NO:2021.01

CHINT ELECTRICS

JKF8 Series
Smart Low-Voltage Reactive Power Compensation Controller

User Instructions

Standard: JB/T 9663-2013

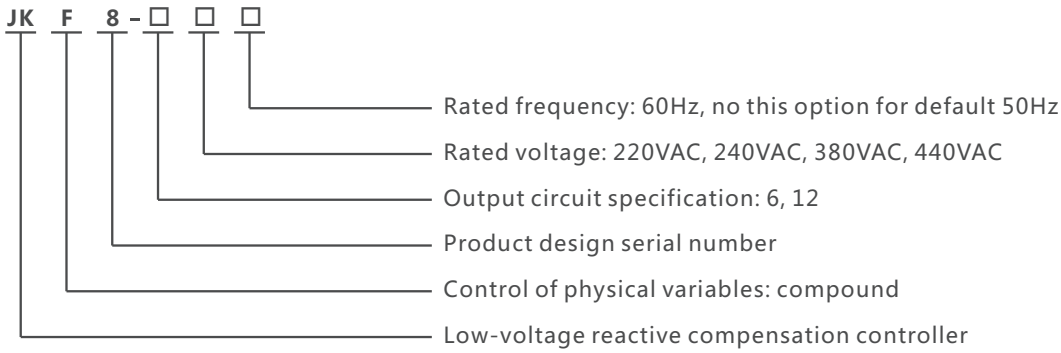
Safety Warning

1. Only professional technicians are allowed for installation and maintenance.
2. Installation in any damp, condensed-phase environment with inflammable and explosive gas is forbidden.
3. When the product is being installed or maintained, the power must be switched off.
4. You are prohibited from touching the conductive part when the product is operating.

1 Use Purpose

JKF8 smart low-voltage reactive power automatic compensation controller (hereinafter referred to as controller) is designed for reactive power compensation in low voltage power distribution systems. By compounding controlling of physical variables (reactive power and power factor), the product enables automatic capacitor switching, power factor improvement and line reactive power loss reduction. It is easy for operation and reliable, with complete functions and strong anti-interference capability. The product complies with JB/T9663 standard and can correctly display grid power factor under harmonic environment.

Type Key and Definitions



2 Key Technical Parameters

Table 1 Key technical parameters

Environmental conditions	Ambient temp. (℃)	-25℃~+70℃	
	Hot and humid atmospheric conditions	50% relative humidity at +40℃; up to 90% at +20℃;	
	Altitude	≤2000m, (take ventilation, heat dissipation and anti-condensation measures for altitude above 2000m)	
	Pollution class/installation category	Free from hazardous gases and vapors, conductive or explosive dusts, and strong mechanical vibration	
Functions	Control strategy	Compound control of reactive power and power factor, ensuring reliable switching under low load and preventing resonance during switching.	Display code
	Non-polarized current	Self-identifying of current polarity, no direction requirement for IS1 and IS2 sampling lines.	
	Undervoltage protection	Automatically removes capacitor banks in operation level by level (in 5 seconds) when grid voltage is lower than 0.78UN and displays voltage value.	≡U
	Overvoltage protection	Automatically removes capacitor banks in operation level by level (in 5 seconds) when grid voltage higher than overvoltage threshold and displays voltage value.	≡U
	Undercurrent protection	Automatically removes capacitor banks in operation level by level (in 5 seconds) and lock-up capacitor adding when the secondary signal of the current transformer is lower than 150mA.	≡1

