Uppf POWER FACTOR CONTROLLER

Operation manual

Lafaelt

LAFAELT ELECTRIC

Catalogue

Please read this manual carefully before installing, wiring, operating, maintaining or checking this equipment.

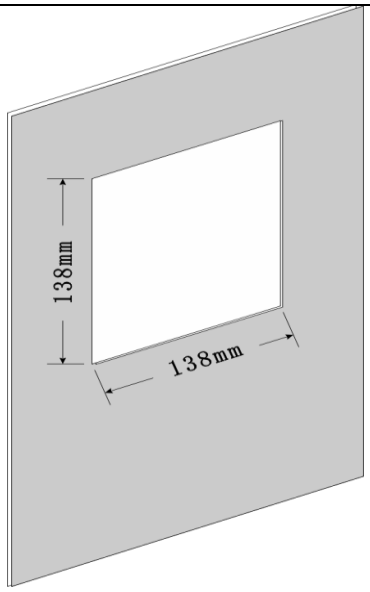
Please keep this manual within easy reach for quick reference.

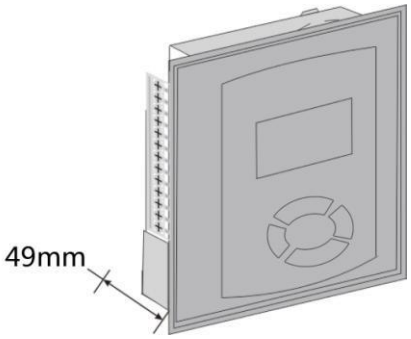
Safety Operation Warning

1. Before powering on, carefully check whether the device is reliably grounded.
2. Only professional technicians who are familiar with the operation manual of the machine are allowed to install, operate or repair the device.
3. The installation of this device must comply with all relevant safety operating procedures, and the correct wiring and wire size must be used to ensure the safety of operation, reliability of operation, and accuracy of measurement.
4. Both the power input and CT secondary side can generate high voltages that endanger personal safety. Be careful when operating and strictly abide by the safe operation regulations for electricity.
5. When repairing, installing, and replacing this unit, it is necessary to ensure that the power supply is disconnected and the CT secondary circuit is short circuited.
6. When collecting and setting data with power, no contact with live parts is allowed under any circumstances.

Basic Installation

When installing this automatic power factor controller, please be sure to follow standard operating procedures and safety guidelines.
Installation:
1. Confirm whether the measurement and control voltage, power supply frequency and current conversion ratio are consistent with the technical data of the controller.
2. The size of the opening on the switchboard is 138*138mm, the adjuster is installed on the switchboard with two fixing clips, and the embedded depth is 49mm.





3. Wiring according to the wiring diagram.
4. Please connect the protective grounding to the PE contact on the metal shell of the equipment.
5. Please remove the CT short connector.

1. Product Overview

Uppf power factor controller is a new type of distribution, measurement and control equipment that integrates functions such as data collection, reactive power compensation, and grid parameter analysis. It is suitable for monitoring and reactive power compensation control of AC 0.4KV and 50Hz low-voltage distribution systems.

The core of Uppf controller is a high-speed digital signal processor, AC sampling is adopted, and the HMI is a 128*64 dot matrix large screen LCD display. It has power distribution monitoring, reactive power compensation, harmonic analysis, adaptive frequency algorithm, and input signal changes between 45Hz and 55Hz.

2. Usage Condition

Temperature: the temperature not higher than +65℃, not lower than -25℃.

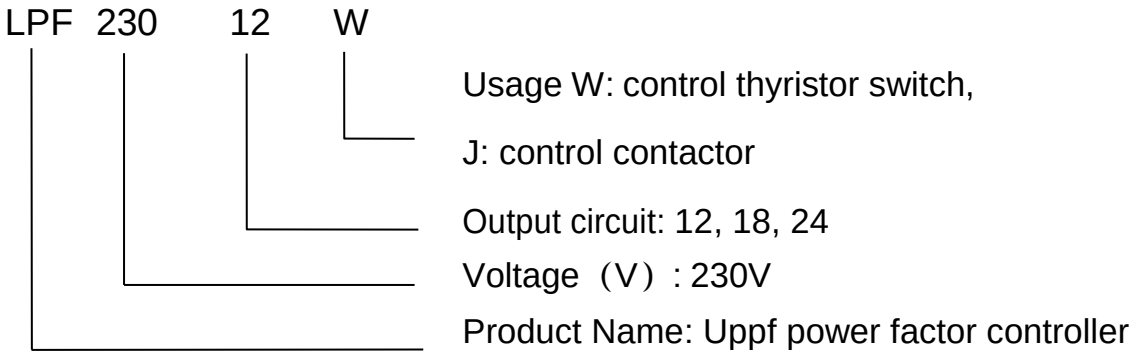
Atmospheric conditions: Air humidity does not exceed 90% at 20°C, and higher relative humidity is allowed when the temperature is low.

Altitude: Not exceed 2500m

Environment condition: the surrounding medium has no danger of explosion, no corrosive gas, no conductive dust and rain and snow

erosion, and the installation site cannot be violently vibrated.

3. Model Description



Note: The above models are only reflected in the label

4. Terminal Function

4.1 Real-time Data Monitoring

Voltage, current, and switching status of the capacitor banks for each phase of the power factor

Active power, reactive power

Voltage total harmonic distortion rate, current total harmonic distortion rate, system frequency

3、5、7、9、11、13、15、17、19、21st voltage harmonic content rate

3、5、7、9、11、13、15、17、19、21st current harmonic content rate

4.2 Reactive Power Compensation

The sampling physical quantity is reactive power, without switching oscillation

Mixed compensation: Y type compensation method

Pure co-complementation: Δ type compensation method

Δ type compensation method

Y+Δ comprehensive compensation method

5. Technical Parameter

5.1 Basic Parameter

Power Voltage	AV 380V±20% (I generation co-compensate and II generation co-compensate 16/18/24 channels)
	AC 220V±20% (II generation co-compensate 12 channel and mixed compensation controller)
Sampling Voltage	AC 380V±20% (Co-compensation) AC220V±20% (Mixed compensation)
Power Frequency	50Hz±5%
Sampling Current	0~5A
Overall Unit Maximum Consumption	12W (Depends on the switching power controlled)
Control Output Terminal	A Type: each channel DC12V*40Ma (+12V output) B Type: 220V/5A (Relay output)

Remarks: The sampling voltage can be changed according to customer needs. If 690V voltage is required, the sampling voltage is 690V±20%.

