



NJBK2 Series
Motor Protector

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.

1 Use Purpose

NJBK2 series motor protector (hereinafter referred to as the protector) is applicable to the protection of overload, blocking, loss of phase, three-phase current unbalance, grounding and PTC temperature of none-stop or intermittent duty AC motors with AC frequency of 50Hz, rated insulation voltage below AC 690V and rated operating current 1A~800A. The protector is generally used along with an AC contactor.

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	NJBK2-200/10	NJBK2-200/50	NJBK2-200/200	NJBK2-400/400	NJBK2-800/800
Current setting range (A)	10	50	200	400	800
Appropriate motor power (kW)	2~10	10~50	40~200	160~400	320~800
Installation method	1~5	5~25	20~100	80~200	160~400
Setting method	Rail mounting, Equipment type				
Display method	Digital dial				
Protection function	LED and Nixie tube				
Number of contacts	Protection of overload, blocking, loss of phase, three-phase current unbalance, grounding, and PTC temperature				
Current setting range (A)	1 group normally open, 1 group normally closed (95 and 96 are NC contacts, 97 and 98 are NO contacts)				

Table 3 Main Circuit Technical Parameters

No.	Product Model	NJBK2-200/10	NJBK2-200/50	NJBK2-200/200	NJBK2-400/400	NJBK2-800/800
1	Rated insulation voltage (V)	690				
2	Rated control supply voltage U_s (V), frequency (Hz)	AC220, AC380, 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)	4				
5	Rated conditional short-circuit current (kA)	30			40	50
6	SCPD type	Type 2				
7	SCPD model	RT36-00/25A	RT36-00/125A	RT36-2/200A	RT36-2/400A	RT36-4/800A
8	Enclosure protection class (if applicable)	IP20				
9	Terminal tightening screw (or nut) size	M3				
10	Torque of terminal tightening screw (N·m)	0.5				
11	Pollution class	Class 3				
12	Rated duty	8h duty or non-stop duty				
13	Electromagnetic environment	B				

Table 4 Auxiliary Circuit Technical Parameters

No.	Product model	NJBK2-200	NJBK2-400	NJBK2-800
1	Rated insulation voltage (V)	380		
2	Rated impulse withstand voltage U_{imp} (kV)	2.5		
3	Agreed free air heating current I_{th} (A)	5		
4	Rated operating voltage U_e (V)	240		380
5	Use type under rated operating voltage and rated operating current I_e (A)	AC-15		
		1.5		0.95
6	SCPD model	RT16-16A	NT00-6A	

2.1 Motion characteristic

2.1.1 For the motion characteristic of balanced three phase load, please refer to Table 5.

2.1.2 For the time-current characteristic curve of the protector, please refer to Figure 1.

2.1.3 The motion characteristic of loss of phase and three-phase current unbalance should meet the following requirements, and the motion time of the protector should be $\leq 5s$.

$$\frac{I_{max}-I_{min}}{I_{max}} \times 100\% > 40\%$$

Where : I_{max} -- Max current value among three-phase currents

I_{min} -- Min current value among three-phase currents

2.1.4 The ground fault protection of the protector is realized by the measurement of the external zero-sequence current transformer. When the zero-sequence current is $\geq 0.5A$, the protector's motion time is $\leq 1s$.

2.1.5 The overheating protection of the protector is realized by detecting the resistance value of the PTC thermistor embedded in the stator winding of the motor. When the resistance value of PTC thermistor is not greater than 750Ω , the protector will not motion; when the resistance value of PTC thermistor is in the range of rising from 1650Ω to 4000Ω , the protector will motion for $\leq 1s$; When the resistance value of PTC thermistor is in the range of falling from 1650Ω to 750Ω , the protector will not motion or can be reset. When a resistor of 4000Ω is connected to the temperature protection terminal of the protector and the protector works under the rated operating voltage, the voltage on the terminal shall not exceed $7.5V$ (DC or AC peak value).

