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XUCKY



Low-voltage electrical component supplier

W1-2000 Series
Intelligent Air Circuit Breaker

W2-1600 Series
Intelligent Air Circuit Breaker

M1 Series
Moulded Case Circuit Breaker

XUCKY

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CORPORATE VISION

The capable are infinite
Intelligence creates the future



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—— The capable are infinite
Intelligence creates the future ——

W1-2000 Series

Intelligent Air Circuit Breaker

- ◇Featured with complete intelligence, high breaking capacity and zero arc;
- ◇AC rated current 200A-6300A, short circuit breaking capacity 85kA-120kA;
- ◇It has 3 and 4 poles, draw-out type and fixed type, and can be installed with inverted wires;
- ◇With multiple intelligent controllers, providing different functions; intelligent function, display function
- ◇Setting function, monitoring function, fault memory function, available for communication interface for remote measurement, remote adjustment, remote control and remote communication;
- ◇With complete protection features, convenient setting and high accuracy, it has instantaneous, short delay, long delay, single-phase grounding and other protection characteristics.



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W1-2000 Series Intelligent Air Circuit Breaker



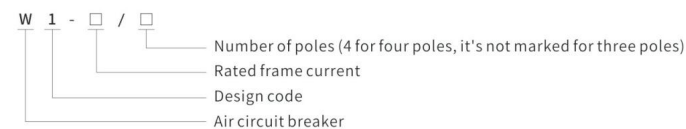
Purpose and scope of use

The W1 series intelligent low-voltage air circuit breaker (hereinafter referred to as circuit breaker) is suitable for distribution networks with frequency of AC 50Hz, rated voltage up to 660V (690V) and below and rated current ranging from 200A to 6300A. It's used to distribute electrical energy and protect lines and power equipment from overload, undervoltage, short circuit, single-phase grounding and other faults. The circuit breaker has intelligent protection function and precise selective protection, can improve power supply reliability and avoid unnecessary power outages. Meanwhile, it has open type communication interface and can be used for four remote operations to meet the requirements of the control center and automation system. The circuit breaker has pulse withstand voltage of 8000V at altitude of 2000 meters (corrected according to standards for different altitudes, with maximum voltage not exceeding 12000V). The circuit breaker without intelligent controller and sensor can be used as isolator, marked as $\text{---}/\text{---}$.

The circuit breaker complies with standards such as GB 14048.2 Low-voltage switchgear and controlgear-Part 2: Circuit-breakers and IEC60947-2 Low-voltage switchgear and controlgear-Part 2: Circuit-breakers.

Model and meaning and classification

©Model and meaning



©Classification

1. Classification by installation method

- Fixed type
- Draw-out type

2. Classification by the number of poles: three poles, four poles

3. Classification by operation method

- Electric operation
- Manual operation (for maintenance and repair)

©Type of release

Intelligent controller, undervoltage instantaneous (or delayed) tripping

©Intelligent controller performance

- The intelligent controller is classified into H type (communication type), M type (ordinary intelligent type), and L type (economic type);
- Equipped with overload long delay inverse time limit, short delay inverse time limit, definite time limit and instantaneous functions. The required protection characteristics can be set by the user;
- Single phase grounding protection function;
- Display function: setting current display, action current display and voltage display of each line (voltage display should be proposed when ordering);
- Alarm function: overload alarm;
- Self inspection function: overheating self inspection, microcomputer self-diagnosis;
- Test function: It can test the action characteristics of the controller.



Normal working and installation condition

◎ Ambient air humidity

The upper limit value shall not exceed +40°C, the lower limit value shall not be less than -5°C, and the 24-hour average value shall not exceed +35°C.

Note: For working condition with lower limit of -10°C or -25°C, the user should declare to our factory;

For working condition where the upper limit value exceeds +40°C or the lower limit value is below -10°C or -25°C, the user should consult with our factory.

◎ The altitude of the installation site shall not exceed 2000m

◎ Atmospheric condition

The relative humidity of the atmosphere does not exceed 50% when the ambient air temperature is +40°C. At lower temperature, there can be higher relative humidity. The average maximum relative humidity in the wettest month is 90%, and the average minimum temperature in that month is +25°C, and the condensation on the product surface due to temperature change should be considered. The user should consult with our factory for condition beyond the regulation.

◎ Protection level: IP30

◎ Utilization category: Category A or B

◎ Installation category

For the circuit breaker and undervoltage release with rated working voltage of 660V (690V) and below, the installation category of primary coil of power transformer is IV; and the installation category of auxiliary and control circuit is III.

◎ Installation condition

The circuit breaker should be installed according to the requirement of this manual, and the vertical inclination of the circuit breaker should not exceed 5° (the inclination of mining circuit breaker should not exceed 15°).

Technical data and performance

◎ 1. The rated current of the circuit breaker is shown in Table 1

Table 1

Rated frame current Inm A	Rated current In A
2000	400、630、800、1000、1250、1600、2000
3200	2000、2500、2900、3200
4000	3200、3600、4000
6300	4000、5000、6300

◎ 2. The rated short-circuit breaking capacity and short-term withstand current of the circuit breaker are shown in Table 2, and the arc distance of the circuit breaker is "zero" (i.e. there is no arc outside the circuit breaker)

Table 2

Rated frame current Inm A		2000	3200	4000	6300
Rated ultimate short-circuit breaking capacity Icu(KA)O-CO	400V	80	100	100	120
	690V	50	65	65	85
Rated short-time making capacity n×Icu(KA)/-cosΦ	400V	176/0.2	220/0.2	220/0.2	264/0.2
	690V	105/0.25	143/0.2	143/0.2	187/0.2
Rated service short-circuit breaking capacity Ics(KA)O-CO-CO	400V	65	80	80	100
	690V	50	50	65	75
Rated short-time withstand current Icw (KA) 1s, delay 0.4s, O-CO	400V	50	65	65/80(MCR)	85/100(MCR)
	690V	40	50	50/65(MCR)	65/75(MCR)

Note: The breaking capacity in the table is the same for the upper and lower incoming lines.

◎ 3. The maximum power consumption of the circuit breaker is 360W. The variation of the rated continuous current of the circuit breaker under different ambient temperatures is shown in Table 3

Table 3

Ambient temp. °C	W1	400A	630A	800A	1000A	1250A	1600A	2000A
40		400A	630A	800A	1000A	1250A	1600A	2000A
50		400A	630A	800A	1000A	1250A	1550A	1900A
60		400A	630A	800A	1000A	1250A	1550A	1800A



◎ 4. Intelligent overcurrent controller protection characteristic and function

4.1 Overcurrent controller protection characteristic

4.1.1 The setting value Ir (I/In) and error of the controller are shown in Table 4

Table 4

Long delay		Short delay		Instantaneous		Ground fault	
Ir1	Ir2	Error	Ir3	Error	Ir4	Error	
(0.4-1) In	(0.4-15) In	±10%	In-50kA(Inm=2000A) In-75kA(Inm=3200~4000A) In-100kA(Inm=6300A)	±15%	Inm=(2000~4000A) (0.2~0.8)In Max 1200A Min 160A	Inm=6300A (0.2-1.0)In	±10%

Note: When simultaneously having three-section protection(required), the setting value cannot cross.

4.1.2 For long delay overcurrent protection inverse time limit action characteristic I2TL=(1.5Ir1)2tL, the action time of (1.05-2.0)Ir1 is shown in Table 5, with time error of ± 15%.

Note: tL-Setting time for long delay of 1.5Ir1, TL-Action time for long delay

Table 5

1.05Ir1	1.3Ir1	1.5Ir1 setting time s	15	30	60	120	240	480
>2h non action	<1h non action	2.0Ir1 f action time s	8.4	16.9	33.7	67.5	135	270

4.1.3 Short delay overcurrent protection characteristic

The short delay overcurrent protection is of definite time limit. If the low multiple is required to be the inverse time limit, its characteristic is as follows: I2Ts=(8Ir1)2ts, ts is the generally designed delay time; when the overload current is greater than 8Ir1, it automatically switches to definite time limit characteristic, which is shown in Table 6. The time limit error is ±15%.

Table 6

Delay time s				Returnable time s			
0.1	0.2	0.3	0.4	0.06	0.14	0.23	0.35

4.1.4 The overcurrent tripping protection characteristic is shown in Figure 1, and the ground fault protection characteristic is shown in Figure 2

4.2 M type intelligent controller function

a. Ammeter function

It displays the operating current and ground leakage current of each phase, normally displays the maximum phase current, and also displays the current or time value of setting, testing and fault.

b. Voltmeter function

It displays the voltage of each line, and normally displays the maximum value.

c. Remote monitoring and self-diagnosis function

① The controller has local fault self-diagnosis function

When the computer malfunctions, error "E" display or alarm can be sent, and the computer can be restarted. If the user needs it, the circuit breaker can also be opened.

② When the local ambient temperature reaches 80°C, alarm can be sent and the circuit breaker can be opened at low current (when required by the user).

③ The intelligent controller has overload, grounding, short circuit, load monitoring, pre-alarm, and trip indication (OCR) signals output through contact or optocoupler, making it easy for users to use for external remote control. The contact capacity is DC28V, 3A; AC125V, 3A.

d. Setting function

Various parameters of the controller can be adjusted with the four buttons: **Set**, **↑**, **↓**, and **Store**. Press the **Set** to the desired state (indicated by the status indicator light), then press the **↑** or **↓** to adjust the parameter to the desired value, and then press the **Store** button again. The store light illuminates once to indicate that the setting value has been locked. The protection parameter of the controller shall not be set across. After the controller is powered off and reset, press the **Set** button again to check the various parameters set circularly.

e. Test function

By using buttons such as **Set**, **↑**, **↓**, **Trip**, **Non-trip** and **Reset**, various protection characteristics of the controller can be checked. Use the **Set**, **↑**, and **↓** buttons to adjust simulated fault test current (note: do not store and lock), and then press the **Trip** or **Non-trip** button to test. The controller can enter fault handling. When pressing the **Trip** button, the circuit breaker breaks, when pressing the **Non-trip** button, the circuit breaker doesn't break, and the controller's various indicating states are normal. After the test, you need to press the **Reset** or **Clear light** button once before proceeding with other tests.

Note: For the convenience of the test, regardless of whether the grounding leakage is set at the tripping or alarm position, the test will be treated as tripping, and the priority is lower than overload protection. Once malfunction occurs during the test, the controller automatically stops all tests and enters fault handling.



f. Load monitoring function

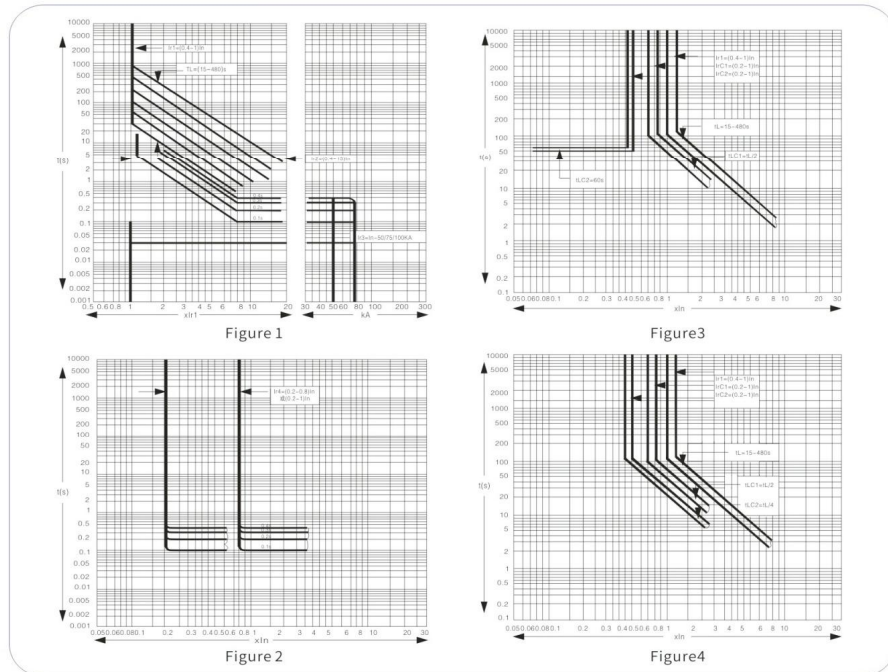
Set two setting values: ILC1 setting range (0.2-1) In and ILC2 setting range (0.2-1) In, ILC1 delay characteristic is inverse time limit characteristic, and its time setting value is 1/2 of the long delay setting value; there are two types of ILC2 delay characteristics. The first is the inverse time limit characteristic, with time setting value of 1/4 of the long delay setting value. The second is the fixed time limit characteristic, with delay time of 60 seconds. For these two delay functions, the former is used to cut off the unimportant load when the current approaches the overload setting value, while the latter is used when the current exceeds the setting value of ILC1, causing a delay of cutting off the unimportant load at the lower level, causing the current to decrease and maintain power supply for the main circuit and important load circuit. When the current drops to ILC2, after a certain delay, a command is sent to reconnect the cut off circuit at the lower level, restoring power supply of the entire system. The user can choose either of the two types of monitoring protection mentioned above, and the monitoring characteristic is shown in Figure 3 and Figure 4. g. MCR tripping and simulated tripping protection can be turned off according to user requirement, and generally need to be turned off when conducting short delay breaking test

① MCR on/off protection is mainly used when the line is in fault state (when the controller is powered on), and the controller has the function of breaking the circuit breaker at low short-circuit current. The factory setting is 10kA with error of $\pm 20\%$, and the set current can be determined according to the protection requirement.

② The controller has the function of directly sending trip signal without processing the signal by the host chip when there is an extremely large short-circuit current.

h. Thermal memory function

After the controller is overloaded or has a short circuit delay trip, it has memory function that simulates the characteristic of bimetallic sheets before the controller is powered off. The overload energy is released after 30 minutes, and the short delay energy is released after 15 minutes. During this period, if overload and short delay faults occur, the tripping time will become shorter, the controller will power off, and the energy will automatically reset.



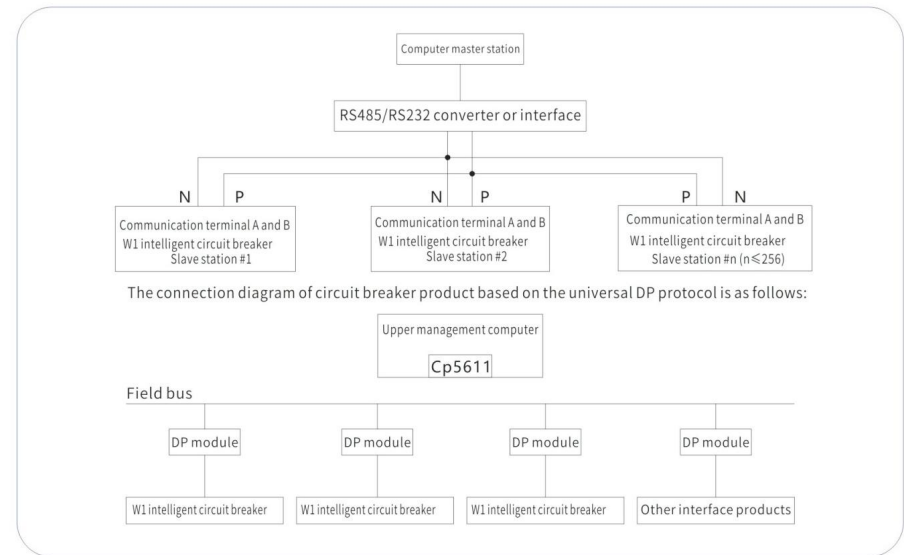
4.3 H type intelligent controller

In addition to having all the functions of the M type, it also has serial communication interface. Through the communication interface, a local area network system (hereinafter referred to as the system) with a master-slave structure can be formed, with 1-2 computers as the master station. If the intelligent circuit breaker or other communicable components are used as the slave station, the system network structure is shown in the following figure.

For circuit breaker unit, the system can achieve long-distance "four remote" functions for monitoring of various power grid parameters and operating parameters, monitoring of the current operating status of intelligent circuit breaker, adjustment and download of various protection limit parameters and control of opening and closing operations of intelligent circuit breaker. The system is suitable for the construction and renovation of power distribution monitoring system in various power stations, power plants, small and medium-sized substations, industrial and mining enterprises, buildings, etc.



The connection diagram of the dedicated communication protocol interface is as follows:



4.3.1 System composition

(a) Hardware structure of data communication network system

- △ The intelligent circuit breaker provides standard RS485 communication interface, which is led out from the No. 10 and 11 outgoing lines of the circuit breaker;
- △ The communication medium connected to the system: Class A shielded twisted pair.
- (b) Main characteristic of the network
- △ Bidirectional serial data transmission method, the product can provide multiple communication protocol modes: "Data Communication and Its Criteria for Low Voltage Apparatus V1.0", PROFIBUS-DP, MODEBUS, etc.
- △ Strict master-slave mode, that means the master station is the initiator and controller of communication, and the slave station can only communicate with the master station and cannot directly communicate with other slave stations.
- △ The communication baud rate is 9600bit/s, and the communication distance is 1.2km. For typical applications of PROFIBUS-DP communication baud rate, it can reach 187.5kbit/s.

(3) Monitoring software

YSS2000 configuration software can achieve the required configuration application of monitoring and management software according to different project requirements. For intelligent circuit breaker, it can achieve operation monitoring and various daily management functions.

4.3.2 System function

(a) Remote control

Remote control refers to the operation and control of energy storage, closing and opening of circuit breaker of each slave station in the system through the master station computer. The operator selects the corresponding object from the system interface, clicks the remote control button with the mouse, and the system provides the current operating status of the corresponding object. After the operator inputs the operation password, they can send remote control command for "closing" or "opening". The system passes the command to the corresponding circuit breaker slave station. After receiving the commands, the slave station performs operations such as breaking, closing and energy storage according to the established sequence, and reports the remote control result to the master station.

(b) Remote adjustment

Remote adjustment refers to setting the protection setting value of the slave station through the master station computer. In the master station computer, there are protection setting tables for all slave stations. The operator selects the corresponding object from the system interface, clicks the remote adjustment button with the mouse, and the system provides the current settings of all protection setting values for the corresponding object, as well as the protection setting table for that object. After the operator inputs the operation password, they can select the required parameter from the parameter table, and then click the corresponding button. The master station downloads the parameter to the corresponding slave station, and report the result of remote debugging. After receiving command, the slave station modifies its own protection setting value.



© Remote measurement

Remote measurement refers to the real-time monitoring of the power grid operating parameter of each slave station through the master station computer. The communication sub-station reports the working parameter to the upper computer as follows: real-time A, B, C, N phase current value of each sub-station, voltage value of UAB, UBC, UCA, etc.

