NO:2019.11

CHINT ELECTRICS

NWK1-GR 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

NWK1 series 3-phase compensation low voltage power factor controller (with Chinese/English LED) is equipped with ASIC chip which can conduct calculation and analysis of the collected voltage and current through FFT. It uses the calculated fundamental reactive power as controlled physical variable and conduct capacitor switching in cycle or by code based on fundamental power factor and harmonic status, providing optimized compensation for users under both stable and fluctuating load environment.

NWK1-G general type product (no communication) is only applicable to reactive compensation of 380V grid system.

NWK1-GR multifunction type product with sampling voltage of AC (100~800) V and frequency of 50/60Hz is applicable to most low voltage grid systems around the world.

NWK1-GR can be connected to SCADA, PLC systems through RS485 communication interface, achieving easy and direct networking with major industrial control configuration software for data transmission and remote control.

Product standard: JB/T 9663

Type key and definitions

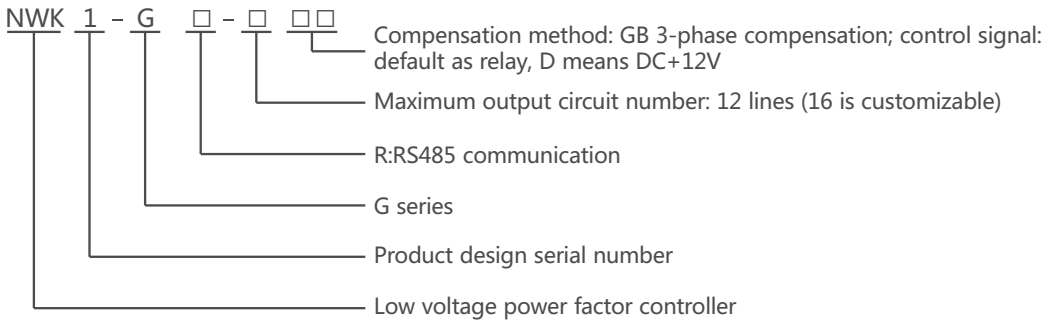


Table 1 General specification and product sizing:

No.	Model	Technical introduction	Control object
1	NWK1-G-12GB	General functions, 380V±20%, max. 12 lines, relay output	Cj19 capacitor switching contactor
2	NWK1-GR-12GB	Harmonci analysis and communication function, (100~800)V, max. 12 lines, relay output	Cj19 capacitor switching contactor
3	NWK1-G-12GBD	General functions, 380V±20%, max. 12 lines, DC +12V output	ZCK smart compound switch
4	NWK1-GR-12GBD	Harmonci analysis and communication function, (100~800)V, max. 12 lines, DC+12V output	ZCK smart compound switch
Note	NWK1-GR-12GB means NWK1-GR series with sample voltage of (100~800)VAC, max. 12 lines output, 3-phase compensation, relay output as control signal, and contact as control object.		

