JKF (S)

Anti-Harmonic Power Factor Controller Separate(single phase)

User Manual

Version：1.3

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Read me

When you use JKF Power factor controller, be sure to carefully read this user manual, and be able to fully understand the implications, the correct guidance of operations in accordance with user manual, which will help you make better use JKF Power factor controller, and help to solve the various problems at the scene.

The material in this guide is for information only and is subject to change without notice. Foshan Wasvar Electronics Co., Ltd reserves the right to make changes in the product design without reservation and without notification to its users.

1. Before the meter turning on the power supply, be sure that the power supply within the provisions of the instrument;

2. When installation, the current input terminal must non-open, voltage input terminals must Non-short circuit;

3. Communication terminal (RS232 or RS485) is strictly prohibited to impose high pressure;

4. Be sure the instrument wiring consistent with the internal system settings;

5. When communicating with the PC, instrument communication parameters must be consistent with the PC

- **Please read carefully before using this user manual**
- **Please save this document**

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1. SUMMARIZE

This product is intended for use in an industrial environment.

This equipment is classified as open equipment and must be mounted in an enclosure during operation to provide safety protection.

This manual shows how to install and operate the JKF power factor controllers. Please read this manual carefully before installation. Keep it for maintenance and operation.

Safety

1) Installation, maintenance and operation of the JKF Controller must be performed by qualified technicians.
2) Make sure that the work voltage of the controller is between AC 220V±20％ ,50Hz ±10%.

3) Do not open the cover of the controller. User should not try to fix it.
4) The JKF Controller is connected to a current transformer. Before disconnecting the current instrument transformer connected to the controller, make sure that the instrument transformer is short-circuited or it are connected in parallel another the load that the resistance value is small enough.

Application conditions

1) Environment temperature: -25℃ to +65℃
2) Altitude: less 2000 m
3) Humidity: Maximum 90%

2. TECHNICAL PARAMETER

Standard applied: The Electric Industry Standard of the People's Republic of China:
《 DL / T 597—1996 》

Basic parameters

Operating voltage : 220V AC (-20% ~ +20％), 50Hz ± 10%
Sampling voltage: Three phase four wire 220V AC (-20% ~ +20％), 50Hz ± 10%
Sampling current: Three 0—5A, AC
Control channel current:16 steps & 24 steps
Power consumed: ≤ 12VA
Measuring sensitivity: 100mA
Measuring accuracy: Voltage: 0.5 class;
Current: 0.5 class;
Power factor: 0.5 class;
Power: 1.0 class;
Reactive power: 2.0 class;
Frequency: 0.1 Hz.
Overall Size: 144 X 144 X 110 mm.
Mounting dimensions: 138 X 138 mm.

