

State High-tech Enterprise
State exemption Products
Shanghai Famous Brand



ZW1 (DW45) Series

Intelligent air
Circuit breaker



- 3P.4P
- In400 ~ 6300A
- High breaking capacity
- Zero arcover
- Intelligent



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ZW1 (DW45) series intelligent air circuit breaker

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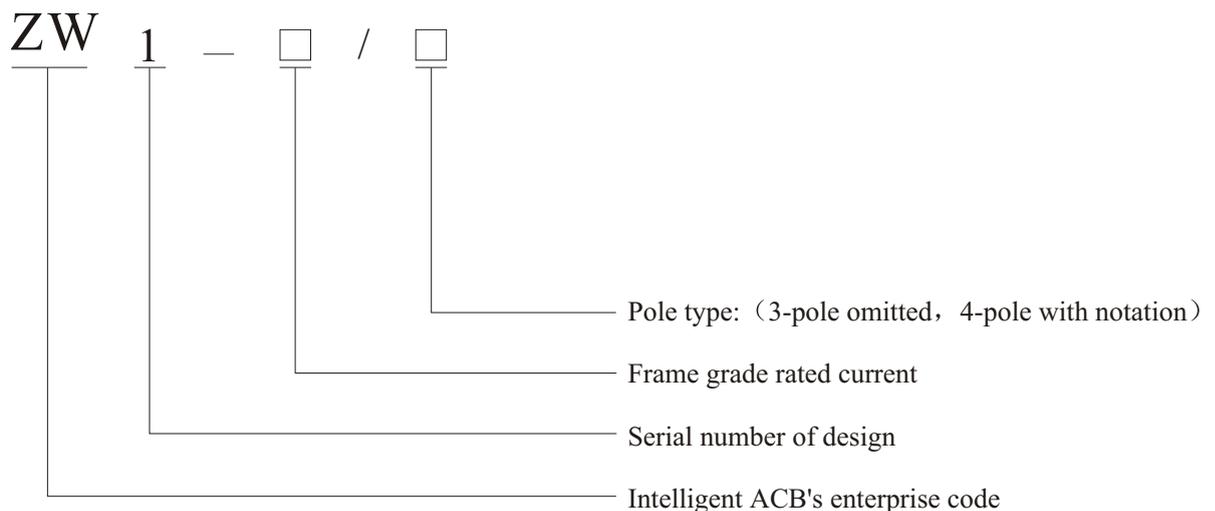
- ZW1 series intelligent ACB(breaker for short hereinafter) conformed standards :

IEC 60947-2 《low-voltage switchgear and control-gear Part 2: low voltage circuit breaker》
GB 14048.2 《low-voltage circuit breaker》

- Application of ZW1 series ACB:

Zw1 series intelligent ACB is mounted in the distribution network of AC50Hz, 400V or 690V for the electric energy distribution, line protection and protecting the power equipment against the danger caused by the failure of overload, short-circuit, under-voltage, or single-phase grounding with great and selective intelligent protective functions so as to avoid unnecessary power-off and raise both the safety and reliability of the electricity network in operation.

- Model and meaning



● Normal working condition and installation mode

- Ambient air temperature $-5 \sim +40^{\circ}\text{C}$, and the average value during 24h is not over 35°C .;
- The elevation at the installation place not over 2000m;
- The RH not over 50% at the maximum temperature $+40^{\circ}\text{C}$; can be higher at a lower temperature, the lowest average temperature in a most humidity month is not over 25°C , the RH is not over 90% in the month, the condensed dewdrops produced on the product surface due to temperature variation should be taken into consideration
- Pollution grade: 3;
- The installation mode IV is suitable in the main circuit of the breaker and for the under-voltage shunt release coils, the power transformer primary coils. Other auxiliary circuit and control circuit should be fitted with installation mode III.;
- Category for use: B, A;
- The installation mode: fixed-type, drawer-type;
- The vertical gradient of the breaker not allowed to over 5° ;
- Main circuit may allowed reverse inlet (either power side or load side) ;
- Wiring mode: horizontally or vertically



● Intelligent controller's category and function

● L-type(economic) intelligent controller(the panel layout see figure 1 , L4 as example)

Function :

- Over-load long delay, short-circuit instantaneous operating and so on four-sections protection
- Load current photo-column indication
- MCU running monitor
- Over-load thermo-memory function
- Fault state indication
- Instantaneous operating experimental function

Selectable function

- MCR making and breaking capacity(MCR making/breaking protection is available only at the moment in which the breaker switches-on within 100ms.)
- Alarm or fault state indication of remote signal output units of four groups

Notes: L2 protective function:

long-delay+instantaneous

L3 protective function:

long-delay+short-delay+instantaneous

L4 protective function:

long-delay+short-delay+instantaneous+grounding

- 1 fault tripping reset push-button
- 2 controller's MCU running monitor indication
- 3 load current percentage photo-column indication
- 4 long-delay over-load alarm
- 5 grounding protection current adjusting knob switch (nil in L3、 L2)
- 6 long-delay protection current adjusting knob switch
- 7 short-delay protection current adjusting knob switch (nil in L2)
- 8 short-circuit instantaneous operating protection current adjusting knob switch
- 9 instantaneous fault indication
- 10 short-delay fault indication (nil in L2)
- 11 long-delay fault indication
- 12 grounding fault indication (nil in L3, L2)
- 13 short-delay motion time adjusting dial switch (nil in L2)
- 14 long-delay motion time adjusting dial switch
- 15 grounding motion time adjusting dial switch (nil in L2, L3)
- 16 fault indication clear push-button
- 17 instantaneous operating experimental push-button
- 18 fault inspection push-button

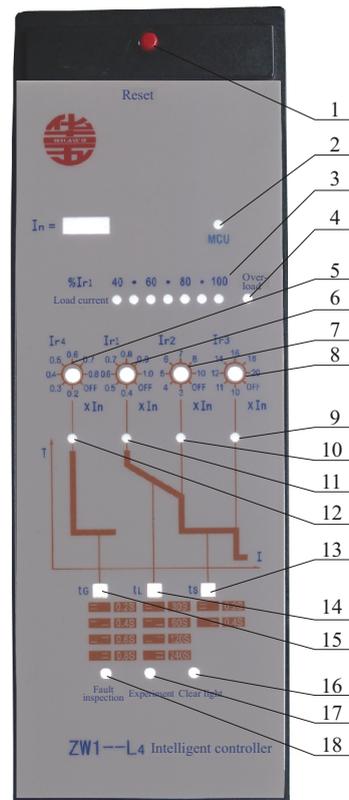


Figure 1



● M-type (standard-type) intelligent controller
(panel layout see figure 2)

- Function:**
- over-load long-delay、short-circuit short-delay、short-circuit instantaneous operating protection
 - grounding protection
 - load monitor indication
 - each state target and value indication
 - ammeter function
 - fault memory function
 - thermo-memory function
 - experimental function

selectable function:

- voltage meter function
- MCR making/breaking (MCR making/breaking protection is effective only when the breaker switches-on within 100ms)。
- clock function。(to record fault time)
- alarm or fault state indication of remote output signal units of four groups

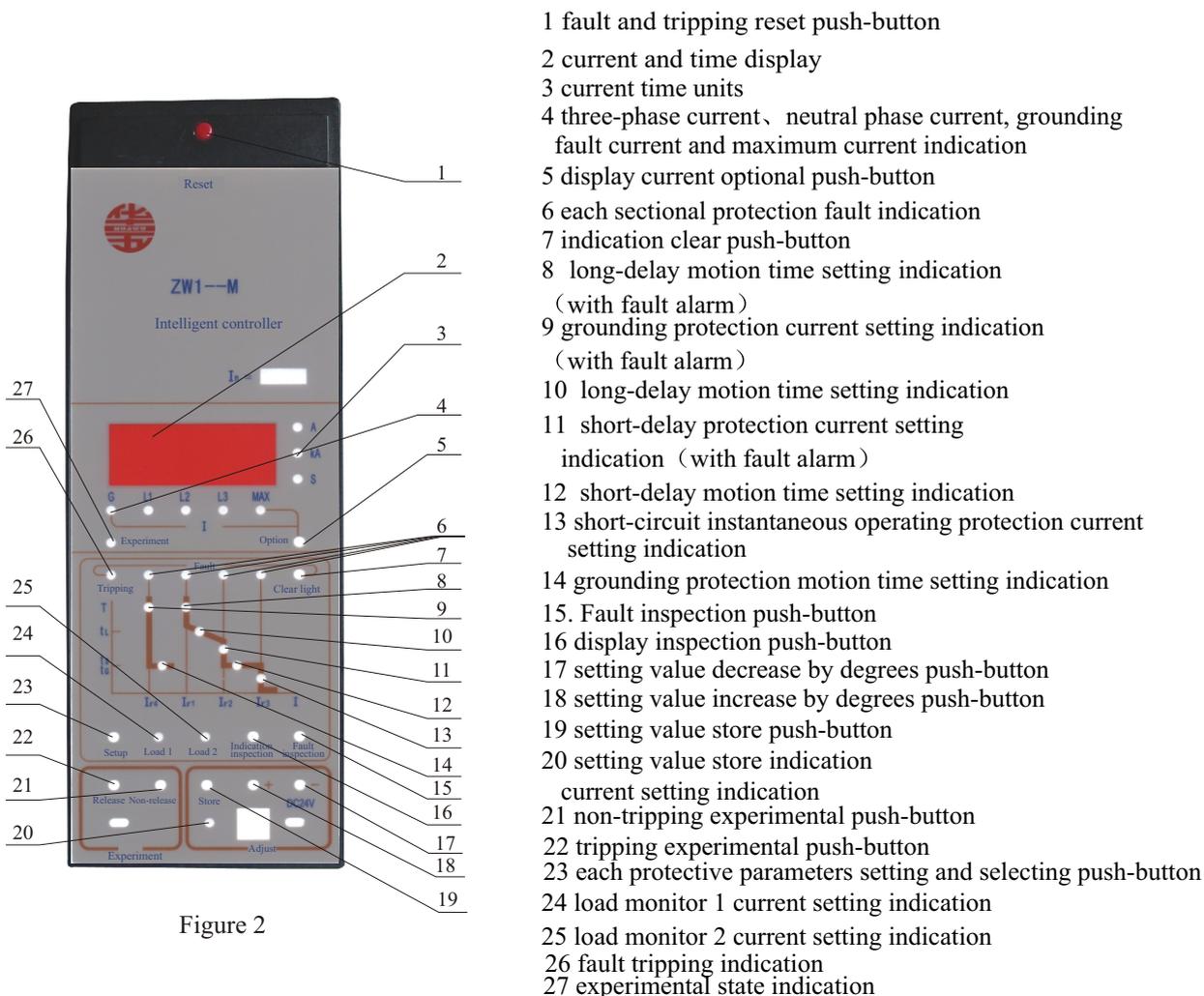


Figure 2

●H-type (communication-type) intelligent controller (panel layout see figure 3)

- function:**
- over-load long-delay、short-circuit short-delay、short-circuit instantaneous operating protection
 - grounding protection、three-phase unbalance protection
 - load monitor protection
 - each state indication and value display
 - ammeter function
 - voltage meter function
 - fault memory function
 - thermo-memory function
 - experimental function
 - RS485 serial interface

selectable function:

- MCR making/breaking (MCR making/breaking protection effective only when the breaker switches-on within 100ms.
 - alarm or fault state indication of remote signal output units of four groups (the 1st and 2nd group can be on the request from users; the 3rd group is remote breaking, the fourth group is remote switching-on two groups signals output.
- 1 fault tripping reset push-button 2 power and voltage unit
 3 three-phase current indication 4 times of breaker's tripping
 5 rate of unbalance 6 current and time 7 long-delay current and time indication 8 short-delay current and time indication
 9 instantaneous current indication 10 self-diagnosis fault indication
 11 fault tripping indication 12 fault alarm indication
 13 setting value store indication 14 confirmation push-button
 15 return push-button 16 communication signal R/S indication
 17 state permission location lock 18 state function option push-button
 19 function scroll-up and value setting increase by degrees push-button
 20 function scroll-down and value setting decrease by degrees push-button
 21 current and time setup state indication 22 fault inquiry state indication
 23 experimental state indication 24 load current 1 and time indication 25 load current 2 and time indication
 26 N phase indication 27 unbalance rate and time indication 28 grounding current and time indication
 29 parameters display window 30 voltage display

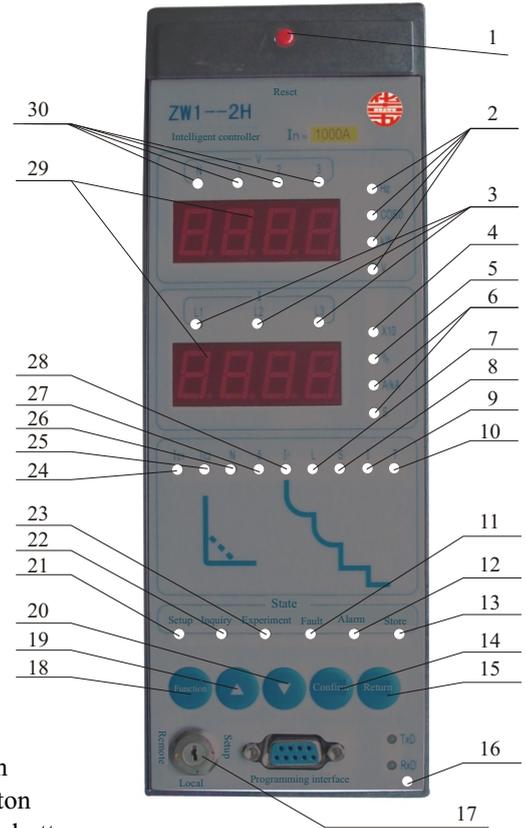


Figure 3

If without special note at order, the factory parameters setting value and the release will be same as table 1. Any special request in the characteristic of products please note at order.

