NO:2020.11

CHINT ELECTRICS

NJBK7-800 Series
Motor Protector

User Instruction

Standard: IEC/EN 60947-4-1

⚠ 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

NJBK7-800 motor protector (hereinafter referred to as the protector) is applicable to the protection of overload, blocking,loss of phase, three-phase current unbalance, undercurrent, grounding, PTC temperature and communication failure 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. Equipped with RS485 interface and 4mA~20mA analog transmission interface, the protector can achieve network communication. The remote monitoring, control, fault inquiry and other functions of the motor are realized through the upper computer. The large current specification uses a flexible Rogowski coil to collect current, which has the advantages of wide range of setting current, high precision and convenient installation. The protector is generally used in conjunction with an AC contactor.

2 Key Technical Parameters

Table 1 Ambient Conditions

Normal use conditions	Ambient temp.: -5℃~+40℃; average value within 24h not exceeding +35℃; altitude not exceeding 2,000m.
Atmospheric conditions	RH shall not exceed 50% when maximum temperature is +40℃; 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℃~+55℃

Table 4 Auxiliary Circuit Technical Parameters

No.	Product model	NJBK7 Series	
1	Rated insulation voltage (V)	AC480	
2	Rated impulse withstand voltage Uimp (kV)	2.5	
3	Agreed free air heating current Ith (A)	5	
4	Rated operating voltage Ue(V)	240V	480V
5	Utilization category and rated operating current Ie(A)	AC-15	
		1.5	0.75
6	SCPD model	NT00-6A	

Table 2 Product Specifications and Main Technical Parameters

Model		NJBK7-800/5 NJBK7-800M/5 NJBK7-800T/5 NJBK7-800MT/5	NJBK7-800/10 NJBK7-800M/10 NJBK7-800T/10 NJBK7-800MT/10	NJBK7-800/40 NJBK7-800M/40 NJBK7-800T/40 NJBK7-800MT/40	NJBK7-800/100 NJBK7-800M/100 NJBK7-800T/100 NJBK7-800MT/100	NJBK7-800/400 NJBK7-800M/400 NJBK7-800T/400 NJBK7-800MT/400	NJBK7-800/800 NJBK7-800M/800 NJBK7-800T/800 NJBK7-800MT/800
Function code	M	4mA~20mA analog transmission					
	T	RS485 communication interface					
Rated current (A)		5	10	40	100	400	800
Current setting range (A)		1~5	2~10	8~40	20~100	80~400	200~800
Appropriate moter power (kW)		0.5~2.5	1~5	4~20	10~50	40~200	100~400
Mounting type		The protector is installed with split panel, and the installation of the transformer is guide rail type and device type					
Setting method		Buttons					
Display method		Nixie tube and indicator light					
Protection function		Overload, blocking, loss of phase, three-phase current unbalance, undercurrent, grounding, PTC temperature and communication failure					
Number of contacts		1 group of change-over (protective), 1 group of normally on (auxiliary)					

Table 3 Main Circuit Technical Parameters

No.	Product Model	NJBK7-800 □□/5	NJBK7-800 □□/10	NJBK7-800 □□/40	NJBK7-800 □□/100	NJBK7-800 □□/400	NJBK7-800 □□/800
1	Rated insulation voltage (V)	AC690					
2	Rated control supply voltage Us (V), frequency (Hz)	AC220V, AC230V, AC240V, AC380V, AC400V, AC415V, 50Hz					
3	Allowable fluctuation range of rated control power supply voltage	85%Us~110%Us					
4	Rated impulse withstand voltage Uimp (kV)	4					
5	Rated conditional short-circuit current (kA)	10				30	
6	SCPD type	Type 2					
7	SCPD model	NT00-6A	NT00-10A	NT00-50A	NT2-100A	NT2-400A	NT4-800A
8	Enclosure protection class (if applicable)	IP20					
9	Size of terminal tightening screw (or nut)	M2.5					
10	Torque of terminal tightening screw (N·m)	0.5					
11	Pollution class	Class 3					
12	Rated duty	8h duty or uninterrupted duty					
13	Electromagnetic environment	Environment B					

2.1 Motion characteristic

2.1.1 Motion characteristic of inverse time lag (overload): When the current value exceeds 1.05 times of the setting current value, the protector will start the inverse time lag overload protection function. The protector will simulate and calculate the thermal accumulation and motion time of the motor according to the overload multiple of the overload current. When the thermal accumulation reaches a certain value, the protector will motion and cut off the AC contactor to protect the motor. For the relationship between overload current and time, please refer to Figure 1 and table 5.

