HUW1

Series Universal Circuit Breaker

I. Scope of Application

The HUW1 Series Intelligent Universal Circuit Breaker (hereinafter referred to as “circuit breaker”) is suitable for distribution networks with AC 50 Hz, rated working voltage of 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 lines and power equipment from faults such as overload, undervoltage, overvoltage, current voltage imbalance, 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 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.

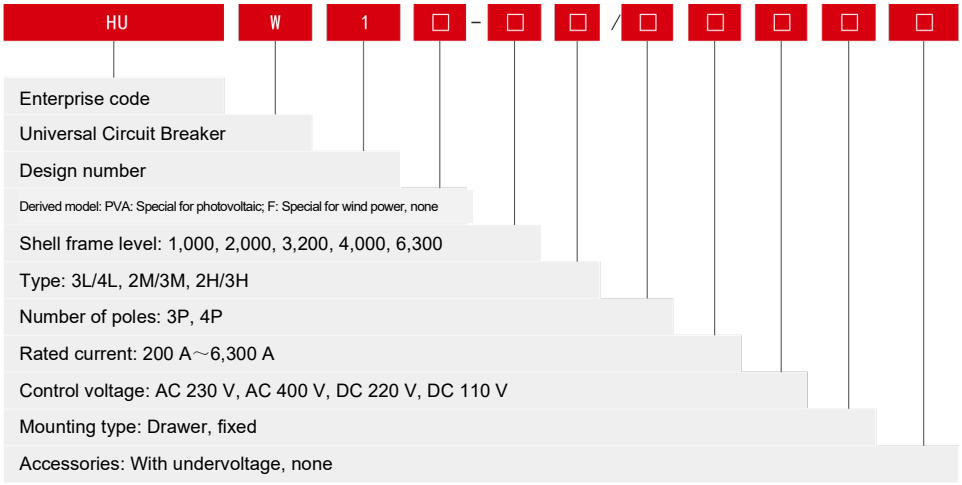
The core components of circuit breakers adopt intelligent controllers, which can realize accurate selective protection, so as to avoid unnecessary power failure and enhance the reliability, continuity and safety of the power supply. These components can also be equipped with open communication interfaces 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.

HUW1PVA and HUW1F, the derivative products of this series of circuit breakers, have passed the ultra-high/-low temperature environment test and the "three prevention" related test, and are suitable for photovoltaic and wind power generation systems with AC 50 Hz, rated voltage up to 690 V and rated current up to 3,200 A. They are mainly used for power distribution, power feeding and power generation protection, so as to protect circuits and power supply equipment from faults such as overload, undervoltage, overvoltage, current voltage imbalance, short circuit and grounding fault.

The product complies with GB/T 14048.2 *Low-voltage Switchgear and Controlgear — Part 2: Circuit breakers.*

II. Model Description



III. Normal Operating and Installation Conditions

1. Ambient air temperature -5°C – +40°C (-40°C – +70°C for HUW1F and HUW1PVA). The average temperature within 24 hours shall not exceed +35°C.
2. Altitude: The altitude of the installation location shall not exceed 2,000 meters.
3. Atmospheric conditions: The relative atmospheric humidity does not exceed 50% when the maximum temperature is +40°C, and a higher relative humidity is allowed at a lower temperature. For example: The humidity is 90% at 20°C, and special measures shall be taken for occasional condensation due to the temperature change.
4. Contamination grade: Grade 3.
5. Installation category: The installation category of the main circuit breaker, undervoltage trip coil and primary coil of the power transformer is IV, and the other auxiliary circuits and control circuits are III.
6. Use category: Class B.
7. Installation conditions: The circuit breaker shall be installed according to the requirements of this manual. 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.

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IV. Classification

1. According to the installation mode: Fixed; drawer.
2. According to the operation mode: Electrical operation; manual operation (for overhaul and maintenance).
3. According to the number of poles: Three-pole and four-pole.
4. According to the performance of intelligent overcurrent controller: Type H (for communication); Type M (ordinary); Type L (economical). The functions of the three types of controllers are shown in Table 1.

Table 1

Controller type	DIP type (L)	Digital type (M)	Liquid crystal type (M, H)	
Standard functions	● Long time delay protection ● Short-circuit instantaneous protection ● Parameter setting ● Indicator light display ● Fault self-diagnosis ● Fault memory ● Thermal memory ● Test trip	● 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)	● 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 imbalance protection ● Grounding protection (vector sum type) ● Neutral phase protection ● Load monitoring (Mode I) ● Undervoltage protection ● Overvoltage protection ● Voltage imbalance protection ● Communication function (H type) ● 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	● Short time delay protection ● Grounding protection (vector sum type) ● Alarm signal output	● Contact output of four groups of signals ● MCR and HSISC protection ● Menu functions Measurement: voltage, frequency, power factor, active power, active watt hour ● Power grid parameter history recording	● MCR and HSISC protection ● Output 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 protection	● Zone selective interlock ● Overfrequency protection ● Phase sequence protection ● Reverse power protection ● Reclosing ● Underfrequency protection

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V. Technical Data and Performance

1. See Table 2 for basic parameters of the circuit breaker

Table 2

Type and shell frame current (Inm)		HUW1-1000	HUW1-2000 HUW1F-2000 HUW1PVA-2000	HUW1-3200 HUW1F-3200 HUW1PVA-3200	HUW1-4000	HUW1-6300
Rated current In (A)		200, 400, 630 800, 1,000	630, 800, 1,000, 1,250, 1,600, 2,000	2,000, 2,500 2,900, 3,200	2,500, 2,900 3,200, 4,000	4,000, 5,000 6,300
Neutral rated current In (A)		100% In	100% In	100% In	100% In	50% In
Rated working voltage Ue (V)		AC400/690				
Frequency		50 Hz				
Number of poles		3P/4P				
Rated impulse withstand voltage Uimp (kV)		AC 12				
Rated insulation voltage Ui (V)		AC 1,000				
Power frequency withstand voltage (V)		AC 3,500				
Rated ultimate short-circuit breaking capacity Icu (kA)	AC400V	42	85	100	100	120
	AC690V	30	50	65	70	85
Rated operating short-circuit breaking capacity Ics (kA)	AC400V	30	65	65	100	100
	AC690V	20	50	50	70	75
Rated short-time withstand capacity Icw/1 s (kA)	AC400V	15	65	65	100	100
	AC690V	15	50	65	70	85
Use category		**B**				
Full breaking time (without additional delay)		≤ 30 ms				
Closing time		≤ 70 ms				
Electrical life (times) ≤ 2,500 1 time/3 min > 2,500 1 time/6 min	400V	15,000	15,000	12,500	10,000	6,000
	690V	5,000	5,000	5,000	3,500	1,000
Mechanical life (times) ≤ 2,500 1 time/3 min > 2,500 1 time/6 min	Without maintenance	20,000	20,000	15,000	12,500	10,000
	With maintenance	3,000	3,000	25,000	20,000	20,000
Mechanical life of drawer seat (times) 1 time/2 min		1,000	1,000	1,000	600	3,00
Connection mode		Top-in or bottom-in				
Flashover distance (mm)		**0**				
Mounting type		Fixed or drawer				
Wiring mode		Horizontal wiring or vertical wiring			Horizontal wiring	

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.

2. Altitude and derating factor

Altitude (m)		2,000	3,000	4,000	5,000
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

3. Look-up table of working current derating with ambient temperature change/power consumption

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.

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Shell frame current (A)	Rated current (A)	Working current after derating (A)			
		+40°C	+50°C	+60°C	+70°C
1000	200	200	200	200	200
	400	400	400	400	400
	630	630	630	630	630
	800	800	800	800	800
	1,000	1,000	1,000	1,000	1,000
2000	630	630	630	630	630
	800	800	800	800	800
	1,000	1,000	1,000	1,000	1,000
	1,250	1,250	1,250	1,250	1,250
	1,600	1,600	1,600	1,600	1,600
	2,000	2,000	1,700	1,700	1,600
3200	2,000	2,000	2,000	2,000	2,000
	2,500	2,500	2,400	2,300	2,200
	2,900	2,900	2,900	2,900	2,900
	3,200	3,200	3,000	3,000	2,900
4000	2,500	2,500	2,500	2,500	2,500
	2,900	2,900	2,900	2,900	2,900
	3,200	3,200	3,200	3,200	3,200
	4,000	4,000	3,800	3,600	3,600
6300	4,000	4,000	4,000	4,000	4,000
	5,000	5,000	5,000	4,500	4,500
	6,300	6,300	5,500	5,500	5,000

Shell frame current (A)	Rated current (A)	Power consumption (W)			
		3P, drawer	4P, drawer	3P, fixed	4P, fixed
1000	200	8	11	4	6
	400	35	47	18	24
	630	81	104	45	60
	800	96	128	48	64
	1,000	144	192	85	114
2000	630	42	56	24	32
	800	67	90	38	51
	1,000	75	100	45	60
	1,250	117	156	70	94
	1,600	192	256	115	154
	2,000	276	368	156	208
3200	2,000	276	368	156	208
	2,500	375	500	188	250
	2,900	454	606	252	336
	3,200	553	737	307	410
4000	2,500	400	550	268	350
	2,900	510	680	275	380
	3,200	598	790	300	400
	4,000	660	880	332	450
6300	4,000	576	768	-	-
	5,000	900	1,200	-	-
	6,300	1,429	1,905	-	-

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4. Protection characteristics of intelligent controller

4.1 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.

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	< 1 h 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%

4.2 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.

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4.3 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, and 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; and further strengthen the cooperation with the lower protection device.

Short time delay protection can be provided with 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 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	0.1 – 1 s (differential: 0.1 s)		

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 is not less than the setting time of the fixed time limit.

4.4 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 HUW1-6300 is 100 kA.

4.5 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) Ir+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 Tg — set delay time Cr — shear coefficient Ig — set action current I — ground fault current		

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.

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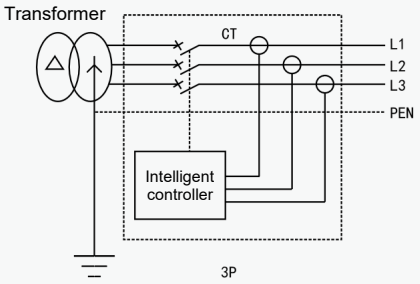
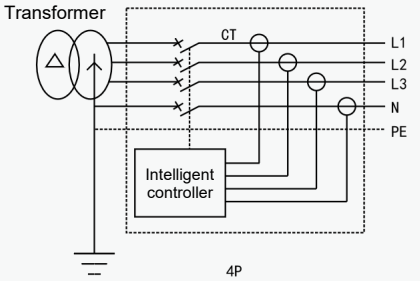
Ground fault protection mode and electrical schematic diagram



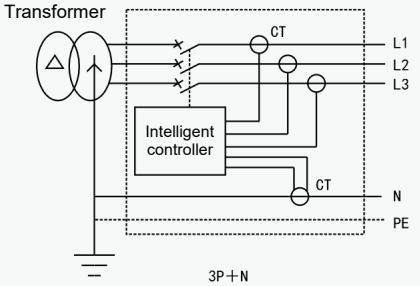
Mode I (difference type)
TN-C, TN-C-S and TN-S distribution systems use three-pole circuit breakers without neutral current transformers.

- The vector sum of three-phase current is taken for the ground fault protection signal.
- The protection characteristic is 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.

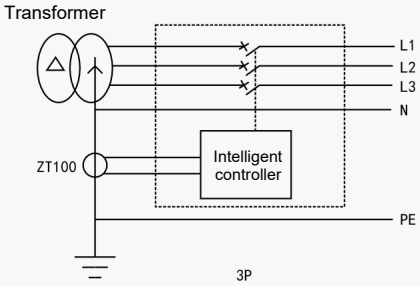
- The vector sum of four-phase current is taken for the ground fault protection signal.
- The protection characteristic is fixed time or inverse time protection.



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 characteristic is fixed time or inverse time protection.

Note: The conductor length of the neutral current transformer shall not be 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 shall not be more than 10 meters.

4.6 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		

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4.7 Current imbalance protection

The current imbalance 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	10 s–200 s
No action characteristics	≤ 0.9 (actual current imbalance rate/set value), no action
Action characteristics	> 1.1 (actual current imbalance rate/set value), action

4.8 Load monitoring

Load monitoring can be used for pre-alarm and branch load control. The action principle is based on 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" acts to connect the interrupted load and restore the power supply of the system.

Action current set value Ii	Current mode 1/2	Setting current Ic 1, Ic 2	(0.2–1) Ir
	Power mode 1/2	Setting power Pc 1, Pc 2	200kW–10000kW
Action current set value Ii	Current mode 1/2	Current delay time T_C 1, T_C 2	(20%–80%) Tr
	Power mode 1/2	Power delay time T_C 1, T_C 2	10 s–3,600 s
Action current set value Ii	Current mode 1	Setting current I_C 1 (starting value)	(0.2–1) Ir
	Current mode 2	Setting current I_C 2 (return value)	0.2Ir–Ic 1
	Power mode 1	Setting power P_C 1 (starting value)	200 kW–10,000 kW
	Power mode 2	Setting power P_C 2 (return value)	100 kW–Pc 1
Action current set value Ii	Current mode 1	Current delay time T_C 1	(20%–80%) Tr
	Current mode 2	Current delay time T_C 2	10 s–600 s
	Power mode 1/2	Power delay time T_C 1, T_C 2	10 s–3,600 s
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.

4.9 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 IΔn 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 with high accuracy and sensitivity, is suitable for the protection of the small current.

