

The product models and specifications published in this manual are for reference only, and everything is subject to the actual product and product description.

Due to product upgrades and version updates, the content described in this manual is subject to the actual product. If there are any errors, omissions, or other inappropriate aspects, we kindly ask for your understanding.

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OPERATION INSTRUCTIONS

- ▶ Anti Harmonic
Intelligent Capacitor

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1. Product Overview

Anti harmonic intelligent capacitors are integrated reactive power compensation devices used in 0.4kV power grids. It consists of a CPU measurement and control module, a capacitor switching composite switch, a capacitor protection module, and two (Δ type) or one (Y-shaped) low-voltage self-healing power capacitors to form an independent and complete intelligent compensation unit. The low-voltage reactive power compensation complete set device composed of intelligent capacitors has the characteristics of flexible compensation methods (co compensation and sub compensation can be combined arbitrarily), easy installation and maintenance, strong protection function, small device size, good compensation effect, low power consumption, high reliability, etc., meeting users' requirements for reactive power compensation, effectively achieving the practical needs of improving power factor, voltage quality, energy conservation and loss reduction.

2. Product Function

2.1 Measurement and Calculation Function

Collect low-voltage bus voltage, total incoming current, and calculate parameters such as active power, reactive power, and power factor.

2.2 Reactive Power Compensation Function

Based on the operating parameters of the low-voltage system and the upper and lower limits of reactive power and voltage, the reactive power compensation control algorithm is calculated to determine the two-stage and cyclic switching of a single intelligent capacitor.

2.3 Capacitor Protection Function

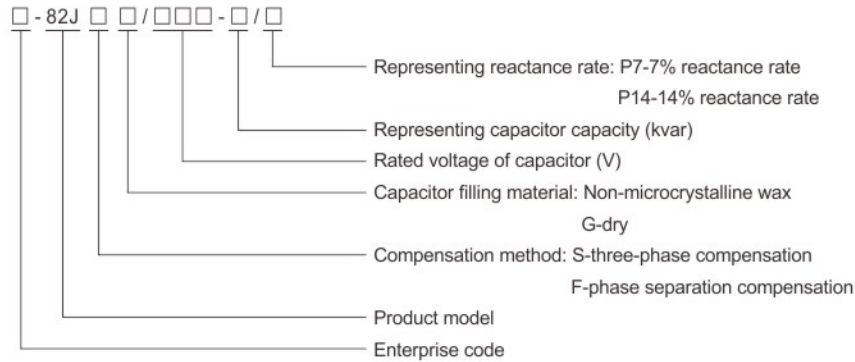
- ◆ Overvoltage protection: When the system voltage exceeds the capacitor overvoltage protection limit, all capacitors will be disconnected within 1 minute.
- ◆ Undervoltage protection: When the system voltage exceeds the capacitor undervoltage protection limit, all capacitors will be cut off within 1 minute.
- ◆ Short circuit protection: When a short circuit occurs inside the capacitor, the air switch of the smart capacitor will trip.
- ◆ Overcurrent protection: When overcurrent occurs inside the capacitor, the air switch of the smart capacitor will trip.
- ◆ Phase loss protection: When the system experiences a phase loss, all capacitors should be disconnected within 1 minute.
- ◆ Temperature protection: When the temperature of the smart capacitor exceeds the temperature setting value, the group of smart capacitors will be cut off.

2.4 Communication Networking Function

By setting communication addresses through automatic networking, the minimum serial number is address 1, and the maximum 31 channels are randomly arranged. When there is no controller, a maximum of 12 units can be networked.

