

NQ1 series

Star Delta Starter

# User manual

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Thanks for choosing this product. Please carefully read the user manual before installing, using, or maintaining the product.

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The product manufacturer has passed the following management system certifications:  
ISO 9001, ISO 14001, ISO 45001

Conforming to the standard: GB/T  
14048.4



## Safety Alert

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- 1 The product is strictly prohibited from being installed in environments containing flammable and explosive gases, damp condensation, and wet hands are strictly prohibited from operating the product.
- 2 During product operation, it is strictly prohibited to touch the conductive parts of the product.
- 3 When installing, maintaining, and maintaining products, it is necessary for professional personnel to ensure that the circuit is
- 4 powered off. Children are strictly prohibited from playing with products or packaging.
- 5 Sufficient space and safe distance should be reserved around the installation of the product.
- 6 Do not install in areas where gas media can corrode metals and damage insulation.
- 7 When installing and using the product, standard wires must be used and connected to the required power supply and load. To avoid dangerous
- 8 accidents, the installation and fixation of the product must strictly follow the requirements of the manual.
- 9 After opening the packaging, the product should be checked for damage and the integrity of the items should be checked.



### General warning signs:

Used to alert users to potential hazards. All safety information attached to this sign should be followed to avoid potential harm.

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## 1 Applications

The NQ1 series star delta starter (hereinafter referred to as the starter) is suitable for three-phase squirrel cage induction motors with AC 50Hz、60Hz、50/60Hz, rated voltage of 380V/400V, and rated working current up to 110A (phase current when the starter is delta connected), controlling power up to 90kW. It is used to control the start, operation, and stop of the stator winding from star to delta, in order to reduce the impact of starting current and motor starting on the transmission network.

The starter adopts a modular design and integrated structure, integrating contactors, intelligent controllers, and intelligent auxiliary contacts. The intelligent controller can automatically control the starter to run according to the predetermined program, thereby completing the star delta starting of the motor.

This series of products is suitable for the star delta voltage reduction starting of electric motors for dual speed fans, domestic water pumps, and drainage pumps, as well as manual forced starting of fire water supply, as well as applications where the load that requires voltage reduction starting has protection requirements for starting and operation. Starters can meet the requirements of different fields by installing functional modules.

## 2 Type designation

N Q 1- □ □

① ② ③ ④ ⑤

① Enterprise code

② Starters (AC contactors)

③ Design serial number

④ Rated current: 65A、75A、85A、95A、100A、110A

⑤ Functional modules: Omit (automatic type), S (mechanical emergency type), Z (multifunctional type)

## 3 Normal use, installation, transportation, and storage conditions

### 3.1 Normal usage conditions

The upper limit value of the normal operating environment temperature shall not exceed +70 °C, the lower limit value shall not be lower than -25 °C, and the average temperature value within 24 hours shall not exceed +35 °C; When the ambient temperature exceeds the range, users need to negotiate with the manufacturer;

--When the environment temperature is +40 °C, the relative humidity of the air does not exceed 50%, and there can be higher relative humidity at lower temperatures. When the monthly average minimum temperature is +25 °C, the monthly average maximum relative humidity of the month does not exceed 90%. Due to occasional condensation caused by temperature changes, users should take special protective measures.

--No abnormal vibration or impact;

--Pollution level: Level 3.

### 3.2 Installation conditions

--The altitude of the installation site shall not exceed 2000 meters.

#### ■ Vertical installation

The vertically installed starter has an upward power terminal and a downward load terminal.

The inclination angle between the installation surface and the vertical surface of all starters shall not exceed  $\pm 5^\circ$ , which does not affect their performance.

#### ■ Installation: screw mounting.

### 3.3 Transportation and storage conditions

The applicable temperature range for transportation and storage is between  $-25\text{ }^{\circ}\text{C}$  and  $+60\text{ }^{\circ}\text{C}$ , and can reach  $+70\text{ }^{\circ}\text{C}$  in a short period of time (24 hours). The storage area should be ventilated, dry, and not affected by rain, snow, or direct sunlight.