Table 1

Load monitor	grounding protection	long-delay protection	short-delay protection	instantaneous protection
$I_{c1}=I_n$ $I_{c2}=I_n$	$I_r=0.8I_n$ $t_c=0.2s$	$I_r=I_n$ $T_l=30s$	$I_r=6I_n$ $t_s=0.2s$	$I_r=14I_n$ ($\geq 20kA$)

Notes: the above parameters can't be suitable in any site, please practically adjust it accordingly.

●Main technical parameters

● Breaker's rated short-circuit breaking capacity and short time withstand current see table 2.

Table 2

Frame grade rated current $I_{nm}(A)$	Rated current $I_n(A)$	Rated limited short-circuit breaking capacity $I_{cu}(kA)$		Rated running short-circuit breaking capacity $I_{cs}(kA)$		Rated short-time withstand current $I_{cw}(kA)$ I_s		Mechanical life (times) (Free/with maintenance)	Electric life (times)
		400V	690V	400V	690V	400V	690V		
2000	400,630,800,1000,1250,1600,2000	80	50	50	40	50	40	13500/20000	6500
3200	2000,2500,2900,3150,3200	100	65	65	50	65	50	10000/20000	3000
4000	3200,3900,4000	100	75	80	65	80	65	5000/10000	1500
6300	4000,4900,5000,5900,6300	120	85	100	75	100	75	5000/10000	1500



● M, H type controller's current setting value I/In see table 3

Table 3

long-delay I_{r1}		short-delay I_{r2}	Instantaneous I_{r3}	Grounding fault I_{r4}	Load monitor I_c
Electric distribution and motor protection	$(0.4 \sim 1.0)I_n$ (Minimum 160A)	$(0.4 \sim 15)I_n$	$I_n \sim 50kA (I_{nm}=2000A)$ $I_n \sim 75kA (I_{nm}=3200 \sim 4000A)$ $I_n \sim 100kA (I_{nm}=6300A)$	$(0.2 \sim 0.8)I_n$ (minimum 160A)	$(0.2 \sim 1.0)I_{r1}$ (Minimum 160A)
Generator protection	$(0.4 \sim 1.25)I_n$ (Minimum 160A)				

● long-delay over-current protection inverse time limit motion characteristic see table 4.

table 4

Current	motion time						
$1.05I_{r1}$	>2h no motion						
$1.31I_{r1}$	<1h with motion						
$1.5I_{r1}$	Setting time $t_L(s)$	15	30	60	120	240	480
$2.0I_{r1}$	Motion time T(s)	8.4	16.9	33.7	67.5	135	270

● short-delay over-current protection motion characteristic see table 5

Table 5

Setting current $I_{r2}(A)$	$(0.4 \sim 15)I_n$			
Setting time $t_s(s)$	0.1	0.2	0.3	0.4
motion characteristic	$> 8 I_{r1}$ definite time limit motion			
	$\leq 8 I_{r1} \quad T = \frac{(8I_{r1})^2 \cdot t_s}{I^2} \quad I - \text{short-circuit current}$			

● Power loss (ambient temp.+40°C)

ZW1-2000 three-pole	360W	ZW1-4000 three-pole	1225W
ZW1-2000 four-pole	420W	ZW1-4000 four-pole	1240W
ZW1-3200 three-pole	900W	ZW1-6300 three-pole	1400W
ZW1-3200 four-pole	1220W	ZW1-6300 four-pole	1600W

● Reduced capacity coefficient see table 6

Table 6

Ambient temperature		+40°C	+45°C	+50°C	+55°C	+60°C
Permitted continuous working current	2000A	$1.0I_n$	$0.95I_n$	$0.90I_n$	$0.85I_n$	$0.80I_n$
	3200A 4000A 6300A	$1.0I_n$	$0.92I_n$	$0.86I_n$	$0.80I_n$	$0.74I_n$

Notes : The relation between the ambient temp. and permitted continuous working current bases on 110°C of the breaker's in/out terminal's testing temperature in practical under various ambient temperatures.



long-delay、 short-delay、
instantaneous operating protection

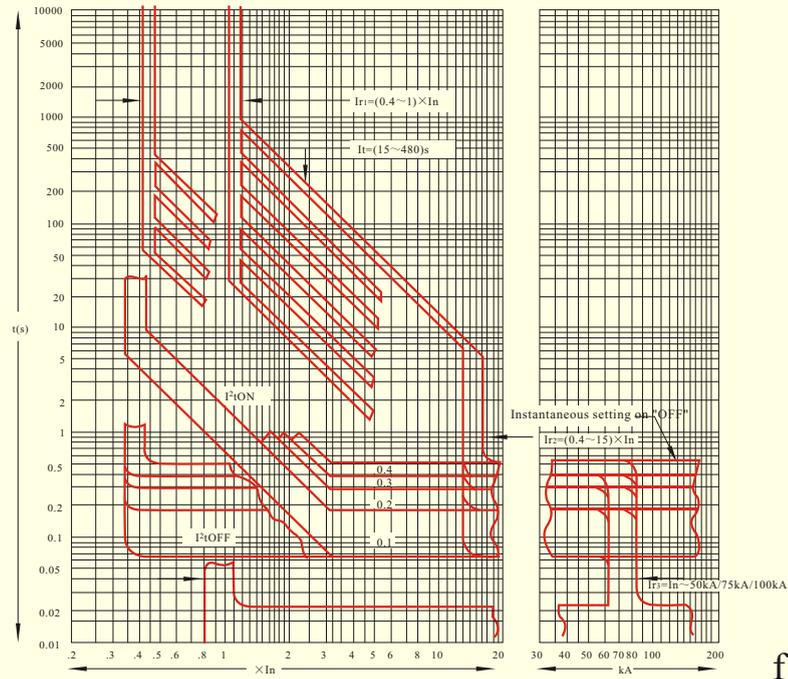


figure 3

Grounding fault protection

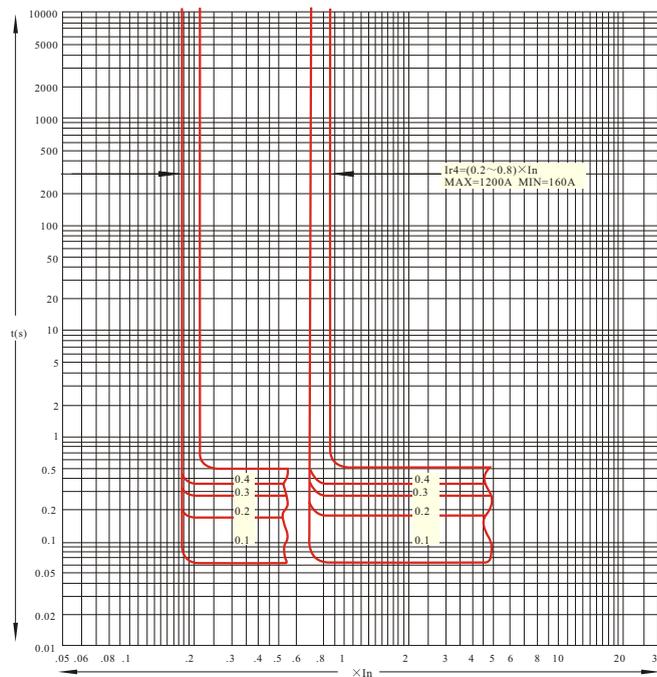


figure 4



Load monitor mode 1:
dual-load limit motion

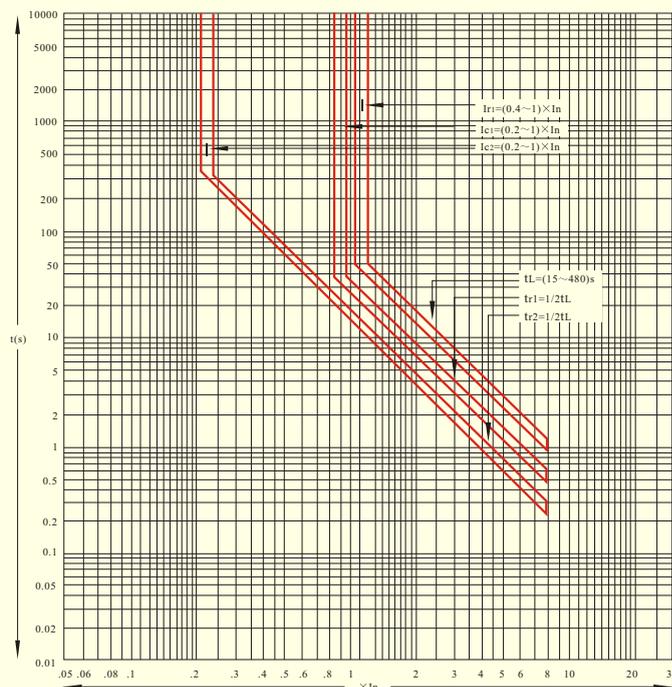


Figure 5

Load-monitor's mode 2:
1 load limit and 1 load re-switching-on motion

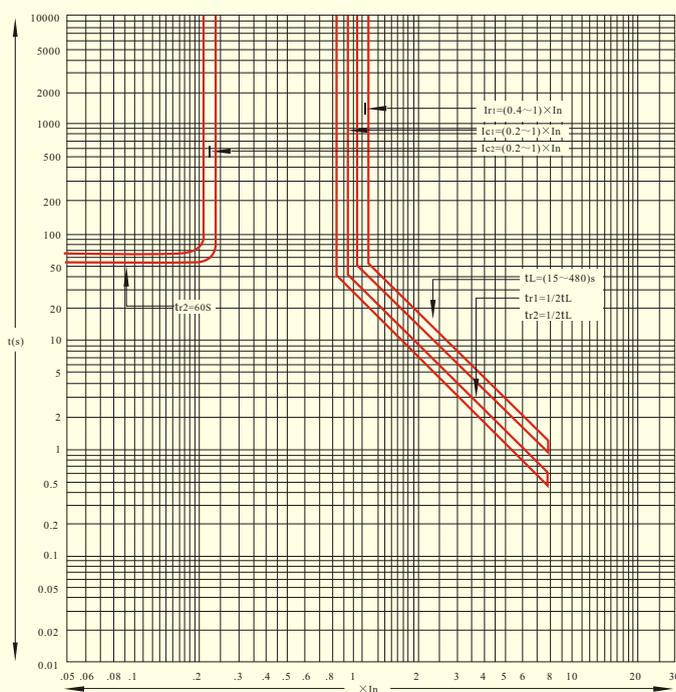


Figure 6



● Structure

The fixed-type breaker is mainly consisted of the contact system, intelligent controller, manual operational mechanism, electric energy-stored mechanism and mounting boards. It is of three-dimensional layout with compact, small volume structure feature. The contact system is sealed in an insulating base and each phase contact is isolated with an insulating base to form many small cubicles. The intelligent controller, manual operational mechanism, electrical energy-stored mechanism in its front forms each one independent unit in turn. It can be removed one by one and replaced by a new one accordingly. The structure see figure 7.

The drawer-type breaker is consisted of its main body and the drawer base. Beside the drawer base, there are lead rails, on which there are mobilizable guide plate, and the breaker's main body is set on the left and right guide plates. To connect with the main circuit, the drawer-type breaker is by using its main body's busbar to insert into the bridge-contact on the drawer base. There are 3 working position: "connected" position, "experimental" position, "isolated" position changed by a handle to spin in or out. There is an indicator on the crossbeam of the drawer base to show their positions. When it is on "connected" position, the primary circuit and secondary one are connected; when it is on "experimental" position, the primary circuit is off and isolated by an insulation base, only secondary circuit is on; when it is on "isolated" position, all of them are breaking. Since there is an interlocking mechanism in the drawer-type breaker, only on "connected" or "experimental" position, the breaker can switch-on; while on the middle position between the "connected" and "experimental", the breaker can not switch-on.