Table 5 Motion Characteristic of Inverse Time-delay(Overload)

Overload multiple / Overload curve / Motion time (s)	1.05	1.2	1.5	2	5	6	7.2	Note
Kr=1	No motion	63	40	22	3.6	2.5	1.8	Meet Level 5
Kr=2		125	80	45	7.2	5	3.5	Meet Level 10A
Kr=3		250	160	90	14	10	6.9	Meet Level 10
Kr=4		500	320	180	29	20	14	Meet Level 20
Kr=5		750	480	270	43	30	21	Meet Level 30

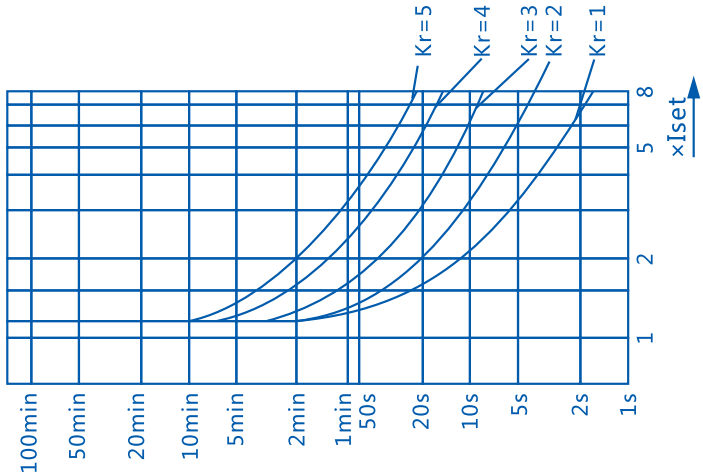


Figure 1 Time-current Characteristic Curve

2.1.2 Motion characteristic of blocking protection: When the maximum phase current ≥ the setting current value × the set blocking ratio, the protector motions, and the motion time is the set blocking motion time.

2.1.3 Motion characteristic of phase loss protection: When any one of the three-phase currents of the main circuit is lower than 25% of the setting current, the protector motions, and the motion time ≤3s.

2.1.4 Motion characteristic of three-phase unbalance protection: When the three-phase current of the main circuit conforms to the following formula, the protector motions, and the motion time ≤3s.

$$\frac{\underset{i=1}{\overset{3}{Max}}\left|I_i\text{-}I_{avg}\right|}{I_{avg}}\times 100\% > \text{The set current unbalance rate}$$

Where: I_i— Effective current value of each phase.

I_{avg}— Mean value of effective three-phase current values.

2.1.5 Motion characteristic of undercurrent protection: When the minimum phase current ≤ the set current value × the set undercurrent percentage, the protector motions, and the motion time is the set undercurrent motion time.

2.1.6 Motion characteristic of grounding protection: The ground fault protection of the protector is realized by an external zero-sequence current transformer. When the current passing through the primary side of the zero-sequence current transformer is within (0.9~1.1) times of the motion current range, the protector motions, and the motion time ≤1s.

2.1.7 Characteristic of temperature protection: The overheat protection function 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 the PTC thermistor ≤ 750Ω, the protector will not motion; when the resistance value of the PTC thermistor is in the range of 1650Ω~4000Ω, the protector will motion for≤ 1s; when the resistance value of the PTC thermistor is in the range of 750Ω ~1650Ω, the protector can be reset; When the user does not select the temperature protection function, terminals T1 and T2 must be short circuited.

2.1.8 Characteristic of communication failure: The protector and the transformer are connected through a dedicated cable, and when the cable is broken or damaged, the protector motions, and the motion time ≤3s.

