iALLway

Product Selection Manual

ZHEJIANG IALLWAY ELECTRIC CO., LTD

iALLway

Iallway's spirit: concentric, pragmatic and innovative

Iallway's mission: to make electricity use safer

Iallway's values: respect, dedication, team, integrity and passion

ENTERPRISE ENVIRONMENT

CONTENT

iALW1 Intelligent Universal Circuit Breaker

Product overview

iALW1 series intelligent universal circuit breaker is applicable to the AC 50Hz distribution network with rated current of 200A to 6300A, rated insulation voltage of 1000V, and rated working voltage of 400V and 690V. It is used to distribute electric energy and protect circuits and power equipment from overload, undervoltage, short circuit, single-phase grounding and other faults. At the same time, it can also be used as a disconnector. It has a variety of protection functions and high-precision selective protection to improve the reliability of power supply.

Product naming rules

iAL W 1 - □ □ / □

- Number of poles
- Rated limited short circuit breaking capacity level
- Rated current of frame size
- Design code
- Universal circuit breaker
- Enterprise feature code

◆Product classification

◇According to the installation mode: a. fixed type b. draw-out type.

◇According to the operation mode: a. electric operation b. manual operation (for overhaul and maintenance)

◇According to the number of poles: a. 3P b. 4P

◇Release type a. intelligent controller type: M, 3H b. undervoltage instantaneous (or delay) operated release c. shunt release.

◆Working environment and installation conditions

◇Ambient air temperature: - 5℃~+ 40℃, and the average value in 24 hours shall not exceed + 35℃.

Note: if the upper or lower limit of ambient air temperature exceeds the specified range, the user shall negotiate with the manufacturer.

◇The altitude of the installation site shall not exceed 2000m.

◇Atmospheric conditions: when the ambient air temperature is +40℃, the atmospheric relative humidity shall not exceed 50%. At a lower temperature, it can have a higher relative humidity. The monthly average maximum relative humidity in the wettest month is 90%. At the same time, the monthly average minimum temperature in that month is +25℃, the condensation on the product surface due to temperature change should be taken into.

◇The pollution level is level 3.

◇Installation category: class IV for main circuit, coil of undervoltage release and primary coil of power transformer, and class III for other auxiliary circuits and control circuits.

◇Installation conditions: the circuit breaker shall be installed according to the installation requirements of the product manual, and the vertical inclination of the circuit breaker shall not exceed 5%.

◇Protection grade: IP30, IP40 (installed in cabinet chamber and equipped with door frame).

◇Usage category: class B.

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Product parameters

Basic information						
Rated current of frame size		1000	2000/2000H	3200	4000	6300
Rated working current In(A)		200/250 /300/350 /400/500 /630/700 /800/1000	200/400 /630/800 /1000/1250 /1600/1900 /2000	2000/2500 /2900/3150 /3200	2000/2500 /2900/3150 /3200/4000	4000/4900 5000/5900 6300
Number of poles		3P/4P	3P/4P	3P/4P	3P	3P/4P
Frequency(Hz)		50	50	50	50	50
Rated working voltage Ue(V)		400/690	400/690	400/690	400/690	400/690
Rated insulation voltage Ui(V)		1000	1000	1000	1000	1000
Rated impulse withstand voltage Uimp(KV)		12	12	12	12	12
Breaking capacity level		Blank (general)	Blank (general)/ H	Blank (general)	Blank (general)	Blank (general)
Rated limited short circuit breaking capacity Icu(KA)	AC400V	42	80/90	100	100	120
	AC690V	25	50/65	65	65	75
Rated service short-circuit breaking capacity Ics(KA)	AC400V	30	50/75	80	80	100
	AC690V	20	40/65	50	50	65
Rated short-time withstand current Icw/1s(KA)	AC400V	30	50/60	80	80	100
	AC690V	20	40/50	50	50	65
Rated short-time withstand current Icw/0.5s(KA)	AC400V	/	-/75	/	/	/
	AC690V	/	-/65	/	/	/
Service life	Mechanical	Maintenance free 15000 With maintenance 30000	Maintenance free 15000 With maintenance 30000	Maintenance free 10000 With maintenance 20000	Maintenance free 10000 With maintenance 20000	Maintenance free 5000 With maintenance 10000
	Electrical	Maintenance free 8000	Maintenance free 8000	Maintenance free 6000	Maintenance free 6000	Maintenance free 1500
Arcing distance (mm)		0	0	0	0	0
Installation mode		Fixed type, draw-out type	Fixed type, draw-out type	Fixed type, draw-out type	Fixed type, draw-out type	draw-out type
Wiring mode		Horizontal, vertical	Horizontal, vertical	Horizontal, vertical	Horizontal	Horizontal
Controller type		M/3H	M/3H	M/3H	M/3H	M/3H

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Additional information					
Intelligent release	■ (Standard M)	■ (Standard M)	■ (Standard M)	■ (Standard M)	■ (Standard M)
Shunt release	■ (Standard)	■ (Standard)	■ (Standard)	■ (Standard)	■ (Standard)
Undervoltage release (instantaneous)	■ (Standard)	■ (Standard)	■ (Standard)	■ (Standard)	■ (Standard)
Undervoltage-delay release (instantaneous)	□ (Optional)	□ (Optional)	□ (Optional)	□ (Optional)	□ (Optional)
Closing electromagnet	■ (Standard)	■ (Standard)	■ (Standard)	■ (Standard)	■ (Standard)
Motor	■ (Standard)	■ (Standard)	■ (Standard)	■ (Standard)	■ (Standard)
Auxiliary (four sets of auxiliary contacts)	■ (Standard)	■ (Standard)	■ (Standard)	■ (Standard)	■ (Standard)
Door frame	■ (Standard)	■ (Standard)	■ (Standard)	■ (Standard)	■ (Standard)
Interphase partition	■ (Standard)	■ (Standard)	■ (Standard)	■ (Standard)	■ (Standard)
Draw-out type three-position indication	□ (Optional)	□ (Optional)	□ (Optional)	□ (Optional)	□ (Optional)
Key lock	□ (Optional)	□ (Optional)	□ (Optional)	□ (Optional)	□ (Optional)
Cable mechanical interlock	□ (Optional)	□ (Optional)	□ (Optional)	□ (Optional)	□ (Optional)
mechanical interlock	□ (Optional)	□ (Optional)	□ (Optional)	□ (Optional)	□ (Optional)
Wiring screw	■ (Standard)	■ (Standard)	■ (Standard)	■ (Standard)	■ (Standard)
L-shaped vertical transfer row	□ (Optional)	□ (Optional)	□ (Optional)	□ (Optional)	/
3P+N trans-former (T type / W type)	□ (Optional)	□ (Optional)	□ (Optional)	□ (Optional)	□ (Optional)
Leakage transformer	□ (Optional)	□ (Optional)	□ (Optional)	□ (Optional)	□ (Optional)

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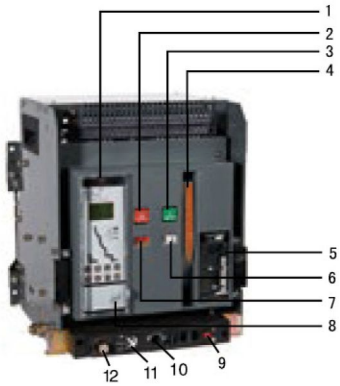
◆Circuit breaker front indication

1. Reset button
2. Opening button
3. Closing button
4. Energy storage handle
5. Nameplate
6. Energy release and storage indication
7. Opening and closing indication
8. Test port
9. Three-position lock
10. Rocker operating position
11. "Connection", "test", " Disconnection" position indication
12. Rocker and its storage position



◆The draw-out type circuit breaker is composed of a circuit breaker body and a draw-out base. There are guide rails on both sides of the draw-out base, on which there are movable guide plates, and the circuit breaker frame falls on the left and right guide plates. The draw-out type circuit breaker is connected to the main circuit by inserting the bus on the circuit breaker body into the bridge contact on the draw-out base

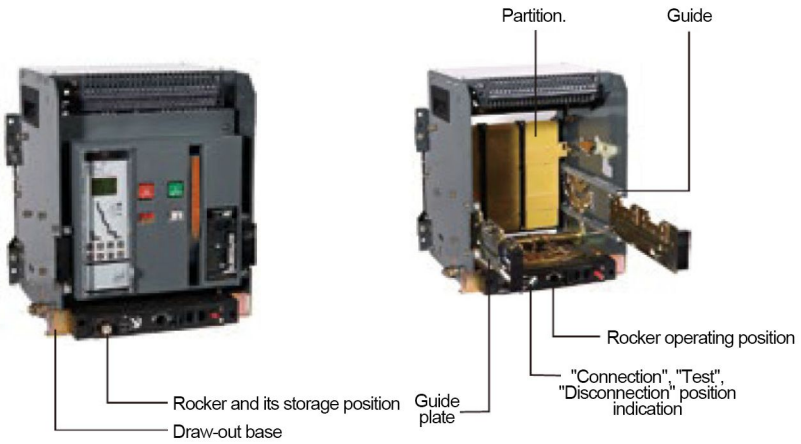
By shaking the rocker on the lower beam of the draw-out base it can realize the three working positions of the draw-out circuit breaker (there is a position indication next to the rocker)

"Connection" position: the main circuit and secondary circuit are connected.

"Test" position: when the main circuit is disconnected and the secondary circuit is connected, necessary action tests can be carried out.

"Disconnection" position: the main circuit and secondary circuit are all disconnected, the circuit breaker body can be taken out at this position.

The draw-out type circuit breaker has interlocking device, and the circuit breaker can be closed only in the connection position and test position. It cannot be closed between connection and test.



Control unit

The M and 3H series intelligent controllers used by iALW1 series intelligent universal circuit breaker represent the latest technical level of today's universal circuit breaker controller, and can provide more perfect protection function, more comprehensive measurement function, more powerful communication function and richer man-machine interface for power system, communication industry, metallurgy industry and industrial building system.

M, 3H series intelligent controller is mainly used for power distribution, feed or power generation protection to protect circuits and power supply equipment from overload, short circuit, grounding/leakage, current imbalance, overvoltage, undervoltage, voltage imbalance, over frequency, under frequency, reverse power and other faults, and it realizes the reasonable operation of power grid through load monitoring, demand protection, regional interlocking and other functions. The controller also has the measurement function of power grid parameters such as current, voltage, power, frequency, electric energy, demand and harmonic of power grid nodes, and the recording function of operation and maintenance parameters such as fault, alarm, operation times, historical maximum current and switch contact wear. When the power network is connected with communication network, the intelligent controller can realize telemetry, remote signaling, remote control and remote adjustment at the remote terminal of power automation network, and supports a variety of communication protocols.

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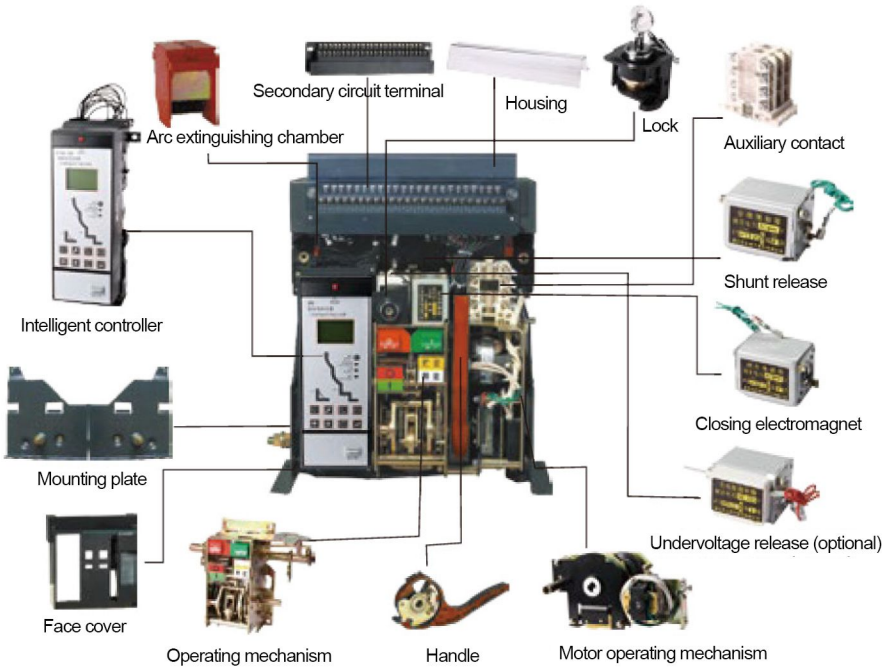
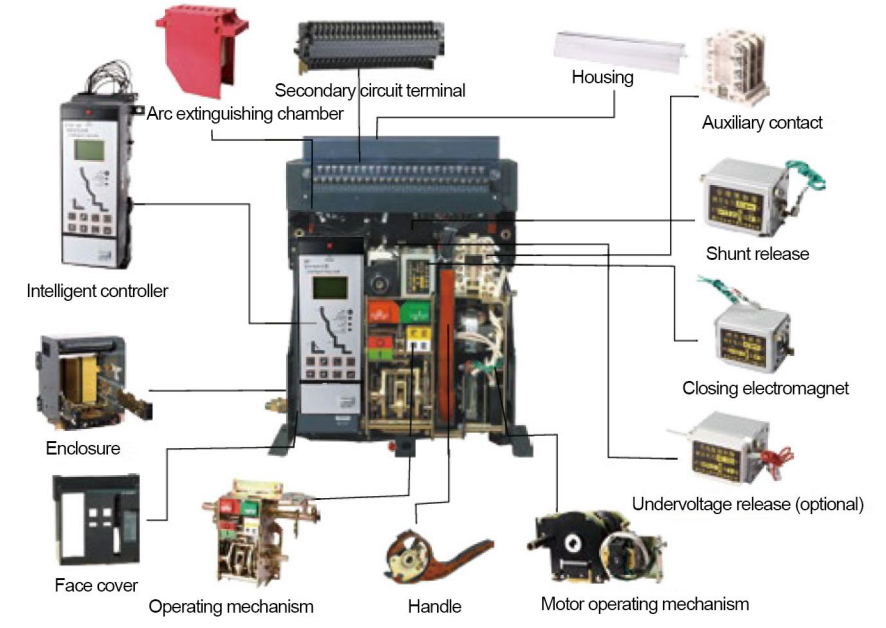
Product composition

◆Structure of circuit breaker

◇Fixed type structure decomposition drawing:



◇Draw-out type structure decomposition drawing:



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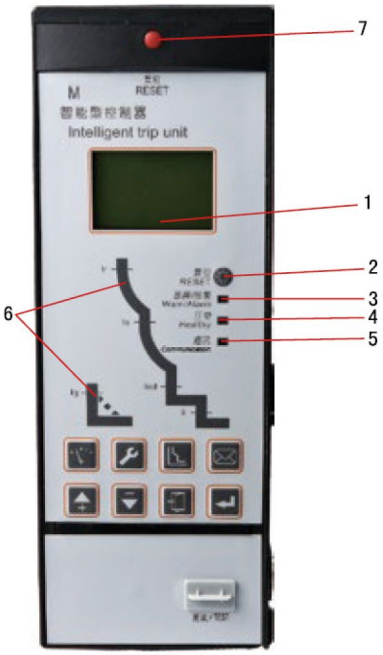
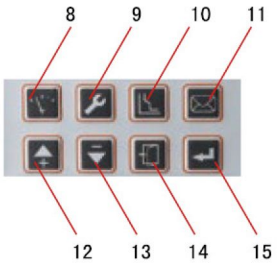
◆Menu operation instructions

◇Display operation panel





Instruction description

1. LCD interface display
2. Fault and alarm reset key
3. "Fault/alarm" LED

During normal operation, the LED does not light up. When it trips, the red LED will flash quickly; when an alarm occurs, the red LED is always on.

4. "Normal" LED

As long as the controller is powered on and working normally, the green LED always flashes.

5. Communication indicator

The communication status indication is as below:

Profibus: it is off when there is no communication, and it is always on when there is communication.

Modbus: it is off when there is no communication, and it flashes when there is communication.

Device Net: it flashes when there is no communication, and is always on during communication.

6. Curve LED

Red LED indicator is hidden in the curve. In case of fault tripping, the corresponding LED light flashes quickly to indicate the fault type. In case of protection parameter setting, the LED is constantly on to indicate the currently set items.

7. Mechanical reset button

This button pops up during fault trip or test trip. When it is not pressed, the circuit breaker cannot be closed; after the button is pressed, the fault indication is reset at the same time.

Keyboard description

8. Measurement-function key 1, it switches to the measurement default theme menu.
9. Set-function key 2, it switches to the parameter setting theme menu.
10. Protection-function key 3, it switches to the protection parameter setting theme menu.
11. Information-function key 4, it switches to the history and maintenance topic menu.
12. Up-it moves the menu content upward at the currently used level, or changes the selected parameter upward.
13. Down-it moves the menu content downward at the currently used level, or changes the selected parameter downward.
14. Exit- it exits the currently used level, enters the previous menu, or cancels the selection of the current parameter.
15. Selection-it enters the next menu pointed to by the current item, or selects the current parameter to store the changes.

◇Menu structure

The menu consists of measurement menu, parameter setting menu, protection parameter setting menu, history record and maintenance menu.

Note: the actual menu changes according to different functions selected by the user.

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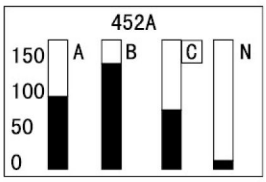
◇Theme menu

The controller provides four theme menus and one default interface.

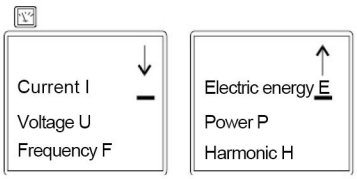
a)Default interface



The default interface is displayed when the controller is powered on.

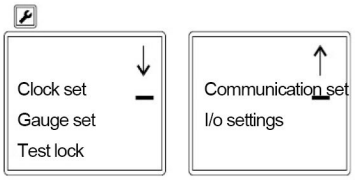
Press the button or corresponding topic key under each theme menu to return to the default interface.
If there is no key operation within 5 minutes, the box cursor will automatically indicate the current maximum phase.
In the non fault pop-up interface, if there is no key operation within 30 minutes, it will automatically return to the default interface.

b) “Measurement” menu



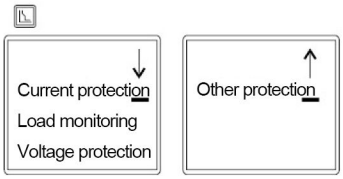
Press the or button to return to the default interface
In other non fault interfaces, press to jump to the measurement menu.

c) "System parameter setting" menu



Press the or button to return to the default interface
Press in other non fault interfaces to jump to the system parameter setting menu.

d) “Protection parameter setting” menu

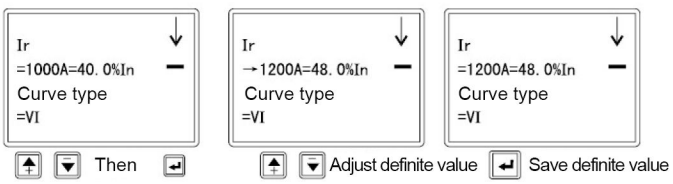


Press the or button to return to the default interface
Press in other non fault interfaces to jump to the system parameter setting menu.

e) “History and maintenance” menu

Press the or button to return to the default interface
Press in other non fault interfaces to jump to the system parameter setting menu.

f) Sub menu operation example: overload long delay protection setting



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◆Protection parameter setting

No.	Symbol	Function description	Show instance	Display description
1	Ic1	Load monitoring 1 setting current	1000	Ic1=1000A
2	Ic2	Load monitoring 2 setting currentring	1000	Ic2=1000A
3	Ig	Setting value of grounding current	400	Ig=400A
4	tg	Grounding protection delay time	OFF	tg=OFF, Alarm action only
5	IR	Long time delay protection setting current	1000	IR=1000A
6	tR	Long time delay protection setting time	15	tR=15s
7	Isd	Short time delay protection setting current	8000	Isd=8000A
8	tsd	Short time delay protection setting time	0.4	Tsd=0.4s
9	Ii	Instantaneous protection setting current	12.00	Ii=12.00kA

Taking the setting of long time delay protection setting current (IR) as an example, the operation steps are as follows:
Step 1: confirm that the controller is in the 【main interface】, otherwise press the 【clear】key to exit other states and enter the【main interface】;
Step 2: press the 【set】key continuously, and the IR light is on;
Step 3: press 【+】or【-】 key to modify the current parameter, long press to increase or decrease quickly, and click to increase or decrease slowly;
Step 4: press the 【save】key to save the modified parameters. At this time, the storage light is on, indicating that the current data modification and saving is completed;
Step 5: continue to modify other parameters, or press 【clear】to exit

◆Test function operation

The controller can realize the simulation test by pressing the【trip】or【non-trip】button;
Example: current IR=1000A, tR=15s; for the simulation test when the fault current is 1500A (1.5IR), the operation steps are as follows:
Step 1: confirm that the controller is in the 【main interface】, otherwise press the 【clear】key to exit other states and enter the 【main interface】;
Step 2: press the【set】key continuously until the Isd light is on;
Step 3: long press the【-】key to change the current Isd to 1500A (Note: do not save the setting parameters);
Step 4: press【trip】or 【non-trip】to start the simulation test; at this time, the test lamp is always on, indicating that it is in the test delay state;
Step 5: when the test delay time is up, the controller sends a tripping or non-tripping command, and displays the delay time and test current in turn;
Step 6: press the【clear】key to return to the main interface.

【Instructions for use】:

[1] After the 【tripping】test, the controller sends a tripping command to display the test current and time, and the "tripping" light is on;
[2] After the 【non-tripping】test, the controller does not send tripping command and displays the test current and time;
[3] If the setting parameters are unreasonable, the test will not start;
[4]The test information after the test is not stored;
[5]The test is only for protection. When a function is set to alarm mode, the test will not start.

◆Fault query operation

The controller can view the fault information corresponding to the last protection action. The operation steps of fault query are as follows:
Step 1: confirm that the controller is in the 【main interface】, otherwise press the 【clear】key to exit other states and enter the 【main interface】;
Step 2: press the【fault query】key, and the controller circularly displays the fault current and delay time;
Step 3: press the【select I】key to query the current of each phase at the tripping moment;
Step 4: press the【clear】key to return to the main interface.

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◆Controller classification and technical performance

◇Classification and function

1) Basic functions

For model M, if no optional functions are selected, the functions are configured as basic functions, as shown in the table.

Protection function	Measurement function	Maintenance function	Human-computer interface
1.Load monitoring (current mode 1) 2. Multi curve long delay protection 3. Multi curve short delay inverse time limit protection 4. Short delay definite time protection 5. Instantaneous protection 6. MCR and HSISC protection 7. Current unbalance (phase failure) protection 8. Grounding protection (T-type is default) 9. Grounding alarm 10. Neutral protection	1. Four phase current and grounding current measurement 2. Heat capacity	1. Eight fault records 2. Eight alarm records 3.Eight displacement records 4.Historical peak current 5. Contact equivalent 6. Operation times 7. Clock function 8. Self-diagnosis	1. Chinese graphic LCD 2. LED status indication 3. Keyboard operation

2) Communication function

The communication function is optional. There is no communication function for model M. For model 3H communication protocol, it can be selected as "2" Profibus-DP, "3" Modbus and "4" Device Net as required.

3) Optional function

The optional function is optional, and the optional function configuration can be selected for M type and 3H type. The code and content of different optional functions are shown in the table.

Optional function code						
D	U	UD	P	PD	H	HD
1. Required value measurement (current) 2. Required value protection	1. Voltage measurement 2. Frequency measurement 3. Voltage unbalance rate measurement 4. Phase sequence detection 5. Overvoltage protection 6. Undervoltage protection 7.Voltage unbalance protection 8. Over frequency protection 9. Underfrequency protection 10.Phase sequence protection	1. Voltage measurement 2.Frequency measurement 3. Voltage unbalance rate measurement 4. Phase sequence detection 5. Current demand Value measurement 6. Overvoltage protection 7. Undervolt-age protection 8. Voltage unbalance protection 9. Over frequency protection 10. Under frequency protection 11. Phase sequence protection 12. Required value protection	1. Voltage measurement 2.Frequency measurement 3. Voltage unbalance rate measurement 4.Phase sequence detection 5. Power measurement 6.Power factor measurement 7. Electric energy measurement 8. Overvoltage protection 9. Undervolt-age protection 10. Voltage unbalance protection 11. Over frequency protection 12. Under frequency protection 13. Phase sequence protection 14. Reverse power protection	1. Voltage measurement 2.Frequency measurement 3. Voltage unbalance rate measurement 4. Phase sequence detection 5. Power measurement 6. Power factor measurement 7. Electric energy measurement 8. Required value measurement (current, power) 9. Overvoltage protection 10. Undervolt-age protection 11. Voltage unbalance protection 12. Over frequency protection 13. Under frequency protection 14. Phase sequence protection 15. Reverse power protection protect 16. Required value protection	1.Voltage measurement 2.Frequency measurement 3. Voltage unbalance rate measurement 4. Phase sequence detection 5. Power measurement 6. Power factor measurement 7. Electric energy measurement 8. Harmonic measurement 9. Overvoltage protection 10. Undervolt-age protection 11. Voltage unbalance protection 12. Over frequency protection 13. Under frequency protection 14. Phase sequence protection 15. Reverse power protection	1. Voltage measurement 2. Frequency measurement 3. Voltage unbalance rate measurement 4. Phase sequence detection 5. Power measurement 6. Power factor measurement 7. Electric energy measurement 8. Required value measurement (current, power) 9. Harmonic measurement 10. Overvoltage protection 11. Undervoltage protection 12. Voltage unbalance protection 13. Over frequency protection 14. Under frequency protection 15. Phase sequence protection 16. Reverse power protection 17. Required value protection

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4) Selection of regional interlocking and signal unit

"Regional interlocking and signal unit" is optional. The function configuration of signal unit can be selected for M and 3H types. When the signal unit is S2 and S3, the controller has regional interlocking function. In order to realize "remote control" for 3H type, the function of "signal unit" must be selected.

◇Technical performance of controller

1) Working power supply

The auxiliary power supply and power transformer supply power at the same time to ensure that the controller can work reliably under small load and short circuit. There are three power supply modes for the controller:

a) Power CT power supply

When the rated current is greater than or equal to 400A, the single-phase primary current is not less than 0.4In, and the three-phase current is not less than 0.2In, the controller works normally.

b) Auxiliary power supply

Allowable variation range of rated voltage DC24V: ±5%,

AC220V allowable variation range: ±15%,

AC380V allowable variation range: ±15%

DC110V/DC220V allowable variation range: ±15%,

Rated power consumption: <7W

c) Test port power supply

Rated voltage DC24V, allowable fluctuation range: ±5%.

Note: when using grounding protection, communication and thermal memory functions or the circuit breaker is required to maintain input and output signals in the open state, it must be equipped with auxiliary power supply

◇Input and output

a) Switching value contact output (DO) contact capacity

DC110V 0.5A resistant

AC250V 5A resistant

b) Switching value input power requirements

Voltage level: DC110V-DC130V or AC110V-AC250V

Minimum ON voltage: 60V, maximum OFF voltage: 30V.

◆Function description and parameter setting

◇Protection characteristics and functions

1) Overload long time delay protection

Overload long time delay protection function is generally used to protect cable overload based on the effective value of current (r.m.s).

Setting parameters related to overload protection:

Parameter name	Setting range	Setting step	Remarks
Operation current setting value I_R	OFF+ (0. 4-1.0) In	1A (iALW1-2000) 2A (iALW1-3200~6300)	As required, the lower limit of IR can be 0.2In, 0.3In and 0.4In (I factory set), and the upper limit is 10In (power distribution protection), "OFF" means exit
Protection curve type selection	S1: standard inverse time V1: fast inverse time limit EI(G): extra-fast inverse time limit (for general distribution protection) EI (M): extra-fast inverse time limit (for motor protection) HV: high voltage fuse compatible I²h: Universal inverse time protection		
Protection curve setting (delay time setting)	C01-C16		
Thermal memory time setting	Instantaneous, 10 minutes, 20 minutes, 30 minutes, 45 minutes, 1 hour, 2 hours, 3 hours		

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Relevant setting parameters of short time delay protection

Parameter name	Setting range	Setting step	Remarks
Inverse time operation current setting value Is	OFF+1.5~15I_R	1A(iALW1-2000) 2A(iALW1-3200~6300)	IR load length delay setting value.When IR = OFF, the IR rated current In
Definite time operation current setting value Isd	OFF+1.5~15I_R		
Definite time delay time setting value tsd	0.1~0.4s	step 0.1S	The customizable time is 0.1-1s
Short circuit zone interlock (ZSI)	1. At least one circuit switching value output (DO) is set as "area interlocking" or "short circuit interlocking" 2. At least one circuit switching value input (DI) is set as "area interlocking" or "short circuit interlocking"		The signal unit option must be S2 or S3. When DI/DO is set as "area interlocking", it works on "grounding area interlocking" and "short circuit area interlocking". When it is set as "short circuit interlocking", it only works on "short circuit area interlocking". If the function is not set, the area interlocking function does not work.

Short delay inverse time operation characteristics

Characteristic	Current multiple (I /Is)	Conventional tripping time	Allowable delay error
Non-operation characteristics	<0.9	Non-operation	
Opertion characteristics	>1.1	Operation	
Operation delay	⩾ 1.1	Note 1	±10% (Inherent absolute error ±40ms)

Note 1: The short delay inverse time delay characteristic is the same as the overload long delay, and the action delay time is one tenth of the long delay.

Short delay definite time limit operation characteristic

Characteristic	Current multiple (I /Is)	Conventional tripping time	Allowable delay error
Non-operation characteristics	<0.9	Non-operation	
Opertion characteristics	>1.1	Operation	
Operation delay	⩾ 1.1	Definite-time limit delay time ts	±10% (Inherent absolute error ±40ms)

2) Instantaneous protection characteristics

The instantaneous protection function prevents the solid short circuit of the distribution system. Such faults are generally phase to phase faults. The short-circuit current is relatively large and needs to be disconnected quickly. This protection is based on the effective value of current (r.m.s).

Relevant setting parameters of instantaneous protection

Parameter name	Setting range	Setting step
Operation current setting value Ii	OFF+1.0~20In	1A (iALW1-2000) 2A (iALW1-3200~6300)

Instantaneous protection operation characteristics

Characteristic	Current multiple(I/Ti)	Conventional tripping time
Non-operation characteristics	<0.85	Non-operation
Operation characteristics	>1.15	operation
Operation delay	⩾ 1.15	<40ms

iALW1 Intelligent Universal Circuit Breaker

◇Factory settings of intelligent controller

Controller tripping curve type	I^2t		Grounding fault protection	I_g	0.5In(In ⩽ 2000A)
Overload long time delay protection	I_R	1In			1000A (In > 2000A)
	t_R	60s			
Overload long time delay protection curve setting	C3			t_g	0.1s(Definite time limit)
Short circuit short time delay protection	Is	6In	Load monitoring	Ic1	1In
	Iad	8In		Ic2	1In
	tsd	0.2s			
Short circuit instantaneous protection	Ii	10In			
Thermal memory function	OFF				

Note: 1. The user can set it according to needs, but it cannot be crossed (that is, the parameter setting must comply with Ii≥Isd≥IR).
2. If there are special requirements, it shall be stated when ordering.

◇Selection of working voltage of intelligent controller

Type	Rated working voltage(V)	
	AC	DC
Intelligent controller(Ue)	220/230、380/400	24、110、220

Note: if you need other working voltages, please contact our company.

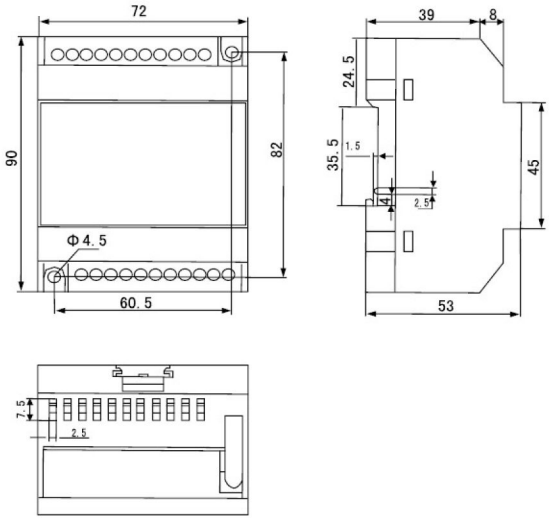
◆Control unit accessories

◇ST201 relay module

The signal unit output by the controller is generally used for fault alarm or indication. When the load capacity used to control the opening and closing of the circuit breaker is large, it needs to be controlled after conversion through the ST201 relay module. The contact capacity of ST201 is AC250V 10A, DC28V 10A. The outline and installation dimensions are the same as those of ST power module (IV).

