

Primary Distribution

HUW1PVA, HUW1F

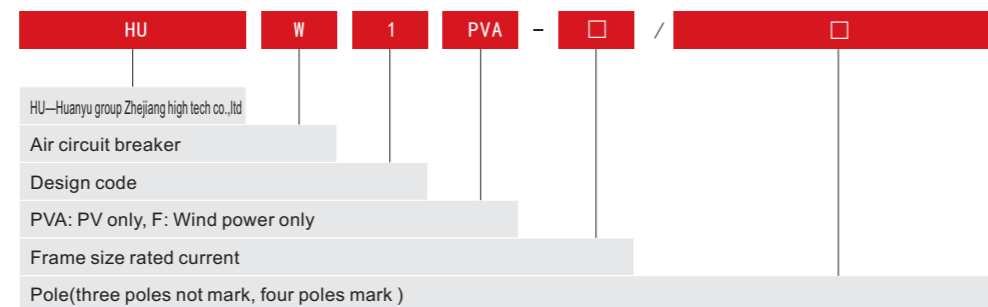
Series air circuit breaker



1. Application range

HUW1PVA, HUW1F series of intelligent air circuit breaker (hereinafter referred to as circuit breaker) for the AC 50Hz, rated voltage of 400V, 690V, rated current of 630A-3200A photovoltaic, wind power distribution system used to distribute power and protect circuit and power equipment from overload, under voltage, short circuit, single-phase ground fault and other hazards. Circuit breaker with intelligent protection, selective protection of precision, can improve the reliability of power supply, to avoid unnecessary blackouts.
Product conforms to the standards: GB 14048.2, IEC 60947-2
Product Certification: CCC, CB, CE, ROHS

2. Model and meaning



HUW1PVA is a targeted product developed for the special use of photovoltaic systems, the product passed the high and low temperature test, and three proofing(TH-type) related tests.
HUW1F can meet the requirements of wind power generation and can be used in AC 10Hz-200Hz,690V and below. Overload and short circuit protection can be provided even under wind speed. The product passes the high and low temperature test and the three proofing(TH-type)test .
HUW1PVA, HUW1F can increase the over-temperature protection function, can do dual-power system, see additional functions explanation.
Circuit breakers use industrial-grade electronic components, aviation lubricants and special mechanical components, can be stored in the -40 °C~70 °C.

3. Normal working condition

- 3.1 Ambient air temperature at -40 °C ~ 70 °C, circuit breakers in different ambient temperature derating factor in Table 3
- 3.2 Altitude: The installation place is no more than 2000 meters above sea level, more than 2000 meters need to derate (see Table 4).
- 3.3 Atmospheric conditions: air relative humidity at the maximum temperature of +40 °C not more than 50%, at lower temperatures can allow a higher relative humidity, for example: 20 °C when the humidity is 90%, due to temperature changes occasionally produce condensation to take special measures.
- 3.4 Pollution level: 3.
- 3.5 Installation category: the main circuit breaker and under-voltage release coil, power transformer primary coil installation category is IV, the other auxiliary circuits, control circuit installation category is III.
- 3.6 Utilization categories: B class.
- 3.7 Mounting conditions: circuit breaker should be installed in accordance with the instructions, the vertical tilt of the circuit breaker does not exceed 5°.

4. Classification

- 4.1 According to the installation method: fixed; drawer.
- 4.2 According to the mode of operation: electric operation; manual operation (for maintenance).
- 4.3 According to poles: three, four.
- 4.4 According to intelligent over-current controller performance: H (communications); M (normal); L (economy) three types of controller functions as shown in Table 1.

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Table.1

Application	Series	Memo	Function			
For general industry	H	All digital units, L-type coding switch and toggle button setting mode. M, H-type adopt digital display and button setting method.	H series			Communication Interface: Provide standard RS485 interface Multi-protocol data transmission Function (internal integrated ModBus communication protocol)
	M		M series			
	L		L series			
			Valid value protection Three sections protection + grounding or leakage protection Load current beam indicator A variety of alarm functions Test function Fault memory function Self-diagnosis function MCR making and breaking and overrun trip function	Ammeter power meter More protection features, optional five features Load monitoring Contact wear and mechanical life instructions Fault inquiry Programming interface		

5. Technical data and performance

5.1 The basic parameter of circuit breaker as table 2 shown

Table.2

Frame size	Rated insulation voltage U _i (V)	Rated current I _n (A)	Rated impulse withstand voltage: U _{imp} (kV)	Rated voltage U _e (V)	Rated limit short-circuit breaking capacity I _{cu} k(A) o-co		Rated operating short-circuit breaking capacity I _{cs} k(A) o-co-co		Rated short-time withstand current I _{cw} kA (1s)	Power loss (I _n) W	
					400V	690V	400V	690V		Fixed type	Drawed type
2000	1000	630, 800 1000, 1250 1600, 2000	12	AC 50Hz 400 690	65	50	65	50	65/50	90	205
										140	310
										170	310
3200	1000	2000 2500 2900 3200	12	AC 50Hz 400 690	100	65	85	50	65	170	400
										260	510
										320	650
										420	760
4000	1000	3200 3600 4000	12	AC 50Hz 400 690	100	75	80	65	65	430	780
										440	790
										450	800
6300	1000	4000 5000 6300	12	AC 50Hz 400 690	120	85	100	75	100/85	1225	
										1250	
										1625	

- Note: 1. Arc distance is zero
- 2. The same breaking capacity with inlet and outlet in the table.

5.2 Temperature derating coefficient in Table 3

Table.3

Ambient temperature	+40°C	+45°C	+50°C	+55°C	+60°C	+70°C
Allowed continuous working current	1 I _n	0.95 I _n	0.9 I _n	0.85 I _n	0.8 I _n	0.73 I _n

Note: Under various ambient temperature conditions, make the measured circuit breaker inlet and outlet temperature reaching 110°C as a benchmark

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5.3 Altitude derating factor in Table 4
Table 4.

Altitude(m)	2000	3000	4000	5000
Power frequency (V)	3500	3450	2500	2000
Working current correction factor	1	0.93	0.88	0.82
Short-circuit breaking ability correction factor	1	0.83	0.71	0.63

5.4 Intelligent over-current controller protection features and functions
5.4.1 Intelligent controller protection features shown in Figure 1 ~ Figure 4

Figure 1 the basic functions (long-timedelay,short-time delay and instantaneous protection)

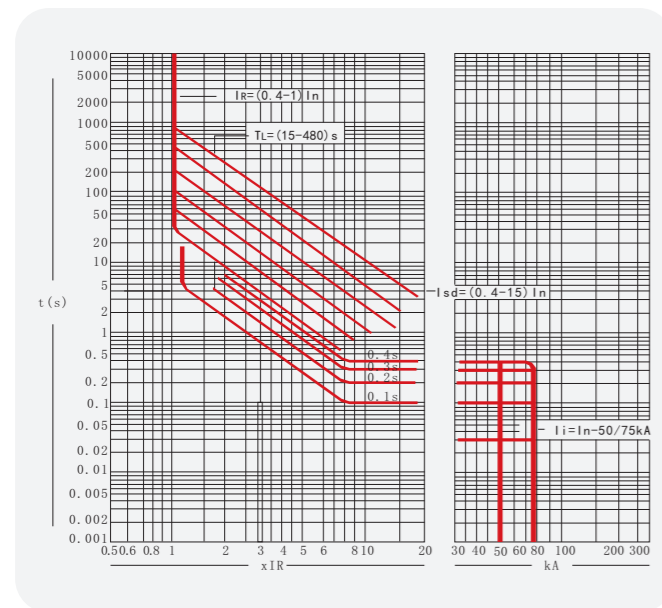


Figure 3 load monitoring and control (a load limit and a load doubling protection features)

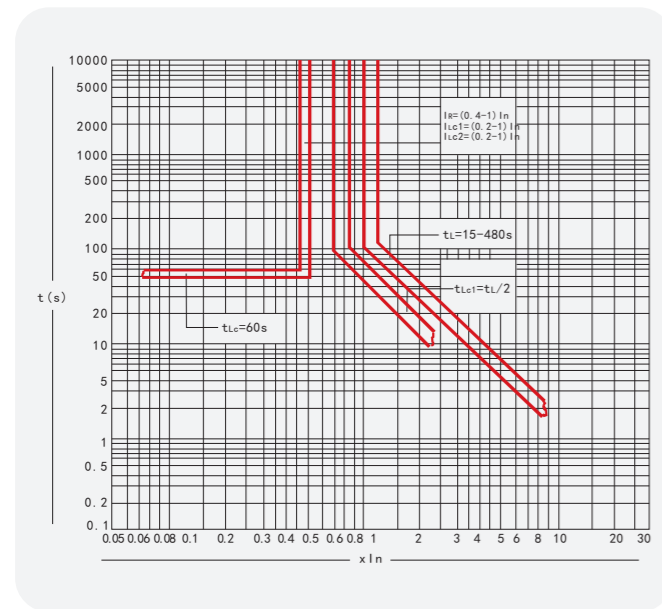


Figure 2 Ground fault protection

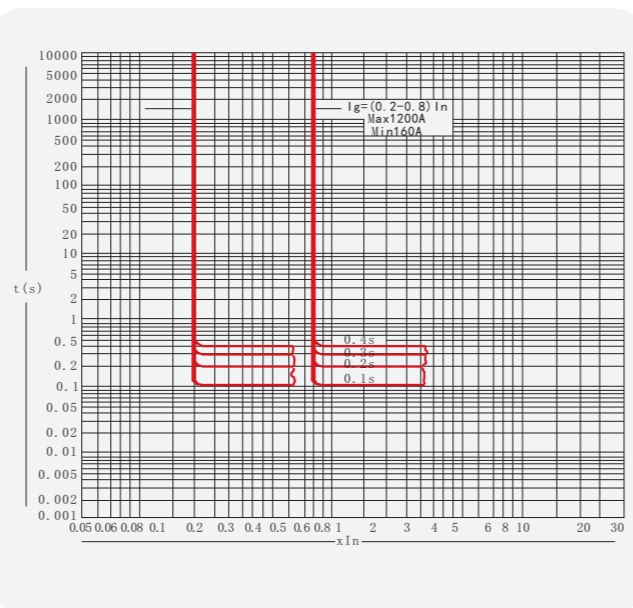
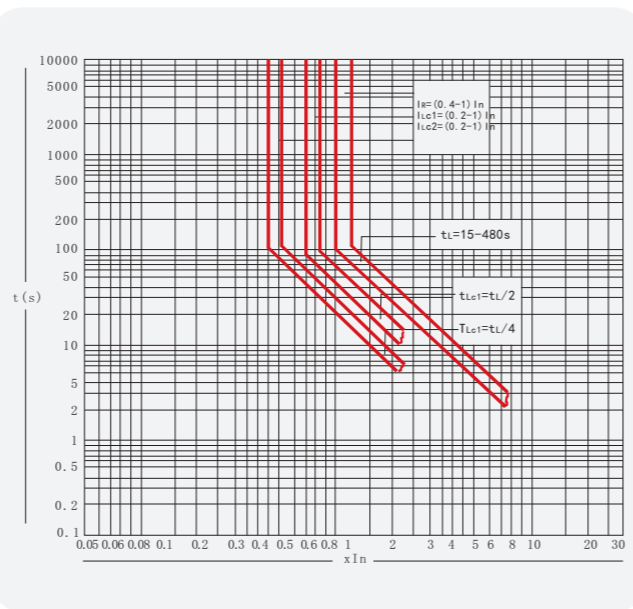


Figure 4 load monitoring and control (double-load limit protection features)



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5.4.1.1 Release current setting value Ir and tolerance in Table 5
Table 5

Long-time delay		Short-time delay		Instantaneous		Ground fault	
IR	Tolerance	I _{sd}	Tolerance	I _i	Tolerance	I _g	tolerance
(0.4~1) I _n min 160A	±10%	(0.4~15) I _n	±10%	10 I _n ~50kA	±15%	(0.2~0.8) I _n (max1200A, min 160A)	±10%

Note: When there are three sections of protection at the same time, the setting values can not be crossed.

5.4.1.2 Long-time overcurrent protection inverse time operating feature is shown in Table 6
Table 6

I	Operating time						Tolerance
1.05 IR	>2h Non-operating						±15%
1.3 IR	>1h Operating						
1.5 IR	15s	30s	60s	120s	240s	480s	
2.0 IR	8.4s	16.9s	33.7s	67.5s	135s	270s	

Note: The 2.0IR time is calculated by $t_{2T} = (1.5IR)^2 t_1$, and t_1 is the operating time at 1.5IR, set by the user.

5.4.1.3 Short-time delay current protection characteristics in Table 7
Table 7

Current	Operating characteristic	Operating time (s)				Tolerance	
$I \geq I_{sd}$ $I \leq 8 IR$	Inverse time	Setting time $T = (8IR)^2 t_{sd} / I^2$				±15%	
$I \geq I_{sd}$ $I \leq 8 IR$	Limit time	Setting time t2	0.1	0.2	0.3		0.4
		Return time	0.06	0.14	0.23		0.35

5.4.1.4 The earth fault protection feature is short-time delay definite time, see Table 6 for definite time operation time and returnable time. The setting value of earth fault factory time is "OFF".