△ The fault record can record the following fault parameters

The current value of A, B, C, and N phases during the fault, the voltage value of UAB, UBC and UCA, the fault type, and the fault action time, and it can also record the fault in the fault database.

△ The computer displays the current real-time current and voltage of each sub-station through bar chart, absolute value table and other methods, and displays the operating status of each node through real-time curves.

(d) Remote communication

Remote communication refers to viewing the model, closing and opening status, various protection setting values, as well as the operation and fault information status of the slave station through the master station computer. The parameters reported from the slave station circuit breaker to the upper computer mainly include: switch model, switch status (on/off), fault information, alarm information, various protection setting values, etc.

(e) Other system functions

In addition to the four remote operation control function, the system can also perform various management functions: accident alarm (information screen, screen pushing, event printing, accident dialing, sound alarm), event recording, maintenance listing, shift handover management, load trend analysis and various reports printing.

4.3.3 L type intelligent controller

The L type controller adopts code switch and toggle switch setting methods, and has overload long delay, short circuit short delay, instantaneous and ground leakage four-section protection characteristics. It also has functions such as fault status and load current light column indication, but there is no digital display, and its functions are not as complete as the M and H types. The user can choose it for general situations.

© 4.4 Operating performance of circuit breaker

The operating performance of the circuit breaker is represented by the number of operation cycles, as shown in Table 7

Table 7

Rated frame current (A)	Total number of operation cycles
2000	10000
3200, 4000	5000
6300	2000

© 4.5 The working voltage and required power of the shunt release, undervoltage release, motor operating mechanism, energy release (closing) electromagnet and intelligent controller of the circuit breaker are shown in Table 8

Table 8

项目	Required power	Rated working voltage	AC (50Hz)		DC	
			220V	380V	110V	220V
	Shunt release		24VA	36VA	24W	24W
	Undervoltage release		24VA	36VA	-	-
	Closing electromagnet		24VA	36VA	24W	24W
Electric operating mechanism	Rated frame current of circuit breaker	2000A	85VA	85VA	85W	85W
		3200A, 4000A	110VA	110VA	110W	110W
		6300A	150VA	150VA	150W	150W
Intelligent controller supply voltage			AC220V、AV380V、DC220V、DC110V			

Note: The reliable operating voltage range of the shunt release is 70%~110%, and that of the closing electromagnet and operating mechanism are 85%~110%

© 4.6 The performance of the undervoltage release of the circuit breaker is shown in Table 9

Table 9

Category	Undervoltage delay release	Undervoltage instantaneous release
Release action time	1,3,5s delay	Instantaneous
Release action voltage value	35%~70%Ue	The circuit breaker can reliably open
	≤35%Ue	The circuit breaker cannot close
	(85~110%) Ue	The circuit breaker can reliably close

If the supply voltage recovers to 85% Ue within 1/2 delay time

The circuit breaker doesn't open

Note: The accuracy of the delay time is ±10%



© 4.7 Performance of auxiliary contact

4.7.1 The conventional thermal current of the auxiliary contact is 6A

4.7.2 Auxiliary contact form: 4NO, 4NC.

4.7.3 Abnormal making and breaking capacity of auxiliary contact

The making and breaking capacity determined by the use of auxiliary contact under abnormal usage conditions is shown in Table 10

Table 10

Utilization category	Making			Breaking			Number of making/breaking operation cycles and operation frequency		
	I/le	U/ Ue	COSΦ or T0.95	I/le	U/ Ue	COSΦ or T0.95	Number of operation cycles	Number of operation cycles per minute	Power-on time (s)
AC-15 DC-13	10 1.1	1.1 1.1	0.3 6Pe	10 1.1	1.1 1.1	0.3 6Pe	10	6 (or the same operating frequency as the main circuit)	0.05

Note: When $Pe \geq 50W$, the upper limit of $T0.95=6Pe \leq 300ms$

4.7.4 The making and breaking capacity of auxiliary contact under normal condition is shown in Table 11

Table 11

Utilization category	Making			Breaking		
	I/le	U/ Ue	COSΦ or T0.95	I/le	U/ Ue	COSΦ or T0.95
AC-15	10	1	0.3	1	1	0.3
DC-13	1	1	6Pe	1	1	6Pe

© 4.8 Key lock in open position

The circuit breaker is equipped with an "open position key lock" accessory (supplied according to order requirement), which can lock the circuit breaker in the open position. At the moment, neither the closing button nor the release (closing) electromagnet can close the circuit breaker.

Structure overview

The fixed type circuit breaker mainly consists of contact system, intelligent controller, manual operating mechanism, electric operating mechanism and mounting plate;

The draw-out type circuit breaker mainly consists of contact system, intelligent controller, manual operating mechanism, electric operating mechanism and draw-out seat.

The circuit breaker is arranged in a three-dimensional form, with the characteristics of compact structure and small volume. The contact system is enclosed in insulated base plate, and the contact of each phase is also separated by insulated plate, forming small compartments. The intelligent controller, manual operating mechanism and electric operating mechanism are arranged in front of each other to form independent units. If one of the units is damaged, the entire unit can be removed and replaced with a new one.

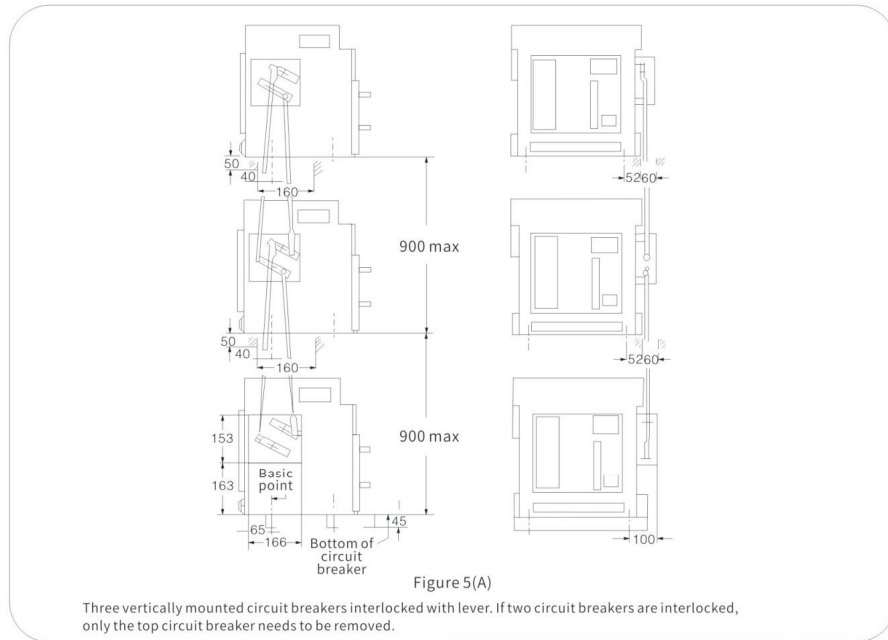
The draw-out type circuit breaker consists of plug-in circuit breaker and a draw-out seat. The guide rail inside the draw-out seat can be pulled in and out, and the inserted circuit breaker is located on the guide rail to get in and out of the draw-out unit. The main circuit is connected through the insertion connection between the busbar on the inserted circuit breaker and the bridge contact on the draw-out seat.

The draw-out type circuit breaker has three working positions: "connection" position, "test" position, and "disconnection" position. The position change is achieved by turning the handle in or out. The indication of the three positions is displayed by the pointer on the draw-out seat crossbeam.

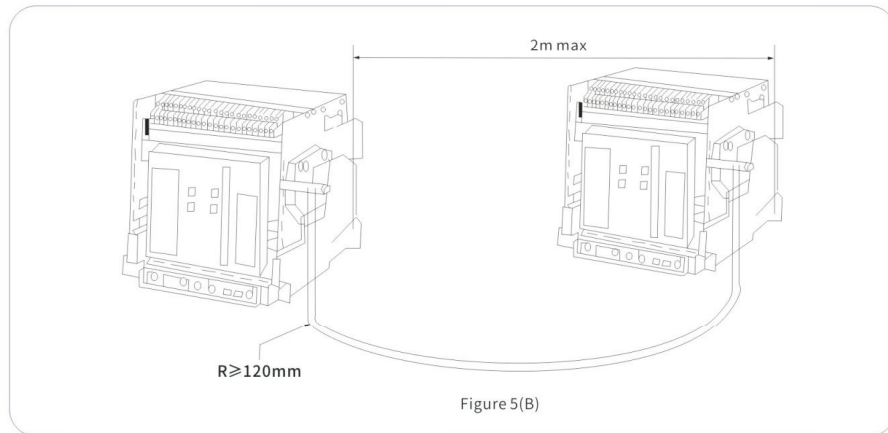
When in the "connection" position, both the main circuit and the secondary circuit are connected; when in the "test" position, the main circuit is disconnected and separated by insulation partition, and only the secondary circuit is connected for some necessary action tests; when in the "disconnection" position, both the main circuit and the secondary circuit are disconnected. The draw-out type circuit breaker has mechanical interlocking device, the circuit breaker can only be closed in the connection position or test position, and cannot be closed in the middle position between connection and test.

① Interlocking mechanism of circuit breaker (suitable for draw-out type and fixed type). The user can use interlocking mechanism to switch two or three sets.

■ 1.1 Lever interlocking

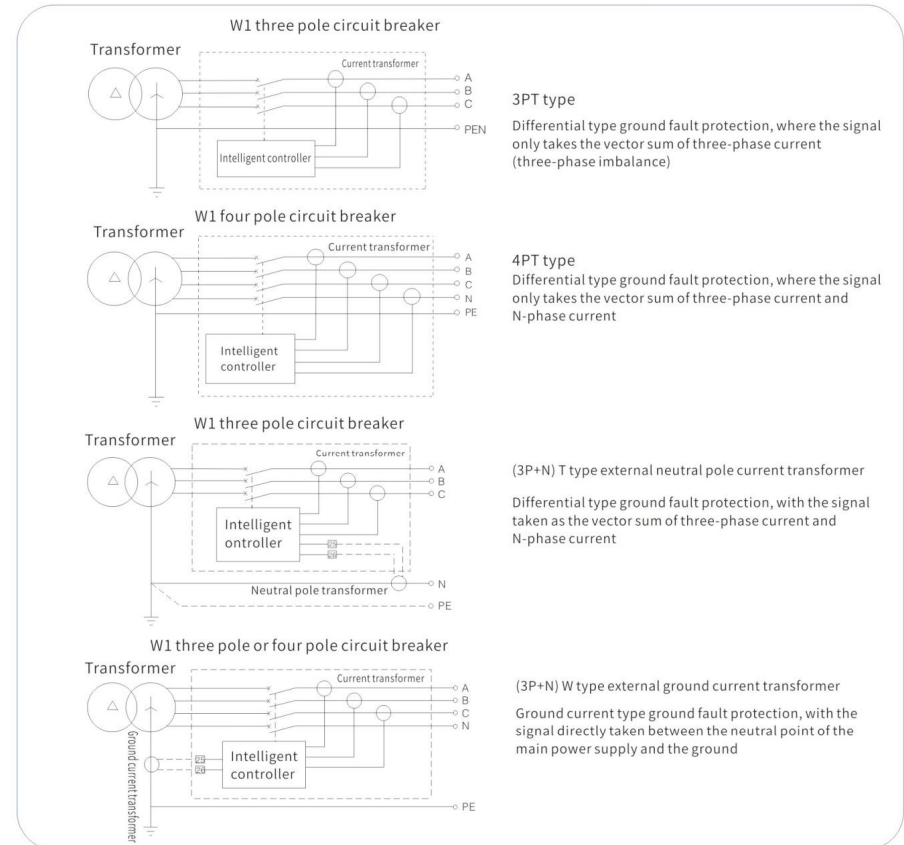


■ 1.2 Soft interlocking (both horizontal and vertical can be equipped)



■ Internal connection

1. Ground fault protection circuit



2. External single-phase ground protection function

External current transformer (neutral pole transformer or ground current transformer) is provided as an accessory to user. The user shall insert it into the busbar and connect the wiring (with a length of 2m) to the secondary wiring terminals # 25 and # 26 of the circuit breaker.

The center cut-out dimension of the external current transformer (maximum allowable size of the perforated busbar) is as follows:

Model	Width	Height
W1-2000 W1-4000 / 4	61	21
W1-3200 and above (except for W1-4000/4)	87	31



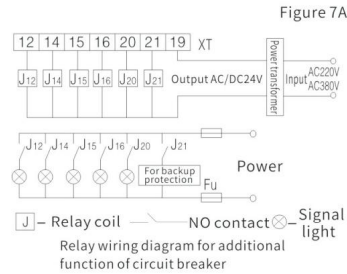
3. Wiring terminal

There are a total of 47 wiring terminals for the circuit breaker, which are simple and convenient for user to use. The wiring diagram is shown in Figures 7A and 7B

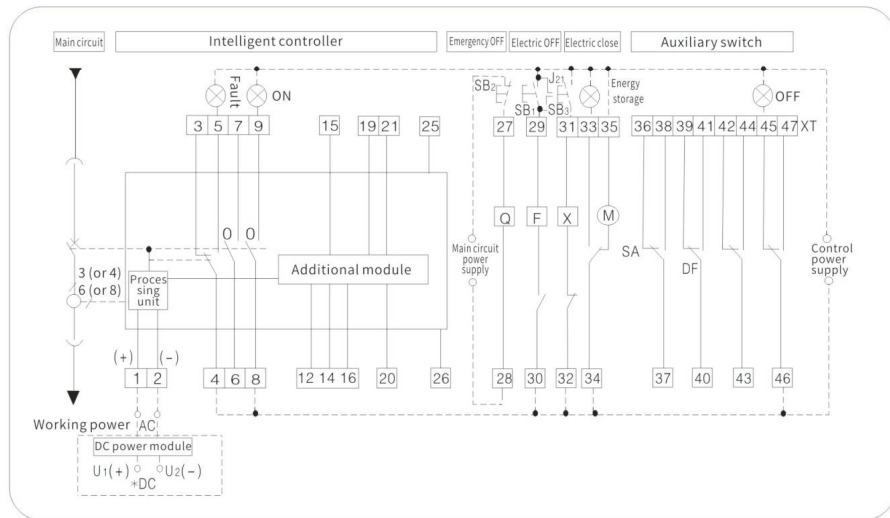
Figure 7A (M type or L type controller with basic function)

Other wirings of intelligent controller:

- #1, #2 AC working power input (input from DC power modules U1 and U2 during DC)
- #12 Overload pre-alarm signal output
- #14 Instantaneous short delay trip signal output
- #15 Long delay trip signal output
- #16 Ground (or zero) fault trip signal output
- #19 Signal output common line
- #20 Self-diagnosis signal output
- #21 Trip signal (available for shunt or undervoltage actuators)
- #25, #26 External neutral pole or ground current transformer input



- 1) The controller signal output drives the external relay J to output contact action signal through terminals 12, 14-16, 20 and 21.
- 2) The power transformer (user needs to specify the input voltage value in the order specification) is provided by the manufacturer. The power transformer can be inserted into the standard guide rail together with the relay base, and installed by the user in the appropriate position of the switchgear.
- 3) Relay model: HH62P, AC/DC24V, provided by user.
- 4) Output conditions of self-diagnosis signal: a. The internal temperature of the controller is >80°C; b. The chip is not working properly; c. The controller loses power.
- 5) The user can choose to connect to J12, J14-J16, J20 and J21 according to actual needs



- Note: (1) If the control supply voltage of F, X and M is different, they should be connected to different power supplies separately.
 (2) Terminal #35 can be directly connected to the power supply (automatic energy pre-storage) or connected in series to the normally open button and then connected to the power supply (manual energy pre-storage).
 (3) If requested by the user, terminals # 6-# 7 can output normally closed contact.
 (4) Additional accessories are provided by the user.
 (5) *When the working power of the intelligent controller is DC power, DC power module must be added (at this time, terminals #1 and #2 cannot be directly connected to AC power). The secondary wiring is shown in the figure (DC power supply DC110V or 220V is input from U1 (+) and U2(-), and the two output terminals of the DC power module are respectively connected to terminals 1(+) and 2(-) of the secondary wiring base).

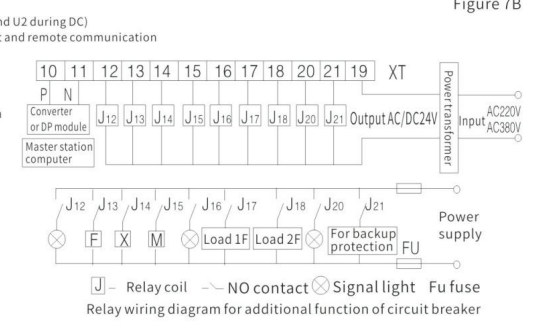
SB1 shunt button (provided by user)	X closing electromagnet	DF auxiliary contact	Q undervoltage release or undervoltage delay release
SB2 undervoltage button (provided by user)	M energy storage motor	F shunt release	O NO contact (3A/AC380V)
SB3 closing button (provided by user)	XT wiring terminal	SA motor microswitch	⊗ Signal light (provided by user)



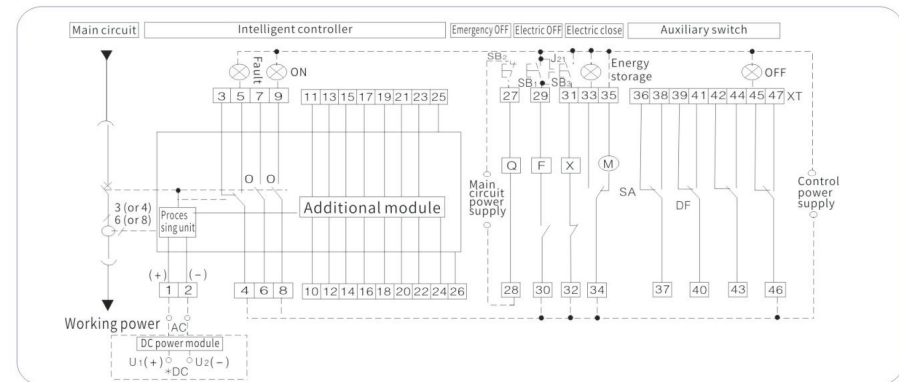
Figure 7B (M type controller with additional function or H-type)

Other wirings of intelligent controller:

- #1, #2 AC working power input (input from DC power modules U1 and U2 during DC)
- #10 RS485 communication P terminal (simplex) remote adjustment and remote communication
- #11 RS485 communication N terminal (simplex) remote control and remote measurement, etc
- #12 Overload pre-alarm signal output
- #13 Communication remote control shunt trip output
- #14 Instantaneous short delay trip signal output or communication remote control closing output
- #15 Long delay trip signal output or communication remote control energy storage output
- #16 Ground (or zero) fault trip signal output
- #17 Unloading 1 signal output
- #18 Unloading 2 signal output
- #19 Signal output common line
- #20 Self-diagnosis signal output
- #21 Trip signal (available for shunt or undervoltage actuators)
- #22 Voltage signal phase A
- #23 Voltage signal phase B
- #24 Voltage signal phase C
- #25, #26 External neutral pole or ground current transformer input



- 1) The controller signal output drives the external relay J to output contact action signal through terminals 12-18, 20 and 21.
- 2) The RS485y232 converter, DP module and power transformer (the user needs to specify the input voltage value in the order specification) are provided by the manufacturer. The power transformer can be inserted into the standard guide rail together with the relay base and installed by the user in the appropriate position of the switchgear.
- 3) Relay model: HH62P, AC/DC24V, provided by user.
- 4) Main station computer is provided by user.
- 5) Terminals 13-15 output can be used for opening, closing, and other functions of communication remote control. The trip signals of corresponding terminals 14 and 15 are no longer output at this time. The normally open contact of the corresponding relay can be connected in parallel with the corresponding manual control button, which can achieve both manual control and remote control. If remote control function is not required, terminals 14 and 15 can be connected to two signal lights in series through the normally open contacts of relays J14 and J15, and the corresponding signal can be remotely output. Please specify whether remote control function is required in the order specification, and the manufacturer will determine the corresponding function output by terminals 14 and 15 based on this. Terminal 21 output drives relay J21 for backup protection.
- 6) Output conditions of self-diagnosis signal: a. The internal temperature of the controller is >80°C; b. The chip is not working properly; c. The controller loses power.
- 7) The user can choose to connect to J12, J14-J16, J20 and J21 according to actual needs.



