WP series static advancer

Foreword

Thank you for selecting WP series static advancer from Hubei Worldwide Electric Co., Ltd. This product is a on-site reactive power compensation device specially designed for energy saving and consumption reduction of large and medium wound asynchronous motor, which is professionally produced and sold by Worldwide Electric Group Co., Ltd based on long-time experience.

This manual provides the user with relevant precautions for installation, abnormality diagnosis, routine maintenance and safe operation. Please read this manual carefully before installation to ensure correct installation and operation of this product.

As regards our products and our service, the staff of our company firmly believes the principle that the customer is God. In case of any difficulty and unsettled problem arising from operation, please contact the dealer or directly contact us.

Please keep this manual well, which will be helpful for maintenance, repair and other applications in future. Please contact us directly in case of any problem, and please browse the website of this company for information about more products:

http://www.wanzhou.com.cn

Service hotline：0710-3400558-8016

Direct line: 0710-3405771

Sales hotline：0710-3405668

Fax：0710-3403399

Email：sales@ wanzhou.com.cn

Unpacking for check

WP series static advancer has passed the strict quality inspection and performance testing before ex-factory. After it arrives at the installation field, please check whether there is any damage due to careless transportation, and whether the model of the product conforms to the one ordered before unpacking. As the product is continuously upgraded, there may be several parts or words of the equipment and product, which do not conform to the advertising materials; please consult us if the equipment meets with such problems. After opening the box, check if there are qualified mark, product description, product warranty manual and packing list in the document box in the front cabinet door of the equipment. In case of any problem, please contact us or the supplier.

1. Check if the information attached to the equipment is complete and in line with the content of packing list of the equipment.
2. Check the nameplate on the cabinet body to confirm that the equipment is in line with the ordered equipment.
3. Check whether the spare parts and components are damaged or lost. The spare parts and components shall be governed by the procurement contract.

（Note：Please note that whether the accessories are the same with the packing list）

Safety warnings

Be free from raff handling or installation, rain and electromagnetic interference.

Prevent the children and the public from touching or approaching to this equipment. This equipment, with dangerous voltage, controls the dangerous rotary mechanism.

This equipment shall be only used for the purpose specified by the manufacturer; any modification without authorization or operation not conforming to the regulations of this manual will result in severe personal injury and other injuries.

Please read the installation operation and safety instructions of maintenance in this manual carefully before operating this equipment.

I. General

In China, the electric energy consumed by motors takes up 60%～68% of all industrial energy consumption. Reactive consumption caused by inductive load like the motor is the main source of reactive consumption of electric network; however, large and medium motors are the main power equipments used in industrial and mining enterprises. Thus, how to reduce the reactive consumption caused by large and medium size motors is the key to energy saving and consumption reduction of many industrial and mining enterprises.

WP series static advancer is a reactive power compensation on-site device designed by us for energy saving and consumption reduction of large and medium wound asynchronous motor. It is concatenated in rotor loop of the motor, changing the phase and position relationship between state current of the motor and the voltage by changing the phase and position relationship between rotated current of the motor and the rotated voltage to increase the power factor and efficiency of the motor itself, to improve the overload capacity of the motor, to lower the state current of the motor and reduce the consumption of the motor itself.

It is an essential difference between WP series static advancer for reactive power compensation and parallel capacitor compensation. Capacitor compensation is only reactive compensation for electric network except the motor, which only reduces the reactive transmission amount in the electric network, but operation parameters of the motor itself such as the current of the motor, power factor and so on have no change at all.

WP series static advancer is also different from self-excitation (rotated) advancer. WP series static advancer adopts advanced alternating frequency technology and silicon controlled control technology, which

can track the running state of the motor and changes the relative parameter automatically to obtain a perfect effect which cannot be done by self-excitation advancer. Furthermore, WP series static advancer overcomes radically the defects of particular no dustproof, short lifespan, frequent maintenance of "Commutator" structure of self-excitation advancer. It has no rotatable parts of the advancer mechanism, and it is dustproof, highly reliable, convenient for maintenance and with long service lifespan, which is an ideal high-technical product to replace self-excitation advancer.

