HUYU

Electrical
Safety Guard

H8A Series
Intelligent Universal Circuit Breaker Instruction

环宇高科有限公司
HUANYU HIGH-TECH CO., LTD.

Considerations before use:

After you receive the ordered products, please check according to the following terms:

1) Check whether the appearance, such as the housing, is damaged.
2) Check whether the attached accessories are complete according to the inventory of packing materials in Table 1.
3) Check whether the parameters on the label of the circuit breaker are consistent with the goods ordered.

Table 1 Inventory of packing materials

Name	Unit	Quantity	Notes
Circuit breaker	Set	1	Standard
H8A Series Intelligent Universal Circuit Breaker Instruction	Copy	1	Standard
Door frame + O-ring	Set	1	Standard
Phase spacer plate	Set	1	Standard
Mounting screw	Bag	1	Standard (configured based on product specifications)
Desiccant	Bag	1	Standard
ST power module	Piece	1	Optional (only available when ordered)
ST201 relay module	Piece	1	Optional (only available when ordered)
Mechanical interlock	Set	1	Optional (only available when ordered)
Dual power supply controller	Set	1	Optional (only available when ordered)
ST-DP protocol conversion module	Piece	1	Optional (only available when ordered)
External transformer	Piece	1	Optional (only available when ordered)

The company pledges:

On the premise that users abide by the use and storage conditions and that the product seals are intact, if the product is damaged or cannot be used normally due to manufacturing quality problems within 18 months from the production date of the product, the company will be responsible for the repair or replacement free of charge. If the warranty period expires, users shall pay for the repair. However, if the damage is caused by the following circumstances, the fees for repair still shall be charged even within the warranty period:

(1) Misuse, self-modification, improper maintenance, and other reasons;
(2) Use beyond the standard specification requirements;
(3) Falling, damage during transportation, or other causes after purchase;
(4) Earthquake, fire, lightning strike, abnormal voltage, other natural disasters and secondary disasters, etc.

In case of any questions, please contact the dealer or our customer service department.

Dear customers:

To protect our environment, please recycle the product or its components when the product is scrapped. For materials that cannot be recycled, please handle them properly. Thank you very much for your cooperation and support.

1 Scope of Application

The H8A Series Intelligent Universal Circuit Breaker (hereinafter referred to as “circuit breaker”) is suitable for distribution networks with AC 50 Hz, rated working voltage of 400 V and 690 V and rated current up to 6,300 A, and is mainly used for power distribution, power feeding and power generation protection, so as to protect circuits and power equipment from faults such as overload, undervoltage, overvoltage, current voltage unbalance, short circuit and grounding fault. The rational operation of the power grid can be realized through load monitoring, regional interlock and other functions. Furthermore, the circuit breaker series can be used to measure power grid parameters such as current, voltage, power, frequency, electrical energy, demand and harmonics. It can also be directly used for overload, undervoltage and short-circuit protection of motors and generators.

The core components of circuit breakers adopt intelligent controllers, which can realize accurate selective protection, so as to avoid unnecessary blackout and enhance the reliability, continuity and safety of power supply. These components can also be equipped with open communication interfaces to realize telemetering, telesignaling, telecontrol and teleregulation, thus meeting the requirements of the control center and the automation system.

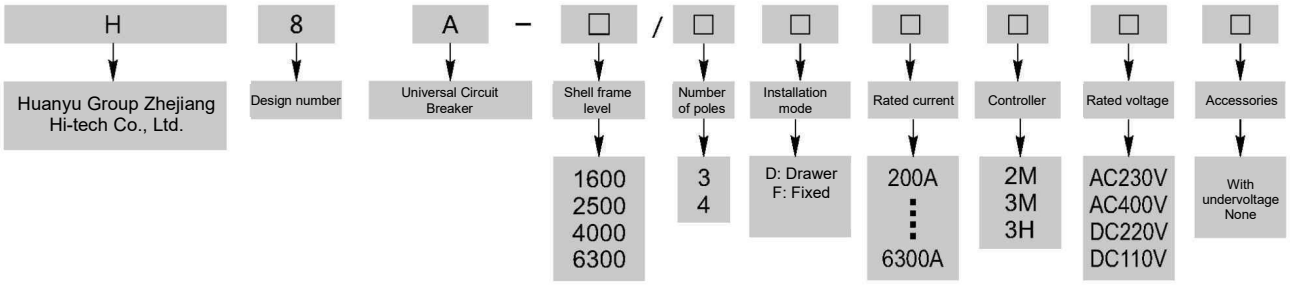
The circuit breaker series can be used as isolators without intelligent controllers and transformers.

The circuit breaker series can be compatible with top-in or bottom-in incoming lines, which is suitable for various low-voltage power distribution fields such as power stations, factories and intelligent buildings, and can also be used for infrequent starting of motors.

The standard followed: GB/T 14048.2 *Low-voltage Switchgear and Controlgear Part 2: Circuit Breakers*

2 Product Model Description and Classification

2.1 Product model description



2.2 Classification

2.2.1 According to the installation mode

Fixed, drawer

2.2.2 According to the number of poles

Three-pole, four-pole

2.2.3 According to the operation mode

Electrical operation, manual operation (for overhaul and maintenance)

2.2.4 Release type

Intelligent controller, undervoltage instantaneous (or delay) release, shunt strip

2.2.5 According to the intelligent controller

Type 2M, 3M and 3H

2.2.6 According to the wiring mode

Horizontal wiring, vertical wiring

3 Normal Working, Installation and Transportation Conditions

3.1 Normal working conditions

a) The ambient air temperature shall be -5°C – +40°C; and the average temperature of 24 hours shall not exceed +35°C.

Note: If the upper limit exceeds +40°C or the lower limit is lower than -5°C, the user shall consult with the manufacturer.

b) The altitude of the installation location shall not exceed 2,000 meters.

Note: If the circuit breaker is used at an altitude above 2,000 meters, the user shall consult with the manufacturer.

c) The relative atmospheric humidity does not exceed 50% when the ambient air temperature is +40°C, and a higher relative humidity is allowed at a lower temperature. For example, the average maximum relative humidity in the wettest month is 90%, and the average minimum temperature in this month is +20°C. Measures shall be taken to deal with the occasional condensation due to temperature changes.

d) The contamination grade is Grade 3.

e) The installation category of the main circuit of the circuit breaker is IV. When the rated working voltage of the main circuit is not greater than AC 400 V, the installation categories of the control circuit and the auxiliary circuit are III except that the undervoltage release coil and the primary coil of power transformer of the intelligent controller are the same as the circuit breaker. When the rated working voltage of the main circuit ranges from AC 400 V to AC 690 V, the control circuit and the auxiliary circuit need to be isolated from the main circuit by the transformer. Also, the maximum working voltage of the control circuit and the auxiliary circuit is AC 400 V, and the installation categories of the control circuit and the auxiliary circuit are both III.

f) The circuit breaker is suitable for electromagnetic environment A.

3.2 Normal installation conditions

a) Installation of the circuit breaker: Place the circuit breaker in the distribution cabinet and fasten it with 4 M8 (1,600 A shell frame) or M10 (2,500 A+ shell frame) bolts and gaskets. The circuit breaker shall be installed smoothly without additional mechanical stress, so as to avoid damage to the circuit breaker or poor contact of the main busbar.

b) The circuit breaker shall be installed in places where there is no explosion hazard, conductive dust, metal corrosion, or insulation damage.

c) The protection rating is IP20. When the circuit breaker is installed in the cabinet and the door frame is installed, the protection rating can reach IP40.

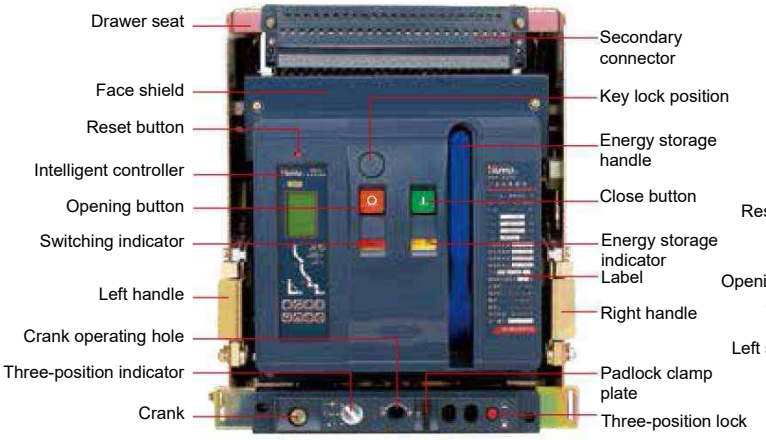
3.3 Normal storage and transportation conditions

a) The lower temperature limit shall be not less than -25°C, and the upper temperature limit shall not be more than +55°C; the relative humidity (at +25°C) shall not exceed 95%.

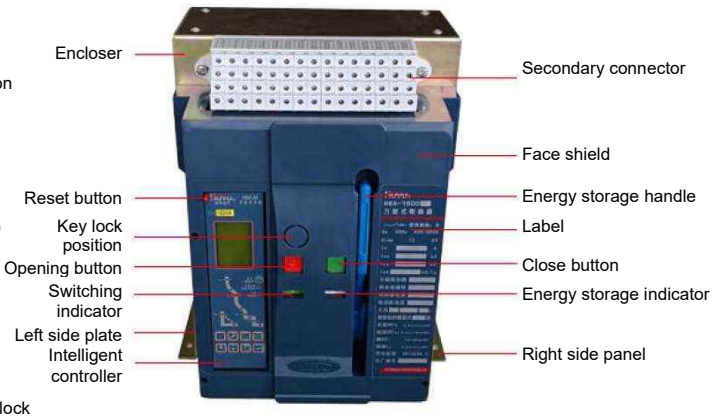
b) The product shall be handled with care during transportation, and shall not be turned upside down or rolled to avoid violent collision.

4 Product Structure and Working State

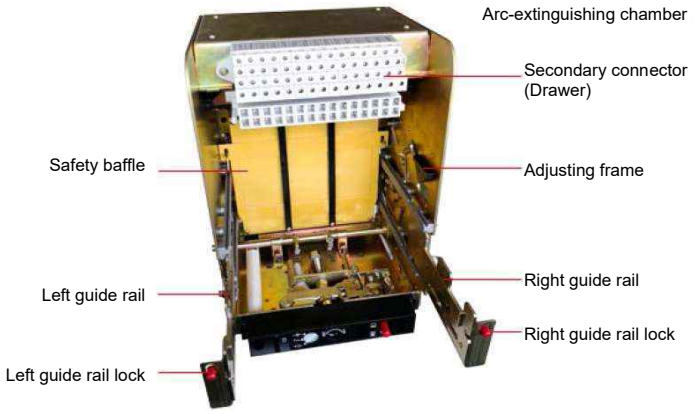
4.1 Structure of the circuit breaker



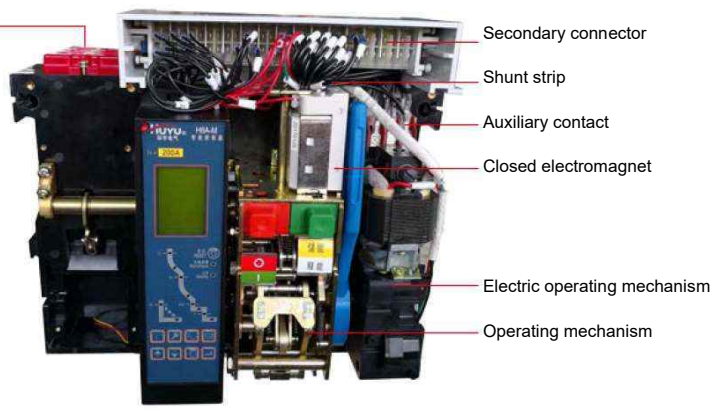
Drawer Mode Circuit Breaker
(Example: 2,500)



Fixed Circuit Breaker
(Example: 1,600)



Drawer Seat (Example: 1,600)



Main Body of the circuit breaker (Example: 1,600)

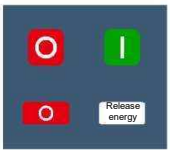
4.2 Working state of circuit breaker

4.2.1 Working state of intelligent controller

Normal condition of the intelligent controller

When the intelligent controller is in the protection state, the circuit breaker is open. After clearing the line fault, press this button to close the circuit breaker.

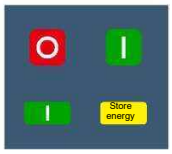
4.2.2 Working state of operating mechanism



Circuit breaker being open without stored energy

Circuit breaker being open with stored energy

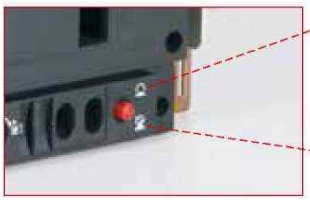
Circuit breaker being closed without stored energy



Circuit breaker being closed with stored energy

4.2.3 Working state of drawer seat (only available for drawer mode circuit breaker)

Three-position lock of drawer seat
Lock the main body of the circuit breaker in three positions, namely "disconnection", "test" and "connection" of the drawer seat.



In the three positions of "disconnection", "test" and "connection", the position lock is locked and the crank cannot be operated (in unlocked state)

After the position lock is locked, press the position lock button to unlock (in locked state) if the user needs to operate the crank again.

Three-position indicator of drawer seat
Indicate the main body of the circuit breaker in three positions, namely "disconnection", "test" and "connection" of the drawer seat.

In the "disconnection" position, both the main circuit and the secondary circuit are disconnected

In the "test" position, the main circuit is disconnected and the secondary circuit is connected

In the "connection" position, both the main circuit and the secondary circuit are connected

5 Technical Parameters and Performance of Circuit Breaker

5.1 Technical parameters and performance

Type and shell frame current Inm		H8A-1600	H8A-2500	H8A-4000	H8A-6300
Rated current In (A)		200, 400, 800, 1000, 1250, 1600	630, 800, 1000, 1250, 1600, 2000, 2500	2500, 2900, 3200, 3600, 4000	4000, 5000, 6300
Neutral rated current IN(A)		100%In	100%In	100%In	50%In
Rated working voltage Ue (V)		AC400/690			
Frequency		50Hz/60Hz			
Number of poles		3P/4P			
Rated impulse withstand voltage Uimp (kV)		AC12			
Rated insulation voltage Ui (V)		AC1000			
Power frequency withstand voltage (V)		AC3500			
Rated ultimate short-circuit breaking capacity Icu (kA)	AC400V	50	80	100	125
	AC690V	35	65	70	85
Rated service short-circuit breaking capacity Ics (kA)	AC400V	50	80	100	125
	AC690V	35	65	70	85
Rated short-time withstand capacity Icw/ 1 s (kA)	AC400V	50	80	100	100
	AC690V	35	65	70	80
Use category		B			
Full breaking time (without additional delay)		≤30 ms			
Closing time		≤70ms			
Electrical life (times) ≤2,500 1 time/3 min >2,500 1 time/6 min	400V	15000	15000	12500	8000
	690V	6000	5000	3500	2000
Mechanical Life (times) ≤2,500 1 time/3 min >2,500 1 time/6 min	Without maintenance	20000	20000	15000	10000
	With maintenance	30000	30000	25000	20000
Mechanical life of drawer seat (times) 1 time/2 min		1000	1000	600	300
Incoming mode		Top-in or bottom-in			
Flashover distance (mm)		0			
Mounting mode		Fixed or drawer		drawer	
Wiring mode		Horizontal or vertical			

Note: The mechanical life "1 time" of drawer seat means that the circuit breaker body is moved from "disconnection" to "connection" and then to "disconnection" position through cranking in the drawer seat.

5.2 Power consumption

Shell frame current (A)	Rated current (A)	Power consumption (W)			
		3P, drawer mode	4P, drawer mode	3P, fixed mode	4P, fixed mode
1600	200	8	11	4	6
	400	34	45	17	22
	630	83	111	42	56
	800	96	128	48	64
	1000	150	200	75	100
	1250	188	250	94	125
	1600	307	410	154	205
2500	630	42	56	24	32
	800	67	90	38	51
	1000	75	100	45	60
	1250	117	156	70	94
	1600	192	256	115	154
	2000	276	368	156	208
	2500	431	575	244	325
4000	2500	375	500	188	250
	2900	454	606	252	336
	3200	553	737	307	410
	4000	864	1152	480	640
6300	4000	576	768	-	-
	5000	900	1200	-	-
	6300	1429	1905	-	-

Note: The power consumption of the circuit breaker refers to the power consumption of the main circuit measured by the rated current of the circuit breaker at normal temperature, excluding the power of other accessories with power consumption of the circuit breaker. The data in this table is for users' selection reference only, and cannot be seen as the circuit breaker's actual power consumption when in use..

5.3 Altitude and derating factor

Altitude (m)		2000	3000	4000	5000
Derating factors of related items	Working current Ie	1	0.93	0.88	0.82
	Short-circuit breaking capacity Icu, Ics	1	0.83	0.71	0.63
	Short-circuit withstand capacity Icw	1	0.83	0.71	0.63
	Rated impulse withstand voltage Uimp	1	0.9	0.71	0.63
	Power frequency withstand voltage	1	0.9	0.71	0.63
	Rated insulation voltage Ui	1	0.83	0.71	0.63

Note: When the circuit breaker needs to be used in other special environments, please consult with the manufacturer for the derating factors of the breaker-related items.