◇ST power module (IV)

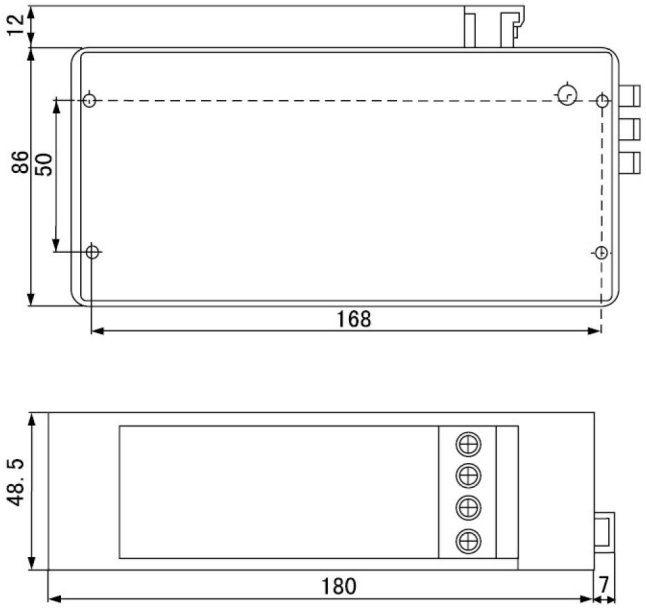
ST power module (IV) can provide DC24V power supply with power not less than 9.6W, output four groups of wiring terminals and input AC or DC universal (AC/DC220V). It can be used as the power supply of ST201 relay module. The product adopts two installation methods: 35mm standard guide rail and direct fixation. The outline and installation dimensions are as follows:



iALW1 Intelligent Universal Circuit Breaker

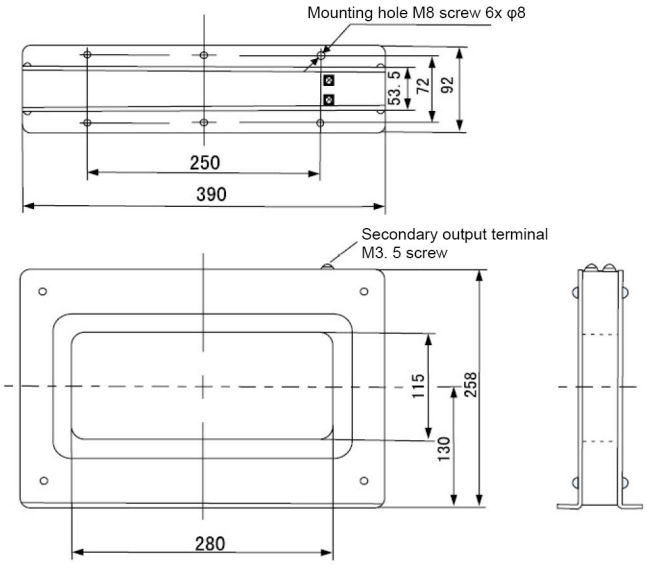
◇DC power module ST-I

External power module I DC inverter power supply, input AC/DC 220V or 110V, output DC28V, 0.63A. It is generally used as the power module when the auxiliary power supply of the controller is required to be DC110V/DC220V. See the figure below for its appearance and installation dimensions.



◇ZCT1 Leakage transformer

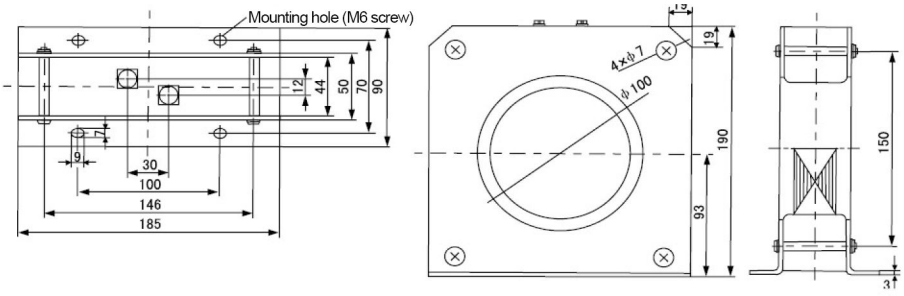
When the grounding protection mode is leakage (E) type, the installation size of the additional special rectangular transformer is shown in the figure below.



iALW1 Intelligent Universal Circuit Breaker

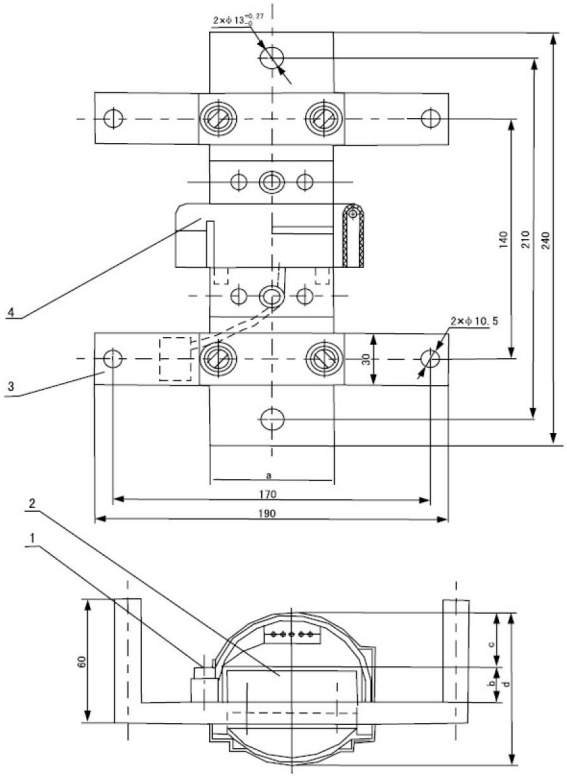
◇ ZT100 grounding transformer

When the grounding mode is ground current return type (W), the installation dimensions of the external special transformer are shown in the figure below.



◇ N-pole external transformer

When the user selects 3P+N grounding mode, the installation dimensions of external neutral transformer or ground current transformer are shown in the figure below.



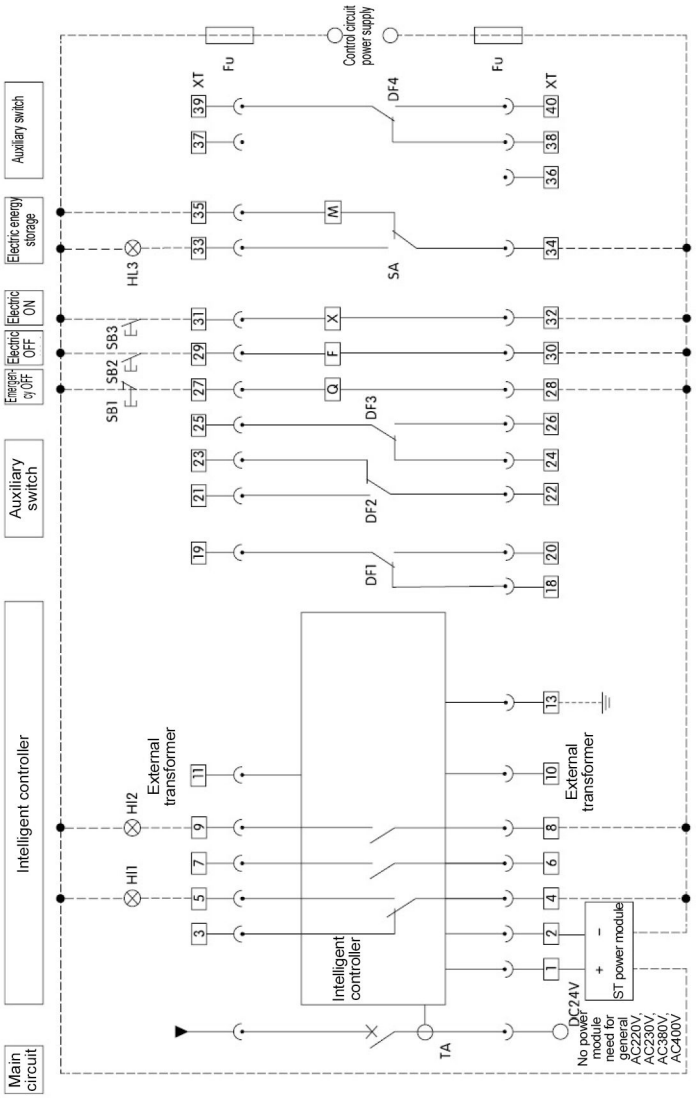
1-grounding plate 2-bus 3-fixed plate 4-transformer

Inm(A)	a(mm)	b(mm)	c(mm)	d (mm)
2000	60	12.5	34	Φ89
3200、4000	80	20	35	Φ109.5

iALW1 Intelligent Universal Circuit Breaker

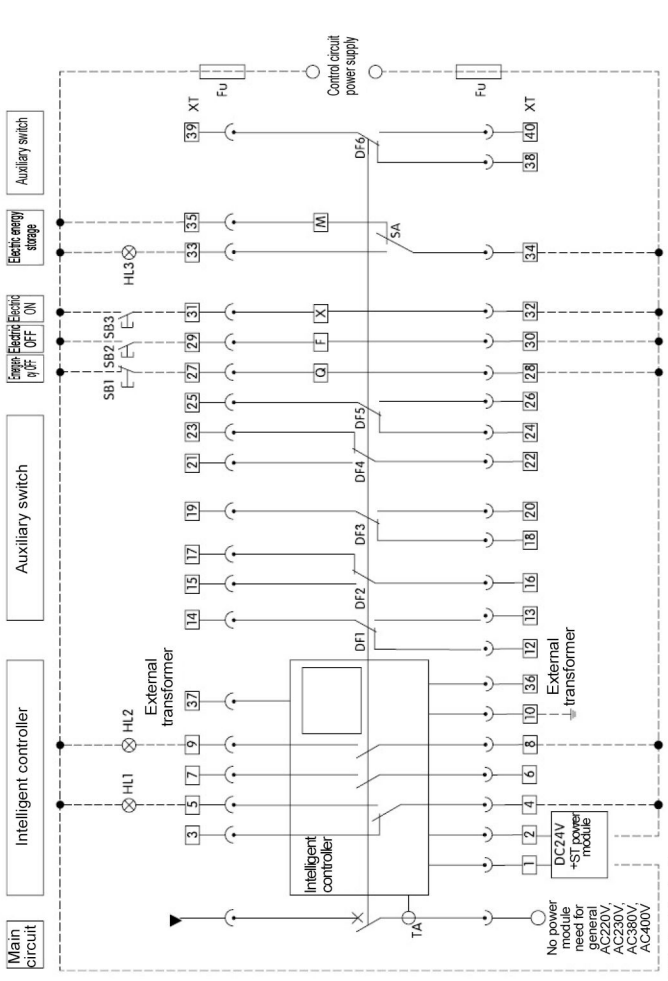
Electrical wiring diagram

◆iALW1-1000 secondary circuit wiring diagram (M-type, four groups of conversion contacts)



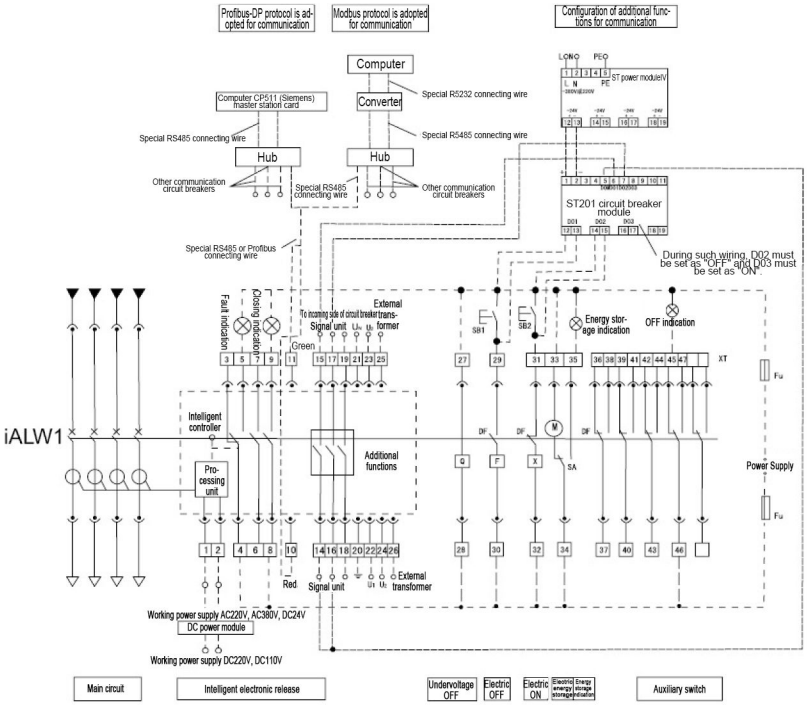
iALW1 Intelligent Universal Circuit Breaker

◆iALW1-1000 secondary circuit wiring diagram (M-type,six groups of conversion contacts)



iALW1 Intelligent Universal Circuit Breaker

◆ Electrical wiring diagram of iALW1-1000~6300 equipped with 3H intelligent controller.



3H communication status intelligent controller electrical wiring diagram

● Power input
#1, #2: since the controller has a variety of working power types, it must be noted whether the input power type is consistent with the working power type of the controller, otherwise the controller will be damaged.

● Fault trip auxiliary contact
#3, #4, #5: fault trip contact output (#4 for common terminal), contact capacity: AC250V, 16A

● Communication output
#10, #11: communication interface output, the output modes of the three communication protocols are the same.

● Programmable I/O interface
#14~#19: (DO:DC110V 0.5A, AC250V, 5A.DI:DC110V~130V or AC110V ~ AC250V).
When the signal unit type is S1: (4DO mode)
#14, #15: programmable output contact 2 (DO2);
#16 #, #17: programmable output contact 3 (D03);
#18, #19: programmable output contact 4 (D04).
When the signal unit type is S2: (3DO + 1DI mode)
#14, #15: programmable output contact 2 (DO2);
#16, #17: programmable switching value output (DO3);
#18, #19: programmable switching value input (DI1).
When the signal unit type is S3: (2DO + 2D1 mode)
#14, #15: programmable output contact 2 (DO2);
#16, #17: programmable switching value input 2 (DI2);
#18, #19: programmable switching value input 1 (DI1).

● Protective grounding
#20 is the grounding wire of the control line.

● Voltage signal input
#21-#24 are the voltage signal input terminals. Note that the sequence shall not be wrong and the terminals should be connected to the incoming side of the power supply. When there is no voltage addition function, this pin is empty.

● External transformer input
#25, #26 for input of external transformer.
When the grounding mode is current return type (T type), this pin is connected to the output of the external grounding transformer ZT100.
When the grounding protection mode is leakage type, this pin is used to connect to the output of rectangular transformer ZCT.
When the grounding protection mode is 3P+N difference-value type, this pin is used to access the external N-pole transformer.

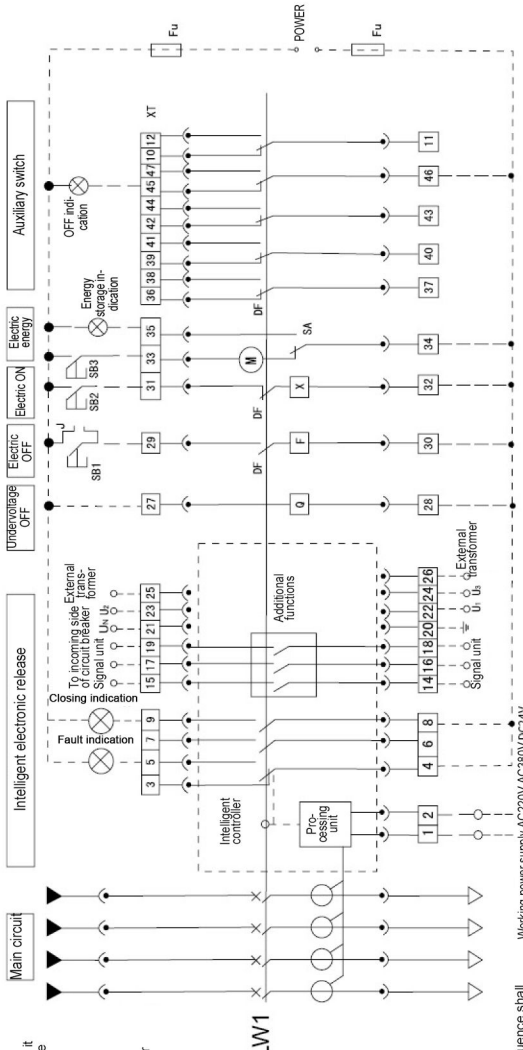
Codes and names of accessories:

SB1 shunt button	Q undervoltage (instantaneous or delayed) release
SB2 closing button	F shunt release
SA motor travel switch	M energy storage motor
DF auxiliary switch	Fu fuse
XT connection terminal	

Note: 1. The dotted line part is wired by user.
2. If the rated voltage of Q, F, X and M intelligent controllers is different, they can be connected to the power supply respectively.
3. All indicator lights, buttons, fuses and relays shall be provided by the user.
4. When adding menu functions, please connect according to the voltage sequence, and do not connect incorrectly.
5. When the power distribution system is three-phase three-wire system, the short circuit of 21 and 23 is U2. The three-phase four-wire system is connected according to this figure.
6. #33 pin can be directly connected to the power supply (automatic pre-energy storage)

iALW1 Intelligent Universal Circuit Breaker

◆Electrical wiring diagram for iALW1-1600~6300 equipped with m intelligent controller.



● Power input
#1, #2: since the controller has a variety of working power types, it must be noted whether the input power type is consistent with the working power type of the controller; otherwise the controller will be damaged.

● Fault trip auxiliary contact
#3, #4 and 5#: fault trip contact output (#4 for common terminal), contact capacity: AC250V 16A

● Auxiliary contact synchronized with circuit breaker
#6, #7 and #8, #9: two sets of auxiliary contacts of circuit breaker status, contact capacity: AC250V 16A

● Programmable I/O interface
#14~#19: (DO:DC110V 0.5A, AC250V, 5A;DI:DC110V~130V or AC110V ~ AC250V).

When the signal unit type is S1: (4DO mode)
#14, #15: programmable output contact 2 (DO2);
#16 #, #17: programmable output contact 3 (DO3);
#18, #19: programmable output contact 4 (DO4).

When the signal unit type is S2: (3DO + 1DI mode)
#14, #15: programmable output contact 2 (DO2);
#16, #17: programmable switching value output 3 (DO3);
#18, #19: programmable switching value input4 (DI1).

When the signal unit type is S3: (2DO + 2DI mode)
#14, #15: programmable output contact 2 (DO2);
#16, #17: programmable switching value input 2 (DI2);
#18, #19: programmable switching value input 1 (DI1).

● Protective grounding
20 is the grounding wire of the control line

● Voltage signal input
#21-#24 are the voltage signal input terminals. Note that the sequence shall not be wrong and terminals should be connected to the incoming side of the power supply. When there is no voltage addition function, this pin is empty.

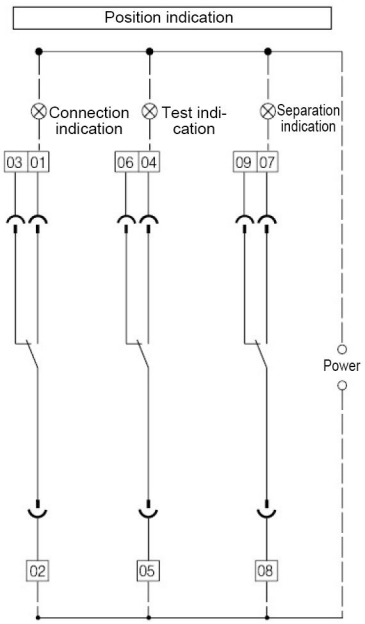
● External transformer input
#25, #26 for input of external transformer.
When the grounding mode is current return type (T type), this pin is connected to the output of the external grounding transformer ZT1/00.
When the grounding protection mode is leakage type, this pin is used to connect to the output of rectangular transformer ZCT.
When the grounding protection mode is 3P+N difference-value type, this pin is used to access the external N-pole transformer.

Codes and names of accessories:
SB1 shunt button
SB2 closing button
Sb3 electric energy storage button
SA motor travel switch
DF auxiliary switch
FU fuse
Q undervoltage (instantaneous or delayed) release
F shunt release X closing electromagnet M energy storage motor XT terminal
J relay normally open (remote control disconnects the circuit breaker)

Note: 1. The dotted line part is wired by user.
2. If the rated voltage of Q, F, X and M intelligent controllers is different, they can be connected to the power supply respectively.
3. All indicator lights, buttons, fuses and relays shall be provided by the user.
4. When adding menu functions, please connect according to the voltage sequence, and do not connect incorrectly.
5. When the power distribution system is three-phase three-wire system, the short circuit of 21 and 23 is U2. The three-phase four-wire system is connected according to this figure.
6. #33 pin can be directly connected to the power supply (automatic pre-energy storage)

iALW1 Intelligent Universal Circuit Breaker

◆Wiring diagram of position indication signal device



Operation requirements:

1. The draw-out base position indicating device can indicate the positions of "separation", "test" and "connection", which can be selected completely or partially according to the order requirements.

2. When the body of the draw-out type circuit breaker is pushed from the "draw-out" position to the "separation" position, #08, #09 terminals shall be switched from on to off, and #07 and #08 terminals shall be switched from off to on.

3. When the draw-out type circuit breaker body turns from the "separation" position to the "test" position, the #05, #06 terminals shall be switched from on to off, and the #04, #05 terminals shall be switched from off to on. There shall be sufficient safety distance between the bus of the circuit breaker body and the bridge contact of the draw-out base, and the opening and closing operation can be carried out reliably.

4. When the draw-out type circuit breaker body turns from the "test" position to the "connection" position, the draw-out base makes a "click" sound, and then continues to turn forward. It is required that within 1.5 turns of the rotary handle of the draw-out base, #02, #03 terminals should be switched from on to off, #01 and #02 terminals should be switched from off to on, and the bus of the circuit breaker body should be reliably inserted into the bridge contact of the draw-out base and reliably carry the current of the main circuit for work.

5. When the draw-out type circuit breaker body turns from the "connection" position to the "test" position, #05 and #06 terminals shall be switched from on to off, #04 and #05 terminals shall be switched from “off” to “on”, there shall be sufficient safety distance between the bus of the circuit breaker body and the bridge contact of the draw-out base, and the opening and closing operation can be carried out reliably.

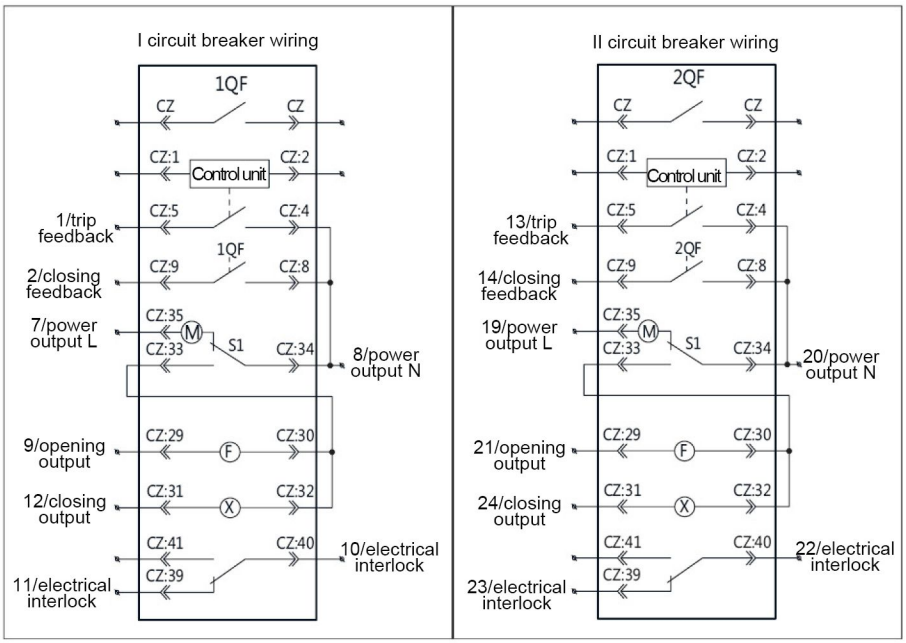
6. When the body of the draw-out type circuit breaker turns from the "test" position to the "separation" position, #08, #09 terminals shall be switched from on to off, and #07 and #08 terminals shall be switched from off to on. At this time, the body of the circuit breaker still cannot be out and needs to continue to turn to "separation" position until the handle cannot be swung, and then the circuit breaker body can be pulled out. After the draw-out type circuit breaker body is pulled out, #08 and #09 terminals shall be switched from off to on, and #07 and #08 terminals shall be switched from on to off.

7. During the position conversion operation of the draw-out base, it is allowed to stop only when the pointer points to "separation", "test" and "connection", otherwise the position indicating device will not correctly indicate the position of the circuit breaker body in the draw-out base.

iALW1 Intelligent Universal Circuit Breaker

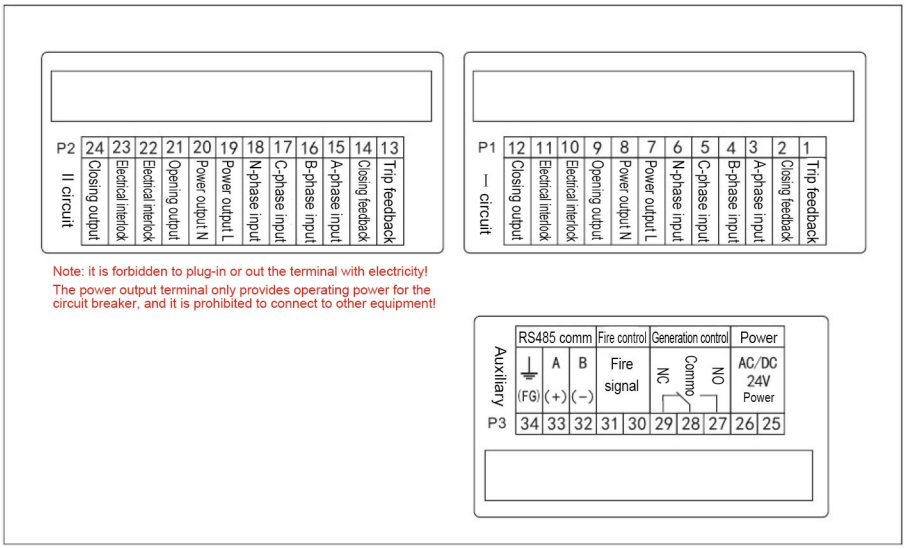
◆Secondary wiring diagram of dual-circuit automatic switching device

Circuit breaker at opening and no energy storage status



The power output port of the WATSE controller is only used to provide operating power for the circuit breaker. It is forbidden to access other electrical equipment or other power supplies, otherwise the controller will be damaged.

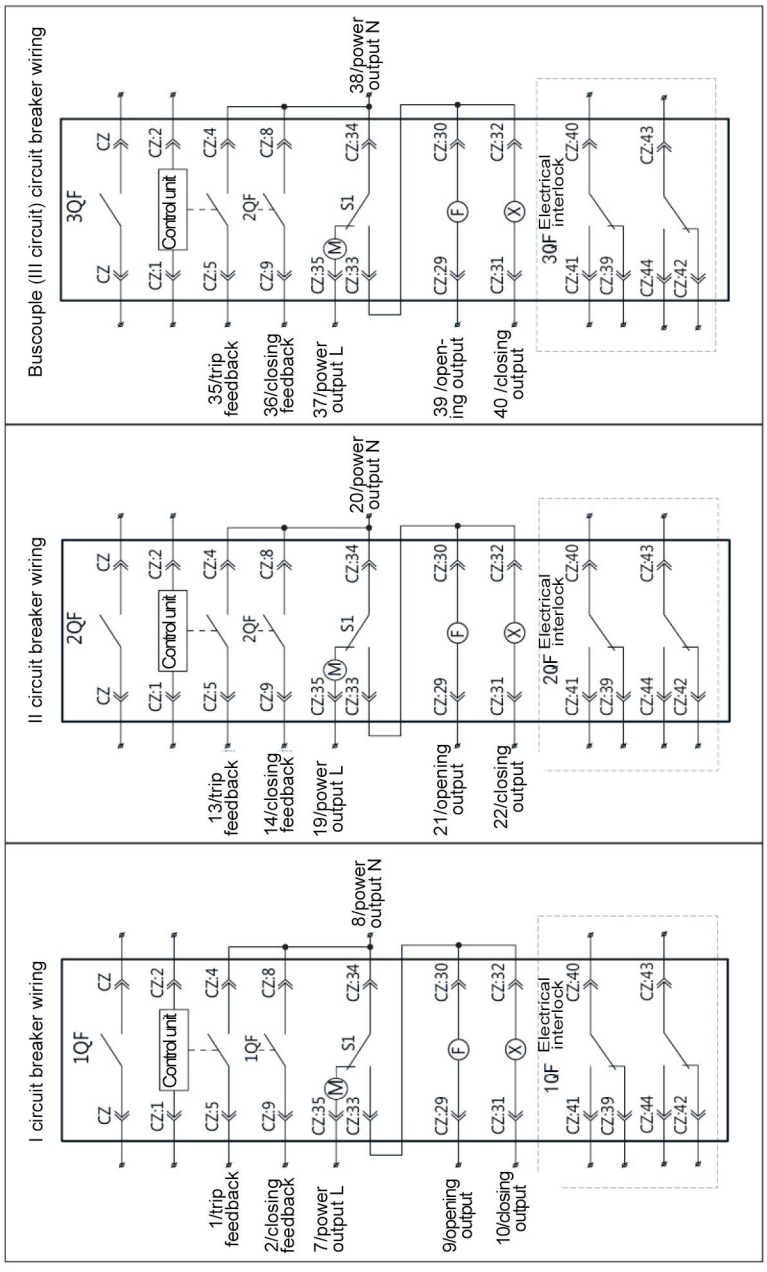
◆Controller terminal definition



iALW1 Intelligent Universal Circuit Breaker

◆Secondary wiring diagram of buscouple automatic switching device

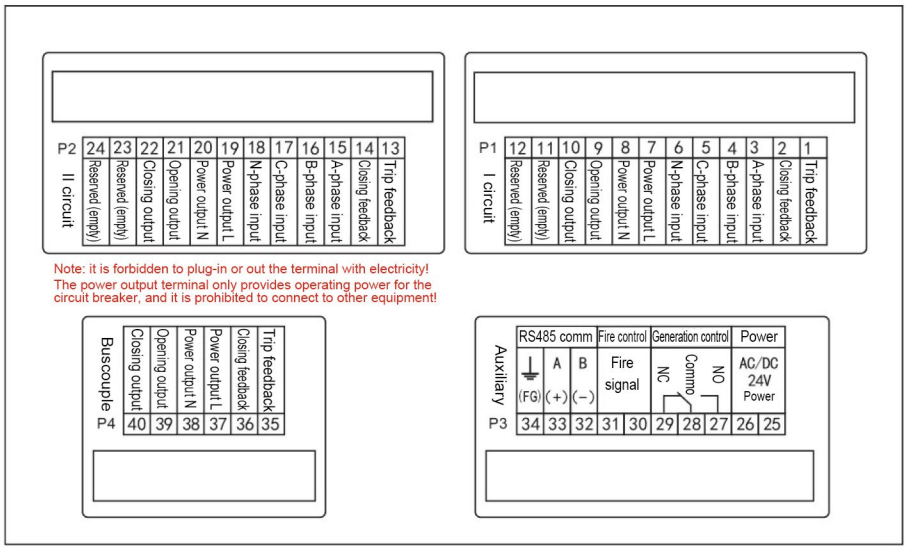
Circuit breaker at opening and no energy storage status

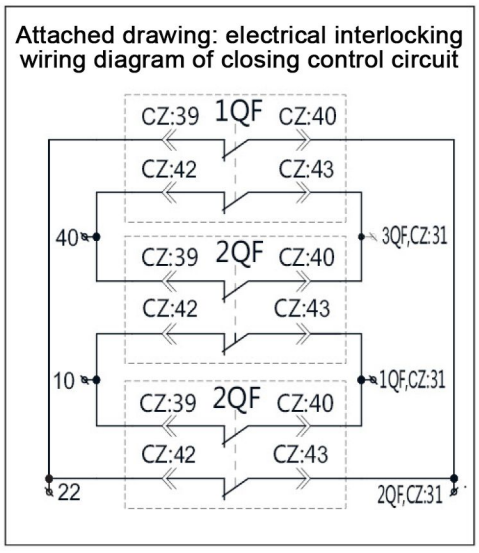


The power output port of the WATSE controller is only used to provide operating power for the circuit breaker. It is forbidden to access other electrical equipment or other power supplies, otherwise the controller will be damaged. If it is necessary to add electrical interlock to the closing control circuit, the closing electromagnet shall be connected in series into the closing control circuit of the controller as shown in the attached figure.

iALW1 Intelligent Universal Circuit Breaker

◆Controller terminal definition





iALW1 Intelligent Universal Circuit Breaker

◆Dual power automatic transfer switch

The dual power automatic transfer switch of CB level is mainly composed of two TGW1 series intelligent universal circuit breakers and power transfer switch controllers. It is suitable for two-way three-phase four-wire power grid with frequency of 50/60Hz and rated working voltage of 400V. Dual power automatic transfer switch is classified into automatic switching and automatic recovery type and power grid-power generation type. When ordering dual power automatic transfer switch, you must pay attention to the following points:

a. In order to prevent user wiring errors, the dual power automatic controller cannot be purchased separately, which needs to be ordered together with the circuit breaker.

b. Steel cable interlocking and 4 sets of change-over contact auxiliary (3 sets of change-over contacts actually used by the user) must be ordered at the same time.

c. The special cable for dual power automatic controller is 2m long, and the connecting line between two circuit breakers is 2m long.

d. For circuit breaker with dual power automatic controller, it is forbidden to carry key.

e. The control supply voltage of dual power automatic controller can only be AC220V.

f. The circuit breaker with dual power automatic controller cannot be interlocked with opening and closing status door.

g. When the circuit breaker with dual power automatic controller is equipped with H-type intelligent controller, the closing and opening functions of remote control circuit breaker cannot be used.

h. The circuit breaker must be equipped with undervoltage release.

