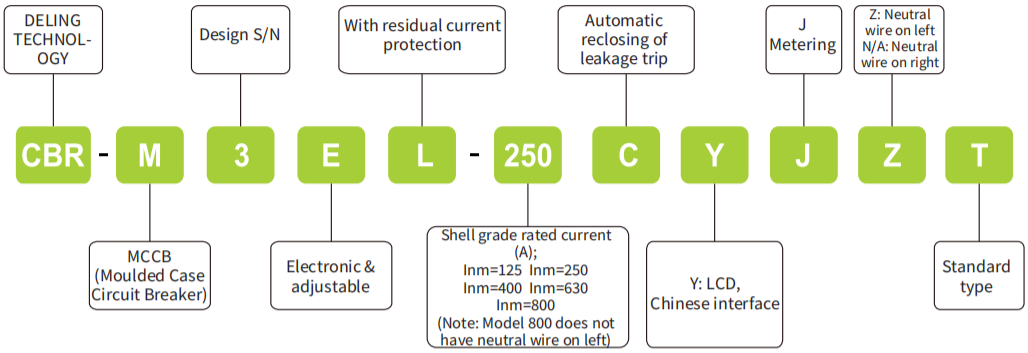
CBRM3EL

Circuit break with residual current protection (metering)

Model and Meaning



Main Functions and Features

- High-performance 32-bit ARM microprocessor is used to carry out signal processing and intelligent control in real time;
- LCD Chinese/English display provides friendly HMI and simple operation;
- For residual current (leakage) protection, the residual current gear can be set online, with reclosing function;
- Monitor and track the residual current of the line in real time, and automatically adjust the gear to ensure the operation rate and reliability of the product;
- Long delay, short delay and instantaneous three-stage protection, electronic tripping mode is applied, which is independent of supply voltage;
- High breaking ability could ensure the reliability of short circuit protection for the line;
- Overvoltage protection, undervoltage protection, phase loss protection and neutral wire missing protection: Protection functions and parameters can be set and modified online;
- Real-time display of line residual current, three-phase supply voltage and load current; Real-time measurement of parameters such as active power, reactive power, apparent power & power factor;
- Trip types (residual current, locking, overload, undervoltage, overvoltage, phase loss, fault neutral line) can be identified & displayed, and can be stored, inquired & deleted;
- Functions of remote communication, telemetry, remote control and remote adjustment are supported; HPLC pluggable module and micro-power Bluetooth wireless communication;
- 0.05In-1.2In metering can reach level 1.0; Real-time monitoring of the temperature of the incoming connector bar (optional);
- Accumulation of three-phase active power; Modes such as time control & cost control are optional, and the application is more flexible;
- Support DL/T645 protocol and Modbus protocol, and automatic identification is achieved; Support online remote upgrade, which is convenient for maintenance and upgrade;
- Accuracy grade: The highest accuracy of current and voltage can reach 0.5s; The accuracy of active and reactive power can reach level 1, and the residual current can reach level 2.

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Classification and Function of Circuit Breakers

Classification of functions		Conventional	Measuring	PV
Protection function	Overload protection	●	●	●
	Short circuit protection	●	●	●
	Residual current protective	●	●	●
	Automatic reclosing	●	●	●
	Phase loss protection	●	●	●
	Overvoltage protection	●	●	●
	Undervoltage protection	●	●	●
	Null line protection	●	●	●
	Over/under-frequency protection	●	●	●
	Power failure protection	●	●	●
	PH sequence protection	●	●	●
	Island protection	○	○	●
	Overtemperature protection	○	△	●
	Power generation quality monitoring and protection	○	△	●
Measuring display	Residual current of line	●	●	●
	Three-phase operating voltage	●	●	●
	Four-phase operating current	●	●	●
	Active power	○	●	●
	Reactive power	○	●	●
	Apparent power	○	●	●
	Voltage unbalance	○	●	●
	Current imbalance	○	●	●
Performance settings	Rated residual operating current	●	●	●
	Overload long delay	●	●	●
	Short-circuit short-time delay	●	●	●
	Short-circuit instantaneous	●	●	●
	Overvoltage protection value	●	●	●
	Undervoltage protection value	●	●	●
	Time, date	●	●	●
	Protect input and exit	●	●	●
	Phase loss protection value	●	●	●
	Over/under-frequency protection value	○	●	●
	Voltage unbalance protection value	○	●	●
	Current unbalance protection value	○	●	●
Information storage, query and display	Residual current operating	●	●	●
	Other operatings	●	●	●
Communication function	RS-485/DL-T-20	●	●	●
	Carrier	○	△	△
	Bluetooth	○	△	△