Action current set value IΔn		0.5A–30A+OFF				Current tolerance				±10%			
Action characteristics		<0.8IΔn, no action											
		≥1.0 IΔn, 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	0.05	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

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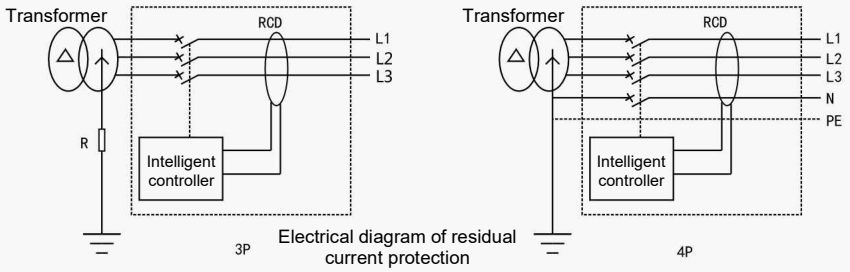

Electrical diagram of residual current protection

4.10 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	

4.11 Voltage imbalance 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 imbalance rate is greater than the action threshold; when the voltage imbalance rate is less than the return threshold, the alarm action returns.

Action threshold (V)	2% – 30% (differential: 1%)	
Action delay time (s)	0.2 – 60 (differential: 0.1)	
Return threshold (V)	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	
Overvoltage alarm return characteristics (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	

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4.12 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	△φ: A, B, C/△φ: 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

4.13 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.
Return 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
Overvoltage 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	

4.14 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 D).

Protection starting set value (A)	(0.2–1.0) In	
Action delay time set value (s)	15–1,500	
Protection action return set value (A)	0.2 In – starting set value	This set value is only available when the execution mode is "Alarm".
Protection return delay time (s)	15–3,000 s	
Demand current action characteristics (delay tolerance±10%)	I/starting set value ≤0.9	No action
	I/starting set value >1.1	Fixed time operation
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	

4.15 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	0.2–5.0 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	0.2–36.0 s (step length: 0.1 s)		
Alarm contact output	When the execution mode is “Alarm”, the "Underfrequency Alarm" and “Overfrequency Alarm” contact output can be added			
Protection execution mode	Alarm/trip/shutdown			

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4.16 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	5–500 kW	
Protection action delay time set value	0.2–20 s	
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	1.0–360 s	
Protection alarm DO output	Set one DO of the signal unit to "Power Failure".	
Protection execution mode	Alarm/trip/shutdown	

4.17 MGR and HSISG protection

MCR and HSISC are adjustable instantaneous protection for the circuit breaker itself. When the out-of-limit fault current generates, 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.

MCR, HSISC action current set value (kA)	30–100	
No action characteristics	<0.80I/Ii	No action
Action characteristics	>1.0I/Ii	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: HUW1-1,000/20 kA; HUW1-2,000 above/50 kA.
HSISC: HUW1-1000/30kA HUW1-2000/50kA; HUW1-3200/65kA; HUW1-4000/80kA HUW1-6300/100kA.

4.18 Self-diagnosis

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

4.19 Contact wear indication

The intelligent controller can display the current contact wear condition 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 by setting.

4.20 Test & lock

There are three test modes for test tripping, including 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.

4.21 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.
1). When the location of the short circuit or grounding fault is at the outgoing side, such as location②of 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.

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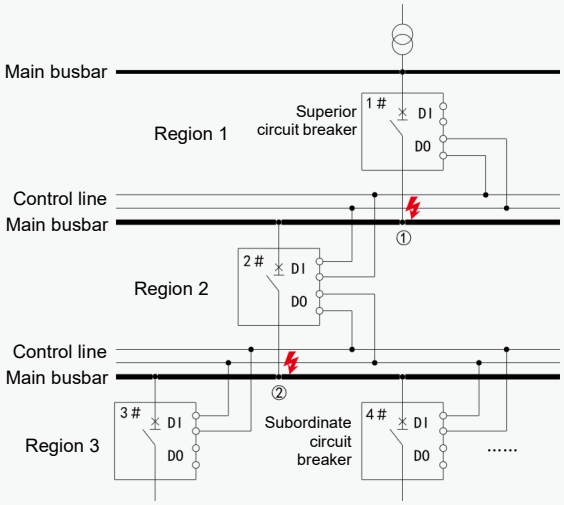
2). When the location of the short circuit or grounding fault is between the superior circuit breaker (1# circuit breaker) and the subordinate circuit breaker (2#–4# circuit breaker), such as location①, the superior circuit breaker does not receive the regional interlock signal, and therefore it trips 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.



4.22 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.

4.23 Communication function
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 strong electromagnetic interference environments.

Communication protocol		Modbusbar-RTU	Profibus-DP	DeviceNet
Communication address		0–255	3–126	0–63
Transmission rate (bit/s)		9.6 k, 19.2 k	Self-adaption	125 k, 250 k, 500 k
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.		

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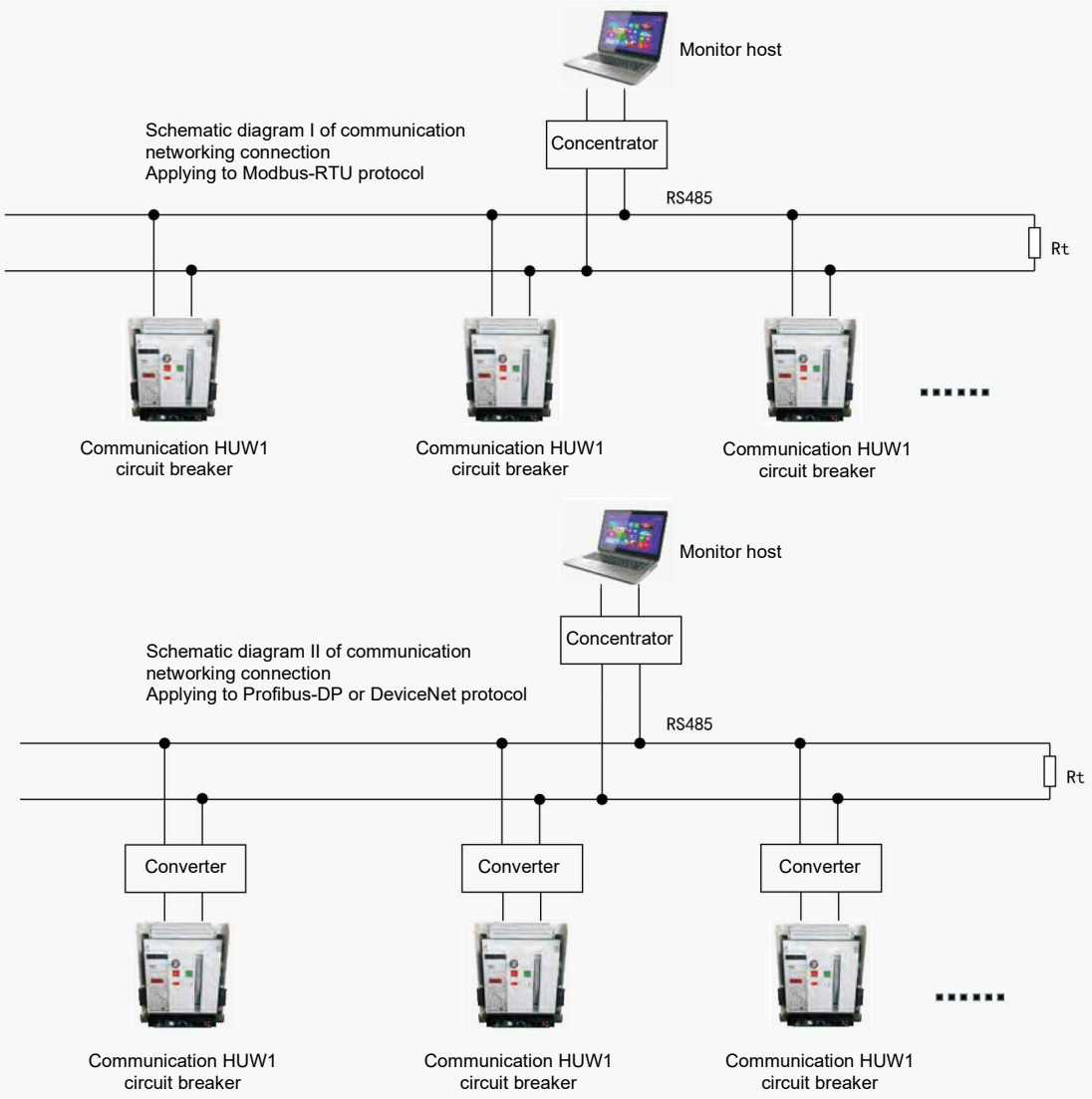

Note: 32 communicable circuit breakers can be connected on one line at the same time. The maximum wiring distance is 1,200 meters, and the communication distance can be extended by installing intermediate relays.

4.24 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 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: 100–160ºC

Overtemperature protection action delay time: 0.2 s – 60 s

Overtemperature alarm temperature: 100–160ºC

Overtemperature alarm delay time: 0.2 s – 60 s

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Series Universal Circuit Breaker

VI. Structure Overview

The circuit breaker is compact in structure and has the characteristics of three-dimensional partition. The contact system is enclosed between two insulation baseboards with partition structure, and the contacts of each phase are partitioned to form independent chambers. The controller, operating mechanism, manual and electric operating mechanisms are arranged in front of each other in turn to form their own independent units. If one of the units fails, the unit can be completely removed to replace the drawer circuit breaker.

Drawer circuit breaker

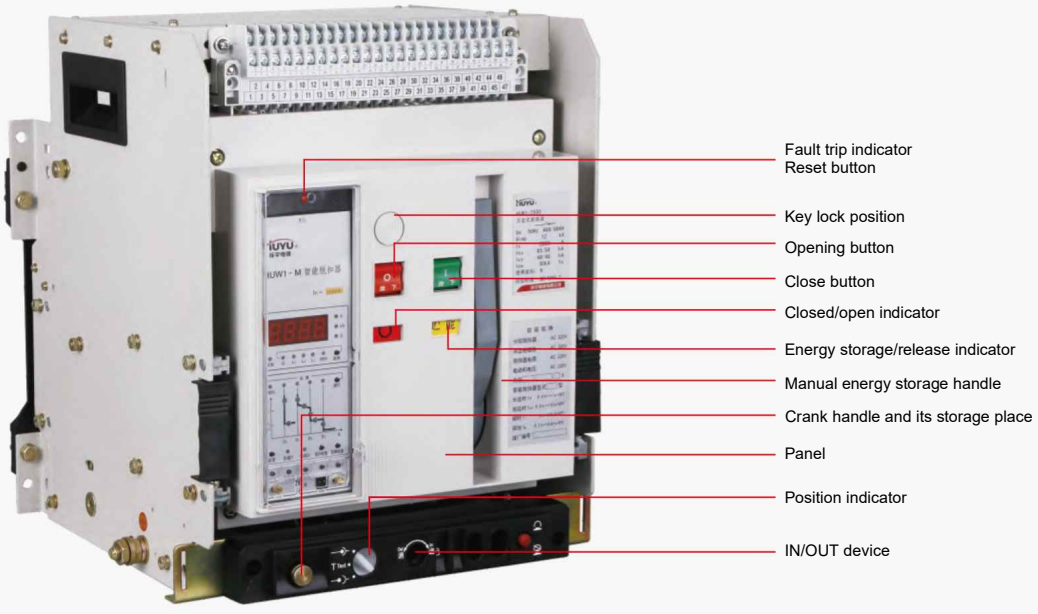
It consists of a circuit breaker body and a drawer seat. Guide rails are arranged on both sides of the drawer seat, which have movable guide plates on them, and the main frame of the circuit breaker is placed on the left and right guide plates. The drawer circuit breaker is connected to the main circuit by inserting the busbar on the breaker body into the bridge contact on the drawer seat. Through cranking the handle of the lower beam of the drawer seat, three working positions of the drawer circuit breaker can be realized (there is a position indication beside the handle).

“Connection” position: Both the main circuit and the secondary circuit are connected.

“Test” position: The main circuit is disconnected and separated by an insulating partition. Only when the secondary circuit is connected, the necessary action test can be carried out.

“Disconnection” position: The main circuit and the secondary circuit are all disconnected. If the circuit breaker body needs to be removed in the “Disconnection” position, the crank handle must be removed.

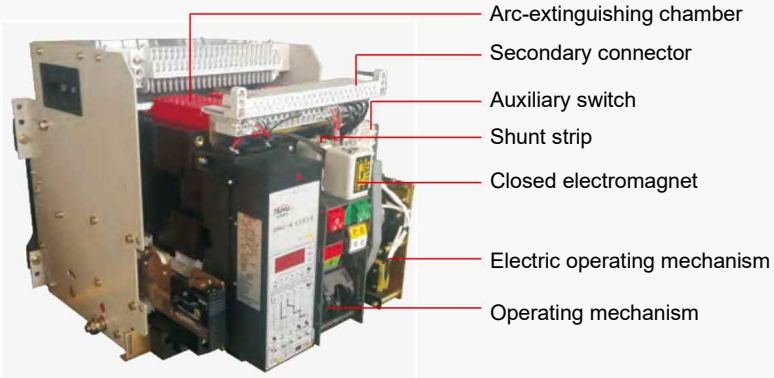
The drawer circuit breaker has a mechanical interlock device, which can only make the circuit breaker closed at the connection position or the test position. It cannot be closed in the middle of the connection and test positions.