1. The circuit breaker and dual power automatic controller must be reliably grounded.

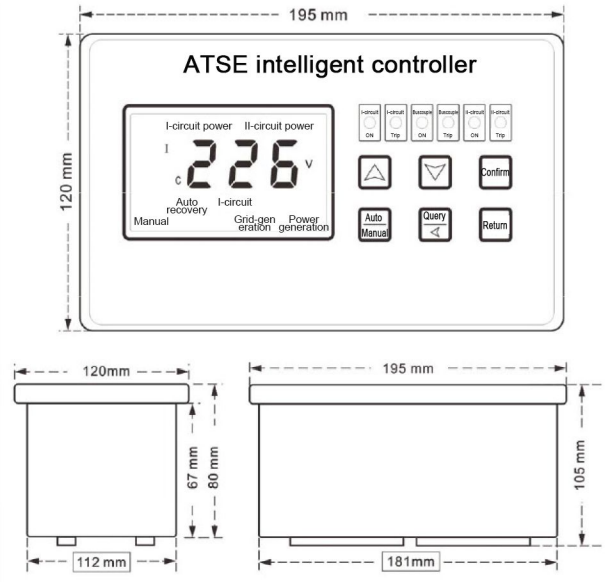
J. Dual power automatic controller types:

Power grid-power grid, with automatic switching and automatic recovery;

Power grid- power generation, with automatic switching and automatic recovery

Note: after the user presses“↑”and“↓”at the same time after wiring, all lights are on, which means qualified

Installation dimensions and outline dimensions of dual power controller



Overall dimension of controller: 195mm wide×120mm high×105mm deep (including connection terminal)

Recommended opening size: 182mm (W)×113mm (H)

iALW1 Intelligent Universal Circuit Breaker

Accessories

◆Electrical accessories

Electrical parameters of accessories

Attachment name		Rated working voltage(V)			Power dissipation	
		Parameter symbol	AC(50Hz)	DC	AC (50Hz)	DC
Undervoltage release		Ue	220 (230)	-	24VA	-
			380 (400)	-	36VA	-
Shunt release		Us	220 (230)	110	24VA	24W
			380 (400)	220	36VA	24W
Closing electromagnet			220 (230)	110	24VA	24W
			380 (400)	220	36VA	24W
Motor	iALW1-2000		220 (230)	110	85VA	85W
			380 (400)	220		
	iALW1-3200 (4000)		220 (230)	110	125VA	125W
			380 (400)	220		
	iALW1-6300		220 (230)	110	150VA	150W
			380 (400)	220		
Auxiliary contact			220 (230)	110	300VA	60W
			380 (400)	220		

◇Undervoltage release

Undervoltage release

1) Operation characteristics of undervoltage release

a. When the applied voltage drops, or even slowly drops to 70%-35% of the rated control supply voltage, the undervoltage release acts to disconnect the circuit breaker.

b. When the applied voltage is lower than 35% of the rated voltage of the undervoltage release, the undervoltage release makes the circuit breaker unable to close.

c. When the applied voltage is equal to or higher than 85%-110% of the rated voltage of the undervoltage release, the undervoltage release can ensure the reliable closing of the circuit breaker.

2) The voltage release is mainly composed of coil, iron core assembly and circuit board, which is classified into undervoltage instantaneous release and undervoltage delay release. The undervoltage delay release can adjust the delay time through the toggle switch on the undervoltage delay device, and the setting values of the delay time are Is, 3s and 5s.

Rated supply voltage Ue (V)	AC400/380、230/220	DC220、110
Operating voltage (V)	(0. 35~0.7) Ue	(0. 35~0. 7) Ue
Reliable closing voltage (V)	(0. 85~1. 1) Ue	(0. 85~1. 1) Ue
Reliable non-closing voltage (V)	≤ 0. 35Ue	<0. 35Ue
Power dissipation	48VA	48W

◇Shunt release

Shunt release

1) Operation characteristics of shunt release

a. When the supply voltage of the shunt release remains between 70% and 110% of the rated control supply voltage Us, the shunt release can be operated to disconnect the circuit breaker.

b. The shunt release is of short-time working system.

2) The shunt release is mainly composed of coil and iron core components. It is suitable for short-time working system and can be operated remotely to disconnect the circuit breaker.

iALW1 Intelligent Universal Circuit Breaker

Characteristic

Rated control supply voltage Us(V)	AC400/380、230/220	DC220	DC110
Operating voltage (V)	(0.7~1. 1) Us		
Power dissipation	300VA	132W	70W
Breaking time (ms)	30 ～ 50		

Note: it must be in pulse mode with pulse width of 1s, otherwise it is easy to burn the components.

closing electromagnet

◇closing electromagnet

1) Action characteristics of closing electromagnet

a. when the power supply voltage of the closing electromagnet is maintained between 85% and 110% of the rated control power supply voltage us, operating the closing electromagnet can make the circuit breaker close reliably.

b. the closing electromagnet is a short-time working system.

2) The closing electromagnet is the switch-on electromagnet, which is mainly composed of coil and iron core components. It is suitable for short-time working system. In the energy storage state, the circuit breaker can be closed as long as the electromagnet is energized.

Characteristic

Rated control power supply voltage Us (V)	AC400/380、230/220	DC220	DC110
Operating voltage (V)	(0. 85~1. 1) Us		
Power dissipation	300VA	132W	70W
Closing time	≤70ms		

Note: it is forbidden to power on for a long time to avoid damage, especially in the automatic control system. It must be in pulse mode with pulse width of 1s, otherwise it is easy to burn the components.

closing electromagnet

◇Motor operating mechanism

1) The electric energy storage of the circuit breaker is completed by the motor operating mechanism.

2) Operating characteristic

The motor operating mechanism shall be within the range of 85% to 110% of the supply voltage to make the energy storage of the circuit breaker mechanism in place.

Characteristic

Rated control supply voltage Us(V)	AC400、230	DC220、DC110
Operating voltage (V)	(0. 85~1. 1) Us	
Power dissipation	85W/110W	85W/110W
Energy storage time	≤5s	

Note: it is forbidden to connect the power supply for a long time to avoid damage.

iALW1 Intelligent Universal Circuit Breaker

◇ Auxiliary contact

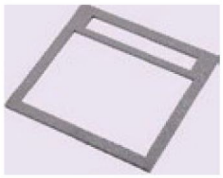
1) The conventional heating current of auxiliary contact is 6A. See the table below for the type of auxiliary contact (please contact our company for special supply).

Circuit breaker status	Close“1”	Open“0”
Auxiliary contact normally open	1	0
Auxiliary contact normally closedlosed	0	1

Circuit breaker status	Normally open	Remarks
Basic type	4	3H controller
	5	M controller
Special type	6	

Note: a. in order to ensure that the shunt and closing electromagnets will not be powered on and damaged for a long time, the company will connect a group of normally open and normally closed contacts in the basic type, which does not include the connected normally open and normally closed contacts, and the shunt and closing electromagnets of special type will not be connected to the normally open and normally closed contacts.

b. if users have special needs, they can negotiate with the company.



◆Doorframe and pad

It is installed on the door of the distribution cabinet room to seal, and the protection level reaches IP40 (fixed type and draw-out type).

◆Interphase partition

It is installed between phases of the terminal block to increase the phase insulation capacity of the circuit breaker.

◆"Separation" position locking device

When the draw-out circuit breaker is in the "separation" position, the lock rod can be pulled out and locked with a padlock. The circuit breaker cannot be swung to the "test" or "connection" position (the padlock is provided by the user).

◆Button lock

The mechanical button for opening and closing the circuit breaker shall be locked with a padlock. After locked, the closing and opening operation cannot be carried out manually (the padlock is provided by the user).

◆Dust cover

It should be fastened on the cross beam of the draw-out base to prevent dust and other sundries from falling into the secondary circuit connection terminal, resulting in poor contact.

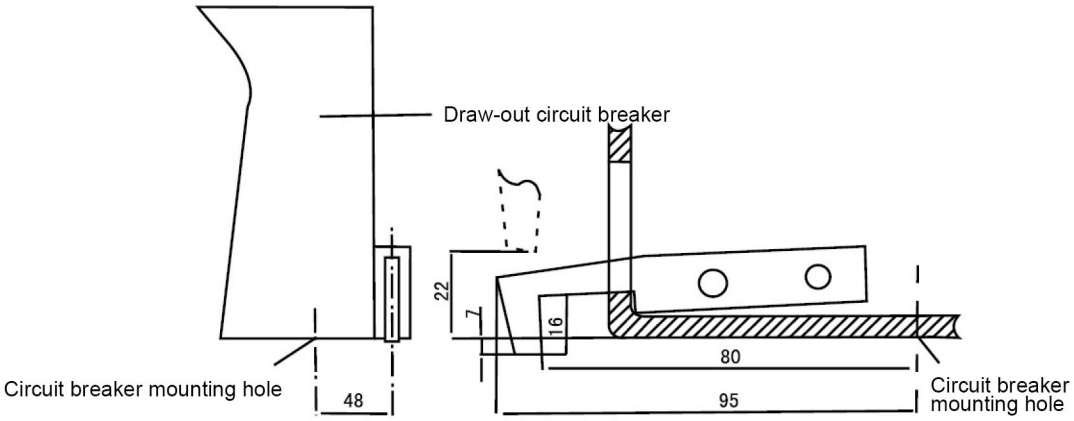
iALW1 Intelligent Universal Circuit Breaker

◆Draw-out type three-position indicating mechanism

The draw-out type three-position indicating mechanism can indicate the connection position, test position and separation position of the body.

◆Door interlock

The door interlock mechanism is installed on the circuit breaker to prevent the cabinet compartment door from opening when the draw-out circuit breaker is in the non-separation position. The interlock is generally installed on the right side of the circuit breaker, and the door interlock is allowed to be installed on the left side.



◆Mechanical accessories

Interlocking mechanism

The mechanical interlocking mechanism is installed on the right board of the circuit breaker.

When one of the circuit breakers is closed, the other circuit breakers shall not be closed.

The mechanical interlocking mechanism can be used for interlocking between draw-out circuit breakers and fixed circuit breakers.

The interlocking mechanism shall be installed by the user. (see the attached operation manual for the specific installation method)

For cable interlocking, the distance between circuit breakers shall not be more than 2m.

For hard rod interlocking, the distance between circuit breakers is 0.9m.

The minimum angle of the cable shall not be less than R120mm radius when cable is used for interlocking.

Available mechanical interlocking types

Interlocking type	Between two circuit breakers		Between three circuit breakers	
	Horizontal	Vertical	Horizontal	Vertical
Cable interlocking	√	√	√	√
Hard rod interlocking	×	√	×	×

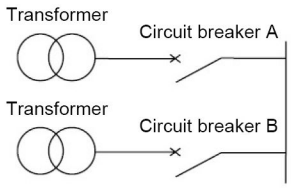
iALW1 Intelligent Universal Circuit Breaker

Typical application of interlocking device

Interlocking between two circuit breakers

Emergency power supply (circuit breaker B)	Normal power supply (circuit breaker A)
0	0
0	1
1	0

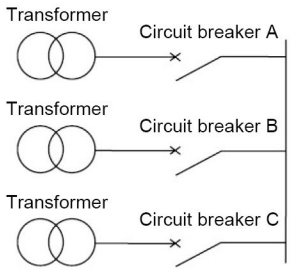
1 indicates that the circuit breaker is closed and 0 indicates that the circuit breaker is open



Emergency power supply (circuit breaker C)

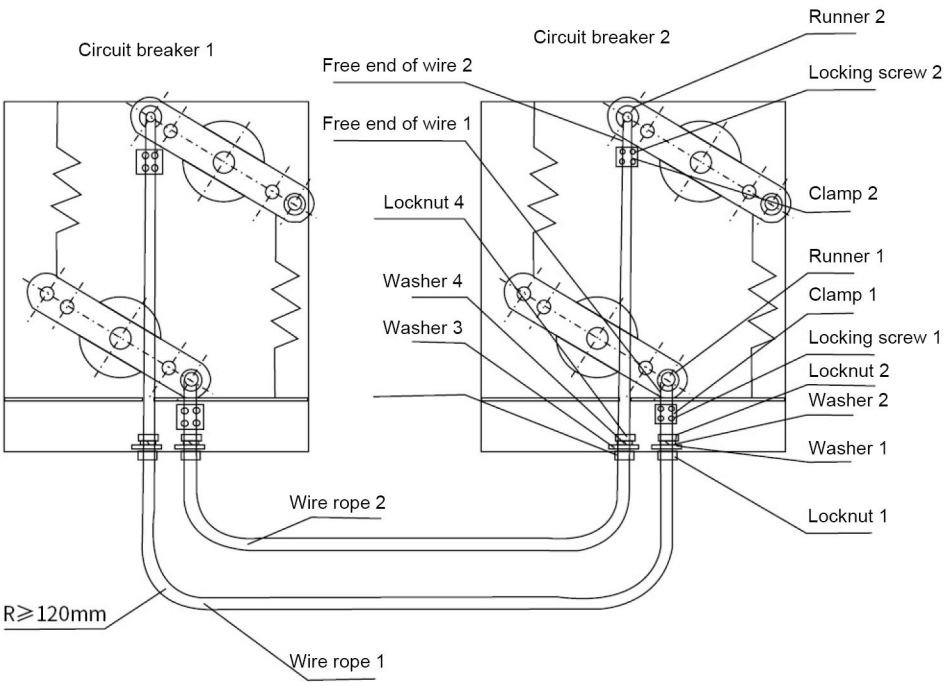
Emergency power supply (circuit breaker C)	Emergency power supply (circuit breaker B)	Normal power supply (circuit breaker A)
0	0	0
0	0	1
0	1	0
1	0	0

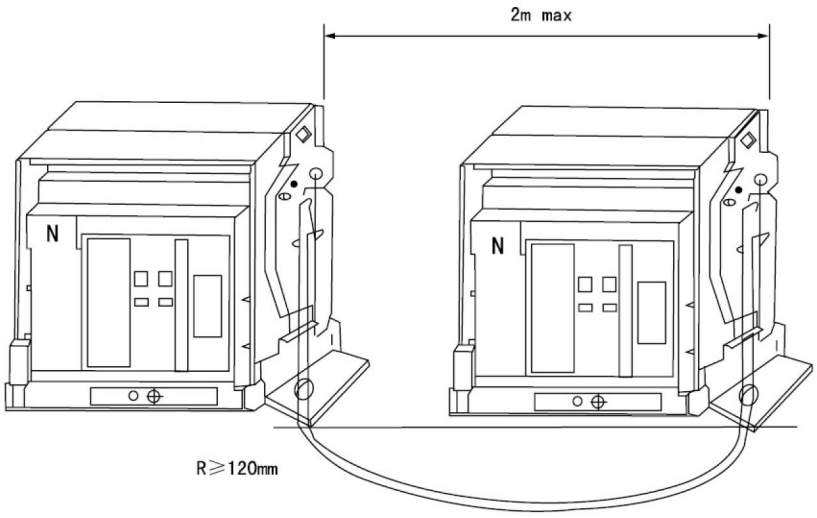
1 indicates that the circuit breaker is closed and 0 indicates that the circuit breaker is open.



iALW1 Intelligent Universal Circuit Breaker

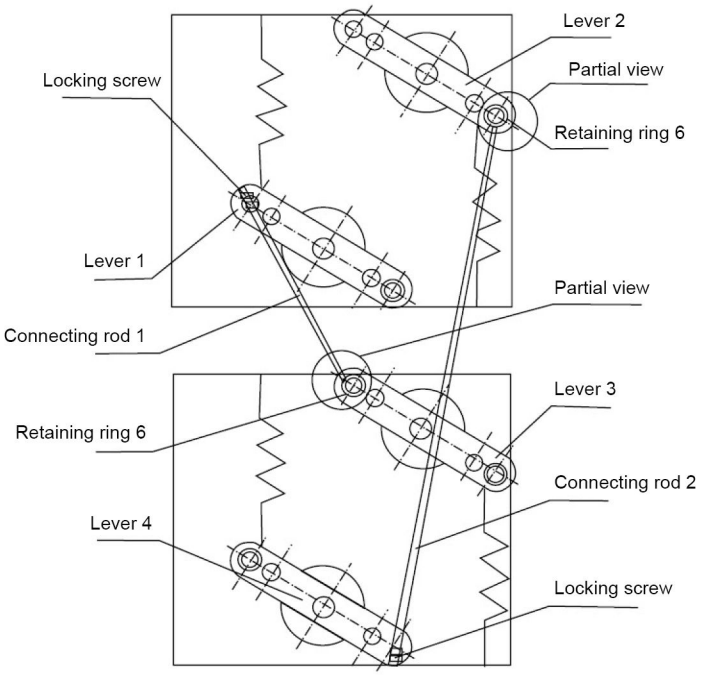
Schematic diagram of cable interlocking connection between two circuit breakers



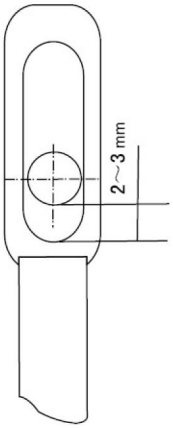


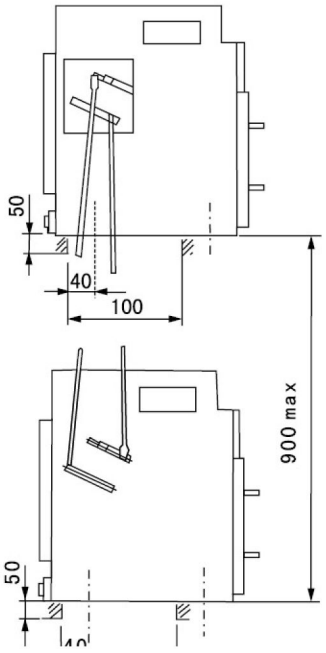
iALW1 Intelligent Universal Circuit Breaker

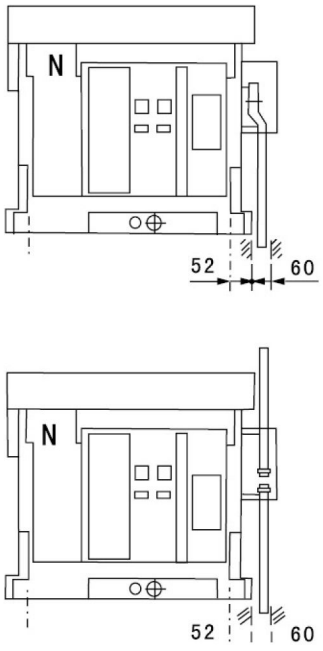
Schematic diagram of cable interlocking connection between two circuit breakers



Partial view enlarged

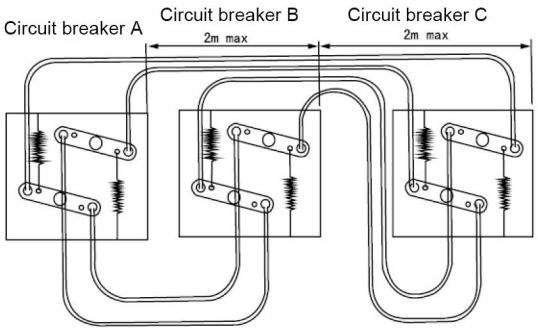






iALW1 Intelligent Universal Circuit Breaker

Flexible rod interlocking of three circuit breakers



Off position key lock

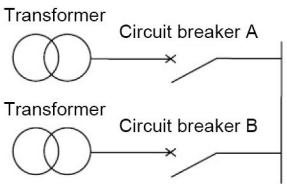
The key lock is locked in the off position. When locked, the circuit breaker cannot be closed.

We can provide users with a variety of ways to use:

One circuit breaker equipped with independent key and lock. (the circuit breaker should be locked in the off position to prevent illegal operation).

Two circuit breakers matched with the same lock and one key (manual interlocking can be used as power grid conversion to ensure that power grid B is disconnected while power grid A is applied or power grid A is disconnected while power grid B is supplied).

Interlocking between two circuit breakers

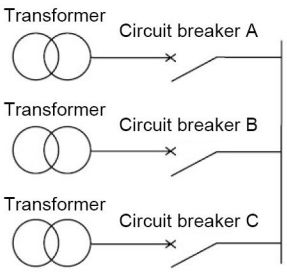


Emergency power supply (circuit breaker B)	Emergency power supply (circuit breaker A)
0	0
0	1
1	0

1 indicates that the circuit breaker is closed and 0 indicates that the circuit breaker is open

Three circuit breakers matched with the same lock and one same key.

(manual interlocking can be carried out as power grid conversion to ensure that only one of the three circuit breakers can be closed.)

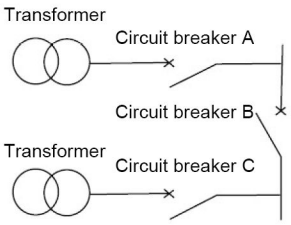


Emergency power supply (circuit breaker C)	Emergency power supply (circuit breaker B)	Emergency power supply (circuit breaker A)
0	0	0
0	0	1
0	1	0
1	0	0

1 indicates that the circuit breaker is closed and 0 indicates that the circuit breaker is open

Three circuit breakers matched with the same lock and one same key.

(it is used for two incoming lines and one buscouple circuit to ensure that two of the three circuit breakers are in the ON position.)



Power supply 1 (circuit breaker A)	Buscouple (circuit breaker B)	Power supply 2 (circuit breaker C)
0	0	0
0	1	1
1	0	1
1	1	0

1 indicates that the circuit breaker is closed and 0 indicates that the circuit breaker is open

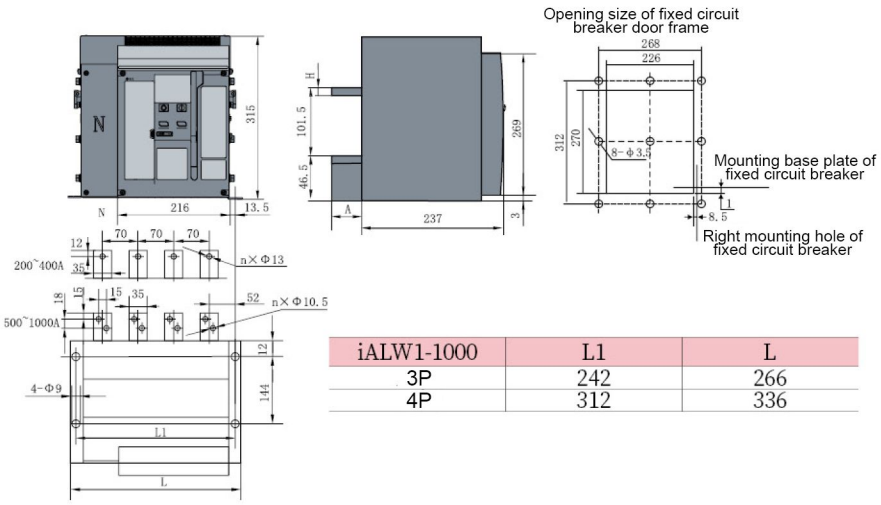
Five circuit breakers matched with the same lock and three same keys. (it ensures that three of the five circuit breakers are closed).

Note: when the universal circuit breaker with key interlocking needs to pull out the key, first press and hold the opening button, rotate the key counterclockwise, and then pull out the key.

iALW1 Intelligent Universal Circuit Breaker

Overall dimension and installation dimension

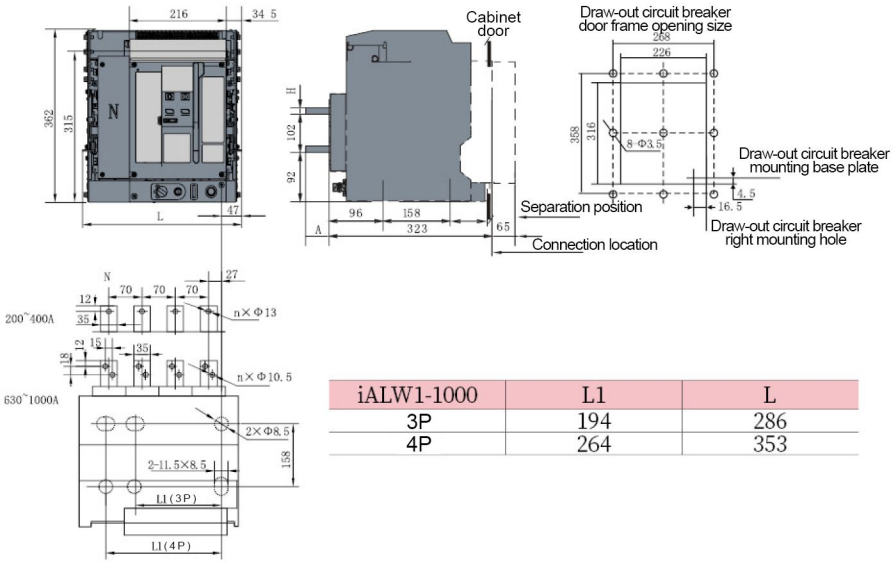
Outline dimension and installation dimension drawing of iALW1-1000 fixed circuit breaker



iALW1-1000	L1	L
3P	242	266
4P	312	336

In(A)	A(mm)	n（3P/4P）	H(Hmm)
200、250、300、350、400	32	3/4	6
500、630	50	6/8	8
700、800、1000	50	6/8	10

Outline dimension and installation dimension drawing of iALW1-1000 draw-out type circuit breaker

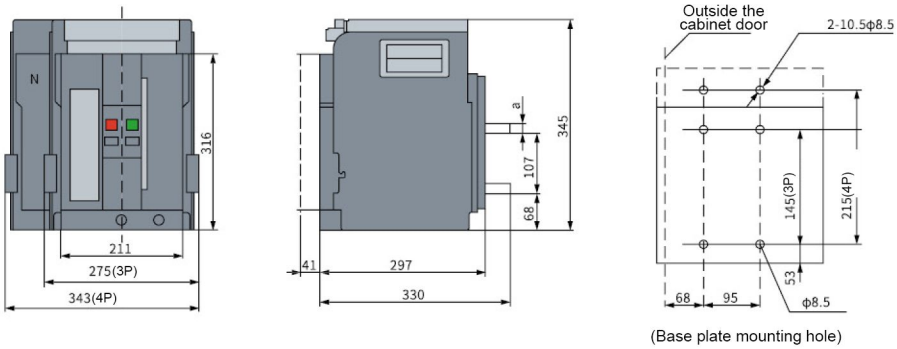


iALW1-1000	L1	L
3P	194	286
4P	264	353

In(A)	A(mm)	n（3P/4P）	H(Hmm)
200、250、300、350、400	32	3/4	6
500、630	50	6/8	8
700、800、1000	50	6/8	10

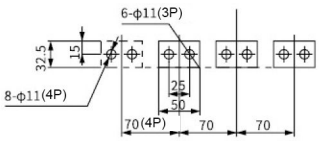
iALW1 Intelligent Universal Circuit Breaker

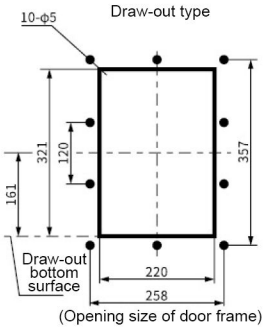
Outline dimension and installation dimension drawing of iALW1-1600 draw-out circuit breaker



(Base plate mounting hole)

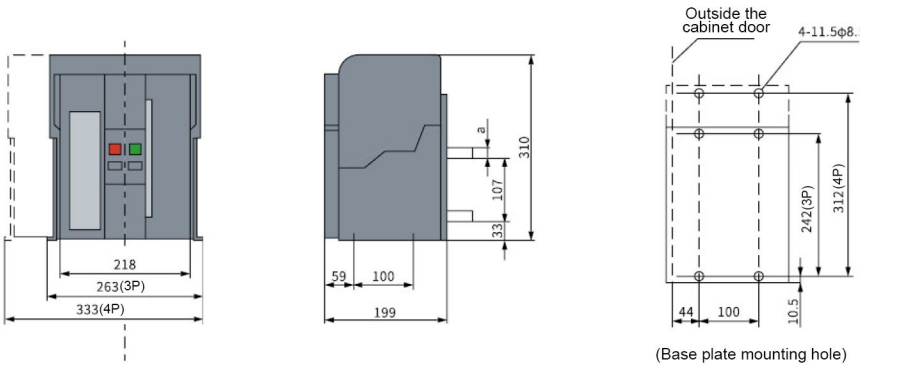
In	a(mm)
200-1000A	10
1250-1600A	18





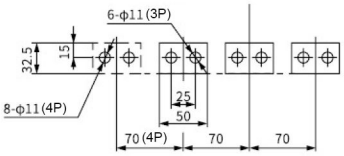
(Opening size of door frame)

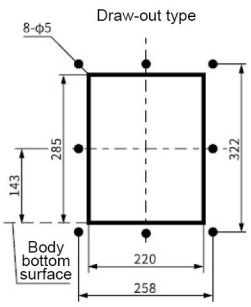
Outline dimension and installation dimension drawing of iALW1-1600 fixed circuit breaker



(Base plate mounting hole)

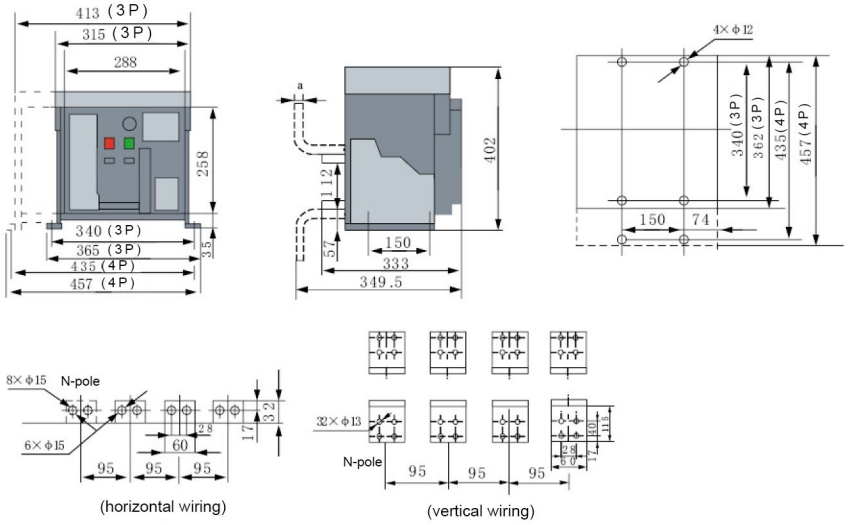
In	a(mm)
200-1000A	10
1250-1600A	18





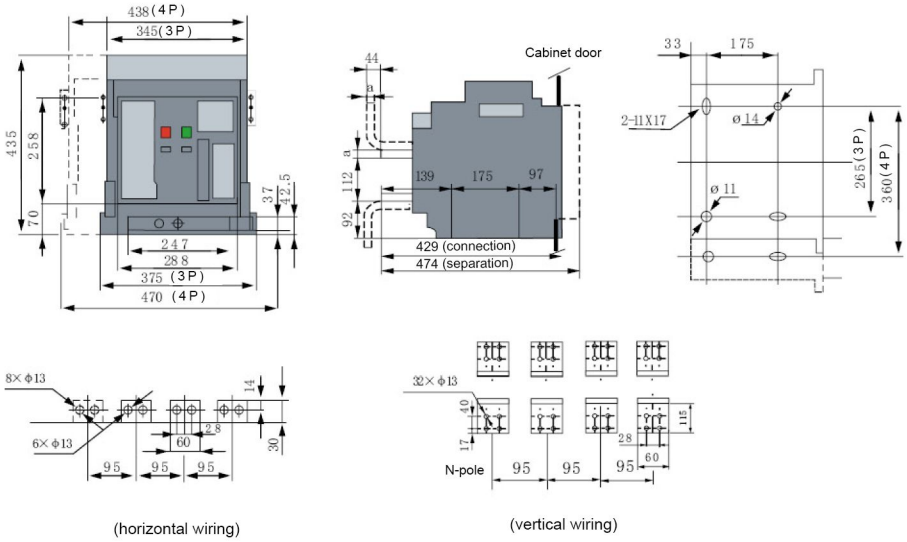
iALW1 Intelligent Universal Circuit Breaker

Outline dimension and installation dimension drawing of iALW1-2000 draw-out type circuit breaker



In	200-630A	800-1600A	1900-2000A
a	10	15	20

Outline dimension and installation dimension drawing of iALW1-2000 draw-out type circuit breaker

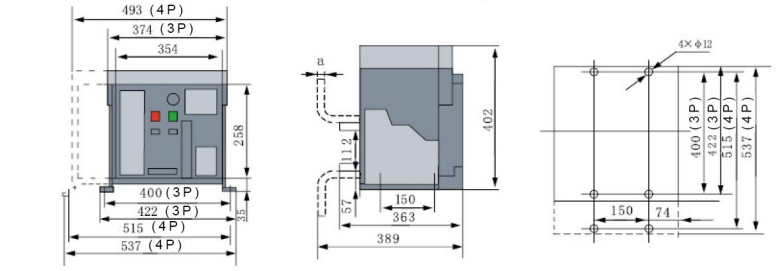


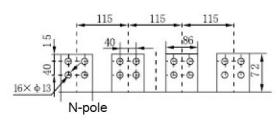
In	200-630A	800-1600A	1900-2000A
a	10	15	20

iALW1 Intelligent Universal Circuit Breaker

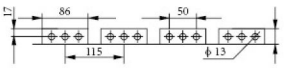
Outline dimension and installation dimension drawing of iALW1-3200 fixed circuit breaker.