## 4 Main technical parameters and functions

**Table 1**

Parameter		Unit	NQ1					
Rated current $I_e$ (AC-3)		A	65	75	85	95	100	110
Rated voltage $U_e$		V	380V/400V					
Rated insulation voltage $U_i$		V	800					
Poles		P	3					
Mechanical life	Automatic/multifunctional	10000 times	60					
	Mechanical emergency (manual operation)	times	3000					
Suggest controllable operating power of three-phase squirrel cage motor (AC-3)		KW	45	45	55	55	75	75
Matched fuse		A	100	100	125	125	160	160
Terminal size		mm <sup>2</sup>	35			50		
Coil parameters	Rated control voltage $U_s$	V	220V/230V					
	pull-in voltage	% $U_s$	80%~110%					
	Release voltage	% $U_s$	20%~75%					
	Power consumption (pull in)	VA	230					
	Power consumption(keeping)	VA	19			32		

Table 2

Function	Automatic type	S mechanicalemerg ency type	Z multifunctional type
Star Delta Conversion	■	■	■
Adjustable star running time	■	■	■
Mechanical emergency (manual forced start)	-	■	-
overload protection	-	-	■
Locked rotor protection	-	-	■
Phase loss protection	-	-	■
Three-phase imbalance protection	-	-	■
Overvoltage protection	-	-	■
Undervoltage protection	-	-	■
Fault display	-	-	■
Fault alarm	-	-	■
Status display	-	-	■
Communication function	-	-	□

Notes: - indicates not available, □ indicates optional, and ■ indicates standard.

## 5 Structural features and working principles

**Star Delta Start:** When the control coil is energized with a 220V control voltage, the main contactor of the product closes, forming a star circuit with the star contactor. The motor starts running at reduced voltage. When the operating time reaches the set switching time and the motor speed approaches normal speed, the main contactor automatically disconnects and then simultaneously closes with the angle contactor, forming a delta circuit, and the motor runs at full voltage.

**Mechanical emergency:** When the signal line or the control line of the fire pump control box malfunctions, making it impossible to automatically or manually start the fire pump, the mechanical emergency start device on the fire pump control box door can be used to manually close the main and corner contactors of the fire pump to start the fire water pump.

## 6 Setting and operating instructions

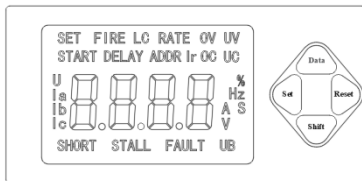
### 6.1 Basic/Emergency



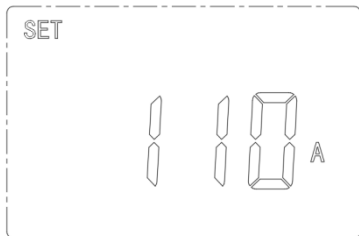
Parameter	Unit	NQ1					
Rated current $I_e$ (AC-3)	A	65	75	85	95	100	110
Suggest controllable operating power of three-phase squirrel cage motor (AC-3)	KW	45	45	55	55	75	75
Delay setting value (recommended)	S	17	17	19	19	21	21

By using tools such as a flat screwdriver to rotate the knob and pointing the arrow towards the number, the star delta start delay can be adjusted within a range of 5s to 30s. The default value for the product at the factory is 5s.

### 6.2 Multifunctional

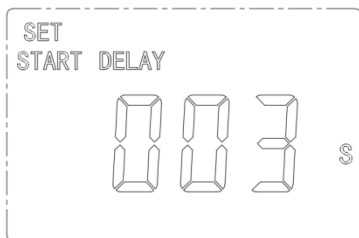


Press the "Settings" button to enter the "Settings interface" and press the "Shift" button to move data bits, Press the "data key" to modify parameters, Press the "reset button" to exit and save the settings.

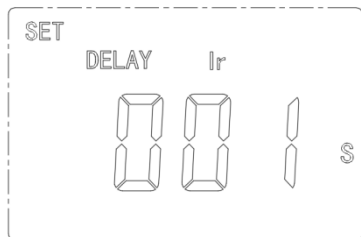


Press the "Settings" button once to enter the "Setting Current Parameter Setting Interface". Use the "Shift" and "Data" keys to set the numerical values. Set the range of  $I_e$ : 110A (65-110A),  $I_c$ : 95A (65-95), and  $I_r$ : 65A (45-65);

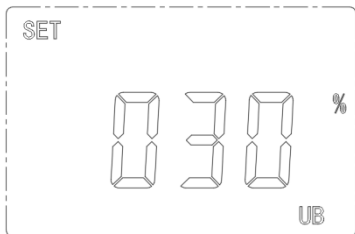
The default is  $I_c = I_e$ .