5.4 Look-up table of working current derating with ambient temperature change

Shell frame level (A)	Rated current (A)	Working current after derating (A)			
		+40°C	+50°C	+60°C	+70°C
1600	200	200	200	200	200
	400	400	400	400	400
	630	630	630	630	630
	800	800	800	800	800
	1000	1000	1000	1000	1000
	1250	1250	1250	1250	1250
	1600	1600	1360	1360	1280
2500	630	630	630	630	630
	800	800	800	800	800
	1000	1000	1000	1000	1000
	1250	1250	1250	1250	1250
	1600	1600	1600	1600	1600
	2000	2000	2000	2000	2000
	2500	2500	2125	2125	2000
4000	2500	2500	2500	2500	2500
	2900	2900	2900	2900	2900
	3200	3200	3200	3200	3200
	4000	4000	3400	3400	3200
6300	4000	4000	4000	4000	4000
	5000	5000	5000	5000	5000
	6300	6300	5355	5355	5000

5.5 Recommended look-up table corresponding to the cross-sectional area of the external copper busbar and rated current of the circuit breaker

Rated current (A)	Specification of external copper busbar width × thickness (mm)	Number of wires per terminal (piece)	Cross-sectional area per terminal (mm^2)
200	20×5	1	100
400	40×5	1	200
630	40×5	2	400
800	50×5	2	500
1000	60×5	2	600
1250	80×5	2	800
1600	100×5	2	1000
2000	100×5	3	1500
2500	100×5	4	2000
2900	100×10	3	3000

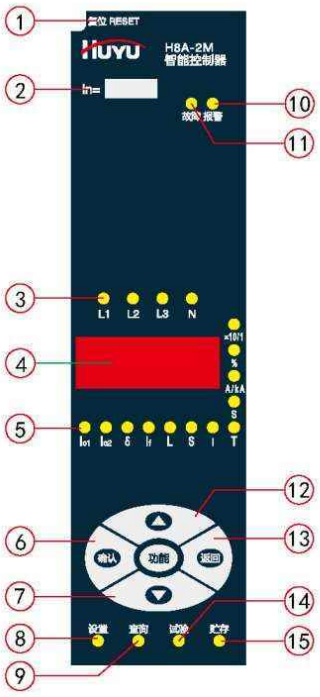
Continued

Rated current (A)	Specification of external copper busbar width × thickness (mm)	Number of wires per terminal (piece)	Cross-sectional area per terminal (mm^2)
3200	100×10	4	4000
3600	100×10	5	5000
4000	100×10	5	5000
5000	100×10	6	6000
6300	100×10	8	8000

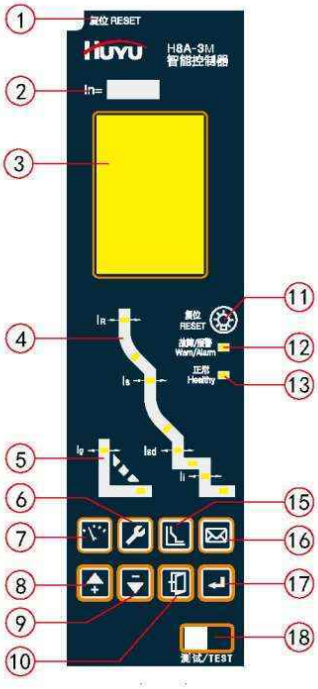
Note: The material of the external copper busbar in this table is T2 bare copper. The specifications of the external copper busbar can be changed according to the actual usage, but it shall meet the cross-sectional area requirements of different currents in the table. Also, the sum of the contacting areas between copper busbars shall not be less than the cross-sectional area to ensure good contact.

6 Protection Characteristics of Intelligent Controller

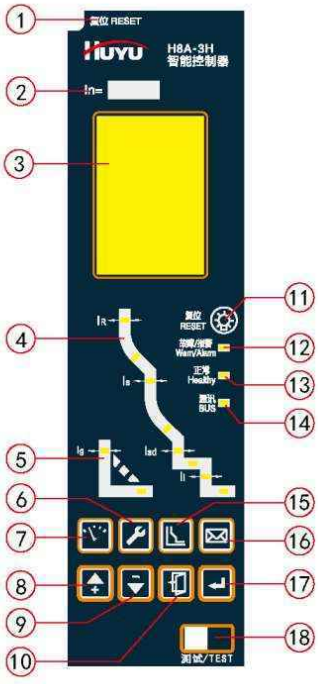
6.1 Type and interface description of intelligent controller



Type 2M (digital display)



Type 3M (liquid crystal)



Type 3H (communication)

6.1.1 Interface symbols, indicator lights and key descriptions of 2M (digital) intelligent controller

Serial number	Symbol/Name	Definition
1	Reset button	After the release is interrupted due to the circuit breaker fault, it is required to press this button before the circuit breaker can be closed again
2	In	Circuit breaker rated current
3	L_1, L_2, L_3, and N indicator lights	During normal operation, L_1, L_2, L_3 and N-phase (i.e., A, B, C and N-phase) current indicators flash cyclically
4	Digital display window	Parameters such as current, voltage, frequency, setting and fault are displayed in the window.
5	Indicator lights of corresponding parameters	I_{C1} indicates load monitoring 1 protection; I_{C2} indicates load monitoring 2 protection; δ indicates current unbalance protection; I_f indicates grounding protection; L indicates long time delay protection; S indicates short time delay protection; I indicates instantaneous protection; T indicates the self-diagnosis fault status indication; ×10/1 indicates the number of circuit breaker actions; % indicates the contact wear percentage; A/kA indicates ampere/kiloampere (current); s indicates second (time).
6	“Enter” key	Press Enter to enter the functional state or save the changed data.
7	“▼” key	Press ▼ to select function items or reduce parameter values.
8	"Setting" indicator light	When the "Setting" light is always on, you can view or modify the setting values of various protection characteristic parameters.
9	"Inquiry" indicator light	When the "Inquiry" light is always on, you can view the fault history.
10	"Alarm" indicator light	When the "Alarm" light is always on, it indicates being in the process of fault delay.
11	“Fault” indicator light	When the "Fault" light is always on, it indicates the fault category, and circularly displays the fault current and duration.
12	“▲” key	Press ▲ to select function items or increase parameter values.
13	“Back” key	Press Back to return to the previous operation.
14	“Test” indicator light	When the "Test" light is always on, the trip test can be carried out.
15	"Save" indicator light	When the "Save" light flashes, it indicates a data change.

6.1.2 Interface symbols, indicator lights and key descriptions of 3M, 3H (liquid crystal) intelligent controller

Serial number	Symbol/Name	Definition
1	Reset button	After the release is interrupted due to the circuit breaker fault, it is required to press this button before the circuit breaker can be closed again.
2	In	Circuit breaker rated current
3	Liquid Crystal Display (LCD)	Display all measurement parameters, system setting parameters, protection setting parameters and all information in Chinese.
4	Overload and short-circuit protection area	When the current protection is set, the indicator light of this area is always on, indicating that the protection current value or delay time value of the corresponding area is being set.
5	Grounding protection area	In case of fault or alarm, the indicator light of this area flashes, indicating that the corresponding area is in fault protection or alarm.
6	Setting key	Quickly switch to the "System Settings" main menu ("Right Arrow" when adjusting the system clock),
7	Running parameter key	Quickly switch to the "Running Parameters" main menu ("Left Arrow" when adjusting the system clock).
8	Up arrow key	Move the cursor up, change the selected parameter up, or position the display to the left.
9	Down arrow key	Move the cursor down, change the selected parameter down, or position the display to the right.
10	Exit key	Exit the current menu to enter the previous menu, or cancel the modification of the current parameters.
11	Reset key	Reset to enter the reset (running) state in fault trip or alarm state.
12	"Fault/Alarm" indicator light	In normal operation, the fault or alarm indicator light is not on; when the "Fault/Alarm" indicator light flashes, there must be a fault in the system.
13	"Normal" indicator light	When the intelligent controller is powered on, the "Normal" indicator light shall always flash. If the light does not flash after power-on, the intelligent controller is not working properly and shall be replaced immediately.
14	“Communication” indicator light	The communication indicator light is on, indicating that communication data is transmitted; the light goes off when there is no communication data transmission.
15	Protection setting key	Quickly switch to the "Protection Settings" main menu.
16	Inquiry key	Quickly switch to the "Information Inquiry" main menu.
17	Enter key	Enter the next menu of the item pointed by the current cursor, select the current parameter, or save the modification.
18	Test interface	It includes the following functions: DC24V power input port; analog signal input port; programming and communication interface.

Note: Due to the rapid upgrade of the intelligent controller, its physical interface may be different from the existing instruction. Therefore, please refer to the physical object.

6.2 Function configuration table of the intelligent controller

Controller type	Type 2M (digital display)	Type 3M (liquid crystal)	Type 3H (communication)	
Standard functions	• Long time delay protection • Short-circuit instantaneous protection • Parameter setting • Indicator light display • Fault self-diagnosis • Fault memory • Thermal memory • Test trip • Short time delay protection • Grounding protection (vector sum type) • Alarm signal output	• Long time delay protection • Short time delay protection • Short-circuit instantaneous protection • Grounding protection (vector sum type) • Parameter setting • Digital display • Test trip • Effective value protection • Test function • Fault memory • Fault self-diagnosis • Thermal memory • More protection functions, including six optional characteristic curves • Contact wear and mechanical life indication • Load monitoring (Mode I) • Menu functions Measurement: Voltage, frequency, and power factor	• Short-circuit instantaneous protection • Short time delay fixed time protection • Multi-curve short time delay inverse time protection • Multi-curve long time delay protection • Current unbalance protection • Grounding protection (vector sum type) • Neutral phase protection • MCR and HSISC protection • Load monitoring (Mode I) • Undervoltage protection • Overvoltage protection • Voltage unbalance protection • Communication function (Type H) • Thermal memory • Three-/four-phase current • Asymmetric grounding current • Long time delay heat capacity • Phase & Line voltage • Voltage imbalance	• Frequency • Phase sequence • Power • Power factor • Current waveform • Harmonic influence coefficient of power grid • Chinese graphic LCD display • LED status indication • Keyboard operation • Eight fault records • Eight alarm records • Eight shift records • Main contact wear equivalent • Number of operations • Number of trips • System clock • Test & lock • Fault self-diagnosis • Disconnection self-diagnosis
Optional Functions	• Contact output of four groups of signals • MCR and HSISC protection • Power grid parameter history recording		• Outputs of four groups of contacts • Leakage protection (with special transformer) Note: No grounding protection is required when provided with leakage protection • Demand value measurement and protection • Temperature control monitoring and	• Overfrequency protection • Phase sequence protection • Reverse power protection • Reclosing • Underfrequency protection

		protection ● Zone selective interlock

6.3 Protection characteristics of intelligent controller

6.3.1 Long time delay protection and curve

The long overload delay protection function is generally used to protect the cable from overload based on the true RMS of the current.

Long-delay action current is continuously adjustable, and tripping time is of inverse time characteristic. The adjustment step of short-time key is 1A (2 A for 2,000 A and above).

Distribution protection current set value Ir	(0.4–1.0) In+OFF	Current tolerance	±10%
Generator protection current set value Ir	(0.4–1.25) In+OFF		

Applied current I	Agreed tripping time
1.05Ir	> 2 h No trip
1.3Ir	< 1h Trip

Type of protection characteristic	Fault current	Setting time Tr (s)															
SI Standard inverse time lag	1.5Ir	0.61	0.98	1.47	2.46	3.68	4.91	6.14	9.21	11.05	17.19	24.56	36.84	49.13	61.41	73.69	85.97
	2Ir	0.36	0.57	0.86	1.43	2.15	2.87	3.58	5.37	6.45	10.03	14.33	21.49	28.65	35.82	42.98	50.15
	6Ir	0.14	0.22	0.33	0.55	0.82	1.1	1.37	2.06	2.47	3.84	5.48	8.22	10.96	13.7	16.45	19.19
	7.2Ir	0.12	0.2	0.3	0.5	0.74	0.99	1.24	1.86	2.23	3.48	4.97	7.45	9.93	12.42	14.9	17.38
VI Very inverse time lag	1.5Ir	2	3.2	4.8	8	12	16	20	27	36.6	56	80	120	160	200	240	280
	2Ir	1	1.6	2.4	4	6	8	10	13.5	18	28	40	60	80	100	120	140
	6Ir	0.2	0.32	0.48	0.8	1.2	1.6	2	2.7	3.6	5.6	8	12	16	20	24	28
	7.2Ir	0.16	0.26	0.39	0.65	0.97	1.29	1.61	2.18	2.9	4.52	6.45	9.68	12.9	16.13	19.35	22.58
EI (G) Extreme inverse time lag (for general distribution protection)	1.5Ir	8	12.8	19.2	32	48	64	80	108	144	224	320	480	640	800	960	1000
	2Ir	3.33	5.33	8	13.33	20	26.67	33.33	45	60	93.33	133.33	200	266.67	333.33	400	433.33
	6Ir	0.29	0.46	0.69	1.14	1.71	2.29	2.86	3.86	5.14	8	11.43	17.14	22.86	28.57	34.29	37.14
	7.2Ir	0.2	0.31	0.47	0.79	1.18	1.57	1.97	2.66	3.58	5.51	7.87	11.8	15.74	19.67	23.6	25.57
EI (M) Extreme inverse time lag (for motor protection)	1.5Ir	6.22	9.96	14.93	24.89	37.34	49.78	62.23	84.01	112.01	174.24	248.91	373.37	497.82	622.28	746.73	208.96
	2Ir	2.95	4.72	7.07	11.79	17.69	23.58	29.48	39.79	53.06	82.53	117.9	176.86	235.81	294.76	353.71	383.19
	6Ir	0.28	0.45	0.68	1.13	1.69	2.26	2. 82	3.81	5.08	7.9	11.29	16.94	22.58	28.23	33.88	36.7
	7.2Ir	0.2	0.31	0.47	0.78	1.17	1.56	1.95	2.63	3.51	5.46	7.8	11.7	15.61	19.51	23.41	25.36
HV High voltage fuse compatibility	1.5Ir	2.46	3.94	5.91	9.85	14.77	19.69	24.62	33.23	44.31	68.92	98.46	147.69	196.92	246.15	295.38	320
	2Ir	0.67	1.07	1.6	2.67	4	5.33	6.67	9	12	18.67	26.67	40	53.33	66.67	80	86.67
	6Ir	0.01	0.01	0.02	0.03	0.05	0.06	0.08	0.1	0.14	0.22	0.31	0.46	0.62	0.77	0.93	1
	7.2Ir	0	0.01	0.01	0.01	0.02	0.03	0.04	0.05	0.07	0.1	0.15	0.22	0.3	0.37	0.45	0.48
I^2T Universal inverse time protection	1.5Ir	15	30	60	120	240	360	480	600	720	840	960					
	2Ir	8.44	16.88	33.75	67.5	135	202.5	270	337.5	405	472.5	540					
	6Ir	0.94	1.88	3.75	7.5	15	22.5	30	37.5	45	52.5	60					
	7.2Ir	0.65	1.3	2.6	5.21	10.42	15.63	20.83	26.04	31.25	36.46	41.67					

Note 1: This table takes the set value of long time delay action duration of liquid crystal intelligent controller as an example.
Note 2: Action time error ±15%

6.3.2 Thermal memory protection

Repeated overload may cause the conductor to heat up. The intelligent controller has the function of simulating the heating effect of bimetallic strip after the action of fault delay such as overload or short time delay.

Setting time for heat capacity cooling: Instantaneous, 10 min, 20 min, 30 min, 1 h, 2 h, 3 h, OFF.

Note: Power failure of the intelligent controller can eliminate thermal memory protection.

6.3.3 Short-circuit short time delay protection and curve

Short time delay protection prevents the impedance short circuit of the distribution system. This kind of short circuit is usually caused by the local short circuit fault of the line, where the current generally exceeds the overload range, but the short-circuit current is not very large.

The trip delay of short-circuit short time delay is to realize selective protection.

Short-circuit delay protection is based on the true RMS of the current, which can be divided into: Inverse time period and fixed time period. Short-circuit delay protection further strengthens the cooperation with the lower protection device.

Short time delay protection can be provided with the zone selective interlock function.

Action current set value *Isd*	(1.5–15) Ir + OFF	Current tolerance	±10%
Inverse time delay action time Tsd	The curve is the same as the overload long time delay curve, and the curve speed is 10 times faster than the overload long time delay curve (the time calculated by the overload delay time curve formula divided by 10 is the short time delay inverse time delay time)		
Fixed time delay set value Tsd	0.1s, 0.2s, 0.3s, 0.4s		

Note: When both inverse time protection and fixed time protection are on, the set value of the inverse time current must be less than that of the fixed time current, otherwise the inverse time function will automatically fail. Also, the actual inverse time delay time shall not be less than the setting time of the fixed time limit.

6.3.4 Short-circuit instantaneous protection and curve

The instantaneous protection function prevents the load short circuit of the distribution system. It is usually an interphase fault, with a large short-circuit current, which needs to be quickly disconnected. This protection is based on the true RMS of the current.

Action current set value Ii	(1.0–20) Ir + OFF	Current tolerance	±10%
Action characteristics	≤0.85 Ii No action		
	>1.15 Ii Action		

Note 1: The protection parameters shall not be cross-set, and shall comply with Ir< Isd< Ii.

Note 2: The set value of maximum instantaneous action current of H8A-6300 is 100 kA.

6.3.5 Grounding protection and curve

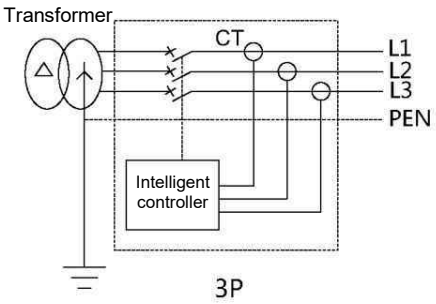
There are two protection modes for the ground fault caused by equipment insulation damage, including residual current (difference) type (T) and ground current type (W). T-type detection of zero sequence current, that is, the vector sum of four-phase (three-phase, four-wire system) or three-phase (three-phase, three-wire system) current is taken for protection. The ground current directly detects the current on the grounding cable through a special external transformer, which can simultaneously protect the upper and lower ground faults of the circuit breaker.

Action current set value Ig		(0.2–1.0) In + OFF	Current tolerance	± 10%
Action characteristics		< 0.8 Ig No action		
		≥ 1.1 Ig Action		
Action time Tg Time tolerance ±10%	Fixed time setting	0.1–1s+OFF		
	Inverse time shear coefficient Cr	1.5–6 + OFF		
	Inverse time formula	t=Tg×Cr×Ig/I	t — delay time Ig — set action current	Tg — set delay time I — ground fault current Cr — shear coefficient

Note 1: When the multiple of the fault current (I/Ig) is less than Cr, the action is of inverse time characteristic; when the multiple of the fault current is greater than or equal to Cr, the action is of fixed time characteristic.

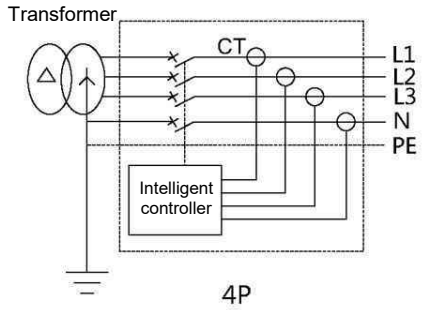
Note 2: The functions of grounding alarm and grounding protection are independent of each other, with independent parameter settings, which can coexist.