The installation dimensions and overall dimensions of (iALW1-4000) fixed three-pole circuit breaker are the same as those of iALW1-3200 fixed four-pole circuit breaker.

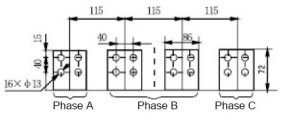




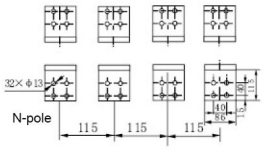
(horizontal extended wiring)



Horizontal wiring (default configuration)



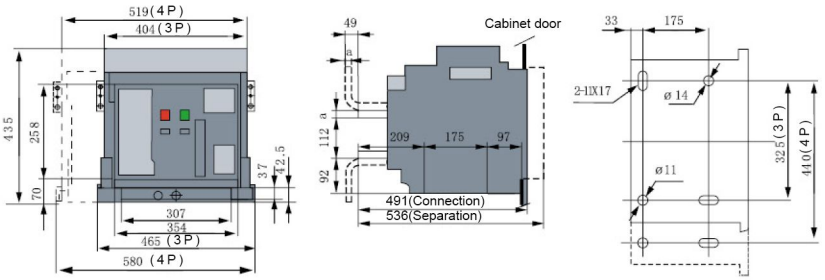
(iALW1-4000 three-pole horizontal wiring)

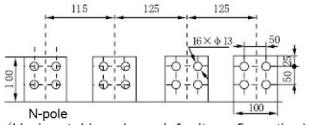


(vertical wiring)

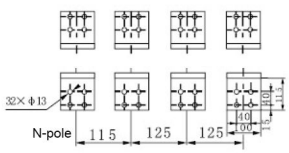
In	2000A、2500A	2900-3200A
a	20	30

Outline dimension and installation dimension drawing of iALW1-3200 draw-out circuit breaker

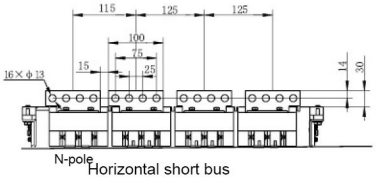




(Horizontal long bus, default configuration)



(vertical wiring)

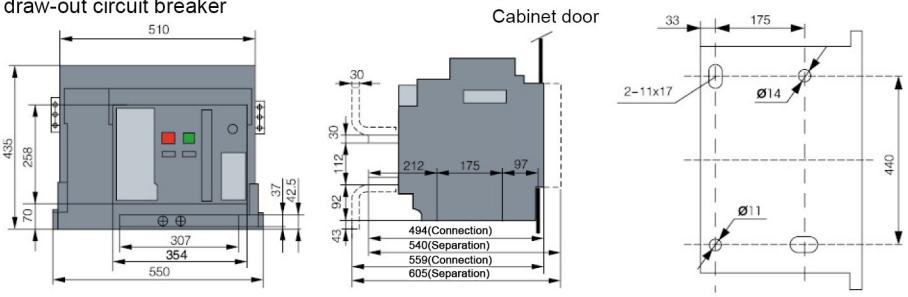


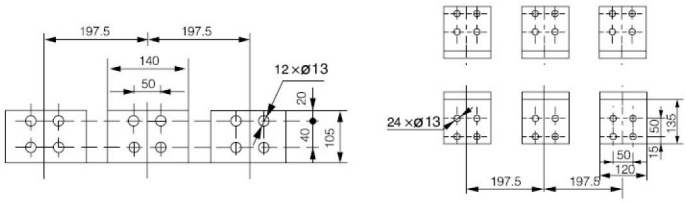
Horizontal short bus

In	2000A、2500A	2900-3200A
a	20	30

iALW1 Intelligent Universal Circuit Breaker

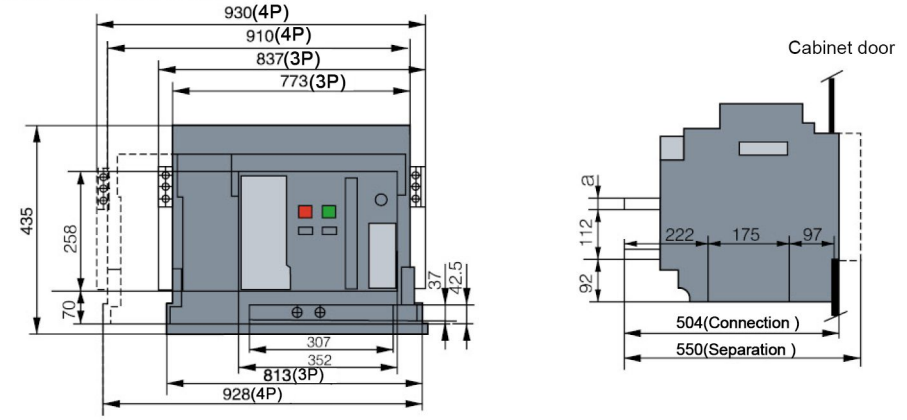
Outline dimension and installation dimension drawing of iALW1-4000 /3 draw-out circuit breaker

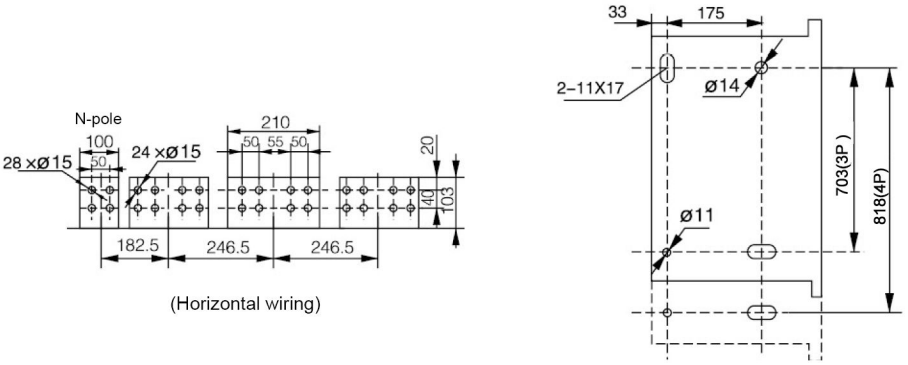




(Horizontal wiring) (Vertical wiring)

Outline dimension and installation dimension drawing of iALW1-6300 (In=4000~5000A) draw-out circuit breaker

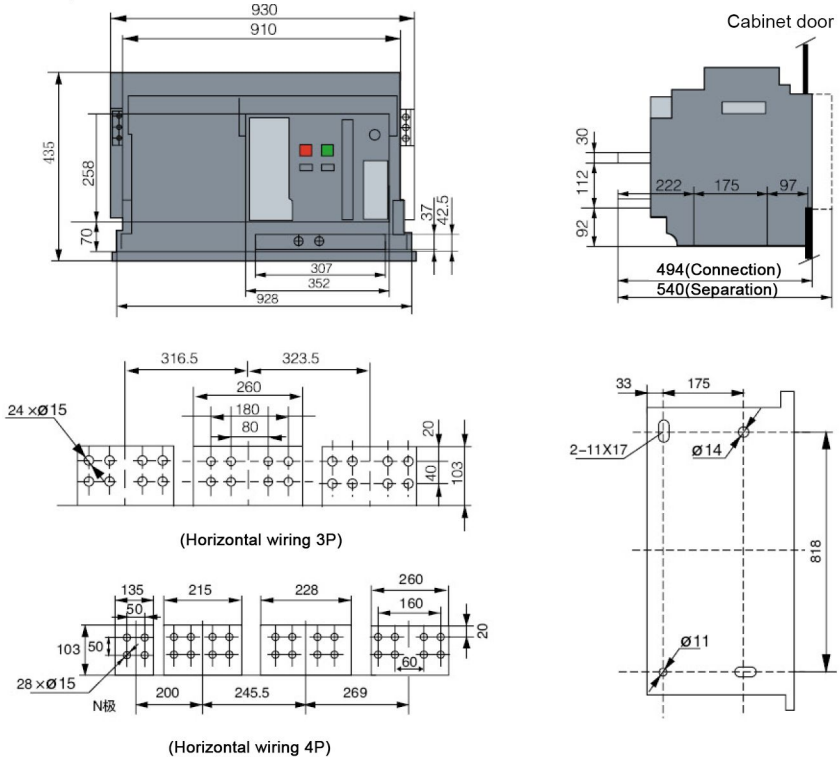




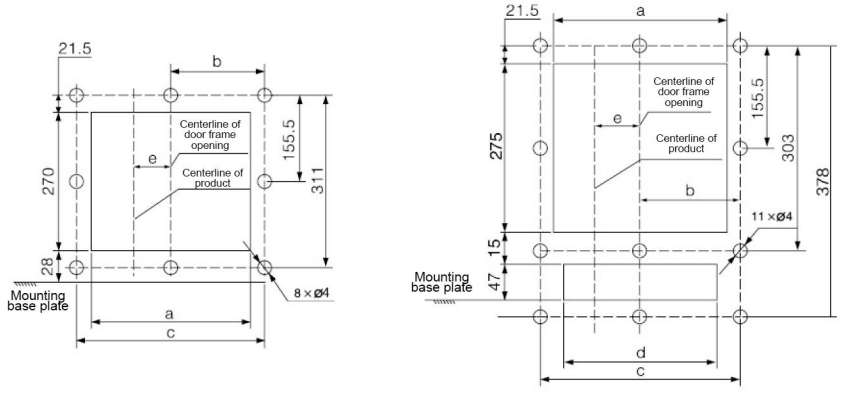
(Horizontal wiring)

iALW1 Intelligent Universal Circuit Breaker

Outline dimension and installation dimension drawing of iALW1-6300 (In=6300A) draw-out circuit breaker



Installation dimension drawing of panel opening



In	a	b	c	d	e (3P)	e (4P)
2000	306	172.5	345	263	0	47.5
3200	366	202.5	405	323	0	57.5
4000	366	202.5	405	323	57.5	
6300	366	202.5	405	323	189 (4000, 5000 3P) 246.5 (4000, 5000 4P and 6300)	

iALW1 Intelligent Universal Circuit Breaker

Operation guide for circuit breaker

◆ Recommended bus for the user

Copper conductor connection

Rated current (A)	Number of pieces (piece)	Conductor size (mm²)
⩽ 400	1	240
⩽ 630	2	185
⩽ 800	3	240

Copper bus connection

Rated current (A)	Number of pieces (piece)	Conductor size (mm²)
⩽ 630	2	40×5
⩽ 800	2	50×5
⩽ 1000	2	60×5
⩽ 1250	2	80×5
⩽ 1600	2	100×5
⩽ 2000	3	100×5
⩽ 2500	4	100×5
⩽ 3200	3	100×10
⩽ 4000	4	100×10
⩽ 6300	4	100×15

Note: the number here refers to the number of busbars required for each phase bus.

◆ Derating factor of circuit breaker

Ambient temperature		+40℃	+45℃	+50℃	+55℃	+60℃
Allowable continuous operating current	iALW1-2000(H)	1In	0.95In	0.9In	0.85In	0.80In
	iALW1-3200(4000)	1In	0.92In	0.86In	0.81In	0.74In
	iALW1-6300	1In	0.93In	0.87In	0.81In	0.75In

◆Precautions for circuit breaker installation:

In order to ensure the safety of your personal and electrical equipment, before the circuit breaker is put into operation, the user must:

◇The operation manual must be carefully read before installation and use of the circuit breaker.

◇The circuit breaker must be used under normal operating conditions.

◇Before installation, please check whether the specification of the circuit breaker meets the use requirements.

◇Please measure the insulation resistance of the circuit breaker with a 500V megger before installation. The resistance should not be less than 10MΩ under the ambient air temperature of 20℃±5℃ and relative humidity of 50%-70%, otherwise it shall be dried and can be used only after the insulation resistance meets the requirements.

◇When installing the circuit breaker, make its installation surface in a horizontal position and fix it with M10 bolts. For the draw-out type circuit breaker, first pull out the circuit breaker body, fix the draw-out base, and then put the circuit breaker body into the draw-out base.

◇During installation, please note that no conductive foreign matter can fall into the circuit breaker.

◇During installation, the conductive bus connected to the circuit breaker must be flat on the connection ground without additional mechanical stress.

◇During installation, the circuit breaker must be reliably protected and grounded. There shall be obvious grounding symbol at the grounding point. The fixed circuit breaker shall strictly abide by the safety zone.

◇After the installation of the circuit breaker, the operation test of the following steps must be carried out before the main circuit is energized to ensure that everything is normal before it can be formally energized:

a. Carefully check whether there is any foreign matter falling into the circuit breaker. If there is, it must be completely removed, and the circuit breaker must be kept clean.

b. The secondary circuit shall be properly connected according to the relevant wiring diagram. Check that the working voltage of undervoltage, shunt, closing electromagnet, motor, intelligent controller and other relevant parts is consistent with the actual supply voltage, and then energize the secondary circuit. If it is a draw-out type circuit breaker, turn the circuit breaker body to the test position, pull in the undervoltage release at this time, and the circuit breaker can be closed.

c. Check whether the reset button of the intelligent controller is reset. The circuit breaker can be closed only when the reset button is placed in the reset position.

d. During manual energy storage, pull the handle on the front panel up and down. After seven actions, you can hear a "click" and the panel displays "energy stored". At this time, press the "I" button or close the electromagnet to power on, the circuit breaker is closed reliably, and the handle can store energy again.

e. If the motor is used to operate the energy storage, connect the motor power supply, power on the motor until the panel displays "energy stored", and then the energy storage is completed.

iALW1 Intelligent Universal Circuit Breaker

Press the "I" button or close the electromagnet, and the circuit breaker will be closed reliably. At the same time, the motor can be energized to store energy, so as to prepare for the next closing.

f. After the circuit breaker is closed, no matter using the undervoltage release or shunt release, either the "O" button on the panel or the tripping test of the intelligent controller should make the circuit breaker open.

g. Use the test function of intelligent controller to open the circuit breaker reliably. After the test, press the reset button.

h. After the "close" and "open" operation of the test position of the draw-out type circuit breaker is normal, turn the circuit breaker to the ON position.

Note: the circuit breaker can be put into normal operation only after the above steps prove that the operation is normal!!!

Fault analysis and troubleshooting

No.	Fault phenomenon	Possible causes	Troubleshooting methods
1	Circuit breaker trip	Overload fault (overload fault indicator light flashes)	1. Check the breaking current value and action time on the intelligent controller. 2. Analyze the load and power grid. 3. If there is an overload fault, please find and eliminate the overload fault. 4. If there is no overload fault, please check whether the actual operating current matches the setting value IR of overload protection operating current. If not, please reset IR to protect with appropriate matching. 5. Press the RESET button (red) to reclose the circuit breaker.
		Short circuit fault (short circuit delay or short circuit instantaneous fault indicator flashes)	1. Check the breaking current value and action time on the intelligent controller. 2. Analyze the load and power grid. 3. If there is a short circuit fault, please find and eliminate the short circuit fault, and check the integrity of the circuit breaker, including main contact, arc extinguishing chamber, fasteners, etc. 4. If there is no short circuit fault, please check whether the inverse time limit operating current setting value Is of short time delay protection and the fixed time limit operating current setting value Isd of short time delay protection meet the matching requirements. If not, please reset Is and Isd to protect with appropriate matching. 5. Press the RESET button (red) to reclose the circuit breaker
		Ground fault (ground fault indicator flashes)	1. Check the breaking current value and action time on the intelligent controller. 2. Analyze the load and power grid. 3. If there is a ground fault, please find and eliminate the ground fault. 4. If there is no ground fault, please check whether the ground current setting Ig matches the actual protection requirements. If not, please reset Ig to protect with appropriate matching. 5. Press the RESET button (red) to reclose the circuit breaker.
		Undervoltage release operates	1. If the voltage of undervoltage circuit is less than 85%Ue (rated working voltage of undervoltage release), please find and eliminate the fault. 2. If the voltage of undervoltage circuit is ≥ 85% Ue, Please contact us to replace the undervoltage release.
		Undervoltage release does not pull in	1. If the voltage of undervoltage circuit is less than 85%Ue (rated working voltage of undervoltage release), please find and eliminate the fault. 2. If the voltage of undervoltage circuit is ≥ 85%Ue, Please contact us to replace the undervoltage release.
2	The circuit breaker cannot be closed	Intelligent controller RESET (red) reset button does not reset	Press the RESET button (red) to reclose the circuit breaker.
		Contact problem of secondary circuit of draw-out circuit breaker	1. Turn the draw-out circuit breaker to the "on" position (after hearing "click" twice), the on indication can be seen on the indication sign of the draw-out base. 2. Check whether the secondary circuit is connected.
		The draw-out body is not in the "connection" or "test" position	Turn the circuit breaker body to the "connection" or "test" position with the handle
		The circuit breaker does not store energy	1. The electric mechanism stores energy. If the voltage of the motor circuit is <85% Us (rated working voltage of the motor), please find and troubleshoot the problem. If the voltage of the motor circuit is ≥ 85%Us, please contact us to replace the motor. 2. Manual energy storage shall be adopted to ensure the operation of the circuit breaker. If there is a problem with manual energy storage, please contact us for maintenance.

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No.	Fault phe-nomenon	Possible causes	Troubleshooting methods
3	The circuit breaker cannot be closed	The key lock on “off” position is locked	Use specialized key to open the key lock.
		The mechanical interlock acts and the circuit breaker is locked	Check the other circuit breaker’s work condition of the two interlocked circuit breakers, only one set can be closed.
		The closing electromagnet cannot close the circuit breaker	1.If the circuit voltage of closing electromagnet is <85%Us (rated operating voltage of undervoltage release), please find the fault and eliminate it. 2. If the circuit voltage of closing electromagnet is ≥85%Us, please contact us to replace the closing electromagnet.
4	The circuit breaker trips after closing	Overcurrent	See 1 for “overload fault” part
		Short circuit current	See 1 for “short circuit fault” part
		Grounding fault current	See 1 for “grounding fault” part
		Excessive transient current during closing	1. Check the breaking current value and action time on the intelligent controller. 2. Analyze the load and power grid. 3. Reset the parameters. 4. Press the RESET button (red) to reclose the circuit breaker.
		Overload protection makes it trip, but the thermal memory function does not cut off the power timely and reclose	Interrupt the controller once or reclose the circuit breaker after 30mins.
5	The circuit breaker cannot open	Mechanical fault of circuit breaker	Check the operating mechanism, and please contact us to settle if it’s stuck.
		Shunt release doesn’t act	1.Check whether the operating voltage of shunt release is ≥70%Us. 2. Please contact us to replace the shunt release if the Us is in normal range.
6	The circuit breaker can not store the energy	Mechanical fault of circuit breaker	See 2 for “The circuit breaker does not store energy” part.
7	The rotary handle of the draw-out circuit breaker	Mechanical fault of circuit breaker	See 2 for “The circuit breaker does not store energy” part.
	The circuit breaker could not be pushed after inserting	The body of circuit breaker is not in place	Push the circuit breaker and guide rail to the end.
8	The circuit breaker does not completely reach the “off” position	Foreign matters fall into the draw-out base and block the turn-out mechanism or the teeth of the turn-out mechanism skip	Check and remove the foreign matters, please contact us if it still cannot be turned out.
		The circuit breaker does not completely reach the “off” position	Turn the circuit breaker completely to the “off” position.
9	The circuit breaker does not completely reach the “connection” position	Foreign matters fall into the draw-out base and block the turn-in mechanism or the teeth of the turn-in mechanism skip	Check and remove the foreign matters, please contact us if it still cannot be turned in.
		The rated current of the circuit breaker body and that of the frame size of the draw-out base does not match	The circuit breaker body and draw-out base with the same rated current of frame size shall be selected.
10	The rotary handle of the draw-out circuit breaker cannot insert to the circuit breaker	The draw-out guide rail or circuit breaker body isn’t pushed in completely	Push the guide rail or circuit breaker body to the end.
		There’s a padlock in separation position.	Remove the padlock.
11	It cannot draw out of the circuit breaker when the body is in “off” position	The handle is not pulled out	Pull out the rotary handle.
		The body of circuit breaker does not completely reach “separation” position	Turn the circuit breaker completely to the “separation” position.

iALW1 Intelligent Universal Circuit Breaker

Product ordering instructions

User company		Order qty.		Order date
Model & spec.	☐ iALW1 ☐ Fixed type ☐ 3P ☐ Rated current In= ☐ A ☐ Draw-out type ☐ 4P ☐ H-type high breaking H-type			
intelligent controller	Model	Basic function	Optional function	Optional accessory
	Type M	1. Protection and monitoring function 2. Measurement function 3. Maintenance function 4. Man-machine interface	☐ D ☐ U ☐ UD ☐ P	
	Type 3H	1. Protection and monitoring function 2. Measurement function 3. Maintenance function 4. Man-machine interface 5. Communication function 6. Output function of four sets of contacts 7. Use of programmer	☐ PD ☐ H ☐ HD ☐ 3P+N grounding mode (external N-pole transformer accessories must be added) ☐ W-type grounding mode (ZTI00 accessories must be added) ☐ E-type grounding mode (ZCT1 accessories must be added) One of the following regional interlocking and signal output units can be added: ☐ S1 ☐ S2 ☐ S3 Type H can add one of the following communication protocols: ☐ Modbus communication protocol ☐ Profibus- DP communication protocol ☐ Device Net communication protocol	☐ DC power supply module ST-1 (DC110V/ DC220V for controller auxiliary power supply) ST power supply module IV (for power supply of ST201 relay module) N-pole external transformer ☐ ZCT1 leakage transformer (for E-type grounding mode) ZTIO0 grounding Leakage transformer (for W-type grounding mode) ☐ ST201 relay module
	Current, time setting	Factory setting / Special requirements	Overload long delay setting current ____ A Time set ____ s Short circuit short delay inverse time limit setting current ____ A Short circuit short delay definite time setting current ____ A Time set ___ s Short circuit instantaneous setting current ___ A Grounding fault setting current____ A Time set __ s	
	Grounding mode	☐ 3PT ☐ 4PT ☐ (3P+N)T		
	Leakage monitoring mode	☐ 3-phase 3-wire (external leakage transformer ZCT1) ☐ 3-phase 4-wire (external leakage transformer ZCT1) ☐ With PE or PEN (external leakage transformer ZT100)		
	Power Supply	☐ AC220V/230V ☐ AC380V/400V ☐ DC110V ☐ DC220V ☐ DC24V		
Standard accessories	☐ Undervoltage release	☐ AC220V/230V ☐ AC380V/400V ☐ Undervoltage instantaneous release (conventional) ☐ Undervoltage delay release ☐ 0.5s ☐ 1s ☐ 3s ☐ 5s		
	☐ Shunt release	☐ AC220V/230V ☐ AC380V/400V ☐ DC220V ☐ DC110V		
	☐ Closing electromagnet	☐ AC220V/230V ☐ AC380V/400V ☐ DC220V ☐ DC110V		
	☐ Electric operating mechanism	☐ AC220V/230V ☐ AC380V/400V ☐ DC220V ☐ DC110V		
	☐ Auxiliary contact	☑ 4NO 4NC (normal) ☑ 5NO 5NC ☑ 6NO 6NC		
	Others	☐ Door frame and its mounting screws ☐ Interphase partition ☐ Connecting bolt		
Optional Accessories	☐ Mechanical interlocking	☐ Cable interlock ☐ Hard rod interlock ☐ 3 locks and 2keys ☐ 2 locks and 1 key ☐ 1 lock and 1 key		
Connection	Connection mode	☐ Horizontal connection (normal) ☐ Vertical connection (drawings should be provided by the user)		
Remarks	If there are other special requirements, please consult with our company			

Note:

1. When there are no special requirements, the time and current setting values of the controller shall be set according to the factory setting.
2. If there are no special requirements, it shall be supplied as M-type intelligent controller.
3. Only one of the grounding and leakage protection functions can be selected (please indicate in the remarks column, if not, it will be supplied according to the grounding protection function).
4. Additional functions and accessories of intelligent controller shall be charged additionally.
5. Leakage transformer ZCT1 or ZTI00 must be selected when selecting leakage protection circuit breaker.
6. If there are special requirements, please indicate them in the remarks column.

iALW1 Intelligent Universal Circuit Breaker

Product model introduction of iALW1-2000

Configuration description

I.iALW1-2000 standard configuration

1.Electric operation: undervoltage instantaneous release, shunt release, closing electromagnet, 5 sets of transfer auxiliary contacts, motor, 3M controller, horizontal wiring of main circuit, door frame, dust cover, interphase partition, operation manual, packing box and main circuit mounting bolts.

2. Manual operation: undervoltage instantaneous release, 5 sets of transfer contacts, 3M controller, horizontal wiring of main circuit, door frame, mounting bolts of main circuit, dust cover, interphase partition, operation manual and packing box.

II. Optional configuration (The cost is calculated separately)

Options instruction for iALW1-2000: undervoltage delay release (zero voltage relay), mechanical interlock, external transformer grounding protection function, vertical bus, 4 sets of transfer contacts, door interlock, draw-out base three-position indicating mechanism, dual power automatic transfer switch, button lock, 3H controller, additional functions of intelligent controller.

iALM1L Residual Current Operated Circuit Breaker

Overview

iALM1L series intelligent residual current operated circuit breaker (hereinafter referred to as leakage circuit breaker) is an integrated, multifunctional and current adjustable leakage circuit breaker. It is applicable to the low-voltage power grid with three-phase four-wire neutral direct grounding (TT grounding system), which is used to provide indirect contact protection against human contact hazards, and also to protect the grounding fault, overcurrent, short circuit, etc. of lines or electricity.

Product naming rules

iAL M 1 E/C L - □ □ / 3N

- 3N: it means there are three protective poles, and N pole is normally on
- Breaking capacity level: M type: medium high breaking capacity; H type: high breaking capacity
- Rated current of frame size
- Residual current operated circuit breaker
- Electronic type: E denotes nixie tube display, C denotes LCD display
- Design code
- Moulded case circuit breaker
- Enterprise code

Functional features

- High performance 8-bit microprocessor is adopted for real-time signal processing and intelligent control;
- It supports LCD Chinese display, friendly man-machine interface and simple operation;
- Long time delay, short-circuit short time delay and instantaneous three-segment protection, electronic tripping, independent of auxiliary power supply;
- Overvoltage and undervoltage protection, phase loss protection, abrupt change protection, etc., with automatic reclosing function after recovery meanwhile;
- Residual current protection, automatic gear setting and reclosing function;
- Real time display of line residual current, three-phase supply voltage and load current;
- Enabling and disabling of the setting of protection functions and parameters;
- It can monitor and record a large amount of data to facilitate maintenance and overhaul;
- It has communication function, and the product meets the standard: DL/T20 Residual Current Device Communication Protocol;

Scope of application

The products are applied to low-voltage JP cabinet (integrated distribution cabinet of distribution transformer) and photovoltaic power generation system for urban and rural power grid transformation; JP cabinet is designed to meet the requirements of standardization, miniaturization and outdoor type of rural low-voltage distribution devices. It integrates power distribution, metering, protection (overload, short circuit, leakage, snow prevention) and capacitance reactive power compensation into one whole.

Normal operating conditions

- Ambient temperature: -15℃~ 70℃;
- Relative air humidity: when the maximum temperature is +40℃, the relative humidity of the air shall not exceed 50%; at +20℃, the relative humidity of the air is allowed to reach 90%, and the condensation on the product surface due to temperature change should be taken into;
- The altitude is generally not more than 2000m, otherwise it needs to be reduced;
- The pollution level is level 3;
- Installation category is III;
- The magnetic field outside the installation site shall not exceed 5 times of the geomagnetic field in any direction; no explosive and corrosive gas; no invasion of rain or snow; dry and ventilated;
- The sine wave distortion of the power supply is less than 5%.

iALM1L Residual Current Operated Circuit Breaker

Function sort

Sort	Display type	LCD	Nixie tube type
Display	12864 LCD	●	
	4-digit nixie tube display		●
	Highlight LED indicator		8
Leakage protection	Slow change protection	●	●
	Abrupt change protection	●	●
	Baud protection	●	●
	Leakage alarm	●	●
	Maximum leakage phase judgement	●	●
Current protection	Overload long time delay protection	●	●
	Short circuit short time delay protection	●	●
	Short circuit instantaneous protection	●	●
	Self-generated power supply	●	●
Voltage protection	Overvoltage protection	●	●
	Undervoltage protection	●	●
	Phase loss protection	●	●
	Total voltage loss protection	●	●
External breaking	Short circuit opening/closing	●	●
	Auxiliary output interface	●	●
Clock function	Real time clock	●	●
Storage record	Fault trip record	●	●
	Residual current alarm record	●	●
	Residual current overrun record	●	●
	Protector test record	●	●
	Record of maximum daily residual current	●	●
	Daily ABC phase current maximum value record	●	●
	Daily ABC phase voltage maximum value record	●	●
	Daily residual current minimum value record	●	●
	Daily ABC phase current minimum value record	●	●
	Daily ABC phase voltage minimum value record	●	●
	Leakage curve record	●	●
	Statistics of tripping times	●	●
Communication function	All functions (national standard)	●	●
	Part functions (national standard)	●	●

Technical parameter

Model	iALM1E/CL-125	iALM1E/CL-250	iALM1E/CL-400/630	iALM1E/CL-800
Rated current of frame size Inm(A)	125	250	400/630	800
Rated current In(A)	0.4-1.0Inm (A) continuously adjustable			
Auxiliary supply voltage Ue(AC V)	400/50HZ			
Applicable poles	3P+N			
Rated residual operating current(mA)I△n	The gear value is optional, and eight groups of parameter values can be customized according to customer requirements (default 50-1000)			
Rated residual non-operating current (mA)	I△no=50%I△n			
Rated limit non-actuating time (s)	The gear value is optional, and three groups of parameter values can be customized according to user requirements (default 60-300ms)			
Ultimate short circuit breaking capacity Icu (KA)	M50	M50/H85	M65/H100	M65/H100
Service short circuit breaking capacity Ics (KA)	M35	M35/H55	M50/H65	M50/H65
Rated residual short circuit making (breaking) capacity	25%Icu			
Delayed reclosing time (s)	20-60			
Operation characteristic classification	AC type			
Undervoltage operation value (V)	Single phase 165V±5% (user adjustable)			
Overvoltage operation value (V)	Single phase 275V±5% (user adjustable)			
Phase failure operation value (V)	Default 120±5% (user adjustable)			
Delay Time	0~10s (overvoltage, undervoltage, full voltage loss time for photovoltaic grid connection can be adjusted by the user)、			
Operation mode	Key setting			
Display mode	LCD, LED display			

iALM1L Residual Current Operated Circuit Breaker

Protection characteristics

Overload long time delay protection

Model	Frame size current	Set value
Operation set value Ir1	125	0.4-1.0Inm(A) continuously adjustable, step size:1A
	250	0.4-1.0Inm(A) continuously adjustable, step size:1A
	400	0.4-1.0Inm(A) continuously adjustable, step size:1A
	630	0.4-1.0Inm(A) continuously adjustable, step size:1A
Delay time set value Tr1	3-18S, step size:1S	

Delay characteristic

Overload protection shall be carried out according to inverse time limit

T=(6Ir1/I) 2*Tr1, ± 20%; T is the actual operation time; I is the fault current and Tr1 is the delay setting value; Ir1 is the operation setting value.

Short circuit short time delay protection

Parameter	Set value
Operation set value Ir2	2 ~12 times of Ir1, step size: 1 time
Delay time set value Tr2	100~1000ms, step size:1ms
Note: T>200ms (if it is less than 200ms, the operation shall be delayed by 200ms), ±20%;	

Delay characteristic

The protection shall be carried out according to definite time limit

Parameter	Set value
Operation set value Ir3	4~14x Ir1, step size: 1x
Delay time set value Tr3	< 200ms

Residual current protection

Gear setting range

Parameter	Set value
Residual operating current	Default: 30, 50, 100, 150, 200, 300, 500, 800, 1000

iALM1L Residual Current Operated Circuit Breaker

Protection characteristics

Unit(S)

Parameter	Set value			
Short time characteristic	2 I △ n limit non-actuating time	Breaking time		
		1 time	2times	5times
0.06	＞0.06	0.2	0.2	0.2
0.2	＞0.2	0.3	0.3	0.3
0.3	＞0.3	0.5	0.5	0.5

Automatic reclosing

When the residual current exceeds the operation current value and the gear acts and trips, it can automatically reclose after 20-60 seconds, but the manual closing is not limited by time. If the fault current is eliminated within 3 minutes after closing, the closing is successful and the circuit breaker operates normally; If the fault current is not eliminated, the circuit breaker trips and locks again, and it will not automatically reclose, then it must be closed manually.

