

NJBK5 Series
Motor Protective Controller

User Instruction

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.
- 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 series motor protective controller (hereinafter referred to as the controller) is mainly applied in the circuit with AC frequency of 50Hz/60Hz, rated operating voltage 380V and rated control power supply up to 11kW (current up to 22A) to control the direct start and stop of water pumps or motors. It can protect the motor from overload and loss of phase, and can also 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	III
Transport and storage conditions	-25°C~+55°C

Table 2 Product Specifications and Main Technical Parameters

Model	NJBK5-10				NJBK5-10D			
Current setting range (A)	0.72~2.4	3.5~11	10~16	20~25	0.72~2.4	3.5~11	10~16	20~25
Installation method	Equipment type							
Setting method	knob							
Display method	Indicator light							
Protection function	Protection of overload, loss of phase							

Table 3 Main Circuit and Auxiliary Circuit Technical Parameters

No.	Product Model		NJBK5-10	NJBK5-10	NJBK5-10	NJBK5-10	
			0.72A~2.4A	3.5A~11A	10A~16A	20A~25A	
		NJBK5-10D	NJBK5-10D	NJBK5-10D	NJBK5-10D	NJBK5-10D	
		0.72A~2.4A	3.5A~11A	10A~16A	20A~25A	20A~25A	
1	Rated insulation voltage U_i (V)		AC660				
2	Rated control supply voltage U_s (V), frequency (Hz)		AC220V, AC380V,50Hz/60Hz				
3	Allowable fluctuation range of rated control power supply voltage		85% U_s ~110% U_s				
4	Rated impulse withstand voltage U_{imp} (kV)		4				
5	Rated conditional short-circuit current (kA)		3				
6	Max rated power (kW)	AC-3	380V	1.1	5.5	7.5	11
			220V	0.55	3	4	5.5
7	Operation frequency (times / hour)	AC-3	1200				
		AC-4	300				
8	Conventional thermal current (A)		2.4	12	16	25	
9	SCPD type		1型				
10	SCPD model		NT00-20			NT00-40	
11	Model of supportive AC contactor		NXC-06/ CJX2-1210	NXC-12/ CJX2-1210	NXC-16/ CJX2-1810	NXC-25/ CJX2-2510	
12	Model of supportive motor controller		JD-8 0.5A~5A	JD-8 2A~20A	JD-8 2A~20A	JD-8 20A~80A	
13	Number of feedthru windings		5	1	1	1	
14	Enclosure protection class (if applicable)		IP55				
15	Size of terminal tightening screw (or nut)		M3				
16	Torque of terminal tightening screw (N·m)		0.5				
17	Pollution class		Class 3				
18	Rated duty		8h duty, uninterrupted duty or intermittent periodic duty				
19	Electromagnetic environment		Environment B				
20	Liquid level control electrode lead distance		Up to 200m				
21	Requirements on controlled liquid		General civil water or sewage with good conductivity				

Notes: NJBK5-10D is not equipped with NJB1-YW1 liquid level relay.

2.1 Motion characteristic

2.1.1 Phase loss protection characteristic: When any phase of the three-phase main circuit passing through the center hole of the integrated motor controller is open, the integrated motor controller motions, and the motion time is $\leq 5s$.

2.1.2 Overload protection characteristic: For the overload protection characteristic of balanced three phase load, please refer to Table 4.

2.2 Reset characteristic

The controller is reset automatically.

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	Trip level	30	$\leq 12min$	Start 2 hours after 1.0 time of setting current is applied
4	7.2	Trip level	30	$9s < T_p \leq 30s$	Start from cold state

2.3 Structural features

The controller adopts the enclosure protection structure and is composed of NXC or CJX2 AC contactor, JD-8 integrated motor controller and NJB1-YW1 liquid level relay. The incoming and outgoing lines of the controller use the knock-out type wiring holes. Users can selectively knock out the four knock-out holes according to the wiring needs and connect wires. The enclosure and the base of the controller can be completely separated, which is very convenient for the installation and maintenance; the button uses the micro switch assembly to realize the start and stop of the controller, which is safe and reliable.

2.4 Working principle

The user needs to connect the three electrode lines E1, E2 and E3 of the liquid level relay 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, press the start button to pull in the AC contactor in the controller to drive the water pump motor to start pumping, the "pumping" indicator on the controller panel will be on until the water level in the pool reaches the position E1, the "water is full" indicator on the controller panel will be on, and the water pump will stop pumping. User can also press the stop button to stop the machine during the pumping process; if the water level in the pool is below the position E1, but not below the position E2, the controller cannot be started until it is below the position E2.

The controller is equipped with a JD-8 integrated motor controller, which can protect the motor from phase loss, overload and other faults. After installation, user needs to set the current of the integrated motor controller.

3 Installation

3.1 Outline and installation size: see Figure 1, unit: mm.

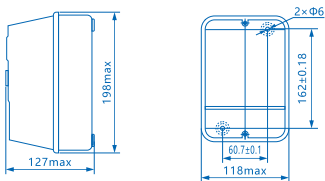


Figure 1 Outline and Installation Size of the Controller

3.2 Wiring diagram of NJBK5-10 controller: see Figure 2 and Figure 3; wiring diagram of NJBK5-10D: see Figure 4 and Figure 5.

