

## HSQ6

### 系列自动转换开关电器

SERIES AUTOMATIC TRANSFER SWITCHING EQUIPMENT



## 1、Application

HSQ6 Series Automatic Transfer Switching Equipment is suitably used in dual power supply (normal power supply and backup power supply) system rated AC 50Hz, insulating voltage 690V, working voltage up to 400V, working current up to 400A for automatic or manual transfer when one power supply fails or actual load demands in order to guarantee reliability and safety of power supply.

This series of product complies with IEC60947-6-1 Automatic Transfer Switching Equipment, GB/T14048.11 Automatic Transfer Switching Equipment and Hangshen's Enterprise Standard Q/HZK578 "HSQ6 Series Automatic Switching Equipment" and other standards.

As HSQ6 Series product ranks in PC grade automatic transfer switching equipment, no power will feed to load during the period of transferring.

## 2、Features

HSQ6 Series Transfer Switching Equipment is composed of two major parts: Transfer controller and switch body which are interconnected with special cable in between. The transfer controller supervises working status of normal power supply and backup power supply, receives and deals with outside signals such as remote control signal on one hand, and transmits transfer commands to the switch body, gives out start, stop, unload and load control commands to generator set as per working mode set by the customer on the other. As compared with same kind of product produced by manufacturers abroad and at home, HSQ6 Series possess the following features:

- As a building block type, the apparatus is compact. The cubic volume is 1/3-1/2 of that for same specification in CB Grade ATSE (automatic transfer switching equipment).
- The main contact system is of single pole double throw (SPDT) and self-interlocking structure. It is impossible to connect two power supplies simultaneously.
- Operated with single coil for two positions, the operating mechanism is simple and quick for transfer operation. The transfer time is less than 150ms.
- The transfer capacity of main contacts is big enough to make transfer operation with 6le.
- The transfer controller may accurately inspect and test voltage fluctuation in every phase on the two power supplies. Any small voltage fluctuation in one phase or in three phases can be supervised clearly.
- Operation and regulation can be made just as easily. Overvoltage and undervoltage threshold value may be set according to power supply quality of local power grid. Transfer and reset delay time may also be set as per customer's requirement. Parameter setting is easy and prompt.
- There is a mechanical fault alarm system for switch body. If the switch body is impossible to transfer due to various causes, the controller will give out an alarm and disconnect the power supply to motor-driven operating mechanism at same time. Therefore, it gives out the minimum fault range to the operator and also prevents of the motor-driven operating mechanism from damage.
- Of an integrated structure, the controller and switch body of HSQ6y Series ATSE are mounted together as a whole. No hole piercing is needed on the cubicle door. Free demolition wiring mode is adopted. Up incoming line for normal power supply, down incoming line for backup power supply and down outgoing line for load are configured just to cater for habits of general customers.

## 3、The working condition

- Ambient temperature not higher than + 40℃ nor lower than - 5℃ with average temperature in 24 hours not over + 35℃ ;
- Altitude of installation location not over 2000 meters above sea level;
- The relative humidity at max. ambient temperature of + 40℃ is not over 50%. Under lower temperature, higher humidity is acceptable, such as 90% at 20℃ . Measures should be taken for the occasional condensation due to temperature changes
- Pollution Grade 3. Application category AC - 33iB.
- Installation conditions: the installation of the switch is vertical and can be installed horizontally.

## 4、Specification

- 1 According to the frame current grade of HSQ6 switch body, there are three such grades for selection at present. For frame current grades of the switch body and main technical parameters, please refer to Table 1.
- 2 For different application sites and customer requirements on HSQ6, two types of transfer controllers may be selected. For type and control function of the transfer controller, please refer to Table 2.



Table 1 Main technical data

Main technical data	HSQ6 – 100, HSQ6y – 100	HSQ6 – 200, HSQ6y – 200	HSQ6 – 400
Frame current grade	100A	200A	400A
Rated working voltage	AC 50Hz 400V (230V)		
Rated working current	100A and below	200A and below	400A and below
Rated making and breaking capacity A	600	1200	2400
Rated limiting short circuit current (I <sub>q</sub> )	5kA	10kA	10kA
Rated duty	Uninterrupted working duty		
Transfer time ( MAX )	80ms	100ms	150ms
Note: For short circuit protecting device (SCPD) for main circuit, RT16 quick fuse is recommended.			