2 Key Technical Parameters

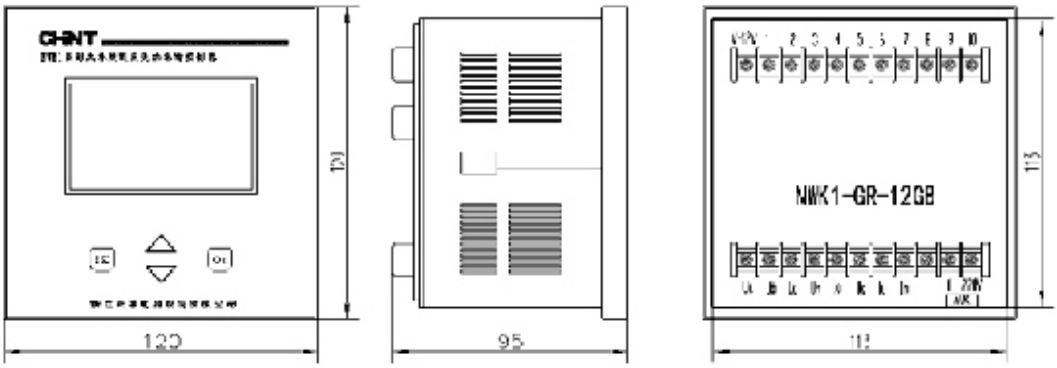
Table 2 Key technical parameters

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	Wide voltage sampling signal AC(100~800)V, applicable to different voltage classes in most countries.	
	Real-time monitoring of 3rd~15th grid harmonic, recording max. harmonic content and total harmonic off-limit time, providing users with harmonic analysis basis, preventing equipment from burning out due to harmonic amplification, saving cost for power clamp meter and maintenance.	
	User can check the average power factor $\overline{PF}$ of last week at any time to see if the reactive compensation status is within the incentive or penalty range as specified by power supply bureau.	
	Four-quadrant real-time display of fundamental power factor cosφ and harmonic containing power factor PF.	
	Measuring functions: cosφ, PF, U, THDV, I, THDI, P, Q, S, F, T.	
	The fundamental reactive power ▵KVar needed to be compensated for the grid to reach target power factor. This parameter can be inquired in real-time.	
	Displays voltage total harmonic distortion rate in real-time and provides harmonic protection for the capacitors.	
	Easy commissioning - enabling manual connecting or disconnecting of individual line independent of line sequence, enabling real-time inquiry of multiple grid parameters for easy wiring correction and compensation analysis.	
	Direct setup of capacity: 1. Constant capacity switching: switching capacitors in cycle automatically according to defined order; 2. Non-constant capacity switching: switching capacitors according to optimized setting or by code (capacitor configured by ratio); the system will identify the method automatically.	
	Pop-up window in case of alarm or protection: overvoltage, undervoltage, overharmonic, overcurrent, undercurrent, over-compensation, under-compensation, average power factor , and a group of relay contact alarm output.	
Technical parameters	Sampling voltage	Phase BC (100~800)V Impedence ≥ 1M Ω Precision: 1%
	Sampling current	Phase A 0.05~6A Impedence≤0.1 Ω Precision: 1%
	Frequency	45Hz~65Hz Precision: 0.5%
	Operating power supply	AC (220V~240)V Independent auxiliary power supply AUX
	Power consumption	≤8W
	Number of output lines	12 lines Number of lines is customizable
	Relay output contact	AC220V 5A
	Active DC output	DC 12V 10mA for each line
	Alarm relay contact	AC220V 5A
	Communication interface	RS485 or others
	Protocol	ModBus RTU

Technical parameters	Display type	Chinese/English lattice LCD display
	Product dimensions	120x120x80mm
	Mounting hole	Embedded type 113x113mm (Customizable perforating dimension: 138x138mm)

3 Installation

3.1 Main Features, outline and installation Dimensions

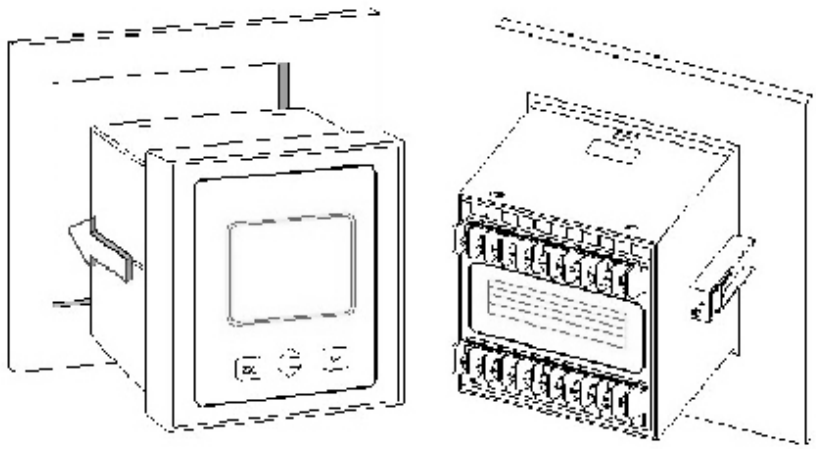


NWK1 series product uses insert type installation method, with mounting hole on the side of the enclosure. User only needs to insertthe hook of the fixing accessory into the mounting hole and tighten the screw of the accessory to secure the controller.

The ouline dimensions of the product is 120×120×80mm, the installation perforating dimensions is 113×113mm, the embedding depth is 80mm (same as the structure of 42L6 series instrument). The perforating dimensions can be customized to 138x138mm as requested.

3.2 Installation Process, Method and Product Wiring Diagram

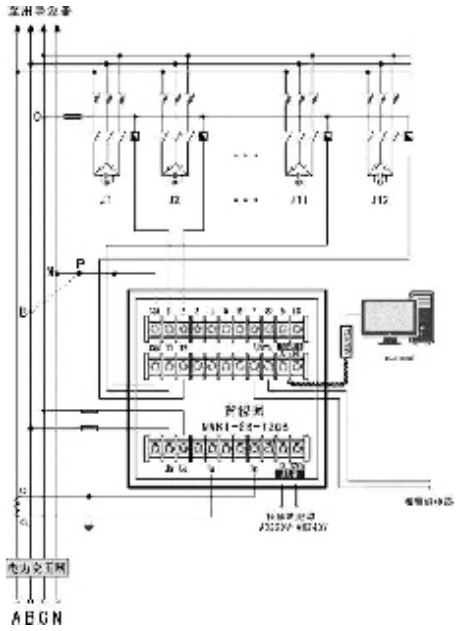
3.2.1 Assemble and fixing of controller



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 enclosure. 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 damaged due to vibration during transportation.

3.2.2 Product wiring

3.2.2.1 NWK1-GR-12GB (Relay contact output), for 3-phase 4-line compensation of AC (110~660)V system.



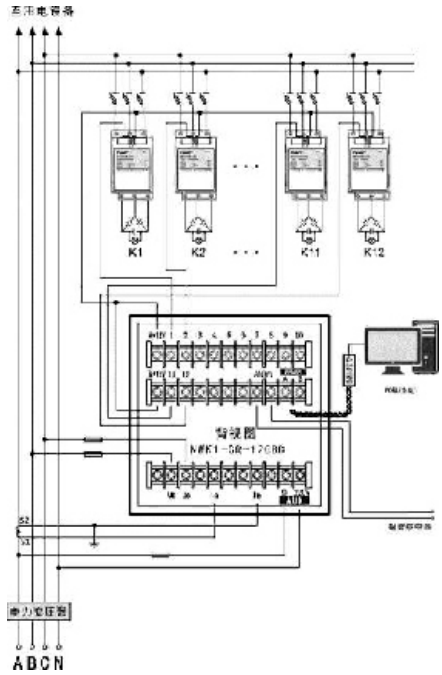
① Terminal "COM" is the internal relay common terminal of the controller. Terminals 1~12 are for control output.