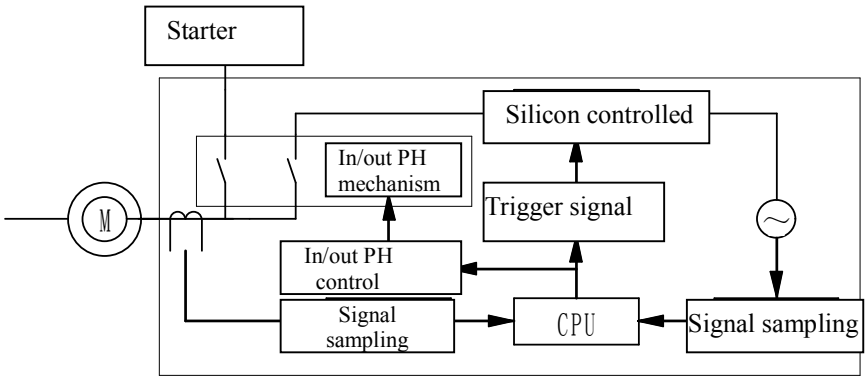
WP series static advancer is widely used for the on-site compensation of large and medium wound asynchronous motor in the fields of cement, chemical industry, wood, sugar, iron and steel, metallurgy, mining and so on.

II. Operation principle

WP series static advancer is composed of four main units: advanced and receded phase mechanism, signal sampling and SCM handling unit, the thyristor frequency conversion device and operation and control loop. The functions of advanced and receded phase mechanism include: switch the rotor of the motor to the advancer when advanced compensating and switch the rotor of the motor to star-point short circuit contactor of the motor starter to avoid the rotor open loop when recede phase with no compensation or the advancer troubles. Signal sampling and SCM handling unit have the functions of handling the signals after sampling them from power voltage and rotated current of the motor, and then sending trigger signal to the thyristor, simultaneously monitoring the operation status and making self-diagnosis.

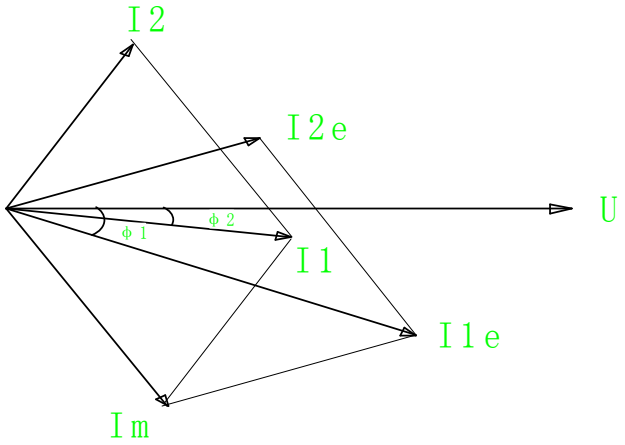
Converter plant transfers the power frequency power supply to additional electric potential with the same frequency of rotor current. Operation and control loop is used for advancing phase, receding phase and automatically receding in case of faults.

The schematic diagram of WP series static advancer is shown as follows:



From the above diagram we can see that WP series static advancer is concatenated in rotor loop of the motor. When the motor operates with advanced phase, the advancer via the rotor current signal sampled from current transducer and the sync signal supplied by power voltage handled by SCM, timely gives trigger order enlarged by trigger board to control the alternative frequency device composed of 12 thyristors, in order to transform the power-frequency power-supply to the same frequency of rotor current and superimpose the advanced phase position on rotor loop of the motor.

When the motor is running on load, its rotor current is I_{2e}, and stator current is I_{1e}. The vector diagram is shown as follows:



In the diagram:

U: voltage vector I1: stator current vector I2: rotor current vector

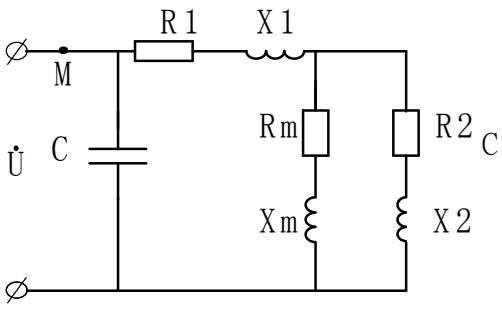
Im: field current vector I1e: stator current rated vector I2e: rotor current rated vector

Φ1: motor rated power factor angle Φ2: power factor angle after compensating

From electromechanics we know that field current Im can be obtained by $Im=I_1e-I_2e$, and Im also can be obtained from the vector diagram. After the electric potential of the static advancer superimposed on the rotor loop, the phase position of rotor current change to I_2 in the diagram. The field current Im does no change because the load doesn't change. The stator current I_1 now can be obtained according to $I_1=Im+I_2$ as the vector diagram shown above. From the diagram we can see that the power factor angle and the amplitude value of I_1 are all smaller than that of I_1e, which indicates the power factor of the motor increased and the stator current reduced.

Static advancer changes the phase position relationship between rotor current and rotor voltage like this, which changes the relationship with magnetic field and reduces the power factor angle to increase the power factor angle of the motor itself and to reduce the stator current at last, in order to achieve the objective of compensating the motor.