3 Installation

3.1 Outline and installation size of the protector with rated current of 5A, 10A, 40A: see Figure 2, unit: mm.

3.2 Outline and installation size of the protector with rated current of 100A: see Figure 3, unit: mm.

3.3 Outline and installation size of the protector with rated current of 400A, 800A: see Figure 4, unit: mm.

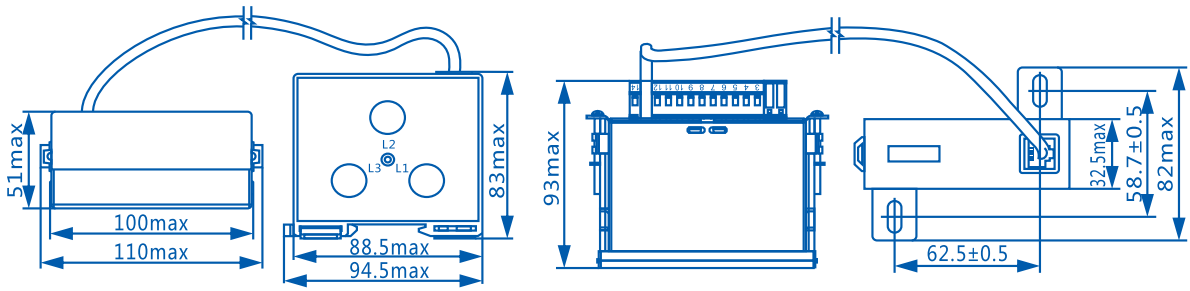


Figure 2 Outline and Installation Size of the Protector with Rated Current of 5A, 10A, 40A

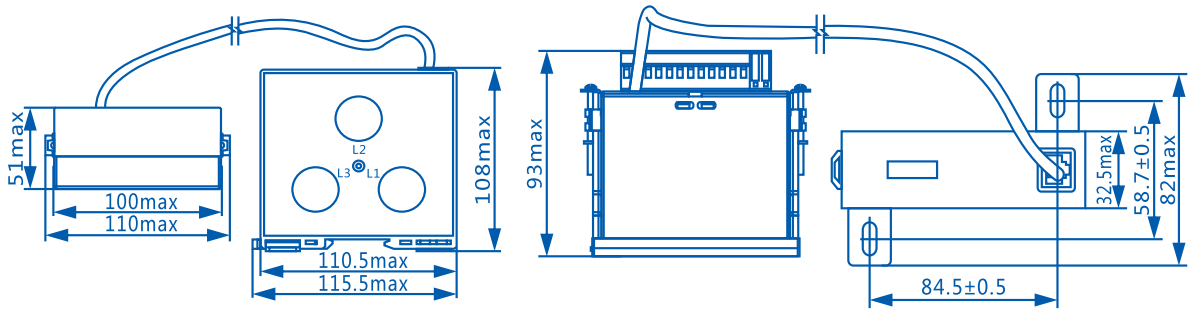


Figure 3 Outline and Installation Size of the Protector with Rated Current of 100A

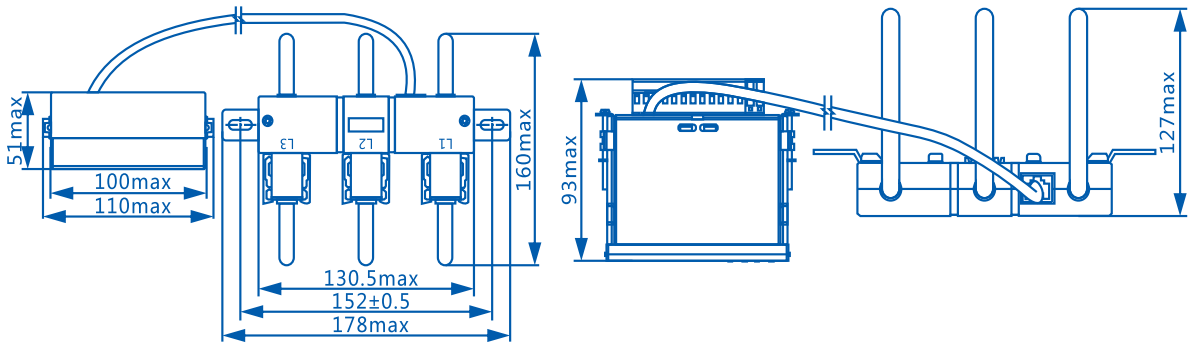


Figure 4 Outline and Installation Size of the Protector with Rated Current of 400A, 800A