Functions	Sampling overcurrent alarm	The overcurrent alarm is triggered when sampling current is bigger than 6.0A.				≡0
	Discharge delay protection	The switching lock-up time for the same group of capacitors is 3 minutes.				
	Circular self-test function	Provides circular self-test function for factory testing of capacitor screen.				
	Safety protection	IP30				
	Installation method	Embedded				
Technical parameters	Sampling and rated voltage	380VAC±20%	440VAC±20%	220VAC±20%	240VAC±20%	
	Overvoltage threshold setup	400V~456V	400V~528V	230V~270V	240V~300V	
	Overvoltage factory preset	430V	500V	250V	270V	
	Rated frequency	50Hz±5% or 60Hz±5%				
	Sampling current	150mA~5A, input impedance≤3mΩ				
	Undercurrent lock-up	≤150mA				
	Current ratio setup	Current ratio setup range for external sampling current transformer: 5~1200, set ratio (factory preset 60 means 300/5)				
	Delay time setup	5~120 seconds (factory preset 30 seconds)				
	Setup mode	Full automatic mode (display code 1): no need to set adding threshold and removing threshold. Manual setup mode(display code 0): adding threshold and removing threshold need to be set manually.				
	Adding threshold setup	Full automatic mode: capacity of the smallest capacitor bank Manual mode: reactive set value, 1~120kvar(factory preset 10 kvar)				
	Removing threshold setup	Power factor, 0.85~-0.95 continuously adjustable (factory preset 1.00)				
	Circuit number setup	JKF8-6 (1~6 circuits available), JKF8-12(1~12 circuits available)				
	Operating method	Automatic circular switching/manual switching				
	Maximum power consumption	15W				
	Tightening torque	Terminal screw torque≤2.5N·m				
	Output contact capacity	5A/220V (or 3A/380V)				
	Weight	About 1.5Kg				

Table 2 Description of dynamic parameters

Code	Definitions	Unit	Description
I	Current	A	Use approximate value when measured value exceeds display range, for example: displays E13 for 1260A.
U	Voltage	V	Displays measured voltage
Q	Reactive power	kvar	Use approximate value when measured value exceeds display range, for example: displays E14 for1360 Kvar
P	Active power	kW	Use approximate value when measured value exceeds display range, for example: displays E14 for1360 Kvar

3 Installation

3.1 Main Features, Outline and Installation Dimensions

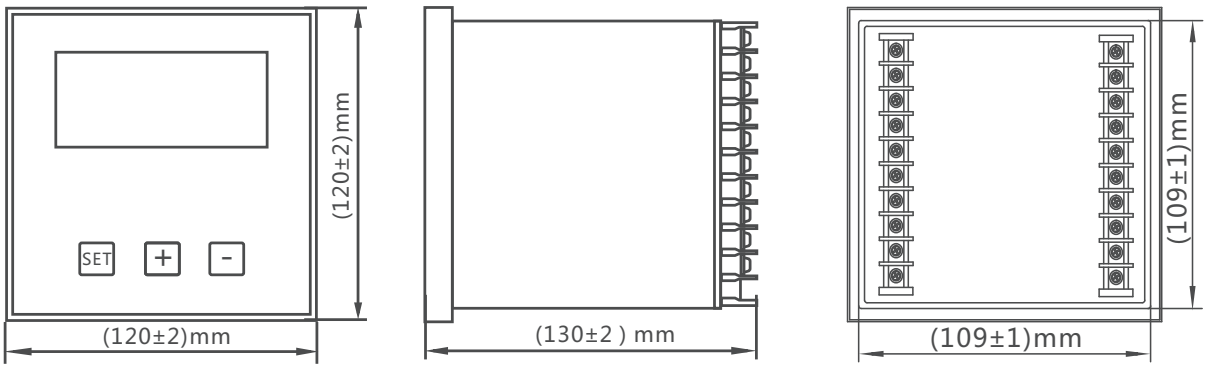


Figure 1 Outline dimensions of the product

The product is equipped with fire retardant plastic case and digital display. The installation method of the product is the same as 42L series product. The outline dimensions of the product is 120mm×120 mm×130mm, the installation perforating dimension of the product 113 mm×113mm, the embedding depth 116 mm.

3.2 Installation Procedure, Method and Product Wiring Diagram

3.2.1 Assembly and fixing of the controller

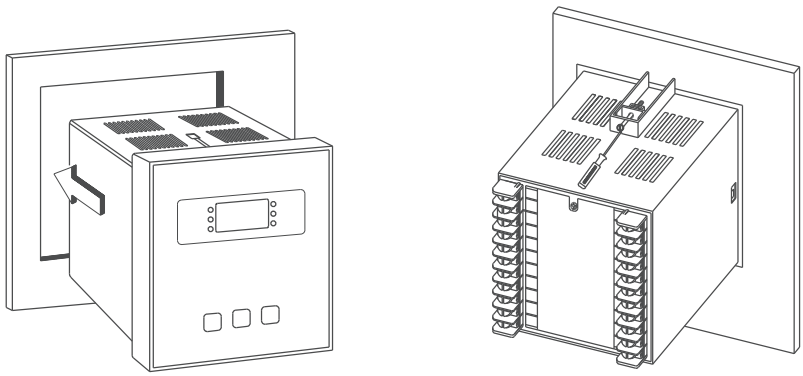


Figure 2 Product installation and fixing

Installation procedure: Embed the controller into the hole on the panel first, then push the mounting parts into the upper and lower slots on the controller case. Tighten the screws to fix the controller onto the panel. After installing the upper and lower mounting parts, please make sure the controller is secured, otherwise it may fall out or be damaged due to vibration during transportation.