Thus we can see the essential distinction between WP series static advancer for reactive power compensation of the motor and the compensation of motor stator side parallel capacitor. The schematic diagrams of capacitor compensation and static advancer compensation are as follows:



Schematic diagram of capacitor compensation

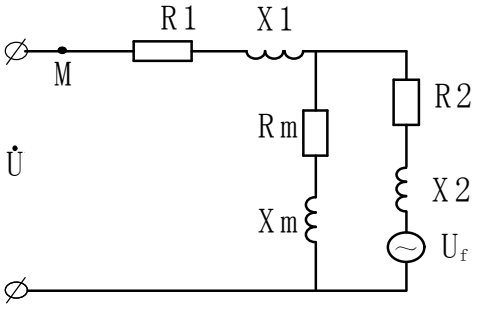


Diagram of static advancer compensation

In the diagram, the motor is equivalently simplified, and R_1、X_1 are resistance and inductance of the stator equivalent circuit of the motor; R_2、X_2 are resistance and inductance of the rotor equivalent circuit of the motor; C is the on-site compensated capacity; U_f is the equivalent circuit of the advancer; M is the wiring interface of the motor.

We can see from the diagram: The capacity compensation has the function of supplying the motor with

reactive power and reducing the reactive input of the electric network by reducing the reactive power absorbed from the electric network by the motor to increase the power factor of the electric network. But the power consumption of the motor is not reduced and the stator current of the motor and its power factor doesn't change, that is, there is no change in the motor operating status. The function of static advancer compensation is adding an additional power supply in rotor loop and changing the phase position relationship between rotor current and rotor voltage, as well as changing the phase position relationship between stator current and stator voltage by magnetic field in order to reduce the reactive consumption of the motor. In this way, the status of motor running is changed, and the stator current reduced, thus the power factor of the electric network increased because the power factor of the motor itself is increased. In addition, reduction of the stator current lowers the copper loss of the motor, and increases the efficiency of the motor along with the temperature down of the motor. The overload capacity correspondingly is improved and the machine hour product is increased whereas single consumption is reduced. Capacitance compensation is not capable of these functions.

WP series static advancer is also different from self-excitation (rotated) advancer. It is a production of mechatronics which selects advanced alternating frequency technology and silicon controlled control technology, and it can automatically track the running state of the motor and automatically change the relative parameter to get a perfect effect which cannot be done by self-excitation advancer. Furthermore, WP series static advancer radically overcomes the defects of particular no dustproof, short lifespan, frequent maintenance of "Commutator" structure of self-excitation advancer. It has no rotatable parts of the advancer mechanism, and it is dustproof, high reliability, long service lifespan, convenient maintenance, which is an ideal high-technical product to replace self-excitation advancer.

III. Performance characteristic

WP series static advancer is a high-tech achievement for reactive power on site compensation of large and medium wound motor, which is applicable to 90～6000kW wound asynchronous motor. Its excellent performance is mainly manifested in the following aspects:

1) Select advanced alternating frequency technology and micro control technology, high reliability.
2) Power factor of the motor up to 0.95～0.99，reactive power down below 60%.
3) Stator current of the motor down to 10%～20%，wire loss, copper loss as low as 20%-30%.
4) Rapid decline of temperature of the motor, great improvement in efficiency and overload capacity, prolonged service life of the motor.
5) Compensating performance is much higher than capacitance compensation: it can not only improve the power factor of the circuit, but can also improve the power factor of the motor itself.
6) All-round performance is better than rotated advancer: controlled by micro computer and it can automatically track the running state of the motor and automatically changes the relative parameter to obtain a perfect effect; high ability to adapt to the environment because it has no rotatable parts.
7) Energy saving effect is remarkable for the improvement of the efficiency.
8) Trouble automatically protecting function, easy operation, maintenance without interrupting the production.

WP series static advancer is widely used for reactive power on site compensation of large and medium wound asynchronous motor with any load in the fields of cement, chemical industry, wood, sugar, iron and steel, metallurgy, mining and so on. Such as:

- ball mill
- fan
- presser
- crusher
- compressor
- rolling mill
- shredder
- prefiner

IV. Type description

WP5	□	□	□	description

—				
capacity	400			power≤245kW，rotor I≤400A of the motor
	600			power≤570kW，rotor I≤560A of the motor
	800			power≤1250kW，rotor I≤750A of the motor
	1000			power≤2500kW，rotor I≤900A of the motor
	1200			power≤2500kW，rotor I≤1100A of the motor
	1400			power≤4000kW，rotor I≤1300A of the motor
	1600			power≤4000kW，rotor I≤1500A of the motor
Auxiliary function（double selection allowable）		P		common（omissible）
		C		PLC control
		Z		Centralized control
		X		digital display
Voltage of host computer			G	high voltage motor
			D	low voltage motor

V. Technical parameter

1. Performance index

★ improve the power factor of the motor to 0.95 or above

★ lower down the stator current of the motor to 10%～20%

★ rapidly reduce the temperature rise of the motor

2. Input and output parameter

Input：

★ signal of motor stator current（01，03）： Standard 0～5A signal output from some phase current transformer.

