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

PRODUCT QUALIFICATION CERTIFICATE

Name: Intelligent Low-voltage Reactive Power Compensation Device Controller

Model: _____

This product meets the standard for crystal inspection and is allowed to leave the factory.

Inspector: Test 8

OPERATION INSTRUCTIONS

Intelligent Low-voltage Reactive Power Compensation Device Controller

V6.0

Note: Thank you for choosing this product. Please read the user manual carefully before installing, using, or maintaining the product.

1. Overview

Before installing and operating the intelligent low-voltage reactive power compensation device controller, please carefully read the following precautions. This instruction manual is intended for personnel responsible for installation, maintenance, and operation, with the aim of helping users quickly master the installation and operation of this controller.

2. Technical Parameter

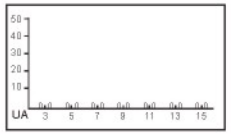
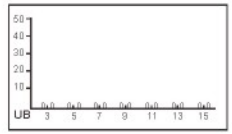
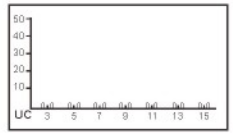
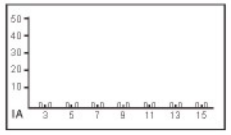
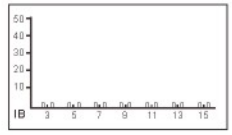
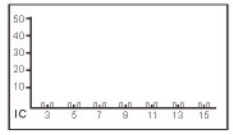
1. Environmental temperature: -25 ℃~+55 ℃;
2. Relative humidity: 20%~90% at 40 ℃;
3. Altitude: not exceeding 2000m;
4. Working voltage: 220V ± 20% 50Hz;
5. Display mode: LCD screen display;
6. Sampling current: 0~5A (secondary side of current sampling transformer);
7. Sensitivity: 100mA;
8. Features: It intuitively displays the current voltage, current, power factor, active power, reactive power, harmonic voltage content and other parameters of the power grid. It has fault alarm displays such as overvoltage, undervoltage, and harmonic exceeding, and quickly and sequentially cuts off the capacitors that are put into operation;
9. Controller dimensions: 120 × 120 × 85mm;
10. Controller opening size: 113 × 113mm;
11. Environmental conditions: There are no gases in the surrounding air that can damage insulation and corrode metals, no conductive dust, and no flammable or explosive media present;
12. Execution standard: Electric power industry industry standard JB/T9663-2013.

3. Button Usage Instructions

Menu	You can enter or return to the interface with three options: automatic, manual, and settings.
△	Used for increasing numerical values or selecting upwards.
▽	Used for decreasing numerical values or selecting downwards.
Confirm	Use the up and down buttons to confirm the selected target or to save parameters.

4. Display Interface Description

4.1 Automatic mode: Press the "△" or "▽" button to switch pages.

Display	1 2 COS U(V) I(A) A 0.707 219.9 249.8 B 0.707 219.9 250.0 C 0.707 220.0 250.0	1 2 P(Kw) Q(Kvar) A 38.9 38.8 B 38.9 38.8 C 38.9 38.9	1 2 thdu(%) thdi(%) A 0.3 0.2 B 0.3 0.2 C 0.3 0.2
Explanatory note	Cos: Three phase power factor U (V): Three phase voltage I (A): Three phase current	P (KW): Active power Q (kvar): Reactive power	Thdu (%): Voltage distortion rate Thdi (%): Current distortion rate
Display	1 S 20.0 2 SS 20.0+20.0 3 YA6.6 B6.6 C6.6 4 N 5 N	11 N 0.0 16 N 0.0 12 N 0.0 17 N 0.0 13 N 0.0 18 N 0.0 14 N 0.0 19 N 0.0 15 N 0.0 20 N 0.0	21 N 0.0 26 N 0.0 22 N 0.0 27 N 0.0 23 N 0.0 28 N 0.0 24 N 0.0 29 N 0.0 25 N 0.0 30 N 0.0
Explanatory note	Capacitor status 1-10 channels S: Single co compensation intelligent capacitor SS: Dual common compensation intelligent capacitor Y: Complementary capacitor N: Indicates no capacitor	Capacitor status 11-20 channels	Capacitor status 21-30 channels
Display			
Explanatory note	Column chart of total harmonic distortion rate of A-phase voltage	Column chart of total harmonic distortion rate of B-phase voltage	Column chart of total harmonic distortion rate of C-phase voltage
Display			
Explanatory note	Column chart of total harmonic distortion rate of A-phase current	Column chart of total harmonic distortion rate of B-phase current	Column chart of total harmonic distortion rate of C-phase current