Table 2 Main functions of the transfer controller

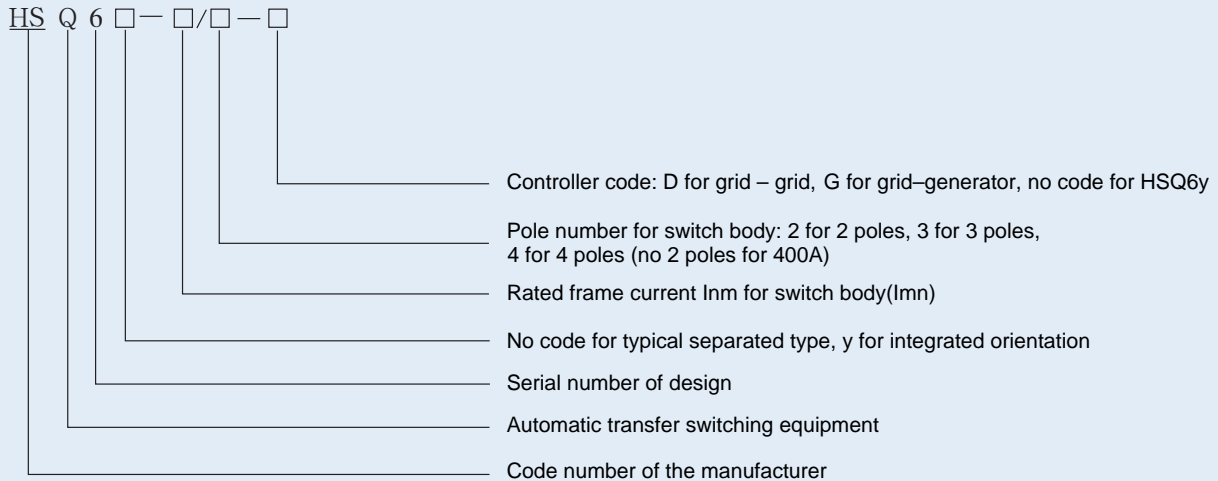
Description	HSQ6分体式		HSQ6y一体式	
			HSQ6y – 100 <sup>③</sup>	HSQ6y – 200 <sup>③</sup>
Phase loss transfer	Any one phase or more than one phase			
Undervoltage transfer	0.7, 0.75, 0.8U <sub>e</sub> , adjustable		0.7U <sub>e</sub>	154V – 198V
Overvoltage transfer	1.1, 1.15, 1.2U <sub>e</sub> , adjustable		No	242V – 264V
Time delay t1 for transfer	0~15s adjustable ①		0~10s	0~999s
Time delay t2 for restore	5~40s adjustable ①		0~50s	0~999s
Generator control	Yes		No	Yes
Unload and load signals	Yes ②		No	Yes ②
Time delay t5 for generator-set shut down	60s		No	0~999s
Time delay t6 for generator-set start	0~15s adjustable ①		No	0~999s
Display mode	LED indicator	LED indicator	LED indicator	LED segment display
RS485 communication	No		No	Yes
Fault alarm	Yes			
Manul, automatic	Yes			
Auto-transfer auto-restore	Yes			
Auto-transfer nonautomatic restore	Yes			

Note: 1. For Grid-Generator type, transfer delay time and restore delay time are all set by t2. Generator startup delay time is set by t1, Set range:0~15s.

2. Only Grid - Generator type has this function

3. For HSQ6Y-100 and HSQ6Y-200, the display module can be installed separately ( with voltage display )

## 5、Type designation



## 6、Main working modes

### Automatic transfer and nonautomatic restore

When the transfer controller is at automatic working mode, it will monitor both normal power and backup power in real time. If there is an abnormal voltage (overvoltage, undervoltage or voltage loss) in one or more than one phases in normal power and the backup power is in good condition, after an appropriate transfer time delay  $t_1$  (this time is used for observation that whether the failure is reversible or not reversible, 0 ~ 15s adjustable), the transfer controller will give out a transfer command when the failure is confirmed not to recover. Then the load circuits will transfer to the backup power after transfer time  $t_0$ . When the normal power recovers, after an appropriate reset time delay  $t_2$  (this time is used for observation that whether the failure recovers really, 5~ 40s adjustable), the transfer controller will give out a transfer command again to change the load circuit back to normal power after transfer time  $t_0$ .