3.2.2 Product wiring

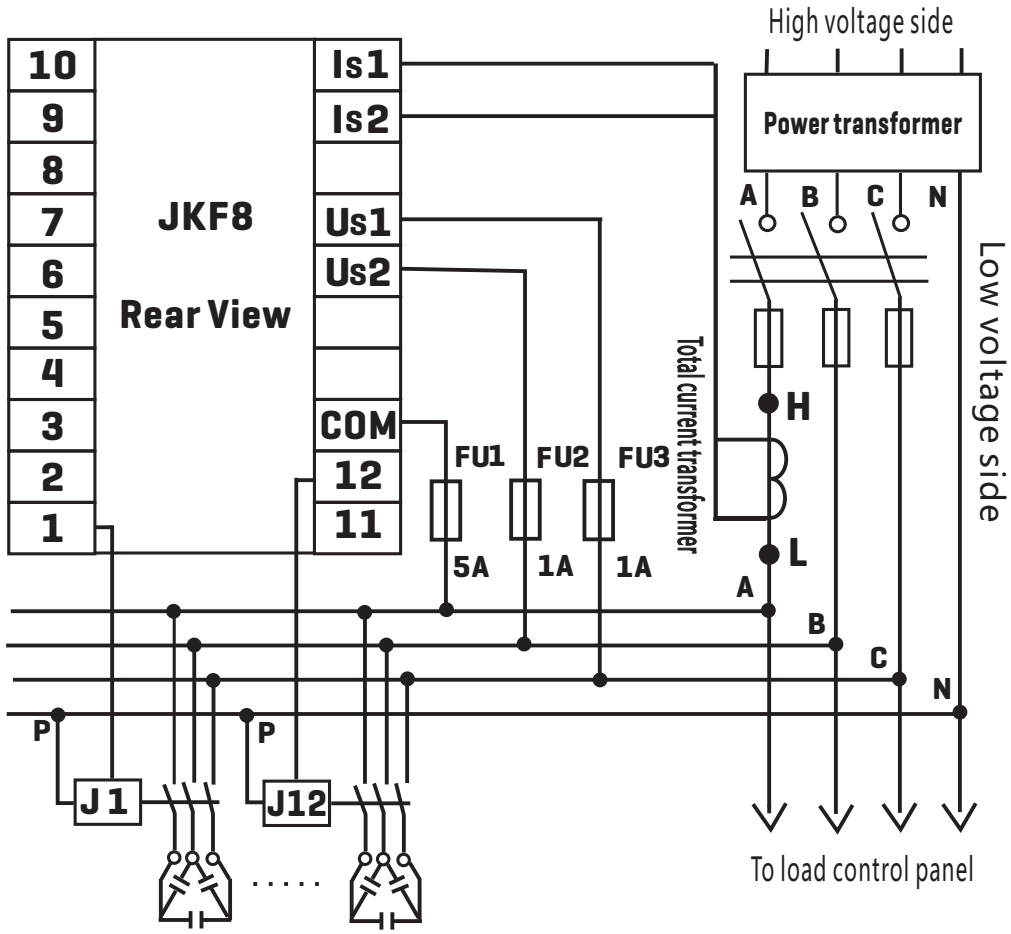


Figure 3 Product wiring

① Terminals "US1" and "US2" are connected to sampling voltage. They must be connected to 380VAC or 220VAC based on rated operating voltage.

② Terminals "IS1" and "IS2" are connected to sampling current which comes from total load current tranformer and set apart from "US1" and "US2". (Phase A for current, phase B and C for voltage; phase B for current, phase A and C for voltage; phase C for current, phase A and B for voltage)

③ Terminal "COM" is the relay common terminal for the output of group 1~12 of the controller. Terminals "1~12" are used for output control of the contactors of the compensation circuits of the capacitor display.