5.2 Measurement Accuracy

Voltage	±0.5%
Current	±0.5%
Active Power	±1.0%
Reactive Power	±1.0%
Frequency	±0.5%
Power Factor	±1.0%

5.3 Control Parameter

Control Sensitivity	30mA	
Target COSΦ	0.85~1.00	Steplength 0.01
Threshold Coefficient	0.1~1.2	Steplength 0.1
Switching Delay(1)	0.02s~600s	Steplength 1/0.02
Switching Delay(2)	00s~300s	Steplength 1
Overvoltage Protection	230~290V (Mixed compensation)	Steplength 1V
	400~480V (Co-compensation)	Steplength 1V
Under-voltage Protection	180~210V (Mixed compensation)	Steplength 1V
	300~360V (Co-compensation)	Steplength 1V
Overcurrent Protection	0~9999A	Steplength 1A
Small Current Protection	0~990A	Steplength 1A
Harmonic Voltage Exceed Limit	00.0%~100%	Steplength 0.5%

Harmonic Current Exceed Limit	00.0%~100%	Steplength 0.5%

6. Display and Operation

6.1 Automatic Operation

Key Description:

ESC :Return Key;

▲ ▼ :Up/Down Keys, turn screen in automatic state, adjust parameters in setting state, switch capacitors in manual state, view historical records in event recording state;

ENT :Confirm Key, confirm to save parameters

After the system is powered on, it will automatically enter the main menu (Chinese/English optional) after 30 seconds, and enter the automatic operation state after a delay of about 30 seconds. LCD backlight automatically turns off in 180 seconds, press any key to activate the backlight.

There are 7 screens in the automatic operation state, and the operation data of the power grid can be displayed cyclically by operating the up or down keys.

"▲▼" is the switching instruction, the ▲ or ▼ flickers when a certain capacitor is to be switched on or off, it indicates the action to be performed.

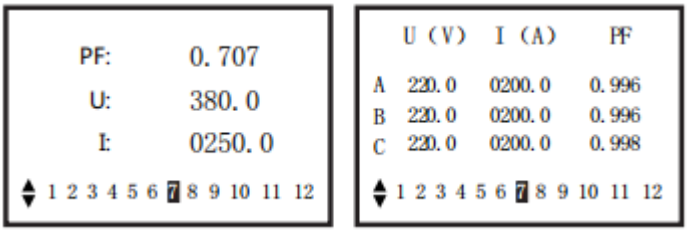
1-24 is the output state, if a channel number is reversed, it means that the channel has been put into use. Otherwise it means not invested.

The number of capacitors displayed on each screen of the controller with different maximum output channels is different.

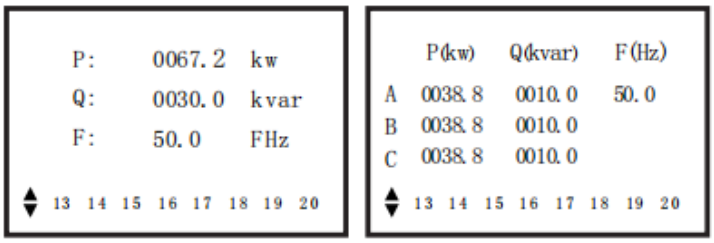
24 channel as an example.

First screen, display power factor, real-time voltage, current, capacitor switching status.

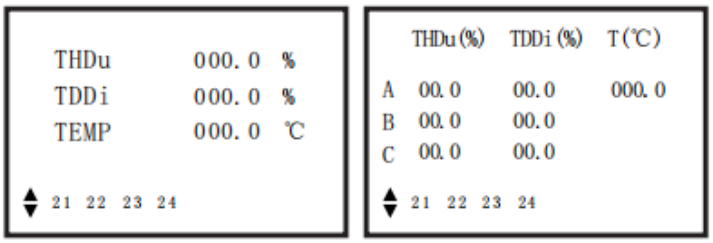
This picture shows the 7 channel is invested.



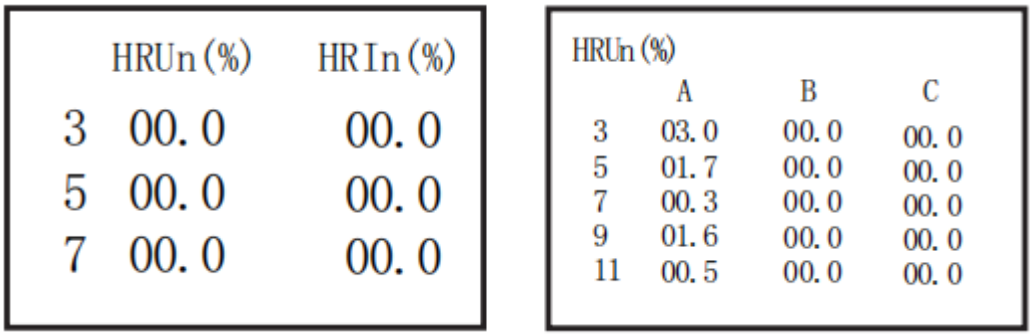
Second screen, display active power, reactive power, grid frequency, capacitor switching status.



Third screen, display voltage and current harmonic total distortion rate, ambient temperature, capacitor switching status.