Protection function

Overvoltage protection function

When the line phase voltage is higher than the set value, the circuit breaker will trip after a 5-second delay. When the line voltage returns to normal voltage, the circuit breaker can be automatically closed and put into operation.
Overvoltage protection setting value range is 255-350V, step size: 1V; the user can also set the protection on or off by himself.

Undervoltage protection function

When the line phase voltage is lower than the set value, the circuit breaker will trip after a 5-second delay. When the line voltage returns to normal voltage, the circuit breaker can be automatically closed and put into operation.
The setting range of undervoltage protection is 120-195V, and the step size is 1V; the user can also set the protection on or off by himself.

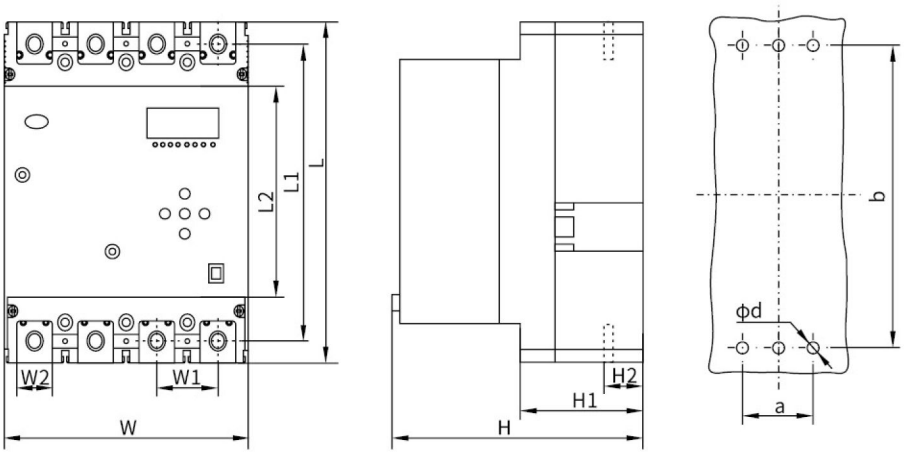
Phase failure protection function

In case of phase loss at the incoming end of the line power supply, the circuit breaker will trip. When the line voltage returns to normal voltage, the circuit breaker is closed again. The setting range of phase loss protection is 10-120V, and the step size is 1V; The user can also set the protection on or off by himself.
For the special circuit breaker for photovoltaic grid connection, the setting value of voltage loss adjustment is 20%UN, the setting value of overvoltage trip is 135%UN, the setting value of closing is 85%UN in condition there's voltage detected, and it can be adjusted for 0~10s in case of overvoltage and undervoltage delay.

iALM1L Residual Current Operated Circuit Breaker

Mounting dimensions

◆ Outline and installation dimensions for circuit breaker of front-panel wiring

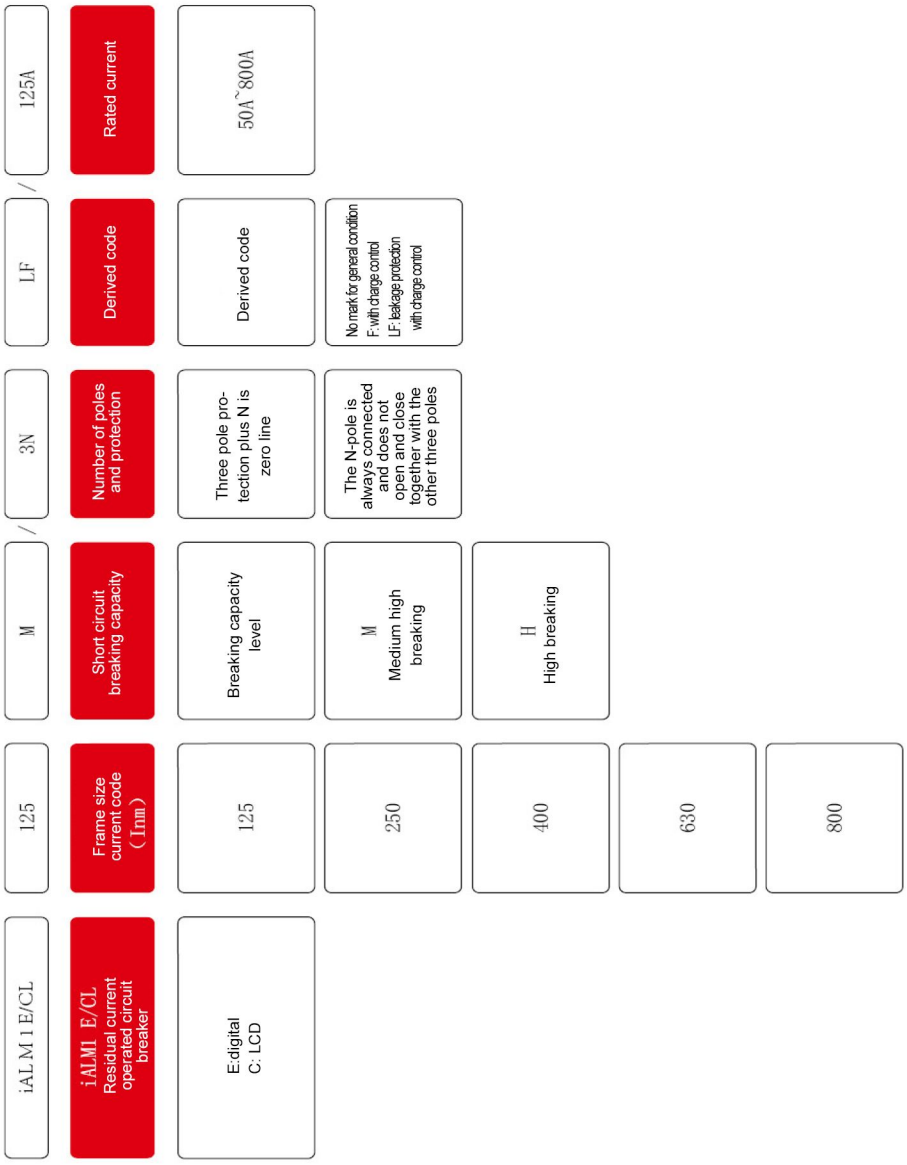


(Unit:mm)

Product model	Overall dimension									Mounting dimension		
	L	L1	L2	**W**	W1	W2	**H**	H1	H2	a	b	ϕd
M1L-125	220	201	169	122.5	30	18	138	81	28	60	198.5	4.5
M1L-250	240	218	178	142.5	35	23	138	86	24	70	201	4.5
M1L-400	335	305	253	198	48	33	182.5	98.5	Upper39 Lower37	96	272	8
M1L-630 (Increased capacity)	335	305	253	198	48	33	182.5	98.5	Upper40 Lower41	96	272	8
M1L-630	355	318	270	240	58	44	191	102	43	116	285	8
M1L-800	370			280			188	107			333	8

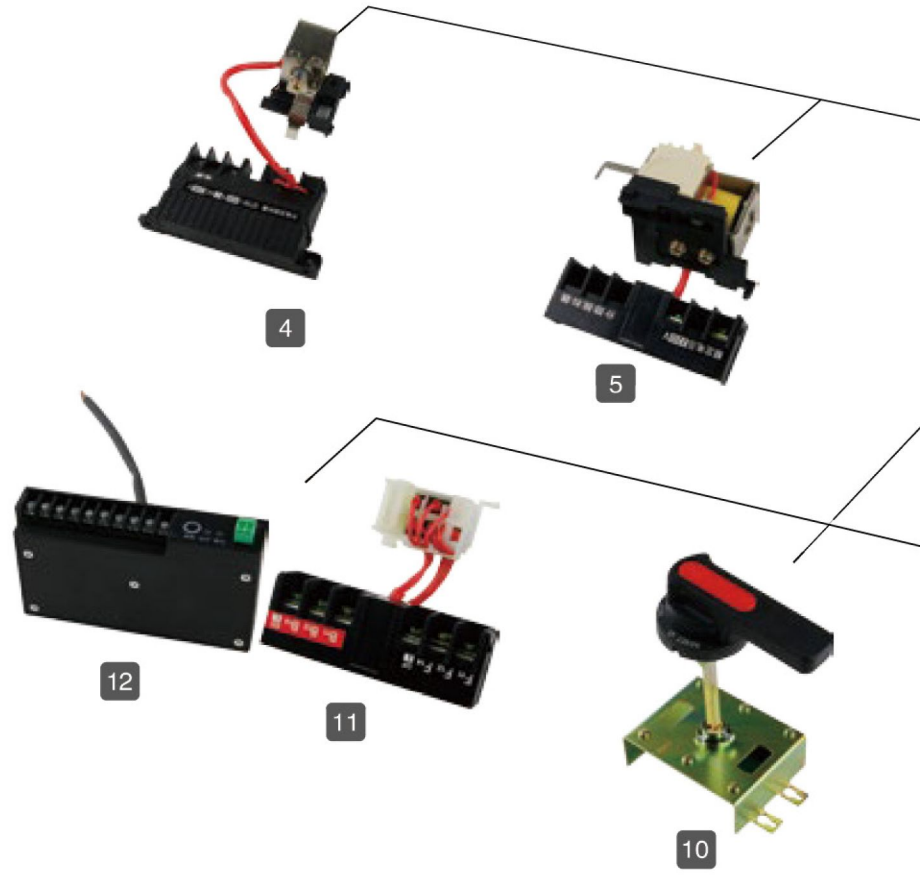
iALM1L Residual Current Operated Circuit Breaker

Quick selection table of iALM1L residual current operated circuit breaker



iALM1E Electronic Moulded Case Circuit Breaker

1	Switch body
2	Arc chute (standard)
3	plug-in type (optional)
4	Undervoltage release (optional)
5	Shunt release (optional)
6	Alarm contact (optional)
7	Auxiliary contact (optional)
8	Front-panel wiring transition board (optional)
9	Electric operating mechanism (optional)
10	Rotary handle operating mechanism (optional)
11	Auxiliary, alarm contact (optional)
12	Communication, shunt, alarm accessories (optional)



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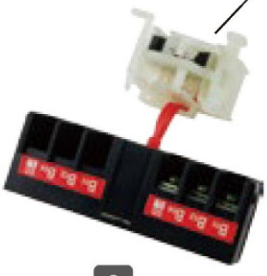

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iALM1E Electronic Moulded Case Circuit Breaker

Product overview

iALM1E series electronic moulded case circuit breaker (hereinafter referred to as circuit breaker) is one of the new circuit breakers developed by our company with international advanced technology. It has the characteristics of four segment selective protection, high breaking, small and compact structure, etc.

The circuit breaker is classified into M type (higher breaking type) and H type (high breaking type) according to rated limit short-circuit breaking capacity (Icu). It is an ideal product for power distribution and motor protection. Its rated insulation voltage is 1000V, which is applicable to the AC 50/60Hz circuit with rated working voltage of 690V and below, and setting current from 12.5A to 800A for infrequent line conversion and infrequent motor startup.

A module with communication function can be added to the circuit breaker, so that the original circuit breaker can be easily upgraded to a communication type circuit breaker.

The circuit breaker has the functions of overload long time delay, short circuit short time delay, short circuit instantaneous and grounding protection. The product can be equipped with undervoltage, shunt, auxiliary, alarm, communication and other accessories.

This series of circuit breakers can be installed vertically (i.e. upright) or horizontally (i.e. transversely).

With isolation function, the corresponding symbol is: . Note: 3P+N has no isolation function

It has a unique "overload alarm without tripping" function to ensure the continuity of power supply.

The circuit breaker complies with series standards:

IEC/EN 60947-1 and GB/T 14048.1 Low-voltage switchgear and controlgear-Part 1: General rules.

IEC/EN 60947-2 and GB/T 14048.2 Low voltage switchgear and controlgear Part 2: Circuit breakers.

Product naming rules

iAL M 1 E – □ □ □ / □ □ □ □ □

- Four pole product code, no code for three pole product
- Purpose Code: no code for power distribution; 2 for motor protection
- Accessories code
- Release mode
- Number of poles (3. three poles; 4. four poles)
- Operation mode
- Rated limit short circuit breaking capacity level
- Rated current of frame size
- Electronic type
- Design code
- Moulded case circuit breaker
- Enterprise code

Note: * there is no code for distribution protection, and the motor protection code is represented by 2.

**There is no code for manual direct operation, electric operation is represented by P, and rotary handle operation is represented by Z.

iALM1E Electronic Moulded Case Circuit Breaker

Table 1

Code	Instruction	Example
A	The N-pole is not equipped with overcurrent tripping element, and the N-pole is always connected and is not closed or open together with other three poles	3N300A
B	The N-pole is not equipped with overcurrent tripping element, and N pole is closed and open together with other three poles (N-pole is closed first and then open)	4300B
C	The N-pole is equipped with an overcurrent tripping element, and the N-pole is closed and open together with the other three poles (the N-pole is closed first and then open)	4300C
D	The N-pole is equipped with an overcurrent tripping element, and the N-pole is always connected and is not closed or open together with other three poles	3N300D

Normal working conditions and installation conditions

◆ Ambient air temperature is -5℃ to +40℃;

◆ The relative humidity of the air at the installation site shall not exceed 50% when the maximum temperature is +40℃ at lower temperatures, there can be higher relative humidity, such as 90% at 20℃. Special measures shall be taken for occasional condensation due to temperature change;

◆ The pollution level is level 3;

◆ The circuit breaker should pass GB/T2423.10, the test requires that it can withstand mechanical vibration with frequency of 2Hz~13.2Hz, displacement of ± 1mm, frequency of 13.2Hz ~100Hz and acceleration of±0.7g;

◆ The installation category of the main circuit of the circuit breaker is II, and the installation category of other auxiliary circuits and control circuits is II;

◆ The circuit breaker is suitable for electromagnetic environment B;

◆ The circuit breaker shall be installed in a place without explosion hazard, conductive dust, sufficient corrosion to metal and damage to insulation;

◆ The circuit breaker shall be installed in a place free from rain and snow;

◆ Operating conditions:

◇ The circuit breaker should pass the test requirements of GB/T 2423.1 and GB/ T2423.2, and the ambient air temperature can be as low as -30℃ and as high as +70℃ (capacity reduction is adopted beyond +40℃, see the technical data in this sample for details);

◇ The characteristics are not affected when the altitude is up to 2000m (the capacity is reduced when it is more than 2000m, see the technical data in this sample for details);

◇ Storage conditions: ambient air temperature is -40℃~ +75℃.

◆ The protection level of the product body is IP20

◆ Cabinet door installation

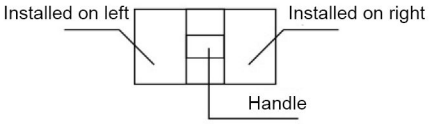
Equipped with toggle handle: the protection level is IP40

Equipped with rotary handle: the protection level is IP50

Equipped with electrical operating mechanism: the protection level is IP40

Release type and accessory code

Release type and accessory code



Alarm contact ●　Auxiliary contact ○
Shunt release ■　Undervoltage release ▲

Table 2

Accessory name	Accessory code	Accessory installation and lead mode					
	Electronic release	iALM1E-125/160		iALM1E-250/320		iALM1E-400 iALM1E-630 iALM1E-800	
No accessories	00						
Alarm contact	08						
Shunt release	10						
Auxiliary contact	20						
Undervoltage release	30						
Shunt release, auxiliary contact	40						
Shunt release, undervoltage release	50						
Two sets of auxiliary contacts	60						
Auxiliary contact, undervoltage release	70						
Shunt release, alarm contact	18						
Auxiliary contact, alarm contact	28						
Undervoltage release, alarm contact	38						
Shunt release, auxiliary contact, alarm contact	48						
Two sets of auxiliary contacts, alarm contacts	68						
Undervoltage release, auxiliary contact, alarm contact	78						

Note: the 800 moulded case product has no right alarm accessories
A group of auxiliary contacts below 400 type includes one normally open and one normally closed contact, and a group of auxiliary contacts above 400 type includes two normally open and two normally closed.

iALM1E Electronic Moulded Case Circuit Breaker

Product parameters

◆See Table 3 and table 4 for product parameters

Table 3

Basic information					
Rated current of frame size		125		250	
Number of poles		3P、3P+N、4P		3P、3P+N、4P	
Frequency (Hz)		50/60		50/60	
Rated working voltage Ue (V)		380/400 /415/660/690		380/400 /415/660/690	
Rated insulation voltage Ui (V)		1000		1000	
Rated impulse withstand voltage Uimp (kV)		8		8	
Rated working current In (A)		32AF:12.5-32 63AF:25-63 125AF:50-125		250AF:100-250	
Breaking capacity level		M	H	M	H
Rated limit short circuit breaking capacity Icu (KA)	AC400V	50	65	50	65
	AC690V	10	20	10	20
Rated service short-circuit breaking capacity Ics (KA)	AC400V	35	55	35	55
	AC690V	10	10	10	10
Rated short-time withstand current Icw (KA/1s)	AC400V			5	5
Isolation capability		Provided (3P, 4P)		Provided (3P, 4P)	
Usage category		Type A		Type A	
Arc distance (mm)		⩽ 50		⩽ 50	
Mechanical life (times)	Maintenance free	20000		20000	
	With maintenance	40000		40000	
Electrical life (times)		10000		10000	

Table 4

Basic information							
Rated current of frame size		400		630		800	
Number of poles		3P、3P+N、4P		3P、3P+N、4P		3P、3P+N、4P	
Frequency (Hz)		50/60		50/60		50/60	
Rated working voltage Ue (V)		380/400/415 660/690		380/400/415 660/690		380/400/415 660/690	
Rated insulation voltage Ui (V)		1000		1000		1000	
Rated impulse withstand voltage Uimp (kV)		8		8		8	
Rated working current In (A)		400AF:160-400		630AF:250-630		630AF:250-630 800AF:315-800	
Breaking capacity level		M	H	M	H	M	H
Rated limit short circuit breaking capacity Icu(KA)	AC415V	85	100	85	100	85	100
	AC690V	20	30	20	30	20	30
Rated service short-circuit breaking capacity Ics(kA)	AC415V	65	70	65	70	65	70
	AC690V	20	20	20	20	20	20
Rated short-time withstand current Icw (kA/1s)	AC415V	8	6	10(Bulk)	10(Bulk)	10	10
Isolation capability		Provided(3P, 4P)		Provided(3P, 4P)		Provided (3P, 4P)	
Usage category		Type B		Type B		Type B	
Arc distance		⩽ 100		⩽ 100		⩽ 100	
Mechanical life (times)	Maintenance free	10000		10000		8000	
	With maintenance	20000		20000		10000	
Electrical life (times)		8000		8000		7500	

iALM1E Electronic Moulded Case Circuit Breaker

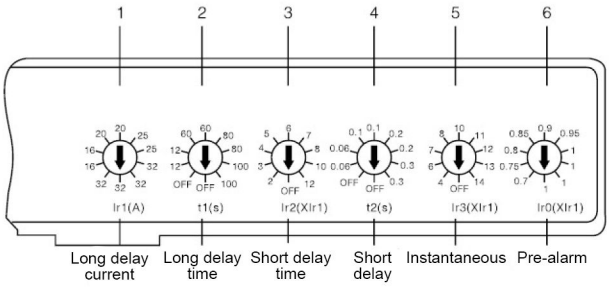
◆ Overload pre-alarm

Table 5

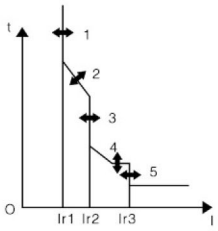
Electronic release	Rated current of frame size Inm (A)	Rated current In (A)	Current setting value of adjustable overload pre-alarm protection release I_p(A)	Tripping characteristics/time
Overload pre-alarm	Full-series	32-800	I_p=(0.7-0.75-0.8-0.85-0.9-0.95-1)×I_R+OFF	/

Electronic release

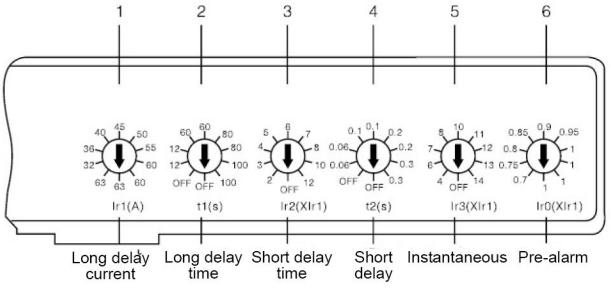
iALM1E-125 type, In=32A electronic release



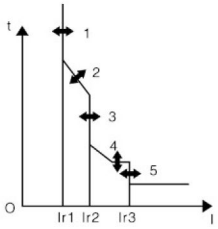
Protection characteristic curve of electronic release



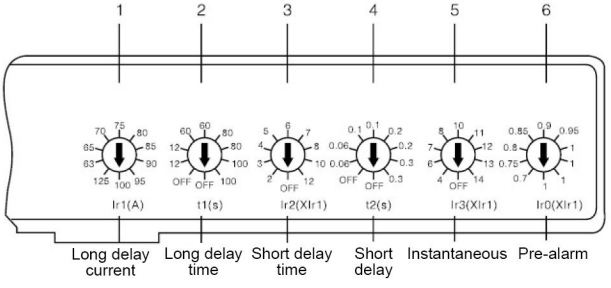
iALM1E-125 type, In=63A electronic release



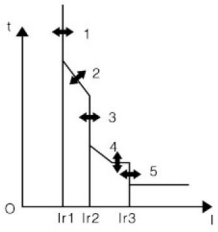
Protection characteristic curve of electronic release



iALM1E-125 type, In=100A electronic release

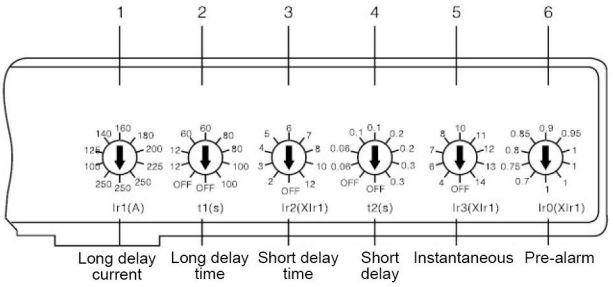


Protection characteristic curve of electronic release

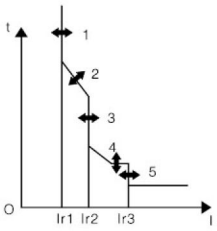


iALM1E Electronic Moulded Case Circuit Breaker

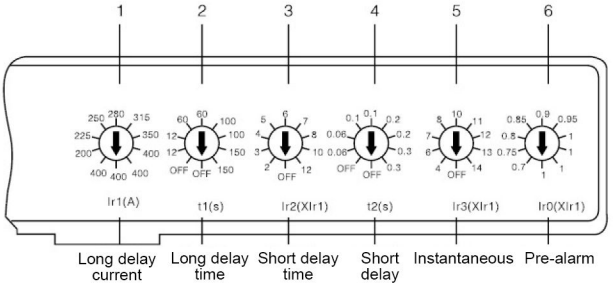
iALM1E-250 type, In= 250A electronic release



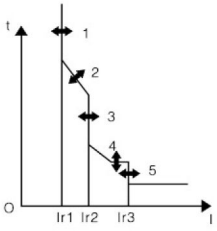
Protection characteristic curve of electronic release



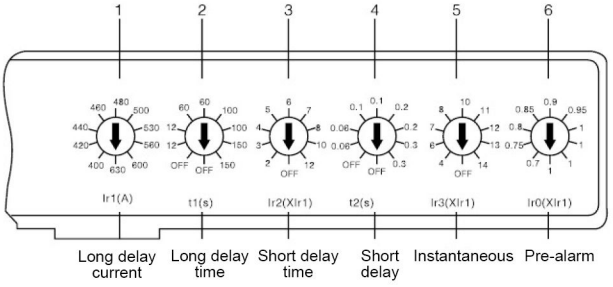
iALM1E-400-400 type, In=400A electronic release



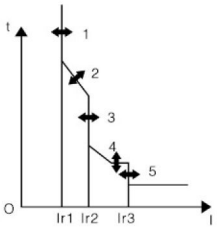
Protection characteristic curve of electronic release



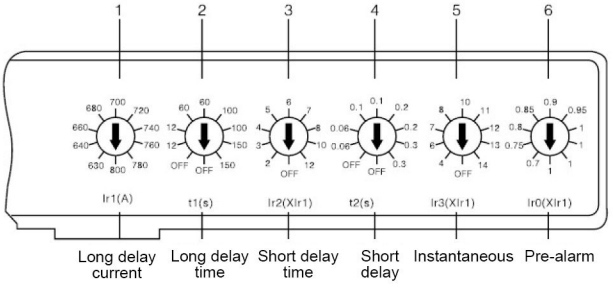
iALM1E-630 type, In=630A electronic release



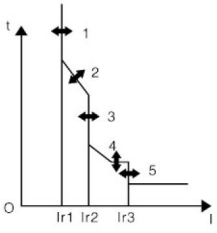
Protection characteristic curve of electronic release



iALM1E-800 type, In=800A electronic release



Protection characteristic curve of electronic release



iALM1E Electronic Moulded Case Circuit Breaker

Technical data

◆ Reference cross-sectional area of connecting wires with different rated currents

Table 6

Rated current In (A)	32	63	125	160	250	320	400
Conductor cross-sectional area(mm²)	6	16	50	70	120	185	240

Table 7

Rated current In(A)	Cable		Copper bar	
	Sectional area(mm²)	Qty.	Size (mm * mm)	Qty.
630	185	2	40×5	2
800	240	2	50×5	2

◆ Power loss

Table 8

Product model	Power-on current (A)	Total power loss of three pole/four pole (W)		
		Front-panel/ back-panel wiring	Plug in front-panel wiring	Plug in type back-panel wiring
iALM1E-125	125	12	12	12.2
iALM1E-250	250	50	75	86
iALM1E-400	400	58	87	90
iALM1E-630	630	110	120	130
iALM1E-800	800	115.2	125	140

◆ Derating coefficient at different temperatures

Table 9

Product model	Power-on current (A)	Ambient temperature						
		-35℃	-30℃	-25℃	-20℃	-15℃	-10℃	-5℃
iALM1E-125	125	1.45In	1. 4In	1.35In	1.3In	1.2In	1.18In	1.15In
iALM1E-250	250	1.45In	1. 4In	1.35In	1.3In	1.25In	1.2In	1.18In
iALM1E-400	400	1.65In	1.6In	1.55In	1.44In	1.42In	1.4In	1.35In
iALM1E-630	630	1.4In	1.35In	1.31In	1.3In	1.25In	1.2In	1.18In
iALM1E-800	800	1.35In	1.34In	1.32In	1.31In	1.3In	1.25In	1.23In

Table 10

Product model	Power-on current (A)	Ambient temperature						
		0℃	45℃	50℃	55℃	60℃	65℃	70℃
iALM1E-125	125	1.15In	0.95In	0.94In	0.93In	0.92In	0.91In	0.89In
iALM1E-250	250	1.15In	0.95In	0.94In	0.89In	0.85In	0.81In	0.78In
iALM1E-400	400	1.3In	0.95In	0.94In	0.89In	0.85In	0.81In	0.78In
iALM1E-630	630	1.13In	0.95In	0.94In	0.92In	0.9In	0.87In	0.86In
iALM1E-800	800	1.18In	0.95In	0.94In	0.85In	0.82In	0.8In	0.78In

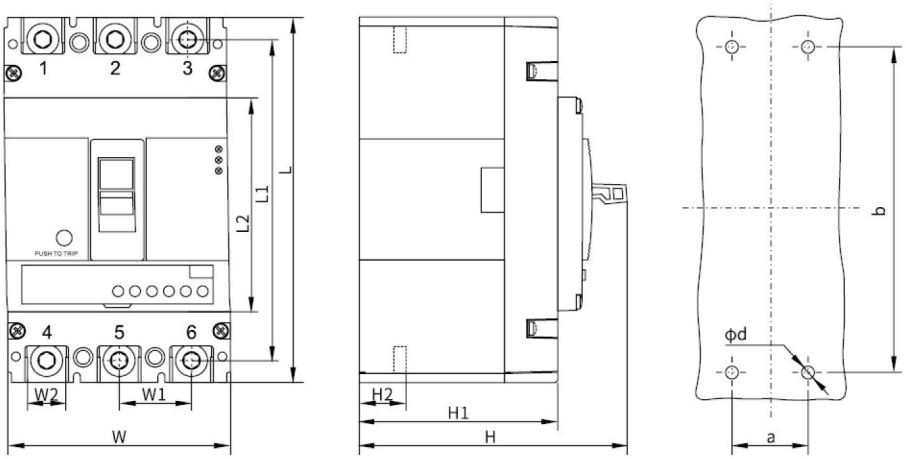
(1) Derating factor 1in of all moulded case circuit breakers at 40℃;

(2) For iALM1E circuit breaker, the derating factor is measured under the maximum rated current of each moulded case.

iALM1E Electronic Moulded Case Circuit Breaker

Outline and installation dimensions

◆ Overall dimension and installation dimension of the product

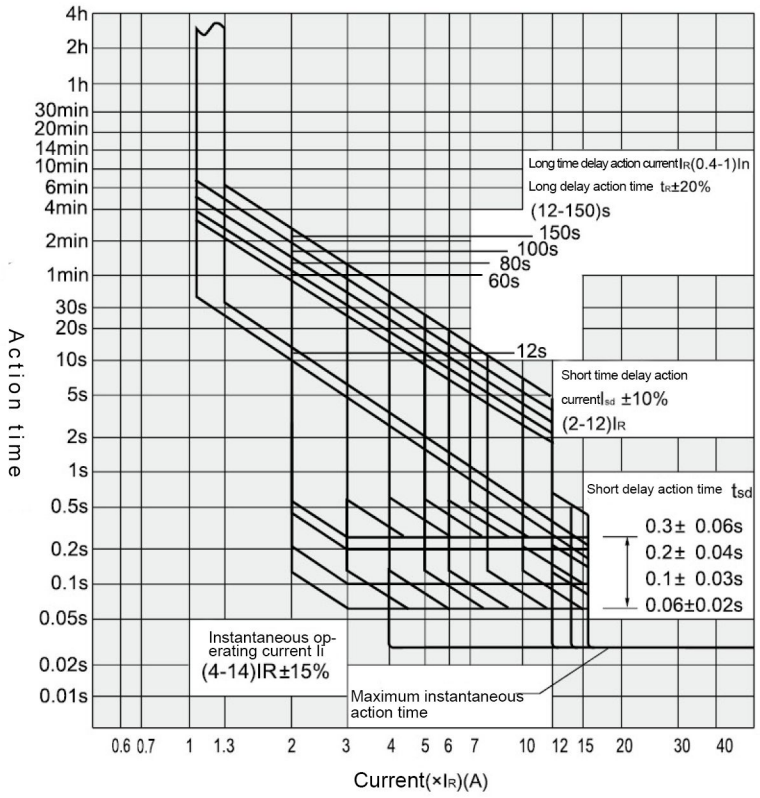


（Unit:mm）

Product model	Number of poles	Overall dimension									Mounting dimensions		
		L	L1	L2	**W**	W1	W2	**H**	H1	H2	a	b	ϕd
M1E-125	3	150	130	88.5	92	30.5	18	114	81	28	30	129	4.5
	4	150	130	88.5	123	30.5	18	114	81	29	60	129	4.5
M1E-250	3	165	142	101.5	107	35	23	113	85	23	35	126	4.5
	4	165	142	101.5	142	35	23	113	85	23	70	126	4.5
M1E-400	3	258	225	175	150	48.5	33	150	98	Upper40 Lower38	44	194	7
	4	258	225	175	198	48.5	33	150	98	Upper40 Lower38	94	194	7
M1E-630	3	270	235	185	182	58	43.5	155	103.5	44	58	200	7
	4	270	235	185		58	43.5	155	103.5	44		200	7
M1E-800	3	280	243	205	210	70.5	45	162	103.5	Upper40 Lower42	70	242	7
	4	280	243	205	282	70.5	45	162	103.5	Upper40 Lower46	140	242	7

iALM1E Electronic Moulded Case Circuit Breaker

Protection characteristic curve of circuit breaker



Factory parameter setting of intelligent controller for circuit breaker

Factory parameter setting value

Table 12

	Protection type		Distribution protection		Motor protection
4	Overload long delay	Setting current I_R (A)	In		
5		Delayed t_R (s)	60/64(iALM1E-1250)		100/96(iALM1E-1250)
6	Short circuit short delay	Setting current I_{sd} (A)	8 (XI_R)		10(XI_R)
7		Delayed t_{sd} (s)	0.3		
8	Short circuit transient	Setting current I_i (A)	Inm ⩽ 630A	12 (XI_R)	14 (XI_R)
			Inm ⩾ 800A	10 (XI_R)	
9 (pre-alarm standard provision, others optional)	Pre-alarm	Setting current I_P (A)	0.9 (XI_R)		
	Grounding protection	Setting current I_g (A)	Close		
	Neutral protection	Setting current I_{RN} (A)	Close		

iALM1E Electronic Moulded Case Circuit Breaker

Ordering instructions

The user must specify the following items when ordering:

a) Model, name and number of poles of circuit breaker.

b) Rated current of circuit breaker.

c) Name, specification and combination code of accessories of circuit breaker (working voltage value shall be indicated for shunt release and undervoltage release)

d) Purpose: for power distribution (delivery as power distribution use if not indicated), for motor protection (represented by 2).

e) Quantity.