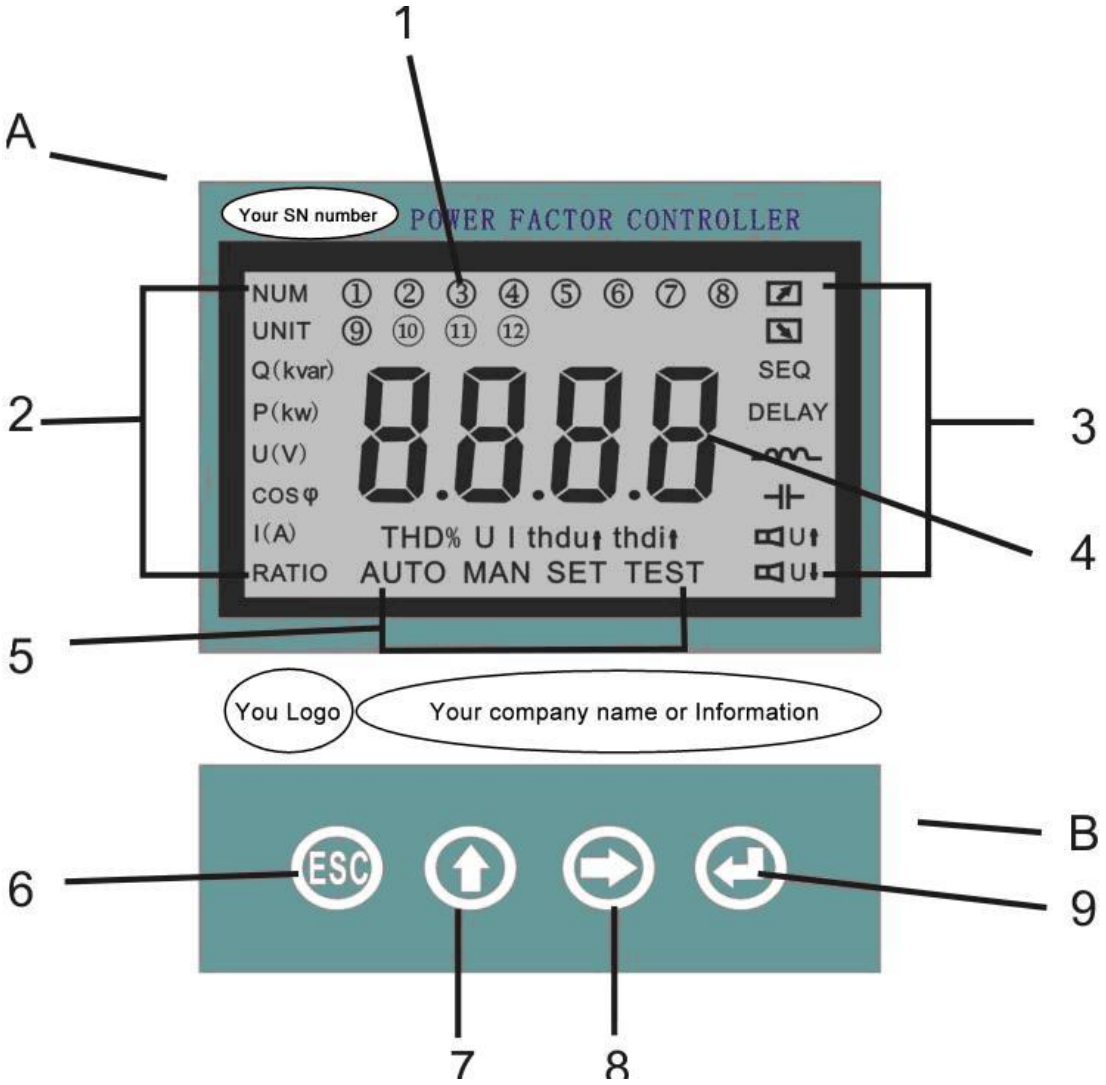
Functions

1. Control object: Reactive power. Stable in all range.
2. Detect phase sequence automatically: Controller will detect the CT polarity internally, as well as the voltage phase Ub and Uc.
3. Multiple output modes available.

3. LCD DISPLAY & KEYPAD

A. LCD Display

1. Outputs 2. Electrical parameters
3. Operating state 4. Numerical display



5. Main menu
AUTO: Automatic operating mode
MAN: Manual operating mode
SET: Setting parameters
TEST: Testing mode

B. Keypad

6. ESC key: Press this button to exit current state and return to main menu.

7. ↑ key: In AUTO Mode: press this button, the LCD will display U, I, P, Q, COS φ and Frequency in turn;
In SET Mode; press this button, the number will increase by 1, from 0 to 9.

8.→ key：In AUTO Mode, press this button to display the next parameter; In SET Mode, press this button to set the next number

9. ↵ key: In SET Mode, press this button to save the setting in memory and go to the next setting; In MAN Mode, press this key to switch on the capacitor, press the button again to switch the same capacitor off.

