

NJBK5-5  
Motor Protective Controller

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**User Instruction**

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## **Safety Warning**

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- 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.
- ⑤ The product shall be stored, installed and used in accordance with the rated control power supply voltage and specified conditions indicated in the user instructions.
- ⑥ The products shall be properly wired in strict accordance with the wiring diagram.

## 1 Use Purpose

NJBK5-5 motor protective controller (hereinafter referred to as the controller) is mainly applied in the circuit with AC frequency of 50Hz, rated operating voltage 220V and rated control power supply up to 2.2kW (current up to 20A) to control the direct start and stop of single-phase water pumps. With the functions of overload protection and underload protection (empty pumping protection), it can realize the automatic control of liquid level in civil water towers, water reservoirs and etc. This product is not applicable for liquid level control of oil, purified water, flammable and explosive chemical liquid, corrosive liquid and sewage with high density.

## 2 Key Technical Parameters

Table 1 Ambient Conditions

|                                  |  |
|----------------------------------|--|
| Normal use conditions            | Ambient temp.: -5°C~+40°C; average value within 24h not exceeding +35°C; altitude not exceeding 2,000m.  |
| Atmospheric conditions           | RH shall not exceed 50% when maximum temperature is +40°C; in case of lower temperature, higher RH is allowed. Measures should be taken against occasional condensation due to temperature change. |
| Installation category            | II   |
| Transport and storage conditions | -25°C~+55°C  |

Table 2 Product Specifications and Main Technical Parameters

| Model                        | NJBK5-5/10                         | NJBK5-5/20 |
|------------------------------|------------------------------------|------------|
| Rated current (A)            | 10                                 | 20         |
| Current setting range (A)    | 2~10                               | 4~20       |
| Appropriate moter power (kW) | 0.25~1.1                           | 0.55~2.2   |
| Appropriate moter power (HP) | 1/3~1.5                            | 3/4~3      |
| Installation method          | Equipment type                     |            |
| Setting method               | knob                               |            |
| Display method               | Indicator light                    |            |
| Protection function          | Protection of overload, under load |            |

**Table 3 Main Circuit and Auxiliary Circuit Technical Parameters**

| No. | Product Model   | NJBK5-5/10   | NJBK5-5/20 |
|-----|---|--|------------|
| 1   | Rated insulation voltage (V)                                      | 250  |            |
| 2   | Rated control supply voltage $U_s$ (V), frequency (Hz)            | AC220, 50Hz  |            |
| 3   | Allowable fluctuation range of rated control power supply voltage | 85% $U_s$ ~110% $U_s$                                |            |
| 4   | Rated impulse withstand voltage $U_{imp}$ (kV)                    | 2.5  |            |
| 5   | Rated conditional short-circuit current (kA)                      | 3  |            |
| 6   | Use class   | AC-1   |            |
| 7   | Conventional thermal current (A)                                  | 20   |            |
| 8   | SCPD type   | Type 1   |            |
| 9   | SCPD model  | NT00-10A   | NT00-20A   |
| 10  | Enclosure protection class (if applicable)                        | IP20   |            |
| 11  | Size of terminal tightening screw (or nut)                        | M4   |            |
| 12  | Torque of terminal tightening screw (N·m)                         | 1.2  |            |
| 13  | Pollution class   | Class 3  |            |
| 14  | Rated duty  | Short-time duty                                      |            |
| 15  | Electromagnetic environment                                       | Environment B  |            |
| 16  | Liquid level control electrode lead distance                      | Up to 500m   |            |
| 17  | Requirements on controlled liquid                                 | General civil water or sewage with good conductivity |            |

## 2.1 Motion characteristic

2.1.1 Overload protection characteristic: When the pump motor is overloaded, the red "fault" indicator light of the controller is normally on, and the trip level is 10, as shown in Table 4.

**Table 4 Overload Protection Characteristic**

| No. | Setting current multiple | Motion time         | Starting condition   |
|-----|--------------------------|---------------------|--|
| 1   | 1.05                     | No motion within 2h | Start from cold state                                      |
| 2   | 1.2                      | Motion within 2h    | Follow No.1  |
| 3   | 1.5                      | ≤4min               | Start 2 hours after 1.0 time of setting current is applied |
| 4   | 7.2                      | 4s < $T_p$ ≤ 10s    | Start from cold state                                      |

2.1.2 Under load protection (empty pumping protection) characteristic: when the working current of the pump motor is less than 20% ~100% of the rated current of the motor, the red "fault" indicator light of the controller will flash, and the controller will stop working after a delay of 60s ± 10s.

2.1.3 Protection return characteristic: after the motion of overload protection or underload protection (empty pumping protection), the controller will automatically restart after a delay of 30min ± 3min.

## 2.2 Reset characteristic

Power-off reset on the controller, and the reset time ≤1min.

## 2.3 Structural features

The controller consists of an enclosure, a base, a sealing ring and a main control board. There is a "force start" button on the enclosure, which is used to forcibly start the pump motor when the water level does not reach the highest position to make the pool full. When the water level is at the highest position, this button is invalid; a "power" switch is provided to connect or disconnect the power supply of the controller, "I" is on, "O" is off.

The incoming and outgoing lines on the controller's base use the knock-out type wiring holes. User can selectively knock out the knock-out holes directly below the controller according to the wiring needs, and install the matching sealing ring on the corresponding knock-out holes for wiring. User can pull out the plug connecting the enclosure and the base at installation time, and then the enclosure and the base of the controller are completely separated. Connect wires after the base is installed and fixed, and then insert the plug back to its original position and fix the enclosure with screws.