● indicates that this function is available; △ indicates that this function is optional; ○ indicates that this function is not available;

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Measuring accuracy grade

Accuracy	Allowable error
Current accuracy	±0.5%、±1.0%
Voltage accuracy	±0.5%、±1.0%
Active power accuracy	±1.0%、±1.5%、2.0%、2.5%
Reactive power accuracy	±1.0%、±1.5%、2.0%、2.5%
Residual current accuracy	±1.0%、±2.0%

Specification/Model		125	250	400、630	630	800
Shell grade rated current (A)		125	250	400、630	630	800
No. of poles		3P+N				
Rated operating voltage Ue: (V)		AC 400/50HZ				
Rated insulation voltage Ui (V)		1000				
Rated impact withstand voltage (V)		8000				
Flashing distance (mm)		≯50		≯100		
Limit short circuit breaking capacity Icu (kA)		50		65	65	65
Operating short circuit breaking capacity Ics (kA)		36		50	50	50
Rated residual short circuit on (off) capacity I△m (kA)		12.5 17.5 (H)		16.25 21.25 (H)		
Residual current operating features		AC type				
Rated residual operating current I△n (mA)		30/50/75/100/200/300/500/600/800Auto		30/50/100/200/300/400/500/600/800/1000/Auto		
Rated short-time withstand current Icw (kA)/S		3		400:5 630:8	8	10
Residual operating time features		Delayed/non-delayed type				
Limit non-drive time of delayed type (s)		0.06/0.1/0.2 Optional: 21△n				
Breaking time (s)		I△n≤0.5；2I△n≤0.2；5IΔn≤0.15				
Auto re-closing time (s)		20-60				
Operational performance (times)	Powered	1000		1000		500
	Not powered	7000		4000		2500
	Total	8000		5000		3000
Overload and short circuit features		Three-stage protection, electronically adjustable, see "Description of Protection features" for details				
Overvoltage protection value (V)		Set value (231 ~ 330V)/default value 275V				
Undervoltage protection value (V)		Set value (88 ~ 209V)/default value 145V				
Phase loss protection value (V)		Set value (10 ~ 130V)/default value 30V				
Link control delay time (ms)		≤40ms				
Communication delay time (ms)		≤200ms				

Description of Protection features

◆ Overload long delay protection

operating value setting range

Table 1: Overload Long Delay Parameters Setting

Parameters	Shell current	Set value	Factory setting value
operating setting value Ir1	125	40A、50A、63A、80A、100A、125A	125A
	250	63A、80A、100A、125A、140A、160A、180A、200A、225A、250A	250A
	400、630	160A、180A、200A、225A、250A、315A、350A、400A 450A、500A、560A、630A	400A 630A
	630	250A、300A、315A、350A、400A、500A、560A、630A	630A
	800	315A、350A、400A、450A、500A、560A、630A、700A、800A	800A
Delay time setting value tL		3s, 4s, 6s, 8s, 10s, 12s, 16s, 18s, OFF	3s

◆ operating features

Table 2: Protection operating features

Ambient temperature	Current name	Setting current multiple	Agreed time
+40℃	Agreed non-release current	1.05Ir1	⩾2h
	Agreed release current	1.3Ir1	<2h

◆ Delay features

Overload protection is carried out according to inverse time features:
T=(6I1)2tL Delay accuracy: 10%, where T is the operating time value, Ir1 is the long delay protection setting value, I is the fault current, and tL is the long delay time setting value.