★ signal of motor stator voltage（04，05）： standard 100V signal output from two-phase wire-voltage via the voltage transformer for high voltage motor； standard 380V signal output from two-phase wire-voltage directly leading for low voltage motor

Note: the signal of stator current of the motor shall not be the same with the one of the stator voltage. That is to say, the voltage signal shall only be B phase or C phase if the current signal is A phase.

★ Start finished signal（W，111）：Comes from the rotor short circuit signal of the starter, which usually supplied by star-point short circuit contactor. This signal is required to be kept and the contact capacity is 5A, 380V.

Output：

★ Pointer or digital motor power factor and stator current display.

★ Start allowable（ready）signal（121，123）： This signal is used for the interlock of motor primary cabinet, which concatenates besides the start button and in the self protection range. The capacity of this contact is AC380, 5A.

★ Trouble stop(trip)signal(125, 129)and(131,133)：This signal is used for the interlock of motor primary cabinet. The capacity of this contact is AC380, 5A. WP series static advancer supplies two sets of signals, and chooses one of the two according to the different state: (125, 129) is for circuit breaker kind electric trip switch. Parallel connect it with stop button；(131, 133) is for contactor kind electric trip switch. Concatenate it with stop button.

In case that centralized control is needed, WP can supply the user with centralized control interface:

Input：

★ Order of phase-in：This interface is used for phase-in operation by centralized control. Turn-on indicates phase-in. The required capacity of centralized control interface is AC380, 2A, and the signal shall be kept in case of short circuit.

★ Order of phase-out：This interface is used for phase-out operation by centralized control. Turn-on indicates phase-out. The required capacity of centralized control interface is AC380, 2A，and the signal shall be kept in case of short circuit.

Output：

★ Ready signal： This interface is used for sending the centralized control a signal that has no effect on the host operating when phase-in and can starts the host. This interface constantly cuts-in as long as there is no phase-in and the capacity is AC380, 5A.

★ Phase in/out state：This interface is used for sending the centralized control a signal that is the feedback signal of phase-out operation. It is in phase-in state when cut-in, and in phase-out state or power off when cut-off. The capacity is AC380, 5A.

★ Trouble signal：This interface cuts-off indicates there is trouble in phase-in, and the capacity is AC380, 5A.

★ Trip signal：This interface cuts-in indicates the trip of the host is necessary.

Note：The trip signal is on when there is no power supply.

1. Service power supply

WP series static advancer needs the external to supply three-phase four-wire power supply. The capacity is below:

type specification	capacity of power supply	sectional area of the cable
400 type	15A	6 mm^2
600 type	20A	6 mm^2
800 type	25A	6 mm^2
1000 type	30A	10 mm^2
1200 type	40A	10 mm^2
1400 type	50A	10mm^2
1600 type	50A	10 mm^2

2. Protection degree

The protection degree of WP series static advancer is IP20.

3. Environmental condition

type		all types of WP series static advancer
Height above sea level		No more than 1500m
Environmental parameter	temperature	No more than 40℃
	Relative humidity	No more than 90%
	Airing requirement	no objects within 500mm above the cabinet; The overhead for 100mm of the inlet cabinet is necessary if the trench is enclosed.
	Safety requirement	No danger, no explosion, no corrosive gas in the installation place
power supply and voltage requirement		Three-phase AC 380V±10%

Please declare it if the local service condition of the customer's can't meet the above terms, so we can design the cabinet additionally according to the actual condition.

VI. Installation and commission

Safety terms for use：

- The equipment must be installed safely, reliably and firmly.
- Power on after finishing the inner loop wiring when wire the device.
- Do not touch the panel or its element inside the cabinet to avoid electroshock after powering on.
- Do not touch the panel inside the cabinet or any components assembly immediately after powering off.
- Before use, please confirm if the grounded terminal of the device is correctly and reliably grounded according to the state electric safety specification and other relative standards.