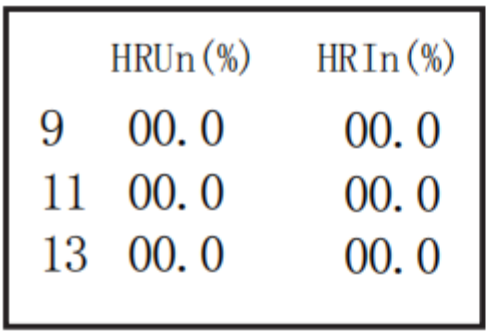


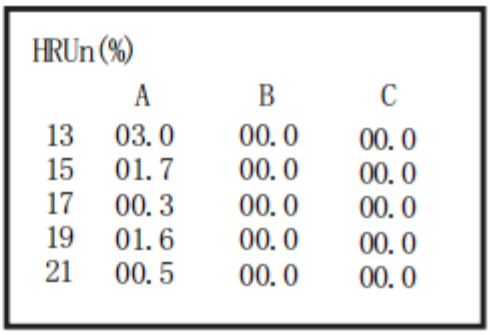
Fourth screen, co-compensation displays 3rd, 5th, 7th voltage and current harmonic distortion rate. Mixed compensation displays 3rd, 5th, 7th, 9th, 11th voltage harmonic distortion rate.



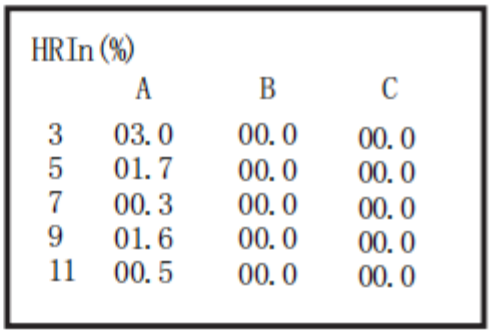
Fifth screen, co-compensation displays 9th, 11th, 13th voltage and current harmonic distortion rate. Mixed compensation

displays 13th, 15th, 17th, 19th, 21st voltage harmonic distortion rate.

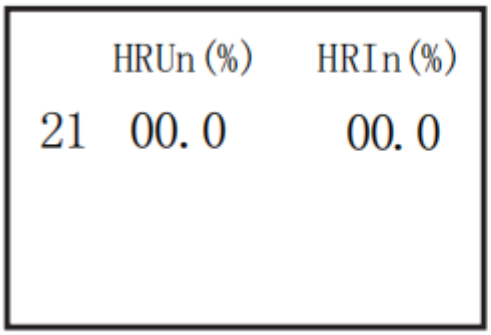


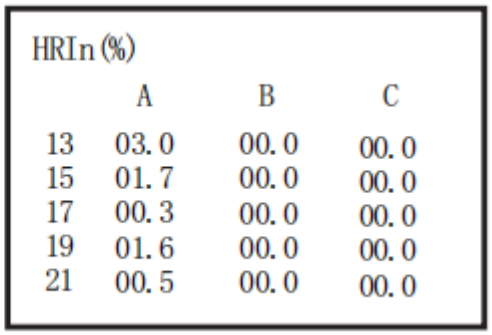


Sixth screen, co-compensation displays 15th, 17th, 19th voltage and current harmonic distortion rate (some controllers do not display). Mixed compensation displays 3rd, 5th, 7th, 9th, 11th, 13th current harmonic distortion rate.



Seventh screen, co-compensation displays 21st voltage and current harmonic distortion rate (some controllers do not display). Mixed compensation displays 15th, 17th, 19th, 21st current harmonic distortion rate.





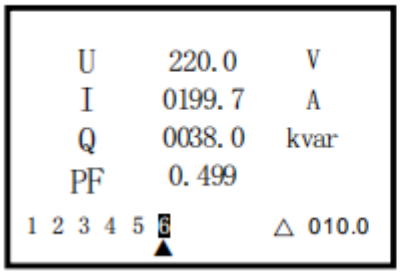
6.2 Manual Control

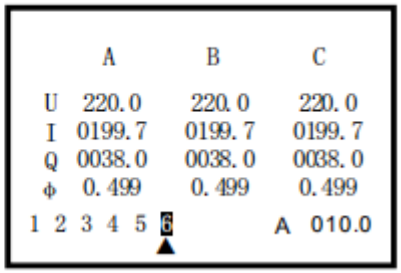
The manual function only acts on the forced switching of the compensation capacitor.

Press the Esc key to enter the main menu, operate the "▲ ▼"

key to select "manual control", and operate the "Ent" key to enter the manual state.

If the capacitance value of a certain channel is reversed, it means it has been put in, otherwise it means it has not been put in. (When the network port controller is in the networking state, manual control does not work)





This picture shows that the capacity of the 6 channel is 10kvar, and its electrical parameters. If the capacity of a certain channel is set to “00”, the channel cannot be put into operation. Operate the ▲▼ keys to select the channel number to be put into operation, and operate the “Ent” key to perform the input or removal action of the capacitor.

6.3 Parameter Setting

The relevant parameters of the product have been preset at the factory, and the user can modify them according to the needs of the site.

All setting parameters are automatically memorized and will not be lost when power off.

If a parameter is reversed, if you need to modify it, you can directly operate the "▲" and "▼" keys to modify the parameter.

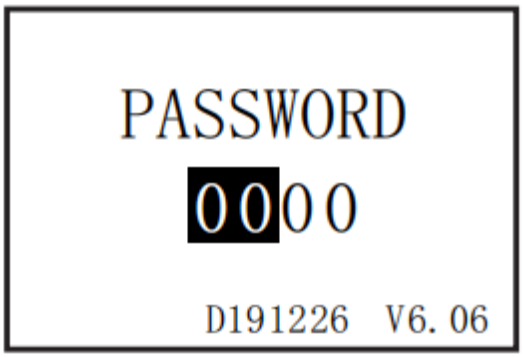
If a certain parameter is reversed, if you do not need to modify it, you can directly operate the "Ent" key to select other parameters.