For example: iALM1E-250, 3P, 50kA breaking capacity, rated current 250A, with shunt release, its voltage is AC400V, external terminals, totally 20 sets. It shall be written as: iALM1E-250M/3310, 250A AC400V, external terminal, 20 sets.

Special requirements for circuit breaker can be determined through consultation with the manufacturer.

Quick selection example

The user must specify the following items when ordering:

a) Model, name and number of poles of circuit breaker.

b) Rated current of circuit breaker.

c) Name, specification and combination code of accessories of circuit breaker (working voltage value shall be indicated for shunt release and undervoltage release)

d) Purpose: for power distribution (delivery as power distribution use if not indicated), for motor protection (represented by 2).

e) Quantity.

c) iALM1E-125H/3300E1 125A:

That is to order a set of iALM1E series electronic circuit breaker of 125A frame size, 85kA (high breaking type), three pole, three knob controller with rated current of 125A, for distribution protection.

Note: if you need special customized products, please consult our company first.

iALM1E Electronic Moulded Case Circuit Breaker

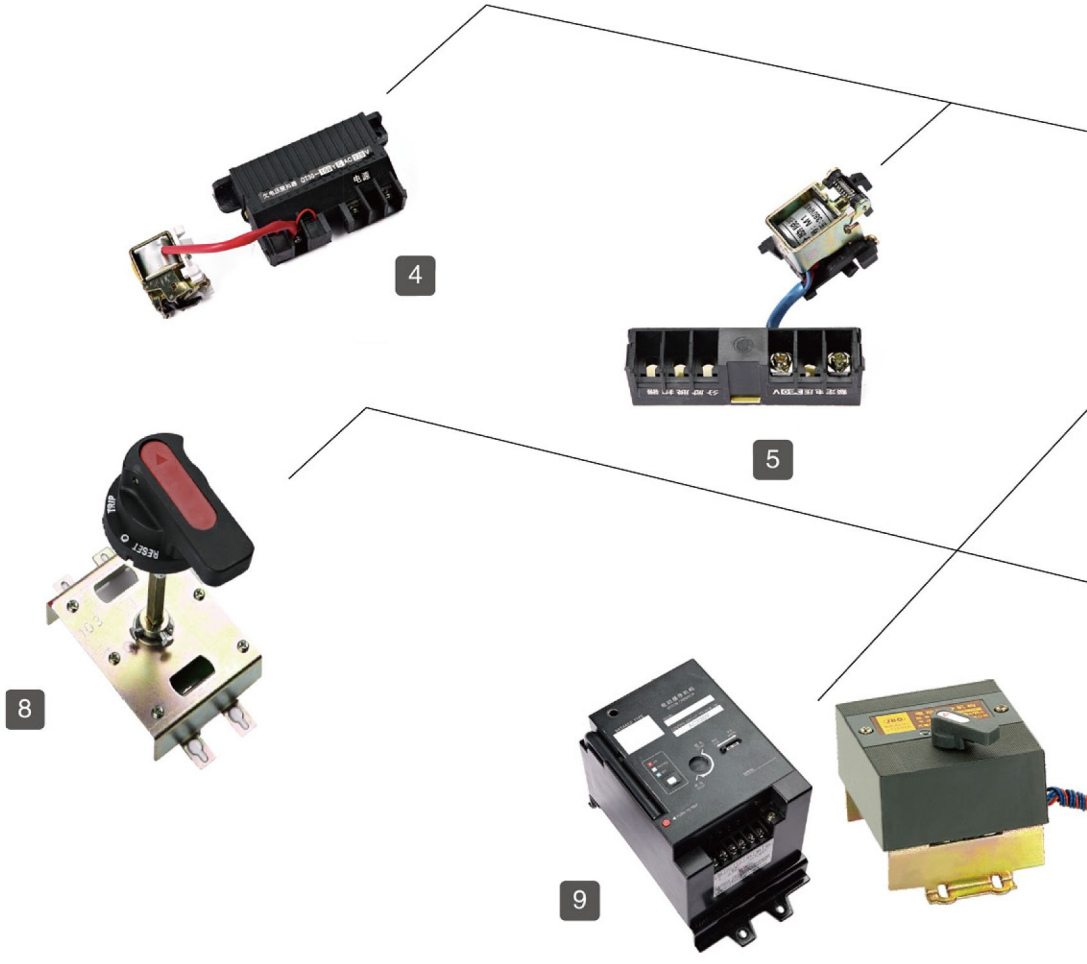
Description of selection table of iALM1E series electronic molded case circuit breaker

iALM1E-	125	M	Z	/	4	3	00	2	B	II	E1	125	AC230V	B	Plateau
Product model	Frame size current	Breaking capacity	Operation mode		Number of poles	Tripping mode	Internal accessories	Purpose	N-pole code	Alarm module	Controller code	Rated current	Accessory voltage	Installation mode	Application occasion
iALM1E electronic moulded case circuit breaker	125: 125A 250: 250A	M: Higher breaking	Default: direct operation		3:3P	2:Electronic type	00: no accessories 10: shunt release 20: auxiliary contact 30: undervoltage release 40: shunt + auxiliary	Default: distribution protection	A:The three protective poles and the zero line are not disconnected with other poles	Default: overload alarm trip	Default: pre-alarm controller	125: 32A 63A 125A	AC380/400V AC220/230V DC220V DC110V DC24V	Default: fixed type front-panel	Default: general application
	400: 400A 630: 630A	H: High breaking	Z: Rotary handle operation		3N: 3P+N		50: shunt + undervoltage 60: two sets of auxiliary contacts 70: undervoltage + auxiliary 08: alarm contact	2: Motor protection	B: The three protective poles and zero line are disconnected with other poles	II : Overload alarm without trip	E1: three-knob controller	160: 63A 125A 160A	In case of kinds of accessory voltages, they shall be described separately (e.g. shunt AC230V, undervoltage AC400V)	B: Fixed type back-panel	Plateau Damp heat Environment protection Salt fog Low temperature
	800: 800A	P: Motor operation			4:4P		18: shunt + alarm 28: auxiliary + alarm 38: undervoltage + alarm 48: shunt + alarm+ auxiliary		C: The four protective poles and zero line are disconnected with other poles		E3: grounded controller	250: 250A 400: 400A		C: Plug in type back-panel	
							68: two groups of auxiliary + alarm 78: undervoltage + auxiliary + alarm		D: The four protective poles and the zero line are not disconnected with other poles		E4: neutral protection controller	630: 630A 800: 630A 800A		F: Plug in type back-panel	

Note: accessories of undervoltage release are not provided temporarily. Please contact local sales personnel when purchasing

iALM1 Moulded Case Circuit Breaker

1	Switch body
2	Arc chute (standard)
3	Plug-in type (optional)
4	Undervoltage release (optional)
5	Shunt release (optional)
6	Alarm contact (optional)
7	Auxiliary contact (optional)
8	Rotary handle operating mechanism (optional)
9	Electric operating mechanism (optional)
10	Front wiring transition board (optional)



2

3


iALLway
IALM1-250L/3300
In 250 A
Ue 400V
Ui 1000V
F 50Hz
Cat A
+40°C
ON
OFF
MCCB
Icu 35kA
Ics 22kA
Ii 10In
GB/T14048.2
浙江沃威电气有限公司

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7

10

iALM1 Moulded Case Circuit Breaker

Product overview

iALM1 series moulded case circuit breaker (hereinafter referred to as circuit breaker) is one of the new circuit breakers developed by adopting international advanced design technology. It is classified into type L (standard type) according to its rated limit short-circuit breaking capacity (Icu), type M (high breaking type) and type H (high breaking type). The product has the characteristics of small volume, high breaking capacity, short arcing and anti vibration. It is an ideal product for land and ship use. Its rated insulation voltage is 800V (500V for iALM 1-63), which is suitable for infrequent line conversion and infrequent motor startup in circuits with AC 50Hz and rated working voltage of 690V and below. This series of circuit breakers have overload, short circuit and undervoltage protection devices, which can protect lines and power supply equipment from damage.

This series of circuit breakers can be installed vertically (i.e. upright) or horizontally (i.e. transversely).

Product naming rules

iAL M 1 – □□□/□□□

- Purpose code note: 2)
- Release mode and accessory code (see Table 6)
- Number of poles
- Operation mode note: 1)
- Rated limit short circuit breaking capacity level
- Rated current of frame size
- Design code
- Moulded case circuit breaker
- Enterprise code

Note: 1) there is no code for direct operation; the manual operating mechanism is represented by Z; and the electric operating mechanism is represented by P.

2) No code for circuit breaker for power distribution; the circuit breaker for protecting motor is represented by 2.

iALM1 Moulded Case Circuit Breaker

Tripping mode and accessory code

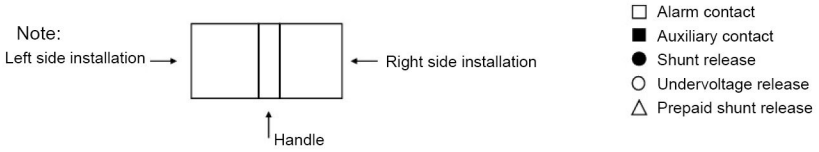


Table 2 Tripping mode and accessory code

Tripping mode and accessory code	Accessory name	Model: iALM1-63L、M iALM1-125L、M、H iALM1-250L、M、H Number of poles: 3P、4P	Model: iALM1-400L、M、H iALM1-630L、M、H Number of poles: 3P、4P	Model: iALM1-800L、M Number of poles: 3P	Model: iALM1-1250/1600 Number of poles: 3P
00	No accessories	□□	□□	□□	□□
08	Alarm contact	□□	□□	□□	
10	Shunt release	●□	●□	□●	□●
10F	Prepaid shunt release	△□	△□		
20	Auxiliary contact	■□	■□	□■	■□
30	Undervoltage release	□○	□○	□○	
40	Shunt release auxiliary contact	●■	●■	■●	■●
40F	Prepaid shunt release auxiliary contact	△■	△■		
50	Shunt release, undervoltage release	●○	●○	○●	
60	Two sets of auxiliary contacts	■■	■■	■■	■■
70	Auxiliary contact, undervoltage release	■○	■○	■○	
18	Shunt release, alarm contact	●□	□●	□●	
18F	Prepaid shunt release, alarm contact	△□	△□		
28	Auxiliary contact, alarm contact	■□	■□	■□	
38	Under voltage release, alarm contact	□○	□○	□○	
48	Shunt release, alarm contact, auxiliary contact	■●	■●	■●	
48F	Prepaid shunt release, auxiliary contact, alarm contact	■△			
68	Two sets of auxiliary contacts, alarm contacts	■■	■■	■■	
78	Auxiliary contact, undervoltage release, alarm contact	■○	■○	■○	

The first digit of release mode and internal accessory code "2" represents electromagnetic (instantaneous) release, "3" represents thermal electromagnetic (compound) release.

Only 63, 125, 250, 400 and 630 types can be used as prepaid shunt release. There are only 08, 10, 20, 28 and 30 for accessories of 125 and 250 type 2P products.

iALM1 Moulded Case Circuit Breaker

Product parameters

◆Product parameters

Table 3

essential information																							
Rated current of frame size		63		125			250			400			630			800		1250	1600				
Number of poles		3P 3P+N、4P		2P、3P 3P+N、4P			2P、3P 3P+N、4P			3P 3P+N、4P			3P 3P+N、4P			3P 3P+N、4P		3P、4P	3P、4P				
Frequency (Hz)		50		50			50			50			50			50		50	50				
Rated working voltage Ue (V)		400/415		400/415 660/690			400/415 660/690			400/415 660/690			400/415 660/690			400/415 660/690		400	400/690				
Rated insulation voltage Ui (V)		500		1000			1000			1000			1000			800		800	800				
Rated impulse withstand voltage Uimp(kV)		6		12			12			12			12			8		8	8				
Rated working current In(A)		10、16 20、25 32、40 50、63		16、20 25、32 40、50 63、80 100、125			100、125 160、180 200、225 250			225 250 315 350 400			400 500 630			630 700 800		630 700 800 1000 1250	630 700 800 1000 1250 1400 1600				
Breaking capacity level		L	M	L	M	H	L	M	H	L	M	H	L	M	H	L	M	/	/				
Rated limit short circuit breaking capacity Icu (kA)	AC400/415V	25	50	35	50	85	35	50	85	50	65	100	50	65	100	50	75	85	85				
	AC660/690V	/	/	5	20	/	5	20	/	20	10	/	10	30	/	30	30	/	35				
Rated service short-circuit breaking capacity Ics (KA)	AC400/415V	18	25	25	35	55	25	35	55	35	42	65	35	45	65	35	37.5	50	50				
	AC660/690V	/	/	/	10	/	/	10	/	15	5	/	5	20	/	15	15	/	22				
Isolation function		Provided		Provided			Provided			Provided			Provided			Provided		Provided	Provided				
Usage category		Class A		Class A			Class A			Class A			Class A			Class A		Class A	Class A				
Service life	Mechanical	20000		20000			20000			10000			10000			10000		5000	2500				
	Electrical	3000		3000			3000			2000			2000			2000		800	500				
Arc distance (mm)		⩽50		⩽50			⩽50			⩽100			⩽100			⩽100		⩽120	⩽120				
Accessory information																							
Handle direct operation		■(Standard)		■(Standard)			■(Standard)			■(Standard)			■(Standard)			■(Standard)		■(Standard)	■(Standard)				
Extended rotary handle		□(Optional)		□(Optional)			□(Optional)			□(Optional)			□(Optional)			□(Optional)		——	——				
Electric operating mechanism		□(Optional)		□(Optional)			□(Optional)			□(Optional)			□(Optional)			□(Optional)		□(Optional)	□(Optional)				
Shunt release		□(Optional)		□(Optional)			□(Optional)			□(Optional)			□(Optional)			□(Optional)		□(Optional)	□(Optional)				
Undervoltage release		□(Optional)		□(Optional)			□(Optional)			□(Optional)			□(Optional)			□(Optional)		——	——				
Auxiliary contact		□(Optional)		□(Optional)			□(Optional)			□(Optional)			□(Optional)			□(Optional)		□(Optional)	□(Optional)				
Alarm contact		□(Optional)		□(Optional)			□(Optional)			□(Optional)			□(Optional)			□(Optional)		□(Optional)	□(Optional)				
Fixed type back panel		□(Optional)		□(Optional)			□(Optional)			□(Optional)			□(Optional)			□(Optional)		——	——				
Plug in type front panel		□(Optional)		□(Optional)			□(Optional)			□(Optional)			□(Optional)			□(Optional)		——	——				
Plug in type back panel		□(Optional)		□(Optional)			□(Optional)			□(Optional)			□(Optional)			□(Optional)		——	——				
Transition bar		□(Optional)		□(Optional)			□(Optional)			□(Optional)			□(Optional)			□(Optional)		■(Standard)	■(Standard)				
Interphase partition		■(Standard)		■(Standard)			■(Standard)			■(Standard)			■(Standard)			■(Standard)		■(Standard)	■(Standard)				

iALM1 Moulded Case Circuit Breaker

◆ Protection characteristics of overcurrent release

◇ Inverse time limit breaking action characteristics of circuit breaker overcurrent release for distribution when each pole is energized at the same time. Table 4

No.	Test current name	I/In	Conventional time	Initial state
1	Conventional non-tripping current	1.05	≥2h(In>63A), ≥1h(In≤63A)	Cold state
2	Conventional tripping current	1 3	<2h(In>63A) <1h(In≤63A)	Start immediately after test No. 1

◇ Inverse time limit breaking action characteristics of overcurrent release of circuit breaker for motor protection when each pole is energized at the same time. Table 5

No.	I/In	Conventional time	Initial state	Remarks
1	1.0	≥2h	Cold state	
2	1.2	<2h	Start immediately after test No. 1	
3	1.5	≤4min	Cold state	10≤In≤250
		≤8min	Cold state	250<In≤630
4	7.2	4s≤T≤10s	Cold state	10≤In≤250
		6s≤T≤20s	Cold state	250<In≤630

◆ Protection characteristics of instantaneous overcurrent release

◇ The instantaneous action characteristic of the circuit breaker for distribution is set to 10In±20%.

◇ The instantaneous action characteristic of the circuit breaker for motor protection is set to 12In±20%.

Normal working and installation conditions

◆ Ambient air temperature

The upper limit of ambient air temperature is +40℃; the lower limit of ambient air temperature is -5℃; the average value of ambient air temperature for 24h shall not exceed + 35℃.

Altitude: the altitude of the installation site shall not exceed 2000m.

The relative humidity of the atmosphere shall not exceed 50℃ when the ambient air temperature is +40℃; it can have higher relative humidity at lower temperature;

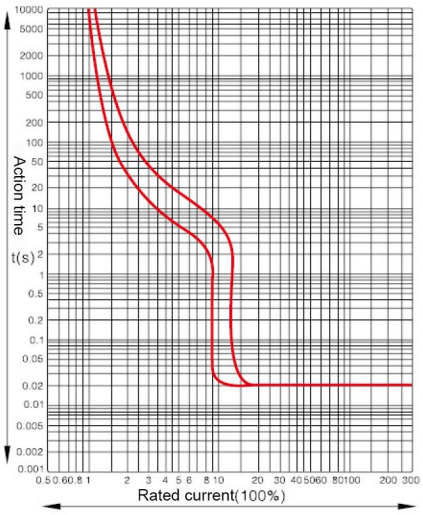
The monthly average maximum relative humidity in the wettest month is 90%, and the monthly average minimum temperature in that month is +25℃, and the condensation on the product surface due to temperature change should be taken into.

Pollution level: Level 3.

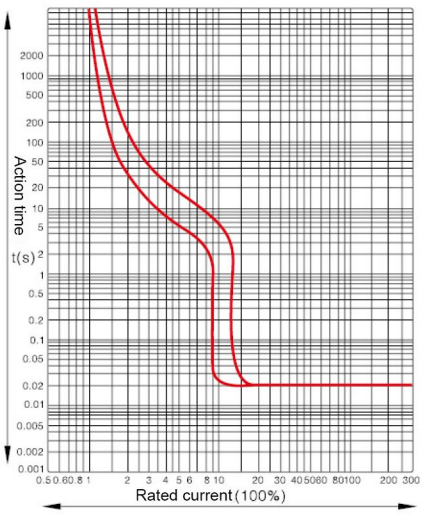
Installation category: II.

iALM1 Moulded Case Circuit Breaker

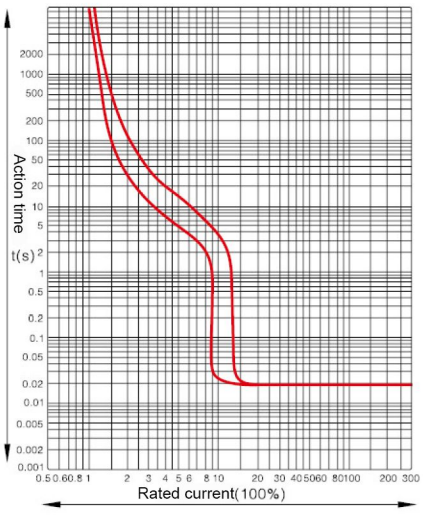
Circuit breaker characteristic curve



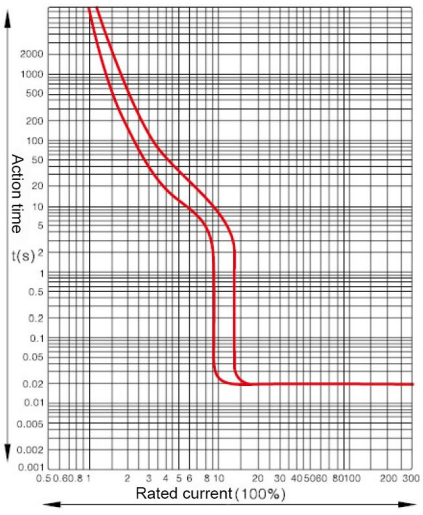
iALM1–63



iALM1–125



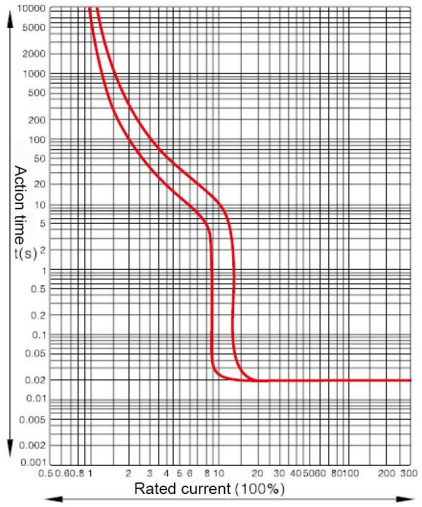
iALM1–250



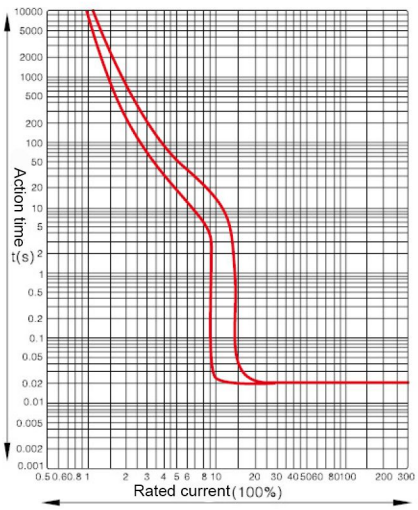
iALM1–400

iALM1 Moulded Case Circuit Breaker

Circuit breaker characteristic curve



iALM1–630

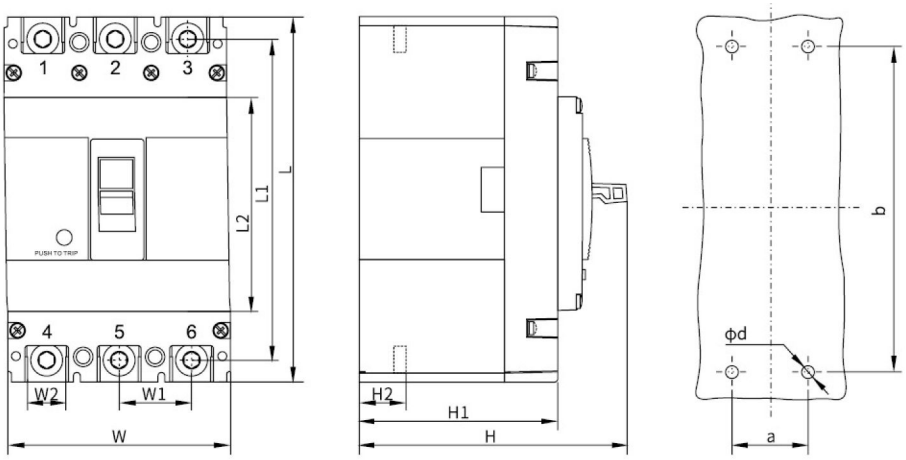


iALM1–800

iALM1 Moulded Case Circuit Breaker

Outline and installation dimensions

◆ Outline and installation dimension of front panel wiring of circuit breaker



M1-63~800 outline and installation drawing

(unit: mm)

Product model	Number of poles	Overall dimension									Mounting dimension		
		L	L1	L2	**W**	W1	W2	**H**	H1	H2	a	b	ϕd
M1-63L	3	136	117	85	78	25	14	89	65	19	25	116.5	3.5
	4	136	117	86	102	25	14	89	65	19	50	116.5	3.5
M1-63M	3	136	117	85	78	25	14	98	74	27	25	116.5	3.5
	4	136	117	86	102	25	14	98	74	27	50	116.5	3.5
M1-125L	3	150	133.5	88.5	92	30.5	18	88.5	62	23.5	30	129	4.5
	4	150	133.5	88.5	122	30.5	18	88.5	62	23.5	60	129	4.5
M1-125M	3	150	133.5	88.5	92	30.5	17	105	79	23	30	129	4.5
	4	150	133.5	88.5	122	30.5	17	105	79	23	60	129	4.5
M1-250L	3	165	144	102	107	35.5	23	110	80	23	35	126	4.5
	4	165	144	102	142	35.5	23	110	81	23	70	126	4.5
M1-250M	3	165	144	102	107	35.5	23	126	99	24	35	126	4.5
	4	165	144	102	142	35.5	23	126	99	24	70	126	4.5
M1-400L	3	257	225	174	150	48	30	153	98	Upper40 Lower38	44.5	194	7
	4	257	225	174	198	48	30	153	98	Upper40 Lower38	94	194	7
M1-630L	3	270	237	185	180	58	44	160	104	Upper45 Lower42	58	200	7
	4	270	237	185	240	58	44	160	104	Upper45 Lower42	116	200	7
M1-800M	3	280	243	205	210	70.5	46	155	96	Upper30 Lower35	70	243	7
	4	280	243	205	280	70.5	46	155	96	Upper30 Lower35	140	243	7

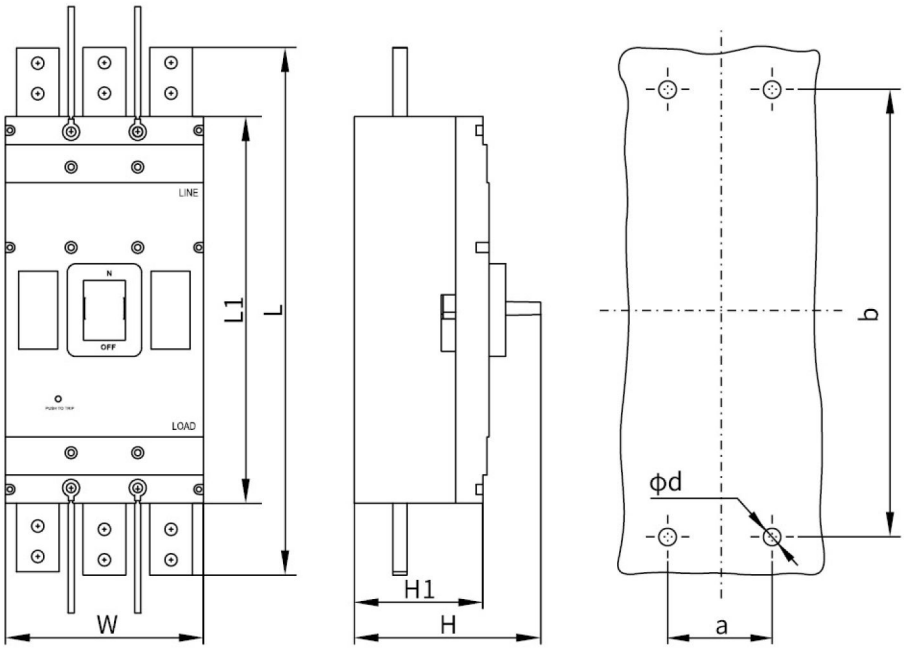
Note: 1 If any of shunt, auxiliary and alarm accessories is installed in the product, the width dimension on the installation side shall be increased by 18mm. If undervoltage release accessories are installed, the width dimension on the installation side shall be increased by 21mm.

2. Dimensions prefixed with "M" indicate threaded holes.

iALM1 Moulded Case Circuit Breaker

Outline and installation dimensions

◆ Outline and installation dimension of front panel wiring of circuit breaker board



M1-1250、1600 outline and installation drawing

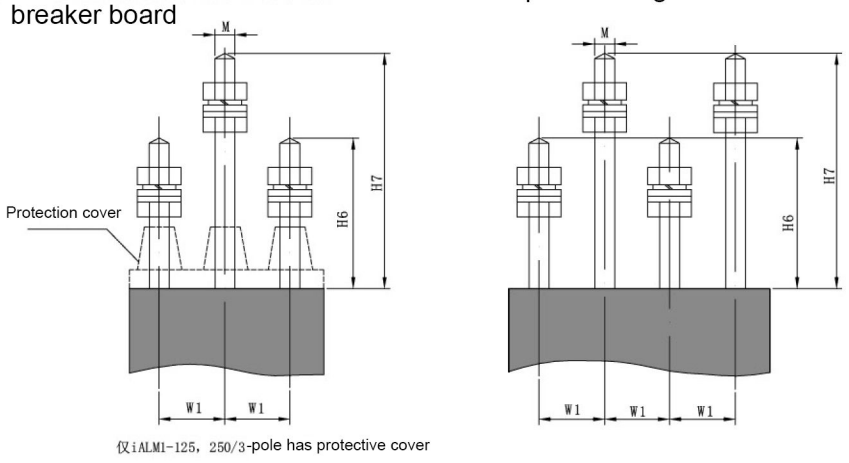
(unit: mm)

Product model	Number of poles	Overall dimension					Mounting dimension		
		L	L1	**W**	**H**	H1	a	b	ϕd
M1-1250	3	470	330	210	191	137	70	299	9
	4	470	330	280	191	137	140	299	9

Note: the size of 1600A body is the same as that of 1250A model, and the total length of connecting plate (L) is 510mm.

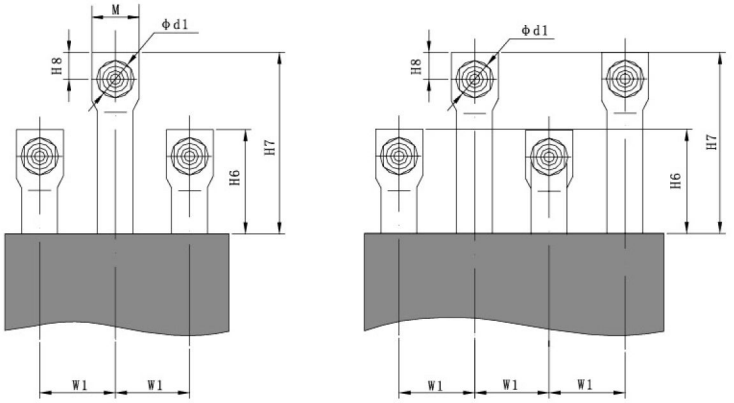
iALM1 Moulded Case Circuit Breaker

◆Outline and installation dimensions of back-panel wiring of circuit breaker board

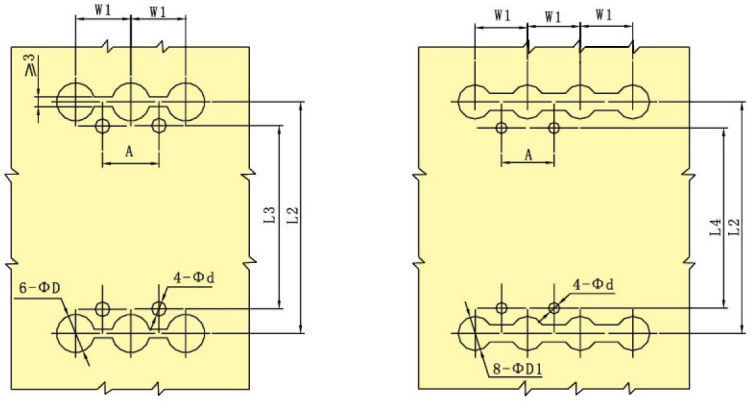


仅iALM1-125，250/3-pole has protective cover

iALM1-63、125、250



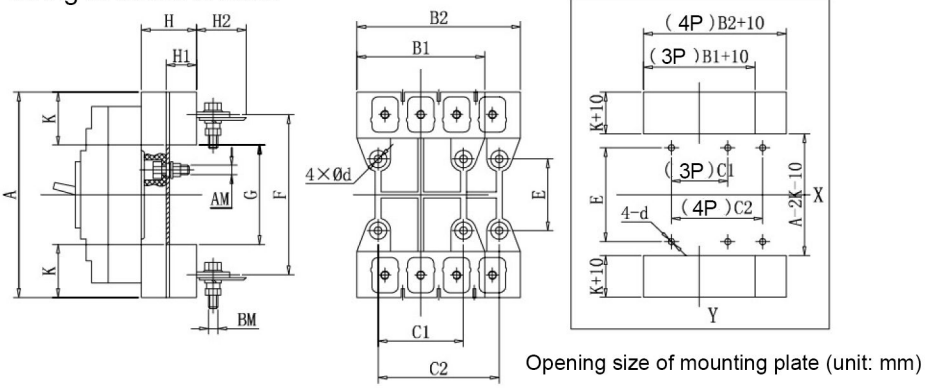
iALM1-400、630



Outline and installation dimensions of back-panel wiring

iALM1 Moulded Case Circuit Breaker

◆ Outline and installation dimensions of plug-in type back-panel wiring of circuit breaker



Opening size of mounting plate (unit: mm)

Outline and installation dimensions of iALM1 plug-in type back-panel wiring

Table 8

Product model	Plug-in type overall installation dimension (mm)															Overall installation dimension of back-panel wiring (mm)											
	A	B_1	B_2	C_1	C_2	E	F	G	K	H	H1	H2	AM	BM	4-d	H6	H7	H8	L2	L3	L4	W1	A	D	D1	d	d1	M
iALM1-63	135	75	100	50	75	60	117	100	18	28	18	16	M5	M5	ϕ5.5	34	53	—	117	100	–	25	25	7	7	4.5	—	M6
iALM1-125	168	91	125	60	90	56	132	92	38	50	33	28	M6	M8	ϕ6.5	50	80.5	—	132	129	129	30	30	23	10	4	—	M8
iALM1-250	186	107	145	70	105	54	145	94	46	50	33	37	M6	M8	ϕ6.5	59	89	—	144	126	126	35	35	24	12	5	—	M10
iALM1-400	281	144	188	88	132	145	224	181	50	60	38	46	M8	M12	ϕ8.5	58	87	19.5	224	215	–	44	44	30	30	6	12.4	30
iALM1-630	300	182	242	100	158	123	234	170	65	60	39	50	M8	M12	ϕ8.5	65	65	21.5	234	200	–	58	58	36	36	7	16	36
iALM1-800	305	210	280	90	162	143	243	178	62	87	60	22	M10	M14	ϕ11													

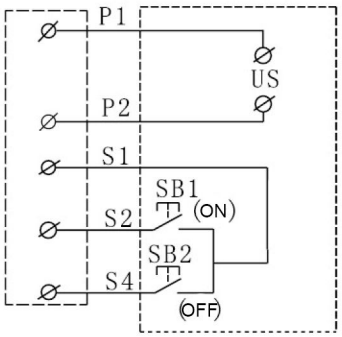
Note: dimensions prefixed with "M" are thread dimensions.