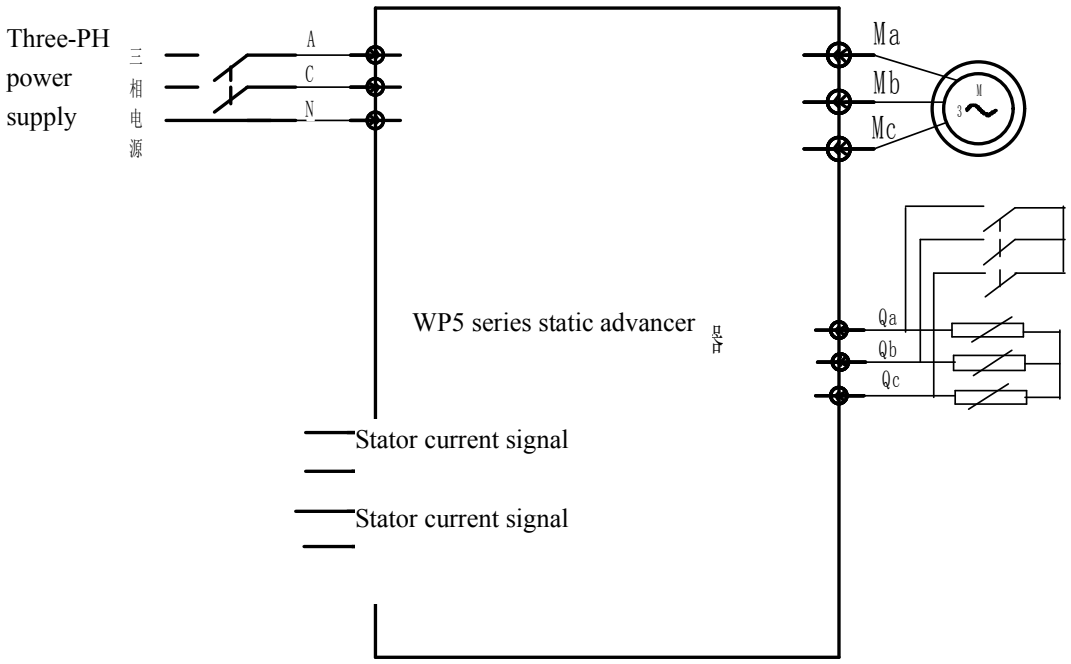
Note: Only the professional personnel who have been strictly trained and the career men are allowed to operate and maintain this product. Please read this manual carefully for the parts of electric safety, installment, operation and maintenance. The normal running of this product needs your correct operation and maintenance!

1. Installation sketch map

This device shall be installed in draughty indoor place, and the method of trench inlet installation should be adopted.

2. Wiring sketch map and precautions

The installation of the advancer shall be correctly grounded according to the wiring mode shown in the diagram below.



- ✧ Try to reduce the closed touch of energy saving unit with the electromagnetic contactor, relay and other interference source.
- ✧ To avoid any accident, the reliable grounding of the grounded terminal is necessary, otherwise, electroshock may happen.
- ✧ The line width specification selection for wiring, the connection of cable head and the advancer shall be in line with the state electrician safety specification when wire.
- ✧ The capacity of the motor and the rotor current shall not exceed the rated capacity of the advancer.

Ⅶ. Operation method

1. Drive：

1) Open the front cabinet door of the advancer and close the air switch(QF1)，then power on the advancer and the red indicator light (HL1)of the panel on the cabinet will be on. Close the door when the host is starting.

2) The host is starting until the host begins normal running.

2. Input phase-in：

1) Open the cabinet door to monitor if the control unit is normal. What each indictor light shows is as follows when the control unit is normal:
the main panel (the one in the middle): Besides the above three indicator lights (L1、L2、l3)periodically round display, other five lights constantly on (note: The motor is in heavy load operating state now. If the motor is not running or with light load, L1, L2, L3 and L6 are in stochastic regime).

2) The drive panel (the two at both sides): All the indicator lights (total 12) are all on with tiny twinkle. If any of the lights are off, it indicates the control unit is in trouble and shall be phase-in after requirement.

Strongly press “phase-in” button (SB1, the red button), and on the panel, the red light will be off and the green one (HL2) will be on, and then phase-in will begin. The finger of the current meter on the advancer declines fast and it is going to be stable, and at the same time, the finger of the power factor meter rises to about 1 until it is stable.

3. phase-out：

Strongly press “phase-in” button (SB2, the red button). The red light will be on and the green one will be off, and the advancer will exit phase-in state.

(Forced phase-out: if normal phase-out can’t be done by pressing “phase-out” button, it indicates that heavy current loop of the advancer is in trouble, in that case, OF2 inside the advancer shall be cut off to force the advancer exiting phase-out state. High spot inspect “phase-in” button SB1).

4. stop：

after the advancer phase-out, press the host stop button and the host will stop.