② The independent power supply of the controller is connected to auxiliary power supply AC(220-240)V.

③ In LL380V system, if the coil voltage of the contactor is 380V, user can connect point P to phase B instead of phase N (It is recommended to use AC contactor with coil voltage of 220V).

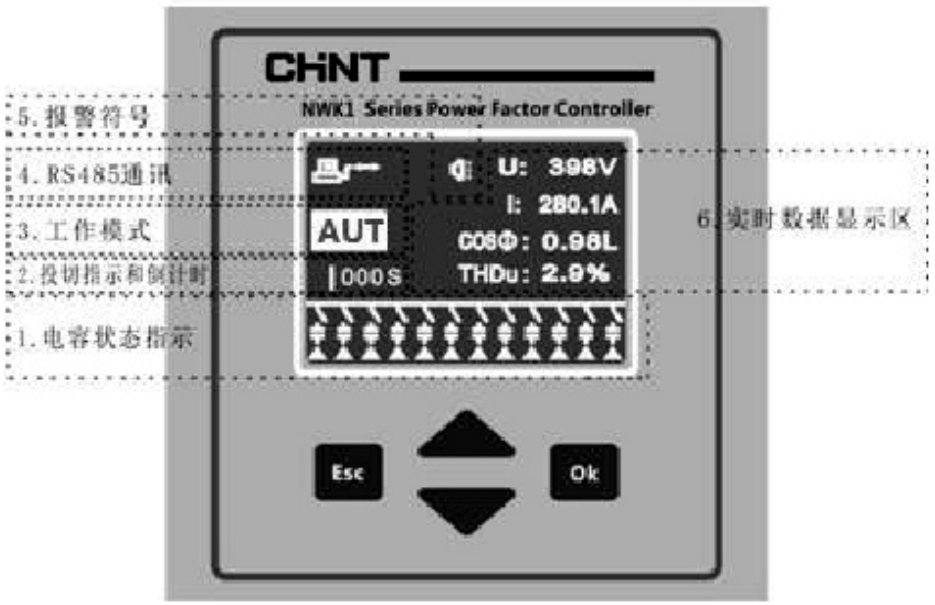
④ If the product is used in LL660V system or LL127V system, it is recommended to choose AC220V for both contactor coil voltage and auxiliary power supply.

3.2.2.2 NWK1-GR-12GBD (Active DC12V output control compound switch), for 3-phase 4 line compensation of 400V system.



① V+12V is the common terminal of controller active control signal, terminals 1~12 are for active signal output. The controller is equipped with built-in DC source, providing 10mA/12V for each line.
② The independent operating power supply of the controller is connected to AC (220-240)V auxiliary power supply.

4 Panel Function Introduction



5. Alarm symbol 4. RS485 communication 3. Operating mode 2. Switching indication and countdown
1. Capacitor status indication 6. Real-time data display area

4.1 Capacitor status indication:

Table 3 Capacitor status indication

Symbol	Operating status and definition	Other operating status
	Disconnected	△ Means 3-phase compensation capacitro, 0 means the circuit is not in use.
	Connected	

4.2 Switching indication and countdown

Table 4 Switching indication and countdown

 symbol flashing	Means ready for switching	 030S means 30 seconds before connecting
 symbol flashing	Means ready for switching	 030S means 30 seconds before disconnecting
Symbol 000S means not operating (no capacitor is being connected or disconnected).		

4.3 Operation mode

Displays operation mode: automatic switching or manual switching.

4.4 RS485 communication

Symbol means communication is enabled; symbol means communication is disabled.

Symbol ◀ flashing means receiving data; symbol ▶ flashing means sending data;

Symbol means data transmission is interrupted.

4.5 Alarm symbol

When there is an alarm,the symbol will flash and a corresponding dialog box will pop-up.

Keys

:

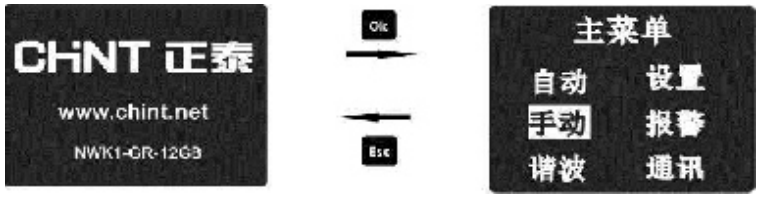
返回	Return to previous menu; cancel the current operation; return to main screen or main menu;
确认	Confirm the selected function; save any changed data;
▼	Show next interface; select function; move the cursor; increase value;
▲	Show previous interface; select function; move the cursor; decrease value.

If large type main interface is used during setup, the screen will show fundamental power factor in large font in automatic mode so user can check the value easily from a long distance.