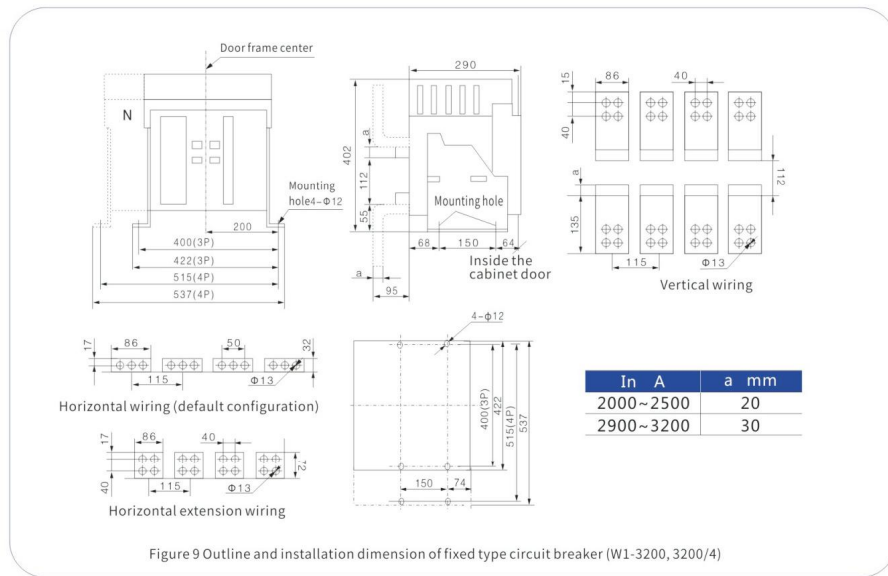
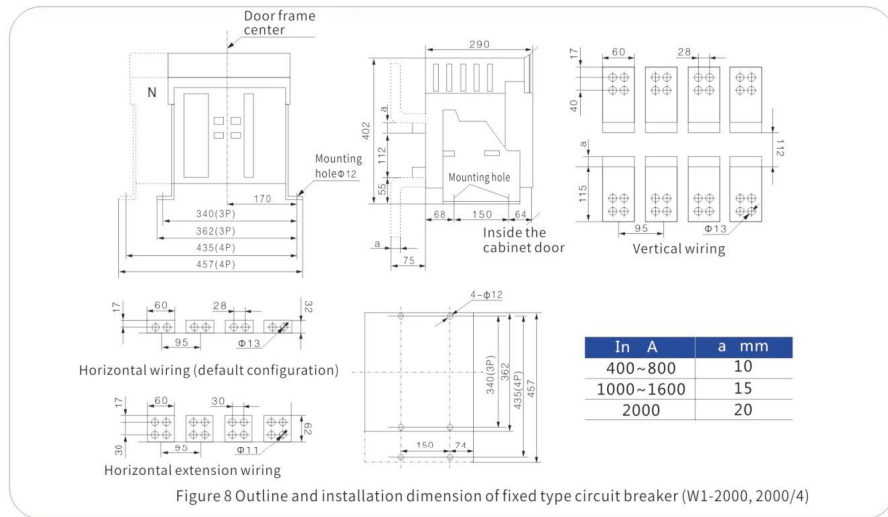
- Note: (1) If the control supply voltage of F, X and M is different, they should be connected to different power supplies separately.
 (2) Terminal #35 can be directly connected to the power supply (automatic energy pre-storage) or connected in series to the normally open button and then connected to the power supply (manual energy pre-storage).
 (3) If requested by the user, terminals # 6-# 7 can output normally closed contact.
 (4) Additional accessories are provided by the user.
 (5) *When the working power of the intelligent controller is DC power, DC power module must be added (at this time, terminals #1 and #2 cannot be directly connected to AC power). The secondary wiring is shown in the figure (DC power supply DC110V or 220V is input from U1(+) and U2(-), and the two output terminals of the DC power module are respectively connected to terminals 1(+) and 2(-) of the secondary wiring base).

SB1 shunt button (provided by user)	X closing electromagnet	DF auxiliary contact	Q undervoltage release or undervoltage delay release
SB2 undervoltage button (provided by user)	M energy storage motor	F shunt release	O NO contact (3A/AC380V)
SB3 closing button (provided by user)	XT wiring terminal	SA motor microswitch	⊗ Signal light (provided by user)

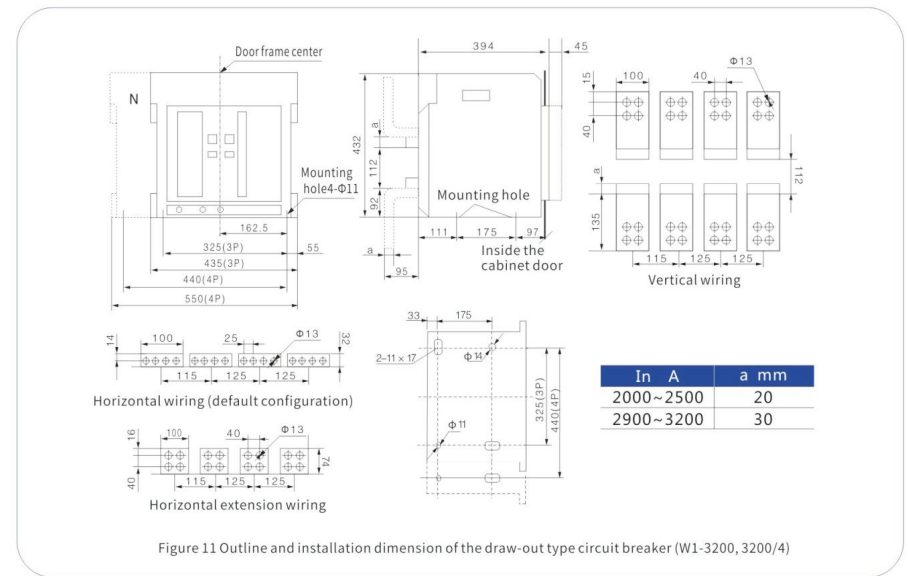
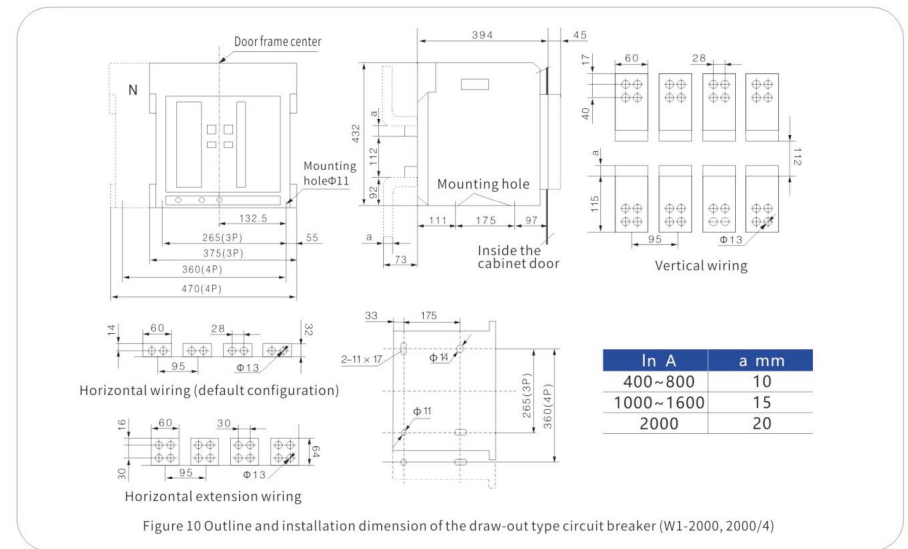


■ Outline and installation dimension

● 1. The outline and installation dimension of fixed type circuit breaker is shown in Figures 8 and 9



● 2. The outline and installation dimension of the draw-out type circuit breaker is shown in Figure 10, 11, 12, 13, 14, 15 and 16



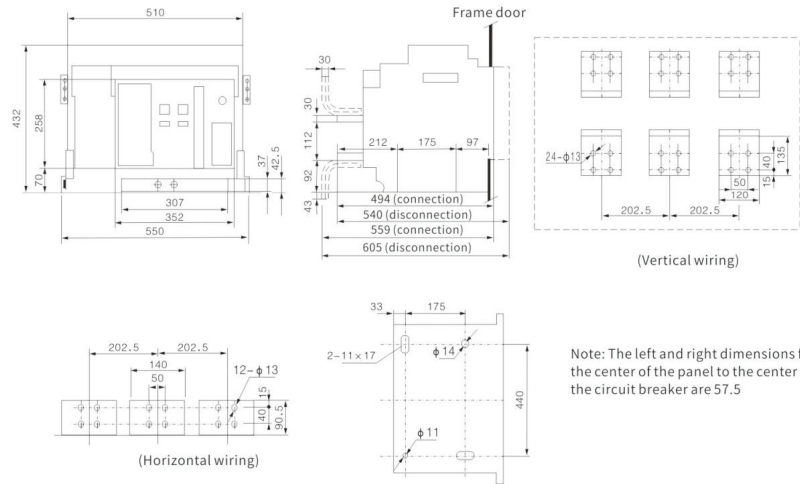


Figure 12 Outline and installation dimension of the draw-out type circuit breaker (W1-4000/3)

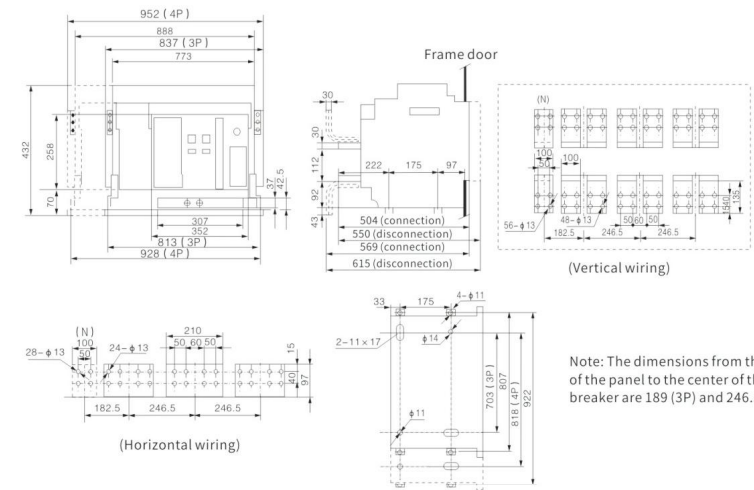


Figure 14 Outline and installation dimension of the draw-out type circuit breaker (W1-6300/3, 6300/4 In=4000A, 5000A)

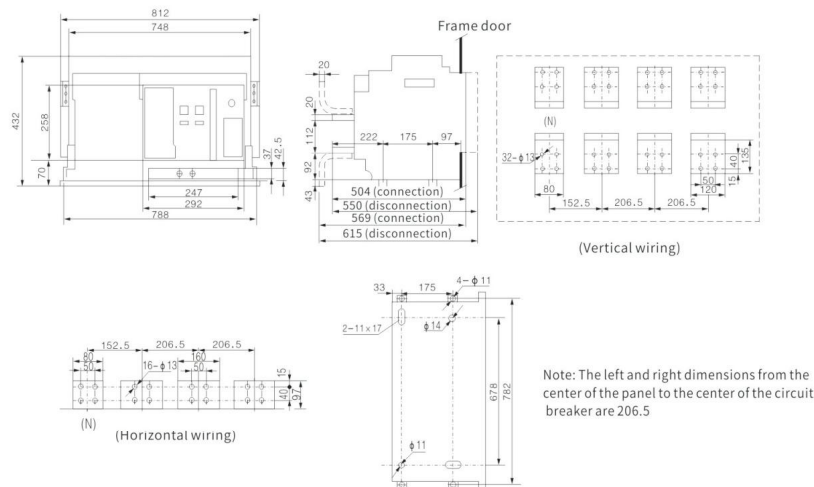


Figure 13 Outline and installation dimension of the draw-out type circuit breaker (W1-4000/4)

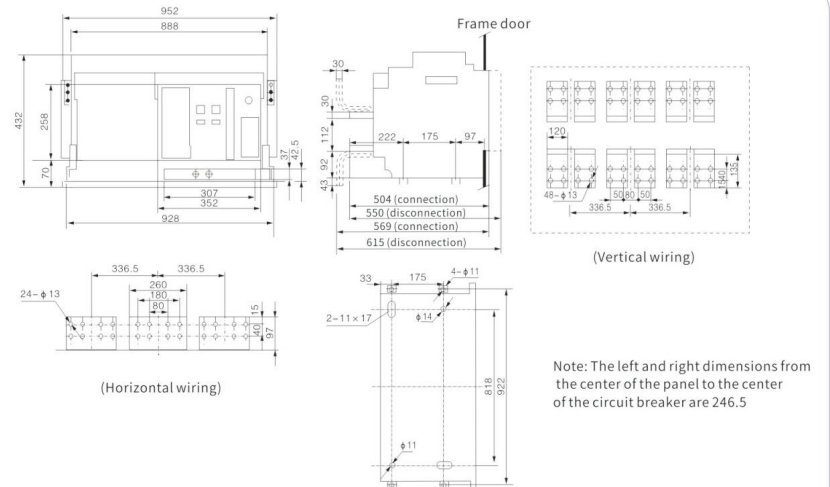


Figure 15 Outline and installation dimension of the draw-out type circuit breaker (W1-6300/3 In=6300A)



C. Reset

Before closing the circuit breaker, you must first press the "Clear light" button of the controller to put it into normal operation, and then press the red mechanical "Reset" button again to close the circuit breaker.

2.4 When the user has specific requirement for product characteristic based on Tables 4, 5 and 6, it can be specified during ordering and be adjusted according to the ordering requirement when leaving the factory.

2.5 If there is no specific requirement for user when ordering, the controller should be M type and factory value set at:

- a. The long delay Ir1 is set to 1.0In, and the action time of 1.5Ir1 is set to 15s.
- b. The short delay Ir2 is set to a value slightly greater than 8Ir1, with definite time limit of 0.4s. (In=4000A and above, Ir2=5In)
- c. Instantaneous Ir3 is set at 12In. (In=4000A and above, Ir3=8In)
- d. Ground fault Ir4 is set at 0.4In, and the action time is set at 0.2s.

2.6 If the user needs to make change to the factory setting value during use, after fully understanding this product, the user is allowed to set through the controller according to Table 4.

M type or H type controller

1-Reset button. If the circuit breaker needs to be closed again after tripping, the reset button needs to be pressed once, otherwise the circuit breaker cannot be closed.

2-Current (voltage) and time display: it's capable of displaying current (voltage) or time value.

3-"Option" button. The normal operating state can display various current (voltage) values in a cyclic manner, while the fault state or fault inspection state can display fault current or time value in a cyclic manner.

4-LED indicator light, it's capable of indicating various states and categories.

5-"Clear light" button, it must be pressed once after the controller is set, tested for fault, or before the circuit breaker is closed, so as to keep the release in normal operation condition.

6-"Set" button. Check or set various protective characteristics for current or time. Press this button to cycle through various states.

7-"Fault check" button. After pushing the controller "Clear light", pressing this button can display and indicate the status of the last fault and the fault current or time value. The fault current or time can be checked cyclically by pressing the "Option" button.

8-"Trip" and "Non trip" buttons are used for testing functions.

9-"Store", "+" buttons are used for the current or time setting.

IR4-Setting value of ground protection current

Ir1-Long delay current setting value

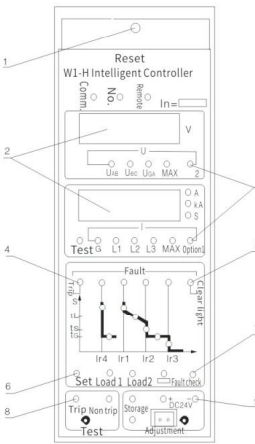
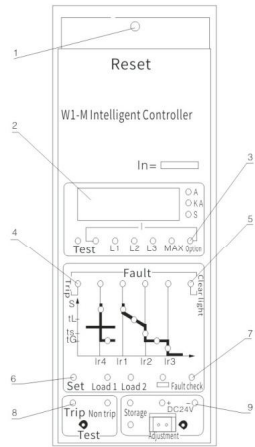
Ir2-Short delay current setting value

Ir3-Instantaneous current setting value

TG-Ground protection time setting value

tL-Long delay time setting value

tS-Short delay time setting value



L type controller

1. Reset button

After the circuit breaker malfunctions or trips during the test, press this button to close the circuit breaker again.

2. Load display

It displays overload long delay current

3. The current setting values for long delay, short delay, instantaneous and ground protection are set according to the scale values on the knob.

4. Fault indicator light

It indicates the fault category.