5.4.1.5 If there is no special request when ordering, the factory will configure the intelligent release according to Table 8
Table 8

Long-time	Setting value	IR	In
	Delay	$T_R(1.5IR)$	15s
Short-time delay	Setting value	I _{sd}	8 I _n
	delay	t _{sd}	0.4s
instantaneous	Setting value	I _i	12 I _n
Grounding fault	Setting value	I _g	0.4 I _n
	delay	t _g	OFF ((Only display,non-brea))
Load monitoring		ILC1	I _n
		ILC2	I _n

Note: IR is long-time delay protection setting current in the table, I_{sd} is short-time delay protection setting current, I_i is instantaneous protection setting current, I_g is grounding protection setting value; ILC1, ILC2 is load monitoring setting current.

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5.4.2 Intelligent over-current controller function

5.4.2.1 L-type over-current controller function

L-type release adopts coding switch and toggle switch setting mode, with overload long-time delay, short circuit short-time delay, instantaneous, ground leakage protection features, and fault status, load current beam indicator and other functions, but no digital display, function less than M and H type. For users to use in the general occasion.

5.4.2.2 M-type over-current controller function

A. Ammeter function

Show the operating current of each phase and ground leakage current, the normally display maximum phase current, but also display setting, test and fault current value or time value.

B. Voltage function

Show lines voltage, normally display the maximum value.

C. Load monitoring function

Set the two settings, ILc1 setting range is (0.2 ~ 1) In, ILc2 setting range is (0.2 ~ 1) In, ILc1 delay characteristics of inverse time characteristics, the time setting value for the delay setting value of 1/2; ILc2 there are two kinds of delay characteristics, the first one is inverse time characteristic, whose time setting value is 1/4 of the long-time delay setting value, the second one is the definite-time limit, and the delay time is 60s.

These two delay functions, the former is used when the current close to the overload setting value is not to break important lower load, the latter is used when the current exceeds the ILc1 setting value, the delay break less important load let current down, making main circuits and important load circuit to protect power supply, when the current drops to ILc2, after a certain delay after the command issued again lower level has been cut off the circuit to restore the power supply of the entire system. The two monitoring protection, users can choose one, the monitoring features are shown in Figure 3, Figure 4.

D. Setting function

Set + - store four buttons to set various parameters of the controller.

E test function

With the set + - store trip no trip reset button, etc, you can check the various protection features of the controller.

F. Remote monitoring and diagnostic functions

(1). The controller has fault diagnosis function. display error "E" or alarm when a computer fails, restarting the computer at the same time. If users need, it can break the breaker.

(2). When the local ambient temperature reaches 85°C, it can alarm and can cut off the circuit breaker when the current is small (when user needs).

(3).The intelligent controller has overload, ground, short circuit, load monitoring, pre-alarm and tripping indicator(OCR) signal output through contacts or optocouplers for outdoor remote control. The contact capacity is DC28V, 3A, AC125V, 3A.

G. Thermal memory function

After controller overload or short-circuit delay tripping, before the controller is not powered off, has analog bimetal memory function, overload energy release end in 30min, short-time delay energy release end in 15min. During this period there are overload and short-time delay fault, tripping time will be shorter, the controller powers off, the energy automatically clear.

5.4.2.3 H-type over-current controller function

In addition to the all M-type functions, also has a serial communication interface, through a dedicated device and printer, language system or PC support, to transmit the circuit breaker number, on-off state, a variety of release settings, operating current, voltage, fault current, operating time and fault status and other parameters, graphics, text, etc. to display or print out, to achieve telemetry, remote adjustment, remote control, remote signaling capabilities for network systems.

(1). Communication interface hardware support

* Central processor 16-bit micro-controller, the clock frequency is 25MHz.

* Communication baud rate up to 1MHz

* Port complies with EIA Rs485 protocol

* Support duplex, half duplex mode, the cable uses dual-core 8 pairs, use shielding line in the case of serious interference.

(2). Data transmission support

* Support serial synchronization and serial asynchronous mode

* Support 8-bit, 9-bit data transmission, support parity check out.

* If necessary, parallel communication can be achieved

(3). Communication interface protocol

Divided into three layers: application layer, link layer, physical layer, layer protocol dedicated.

(4). Communication interface functions

Mainly to achieve low-voltage power distribution system requiring four remote functions: remote control, remote control, telemetry, remote signaling.

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5.5 ACB operation performance

The operating performance of breaker is showed by cycle index as table 8 shown. Table.8

Operating times per hour	Energizing operation times	Non-energizing operation times
20	8000	15000

5.6 The operating voltage of shunt release, under-voltage release, motor operation mechanism, energy releasing(closing) electromagnet, intelligent controller as table 9 shown.

Table.9

Type	Rated voltage AC (50Hz) V	DC V
Shunt release	Us	110、220
Under-voltage release	Ue	—
Motor operation mechanism	Us	110、220
Energy releasing (closing) electromagnet	Us	110、220
Intelligent controller	Us	110、220
	Us	110、220

Note: the reliable operation range of shunt release is (70%~110%)Us,of energy releasing (closing) electromagnet and motor operation mechanism is (85%~110%)Us.

5.7 ACB under-voltage release performance

Table.10

Type	Under-voltage delay release	Under-voltage instantaneous release
Release operating time	delay1、3、5s	instantaneous
Release operating voltage value	35%~70%Ue	Make the breaker break
	≤35%Ue	The breaker cannot close
	≥85%Ue	The breaker reliably close
In ½ delay time, if power supply voltage return to 85% Ue.	The breaker non-break	

Note: Delay time accuracy is (+10%).

5.8 Auxiliary contact performance

5.8.1 The conventional thermal current of auxiliary contact is 6A.

5.8.2 The auxiliary contact form:4NO+4NC

5.8.3 Auxiliary contact's abnormal close and breaking capacity. Auxiliary contact breaking capacity according to the use of the identified abnormal using conditions in Table 11.

Table.11

Using category	Making			Breaking			Operating times and frequency of making andbreaking operation		
	I / Ie	U / Ue	COS φ or T0.95	I / Ie	U / Ue	COS φ Cosθ or T0.95	Operating times	Operating times per minute	Energizing time(s)
AC-15	10	1.1	0.3	10	1.1	0.3	10	6(Or with the main circuitThe same operating frequency)	0.05
DC-13	1.1	1.1	6Pe	1.1	1.1	6Pe			

Note: When Pe≥50W, T0.95 upper limit=6Pe≤300ms.

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5.8.4 The making and breaking capacity of auxiliary contact in normal operating conditions
Table.12

Using	Making			Breaking		
	I / I _e	U / U _e	COSΦms)T0.95	I / I _e	U / U _e	COSΦorT0.95
AC-15	1	1	0.3	1	1	0.3
DC-13	1	1	6Pe	1	1	6Pe

Cosθ or T(ms)0.95

5.9 Key lock at breaking location

The circuit breaker has a "breaking location key" accessory (supplied on request) that locks the circuit breaker in the open position, and neither closing switch nor the release (closed) electromagnet make circuit breaker closed. (See attached table)

6. Structure overview

Circuit breaker is compact structure, with the characteristics of separation. The contact system is enclosed between two insulating base plates with separate structure, each contact is separated to form an independent cell, controller, operating mechanism, manual and electric operating mechanism in turn form in front of the independent units, such as one unit is failure, the unit can be removed and replaced (See Figure 6, Figure 7).

Fig.5 HUW1PVA,HUW1F ACB operating indicator diagram



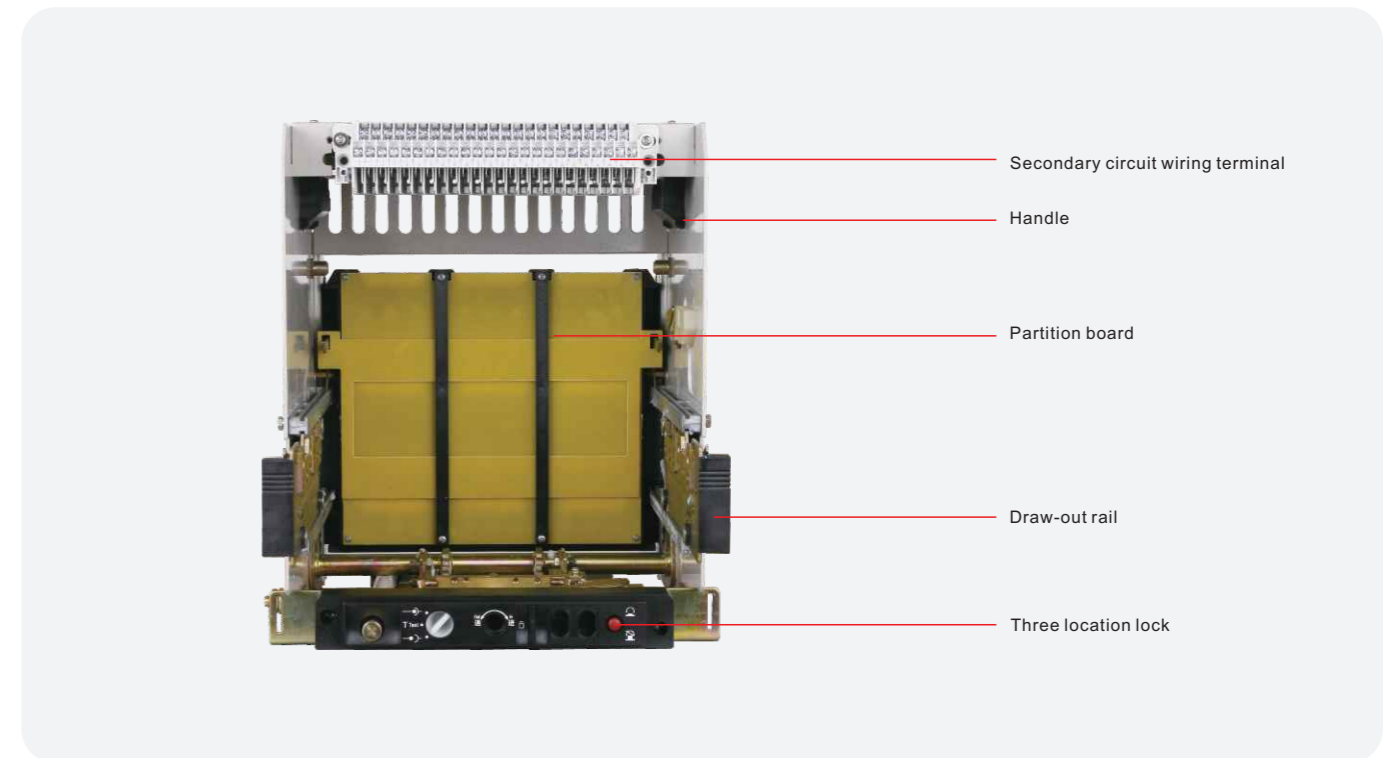
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Fig.6 HUW1PVA,HUW1F ACB draw-out position



Fig.7 HUW1PVA,HUW1F ACB drawer seat



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6.1 .Drawer circuit breaker

Drawer circuit breaker composes of the circuit breaker body and drawer seat. Drawer seat both sides has guide rails, and on the guide rail has active guide plate, the circuit breaker body rack on the left and right guide plates. Drawer circuit breaker is connected to the main circuit through the bridge contact that the busbar on the circuit breaker body is inserted into the drawer seat. Shake the drawer seat bottom beam shaking handle, drawer circuit breaker can be achieved three working position (shaking handle next to the location instructions).

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

"Test" position: The main circuit is disconnected and separated by an insulating partition plate. Only secondary circuit connected, can carry out the necessary action test.

"Separation" position: the main circuit and the secondary circuit all disconnected. To remove the circuit breaker body in the "separation" position, the rocking handle must be removed.