Note:

1) The air switch (QF1) inside the advancer must be closed before the main motor starting to power on the advancer, otherwise, the main motor can’t be started(pressing start button in vain).
2) Power off the advancer when running the motor is prohibited——open the air switch inside the advancer or cut off the 380V power supply leading to the advancer. Otherwise, the host will stop.
3) After the device is overhauled or the advancer is idle for quite a while, check if the indicator lights on the control unit inside the cabinet are normal for first phase-in (the motor starts and runs normally). Input phase-in if it is normal.
4) After advancement, when the stator current of the motor wide-range sways, recede phase right and check the reason before reusing it.
5) Frequent phase-in and out is prohibited. The interval shall not be less than 1 minute.
6) Randomly put in and out the panel is prohibited.
7) The inspection of the advancer shall not in phase-in state. Recede immediately there is any trouble.
8) Must conform to the start sequence of “start before phase-in” and stop sequence of “phase-out before stop”. Negative operation is prohibited.

VIII. Basic maintenance

1) Check if the cooling fan stops running regularly, recede in time and inspect or replace the fan if it stops to avoid burning the thyristor.

2) Inspect the contacts of the two contactors of the advancer timely to prolong the service lifespan of the contactor and to guarantee the safe operation of the advancer and the motor.

3) Sweep and clear away the dust on the advancer timely to avoid that too much dust affects the normal radiation of the thyristor inside the advancer and of the transformer as well as to avoid the normal operation of the control unit. Dusting must be done especially when the advancer is reused after a long time non-use.

IX. Inspection manual

Notes for maintenance：

- The inspection of the advancer must be done by technicians, casual handling by laymen is not allowed.
- The trouble shooting of the advancer is: light current inspection before heavy current inspection. That is, firstly check if the control unit (the control panel) is normal, and then check the trouble of heavy current control loop, check if the control unit is normal.
- If the put-in and take-out of the control panel is needed for inspection, the single phase air- switch QF2 (no affect on the host operation) of the advancer in phase-out state shall be cut off at first. Moreover, overexertion should be avoided during insertion to avoid the damage of the contact pin.
- Any circuit variety related to the advancer (such as phase sequence of the main loop, phase sequence of the power supply and so on) must be all debugged again.

⑤ Please contact our company in time in case of any unsettled problem. We will supply you with technology support at any time.

ⅰ. The inspection of light current trouble

Our company does not supply the users with the circuit diagram of light current parts (the control panel) in view of protecting intellectual property rights. But the users can clear up the simple trouble by the status of the indicator lights on the control panel and by following the method described in this manual.

The meanings that each indicator light presents on the pane are as follows:

- the indicator lights (count from the above to the below) of the main board (the one in the middle)
  - ▲ Ｌ１, Ｌ２, Ｌ３, three-phase current direction of the motor stator
  - ▲ Ｌ４,＋５Ｖ direction of power supply
  - ▲ Ｌ５, direction of heat trouble
  - ▲ Ｌ６, direction of phase-open and automatically trouble protection
  - ▲ Ｌ７, ＋１５Ｖ direction of power supply
  - ▲ Ｌ８, －１５Ｖ direction of power supply
- the drive panel (the two on both sides)

  Respectively represent the triggering signal of the 12 thyristors.

The display state of the indicator lights in normal condition is below:

▲ **The main board:** besides the above three indicator lights (L1, L2, l3) periodically round display, other five lights constantly on (note: The motor is in operating state now. If the motor is not running, the tree lights are in stochastic regime).

▲ **The drive panel:** All the indicator lights (total 12) are all on with tiny twinkle.

Check if the motor is running normally and then check if the control board is firmly inserted if any display of the light is not in line with the above state, and then repair following the methods below:

Close QF2 when the motor is running to monitor the status of the indicator lights on the three control panels. It is light current trouble if any one of the lights doesn’t conform to the normal status.

1. The three panels are all abnormal

a. if some of the lights on the three panels are not on:

- Replace IC210 on the main board;
- Replace 2004 if ① does not work.

b. if one or two lights on the three panels are not on:

- Check if the panel is inserted well, and press it strongly.
- Replace 555 chips on two drive panels if ① does not work.

c. if all of the lights on the three panels are not on:

- Check if the motor finished starting. Check if the star contactor is short circuit.
- Check if the three panels are inserted well.
- Check if the star contactor is closed. Check is the constantly open auxiliary contact (shall be W, 111 on the terminal of the advancer) is connected.

2. The main control panel troubles (the one in the middle):

Observe that if L1～L3 twinkle normally and roundly at first, and observe that if L4～L8 are constantly on.

A. replace IC211 chip if some light is roundly on well someone is no of L1～L3, as well as other lights are all on:

①If L6 is off and others are all on, then check: If the motor is open circuit and the motor is running on load.

②replace IC210 chip;

③Replace the current transformer TA if the same light is still off.