HUW1

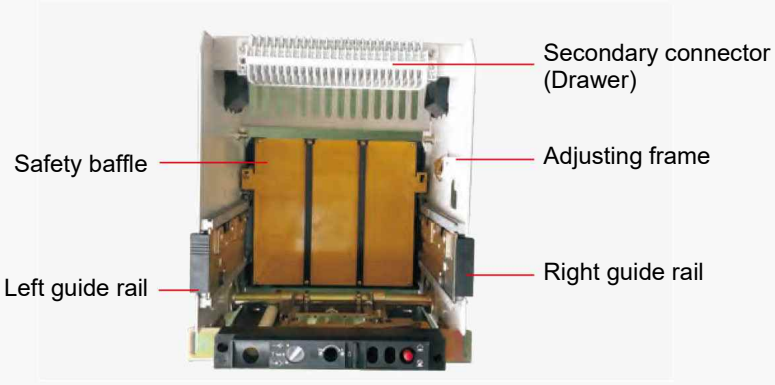
Series Universal Circuit Breaker

Figure 1. HUW1 Series Universal Circuit Breaker extraction position



Body Removal Face Shield
(Example: 2,000)

Figure 2. HUW1 Series Universal Circuit Breaker drawer seat



Drawer Seat (Example: 2,000)

HUW1

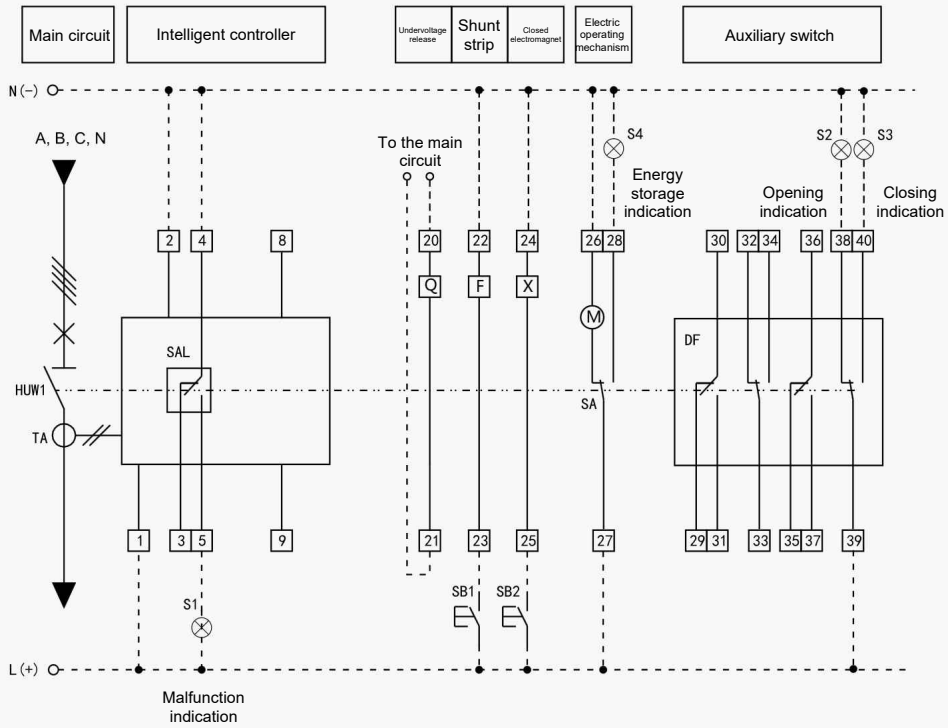
Series Universal Circuit Breaker

VII. Wiring Diagrams of Circuit Breaker Control Circuit

The circuit on the dotted line is wired by the user, which cannot be performed when the optional accessories are not customized.
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.
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.
The three-position indication function of the drawer seat is only optional for the drawer circuit breaker.

1. Wiring diagram of HUW1-1000 Circuit Breaker control circuit

Terminal function in wiring diagram of secondary circuit of HUW1-1000 L, M Intelligent Controller



Terminal number	Function description	Notes
1, 2	Auxiliary power input: AC 230 V, AC 400 V, DC 220 V, DC 110 V	Power module is required for DC power
3, 4, 5	Fault trip auxiliary contact, contact capacity: AC 250 V, 3 A	
8, 9	External transformer	Optional accessories
20, 21	Undervoltage release	
22, 23	Shunt strip	Optional accessories
24, 25	Closed electromagnet	
26, 27, 28	Electric operating mechanism, 28 connected to the green line, 27 connected to the red line and 26 connected to the black line	
29–40	DF auxiliary switch	

Interpretation of symbols in wiring diagram

HUW1: HUW1-1000 Universal Circuit Breaker
S1–S4: 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)
M: Electric operating mechanism
SA: Limit switch
L (+), N (-): Control power supply (DC: L is positive; N is negative)
A, B, C, N: Main circuit phase line
DF: Auxiliary switch

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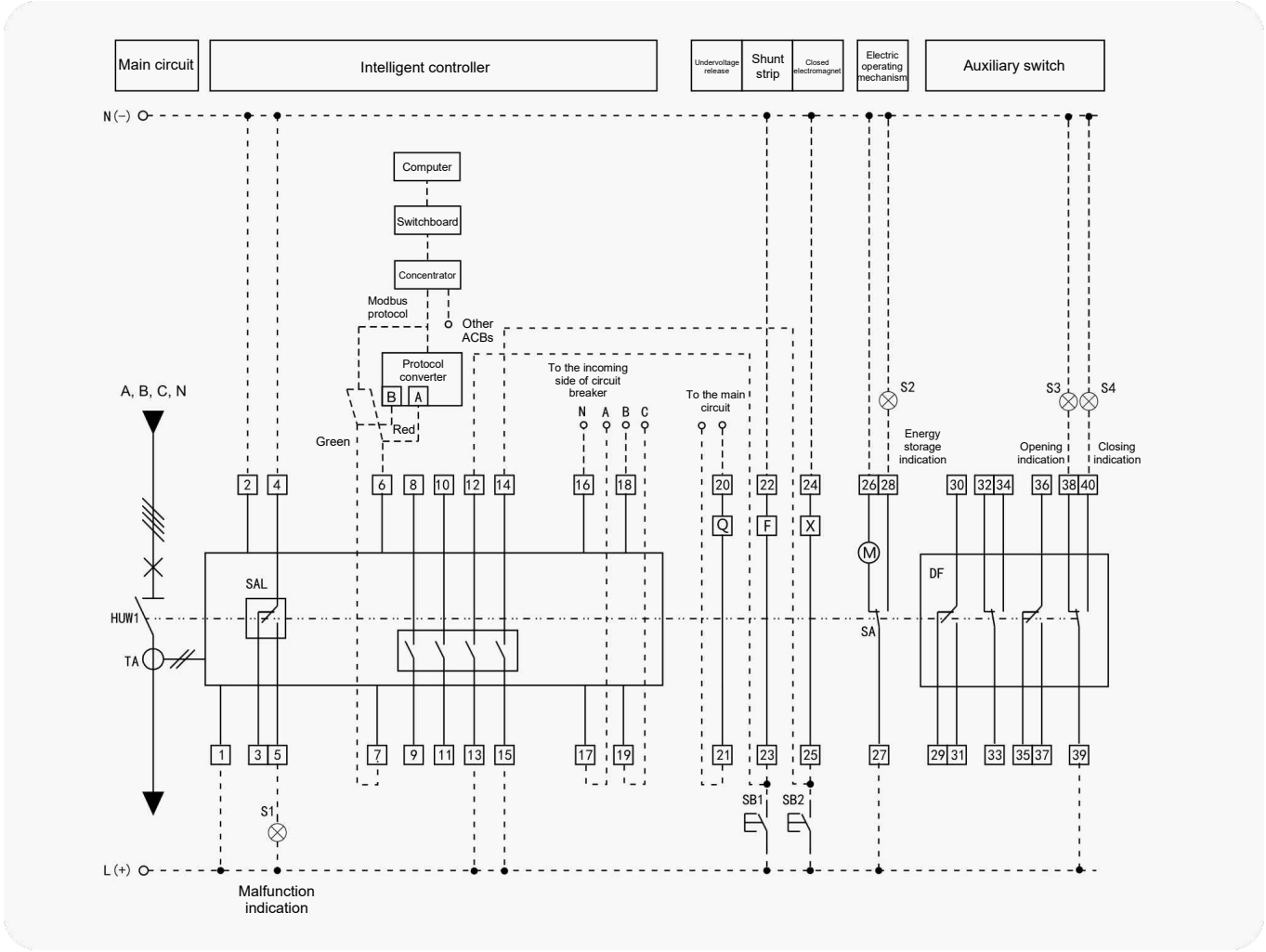
Wiring diagram of secondary circuit of HUW1-1000 H and Reclosing Intelligent Controller



Terminal functions in wiring diagram of secondary circuit of HUW1-1000 H and Reclosing Intelligent Controller

Terminal number	Function description	Remarks
1, 2	Auxiliary power input: AC 220 V, AC 380 V, DC 220 V, DC 110 V	Power module is required for DC power
3, 4, 5	Fault trip auxiliary contact, contact capacity: AC 250 V, 3 A	
6, 7	Communication interface output, 6 connected to A (red line), 7 connected to B	Default Modbus-RTU
8–15	Signal output, 8, 9: DO1; 10, 11: DO2; 12, 13: DO3; 14, 15: DO4;	Set based on functional requirements
16, 17, 18, 19	Voltage signal measurement: 16 connected to N, 17 connected to A, 18 connected to B, and 19 connected to C	Optional functions
20, 21	Undervoltage release	Optional accessories
22, 23	Shunt strip	
24, 25	Closed electromagnet	
26, 27, 28	Electric operating mechanism, 28 connected to the green line, 27 connected to the red line and 26 connected to the black line	
29–40	DF auxiliary switch terminal	

Note: When the external transformer needs to be configured, the terminal numbers are 8 and 9, and the signal output has no DO1 (optional function, which shall be noted when ordering).

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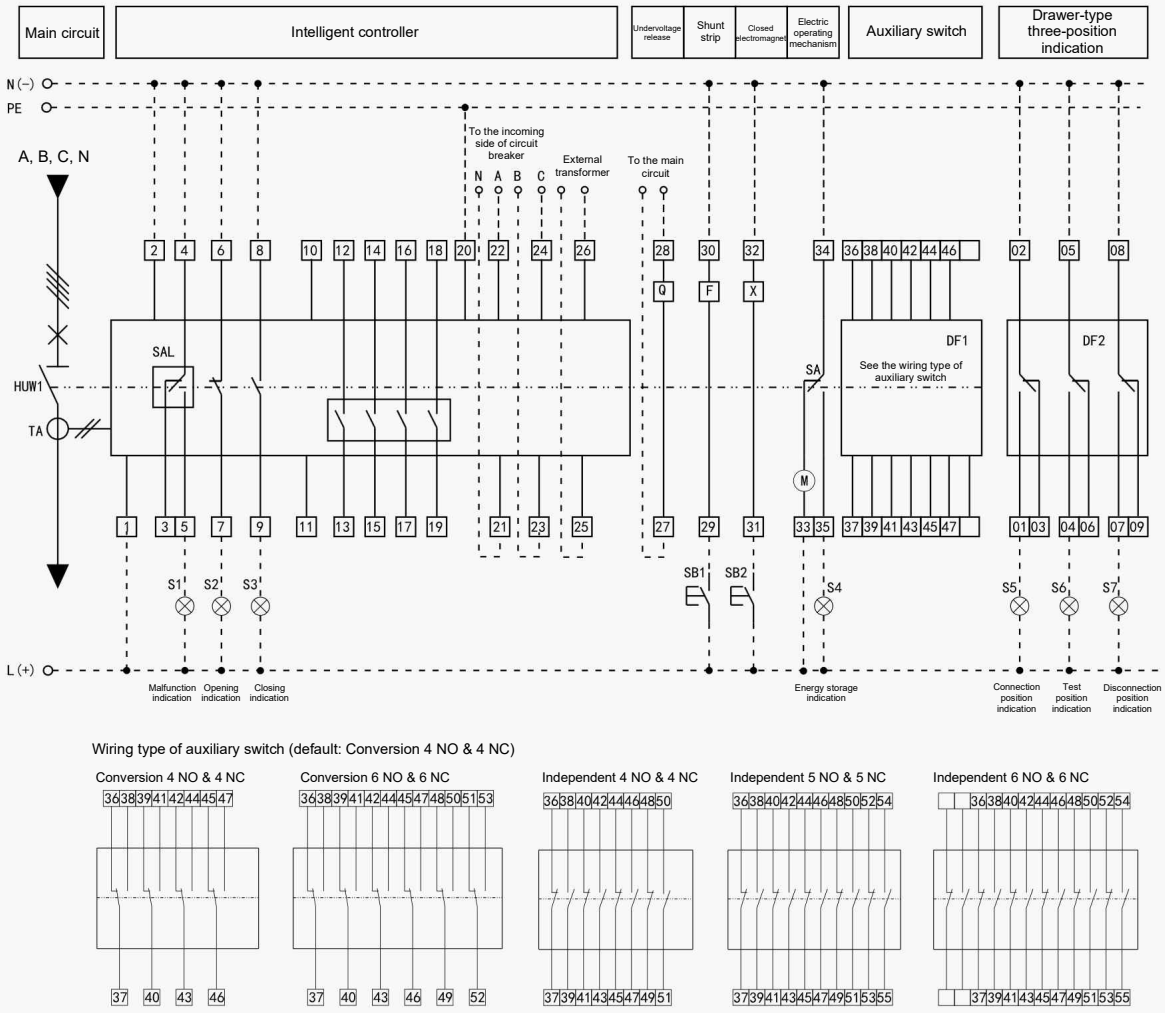
2. Wiring diagrams of control circuit of HUW1-2000 (and above) Circuit Breakers

Wiring diagram of secondary circuit of HUW1-2000 (and above) L3/L4, 2M/3M Intelligent Controller



Terminal functions in wiring diagram of secondary circuit of HUW1-2000 (and above) L, M Intelligent Controller

Terminal number	Function description	Remarks
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	