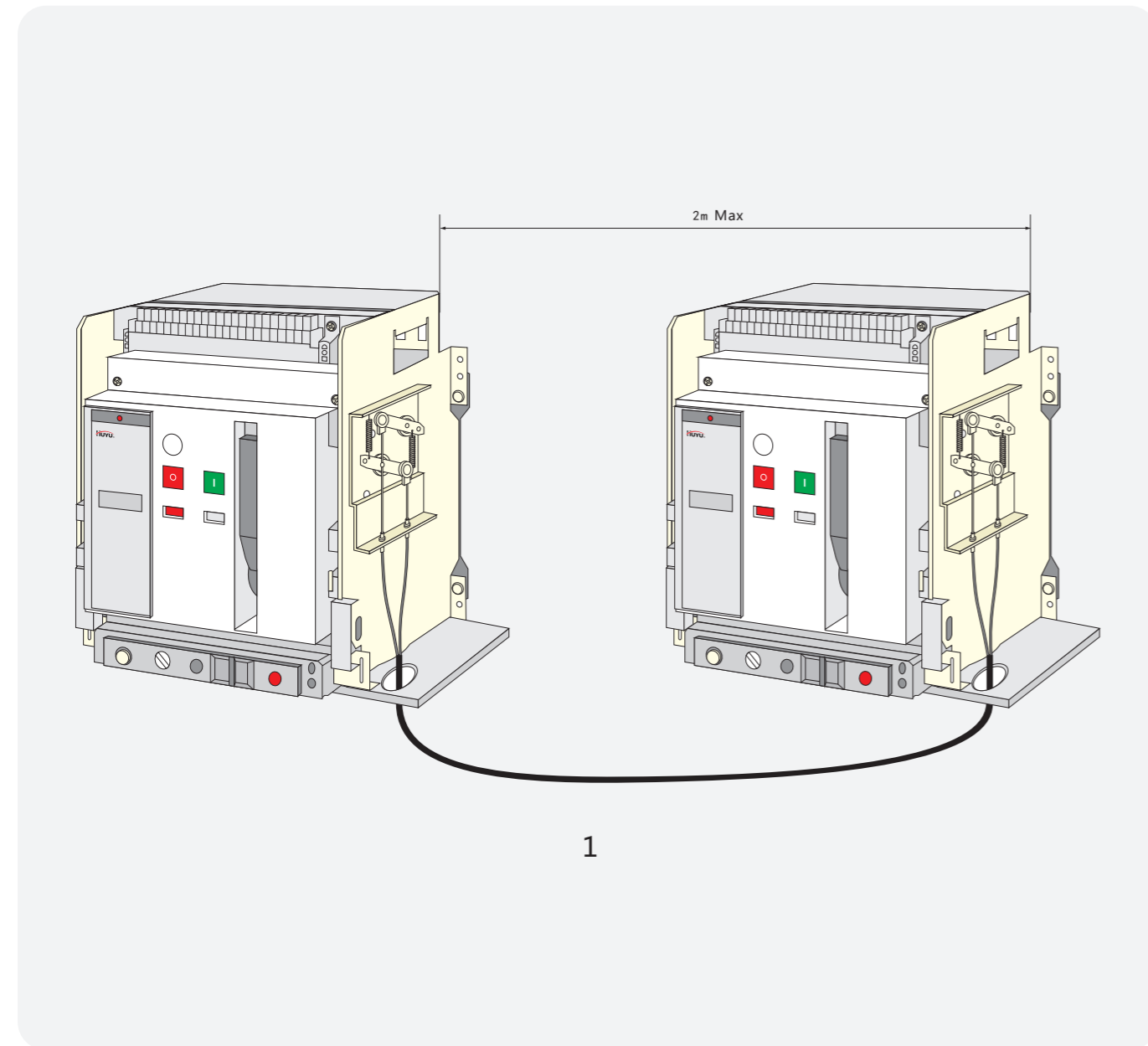
Drawer circuit breakers have a mechanical interlock, which can be closed only when in the connection or test position. Can not be closed in the middle of connection and test.

6.2 Interlocking mechanism

The interlocking mechanism is installed on the right side of the circuit breaker, horizontal circuit breaker interlocking with steel cable(Figure 8),overstowedcircuit breaker with connecting rod interlocking(Figure 9). When one of the circuit breakers in the closing state, then the other can not be closed, the interlocking mechanism installed by the user.

Figure 8 shows the three overstowed circuit breakers interlocked with the linkage. If two circuit breaker interlocks only need to remove the front-mostcircuit breaker.

Figure.8 Horizontal circuit breaker interlocking

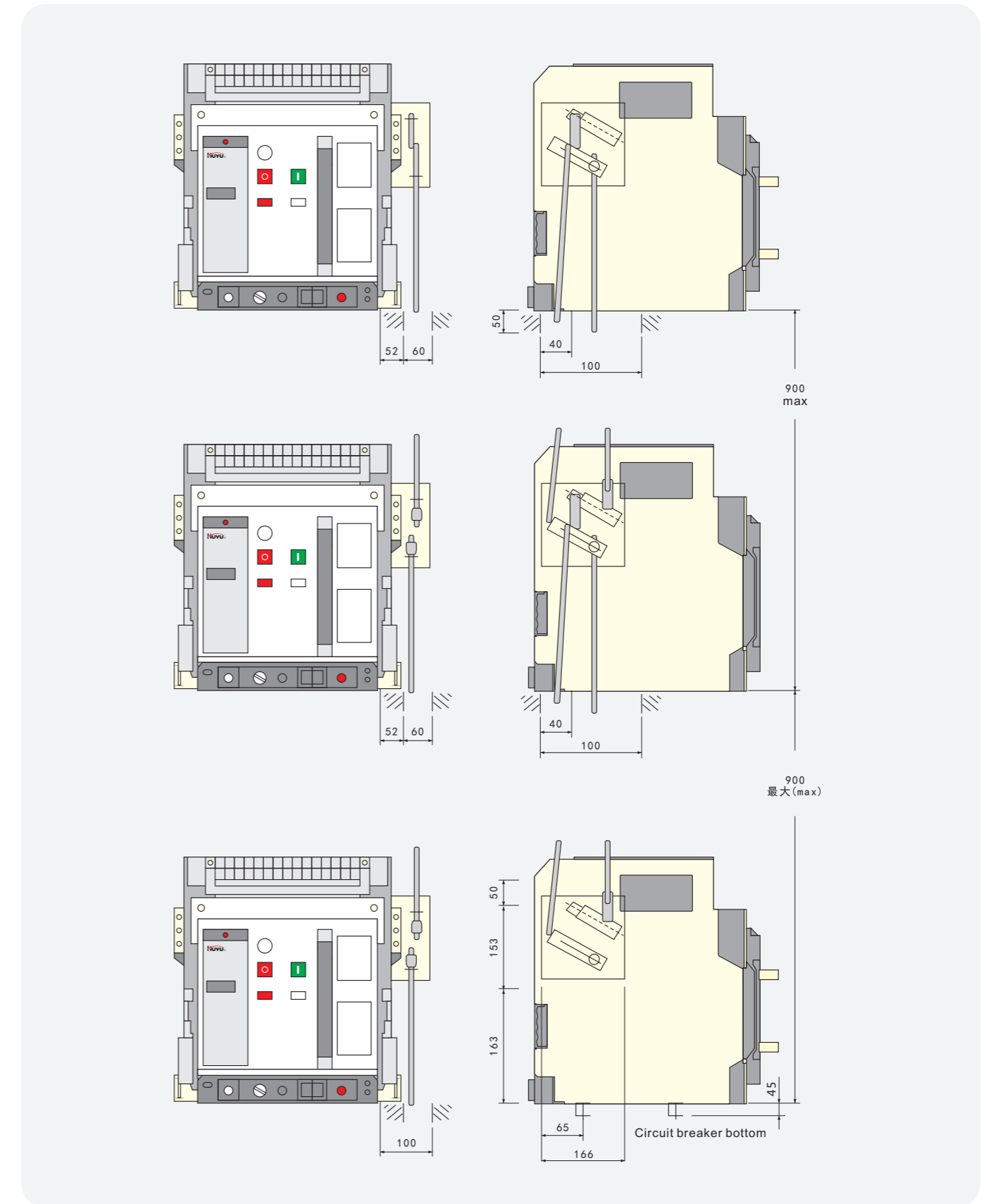


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Figure.9 Overstowed circuit breaker interlocking



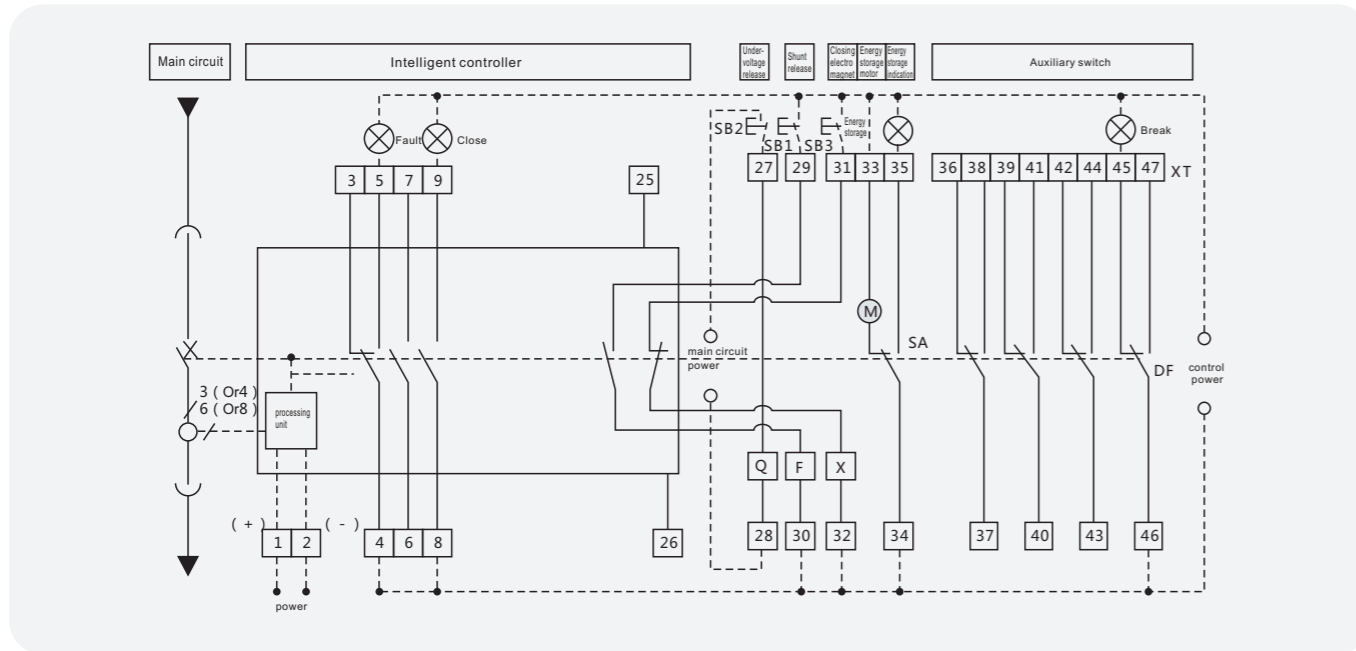
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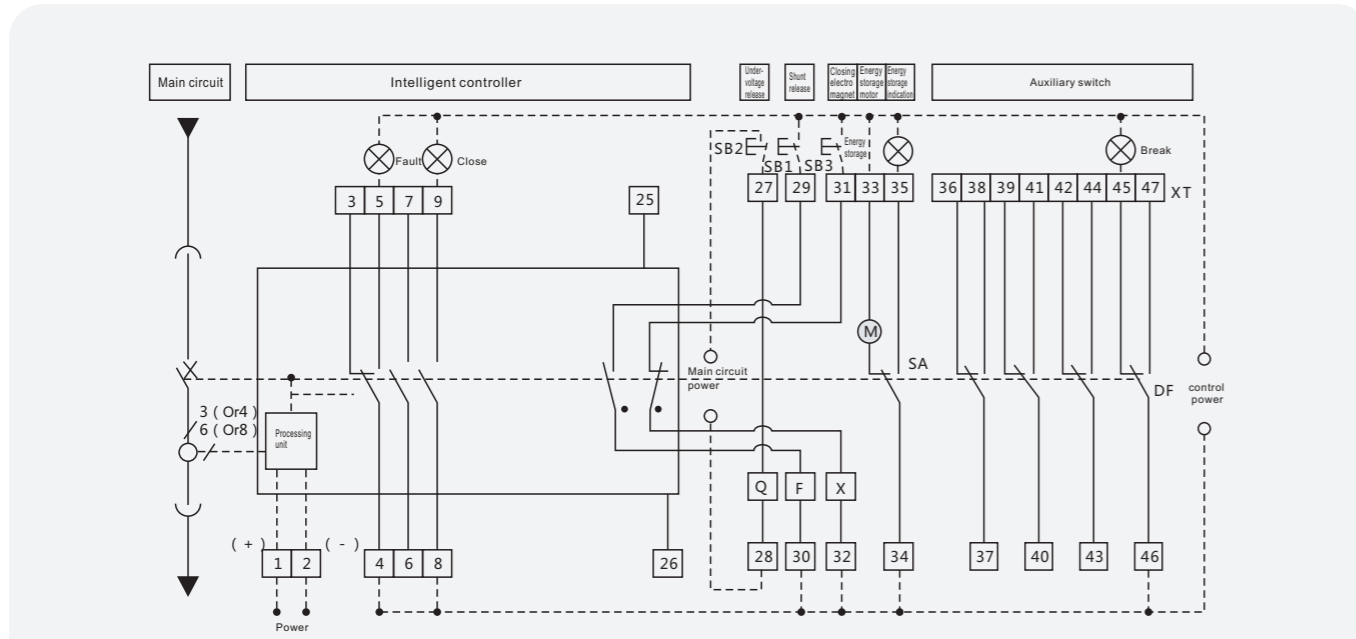
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7. Wiring diagram