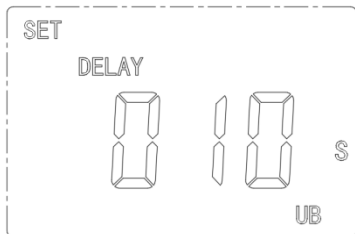
Press the "Settings" button twice to enter the "Start Delay Parameter Setting Interface", use the "Shift" and "Data" keys to set the numerical value, with a setting range of 0-99 seconds, default to 3 seconds, 0 indicating shutdown.



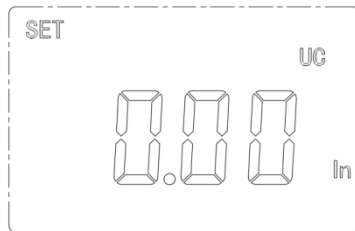
Press the "Set" button three times to enter the "Overload inverse time protection characteristic setting interface", use the "Shift" and "Data" keys to set the numerical value, with a setting range of 0 to 4, "0" indicates turning off overload long time delay protection; "1" represents a  $1.5I_r$  action time of 51s; "2" represents a  $1.5I_r$  action time of 98s; "3" represents a  $1.5I_r$  action time of 144s; "4" represents a  $1.5I_r$  action time of 200s.



Press the "Settings" button four times to enter the "Current Unbalance Parameter Setting Interface", use the "Shift" and "Data" keys to set the numerical value, with a setting range of 20% to 80%, in steps 10%, default to 30%, 0 indicates shutdown.

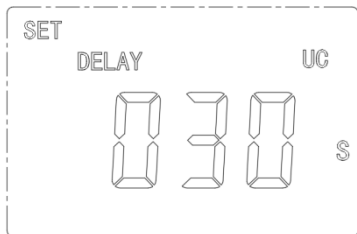


Press the "Settings" button five times to enter the "Current Unbalance Protection Delay Parameter Setting Interface". Use the "Shift" and "Data" keys to set the numerical value. The setting range is 1~40s, with a default of 10s.

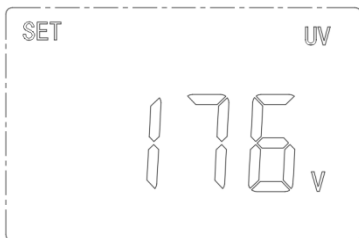


Press the "Settings" button six times to enter the "Undercurrent Protection Multiplier Parameter Setting Interface", use the "Shift" and "Data" keys to set numerical values, with a setting range of 0.2~0.8. Default 0, 0 indicates shutdown.

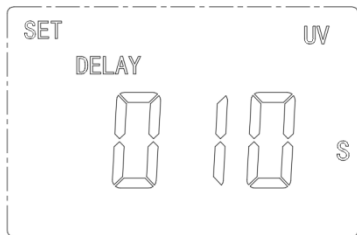




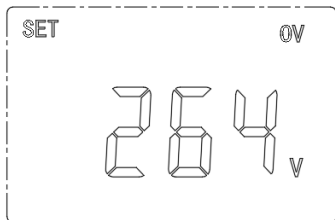
Press the "Settings" button seven times to enter the "Undercurrent Protection Delay Parameter Setting Interface". Use the "Shift" and "Data" keys to set numerical values. The setting range is 1 to 60 seconds, with a default of 30 seconds.



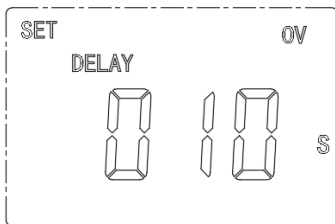
Press the "Settings" button eight times to enter the "Undervoltage Protection Parameter Setting Interface". Use the "Shift" and "Data" keys to set the numerical value. The setting range is 154~198V, with a default of 176V and 0 indicating shutdown.



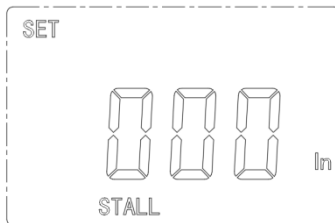
Press the "Settings" button nine times to enter the "Undervoltage Protection Delay Parameter Setting Interface". Use the "Shift" and "Data" keys to set numerical values. The setting range is 1-30s, with a default of 10s.



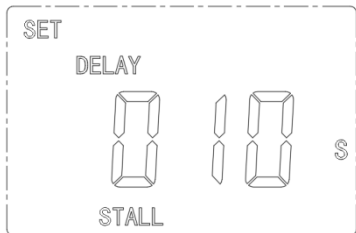
Press the "Settings" button ten times to enter the "Overvoltage Protection Parameter Setting Interface", use the "Shift" and "Data" keys to set numerical values. The setting range is 230~286V, with a default of 264V, and 0 indicating shutdown.