### Automatic transfer and nonautomatic restore

When the transfer controller is at automatic working mode, it will monitor two power suppliers (Power I and Power II) in real time. If there is an abnormal voltage (overvoltage, undervoltage or voltage loss) found in one or more than one phases at the present power supply (suppose it is Power I), after an appropriate transfer time delay  $t_1$  (this time is used for observation that whether the failure is reversible or not reversible, 0 ~ 15s adjustable), the transfer controller will give out a transfer command when the failure is confirmed not to recover. Then the load circuits will transfer to the Power II after transfer time  $t_0$ . At this, the transfer will not give out transfer command for reset even if Power I resumes later unless Power II fails or manual command is given. Power I and Power II are backed up for each other without any major or minor.

### Start or stop the generator

Based on grid-grid type transfer controller, this grid-generator type of HSQ6 transfer controller has generator start and stop signals added. The actual working principle is as follows: If there is a failure such as overvoltage and undervoltage occurring in the normal power and the failure cannot disappear after generator start time delay  $t_6$ , the transfer controller gives out a signal to start generator (contact points closed). When a voltage loss occurs in normal power, the generator start contacts are directly closed without any time delay. When the generator voltage reaches at a setting range, the transfer controller will give out a unload command and the load circuits will be powered by the generator after the controller gives out a transfer command through time delay  $t_1$  if the normal power still cannot resume within  $t_1$ . Suppose the normal power resumes after a certain time, the transfer controller will gives out a transfer back command after reset time delay  $t_2$  and the load circuits is ready to be powered by grid. Still after a load time delay, the controller gives out a load command and the generator will be shut down (contact points disconnected) after 1 minute time delay for cooling.

## 7、Main technical parameters

- 1 The rated working voltage of transfer controller and motor-driven operating mechanism is AC 230V (220V) 50Hz;
- 2 For the mechanical and electrical endurance (one transfer and one restore) of the switch body, please refer to Table 3;

Table 3 Mechanical and electrical endurance of the switch body

Rated working current $I_n$ (A)	Operating cycle (min)	Operations		
		Without current	With current	Total
$0 < I_n \leq 300$	1	5000	1000	6000
$300 < I_n \leq 400$	1	3000	1000	4000

3. For the grid-generator type controller, there are contact points for start and stop generator as well as load and unload signals. The capacity of such contact points is AC 230V (220V) 5A, DC 30V 5A;

4. The contacts for auxiliary switch in the switch body are shown in Table 4.

Table 4 Auxiliary contact ratings

Frame size current	Auxiliary contact ratings
100A	1C, AC250V / 3A
200A	1A; 1B, AC400V / 16A
400A	1C, AC400 / 16A

Note: 1A (normally open), 1B (normally closed), 1C (change over)

## 8、Installation and wiring

### 1. Installation for the switch body

For HSQ6 typically separated type auto transfer switching equipment, remove the cover of switch body, fix the uncovered body on the case, then connect the power incoming lines of normal and back up power supplies and loads to corresponding terminals of the body with reliable earthing. Wiring should be made strictly as per symbol. For a switch body with N pole (4-pole), the power wiring has thus finished. However, N pole should not be wrongly wired, otherwise, the coil of motor-driven operating mechanism and transfer control will be burnt down. For a switch body without N pole (3-pole), customer is supposed to connect an N line to N terminal on the switch body. If the auxiliary contacts are needed, the leads may be drawn forth hereby together. If wiring is inspected to be right, put the cover back on the switch body.

### 2. Installation for the controller

D or G type transfer controller is fixed on panel with two supporters (attachments to the product) . Connections should be made to the controller with a special cable from the switch body correctly. Cables for signals of remote control, start and stop generator, load and unload should be connected to corresponding terminals on the controller directly by customer as per need.

**Special notes: Secondary wiring of ATSE has been made perfectly before delivery. Customers is required to install and wire as per 7.1 and 7.2 only. For detail regulation and operation, please refer to Installation and Operation Manual with ATSE.**

## 9、Debugging

After correct installation as per above requirement, debugging may be performed: If both normal power and spare power are OK, the "normal power" and "spare power" indicating lamps go on. When the main contact is connected to the common power supply, the "power supply" indicator light is lighted. If the standby power is connected, the "standby power supply" indicator lights up

The threshold of overvoltage and undervoltage can be set according to the quality of the power supply or the requirement of the load. The undervoltage threshold is three levels: 0.7, 0.75, 0.8( $U_e$ ), the overvoltage threshold is 3 levels: 1.1, 1.15, 1.2( $U_e$ ),  $U_e$  is the rated working voltage. If supply voltage value  $U$  is between  $U$ -undervoltage and  $U$ -overvoltage values, the power indicator is bright, otherwise the power indicator light is not bright.