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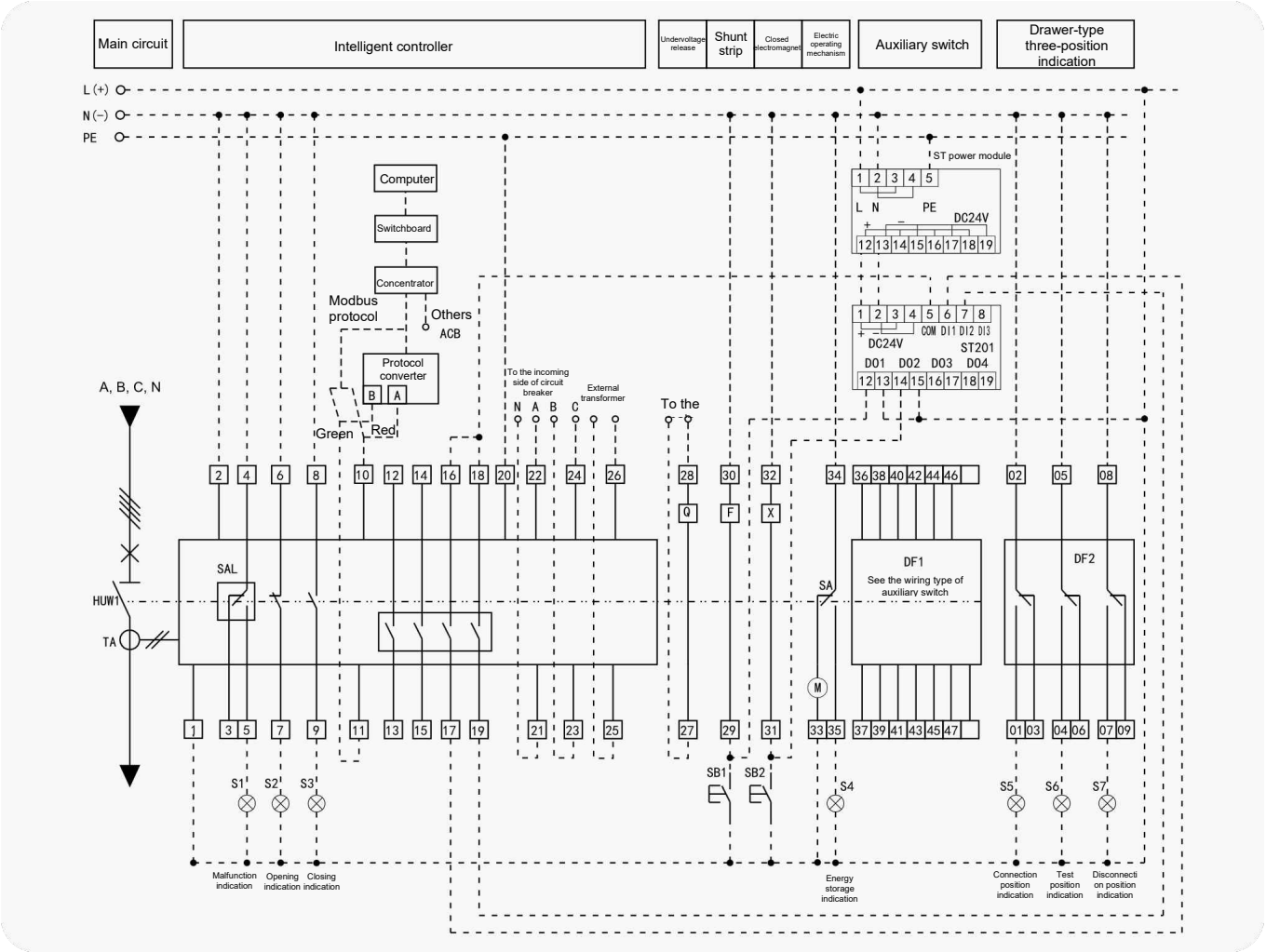
Wiring diagram of secondary circuit of HUW1-2000 (and above) 2H/3H Intelligent Controller



Terminal functions in wiring diagram of secondary circuit of HUW1-2000 (and above) H and Reclosing Intelligent Controller

Terminal number	Function description	Remarks
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-RTU
12—19	Signal output, 12, 13: DO1; 14, 15: DO2; 16, 17: DO3; 18, 19: DO4;	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	

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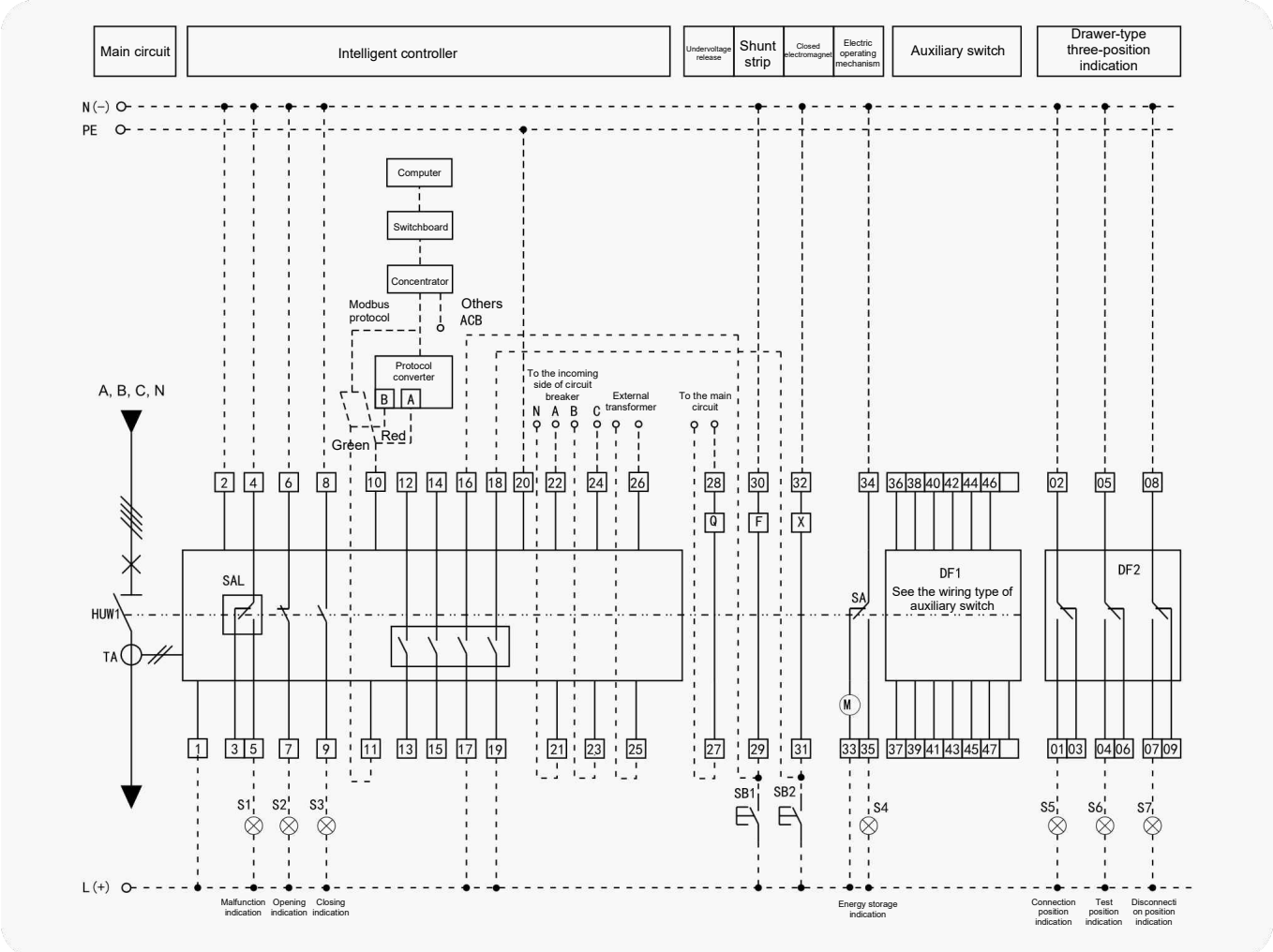
Interpretation of symbols in wiring diagram

Qualified	Interpretation	Remarks	Qualified	Interpretation	Remarks
HUW1	HUW1 Universal Circuit Breaker		PE	Grounding wire	
S1–S7	Signal lamp	User-provided	L(+), N(-)	Control power supply (DC L is positive; N is negative)	
TA	Current transformer		A, B, C, N	Main circuit phase line	
SAL	Microswitch		DF1	Auxiliary switch	Type optional
SB1	Opening button	User-provided	DF2	Drawer-type three-position electric indicator switch	Optional accessories
SB2	Close button	User-provided	ST power module	DC 24 V power supply is provided	Optional accessories
X	Closed electromagnet		St201	Relay	Optional accessories
F	Shunt strip		Protocol converter	Except Modbus protocol, other protocols need to be configured	Optional accessories
Q	Undervoltage release	Optional accessories			
M	Electric operating mechanism				
SA	Electric operating mechanism limit switch				

Wiring diagram of secondary circuit of reclosing Intelligent Controller of HUW1-2000 (and above)



Note: When the switch at the bottom left of the controller is placed in the "I" position, the automatic reclosing function is turned on; when the switch is placed in the "O" position, the automatic reclosing function is turned off (anti-reclosing for maintenance).

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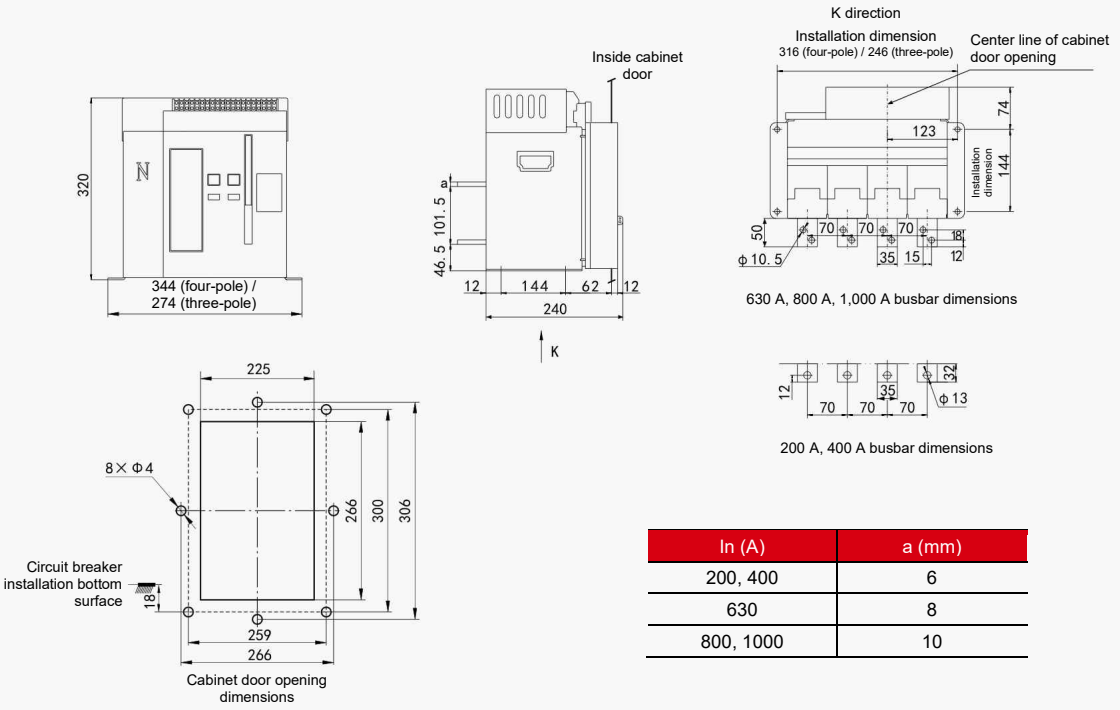
Series Universal Circuit Breaker

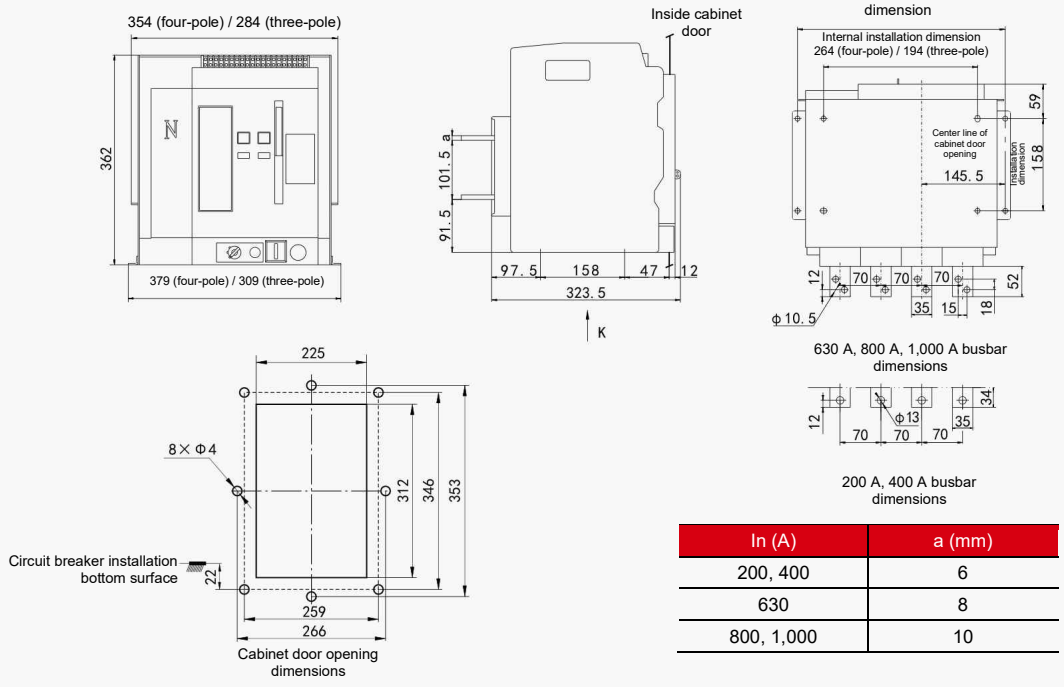
VIII. Outline and Installation Dimensions

