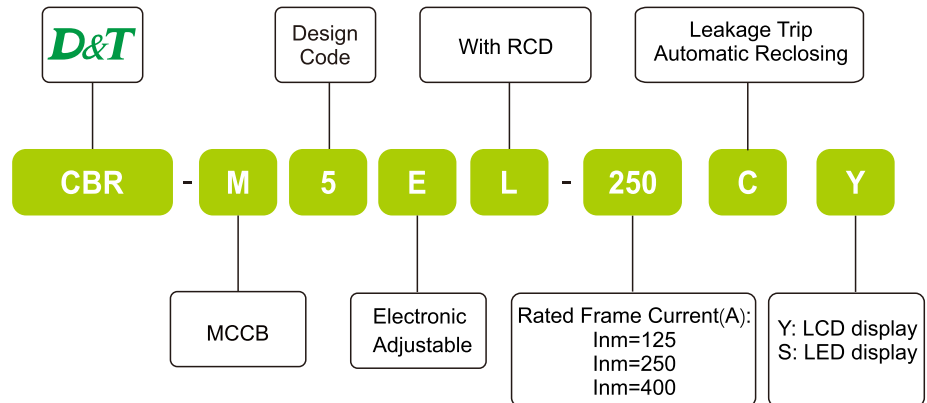




Model & Meaning



Application

The rated insulation voltage of the CBRM5EL Series Residual Current Operated Circuit Breakers is 1000 V. They are suitable for three-phase four-wire TT distribution networks with AC 50 Hz, rated voltage of 400 V, and rated current up to 400 A, where the neutral point is directly earthed.

They are used to provide protection against indirect contact; prevent fire hazards caused by earth fault currents due to insulation breakdown of equipment; and can also be applied for power distribution, as well as protecting lines and power supply equipment against damages from faults such as overload, undervoltage, short circuit, and single-phase earthing.

This product complies with the following standards:

- ◆ IEC60947-1 Low-voltage switchgear and controlgear - Part 1: General rules
- ◆ IEC60947-2 Low-voltage switchgear and controlgear - Part 2: Circuit-breakers
- ◆ IEC 60934: Circuit Breakers for Equipment

Main Functions & Features

- ◆ Adopts high-performance 32-bit ARM microprocessor, enabling real-time signal processing and intelligent control.
- ◆ LCD display, user-friendly human-machine interface and easy operation.
- ◆ Residual current (leakage) protection with online adjustable residual current settings and automatic reclosing function.
- ◆ Monitors and tracks line residual current in real time and automatically adjusts settings to ensure product operation rate and reliability.
- ◆ Three-stage protection: long-time delay, short-time delay and instantaneous protection.
- ◆ Electronic tripping that is independent of power supply voltage
- ◆ High breaking capacity for reliable line short-circuit protection
- ◆ Overvoltage protection, undervoltage protection, phase failure protection;
- ◆ Displays line residual current, three-phase power supply voltage, and load current in real time.
- ◆ Allows online setting and modification of protection functions and parameters.
- ◆ Identifies and displays trip types (residual current, blocking, overload, under-voltage, over-voltage, phase-loss), with data storable, queryable, and deletable.
- ◆ Networked models are equipped with communication functions to realize remote signaling, remote monitoring, remote control, and remote adjustment.

Operating Environment

- ◆ The installation site shall be free of conductive dust, corrosive gases, flammable and explosive gases, and shall not be exposed to rain, snow or moisture.
- ◆ Altitude: not exceeding 2000 m;
- ◆ Ambient temperature: -5 °C ~ +40 °C , daily average maximum temperature ≤ +35 °C ;
- ◆ Relative humidity: ≤ 50% (at ambient temperature of +40°C);
- ◆ The external magnetic field at the installation site shall not exceed 5 times the geomagnetic field in any direction;
- ◆ The installation position shall have good ventilation and heat dissipation conditions;
- ◆ When HPLC (High Power Line Communication) is required, ensure that all communication devices