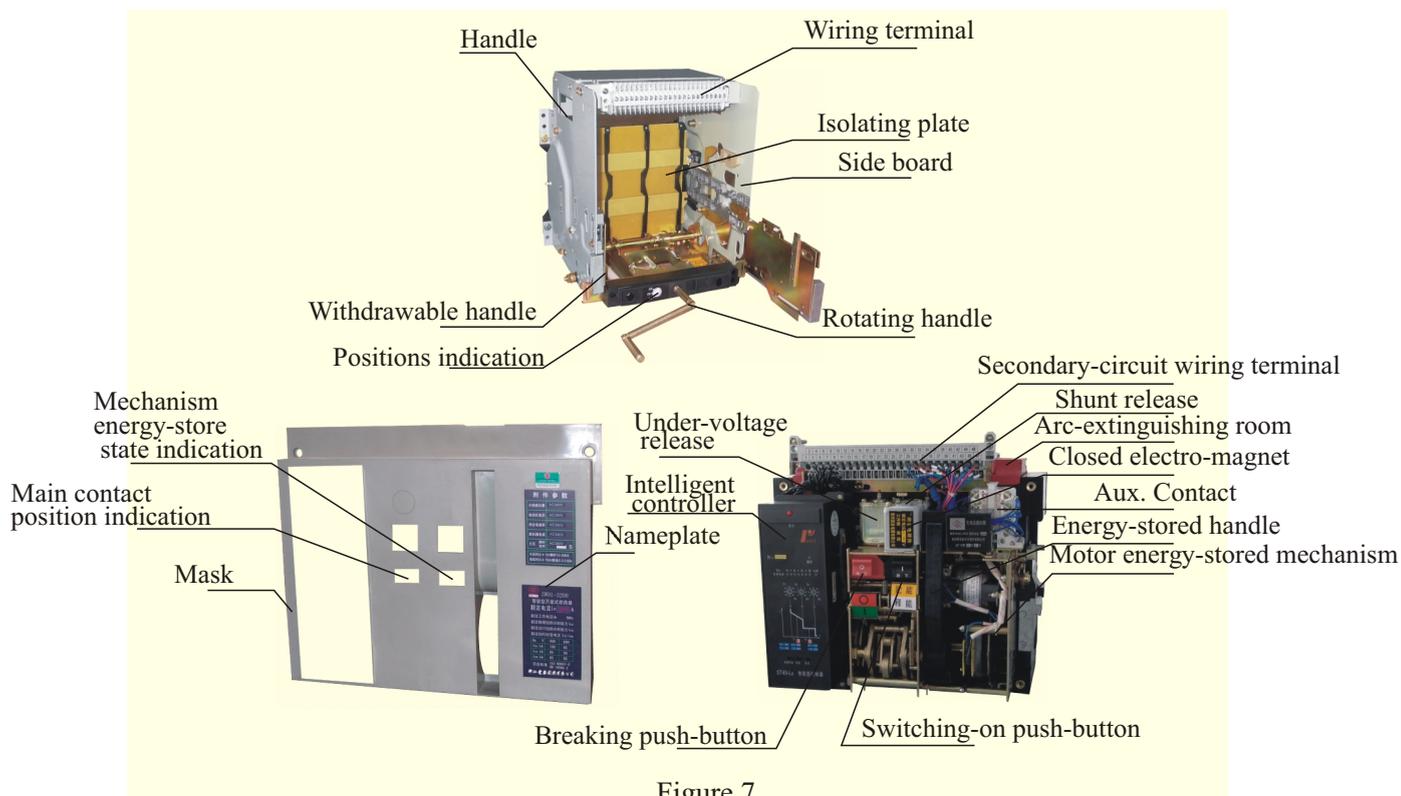


Figure 7



● Accessory

● Electric accessory

The working voltage and power of breaker's shunt release、under-voltage release、electric operational mechanism、closed electro-magnet, see table 7。

table 7

Item	AC (50Hz)		DC	
	220V	380V	110V	220V
Shunt release	24VA	36VA	24W	24W
Under-voltage release	24VA	36VA		
Closed electro-magnet	24VA	36VA	24W	24W
Electric operational mechanism	85VA	85VA	85W	85W

Notes : shunt release's reliable motion voltage range is 70%~110%, under-voltage release is 85%~110%。closed electro-magnet and electric operational mechanism is 85%~110%。

● Under-voltage release

When the circuit's working voltage is lower than its standard value, it will be under-voltage tripping.

Type: instantaneous tripping, delay tripping (any one of them can be chosen by users)

(In three sections of protection system the delay under-voltage release should be chosen).

Under-voltage release performance see table 8

Table 8

Type	Under-voltage delay release	Under-voltage instantaneous release
Release motion time	Delay 0.3s, 1s, 3s, 5s, accuracy $\pm 10\%$	Instantaneous
Release motion voltage value	35%~70%Ue	Able to break the breaker
	$\leq 35\%Ue$	The breaker can't switch-on
	$\geq 85\% \sim 110\%Ue$	The breaker can switch-on reliably
During 1/2-delay time, when the power voltage recovers up to 85%Ue	The breaker won't break	

● Shunt release (short-time working mode)

Remote operation to break the breaker

● Closed electro-magnet (short-time working mode)

The device can make the spring under the status of energy storage to remote control the breaker's switching-on.

● Electric operational mechanism

Motor energy storage and automatic energy re-storage device.

● Aux.switch

To indicate making and breaking states of breaker

The rated value of aux.contact of breaker and its performance see table 9

Table 9

Current Type	Utilization type	Rated Voltage Ue	Rated thermo-current Ith	Rated control capacity	Aux.contact basic type	Aux.contact electric operational performance	The making/breaking capacity of aux.contact in abnormal condition			
							U/Ue	I/Ie	Cosφ or T0.95	Operation cycle times
AC	AC-15	220V 380V	6A	300VA	Four N.O. Four N.C. Bridge type contact	Same with the total times of breaker's operation performance	1.1	10	0.3	10
DC	DC-13	220V		60W			1.1	1.1	300ms	



● Mechanical accessory

● Anti-closed lock

To prevent the breaker switching-on when it is breaking.

settings selectable :(1)Sole lock and key per breaker; (2)Two same locks and one key per two breakers; (3)Three same locks and two same keys per three breakers; (4) Special settings

● Door frame

It is installed on top of the switch's screen door for seal up.

● Mechanical interlocking

It is used in the multi-power supply systems with a safe interlocking device to prevent the two to switch-on in parallel connection . It is sorted by types of two-horizontal and two-vertical.

Drawer type breaker see figure 8

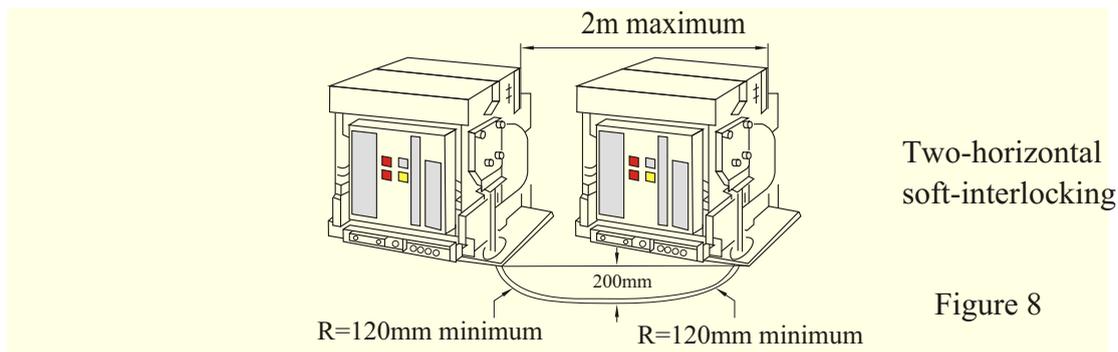


Figure 8

Bar interlocking two-fold mounting drawer type breaker see figure 9

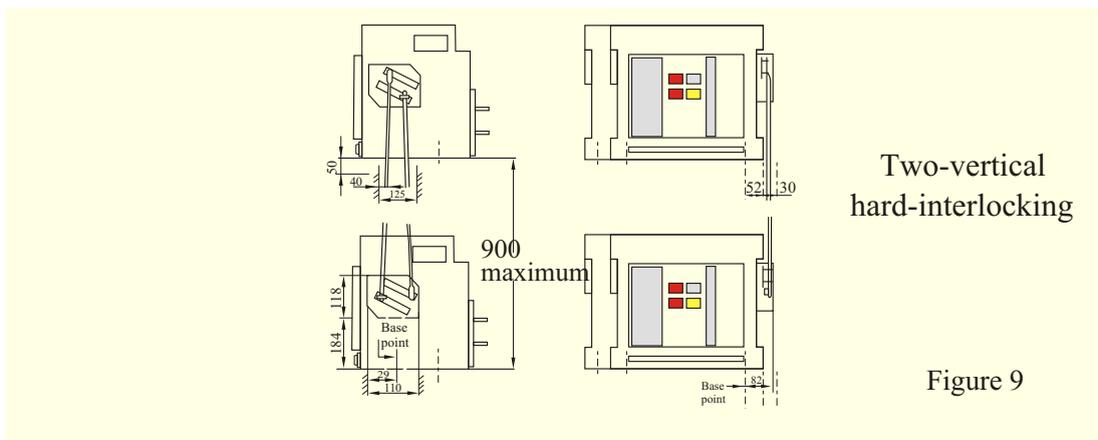


Figure 9

● Wiring terminal

There are 47 of main wiring terminals of breaker.

The wiring is simple and convenient to be use , see figure 10A、B、C。

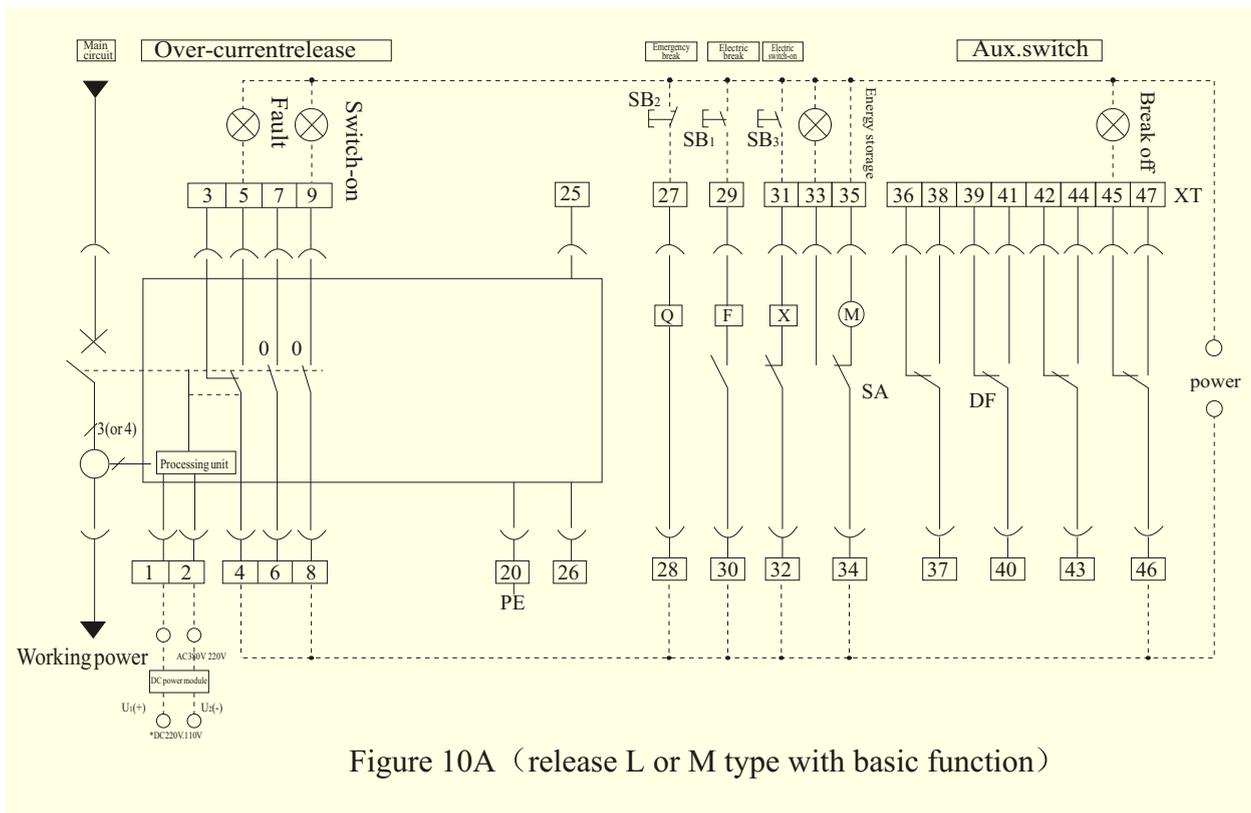


Figure 10A (release L or M type with basic function)

Notes :

- (1) It can be connected with different power if the control power voltage of Q、F、X、M are different.
- (2) The 35# terminal can be wired directly to the power (automatic energy pre-storage), and also can be connected in serial with N.O. push-button before connecting the power (manual energy pre-storage)
- (3) The attachment of accessory supply by users
- (4) * When the working power of intelligent release is DC one, it must be added with power module (In this moment, terminals 1#, 2# are strictly not allowed to be wired with AC power again). The power module and its overall and mounting dimensions see figure 10D. The head wiring as shown in the figure (when DC power Dc110 V or 220V , input from u1(+), u2(-)), and the two output terminals of power module should be wired correspondingly with secondary wiring socket terminals 1(+), 2(-).

SB1 shunt-push-button X switch-on electro-magnet DF aux.contact 1#、2#: input of working power

SB2 under-voltage push-button M energy storage motor F shunt release 20# : protection grounding

SB3 switch-on push-button XT wiring terminal SA trimming switch 25#、26#: input terminals to connect outwards with current transformer.