Table 5 Motion Characteristics of Each Trip Level in Balanced Three-phase Load

No.	Setting current multiple	Trip level	Motion time	Starting condition	Ambient air temperature ℃
1	1.05	10A	No motion in 2h	Start from cold state	20±2
		10			
		20			
		30			
2	1.2	10A	Motion in 2h	Follow No.1	
		10			
		20			
		30			
3	1.5	10A	< 2min	Start 2h after the main circuit is connected with 1 time of setting current	
		10	< 4min		
		20	< 8min		
		30	< 12min		
4	7.2	10A	2s < Tp≤10s	Start from cold state	
		10	4s < Tp≤10s		
		20	6s < Tp≤20s		
		30	9s < Tp≤30s		

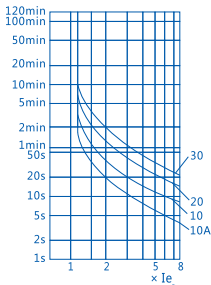


Figure 1 Time-current Characteristic Curve of the Protector

2.2 Reset characteristic

After tripping action, if the auxiliary power supply (A1, A2) is disconnected, the protector will reset automatically; if the auxiliary power supply is not disconnected, the protector has three reset modes: manual reset, remote manual reset and automatic reset. Manual reset and remote manual reset require the corresponding reset device. The reset time after the protector's motion is $4 \text{ min} \leq t \leq 12 \text{ min}$.

2.3 Working principle

The working current of the motor takes out the current signal through the secondary side of the current transformer. The processing of the current signal is completed by the operational amplifier and A/D conversion. The single-chip microcomputer performs the logic operation on the input signal, simulates the heating characteristics of the motor for inverse time lag protection, and makes accurate judgment on the overload, phase loss, three-phase current unbalance, grounding, too high motor winding temperature and other faults. Within the specified motion time, the I/O port outputs the tripping signal, drives the protector to motion, and causes the contactor to cut off the main circuit current of the motor.

3 Installation

3.1 Outline and installation size of NJBK2-200: see Figure 2, unit: mm.

3.2 Outline and installation size of NJBK2-400: see Figure 3, unit: mm.

3.3 Outline and installation size of NJBK2-800: see Figure 4, unit: mm.

3.4 Outline and installation size of the protector: see Figure 5, unit: mm.

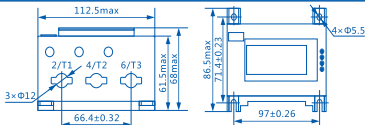


Figure 2 Outline and Installation Size of NJBK2-200 Protector

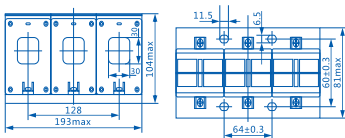


Figure 3 Outline and Installation Size of NJBK2-400 Protector

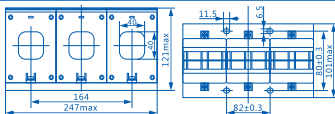


Figure 4 Outline and Installation Size of NJBK2-800 Protector

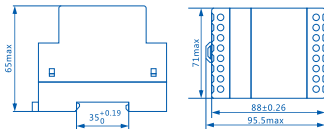


Figure 5 Outline and Installation Size of NJBK2 Series Protector

3.5 Wiring diagram of the protector: see Figure 6~ Figure 9.

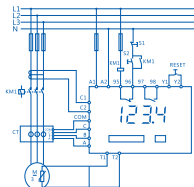


Figure 6 Wiring Diagram for Control Power Supply Voltage of AC220V and Rated Operating Voltage of AC220V

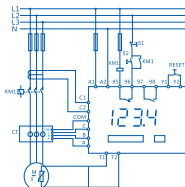


Figure 7 Wiring Diagram for Control Power Supply Voltage of AC220V and Rated Operating Voltage of AC380V

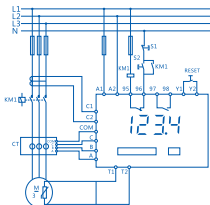


Figure 8 Wiring Diagram for Control Power Supply Voltage of AC 380V and Rated Operating Voltage of AC220V

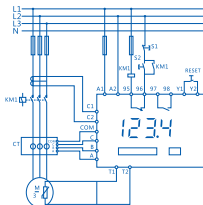


Figure 9 Wiring Diagram for Control Power Supply Voltage of AC 380V and Rated Operating Voltage of AC380V

3.6 According to different use environment, the following two kinds can be selected.

- Integral installation: fix the protector on the installation guide rail of the current transformer, and connect the current transformer with the connection terminals A, B, C and COM of the protector with four-core shielded wires respectively;
- Split installation: fix the protector equipped with the clamp and wiring holder and the current transformer at different positions respectively, and then connect the

current transformer with the connection terminals A, B, C and COM of the protector with four-core shielded wires of appropriate length.