1. Outline and installation dimensions of HUW1-1000 FIXED CIRCUIT BREAKER



In (A)	a (mm)
200, 400	6
630	8
800, 1000	10

2. Outline and installation dimensions of HUW1-1000 drawer circuit breaker



In (A)	a (mm)
200, 400	6
630	8
800, 1,000	10

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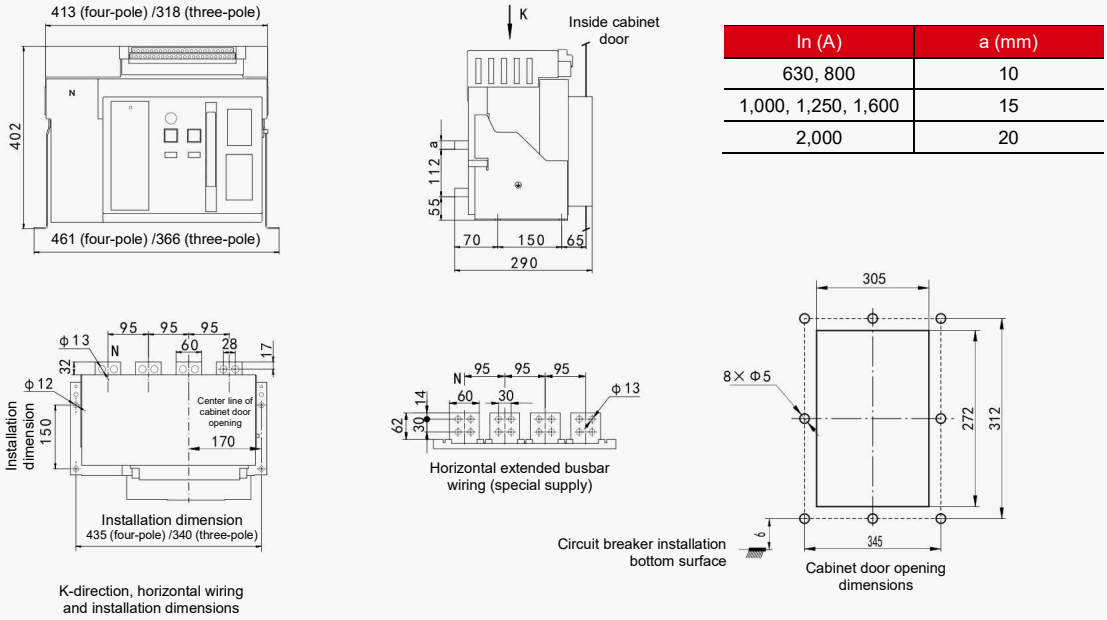
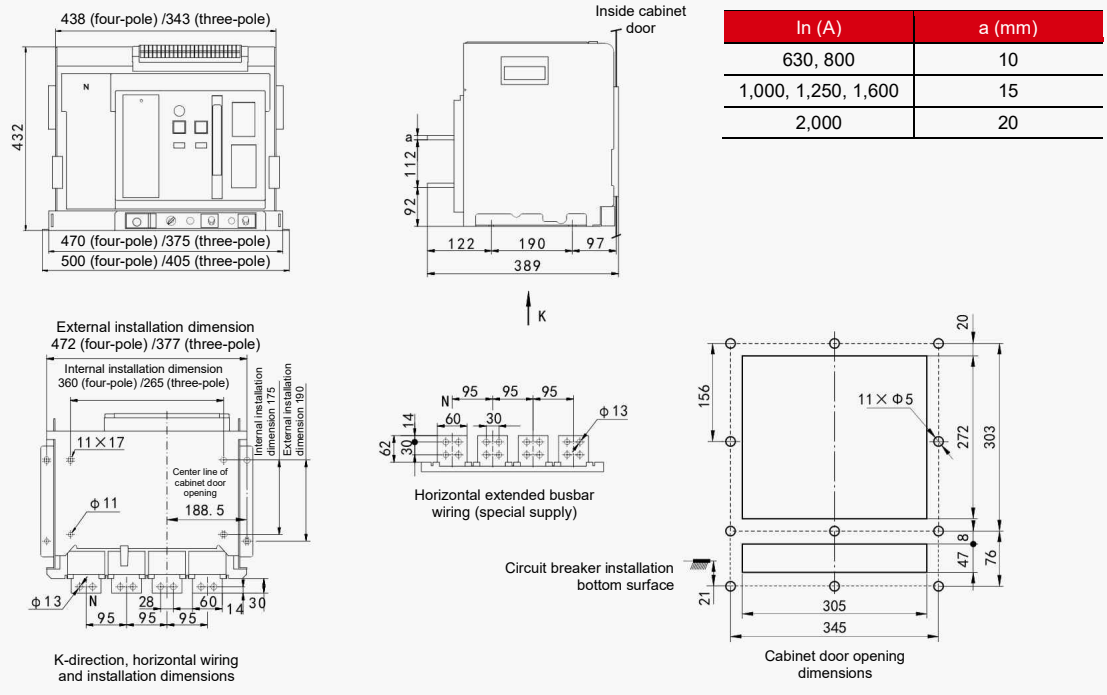
Series Universal Circuit Breaker

3. Outline and installation dimensions of HUW1-2000 fixed circuit breaker



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

4. Outline and installation dimensions of HUW1-2000 drawer circuit breaker

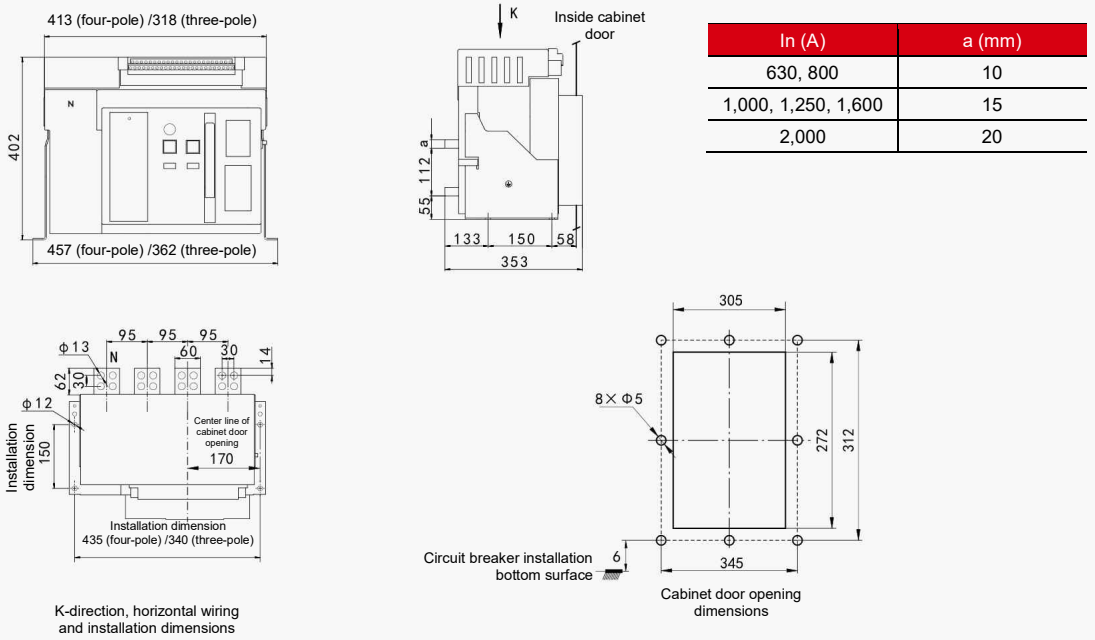


In (A)	a (mm)
630, 800	10
1,000, 1,250, 1,600	15
2,000	20

HUW1

Series Universal Circuit Breaker

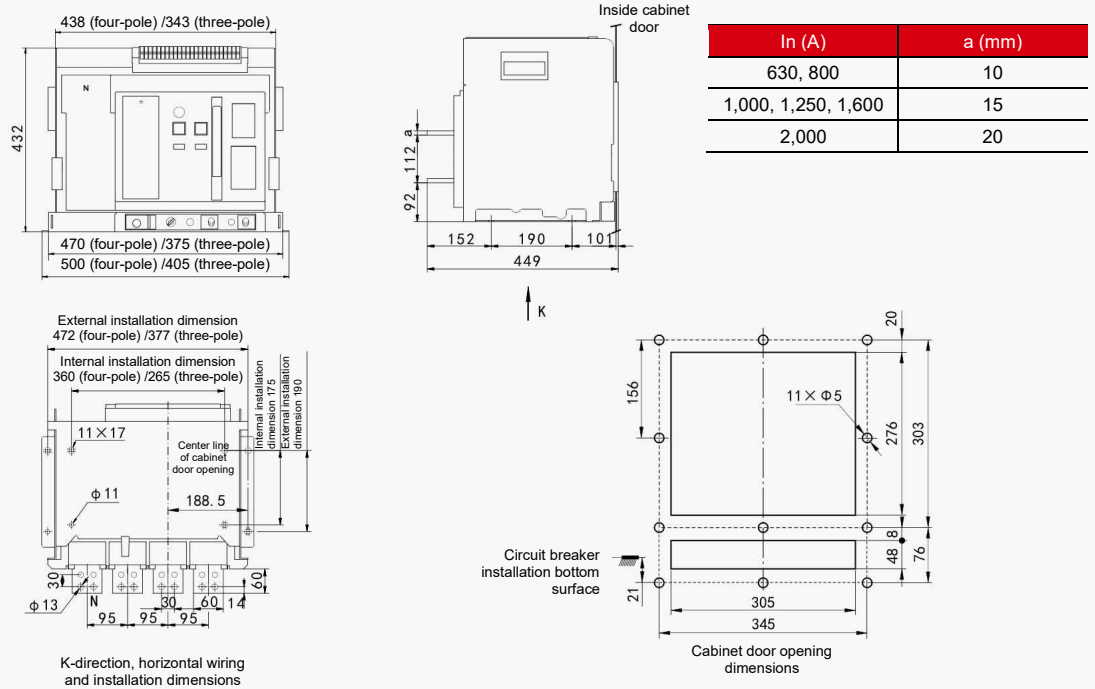
5. Outline and installation dimensions of HUW1F-2000 and HUW1PVA-2000 fixed circuit breakers



K-direction, horizontal wiring and installation dimensions

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

6. Outline and installation dimensions of HUW1F-2000 and HUW1PVA-2000 drawer circuit breakers



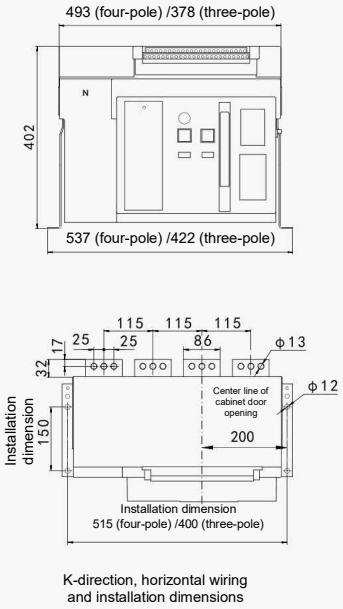
K-direction, horizontal wiring and installation dimensions

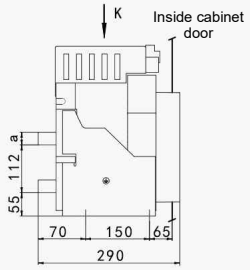
In (A)	a (mm)
630, 800	10
1,000, 1,250, 1,600	15
2,000	20

HUW1

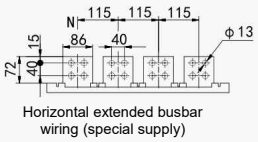
Series Universal Circuit Breaker

7. Outline and installation dimensions of HUW1-3200 fixed circuit breaker

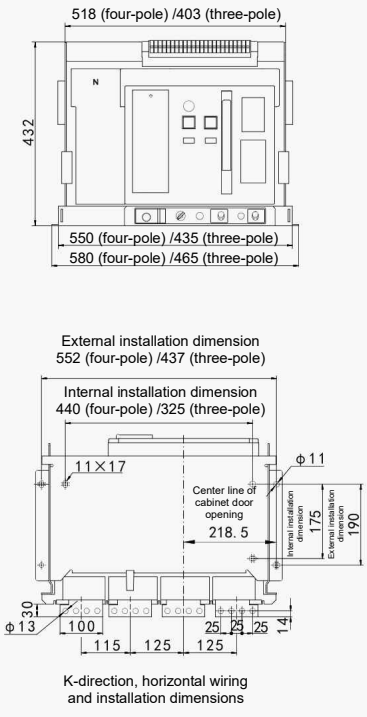


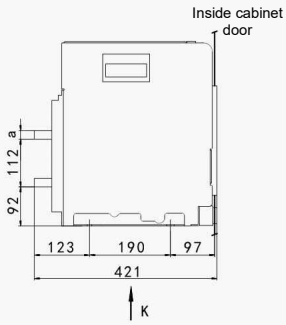


In (A)	a (mm)
2,000, 2,500	20
2,900, 3,200	30

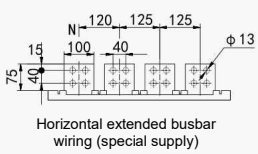


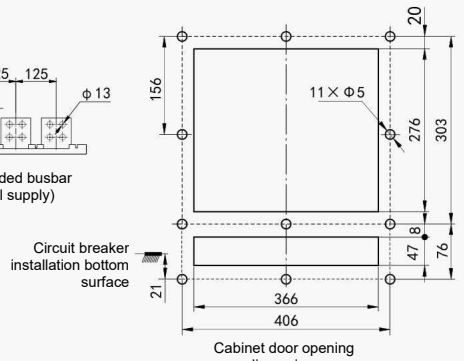
8. Outline and installation dimensions of HUW1-3200 drawer circuit breaker