◆ Installation and electrical wiring diagram of motor operating mechanism

◇ iALM1-63, 125, 250, 400, 630, 800-CD2 electric operation

iALM1 Moulded Case Circuit Breaker

◇ Wiring diagram of ordinary electric operating mechanism (voltage: AC230V, AC4000V)



◇ Overall dimensions of electric operating mechanism

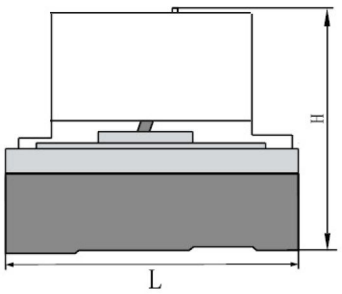


Table 9

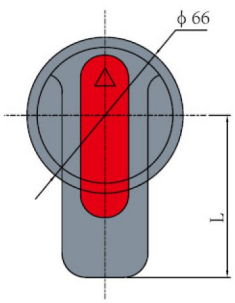
Electric operation model	Size (mm)	Product model										
		63L	63M	125L	125M	250L	250M、H	400L、M、H	630L、M、H	800L、M	1250	1600
CD2	L	135	135	150	150	165	165	257	270	280	552	506
	H	158	164	157	173	174	192	250	250	250	312	253

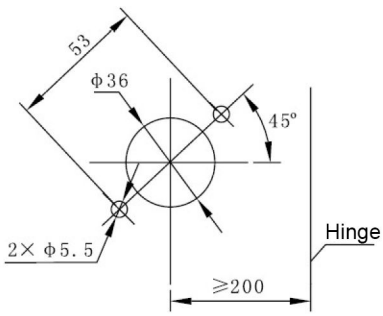
Note: CD2 electric operation connecting plate is an optional accessory.

◆ Installation of rotary handle operating mechanism

◇ Outline and opening schematic diagram of circular handle

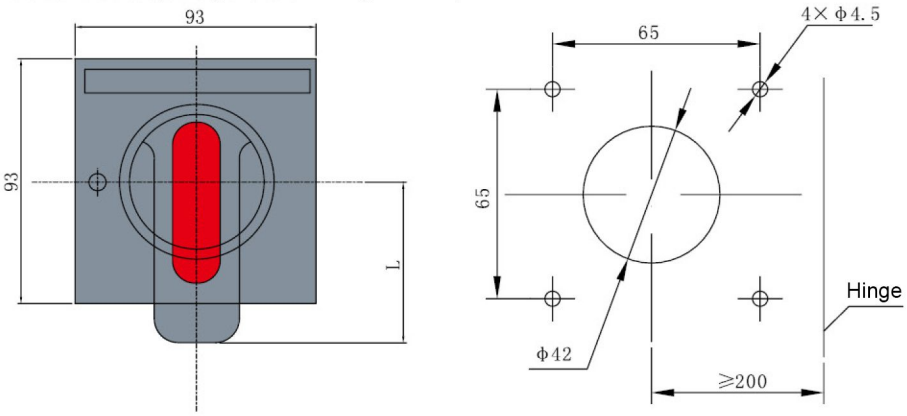
Unit: mm





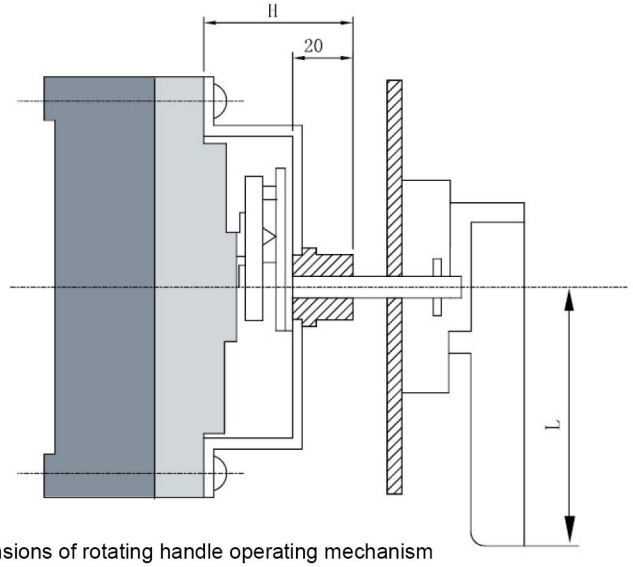
iALM1 Moulded Case Circuit Breaker

◇ Outline and opening schematic diagram of square handle



Installation of rotary handle operating mechanism

◇ Outline and installation schematic diagram of central rotary handle operating mechanism



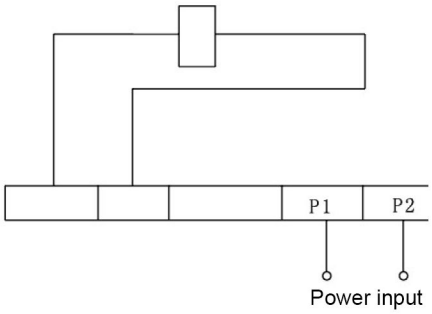
Overall dimensions of rotating handle operating mechanism Table 10

Circuit breaker model	H(mm)	L(mm)
iALM1-63	51	65
iALM1-125	52	65
iALM1-250	56	95
iALM1-400	78.5	125
iALM1-630	88	125
iALM1-800	87	125

iALM1 Moulded Case Circuit Breaker

Internal accessories

◆ Undervoltage release

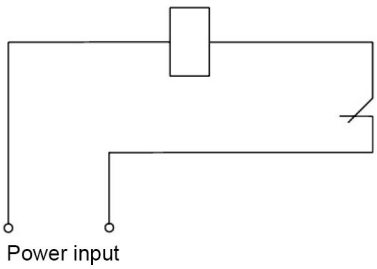


Rated working voltage Ue: AC220V/230V, AC380V/400V

When the voltage drops (even slowly) to 70%-35% of the rated voltage, the undervoltage release shall act; when the supply voltage of the undervoltage release is lower than 35% of the release voltage, the undervoltage release shall prevent the circuit breaker from closing; when the supply voltage is equal to or greater than 85%, the circuit breaker shall be able to be closed.

Special reminder: for the circuit breaker with undervoltage release, the circuit breaker can be opened and closed normally only when the undervoltage release is connected with the rated voltage, otherwise the circuit breaker will be damaged.

◆ Shunt release



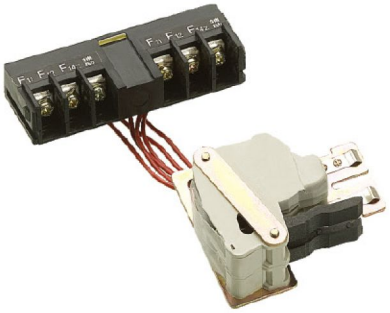
Rated control supply voltage Us: AC220V / 230V, AC380V / 400V, DC24V, dc110v

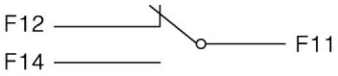
The circuit breaker shall open at 70% - 110% of the rated voltage.

Note: when the voltage specification is DC24V, the rated current of the control circuit must reach 5A.

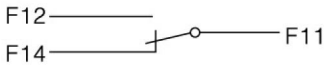
iALM1 Moulded Case Circuit Breaker

◆ Auxiliary contact





Status of circuit breaker in "OFF" position

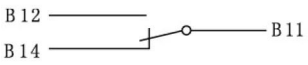


Status of circuit breaker in "ON" position

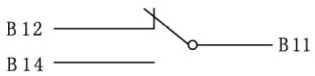
Table 11

Frame size	Conventional heating current Ith (3A)	Rated current of AC400 Ie (A)	Rated current of DC230 Ie (A)
Inm ⩽ 63A	3A	0.4A	0.15A
125 ⩽ Inm ⩽ 250A		0.3A	0.15A
400 ⩽ Inm ⩽ 630A		3A	0.2A
Inm ⩾ 800A		0.4A	0.15A

◆ Alarm contact



Status of circuit breaker in free tripping (alarm)



Status of circuit breaker in "OFF" and "ON" positions

When the circuit breaker is normally closed and opened, the alarm contact does not act. Only after tripping (or fault tripping), the contact changes its original position, that is, normally open to closed and normally closed to open. After the circuit breaker re-trips, the alarm contact will return to the original state.

iALM1 Moulded Case Circuit Breaker

Standard cross-sectional area of copper conductor used for connection

Table 12

Rated current (A)	10	16 20	25	32	40 50	63	80	100	125	160	180 225	250	315 350	400
Conductor cross-sectional area (mm^2)	1.5	2.5	4	6	10	16	25	35	50	70	95	120	185	240

Rated current (A)	Copper conductor		Copper busbar	
	Qty.	Sectional area(mm^2)	Qty.	Sectional area(mm^2)
500	2	150	2	30×5
630	2	185	2	40×5
800	2	240	2	50×5
1250	—	—	2	80×5
1600	—	—	2	50×10

Ordering instructions

The user must specify the following items when ordering:

a. Model, name and number of poles of circuit breaker.

b. Rated current of circuit breaker.

c. Name, specification and combination code of accessories of circuit breaker; when using under-voltage release and shunt release, the voltage value of working voltage (or control supply voltage) shall be indicated.

d. Purpose: for power distribution (delivery as power distribution use if not indicated), for motor protection (represented by 2).

e. Wiring mode: front-panel wiring (delivery as front-panel wiring if not indicated), back-panel wiring and plug-in type.

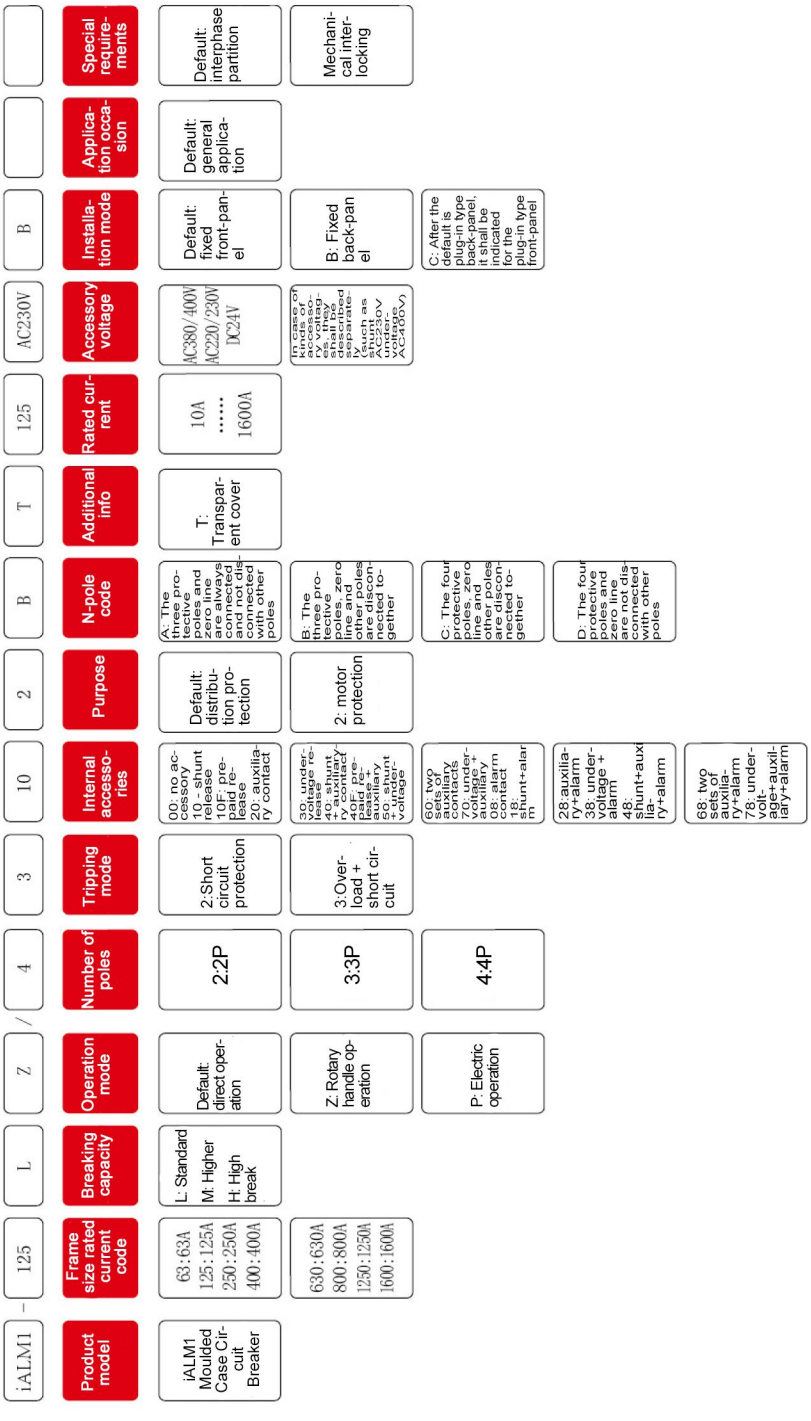
f. Quantity.

For example:

iALM1-125, standard L, three pole, circuit breaker current (rated current) 100A, with shunt release of AC 380V and alarm contact, external terminal for power distribution, front-panel wiring, quantity: 20 sets. It shall be written as: iALM1-125L/ 3318, 100A, AC380V, external terminals, 20sets.

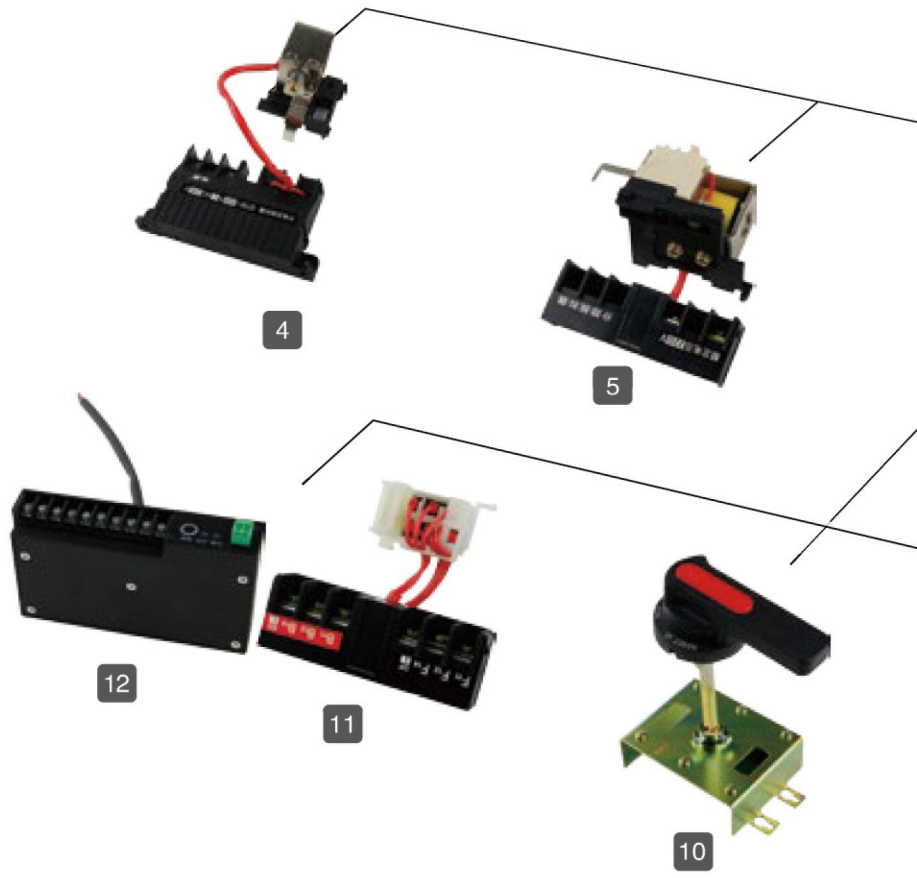
iALM1 Moulded Case Circuit Breaker

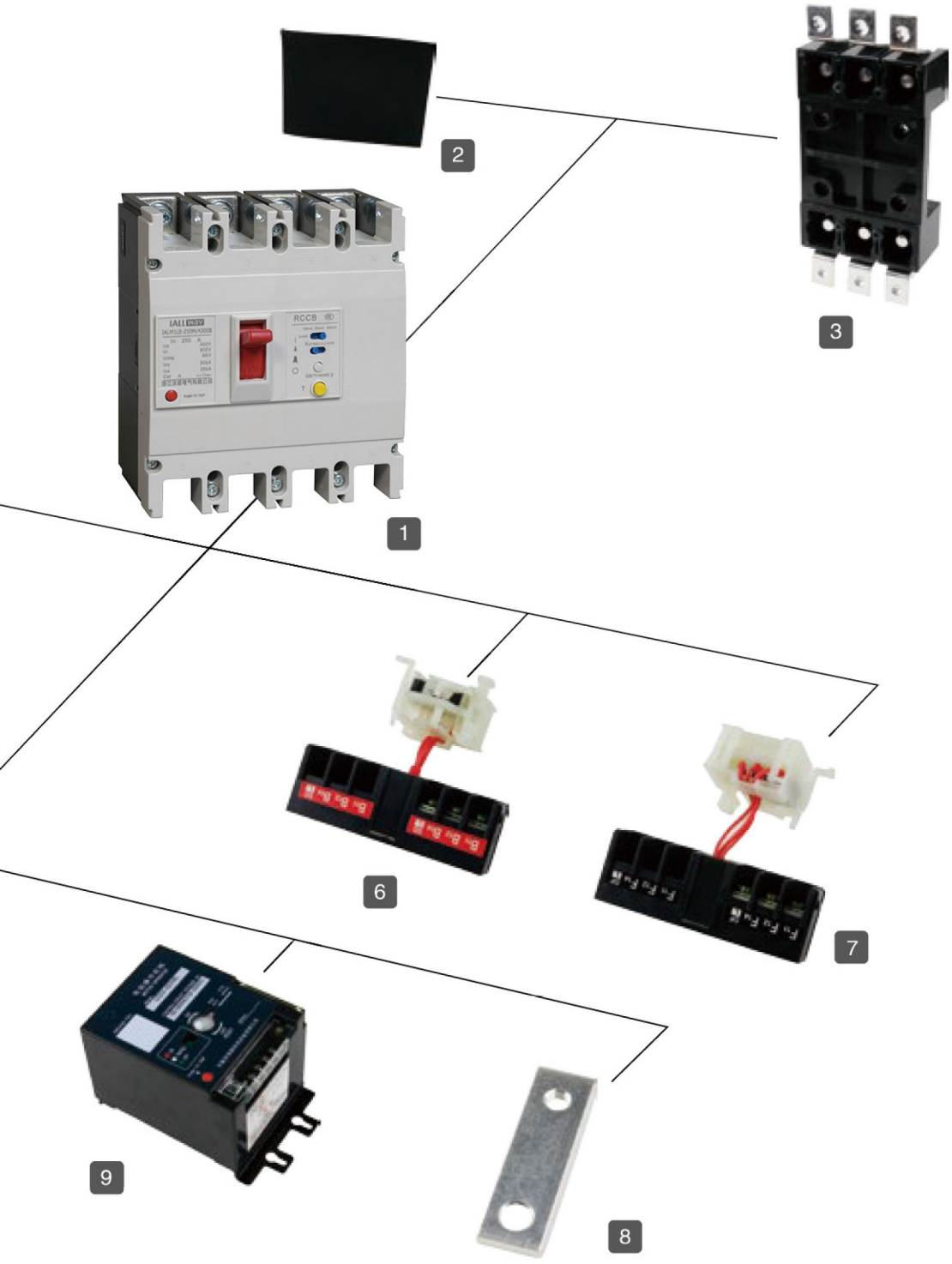
iALM1 series moulded case circuit breaker quick selection table



iALM1LE Moulded Case Leakage Circuit Breaker

1	Switch body
2	Arc chute (standard)
3	plug-in type (optional)
4	Undervoltage release (optional)
5	Shunt release (optional)
6	Alarm contact (optional)
7	Auxiliary contact (optional)
8	Front-panel wiring transition board (optional)
9	Electric operating mechanism (optional)
10	Rotary handle operating mechanism (optional)
11	Auxiliary alarm contact (optional)
12	Communication shunt alarm accessories (optional)




2
3
1
6
7
9
8

iALM1LE Moulded Case Leakage Circuit Breaker

Product overview

iALM1LE series residual current protection circuit breaker (hereinafter referred to as circuit breaker) is one of the new leakage circuit breakers designed and developed by our company with international advanced technology. It is applicable to the AC 50Hz circuit with rated voltage up to 400V and rated current from 16A to 800A.

Its main function is to provide indirect contact protection for personal electric shock with fatal danger. When other protective measures fail, the leakage circuit breaker with rated residual operating current not exceeding 30mA can also be used as supplementary protection for direct contact, but not as the only direct contact protection. It can also be used to prevent fire hazards caused by contact with fault current. Meanwhile it can be used to protect the line from overload, short circuit and other hazards. It can also be used for infrequent conversion of the line and infrequent startup of the motor.

The circuit breaker has the characteristics of small volume, high breaking, short arcing, adjustable residual operating current and residual current operation time. At the same time, it can be equipped with alarm contact, shunt release, auxiliary contact, rotating handle operating mechanism, electric operating mechanism and other accessories. It can also adopt a variety of wiring modes such as front-panel, back-panel and plug-in type. It is an ideal product for users.

Standards: GB/T 14048.2 and IEC 60947-2.

Product naming rules

iAL M 1 LE – □□□/□□□□

- Leakage function code[4)]
- Four pole product code[3)]
- Release mode and accessory code (see Table 1)
- Number of poles[2)]
- Operation mode[1)]
- Rated ultimate short circuit breaking capacity level
- Rated current of frame size
- Derived code of leakage
- Design code
- Moulded case leakage circuit breaker
- Enterprise code

Note: 1) there is no code for direct operation of the handle; electric operation is represented by D; the rotation operation is represented by Z.
2) Three-pole is represented by 3; the four-pole is represented by 4.
3) Type A: the N-pole is not equipped with overcurrent tripping element, and the N-pole is always connected and is closed and open with other three poles;
Type B: the N-pole is not equipped with overcurrent tripping element, and the N pole is closed and open together with other three poles;
Type C: the N-pole is equipped with overcurrent tripping element, and the N-pole is closed and open together with other three poles;
Type D: the N-pole is equipped with overcurrent tripping element, and the N-pole is always connected, and it is not closed or open together with other three poles;
4) No code for Leakage tripping without alarm; the leakage tripping with alarm is represented by 1; the leakage alarm without tripping is represented by II.

iALM1LE Moulded Case Leakage Circuit Breaker

Release and accessory code

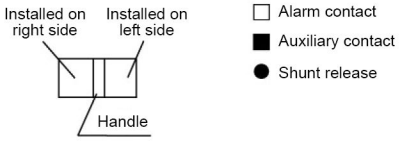


Table 1

Tripping mode and accessory code	Accessory name	iALM1LE-125 iALM1LE-250 3P	iALM1LE-125 iALM1LE-250 4P	iALM1LE-400 iALM1LE-800 3P	iALM1LE-400 iALM1LE-800 4P
00	No accessories				
08	Alarm contact				
10	Shunt release				
20	Auxiliary contact				
40	Shunt release, auxiliary contact	—		—	
60	Two sets of auxiliary contacts	—		—	
18	Shunt release, alarm contact	—		—	
28	Auxiliary contact, alarm contact				
48	Shunt release, auxiliary contact, alarm contact	—		—	
68	Two sets of auxiliary contacts, alarm contact	—		—	

Note: 1. The first digit 2 of release mode and internal accessory code represents electromagnetic (instantaneous) release, and 3 represents thermal electromagnetic (compound) release; the last two digits represent the code of internal accessories. If there is no accessory, it is represented by 00.
2. In iALMILE series, the auxiliary contacts of specifications 28 and 48 are a pair of contacts (one normally open and one normally closed), and the auxiliary contacts of specification 68 are two pairs of contacts (i.e. two normally open and two normally closed).
3. If a leakage alarm module is required, when the number of accessories is greater than 2, it cannot be equipped with wiring terminals.

iALM1LE Moulded Case Leakage Circuit Breaker

Product parameter

◆ See table 2 for product parameters

Table 2

Basic information								
Rated current of frame size		125		250		400		800
Number of poles		1P+N、2P	3P、3P+N、4P	1P+N、2P	3P、3P+N、4P	3P、3P+N、4P		3P、3P+N、4P
Frequency (Hz)		50		50		50		50
Rated working voltage Ue (V)		230	400	230	400	400		400
Rated insulation voltage Ui (V)		690	800	690	800	800		800
Rated impulse withstand voltage Uimp(kV)		8		8		8		8
Rated operating current In(A)		16A、20A、25A、32A、40A、50A、63A、80A、100A、125A		100A、125A、140A、160A、180A、200A、225A、250A		225A、250A、315A、350A、400A		400A、500A、630A、700A、800A
Rated residual operating current I△n (mA)		30、50、75、100、150、200、300、400、500		30、50、75、100、150、200、300、400、500		50、75、100、、150、200、300、400、500、1000		50、75、100、200、300、500、1000
Breaking capacity level		L	M	L	M	L	M	/
Rated ultimate short circuit breaking capacity Icu(kA)	AC400V	35	65	35	65	65	80	65
Rated service short circuit breaking capacity Ics(kA)	AC400V	22	50	22	50	42	65	42
Isolation function		2P、3P、4P Provided		2P、3P、4P Provided		3P、4P Provided		3P、4P Provided
Usage category		Class A		Class A		Class A		Class A
Service life	Mechanical	40000		40000		20000		20000
	Electrical	8000		8000		7500		7500
Arc distance (mm)		≤ 50		≤ 50		≤ 100		≤ 100
Accessory information								
Handle direct operation		■ (Standard)		■ (Standard)		■ (Standard)		■ (Standard)
Extended rotary handle		□ (Optional)		□ (Optional)		□ (Optional)		□ (Optional)
Electric operating mechanism		□ (Optional)		□ (Optional)		□ (Optional)		□ (Optional)
Shunt release		□ (Optional)		□ (Optional)		□ (Optional)		□ (Optional)
Auxiliary contact		□ (Optional)		□ (Optional)		□ (Optional)		□ (Optional)
Alarm contact		□ (Optional)		□ (Optional)		□ (Optional)		□ (Optional)
Fixed type front-panel		■ (Standard)		■ (Standard)		■ (Standard)		■ (Standard)
Fixed type back-panel		□ (Optional)		□ (Optional)		□ (Optional)		□ (Optional)
Plug-in front-panel (4P product cannot be selected)		□ (Optional)		□ (Optional)		□ (Optional)		□ (Optional)
Plug-in back-panel		□ (Optional)		□ (Optional)		□ (Optional)		□ (Optional)
Transition bar		□ (Optional)		□ (Optional)		□ (Optional)		□ (Optional)
Interphase partition		■ (Standard)		■ (Standard)		■ (Standard)		■ (Standard)

Note: the current specifications in the column of rated residual operating current are for users to choose, and the product itself is adjustable in three gears.
Delay type and delay adjustable products have no 30mA gear.
If the rated residual operating current needs to be fixed in one gear, please indicate it when ordering, otherwise the three-gear is adjustable by default.

iALM1LE Moulded Case Leakage Circuit Breaker

◆ See table 3 for inverse time breaking operation characteristics of overcurrent release of distribution circuit breaker when all poles are energized at the same time

Table 3

No.	Test current name	I/In	Conventional time	Initial state
1	Conventional non-tripping current	1.05	≥2h(In>63A), ≥1h(In≤63A)	Cold state
2	Conventional tripping current	1.3	<2h(In>63A), <1h(In≤63A)	Immediately after test No. 1

◆ See table 4 for inverse time limit breaking operation characteristics of overcurrent release of circuit breaker for motor protection when all poles are energized at the same time

Table 4

No.	Test current name	I/In	Conventional time	Initial state
1	Conventional non-tripping current	1.0	≥2h	Cold state
2	Conventional tripping current	1.2	<2h	Immediately after test No. 1

◆ The instantaneous operation characteristic of the circuit breaker for power distribution is set to 10In±20%.
The instantaneous operation characteristic setting of the circuit breaker for motor protection is 12In±20%.

Normal operating and installation conditions

◆ Ambient air temperature: the upper limit of ambient air temperature is +40℃, the lower limit of ambient air temperature is -5℃, and the average value of ambient air temperature for 24h does not exceed +35℃.

◆ Altitude: the altitude of the installation site shall not exceed 2000m.

◆ Pollution level: Level 3.

◆ Installation category:III.

◆ Atmospheric conditions: the atmospheric relative humidity shall not exceed 50% when the ambient air temperature is + 40℃; it can have higher relative humidity at lower temperature; the monthly average maximum relative humidity in the wettest month is 90%, and the monthly average minimum humidity in that month is +25℃, the condensation on the product surface due to temperature change should be taken into.

◆ External magnetic field: the magnetic field near the circuit breaker installation site shall not exceed 5 times of the geomagnetic field in any direction.

◆ It shall be installed in a place without impact, vibration, and invasion from rain and snow. The upper terminal shall be connected to the power side and the lower terminal shall be connected to the load side. The inclination with each direction shall not exceed 5%.

Residual current breaking time of circuit breaker

◆ Operation characteristics of general circuit breaker

See table 6 for the operation characteristics of general circuit breaker (the circuit breaker with I△n≤ 30mA shall be non-time delay type).

Table 5

Residual current	I△n	2I△n	5I△n[a]	10I△n[b]
Max breaking time (s)	0.2	0.15	0.04	0.04

Note: a. For circuit breakers with I△n < 30mA, 5I△n can be replaced by 0.25A.

b. When 0.25A is adopted according to note a, 10I△n is 0.5A.