*** Electrical parameters**

Q（kvar）…… Reactive power
P（kw） ……Power
U (V) …… Voltage
COS φ …… Power factor
I（A） ……Current
F ##.# ……Frequency (Hz)
THD%U ……Total harmonic voltage distortion ratio
THD% I …… Total harmonic current distortion ratio

*** Operating states**

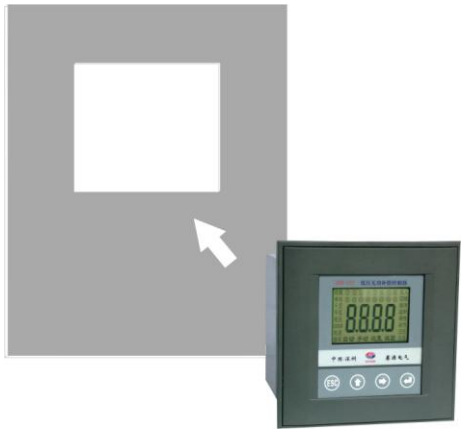
: The load is in inductive state.
: The load is in capacitive state.
: Maximum voltage. High voltage alarm setting. All capacitors will be cut off if voltage over this setting.
: Minimum voltage. Low voltage alarm setting. All capacitors will be cut off if voltage below this setting.
thdu↑: Maximum total harmonic voltage distortion. Alarm setting. All capacitors will be cut off if total harmonic voltage distortion over this setting.
thdi↑: Maximum total harmonic current distortion. Alarm setting. All capacitors will be cut off if total

harmonic current distortion over this setting.

: The capacitor is going to be turned on.

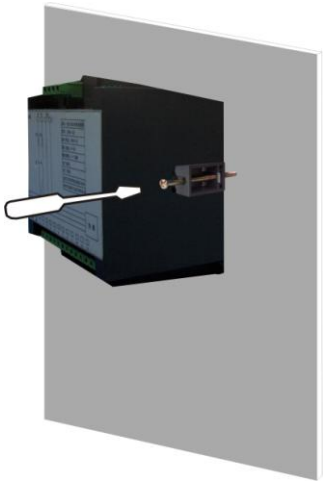
: The capacitor is going to be turned off.