5. Long delay overload protection time setting, it adjusts the time by turning the switch position.

6. The short delay protection time setting, it adjusts the time by turning the switch position.

7. The ground fault protection time setting, it adjusts the time by turning the switch position.

8. Clear light button

After controller setting, testing and malfunction, this button must be pressed to put the controller into normal operation.



9. Fault check button

Press this button after the circuit breaker trips due to fault to indicate the cause of the fault trip. It still has fault memory function after power outage.

10. Test button

This button checks the good coordination between the controller and the circuit breaker.

L type setting method:

1. Long delay setting

a. Rotate the Ir1 switch to set the current (0.4-1) In;

b. Press the tL button to set the time to 30s, 60s, 120s and 240s;

c. If the Ir1 switch is turned to the OFF position, it means exiting this function.

2. Short delay setting

a. Rotate the Ir2 switch to set the current (3-10) In;

b. Press the tS button to set the time to 0.2s and 0.4s;

c. Rotating the Ir2 switch to the OFF position indicates exiting some functions.

3. Instantaneous setting

a. Rotate the Ir3 switch to set the current (3-10) In or (7-14) In;

b. If the Ir3 switch is turned to the OFF position, it means exiting this function.

4. Ground fault protection setting

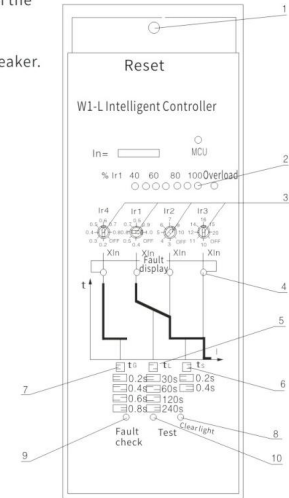
a. Rotating Ir4 switch setting current (0.2~0.88) In;

b. Press the TG button to set the time to 0.2s, 0.4s, 0.6s and 0.8s;

c. If the Ir4 switch is turned to the OFF position, it means exiting this function.

5. The controller enters the running state

Press the "Clear light" button after all controller parameters have been adjusted.



3 Common fault and troubleshooting

No.	Fault phenomenon	Cause	Troubleshooting
1	The circuit breaker cannot be closed	<ul style="list-style-type: none"> The undervoltage release has no supply voltage and is not connected. After the intelligent controller acts, the red button on the upper part of the controller panel does not reset. The operating mechanism has not stored energy. Draw-out type body in "connection" or "test" position The "open position key lock" is in the locked state 	<ul style="list-style-type: none"> Check the circuit and connect the power supply of the undervoltage release. Press the reset button. Manually or electrically store the energy of the mechanism Use the handle to swing the circuit breaker body to the "connection" or "test" position. Use a dedicated key to open the keylock.
2	The circuit breaker cannot store energy electrically	<ul style="list-style-type: none"> The power supply of the electric operating mechanism is not connected. Insufficient power capacity 	<ul style="list-style-type: none"> Check the circuit and turn on the power supply. Check that the operating voltage should be greater than 85% Ue.
3	The electromagnet can't make the circuit breaker close.	<ul style="list-style-type: none"> No supply voltage Insufficient power capacity 	<ul style="list-style-type: none"> Check the circuit and turn on the power supply. Check that the operating voltage should be greater than 85% Ue.
4	The shunt release cannot disconnect the circuit breaker	<ul style="list-style-type: none"> No supply voltage Insufficient power capacity 	<ul style="list-style-type: none"> Check the circuit and turn on the power supply. Check that the operating voltage should be greater than 85% Ue.
5	The fault current exceeds the long delay, short delay and instantaneous setting value, and only instantaneous actions occurs, no short delay or long delay actions.	<ul style="list-style-type: none"> The setting value of long delay, short delay and instantaneous setting is unreasonable, and the setting is within the same current value range. 	<ul style="list-style-type: none"> According to the principle of Ir1<Ir2<Ir3 and considering its action range, reset it.
6	Frequent tripping of circuit breaker	<ul style="list-style-type: none"> The overload operation on site causes the over load thermal memory function, the circuit breaker recloses. 	<ul style="list-style-type: none"> Power off the controller once, or close the circuit breaker after 30 minutes
7	The crank handle of the draw-out type circuit breaker cannot be inserted into the circuit breaker	<ul style="list-style-type: none"> The draw-out type guide rail or circuit breaker body is not fully pushed in. 	<ul style="list-style-type: none"> Push the guide rail or circuit breaker body to the bottom
8	The draw-out type circuit breaker body cannot be pulled out when in the disconnected position	<ul style="list-style-type: none"> The crank handle is not pulled out. The circuit breaker has not fully reached the "disconnection" position. 	<ul style="list-style-type: none"> Pull out the crank handle. Fully swing the circuit breaker to the "disconnection" position.



Ordering specification

(please tick or fill the number in)

Client	Order quantity	Order date
Model <input type="checkbox"/> W1-2000 [I frame] <input type="checkbox"/> W1-3200 [II frame] <input type="checkbox"/> W1-4000 [III frame] <input type="checkbox"/> W1-6300[IV frame]	<input type="checkbox"/> Fixed type <input type="checkbox"/> 3P <input type="checkbox"/> Draw-out type <input type="checkbox"/> 4P	Rated current In= <input type="text"/> A Rated voltage <input type="checkbox"/> AC380 (4100) V <input type="checkbox"/> AC660 (690) V

Intelligent controller	Model("F" indicates generator protection)	Basic function		Optional additional functions or accessories
	L type	<input type="checkbox"/> L2	Long delay, instantaneous (3~10) In	1. Load light column indication 2. MCU operation monitoring 3. Fault status indication 4. Fault memory 5. Instantaneous test function
<input type="checkbox"/> L3		Long delay, short delay (3~10) In Instantaneous (10~20)In [I frame] (7~14)In [II frame]		
<input type="checkbox"/> L4		Long delay, short delay (3~10)In Instantaneous (10~20)In [I frame] (7~14)In [II frame] Single-phase ground fault protection		
M type	<input type="checkbox"/> M	Long time delay, short time delay, instantaneous, single-phase ground fault protection	1. Various off state indications and numerical display 2. Ammeter 3. Fault memory 4. Thermal memory 5. Test	<input type="checkbox"/> 1. Load monitoring, mode 1 <input type="checkbox"/> 2. Voltmeter, mode 2 <input type="checkbox"/> 3. MCR ON/OFF and analog trip <input type="checkbox"/> 4. Signal unit for pre-alarm, self-diagnosis and OCR trip alarm
	<input type="checkbox"/> M/F	Long delay, short delay, instantaneous, pre-alarm		
M type	<input type="checkbox"/> H	1. Long delay, short delay, instantaneous, load monitoring; 2. Single-phase ground fault protection; 3. Various status indications and numerical display 4. Ammeter;5. Voltmeter;6. Fault memory; 7. Thermal memory 8. Test; 9. RS485 serial interface; 10. Alarm fault statusControl power supply		<input type="checkbox"/> MCRON/OFF and analog trip <input type="checkbox"/> RS485/232 converter <input type="checkbox"/> DP module
	<input type="checkbox"/> H/F			
Control power supply		<input type="checkbox"/> AC220V <input type="checkbox"/> AC380V	<input type="checkbox"/> DC110 <input type="checkbox"/> DC220	
		<input type="checkbox"/> AC220V <input type="checkbox"/> AC380V		
<input type="checkbox"/> Undervoltage release		<input type="checkbox"/> Undervoltage instantaneous release <input type="checkbox"/> Undervoltage delay release <input type="checkbox"/> 1s <input type="checkbox"/> 3s <input type="checkbox"/> 5s <input type="checkbox"/> Undervoltage delay release <input type="checkbox"/> Undervoltage delay release		
<input type="checkbox"/> Shunt release		<input type="checkbox"/> AC220V <input type="checkbox"/> AC380V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V		
<input type="checkbox"/> Energy release(closing) electromagnet		<input type="checkbox"/> AC220V <input type="checkbox"/> AC380V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V		
<input type="checkbox"/> Electric operating mechanism		<input type="checkbox"/> AC220V <input type="checkbox"/> AC380V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V		
<input type="checkbox"/> Mechanical interlock		<input type="checkbox"/> Horizontal interlock <input type="checkbox"/> Vertical interlock <input type="checkbox"/> Door interlock		
<input type="checkbox"/> Open position key lock		<input type="checkbox"/> Lock <input type="checkbox"/> Key (please fill in the quantity)		
<input type="checkbox"/> Door frame				
<input type="checkbox"/> External single-phase ground current transformer		<input type="checkbox"/> Differential type (3P+N) T <input type="checkbox"/> Ground current type (3P+N) W		
<input type="checkbox"/> Power transformer (for relay)		Input <input type="checkbox"/> ~220V <input type="checkbox"/> ~380V <input type="checkbox"/> ~220V <input type="checkbox"/> ~110V Output <input type="checkbox"/> ~24V <input type="checkbox"/> ~24V		
Connection <input type="checkbox"/> Horizontal connection (regular supply) <input type="checkbox"/> Vertical connection				
Remark				

Note: 1) If the user selects the controller, additional functions or accessories can be added, and additional fees will be required.
2) The long delay setting value of the L type controller is 10% of In, with each gear decreasing.
3) When selecting H type controller, please indicate which communication protocol it is based on.
①Dedicated communication protocol
②DP protocol
③Modbus protocol

XUCKY

W2-1600 Series

Intelligent Air Circuit Breaker

- ◆ Featured with complete intelligence, high breaking capacity and zero arc;
- ◆ AC rated current 200A -1600A, short circuit breaking capacity 20kA~42kA; It has 3 and 4 poles, draw-out type and fixed type, and can be installed with inverted wires;
- ◆ With multiple intelligent controllers, providing different functions; intelligent function, display function
- ◆ Setting function, monitoring function, fault memory function, available for communication interface for remote measurement, remote adjustment, remote control and remote communication;
- ◆ With complete protection features, convenient setting and high accuracy, it has instantaneous, short delay, long delay, single-phase grounding and other protection characteristics.



— The capable are infinite —
Intelligence creates the future —



Purpose and scope of use

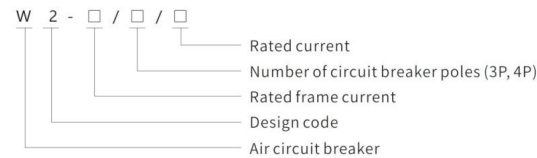
The W2-1600 Series intelligent air circuit breaker (hereinafter referred to as circuit breaker) is suitable for distribution networks with frequency of AC 50Hz, rated working voltage up to 690V and rated current ranging from 200A to 1600A. It's used to distribute electrical energy and protect lines and power equipment from overload, short circuit, undervoltage, single-phase grounding (leakage) and other faults. The circuit breaker has intelligent protection function and precise selective protection, can improve power supply reliability and avoid unnecessary power outages. Meanwhile, it has open type communication interface, which is convenient for fieldbus connection, and can be used for four remote operations to meet the requirements of the control center and automation system. Equipped with corresponding leakage transformer and intelligent controller, leakage protection can be achieved.

The circuit breaker has isolation function and is represented by symbol “—/—”

The circuit breaker with rated working current of 630A and below can also be used for overload, short circuit, phase loss, undervoltage and ground protection of motor in AC 50 (60) Hz, 400V distribution network. Under normal condition, the circuit breaker can also serve for infrequent switching of circuit and infrequent starting of motor.

The circuit breaker complies with GB14048.1-2012 Low-voltage switchgear and controlgear-Part 1: General rules; And GB 14048.2-2008 Low-voltage switchgear and controlgear-Part 2: Circuit breakers; GB14048.4-2020 Low-voltage switchgear and controlgear-Part 4-1: Contactors and motor-starters-Electromechanical contactors and motor-starters (Including motor protector)

Model and meaning and classification



Classification by utilization category:

Main circuit: category A (non selective), category B (selective), and AC-3 (direct operation motor)

Auxiliary circuit: AC-15, DC-13;

- Installation method: fixed type, draw-out type;
- Transmission method: electric motor transmission, manual;
- Number of poles: three poles, four poles;
- Type of release: intelligent controller, shunt release, undervoltage instantaneous (or delayed) release;
- Classification of intelligent controller:
2M type: economic type (basic function)
3M type: basic type (basic function+ intelligent function)
3H type: advanced type (basic function+ intelligent function +communication interface).

Normal working and installation condition

- Ambient air humidity: The upper limit shall not exceed +40°C; the lower limit shall not be less than -5°C; the average value within 24 hours shall not exceed +35°C;
- Note: For working condition where the upper limit value of the ambient air used exceeds +40°C or the lower limit value is below -25°C, the user should consult with the manufacturer.
- Altitude: The altitude of the installation site shall not exceed 2000m.
- Atmospheric condition: When the maximum temperature is +40°C, the relative humidity of the air does not exceed 50%.
- At lower temperatures, there can be higher relative humidity, such as 90% at 20°C. Special measures should be taken for occasional condensation caused by temperature change.
- Pollution level: level 3
- The circuit breaker is installed inside the cabinet and equipped with door frame, with protection level of IP40.
- The installation category of main circuit of circuit breaker, coil of undervoltage release, primary coil of power transformer is IV; and the installation category of auxiliary and control circuit is III.
- Utilization category: category B.
- Transportation and storage condition for circuit breaker: -25°C to 55°C, up to 70°C in a short period of time (within 24 hours).
- The circuit breaker should be installed in place without explosion hazard and conductive dust sufficient to corrode metal and damage insulation, and the vertical inclination of the circuit breaker should not exceed 5°.



Technical data and performance

1. The rated current of the circuit breaker is shown in Table 1

Table 1

Rated frame current Inm (A)	Rated current In (A)
1600	200, 400, 630, 800, 1000, 1250, 1600

2. Rated insulation voltage Ui of circuit breaker: 690V; Rated working voltage Ue: 400V, 690V.

3. The rated short-circuit making and breaking capacity of the circuit breaker should not be less than 2.1 Icu.

4. The rated short-circuit breaking capacity and short-term withstand current of the circuit breaker are shown in Table 2.

5. Intelligent controller protection characteristic

5.1 The characteristic curve of overcurrent release protection is shown in Figure 1, and the characteristic curve of ground fault protection is shown in Figure 2.

5.2 The setting value and error of the intelligent controller are shown in Table 3.

Table 2

Rated frame current Inm (A)	1600		Incoming method	Arc distance
	Rated ultimate short-circuit breaking capacity Icu (kA) O-CO	Rated service short-circuit breaking capacity Ics (kA) O-CO		
1600	AC400V	≥ 55	Upper or lower incoming line	Zero arc
	AC690V	≥ 40		
630	AC400V	≥ 50		
	AC690V	≥ 35		
400	AC400V	≥ 42	Zero arc	
	AC690V	≥ 35		

Table 3

Overcurrent tripping characteristic	Setting value range		Factory setting value
	2M/2H	3M/32H	
Long delay Ir	(0.4~1)In+OFF	(0.4~1)In+OFF	1In, 120s
Short delay Isd	(1.5~15)In+OFF	(1.5~15)In+OFF	6In, 20s
Instantaneous li	1In ~ 50kA+OFF	1In ~ 50kA+OFF	10In
Ground fault Ig	(0.2~1)In+OFF	(0.2~1)In+OFF	0.4In, 0.2s

Note: 1. OFF indicates that the overcurrent release protection characteristic is in the off state.

2. Unless otherwise specified by the customer, the product is set to the factory setting value when leaving the factory.

If the customer needs to set the value, please refer to the intelligent controller user's manual.

5.3 Intelligent controller long delay overcurrent protection inverse time limit action characteristic

Intelligent controller long delay overcurrent protection inverse time limit action characteristic: $I^2 T_n = (1.5I_n)^2 t_n$ (where t_n : time setting time for long delay 1.5I_n, I_n: long delay set current, T_n: long delay action time), see table 4 for action time, with return coefficient of not less than 0.9, and return current of 0.9I_n.



Table 4

Current setting value	Action time										Accuracy
	2M/2H					3M/3H					
1.05I _r	>2h non action					>2h non action					±15%
1.3I _r	≤ 1h action					≤ 1h action					
1.5I _r	30s	60s	120s	240s	15s	30s	60s	120s	240s	480s	
2.0I _r	16.9s	33.7s	67.5s	135s	8.4s	16.9s	33.7s	67.5s	135s	270s	
7.2I _r	1.3s	2.6s	5.2s	10.4s	0.65s	1.3s	2.6s	5.2s	10.4s	21s	
Tripping level	-	10A	10	20	-	-	10A	10	20	30	

Note: The above is the setting time for distribution and motor protection. The setting time for generator protection can be negotiated between the user and the company.

5.4 Intelligent controller short circuit short delay action characteristic:

Short circuit short delay overcurrent protection is generally of definite time limit. If low multiple is required as the inverse time limit, its characteristic is as follows: $I^2T_s = (8I_n)^2tsd$ (T_s is the short delay setting time, tsd is the short delay action time). When the overload current is $8I_n$, it automatically switches to the definite time limit characteristic, and its action characteristic is shown in Table 5.

5.5 Intelligent controller short-circuit instantaneous action characteristic:

The instantaneous action time of the short circuit (including the inherent breaking time of the circuit breaker) should be less than 30ms, and its action characteristic is: $0.85I_i$ non-action, $>1.15I_i$ action.

Table 5

Protection method	Action time		Accuracy	
	2M/2H	3M/3H		
Definite time limit	Tripping time setting value tsd	200ms	400ms	±10%
	Maximum breaking time	230ms	460ms	
	Non-tripping duration	140ms	330ms	
Inverse time limit characteristic	None		The curve is the same as that of the overload delay, but the curve speed is 10 times faster	
Action characteristic			≤ 0.9I _{sd} non action	
			>1.1 I _{sd} delay action	

5.6 The action characteristic of ground fault protection is of definite time limit, and it delay characteristic complies with Table 6.