Q under-voltage instantaneous release or under-voltage delay release

O N.O (normally open) contact (3A/AC380V)

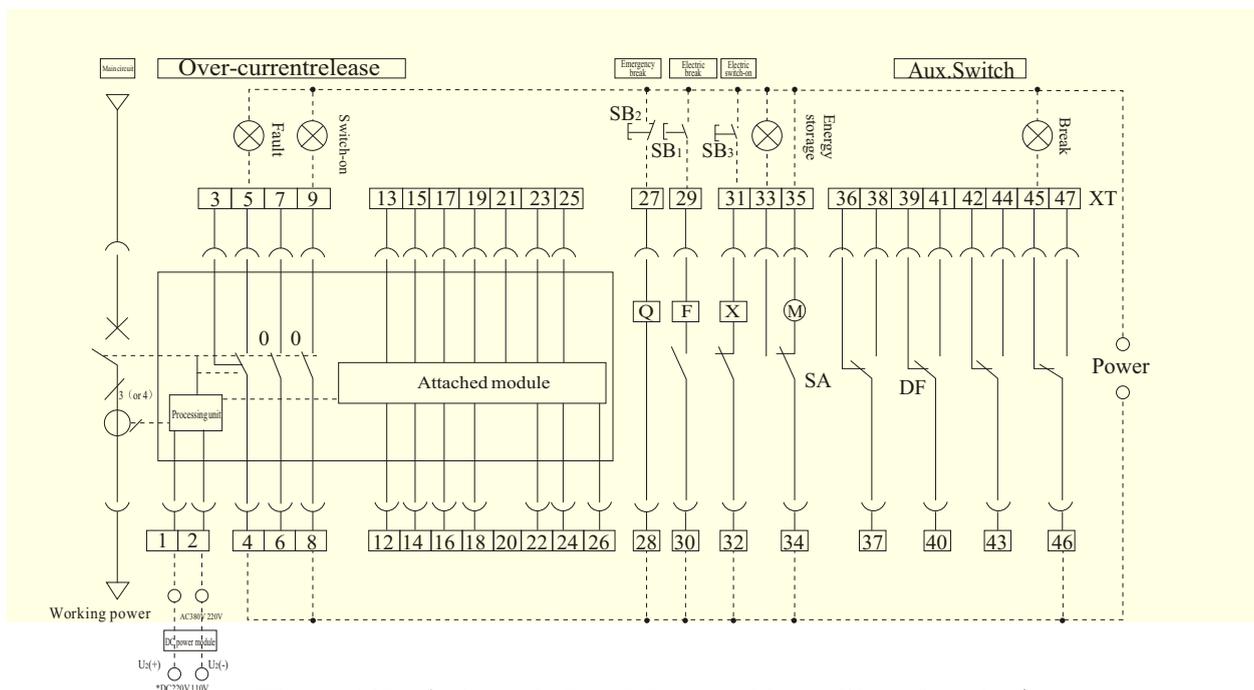


Figure 10B (release is L or M type with auxiliary function)

Notes :

- (1) It can be connected with different power if the control power voltage of Q、F、X、M are different.
- (2) The 35# terminal can be wired directly to the power (automatic energy pre-storage), and also can be connected in serial with N.O. push-button before connecting the power (manual energy pre-storage)
- (3) The attachment of accessory supply by users
- (4) * When the working power of intelligent release is DC one, it must be added with power module (In this moment, terminals 1#, 2# are strictly not allowed to be wired with AC power again). The power module and its overall and mounting dimensions see figure 10D. The head wiring as shown in the figure (when DC power Dc110 V or 220V , input from u1(+), u2(-)), and the two output terminals of power module should be wired correspondingly with secondary wiring socket terminals 1(+), 2(-).

SB1 shunt-push-button	X switch-on electro-magnet	DF aux.contact
SB2 under-voltage push-button	M energy storage motor	F shunt release
SB3 switch-on push-button	XT wiring terminal	SA trimming switch
Q under-voltage instantaneous release or under-voltage delay release		
O N.O (normally open) contact (3A/AC380V)		

1#, 2# are working power inputs

(12#, 13#) and (14#, 15#) and (16#, 17#) and (18#, 19#) are four groups of signal contact output; The contact output of auxiliary function can be selected by users according to table 11. 20# is protection grounding; 21# N phase, 22# A phase, 23# B phase, 24# C phase are voltage input ends of voltage meter function; 25#, 26# are the input ends of outward current transformer

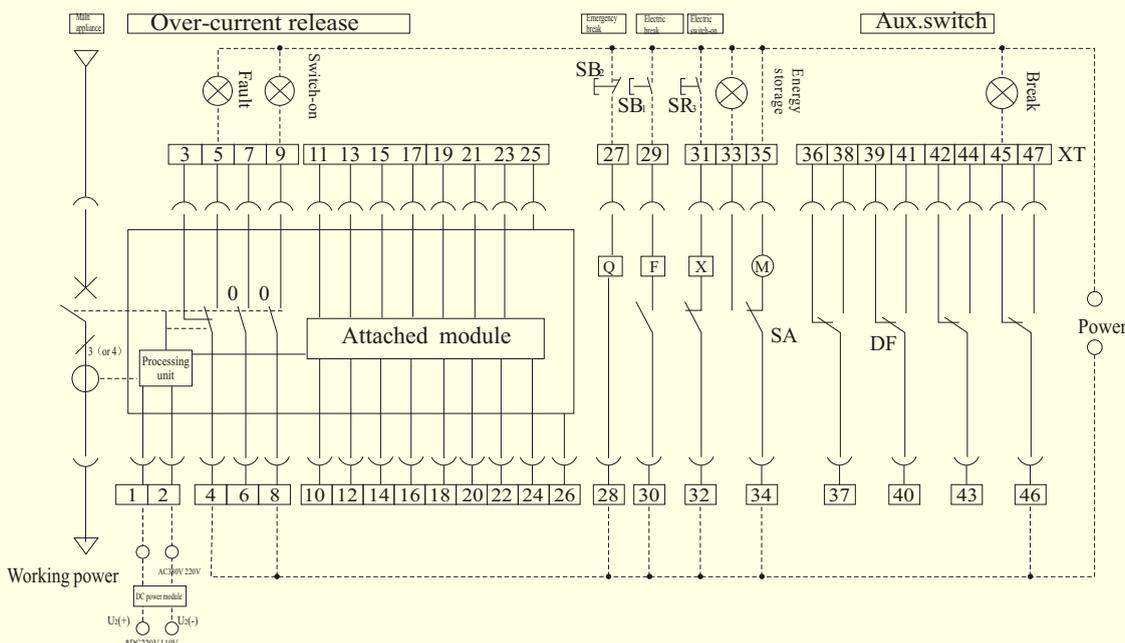


Figure 10C (release is H type function)

Notes :

- (1) It can be connected with different power if the control power voltage of Q, F, X, M are different.
- (2) The 35# terminal can be wired directly to the power (automatic energy pre-storage), and also can be connected in serial with N.O. push-button before connecting the power (manual energy pre-storage)
- (3) The attachment of accessory supply by users
- (4) * When the working power of intelligent release is DC one, it must be added with power module (In this moment, terminals 1#, 2# are strictly not allowed to be wired with AC power again). The power module and its overall and mounting dimensions see figure 10D. The head wiring as shown in the figure (when DC power Dc110 V or 220V , input from u1(+), u2(-)), and the two output terminals of power module should be wired correspondingly with secondary wiring socket terminals 1(+), 2(-).

SB1 shunt-push-button	X switch-on electro-magnet	DF aux.contact
SB2 under-voltage push-button	M energy storage motor	F shunt release
SB3 switch-on push-button	XT wiring terminal	SA trimming switch
Q under-voltage instantaneous release or under-voltage delay release		
O N.O (normally open) contact (3A/AC380V)		

1#, 2# are working power inputs

10#, 11# are A,B ends of extend lines from communication interface

(12#, 13#) and (14#, 15#) and (16#, 17#) and (18#, 19#) are four groups of contact output when ex-works see table 10; The contact output of auxiliary function can be selected by users according to table 11; 20# is protection grounding; 21# N phase, 22# A phase, 23# B phase, 24# C phase are voltage input ends of voltage meter function; 25#, 26# are the input ends of outward current transformer.



The default states of four groups of output signals contact functions of the controller

Table 10

	contact1	contact2	contact3	contact4
H-type	load monitor1 unload output	load monitor2 unload output	remote break	remote switch-on
M-type	load monitor1 unload output	load monitor2 unload output	self-diagnosis fault alarm	fault tripping

Notes: The contact 3、contact 4 of H-type are permanent used in remote breaking、remote switching-on, can't be set for other function, other contacts can be selected by users according to the function listed in table 11.

The output signal contact function of breaker and time table

Table 11

Function serial number	Signal contact output function	Signal contact output time
1	1.short-circuit instantaneous fault tripping alarm	1.short-circuit instantaneous fault tripping output
2	2.grounding or leakage fault tripping alarm	2.grounding or leakage fault tripping output
3	3.current unbalance fault tripping alarm	3.current unbalance fault tripping output
4	4.short-circuit short-delay fault tripping alarm	4.short-circuit short-delay fault tripping output
5	5. over-load long-delay fault tripping alarm	5.over-load long-delay fault tripping output
6	6.fault tripping alarm	6.any fault tripping output
7	7.load monitor1 unload output	7.load monitor1 unload output
8	8.load monitor2 unload output	8.load monitor2 unload output
9	9.system self-diagnosis fault alarm	9.system self-diagnosis fault alarm

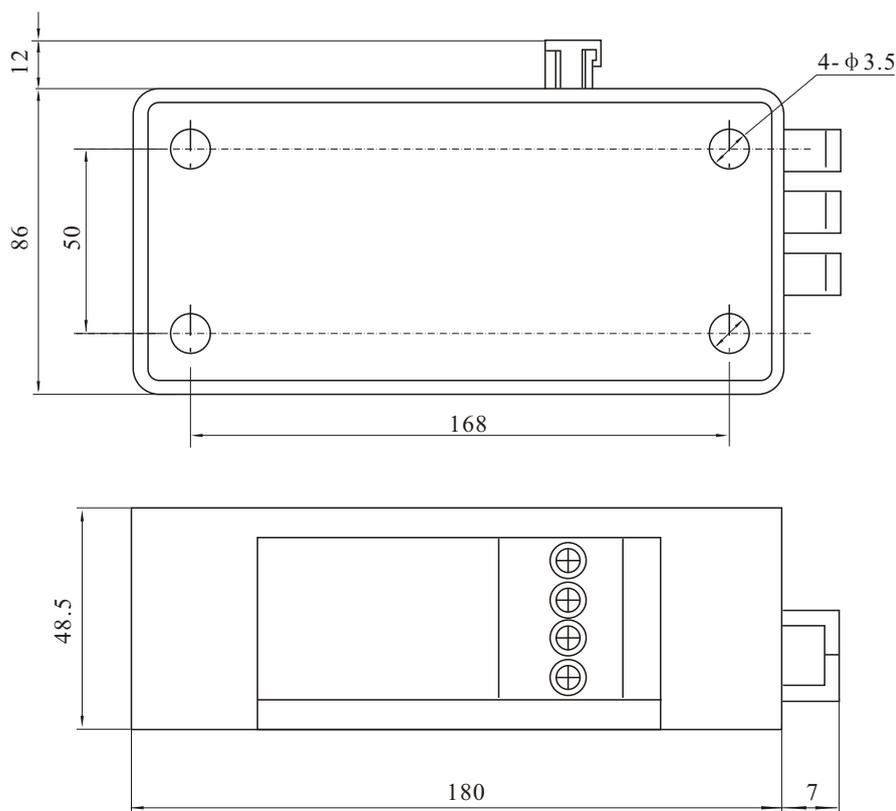


Figure 10D (power module overall and mounting dimensions figure)



● ZW1-3200-type overall and mounting dimensions see figure 13 (drawer type)