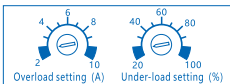
## 2.4 Working principle

User needs to connect the three electrode lines E1, E2 and E3 for liquid level detection in the controller, and install them in the controlled pool according to the high, medium and low positions. If the water level in the pool is below E3, the controller starts the pump motor to pump water, and the yellow "water level" indicator on the controller panel flashes until the water level reaches E1. Then the yellow "water level" indicator on the controller panel is normally on, and the pump stops pumping water.

If the pump motor starts to pump water, the controller detects that the water pump is idling due to water shortage, the red "fault" indicator will flash, with a delay of 60s ± 10s. If the water pump continues to idle, the controller stops pumping water, and starts the water pump again after an interval of 30min ± 3min. If the water pump motor is overloaded during the working process, the red "fault" indicator is normally on, and the controller motions in an inverse time lag; If the water pump works normally, the red "fault" indicator does not light up. Refer to Table 5 for the working indication status of the controller, and refer to Figure 1 for the schematic diagram of the setting knobs of the controller.

**Table 5 Working Indication Status of the Controller**

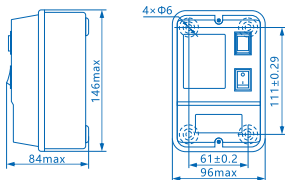
| Status<br>Indicator light            | Normally on   | Flash  | Go off  |
|--------------------------------------|---|--|---|
| Power indicator light(green)         | Indicates that the controller is powered on                     | —  | Indicates the controller is powered off or malfunctions       |
| Fault indicator light(red)           | Indicates an overload fault                                     | Indicates that the pump is under-loaded (empty pumping fault)  | Indicates no fault  |
| Water level indicator light (yellow) | Indicates there is water, and the water level is above E1 or E2 | Indicates no water, the water level is below the E2 position, and the controller automatically starts working. | Indicates no water or water pump under load or overload fault |



**Figure 1 Schematic Diagram of Setting Knobs**

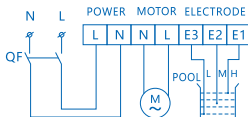
### 3 Installation

3.1 Outline and installation size: see Figure 2, unit: mm.



**Figure 2 Outline and Installation Size of the Controller**

### 3.2 Wiring diagram of the controller: see Figure 3.



**Figure 3 Wiring Diagram of the Controller**

3.3 The installation and use are as follows:

- The controller must be installed vertically, and M5 screws should be selected according to the size of the mounting hole, and the spring washer, flat washer and sealing rubber ring should be used additionally to ensure the tight installation of the controller and avoid its falling.
- The user needs to correctly connect wires according to the wiring diagram and distinguish between the live line and the neutral line for the power supply of the controller. The user needs to install the three detection electrodes E1, E2 and E3 for the liquid level detection in the controlled water pool according to the high, medium and low positions, and the end part should have a good conductivity (See Figure 3 for the wiring diagram of the controller or see the wiring diagram on the inner wall of the controller's enclosure).
- Overload setting must be done for the controller whose wires have been connected, otherwise overload protection cannot be realized. Set the current value on the overload dial of the controller to the rated current of the motor; in general, set the underload current to 50% of the rated current.
- After current setting and liquid level electrode installation, cover the enclosure and tighten the mounting screws. Next, press the power switch on the controller to carry out the corresponding overload test specified in Table 4, which should meet the requirements, otherwise current setting needs to be redone.

Notes:

- The front end of the power supply of the controller should be equipped with a circuit breaker for short-circuit protection, as shown in Figure 3 QF.
- During the installation, no objects shall be left in the controller so as to avoid affecting the operation of the controller or causing short circuit.
- A short circuit protection device (SCPD) should be used to support the controller.

- 4) You are required to check whether the overload motion of the controller is reliable on a regular basis (preferably once a month) by the method: reduce the setting current by adjusting the current setting knob until the controller motions; then, reset the current.
- 5) Three copper conductors (preferably stainless steel) with good conductivity should be used as the electrodes for liquid level detection in the controller, and the exposed metal part with a strip length of no less than 5cm at the end should be used as the detection electrode. The horizontal spacing of the three electrodes shall not be greater than 5cm. If the controlled liquid level tank is made of metal, the enclosure must be grounded.
- 6) In case of unreliable liquid level detection and control, please check the three copper conductors for liquid level detection, timely remove rust for the exposed metal part at the end of the conductor or strip the conductor again.

## 4 Maintenance

4.1 The terminal of the controller should be tightened on a regular basis.

4.2 Avoid squeezing the product; the product should be stored in a well-ventilated place.

4.3 For equipment that may cause material economic losses or personal safety, safety measures such as secondary circuit protection should be taken.

**Table 6 Fault Analysis and Troubleshooting**

| Symptoms                            | Cause analysis  | Troubleshooting method   |
|-------------------------------------|---|--|
| The power indicator light is not on | Whether the wire and the terminal are in reliable contact, and whether the power terminal is correctly wired. | Connect wires reliably according to the user instructions.   |
| The motor stops in operation        | Whether the motor is overload or under load.  | Confirm whether the setting current value of the controller is appropriate according to the actual current of the operation, check whether the water pump is idling due to water shortage, and check whether the main circuit is at fault. |



## 5 Environmental Protection

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

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**CHINT**

**QC PASS**

NJBK5-5

Motor Protective Controller

IEC/EN 60947-4-1

JDQ Check 10

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Test date: Please see the packing

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**ZHEJIANG CHINT ELECTRICS CO., LTD.**

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# CHINT

CHINT ELECTRICS

## NJBK5-5 Motor Protective Controller User Instruction

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