5 Power-on and Manual Test

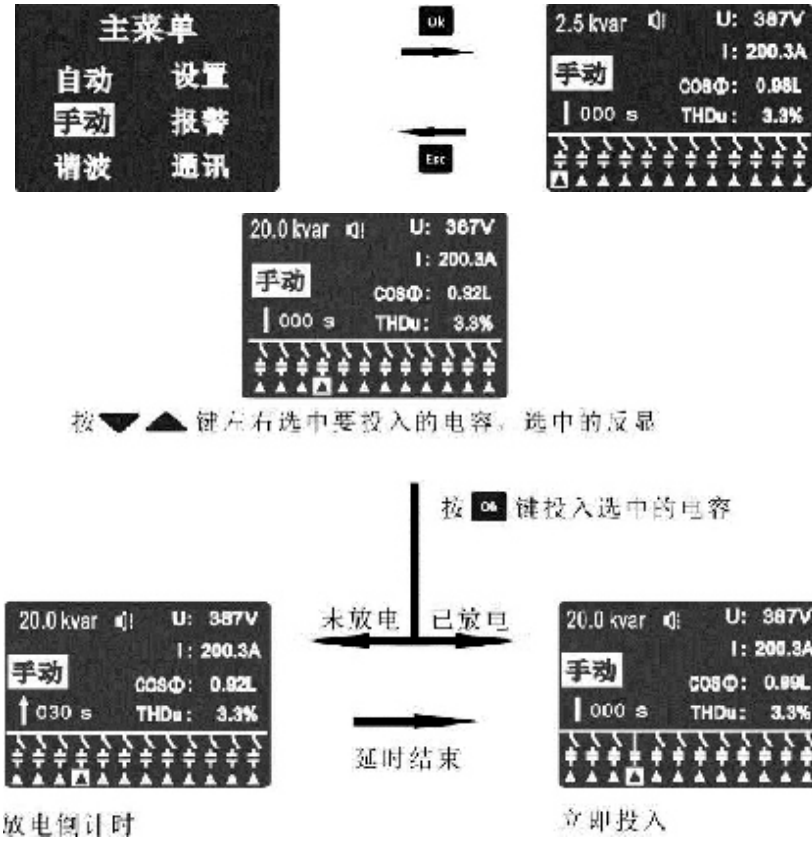
5.1 Start-up

When starting the product for the first time, the controller will show product model and company information,press any key to enter main menu;



5.2 Manual test

Press ▼ or ▲ key in the main menu to select manual function, then press 确认 key to enter manual switching interface.



Press key to select the capacitor to be connected, the selected capacitor will be displayed in a contrast color.

Press Ok key to connect the selected capacitor

Not discharged Discharge

Delay over

Discharge countdown Connect immediately

The process for disconnecting a capacitor is the same as connecting a capacitor. Press 返回 key to cancel the action during the discharge countdown.

Check the real-time data of the grid to provide reference for analysis of wiring, power factor, load status, consistence between capacitor and load as well as compensation effect in manual operation mode.

In manual switching mode, the capacitor switching status will be saved automatically upon power failure and recovered after power being restored.

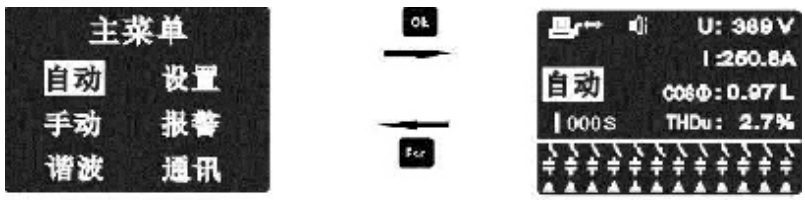
All protectective disconnection of capacitors are invalid in manual operation mode.

6 Automatic Operation

The controller can automatically identify the polarity of voltage and current. In automatic operation mode, the controller will determine the switching of capacitor banks according to user settings and grid power changes automatically, so as to maintain the grid power factor within the range as required by user.

See troubleshooting 6 and 7 for switching principle analysis.

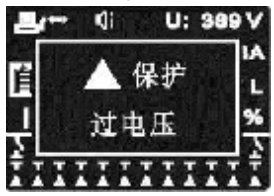
User can check various real-time grid data in automatic interface. The system will pop-up alert information in case of alarm or protection.



自动主界面

6.1 Pop-up information

When protection or alarm occurs in automatic mode, a dialog box will pop-up on the display to show corresponding information, in the meantime, the backlight will be hightlight for warning. After the controller activated protection, the system will automatically disconnect capacitors and lock-up connecting of any capacitro. See the table below for alarm type.



In case of multiple alarms, press ▼ or ▲ key to navigate through different alarm windows;

Press 确认 key to close the dialog box.

If the incident is not handled within 15 seconds after closing the dialog box, the dialog box will pop-up again.

Table 5 Alarm list

Alarm	Condition	Possible cause
Overvoltage protection	Voltage is higher than threshold	The set overvoltage threshold is too low; the grid voltage is too high
Undervoltage protection	Voltage is lower than threshold	The set undervoltage threshold is too high; the grid voltage is too low
Over-harmonic protection	THDv is higher than threshold	The set harmonic threshold is too low Severe grid harmonic pollution; resonance
Undercurrent protection	The secondary side current of the transformer is smaller than 10mA	Load is too small The ratio of installed CTs too big CT open circuit Shor circuit bridge is not open
Undercurrent alarm	The secondary side current of the transformer is smaller than 50mA	Load is too small The ratio of the installed CTs too big CT open circuit Short circuit bridge is not open
Overcurrent alarm	The secondary side current of the transformer is bigger than 5.5A	The ratio of the the installed CTs is not matching with load current.