3.4 Installation mode of Rogowski coil transformer: see Figure 5 and Figure 6.

3.5 Hole-cutting size: see Figure 7, unit: mm.

3.6 Schematic diagram of the panel: see Figure 8.

3.7 Terminal definition and wiring diagram

Terminal definition of the protector: see Figure 9; wiring diagram of the protector: see Figure 10~ Figure 13.

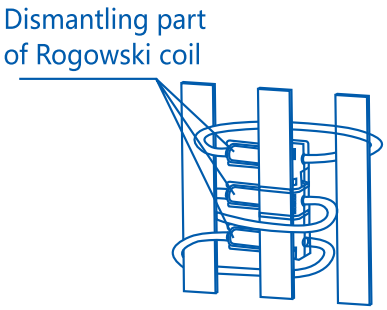


Figure 5 Installation Mode 1 of Rogowski Coil Transformer

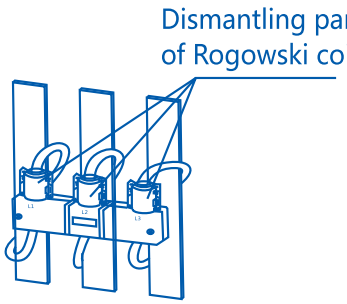


Figure 6 Installation Mode 2 of Rogowski Coil Transformer

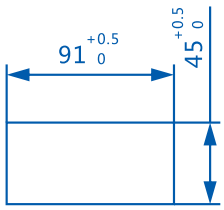


Figure 7 Hole -cutting Size

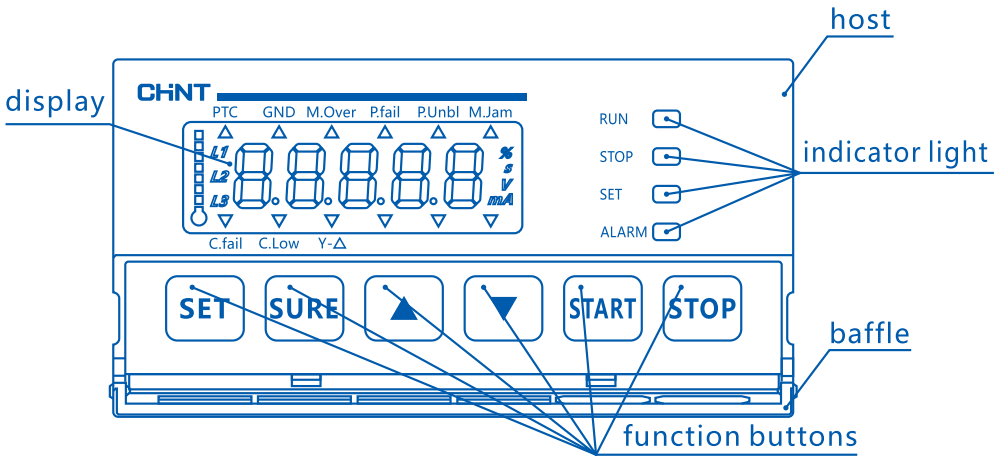


Figure 8 Schematic Diagram of the Panel

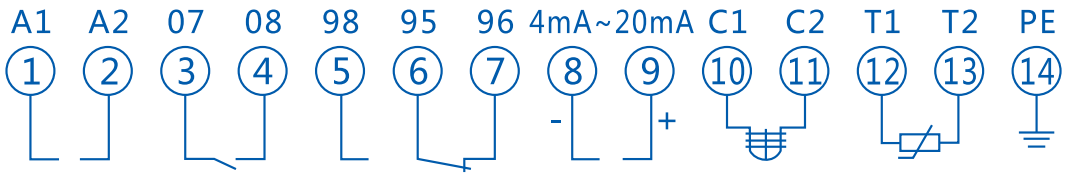


Figure 9 Terminal Definition

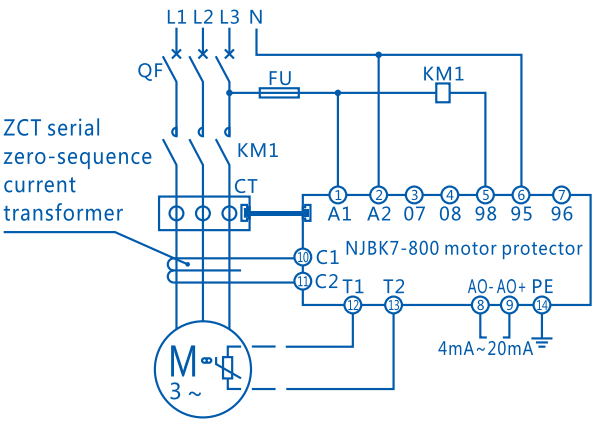


Figure 10 Wiring Diagram of Direct Start-up

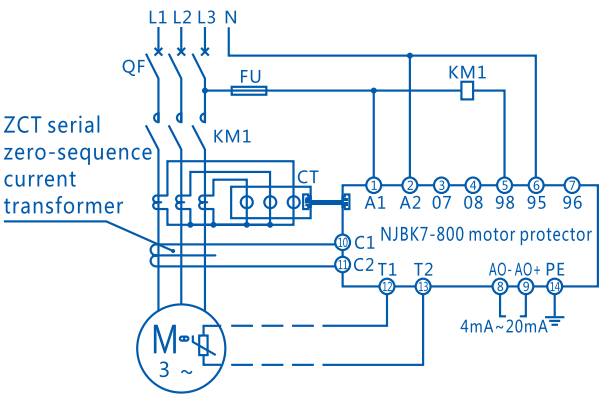
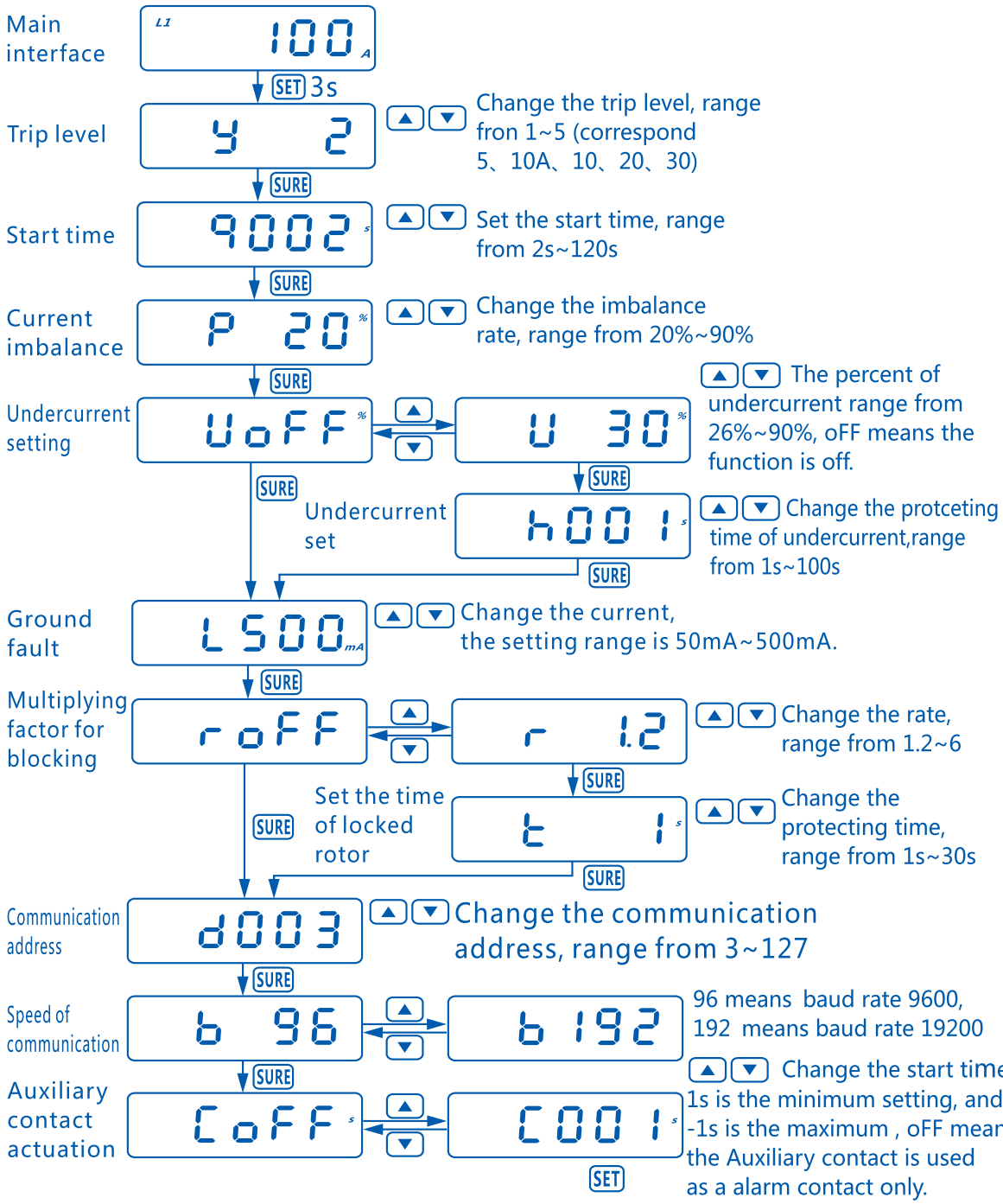