④ If the system voltage is 3-phase 380V and the coil voltage of contactor J is 220V, P is connected to phase N. If the coil voltage of contactor J is 380V时, P is connected to phase C (different from relay common terminal COM).

⑤ If the system voltage is 3-phase 220V, please select 220V for the coil voltage of contactor J, and P

is connected to phase C.

⑥ FU1~3— External fuse provided by user itself. The rated current of fuse core FU1 is 5A, the rated current of fuse core FU2 and FU3 is 1A.

3.3 Operating Principles, Parameter Setup and Application Requirements

3.3.1 Operating principles

The controller displays "CAL" when it is powered-on, then it will enter auto operating status after 5 seconds. If the input current meets minimum requirement (bigger than 150mA), the controller will display measured grid power factor COSΦ. In full automatic setup mode, the controller will initiate a "self-learning process". During this process, the controller will compare the given "power factor value" with the current power distribution system and add capacitors automatically to improve power factor. In the meantime, the controller will record the values of the connected capacitor banks and use the smallest capacitor bank as the reactive adding threshold.

No matter in automatic or manual parameter setup mode, the controller will compare the measured inductive reactive power demand with F-1 reactive power threshold Qs. If the inductive reactive power demand is larger than adding threshold, the lagging indicator will start flashing. After delay, add capacitors level by level until the grid reactive power demand is lower than reactive power threshold Qs and the power factor is not bigger than target power factor; when the power factor of the grid exceeds target power factor, the leading indicator will start flashing, the system will automatically remove capacitor banks in operation level by level (in 5 seconds).

3.3.2 Parameter setup

3.3.2.1 See Table 3 for parameter setup (menu introductions)

Table 3 Parameter setup

Code	Name	Setup range	Factory settings	Increment	Remarks
F-0	Threshold setup mode	1 or 0	1	—	1 for full automatic setup, 0 for manual setup
F-1	Adding threshold	1~120 kvar	10 kvar	1	Does not display F-1 under full automatic mode
F-2	Target power factor	0.85~-0.95	1.00	0.01	Minus means capactive system
F-3	Switching delay	5~120 seconds	30 seconds	1	
F-4	Overvoltage	400V~456V	430V	2	Backflash voltage 8~10V
F-5	Number of control circuits	1~6 or 1~12	6 or 12	1	Two specifications
F-6	Current sampling tranformer ratio	5~1200	60	5	(300 : 5)

Note: When "F-0" is set to "1" (full automatic), "F-1" is set automatically, other parameters can be set manually.

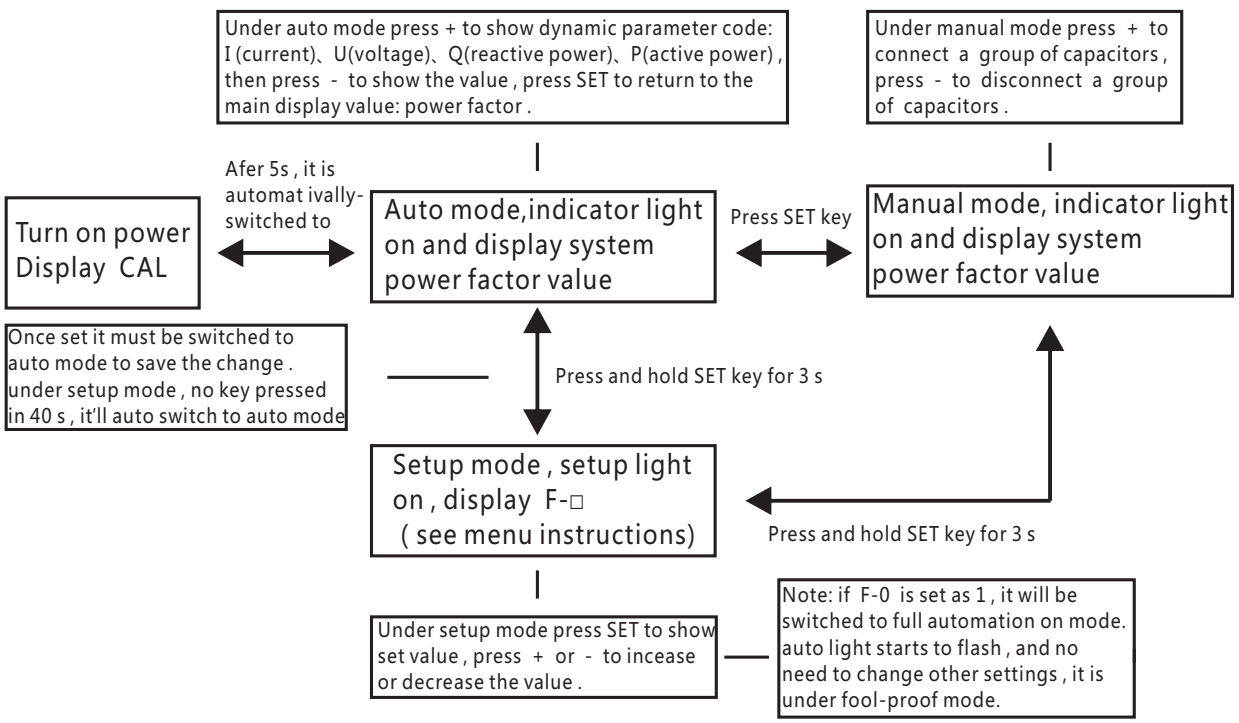
3.3.2.2 See Table 4 for parameter setup and operation instructions