Table 6

Protection method	Action time				Accuracy	
	2M/2H		3M/3H			
Definite time limit	Tripping time setting value tsd	200ms	400ms	600ms	800ms	±10%
	Maximum breaking time	230ms	460ms	650ms	850ms	
	Returnable time	140ms	330ms	560ms	760ms	
Action characteristic					≤ 0.8I _{sd} non action	
					>1.0 I _{sd} delay action	

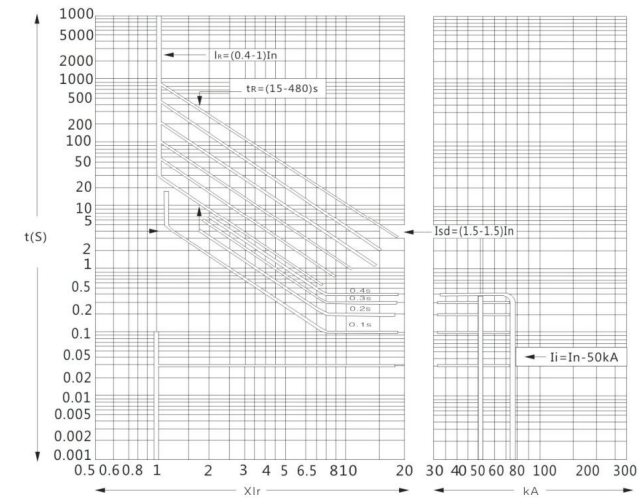


Figure 1 Overcurrent release protection characteristic curve

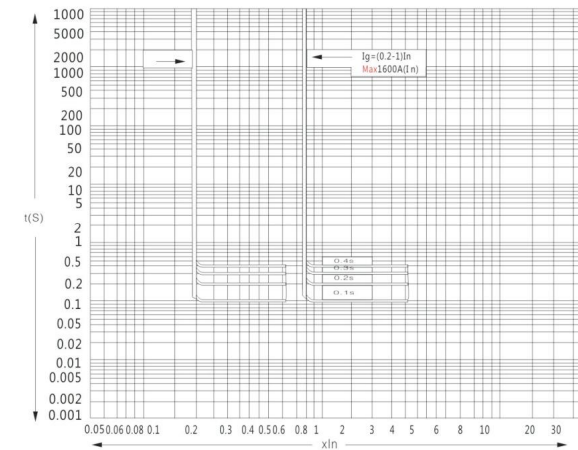


Figure 2 Ground fault protection characteristic curve

5.7. Residual current protection is achieved by connecting external leakage transformer for detecting residual current signal, with delayed action characteristic. Its delay characteristic complies with Table 7 (excluding the inherent working time of 20ms). Rated residual operating current $I_{\Delta n}$: 3A, 10A, 20A, 30A.

The minimum value of rated residual non-operating current ($I_{\Delta no}$) is 0.51 Δn .



Ultimate non driving time (at 2IΔn)	0.06s	0.1s	0.2s	0.3s	0.4s	0.5s	1s
Residual current	Maximum breaking time (s)						
I _a n	0.36	0.50	1.00	1.50	2.00	2.50	5.00
2I _a n	0.18	0.25	0.50	0.75	1.00	1.25	2.50
5I _a n, 5I _a n	0.07	0.10	0.20	0.30	0.40	0.50	1.00

5.8 Ground or residual current protection methods

It is a protective function of the equipment due to the residual current to the ground. According to the magnitude of leakage current, it is classified into ground protection and residual current protection. Ground protection is the protection provided by the controller based on the vector sum of three-phase current and neutral current. According to the number of poles in the circuit breaker, there are three protection methods: 3PT, 4PT and (3P+N) T (see Figure 3). Residual current protection refers to the controller directly taking the output current signal of the external current transformer for protection. With high protection sensitivity, it's especially suitable for protection of low ground currents of tens of amperes. There are two methods for sampling grounding signal, one is rectangular transformer (ZCT1) sampling and the other is circular transformer (ZT100) sampling with a diameter of 100mm.

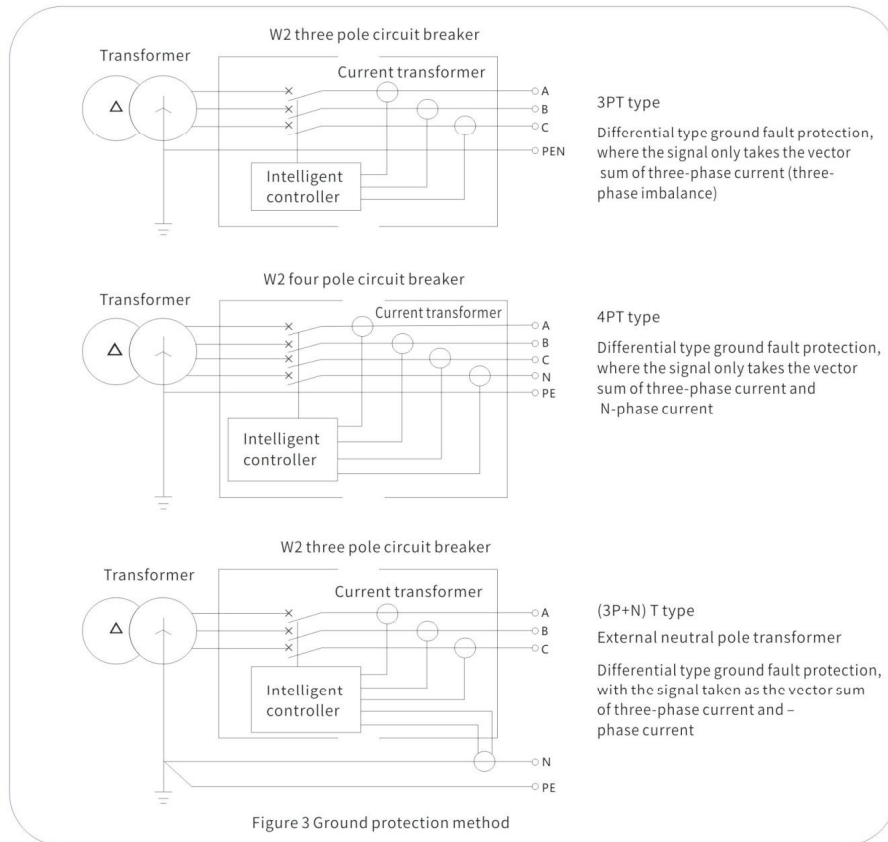


Figure 3 Ground protection method



6. The working voltage and required power consumption of the circuit breaker's shunt release, undervoltage release, electric operating mechanism, energy release (closing) electromagnet and intelligent controller are shown in Table 8.

Table 8

Item	AC (50Hz)		DC	
	220V	380V	110V	220V
Shunt release	24VA	36VA	24W	24W
Undervoltage release	24VA	36VA	-	-
Closing electromagnet	24VA	36VA	24W	24W
Electric operating mechanism	85VA	85VA	85W	85W
Intelligent controller supply voltage	AC220V, AC380V, DC220V, DC110V, DC24V			

Note: 1. The working voltage of the controller is DC24V, and the primary side of the transformer or power module can provide voltages of AC380V, 220V (50Hz) or DC220V, 110V.

2. The reliable operating voltage range of the shunt release is 70%~110%, and that of the closing electromagnet and operating mechanism are 85%~110%

7. The performance of the undervoltage release of the circuit breaker is shown in Table 9

Table 9

Category	Undervoltage delay release	Undervoltage instantaneous release
Release action time	1, 3, 5s delay	Instantaneous
Release action voltage value	35%~70%	The circuit breaker can reliably open
	≤35%U _e	The circuit breaker cannot close
	(85~110%) U _e	The circuit breaker can reliably close
If the supply voltage recovers to 85% U _e within 1/2 delay time	The circuit breaker doesn't open	-

Note: The accuracy of the delay time is ±10%

8. Performance of auxiliary contact

8.1 The conventional thermal current of the auxiliary contact is 6A, the rated working voltage is 127V, 220V, 380V for AC and 110V, 220V for DC, and the control capacity is 300VA/U_e (AC) and 60W/U_e (DC);

8.2 Auxiliary contact form: 4NO, 4NC. Special forms should be specified when ordering.

9 Open position key lock (optional)

The circuit breaker is equipped with an "open position key lock" accessory (supplied according to order requirement), which can lock the circuit breaker in the open position. At the moment, neither the closing button nor the release (closing) electromagnet can close the circuit breaker. It's suitable for interlocking between long-distance circuit breakers.

10. Steel cable mechanical interlocking or linkage type mechanical interlocking (optional) can achieve interlocking of two or three circuit breakers installed horizontally or vertically in different states.

11. Door interlocking (optional)

When the circuit breaker is in the "connection" or "disconnection" position, it is prohibited to open the cabinet door. If the cabinet door is opened, and the circuit breaker is in the "test" position, the cabinet door can be closed without disconnecting the circuit breaker.

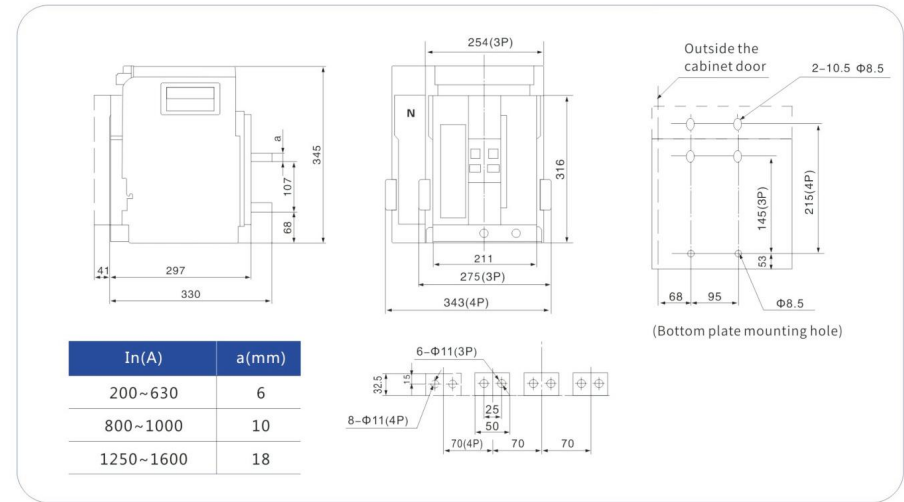


Intelligent controller function list

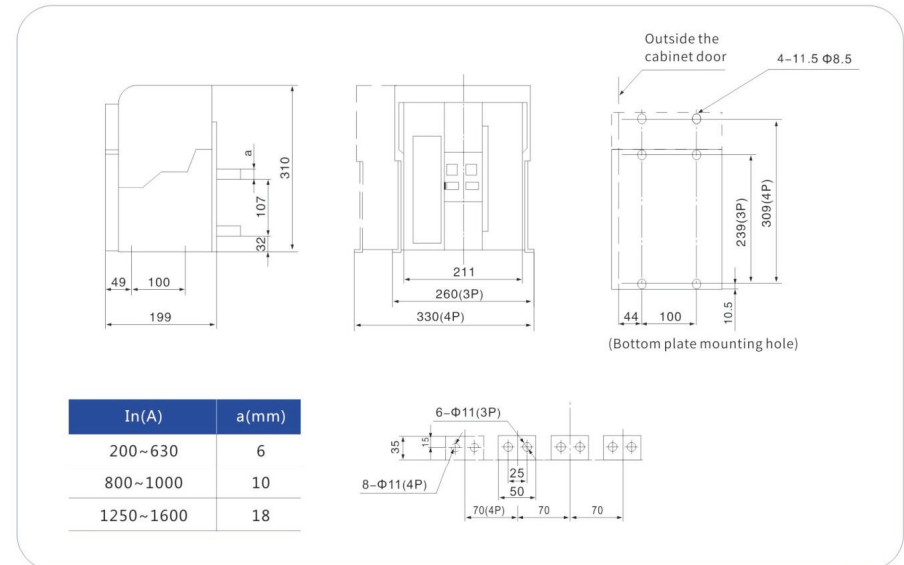
Table 10

Controller model	2M/2H	3M	3H
Overload long delay protection	√	√	√
Short circuit short delay protection	0	√	√
Short circuit instantaneous protection	√	√	√
Ground imbalance protection	0	√	√
Current imbalance protection	-	0	0
Leakage protection	-	0	0
Function test	√	√	√
Fault memory	√	√	√
Signal contact output	0	0	0
Thermal memory	√	√	√
Self-diagnosis	√	√	√
MCU working indication	√	-	-
Current column display	√	-	-
Ammeter	-	√	√
Making and breaking, out-of-limit adjustment	0	0	0
Load monitoring	-	0	0
Fault status indication and numerical display	-	√	√
Physical measurement	-	√	√
Communication	-	-	√
Contact wear indication	-	0	0
Zone interlock	-	√	0
Harmonic measurement	-	√	0
Voltage protection	-	√	0
Historical memory of grid parameter	-	√	0

(Draw-out type) installation dimension

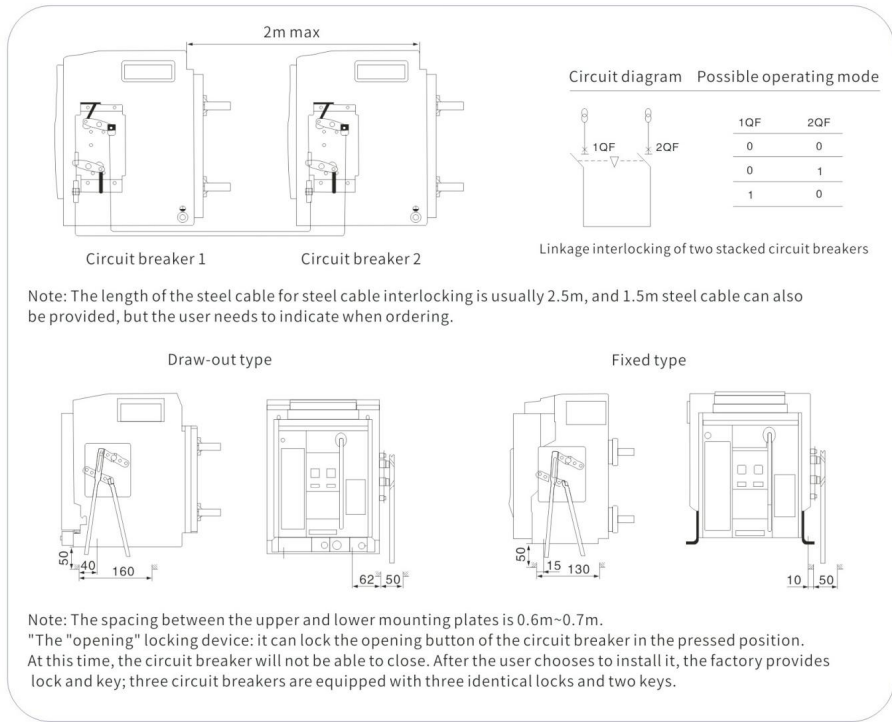


(Fixed type) installation dimension

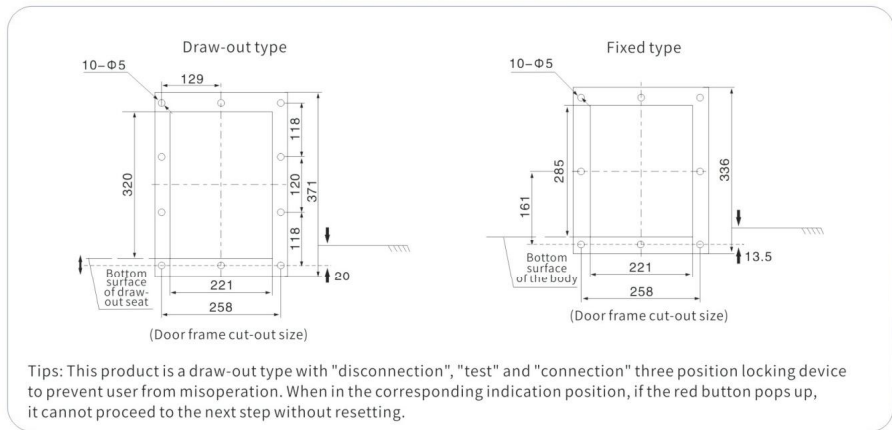




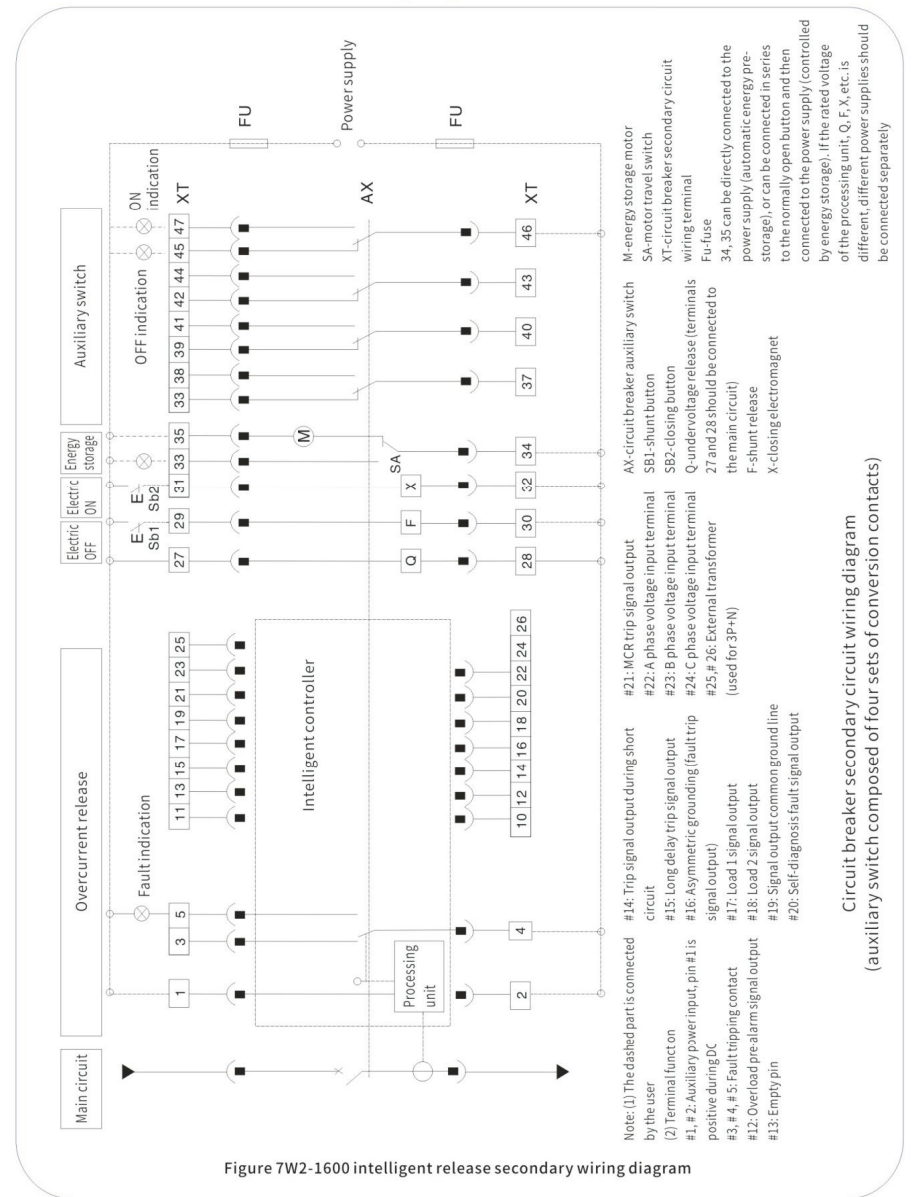
Steel cable interlocking of two horizontally placed or stacked circuit breakers