Figure 11 Wiring Diagram of Secondary Direct Start-up

3.8 Operating instructions

3.8.1 Setting current setting process

3.8.2 Protection parameter setting process



Notes: It' s a recommendation that you set up under the stop mode, long press SET for 3s after the setting to return to the home screen; if you fail to operate the button within 30s under the setting mode, the machine returns to the home screen automatically.

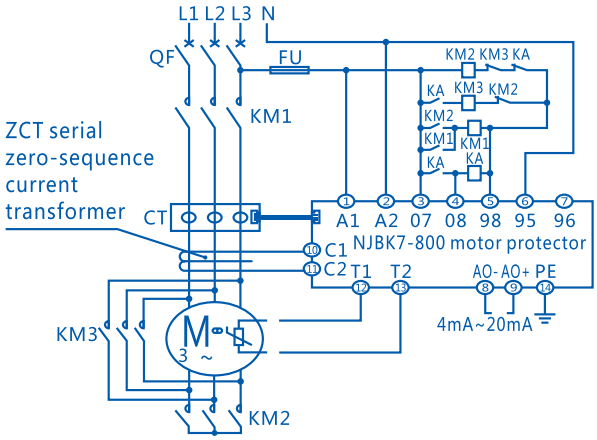


Figure 12 Wiring Diagram of Star-delta Start-up

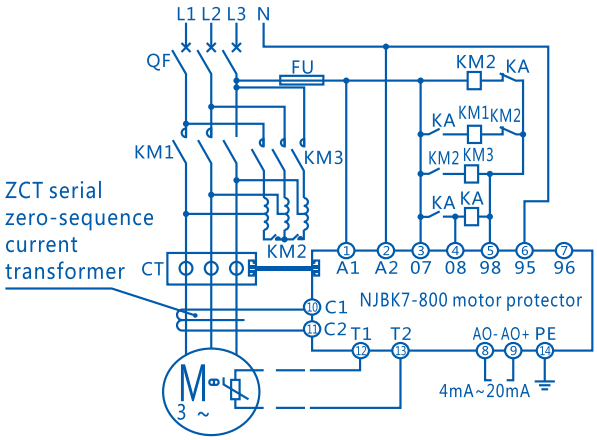


Figure 13 Wiring Diagram of Self-coupling Buck Start-up

3.9 Motor start-up instructions

3.9.1 Operating instructions of non-star-delta start-up or non-self-coupling buck start-up

After the wiring is completed according to the wiring diagram in Figure 10 or Figure 11, start the main switch QF, press the button START, the normally open contacts 95 and 98 of the protector are closed, and the AC contactor KM1is connected to realize the start-up of the motor; press the button STOP, the normally open contacts 95 and 98 of the protector are open, and the AC contactor KM1 is disconnected to realize the stop operation of the mortar, and the motion sequence is shown in Figure 14.