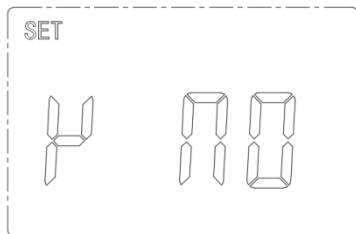
Press the "Settings" button eleven times to enter the "Overvoltage Protection Delay Parameter Setting Interface". Use the "Shift" and "Data" keys to set numerical values. The setting range is 1-30s, with a default of 10s.



Press the "Settings" button twelve times to enter the "Locked rotor protection current multiple setting interface". Use the "Shift" and "Data" keys to set the numerical value. The setting range is 5-9 times, default to 0 times, 0 means off.



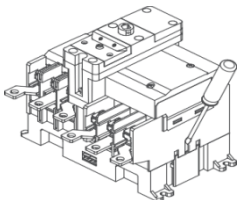
Press the "Set" button 13 times to enter the "Stall Protection Delay Parameter Settings" interface, and use the "Shift" and "Data" buttons to set the value. The setting range is 1-10 seconds, with a default value of 10 seconds.



Press the "Set" button 14 times to enter the "Factory Reset Interface", and use the "Shift" and "Data" buttons to set values. "YES" indicates that the factory reset is being performed, and "NO" indicates that the factory reset is not being performed. The default is NO.

### 6.3 Motor phase power failure detection

Before the product is powered on for operation, it can be tested for power failure according to the motor wiring condition and the indicated location in the following diagram.

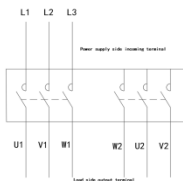


When performing phase detection on the motor, insert a straight screwdriver into the auxiliary contact slot

on the right side of the product and press down 2-3mm to disconnect the star contactor contacts. After testing is complete, remove the straight screwdriver from the slot and restore the star contactor contacts to their closed position.

## 7 Main circuit and terminal wiring diagram

### 7.1 Main circuit wiring diagram

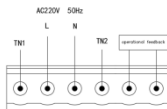


Main circuit wiring diagram

L1, L2, and L3 are the main input terminals of the circuit, U1, V1, and W1 are the output terminals of the main contactor, and W2, U2, and V2 are the output terminals of the star delta contactor.

### 7.2 Schematic diagram of

coil control terminal wiring



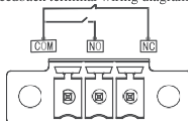
Automatic terminal wiring diagram

L and N are the power supply ports for coil control. When this port is powered on, the product operates in a star delta manner according to the control logic;

TN1 and TN2 are the product function detection ports, which do not require wiring during use

The operation feedback port is a set of normally open auxiliary contacts. When the starter starts to start, the auxiliary contacts close and can be used as operation signal feedback or control circuit self-locking.

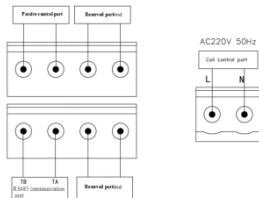
### 7.3 Mechanical emergency feedback terminal wiring diagram



Mechanical emergency terminal wiring diagram

COM is a common point, with a set of normally open NO and a set of normally closed auxiliary contacts NC. When the manual operating mechanism of the starter rotates and closes, it can serve as an emergency start feedback signal or interlock signal for the product.

## 7.4 Multifunctional Feedback Terminal Wiring Diagram



Multifunctional terminal wiring diagram

RS485 communication port: achieving external communication connection.

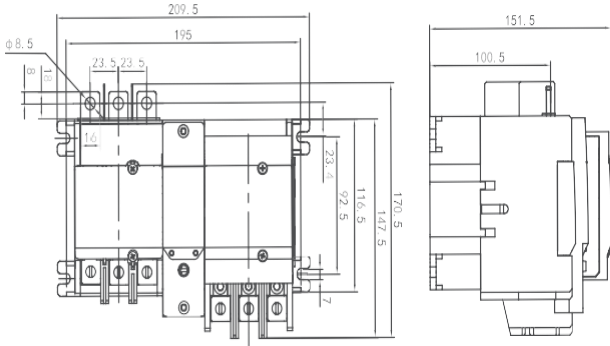
Passive control port: The external controller (user provided) reserves a port, which is short circuited by default at the factory. When this port is disconnected, the product cannot start;

Reserved port: a signal feedback port for added functionality.