◆ Short-circuit short-time delay protection

Short-circuit short-delay protection prevents impedance short-circuit of distribution system. The purpose of trip delay is to realize selective protection.

Setting of related parameters of short-circuit short-delay protection

Table 3: Short Circuit Short-Delay Parameter Setting

Parameters setting	Set value	Factory setting value
Setting value of short-delay operating current Ir2	2Ir1,2.5Ir1,3Ir1,4Ir1,5Ir1, 6Ir1,7Ir1,8Ir1,10Ir1,12Ir1	6Ir1
Setting value of short-delay time ts	0.1s,0.2s,0.3s,0.4s,0.6s、 0.8s,1.0s,OFF	0.4s

operating features of short-circuit short-delay protection

Table 4: Short-circuit Short-Delay operating features

features	Fault current multiple	Release features	Delay error
Non-operating features	⩽0.85 Ir2	Non-operating	/
Activate features	>1.15 Ir2	Delay operating	±40ms

◆ Instantaneous protection

Setting of related parameters of instantaneous protection

Table 5: Instantaneous Parameters Setting

Parameters setting	Set value	Factory setting value
Setting value of short-delay operating current Ir3	4 Ir1,6 Ir1,7 Ir1,8 Ir1,9 Ir1,10 Ir1, 11 Ir1,12 Ir1,13 Ir1,14 Ir1,OFF	10 Ir1

operating features of short-circuit instantaneous protection

Table 6: Instantaneous operating Features

features	Current multiple	Release features	Release time
Non-operating features	⩽0.85	Non-operating	⩾200ms
Activate features	>1.15	operating	＜200ms

◆ Residual current protection features

Gear setting range

Parameters	Setting values (125,250)	Setting values (400, 630, 800)	Factory setting value
Residual operating current I△n	30,50,75,100,200 300,500,600,800 automatic	30,50,100,200,300,400,500 ,600,800,1000 automatic	500

◆ operating features

Table 2: Protection operating features

Parameters	features			
Rated non-operating current	0.5 I△n			
Rated active current	≥0.8 I△n			
Delay features	2I△n limit undriven time (△t)	Segment time		
		I△n	2I△n	5 I△n
Non-delay		≤0.3s	≤0.15s	≤0.04s
0.06	≥0.06s	≤0.5s	≤0.2s	≤0.15s
0.1	≥0.10s	≤0.8s	≤0.3s	≤0.3s
0.2	≥0.20s	≤1.0s	≤0.4s	≤0.4s

◆ Automatic gear mode

Each gear value and floating value in automatic gear mode:

Gear value (mA)	Floating value (mA)
30	15
50	25
75	37.5
100	50
200	100
300	150
400	200
500	250
600	300
800	400
1000	-

When the residual current is greater than the floating value of the gear but does not reach its operating value and stably maintains for 60s, the gear goes up a gear, and so on, until reaching the maximum gear; When the residual current is less than the floating value of the next gear in this gear and stably maintains for 120s, the gear goes down a gear, and so on, until reaching the minimum gear. Take "Gear 2" and the initial residual current of 100mA of the line as an example. The circuit breaker is powered on, and the gear is automatically set to 300mA. When the residual current increases to more than 150mA and stabilizes for 60s, the gear changes to gear 500mA; When the residual current decreases below 150mA and stabilizes for 120s, the gear changes to gear 200mA.

◆ Automatic reclosing

When the residual current exceeds the operating current value, the gear can automatically reclose after 20 ~ 60s, but the manual closing is not limited by time. If the fault current is eliminated within 5s after closing, the closing is successful and the circuit breaker runs normally; If the fault current is not eliminated, the circuit breaker trips again and is locked, so it cannot be reclosed automatically, but must be closed manually.

◆ Overvoltage protection function

When the line phase voltage is higher than the set value of overvoltage protection, the circuit breaker protection trips. When the line voltage returns to normal, the circuit breaker can be automatically closed for operation. The setting value range of overvoltage protection is 231V~330V, and the factory setting is 275V. Users can set or close the protection.