3.9.2 Operating instructions of star-delta start-up or self-coupling buck start-up

In this mode, first ensure that the auxiliary contact function is set to a non-OFF state. After the wiring is completed according to the wiring diagram in Figure 12 or Figure 13, start the main switch QF, press the button START, the normally open contacts 95 and 98 of the protector are closed, when the motion time of the auxiliary contacts is up, the contacts 07 and 08 are closed; press the button STOP, the normally open contacts 95 and 98 of the protector are open, and the auxiliary contacts 07 and 08 are open, and the motion sequence is shown in Figure 14.

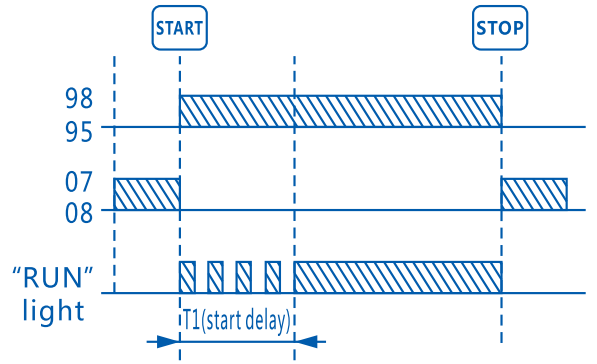
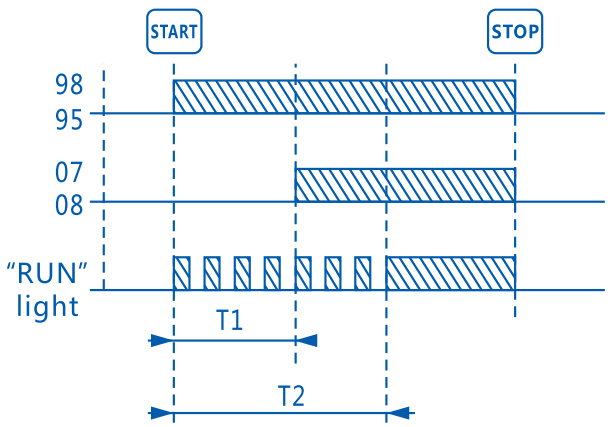


Figure 14 Start-up Sequence Diagram



Note: T1: motion time of auxiliary contact;
T2: Start-up delay.

Figure 15 Start-up Sequence Diagram

3.10 Operating state description

The protector has four states: run, stop, setting and alarm. The protector is initially in the stop state after it is powered on. When the button START is pressed, the protector will enter the run state. During the period of start-up delay, the protector will not judge overload, undercurrent and blocking faults. When the start-up delay time is up, the protector will start to judge all faults. After the fault occurs, the protector will enter the alarm state. When the button STOP is pressed. Enter the setting state and return when the protector is in any state, the protector will return to the previous state.

Notes: Long press the button START before the protector is powered on, it directly enters the run sate after being powered on for 1s. The protector will be in the run state when it is powered on next time. Long press the button STOP before the protector is powered on, it directly enters the stop state after being powered on for 1s. The protector will be in the stop state when it' s powered on again next time.

3.11 Analog 4mA~20mA transmission interface

20mA corresponds to twice the setting current of the protector. For example: when the setting current value is set to 15A, the current value corresponding to 20mA is 30A, and the current value corresponding to 4mA is 0A. The test method is shown in Figure 16.