7.1 M-type or L-type basic function wiring diagram of HUWF. PVA-2000~6300 controller



7.2 Secondary circuit wiring diagram of HUWF. PVA-2000~6300 auxiliary switch composes of 4NO+4NC individual contact



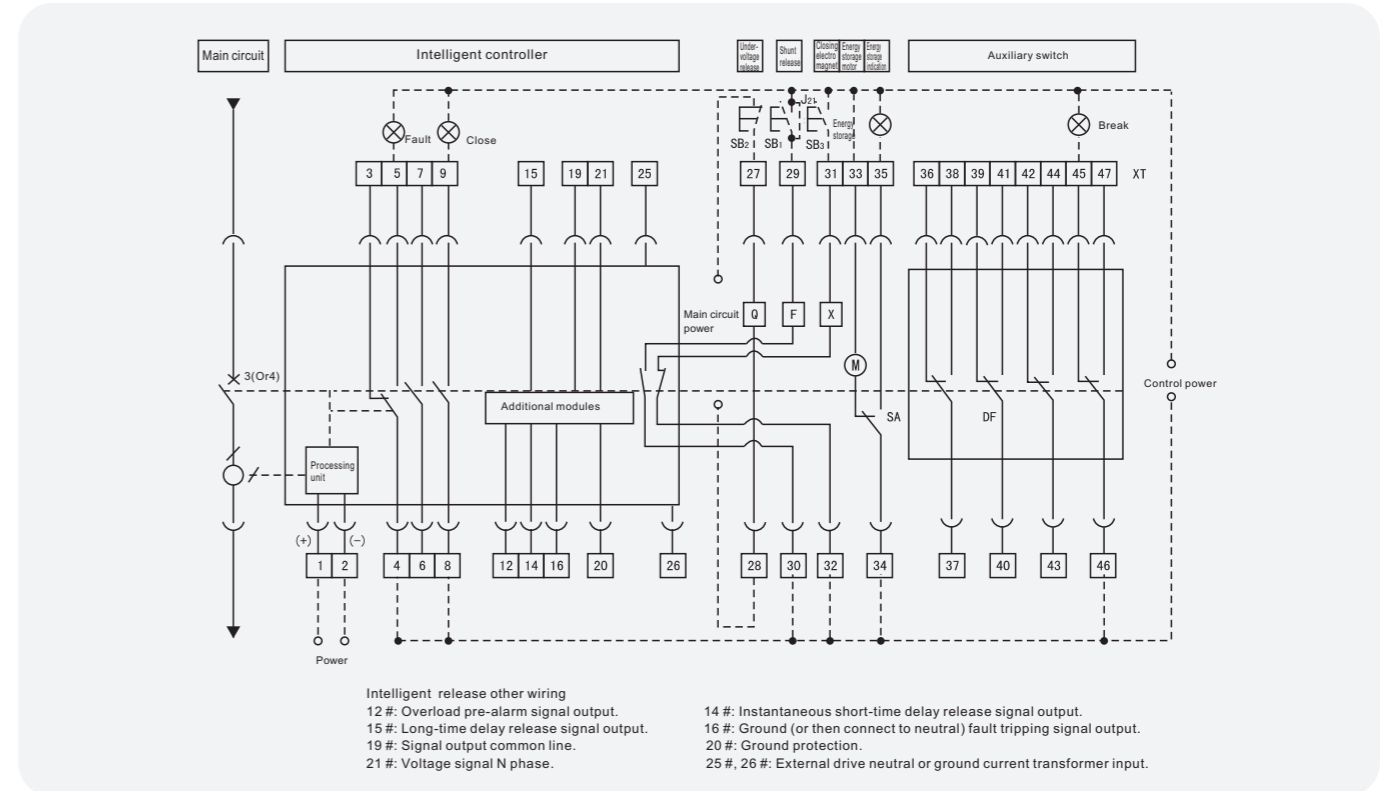
1 #, 2 #: Auxiliary power input, when the auxiliary power is DC, 1 # is the positive terminal.
 3 #, 4 #, 5 #: Fault trip contact output. Contact capacity is AC380V, 3A.
 6 #, 7 #, 8 #, 9 #: two groups of circuit breaker auxiliary contacts, contact capacity is AC380V, 3A. If the user requires, 6 #, 7 # can output NC contacts.
 25 #, 26 #: External drive neutral or ground current transformer input.
 SB1: Shunt button (user-provided) X: closing electromagnet Q: under-voltage release or under-voltage delay release.
 SB2: Under-voltage button (user-provided) M: energy storage motor Df: Auxiliary contact.
 SB3: Closing button (user-provided) F: shunt release XT: terminal.
 0: NO Contact SA: microswitch : Signal light (user-provided).
 Note:
 (1) If the control power voltage of Q, F, X, M is different, then connect different power respectively.
 (2) Terminal 33 # can directly connect power (automatic pre-energy storage), but also can series connect power NO button then NO button connect power (manual pre-energy storage).

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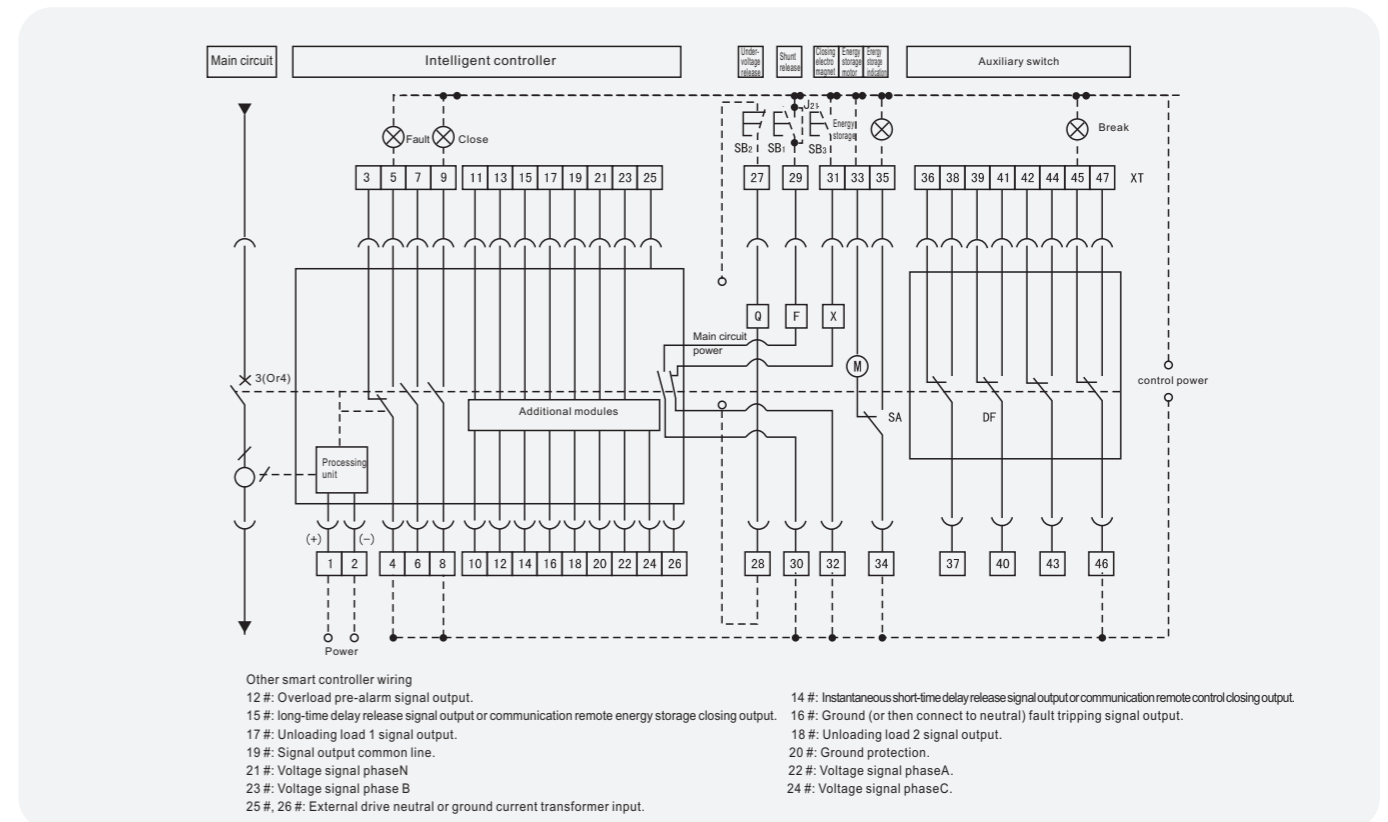
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7.3 L-type additional function circuit diagram of HUW1F.PVA-2000 ~ 6300 controller



7.4 M-type functional circuit diagram of HUW1F.PVA-2000 ~ 6300 controller

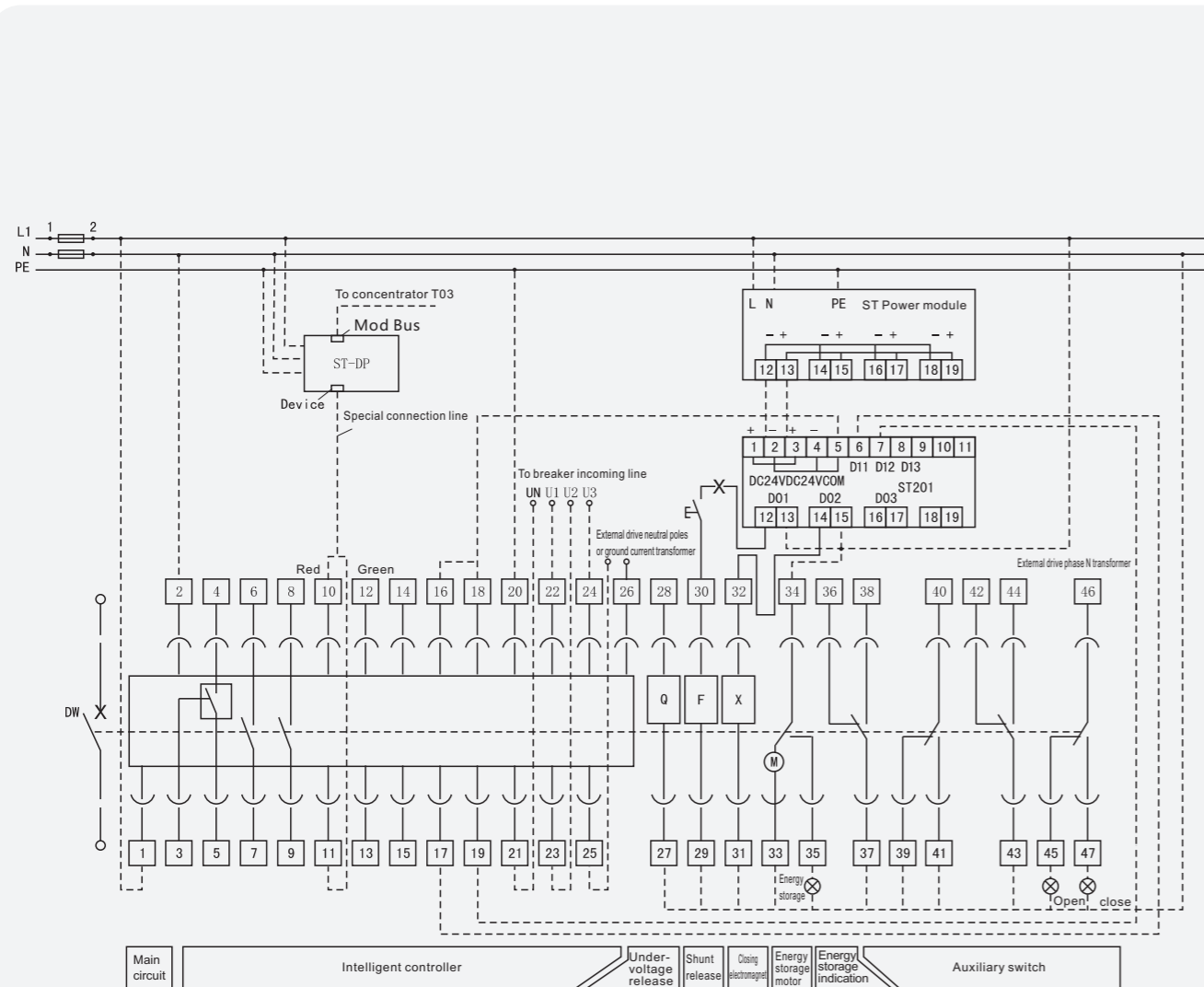


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7.5 HUW1F.PVA-2000 ~ 6300 controller for the H-type main secondary wiring (using ModBus protocol networking, achieve "four remote")



- 1#, 2 #: Power input.
 - 10 #: RS485 Communication terminal P (single 2).
 - 11 #: RS485 Communication terminal N (single 2).
 - 12 #, 13 #: Load 1 alarm.
 - 14 #, 15 #: Load 2 alarm.
 - 16 #, 17 #: Opening signal output.
 - 18 #, 19 #: closing signal output.
 - 20 #: PE line.
 - 21 #: N input terminal.
 - 22 #, 23 #, 24 #: A, B, C three-phase power input terminal.
 - ST-DP: DP protocol module.
 - ST Power Module: power converter (optional).
 - ST201: Controller signal energy amplification (optional).
- Note:
- (1) Dotted line part needs the user to connect.
 - (2) Wiring with auxiliary function release refer to the figure above.