4. INSTALLATION



1. Push the controller slightly into the hole on the panel.

2. Insert the Mounting Brackets in the corresponding holes (both sides) of the controller.

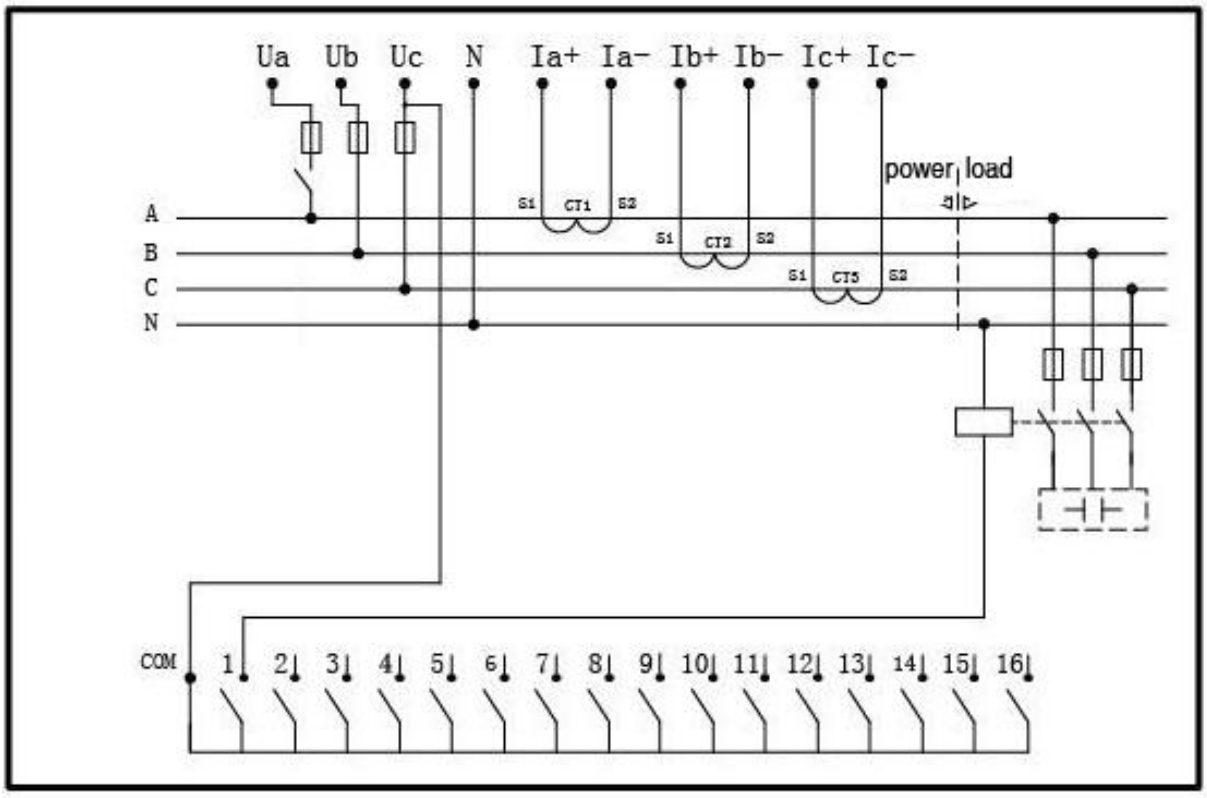


3. Turn the Screw in the Mounting Bracket and tight it.

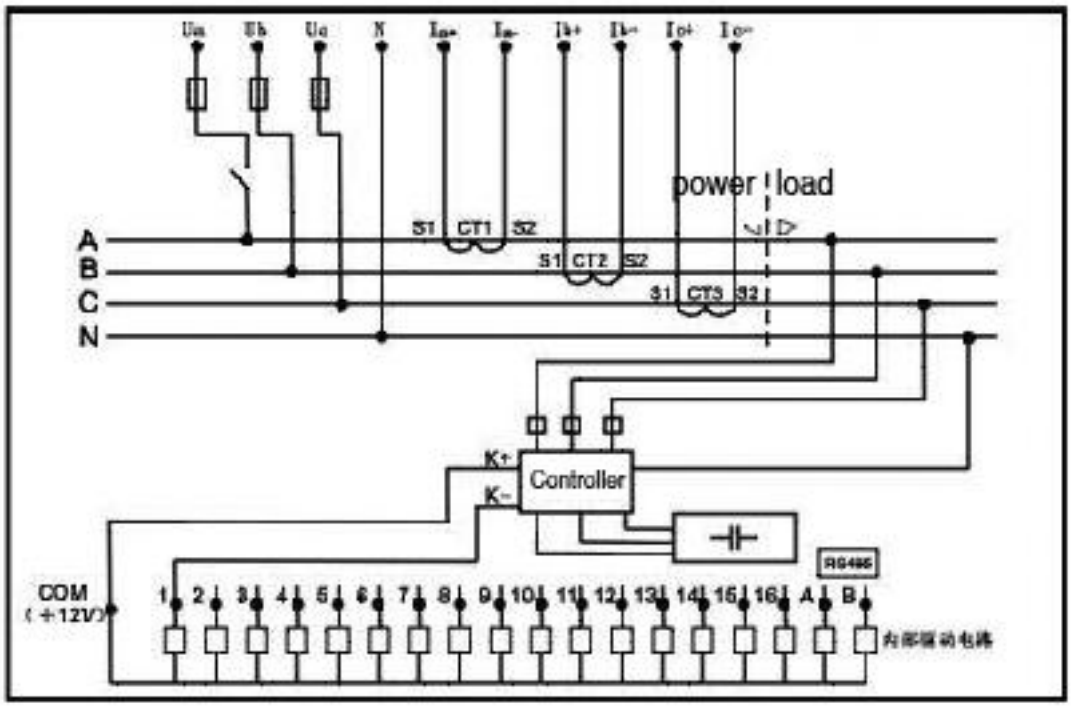
5. WIRING DIAGRAM

Input voltage are A, B, C phase voltage (220V × 3), the input current are A, B, C phase current:

Eg.JKF-16J wiring diagram: (capacitor switch is AC contactor)



Eg.JKF-16D wiring diagram: (capacitor switch is Composite switch or Thyristor)



6. OPERATING MODE

6.1. AUTO Mode

Turn on power, the controller will enter AUTO mode. Press "↑" button, the display will show all parameters one by one automatically.