4.2 Parameter Setting Mode: Press the "△" and "▽" buttons to select modification options, click or long press the "△" and "▽" buttons to modify parameters, and press the "Confirm" button to save and exit.

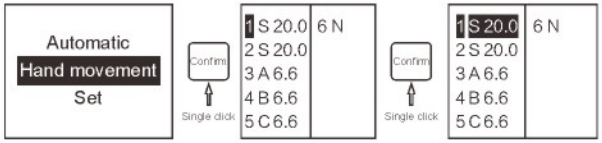
Content	Explanatory note
Device ID : 1 Sampling settings : 3U4L Variable ratio setting : 100	ID setting: Use the increment or decrement keys to display in sequence: 001-247 for selection. (Factory Setting 001) Purpose: Communication address setting.
Device ID : 1 Sampling settings : 3U4L Variable ratio setting : 100	Transformer sampling setting: Use the increment or decrement keys to display in sequence: (Split compensation mode) 3U4L voltage: UA.UB.UC-UN, split compensation: IA.IB.IC current (Co compensation mode) BCLA voltage: UA.UB.UC-UN, Co compensation: IA current (Co compensation mode) ACLB voltage: UA.UB.UC-UN, Co compensation: IB current (Co compensation mode) ABLC voltage: UA.UB.UC-UN, Co compensation: IC current
Device ID : 1 Sampling settings : 3U4L Variable ratio setting : 100	CT ratio setting (transformer multiplier setting): Operate the increment or decrement keys in sequence Display: 2-1600 for selection. (Controller display magnification example: 500/5 displays 100) Purpose: To provide measurement and control parameters for the current transformer ratio in the incoming cabinet.
Investment threshold : 0.99 Cut off threshold : –.99 Investment delay : 30S	Power factor input threshold setting: Press the increment or decrement keys to display in sequence: -0.12-1.00 for selection. (Factory setting 0.98) Purpose: To compensate for the minimum power factor of switching capacitors. Input capacitors below this value.
Investment threshold : 0.99 Cut off threshold : –.99 Investment delay : 30S	Power factor input threshold setting: Press the increment or decrement keys to display in sequence: -0.10-1.00 for selection. (Factory setting 1.00) Purpose: To compensate for the maximum power factor of switching capacitors. Cut off the capacitor above this value.
Investment threshold : 0.99 Cut off threshold : –.99 Investment delay : 30S	Input delay setting: Use the increment or decrement keys to sequentially display: 001-600 seconds for selection. (Factory setting 30 seconds) Purpose: Switching delay refers to the delay when a capacitor needs to be switched on or off. Only when the delay is reached can a group of capacitors be switched on or off. If the switching signal is cancelled during the delay time, the timer will be restarted. If there is a fault state, the capacitor will not be limited by this delay and will be quickly disconnected.