Ground fault protection mode and electrical schematic diagram



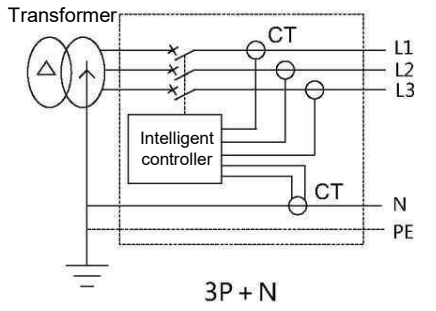
Mode I (difference type)
TN-C, TN-C-S and TN-S distribution systems use three-pole circuit breakers without neutral current transformers.

- The vector sum of three-phase current is taken for the ground fault protection signal.
- The protection characteristics are fixed time or inverse time protection.



Mode II (difference type)
The four-pole circuit breaker with built-in neutral current transformer is used in the TN-S distribution system.

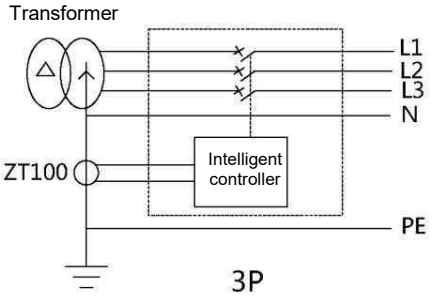
- The vector sum of the four-phase current is taken for the ground fault protection signal.
- The protection characteristics are fixed time or inverse time protection.



Mode III (difference type)
The three-pole circuit breaker with external neutral current transformer is used in the TN-S distribution system.

- The vector sum of the three-phase current and the N-phase current is taken for the ground fault protection signal.
- The protection characteristics are fixed time or inverse time protection.

Note: The conductor length of the neutral current transformer is not more than 2 meters.



Mode IV (ground current type)
The three-pole circuit breaker with external ground current transformer is used in the ground current protection distribution system.

- Provided with additional special current transformer.
- The distance between the special current transformer and the circuit breaker is not more than 10 meters.

6.3.6 Neutral line protection

The cable and current characteristics used in the neutral phase are often quite different from those of other three phases, and intelligent controllers implement different protections for the neutral phase according to different applications. When the neutral line is thin, it can be protected by semi-fixed value method; when the neutral line is the same as other phases, it can be protected by full fixed value; and when the harmonics in the power grid are serious, double fixed value or 1.6 times fixed value can be used for protection.

Action current set value I_N	(0.5, 1.0) In + OFF	Current tolerance	±10%
Action time T_N	Same as overload long time delay duration		

6.3.7 Current unbalance protection

The current unbalance protection protects the open-phase and three-phase current imbalance, and performs protection actions according to the imbalance rate between the three-phase currents. When the execution mode is “Alarm”, its action principle is the same as that of grounding protection.

Protection set value	5%–60% (step length: 1%)
Delay time	0.1 s–40 s (step length: 0.1 s)
Protection return set value	5% – starting value (step: 1%)
Delay time	10s–200s
No action characteristics	≤0.9 (actual current imbalance rate/set value), no action
Action characteristics	>1.1 (actual current imbalance rate/set value), action

6.3.8 Load monitoring

Load monitoring can be used for pre-alarm and branch load control. The action principle is based on the power or current monitoring, with two optional modes.

Mode I: The load of two branches can be independently controlled. When the operating parameters exceed the setting value, the corresponding load monitors the DO delay action (corresponding DO function needs to be set), and controls the load of two branches to be interrupted to ensure the power supply of the main system.

Mode II: Generally, it is used to control the load of the same branch. When the operating parameters exceed the starting value, the "Load Monitoring I" DO delays the action (the action form can be pulse mode or level mode) to interrupt the branch load. If the operating parameter value is lower than the return value after the interruption, and after the delay set time, the "Load Monitoring I" DO returns, and the "Load Monitoring II" DO acts to connect the interrupted load and restore the power supply of the system.

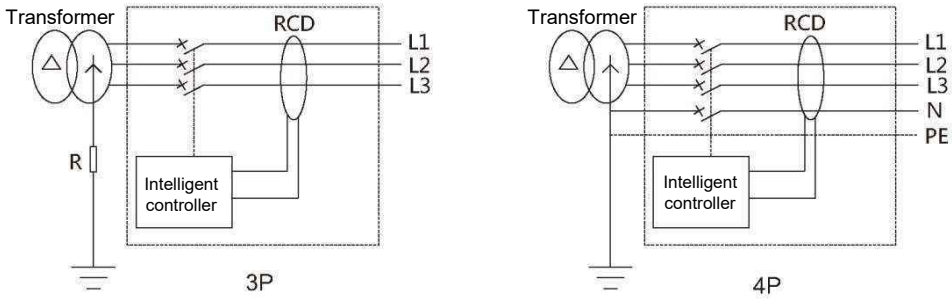
Unloading I action settings	Current mode 1/2	Setting current I_{C1}, I_{C2}	(0.2–1) Ir
	Power mode 1/2	Setting power P_{C1}, P_{C2}	200kW–10000kW
Unloading II action settings	Current mode 1/2	Current delay time T_{C1}, T_{C2}	(20%–80%) Tr
	Power mode 1/2	Power delay time T_{C1}, T_{C2}	10s–3600s
Unloading II action settings	Current mode 1	Setting current I_{C1} (starting value)	(0.2–1) Ir
	Current mode 2	Setting current I_{C2} (return value)	0.2Ir–Ic1
	Power mode 1	Setting power P_{C1} (starting value)	200kW–10000kW
	Power mode 2	Setting power P_{C2} (return value)	100kW–P_{c1}
Unloading II delay settings	Current mode 1	Current delay time T_{C1}	(20%–80%) Tr
	Current mode 2	Current delay time T_{C2}	10s–600s
	Power mode 1/2	Power delay time T_{C1}, T_{C2}	10s–3600s
Protection alarm DO output		Set one DO of the signal unit to "Load Monitoring I" and another to "Load Monitoring II".	

Note: In Mode II, $I_{c1} \geq I_{c2}$ or $P_{c1} \geq P_{c2}$ is required.

6.3.9 Residual current (leakage) protection

It is suitable for the leakage fault caused by equipment insulation damage or human contact with exposed conductive parts, and the residual current set value I△n is irrelevant to the rated current of the circuit breaker. The signal sampling mode is zero sequence sampling, and a rectangular transformer is required. This sampling has high accuracy and sensitivity, which is suitable for the protection of the small current.

Action current set value 1Δn		0.5A–30A+OFF				Current tolerance			±10%				
Action characteristics		< 0.8IΔn, no action											
		≥1.01Δn, action											
Delay time setting TΔn (s)		Instantaneous	0.06	0.08	0.17	0.25	0.33	0.42	0.5	0.58	0.67	0.75	0.83
Maximum breaking time of fault current (s)	IΔn	0.04	0.36	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5
	2IΔn	0.04	0.18	0.25	0.5	0.75	1	1.25	1.5	1.75	2	2.25	2.5
	5IΔn, 10IΔn	0.04	0.07	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1



RCD: Zero sequence current transformer
R: Ground resistor

Electrical diagram of residual current protection

6.3.10 Overvoltage protection

The intelligent controller measures the true RMS of the primary circuit voltage. When all three phase-to-phase voltages (line voltages) are greater than the set value, that is, when the minimum value of the three line voltages is greater than the set value of the overvoltage protection, the overvoltage protection acts; when the minimum value of the three line voltages is less than the return value, the alarm action returns.

Action threshold (V)	Return threshold – 1,200 (step length: 1)	
Action delay time (s)	0.2 – 60 (step length: 0.1)	
Return threshold (V)	100 – action threshold (step length: 1)	This set value is only available when the execution mode is "Alarm", and the starting value must be greater than or equal to the return value.
Return delay time (s)	0.2 – 60 (step length: 0.1)	
Action or alarm characteristics (delay tolerance±10%)	Umin/action threshold ≥ 1.1 Fixed time action or alarm	
	Umin/action threshold < 0.9 No action or alarm	
Overvoltage alarm return characteristics (delay tolerance±10%)	Umax/action threshold ≤ 0.9 Return	
	Umax/action threshold > 1.1 No return	
Alarm contact output	When the execution mode is “Alarm”, the "Overvoltage Alarm" contact output can be added.	

6.3.11 Voltage unbalance protection

Voltage imbalance rate protection acts according to the imbalance rate between three line voltages. The intelligent controller measures the voltage imbalance rate. It performs protection action when the voltage unbalance rate is greater than the action threshold; when the voltage imbalance rate is less than the return threshold, the alarm action returns.

Action threshold	2% – 30% (differential: 1%)	
Action delay time (s)	0.2 – 60 (differential: 0.1)	
Return threshold	2% – starting value (differential: 1%)	This set value is only available when the execution mode is "Alarm", and the return value must be less than or equal to the starting value.
Return delay time (s)	0.2 – 60 (differential: 0.1)	
Action or alarm characteristics (delay tolerance±10%)	Actual voltage imbalance rate/set value ≥ 1.1 Fixed time action or alarm	
	Actual voltage imbalance rate/set value < 0.9 No action or alarm	
Voltage imbalance alarm return characteristic (delay tolerance±10%)	Actual voltage imbalance rate/set value ≤ 0.9 Return	
	Actual voltage imbalance rate/set value > 1.1 No return	
Alarm contact output	When the execution mode is “Alarm”, the "Voltage Imbalance Alarm" contact output can be added.	

6.3.12 Phase sequence protection

Phase sequence detection is taken from the primary voltage. When it is detected that the phase sequence is the same as the setting direction of the starting value, the protection action is instantaneous. When one or more phases of voltage do not exist, this function will automatically exit.

Setting range of action phase sequence	Δφ: A, B, C/Δφ: A, C, B
Alarm contact output	When the execution mode is “Alarm”, the "Phase Sequence Fault Alarm" contact output can be added
Protection execution mode	Alarm/trip/shutdown

6 3.13 Undervoltage protection

The intelligent controller measures the true RMS of the primary circuit voltage. When all three phase-to-phase voltages (line voltages) are less than the set value, that is, when the maximum value of the three line voltages is less than the set value of the undervoltage protection, the undervoltage protection acts; when the maximum value of the three line voltages is greater than the return value, the alarm action returns.

Action threshold (V)	100 – return threshold (step length: 1)	
Action delay time (s)	0.2 – 60 (step length: 0.1)	
Return threshold (V)	Action threshold – 1,200 (step length: 1)	This set value is only available when the execution mode is "Alarm", and the return value must be greater than or equal to the starting value.
Action delay time (s)	0.2 – 60 (step length: 0.1)	
Action or alarm characteristics (delay tolerance±10%)	Umax/action threshold ≤ 0.9	Fixed time action
	Umax/action threshold > 1.1	No action
Undervoltage alarm return characteristics (delay tolerance±10%)	Umin/action threshold > 1.1	Fixed time return
	Umin/action threshold ≤ 0.9	No return
Alarm contact output	When the execution mode is “Alarm”, the "Undervoltage Alarm" contact output can be added.	

6.3.14 Demand current protection

Calculate the demand value of the true RMS of each phase current in a sliding time window, and perform protection action when the demand value exceeds the limit. When the execution mode is “Alarm”, its action principle is the same as that of grounding alarm. The setting of the sliding time window is in the menu item "Meter Settings" (the parameters are set in the same way for phases A, B, C and N).

Protection starting set value (A)	(0.2 – 1.0) In	
Action delay time set value (s)	15 – 1500	
Protection action return set value (A)	0.2In–starting set value	This set value is only available when the execution mode is "Alarm".
Protection return delay time (s)	15 – 3000	
Demand current action characteristics (delay tolerance±10%)	I/Starting set value ≤ 0.9	No action
	I/Starting set value > 1.1	Fixed time action
Demand current return characteristics (delay tolerance±10%)	I/Return set value > 1.1	No return
	I/Return set value ≤ 0.9	Fixed time return
Protection execution mode	Alarm/trip/shutdown	

6.3.15 Underfrequency and overfrequency protection

The intelligent controller detects the frequency of the system voltage, and can perform protection if the frequency is too high or too low. The action principle and characteristics of overfrequency and underfrequency protection are the same as those of overvoltage and undervoltage protection.

Setting range of different parameters	Action threshold	Underfrequency	45 Hz–return value (step length: 0.5 Hz)	
		Overfrequency	Return value – 65 Hz (step length: 0.5 Hz)	
	Action delay time	0.2 s–5.0 s (step length: 0.1 s)		
	Return threshold	Underfrequency	Starting value–65 Hz	This set value is only available when the execution mode is "Alarm"
		Overfrequency	45 Hz–starting value	
	Return delay time	0.2 s–36.0 s (step length: 0.1 s)		
Alarm contact output	When the execution mode is “Alarm”, the "Underfrequency Alarm" and “Overfrequency Alarm” contact outputs can be added.			
Protection execution mode	Alarm/trip/shutdown			

6.3.16 Reverse power protection

The sum of three-phase active power is taken for the inverse power protection. When the direction of power flow is opposite to that of the user's setting power and greater than the set value, the protection starts. The direction of power and incoming direction of power supply are set in the "Meter Settings" menu, which must be consistent with the actual application. Its action principle is the same as overvoltage protection.

Protection starting set value	5kW – 500kW	
Protection action delay time set value	0.2s – 20s	
Protection action return set value	5 kW – starting set value	This set value is only available when the execution mode is "Alarm", and the return value must be greater than or equal to the starting value.
Protection return delay time	1.0s – 360s	
Protection alarm DO output	Set one DO of the signal unit to "Power Failure".	
Protection execution mode	Alarm/trip/shutdown	

6.3.17 MCR and HSISC protection

MCR and HSISC are instantaneous protection for the adjustment of the circuit breaker itself. When the out-of-limit fault current is generated, the intelligent controller will issue a trip instruction within 10 ms. Among them, MCR protects the switch-on ability of the circuit breaker to prevent the switch from being damaged due to the switch-on current exceeding the switch-on limit ability, and the protection works at the moment of opening and closing of the circuit breaker (within 100 ms). HSISC protects the maximum carrying capacity of the circuit breaker to prevent the switch from carrying current exceeding the maximum breaking capacity, which will take effect after closing for 100 ms.

MCRHSISC action current set value (kA)	30 – 100	
Non-action characteristic I/Ii	<0.80	No action
Action characteristic I/Ii	> 1.0	Action
Action delay	< 20ms	

Note: This group of set values is generally set according to the breaking capacity of the circuit breaker when the circuit breaker leaves the factory, and is not adjustable by the end user.

Factory default MCR: H8A-1600/35 kA,H8A-2500 above /50 kA.

HSISC: H8A-1600/50kA; H8A-2500/65kA; H8A-4000/80kA; H8A-6300/100kA.

6.3.18 Self-diagnosis

The intelligent controller can diagnose its own faults, including ultra-high ambient temperature, E^2PROM data error, A/D sampling error, and action reject of the circuit breaker.

6.3.19 Contact wear indication

The intelligent controller can display the current contact wear on the screen. When the intelligent controller leaves the factory, the display value is 100%, which means that the contact is not worn. When the display value drops to 60%, an alarm signal will be sent to remind the user to take maintenance measures timely. After the contact is replaced, it can be restored to the initial wear value through setup.

6.3.20 Test & lock

There are three test modes for test tripping, namely three-section protection, grounding/leakage fault, and mechanism action time.

Three-section protection test: Input the fault current to simulate the protection of the controller when the overload, short circuit and transient fault occur.

Grounding/leakage fault test: Input the grounding/leakage fault current to simulate the protection of the controller when the grounding/leakage fault occurs.

Mechanism action time test: Force the magnetic flux converter to act to test the inherent mechanical time of circuit breaker tripping.

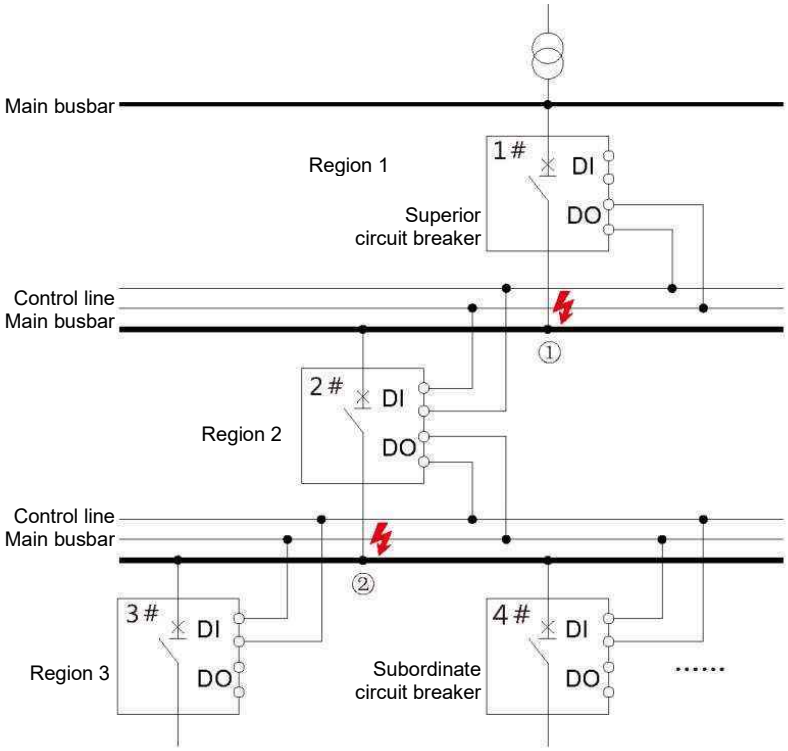
6.3.21 Zone selective interlock

In the same power circuit, two or more circuit breakers with superior-subordinate relationship can realize zone selective interlock, which includes short-circuit interlock and grounding interlock. There are two possibilities for this interlock according to the location of the fault.

a) When the location of the short circuit or ground fault is at the outgoing side, such as location ② of the subordinate circuit breaker (2#–4# circuit breaker), the subordinate circuit breaker trips instantaneously and sends a regional interlock signal to the superior circuit breaker; the superior circuit breaker (1# circuit breaker) receives the regional interlock trip signal and delays according to the short circuit or grounding protection settings. If the fault current is eliminated during the delay of the superior circuit breaker, the protection will return and the superior circuit breaker will not act; if the fault current of the subordinate circuit breaker is still not eliminated after tripping, the superior circuit breaker will act according to the short-circuit or grounding protection setting to cut off the fault line.

b) When the location of the short circuit or ground fault is between the superior circuit breaker (1# circuit breaker) and the subordinate circuit breaker (2#–4# circuit breaker), such as location ①, the superior circuit breaker does not receive the regional interlock signal. Therefore, it trips instantly and quickly cuts off the faulty line.