Table 4 Parameter setup and operation instructions

Full automatic setup mode	In this mode, there is no need for further setup except correct wiring. User just need to setup F-6 correctly, the system will display true values of total current, reactive power and active power under full automatic setup mode (F-0 SET 1).
Manual setup mode	This mode enables professionals to conduct setup according to system conditions. In manual setup mode, user must set the current transformer ratio correctly when starting the machine for the first time. For example: if the sampling current transformer ratio is 1000/5A, the controller ratio should be 200.(F-6 SET 200)

Reactive power threshold setup	The setup of F-1 is available in manual setup mode. If the set Qs is too small, the system will switch capacitors frequently (cause oscillation); if the set Qs is too large, the compensation effect will be affected. Therefore, the minimum set Qs should not be smaller than the minimum capacitor capacity. For example: If the equipment has a capacitor bank of 8 circuits, the value of each circuit is 15, 20, 30, 30, 30, 30, 30, 30, then the set Qs value should be minimum capacity of 15 kilovar. (F-1 SET 15)
Manual switching	In automatic mode, press and hold "SET menu" key for 3 seconds to enter manual mode. Press "+ (adjustment display)" key to add one group of capacitor bank, press "- (parameter display)" key to remove one group of capacitor bank.
Circular self-testing	In automatic mode, press and hold "SET menu" key for 10 seconds until the decimal point starts flashing. Release the key to enter circular self-testing mode. Remember to disconnect the capacitor before conducting self-testing.
Change set parameters	In manual mode, press and hold "SET menu" key for 3 seconds to enter parameter setup menu, then press "SET menu" key continuously until you select the parameter that needs to be changed. Press "+ (adjustment display)" key or press "- (parameter display)" key to increase or decrease the parameter value. After you finished alteration, press and hold "SET menu" key for 3 seconds to exit setup menu and enter automatic mode. After you finished alteration, you must enter automatic mode to save and confirm the alteration. In setup mode, the system will enter automatic mode automatically if no key is pressed within 40 seconds.
Dynamic parameter adjustment display	In automatic mode, press "+ (adjustment display)" key to show dynamic parameter display code: I (current), U (voltage), Q (reactive power), P (active power), then press "- (parameter display)" key to show the corresponding display value of the dynamic parameter. Press "SET (menu)" key to returen to main display value: power factor COSΦ.

3.3.2.3 Parameter setup operation



3.3.3 Preparation and inspection before use

1) Before using the capacitor, user should check if the model on the nameplate is consistent with that of the product. User should also check if the included accessories are complete.
2) Identify the sampling phase sequence of the controller correctly: Turn the multimeter to AC voltage position. Press one probe on the busbar of the series sampling transformer in the cabinet, use the other probe to test if the voltage between the transformer and the US1 or US2 terminal of JKF8 controller is UN (rated operating voltage). If yes, the sampling phase sequence is correct.
3) Check if all the parameters of the controller are set correctly according to "Parameter setup". If "F-0" is set to "1", user just need to check if "F-5" and "F-6" are set correctly.

4 Maintenance

4.1 Daily maintenance

4.1.1 User should check the operating status of the controller on a regular basis. Normally, the displayed power factor of the controller should not be larger than 0.92 and should be relatively stable.