The time value of transfer delay, restore delay and start generator delay is set by the user according to the needs (shown in Table 2). The restore delay time  $t_2$  is invalid when the controller is set to working state of nonautomatic restore.

Be careful, When the parameters are adjusted by the rotating code switch on the panel, the arrow of the code switch must be aligned with the corresponding scale.

When the manual/automatic switch is in the manual position, the ATSE can only be manually switched. ATSE can switch automatically when it is in the automatic position.

When the running / test switch is in the test position, the ATSE can simulate the common power failure and switch to the standby power automatically. When the switch is in position, the common power supply analog fault is relieved.

Fault alarm for standby power supply: for grid-grid type ATSE, when the standby power fails, ATSE can send a sound alarm to remind the user to repair it in time. This alarm can also be shut down (move the switch to the left)

Through the above debugging, the normal working ATSE can be put into use. When put into operation, the automatic / manual switch should be in the automatic position. The operation / test switch should be in the running position, and the automatic restore / nonautomatic restore switch can be set according to user needs.

## 10、 Overall and installing dimensions

1. Fig. 1 shows overall and installing dimensions of HSQ6-100, the overall and installing dimensions of controller is shown in Fig. 6. (The upper connects the standby power supply and the load, the lower is connected to the power supply.)

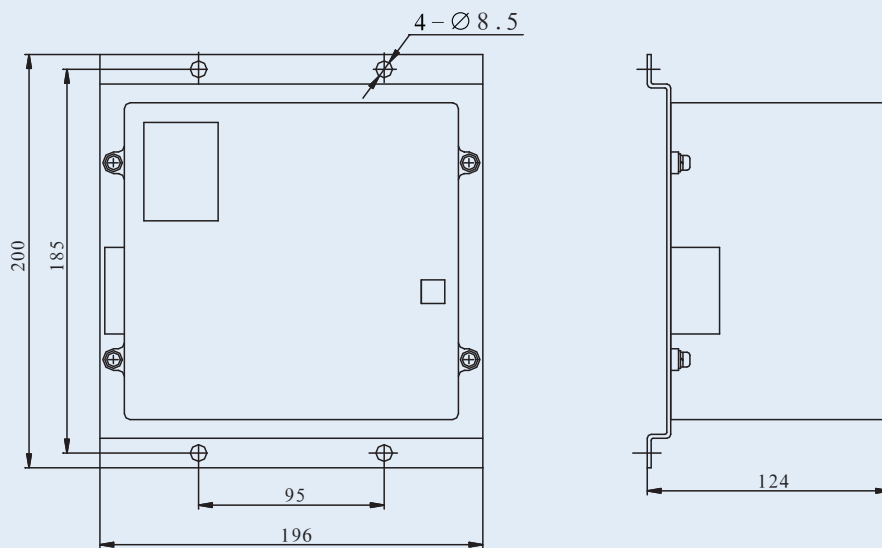


Fig.1

2. Fig. 2 shows overall and installing dimensions of HSQ6y-100, the controller of HSQ6Y-100 ATSE supports split installation. The overall and installing dimensions of controller display module is shown in Fig.4-2, the piercing dimension is 171x91. The upper connects the power supply, the lower is connected to standby power supply and the load.