Alarm	Condition	Possible cause
High temperature alarm	Due to influence from internal heat generating components, the measured temperature is about 3℃ higher than the actual temperature.	The set high temperature threshold is too low. The ambient temperature is too high.
Low avera $\overline{PF}$ gealarm	The average power factor of last week is lower than 0.90.	Improper connecting threshold setting. No capacitor is connected in case of protection. Insufficient compensation capacity. Wrong wiring.
Under-compensation alarm	The power factor has been lower than connecting threshold for 15 minutes after all the capacitors are connected.	Wrong wiring; miniature circuit breaker tripped or fuse was blown; Aging capacitor; insufficient capacity.
Over-compensation alarm	The power factor has been higher than connecting threshold for 3 minutes after all the capacitors are disconnected.	Wrong wiring; contactor is jammed or contact is binded with sub-cabinet which causes capacitive grid; fixed capacitor is installed in the line.
RS485 communication failure	No data transmission for over 30 minutes.	Wrong connection of terminal A and B; wrong selection of protocal; Baud rate does not match with address; disconnected communiation

See Main menu – Alarm for detail alarm inforamtion and real-time status.

6.2 Real time grid data inquiry

Press ▼ key to check next item, press ▲ to check previous item, press 返回 key to return to main interface or the system will return to main interface automatically if there is no action for 30 seconds.

Interface	Display
Main interface	Vrms, Irms, THDV, Cosφ
1st screen	THDI, PF(harmonic included power factor)
2nd screen	Q, ▵Q(reactive power that needs to be compensated)
3rd screen	P, S
4th screen	F, T(ambient temperature)
5th screen	Average power factor

Note: (1)For Cosφ data, L means inductive (lagging status), C means capacitive (leading status).

In first and fourth quadrant: no symbol, for example 0.99L;

In second and third quadrant: expressed by "-", for example -.99L.

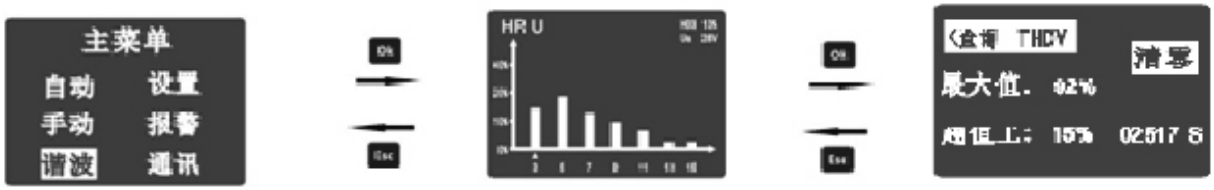
If user changes the wiring direction of sample CT when the controller is powered-on, a "-" symbol will appear in front of power factor Cosφ, therefore please disconnect the main power of the cabinet before changing the wiring for current sampling.

(2): △Q means: The kvar value needed to compensate the current grid power factor to target cosφ value.

When △Q is positive, it means user needs to input reactive power;

When △Q is negative, it means user needs to remove reactive power.

7 Harmonic Analysis



Press ▼ ▲ key to move the cursor ▲ left or right to check the 3rd-15th voltage harmonic ratio one by one.

Press ▼ ▲ key and move the cursor ▲ to right to next screen which shows maximum value of voltage harmonic distortion rate and the time that the harmonic voltage threshold has been exceeded.

8 Setup

Table 6 Setup item list (Default values are applicable to 3-phase 400V system)

Item	Default values	Range	Unit
Target factor	0.98L	0.85L-0.85C	
Switching delay	15	2~180	Second
Overvoltage threshold	440	100~800	V
Undervoltage threshold	320	75~620	V
Over-THDV threshold	Off	Off/3~90	%
Current ratio	5/500	5/5~6000/5	A
Main interface	Off	Off/On	
Undercompensation/ Overcompensation alarm	Off	Off/On	
Output circuit number	12	Programmable	Line
3-phase compensation capacity configuration	10：10:10:10. . . .	0~300	Kvar
Capacitor rated voltage	400	100~1200	V
Auxiliary operating power supply	No need for setup	220~240	V
Capacitor discharge delay	60	0~240	S
Language selection	(Domestic) Chinese, (Overseas) EN	Chinese/English (Optional)	
Recover to factory settings	Default value	Yes/No	

Note (1) CT primary side value: Set the primary side rated current value of CT (The end user must conduct the setup according to the CT ratio of main cabinet). Example: If the CT ratio of main cabinet

(refer to nameplate) is 800/5, set the value to 800.

(2) Capacitor congfiguration: Set the capacity of each line. If the circuit is not in use, press the key until the circuit is set to OFF.Set the capacity of each circuit based on the actual capacity of the capacitors (refer to nameplate), for example: set 15.0 for 15kvar.

(3) Capacitor rated voltage: It is used to calculate the actual power of capacitors in the network so as to improve compensation precision.Example: If the capacitor rated voltage value (refer to nameplate) is 450V, set the value to 450.

(4) Capacitor discharge: Discharge delay time for reconnect a capacitor after disconnecting it. User must install external discharge resistance before reducing discharge time.

(5) THDv threshold: It enables fast disconnecting of capacitors step by step if the harmonic exceeds threshold during operation, to prevent equipment and capacitor burn out due to harmonic amplification.

Set to OFF to disable the protection. Do not run the capacitors under large harmonic for a long time, please install filter compensation device.