Main Technical Parameters

Specification & Model		CBRM5EL-125CY CBRM5EL-125CS	CBRM5EL-250CY CBRM5EL-250CS	CBRM5EL-400CY CBRM5EL-400CS	CBRM5EL-630CY CBRM5EL-630CS
Frame Rated Current(A)		125	250	400	630
Number of Poles		3P+N	3P+N	3P+N	3P+N
Rated Operating Voltage U _e (V)		AC 400/50HZ			
Rated Insulation Voltage U _i (V)		800		1000	
Rated Impulse Withstand Voltage U _{imp} (V)		8000			
Arc Distance(mm)		⩾ 50		⩾ 100	
Ultimate Short-circuit Breaking Capacity I _{cu} (kA)		50		65	85
Service Short-circuit Breaking Capacity I _{cs} (kA)		35		42	65
Rated Residual Short-circuit Making /Breaking Capacity I _{Δm} (kA)		12.5		16.25	21.25
Rated Short-time Withstand Current I _w (kA)/s		1.5	3	5	8
Residual Current Operating Characteristic		AC type			
Rated Residual Operating Current I _{Δn} (mA)		50/100/200/300/400/500/600/800 (MCU auto-tracking or manual setting)			100/200/300/400/ 500/600/800/1000 (MCU auto-tracking or manual setting)
Residual Operating Time Characteristic		Time-delay type / Non-time-delay type			
Time-delay Ultimate Non-operating Time (s)		0.06 : 2 I _{Δn}			
Breaking Time (s)		I _{Δn} ≤0.5; 2I _{Δn} ≤0.2; 5I _{Δn} ≤0.15			
Auto-reclosing Time (s)		20-60			
Operating Performance (Cycles)	Electrical	1500	1000	1000	
	Mechanical	8500	7000	4000	
	Total	10000	8000	5000	
Overload & Short-circuit Characteristics		3-stage Protection, Electronic Adjustable, See "Protection Characteristics" for more details			
Overvoltage Protection Setting (V)		Setting Range (250~300) ±5%			
Undervoltage Protection Setting (V)		Setting Range (145~200) ±5%			
Interlock Delay Time (ms)		≤40ms			
Communication Delay Time (ms)		≤200ms			

Protection Characteristics

◆ Overload Long-Time Delay Protection

Table 1: Overload Long-Time Delay Parameter Setting

Parameter	Frame Current	Setting Range	Factory Default
Operating Setting I _{r1}	125	50A、63A、80A、 100A、125A	125A
	250	100A、125A、140A、160A、 180A、200A、225A、250A	250A
	400	160A、180A、200A、225A、250A、 315A、350A、400A	400A
	630	250A、315A、350A、400A、 500A、630A	630A
Delay Time Setting t _L		3s, 4s, 6s, 8s, 10s, 12s, 16s, 18s, OFF	12s

Table 2: Characteristics of Protection Actions

Ambient Temp. (°C)	Current Type	Setting Multiple	Tripping Time
+40°C	Non-Tripping Current	1.05I _{r1}	≥2h
	Tripping Current	1.3I _{r1}	<2h

◆ Time-delay Characteristic

Overload protection follows the inverse time characteristic:

$$T = (6I_{r1}/I)^2 t_L$$

Delay accuracy: ±10%

Where T is the tripping time value, I_{r1} is the long-time delay protection setting value, I is the fault current, and t_L 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.

Table 3: Short-circuit Short-time Delay Parameter Setting

Parameter Setting	Setting Values	Factory Default
Short-time delay setting current I _{r2}	2I _{r1} , 2.5I _{r1} , 3I _{r1} , 4I _{r1} , 5I _{r1} , 6I _{r1} , 7I _{r1} , 8I _{r1} , 10I _{r1} , 12I _{r1}	6I _{r1}
Short-time delay setting timer(ts)	0.1s, 0.2s, 0.3s, 0.4s, 0.6s, 0.8s, 1.0s, OFF	0.4s

Table 4: Short-circuit Short-time Delay Tripping Characteristic

Characteristic	Fault Current Multiple	Tripping Characteristic	Delay Error
Non-tripping	≤0.85 I _{r2}	Non-tripping	/
Tripping	>1.15 I _{r2}	Time-delayed tripping	±40ms

◆ Instantaneous Protection

Table 5: Short-circuit Instantaneous Protection Parameter Setting

Parameter Setting	Setting Values	Factory Default
Instantaneous Operating Current Setpoint (I _{r3})	4 I _{r1} , 6 I _{r1} , 7 I _{r1} , 8 I _{r1} , 9 I _{r1} , 10 I _{r1} , 11 I _{r1} , 12 I _{r1} , 13 I _{r1} , 14 I _{r1} , OFF	10 I _{r1}

Table 6: Instantaneous Operating Characteristic

Characteristic	Current Multiple (I / I _{r3})	Tripping Characteristic	Tripping Time
Non-tripping	≤0.85	Non-tripping	≥200ms
Tripping	>1.15	Instantaneous tripping	<200ms

◆ Residual Current Protection Characteristic

Gear Setting Range

Parameter	Setting Values (for 125, 250, 400)	Factory Default
Residual Operating Current (I _{Δn})	50, 100, 200, 300, 400, 500, 600, 800, Auto	500