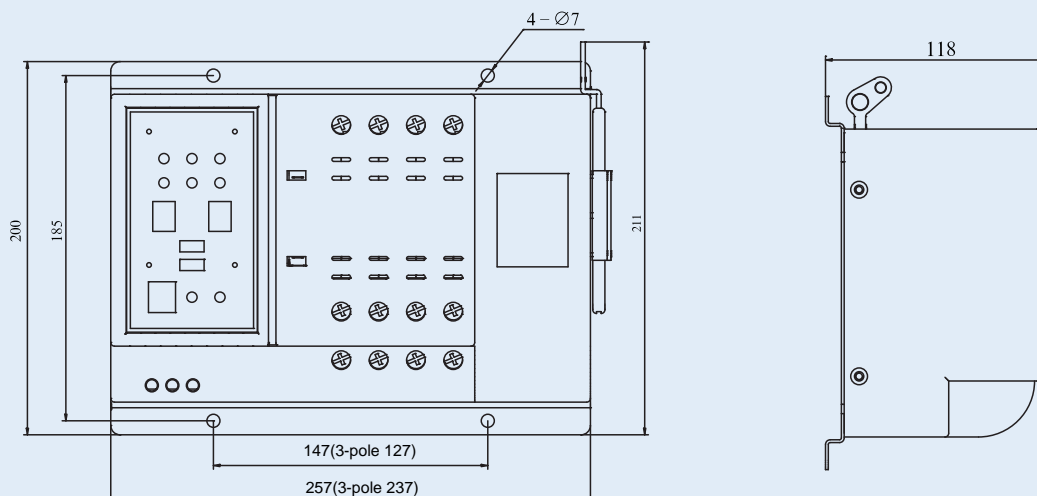


Fig.2



3. Fig. 3 shows overall and installing dimensions of HSQ6-200, the overall and installing dimensions of controller is shown in Fig. 6. (The upper connects the standby power supply and the load, the lower is connected to the power supply.)

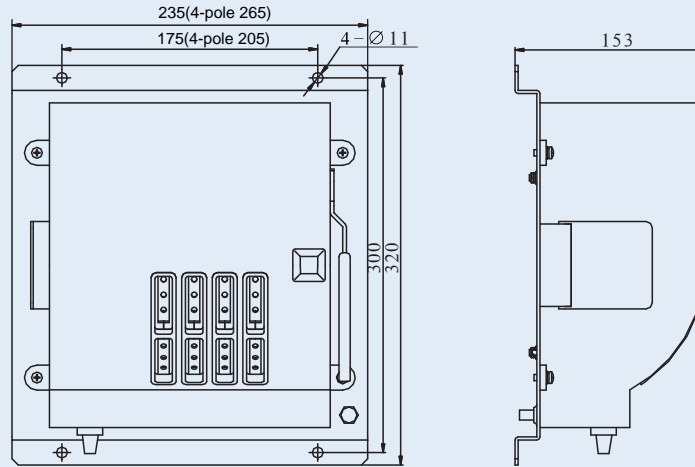


Fig.3

4. Fig. 4-1 shows overall and installing dimensions of HSQ6y-200, the controller of HSQ6Y-200 ATSE supports split installation. The overall and installing dimensions of controller display module is shown in Fig.4-2, the piercing dimension is 171x91. The upper connects the power supply, the lower is connected to standby power supply and the load.