3. Model Description

3.1 Model Description



3.2 List of commonly used anti harmonic intelligent capacitor models

Compensation method	Capacity of each capacitor group (kvar)	Model
Three phase co compensation	50	82JS/480-50/P7
	40	82JS/480-40/P7
	30	82JS/480-30/P7
	25	82JS/480-25/P7
	20	82JS/480-20/P7
	15	82JS/480-15/P7
	10	82JS/480-10/P7
	40	82JS/525-40/P14
	30	82JS/525-30/P14
	20	82JS/525-20/P14
Three phase compensation	10	82JS/525-10/P14
	30	82JF/280-30/P7
	20	82JF/280-20/P7
	15	82JF/280-15/P7
	10	82JF/280-10/P7
	30	82JF/300-30/P14
	20	82JF/300-20/P14
10	82JF/300-10/P14	

4. Product Performance

4.1 Satisfied technical standards

DL/T 842-2003	Technical Conditions for the Use of Low Voltage Parallel Capacitor Devices
GB/T 22582-2008	Power Capacitor Low Voltage Power Compensation Device
GB/T 15576-2008	Low voltage complete reactive power compensation device

4.2 Application environment conditions

Environmental temperature	-25°C~+55°C
Relative humidity	20%~90% at 40°C
Altitude	≤2000m

4.3 Electrical safety

Main circuit insulation strength	Test voltage 2500V (1min)
Protecting circuit continuity	There is a reliable electrical connection between all grounded components and grounding screws
Safety protection	There is a reliable electrical connection between the housing of the device, the metal parts that may be charged, and the metal seats and grounding screws of electrical components that require grounding
Protection grade	IP20
Sampling and Control circuit protection	The current circuit with built-in sampling control in the device uses dedicated wiring terminals, and one end of the circuit is reliably grounded

4.4 Power supply conditions

Rated voltage	AC230V/AC400V
Deviation	±20%
Operating frequency	50±1.5Hz
Power consumption	≤3VA

4.5 Measurement error

Voltage and current	0.5%
Power	1.0%
Power factor	±0.01
Temperature	±1°C

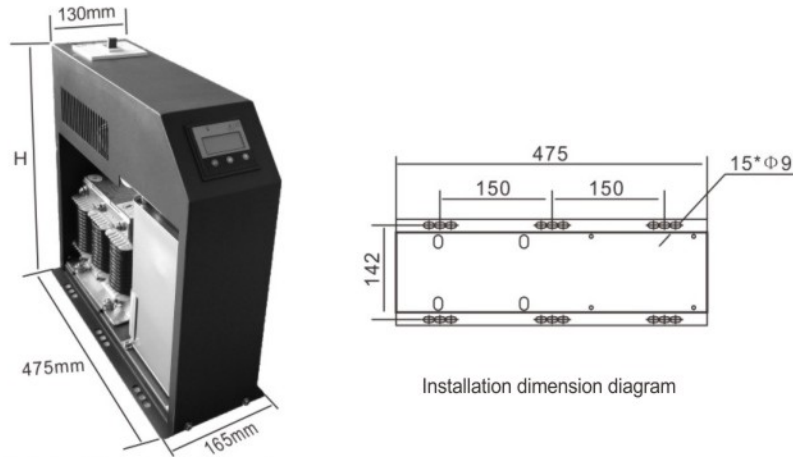
4.6 Guard time

Dwell	5~60s
Capacitor removal time	1s

4.7 Reactive power compensation parameters

Maximum number of networked capacitors	31 units with controller and 12 units without controller
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5. Product Appearance and Installation Fixed Dimensions



Products of different capacities have the same length and width, but different heights

Outline dimension diagram

Model	H(mm)
82JS/480-50/P7	485
82JS/480-40/P7	425
82JS/480-30/P7	425
82JS/480-20/P7	385
82JS/525-40/P14	425
82JS/525-30/P14	425

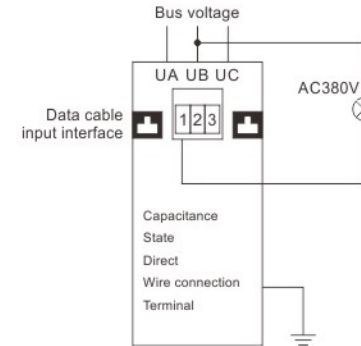
Model	H(mm)
82JS/525-20/P14	385
82JF/280-30/P7	425
82JF/280-20/P7	385
82JF/300-30/P14	425
82JF/300-20/P14	385
82JF/300-10/P14	385

Installation precautions:

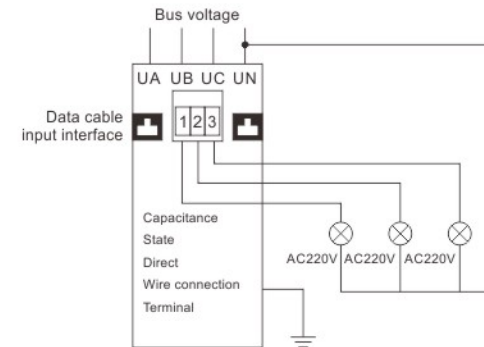
- A. Smart capacitors should be installed flat in the cabinet, perpendicular to the ground, with the display screen facing the front.
- B. The horizontal installation spacing between smart capacitors should not be less than 80mm, leaving space for heat dissipation. The vertical installation spacing should not be less than 200mm, which is conducive to heat dissipation and wiring operations.
- C. The fixing feet of smart capacitors should be firmly clamped. During transportation, hard foam or other filling materials should be used to hold the capacitors together. After transportation to the site and installation, these fillers should be removed, and all wiring should be checked for tightness before power transmission.

6. Definition and Accessories of Wiring Terminal Block

6.1 Arrangement and definition of three phase complementary wiring terminals



6.2 Arrangement and definition of three phase complementary wiring terminals



7. Product Application Electrical Connection and Wiring Diagram

7.1 Specification of connecting wires between the product and the power supply end

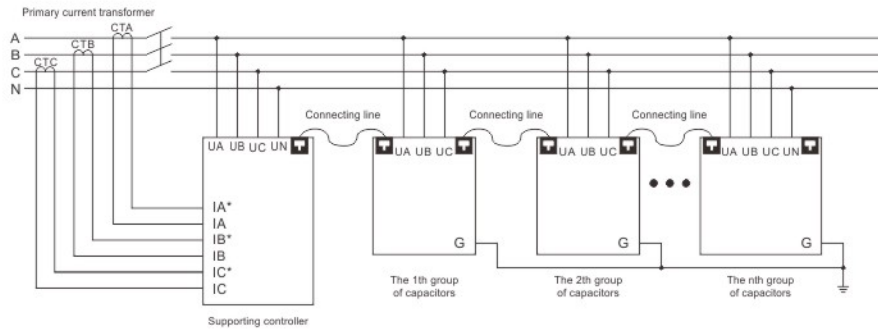
The connecting wire between the smart capacitor and the power supply terminal should use multi-core copper wire, and the cross-sectional area of the wire should be as shown in the table according to the product specifications.

No.	Compensation method	Capacitor capacity (kvar)	Suggested cross-sectional area of wire (mm ²)
1	Three phase co compensation	20	≥10
2		30	≥16
3		40	≥16
4	Three phase compensation	20	≥16
5		30	≥16

7.2 Connection between products

The signal line between smart capacitors adopts the connection line shown in 6.1.

7.3 Product wiring diagram



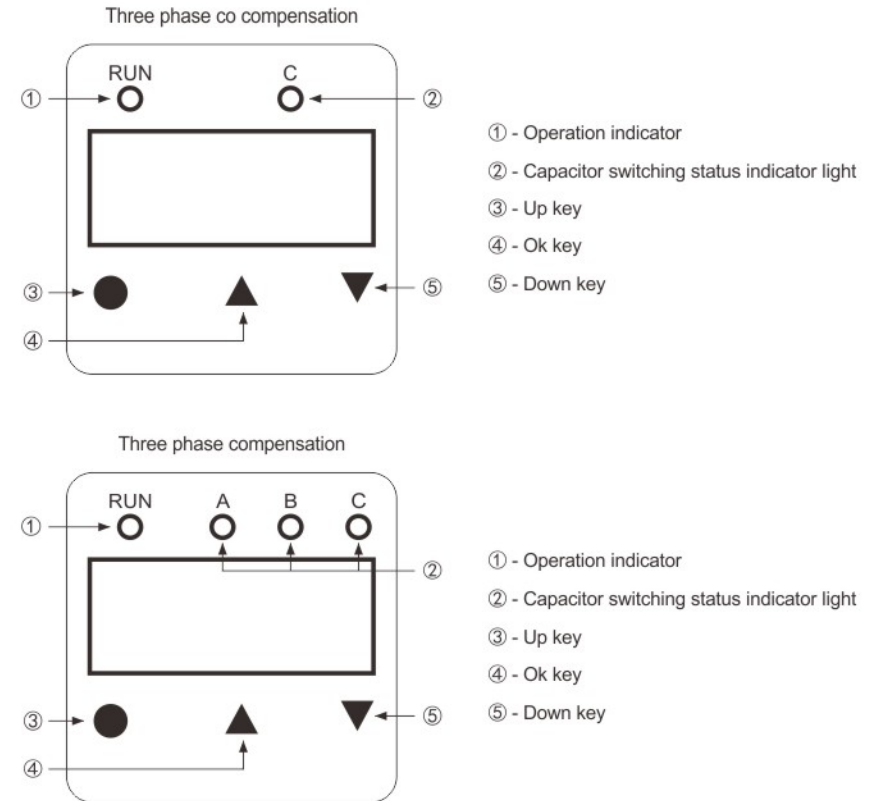
Wiring diagram for the controller system