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

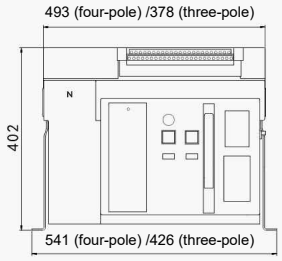


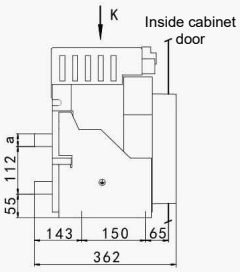


HUW1

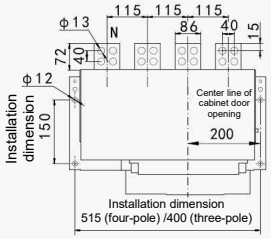
Series Universal Circuit Breaker

9. Outline and installation dimensions of HUW1F-3200 and HUW1PVA-3200 fixed circuit breakers

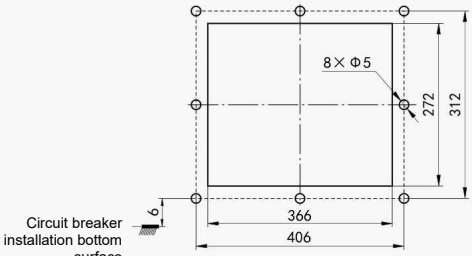




In (A)	a (mm)
2,000, 2,500	20
2,900, 3,200	30

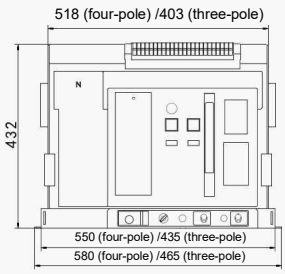


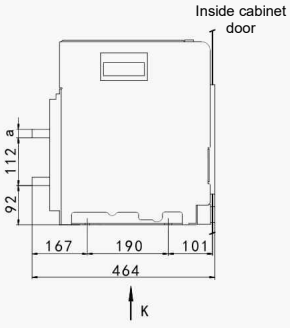
K-direction, horizontal wiring and installation dimensions



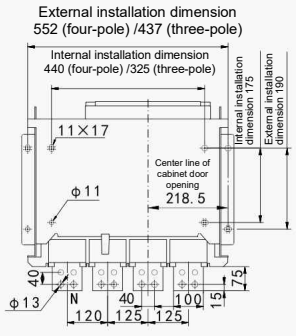
Cabinet door opening dimensions

10. Outline and installation dimensions of HUW1F-3200 and HUW1PVA-3200 drawer circuit breakers

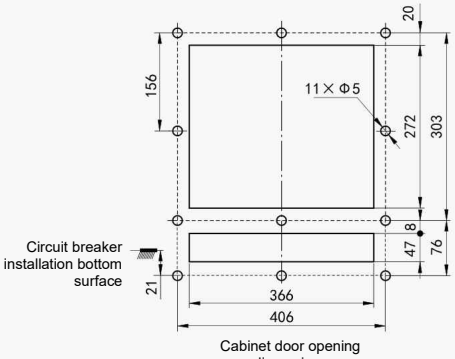




In (A)	a (mm)
2,000, 2,500	20
2,900, 3,200	30



K-direction, horizontal wiring and installation dimensions

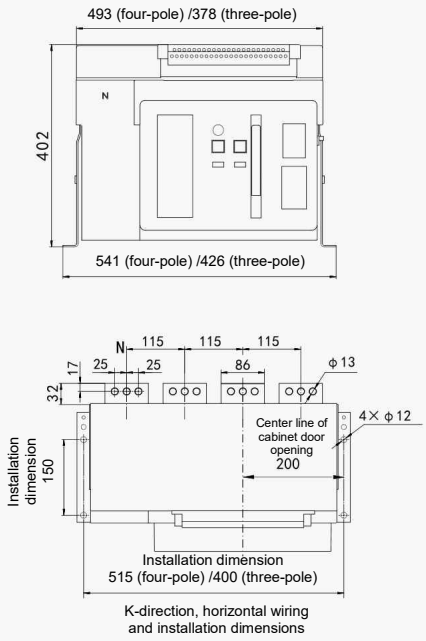


Cabinet door opening dimensions

HUW1

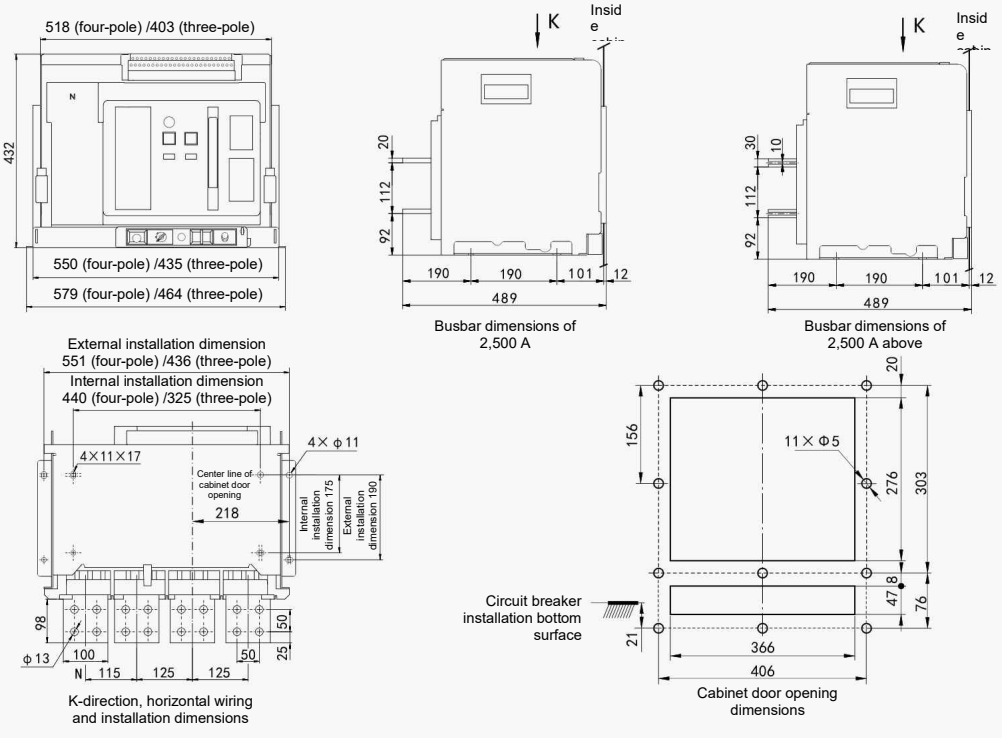
Series Universal Circuit Breaker

11. Outline and installation dimensions of HUW1-4000 fixed circuit breaker



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

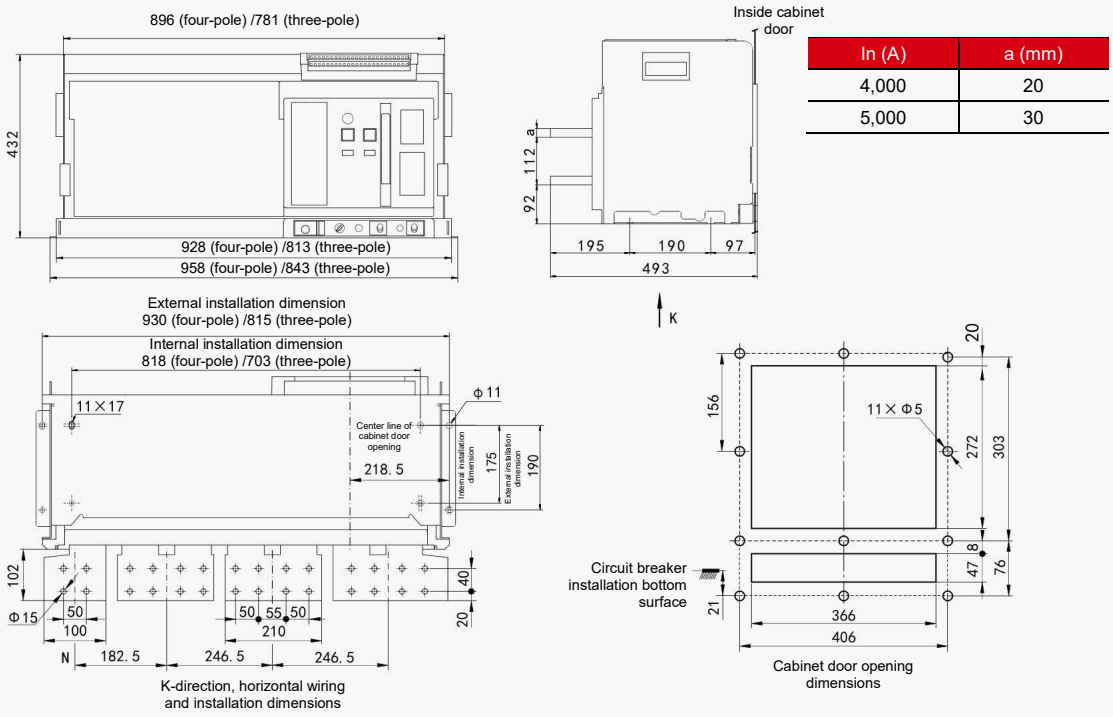
12. Outline and installation dimensions of HUW1-4000 drawer circuit breaker



HUW1

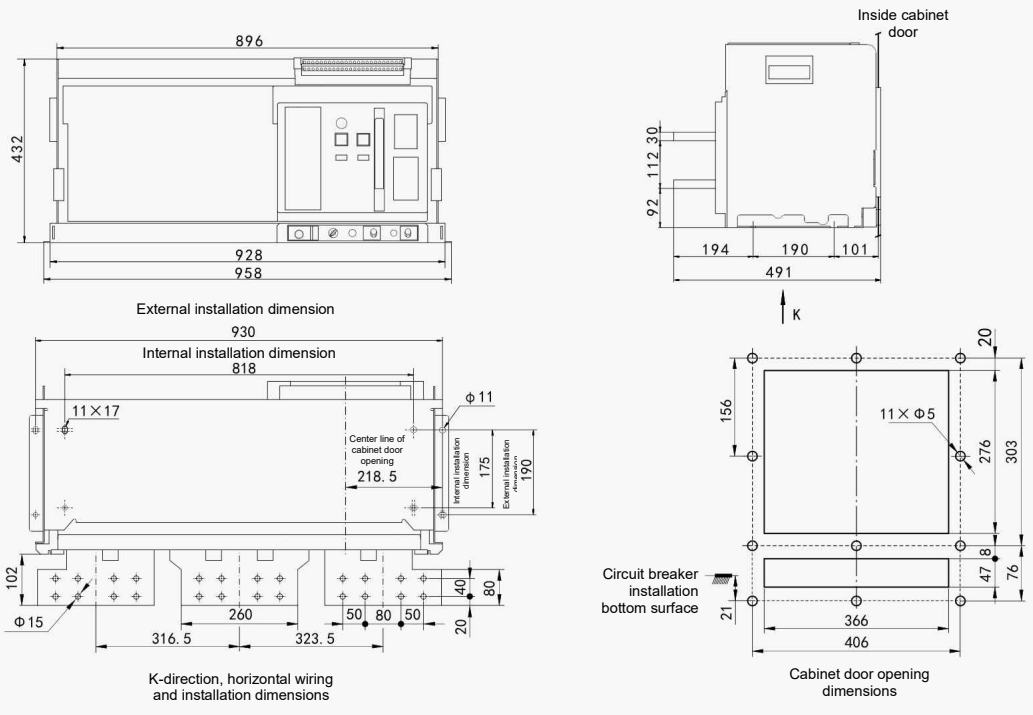
Series Universal Circuit Breaker

13. Outline and installation dimensions of HUW1-6300 drawer circuit breaker (In = 4,000, 5,000)



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

14. Outline and installation dimensions of HUW1-6300 drawer circuit breaker (In = 6,300)



HUW1

Series Universal Circuit Breaker

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

Rated current (A)	External copper busbar specification 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
1,000	60×5	2	600
1,250	80×5	2	800
1,600	100×5	2	1,000
2,000	100×5	3	1,500
2,500	100×5	4	2,000
2,900	100×10	3	3,000
3,200	100×10	4	4,000
3,600	100×10	5	5,000
4,000	100×10	5	5,000
5,000	100×10	6	6,000
6,300	100×10	8	8,000

IX. Installation, Use and Maintenance

1. Properly place after unpacking
- Place the box correctly according to the instruction of the packing box, and screw out the self-tapping screw at the lower terminal 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 horizontally to avoid damaging the circuit breaker.

2. Circuit breaker 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 MΩ 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 are between phases and between phases and frames when the circuit breaker is closed; and between the incoming and outgoing lines of each phase when the circuit breaker is disconnected.

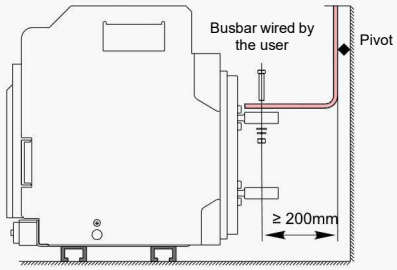
3. Installation of circuit breaker
- Mode I for the installation of the drawer circuit breaker: Move the circuit breaker body out of the drawer seat through cranking, install the inner bottom plate of the drawer seat (inner installation size) on the guide rail of the distribution cabinet, and fasten it with four M10 bolts and gaskets with tightening torque of (15 – 20) N.m or (30 – 36) N.m.
- Mode II for the installation of the drawer circuit breaker: Instead of moving the circuit breaker body 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 M10 bolts and gaskets with 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 circuit breaker.