Note: If it is used for the first time, parameters such as transformation ratio and capacitance must be reset according to the actual site needs.

Press the Esc key to enter the main menu, operate the "▲" and "▼" keys to select "Parameter Configuration", and operate the "Ent" key to enter the setting state.

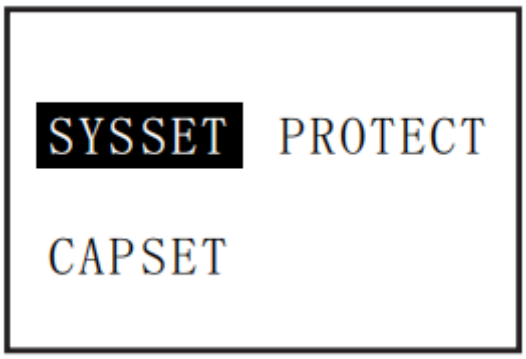
1) Password Confirmation (Factory preset 0000)

Press the "Ent" key to enter, and enter the password.



2） Parameter Selection

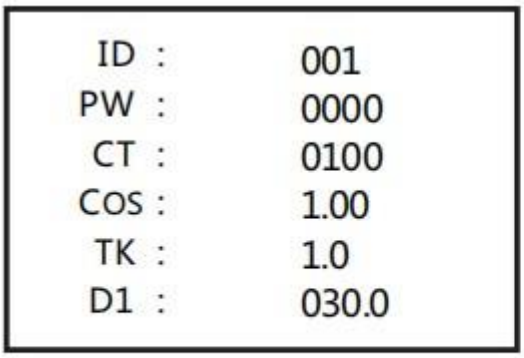
Press the "Ent" key to enter, select the parameter item to be set, such as "operation parameter".



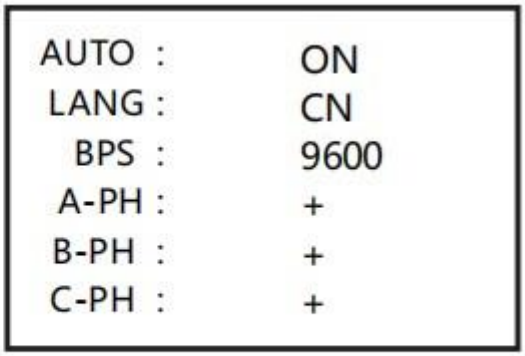
3）Operation Parameter

Press the "Ent" key to enter, select the parameter item to be set. A total of two screens for operating parameters (co-

compensation without B and C items).



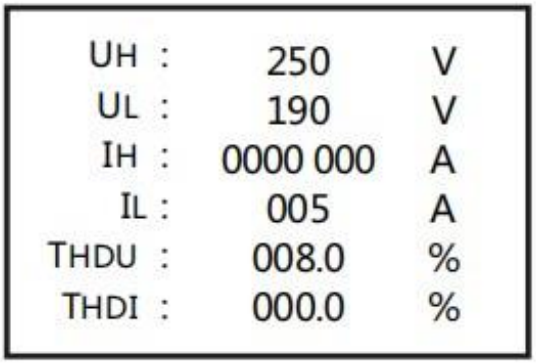
First screen



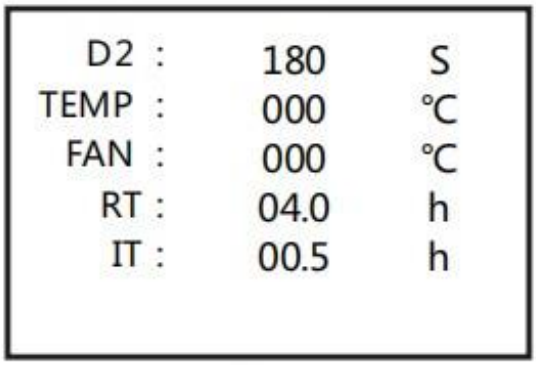
Second Screen

4） Protection Parameter

Press the “Ent” key to enter, select the parameter item to be set. A total of two screens for protection parameters.



First screen



Second Screen

Mark	Factor preset	Usage	Range
ID	001	Communication device address	001-255
PW	0000	Confirm parameter modification permissions	0000-9999
CT	100	Changes of current transformers in incoming cabinets	0000-9000
COS	1.00	Target PF	0.85-1.0
TK	1.0	Threshold coefficient setting	0.1-1.2
D1	30S	Switching capacitor waiting time	0.02-600
AUTO	ON	Manual/automatic mode switching	ON/OFF
LANG	CN	Chinese/English display switching	CN/EN
BPS	9600	Communication baud rate	1200-38400
A-PH	+	Current physical phase	+/-

B-PH		sequence setting	
C-PH			
UH	Co-compensation 430V	Cut off capacitors when grid overvoltage	0-980
	Mixed compensation 250V		
UL	Co-compensation 330V	Cut off capacitors when grid under-current	0-980
	Mixed compensation 190V		
IH	0000	Cut off capacitors when grid overcurrent	0000-9999
	000	Overcurrent cancellation alarm return difference	000-999
IL	005	Cut off the capacitor when the current is less than the set value	000-999
THDU	008.0%	Voltage total harmonic distortion rate overrun protection	000.0%-100%
THD1	000.0%	Current total harmonic distortion rate overrun protection	000.0%-100%
D2	180S	Capacitor discharge time setting	000-900
TEMP	000℃	Temperature protection setting (optional)	000℃-100℃
FAN	000℃	Fan temperature setting (optional)	000℃-100℃
RT	04.0H	Capacitor rotation working time	0-24h
IT	00.5H	Capacitor rotation rest time	0-12h

Special Instructions:

CT: Take the transformation ratio of the current transformer of the incoming line cabinet, such as 500/5, which is 100.