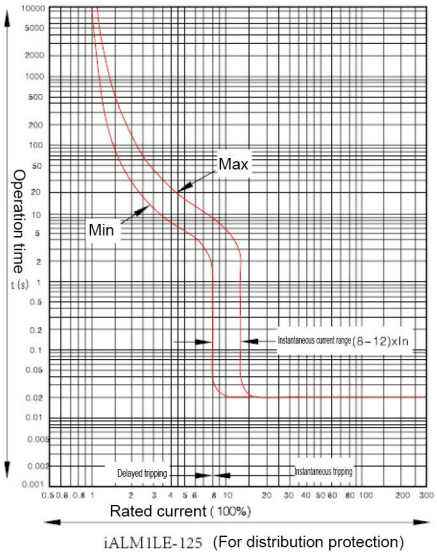
iALM1LE Moulded Case Leakage Circuit Breaker

◆ Operation characteristics of time delay circuit breaker

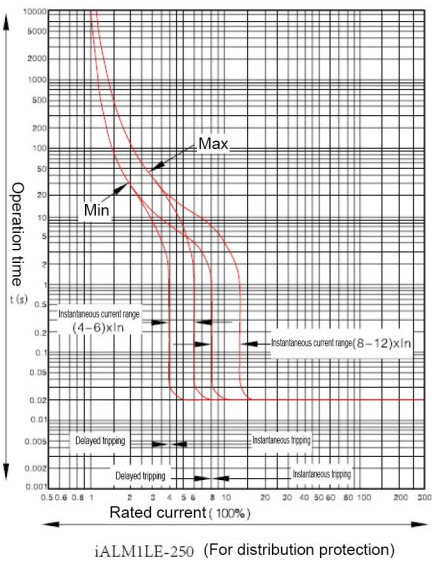
The limited non-driving time of time-delay circuit breaker is specified as 2I△n, and its operation time is shown in table 6. Table 6

Delay Time(s)	Max breaking time at I△n (s)	Limited non-driving time at 2I△n (s)	Max breaking time (s)	Max breaking time at 5I△n (s)	Max breaking time at 10 I△n (s)
0. 1	0. 3	0. 1	0. 3	0. 25	0. 25
0. 2	0. 4	0. 2	0. 4	0. 35	0. 35
0. 3	0. 5	0. 3	0. 5	0. 45	0. 45
0. 4	0. 6	0. 4	0. 6	0. 55	0. 55
0. 5	0. 7	0. 5	0. 7	0. 65	0. 65
0. 6	0. 8	0. 6	0. 8	0. 75	0. 75
0. 7	0. 9	0. 7	0. 9	0. 85	0. 85
0. 8	1	0. 8	1	0. 95	0. 95

Circuit breaker inverse time protection characteristic curve

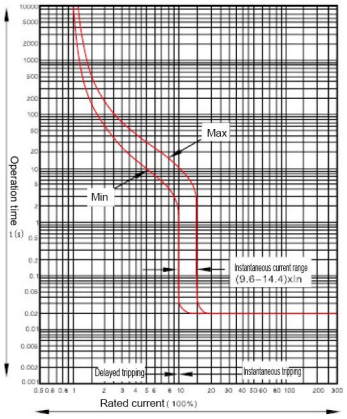


iALM1LE-125 (For distribution protection)

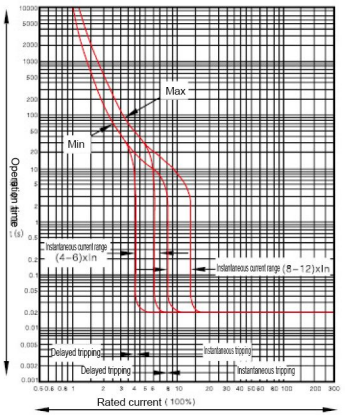


iALM1LE-250 (For distribution protection)

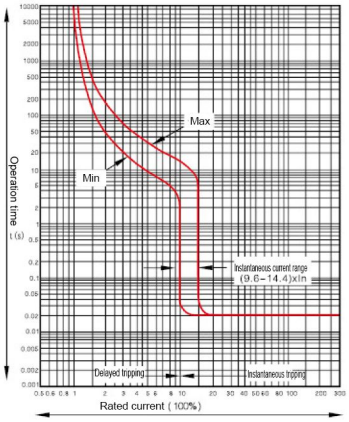
iALM1LE Moulded Case Leakage Circuit Breaker



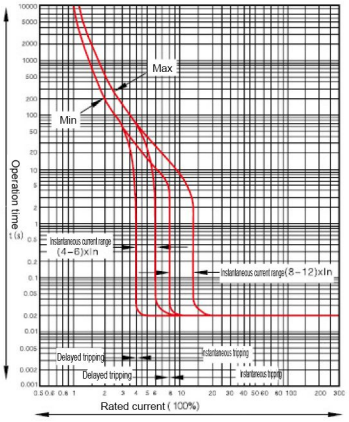
iALM1LE-250 (For motor protection)



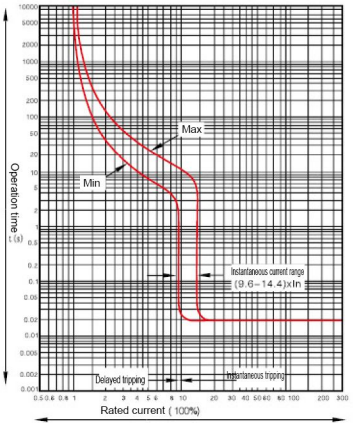
iALM1LE-400 (For distribution protection)



iALM1LE-400 (For motor protection)



iALM1LE-800 (For distribution protection)



iALM1LE-800 (For motor protection)

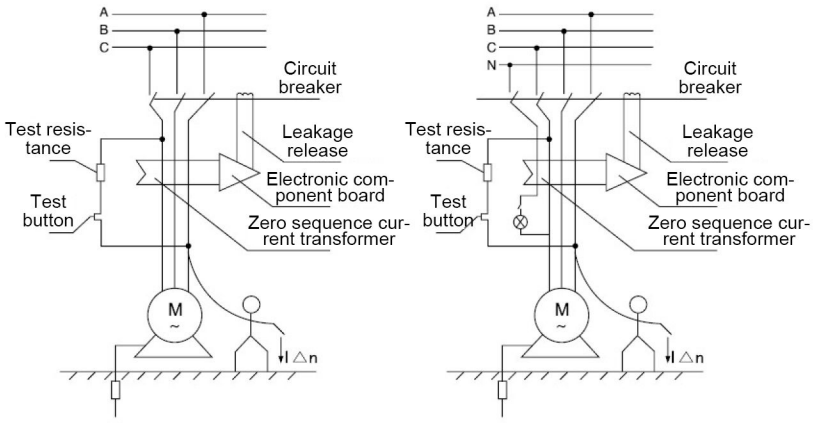
iALM1LE Moulded Case Leakage Circuit Breaker

Structure and working principle

This series of circuit breakers are electronic residual current operated circuit breakers. The main components include: main switch (including overcurrent release), zero sequence current transformer, electronic amplification components, leakage release and test device. All parts are installed in a plastic shell.

Working principle

When there is leakage or personal electric shock in the protected circuit and the current reaches the setting operating current value, the output signal of the secondary winding of the zero sequence current transformer triggers the thyristor to turn on, and the circuit breaker acts through the leakage release to cut off the power supply, so as to play the function of leakage and electric shock protection. Working principle diagram (see the figure below)

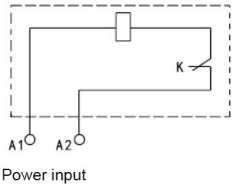


In case of overload or short circuit of the protected circuit, the thermal magnetic release completes the delay or instantaneous tripping action to make the circuit breaker act, so as to cut off the power supply and play the role of overload or short circuit protection.

Internal and external accessories of circuit breaker

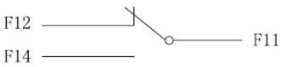
◆ Internal accessories of circuit breaker

a. Shunt release and its wiring diagram

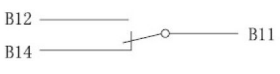
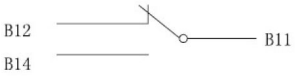
Rated control supply voltage Us	AC400V/380V、AC230/220V、DC220V、DC110V、DC24V
Operating voltage	(0.7-1.1)Us
Wiring diagram	 Power input Note: the microswitch in series with the coil inside the K-shunt release is a normally closed contact. When the circuit breaker switches off, the contact will open automatically and close when switching on.

iALM1LE Moulded Case Leakage Circuit Breaker

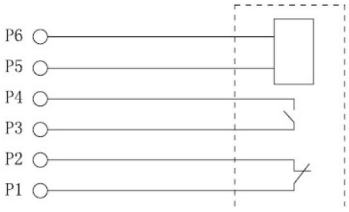
b. Auxiliary contact and its wiring diagram

Rated current of frame size	Inm≤250A		Inm≥400A	
Conventional heating current Ith	3A		6A	
Usage category	AC-15	DC-13	AC-15	DC-13
Operating voltage	AC380V/400V	DC220V/230V	AC380V/400V	DC220V/230V
Rated Operating current	0.26A	0.14A	3A	0.2A
Wiring diagram	 Status of circuit breaker in "off" position		 Status of circuit breaker in "on" position	

c. Alarm contact and its wiring diagram

Conventional heating current Ith	3A
Rated operating current Ie	Same as auxiliary contact
Wiring diagram	 Status of circuit breaker in free tripping (alarm)  Status of circuit breaker in "off" and "on" positions

d. Leakage alarm module and its wiring diagram

Input voltage	AC230V、AC400V、DC24V
Wiring diagram	 Note: the dotted box is the wiring diagram of internal accessories of leakage alarm module. Description: P5-P6: input power; P1-P2, P3 and P4: contact capacity AC230V，0.5A.

Note: the leakage alarm module has two working modes, which can be indicated by the user when ordering:

I: When leakage occurs, the leakage alarm module sends a signal and the circuit breaker trips at the same time.

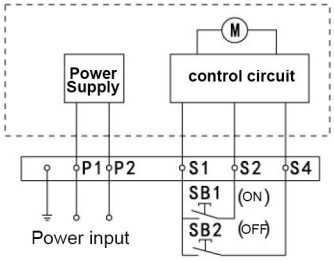
II: In case of leakage, the leakage alarm module sends a signal, but the circuit breaker does not trip.

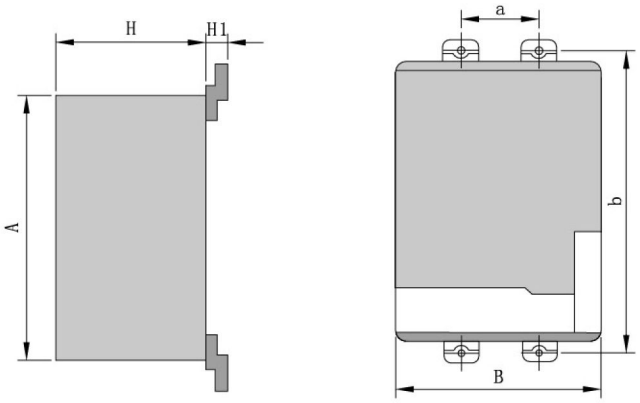
(II is to meet the needs of special occasions, users should consider carefully when using this function to protect electrical appliances)

iALM1LE Moulded Case Leakage Circuit Breaker

◆ External accessories of circuit breaker

a. Electric operating mechanism

Input voltage	AC220V/230V, AC380V/400V
Wiring diagram	 Instruction: P1 and P2 are external power inputs SB1 and SB2 are the operation buttons (provided by the user) Note: the dotted box is the wiring diagram of internal accessories of electric operating mechanism.

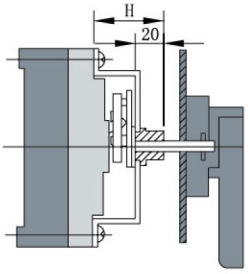


Unit: mm

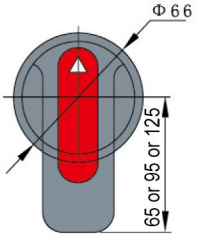
Model	A	B	H	H1	a	b
iALM1LE-125	116	90	77	12.5	30	129
iALM1LE-250	116	90	77	15	35	126
iALM1LE-400	176	130	115	27	44	194
iALM1LE-800	176	130	115	31	70	243

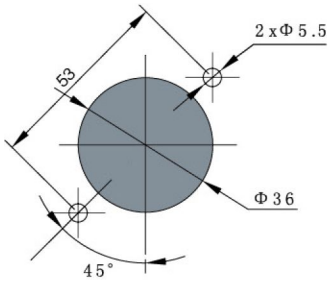
iALM1LE Moulded Case Leakage Circuit Breaker

b. Installation dimension of manual operating mechanism

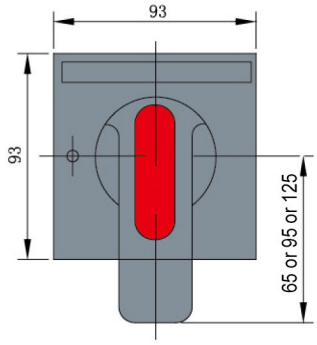


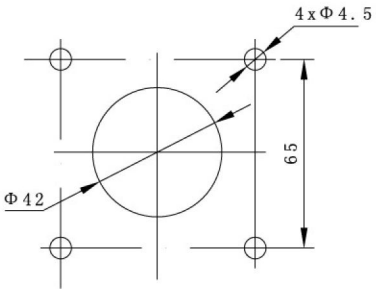
Handle operating mechanism





Outline and opening size of circular handle





Outline and opening size of square handle

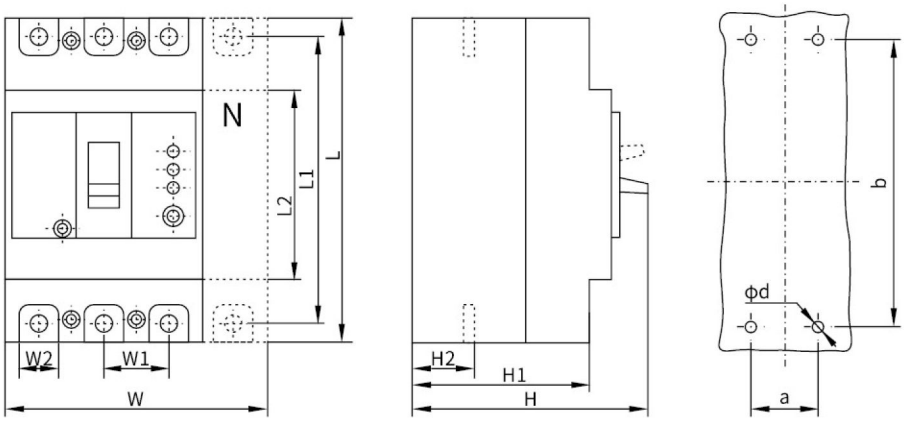
Installation dimension of rotating handle

Model	iALM1LE-125	iALM1LE-250	iALM1LE-400	iALM1LE-800
Mounting dimensions	61mm	57mm	86.5mm	87mm

iALM1LE Moulded Case Leakage Circuit Breaker

Outline and installation dimensions

◆ Outline and installation dimension of front-panel wiring circuit breaker

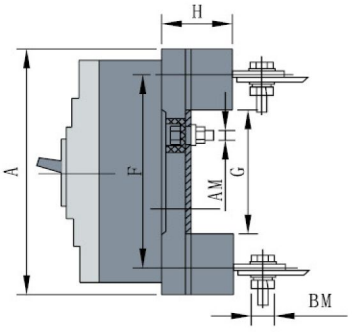


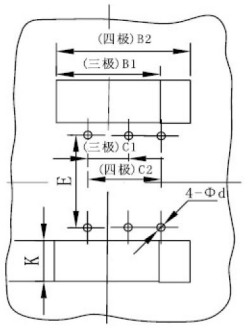
(Unit: mm)

Product model	Number of poles	Overall dimension									Mounting dimension		
		L	L1	L2	**W**	W1	W2	**H**	H1	H2	a	b	ϕd
M1LE-125L	3	150	132	96	92	30	18	94	67	27	30	129	4.5
	4	150	132	96	122	31	18	94	67	27	30	129	4.5
M1LE-125M	3	150	132	96	92	30	18	110	82	29	30	129	4.5
	4	150	132	96	122	30	18	110	82	29	30	129	4.5
M1LE-250L	3	165	145	96	107	35	23	94	62	26	35	126	4.5
	4	165	145	96	142	35	23	94	62	26	35	126	4.5
M1LE-250M	3	165	145	96	107	35	23	110	85	23	35	126	4.5
	4	165	145	96	142	35	23	110	85	23	35	126	4.5
M1LE-400M	3	257	223	175	150	48	32	146	97	39	44	194	7
	4	257	223	175	198	48	32	146	97	39	44 (N phase distance 50)	194	7
M1LE-630M/800M	3	280	235	203	210	71	45	146	104	41	70	243	7
	4	280	235	203	280	71	45	146	104	41	70	243	7

iALM1LE Moulded Case Leakage Circuit Breaker

◆ Outline and installation dimensions of plug-in back-panel wiring





(Unit: mm)

Product model	Overall installation dimension (mm)												
	A	B1	B2	C1	C2	E	F	G	K	H	AM	BM	4-φd
iALM1LE-125	168	91	125	60	90	56	132	92	48	50	M6	M8	Φ6.5
iALM1LE-250	186	107	145	70	105	54	145	94	56	50	M6	M8	Φ6.5
iALM1LE-400	280	149	200	60	108	129	224	170	65	60	M8	M12	Φ8.5
iALM1LE-800	305	210	280	90	162	143	242	181	72	87	M10	M14	Φ11

iALM1LE Moulded Case Leakage Circuit Breaker

Selection principle

a) When selecting the rated residual operating current value of the circuit breaker, full consideration shall be given to the possible normal leakage current value of the protected line and equipment. If necessary, the leakage current value of the protected line or equipment can be obtained through actual measurement.

b) The rated residual non-operating current of the circuit breaker shall not be less than 2 times of the maximum normal leakage current of electrical lines and equipment.

c) Hand held electric tools, mobile appliances, household appliances, sockets, construction site appliances (rated current not less than 100A)

d) Circuit breakers with rated residual operating current of 30mA or less can be selected for single equipment. The circuit breaker with rated residual operating current of 30mA or above shall be selected for the total protection of multiple-equipment (multiple-supports).

e) Circuit breakers with rated residual operating current of 30mA or less shall be selected for electrical equipment installed in wet places.

Ordering instructions

When ordering, the customer must state:

a) Model and name of circuit breaker.

b) Rated current of circuit breaker overcurrent release.

c) Rated residual operating current of circuit breaker.

d) Breaking time of circuit breaker.

e) Protection type, number of poles and quantity.

f) Rated operating voltage of internal and external accessories of circuit breaker.

Note: please indicate the N-pole protection type when ordering. If the protection type is not indicated, then the protection type provided for L-type and M-type are respectively type A and type B.

Example: order of iALMILE-125 with rated current of 125A, rated residual operating current of 100/300/500mA (adjustable in three gears), non delay of 0.2s, breaking capacity of standard type, four pole, for distribution protection, with shunt release (AC220V), N-pole protection type of type A, 100 sets.

It shall be written as: iALMILE-125L/3N310A 125A 100/300/500mA 0.2s AC220V 100 sets.

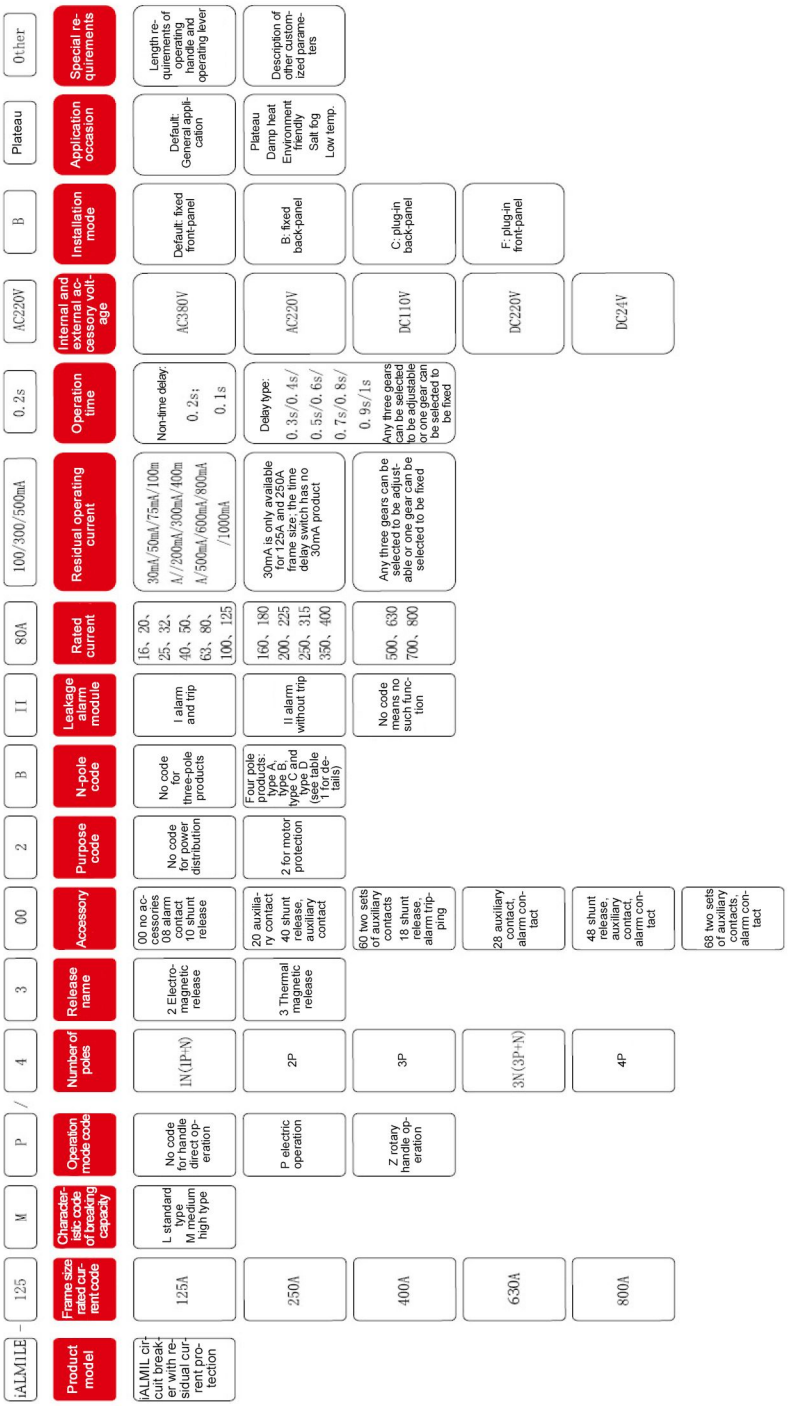
Quick selection

Example: iALM1LE-125MP/43002BII 80A 100/300/500mA 0.2s AC220V.

It refers to the iALM1LE-125 motor protection circuit breaker with residual current protection. The rated current of frame size is 125A, the rated current is 80A, the breaking capacity is medium high type, four pole, type B, the rated residual operation current is 100/300/500mA, three gears adjustable, the breaking time is ≤0.2s, thermal magnetic release, with alarm non-tripping module and motor operating mechanism (AC220V).

iALM1LE Moulded Case Leakage Circuit Breaker

Quick selection table of iALM1LE molded case leakage circuit breaker



DZ47-63 Miniature Circuit Breaker

Scope of application

DZ47-63 miniature circuit breaker is mainly used for overload and short circuit protection in the AC 50Hz/60Hz lines rated voltage up to 380V and rated current up to 63A. At the same time, it can also switch on and off electrical devices and lighting lines infrequently under normal conditions.

Standard: GB10963.1， IEC 60898-1, with CCC and CE certified.

Product naming rules

DZ 47 — 63

- 63 — Rated current of frame size
- 47 — Design code
- DZ — Enterprise code

Normal operating conditions

Ambient temperature: -5℃-+40℃, the average value within 24h shall not exceed 35℃.

Altitude: the altitude of the installation site shall not exceed 2000m.

Main parameters and technical performance

Main specifications:

Classification by current In: 1A, 3A, 6A, 10A, 16A, 20A, 25A, 32A, 40A, 50A, 63A.

Number of poles: A. 1P; b. 2P; C. 3P; d. 4P.

Classification by the type of instantaneous tripping of circuit breaker: type a. type C (5In-10In); b. type D (10In-16In).

Main technical parameters: rated service short-circuit breaking capacity (see table 1 and table 2);

Mechanical and electrical life

a. Electrical life: no less than 4000 times;

b. Mechanical life: no less than 10000 times.

DZ47-63 (C) type

Table 1

Rated current	Number of poles	Voltage	Make-break capacity
C1~C40	1	230/380	6000
C1~C40	2,3,4	380	6000
C50~C63	1	230/380	4000
C50~C63	2,3,4	380	4000

DZ47-63 (D) type

Table 2

Rated current	Number of poles	Voltage	Make-break capacity
D1~D63	1	230/380	4000
D1~D63	2,3,4	380	4000

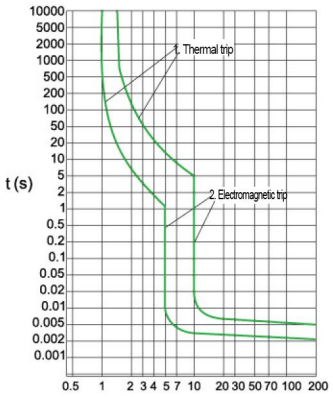
DZ47-63 Miniature Circuit Breaker

Overcurrent protection characteristics (see table 3)

Table 3

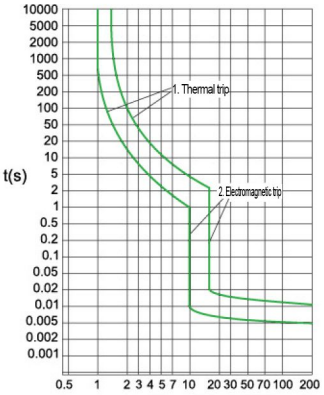
No.	Rated current of release In(A)	Initial state	Test current	Specified time	Prospective result	Remarks
a	1~63	Cold state	1.13In	t>1h	Non-tripping	
b	1~63	Immediately after test a	1.45In	t<1h	Tripping	The current rises steadily to the specified value within 5S
c	1~32	Cold state	2.55In	1s<t<60s	Tripping	
	40~63	Cold state	2.55In	1s<t<120s	Tripping	
d	1~63	Cold state	5In	t>0.1s	Non-tripping	Type C
e	1~63	Cold state	10In	t<0.1s	Tripping	Type C
f	1~63	Cold state	10In	t>0.1s	Non-tripping	Type D
g	1~63	Cold state	16In	t<0.1s	Tripping	Type D

Tripping characteristic curve (see figure 1).



I/In Figure 1 Type C

Current limiting characteristics (see figure 2).



I/In Figure 2 Type D

Table 4

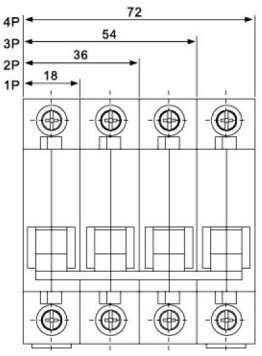
Rated current In(A)	Nominal sectional area of copper conductor (mm^2)
1~6	1
10	1.5
16、20	2.5
25	4
32	6
40、50	10
63	16

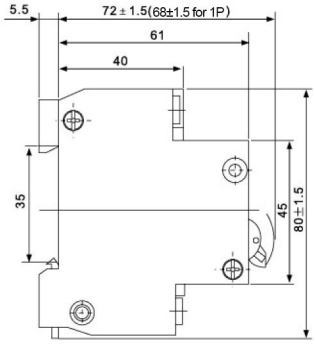
DZ47-63 miniature circuit breaker has high current limiting capacity, so as to limit the destructive energy caused by short circuit to the greatest extent.

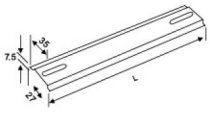
Wiring: suitable for connection of conductor below 25mm (see table 4),

Torque: 2.0N•m。

Outline and installation dimensions







DZ47-63 mounting guide rail dimension

DZ47LE Miniature Leakage Circuit Breaker

Scope of application

DZ47LE series miniature leakage circuit breaker is applicable to AC 50Hz or 60Hz lines with rated voltage of 220V for the single-pole two-wire and two-pole, and 380V for the three-pole, three-pole four-wire and four-wire, and rated current up to 63A. When personal electric shock or power grid leakage current exceeds the specified value, the residual current actuates the circuit breaker, which can quickly cut off the fault power supply in a very short time and protect the safety of personal and electrical equipment. The residual current operated circuit breaker has overload and short circuit protection functions, which can be used to protect the line or motor from overload and short circuit, and can also be used for infrequent switching and starting of the line under normal conditions.

Standard: GB16917 1, IEC 61009-1.

Product naming rules

DZ 47 LE — 63

- 63 — Rated current of frame size
- LE — Function code (electronic residual current operated circuit breaker)
- 47 — Design code
- DZ — Enterprise code

Normal operating conditions

The ambient temperature is -5℃-40℃, and the average temperature within 24 hours shall not exceed 35℃;

Altitude: the altitude of the installation site shall not exceed 2000m;

Installation category: level II and III;

Pollution level: Level 2;

Installation conditions: the external magnetic field of the installation site shall not exceed 5 times of the geomagnetic field in any direction.

Main parameters and technical performance

Main specifications:

Rated current (In):

For 32A frame size: 6A, 10A, 16A, 20A, 25A, 32A;

For 63A frame size: 6A, 10A, 16A, 20A, 25A, 32A, 40A, 50A, 63A;

Rated residual operating current I△n: 0.03A, 0.05A, 0.1A, 0.3A;

Classification by the number of poles and current circuit:

a. One-pole two-wire residual current operated circuit breaker (1P+N);

b. Two-pole residual current operated circuit breaker (2P);

c. Three-pole residual current operated circuit breaker (3P);

d. Three-pole four-wire residual current operated circuit breaker (3P+N);

e. Four-pole residual current operated circuit breaker (4P);

Classification by the characteristics of instantaneous release: type C (5-10)In, type D (10-16) In.

DZ47LE Miniature Leakage Circuit Breaker

Main technical parameters:

Rated voltage Un (V): 220V for the single-pole two-wire and two-pole;

380V for the three-pole, three-pole four-wire and four-pole;

Rated short circuit capacity Icn(A)

For frame size with current of 32A: 4000

For frame size with current of 63A: 3000

Rated residual making and breaking capacity I△m (A): 2000;

Rated residual non-operating current I△no: 0.5I△n;

The breaking time of residual current operation is shown in table 1 as below Table 1

In (A)	I△n(A)	The residual current is equal to the breaking time (s) at the following values:				
		I△n	2I△n	5I△n	5A,10A, 20A, 50A,[a] 100A, 200A, 500A	I△t[b]
6~63	0.03, 0.05, 0.1, 0.3	0.1	0.05	0.04	0.04	0.04

Note: a. Tests for 5A, 10A, 20A, 50A, 100A, 200A and 500A are only conducted for operation during verification, and the current value greater than the lower limit of overcurrent instantaneous tripping range is not tested.

b.The test shall be conducted when I△t is equal to the current value of the lower limit of overcurrent instantaneous tripping range of type C or D.

See table 2 for overcurrent protection characteristics Table 2

No.	Rated current In(A)	Initial state	Test current	Specified time t	Prospective result	Remarks
1	6~63	Cold state	1.13In	t⩾1h	Non-tripping	
2	6~63	Immediately following the previous test	1.45In	t＜1h	tripping	The current rises steadily to the specified value within 5s
3	6~63	Cold state	2.55In	1s＜t＜60	Tripping	In⩽32A
				1s<t<120	Tripping	In>32A
4	6~63	Cold state	5In	t⩾0.1s	Non-tripping	Type C
			10In	t<0.1s	Tripping	
			10In	t⩾0.1s	Non-tripping	Type D
			16In	t<0.1s	Tripping	

Ambient air temperature: the maximum ambient air temperature should be 40℃ and the minimum temperature should not be less than -5℃, and the average temperature in 24h should not be more than +35℃. See table 3 for the impact of ambient air temperature on circuit breaker.

Table 3

Temperature℃	-15	-5	0	10	20	30	40	55
Rated current correction factor	1.19	1.15	1.13	1.06	1.05	1	0.96	0.89

DZ47LE Miniature Leakage Circuit Breaker

See table 4 for model selection of installed copper conductor Table 4

Rated current In(A)	Nominal sectional area of copper conductor (mm²)
10 and below	1.5
10~20	2.5
20~25	4
25~32	6
32~50	10
50~63	16

Tripping characteristic curve (see figure 1).

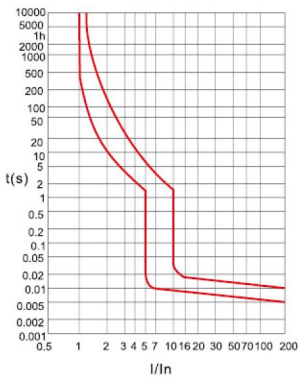


Figure 1 Type C

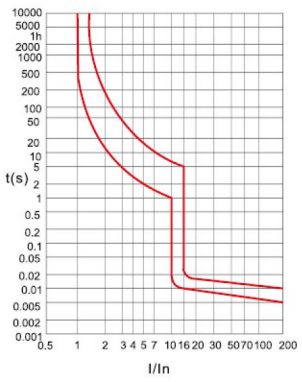
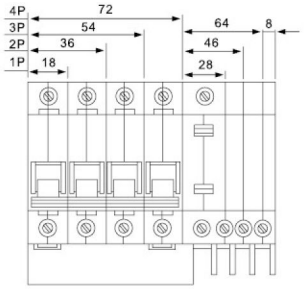


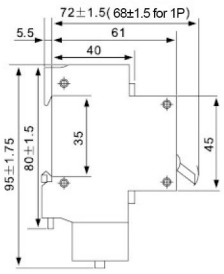
Figure 1 Type D

Mechanical and electrical life:
a. Electrical life: 2000, cos φ= 0.85~ 0.9;
b. Mechanical life: 2000 times;
c. Operating frequency: In≤25A, 240 times/h; In>25A 120 times/h;

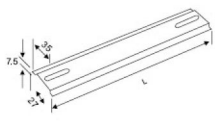
Insulation impulse voltage resistance
a. Each pole is connected together with the neutral pole and can withstand an impulse voltage with a peak value of 6000V;
b. Between poles connected with the neutral pole and the metal support, it can withstand an impulse voltage with a peak value of 8000V.
The residual current operated circuit breaker has bearing capacity when the peak current is 200A impulse current and does not cause misoperation.
The torque of wiring screw shall not be less than 1.5N•m.

Outline and installation dimensions





4P：72+72 3P+N：54+72
3P：54+54 2P：36+36
1P+N：18+36



DZ47LE-63 mounting guide rail dimension

Memo

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