Wiring precautions:

A: When wiring, use the corresponding cold pressed joint and tin plated. After clamping the wire with a wire clamp, connect it to the wiring hole of the small circuit breaker behind the smart capacitor. Pay attention to following the phase sequence prompts on the smart capacitor and wiring correctly. The intelligent capacitor for phase separation compensation should be connected to the neutral line, and its cross-sectional area should be the same as the three primary lines. The primary wire of each smart capacitor should be directly connected to the busbar, and cannot be directly parallel connected to the terminals of the smart capacitor, otherwise it will cause the wire to heat up and burn out.

- B: There are wiring terminals behind the smart capacitor, which must be reliably grounded for safe operation.
- C: Connect the secondary wire on the smart capacitor to the green pluggable terminal at the back, refer to the terminal number and definition, and connect the capacitor status indicator light interface to indicate the switching status of the capacitor.
- D: When intelligent capacitors self compensate, it is necessary to sample the current, and the current sampling should also pay attention to the phase sequence, which must correspond to the voltage. If a matching reactive power compensation controller is used, the voltage and current can also be sampled only through the controller. The smart capacitor only needs to connect the communication line to the controller communication terminal and can obey the controller's commands without sampling the current signal.

8. Display Panel and Case Operation



8.1 Panel composition and button description

The display panel mainly consists of: LCD screen, capacitor status indicator light, up button, down button, and confirm button. Its functions are shown in the table.

Name	Function description
LCD display screen	Display real-time data, system parameters, and system operating status.
Operation indicator	Display the current working status, with red indicating manual mode and green indicating automatic mode.
Capacitor status indicator light	Indicate the switching status of internal capacitors in the system. (C represents the capacitor, and A, B, and C respectively represent the capacitors corresponding to ABC). Green represents input, red represents removal.
Up button	Add 1 to the number during parameter setting, or activate the capacitor manually.
Down button	Subtract 1 from the number during parameter setting, or cut off the capacitor manually.
Confirm button	Enter the parameter setting state.

8.1 Data query

Collaborative module data query: Interface C-S001 is the boot interface, which automatically enters the main interface after a moment and then presses the "up" button to cycle through pages s-1 and s-9 on the interface. At this point, pressing the 'confirm' button is invalid, as shown in the table.

Collaborative display interface

No.	Interface	Describe
S-0	C-5001	Power on display interface "S" is the code for the three-phase common compensation module, "C" is a capacitor, "01" is the mailing address.
S-1	Uac(V) cosΦ 380-.99	AC phase voltage, unit V; three-phase combined power factor. Press the "OK" button to go to interface S-2.
S-2	250 100 Ib(A) Q(KVar)	B-phase current, unit A; total reactive power, unit KVar. Press the "OK" button to go to interface S-3.
S-3	0n 25 tc1(°C) tc2(°C)	The first group temperature and the second group temperature are measured in °C (the first group temperature is currently default). Press the "OK" button to go to interface S-4.
S-4	CODE 000 000	Fault code display (currently default). Press the "OK" button to go to interface S-5.
S-5	00C 001	Capacitor communication address.