Phase COSφ,

Voltage,

KW(The active power KW)

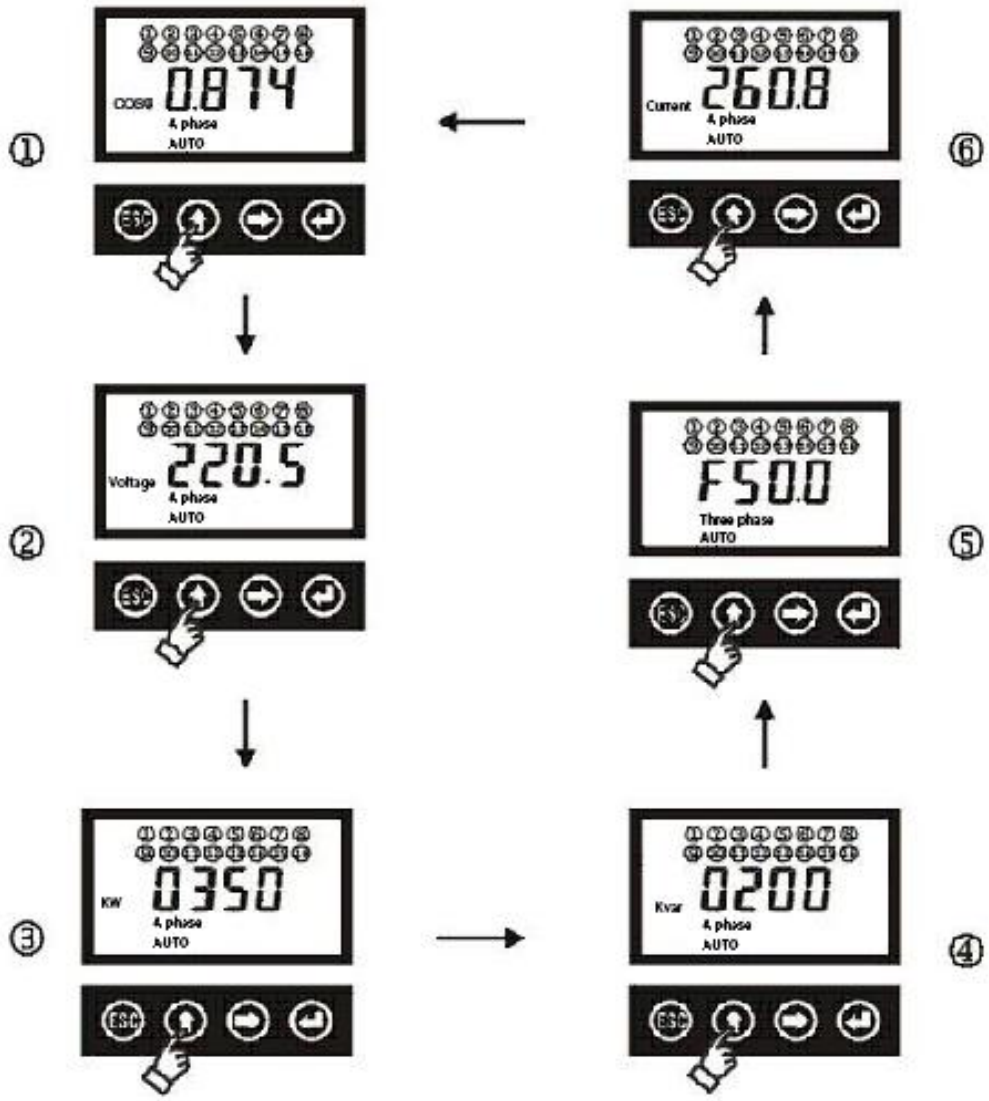
Kvar(Reactive power Kvar)

F(HZ)

Current(A)