◆ Undervoltage protection function

When the line phase voltage is lower than the set value of undervoltage protection, the circuit breaker protection trips. When the line voltage returns to normal, the circuit breaker can be automatically closed for operation.
The setting value range of undervoltage protection is 88V ~ 209V, and the factory setting is 145V. Users can set or close the protection.

◆ Phase loss protection function

When the power supply terminal of the line is of phase loss, the circuit breaker protection trips. When the line voltage returns to normal, the circuit breaker can be automatically closed for operation. The setting value range of phase loss protection is 10V~130V, and the factory setting is 30V. Users can set or close the protection.

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◆ Linkage protection function
Linkage protection can be carried out with other fire fighting equipment through linkage interface as follows:

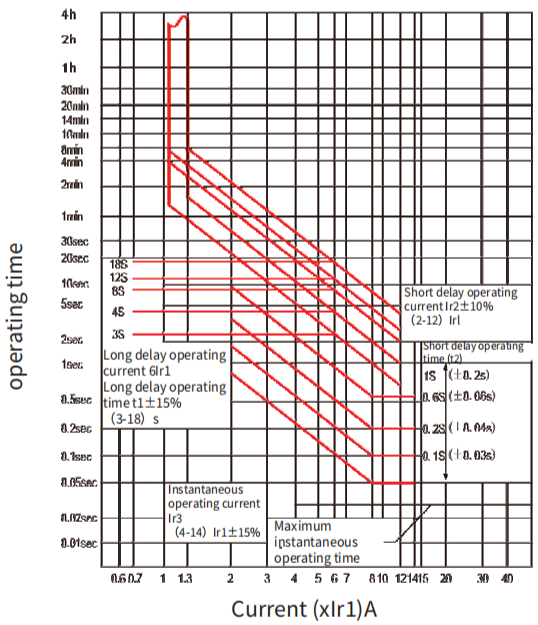
DI input settings		Description of function	Priority	Delay time
Input control	The common terminal is short circuited with the closing port	Circuit breaker closing	Low	≤40ms
	The common terminal is short circuited with the opening port	Circuit breaker opening	High	≤40ms

Note: Long-term short-circuiting will make the short circuit always be in the open state.

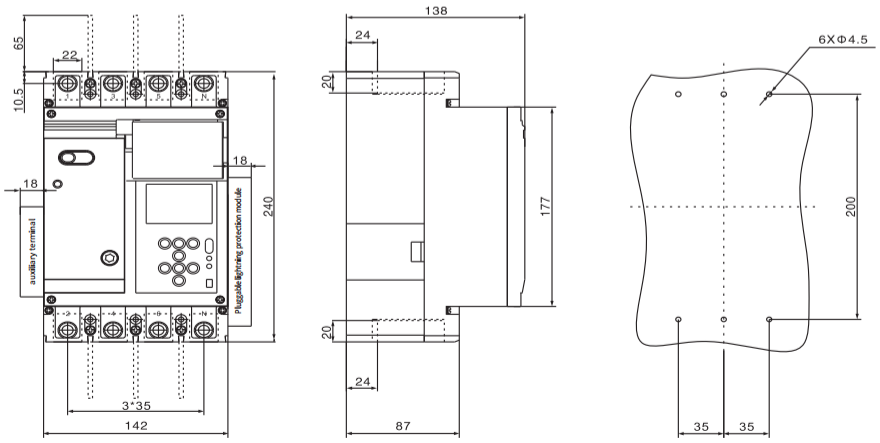
◆ Charge-control protection function
The product can be connected with the charge-controlled electric meter and used as an external circuit breaker of the electric meter. It is compatible with pulse-type and level-type charge-controlled electric meters. The switch shall be configured to charge-control mode and turn on the joint control permit to use this function. When working in charge-control mode, the linkage protection function automatically exits, and when there is no charge-control signal of the meter, it cannot be automatically closed manually. When the product is forcibly closed, it will automatically be disconnected.