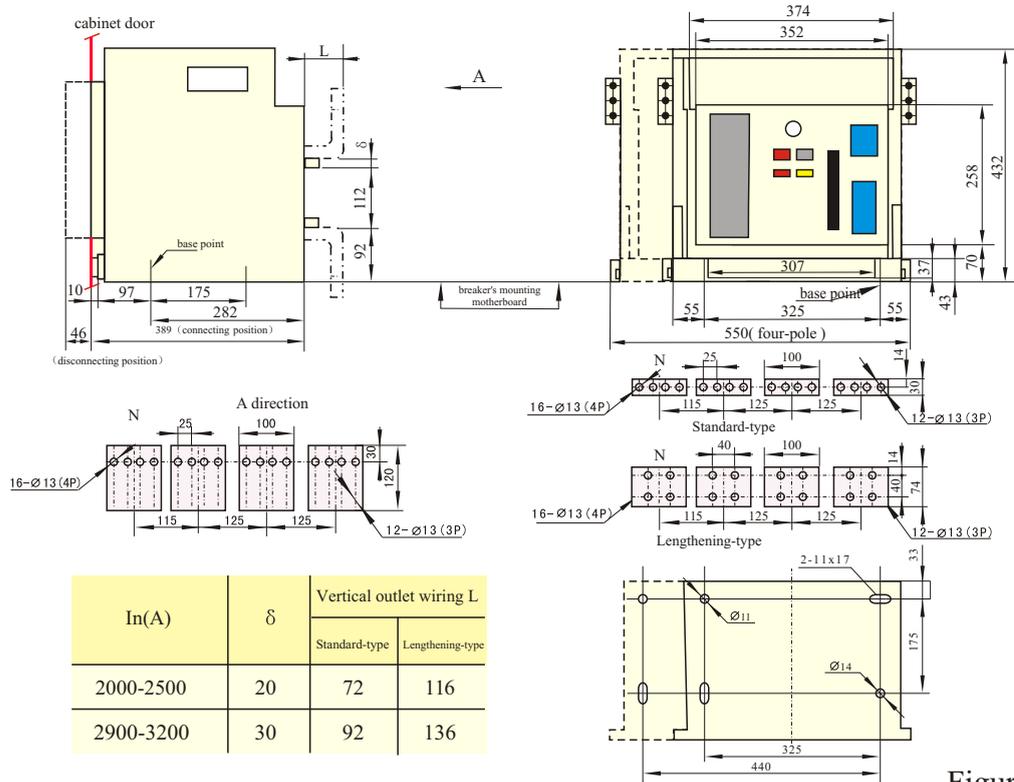


Figure 13

● ZW1-3200-type overall and mounting dimensions see figure 14 (fixed-type)

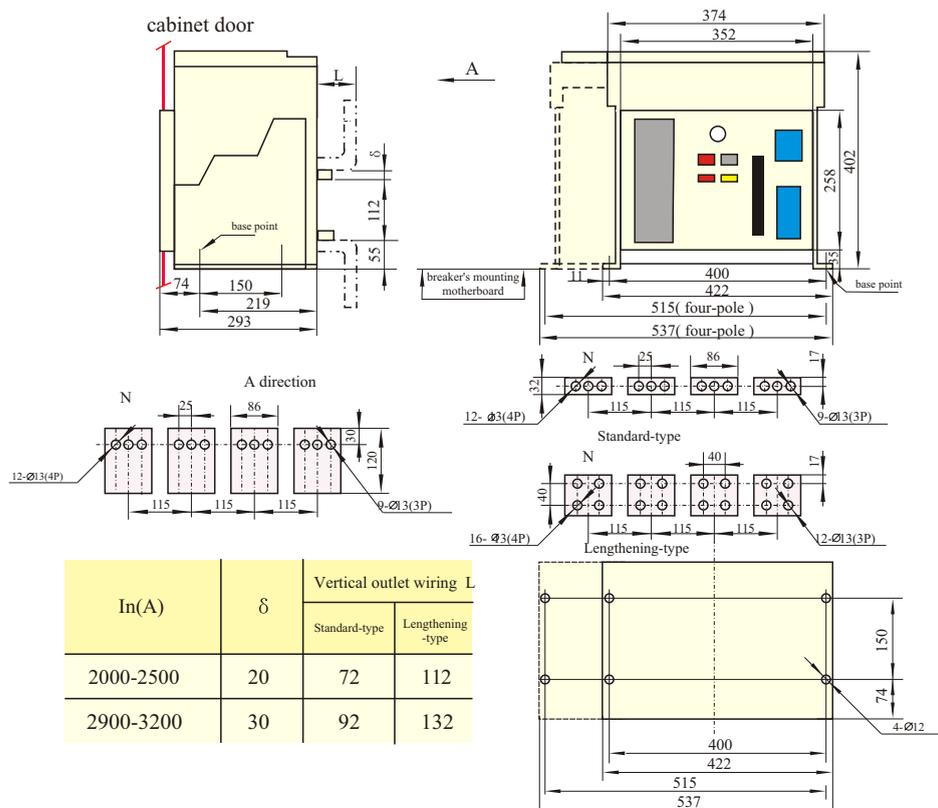


Figure 14



●ZW1-4000/3-type overall and mounting dimensions see figure 15(drawer type)

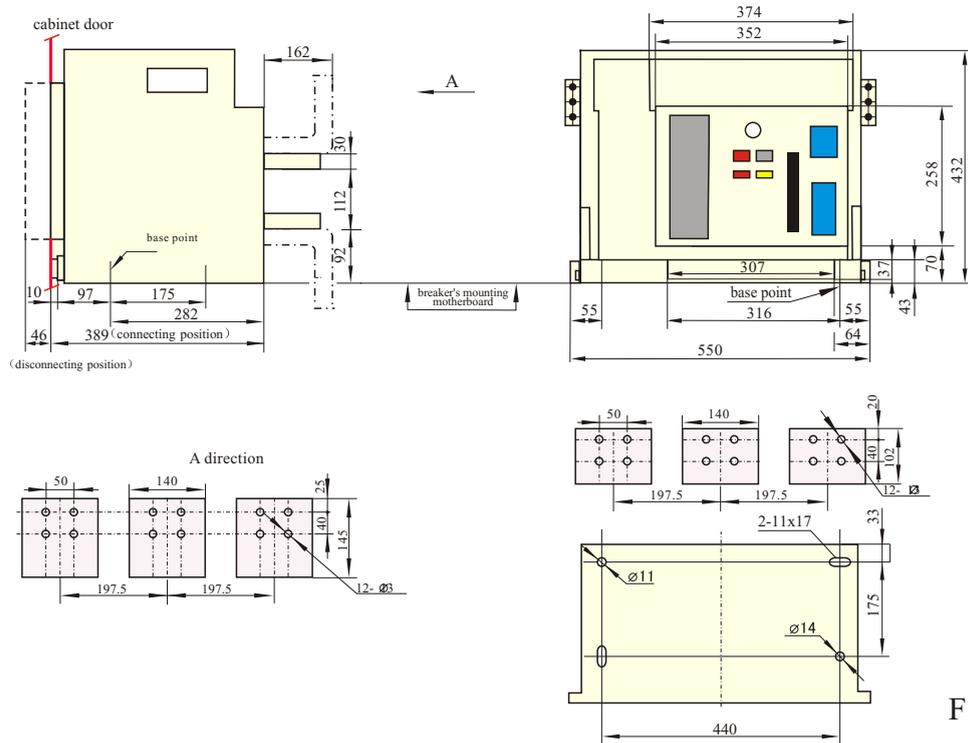


Figure 15

●ZW1-4000/4-type overall and mounting dimensions (see figure 16)(drawer type)

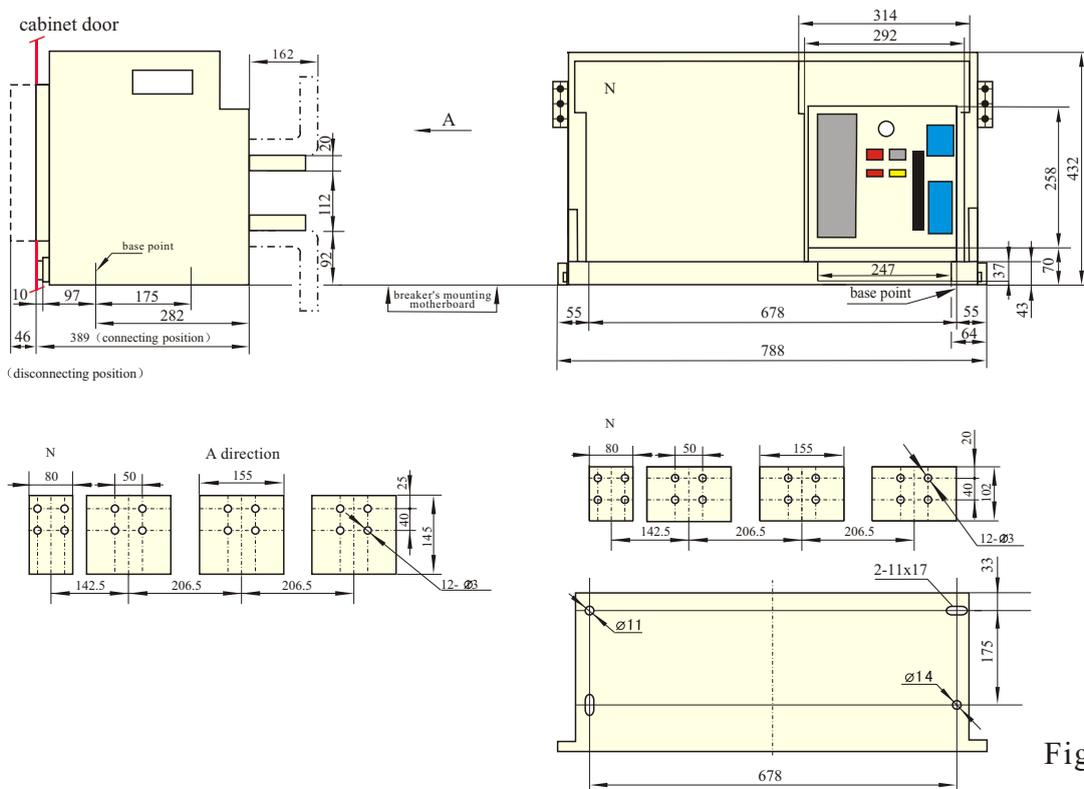


Figure 16



●ZW1-6300(In=4000A, 5000A) see figure 17 (drawer type)

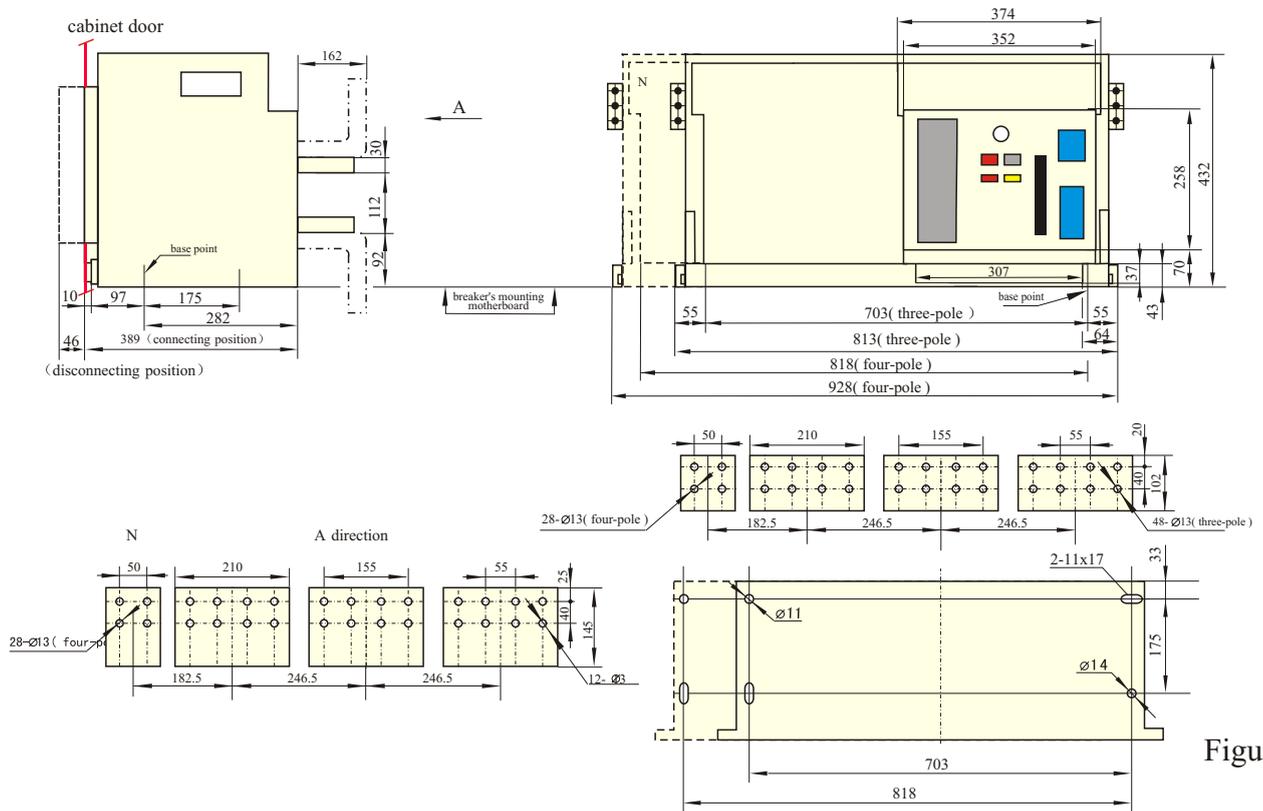


Figure 17

●ZW1-6300(In=6300A, 3P) -type overall and mounting dimensions see figure 18 (drawer type)