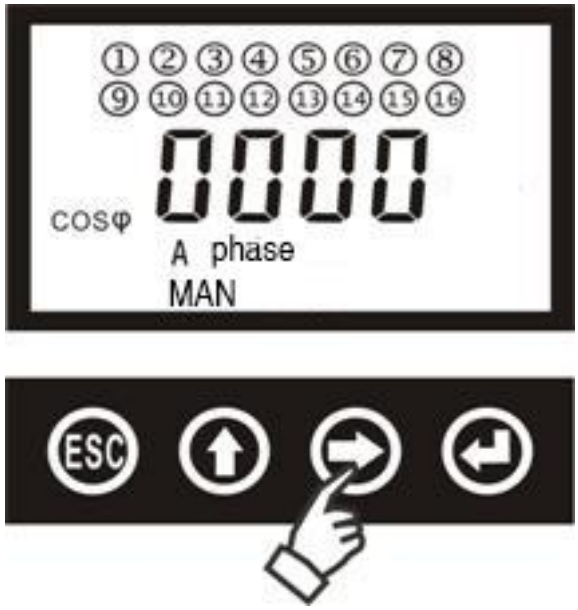
Press "→" button, the display will show the next parameter.in the A,B,C Phase Transformation.

Inductive or capacitive: Show the nature of the load.
Overvoltage or undervoltage: upper or lower voltage exceeds the set, is an alarm condition.
Inputs or removal: Show capacitor being invested or the removal of the state.



6.2. MAN mode

Press ESC button in the main menu, the “AUTO” will flash. Press button “→”, the "MAN" will flash. Then press button “↵” to enter "MAN" Mode, as the figure shows below.



Manual operation

In this mode, the capacitor can be switched on/off manually. Press button “↵” will switch the capacitor (the flashing number) on, press the button again will switch the same capacitor off. Press button “↑” to go to the next left output (capacitor); press button “→” to go to the next right output (capacitor).

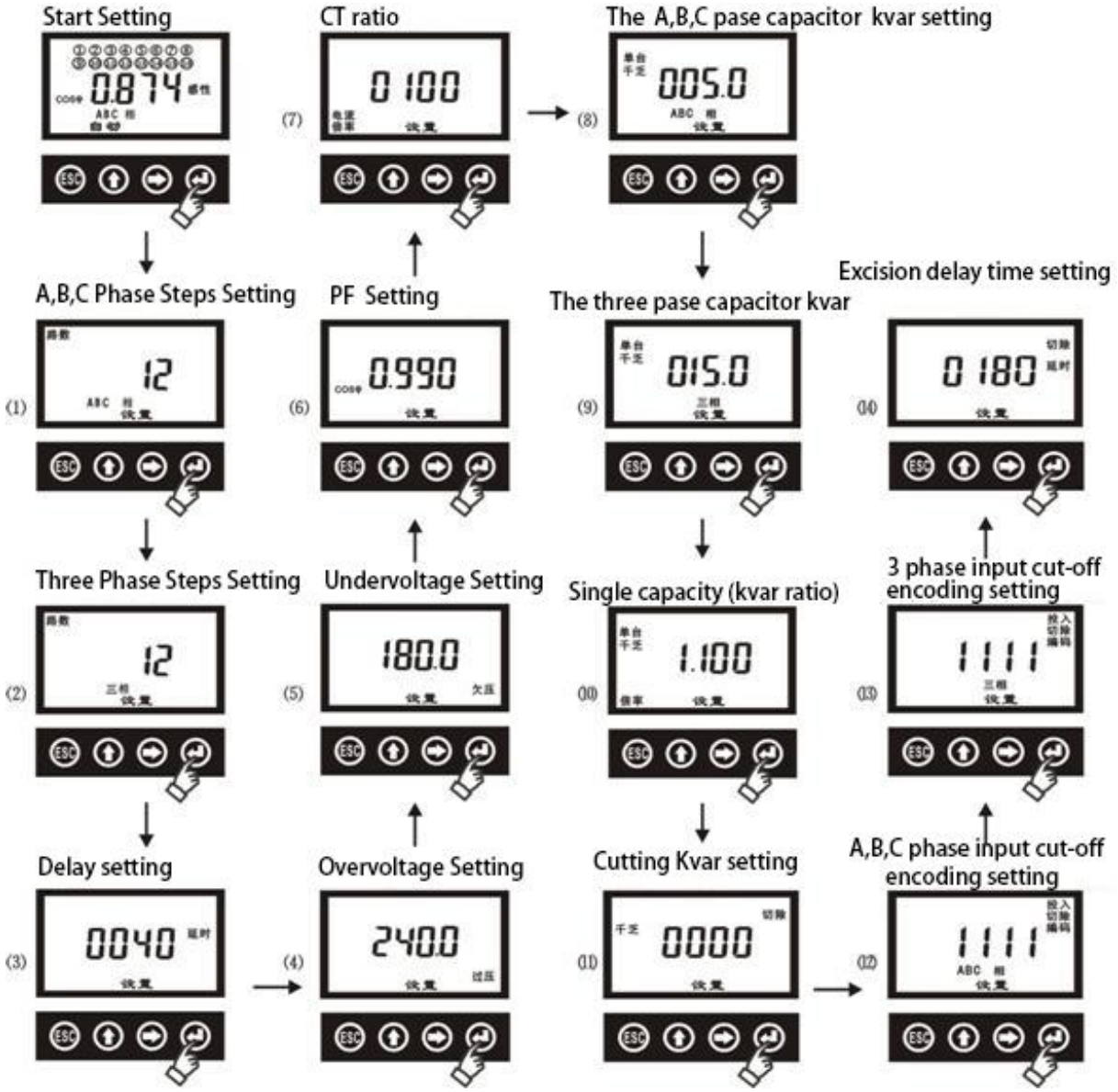
Press button “ESC” will return to the AUTO mode and switch off all capacitors.