◆ Tripping Characteristics

Table 2: Characteristics of Protection Actions

Parameter	Characteristic			
Rated non-tripping current	$0.5 I_{\Delta n}$			
Rated tripping current	$\geq 0.75 I_{\Delta n}$			
Time-delay characteristic	Maximum non-actuate time at $2I_{\Delta n}(\Delta t)$	Breaking Time		
		$I_{\Delta n}$	$2I_{\Delta n}$	$5 I_{\Delta n}$
Non-time-delayed characteristic		$\leq 0.3s$	$\leq 0.15s$	$\leq 0.04s$
0.06	$\geq 0.06s$	$\leq 0.5s$	$\leq 0.2s$	$\leq 0.15s$

◆ Automatic Gear Mode

In automatic gear mode, the values and floating values of each gear are as follows:

Gear Value (mA)	Floating Value (mA)
50	25
100	50
200	100
300	150
400	200
500	250
600	300
800	400
1000	-

When the residual current exceeds the floating value of the current gear but does not reach its operating value and remains stable for 60 seconds, the gear will shift up by one level, and so on until reaching the maximum gear. When the residual current is lower than the floating value of the next lower gear and remains stable for 120 seconds, the gear will shift down by one level, and so on until reaching the minimum gear.

Take "Auto 2" gear with an initial line residual current of 100 mA as an example. When the circuit breaker is energized, the gear is automatically set to 300 mA. When the residual current increases above 150 mA and remains stable for 60 seconds, the gear will switch to 500 mA. When the residual current decreases below 150 mA and remains stable for 120 seconds, the gear will switch to 200 mA.

◆ Auto-Reclosing Function

After tripping due to residual current exceeding the operating threshold, the circuit breaker can automatically reclose within 20–60 seconds. Manual closing is not subject to this time restriction.

If the fault current is cleared within 5 seconds after reclosing, the closing is successful, and the circuit breaker resumes normal operation. If the fault persists, the circuit breaker will trip again and lock out, prohibiting automatic reclosing. Manual closing operation is required thereafter.

◆ Overvoltage Protection

When the phase voltage exceeds the overvoltage protection setting value, the circuit breaker trips. Once the line voltage returns to the normal range, the circuit breaker can automatically reclose and resume operation. The setting range of overvoltage protection 250V and 300V, with a factory default at 275V. Users can set the value or disable the protection function as needed.

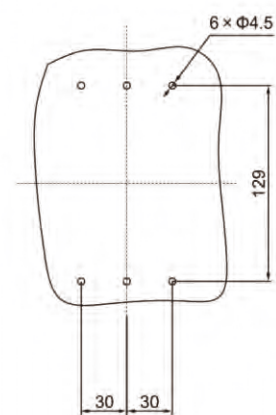
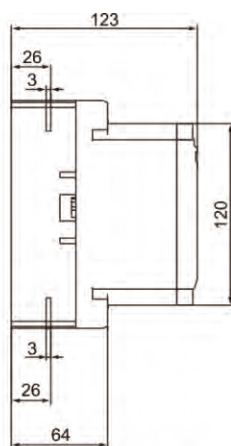
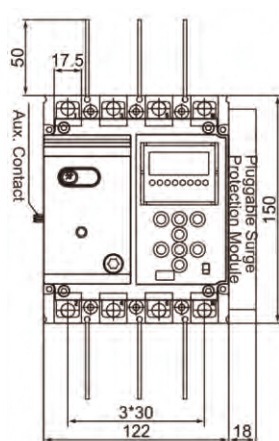
◆ Undervoltage Protection

If the phase voltage drops below the undervoltage protection setpoint, the circuit breaker trips. When voltage is returns to normal, the circuit breaker can automatically reclose and resume operation. The setting range of undervoltage protection is 145V and 200V, with a factory default at 145V. Users can set the value or disable the protection function as needed.

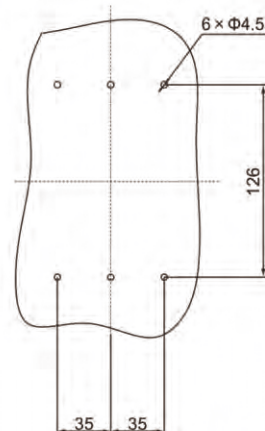
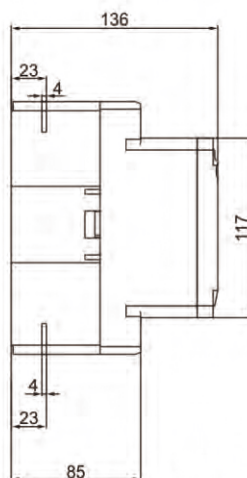
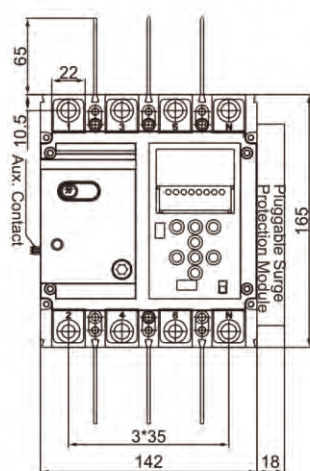
◆ Phase Loss Protection