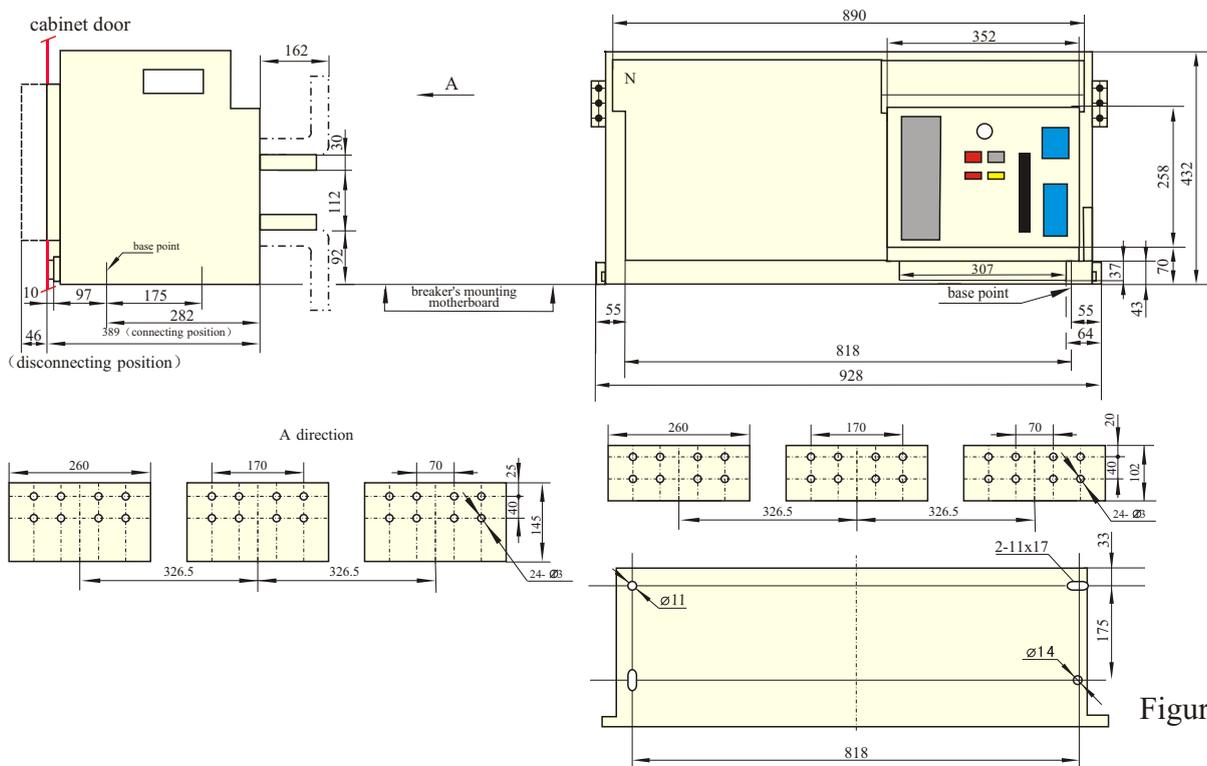


Figure 18



● ZW1-6300(In=6300A, 4P) -type overall and mounting dimensions see figure 19 (drawer type)

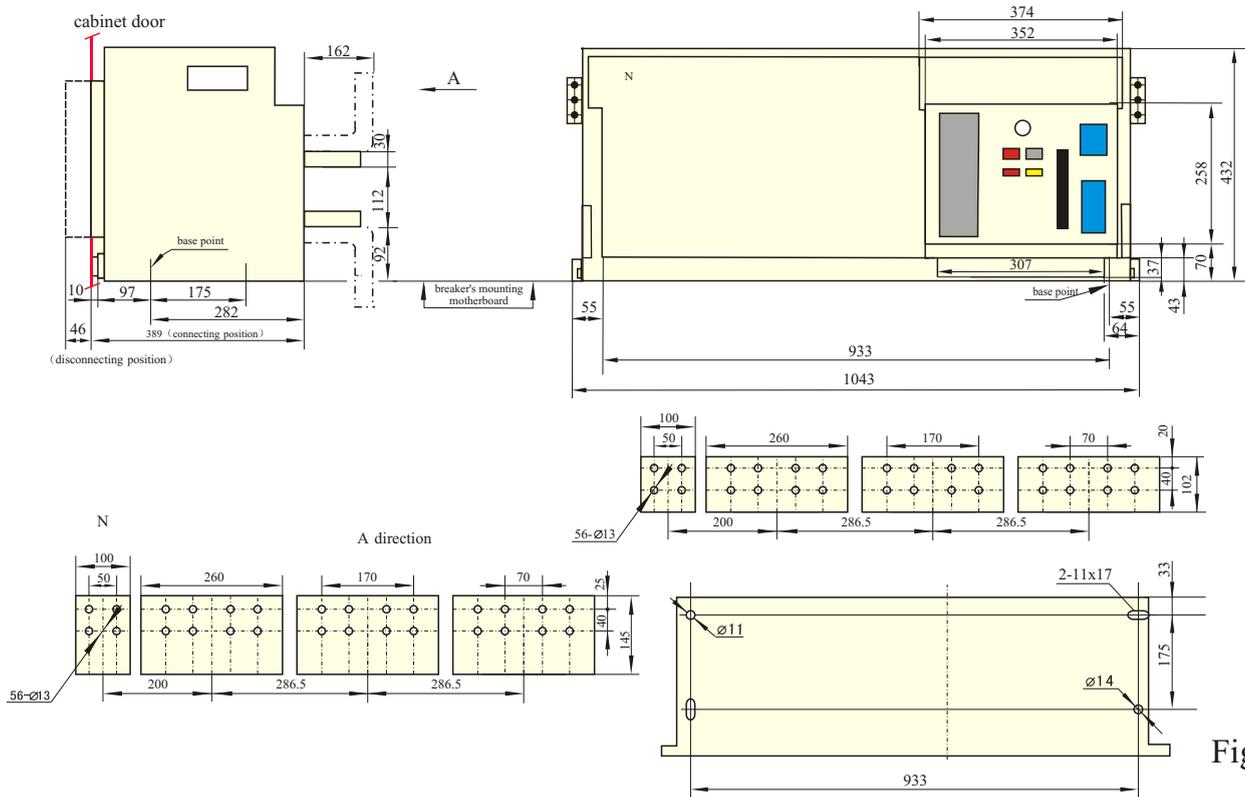


Figure 19

● ZW1-2000、ZW1-4000/4 door frame inner dimensions and mounting hole, hole size see figure 20

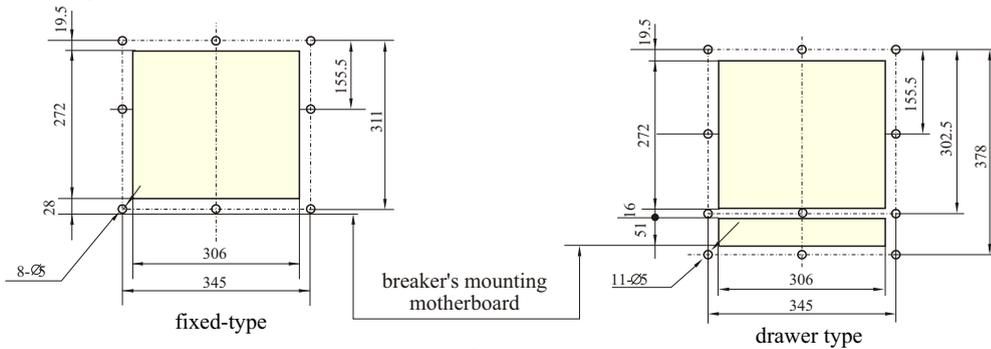


Figure 20

● ZW1-3200~6300 (except 4000/4) door frame inner dimensions and mounting hole, hole size see figure 21

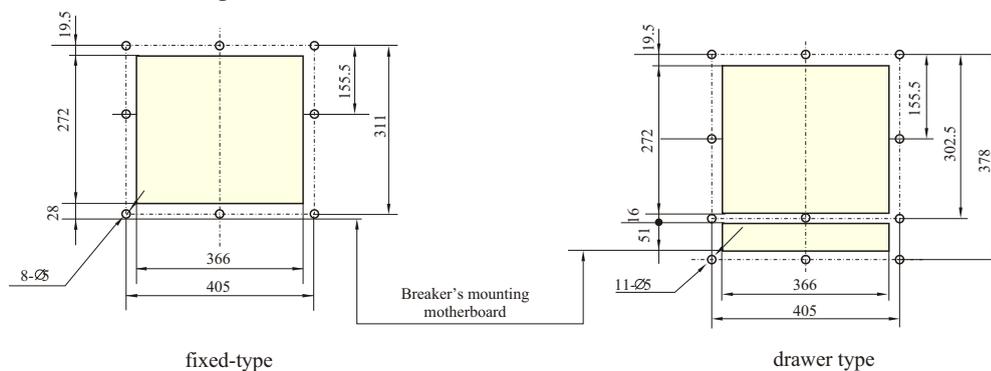


Figure 21



● The copper bar specs and sum for users see table 12

Table 12

Rated current	Specs of copper bar for outward connecting	Sum of each pole	Rated current	Specs of copper bar for outward connecting	Sum of each pole
630A	40×5	2	2900A	100×10	3
800A	50×5	2	3200A	120×10	3
1000A	60×5	2	3600A	120×10	4
1250A	80×5	2	4000A	120×10	4
1600A	100×5	2	5000A	120×10	5
2000A	100×5	3	6300A	120×10	6
2500A	100×5	4			

● The installation, use and maintenance of breaker

Check the specification of breaker if it meets the requirement of order before installation. Meanwhile use a 500V megohmmeter to inspect the circuit breaker dielectric resistance which should be not less than $10M\Omega$ under the condition of ambient temperature $20\pm 5\text{ }^{\circ}\text{C}$ and relative humidity 50% ~70%. Otherwise should make it dry until its dielectric resistance meets the requirement.

After installation and finishing the secondary wiring according to the relevant figure, for the drawer type breaker, the lead rails at its two sides should be drawn out and the main body of breaker should be set on the lead rails reliably and push to the disconnecting position, use rotating handle insert into the setting hole, clockwise turn the handle over to the experimental position, the following test should be done:

A) To check the under-voltage release, shunt release, switch-on electro-magnet, electric energy storage mechanism and intelligent type controller, if the rated voltage of outward connecting auxiliary power is suit with the connecting power or not, then electrify the secondary circuit (at this moment, the under-voltage release should be on position of switching-on)

B) The energy storage of breaker is divided into two types of manual and electric operation. For manual type, the handle on the panel must be pull up and down until the sounds of "ka-da" heard, the indication on panel should be "energy storage", i.e. the action of energy storage finished; For the electric operation of energy storage mechanism, the same sounds be heard and the same indication on panel means the action finished.(at this moment, to press "I" push-button or through electrifying the switching-on electro-magnet all can switch-on the breaker reliably, the electric operational mechanism re-store energy again.)

C) After the breaker switching-on, any use of under-voltage release, shunt release, "O" push-button on panel or the tripping test of the intelligent controller, should make the breaker break.

D) The strong interference source should be kept 1000mm and above away from the breaker.



● Intelligent controller's setting mode

● Since the controller is set with intelligent function to "talk" with us, the protective characteristic setup can be done by users according to following modes

● L-type (economic-type) controller

Users must follow as shown in figure 1, done by a professional, with a special tool (small-type for-watch-use screwdriver) to turn the dial switch until the arrow direction points to a corresponding position of the protective parameters, however the action can't be stopped at the middle of any two calibrations, and each protective parameters can't be crossover set up, it should be suit with $I_{r1} < I_{r2} < I_{r3}$.

● Long-delay protection setup

- a. Rotating I_{r1} switch setting current is $(0.4 \sim 1)I_n$;
- b. To dial tL-key setting time is 30s、60s、120s、240s, any one of these four.
- c. If I_{r1} switch rotating to OFF position means exit from this function.

● Short-delay protection setup

- a. Rotating I_{r2} switch setting current is $(3 \sim 10)I_n$;
- b. To dial tS-key setting time is 0.2s、0.4s, any one of these two.
- c. If I_{r2} switch rotating to OFF position means exit from this function.

● Short-circuit instantaneous protection setup

- a. Rotating I_{r3} switch setting current is $(3 \sim 10)I_n$ or $(10 \sim 20)I_n$ or $(7 \sim 14)I_n$;
- b. If I_{r3} switch rotating to OFF position means exit from this function.

● Grounding fault protection setup

- a. Rotating I_{r4} switch setting current is $(0.2 \sim 0.8)I_n$;
- b. To dial tG-key setting time is 0.2s、0.4s、0.6s、0.8s, any one of these four.
- c. If I_{r4} switch rotating to OFF position means exit from this function;

● Release running state.

Press reset key after all release parameters setting finished.

● M-type (standard-type) controller

Users must follow as shown in figure 2, done by a professional to operate "each protective value setup" key, "setting value increase by degrees" key or "setting value decrease by degrees" key, and "storage" key, with observation the data on relevant "indication" and "current and time display" to finish the setup of protective parameters.

● Each protective value setup key: to be used to check or select the wanted protective value of setup, once press it to choose the content every time, it will move to another item from down to up and to right side by step (the sequence is : load 1—load 2—grounding current—grounding time—long-delay current—long-delay time—short-delay current—short-delay time—instantaneous current), i.e, there are setting indication and meanwhile it will display the value of these items on the current and time display.