Content	Explanatory note
Cut off delay : 30S Overvoltage protection : 245V Overvoltage protection : 450V	Cut off delay setting: Use the increment or decrement keys to sequentially display: 001-600 seconds for selection. (Factory setting 30 seconds) Purpose: Delay time for capacitor removal.
Cut off delay : 30S Overvoltage protection : 245V Overvoltage protection : 450V	Partial compensation overvoltage protection setting: The operation increment or decrement keys display in sequence: 240-265 volts for selection. (Factory setting 245V) Purpose: When the voltage of the power grid exceeds this set value, cut off the capacitors that have been put into operation.
Cut off delay : 30S Overvoltage protection : 245V Overvoltage protection : 450V	Co compensation overvoltage protection setting: The operation increment or decrement keys display in sequence: 400-460 volts for selection. (Factory setting 450V) Purpose: When the voltage of the power grid exceeds this set value, cut off the capacitors that have been put into operation.
Under voltage protection : 0V Under voltage protection : 0V Voltage harmonics : 15%	Partial undervoltage protection setting: Factory preset: 170V, range 000-210V. Purpose: When the grid voltage is lower than this set value, the capacitor is cut off.
Under voltage protection : 0V Under voltage protection : 0V Voltage harmonics : 15%	Co compensation undervoltage protection setting: Factory preset: 310V, range 000-370V. Purpose: When the grid voltage is lower than this set value, the capacitor is cut off.
Under voltage protection : 0V Under voltage protection : 0V Voltage harmonics : 15%	Voltage harmonic protection setting: Press the function key to SET9, and press the increment or decrement keys in sequence to display 0-99.0% for selection. (When set to 0, this protection is canceled). Purpose: When the total harmonic of the power grid voltage is greater than the set value, the capacitor is cut off. Cancel protection when the value is 0.
Current harmonics : 0% Reactive power threshold : 1.1 Locking angle : 70	Current harmonic protection setting: Press the function key to SETA, and press the increment or decrement key in sequence to display 0-99.0% for selection. (When set to 0, this protection is canceled). Purpose: When the total harmonic of the power grid current is greater than the set value, the capacitor is cut off. Cancel protection when the value is 0.

Content	Explanatory note
Current harmonics : 0% **Reactive power threshold : 1.1** Locking angle : 70	Threshold coefficient setting: Press the function key to SETb, and press the increment or decrement keys to display 0.6-1.6 for selection. (Factory setting is 1.1) Usage: (Single unit kilovolt ampere hour) x (threshold coefficient)=input threshold. When the displayed inductive kilovolt ampere hour is ≥ the input threshold, a set of capacitors will be automatically input.
Current harmonics : 0% Reactive power threshold : 1.1 **Locking angle : 70**	Power factor angle lockout value setting: Press the function key to SETF, and press the increment or decrement keys to display: 70 ° -90 ° for selection. (Factory setting 80 °)Usage: When the on-site power factor is below 0.2, the controller can be locked and the locking value can be set to relax the threshold.
Rotation interval : 0H Operating mode : 2XX Target voltage : 220V	Loop interval setting: Press the function key to SETH, and press the increment or decrement key to display the options from 00 to 20 for selection. (Factory setting 00; Example: Set 01, forcibly cut off one channel every hour) Usage: After a certain group of capacitors is put into operation, this delay can be used to cut off this group of capacitors and automatically switch to the next group of capacitors.
Rotation interval : 0H **Operating mode : 2XX** Target voltage : 220V	Working mode setting: Press the function key to SETL, and press the increment or decrement key to display q2:2 quadrants in sequence; Q4: Quadrant 4; (Factory settings q2)
Rotation interval : 0H Operating mode : 2XX **Target voltage : 220V**	This setting is only used in voltage compensation mode. Voltage input threshold setting: Use the increment or decrement keys to sequentially display 180-230V for selection. (Factory setting 220V) Purpose: In voltage compensation mode, the capacitor is activated below the set value.
Investment threshold : 220V Cut off threshold : 750V Voltage hysteresis : 7V	This setting is only used in voltage compensation mode. Voltage input threshold setting: Use the increment or decrement keys to sequentially display 180-230V for selection. (Factory setting 220V) Purpose: In voltage compensation mode, the capacitor is activated below the set value.
Investment threshold : 220V **Cut off threshold : 750V** Voltage hysteresis : 7V	Voltage cut-off threshold setting: Press the increment or decrement keys to display 230-250V for selection in sequence. (Factory setting 230V) Purpose: In voltage compensation mode, the capacitor is cut off when it exceeds the set value.