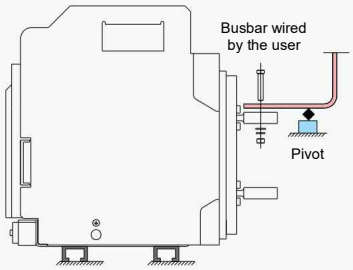
HUW1

Series Universal Circuit Breaker

4. Busbar installation and wiring of circuit breaker

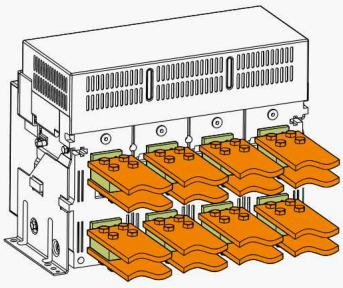
- When installing the circuit breaker, sufficient space shall be provided to ensure good air circulation. The spacer between the upper and lower terminals of the circuit breaker must be made of non-magnetic material to avoid the formation of the magnetic circuit that will affect the use of the product.
- 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).



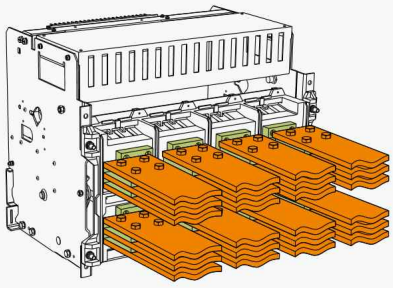


Busbar wiring method

- 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 is 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.



Busbar wiring mode below 1,600 A

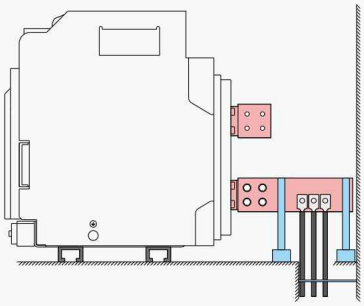


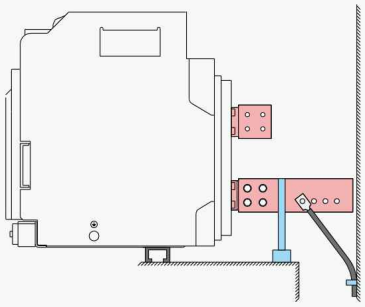
Horizontal wiring mode of 1,600 A and above

Cable connection method

The cable connection shall ensure that there is no excessive mechanical force on the circuit breaker terminals. Users can use the cable connection busbar to extend the terminal of the circuit breaker. The cable can be a single-core cable or a multi-core cable. When wiring, it can usually be connected to the busbar according to the following rules:

(1) Position the cable lug before inserting the bolt; (2) The cable shall be firmly fixed on the rack of the distribution cabinet





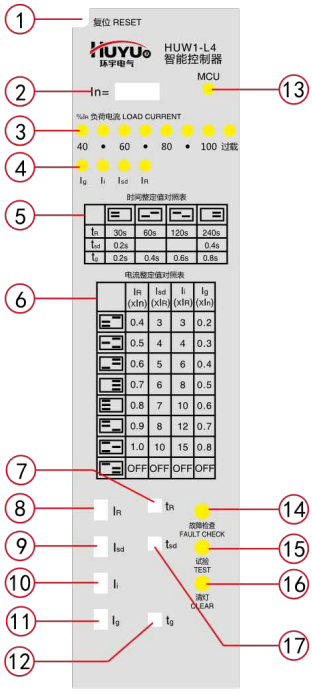
HUW1

Series Universal Circuit Breaker

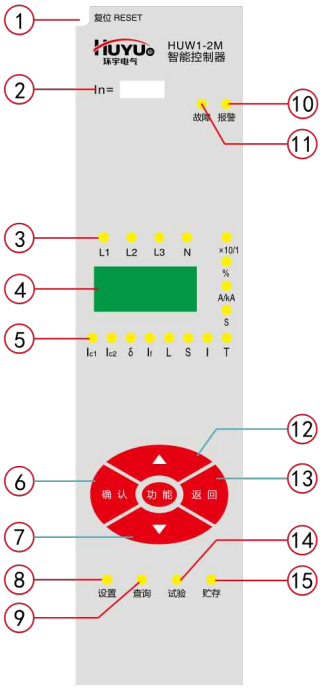
Wiring method of secondary circuit
The terminal of the secondary circuit of the circuit breaker adopts the screw connection, which is suitable for connecting a single-core or a multi-core copper wire with insulating layer, and the cross-sectional area of the wire is 0.5 to 1.5 mm^2. Before connection, the insulating layer of the wire connection terminal shall be removed with a length of about 6 mm. Screw out the secondary circuit screw by about 2 to 3 mm with a special screwdriver, and then insert the wire and tighten it with a screwdriver. The same terminal of the secondary circuit can insert two wires side by side at the same time on both sides of the screw. The wiring mode is shown in the figure below.
Note: The conductor part with insulation removed cannot be exposed outside the secondary circuit to prevent the risk of electric shock.

X. Controller Panel Structure

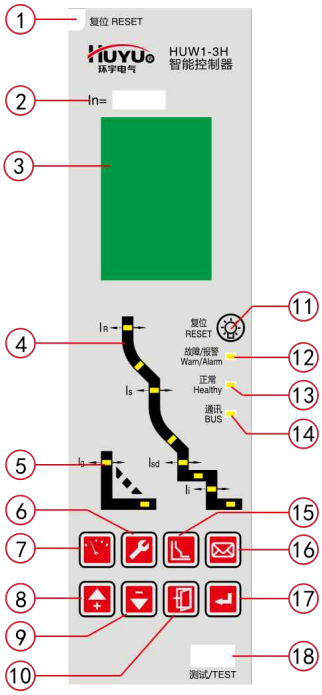
1. Type and interface description of 1,000 A shell frame intelligent controller



Type L4 (DIP)



Type 2M (digital display)



Type 3H (liquid crystal)

HUW1

Series Universal Circuit Breaker

1.1 Interface symbols, indicator lights and key descriptions of 1,000 A shell frame L3/L4 (DIP) 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	“40–100” indicator light	This group of lights is a load current indicator, which shows the percentage of the load current to the setting current (Ir1); if the percentage exceeds 100%, the overload light will be on
4	"Ig, Ii, Isd, and IR" fault indicators	When there is a ground fault, the Ig light is on; when there is an overload fault, the IR light is on; and when there is a short-circuit fault, the Isd light is on for the short-delay action of the circuit breaker and the Ii light is on for the instantaneous action
5	Time setting value comparison table	Comparison table of action delay time values of grounding protection, short-circuit short time delay protection and overload long time delay protection
6	Current setting value comparison table	Comparison table of current multiples of grounding protection, short-circuit instantaneous protection, short-circuit short time delay protection and overload long time delay protection
7	“tR” DIP switch	Setting of the delay time value corresponding to the overload long time delay protection action
8	“IR” DIP switch	Setting of the overload long time delay protection current multiple
9	“Isd” DIP switch	Setting of the short-circuit short time delay protection current multiple
10	“Ii” DIP switch	Setting of short-circuit instantaneous protection current multiple
11	“Ig” DIP switch	Setting of grounding protection current multiple
12	“tg” DIP switch	Setting of the delay time value corresponding to the grounding protection action
13	"MCU" indicator light	During normal operation, the MCU light is always on, and goes out during self-diagnosis and power failure
14	"Fault Check" key	Press this button to display the previous line fault protection section of the system memory
15	"Test" key	During normal operation, press the Test button, and the controller will send out instantaneous trip signals to test the action performance of the circuit breaker
16	"Clear Light" key	After the test trip, phase current selection, fault check and fault trip, press the clear light key to restore the controller to a normal working state
17	"tsd" DIP switch	Setting of the delay time value corresponding to the short-circuit short time delay protection action

1.2 Interface symbols, indicator lights and key descriptions of 1,000 A shell frame 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	L1, L2, L3, N indicator lights	During normal operation, L1, L2, L3 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 imbalance 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

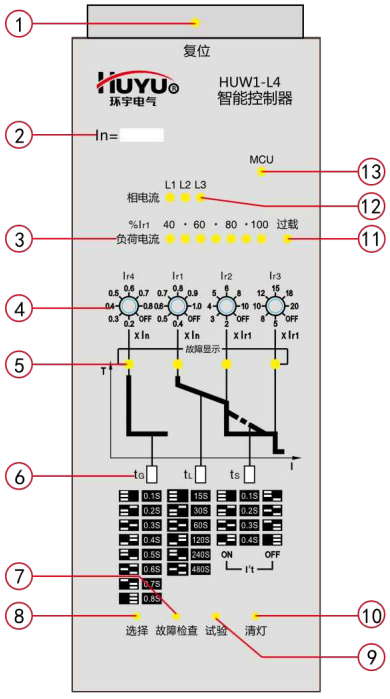
HUW1

Series Universal Circuit Breaker

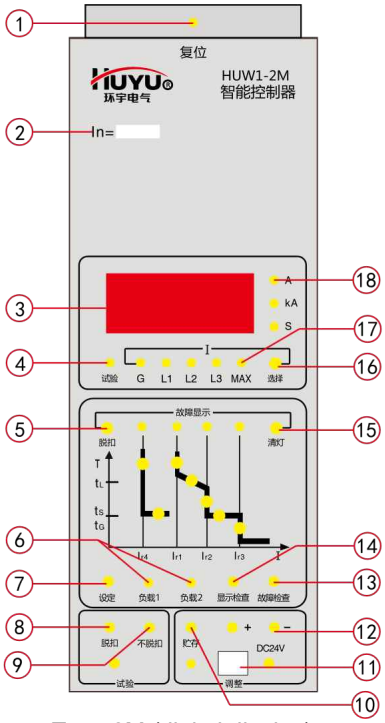
1.3 Interface symbols, indicator lights and key descriptions of 1,000 A shell frame H (liquid crystal) intelligent controller

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	“System Settings” key	Quickly switch to the "System Settings" main menu ("Right Arrow" when adjusting the system clock
7	“Running Parameters” 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 initial working 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 controller is powered on, the "Normal" indicator light shall always flash. If the light does not turn on after power-on, the 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 Settings” key	Quickly switch to the "Protection Settings" main menu
16	“Information 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: DC 24 V power input port; analog signal input port; programming and communication interface

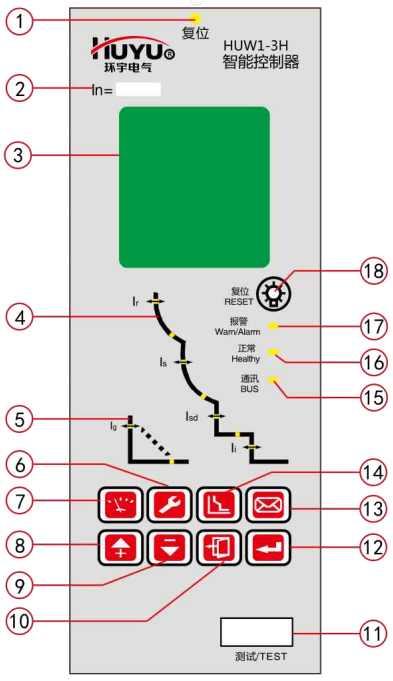
2. Type and interface description of 2,000 A above shell frame intelligent controller



Type L4 (DIP)



Type 2M (digital display)



Type 3H (liquid crystal)

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2.1 Interface symbols, indicator lights and key descriptions of 2,000 A above shell frame L3\L4 (DIP) 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	“40–100” indicator light	This group of lights is a load current indicator, which shows the percentage of the load current to the setting current (Ir1); if the percentage exceeds 100%, the overload light will be on
4	“Ir4, Ir1, Ir2, Ir3”	Setting of the asymmetric grounding (neutral connection) fault, overload long time delay, short-delay short time delay, short-circuit instantaneous rated current multiple
5	"Fault Display" area indicator light	Indicate the fault category (corresponding indicator light is on): Ir 4 indicates grounding fault, Ir 1 indicates long time delay fault, Ir 2 indicates short time delay fault, Ir 3 indicates instantaneous short circuit fault
6	"tG, tL, tS" dip switches	Setting of the action time of the asymmetric grounding (neutral connection) fault, overload long time delay and short time delay. See the corresponding table under the DIP switch for the setting time
7	"Fault Check" key	Press this button to display the previous line fault protection section of the system memory
8	“Select” key	Press this key to cyclically display L1, L2 and L3 phase currents or fault check status to cyclically display the fault current or time value
9	"Test" key	During normal operation, press the Test button, and the controller will send out the instantaneous trip signal to test the action performance of the circuit breaker
10	"Clear Light" key	After the test trip, phase current selection, fault check and fault trip, press the clear light key to restore the controller to a normal working state
11	“Overload” indicator light	When the light is on, it means that the load current has exceeded the overload long time delay protection current value, and the overload long time delay starts to delay the action or alarm
12	"Phase Current" indicator light	Display L1, L2 and L3 phase currents, and show the phase with the largest current during operation
13	"MCU" indicator light	During normal operation, the MCU light is always on, and goes out during self-diagnosis and power failure

2.2 Interface symbols, indicator lights and key descriptions of 2,000 A above shell frame 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	Digital display window	Parameters such as current, voltage, frequency, setting and fault are displayed in the window
4	“Test” indicator light	Display when setting the test trip and no trip (corresponding to the test area)
5	"Fault Display" area indicator light	Ir4 grounding current, Ir1 long time delay current, Ir2 short time delay current, Ir3 instantaneous current, time setting and fault display
6	"Load 1 & Load 2" indicator light	Load Monitoring 1 & Load Monitoring 2 Current setting and alarm indicator light
7	“Setting” key	Select keys for setting parameters (current and time) of the items such as grounding, long time delay and short time delay
8	"Trip" key	Check whether the opening function of the intelligent controller is normal (the circuit breaker is closed first)
9	“No Trip” key	Check whether the intelligent controller's “Alarm Only Without Opening" function is normal (the circuit breaker is closed first)
10	"Save" key	After setting the parameters, press the "Save" key to save them
11	Power interface	DC 24 V power input port;
12	"+/-" key	When adjusting parameters, press the "+"key for increasing and the "-" key for decreasing
13	"Fault Check" key	Press this button to display the previous line fault protection section of the system memory
14	"Display Check" key	Press "Clear Light”, press the "Display Check" key for three seconds to turn on all lights and digital tubes, and then release the key to turn off all lights
15	"Clear Light" key	After the test trip, phase current selection, fault check and fault trip, press the clear light key to restore the controller to a normal working state
16	“Select” key	Press this key to cyclically display L1, L2 and L3 phase currents or fault check status to cyclically display the fault current or time value
17	"G, L1, L2, L3, MAX" indicator lights	Four-phase, grounding and maximum phase current indicator lights, corresponding to the maximum current phase and MAX indicator light
18	"A, kA, s" indicator light	Current and time unit indicator light, where A indicates ampere (long time delay and short time delay), kA indicates kiloampere (instantaneous), and s indicates second