After finishing setup, user must check the above ①②③ against the content on the nameplate of the product, otherwise the product may no function properly. Check other requirements against the factory default values listed in the table above.

Example 1. Setup method of targe power factor (Change to 0.95L)

Press ▼▲ key to select item Press ▼ key to change the value to inductive direction, down to 0.85L

Press 确认 key to pop-up a parameter alteration dialog box ▲ Press key to change the value to capacitive direction, up to 0.85C

Press 确认 key to save the changes and exit

Press 返回 key to exit without saving the changes

Example 2. Setup method of current transformer ratio (Change current ratio to 600/5A)

Press ▼▲ key to select item Press ▼▲ key to increase and decrease value (press and hold to fasten the speed)

Press 确认 key to pop-up a parameter alteration dialog box Press 确认 key to save the changes nd exit Press 返回 key to exit without saving the changes

Example 3. Setup method of over-THDv threshold (Change from Off to 7%)

Press ▼▲ key to select item Press ▼▲ key to increase and decrease value (press and hold to fasten the speed)

Press 确认 key to pop-up a parameter alteration dialog box Press 确认 key to save the changes and exit Press 返回 key to exit without saving the changes

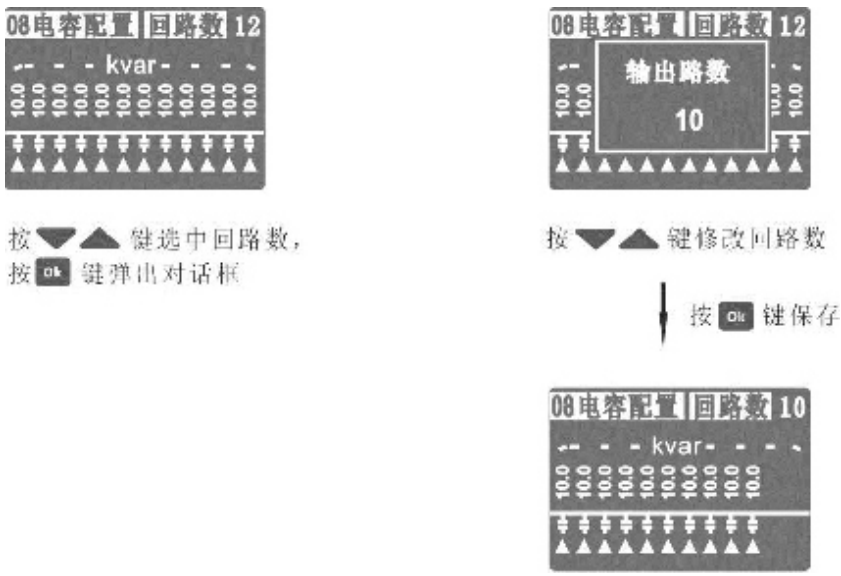
Refer to the procedure above for the setup of other items.

Example 4. Setup method of capacitor configuration

Setup content: ouput circuit number, capacitor capacity of each circuit.

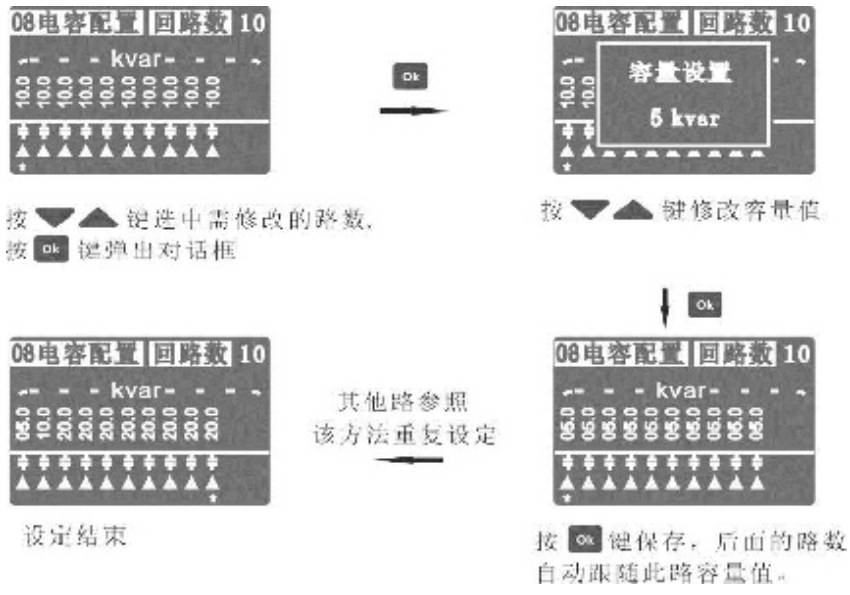
User must conduct the setup according to the actual specifications of the capacitors and the number of circuits in the cabinet.

a Set output circuit number (Change output circuit number to 10)



Press key to select line number	Press key to change line number
Press Ok key to pop-up message box	Press Ok key to save

b Set capacity (Change to 5:10:20:20 ...)



Press key to select line number		Press key to change capacity value
Press Ok key to pop-up message box		
	Set other lines in the same way	
Finish setup		Press Ok key to save, the line number will change according to the capacity value of the line automatically.