Supplementary display interface

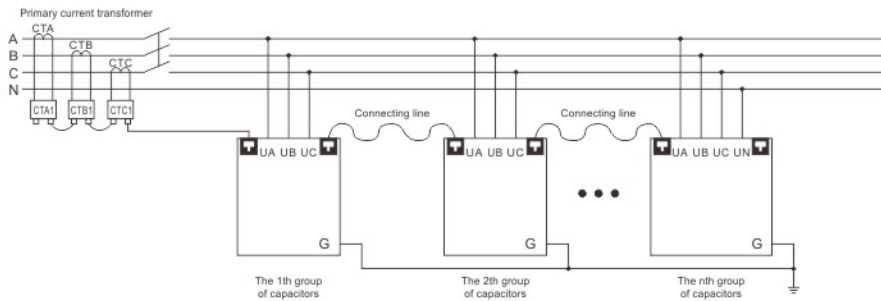
No.	Interface	Describe
S-1	C-F001	Power on display interface "F" is the code for the three-phase compensation module, "C" is the capacitor, "01" is the communication address. Press the "OK" button to go to interface S-2.
S-2	U(V) cosΦ 220 0.99 Phase A	A-phase voltage, unit V. A-phase power four digits. Press the "OK" button to access interface S-3.
S-3	U(V) cosΦ 220 0.99 Phase B	B-phase voltage, unit V. B-phase power four digits. Press the "OK" button to access interface S-4.
S-4	U(V) cosΦ 220 0.99 Phase C	C-phase voltage, unit V. C-phase power four digits. Press the "OK" button to access interface S-5.
S-5	250 100 I(A) Phase A Q(KVar)	A-phase current, unit A. A-phase reactive power, unit KVar. Press the "OK" button to access interface S-6.
S-6	250 100 I(A) Q(KVar) Phase B	B-phase current, unit A. B-phase reactive power, unit KVar. Press the "OK" button to access interface S-7.
S-7	250 100 I(A) Phase C Q(KVar)	C-phase current, unit A. C-phase reactive power, unit KVar. Press the "OK" button to access interface S-8.
S-8	t(°C) 025 000	Capacitor temperature, unit °C. Press the "OK" button to access interface S-9.
S-9	007 001	Capacitor communication address. Press the "OK" button to access interface S-2.

8.3 Parameter settings

Parameter setting for co compensation/sub compensation module: No setting is required in the operating mode with a controller. In the operating mode without a controller, the address of the intelligent capacitor host must be set to 0000. Using a secondary current transformer to sample the current without an external controller can also ensure the normal operation of the entire compensation system.

The relevant operation steps are as follows:

8.3.1 When installing the product, please connect the entire compensation system according to the following diagram:



Wiring diagram for controller system without matching

8.3.2 Setting of capacitor host:

When using a secondary current transformer for current sampling, a host must be designated and controlled by all capacitors in the host system. When all capacitors in the system are shared capacitors, any capacitor can be set as the host, and the six pin plug of the secondary current transformer can be inserted into the socket behind the capacitor; When there are shared and distributed capacitors in the system, set one of the distributed capacitors as the host and insert the six pin plug of the secondary current transformer into the socket behind the capacitor. After the entire system wiring is completed, the primary current transformer ratio and address of the host are set when the system is powered on.

Press and release the up and confirm keys simultaneously while the host is powered on to enter the parameter settings interface.

Supplementary parameter setting table

No.	Interface	Default value	Describe
1	$\cos\Phi$ 001 0.95	0.96	Lower limit of power factor compensation: Press the up key to add 0.01, press the down key to subtract 0.01, and press the OK key to enter the second item.
2	002 100	100	For example, if the transformation ratio of a current transformer is 500/5, then the transformation ratio is 100. Press the up key to add 1, press the down key to subtract 1, and press the OK key to enter the third item
3	00C 001	001	When set to 0 as the host, the slave does not need to set it to display the actual address of the capacitor after successful automatic networking.

Supplementary parameter setting table

No.	Interface	Default value	Describe
1	$\cos\Phi$ 001 0.95	0.96	Lower limit of power factor compensation: Press the up key to add 0.01, press the down key to subtract 0.01, and press the OK key to enter the second item.
2	002 100	100	For example, if the transformation ratio of a current transformer is 500/5, then the transformation ratio is 100. Press the up key to add 1, press the down key to subtract 1, and press the OK key to enter the third item
3	003 001	001	When set to 0 as the host, the slave does not need to set it to display the actual address of the capacitor after successful automatic networking.