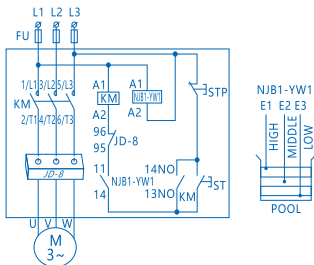


Figure 2 Wiring Diagram of NJBK5-10 Controller when the Control Circuit and Main Circuit Voltages are both AC380V

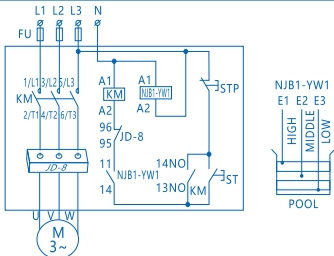


Figure 3 Wiring Diagram of NJBK5-10 Controller when the Control Circuit Voltage is 380V and the Control Circuit Voltage is 220V

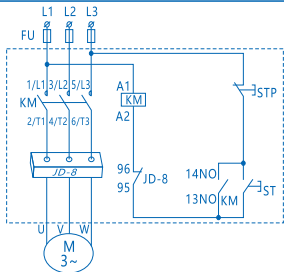


Figure 4 Wiring Diagram of NJBK5-10D Controller when the Control Circuit and Main Circuit Voltages are both AC380V

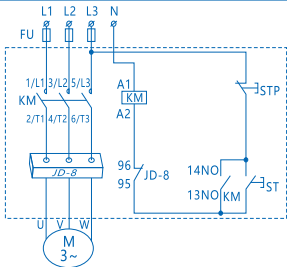


Figure 5 Wiring Diagram of NJBK5-10D Controller when the Control Circuit Voltage is 380V and the Control Circuit Voltage is 220V

3.3 The installation and use are as follows:

- a) The controller must be installed vertically, and the screws no less than M5 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.
- b) When the controller is delivered, the wires of the control circuit have been connected. The user only needs to connect the incoming and outgoing lines of the dashed part of the main circuit according to the wiring diagram. Three detection electrodes E1, E2 and E3 of the liquid level relay in the controller should be installed in the controlled water pool according to the high, medium and low positions by the user, and the end part should have a good conductivity (see Figure 2~ Figure 5 for the wiring diagram of the controller or see the wiring diagram on the inner wall of the controller' s enclosure).
- c) Multicore PVC insulated copper wire is used as the connecting wire of the incoming and outgoing lines of the main circuit of the controller; refer to Table 5 for the sectional area of the wire. The cross-sectional area of the connecting wire of the auxiliary circuit is 1mm². It is recommended that the screw tightening torque for wiring be no less than 1.2 N·m.
- d) Current setting: First turn the setting knob of the integrated motor controller clockwise to the maximum value, and then press the start button to start the

motor after confirming that the wiring is correct. The three-phase indicator (green) of the integrated motor controller should be on, and the overload indicator (red) should be off. Then turn the setting knob slowly counterclockwise until the overload indicator is on. At this time, the integrated motor controller is in the critical state of overload, and then slowly turn it back clockwise until the overload light just goes out, and thus the setting process is over.

- e) After current setting and liquid level electrode installation, cover the enclosure and tighten the mounting screws. Next, press the start button to carry out the corresponding overload test specified in Table 4, which should meet the requirements, otherwise current setting needs to be redone.

Table 5 Sectional Area of the Connecting Wire

Motor rated operating current (A)	Sectional area of the connecting wire (mm ²)
$0 \leq I_e \leq 8$	1.0
$8 \leq I_e \leq 12$	1.5
$12 \leq I_e \leq 20$	2.5
$20 \leq I_e \leq 25$	4.0
$25 \leq I_e \leq 32$	6.0

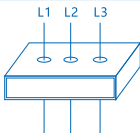


Figure 6 One Feedthru for 3A or above

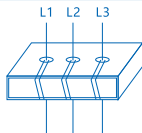


Figure 7 Multiple Feedthrus for 3A or below

Notes:

- 1) The three main circuits from the AC contactor to the motor are respectively connected with the motor through the wire hole of the integrated motor controller. When the rated current of the motor is less than 3A, the three-phase main circuit needs to pass the hole for many times. See Table 3 for the number of windings. The product of the minimum signal current passing through the center hole of the integrated motor controller and the number of windings should be greater than 3A. See Figure 6 and Figure 7 for the feedthru diagram of the

integrated motor controller.

- 2) 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.
- 3) The ground screw of the controller should be properly grounded.
- 4) A short circuit protection device (SCPD) should be used to support the controller.
- 5) You are required to check whether the phase loss and overload motions of the integrated motor controller are reliable on a regular basis (preferably once a month) by the method: reduce the setting current by adjusting the current setting knob, until the integrated motor controller motions. Then redo the current setting; disconnect any phase of the three-phase power supply, and test whether the integrated motor controller's phase loss protection functions is reliable.
- 6) Three copper conductors (preferably stainless steel) with good conductivity should be used as the electrodes of the liquid level relay 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.
- 7) 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 indicators of Phase A, Phase B and Phase C are not on	Whether the main current is zero none or too small.	Use the clamp meter to check whether there is current in the main circuit and whether the motor power is too small.

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.

CHINT

QC PASS

NJBK5 Series
Motor Protective Controller
IEC/EN 60947-4-1

JDQ Check 10

Test date: Please see the packing

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