L and N are the power ports for coil control.

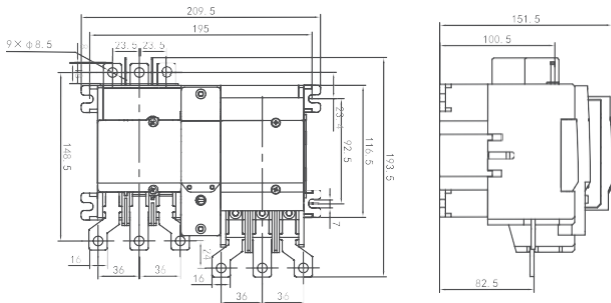
## 8 Appearance and mounting dimensions

### 8.1 Automatic star delta starter (see Figure 1 and Figure 2)



NQ1-65、75、85、95 automatic models

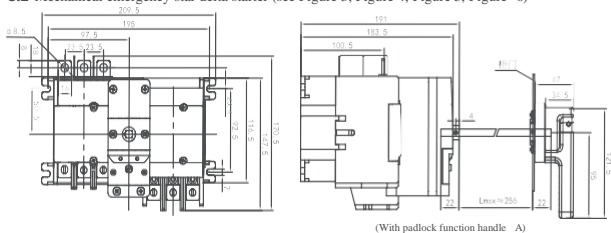
Figure 1



NQ1-100, 110 automatic type

Figure 2

## 8.2 Mechanical emergency star delta starter (see Figure 3, Figure 4, Figure 5, Figure 6)

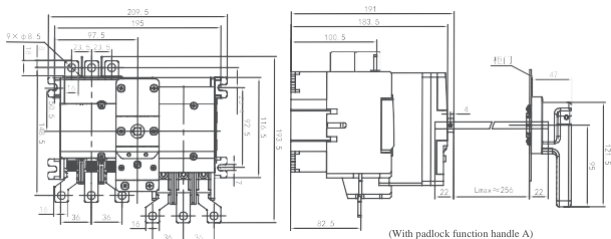


(With padlock function handle A)

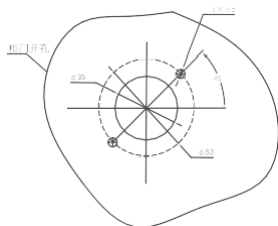
NQ1-65S, 75S, 85S, 95S mechanical emergency type

Sq.	Handle type	Handle length
1	With padlock function A	L=122mm
2	With padlock function B	L=152mm
3	Equipped with lock function C	L=140mm

Figure 3



NQ1-100S、110S Mechanical Emergency Type



Opening diagram of handle A and B with padlock function

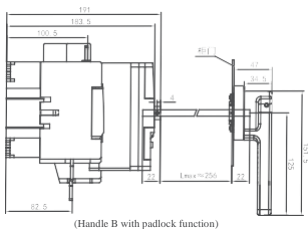
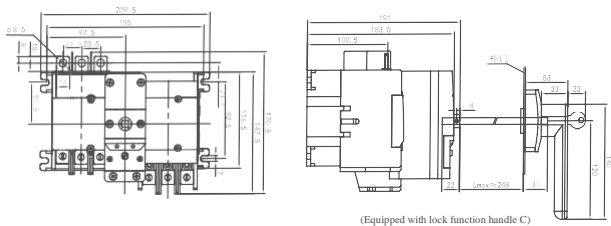
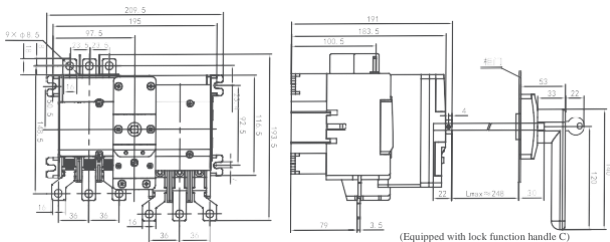


Figure 4



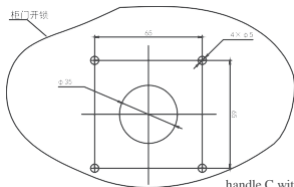
NQ1-65S、75S、85S、95S mechanical emergency type

Figure 5



(Equipped with lock function handle C)