I/O port setting requirements of the circuit breaker: At least one DI of the superior circuit breaker is set as the regional interlock detection; and at least one DO of the subordinate circuit breaker is set as the regional interlock signal.



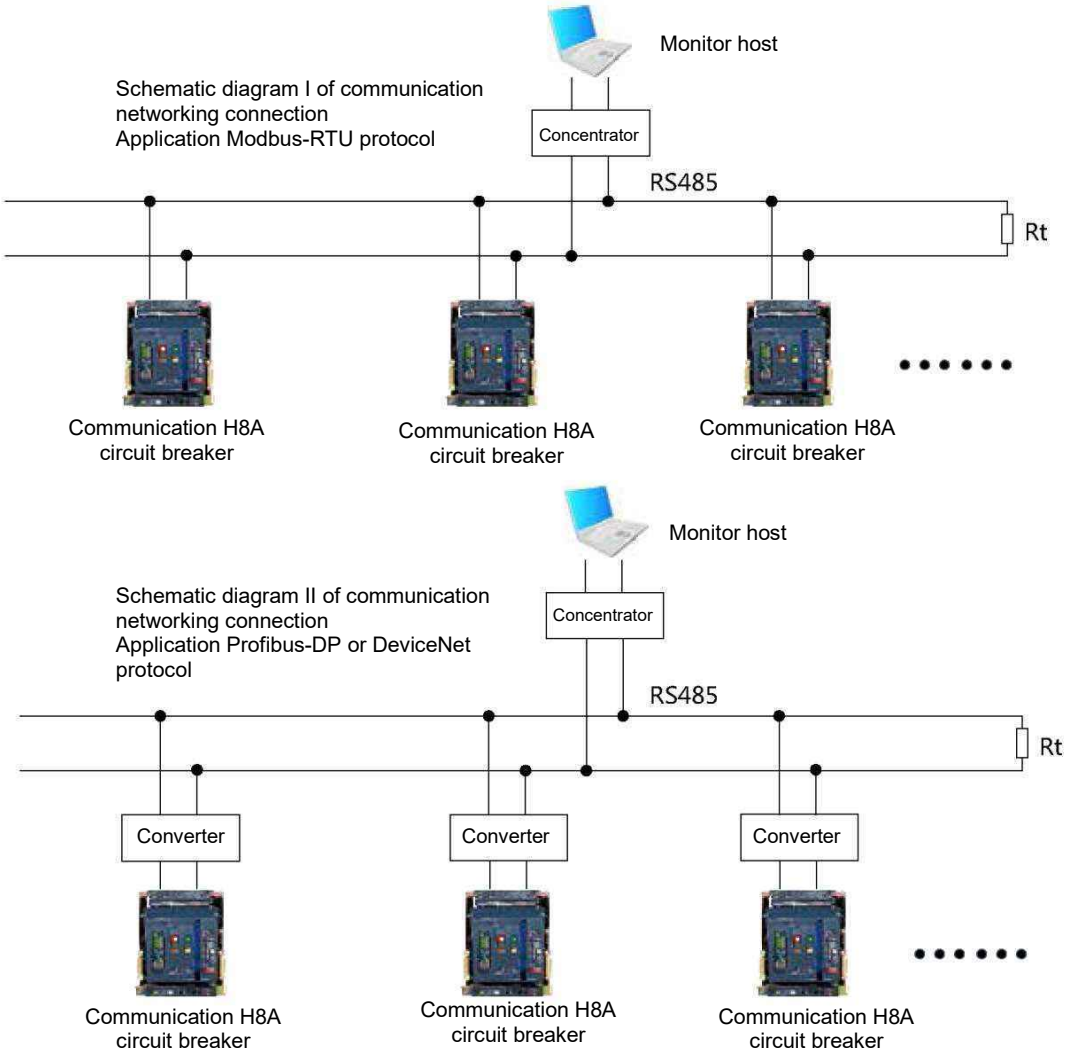
6.3.22 Reclosing

The reclosing function means that the circuit breaker is disconnected due to undervoltage or power failure under non-fault conditions; and when the power supply system returns to normal, the product will automatically close to keep the power supply. The circuit breaker is suitable for places that are not easy to maintain, and can be used in lightning-prone areas or power grids with unstable power supply to prevent the circuit breaker from tripping due to short-time voltage drop, based on the protection caused by abnormal line voltage.

6.3.23 Communication

Through the communication interface, the intelligent controller can realize data transmission functions such as telemetering, telecontrol, teleregulation and telesignaling according to the specified protocol. The output of the communication interface adopts photoelectric isolation, which is suitable for the environment where strong electromagnetic interferes.

Communication protocol		Modbus-RTU	Profibus-DP	DeviceNet
Communication address		0 – 255	3 – 126	0 – 63
Transmission rate (bit/s)		9.6k, 19.2k	Self-adaption	125k, 250k, 500k
Communication module		Internal	External	
Network functions	Telemetering	Remote real-time monitoring of the current, voltage, fundamental current, fundamental voltage, power, power factor, electrical energy, frequency, harmonic content for current and voltage, total harmonic distortion of voltage and current, etc.		
	Teleregulation	Remote reading and modification for protection parameters		
	Telecontrol	Remote control of opening/closing of the circuit breaker		
	Telesignaling	Alarm, fault trip, stored energy signal, undervoltage, breaker body position, closing readiness, opening/closing position and other indicators of the breaker status.		



Note: 32 communicable circuit breakers can be connected on one line at the same time. The maximum wiring distance is 1,200 meters, and the communication distance can be extended by installing intermediate relays.

6.3.24 Busbar temperature detection and protection

The busbar temperature protection function is realized by external temperature acquisition module or built-in temperature sensor. The temperature acquisition module can monitor the temperature of 8 busbars at the same time, and the built-in temperature sensor monitors the temperature of the conductive busbars in the circuit breaker body.

Through RS-485 communication mode, the intelligent controller can read the busbar temperature data of the temperature acquisition module in real time, calculate and process the data according to the preset protection parameters, and realize the functions of busbar overtemperature tripping and overtemperature alarm.

Parameter setting

Temperature protection function on/off: ON/OFF

Overtemperature protection action temperature: 100°C–160°C

Overtemperature protection action delay time: 0.2s–60s

Overtemperature alarm temperature: 100°C–160°C

Overtemperature alarm delay time: 0.2s–60s

6.4 Intelligent controller factory default settings

Long time delay Ir: 1 In, Tr = 19.2 s (C03), curve EI (G);

Inverse time short delay Is: 4Ir Ts = 0.1Tr; Fixed time short delay Isd: 8Ir,Tsd = 0.4s

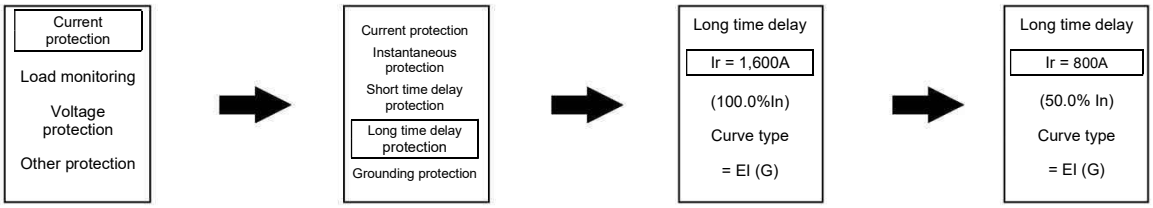
Instantaneous Ii: 12In; Grounding Ig: OFF (open the default value Ig = In, inverse time shear coefficient k = OFF, Tg = 0.4 s)

Note: The default set value is for liquid crystal type, and the setting values will be different for other different types.

6.5 Main parameter settings of intelligent controller (taking liquid crystal type as an example)

6.5.1 Long time delay setting current settings

Example: Set the rated current of the circuit breaker from 1,600 A to 800 A



Press [menu] to enter the menu
Press [▲] [▼] to select "Voltage Protection"
Press [↵] to enter the modification

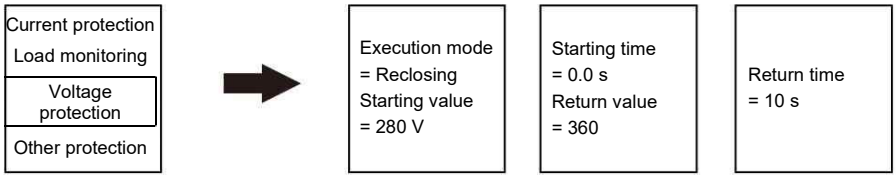
Press [▲] [▼] to select "Long time delay protection"
Press [↵] to enter the subordinate menu

Press [▲] [▼] to select Ir
Press [↵] to enter the modification
Press [▲] [▼] to adjust parameters

Modify the parameter and press [↵] to save

6.5.2 Reclosing settings

1) Start reclosing function setting

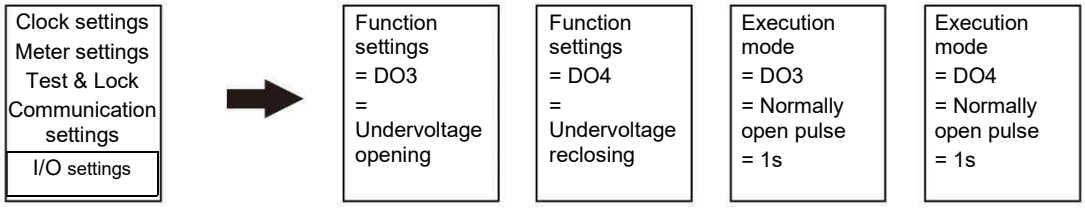


Press [menu] to enter the menu
Press [▲] [▼] to select "Voltage Protection"
Press [↵] to enter the modification

Press [▲] [▼] to select the modification, press [↵] to enter the modification, and then press [▲] [▼] to adjust the value, and press [↵] to save

Note: When the measured line voltage is lower than the starting value of 280 V, i.e. the action voltage, the intelligent controller will send the opening signal with a delay of 0.0 s to make the shunt strip act; when the voltage is restored to the return value of 360 V and kept for 10.0 s, the intelligent controller sends a pulse signal to the closing electromagnet to make it act, thus completing the automatic reclosing.

2) Reclosing I/O settings



Press [menu] to enter the menu
Press [▲] [▼] to select "I/O settings"
Press [↵] to enter the modification

Press [▲] [▼] to select the modification, press [↵] to enter the modification, and then press [▲] [▼] to adjust the value, and press [↵] to save

Note: In the actual operation of the intelligent control interface, due to the different controller types and upgrade versions, there may be some differences with the operation instruction. You can operate according to the prompts of the intelligent controller operation interface, or consult the manufacturer.

7 Wiring Diagrams of Circuit Breaker Control Circuit

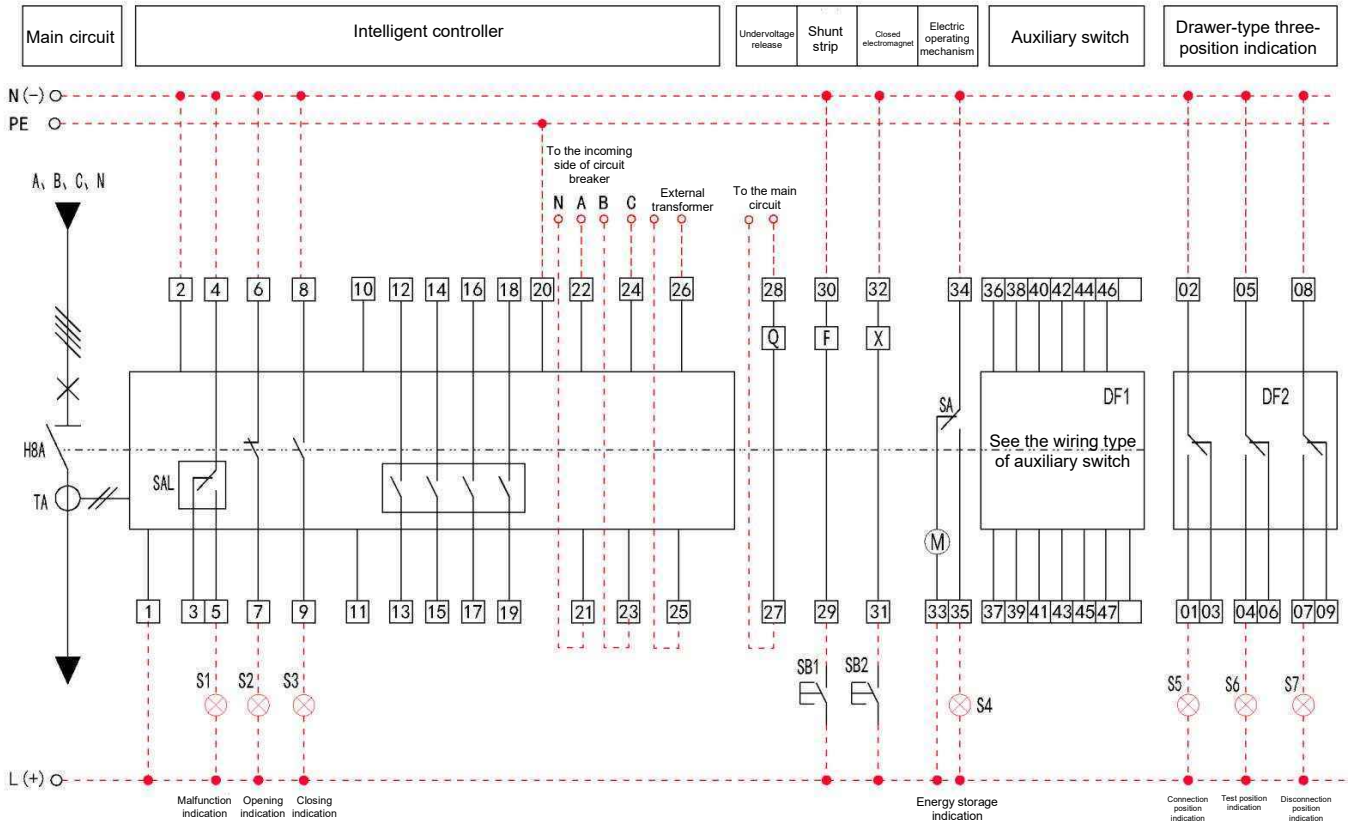
1) The circuit on the dotted line is wired by the user, which cannot be performed when the optional accessories are not customized.

2) The accessories such as intelligent controller, undervoltage release, shunt strip, closing electromagnet and electric operating mechanism shall be connected to different power sources respectively when the voltages are different.

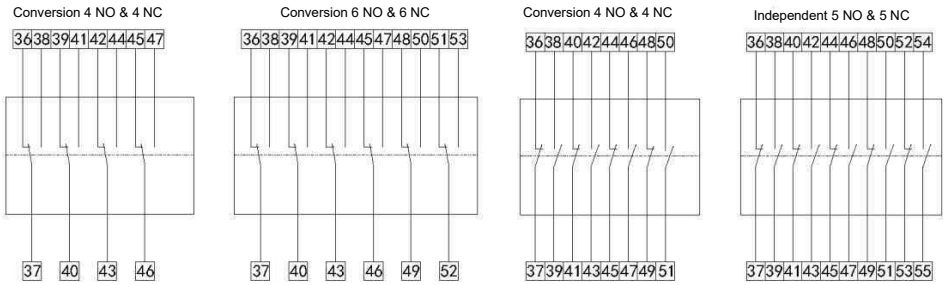
3) Undervoltage release must be directly connected to the power supply of the main circuit, with the highest working voltage not exceeding its rated working voltage; when the working voltage of the main circuit exceeds its rated working voltage, it needs to be isolated from the main circuit by a transformer.

4) The three-position indication function of the drawer seat is only optional for the drawer mode circuit breaker.

Wiring diagram of secondary circuit of 2M/3M intelligent controller



Wiring type of auxiliary switch
(default: Conversion 4 NO & 4 NC)



Note 1: H8A-1600 auxiliary switch wiring mode only provides two types: (1) conversion four normally open & four normally closed, (2) conversion six normally open & six normally closed.
Note 2: When the user needs independent contacts of six normally open & six normally closed, the auxiliary switch is five normally open & five normally closed.
Note 3: When the H8A-1600 intelligent controller is a DC power supply, it must be connected to the conversion power supply module and then to the 1 (+) and 2 (-) terminals of the intelligent controller. However, the H8A-2500 or above does not need to be connected to the conversion power supply module.