Cut-out and installation dimension of circuit breaker door frame



Circuit breaker control circuit wiring diagram

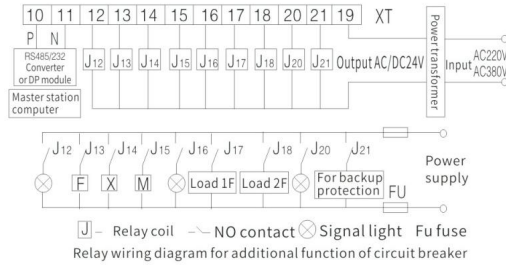


Circuit breaker secondary circuit wiring diagram
(auxiliary switch composed of four sets of conversion contacts)

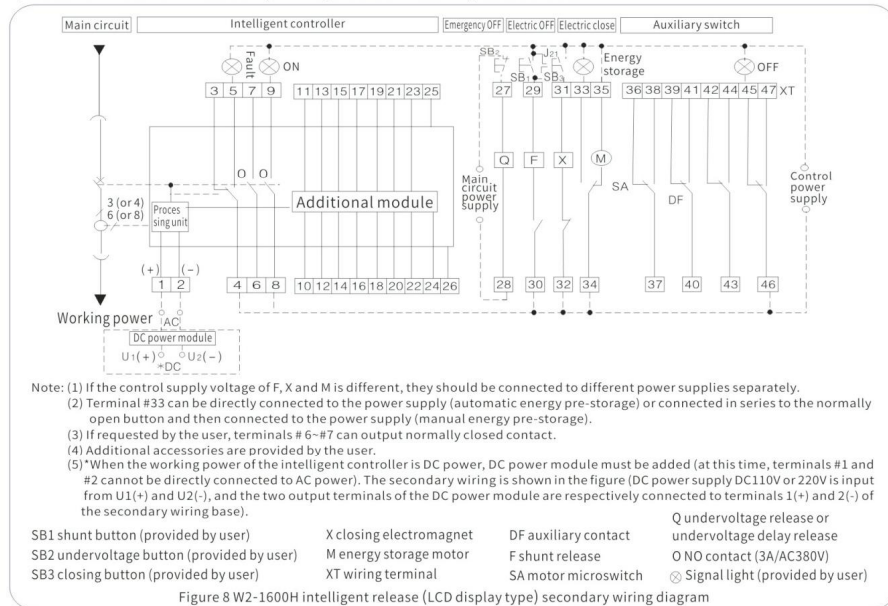


Other wirings of intelligent controller:

- #1, #2 AC working power input (input from DC power modules U1 and U2 during DC)
- #10 RS485 communication P terminal (simplex) remote adjustment and remote communication
- #11 RS485 communication N terminal (simplex) remote control and remote measurement, etc
- #12 Overload pre-alarm signal output
- #13 Communication remote control shunt trip output
- #14 Instantaneous short delay trip signal output or communication remote control closing output
- #15 Long delay trip signal output or communication remote control energy storage output
- #16 Ground (or zero) fault trip signal output
- #17 Unloading 1 signal output
- #18 Unloading 2 signal output
- #19 Signal output common line
- #20 Self-diagnosis signal output
- #21 Trip signal (available for shunt or undervoltage actuators)
- #22 Voltage signal phase A
- #23 Voltage signal phase B
- #24 Voltage signal phase C
- #25, 26 External neutral pole or ground current transformer input

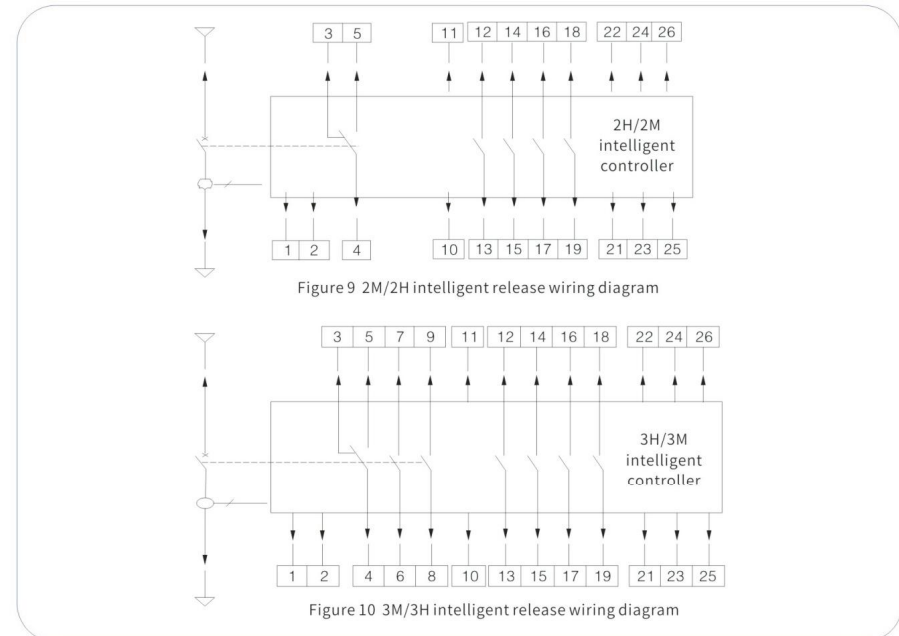


- 1) The controller signal output drives the external relay J to output contact action signal through terminals 12-18, 20 and 21.
- 2) The RS485y232 converter, DP module and power transformer (the user needs to specify the input voltage value in the order specification) are provided by the manufacturer. The power transformer can be inserted into the standard guide rail together with the relay base and installed by the user in the appropriate position of the switchgear.
- 3) Relay model: HH62P, AC/DC24V, provided by user.
- 4) Main station computer is provided by user.
- 5) Terminals 13-15 output can be used for opening, closing, and other functions of communication remote control. The trip signals of corresponding terminals 14 and 15 are no longer output at this time. The normally open contact of the corresponding relay can be connected in parallel with the corresponding manual control button, which can achieve both manual control and remote control. If remote control function is not required, terminals 14 and 15 can be connected to two signal lights in series through the normally open contacts of relays J14 and J15, and the corresponding signal can be remotely output. Please specify whether remote control function is required in the order specification, and the manufacturer will determine the corresponding function output by terminals 14 and 15 based on this. Terminal 21 output drives relay J21 for backup protection.
- 6) Output conditions of self-diagnosis signal: a. The internal temperature of the controller is >80°C; b. The chip is not working properly; c. The controller loses power.
- 7) The user can choose to connect to J12, J14-J16, J20 and J21 according to actual needs.



- Note: (1) If the control supply voltage of F, X and M is different, they should be connected to different power supplies separately.
 (2) Terminal #33 can be directly connected to the power supply (automatic energy pre-storage) or connected in series to the normally open button and then connected to the power supply (manual energy pre-storage).
 (3) If requested by the user, terminals # 6-#7 can output normally closed contact.
 (4) Additional accessories are provided by the user.
 (5) When the working power of the intelligent controller is DC power, DC power module must be added (at this time, terminals #1 and #2 cannot be directly connected to AC power). The secondary wiring is shown in the figure (DC power supply DC110V or 220V is input from U1(+) and U2(-), and the two output terminals of the DC power module are respectively connected to terminals 1(+) and 2(-) of the secondary wiring base).

1. Controller user wiring diagram



Pin definition (relay in default state)

Wire number	Function	Note
1#, 2#	Auxiliary power input terminal, regardless of polarity	
3#, 4#, 5#	Controller status output	
6#, 7#	Normally open node	
8#, 9#	Normally open node	
10#	Communication outgoing line for 2H type networking	485A
11#	Communication outgoing line for 2H type networking	485B
12#, 13#	Load monitoring 1 output (relay contact signal)	Relay 1 contact output
14#, 15#	Load monitoring 2 output (relay contact signal)	Relay 2 contact output
16#, 17#	2H remote control opening (2M pre-alarm)	Relay 3 contact output
18#, 19#	2H remote control closing (2M tripping)	Relay 4 contact output
20#	Ground wire	
21#	UN neutral line input	
22#, 23#, 24#	Three phase voltage input terminals A, B and C respectively	
25#, 26#	External N-phase transformer input terminal	

Note: The four relay contact functions can be programmed as instantaneous fault alarm, grounding alarm, imbalance alarm, short delay alarm, overload fault alarm, fault trip alarm, load 1 alarm, load 2 alarm, self-diagnosis alarm, power grid fault alarm, remote opening and closing.



Ordering specification

(Please tick or fill in the number in , one specification one sheet)

Client	Order quantity (set)		Order date	Delivery date
Model	W2-1600		Number of poles	<input type="checkbox"/> 3P <input type="checkbox"/> 4P
Rated working voltage	<input type="checkbox"/> AC400V <input type="checkbox"/> AC690V		Installation method	<input type="checkbox"/> Fixed type <input type="checkbox"/> Draw-out type
	Rated current In= <input type="text"/> A			
Intelligent controller	Type	<input type="checkbox"/> 3H type	<input type="checkbox"/> 3M type	<input type="checkbox"/> 2M/2H type
	Basic function	<input type="checkbox"/> Overload long delay protection <input type="checkbox"/> Grounding or residual current protection	<input type="checkbox"/> Short circuit delay protection <input type="checkbox"/> Fault memory function	<input type="checkbox"/> Short circuit instantaneous protection <input type="checkbox"/> Test function
	Optional function	<input type="checkbox"/> Ammeter function <input type="checkbox"/> Load monitoring function	<input type="checkbox"/> Thermal simulation function <input type="checkbox"/> MCR function	<input type="checkbox"/> Communication function <input type="checkbox"/> Self-diagnosis function
Standard accessory	Grounding method	<input type="checkbox"/> 3PT	<input type="checkbox"/> 4PT	<input type="checkbox"/> (3P+N) T (additional transformer required) ★
	Controller power supply	<input type="checkbox"/> AC400V <input type="checkbox"/> AC230V		
	Shunt release	<input type="checkbox"/> AC400V	<input type="checkbox"/> AC230V	
Optional accessory	Closing electromagnet	<input type="checkbox"/> AC400V	<input type="checkbox"/> AC230V	
	Electric operating mechanism	<input type="checkbox"/> AC400V	<input type="checkbox"/> AC230V	
	Auxiliary switch	<input type="checkbox"/> Standard type (4 sets of conversion contacts)		
	Undervoltage release	<input type="checkbox"/> AC400V <input type="checkbox"/> AC230V	<input type="checkbox"/> Undervoltage instantaneous release <input type="checkbox"/> Undervoltage delay release <input type="checkbox"/> 1S <input type="checkbox"/> 2S <input type="checkbox"/> 3S	
	Opening position lock	<input type="checkbox"/> 1 lock 1 key	<input type="checkbox"/> 2 locks 1 key	<input type="checkbox"/> 3 locks 2 keys
	Mechanical interlock	<input type="checkbox"/> Steel cable interlock (2 sets) <input type="checkbox"/> 2 lever interlocked switches		
Other accessories	<input type="checkbox"/> Door interlock	<input type="checkbox"/> Draw-out seat three position lock		
	<input type="checkbox"/> Extended bar	<input type="checkbox"/> Others		
Connection	<input type="checkbox"/> Horizontal wiring <input type="checkbox"/> Vertical wiring <input type="checkbox"/> Special wiring			

Note: When the user chooses the optional function with "★", additional fees will be required. If the user has any other special requirement for ordering, please consult with the manufacturer.



Structure Introduction

Two mechanically interlocked W1 circuit breakers equipped with automatic transfer controller can form dual power automatic transfer system. The controller has complete plastic shell installed on the box or cabinet door, and reliable electronic components, relays and integrated circuits are used inside the controller.

The power conversion system is an intelligent dual power switching module that integrates programmable function, automated measurement, LCD display and digital communication. It integrates digitization, intelligence and networking, achieving automation in the measurement and control process and reducing human operational error, and is an ideal product for dual power switching. The dual power automatic switching controller is composed of microprocessor as the core, which can accurately detect three-phase voltage of two circuits, make accurate judgment and handle voltage abnormality (overvoltage, undervoltage, phase loss, overfrequency, underfrequency), and after the adjustable delay (0-9999s), the command relay sends closing or opening command to the circuit breaker to complete the conversion between power supplies, ensuring the continuity and safety of power supply.

Performance and characteristic

- ◎The system type can be set to #1 mains supply #2 mains supply, #1 mains supply #2 power generation, #1 power generation #2 mains supply, #1 power generation #2 power generation;
- ◎The LCD is 128x64 with backlight, displayed in two languages (Simplified Chinese and English), and it can be operated with touch of button;
- ◎It collects and displays three-phase voltage and frequency parameter of two circuits;
- ◎It owns protection functions for overvoltage, undervoltage, phase loss, reverse phase sequence, overfrequency and underfrequency;
- ◎Equipped with automatic/manual state switching, the switch can be forced to close and open in manual mode;
- ◎All parameters can be programmed on site, secondary password is used to prevent non professional personnel from misoperation;
- ◎On site, it can be set to loaded/unloaded mode for the trial operation of the generator set;
- ◎Equipped with switch reclosing and power outage retrip function;
- ◎Real time clock display;
- ◎It has the ability to start and stop the generator set at a fixed time, it can be set for single operation, once a month or once a week, and can also be set to operate with or without load.
- ◎It can control the cyclic operation of two generator sets, and the operating time and interval shutdown of the generator set can be set.
- ◎The equipped RS-485 isolated communication interface applies ModBus communication protocol, it has remote control, remote signaling, and remote measurement functions. It can remotely control the start and stop of the generator set, as well as the opening and closing functions of the ATS;
- ◎It can query the current controller status (including internal switching value such as input port, overvoltage, undervoltage, etc.);
- ◎It's suitable for various wiring types (three-phase four-wire, three-phase three-wire, single-phase two-wire, two-phase three-wire types).

Parameter configuration

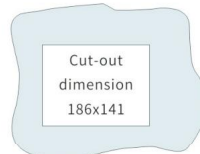
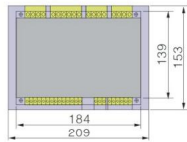
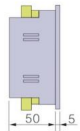
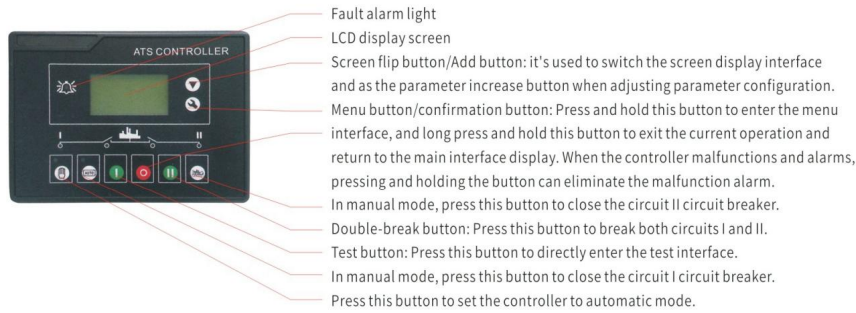
The parameter that the controller can set includes: normal voltage delay of one circuit, abnormal voltage delay of one circuit, normal voltage delay of two circuits, abnormal voltage delay of two circuits, switch conversion interval, on/off time, generator startup delay, generator shutdown delay, over voltage threshold, undervoltage threshold, over/under frequency threshold, power switching priority, system type, time and date, programmable input/output port function and communication parameter, etc. It can also be equipped with current display (The current transformer needs to be provided by user) and current overload alarm function.

The user can adjust and program on site through the controller manual according to the on-site operation needs to meet the electricity demand.

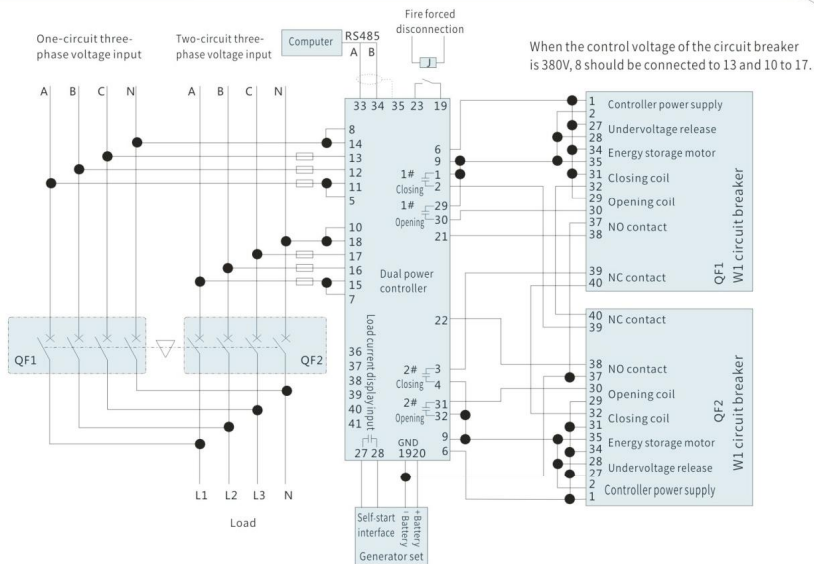
W2-1600 Series Intelligent Air Circuit Breaker



Controller panel, outline and mounting hole dimension (unit: mm)



Application wiring diagram



Note: 19 represents the common point for the closing position signal of two circuit breakers, 21 represents the QF1 circuit breaker status signal, and 22 represents the QF2 circuit breaker status signal.

XUCKY

M1 Series

Moulded Case Circuit Breaker

- ◇ Rated insulation voltage: 690V/1140V
- ◇ Rated frame current: 63A 125A 250A 400A 630A 800A 1250A 1600A
- ◇ High breaking capacity: up to 100kA
- ◇ Reasonable design, safe and reliable, small size, light weight and beautiful appearance
- ◇ Complete variety of accessory, fast installation, convenient application and high applicability



— The capable are infinite
Intelligence creates the future —



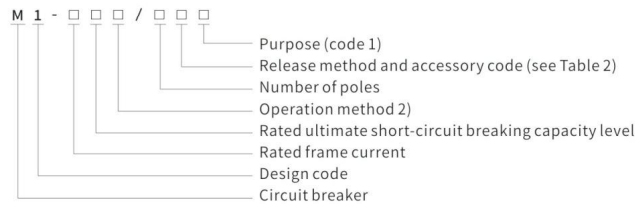
Applicable scope

The M1 series moulded case circuit breaker (hereinafter referred to as the circuit breaker) is one of the new circuit breakers developed by our company with international advanced design and manufacturing technology. With rated insulation voltage of 690V/1140V (500V for M1-63), it's suitable for circuit with frequency of AC 50Hz, rated working voltage of 690V and below (400V for M1-63) and rated working current up to 1600A for infrequent switching and infrequent motor startup. The circuit breaker has overload short circuit and undervoltage protection device, which can protect the circuit and power equipment from damage.