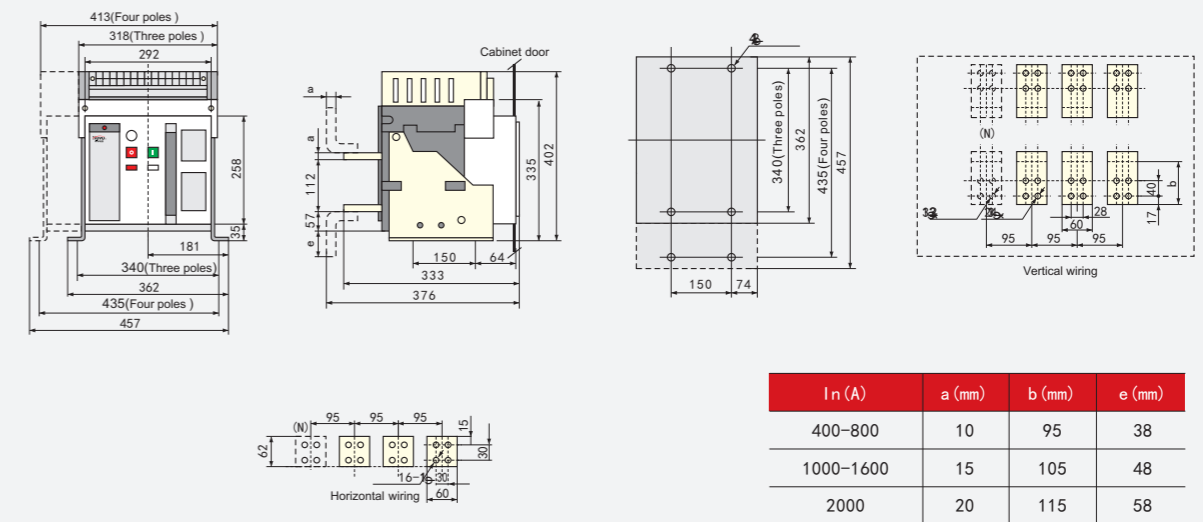
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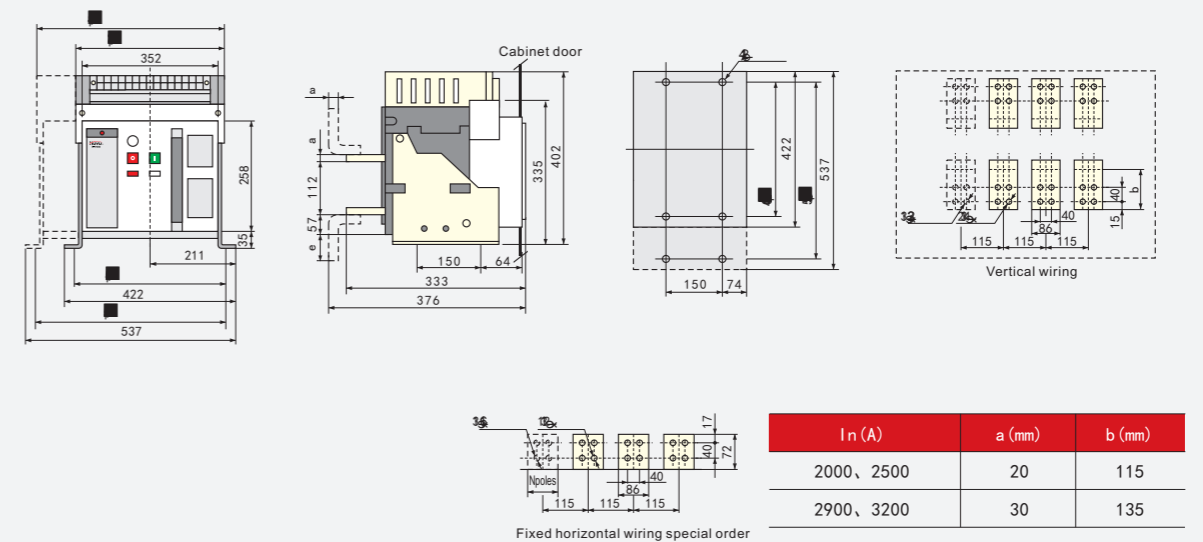
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8. Overall and mounting dimension

8.1 Fixed type circuit breaker mounting and overall dimensions (2000,2000 / 4)



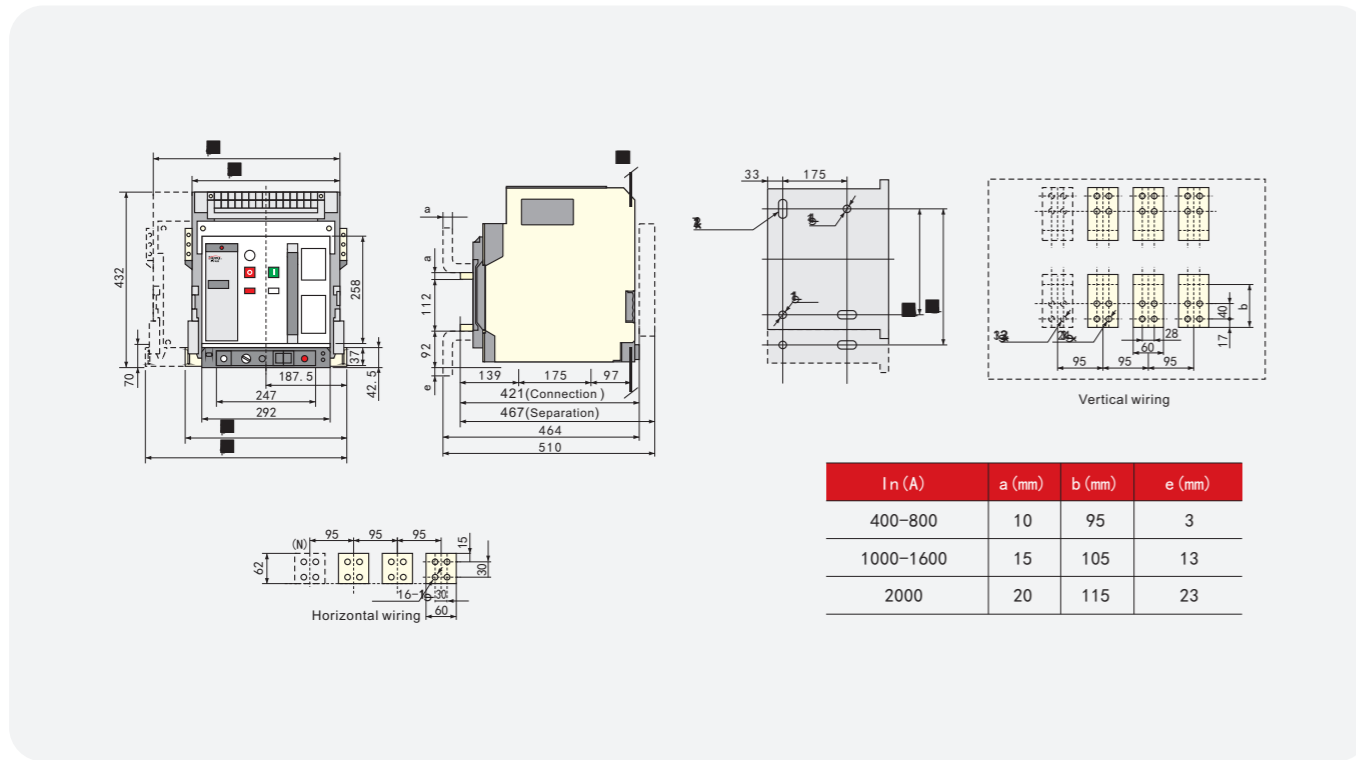
8.2 Fixed type circuit breaker mounting and overall dimensions (3200,3200 / 4)



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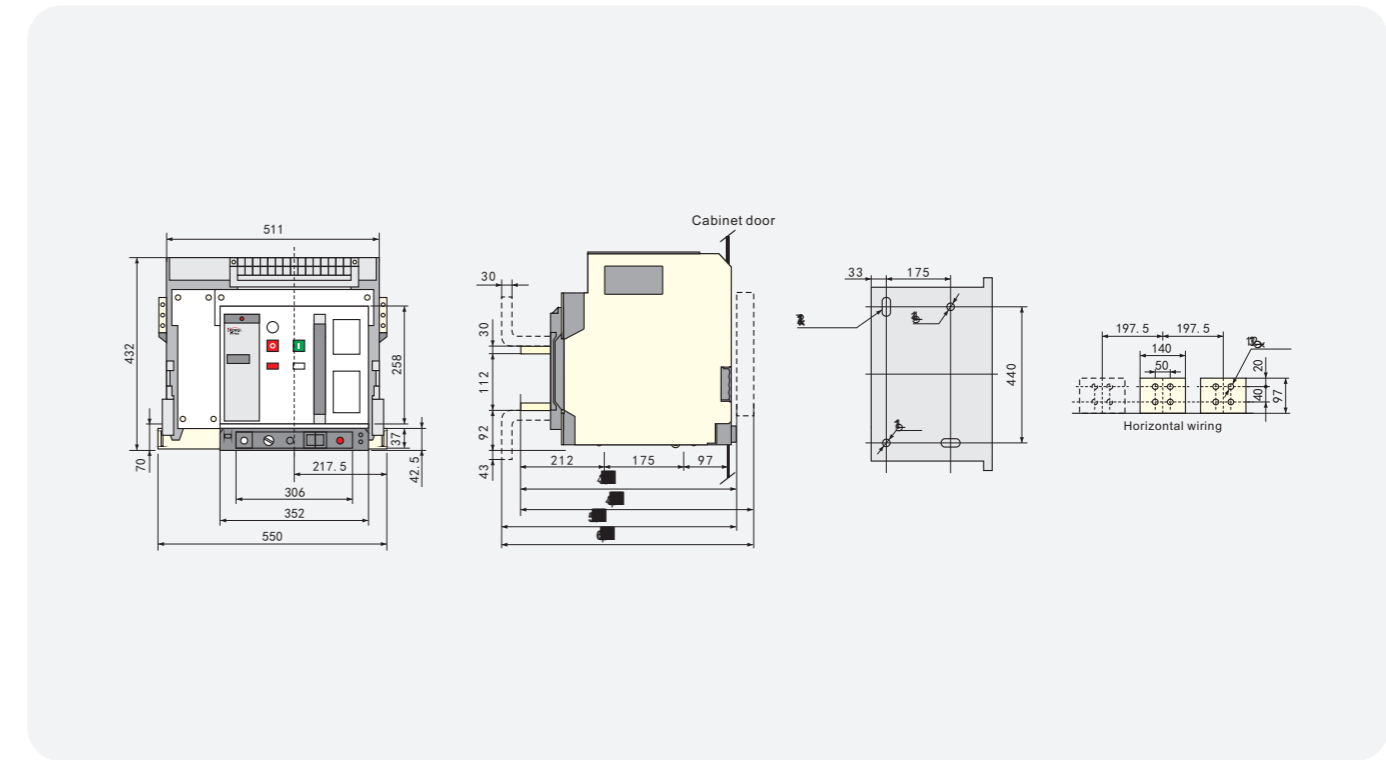
8.3 Drawer type circuit breaker mounting and overall dimensions (2000,2000 / 4)