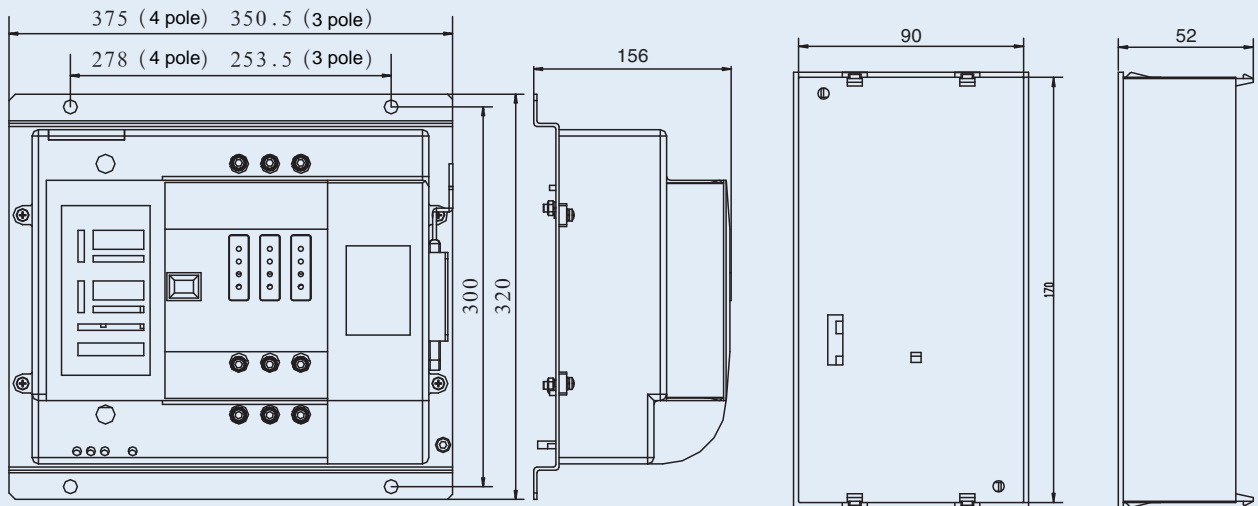


Fig.4-1

Fig.4-2

5. Fig. 5 shows overall and installing dimensions of HSQ6-400, the overall and installing dimensions of controller is shown in Fig. 6. (The upper connects the standby power supply and the load, the lower is connected to the power supply.)

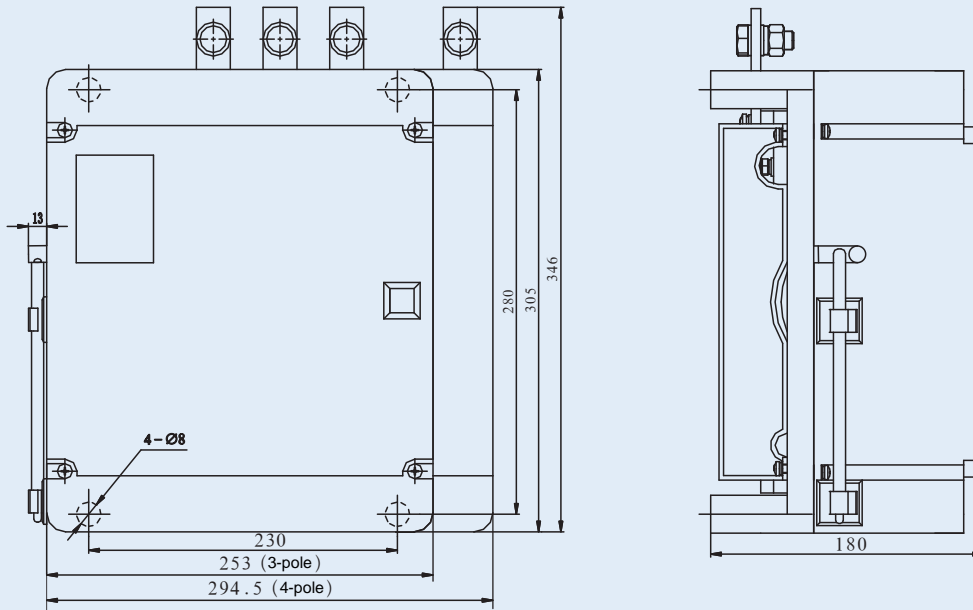


Fig.5

6. Fig. 6 shows overall and installing dimensions of D or G type transfer controller. The piercing dimension for installing panel of the controller is 142×142. (There is no such controller for HSQ6y ATSE)