In Manual mode, if a capacitor is switched off, the controller will wait a “Waiting Time” before the same capacitor switching on again, to give the capacitor a discharge time.

6.3. SET mode

Press ESC button in “AUTO” mode, then press “→” button twice to choose SET mode, then press “↵” button to enter “SET” Mode.

Press “↑” and “→” button to set the selected (flashing digit) parameter, press “↵” button to save the parameter and go next.



SET 1,2: Number of outputs: Press button"↑", the number will increase by l in the range of 0-9. Press button "→", the cursor will go to the next position. Press button "↵" to save the number of outputs.

A,B,C phase steps were set (Separate phase steps, a group of A,B,C's separate capacitor to set up 3-steps) and three phase steps, the maximum steps are 16 steps.

Total common compensation: 1 to 16 steps outputs, at now, separate phase steps set to 0

Total separate compensation: 1 to 15 steps outputs, at now, common phase steps set to 0

1,2,3 is the first group A, B, C phase
4,5,6 is second group A, B, C phase
.....
13,14,15 is the fifth group A, B, C phase

When the three-phase and separate phase mixing Compensation: common compensation and separate compensation the steps of their own setting by the user:

For example: setting the phase Channels steps is 9 (three groups), com, common compensation steps is 5: So

1,2,3 steps as the separate phase first group A, B, C phase

4,5,6 steps for the separate phase second group A, B, C phase

7,8,9 steps for the separate phase third group A, B, C phase

10 to 14 steps for the three-phase steps.

Note: JKFB type is the controller with communication features, only a maximum of 15 steps outputs

SET 3: Delay time (Second): The controller continues to monitor the state for a period of time, to confirm that the circuit always requires to add (switch on) a capacitor for this period of time. Usually, the delay time is set to 30~40s

SET 4:Overvoltage setting (V)**:** usually set to 245V

When Overvoltage, every 0.5 second intervals by removal capacitor, the over-voltage after, the voltage only reaches a value lower than 6V, only to re-enter (6V of hysteresis). If it is a phase overvoltage, then just cutting the three phase common complement capacitors and the phase separate capacitors.

