NJBK7-800电动机保护继电器

英文使用说明书

0ZTD.463.670

CHINT

浙江正泰电器股份有限公司

2017年12月

1 Scope of Application

NJBK7-800 series motor protection relay (hereinafter referred to as "Protector") is applicable for overload protection, locked rotor protection, phase failure protection, three-phase imbalance protection, undercurrent protection, grounding protection , PTC temperature protection and communication failure protection for AC electromotors of a frequency of 50Hz with a rated insulation voltage of up to 690V and a rated operating current of 1A~800A during long-term and discontinuous operation, This protector is provided with RS485 interface and 4mA~20mA current loop transmitter interface for network communication and performs remote monitor control on the motor and fault query through opper computer. This protector is usually used to combine with AC contactor.

This product conforms to IEC60947-4-1.

2 Normal operating conditions、environment、traspotation and storag

2.1 Altitude: Not more than 2000m.

2.2 Ambient air condition: -5℃~+40℃, and the average value in 24 hours shall not exceed +35℃.

2.3 When the maximum temperature is +40℃, the relative humidity of air shall not exceed 50% and higher relative humidity is allowable at lower temperature comparatively (e.g the air humidity may reach 90% when the temperature is +20℃). Special measures shall be taken to deal with occasianal condensation caused by variation in temperature.

2.4 Pollution class: 3.

2.5 The slope degree between installing and verical plane shall not exceed ±5°.

2.6 Explosion hazard-free media, in which there are no gasses that are capable of corroding metals and damage the insulation and not conducting dust.

2.7 Areas with rain-and-snow-proof equipment and without water vapor.

2.8 Areas without noticeable shaking, impact and vibration.

2.9 Installation class: Ⅲ.

2.10 Enclosure protection class: IP20.

2.11 Electromagnetism environment: environment B.

2.12 Rated duties of the protector considered are: eight-hour duty or uninterrupted duty.

2.13 Transportation and storage: the temperature of transportation ranges from -25℃ to +55℃ , and it is allowed to reach +70℃ in a short time (less than 24h). If the Protector is in extreme temperature but not operating, it shall not suffer the damage that is irreversible, and the protector should be operated in proper way. When the protector is in transportation, bumpy、shock and impact violently is not allowed with the ability of preventing rain、snow、dust and wet. The transport requirement must suit for land and water.

3 Model and technical parameters

3.1 Model and Denotation

N JBK 7 - 800 □ □ /□/ □

Control power supply voltage
(AC220V、AC230V、AC240V、AC380V、AC400V、AC415V)

Rated current: 5、10、40、100、400、800

None : communication interface is not available
T: RS485 interface

None: 4mA~20mA analog transformation is not available
M: 4mA~20mA analog transmission

Specification code

Design sequence No.

Motor protection relay

Company code

3.2 Basic parameters of main circuit

Rated insulatin voltage AC690V and rated frequency is 50Hz, rated impulse withstand voltage 1.2/50μs、4kV, rated current 1A~800A. See Table 1 for details.

Table 1 main circuit's main parameters

Model	rated current A	current setting range A	Appropriate motor power kW
NJBK7-800□□/5/□	5	1~5	0.5~2.5
NJBK7-800□□/10/□	10	2~10	1~5
NJBK7-800□□/40/□	40	8~40	4~20
NJBK7-800□□/100/□	100	20~100	10~50
NJBK7-800□□/400/□	400	80~400	40~200
NJBK7-800□□/800/□	800	200~800	100~400

3.3 Auxiliary parameters of main circuit

Rated insulation voltage is AC480V, and the rated frequency is 50Hz, rated impulse withstand voltage 1.2/50μs、2.5kV. See Table 2 for auxiliary contact parameters.