When the sampling current is smaller than 200mA or the controller displays undercurrent alarm, it will be difficult to determine whether the controller is under normal operation, because the power factor can either be positive or negative and the display status can either be leading or lagging, therefore user should conduct motor load commissioning.

4.1.2 The power factor value will decrease as user increases the motor load, and the controller will display lagging. As the capacitors are being added automatically, the power factor will increase gradually and the total current of the cabinet will decrease. User should record the power factor and total cabinet current in real time.

4.1.3 Use the universal change-over switch on the controller or the cabinet to remove the capacitor banks in operation manually before disconnecting the power supply of the cabinet.

4.1.4 Short circuit the secondary side of the sampling current transformer before removing or replacing the JKF8 controller to prevent open circuit of the current transformer. Remove the short circuit line after reinstalling the controller.

4.2 Analysis and troubleshooting of faults

Table 5 Analysis and troubleshooting of faults

No.	Faults	Cause analysis	Solutions
1	Load equipment is turned on, but the controller still displays undercurrent "≡1"	1. The sampling current is smaller than 150mA or the secondary circuit of the current transformer is open; 2. Fault exists in the current transformer or the controller.	1. Check if the secondary circuit of the sampling current transformer is open; 2. If the measured IS1 and IS2 sampling currents are bigger than 200mA, replace the controller.
2	Sometimes the controller displays "≡0"	Current transformer sampling current is bigger than 6.0A, which means the selected sampling current transformer ratio is too small.	Select CT based on the primary current of current transformer is larger than load current.
3	Controller always displays "≡U" or voltage value	1. Undervoltage or overvoltage alarm, display this code; 2. Product fault	Test voltage before increasing set overvoltage threshold. If the increase is invalid, replace the product.
4	The displayed power factor keeps changing, or the leading and lagging indicator keep switching.	1. Load is relatively low and sampling current is smaller than 200mA; 2. Caused by frequent load change, such as electric welding machine, spot-welder, rolling mill, pressing machine, hauling equipment; 3. Electrical load is not stable; transformer load rate is relatively low.	1. Turn on motor load and observe the display of the controller; 2. Select dynamic reactive power compensation equipment for fast changing load;3. Select controller that uses non-isometric optimal switching, such as NWK1-GR liquid crystal controller.
5	After adding capacitors, the power factor remains almost the same.	The installation position of the current transformer is wrong; the primary current is not included in the cabinet.	Take total current: sampling current =load current + capacitor current, which means the primary line of the cabinet is connected after the sampling transformer.
6	No matter what load, the controller always displays leading, the power factor is negative, and the system does not operate automatically.	1. Wrong sampling phase sequence, such as phase A for current, and phase AB for voltage; 2. There is equipment such as frequency converter or rectifier installed at load end, which causes harmonic interference.	1. Determine sampling phase sequence according to 7.3.4; 2. Select NWK1-GR liquid crystal controller with stronger anti-harmonic interference capability.
7	Capacitor switching is too frequent	1. Fast change of load current, the set delay time is shorter than 10s; 2. The set target power factor is too low; 3. The set reactive power threshold is too low.	1. The set delay time is longer than 30s; 2. Increase target power factor; 3. Increase reactive power threshold properly.
8	The displayed power factor is lower than 0.90, but no capacitor is added automatically.	1. Load is relatively low, the required reactive power Qs is smaller than set value of F-1 reactive power threshold; 2. The set transformer ratio is too small.	1. Recommend to replace with 2 groups of capacitors with smaller capacity; 2. Set transformer ratio correctly;
9	The controller displays garbage characters or the controller is crashed.	1. Abnormalities such as lightning strike; 2. Electromagnetic interference。	Disconnect the power and restart the machine. If the problem occurs repeatedly, replace the product.

5 ⚠ Environmental Protection

In order to protect the environment, the product or product parts should be disposed of according to the industrial waste treatment process, or be sent to the recycling station for assortment, dismantling and recycling according to local regulations.

CHINT

QC PASS

JKF8 Series
Smart Low-Voltage Reactive
Power Compensation Controller
JB/T 9663-2013

DR/J03

Test date: Please see the packing

ZHEJIANG CHINT ELECTRICS CO., LTD.

CHINT ELECTRICS

JKF8 Series
Smart Low-Voltage Reactive Power Compensation Controller
User Instructions

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