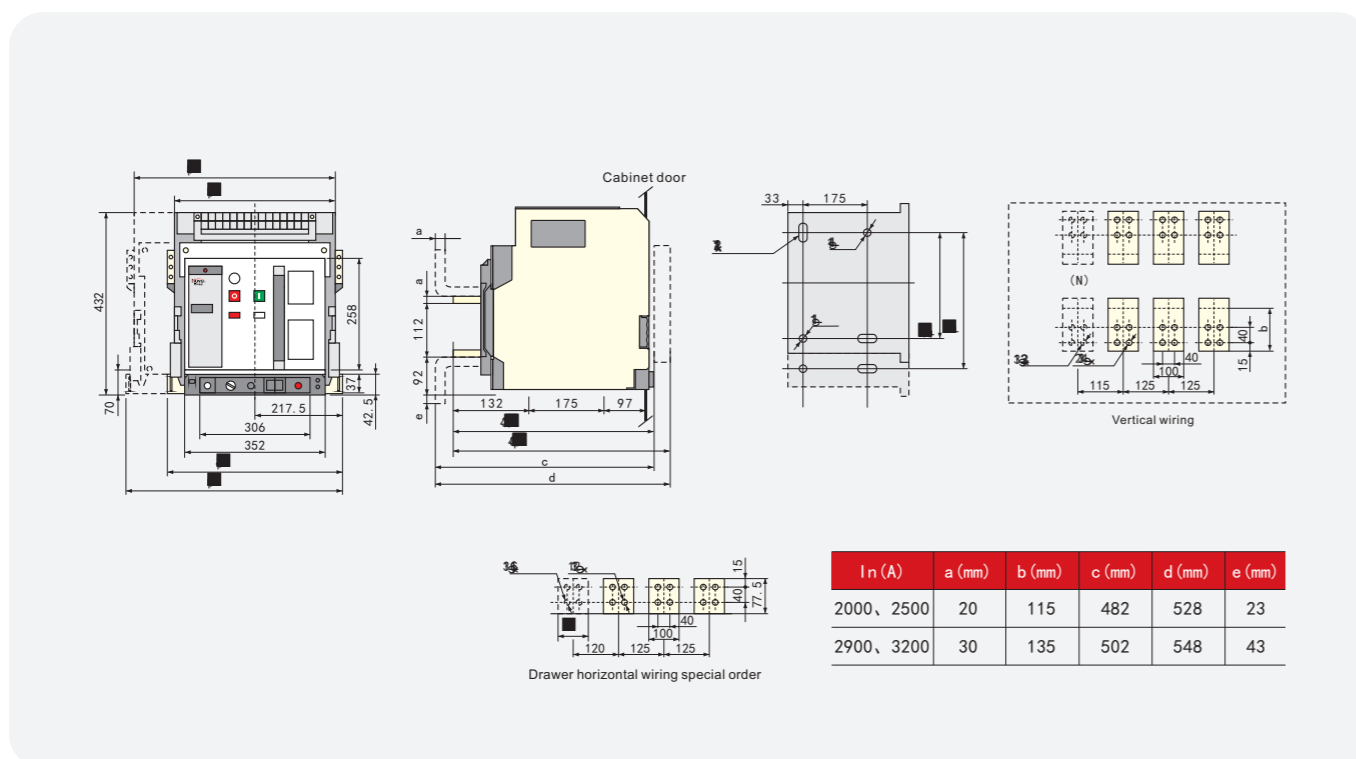
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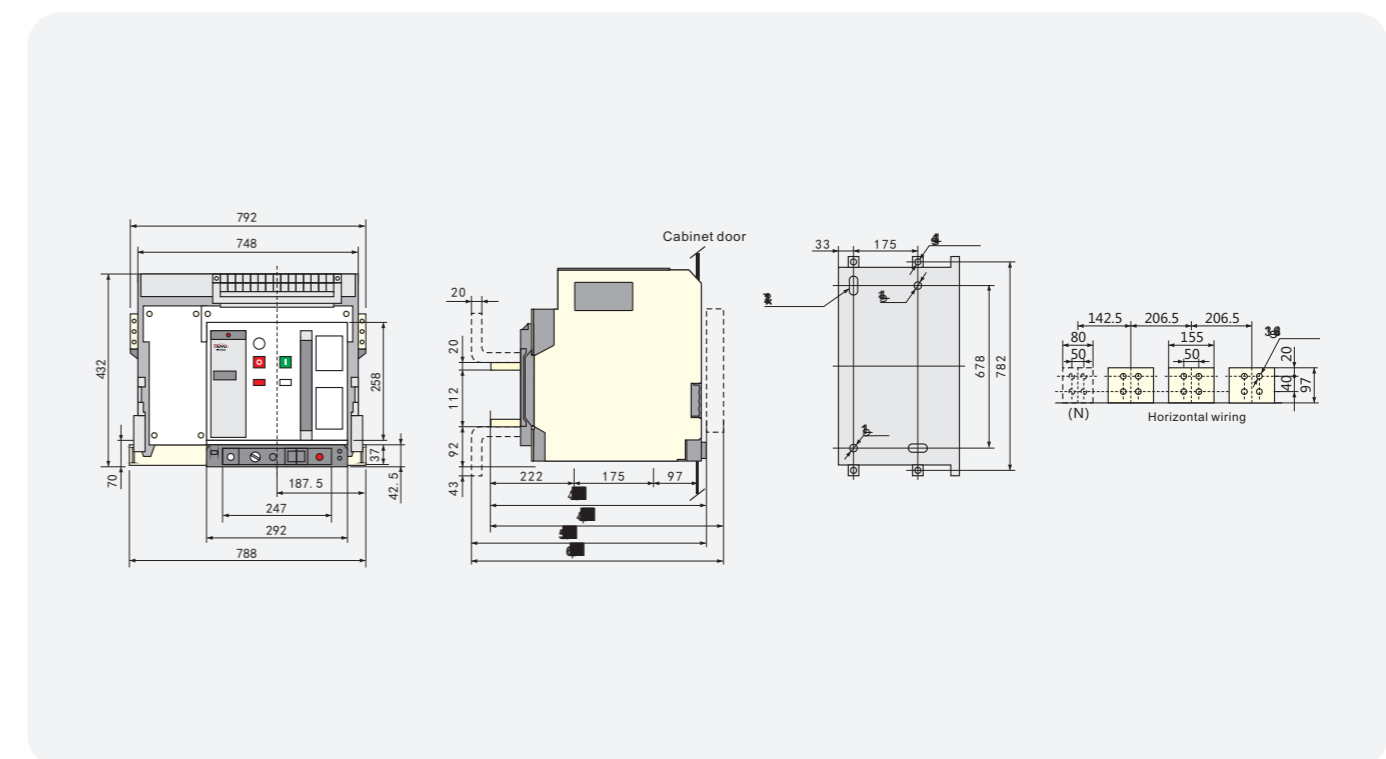
8.5 Drawer type circuit breaker mounting and overall dimensions (4000)



8.4 Drawer type circuit breaker mounting and overall dimensions (3200,3200 / 4)



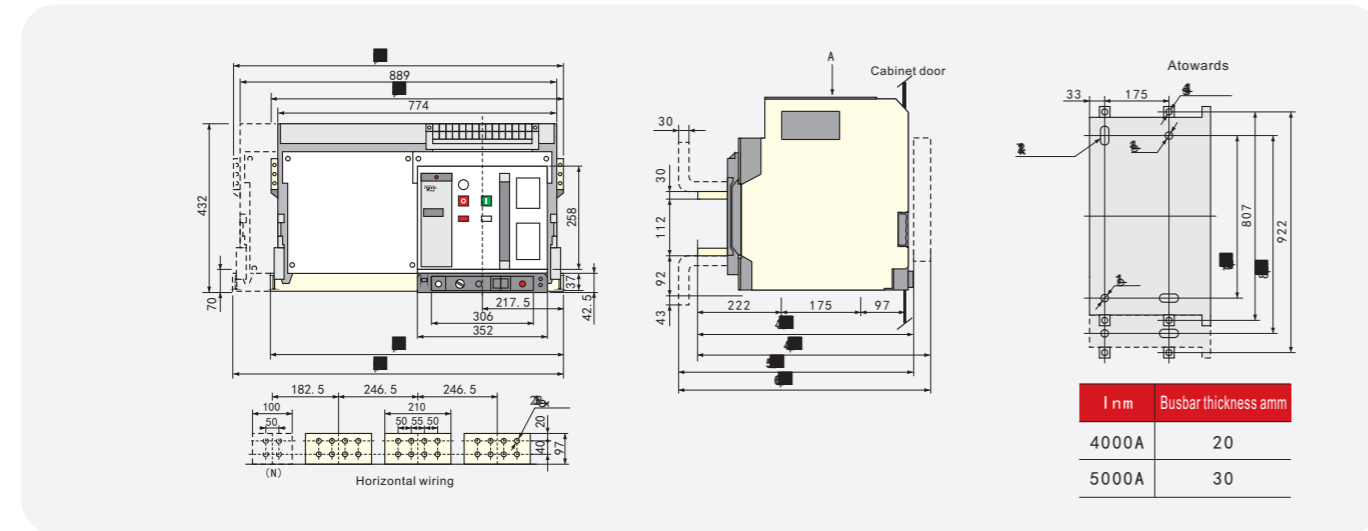
8.6 Drawer type circuit breaker mounting and overall dimensions (4000/4)



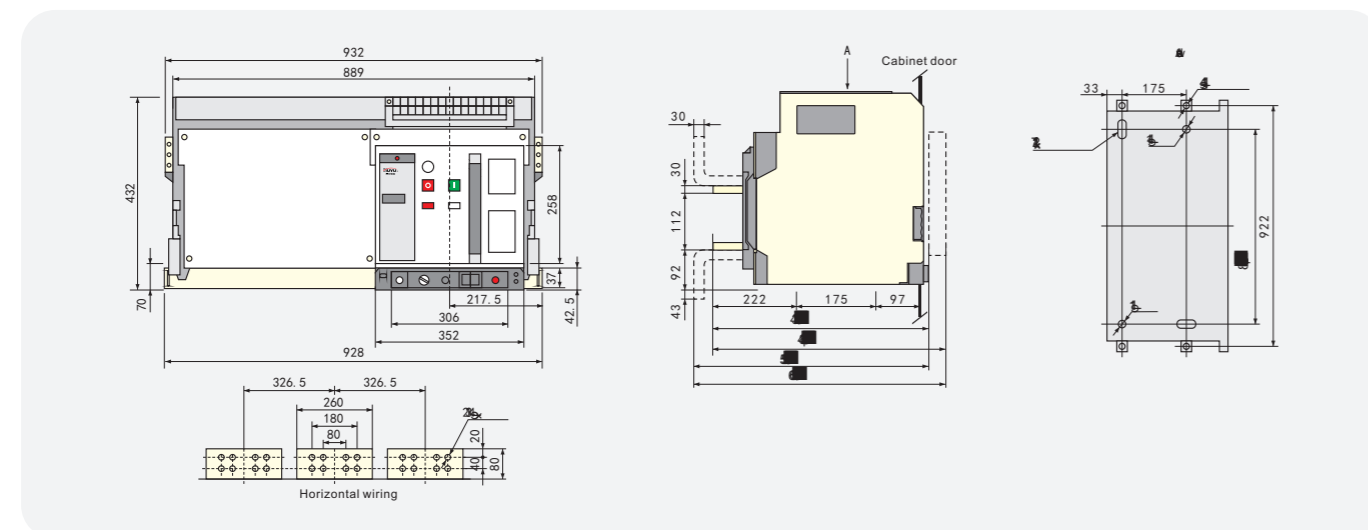
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8.7 Drawer type circuit breaker mounting and overall dimensions (6300、6300/4 In=4000、5000)



8.8 Drawer type circuit breaker mounting and overall dimensions (6300 In=6300)



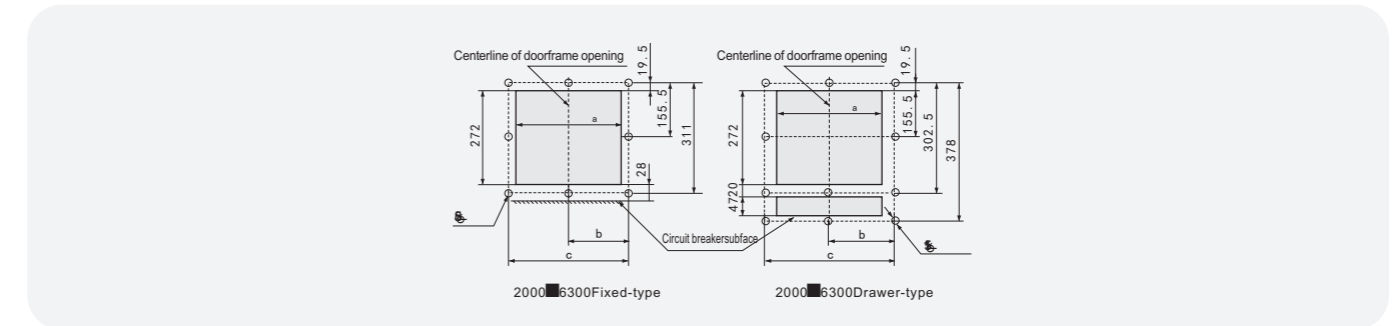
8.9 User connection copper specifications, the number as followings

Rated current	External drive copper specifications	Number per pole	Rated current	External drive copper specifications	Number per pole
200A	15×5	1	2500A	100×5	4
400A	50×5	1	2900A	100×10	3
630A	40×5	2	3200A	120×10	3
800A	50×5	2	3600A	120×10	4
1000A	60×5	2	4000A	120×10	4
1250A	80×5	2	5000A	120×10	5
1600A	100×5	2	6000A	120×10	6
2000A	100×5	3			

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8.10 Panel trepanning mounting dimensions



Frame size	A (mm)	B (mm)	C (mm)
2000, 4000 (4P)	306	172.5	345
3200, 4000 (3P) , 6300	366	202.5	405

9. Installation and maintenance

9.1 Installation

- 9.1.1 Check the specifications whether meets the requirements before installation.
- 9.1.2 Before installation, check the insulation resistance of the circuit breaker with 500V megger. When the surrounding medium temperature is 20 ± 5 °C and the relative humidity is 50% ~ 70%, insulation resistance should be not less than 10MΩ . Otherwise, it should be dried until the insulation resistance meets the requirements.
- 9.1.3 During circuit breaker installation, the circuit breaker should be vertical and screw M10 screws. Drawer type circuit breaker should be drawn out of the circuit breaker body, tighten the drawer seat and then shake the handle to make circuit breaker into the drawer seat.
- 9.1.4 The installation of circuit breakers for reliable protection of grounding, grounding has obvious grounding mark, fixed circuit breakers should strictly abide by safety zone.
- 9.1.5 Circuit breaker installed and connected according to the wiring diagram, before the circuit is electrified(drawer circuit breaker "test" position), the following operation test should be carried out.
 - A. Check the under-voltage release, shunt release and energy release electromagnet, electric energy storage mechanism rated voltage and the power supply is consistent, and then connected the secondary circuit (under-voltage release must be energized, open circuit to operate).
 - B. Check whether the intelligent release button reset, reset button is placed in the reset position, the circuit breaker can be closed.
 - C. After move the handle on the panel up and down seven times ,display the "energy storage" and hear a "click" sound, that is, the end of the energy storage, press the "I" button or release electromagnet powers on, circuit breakers reliable closure, move handle can be stored again.
 - D. If use the motor operation to store energy, the motor power is turned on, the motor powers to the panel shows "storage", and accompanied by "click" sound, storage ends. The motor automatically powers down, presses the "I" button or release electromagnet to power on, circuit breakers is reliable closure while the motor energized and stored for the next closing.
 - E. After the circuit breaker is closed, no matter using under-voltage tripping device, shunt release, "O" button on the panel or the tripping test button of intelligent controller should make the circuit breaker disconnect.

