setting is 187V with a tripping time of 2s. Users can set or disable the protection function as required.

## ◆Phase failure protection function

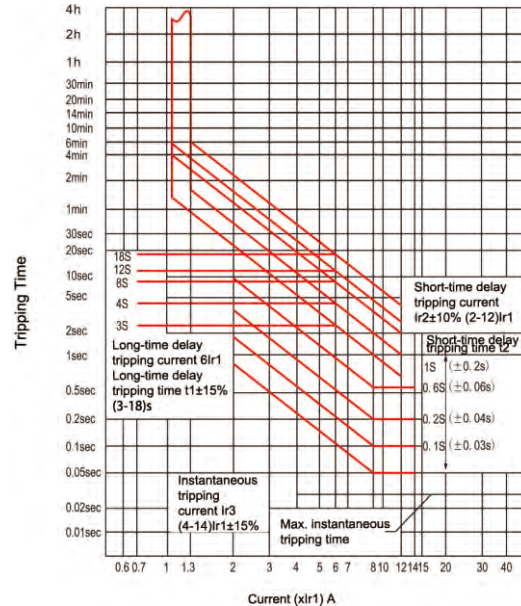
When a phase failure occurs at the power supply side of the line, the circuit breaker will trip for protection. After the line voltage returns to normal, the circuit breaker can be closed manually for operation. The setting range of phase failure protection is 10V ~ 100V, and the tripping time setting range is 0 ~ 999 s. The factory default setting is 30V with a tripping time of 2s. Users can set or disable the protection function as required.

## ◆Interlocking protection function

Through the interlocking interface, it can perform interlocking protection with other fire-fighting equipment, specifically as follows:

| IN Input Configuration |                     | Function Description | Priority | Delay Time |
|------------------------|---------------------|----------------------|----------|------------|
| Input Control          | Connect IN1 to DCOM | Breaker Closing      | Low      | ≤40ms      |
|                        | Connect IN3 to DCOM | Breaker Closing      | High     | ≤40ms      |

Warning: Prolonged short-circuiting will keep the breaker in the tripped state.

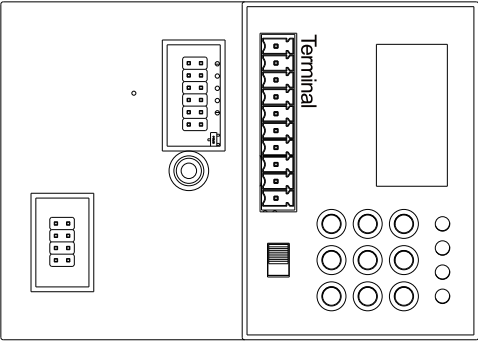


## Protection Characteristic Curve

## Communication Function

| Communication Type | Interface Type     | Communication Protocol       | Communication Address | Communication Rate      |
|--------------------|--------------------|------------------------------|-----------------------|-------------------------|
| RS485              | External Terminals | DL/T-645 Modbus (Adjustable) | 1-255                 | 2400-19200 (Adjustable) |
| PLC                | Plug-in            |                              |                       |                         |
| Bluetooth          | Built-in           |                              |                       |                         |

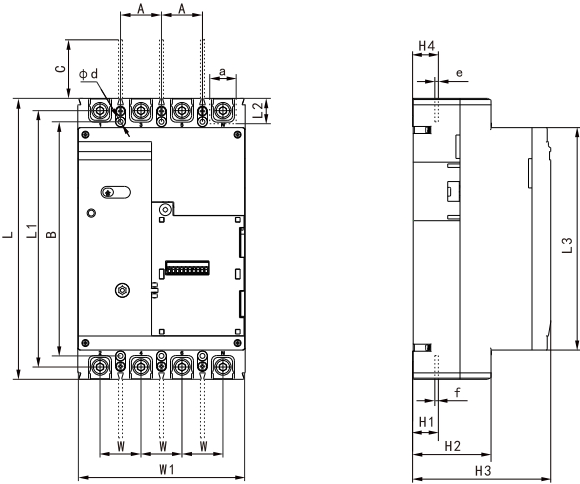
Module interface definition:



Note: terminal block order (top to bottom)

| No. | Description                                                                                                       |
|-----|-------------------------------------------------------------------------------------------------------------------|
| 1   | 485A                                                                                                              |
| 2   | 485B                                                                                                              |
| 3   | Trip                                                                                                              |
| 4   | Common                                                                                                            |
| 5   | Close                                                                                                             |
| 6   | Active Power                                                                                                      |
| 7   | Reactive Power                                                                                                    |
| 8   | Pulse                                                                                                             |
| 9   | Auxiliary 1 is disconnected from Auxiliary 2 when tripped;<br>Auxiliary 1 is connected to Auxiliary 2 when closed |
| 10  |                                                                                                                   |

Outline & Installation Dimensions



| Model | Pole | Outline Dimensions (mm) |     |       |     |     |    |      |     |       |      |   |   | Mounting Dimensions (mm) |    |    |      |    |
|-------|------|-------------------------|-----|-------|-----|-----|----|------|-----|-------|------|---|---|--------------------------|----|----|------|----|
|       |      | C                       | L   | L1    | L3  | W1  | W  | H1   | H2  | H3    | H4   | e | f | B                        | a  | A  | d    | L2 |
| 250   | 3P+N | 65                      | 240 | 219   | 190 | 142 | 35 | 22   | 67  | 118   | 22   | 3 | 3 | 200                      | 22 | 35 | Φ4.2 | 20 |
| 400   | 3P+N | 102.4                   | 336 | 303.4 | 254 | 198 | 48 | 37.5 | 98  | 157   | 37.5 | 5 | 3 | 272                      | 33 | 48 | Φ7   | 33 |
| 630i  | 3P+N | 102.4                   | 336 | 303.4 | 254 | 198 | 48 | 40.5 | 98  | 157   | 38.5 | 6 | 6 | 272                      | 33 | 48 | Φ7   | 33 |
| 630   | 3P+N | 105                     | 350 | 314.6 | 257 | 240 | 58 | 40.5 | 102 | 183.5 | 43.5 | 6 | 5 | 280                      | 44 | 58 | Φ7   | 33 |

## Operation & Maintenance

### ◆ Unpacking and Inspection Notes

Check the appearance for any damage caused during transportation, such as damage to the enclosure. In addition to the circuit breaker, user manual and certificate of conformity, the package shall also include screws, nuts and relevant accessories for installation and operation.

### ◆ Installation and Connection

Please install on flame-retardant materials such as metal.  
The circuit breaker can be installed vertically or horizontally.

### ◆ Maintenance

Maintenance and inspection must be performed by qualified technical personnel.  
Under normal operating conditions, maintenance shall be carried out once a year; under abnormal conditions, once every six months. The maintenance items are as follows:  
Reset, close and open the circuit breaker. When the breaker is closed, use the red emergency trip button to trip the breaker. Perform 5 operations; the breaker shall reliably perform reset, closing, opening and tripping functions.  
Clean dust from the surface and connections of the breaker with a clean, dry cloth.  
Clean the arc chute; replace it if necessary.  
Check all connections, remove oxides with gauze, clean with a solvent, and tighten bolts and nuts.  
If the breaker is equipped with a manual operating mechanism, perform 3 close-open operations manually. The operating lever or handle shall move freely.  
If the breaker is equipped with an electrical operating mechanism, perform 3 close-open operations electrically. The electrical control function shall be normal.

## Transportation & Storage

### Transportation

During transportation, the product shall be protected against exposure to and mixing with harmful liquids such as water, rain, snow, chemical solvents, corrosive liquids and others.  
Avoid strong impact and extrusion between objects.  
Stack according to the direction indicated on the package. The stacking layers shall be subject to the mark on the outer carton.

### Storage

- ◆ Ambient temperature: -10°C ~ +45°C
- ◆ Relative humidity: ≤ 90% (at an ambient temperature of +20°C)
- ◆ Storage location shall be free of dust and conductive dust
- ◆ Free from corrosive, flammable or explosive gases, and protected from rain and snow
- ◆ Dry and well-ventilated
- ◆ Stack in the direction indicated on the package, and the stacking height shall not exceed the number specified on the outer carton label

## Notes

- ◆ The company shall not be held responsible for any warranty claims arising from non-quality issues caused by improper installation, operation, or incorrect wiring that results in terminal block damage.
- ◆ If any problems occur during product use, please contact your local distributor or our customer service center.