B. L1～L3 all don't circle:

- replace IC211 if L4～L8 are all on;
- If L6 is not on and others are all on, check if the motor is running normally on load (starting state not included). Replace IC210、IC205、IC207 chips if everything is normal.

C. L6 is off on the control panel and others are normal:

- replace IC207 chip of the control panel;
- replace IC209 chip of the control panel;
- Check if the four -code switch on the control panel is on operating state (see the front page).

D. If L5, L6 are off on the control panel and others are normal, then check:

- If the temperature of TM output copper row exceeds 75℃, if it exceeds 75℃, then check:

  Ⅰ. If the axial flow fans are normal;

  Ⅱ. If the silicon controlled is punctured (see the front page for the inspection).
- If the temperature is below 75℃, then check if the temperature switch is open circuit (check if the two base pins are connected with QF2 open).

2. The control panel is normal well the drive panel is abnormal:

a. Replace the relative chip 2004 on the panel if some of the lights on the drive panel are off;

b. Replace the relative chip 555 on the panel if all of the lights on the drive panel are off;

c. If all the lights on the two drive panels are on well one or two have no fast twinkle or have tiny light, take out the panel and check if the contact pin is normal, if it was burned, put the panel back if not. The panel is broken if one or two light still doesn't twinkle.

ⅱ. The inspection of heavy current trouble

Note：①When the advancer is in trouble, make sure that the rotor phase sequence of the motor matched for the control power supply of the device has not been changed.

②When the advancer is in trouble, please observe if the indicator lights on the control panel is normal in normal operating state of the host. If it is normal, please inspect as the process of the inspection of heavy current

trouble.

1. The motor can't be started
   - a、 Check if the air switch is closed (it shall be closed). Check if the power supply is normal;
   - b、 Check if KM1 is closed normally.
   - c、 Check if the auxiliary contacts 121, 123 of KM1 are closed and connecting normally.
   - d、 Check the starting equipment and the interlock of other starting device.
2. Press phase-in button to advance; press phase-in releasing button to recede immediately.
   - e、 check if the insurance FU is good;
   - f、 Check if the circuit bundle of KM3 is in good condition and can close normally. It shall be no impermanent short circuit. The contact shall not be ablated or burned;
   - g、 Check if the axial flow fan MF is normal;
   - h、 Check if KM4 is in good condition and can close normally. It shall be no short circuit or open circuit. The contact shall not be ablated;
   - i、 Check if the contactor of KM2 can close normally; check if it has dither phenomenon (can add 380V AC voltage test alone; but attention must be paid to check if the circuit bundle has short circuit condition) and if the auxiliary contact is burned or felt; check if the constant closed point KA is felt without closing and if the constant closed point KMI is not closed.
3. The host stops after phase-in
   - j、 Make sure the phase sequence of the power supply (or it of the rotor) has not been changed. Please change the phase sequence again if it was changed.
   - k、 Make sure the voltage of the power supply (including the stator power supply of the host and the control power supply) is normal;
   - l、 after stopping the main motor, power off the primary cabinet (that is open the high voltage isolator or open the knife switch of low voltage air switch);
   - m、 Cut off the air switch QF2 in the advancer, and turn the code switch of the main panel to test state. See it in page 13 and then close the air switch QF2.
   - n、 remove the stop interlock wire (125，129，131or 133) which goes to the primary cabinet on the terminal. Check if the auxiliary contacts on KM2 or KM3 have dirty or felt phenomenon.
   - o、 short circuit the two wires W1, 111 on the terminal;
   - p、 Press phase-in button to observe if the contactor KM2 tingles and check if 125, 129 have closed phenomenon or 131, 133 have open phenomenon. Poor connection of the contact if there are above phenomenon.
   - q、 If KM2 tingles and sounds or can't closed, please remove the coil and replace some of the voltage dividing capacitors in the circuit bundle.
4. Swag in wide range after advance
   - r、 Make sure the phase sequence of the control power supply has not been changed. Please change the phase sequence again if it was changed.
   - s、 Make sure if the power supply of the motor swags in wide range regularly after phase-out. If so, it is affected by load. If not, please conduct inspection as follows.
   - t、 check if the connection wire behind the control panel is loose weld, rosin joint and unwelded;
   - u、 Check if KM2 is closed well. There shall be no sound, otherwise inspect the coil.
   - v、 Check if the axial fan runs normally. If not, please check if KM3, FU are normal and the zero line is connected;
   - w、 Check if the three indicator lights (L1、L2、L3) on the control panel (the one in the middle) are on roundly and regularly. If there is abnormal twinkling, please replace the relevant TA transducer.
   - x、 Open the air switch QF2, and check if the negative electrode and positive electrode resistance is

normal by measuring with the multimeter with 200KΩ or MΩ position. Close QF2, check if the trigger voltage of the silicon controlled is normal, if not, and please replace the relative thyristor.

iii. The inspection of PLC trouble

If PLC still can't service normally when PLC was reset artificially after powering off, check if the indicator lights of the PLC corresponding input point are on when the connection point is on. Check if the phase-in and phase-out indicator lights are on when phase buttons are in non-trouble status. If on, PLC troubles, if not, it indicates PLC has no trouble, and the external elements shall be inspected.