9.2 The application of intelligent controllers

9.2.1 Controller setting press the "Set" key of intelligent controller to display the setting data of ILc1-ILc2-Ig-t4-IR-tR-Isd-tsd-li in turn. Press the following request to reset if factory setting data can't meet user requirements.

The long-time delay current of the controller is set. Press "Clear" button, then press "Set" button until the long-time delay current status indicator is on, showing the long-time delay factory current setting value, according to the need (0.4 ~ 1.0) In range setting, press "+" "-" key to increase or decrease the current. Press and hold it at $\leq 2\%$ intervals until it close to the required current. Press "Save" to make "save" indicator is on then off, indicating that the long-time delay current setting value has been stored and the original setting value disappears automatically.

Long-time delay setting of controller, after long-time delay current setting, press "set" again, the long-time delay status indicator will be on, indicating the long-time delay factory setting value (1.5I_r, action time setting value) , press the "+" or "-" key, the time can increase or decrease, each time you press to increase or decrease until the time required. Setting is completed, press "Save", the storage indicator light on and off again, said the long-time delay setting is over, the original setting automatically disappear. Short-time delay, instantaneous, load monitoring, ground protection action value setting and action time setting method are the same as long-time delay. When setting these protection characteristics, you must press the "Set" key to make the status indicator position and setting parameter consistent, the grounding protection time setting value indicates the fault status in the "OFF" position, only alarm not trip; instantaneous setting at the "OFF" position (greater than 50kA for the "OFF" position), means the protection canceled, during the process, once the fault signal is automatically blocked, enter the fault handling state. Controller has various protection parameters, shall not be cross-setting. The setting of ILc2 for reclosing is less than ILc1. After the controller parameters are all set, press the "Clear" button again or power off once to make the trip unit operate.

9.2.2 Controller test

- After the controller parameter is set, before the circuit breaker is put into operation, various protection functions of the controller should be checked:
- A. Put circuit breaker to "test" position.
 - B. Use the "Set" button to view the various settings in turn.
 - C. Use "set", "+", "-" call up a simulated test current, be careful not to store lock.
 - D. Press "trip" or "non-trip" button, when press "trip" button, the test indicator is light, the corresponding status indicator light flashing, after the action time, the circuit breaker is off, showing the action time, at the same time click the "test" button to enter the overload test state, the controller according to the inverse time delay action, and indicate the type of fault and test status. Like other characteristics test, after the test, click the "clear" button to enter normal operation, at the same time must press the mechanical "reset" to close the circuit breaker.

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9.2.3 Other rules for the application of the controller

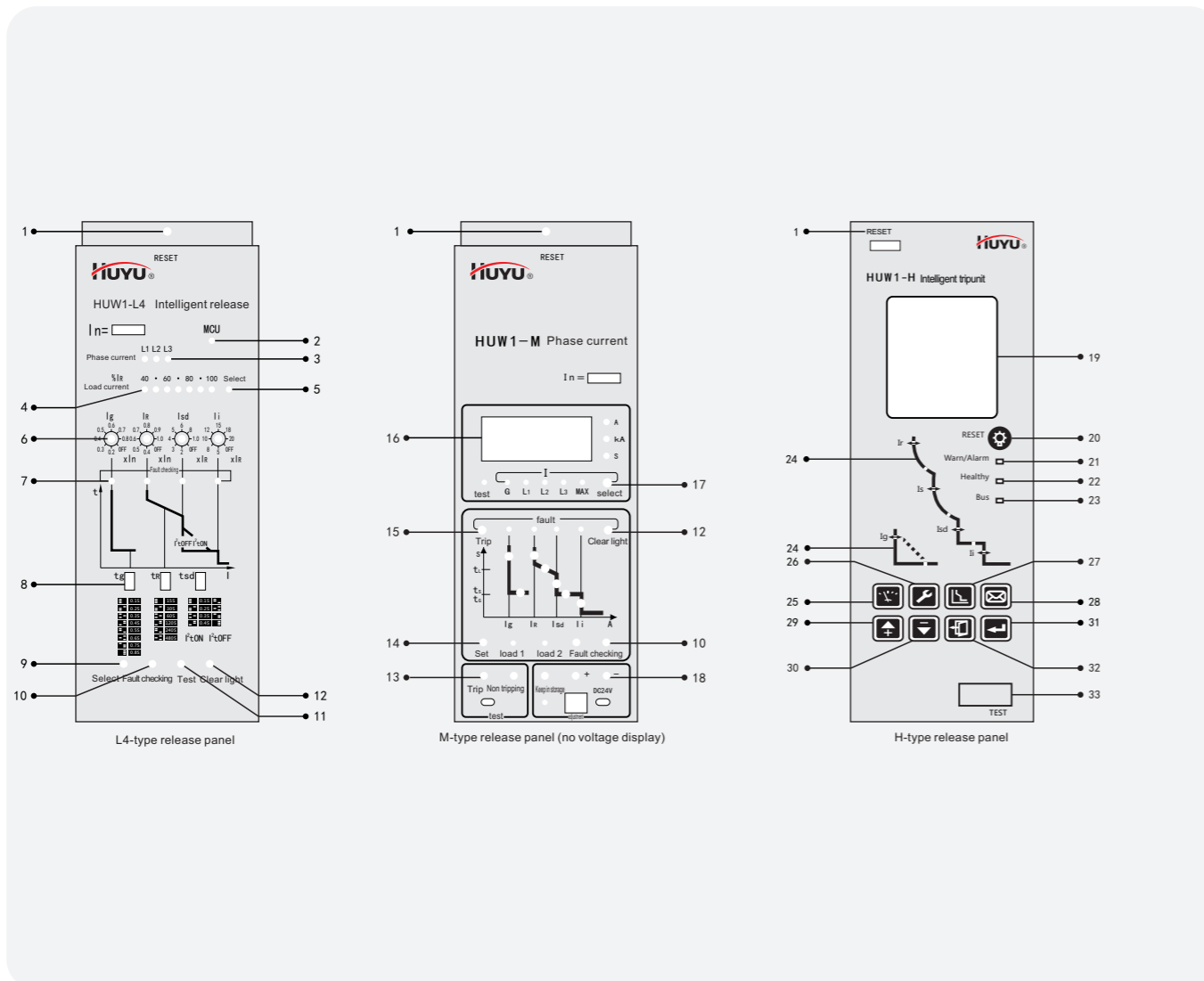
Controller in setting, check state within 1min without key, then automatically clear the key to enter normal operation, at the same time in the event of failure, then automatically block key function, enter the fault handling state. Intelligent memory controller with thermal memory, after power characteristics test, must wait for overload energy release finished to continue next test, otherwise the operation time will be shortened.

A. Setting check –after the controller "clear light", in the case of no fault, continuously press "set" key, cycle indicate various states and the corresponding set current and time. Check is completed, click the "clear light" key, 1min without press automatically enter the normal working condition.

B. Power grid operating current and voltage check - After the controller "clear light", press "Select" key continuously in case of no fault, circularly indicate each phase operating current and grounding current value, and normally display the maximum phase current. If the release with voltage display module, the current display press "select 1", the voltage display press "select 2", then loop indicates that the lines voltage, the normal display maximum line voltage. After the controller "clear light", click the "fault check" key, the last fault status and fault current will be displayed. Press the "Select" key after the test or fault trip. May indicate the test or fault current or time value cyclically. Test state does not remember.

C. Reset - in the case of auxiliary power supply circuit breaker must be closed before press the controller"Clear" button, let the controller into the normal state, and then click the mechanical "reset" button to close the circuit breaker....

9.2.4 Controller panel structure



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- 1."Reset button": circuit breaker fault, press the test button after the tripping test to let the circuit breaker close again.
2. "MCU" indicator: Constant light means micro-controller (MCU) is working properly.
- 3."Phase current" indicator: shows L1, L2, L3 phase current, shows the phase which has the largest current while work.
4. "load current beam" indicator: shows the percentage of load current and IR value.
- 5."Overload" indicator: When the light is on, it indicates that the load current has exceeded the overload long-time delay protection current value, and when the overload long-time delay begins, it starts to act or alarm.
6. "I_g", "I_R", "I_{sd}", "I_i": Ground, long-time delay, short-time delay, instantaneous coding switch.
7. "Fault display" light: indicating the type of fault.
8. "T_g", "t_R", "t_{sd}": ground fault, overload long-time delay, short circuit short-time delay time.
- 9."Select" key: Select L1, L2, L3 phase current.
- 10."Fault check" key: Press this key after circuit breaker fault tripping, can indicate the cause of fault tripping, with memory function after power off.
11. "Test" button: Press this button for instantaneous tripping test, resulting in instantaneous tripping action.
- 12."Clear light" key: after release setting, testing and fault to press this key to reset release, back to normal operation.
- 13."Tripping", "non-tripping" button: use while there is test function.
- 14."Set" button: Check or set various protection features current or time, press this button to indicate status circularly.
15. "LED" light instructions: to indicate the various states and categories.
- 16."Current, time display": can display current or time value.
17. "Select" key: under normal operation status can cyclically display the current value of each phase, under fault status or fault checking status can cyclically display fault current or time value.
- 18."Storage", "+", "-" key: use when setting current or time.
- 19.LCD interface display.
- 20.Fault and alarm reset button.
- 21."Fault / Alarm" LED: In normal operation, the LED does not light, the when fault trip, the red LED flashes quickly, in the event of alarm, the red LED remains light.
- 22."Normal" LED as long as the ST40-3 powered and work in good condition, the green LED is always flashing.
- 23.Communication indicator, communication status indication is as follows: Profibus, no communication to off, communication constant to light. Modbus, off when no communication, flashing during communication. Device Net, flashing when there is no communication, it is always on when communicating.
- 24.Curve LED: hidden red curve LED lights in curve. The corresponding LED flashes when the fault is tripped to indicate the fault type; when the protection parameter is set, the LED remains light to indicate the current set item
- 25.Measurement: function key 1, switch to the measurement of the default theme menu (in the password input interface, "left" key).
- 26.Set: function key 2, switch to the parameter setting theme menu (in the password input interface, "right" button).
- 27.Protection: function keys 3, switch to the protection parameter settings theme menu.
- 28.Information: function keys 4, switch to the history and maintain the theme menu.
- 29.Up: move the menu contents upward at the currently used level, or change the selected parameters upward.
- 30.Down: move the menu contents downward at the currently used level, or change the selected parameters downward.
- 31.Exit: exit the current level used to enter the previous menu, or cancel the current parameter selection.
- 32.Select: to enter the current menu pointing to the next menu, or select the current parameters, save the changes.
- 33.Test port: a 16-pin test port at the bottom of the front panel can be inserted into a plug-in portable power box or detection unit.

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10. Accessories

Under voltage release(Inm=2000-6300A)



10.1 Under voltage release

- When the under voltage release is not powered, the circuit breaker cannot be closed neither electrically nor manually.
- The under voltage release is divided into two types: instantaneous action and delayed action.
- Under voltage delay release time is 0~7S can choose a non-adjustable one
- The circuit breaker would not break when the power supply voltage returns to or above 85% Ue within ½ delay time.