AUTO: ON means automatic compensation, OFF means manual input without exit, and will not automatically input, please use this function with caution.

LANG: CN is displayed in Chinese, EN is displayed in English.

A-PH: + is the correct current phase sequence, indicating that the current is connected to IA into Ia out.

- is the phase sequence of the reverse current, which means that the current connects Ia into IA out, (B and C are the same).

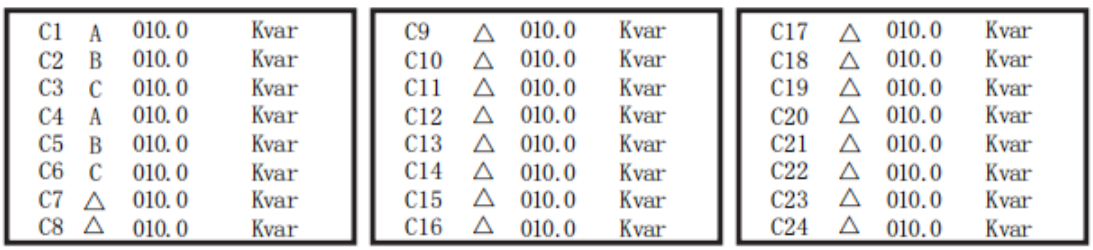
Disable protection when THDU, THDi is set to 0.

Attention：

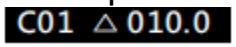
1. The value of TK “switching threshold” refers to the “threshold coefficient of input”, and the sum of it and “threshold coefficient of cutting” is 1.2.
When TK is set to 1.0:
Hysteresis state, if grid reactive power > input threshold (1.0) × pre-investment capacitor capacity, then input the capacitor;
Leading state, if the reactive power of the grid > cut-off threshold (1.2-1.0) × capacitance of the capacitor that has been invested, then cut off the capacitor。
When the compensation effect needs to be improved, the threshold coefficient can be reduced; if the switching stability range needs to be increased, the threshold coefficient can be increased.
The temperature and fan functions are optional, and some controllers do not have this option.

6.4 Capacitance parameter setting

Select “Capacitance Parameters”, press “Ent” to enter, it is divided into 12 channels according to the number of controllers. 16-channel/18-channel/24-channel, operate the “▲ ▼” key to select, the selected channel will be displayed in reverse.
After selecting the number of channels to modify, operate the “Ent” key to enter the modification state of the capacitance value, the capacitance value of the channel will be displayed in reverse, and modify the capacitance parameters by operating the “▲▼” key. After the modification is successful, press the “Ent” key to modify the capacitance value of other channels, no longer modify the capacitance value, operate the “Esc” key to enter the main menu.



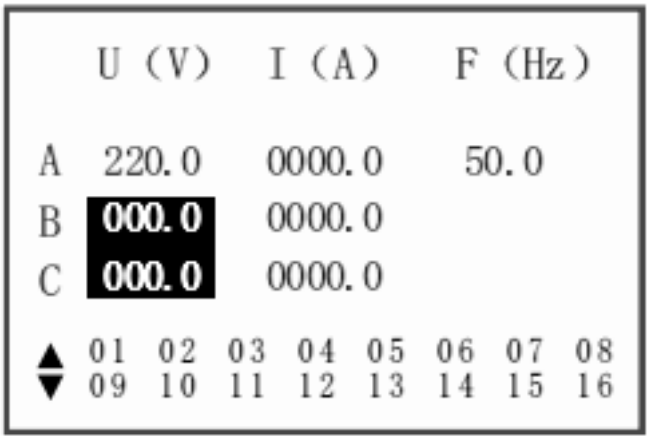
The maximum number of control channels is the channel quantity displayed at most, such as an 18-channel controller, the capacitor setting parameter is C18.
Ordinary controller:
C1-C12: 12-channel capacitance (display the corresponding

capacitance parameters according to the number of output channel);
C1-C16: 16-channel capacitance (display the corresponding capacitance parameters according to the number of output channel)
C1-C18: 18-channel capacitance (display the corresponding capacitance parameters according to the number of output channel)
C1-C24: 24-channel capacitance (display the corresponding capacitance parameters according to the number of output channel)
The compensation mode and capacity of each channel can be set arbitrarily according to the needs.
030.0: capacitor capacitance setting, this capacitor cannot be switched if it is set to 00.0.
The compensation method of each channel and capacitance can be set arbitrarily according to the needs.
Note: A、B、C: Split-phase capacitor setting (split-compensation);
Three-phase capacitor setting (co-compensation);


: 010.0 is corresponding to the capacitance of the capacitor (the general meaning is the first channel, the capacity is 10Kvar), if it is set to 00.0, the capacitance of this channel cannot be switched.

6.5 Overrun and Fault Warning

When the grid fails or a certain parameter exceeds the limit, the corresponding parameter will be displayed in reverse to prompt the status of the certain value, such as overvoltage, under-voltage, phase loss, and a certain parameter is beyond the limit.