- The keys of setting value increase or decrease by degrees are used to adjust the value until to meet the requirement when using the setup key to choose one item of protective value according to the value indicated on the current and time display screen. (When the display indicates OFF , it means the protective function has exited).
- The storage key: when the protective value selected as mentioned above has met the requirement ,to press it in 2 seconds ,if the indication of storage lighten shortly, it means the setup value has be stored and effective.(however if press it when the display indicates OFF ,it means the item's protective function has exited.) For example: an item's long-delay protection current value is 1000A, short-delay motion time is 0.2s, after setting, the long-delay protection current setup will be 800A ,short-delay motion time setup will be 0.4s.

1、 Long-delay protection setup:

- a. To press setup key several times until the long-delay current setting indication lightening, at this moment the indication of current and time display will shows 1000A (the primary setup current value)
- b.To press decrease by degrees key , the value indicated will drop until to 800A;
- c.To press storage key 、 the indication of storage will lighten shortly.

2、 Short-delay time setup

- a.To press setup key several times until the short-delay motion time setting indication lighten, at this moment the indication value on the current and time display is 0.2s (primary setup time value);
- b.To press increase by degrees key, the value on display will increase up to 0.4s.
- c.To press storage key 、 the indication of storage will lighten shortly.

3、 Check-up

To press setup-key again, the values on display of long-delay current setting indication and short-delay motion time setting indication should be 800A and 0.4s.

●H-type (communication-type) controller

According to the indication of figure 3, it must be done by a professional through "function" key 、 "scroll up" key , "scroll up" key 、 "scroll down" key, "confirm" key , and "return" key to set each protective parameters of controller.

●The operational steps of setting each protective values:

a.When the controller is on reset position(three-phase current's indication in cycle), press " function" key , the "setup" light will flash, then press "confirm" key, the light of load 1 (IC1) will lighten, at this moment , press "scroll up" key ,each protective function and protection time will move in turn from down to up and to right , the sequence is :load 1 current→load1 time→load2 current→load2 time (nil in mode 2) →N phase(nil in three-pole) →rate of unbalance→time of unbalance→asymmetric grounding current→asymmetric grounding time→ long-delay current→ long-delay time→ short-delay current→ short-delay time→ instantaneous current, i.e. There is the setting indication of this item, and the value of this item will be indicated on the current and time display.



B. To set the protective values of this item: to press "confirm" key, the "setup" light will lighten in stable way instead of flashing, it is the time for setting the protective values by pressing the key of "scroll up" or "scroll down".

C. When the selected protective values meet the requirement, to press the "confirm" key, the storage light will lighten shortly, it means the setup value has been stored and effective. For example: an item's long-delay protection current value is 1000A, short-delay motion time is 0.2S, after setting, the long-delay protection current setup will be 800A, short-delay motion time setup will be 0.4S.

1、 Long-delay protective value setup

a. When the controller is on the position of reset state (three-phase current indicates in cycle), in other states then press "return" key for several times, press "function" key, the "setup" light is flashing, then press "confirm" key, the light of load 1 (IC1) will lighten; then press "scroll up" key until the long-delay current item (i.e. "L" light lighten, "A/KA" light lighten), after that press "confirm" key. The "setup" light will lighten in stable way instead of flashing, it means it is the time for setting function of protective values. the indication on display is 1000A current.

b. To press "scroll down" key, the indication value on display will drop 1A (when press longer it will decrease fast) until to 800A.

c. To press "confirm" key, the light of storage will lighten shortly, it means the protective values has been stored in the controller and exited from the function of setting. the setup light will flash again instead of lighten stably.

2、 Setup of short-delay

a. Continue to press "scroll up" key to short-delay time (i.e. the "S" light in lower frame lighten, the one in upper frame also lighten), then to press "confirm" key, the setup light will lighten stably instead of flashing, it is the time of function setting of short-delay.

B. To press "scroll up" key, the value on display will increase up to 0.4S.

c. To press "confirm" key, the light of storage will lighten shortly, it means the protective values has been stored in the controller and exited from the function of setting.

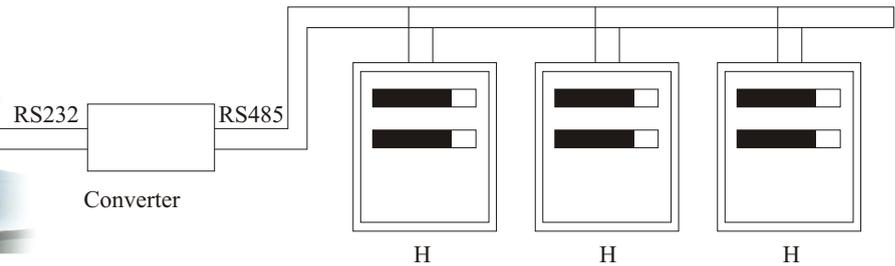
3、 Checkup

According to the steps mentioned above to check up, the long-delay current and short-delay time should be 800A and 0.4S. Furthermore, the H-type controller is also equipped with communication interfaces to link with a computer (see figure 22) to realize functions of remote control, remote measurement, remote adjustment, and remote communication.

- 1、 The communication is in conformity with standard of Modbus agreement (RTU mode) or Profibus-DP agreement.
- 2、 The transmission mode of RS485, communication address and baud rate can be set up through a programmer.
- 3、 It is with photo-electricity coupling equipment and can be used in environment with high electric interference.
- 4、 Longest distance to communicate is 1200m, maximum 127 breakers can be linked with through a dual-gum wire
- 5、 The respondent time of communication is 0.2sec (common value)
- 6、 Communication: agreement data norms: Modbus agreement of communication or Profibus -Dp agreement Of communication or Device Net agreement of communication.



Main monitoring computer



Sketch map of communication links (Modbus agreement)

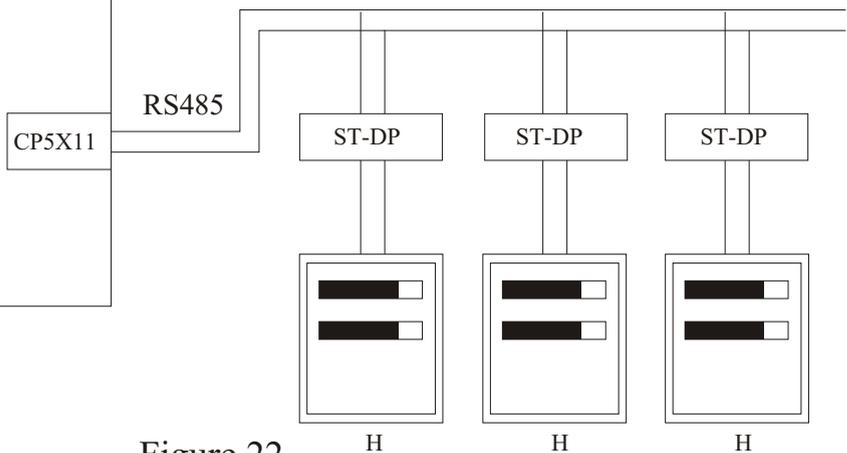
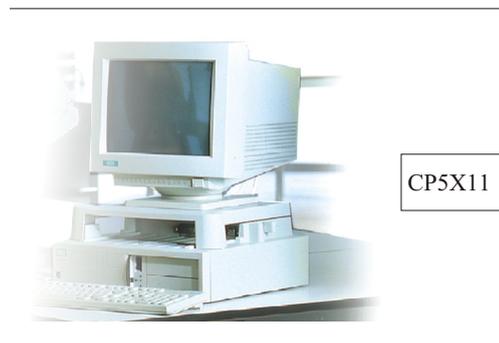


Figure 22

Sketch map of communication links (Profibus-DP agreement)

The ST-DP in figure is communication module, the adapter is CP5X11 made in SIEMENS.
 The RT in figure is a resistance of networks terminal , normally is 120 ohm.

● Maintenance

1. Each rotation parts should be filled in with lubricant oil regularly during the process of use
2. Keep maintenance regularly and clean dust so as to keep the insulation ability of the breaker.
3. To check the contact system regularly especially each time of short-circuit breaking.
 The items including:
 - A. Whether the arc-extinguishing shield is in good condition.
 - B. Whether the contact connection is in good condition.
 - C. Whether the adjoined parts is loose or not.
4. After the fault breaking of breaker, to find out the reason according to the indication of intelligent controller, It can be put in normal operation only after the fault solved.
5. Under the circumstance of proper use according to the instruction of this book, any quality problem will be solved free of charge by our after-sales department within 18 Months from the date of ex-works.(for national customers only)



Attached sheet: the auto-transfer power switch consisted of ZW1 series ACB. i.e: the system is consisted of 2 ZW1 intelligent air circuit breakers with mechanical interlocking mechanism+ 1 SQZW-type auto-transfer power switch+intelligent controller+ 1 control connecting board. The system is centralized and controlled by the intelligent controller of SQZW type auto-transfer power switch, and it is with function of perfect detection, protection and alarm, Its master chip is high-speed single chip embedded microprocessor, it can practically detect the situation of power supply and make it runs with high reliability, its main performance and characteristic is as following:

① Of mechanical interlocks and electric interlocks dual-protection function so as to prevent the two breaker switching-on at same time.

② With 5 control operating mode: “ manual control” 、 “automatic transfer with restoration” 、 “power supply in common use” 、 “stand-by power supply” 、 “stop power supply” 。

③ With protective functions of under-voltage、 over-voltage、 phase-shortage and alarm , indication, prevention of fault power from supplying to the load.

④ its running parameters of (under-voltage value、 over-voltage value、 breaking delay value、 switching-on delay value) can be rectified and adjustable; and it is with digital indication function of phase voltage in networks, so convenient for user to inquiry in time.

The controller's working mode normally is "automatic control" and "automatic transfer with restoration", when the common power is under the situation of faults of power-cut、 under-voltage、 over-voltage、 phase-shortage, the “common power abnormal” indicator lightens, the system will automatically switch over from common power to stand-by one for the load, if the former one recovers normal then restores back automatically. However if the common power is in normal working condition, and the stand-by power is of under-voltage, over-voltage or phase-shortage , the relevant LED on the controller's panel will indicate abnormally.

SQZW-type controller's overall dimensions and mounting opening hole size see figure 23。

The common 、 stand-by two ZW1 breakers' inner equipment of shunt、 closed electro-magnet、 energy-stored motor must be equipped with AC220V, and since the SQZW-type controller has been with function of under-voltage protection, an extra under-voltage release is unnecessary, however the ATSE auto and manual lock is necessary to set, just change the wiring terminal 27、 28 into the auto and manual lock's inner aux.contact to feedback from SQZW controller.

The auto-transfer power switch wiring figure for users see figure 24。 Since the secondary-wiring inside the control connecting board has been done when ex-works,(the wiring of control connecting board and its overall dimensions see figure 25), users only need to wire the common and stand-by power into the control connecting board, and there are three cables of 1.8m for wiring has been equipped with when ex-works (if the length of the cable is not 1.8m, please note at order) , users use the three cables separately to connect the control connecting board with the intelligent controller of SQZW-type auto-transfer power switch and two ZW1 series ACB。

Notes: the common/stand-by breaker's wiring terminal 3#、 38#、 39# and other used terminal can't be used for other purpose.

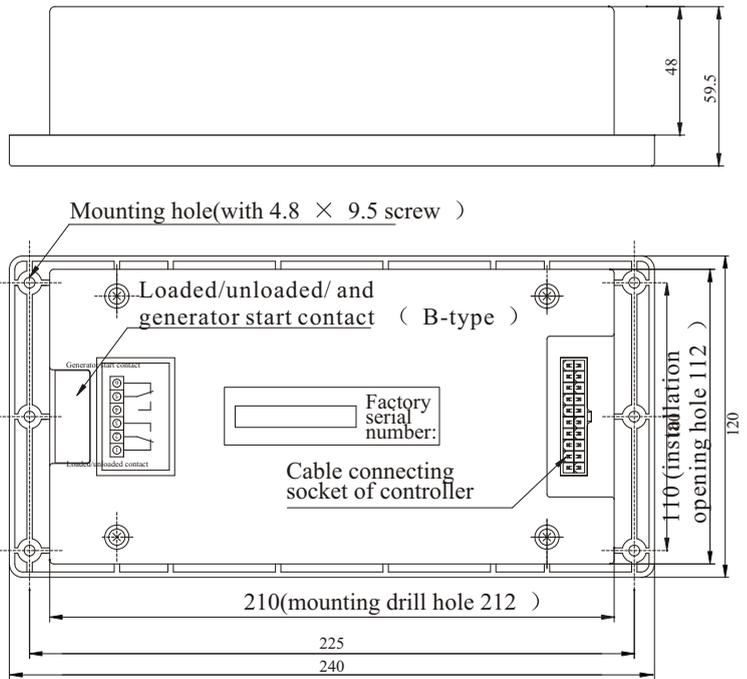
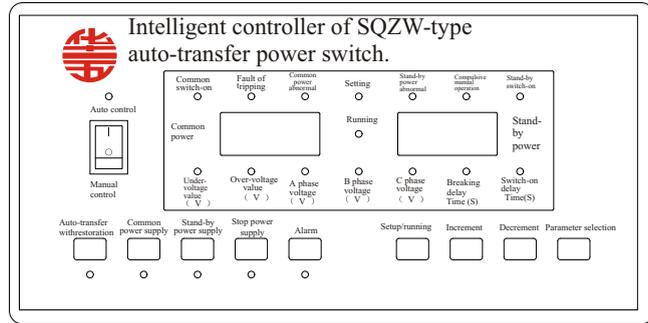