Note: If set to 0, it means this line is not in use.

c The controller will identify the switching method automatically based on the capacity configuration of each line:

The system will switch the capacitors in cycle based on the given order if the capacitors are configured with the same capacity; the system will switch the capacitors by code if the capacitors are configured by ratio. There is no need to configure capacitors by ratio if optimized method is selected, user just need to set at least two different capacities.

8.1 Capacity ratio setup for switching by code

The system uses fundamental reactive power as controlled physical variable to ensure the compensation precision under harmonic environment. User can set the system to switch capacitors by code so as to create different capacity level for more specific compensation output and higher compensation precision across the full load range.

In heavy duty applications, we usually set the capacity of first, second and third lines of capacitor banks to a smaller value for fine adjustment, so we can add a small amount of capacity to achieve target power factor when needed, or provide light load compensation under circumstances with lower inductive load (such as at night). For fourth, fifth line and so on, we usually set the capacity to a bigger value so we can provide sufficient compensation to achieve heavy duty startup without connecting too many lines.

The controller enables easy and intuitive setup of capacity, see below for detailed method:

(1) Set the capacity of first line as reference for minimum fine adjustment, for example: 5kvar

(2) The capacity of second line must be set to twice of or equivalent to the first line, for example: 10kvar

(3) Set the third line as the last line with the same method for setup of line two.

After setting capacity ratio, do not change the value of the reference line, otherwise, all others lines should be reset according to the reference line.

There are 16 available capacity ratios, see below for some common options:

Capacitor code: C1:C2:C3:C4:C5 C12

(1) 1 : 1: 1 : 1: 1: :1 Cycle with consistent capacity
(2) 1 : 2: 2 : 2: 2: :2 Switch by code
(3) 1 : 2: 3 : 3: 3: :3 Switch by code
(4) 1 : 2: 4 : 4: 4: :4 Switch by code
(3) 1 : 2: 3 : 6: 6: :6 Switch by code

8.2 Examples for capacity ratio configuration

Table 7 Examples for capacitor configuration

No.	Configuration scheme	Line 1	Line 2	Line 3	Line 4	Line 5	·····	Last line
Example 1	Cycle 1:1:1:1:1:...:1	10kavr	10kavr	10kavr	10kavr	10kavr	·····	10kavr
Example 2	Cycle 1:1:1:1:1:...:1	30kavr	30kavr	30kavr	30kavr	30kavr	·····	30kavr
Example 3	Code 1:2:3:3:3:...:3	5kavr	10kavr	15kavr	15kavr	15kavr	·····	15kavr
Example 4	Code 1:2:3:3:3:...:3	20kavr	400kavr	60kavr	60kavr	60kavr	·····	60kavr
Example 5	Code 1:2:2:2:2:...:2	10kavr	20kavr	20kavr	20kavr	20kavr	·····	20kavr
Example 6	Code 1:2:2:2:2:...:2	15kavr	30kavr	30kavr	30kavr	30kavr	·····	30kavr

9 Communication

9.1 RS485 setup

Table 8 RS485 setup list

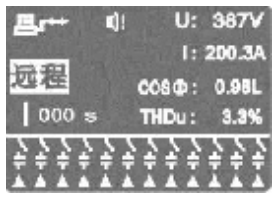
No.	Setup parameters	Default value	Setup range
01	Rs485	Communication	Communication/Off
02	Protocal	ModBus	ModBus RTU
03	Address	1	1-255
04	Baud rate	9600	1200/2400/4800/9600

Set RS485 communicatin to On/Off.

Press ▼ ▲ key to select RS485, then press 确认 key to pop-up setup dialog box.
The factory default for RS485 is Off.
Note: Set address and baud rate according to the description above.

9.2 Configuration application

NWK1-GR-12GB/12GBD controller uses RS485 interface and MODBUS protocol for real-time transmission of data and control command, it is connected to SCADA or PLC system for direct networking with major industrial control configuration software. In such case, the switching of capacitors is controlled remotely. User can press any key on-site or remotely to exit remote mode.



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10 Alarm Inquiry

Table 9 Alarm status list

No.	Alarm status	Setup status	Remarks
01	Overvoltage protection	Normal/alarm	Disconnect relay output and send alarm
02	Undervoltage protection	Normal/alarm	Disconnect relay output and send alarm
03	Undercurrent protection	Normal/alarm	Disconnect relay output and send alarm
04	Overcurrent alarm	Normal/alarm	Relay output alarm
05	Average $\overline{PF}$ (or TPF) alarm	Normal/alarm/Off	Relay output alarm
06	Over-THDV protection	Normal/alarm/Off	Disconnect relay output and send alarm
07	High temperature alarm	Normal/alarm/Off	Relay output alarm
08	Over-compensation alarm	Normal/alarm/Off	Relay output alarm
09	Under-compensation alarm	Normal/alarm/Off	Relay output alarm
10	Communication failure alarm	Normal/alarm	Relay output alarm

When the controller initiates protection, the system will automatically disconnect capacitors and lock -up capacitor connection. In the meantime, the system will send relay contact action alarm.