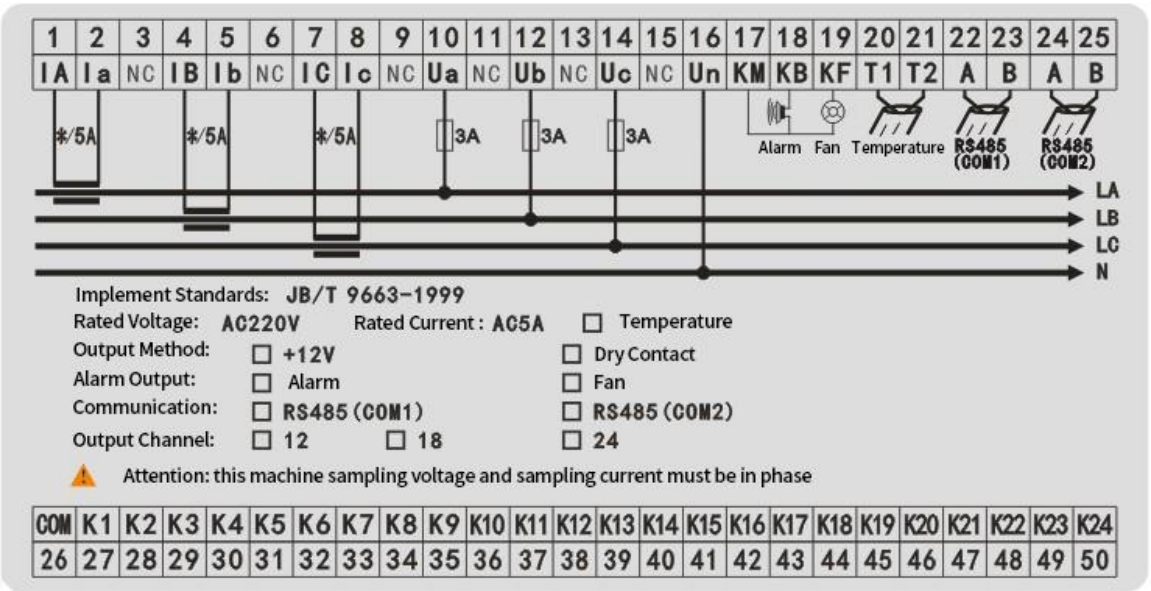


B、C voltage loss phase

7. Installation and Testing

7.1 Inspection and wiring diagram before installation

Before opening the package of the device and preparing for installation, carefully check whether there is any damage and the accessories and instructions are complete. If you find any problems, please contact the supplier in time. Connect to the power supply, power on to check whether the operation function and display are normal.



7.2 Installation Dimension

Dimensions: 144*144*95mm
Hole opening size：138*138mm
Embedding depth: 49mm

7.3 Wiring Instructions

When considering the installation plan, please follow the principles of easy installation, convenient observation and collection, and good wiring for signals, power and grounding.

7.3.1 Working Power

The working power of this device is multiplexed with the phase A voltage sampling channel, AC220V±20%.

7.3.2 Voltage signal wiring

The voltage signal line is also used as the power input of this device. The 1.5mm2 single-strand copper wire should be used, and it should be kept away from high-voltage and large-current carriers to reduce electromagnetic influence.

7.3.3 Current signal wiring

In order not to affect the measurement accuracy, the current signal line should use 2.5mm2 single-strand copper wire, and the wire should be as short as possible.

7.3.4 Contact/Switch Output

The contact output capacity is 5A/AC220V, the level output capacity is DC12V/40mA, and the connection should be kept away from the input circuit, high voltage, and large current carrier as far as possible.

8. Simple Troubleshooting

8.1. No Display

Please check whether the power cord is connected properly.

8.2 No data for a certain phase

Please check whether the phase wiring is secure.

8.3 COSØ value does not change with the switching of the capacitor

Please check whether the position of the sampling current transformer is correct (sampling current = load current + capacitor current).

8.4 COSØ value is wrong

Please check whether the sampling voltage signal and the sampling current signal are in the corresponding phase, and the two cannot be in the same phase.

8.5 Current displays as “0.0A”

Please check whether the circuit between the current transformer and the current signal terminal of the controller is open or there is no load.

8.6 Current displays wrong

Please check whether the value configured in "CT Transformation Ratio" in the parameter setting item is consistent with the ratio of the sampling current transformer.

8.7 Forced removal of capacitors

Please check whether a certain indicator of the grid exceeds the set protection range, and the controller will have a corresponding alarm indication at this time.

8.8 Poor Compensation (COSØ value is small)

Firstly, it can be realized by reconfiguring several items in the parameter setting, increasing the value of “Target COSØ”, or reducing the value of “Switching Threshold”, our recommended values are 1.00 and 1.0, each set of capacitance values is the same as the actual physical values.

Secondly, the capacity of the capacitor should be reasonably configured according to the site conditions. If it is graded compensation, the capacity difference of each level of capacitor should be minimized as much as possible.