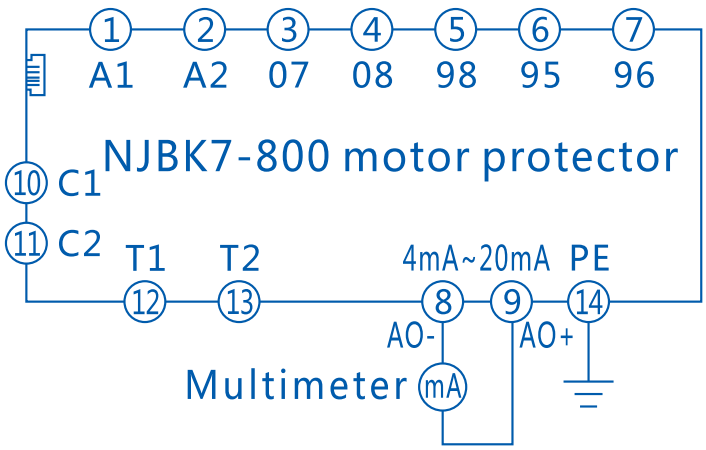


Figure 16 Wiring Diagram of 4mA~20mA Transmission Test

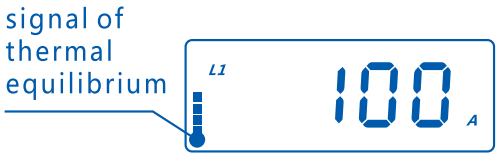


Figure 17 Heat Balance Sign

3.12 Communication

The protector provides RS485 interface and supports the Modbus protocol. If you need network communication, please contact us. We will provide you with the detailed communication specifications for the protector.

3.13 Heat Summation function

When the protector is in the run state, the heat balance state will be reached after the setting current below 1.05 times is applied in cold state for a time. At this time, the heat balance sign will be displayed on the screen, as shown in Figure 17.

Notes:

1) The connecting cable (twisted pair) between the host and the transformer shall not exceed 3m, which is 1m in default. If you need other length, please contact our customer service.

2) The protector machine has the function of automatically identifying the transformer. If you need to replace it with the transformer of different specifications, please operate when the

protector is powered off. After the protector is powered on, the setting value of the setting current of the protector will be restored to the minimum value of the setting current range of the transformer.

3) When the actual operating current value is lower than 25% of the minimum setting current value, the protector will display 0A.

4) The current display error of the protector measured in the setting current range is ± 5%. When the current error is lower or higher than the setting current range, it will increase.

5) The installation and commissioning must be carried out by professionals. Nonprofessionals are not allowed to disassemble the protector without permission, so as to avoid danger or affecting the normal operation of the protector.

6) The external signal line should be as short as possible. Do not use the same cabling pipe of strong current so as to avoid interference. Please use a shielded wire if the line is too long.

7) The use environment should meet the environmental requirements of the protector. Avoid using it in the environment with vibration, impact, corrosion, dust, static electricity, high temperature, high humidity and direct sunlight.

8) The cooperative use of the protector and the frequency converter would lead to a large display current error, therefore the protector cannot be used together with a frequency converter.

9) Avoid strong magnetic field interference (such as inter-phone) near the protector. If there is strong magnetic field interference, keep a distance of more than 3m.

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 6 Fault Analysis and Troubleshooting

Symptom	Cause analysis	Troubleshooting method
The 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 host shows temperature fault.	Whether the motor has PTC temperature protection.	If PTC temperature protection is applied, check whether the motor temperature is too high, and whether PTC thermistor is damaged or in poor contact; if it is not applied, check whether Pin 12 and Pin 13 on the terminal are short circuited.
The protector host shows communication failure.	Check whether the connecting line between the protector host and the transformer falls off or is damaged.	Check whether the connecting wire between the protector host and the transform falls off or is damaged according to the characteristic of communication failure protection in the user instructions.

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

NJBK7-800 Series
Motor Protector
IEC/EN 60947-4-1

JDQ Check 10

Test date: Please see the packing

ZHEJIANG CHINT ELECTRICS CO., LTD.

CHINT ELECTRICS

NJBK7-800 Series
Motor Protector
User Instruction

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