Terminal function in wiring diagram of secondary circuit of 2M/3M intelligent controller

Terminal number	Function description	Notes
1, 2	Auxiliary power input: AC 230 V, AC 400 V, DC 220 V, DC 110 V	
3, 4, 5	Fault trip auxiliary contact, contact capacity: AC 250 V, 3 A	
6, 7	Circuit breaker status auxiliary contact (normally closed), contact capacity: AC 250 V, 3 A	
8, 9	Circuit breaker status auxiliary contact (normally open), contact capacity: AC 250 V, 3 A	
20	Grounding (PE)	
21, 22, 23, 24	Voltage signal measurement: 21 connected to N, 22 connected to A, 23 connected to B, 24 connected to C	Optional functions
25, 26	External transformer input (leakage and neutral transformer)	Optional functions
27, 28	Undervoltage release	Optional accessories
29, 30	Shunt strip	
31, 32	Closed electromagnet	
33, 34, 35	Electric operating mechanism, 35 connected to the green line, 34 connected to the black line and 33 connected to the red line	
36 – ...	DF1 auxiliary switch terminal	Customized according to users' requirements

Terminal function in wiring diagram of secondary circuit of 3M and reclosing intelligent controller

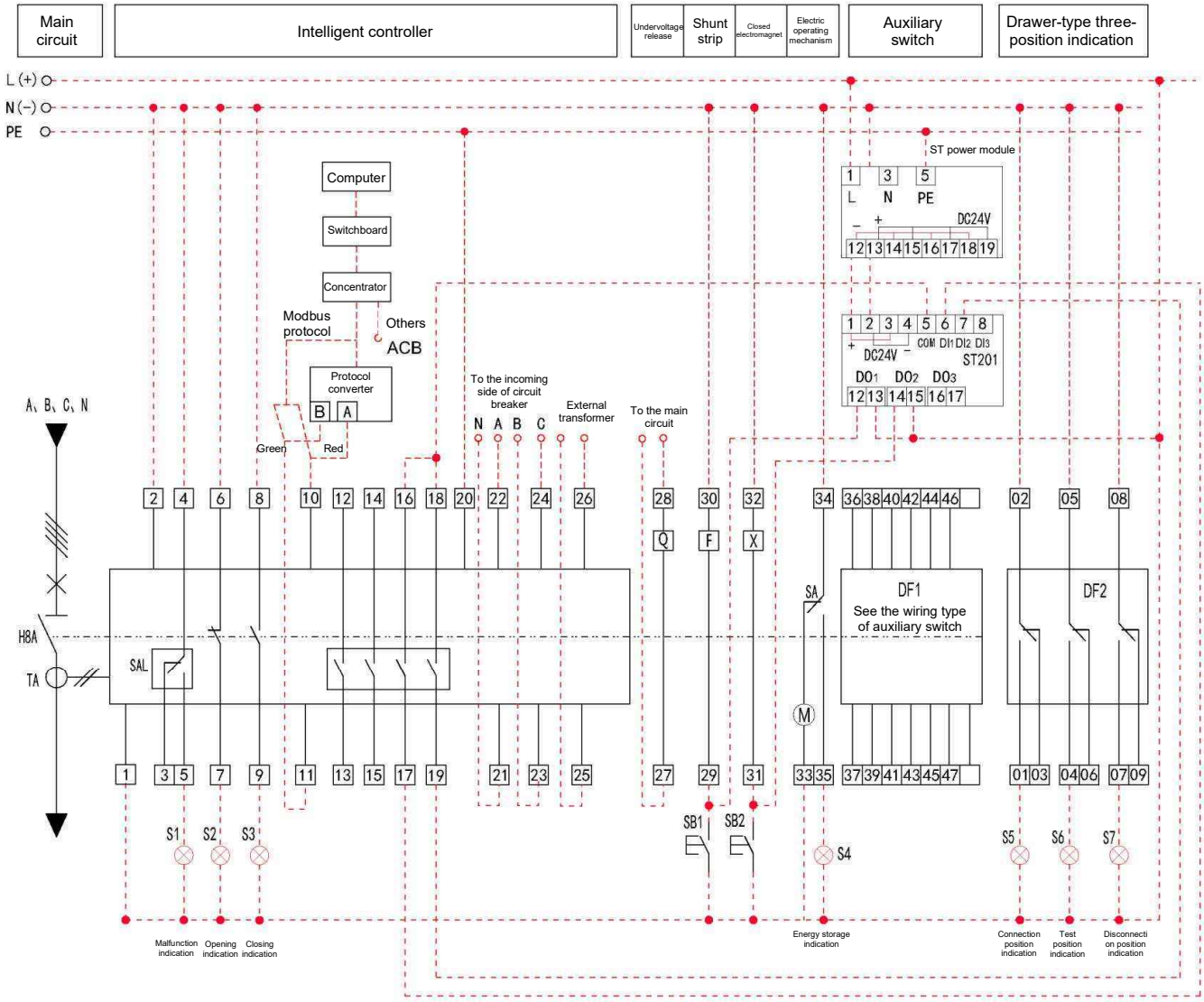
Terminal number	Function description	Notes
1, 2	Auxiliary power input: AC 230 V, AC 400 V, DC 220 V, DC 110 V	
3, 4, 5	Fault trip auxiliary contact, contact capacity: AC 250 V, 3 A	
6, 7	Circuit breaker status auxiliary contact (normally closed), contact capacity: AC 250 V, 3 A	
8, 9	Circuit breaker status auxiliary contact (normally open), contact capacity: AC 250 V, 3 A	
10, 11	Communication interface output, 10 connected to A,11 connected to B	Default Modbus
12–19	Signal output, DO1 for 12 and 13; DO2 for 14 and 15; DO3 for 16 and 17; DO4 for 18 and 19	Set based on functional requirements
20	Grounding (PE)	
21, 22, 23, 24	Voltage signal measurement: 21 connected to N, 22 connected to A, 23 connected to B, 24 connected to C	
25, 26	External transformer input	
27, 28	Undervoltage release	Optional accessories
29, 30	Shunt strip	
31, 32	Closed electromagnet	
33, 34, 35	Electric operating mechanism, 35 connected to the green line, 34 connected to the black line and 33 connected to the red line	
36 – …	DF1 auxiliary switch terminal	Customized according to users' requirements

Interpretation of symbols in wiring diagram

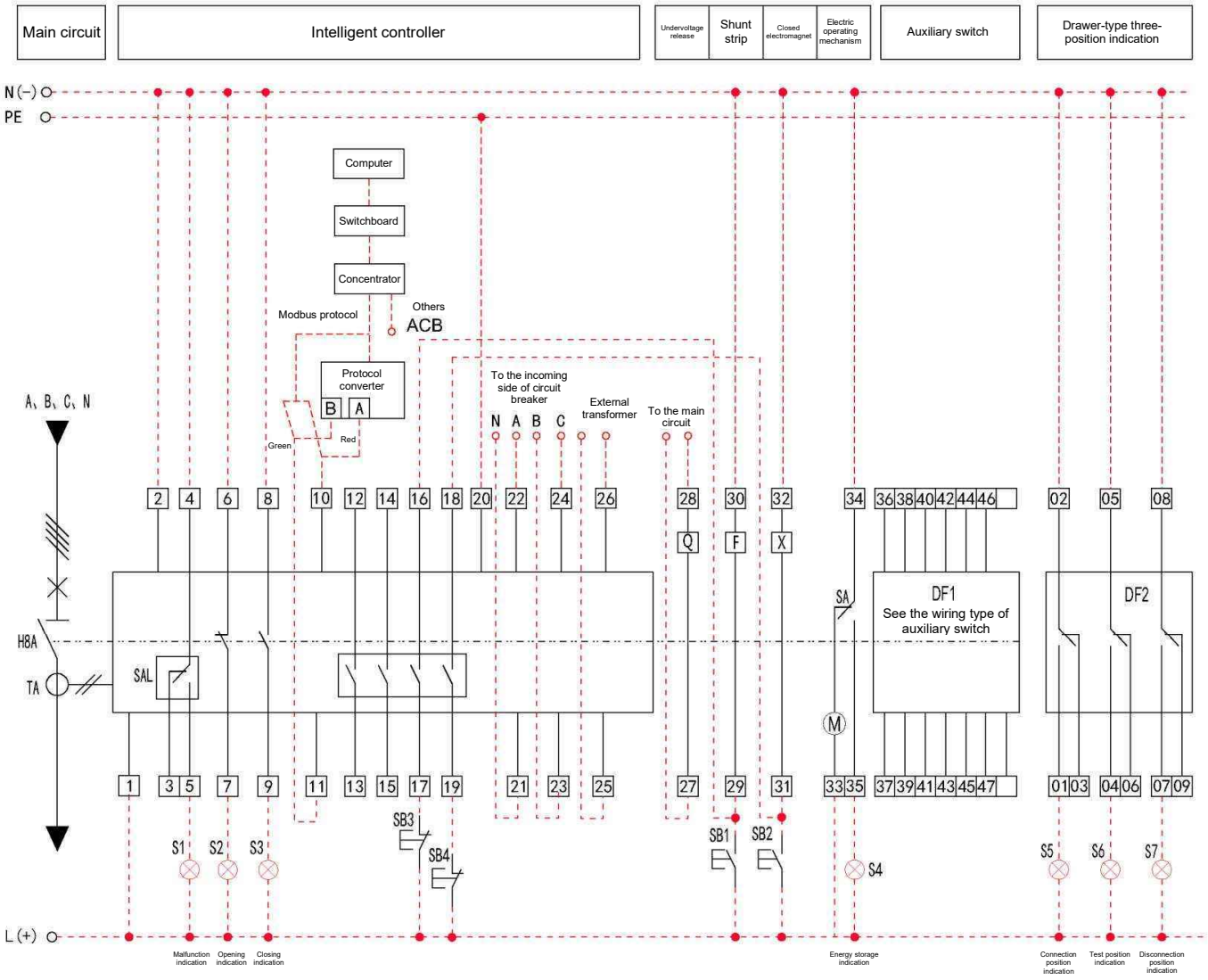
Symbol	Interpretation	Notes
H8A	H8A universal circuit breaker	
S1–S7	Signal lamp	User-provided
TA	Current transformer	
SAL	Microswitch	
SB1	Opening button	User-provided
SB2	Close button	User-provided
X	Closed electromagnet	
F	Shunt strip	
Q	Undervoltage release	Optional accessories
M	Electric operating mechanism	
SA	Electric operating mechanism limit switch	

Symbol	Interpretation	Notes
PE	Grounding wire	
L (+), N (-)	Control power supply (DC L is positive; N is negative)	
A, B, C, N	Main circuit phase line	
DF1	Auxiliary switch	Type optional
DF2	Drawer-mode three-position electric indicator switch	Optional accessories
ST power module	DC 24 V power supply is provided	Optional accessories
ST201	Relay module	Optional accessories
Protocol converter	Except Modbus protocol, other protocols need to be configured	Optional accessories
SB3	Anti-reopening button (for reclosing maintenance)	User-provided
SB4	Anti-reclosing button (for reclosing maintenance)	User-provided

Wiring diagram of secondary circuit of the 3H intelligent controller



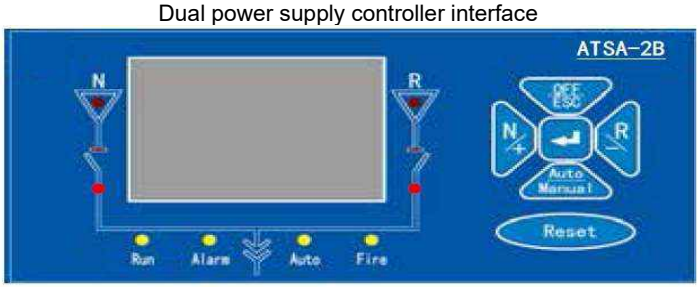
Wiring diagram of secondary circuit of the reclosing intelligent controller



8 Dual Power Supply Controller

8.1 Operation interface and symbol meaning of the dual power controller

Dual power supply controller interface



Key description

Name of key	Manual operation mode	Automatic operation mode
Auto/Manual	Selection key of manual operation mode	Selection key of automatic operation mode
OFF/ESC	Disconnection	ESC
N/+	Normal	+ (Up) key
R/-	Standby	- (Down) key
		Confirm (select) key
Reset	Controller reset	Controller reset

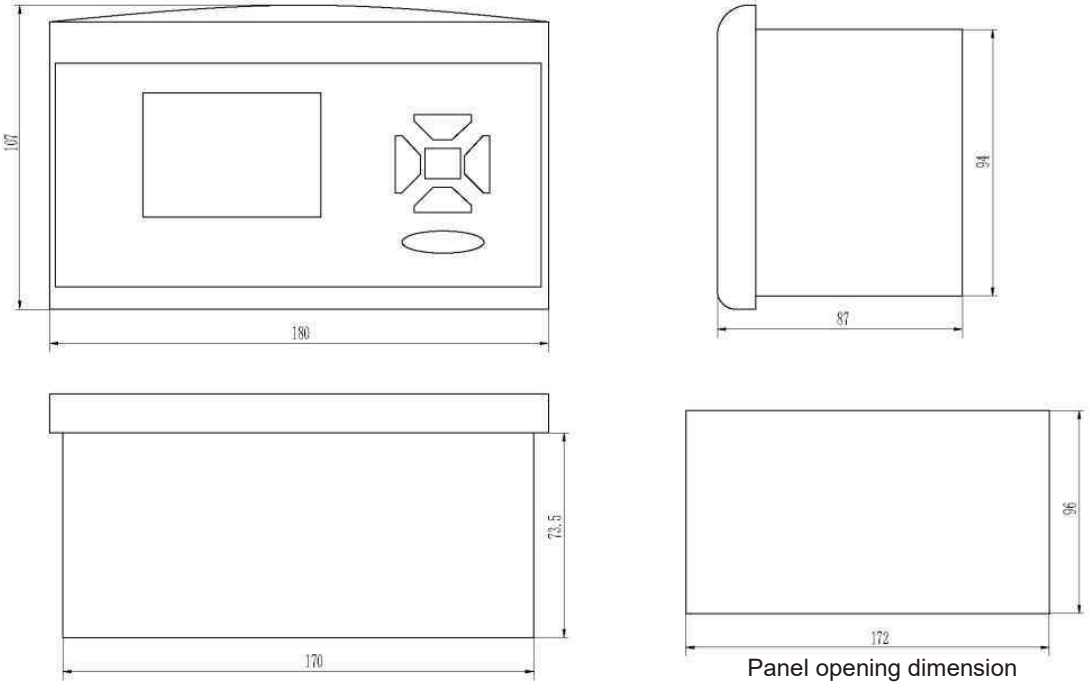
Indicator light description

Name	Definition	Notes
N (top)	ON: The common voltage is abnormal	
	OFF: The common voltage is normal	
R (top)	ON: The standby voltage is abnormal	
	OFF: The standby voltage is normal	
N (bottom)	ON: The dual power switch is in the common power supply position	N & R OFF: The dual power switch is located in the off position
	OFF: The dual power switch is not in the common power supply position	
R (bottom)	ON: The dual power switch is in the standby power supply position	
	OFF: The dual power switch is not in the standby power supply position	

Indicator light description

Name	Definition
Run	Flash: The controller is running
	Normally On or Off: The controller is in a fault state
Alarm	ON: The dual power supply has alarm information
	OFF: The dual power supply has no alarm information
Auto	ON: The dual power switch works in automatic operation mode
	OFF: The dual power switch works in manual operation mode
Fire	Fire signal indicator light

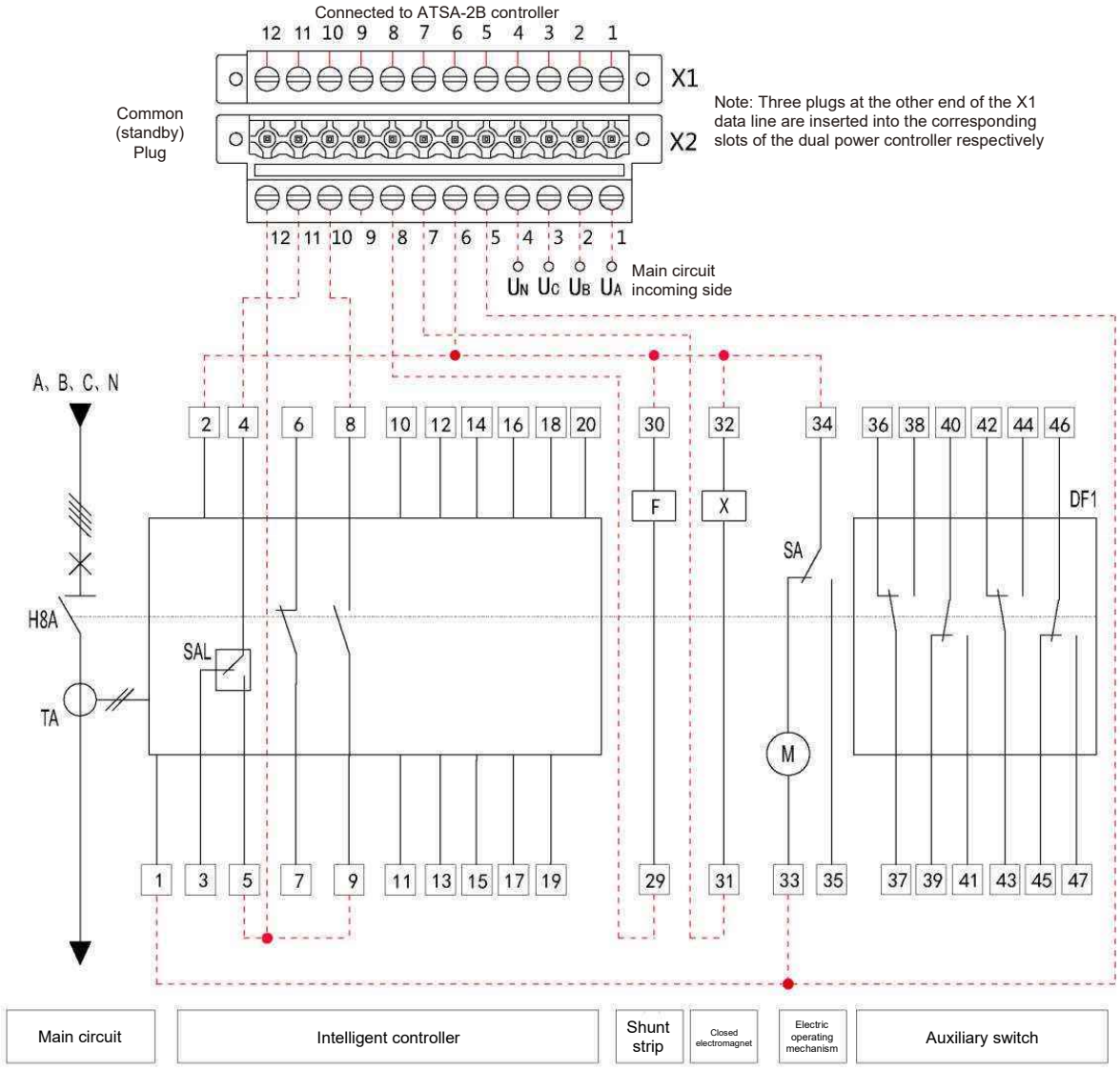
8.2 Outline and installation dimensions of the dual power supply controller



Panel opening dimension

Note: When installing, put the dual power controller into the opening of the panel and clamp the controller on the panel with four clips.
Important reminder: To ensure the normal operation of dual power supply products and prevent operation errors, the dual power supply controller products need to be equipped with corresponding mechanical interlock devices.