3.7 Test: after the protector is installed, you can test the circuit before the main circuit is closed. The test process is as follows: set the setting current to a certain value, power on the protector, touch the test button on the protector panel, the protector current display screen should display 6 times value of the setting current, meanwhile the overload indicator light and operation indicator light should be on, and the protector will trip within a certain time. See Table 6 for the tripping time. After tripping, the protector can only be reset after being delayed to the corresponding reset time.

3.8 Setting current regulation: the addition mode is adopted, i.e. accumulate based on the default setting current value (the accumulation process is to turn the dial switch from off to on, up is on), and the sum is the setting value. The first setting current number from the left on the setting panel is the default value. For example, if the NJBK2-200/50 AC380V protector is selected, the setting current is set to 44A according to the following process: The default setting value is 10A, and 34A needs to be added on this basis, then choose to turn on the four switches 20A, 10A, 3A and 1A. The schematic diagram of the setting panel is shown in Figure 10.

3.9 Setting of trip level: the user should select the trip level according to the insulation level and load characteristics of the motor. See Figure 11 for the setting mode of each trip level.

3.10 Reset: The protector provides three reset modes, namely, manual reset, remote manual reset and automatic reset. When the user selects manual reset, terminals Y1 and Y2 are vacant. After the protector's motion, the protector can be reset by touching the reset button on the panel. When the user selects remote manual reset, terminals Y1 and Y2 should be connected to the NO contacts of the control button. After the protector's motion, the protector can be reset through the external button. When the user selects automatic reset, user need to short circuit the terminals Y1 and Y2.

3.11 Fault memory: After the protector's motion, the panel indicator light will memorize the cause of the fault and keeps the current display of the main circuit at the time of motion. The user can troubleshoot the problems by observing the indicator and the displayed current.

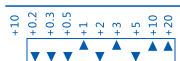


Figure 10 Diagram of Setting Current Setting Panel



Figure 11 Diagram of Trip Level Setting Panel

Table 6 Test Trip Time

No.	Trip level	Trip time (s)
1	10A	5
2	10	10
3	20	20
4	30	30

Notes:

- 1) When the user chooses not to use temperature protection, terminals T1 and T2 must be short circuited.
- 2) After the overload motion of the protector, it must be delayed to the reset time to realize the corresponding reset.
- 3) When the current of the main circuit is more than 80A and less than 200A, it is recommended to select the conductive bar supporting the use of the protector.
- 4) When the rated current of the motor is large and the conductive bar is selected, it is recommended to install the current transformer of the protector with screws to ensure the secure installation.
- 5) The phase loss protection of the protector is only suitable for the phase loss of the motor, and does not protect the high voltage side of the distribution line transformer.
- 6) If the motor stops in operation, determine the fault reason by observing the fault indicator light and displayed current on the panel, and carefully check the motor wiring circuit to eliminate the fault. After the motion of the protector, when the power input of the protector is disconnected, the fault memory and display memory functions are invalid.
- 7) If the protector is only suitable for protecting one motor, then only one motor can be connected to the line passing through the center hole of the protector.
- 8) When the rated current of the motor is less than 2A, the main circuit of the protector should have multiple feedthrus, and the setting current value should be set as the product of the rated current of the motor and the times of feedthrus.
- 9) When setting the setting current, when the sum of the setting current exceeds the setting current range of the protector, the protector motions and displays the error code -ERR. At this time, the protector needs to be powered off and reset.
- 10) Check performance of the protector and perform the overload test and phase loss test on a regular basis. The test should be carried out by professional technicians to ensure the safety of electricity use.
- 11) After the setting current is set, the protector needs to be powered on again.
- 12) When the user chooses not to use the grounding protection function, the terminals C1 and C2 are vacant.
- 13) Split installation requires the support of clamp and wiring holder.
- 14) This protector cannot be installed in front of the frequency converter.

4 Maintenance

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

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

Table 7 Fault Analysis and Troubleshooting

Symptoms	Cause analysis	Troubleshooting method
Nixie tube does not display	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 protector motions and displays "-ERR"	The dial switch' s setting exceeds the setting current range.	Reset the dial switch according to the product's setting current range.
The motor stops in operation	Whether the motor has overload, blocking, phase loss, three-phase current unbalance, grounding, PTC temperature protection and other faults.	Trouble shooting according to Note 6) under No. 3.

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

NJBK2 Series
Motor Protector
IEC/EN 60947-5-1

JDQ Check 10

Test date: Please see the packing

ZHEJIANG CHINT ELECTRICS CO., LTD.

CHINT

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NJBK2 Series Motor Protector User Instruction

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