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Series Universal Circuit Breaker

2.3 Interface symbols, indicator lights and key descriptions of 2,000 A above shell frame 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	“System Settings” key	Quickly switch to the "System Settings" main menu ("Right Arrow" when adjusting the system clock)
7	“Running Parameters” 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	Test interface	It has three functions: DC 24 V power input port; analog signal input port; programming and communication interface
12	“Enter” key	Enter the next menu of the item pointed by the current cursor, select the current parameter, or save the modification
13	“Information Inquiry” key	Quickly switch to the "Information Inquiry" main menu
14	“Protection Settings” key	Quickly switch to the "Protection Settings" main menu
15	“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
16	"Normal" indicator light	After the controller is powered on, the "Normal" indicator light keeps flashing. If the light does not turn on after power-on, the intelligent controller is not working properly and shall be replaced immediately.
17	"Fault/Alarm" indicator light	During 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.
18	“Reset” key	Reset to enter the reset (running) state in fault trip or alarm state

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

XI. Product Accessories

1. Functions and features of accessories

1,000 A Shell Frame Closed Electromagnet

2,000 A Above Shell Frame 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	AC 230 V	AC 400 V	DC 220 V	DC 110 V
Action voltage range	(85–110)% Us			
Starting current	1.3 A	0.7 A	1.3 A	2.5 A
Pick-up time	≤60 ms			

1,000 A Shell Frame Shunt Strip

2,000 A Above Shell Frame 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	AC 230 V	AC 400 V	DC 220 V	DC 110 V
Action voltage range	(70–110) %Us			
Starting current	1.3 A	0.7 A	1.3 A	2.5 A
Pick-up time	≤30ms			

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1,000 A Shell Frame Undervoltage Release
(Overvoltage Protection Optional)

2,000 A Above Shell Frame Undervoltage Release

■ Undervoltage release

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

Working voltage Ue	AC 230 V	AC 400 V
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	20 VA	
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 the undervoltage release with time delay to prevent the circuit breaker from being disconnected due to short-time voltage drop.

Phase Spacer Plate

■ Phase spacer plate

The phase spacer plate 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.

1,000 A Shell Frame Energy Storage Motor

2,000 A Above Shell Frame 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	AC 230 V	AC 400 V	DC 220 V	DC 110 V
Working voltage range	(85–110)% Us			
Energy storage time	(5–7) s			
HUW1-1000 power consumption	75 VA		75 W	
HUW1-2000 power consumption	85 VA		85 W	
HUW1-3000, 4000	110 VA		110 W	
HUW1-6300 power consumption	150 VA		150 W	

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

1,000A Shell Frame Auxiliary Switch

2,000A Above Shell Frame 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, independent six normally open & six normally closed.

Rated working voltage	AC 230 V	AC 400 V	DC 220 V	DC 110 V
Agreed heating current	6 A			
Rated control capacity	300 VA		60 W	

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's 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.

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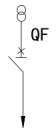
Mode I: One power supply & one load interlock

Circuit diagram | Possible operation mode

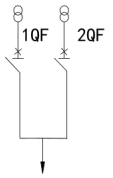


QF
0
1

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

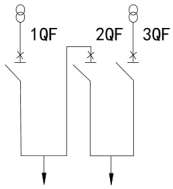


1QF	2QF
0	0
1	0
0	1

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

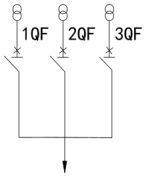


1QF	2QF	3QF
0	0	0
1	0	0
0	0	1
1	1	0
1	0	1
0	1	1

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

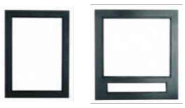
Mode IV: Three power supplies & one load interlock

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, and the protection level can reach IP40 level.

Drawer Operating Padlock

■ Drawer operating padlock

When the main body of the drawer circuit breaker is in the "Disconnection" position, the pull-out card board is locked with padlock, and the body cannot be moved to the "Test" or "Connection" position through cranking after locking. (The padlock is user-provided.)

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.
The installation mode includes 35 mm standard guide rail or direct installation.

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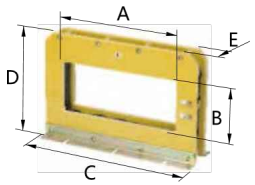
Series Universal Circuit Breaker

Position Door Interlock

■ Position door interlock

When main body of the drawer circuit breaker is in the "Test" or "Connection" position, the cabinet door is forbidden to open; and when the circuit breaker body is in the "Disconnection" position, the cabinet door is allowed to open.



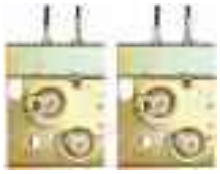
RCD Residual Current Transformer

■ RCD residual current transformer

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

Outline and installation dimensions (unit: mm)

Model	A	B	C	D	E	Change	Applicable products
BH-0.66CT-120x50	121.5	52	215	140	83	30 A/0.3 A	Current grade
BH-LMB-280x120	280	120	380	250	72		1,000 A shell frame
BH-LMB-370x120	370		465				2,000 A shell frame
BH-LMB-390x120	390		485				
BH-LMB-480x120	480		575				Customized



Mechanical Interlock

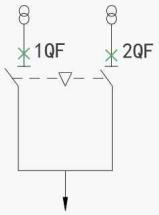
■ Mechanical interlock

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

Cable interlock or lever interlock of two circuit breakers

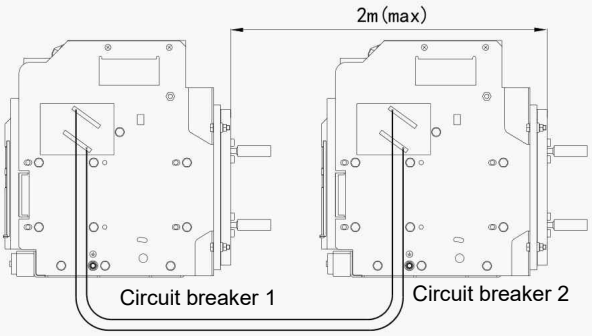
Two power supplies & one load can only close one circuit breaker

Circuit diagram



Possible operation modes

1QF	2QF
0	0
0	1
1	0



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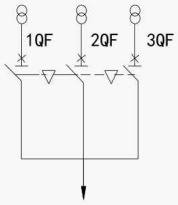
Cable interlock or lever interlock of three circuit breakers

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

Circuit diagram

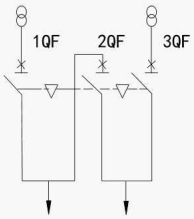


Possible operation modes

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

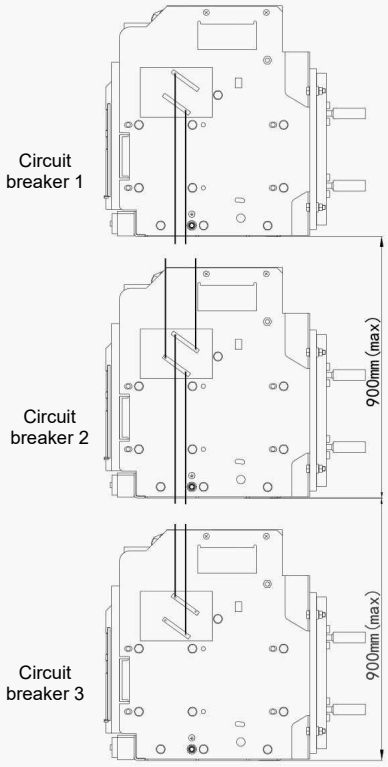


Possible operation modes

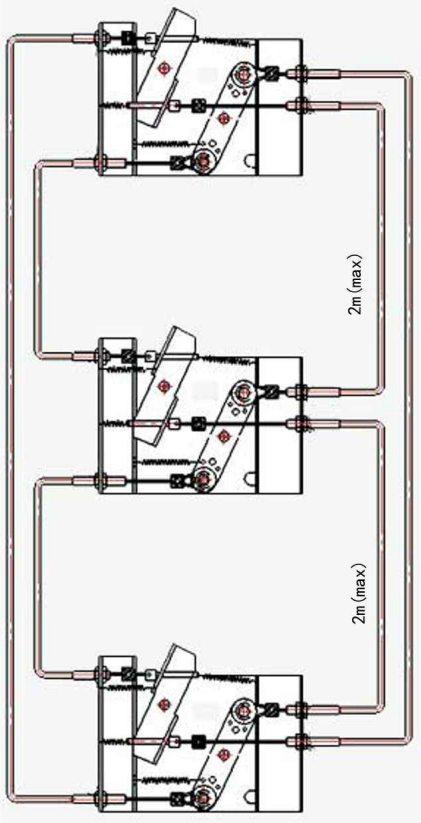
1QF	2QF	3QF
0	0	0
1	0	0
0	0	1
1	1	0
0	1	1
1	0	1

QF: Circuit breaker

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



Schematic diagram of triple lever interlock



Schematic diagram of triple cable interlock

HUW1

Series Universal Circuit Breaker

XII. Troubleshooting

Malfunctions	Possible causes	Inspection and troubleshooting methods
The circuit breaker cannot be closed	a) The undervoltage release is not powered on. b) After the intelligent controller acts, the red button on the controller panel is not reset. c) The operating mechanism does not store energy or does not store energy completely. d) The drawer circuit breaker body is not in the "Connection" or "Test" position. e) "Off Position Key Lock" is in the locked state.	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 circuit breaker body 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) Low power supply 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) Low power supply 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) Low power supply 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 setting of long time delay, short time delay and instantaneous setting values 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. The overload thermal memory function fails to clear the power off in time, and it's closed again.	Restart the intelligent controller after power failure, or close the circuit breaker after the setting time of the thermal memory.
The circuit breaker cannot be inserted by cranking for the drawer circuit breaker	The guide rail or main body of the drawer 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 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.

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XIII. Order Specification

(Please tick V or fill in the number in □)

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

Product model	☐HUW1-1000	☐HUW1-2000 ☐HUW1F-2000 ☐HUW1PVA-2000	☐HUW1-3200 ☐HUW1F-3200 ☐HUW1PVA-3200	☐HUW1-4000	☐HUW1-6300
Rated current	☐ 200 ☐ 400 ☐ 630 ☐ 800 ☐ 1,000	☐ 630 ☐ 800 ☐ 1,000 ☐ 1,250 ☐ 1,600 ☐ 2,000	☐2,000 ☐2,500 ☐2,900 ☐3,200	☐ 2,500 ☐ 2,900 ☐ 3,200 ☐ 4,000	☐ 4,000 ☐ 5,000 ☐ 6,300
Number of poles	☐Three-pole ☐Four-pole				
Mounting type	☐Fixed ☐Drawer				

Selection of intelligent controller	Type	☐L3 (economic DIP type, three-section protection) ☐L4 (economic DIP type) ☐2M (ordinary digital type) ☐3M (ordinary liquid crystal type) ☐2H (digital communication type) ☐3H (liquid crystal communication type)	
	Controller voltage	☐AC 230 V ☐AC 400 V ☐DC 220 V ☐DC 110 V ☐DC 24 V	
	Protection parameter settings	Default factory settings: Ir = 1 In, Tr = 19.2 s; Fixed time Isd = 8 Ir, Tsd = 0.4 s; Inverse time Isd = 4 Ir; 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 = _____ In (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	Ir = _____ 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☐Temperature control (H type) ☐Electrical energy measurement☐ZSI function☐Harmonic measurement ☐Overvoltage protection ☐Undervoltage protection ☐Voltage imbalance protection ☐Reclosing (H type) ☐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 Type H)	
Standard configuration accessories	Closed electromagnet	☐AC 230 V ☐AC 400 V ☐DC 220 V ☐DC 110 V	
	Shunt strip	☐AC 230 V ☐AC 400 V ☐DC 220 V ☐DC 110 V	
	Energy storage motor	☐AC 230 V ☐AC 400 V ☐DC 220 V ☐DC 110 V	
	Auxiliary switch	☐Conversion Four Normally Open & Four Normally Closed ☐Independent Four Normally Open & Four Normally Closed ☐Conversion Six Normally Open & Six Normally Closed ☐Independent Six Normally Open & Six Normally Closed ☐Special form (Note: HUW1-1000 has only Conversion Four Normally Open & Four Normally Closed)	
Optional accessories	Undervoltage release	☐AC220V ☐AC380V	
		☐Instantaneous (default) ☐0.5 s ☐1 s ☐3 s ☐5 s	
	Opening locking device	☐One circuit breaker with one lock and one key ☐Two circuit breakers with two locks and one 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 sources ☐Three power sources ☐Two power supplies + busbar coupler (Note: Please indicate if fire fighting or communication functions are required)	
	Others	☐Residual current transformer ☐Neutral current transformer ☐Ground transformer ☐Power adapter ☐Door interlock ☐Relay module ☐Protocol conversion module (Profibus-DP, Device Net) ☐Electric three-position lock of drawer seat ☐Energy storage ready indicator ☐Opening/Closing button lock ☐Secondary wiring terminal cover ☐Counter	

Note 1: If the user has other special requirements for ordering, please consult with the manufacturer before the ordering;

Note 2: The costs of circuit breaker's optional function and accessories are not included in the standard configuration of the circuit breaker, and therefore will be calculated separately.