8.3 Wiring diagram of the dual power supply controller



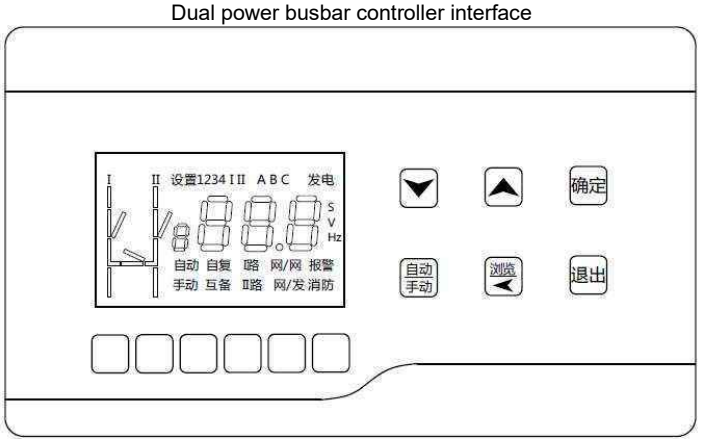
Terminal interpretation of the dual power supply controller

Terminal number	Interpretation	Terminal number of the circuit breaker
1–4	Connected to the main circuit, 1 connected to U_A, 2 connected to U_B, 3 connected to U_C, 4 connected to U_N	Connected to the main circuit incoming side by the users themselves
5	Control power output (L)	1, 3
6	Control power output (N)	2, 30, 32, 34
7	Signal output DO1, connected to the closed electromagnet	31
8	Signal output DO2, connected to the shunt strip	29
9		Standby
10	Signal input DI1,	8
11	Signal input DI2,	4
12	Signal input DIV-,	5, 9

Note 1: The dotted line refers to an external connection; except for 1-4# terminals which are connected to the incoming side of the main circuit, users only need to insert X1 and X2 plugs for other terminals;
Note 2: The common power supply and standby power supply are connected in the same way, just with the wires plugged into their corresponding ports;
Note 3: The working electric source of accessories can only be AC 230 V, which is powered by a dual power controller without an external power supply;
Note 4: The generator starting signal control terminals DO5B, COM (normally closed) or DO5A and COM (normally open) are wired by users themselves.

8.4 Meanings of operation interface and symbols of the dual power busbar controller

Dual power busbar controller interface



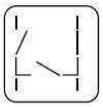
Dual power busbar controller key

Key	Meaning of setting state	Meaning of browsing state
▲	Select setting items or change parameters	Scroll to view browsing items
▼	Select setting items or change parameters	Scroll to view browsing items
确定	Enter the parameter change and confirm the change	No definition
自动手动	1. Switch the manual and automatic modes 2. Combine with the [Browse] key to enter the settings	No definition
浏览	Select single digits, deciles and percentiles when modifying numerical parameters	Enter browsing state
退出	Return to the previous level or exit the setting	Exit browsing state

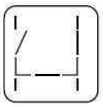
Manual operation key

Circuit I breaker closing
Contact breaker opening
Circuit II breaker opening

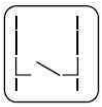
Circuit I breaker closing
Contact breaker opening
Circuit II breaker opening



Circuit I breaker closing
Contact breaker opening
Circuit II breaker opening



Circuit I breaker closing
Contact breaker opening
Circuit II breaker opening



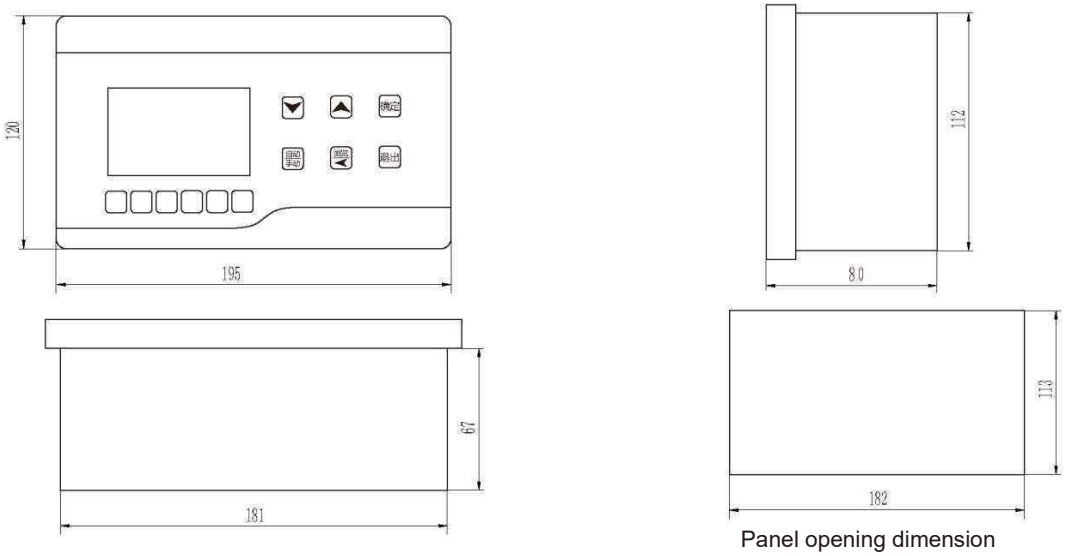
Circuit I breaker closing
Contact breaker opening
Circuit II breaker opening

Circuit I breaker closing
Contact breaker opening
Circuit II breaker opening

Controller status display

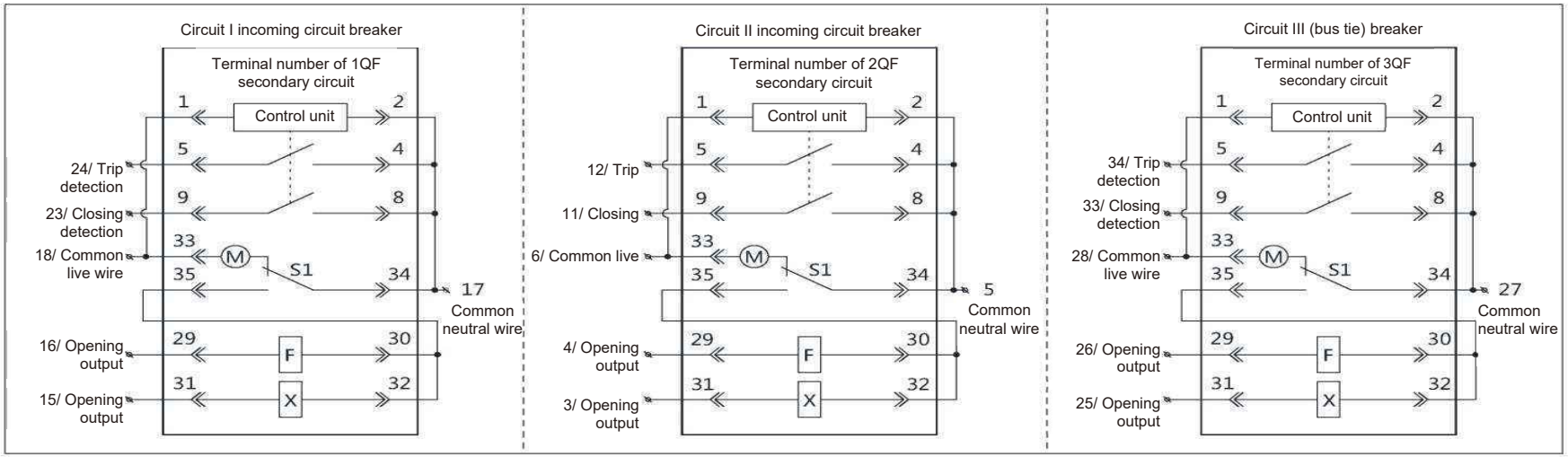
Settings 1, 2, 3, 4 — Setting 1: User primary settings; Setting 2: User advanced settings; Settings 3, 4: Factory settings;
I, II — I: Display Circuit I parameters; II: Display Circuit II parameters;
ABC — A: Display Phase A parameters; B: Display Phase B parameters; C: Display Phase C parameters;
Power generation — "Power Generation" is displayed after the generator is started, and "Power Generation" flashes when the generator is delayed to stop;
S V Hz — Display parameter units, which respectively represent seconds, volts and hertz;
8888 — Digital tube; small digital tube displays setting items, and large digital tube displays parameters;
Automatic — The controller is in automatic working mode;
Manual — The controller is in manual mode;
Automatic recovery — The controller is in the automatic charge and automatic recovery mode;
Mutual backup — The controller is in the automatic charge without automatic recovery mode;
Circuit I — Circuit I commonly used;
Circuit II — Circuit II commonly used;
Grid/Grid — Applicable power grid structure of the controller: Power grid — Power grid;
Grid/Generator — Applicable power grid structure of the controller: Power grid — Generator;
Alarm — Prompt an alarm;
Fire protection — Fire signal input is available.

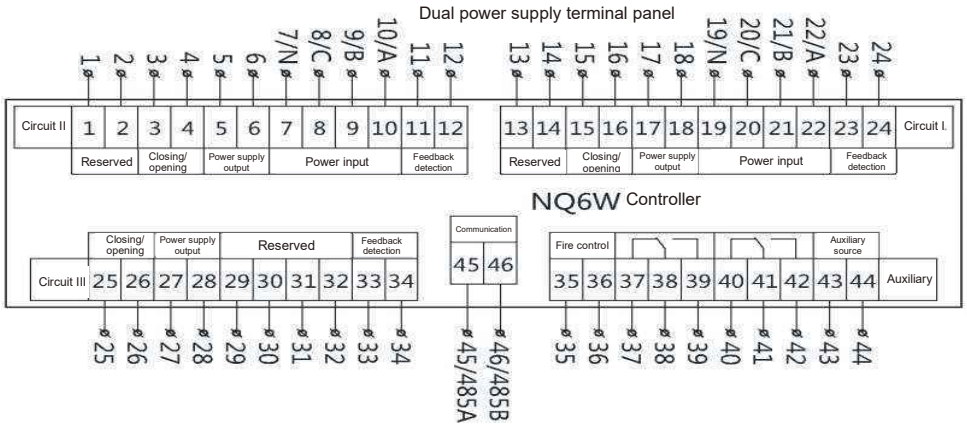
8.5 Outline and installation dimensions of the dual power supply busbar controller



Panel opening dimension

8.5 Wiring diagram of the dual power supply busbar controller



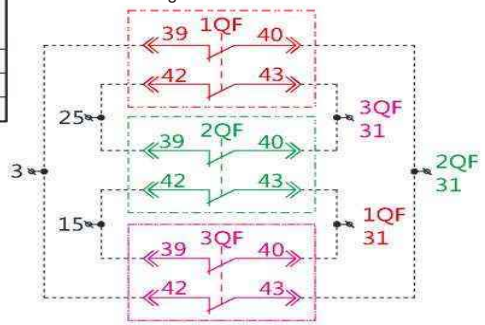


Supplementary explanation

35、36	Fire signal input (default 24 V/AC, DC)
37	Programmable relay 2
38	
39	
40	Programmable relay 1
41	
42	
43、44	
45	Communication 485A
46	Communication 485B

Note 1: The generator starting signal control terminals 37, 38 (normally closed) or 38, 39 (normally open) are wired by users themselves;
Note 2: If the closing electrical interlock is required, an interlock auxiliary switch shall be connected in series between the closing output of the controller and the closing electromagnet of the circuit breaker. The circuit on the dotted line is wired by the user.

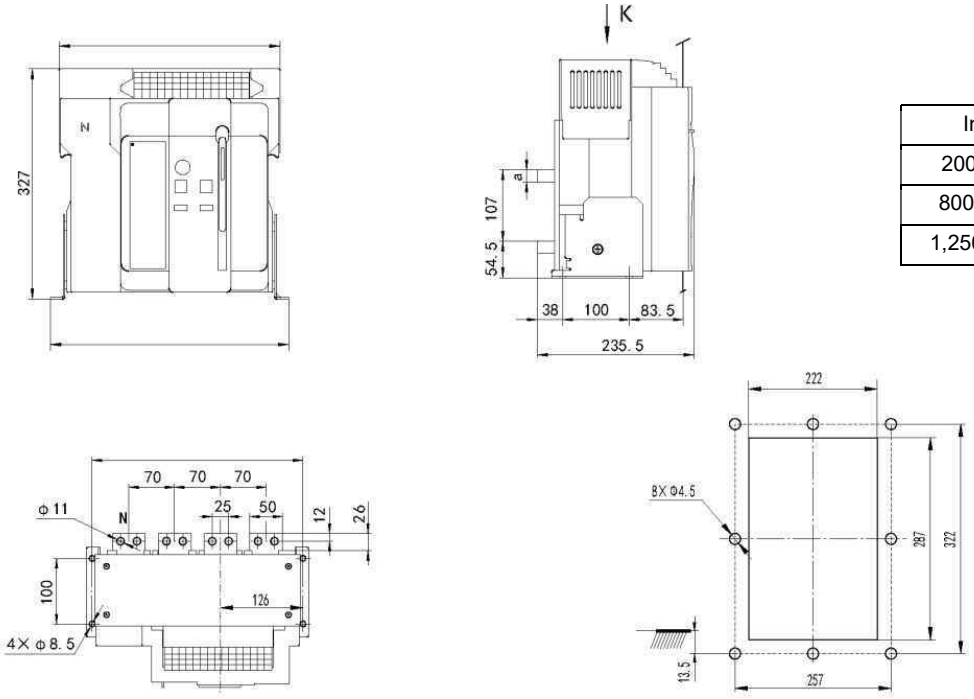
Closing electrical interlock



Interpretation of symbols: 1QF indicates Circuit I breaker; 2QF indicates Circuit II breaker; 3QF indicates bus tie breaker; F indicates shunt strip; X indicates closed electromagnet.
Note: Box I, II and III contain the terminal numbers of the circuit breaker secondary circuit, those outside the box are the corresponding terminal numbers of the dual power busbar controller, and those outside the box are the user connections.
Important reminder: To ensure the normal operation of dual power supply products and prevent operation errors, the dual power supply controller products need to be equipped with corresponding mechanical interlock devices.

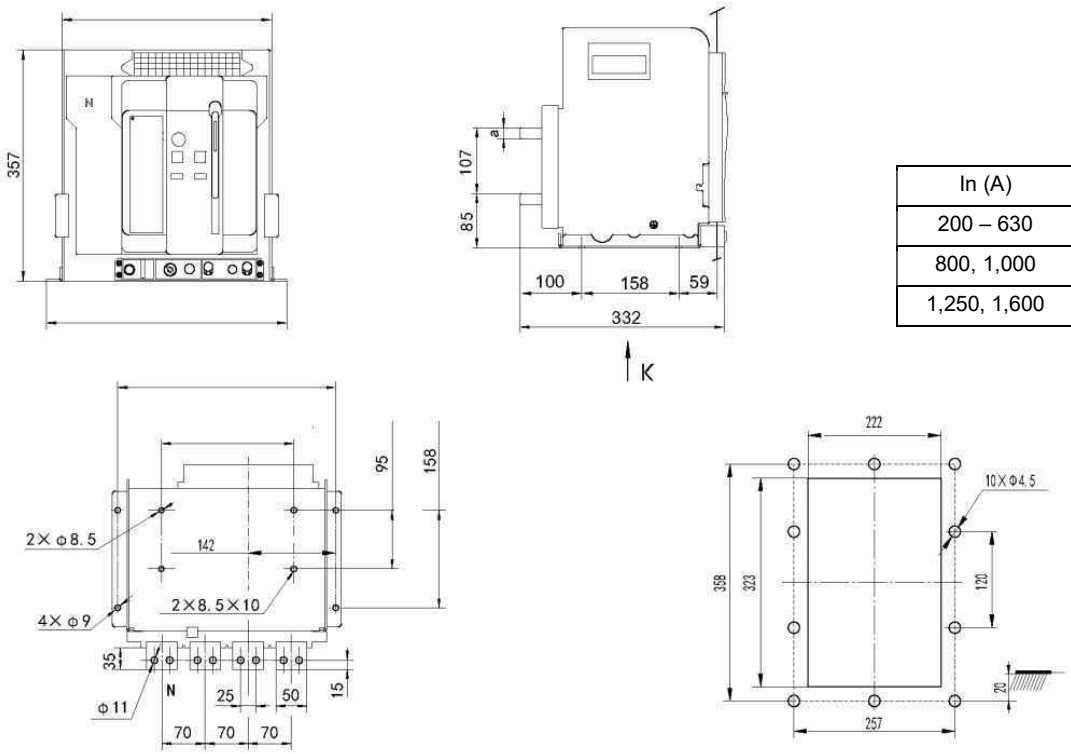
9 Outline and installation dimensions of the circuit breaker (unit: mm)

9.1 Outline and installation dimensions of H8A-1600 Fixed Circuit Breaker



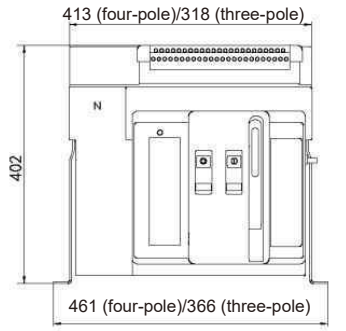
In (A)	a (mm)
200 – 630	6
800, 1,000	10
1,250, 1,600	18

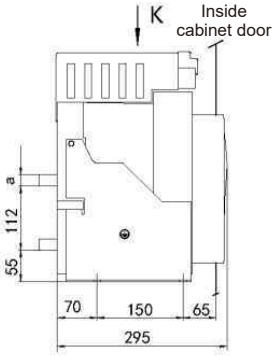
9.2 Outline and installation dimensions of H8A-1600 Drawer Mode Circuit Breaker



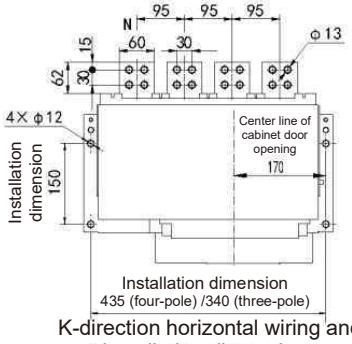
In (A)	a (mm)
200 – 630	6
800, 1,000	10
1,250, 1,600	18