The circuit breaker is classified into four types based on its rated ultimate short-circuit breaking capacity (Icu): C type (low breaking type), L type (standard type), M type (medium breaking type) H type (high breaking type). This circuit breaker has the characteristics of small volume, high breaking capacity, short arc (zero arc for some specifications) and vibration resistance, making it an ideal product for land and ship use.

- ◎ This circuit breaker can either be installed vertically (upright) or horizontally (transversely).
- ◎ This circuit breaker product complies with the following standards:
 - ◎ IEC60947-1 and GB/T14048.1 Low-voltage switchgear and controlgear-Part 1: General rules
 - ◎ IEC60947-2 and GB/T14048.2 Low-voltage switchgear and controlgear-Part 2: Circuit breakers
 - ◎ IEC60947-4-1 and GB/T14048.4 Low-voltage switchgear and controlgear-Part 4-1: Contactors and motor-starters-Electromechanical contactors and motor-starters (including motor protector)
 - ◎ IEC60947-5-1 and GB/T14048.5 Low-voltage switchgear and controlgear-Part 5-1: Control circuit devices and switching element-Electromechanical control circuit devices

Model and meaning and classification



Note: 1. The circuit breaker for power distribution has no code; the protection motor is represented by 2.
2. No code for direct operation; electric operation is represented by P; the rotation handle is represented by Z.

Applicable working environment

- ◎ Altitude: 2000m and below;
- ◎ The ambient medium temperature shall not be higher than +40°C (+45°C for marine products) and not lower than -5°C;
- ◎ Resistant to the influence of moisture;
- ◎ Resistant to the influence of salt mist and oil mist;
- ◎ Resistant to the influence of mycete;
- ◎ The maximum inclination is +22.5°;
- ◎ Reliable operation under normal ship vibration;
- ◎ Reliable operation under earthquake conditions (4g);
- ◎ In the place where there is no explosive medium, and the medium is free of gas and conductive dust that can corrode metal and damage insulation;
- ◎ In a place free from rain and snow

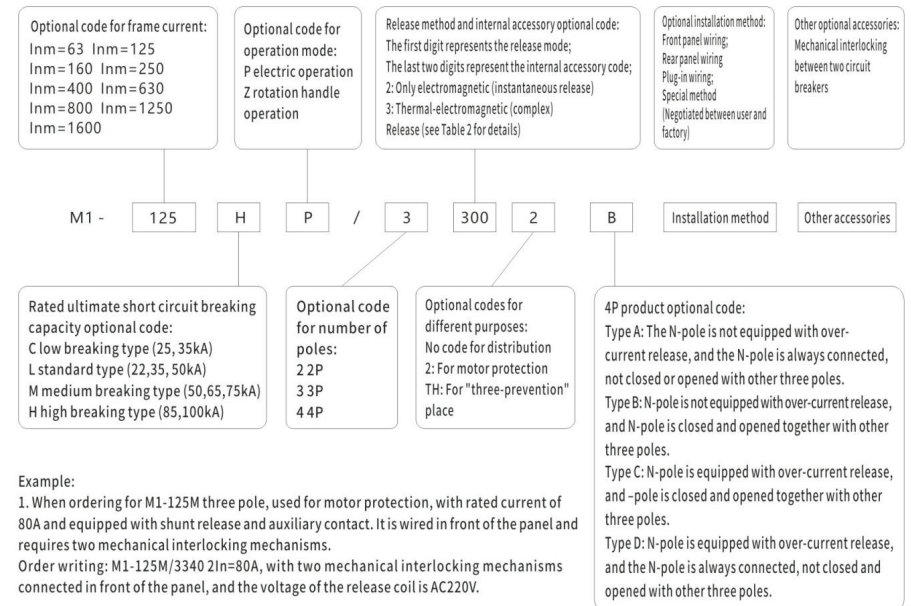


Classification

- ◎ According to the number of poles in the product, it is classified into two poles (125A, 160A, 250A), three poles and four poles (M1-800). There are four types for neutral pole (N pole) in 4P products:
 - Type A: The N-pole is not equipped with over-current release, and the N-pole is always connected, not closed or opened with other three poles.
 - Type B: N-pole is not equipped with over-current release, and N-pole is closed and opened together with other three poles.
 - Type C: N-pole is equipped with over-current release, and N-pole is closed and opened together with other three poles.
 - Type D: N-pole is equipped with over-current release, and the N-pole is always connected, not closed and opened with other three poles.
- ◎ Classification by rated current (A):
 - M1-63: (6), 10, 16, 20, 25, 32, 40, 50 and 63A (no overload protection for 6A);
 - M1-125: (10), 16, 20, 25, 32, 40, 50, 63, 80, 100 and 125A;
 - M1-250: 125, 140, 160, 180, 200, 225 and 250A;
 - M1-400: 225, 250, 315, 350 and 400A;
 - M1-630: 400, 500 and 630A;
 - M1-800: 630, 700 and 800A.
 - M1-1250: 800, 1000 and 1250A.
 - M1-1600: 1250 and 1600A. [Specification with () is not recommended]
- ◎ According to the wiring method, it can be classified into three types: front panel wiring, rear panel wiring and plug-in type.
- ◎ According to the type of overcurrent release, there are two types: thermal-electromagnetic (complex) type and electromagnetic (instantaneous) type.
- ◎ According to the breaking capacity of the circuit breaker, it is classified into standard type (L type), medium type (M type) and high breaking type (H type).
- ◎ According to the operation mode, it can be classified into direct handle operation, rotation handle operation and electric operation.
- ◎ Classification by number of poles: two poles, three poles, and four poles.

M1 quick selection table

◎ The quick selection table is shown in Table 1



Example:
1. When ordering for M1-125M three pole, used for motor protection, with rated current of 80A and equipped with shunt release and auxiliary contact. It is wired in front of the panel and requires two mechanical interlocking mechanisms.
Order writing: M1-125M/3340 2In=80A, with two mechanical interlocking mechanisms connected in front of the panel, and the voltage of the release coil is AC220V.



2. When ordering for M1-250M four pole, used for power distribution, with rated current of 180A, electric operation and shunt release. The N pole is equipped with over current release, and the N pole is closed and opened together with other three poles, rear panel wiring, 10 sets. Order writing: M1-250M/4310C, In=180A, 10 sets, rear panel wiring, electric operation voltage: AC220V, release coil voltage: AC220V.

Accessory



Table 1

Accessory name	Accessory code						
	Electromagnetic release	Complex release	M1-63L, M1-125L, M, H M1-250L, M, H M1-400L, M, H	M1-630L, M, H	M1-800L, M, H	M1-1250M	M1-1600M
			3P,4P	3P,4P	3P,4P	3P,4P	3P,4P
No accessory	200	300					
Alarm contact	208	308					
Shunt release	210	310					
Auxiliary contact	220	320					
Undervoltage release	230	330					
Shunt release, auxiliary contact	240	340					
Shunt release, undervoltage release	250	350					
Two sets of auxiliary contact	260	360					
Auxiliary contact, undervoltage release	270	370					
Shunt release, alarm contact	218	318					
Auxiliary contact, alarm contact	228	328					
Undervoltage release, alarm contact	238	338					
Shunt release, auxiliary contact, alarm contact	248	348					
Two sets of auxiliary contact, alarm contact	268	368					
Undervoltage release, auxiliary contact, alarm contact	278	378					

Note: a. 200: circuit breaker only with electromagnetic release; 300: circuit breaker with thermal -electromagnetic release; 000: circuit breaker without over-current release;
b. For 63, 125, 250 and 2-pole products, there are only 210, 310, 220, 320, 230 and 330.



Normal working condition

- ⊙ Ambient air temperature
- ⊙ The upper limit of ambient air temperature is +40°C
- ⊙ The lower limit of ambient air temperature is -5°C
- ⊙ The average ambient air temperature within 24 hours shall not exceed +35°C
- ⊙ Altitude: The altitude of the installation site shall not exceed 2000m.
- ⊙ Atmospheric condition: The relative humidity of the atmosphere shall not exceed 50% when the ambient air temperature is +40°C; at lower temperature, there can be higher relative humidity; the average monthly maximum humidity in the wettest month is 90% when the average minimum temperature for the month is +25°C, condensation that occurs on the product surface due to temperature change should be considered.
- ⊙ Pollution level: level 3.

Main technical parameter

⊙ Rated value of circuit breaker (see Table 2)

Table 2

Model	Rated frame current Inm (A)	Rated current In (A)	Rated working voltage Ue (V)	Rated insulation voltage Ui (V)	Rated ultimate short-circuit breaking capacity Icu (kA) 400V/690V	Rated service short-circuit breaking capacity Ics (kA) 400V/690V	Number of poles	Arcing distance
M1-63L	63	6,10,16,25,	400	690	25*	18*	2	≤50
M1-63M	63	32,40,50,63			50*	35*	3	
M1-125L	125	10,16,20,25,	400	690	35/8	22/4	3	≤50
M1-125M	125	32,40,50,63,			50/10	35/5	2, 3, 4	
M1-125H	125	80,100,125			85/20	50/10	3	
M1-250L	250	125,140,160,	400	690	35/8	25/4	3	≤50
M1-250M	250	180,200,225,			50/10	35/5	2, 3, 4	
M1-250H	250	250			85/20	50/10	3	
M1-400L	400	250,315,	400	690	50/10	35/5	3, 4	≤100
M1-400M	400				80/10	50/5	3, 4	
M1-400H	400	350,400			100/20	65/10	3, 4	
M1-630L	630	400,500,	400	690	50/10	35/5	3, 4	≤100
M1-630M	630				630	80/10	50/5	
M1-630H	630				100/20	65/10	3, 4	
M1-800M	800	630,700,	400	690	100/30	65/15	3, 4	≤100
M1-800H	800	800			100*	65*	3	
M1-1250L	1250	800,1000,	400	690	50/10	35/5	3, 4	≤100
M1-1250M	1250	1250			80/10	50/5	3	
M1-1600L	1600	1250,1600	400	690	50/10	35/5	3, 4	≤100
M1-1600M	1600				80/10	50/5	3	

Note: ①Test parameter at 400V; ②No thermal release for 6A; ③Zero arc circuit breaker can be customized for 63H-800H (except for 800H/4P);

④Cage type terminal can be equipped for 100S, H and 225S, H.

⊙ Inverse time limit disconnection action characteristic of circuit breaker for distribution when all poles of the overcurrent release are simultaneously energized (see Table 3)

Table 3

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



- © Inverse time limit disconnection action characteristic of circuit breaker for motor protection when all poles of the over current release are simultaneously energized (see Table 4)
- © The instantaneous action characteristic of circuit breaker for distribution is set to $10I_n+20\%$, and the instantaneous characteristic of circuit breaker for motor protection is set to $12I_n \pm 20\%$

Table 4

No.	Setting current	Agreed time	Start state	Remark
1	$1.0I_n$	$>2h$	Cold state	
2	$1.2I_n$	$\leq 2h$	Immediately after test No. 1	
3	$1.5I_n$	$\leq 4min$	Cold state	$10 \leq I_n \leq 225$
		$\leq 8min$	Cold state	$225 < I_n \leq 630$
4	$7.2I_n$	$4s \leq T \leq 10s$	Cold state	$10 \leq I_n \leq 225$
		$6s \leq T \leq 20s$	Cold state	$225 < I_n \leq 630$

Inverse time limit protection characteristic curve of circuit breaker for distribution (see Figure 1-12)

Figure 1 M1-63 (10~32), M1-125 (10~32) action characteristic curve

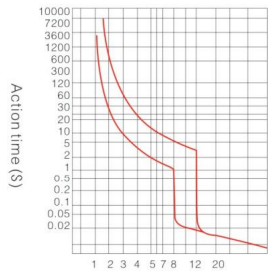


Figure 2 M1-63 (10~32), M1-125 (10~32) temperature compensation curve

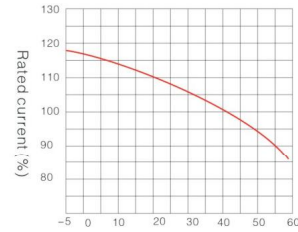


Figure 3 M1-63 (40~63), M1-125 (40~125) action characteristic curve

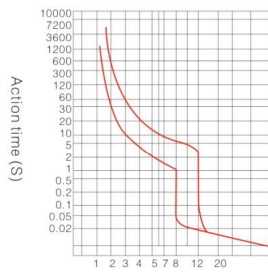


Figure 4 M1-63 (40~63), M1-125 (40~125) temperature compensation curve

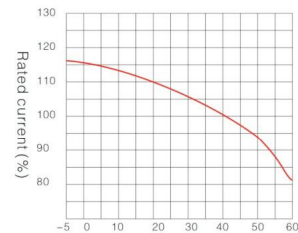


Figure 5 M1-250 action characteristic curve

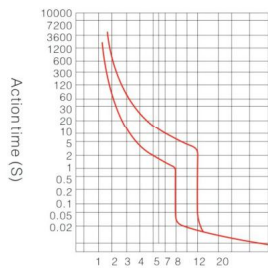


Figure 6 M1-250 temperature compensation curve

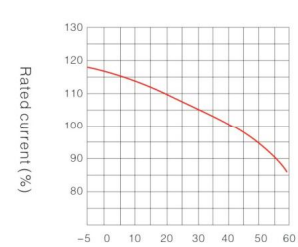


Figure 7 M1-400 action characteristic curve

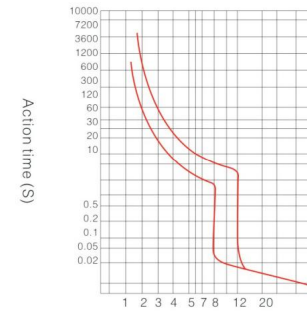


Figure 8 M1-400 temperature compensation curve

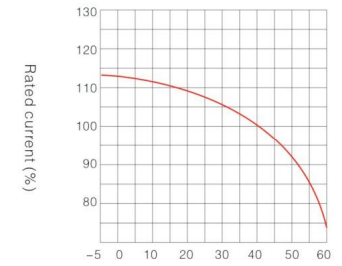


Figure 9 M1-630, 800 action characteristic curve

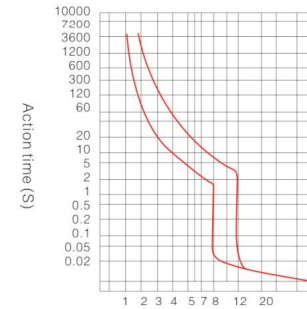


Figure 10 M1-630, 800 temperature compensation curve

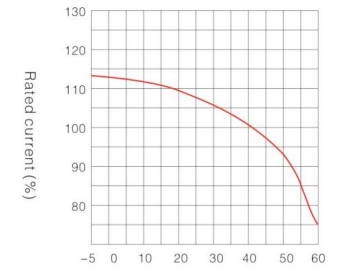


Figure 11 M1-1250 action characteristic curve

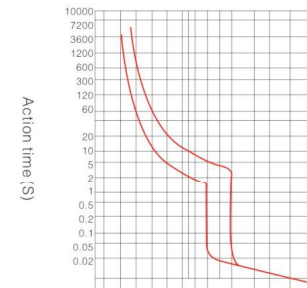
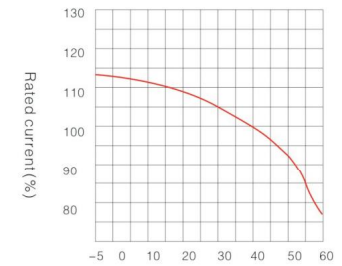


Figure 12 M1-1250 temperature compensation curve





Outline and installation dimension

Outline and installation dimension of M1-63, 125 and 250 (front panel wiring) (see Table 5)

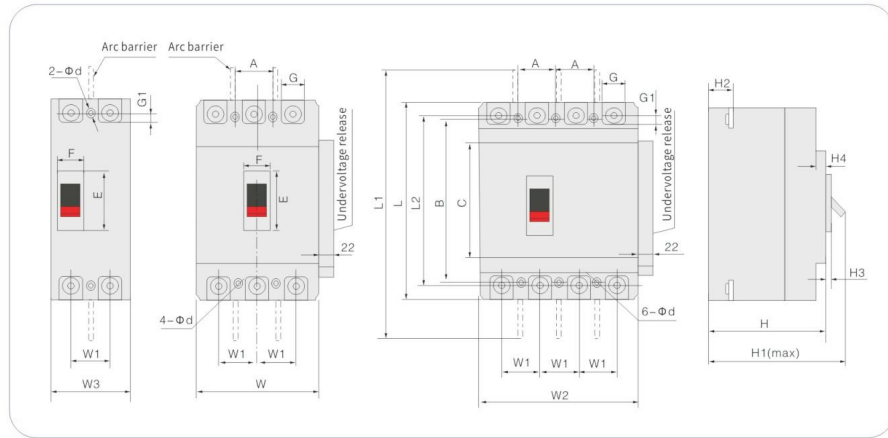


Table 5

Model	M1-63L		M1-63M		M1-125L		M1-125M M1-125H		M1-250L		M1-250M M1-250H		
	Old (WH)	New (BK)	Old (WH)	New (BK)	Old (WH)	New (BK)	Old (WH)	New (BK)	Old (WH)	New (BK)	Old (WH)	New (BK)	
Outline dimension	C	85	85	85	85	87	90	87	90	102	102	102	102
	E	48	56	48	56	50.5	56	51	56	51	55	51	55
	F	22	22	22	22	23	23	23	23	23	26	23	26
	G	14	14	14	14	18	18	18	18	23	23	23	25
	G1	6.5	-	6.5	-	7.5	-	7.5	-	11.5	-	11.5	-
	H	72	73.5	82	83	69	70	85	86	86	90	103	107
	H1	90	90	100	100	87	87	103	103	110	110	127	127
	H2	18.5	18.5	27	27	23.5	23.5	22	22	23.5	23.5	23	23
	H3	4	3	4	4	4	4	4	4	4	4	4	4
	H4	7	7	7	7	7	7	7	7	5	7	5	7
	L	136	136	136	136	150	150	150	150	165	165	165	165
	L1	233	-	235	-	255	-	255	-	350	-	360	-
	L2	117	117	117	117	133	135	132	132	144	144	144	144
	W	76	76	76	76	91	91	91	91	105	105	105	105
W1	25	25	25	25	30	30	30	30	35	35	35	35	
W2	-	-	102.5	-	-	120.5	120	-	-	-	140	-	
W3	-	-	-	-	-	65	65	-	-	-	74.5	-	
Installation dimension	A	25	25	25	25	30	30	30	30	35	35	35	35
	B	117	117	117	117	130	130	130.5	130.5	126	126	126	126
	Φd	3.5	3.5	3.5	3.5	4.5	4.5	4.5	4.5	5	5	5	5