◆ Time control protection function
The product can be used for occasions requiring time-controlled opening and closing, such as smart street lamps, and school energy management. When working in the time-controlled mode, the start time and end time of allowing closing can be adjusted. For the product, 4 time period can be set up. In the time period, the product will automatically close if the line fault cannot be detected. In case of safety fault (such as overvoltage, undervoltage and leakage) during work, it will automatically protect and close automatically after safety. If not in the preset time period, the product will automatically open and lock. If emergency power supply is required during the period, it is necessary to change the working mode to normal mode before closing and supplying power, otherwise the product will automatically open.

Diagram

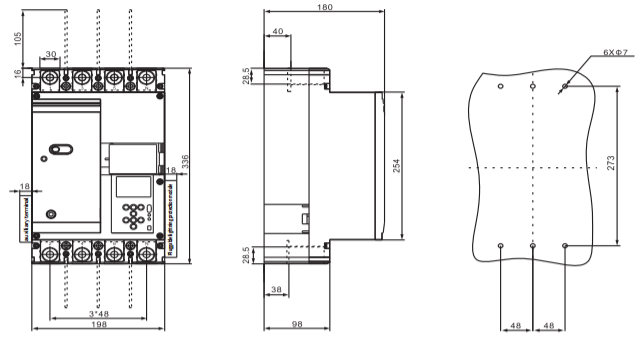


Overall and Installation Dimensions

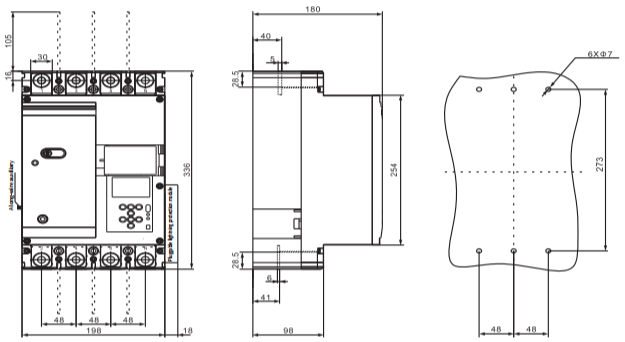


125, 250 shell

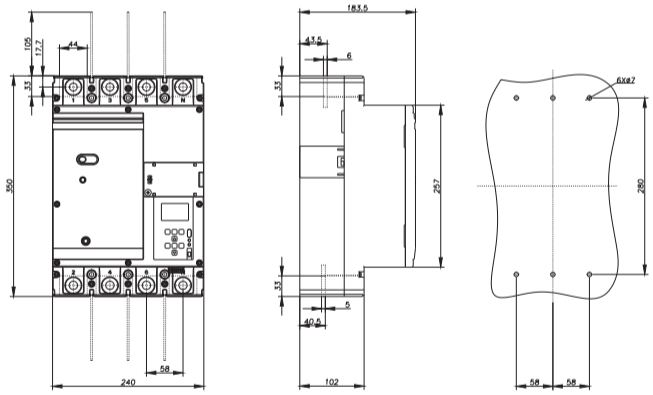
Overall and Installation Dimensions



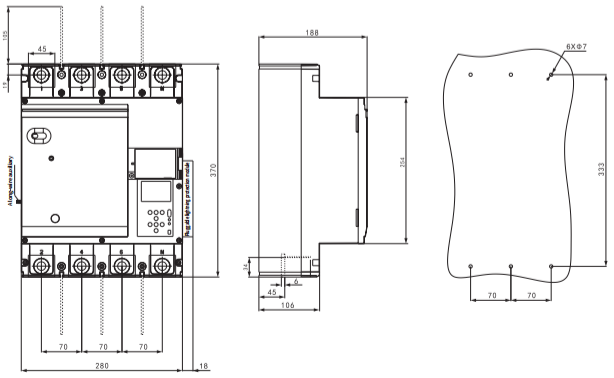
400 shell



630 shell



630 shell (standard)



800 shell