11 Common Faults and Troubleshooting

Table 9 Common Faults and Troubleshooting

No.	Faults	Cause analysis
1	The no display on the LCD and no backlight after the controller is being powered-on.	Measure the voltage of the operating power supply of the controller, the operating power should be provided by 220V-240V auxiliary power supply; If there is overlapped or garbage characters on the display, please restart the system.
2	The system shows ---- for COSφ value; an undercurrent alarm is triggered and the system cannot connect capacitors automatically.	a. It is normal for the controller to show ---- for COSφ value if samplng current signal is smaller than 10mA or there is no sampling voltage signal. With the increase of sampling signal and voltage, the controller will start to operate immediately. Please check the measured value. b. If the power consumption of the system is relatively low, an undercurrent alarm will be triggered and no capacitor is allowed to be connected automatically. c. The ratio of the installed CT is not correct. Please use a CT with primary side value that matches actual maximum load current. The sampling current signal will be very small if the ratio is too big or the load is too small. It is recommended to use CT

No.	Faults	Cause analysis
		with ratio of 1.2~1.8 times of maximum load current. d. Check if the short circuit bridge of current signal is open. The CT line is open. Connect the CT in series if it is used with other equipment.
3	The displayed COSφ value remains the same or changes very slightly after connecting serveral capacitors banks manually.	The installation position of the connected current signal transformer is not correct. The sampling current signal should be able to reflect the current changes in capacitor cabinet and load (main cabinet). This phenomenon will occur when the CT is installed at load side or inside the capacitor cabinet. If only load current is sampled, the power factor will remain almost the same after connecting capacitors manually; if only cabinet current is sampled, the power factor will decrease after connecting capacitors manually.
4	There is large differencebetween the display current value and the actual current value.	a. The set CT primary side value is not correct. The CT primary side value should be consistent with the ratio described on product nameplate. b. Check if the short circuit bridge of current signal is open. Connect the CT in series if it is used with other equipment. It is best to use the CT alone.
5	The COSφ value shows error, the reactive power value shows abnormal.	a. No capacitor bank is connected by the controller. The use of on-site compensation cabinet, sub-cabinet, other compensation screens or capacitive equipment causes capacitive COSφ; disconnect such equipment first before commissioning so that the grid is in inductive COSφ status. b. Connect sampling voltage to phase BC,connect sampling current to phaseA(current and voltage should be connected to different phases), then turn the multimeter to AC 500V and use one probe to touch the busbar of the sampling CT and the other probe to touch the terminal Ub or Uc of the controller. If the measured voltage between these two points is 0, it means the wiring is not correct (same-phase).
6	The controller does not connect any capacitor bank when the grid COSφ value is lower than target power factor.	a. The controller is under overvoltage protection, over-harmonic protection, undervoltage protection or undercurrent protection status, in which the connection of capacitor is locked; b. The controlled physical variable for capacitor connection is lower than target factor and capacity threshold: The reactive power value needed to be added for the grid to reach target power factor must be bigger than 0.68 times of the reference line (capacity of minimum line). For example: ▵Kvar>0.68x5Kvar (reference line). Use the measurement function to check the ▵Kvar value for comparison. c. The actual power of the capacitor in the network is influenced by the real-time voltage of the grid.
7	The controller does not disconnect any capacitor bank when the grid COSφ value is higher than target power factor.	The controlled physical variable for capacitor connection is higher than target factor and capacity threshold: The reactive power value needed to be removed for the grid to reach target power factor must be bigger than 0.62 times of the reference line (capacity of minimum line). For example: ▵Kvar>0.62x5Kvar (reference line) . Use the measurement function to check the ▵Kvar value for comparison.
8	The displayed power factor is lower than 0.90L, the system sends "Under-compensation" alarm.	It is normal for the system to send "Over-compensation or under-compensation" alarm when the equipment is just put into operation. If the power factor COSφ is still below 0.90L when all the capacitors are connected, the controller will pop-up an "under-compensation" alarm after a 5 minutes delay to remind user to add compensation capacitors.
9	The displayed power factor always shows capacitive (leading) status, for example: 0.97c, and the system	If no capacitor is connected or too many capacitors are connected, and the power factor is in capacitive status, the controller will send an "over-compensation" alarm after a 5 minutes delay. 1. The samping phase sequence is wrong which cause the power factor to show capacitive status at all time and the system cannot work automatically;

No.	Faults	Cause analysis
	sends "over-compensation" alarm	2. Check if there is capacitive load generated by photovoltaic power generation equipment or charging pile. Customized controller is needed for photovoltaic power generation equipment.
10	Low average power factor $\overline{PF}$ alarm	It is normal for the system to send "Low average power factor $\overline{PF}$ " alarm when the equipment is just put into operation. A low $\overline{PF}$ alarm will occur if the average power factor $\overline{PF}$ of last week is lower than 0.90. 1. Check the settings of CT ratio and power factor threshold; 2. Check if the controller is in "undercurrent", "overvoltage" or "over-THDv" alarm status all the time.
11	The controller shows "-" before power factor COSφ.	The controller will show "-" before power factor COSφ if user changes the wiring direction of sampling CT when the controller is still operating, please turn off the main power of the capacitor cabinet before changing the sampling current wiring. If the controller shows "-" before power factor COSφ, user can restart the system when there is a certain amount of inductive load and the "-" symbol will disappear when the system is restarted.

12 ⚠ 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

NWK1-GR 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

NWK1-GR Series
Smart Low Voltage Reactive Power Compensation Controller
User Instructions

Zhejiang Chint Electrics Co., Ltd.

Add: No.1, CHINT Road, CHINT Industrial Zone,North Baixiang, Yueqing, Zhejiang 325603,P.R.China
E-mail: global-sales@chint.com
Website: http://en.chint.com