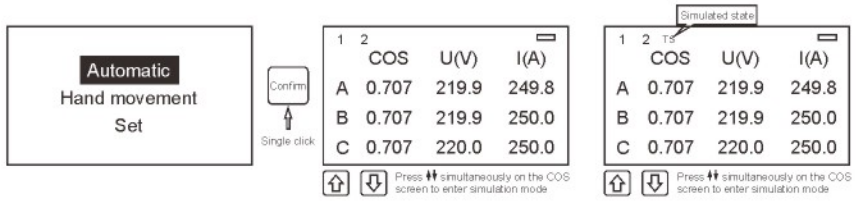
Content	Explanatory note
Investment threshold : 220V Cut off threshold : 750V **Voltage hysteresis : 7V**	Voltage hysteresis setting: Factory preset: 007V, range 002~012V. Purpose: After overvoltage, the capacitor is disconnected. When the grid voltage is less than the overvoltage value, the capacitor is put into operation. After undervoltage, cut off the capacitor. When the grid voltage is greater than the undervoltage value by ten times, the capacitor is put into operation. No capacitors are put into operation within the hysteresis range.
Compensation mode : U	Compensation settings: Use the increment or decrement keys to sequentially display COS (power factor compensation), U (voltage compensation), and COSU (power factor+voltage compensation) for selection. (Factory settings U)

4.3 Manual switching mode: Press "△" or "▽" to select the number of channels, and click the "confirm" button to switch the capacitor in or out.



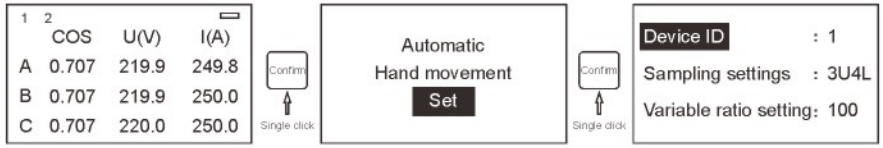
5. Simulation Function

Simultaneously press and hold the " △" and " ▽ " buttons for 2 seconds, and the LCD screen will display the TS letter indicating that the simulation mode has been entered. Press and hold again for 2 seconds, and the TS letter will disappear, exiting this mode (note: in this mode, the controller controls the intelligent capacitor to be automatically or manually engaged, and there will be no actual current output!)

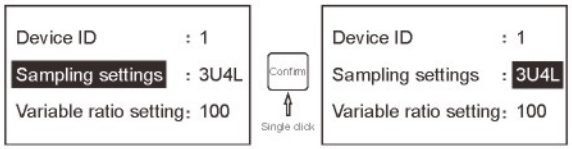


6. Factory Debugging

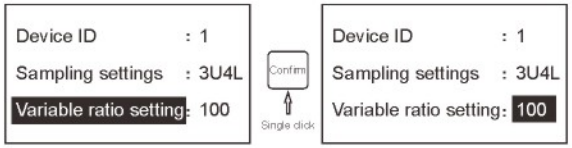
Step 1: After powering on both the smart capacitor and controller, click the "Menu" button, select "Settings", and press and hold the "Confirm" button to enter. The following figure



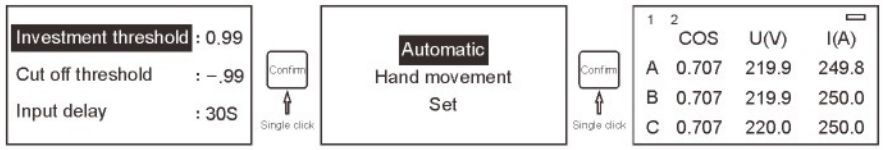
Step 2: Press and hold the "▽" key to select the sampling setting, click the "confirm" key to select it, and use the "△" or "▽" key to modify it based on the position of the sampling transformer in the main incoming cabinet. After the modification is complete, click the "confirm" key to exit the save. As shown in the figure below (note: select 3U4L mode for three-phase current); Select BCLA mode for phase A current; Select ACLB for B-phase current; Select ABLC mode for C-phase current