When a phase loss 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 automatically close and resume operation.

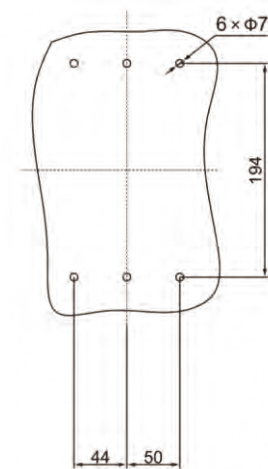
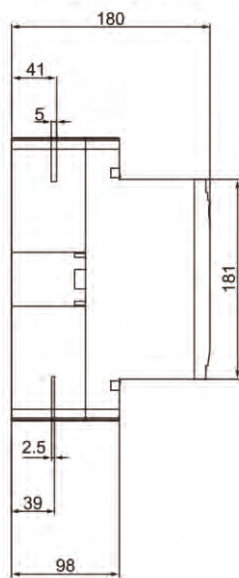
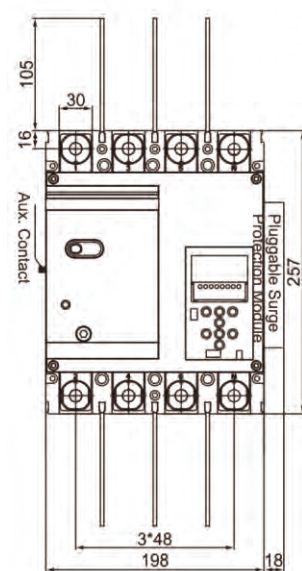
Outline & Mounting Dimensions



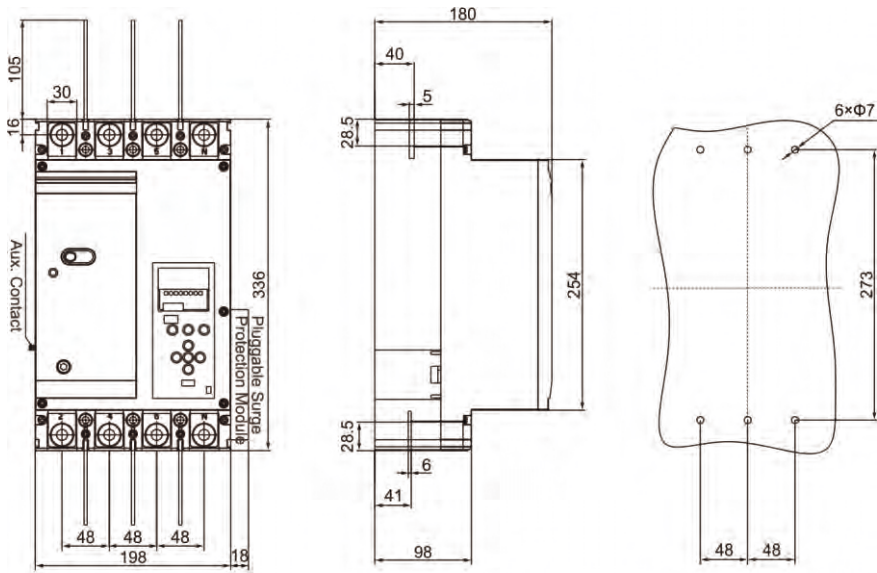
CBRM5EL-125CY
CBRM5EL-125CS



CBRM5EL-250CY
CBRM5EL-250CS



CBRM5EL-400CY
CBRM5EL-400CS



CBRM5EL-630CY
CBRM5EL-630CS

◆ Interlocking Protection Function
The breaker can be linked with other fire-fighting equipment for interlocking protection via the interlock interface, as described below:

IN Input Settings		Function	Priority	Delay Time
Input Control	Short IN1 to DCOM	Close	low	≤40ms
	Short IN3 to DCOM	Trip	high	≤40ms

Note: Persistent short-circuiting will keep the breaker in the tripped state.

Characteristic Curves