9.3 Outline and installation dimensions of H8A-2500 Fixed Circuit Breaker

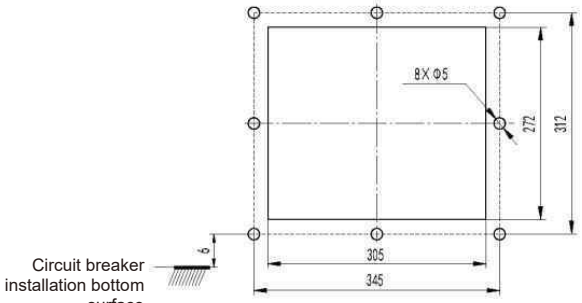




In (A)	a (mm)
630, 800	10
1,000, 1,250, 1,600	15
2,000, 2,500	20

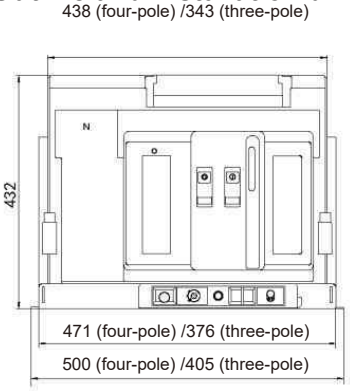


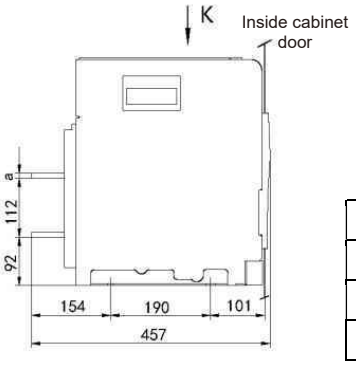
K-direction horizontal wiring and installation dimensions



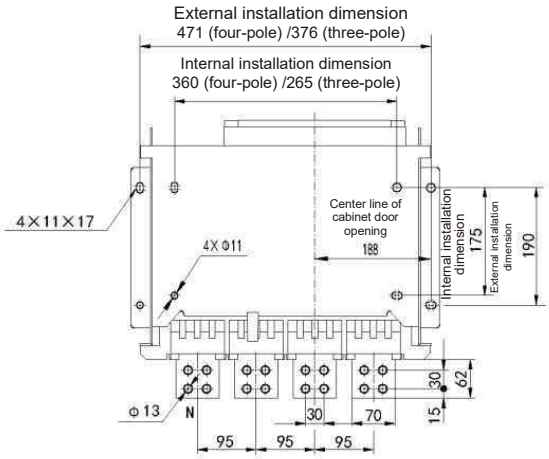
Cabinet door opening dimensions

9.4 Outline and installation dimensions of H8A-2500 Drawer Mode Circuit Breaker

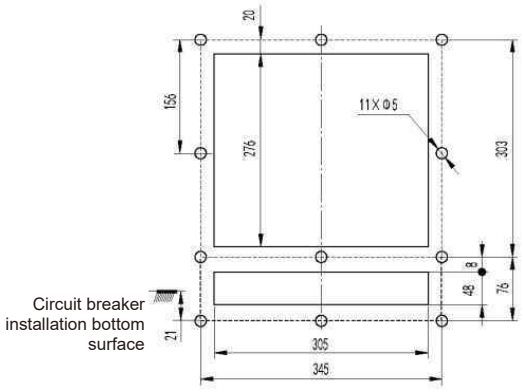




In (A)	a (mm)
630, 800	10
1,000, 1,250, 1,600	15
2,000, 2,500	20

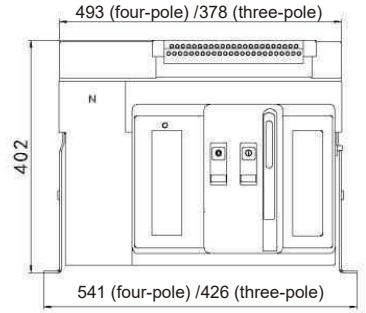


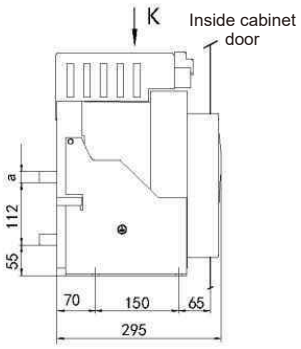
K-direction horizontal wiring and installation dimensions



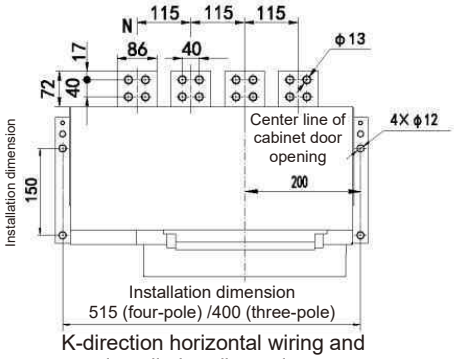
Cabinet door opening dimensions

9.5 Outline and installation dimensions of H8A-4000 Fixed Circuit Breaker

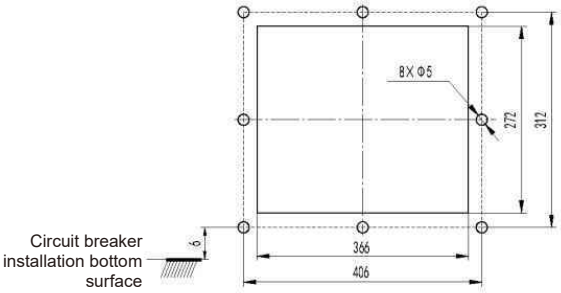




In (A)	a (mm)
2,500	20
2,900, 3,200, 4,000	30

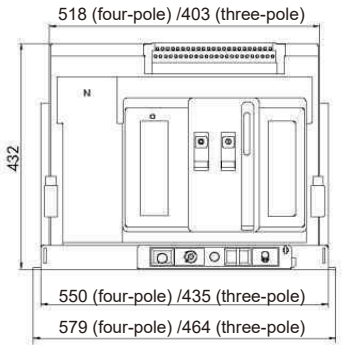


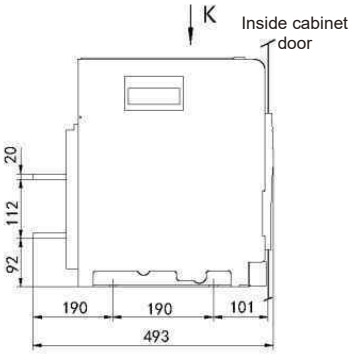
K-direction horizontal wiring and installation dimensions



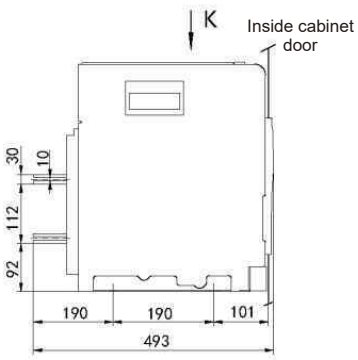
Cabinet door opening dimensions

9.6 Outline and installation dimensions of H8A-4000 Drawer Mode Circuit Breaker

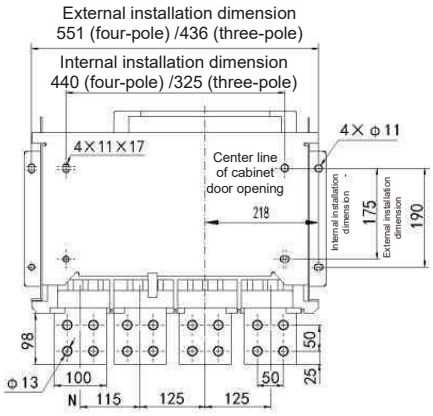




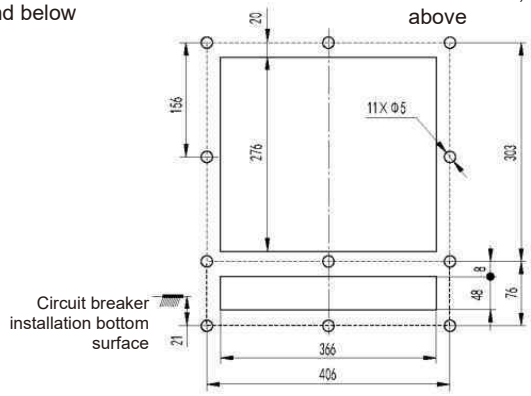
Busbar dimensions of 2,500 A and below



Busbar dimensions of 2,500 A above

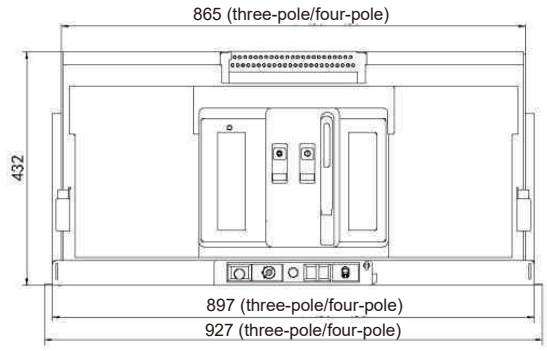


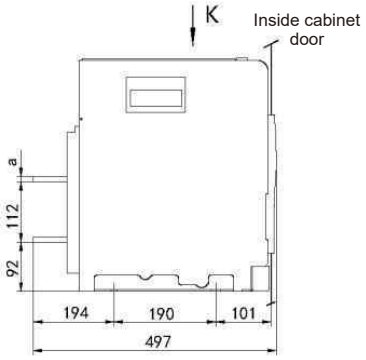
K-direction horizontal wiring and installation dimensions

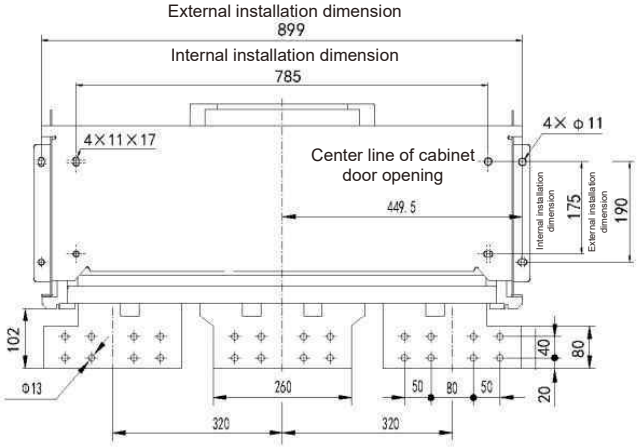


Cabinet door opening dimensions

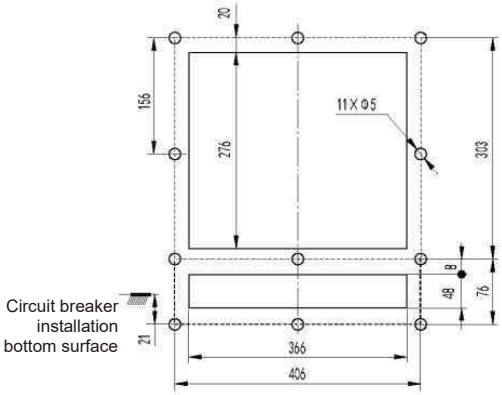
9.7 Outline and installation dimensions of H8A-6300 Drawer Mode Circuit Breaker



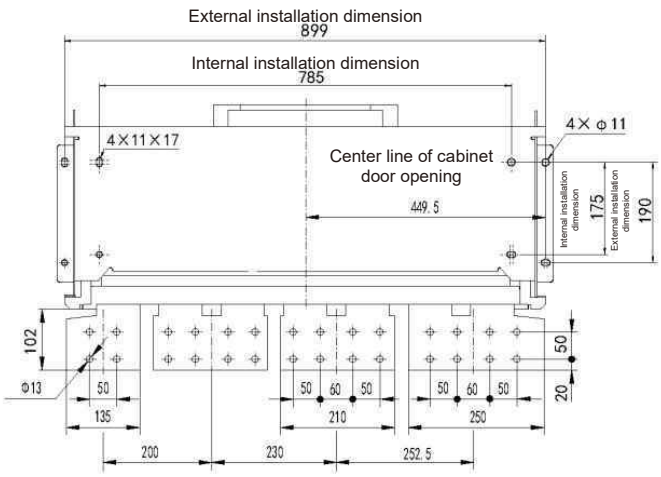




K-direction three-pole horizontal wiring and installation dimensions



Cabinet door opening dimensions



K-direction four-pole horizontal wiring and installation dimensions

In (A)	a (mm)
4,000, 5,000	20
6,300	30

10 Circuit Breaker Installation Operation

10.1 Proper placement after unpacking

- Place the box correctly according to the instruction of the packing box, and screw out the self-tapping screw at the lower end of the outer box to remove the box.
- The circuit breaker can be removed after the bolt fixing the circuit breaker is screwed out. For the circuit breaker fixed in the drawer seat, the main body of the circuit breaker shall be moved out of the drawer seat through cranking, and then the bolt for fixing the drawer seat can be screwed out to remove the drawer seat.
- The removed circuit breaker shall be placed correctly as shown in the figure to avoid damaging the circuit breaker.

Wrong placement

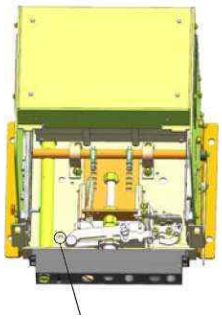
Correct placement

10.2 Pre-installation inspection

- Check whether the parameters on the label of the circuit breaker are consistent with the good ordered.
- Before installation, it shall be confirmed that the control power supply voltage is consistent with the circuit breaker accessory voltage.
- Before installing the circuit breaker, check the insulation resistance of the circuit breaker with a 1,000 V megger, which shall not be less than 20 MQ when the ambient temperature is 20 °C ± 5 °C and the relative humidity is 50% to 70%. Otherwise, it shall be dried to make the insulation resistance meet the requirements before use.
  The test locations of the insulation resistance: (1) between phases as well as between phases and frames when the circuit breaker is closed; (2) between the incoming and outgoing lines of each phase when the circuit breaker is disconnected.

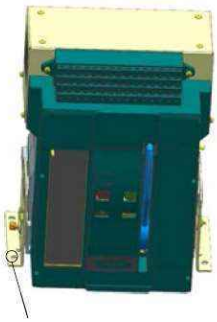
10.3 Installation

- Mode I for the installation of the drawer mode circuit breaker: Move the main body of the circuit breaker out of the drawer seat through cranking, install the inner bottom plate of the drawer seat (inner installation size) on the guide rail of the distribution cabinet, and fasten it with four M8 (1,600 A shell frame) or M10 (2,500 A or above shell frame) bolts and gaskets with the tightening torque of (15–20) N.m or (30–36) N.m.
- Mode II for the installation of the drawer mode circuit breaker: Instead of moving the main body of the circuit breaker out of the drawer seat, directly install the supports (external installation size) on both sides of the circuit breaker on the guide rail of the distribution cabinet, and fasten them with four M8 (1,600 A shell frame) or M10 (2,500 A or above shell frame) bolts and gaskets with the tightening torque of (15–20) N.m or (30–36) N.m.
- The installation of the fixed circuit breaker is the same as the installation mode II of the drawer mode circuit breaker.



Internal installation position of the drawer mode circuit breaker

External installation position of the drawer mode circuit breaker



Installation position of the fixed circuit breaker

10.4 Busbar installation and wiring

- When installing the circuit breaker, sufficient space shall be provided to ensure good air circulation. The spacer between the upper and lower ends of the circuit breaker must be made of non-magnetic materials to avoid the formation of the magnetic circuit that will affect the use of the product.
- The pivot shall be fixed on the distribution cabinet rack to ensure that the terminal of the circuit breaker shall not bear the weight of the external busbar of the user (this support shall be installed near the terminal).

Busbar wiring method

- In order not to affect the normal use of the circuit breaker, it is recommended to use T2 copper busbar for the user's main circuit wiring busbar. See Table "Rated Current of Circuit Breaker Corresponding to the Cross-sectional Area of External Conductor" for busbar specifications.
- Grade required for the bolt: ≥ 8.8.
- Too much or too little torque of bolt tightening is not allowed. If the torque is too large, the bolt will slip easily, which will not play the role of fastening; if the torque is too small, it is easy to cause poor contact between the circuit breaker terminal and the user's busbar; they will cause excessive temperature rise. The torque of bolt M10 is 42 N.m; the torque of bolt M12: 50 N.m.
- After the circuit breaker is installed, the electric gap between different electrified bodies as well as between electrified bodies and other metal parts shall not be less than 20 mm.

11 Functions and Features of Accessories

H8A-1600 Closed Electromagnet

H8A-2500–6300 Closed Electromagnet

■ Closed Electromagnet

When the circuit breaker completes the energy storage operation and is in the normal opening state, the circuit breaker can be quickly closed by remote control of the closing electromagnet.

Working voltage Us	AC230V	AC400V	DC220V	DC110V
Action voltage range	(85–110) %Us			
Starting current	1.3A	0.7A	1.3A	2.5A
Pick-up time	≤60ms			
Instantaneous power consumption	300VA		300W	

H8A-1600 Shunt Strip

H8A-2500–6300 Shunt strip

■ Shunt Strip

When the circuit breaker is in the closing state, the circuit breaker can be quickly disconnected by the remote control of shunt strip.

Working voltage Us	AC230V	AC400V	DC220V	DC110V
Action voltage range	(70–110) %Us			
Starting current	1.3A	0.7A	1.3A	2.5A
Pick-up time	≤30ms			
Instantaneous power consumption	300VA		300W	

H8A-1600 Undervoltage Release (overvoltage protection optional)

■ Undervoltage Release

When the undervoltage release is not powered, the circuit breaker cannot be closed;

Working voltage Ue	AC230V AC400V
Action voltage range	(35–70) %Ue
Reliable closing voltage range	(85–110) %Ue
Voltage range in which the circuit breaker cannot be closed	≤35%Ue
Power consumption	20VA
Delay tripping time	Instantaneous, 0.5 s, 1 s, 3 s, 5 s

Note 1: Within 1/2 delay tripping time, when the working voltage returns to more than 85% Ue, the circuit breaker will not be disconnected.

Note 2: In lightning-prone areas and power grids with unstable power supply voltage, it is recommended to use undervoltage release with time delay to prevent the circuit breaker from being disconnected due to short-term voltage drop.

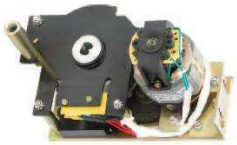
H8A-2500–6300 Undervoltage Release

Phase Spacer Plate

■ Phase Spacer Plate

It is vertically installed between the busbars of each phase of the circuit breaker, which is used to enhance the insulation ability between phases of the circuit breaker.