SET 5: Undervoltage setting: usually set to 180V.

When undervoltage, at a rate of once every 0.5 seconds resection controller ,undervoltage after no hysteresis voltage, as long as the voltage is above the undervoltage value immediately re-enter input.

SET 6: Target COSφ: Target power factor. Usually set to 0.99.

SET 7: CT ratio: The current transformer ratio setting. If the current transformer (CT) is 500 / 5, the setting should be 100 (not 500).

SET 8,9: A,B,C Single capacity (kvar ratio). The capacity of a single capacitor. if it is coded switching mode, especially the first steps capacitance, press ↑ gradually set up a single capacitor kvar value, press ↵ key.

A,B,C-phase single kvar: refers to the separate compensation each phase capacitance,.

Three-phase single kvar: refers to common compensation part of the single capacity capacitance.

SET 10: Single capacitor kvar ratio: The single capacitor kvar× single capacitor kvar ratio = Switch on limit. When the Q power ≥ Switch on limit, the controller will add (switch on) a

capacitor into the circuit. Usually, it sets to 1.100 ~1.200

SET 11: Switch off limit(Cutting kvar setting): Usually set to 000.0. Does not allow over-compensation.

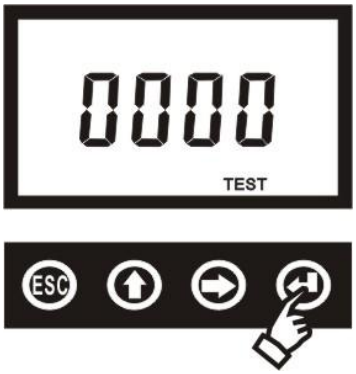
SET 12, 13: Switching input cut-off coding setting(Coding method):
Following switching sequences are available:
A,B,C Phase input cut-off coding method
Three phase input cut-off coding method
Circulation input cut-off: 1111 …… 1
Coded input cut-off: 1244 …… 4
1122 …… 2

SET 14: Excision delay time setting(second): For unbalance protection schemes that are sensitive to system voltage unbalance, either the unbalance protection time delay shall be set long enough for the line protections. press ↑ gradually set , Then press button "↵" save.Usually, When contactor switching the capacitor the delay time is set to 180 seconds.

When parameter setup is completed, press ESC button back to "AUTO" mode.

6.4. TEST mode

Press ESC button in "AUTO" mode, then press button"→" three times, the LCD will show "TEST". Then press button "↵" to enter "TEST" Mode. Shown as below:



In this mode, the controller switches capacitors on and off one by one in cycle, alternatively for 5 seconds. Each capacitor will follow the rule of Waiting Time (i.e. 180 seconds) before switching on again.

7. TROUBLESHOOTING

1. After power turned on, the controller shows capacitive state, Capacitor is not switched on .

A. The wiring is not correct. Please check the voltage and current phases sequence (refer to wiring diagram).

B. If other capacity compensation devise is running on the load side, it may make the load real capacitive circuit.

2. After a capacitor switched on, the Power Factor remain unchanged.

The current transformer may not in the right position. The current go through capacitors should also go through the CT. (refer to wiring diagram).

3. After capacitor switched on, Power Factor decrease.

A. The wiring is not correct. Please check the voltage and current phases sequence (refer to wiring diagram).

B. Turn off all power to the capacitor cabinet, then turn on power again (reset the system).

4. The controller can not follow the change of the load fast enough.

The load changes too fast, such as welding machine, derrick and crane etc. Use dynamic power factor control system in these cases.

5. After capacitor switched on, the current go through capacitors raises too high.

The circuit may have high harmonic current and/or harmonic voltage.

1. Add an inductor in each capacitor, it protects the harmonic current go through the capacitor, but can not eliminate the harmonic current of network.

2. Install harmonic current filter. If harmonic current is too big, installing a harmonic current filter is an effective way to limit the harmonic current.

8.- TECHNICAL SERVICE

For any inquiry about the instrument performance or whether any failure happens, contact to Wasvar technical service.

Wasvar - After-sales service

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