8.3.3 System commissioning:

After the host is set up, the system is powered on again, and the host controls the entire system to enter automatic networking mode. After 3 minutes, the networking is completed, and the slave machine displays the capacitor address to indicate that the networking is complete. During work, the host will continuously display voltage, power factor, and other related parameters, and the capacitor address will be displayed continuously. In the system, only the transformation ratio and address of the host need to be set, and there is no need to make any settings for the slave.

9. Inspection and Testing

9.1 Basic parameter check

9.1.1 After the wiring is completed and verified to be correct, use a multimeter to check whether there is a short circuit between each phase of the three-phase power line and between each phase and the ground.

9.1.2 Check if the communication lines of all modules are well connected.

9.2 Test operation of compensation system without controller

9.2.1 Take one of the modules as the host (when there are only shared modules in the system, use shared modules; in hybrid systems, use distributed modules as the host). Connect the secondary transformer to the host (see 8.3.1 for wiring diagram). After power on, set the host address to 0 and connect the slave to the host through a 485 communication line to control the automatic switching of the slave through the host.

9.2.2 After powering on and setting up the host, the system will automatically network. After successful networking, the LCD screen will display the address as C-Sxxxx and C-Fxxx respectively, indicating successful networking.

9.2.3 Manual switching: Press the down button and confirm button at the same time, then release them at the same time. When the running indicator light turns red, enter manual mode. Press the up button to switch in and the corresponding indicator light turns green. Press the down button to cut off the corresponding indicator light and turn red. If there is no operation within 3 minutes in manual mode, it will automatically return to automatic mode.

9.3 Test operation of compensation system with controller

9.3.1 Connect the controller to the capacitor module according to Figure 7.3, only the controller needs to be set up, and the capacitor module does not require any settings. After power on, the system will automatically network. After successful networking, the LCD screen will display the address as C-Sxxx and C-Fxxx, indicating successful networking.

9.3.2 Manual switching: The compensation system with a controller can manually switch all networked capacitors on the controller. Please refer to our company's controller manual for the operation method.

10. Product Accessories and Instructions

List of intelligent capacitor accessories

No.	Name	Specifications	Purpose	Notes
1	Connecting line	A 0.5m	Installed between capacitors on the same layer	Each group of capacitors comes standard with one capacitor
		B 0.8m	Installed between capacitors on different layers	According to the actual situation
		C 2.6m	Between capacitors and controllers	According to the actual situation

11. Common Faults and Troubleshooting

No.	Abnormal condition	Reason	Solution
1	The capacitor is not connected.	Poor communication between products: Poor communication between products and controllers; The distribution current is too small (the load is too light).	Check if the capacitor module is networked and displays the correct address, and if the communication cables are connected properly. It is a normal phenomenon for the load current to be too small and not put into operation.
2	Capacitors can be used, but the compensation effect is not good.	If the current of a certain phase is too small, it will affect the operation of the three-phase compensation capacitor.	Add phase separation compensation capacitors in the system.
3	The capacitor can be activated, but the power factor remains unchanged after activation.	Is the installation position of the current transformer correct. Is the phase sequence of the voltage and current lines correct.	The installation position of the distribution current sampling transformer should be such that both the capacitor and the load current flow through the current transformer; The phase sequence of voltage and current lines must be connected correctly.
4	The status of the external indicator light does not match the actual situation.	The status of the external indicator light does not match the actual situation.	Check if there are any errors in the specifications and wiring of the indicator light product.
5	Product over temperature protection.	After the capacitor in the product is overheated, it will exit operation and resume working after the temperature drops, achieving the purpose of protecting the capacitor.	No need to handle.
6	After the capacitor is turned on, CS-001 is continuously displayed for co compensation and C-F001 is continuously displayed for sub compensation. Pressing any button does not respond.	Phase loss or poor connection of capacitor power line.	Check if the power supply is out of phase; Is the power cord in good contact.