H8A-1600 Energy Storage Motor



H8A-2500~6300 Energy Storage Motor

■ Energy Storage Motor

It is used to realize electrical energy storage of the circuit breaker and automatic energy storage again after the circuit breaker is closed, so that the circuit breaker can be closed again immediately after the interruption.

Working voltage Us	AC230V	AC400V	DC220V	DC110V
Working voltage range	(85–110) %Us			
Energy storage time	(5–7) s			
H8A-1600 power consumption	75VA		75W	
H8A-2500 power consumption	85VA		85W	
H8A-4000 power consumption	110VA		110W	
H8A-6300 power consumption	150VA		150W	

Note: Manual energy storage operation can also be performed during circuit breaker maintenance.

H8A-1600 Auxiliary Switch

H8A-2500~6300 Auxiliary Switch

■ Auxiliary Switch

Default configuration: Conversion 4 NO & 4 NC

Other types: Independent four normally open & four normally closed, conversion six normally open & six normally closed, independent five normally open & five normally closed, and independent six normally open & six normally closed.

Rated working voltage	AC230V	AC400V	DC220V	DC110V
Agreed heating current	6A			
Rated control capacity	300VA		60W	

Interruption locking device

■ Interruption Locking Device

Lock the opening button of the circuit breaker in the pressed position, and the circuit breaker cannot be closed at this time.

Note 1: When it is required to pull out the key, you must hold down the opening button and then rotate counterclockwise to pull out the key.
Note 2: The following list of power supply modes is for reference only. The installation and interlock can be performed according to the needs of the actual power supply system on site, or the manufacturer can be consulted for negotiation.

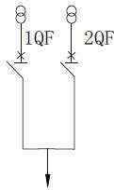
Mode I: One power supply & one load interlock

Circuit diagram	Possible operation mode
	QF 0 1

One lock and one key: A circuit breaker is equipped with a lock and a key, and it is not allowed to be closed when locked.
Note 1: 0 indicates that the circuit breaker is open; 1 indicates that the circuit breaker is closed.

Mode II: Two power supplies & one load interlock

Circuit diagram



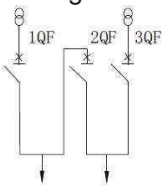
Possible operation modes

1QF	2QF
0	0
1	0
0	1

Two locks and one key: Two circuit breakers are equipped with two identical locks and one key, and only one circuit breaker is allowed to be closed.

Mode III: Two power supplies & two load interlocks

Circuit diagram



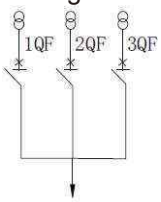
Possible operation modes

1QF	2QF	3QF
0	0	0
1	0	0
0	0	1
1	1	0
1	0	1
0	1	1

Three locks and two keys: Three circuit breakers are equipped with three identical locks and two keys, and only two circuit breakers are allowed to be closed.

Mode IV: Three power supplies & one load interlock

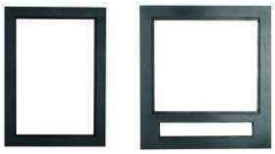
Circuit diagram



Possible operation modes

1QF	2QF	3QF
0	0	0
1	0	0
0	1	0
0	0	1

Three locks and one key: Three circuit breakers are equipped with three identical locks and one key, and only one circuit breaker is allowed to be closed.



Door frame

■ Door Frame

The door frame is installed on the door of the distribution cabinet where the circuit breaker is installed, which plays a sealing and aesthetic role. The protection level of the door frame can reach IP40 level.

Drawer Operating Padlock

■ Drawer Operating Padlock

When the main body of the drawer mode circuit breaker is in the "disconnection" position, the pull-out card board is locked with a padlock. The main body cannot be moved to the "test" or "connection" position through cranking after locking. (Users shall prepare padlocks by themselves.)

Relay Module

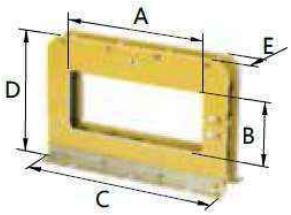
■ Relay Module

Input voltage: DC 24 V
Contact capacity: AC 250 V 10 A; DC 28 V 10 A
When the opening/closing load capacity of the control circuit breaker is large, it needs to be converted by the relay module before control.
There are two installation modes: (1) 35 mm standard guide rail, (2) direct installation.

Position Door Interlock

■ Position Door Interlock

When the main body of the drawer mode circuit breaker is in the "test" or "connection" position, the cabinet door is forbidden to open; when the main body of the circuit breaker is in the "disconnection" position, the cabinet door is allowed to open.



RCD Residual Current Transformer

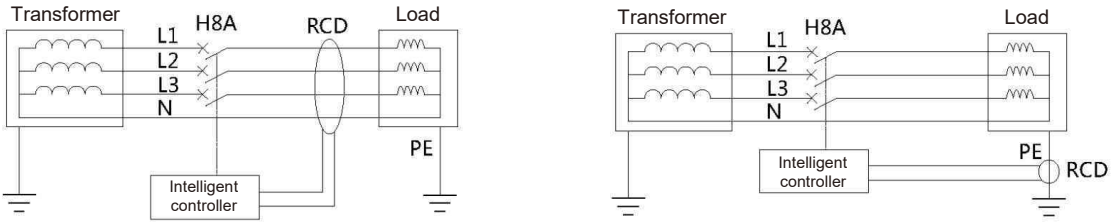
■ RCD Residual Current Transformer

When the grounding protection is residual current type, a zero-sequence current transformer which is suitable to protect the small current needs to be added. The signal sampling mode is the sum of phase current vectors.

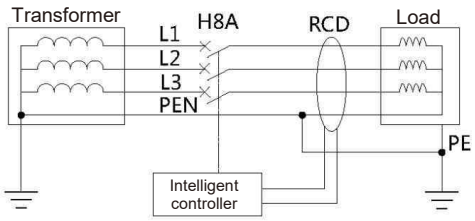
Outline and installation dimensions (unit: mm)

Model	A	B	C	D	E	Ratio	Applicable products
BH-0.66CT-120×50	121.5	52	215	140	83	30A/0.3A	Current grade
BH-LMB-280×120	280	120	380	250	72		H8A-1600
BH-LMB-370×120	370		465				H8A-2500
BH-LMB-390×120	390		485				
BH-LMB-480×120	480		575				Customized

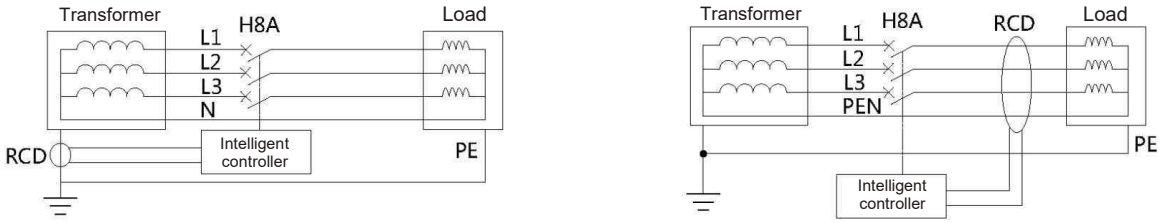
Schematic diagram of installation position of the leakage protection transformer in different grounding systems



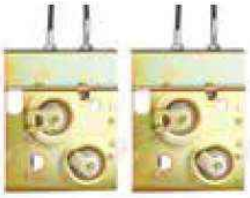
Schematic diagram of installation position of RCD Transformer in the TT system



Schematic diagram of installation position of RCD Transformer in the TN-C-S system



Schematic diagram of installation position of RCD Transformer in the TN-S system



Mechanical interlock

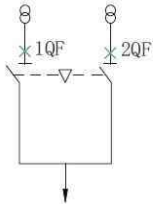
■ Mechanical Interlock

Cable interlock of two flat circuit breakers or lever interlock of two stacked circuit breakers

Cable interlock or lever interlock of two circuit breakers

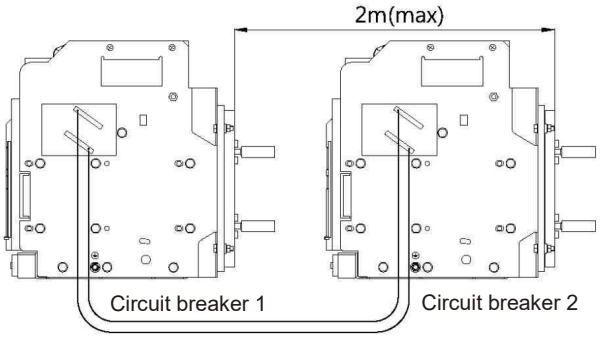
Two power supplies & one load can only close one circuit breaker

Circuit diagram



Possible operation modes

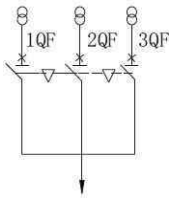
1QF	2QF
0	0
0	1
1	0



Cable interlock or lever interlock of three circuit breakers

Three power supplies & one load can only close one circuit breaker

Circuit diagram

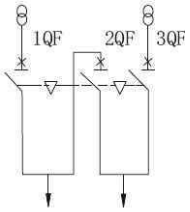


Possible operation modes

1QF	2QF	3QF
0	0	0
1	0	0
0	1	0
0	0	1

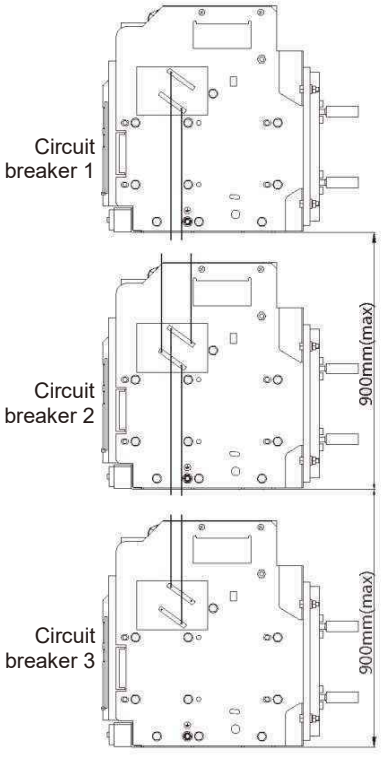
Two power supplies & two loads can close two circuit breakers at most

Circuit diagram

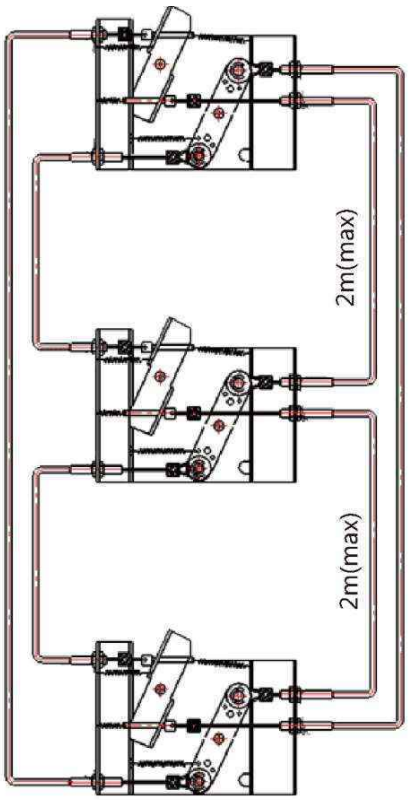


Possible operation modes

1QF	2QF	3QF
0	0	0
1	0	0
0	0	1
1	1	0
0	1	1
1	0	1



Schematic diagram of the triple lever interlock



Schematic diagram of the triple cable interlock

QF: Circuit breaker

Note: The transition arc at the interlock bending of THE steel cable shall not be less than R120 mm

12 Common Faults and Troubleshooting Methods

Malfunctions	Possible causes	Inspection and troubleshooting methods
The circuit breaker cannot be closed.	a) The undervoltage release is not powered on. b) The red button on the controller panel is not reset after the intelligent controller acts. c) The operating mechanism does not store energy or does not store energy completely. d) The main body of the drawer mode circuit breaker is not in the "connection" or "test" position. e) "Off position key lock" is locked.	a) Check the circuit and turn on the power supply of the undervoltage release. b) Press the reset button. c) Manually or electrically store energy for the operating mechanism. d) Move the main body of the circuit breaker to the "connection" or "test" position through cranking. e) Unlock the key lock with a special key.
The circuit breaker cannot store energy electrically.	a) The energy storage motor is not powered on. b) The power supply is of low voltage.	a) Check the circuit and turn on the power supply. b) Check that the working voltage shall be greater than 85%Us.
The closed electromagnet cannot close the circuit breaker.	a) The closed electromagnet is not powered on. b) The power supply is of low voltage.	a) Check the circuit and turn on the power supply. b) Check that the working voltage shall be greater than 85%Us.
The shunt strip cannot disconnect the circuit breaker.	a) The shunt strip is not powered on. b) The power supply is of low voltage.	a) Check the circuit and turn on the power supply. b) Check that the working voltage shall be greater than 70%Us.
The fault current exceeds the long time delay, short time delay and instantaneous setting value, but only instantaneous action occurs, without short time delay and long time delay actions.	The set of long-time delay, short-time delay, and instantaneous setting value is unreasonable, and they are set in the same current range.	Reset the current action range according to the principle of Ir < Isd < Ii.
Frequent trip of the circuit breaker	On-site overload operation causes overload protection trip. However, the overload thermal memory function fails to be powered off in time, so the circuit break is closed again.	Restart the intelligent controller after power failure, or close the circuit breaker after the setting time of thermal memory.
The circuit breaker cannot be inserted by cranking for the drawer mode circuit breaker	The guide rail or main body of the drawer mode circuit breaker is not fully pushed, or the padlock is not removed.	Fully push the guide rail or circuit breaker body, or remove the padlock.
The drawer mode circuit breaker cannot be pulled out when the main body is in the off position	a) The crank is not pulled out. b) The circuit breaker fails to fully reach the "disconnection" position.	a) Pull out the crank. b) Move the circuit breaker completely to the "disconnection" position.

13 Order Specification

Unit	Contact person	Tel.	Order quantity	(set) Order date

Product model	H8A-1600	H8A-2500	H8A-4000	H8A-6300
Rated current	□200 □400 □630 □800 □1000 □1250 □1600	□630 □800 □1000 □1250 □1600 □2000 □2500	□2500 □2900 □3200 □3600 □4000	□4000 □5000 □6300
Number of poles	□Three-pole □Four-pole			
Installation mode	□Fixed mode □Drawer mode			

Selection of intelligent controller	Type	□2M □3M (liquid crystal) □3H (□ Conventional □ Reclosing □ Temperature control)	
	Controller voltage	□AC230V □AC400V □DC220V □DC110V □DC24V	
	Protection parameter settings	Default factory settings: Ir = 1 In, Tr = 19.2 s; Fixed time Isd = 8Ir, Tsd = 0.4 s; Inverse time Isd = 4Ir; Ii = 12 In; Ig OFF {open the default value Ig = In, inverse time shear coefficient k = OFF, Tg=0.4 s}	
		Long time delay protection Ir	Ir = _____Tn (selected in 0.4–1.0 or OFF) Tr (1.5 Ir) = _____ s (selected in 8, 12.8, 19.2, ..., 1,000)
		Short-circuit short time delay Protection Isd	Isd = ____Ir (selected in 1.5–15 or OFF) □ Fixed time Tsd = _____s (selected in 0.1–0.4);
		Short-circuit instantaneous protection Ii	Ii = _____ In (selected in 1.0–20 or OFF), with the maximum of 100 kA
		Grounding protection Ig	Ig = _____ In (selected in 0.2–1.0 or OFF) Tg= _____ s (selected in 0.1–1.0) Inverse time shear coefficient k=_____ (selected in 1.5–6 or OFF)
	Optional functions	□Voltage measurement □Frequency measurement □Voltage imbalance rate measurement □Phase sequence detection □Power measurement □Power factor measurement □Electrical energy measurement □ZSI function □Harmonic measurement □Overvoltage protection □Undervoltage protection □Voltage unbalance protection □Overfrequency protection □Underfrequency protection □Phase sequence protection □Reverse power protection □Demand value protection □Ground current type grounding protection □Residual action current protection □Load monitoring function □Neutral line protection □Demand value measurement (current and power) □DI input function □DO output function □Communication function: Modbus protocol (default, available for H type)	
Standard configuration accessories	Closed Electromagnet	□AC230V □AC400V □DC220V □DC110V	
	Shunt strip	□AC230V □AC400V □DC220V □DC110V	
	Energy Storage Motor	□AC230V □AC400V □DC220V □DC110V	
	Auxiliary switch	□Conversion 4 NO & 4 NC □Independent 4 NO & 4 NC □Conversion 6 NO & 6 NC □Independent 5 NO & 5 NC □Special form	
Optional accessories	Undervoltage release	□AC230V □AC400V	
		□Instantaneous (default) □0.5 s □1 s □3 s □5 s	
	Opening locking device	□One circuit breaker with a lock and a key □ Two circuit breakers with two locks and a key □Three circuit breakers with three locks and two keys □ Special form (customized according to user's requirements)	
	Mechanical interlock	Two circuit breakers □Lever interlock (up and down interlock) □Cable interlock	
		Three circuit breakers □Lever interlock (up and down interlock) □Cable interlock (Note: two closing & one opening or one closing & two opening)	
	Dual power supply controller	□Two power supplies □Three power supplies □Two power supplies + busbar coupler (Note: Please indicate if fire fighting or communication functions are required)	
	Others	□Residual current transformer □Neutral current transformer □Grounding transformer □Power adapter □Relay module □Protocol conversion module (Profibus-DP, Device Net) □Electric three-position indication of drawer seat □Opening/closing button lock □Secondary terminal cover □Counter □Energy storage ready indication □Door interlock	

Note 1: If the user has other special requirements when ordering, please consult with the manufacturer in advance.
Note 2: The costs of the circuit breaker's optional function and accessories are not included in the standard configuration of the circuit breaker, and therefore will be calculated separately.
Note 3: H8A-1600 auxiliary switch only has two types, i.e. conversion four normally open & four normally closed, and conversion six normally open & six normally closed.

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Certificate

Name:	Intelligent Universal Circuit Breaker
Model:	H8A
Inspector:	检 03
Date:	See product label or QR code

The product meets the requirements of GB/T 14048.2 and is allowed to leave the factory after passing the inspection.

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HUANYU HIGH-TECH CO., LTD.

⚠ Before installing and using the product, please read the instruction carefully and well keep it for future reference.

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