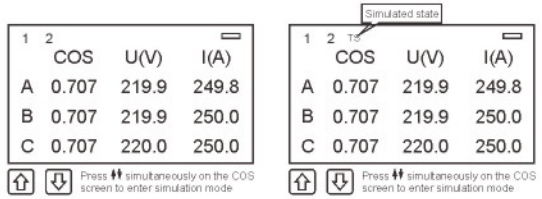
Step 3: Select the variable ratio setting, click or long press the "△" or "▽" button to increase or decrease the value. After completing the modification, click the "confirm" button to exit the save. The following figure



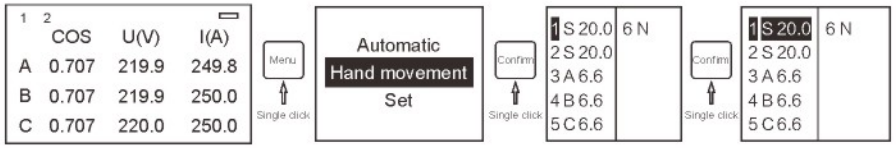
Step 4: Click the "Menu" button to exit this interface, select the "Auto" mode, click the "Confirm" button, and return to the main interface. If the number of capacitors installed in the cabinet matches the number displayed in the upper left corner of the LCD screen, then the debugging is complete! As shown in the figure below (note: if manual switching operation is required, continue with the following steps)



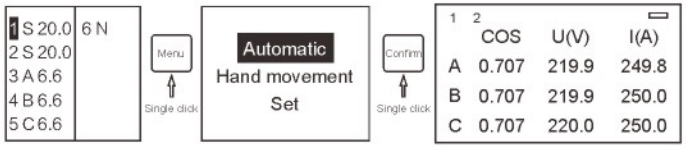
Step 5: Press and hold the " △ " and " ▽ " buttons simultaneously for 2 seconds. When the controller's LCD screen displays the letter TS, it indicates that it has entered the simulation state. (If you do not need to enter the simulation function, ignore this operation) as shown in the following figure



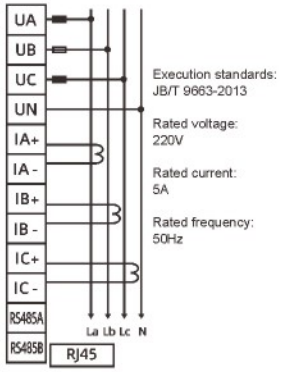
Step 6: Click the menu button to exit this interface. Select "Manual" to enter, press " △ " or " ▽ " to select the capacitor bank, and click the "Confirm" button to insert or remove the capacitor. (Observing the C1/AC2/B and C red lights on or off on the intelligent capacitor display screen, indicating that the capacitor is connected or disconnected) as shown in the following figure



Step 7: After the switching is completed, click the "Menu" button to exit this interface, select "Auto" and click the "Confirm" button to enter automatic mode, turn off the power, and complete the debugging!



7. Controller Wiring



Matters needing attention:

1. The sampling voltage of the controller needs to be connected to UA, UB, UC, UN three-phase four wire.
2. The controller can adapt to four current sampling methods, and can connect the required sampling current line according to the actual position of the sampling transformer in the main incoming cabinet on site! Internally adjustable sampling method.
3. Connect a network cable from RJ45 to any smart capacitor (in any order).
4. RS485 A and RS485 B can be connected to TTU (backend terminal).
5. The controller will come standard with one 2.6-meter Ethernet cable and one 0.8-meter Ethernet cable when it leaves the factory. If additional Ethernet cables are required, please specify them in the order.