Rated operation voltage Ue(V)	AC220V AC380V
Operating voltage	(0.35~0.7) Ue
Reliable closing voltage	(0.85~1.1) Ue
Reliable non-closing voltage	(0.85~1.1) Ue
Power consumption	≤0.35Ue 20VA

Shunt release(Inm=2000-6300A)



10.2 Shunt release

- After the shunt release is powered, the circuit breaker is instantaneously disconnected and can be operated at a long distance.
- Action characteristics

Ue(V) Rated control power supply voltage	AC220V AC380V	DC110V DC220V
Operating voltage	(0.7~1.1) Us	
Power consumption	56VA	250W
Breaking time	50±10 (ms)	

Closing electromagnet(Inm=2000-6300A)



10.3 Closing electromagnet

- After the motor energy storage is completed, the closing electromagnet is powered and would instantaneously release the energy storage spring force of the operating mechanism so that the circuit breaker is quickly closed.
- Action characteristics

Ue(V) Rated control power supply voltage	AC220V AC380V	DC110V DC220V
Operating voltage	(0.85~1.1) Us	
Power consumption	56VA	250W
Closing time	50±10 (ms)	

Auxiliary contact(Inm=2000-6300A)



10.4 Auxiliary contact

- The standard type of the auxiliary contact is 4 sets of switching contacts (2 normally open 2 normally closed), and the special type is 6 sets of switching contacts (3 normally open 3 normally closed)
- Technical parameters

	Rated voltage (V)	Rated conventional heating current I _{th} (A)	Rated control capacity
CommunicationAC	230	10	300VA
	400	6	100VA
DirectDC	220	0.5	60W

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Electric mechanism(2000-6300 frame size)



10.5 Electric mechanism

- It has the functions of motor energy storage and automatic energy storage after the circuit breaker is closed to ensure that the circuit breaker can be closed immediately after breaking.
- Manually store energy
- Action characteristics

Rated control power supply voltage Ue(V)	Ac230V AC400V	AC230V DC220V
Operating voltage	(0.85~1.1) Us	
Power consumption	250VA/350VA	200W
Energy storage time	<4s	
Operating frequency	Max 3 times per minute	

Door frame and pad



10.6 Door frame and pad

Installed on the door of the power distribution cabinet to seal and the protection level reaches IP40 (the protection level is IP20 when the circuit breaker is installed separately)

Partition board



10.7 Partition board

Installed between the terminal blocks to increase the phase insulation between the circuit breakers.

Key lock



10.8 Key lock

The break button of the circuit breaker can be locked at the press down position. At this time, the circuit breaker cannot be closed. The factory provides locks and keys after the user has selected and installed the units. One circuit breaker with one separate lock and one key (one lock and one key)
Two circuit breakers with two separate locks and one key (two locks and one key)
Three circuit breakers with three separate locks and two same keys (three locks and two keys)
Note: When the keyed interlocking universal circuit breaker needs to pull out the key, you must firstly press and hold the breaking button, turn the key counterclockwise, and then pull it out.

Steel cable mechanical interlock



10.9 Steel cable mechanical interlock

It can realize the interlocking of two three-pole or four-pole circuit breakers that is horizontal or vertical installed: the steel cable mechanical interlock is not commonly used with HUW1-2000-6300.

- When the steel cable is bent, there should be enough transition arc at the bend place (generally should be greater than 120mm) to ensure flexible movement of the steel cable.
- Check the cable and make sure there is enough oil in the cable to ensure flexible movement of the cable.
- The maximum distance between two interlocking circuit breakers is 2m.

Drawer seat anti-miss-inserted device

Only the enclosure of the circuit breaker that matches the rated current as indicated by the label can be inserted into the corresponding drawer seat. The enclosure cannot be inserted in when the rated current does not match.

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11. Fault handling

		Cause of failure	processing method
Circuit breaker cannot store energy	Circuit breaker cannot manually store energy	A. Latch spring inside the operating handle	Hook the spring back to its original position or contact the manufacturer.
		B. Energy storage mechanism fault	Energy storage mechanism fault, contact the manufacturer.
	Circuit breaker cannot electrically store energy	A. Energy storage motor is not powered or is damaged.	Circuit breakers cannot electrically store energy.
		B. Electric mechanism control voltage is small	Check if the motor is powered and replace the motor if it is damaged.
		C. Energy storage mechanism fault	Check control voltage of the operating mechanism.
Under voltage release fault and cannot be sucked.	Under voltage release fault and cannot be sucked.	A. Under voltage release is not powered or working voltage is less than 85%	Check if the power is on, then check if the terminal upper and lower plug are well contacted. Adjust the operating voltage if it is too low.
		B. Under voltage release coil or delay control part has fault.	Repair or replace the under voltage release.
		C. If it is a suction-type under voltage release, the reaction spring above the large shaft of the mechanism is broken or displaced.	Repair the reaction spring.
	Energy release electromagnet fault	A. The energy release electromagnet control power supply voltage is less than 85%.	Adjust the voltage
		B. Energy release electromagnet is damaged	Contact the manufacturer and adjust the energy release electromagnet.
		C. Energy release electromagnet trip from the bolt	Adjust the length of the bolt so that it can break the tripping plastic parts.
	Shunt trip unit trip screw too long will trip the half shaft to die		Remove the energy release electromagnet and reset the plastic part.
	Shorten the bolt and release the blocked half shaft		Check that the circuit breaker should be in the test or Operating mechanism fault connection position.
	Operating mechanism fault	A. Displacement of plastic parts under the energy release electromagnet of the mechanism.	Remove the energy release electromagnet and reset the plastic part.
		B. Internal structure fault	Contact the manufacturer for repair.
If it is switch with mechanical interlock, the connection method is wrong, the release half shaft is blocked or make it under trip status.		Adjust the position of the mechanical interlock.	
		There is over current to trip the switch or other reasons make the reset button of the intelligent controller to pop up, the reset button must be pressed in then the circuit breaker can be closed.	
The circuit breaker cannot break	Can not manually break.	A. Operating mechanism fault	Check the operating mechanism, please contact the manufacturer if there is any jam.
		B. The screw on the trip half shaft is not adjusted in place.	Adjust the screw.
	Can not electrically break.	A. The shunt release is not powered or the power supply voltage is less than 85%.	Power on or adjust the operating voltage.
		B. Shunt release is damaged.	Contact the manufacturer to replace the shunt release.
		C. Operation mechanism fault.	Check the operating mechanism, please contact the manufacturer if there is any jam.
	Switch short circuit or over current does not trip	A. Controller is damaged.	Contact the manufacturer to replace the controller.
B. The signal line of the transformer is damaged or the controller is not in good contact, no signal inputted to controller.		Repair or replace the transformer.	
C. The internal mechanism is stuck, and the trip signal of the intelligent controller cannot make the mechanism trip.		Please contact the manufacturer.	
Drawer type circuit breaker cannot be pulled out at the separation position.	The circuit breaker does not fully reach the "separation position".		Please contact the manufacturer.
	Drawer type circuit breaker cannot be pulled out at the separation position.		The handle is not pulled out after the drawer is pulled out.
	There is a foreign object falling into the drawer seat, causing the tooth in the mechanism to be stuck, and the circuit breaker enclosure is hooked on the top plate of the drawer shaft.		Check for foreign objects. Contact the manufacturer if you still can't pull out,
Drawer type circuit breaker cannot be pulled out at the separation position.	There is a foreign object falling into the drawer seat, causing the tooth of the mechanism to jam.		Check for foreign objects. Contact the manufacturer if you still can't pull out,
	The circuit breaker enclosure does not match the rated current of the drawer (ie the busbar thickness is different).		Check whether the thickness of the breaker enclosure busbar is the same as the thickness of the drawer busbar.
	The circuit breaker enclosure is not fully inserted into the drawer seat and is forcibly shaken in.		Put the circuit breaker enclosure completely well and then shake it in.
	Upper and lower terminal is blocked.		Align the upper and lower parts of the terminal.
Controller can not display.	Intelligent controller does not connect to the operating voltage.		Connect to the operating voltage
	Intelligent controller internal fault		Contact the manufacturer
Controller indicator flashing	Intelligent controller internal fault		Contact the manufacturer
	Remove the energy release electromagnet and reset the plastic part.		Clear the external strong electromagnetic interference

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12. Ordering Instruction

Please mark inside the or fill in the quantity

User	Order quantity			
Specification and model	HUW1F-2000	HUW1F-3200	HUW1F-4000	HUW1F-6300
Rated current I_n A	<input type="checkbox"/> 630 <input type="checkbox"/> 800 <input type="checkbox"/> 1000 <input type="checkbox"/> 1250 <input type="checkbox"/> 1600 <input type="checkbox"/> 2000	<input type="checkbox"/> 2500 <input type="checkbox"/> 2900 <input type="checkbox"/> 3200	<input type="checkbox"/> 3200 <input type="checkbox"/> 3600 <input type="checkbox"/> 4000	<input type="checkbox"/> 4000 <input type="checkbox"/> 5000 <input type="checkbox"/> 6300 (No 4 pole)
Installation type	<input type="checkbox"/> Stationary type (No stationary type for 6300) <input type="checkbox"/> Drawer type		<input type="checkbox"/> 3 Pole <input type="checkbox"/> 4 Pole	
Display type	<input type="checkbox"/> L type <input type="checkbox"/> M type <input type="checkbox"/> H type		备注	
Remark: Conventional controller is M type digital display, please note if other type is needed.				
Basic function	1. Over current three phase protection 2. Neutral line or ground fault protection 3. Current measurement 4. Test function 5. Fault inquiry memory function 6. Self-diagnosis function			
Optional function	<input type="checkbox"/> Voltage measurement <input type="checkbox"/> Active energy measurement <input type="checkbox"/> MRC off-on function <input type="checkbox"/> Communication function <input type="checkbox"/> Frequency measurement <input type="checkbox"/> Contact wear measurement <input type="checkbox"/> Load monitoring function <input type="checkbox"/> Thermal memory function <input type="checkbox"/> Power factor measurement <input type="checkbox"/> Grid operation parameter history record <input type="checkbox"/> Signal contact output function <input type="checkbox"/> Power measurement <input type="checkbox"/> Phase sequence detection			
Note: H-type controller communication function is the basic function				
Factory setting for special requirements	Controller power supply _____ A Time value _____ s Short circuit instantaneous current _____ A Overload long delay current _____ A Time value _____ s Ground fault current _____ A Time value _____ s			
Controller power supply	<input type="checkbox"/> AC 230V	<input type="checkbox"/> AC 400V	<input type="checkbox"/> DC 110V	<input type="checkbox"/> DC 220V
Shunt release	<input type="checkbox"/> AC 230V	<input type="checkbox"/> AC 400V	<input type="checkbox"/> DC 110V	<input type="checkbox"/> DC 220V
Closing electromagnet	<input type="checkbox"/> AC 230V	<input type="checkbox"/> AC 400V	<input type="checkbox"/> DC 110V	<input type="checkbox"/> DC 220V
Energy storage motor	<input type="checkbox"/> AC 230V	<input type="checkbox"/> AC 400V	<input type="checkbox"/> DC 110V	<input type="checkbox"/> DC 220V
Auxiliary contact	<input type="checkbox"/> Switch four normally open four normally closed <input type="checkbox"/> Independent four normally open four normally closed <input type="checkbox"/> Switch five normally open five normally closed <input type="checkbox"/> Independent 6 normally open 6 normally closed			
Optional accessories	Under voltage release	<input type="checkbox"/> AC 230V <input type="checkbox"/> AC 400V		
		<input type="checkbox"/> Instantaneous Delay <input type="checkbox"/> 1s <input type="checkbox"/> 3s <input type="checkbox"/> 5s		
	Mechanical interlock	<input type="checkbox"/> Two interlocks <input type="checkbox"/> Three interlocks		
		<input type="checkbox"/> Hard lever mechanical interlock <input type="checkbox"/> Steel cable mechanical interlock		
Dual power supply controller	<input type="checkbox"/> Grid-to-generator F type <input type="checkbox"/> Grid to grid R type			
Note: Mechanical interlock must be selected at the same time, can not be equipped with under voltage release, accessories select rated voltage AC230V				
Disconnect position key lock	<input type="checkbox"/> One lock and one key <input type="checkbox"/> Two locks and one key <input type="checkbox"/> Three locks and one key <input type="checkbox"/> Three locks and two keys			
ST-1 DC power supply module ST-1	<input type="checkbox"/> DC220V	<input type="checkbox"/> DC110V	<input type="checkbox"/> ST201 relay module	<input type="checkbox"/> ST-IV power module
Other accessories	<input type="checkbox"/> Externally connect N phase transformer <input type="checkbox"/> Leakage transformer <input type="checkbox"/> Ground current transformer <input type="checkbox"/> Communication protocol converter (to realize the Modbus protocol converted to Proibus or DeviceNet protocol) <input type="checkbox"/> Communication accessories: communication line, hub			
Wiring	<input type="checkbox"/> Horizontal wiring (factory default)		<input type="checkbox"/> Vertical wiring (special order)	
Remark: 1. When there is no special requirement, the current and time setting value of the controller are set according to the factory value. 2. Extra cost is required for additional functions and accessories. 3. 3P+N neutral line protection function, ground current protection function, leakage protection function, remote reset function need to add corresponding controller and accessories. 4. If you need to realize "four remotes" the H-type controller+ ST-DP module + relay ST201 + power module ST-IV + communication accessories need to be added. 5. The standard configuration of the H-type controller is the Modbus communication protocol. 6. Please note the high and low temperature of the environment in which the circuit breaker is used.				