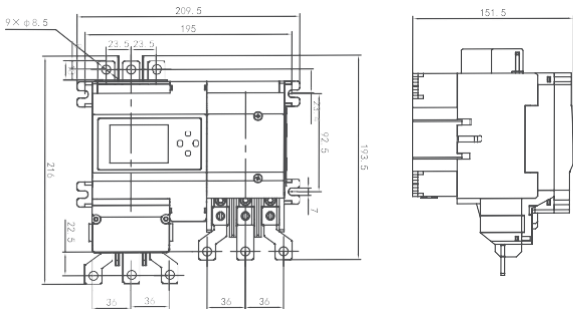
NQ1-100S、110S Mechanical Emergency Type



handle C with built-in lock function

Figure 6

### 8.3 Multifunctional version of star delta starter (Figure 7)



NQ1-110 Multifunctional



**Figure 7**

## 9 Maintenance

- 9.1** Daily cleaning of dust, checking for loose screws at each terminal, and checking for damage and aging of wires.
- 9.2** The usage environment must meet the environmental conditions specified in the manual. Products stored or unused for six months should be checked before reuse.
- 9.3** The exposed parts of the external connecting wires at the inlet and outlet of the starter should be wrapped with insulation to prevent accidents during use.
- 9.4** The maintenance of products must be carried out by personnel with professional qualifications.

## 10 Fault analysis and troubleshooting

Fault phenomenon	Cause analysis	Exclusion methods and preventive measures	Remarks Description
No action or unreliable action	The control power supply voltage does not match the coil voltage	Use the corresponding control power supply	
	Insufficient power capacity of the operating circuit or occurrence of wire breakage or wiring errors	Check the circuit to ensure correct wiring	
	The coil is burnt out and the mechanical movable part is stuck	Repair or replace the product	
Product suction noise	Control power supply voltage too low Dust or foreign objects on the pole surface of the iron core	Use the corresponding control power supply to clean the surface dust or foreign objects of the iron core	
Not releasing or releasing slowly	Contact fusion welding	Repair or replace the product	

## 11 Warranty period, environmental protection, and other legal provisions

### 11.1 Warranty period

Under normal storage and transportation conditions, if the product packaging or product itself is intact, the warranty period for the product from the date of production is 24 months. The following situations are not covered by the warranty:

- 1) Damage caused by improper user use, storage, and maintenance.
- 2) Damage caused by unauthorized organization or personnel, or self disassembly and repair by users.
- 3) The product has exceeded the warranty period.
- 4) Damage caused by force majeure factors.

### 11.2 environmental protection

In order to protect the environment, when this product or its components are scrapped, please dispose of them properly as industrial waste; Or it can be handed over to the recycling station for classification, disassembly, recycling, and reuse in accordance with relevant national regulations.

## 12 Product selection and ordering instructions

Selection Table

NQ1	□	□	□	□	□
starter	Rated current 65A,75A 85A,95A 100A, 110A	Functional module Omit: automatic type  S: Mechanical emergency type  Z: Multifunctional	Rated control voltage  220V/230V	Auxiliary contact (1NO+1NC) F11: Left installation Z11: Right installation F22: Left and right installation	Door handle A: Padlock function (L=122mm) B: Padlock function (L=152mm) C: Equipped with lock (L=140mm)

When placing an order, the user must indicate:

- 12.1** The complete name, model, specifications, and quantity of the starter, including the requirements for the handle and auxiliary contacts.
- 12.2** Rated control power supply voltage and frequency.
- 12.3** If there are special installation conditions or special places for use, corresponding technical information should be provided or negotiated with our company.
- 12.4** Ordering Example

- (1) If automatic 65A current is selected and the control voltage is 220V for 400 units, it is marked as  
NQ1-110 65A 400PCS
- (2) If mechanical emergency type 95A current is selected, control voltage is 220V, equipped with 1 NO and 1 NC auxiliary contact, left mounted, and the handle outside the cabinet has a padlock function (length 122), 150 units, then are marked as NQ1-110S 95A 220V F11 A 150pcs



**CHNT 正泰**

# Certificate of conformity

**Model: NQ1 series****Name: Star Delta Starter**

The product has passed inspection  
and meets the standards  
GB/T 14048.4, approved for delivery

A red rectangular box containing the word "Inspection" in red text, positioned above a horizontal line that serves as a signature line.

**Inspection**

**Inspector:****Inspection date:** See product or packaging**ZHEJIANG CHINT ELECTRICS CO., LTD.**

**CHINT**

正泰电器

## NQ1 series User Manual for Star Triangle Starters

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