Figure 23 of intelligent controller of SQZW-type auto-transfer power switch

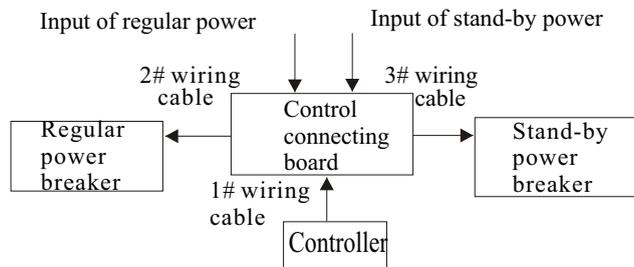
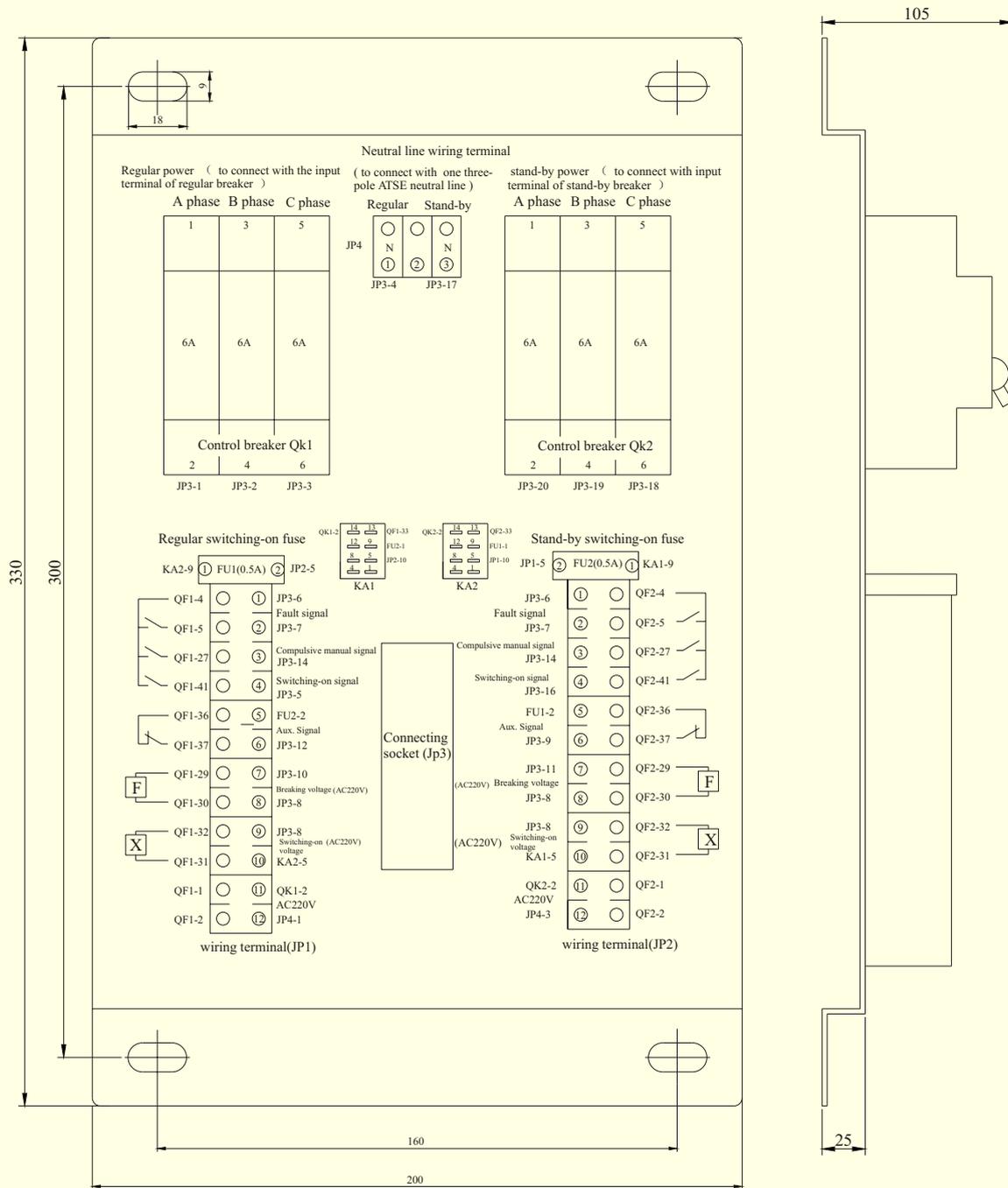


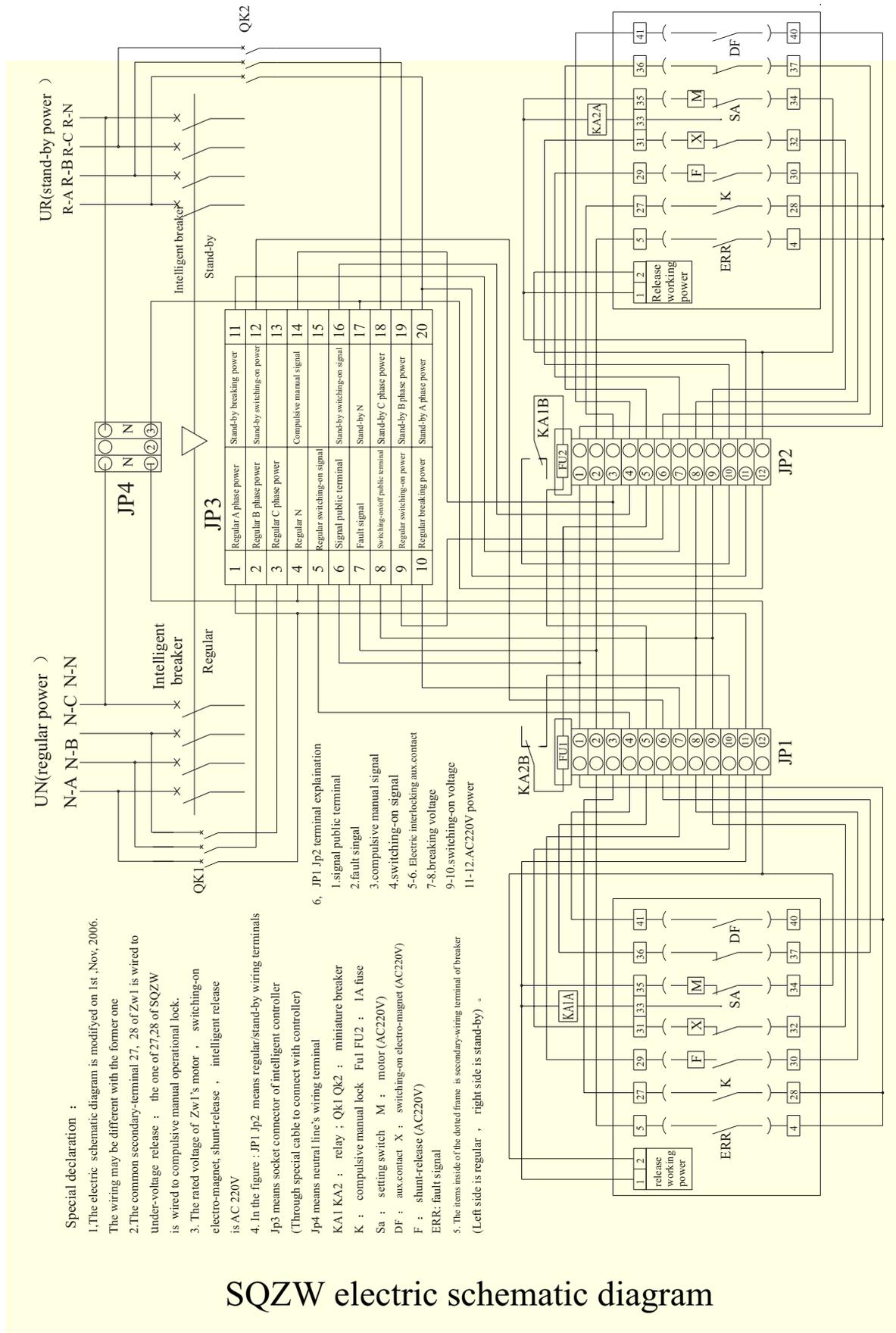
Figure 24: Wiring schematic map for users



Notes:

1. Don't repeat wiring for the secondary wiring has been completed in integral(connecting cable) when ex-works.
2. During wiring, users only need to connect the regular/stand-by cables following the code (1,2,4,5,27,28,29,30,31,32,33,34,35,36,37,40,41) with the corresponding terminals of the regular/stand-by intelligent controller, meanwhile connect the miniature breaker with regular/stand-by power and neutral line (the input conductor of the miniature breaker and neutral line supply by users themselves). The cross-section area of the connecting conductors for the neutral line and the miniature breaker should be not less than 0.75, and the neutral line must be connected well.
3. The breaker's wiring terminals of 3#,38#,39# and others can't be used for other purpose of use.

Figure 25 control connecting board wiring figure and its overall dimensions



SQZW electric schematic diagram



● Norms of order

(Please note √ in or fill in number)

Unit of user		Sum of order		Serial number of order		Date or order	
Model	<input type="checkbox"/> ZW1-2000 <input type="checkbox"/> ZW1-3200 <input type="checkbox"/> ZW1-4000 <input type="checkbox"/> ZW1-6300	Three-pole <input type="checkbox"/> four-pole <input type="checkbox"/>	Fixed-type <input type="checkbox"/> drawer type <input type="checkbox"/>	Rated current In =	A		
Intelligent controller	Model (“F” means generator protection)	Basic function				Selectable function	
	L-type	<input type="checkbox"/> L ₂	Long-delay、instantaneous (3~10) In	1、Load current cursor indication 2、MCU running monitoring 3、Over-load thermo- memory function 4、Fault state indication 5、Fault memory function 6、Instantaneous operating experimental function	<input type="checkbox"/> MCR making/breaking and over-limit breaking function <input type="checkbox"/> signal contact output function (four groups)		
		<input type="checkbox"/> L ₃	Long-delay、short-delay (3~10) In、instantaneous (10~20) In, Inm=2000。(7~14) In, Inm≥3200				
		<input type="checkbox"/> L ₄	Long-delay、short-delay (3~10) In、instantaneous (10~20) In, Inm=2000 (7~14) In, Inm≥3200、grounding				
	M-type	<input type="checkbox"/> M	1、Long-delay、short-delay、instantaneous protection 2、Grounding protection 3、Load monitor protection 4、Each state indication and value indication 5、Ampere-meter function 6、Fault memory function 7、Thermo-memory function 8、Experimental function	<input type="checkbox"/> MCR making/breaking and Over-limit breaking function <input type="checkbox"/> voltage meter function <input type="checkbox"/> signal contact output Function (four groups) <input type="checkbox"/> system clock function			
		<input type="checkbox"/> M/F					
	H-type	<input type="checkbox"/> H	Voltage meter function three-phase unbalance protection Rs485 serial interface signal contact output function (four groups)		<input type="checkbox"/> MCR making/breaking and Over-limit breaking function <input type="checkbox"/> system clock function		
		<input type="checkbox"/> H/F					
	Controller's voltage	<input type="checkbox"/> AC380V(400V) <input type="checkbox"/> AC220V(230V)				<input type="checkbox"/> DC220V <input type="checkbox"/> DC110V	
	Accessory	<input type="checkbox"/> Under-voltage release	<input type="checkbox"/> AC380V <input type="checkbox"/> AC220V <input type="checkbox"/> instantaneous <input type="checkbox"/> delay <input type="checkbox"/> 0.3s <input type="checkbox"/> 1s <input type="checkbox"/> 3s <input type="checkbox"/> 5s				
<input type="checkbox"/> Shunt release		<input type="checkbox"/> AC380V <input type="checkbox"/> AC220V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V					
<input type="checkbox"/> Closed electro-magnet		<input type="checkbox"/> AC380V <input type="checkbox"/> AC220V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V					
<input type="checkbox"/> Electric operational mechanism		<input type="checkbox"/> AC380V <input type="checkbox"/> AC220V <input type="checkbox"/> DC220V <input type="checkbox"/> DC110V					
<input type="checkbox"/> Aux. Contact		4 N.O. 4 N.C. Four-groups of switch contact					
<input type="checkbox"/> Mechanical interlocking		<input type="checkbox"/> Two vertical interlocks <input type="checkbox"/> Two level interlocks <input type="checkbox"/> Three vertical interlocks					
<input type="checkbox"/> Anti-closed lock							
<input type="checkbox"/> Inlet/outlet wiring		<input type="checkbox"/> Level wiring <input type="checkbox"/> Vertical wiring					
<input type="checkbox"/> Door frame		<input type="checkbox"/> Drawer type door frame <input type="checkbox"/> Fixed-type door frame					
Note	2 Zw1 breakers+mechanical interlocks+SQZW controller can compose a power transfer switch.						