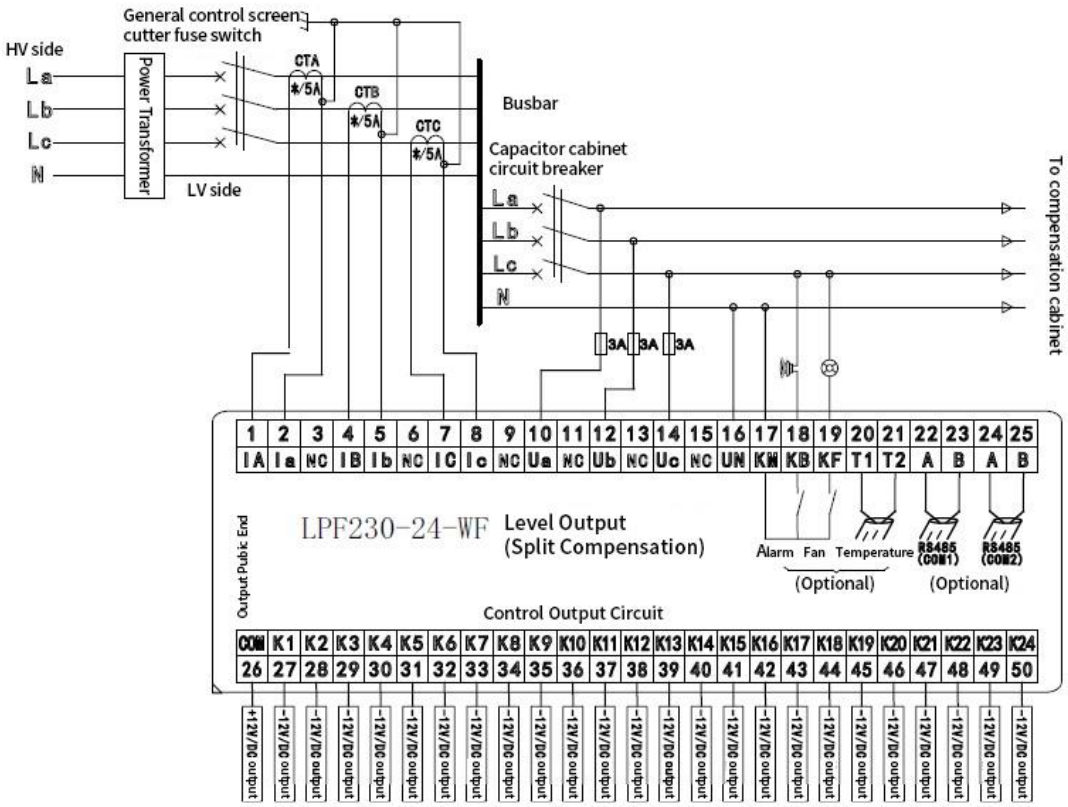
8.9 Others

If the above inspections cannot eliminate the fault, please

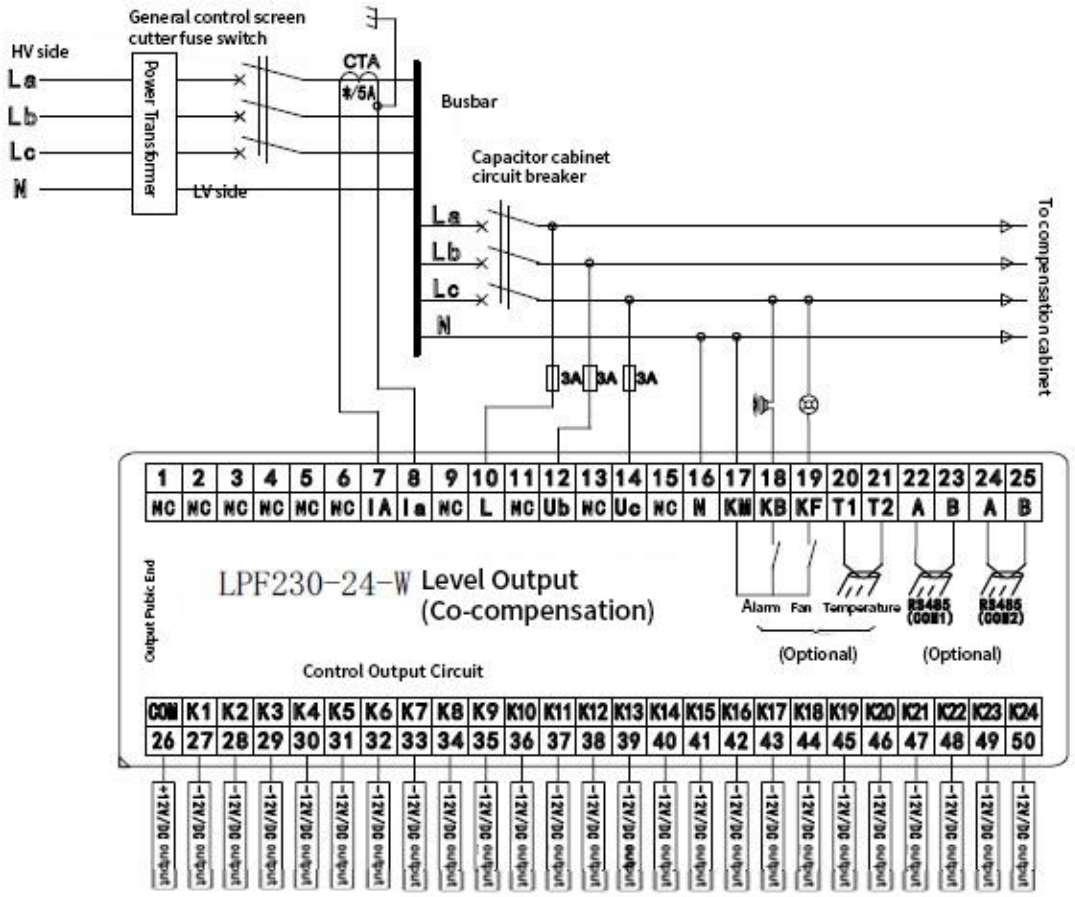
replace a controller and make another judgment, or contact the dealer directly for help.

9. Wiring Diagram

9.1 24 channels dynamic mixed compensation (no external power supply required)