Outline and installation dimension of M1-400, 630 and 800(front panel wiring) (see Table 6)

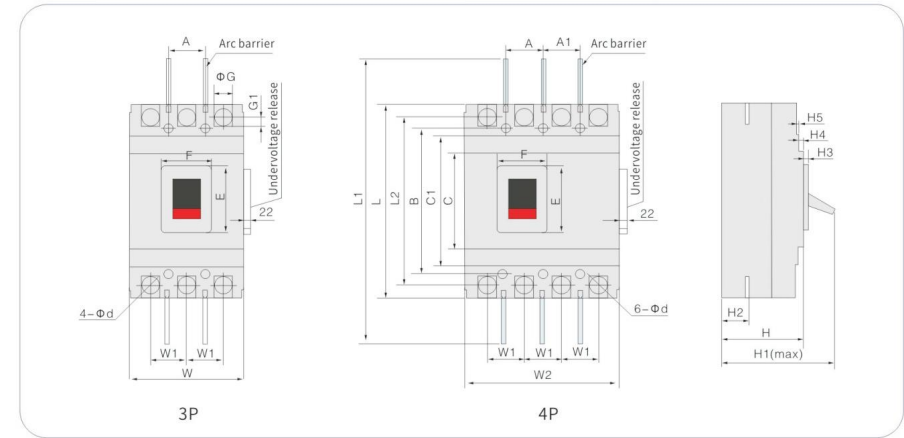
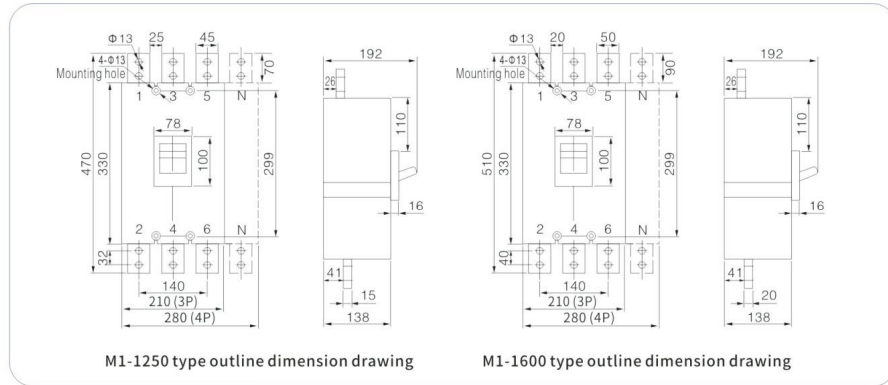


Table 6

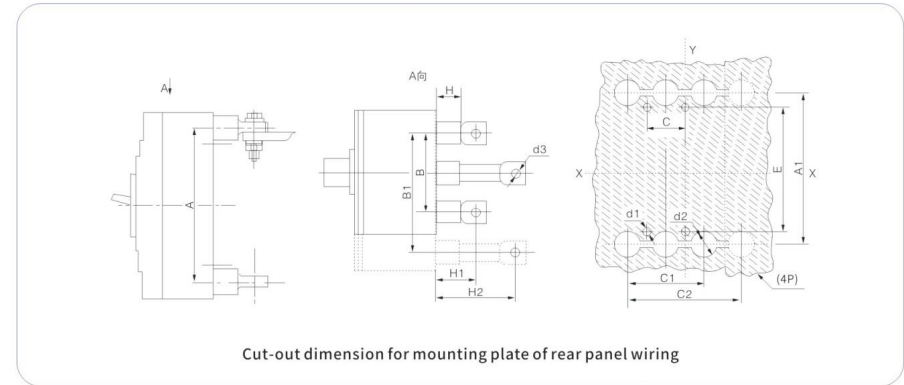
Model	M1-400L/3P M1-400M/3P M1-400H/3P		M1-400L/4P M1-400M/4P M1-400H/4P		M1-630L/3P M1-630M/3P M1-630H/3P		M1-630L/4P M1-630M/4P M1-630H/4P		M1-800L/3P M1-800M/3P		M1-800L/4P	
	Old (WH)	New (BK)	Old (WH)	New (BK)	Old (WH)	New (BK)	Old (WH)	New (BK)	Old (WH)	New (BK)	Old (WH)	New (BK)
	C	127.5	130	127.5	127.5	134	136	134	134	154	155	136
C1	173.5	173	173.5	173.5	184.5	184	184.5	184.5	204	204	204	204
E	88.5	90	88.5	88.5	88	88	89	89	105	114	82	82
F	65	61	65	65	64.5	64.5	65	65	66	66	66	66
ΦG	30.5	31	30.5	30.5	44	44	44	44	45	45	45	45
G1	11	-	12	-	13.5	-	15.5	-	10.5	10.5	12	12
H	106	110	106	106	111	116	111	111	108	111	116	116
H1	150	150	150	150	157	157	160	160	150	150	162	162
H2	37	37	36	37	40	40	40	40	34.5	32	43.5	43.5
H3	6.5	3.5	6	6	6.5	4	6.5	6.5	4.5	4.5	4.5	4.5
H4	5.5	5.5	5	5	3.5	5.5	3.5	3.5	4.5	5	5	5
H5	5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	8	8	8	8
L	257	257	257	257	270.5	270.5	270.5	270.5	280	280	280	280
L1	457	-	457	-	470	-	470	470	470	470	485	485
L2	224	224	224	224	234	234	234	234	243	243	243	243
W	150	149	-	-	182	182	-	-	210	210	-	-
W1	48	48	48	48	58	58	58	58	70	70	70	70
W2	-	-	198	198	-	-	240	240	-	-	280	280
A	44	44	44	44	58	58	58	58	70	70	70	70
A1	-	-	50	50	-	-	58	58	-	-	70	70
B	194	194	194	194	200	200	200	200	243	243	243	243
Φd	7	7	7	7	7	7	7	7	7	7	7	7



Outline and installation dimension of M1-1250,1600 (front panel wiring)



Outline and installation dimension of M1 (rear panel wiring) (see Table 8)



M1 plug-in type outline and installation dimension (see Table 7)

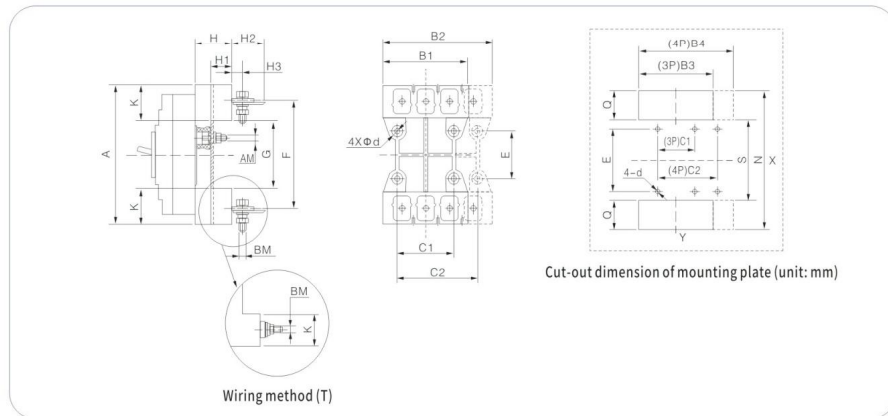


Table 7

Model	Outline and installation dimension (mm)																				
	A	B1	B2	C1	C2	E	F	G	K	H	H1	H2	H3	N	S	Q	B3	B4	AM	BM	4-d
M1-63 type	135	75	100	50	75	60	117	100	18	28	18	16	10	145	90	28	85	110	M5	M5	Φ5.5
M1-125 type	168	91	125	60	90	56	132	92	38	50	33	28	19	178	82	48	101	135	M6	M8	Φ6.5
M1-250 type	186	107	145	70	105	54	145	94	46	50	33	37	20	196	84	56	117	155	M6	M8	Φ6.5
M1-400 type	280	149	200	60	108	129	224	170	55	60	38	46	24	290	160	65	159	210	M8	M12	Φ8.5
M1-630 type	300	182	242	100	158	123	234	170	65	60	39	50	32	310	160	75	192	252	M8	M12	Φ8.5
M1-800 type	305	210	280	90	162	146	243	181	62	87	60	22	/	315	171	72	220	290	M10	M14(T)	Φ11

Table 8

Model	Outline and installation dimension (mm)													
	A	A1	B	B1	C	E	C1	C2	H	H1	H2	d1	d2	d3
M1-63 type	117	117	50	75	25	117	50	75	18	28	44	Φ3.5	Φ12	M6
M1-125 type	132	132	60	95	30	106	60	95	35	62	92	Φ5.5	Φ25	M8
M1-250 type	144	144	70	105	35	124	70	105	35	55	100	Φ5.5	Φ25	M10
M1-400 type	224	224	96	144	44	194	96	144	20	40	75	Φ6.5	Φ32	Φ12.5
M1-630 type	234	234	116	174	58	200	116	174	20	48	80	Φ7	Φ40	Φ16
M1-800 type	243	243	140	210	70	243	140	210	25	50	83	Φ7	Φ40	Φ16

Internal and external accessory of circuit breaker

- ☉ Internal accessory of circuit breaker
- ☉ Undervoltage release

When the voltage drops (even slowly) to the range of 70% and 35% of the rated voltage, the undervoltage release should reliably trip the circuit breaker; when the supply voltage of the undervoltage release is lower than 35% of the release voltage, the undervoltage release should be able to prevent the circuit breaker from closing; when the supply voltage is equal to or greater than 85%, it should be ensured that the circuit breaker is closed.

Tips: The circuit breaker equipped with undervoltage release can only open and close normally when the under voltage passes through the rated voltage.

Rated value (see Table 9)

Table 9

Code	A2	A4	D1	D2
Voltage specification	AC230V	AC400V	DC110V	DC220V
Rated frequency	50Hz	50Hz		

- ☉ Shunt release

The circuit breaker can reliably open under rated voltage of 70% to 110%. Rated value (see Table 10)

Table 10

Code	A2	A4	D1	D2	D3
Voltage specification	AC230V	AC400V	DC110V	DC220V	DC24V
Rated frequency	50Hz	50Hz			

Note: When the voltage specification is DC24V, the rated current reaches 5A±10%.

M1 Series Moulded Case Circuit Breaker



M1 series moulded case circuit breaker undervoltage release wiring diagram



M1 series moulded case circuit breaker shunt release wiring diagram



© Auxiliary contact and alarm contact

Table 11

Frame current	Conventional thermal current Ith A	Rated current at AC400V Ie A	Rated current at DC230V Ie A
Inm≤225A	3	0.26	0.14
Inm≥400A	6	3	0.2

Auxiliary contact

The circuit breaker in the "open" position: F12 F14 F11

The circuit breaker in the "closed" position: F12 F14 F11

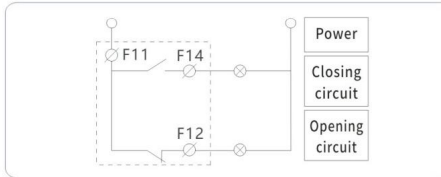
B alarm contact

When the circuit breaker is normally closed and opened, the alarm contact does not act, and only when the alarm is triggered after free tripping (or fault tripping), the contact changes its original position, from normally open to normally closed and normally closed to normally open. After the circuit breaker retrips, the alarm contact will return to its original state.

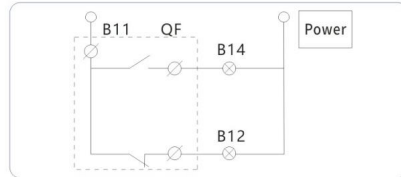
The circuit breaker in the "open" position: B12 B14 B11

The circuit breaker in the "closed" position: B12 B14 B11

M1 Series moulded case circuit breaker auxiliary contact wiring diagram



M1 series moulded case circuit breaker alarm contact wiring diagram



© External accessory of circuit breaker

© Electric operation mechanism. Rating and code (see Table 12)

Table 12

Type	Model	M1-63 M1-125 M1-250	M1-400 M1-630 M1-800	M1-63, M1-125 M1-250, M1-400 M1-630, M1-800
Structure type		Electromagnet	Electric motor	Permanent magnet motor
Code		A2, A4	A2, A4	A1/D1, A2/D2 D3
Voltage specification		AC230V AC400V	AC230V AC400V	AC 110V/DC110V, DC24V AC230V/DC220V
Rated frequency		50Hz	50Hz	50Hz/50Hz



M1 Series Moulded Case Circuit Breaker

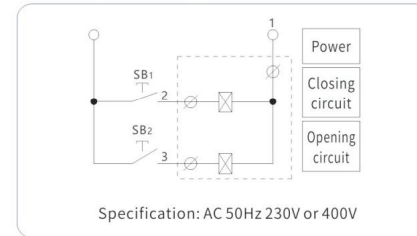
M1-63, 125, 250 electric operation mechanism

M1-400, 630, 800, 1250 electric operation mechanism

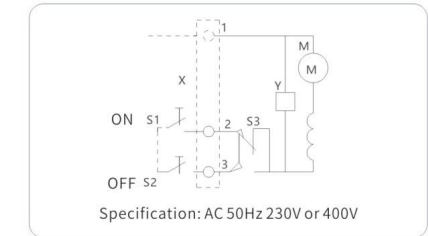
M1-63, 125, 250, 400, 630, 800, 1250 AC/DC electric operation mechanism

Manual operation mechanism

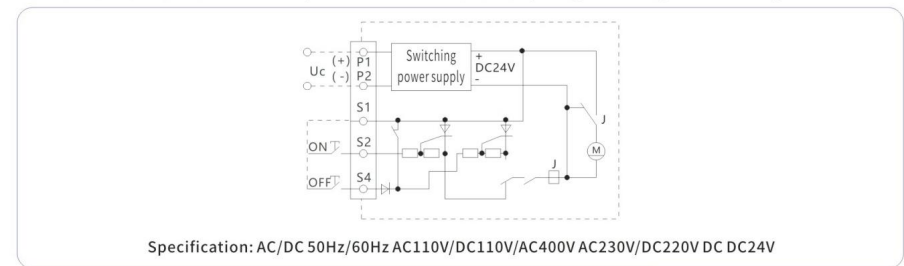
M1-63, 125, 250 electric operation mechanism (AC) opening and closing schematic diagram



M1-400, 630, 800, 1250 electric operation mechanism (AC) opening and closing schematic diagram



M1-63, 125, 250, 400, 630, 800 electric operation mechanism (AC/DC) opening and closing schematic diagram



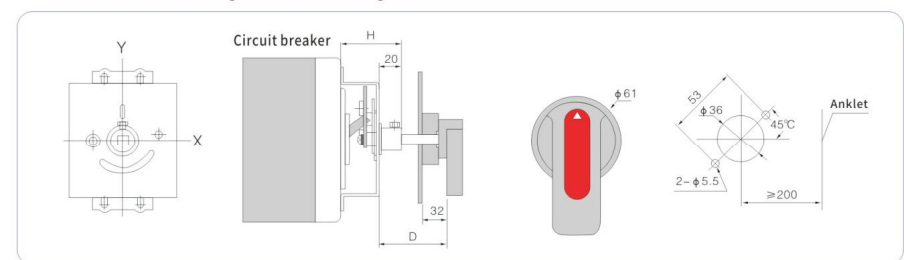
© The total height of the electric operation mechanism installed on the circuit breaker (see Table 13)

Table 13

Model	M1-63L	M1-63M	M1-125L	M1-125M M1-125H	M1-250L	M1-250M M1-250H	M1-400L M1-400M M1-400H	M1-630L M1-630M M1-630H	M1-800L M1-800M M1-800H
H1 (AC)	155	164	152	170	182	199	238	246	247
H2 (AC/DC)	160	171	153	171	177	194	255	262	261

© Installation dimension of manual operation mechanism (see Table 14)

M1-63 ~ 800 handle mounting hole schematic diagram



M1 Series Moulded Case Circuit Breaker



Table 14

Model	M1-63	M1-125	M1-250	M1-400	M1-630	M1-800
Installation dimension H	49	51	54	88	89	76
Y value between the operating handle and the center of the circuit breaker	0	0	0	0	0	0

© Installation dimension diagram of mechanical interlocking mechanism for two circuit breakers (see Table 15)

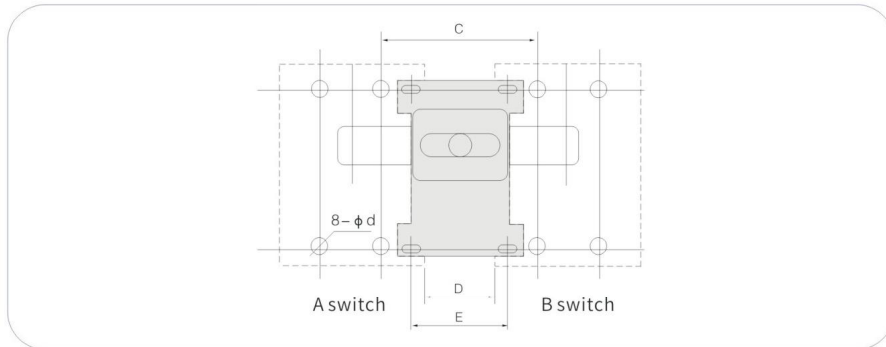


Table 15

Product name	C	D	E
M1-63	80	30	80
M1-125	90	30	90
M1-250	100	30	100
M1-400	136	30	40
M1-630	172	48	62
M1-800	167	28	40

Note: When installing, first install the circuit breaker on the mounting bracket, and then install the interlocking mechanism on the circuit breaker. The relevant installation dimensions of the circuit breaker are shown in Tables 6, 7 and 8.

Ordering instruction

When placing an order, the user should use the order code to place the order.

The composition of the order code is as follows:

Product model+ rated current specification code+ rated voltage code of internal accessory (represented by 00 when not available)+rated voltage code of electric operation mechanism (represented by 00 when not available). For example, when ordering for M1-125L, 50A, three pole, shunt release: (AC230V), electric operation mechanism (AC230V), quantity: 10 sets (see Table 2 for details). The order code should be M1-125L/3310P 50A AC230V 10 sets (see Table 1 for details).