[Attached] inspection method for the thyristor:

The one lead out from the air duct of the thyristor and was fastened on isolating board by the screws of M4 is the trigger electrode of the thyristor. And that radiator terminal connected with the trigger wire is the negative electrode of the thyristor. The easy method to inspect if the thyristor is good is to measure the resistance of its each electrode. The resistance among each electrode of good thyristor is as follows:

Trigger electrode and negative electrode ——dozens of ohms;

Trigger electrode and positive electrode ——dozens of kilohm,

Negative electrode and positive electrode ——dozens of kilohm.

The thyristor is broken if it doesn't satisfy the above terms.

After the silicon controlled is replaced, the radiator must be pressed hard; otherwise, the thyristor may be burned due to overheating.

【attached】The state of main panel code switch:

Test state

ON		■	■	■
OFF	■			
	1	2	3	4

Operating state

ON				
OFF	■	■	■	■
	1	2	3	4

X. Quality assurance

The quality assurance of this product shall be handled according to the following rules and regulations:

1. The maintenance period of this product shall be 12 months after purchase, but should not exceed 15 months after the manufacturing date recorded on the nameplate. However, failures due to the following reasons shall be repaired for compensation even in the maintenance period.

- Problems due to incorrect operation or impermissible repair and reconstruction of one's own-self.
- Problems due to using exceeding the requirements of standard specification.
- Damage due to falling or carrying ferociously after purchasing.
- Aging or failures of the device resulting from using in the circumstances not conforming to the requirements of this manual.
- Failures resulting from earthquake, fire, wind and flood disaster, lightning stroke, abnormal voltage or other natural disasters, or the causes concomitant.

2．You will enjoy the tech support lifetime and paid services whenever and wherever using our product.

- The sales, production and agency of our company across the country shall provide after-sale service.
- If the products fail to operate, our company has the right to assign other persons for maintenance.

3．Matters concerning dissolution of responsibility

- Our company will not undertake the responsibilities resulting or reducing from using this product departing from the regulations of this manual.
- Our company will not be responsible for compensating the losses or affected and subsequent damage of your party due to the failure of the product.

XI. Ordering notice

1. Determine the model according to the rated power of the motor and the condition of rotor current.
2. Offer all of the parameters on the nameplate of the motor. (noted in the contract)
3. It is necessary to state in advance if the customer is not satisfied with the "service condition" or has special requirements.
4. Describe the supply period.

Maintenance bond

I. Maintenance terms

1. Our company is responsible for the drop in maintenance service for the light current part (the component without specific principle diagram) of the product only, for the heavy current part, the user himself debugs the fault according to the diagrams attached in the users' manual and the maintenance instruction.
2. It is applicable to all Chinese mainland users of the products of Worldwide Group.

II. Maintenance period

1. The maintenance period is one year as of the buying date.
2. In line with the maintenance period signed in the contract in particular cases.

III. The device troubles caused by the following reasons shall not be within the maintenance scope

1. Equipment failure caused by operation instruction which does not obey what has been told in the users' manual or precautions.
2. Equipment failure caused by the users' poor service condition.
3. Equipment failure caused by disassembling the product without authorization or repair not in line with the instruction and the requirements in this manual.
4. Force majeure: all earthquakes, fire, abnormal voltage and so on natural disaster or fortuitous event (stolen, lost, etc.) and so on equipment failure caused by force majeure.
5. Equipment failure caused by poor power supply environment or foreign material.
6. Natural wearing of the product.
7. Equipment failure beyond the maintenance period.

Our maintenance duty of the product, whatever may imply or acquiesce maintenance duty in maintenance

terms or in other written instructions, shall all be understood as included in the maintenance scope stated in the maintenance terms or be limited in the maintenance period. Our company keeps the rights for adjusting the relevant maintenance information and technical specification with no additional notice.

In case of any technical problems, please contact us by the following contact ways. We will answer you in time and supply your products made by our company with all life technical support.

Service hotline：0710-3400558-8016

fax：0710-3403399

Email：sales@wanzhou.com.cn

Address: No.58 Changzheng road Xaingfan city Hubei province

Post No.: 441000