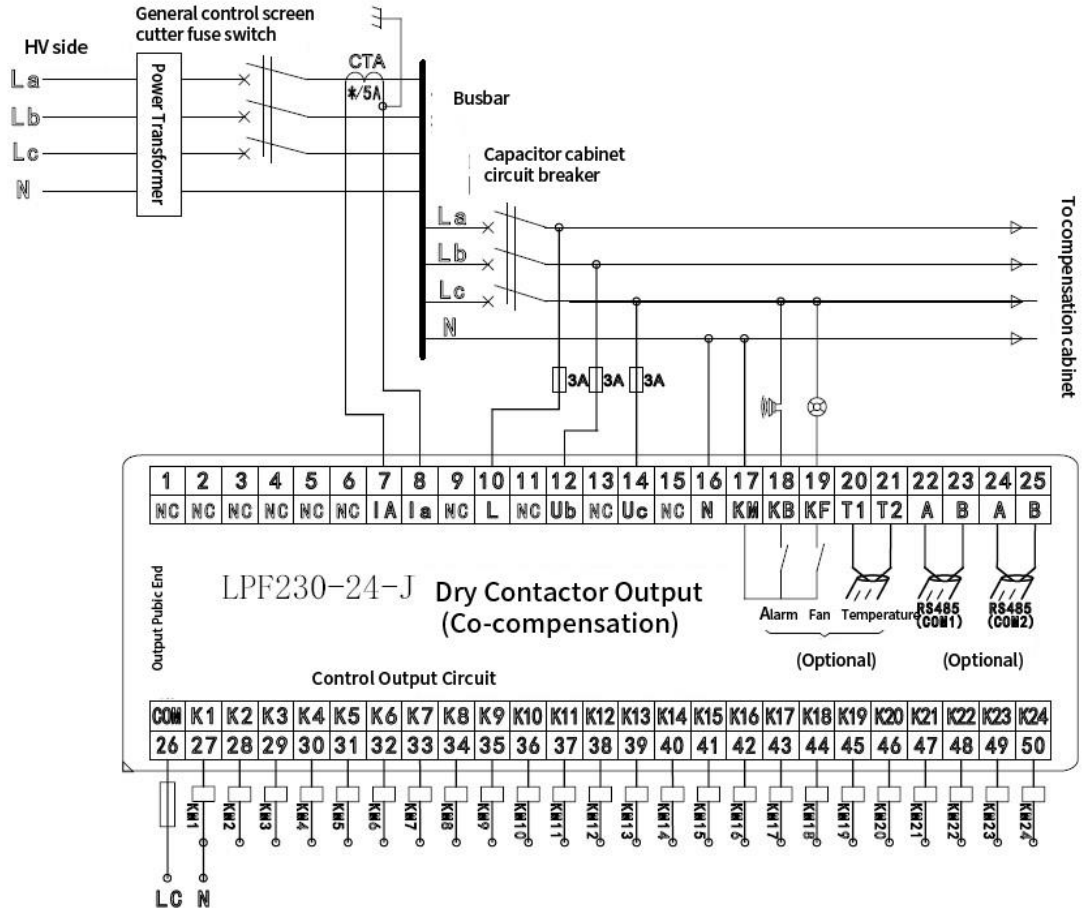


9.2 24 channels dynamic three-phase compensation (external power supply is required)



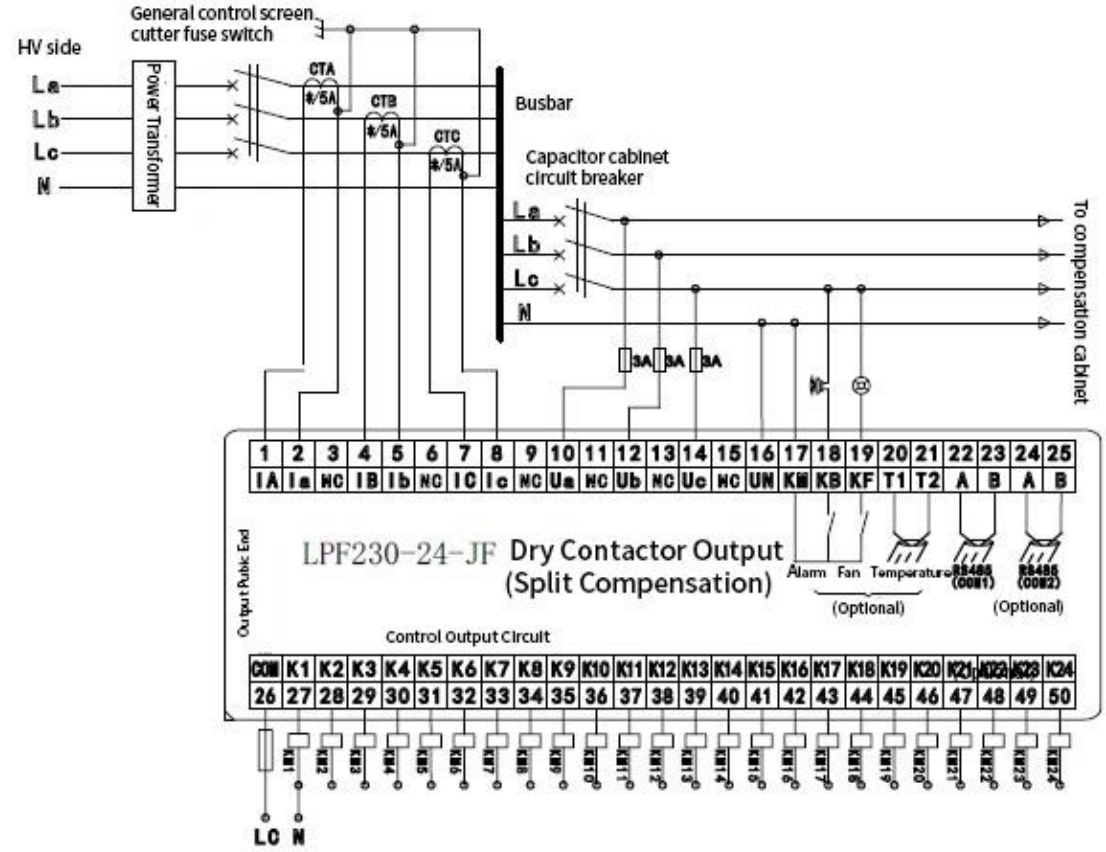
Note: 12 channels and 18 channels are only different in the number of control output circuits, and the other wiring is the same.

9.3 24 channels static three-phase compensation (external power supply is required)



Note: 12 channels and 18 channels are only different in the number of control output circuits, and the other wiring is the same.

9.4 24 channels static mixed compensation (no external power supply is required)



After-sale Service

The products of our company are guaranteed for 1 year, and the warranty period starts from the date of product sale. If the product faults or the parts are damaged during the warranty period, our company will provide free maintenance after it is identified by our technicians as occurring under normal use.

In the following cases, material costs and maintenance man-hours will be charged:

- Damage caused by not following the instructions in the manual
- Damage caused by unauthorized desoldering of parts or modification

The operation exceeds the “Three Guarantees” period

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