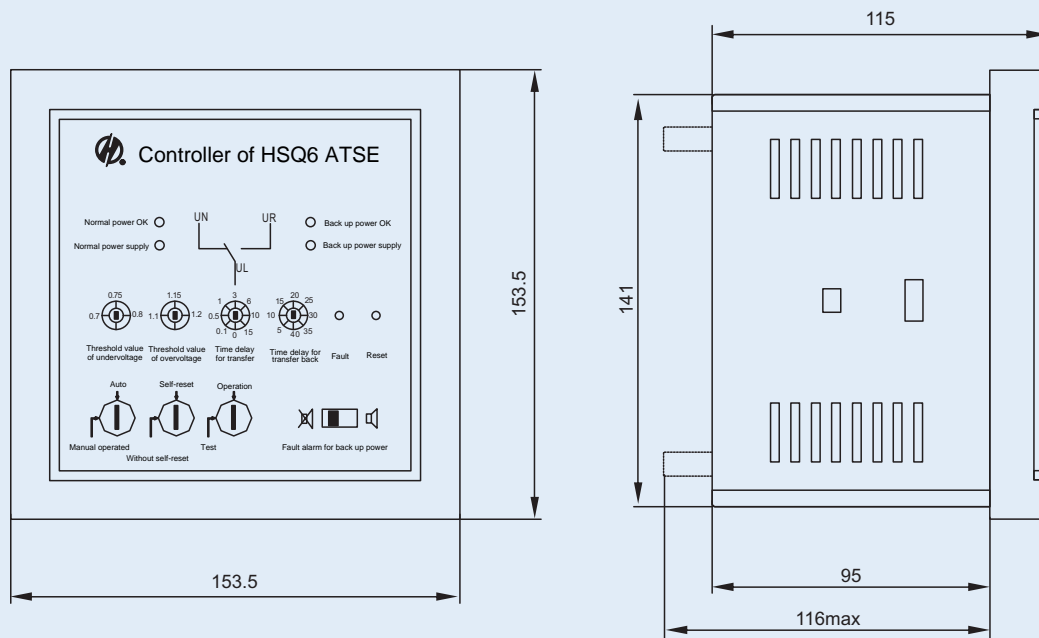
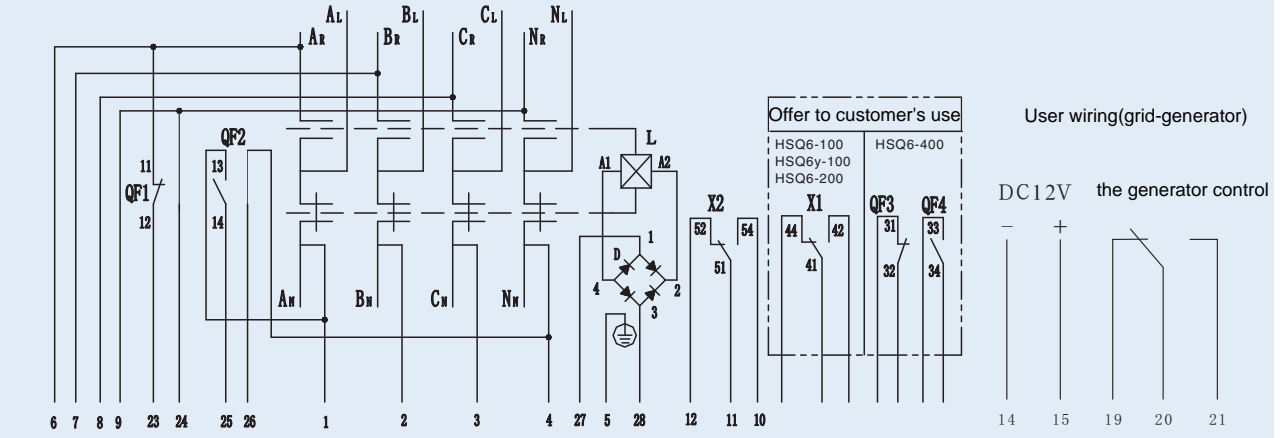


Fig.6



## 11、Electrical schematic diagram for HSQ6 Series



To the controller Z Terminal number Note: QF1, QF2, QF3, QF4 stands for auxiliary switches, D for rectifier, X1, X2 for travel switches, Z for controller's plug, L for solenoid.

Note: When the user is connected to the QFx, the switch housing needs to be opened. (41-42 connectivity: power supply, 41-44 connectivity: standby power supply, 31-32 connectivity: power supply, 33-34 connectivity: standby power supply). For HSO6y-100 and HSO6y-200, connection terminals directly outside the shell, without opening the cover.

Fig.7

## 12、Information given for ordering

### HSQ6 order specification ( 2-stage PC level )

Client	Quantity	Date
Pole number	<input type="checkbox"/> 3P <input type="checkbox"/> 4P	Note:
Frame level	Rated current	
HSQ6 - 100	100A and below	
HSQ6 - 200	200A and below	
HSQ6 - 400	400A and below	
Controller	Type	
	<input type="checkbox"/> Grid-grid (D)	
	<input type="checkbox"/> Grid-generator (G)	

### HSQ6y order specification ( 2-stage PC level )

Client	Quantity	Date
Pole number	<input type="checkbox"/> 3P <input type="checkbox"/> 4P	Note:
Frame level	Rated current	
HSQ6y - 100	100A and below	
HSQ6y - 200	200A and below	
Controller	Type	Optional function
	<input type="checkbox"/> HSQ6y-100	<input type="checkbox"/> Controller integral <input type="checkbox"/> Controller division display module
	<input type="checkbox"/> HSQ6y-200 Grid-grid (D)	
	<input type="checkbox"/> HSQ6y-200 Grid-generator (G)	