Table 2 auxiliary circuit's main parameters

Application class	AC-15	
Rated operating voltage Ue (V)	240	480
Rated operating current Ie (A)	1.5	0.75
Rated thermal current Ith (A)	5	

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4 Outside Dimensions and installation size

4.1 Schematic diagram of panel see Figure 1.

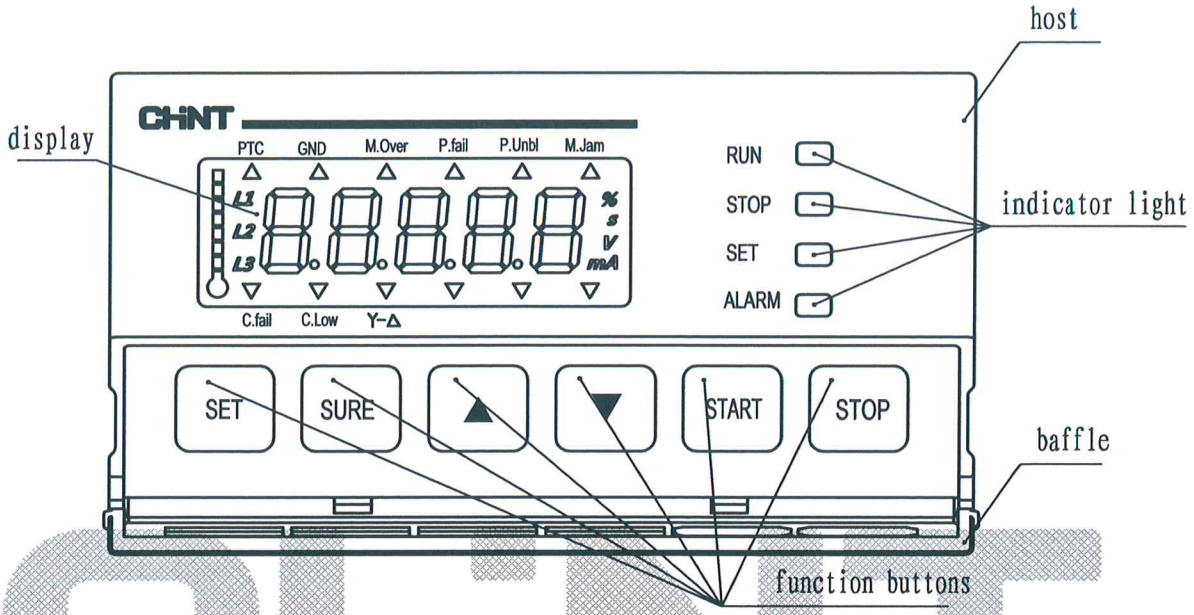


Figure 1 Schematic diagram of panel

4.2 Connecting terminals. seeing Figure 2.

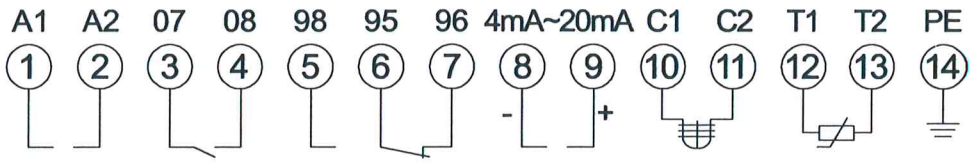
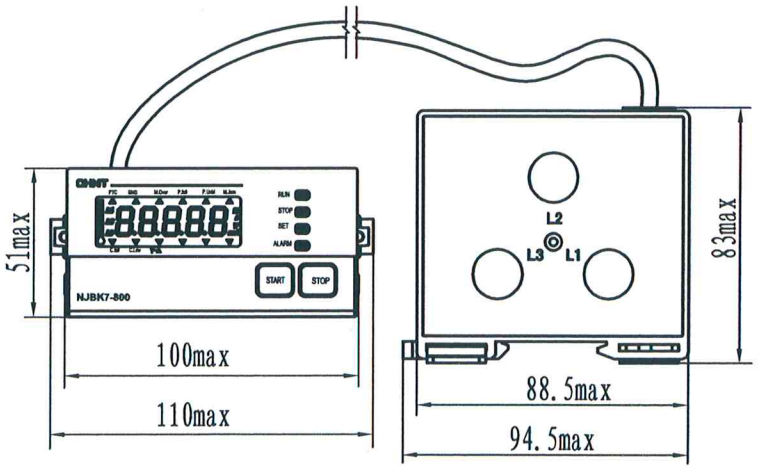


Figure 2 Connecting terminals

4.3 See Figures 3 ~ 5 for outline drawing, Figures 6 for Luo style coil transformer drawing.



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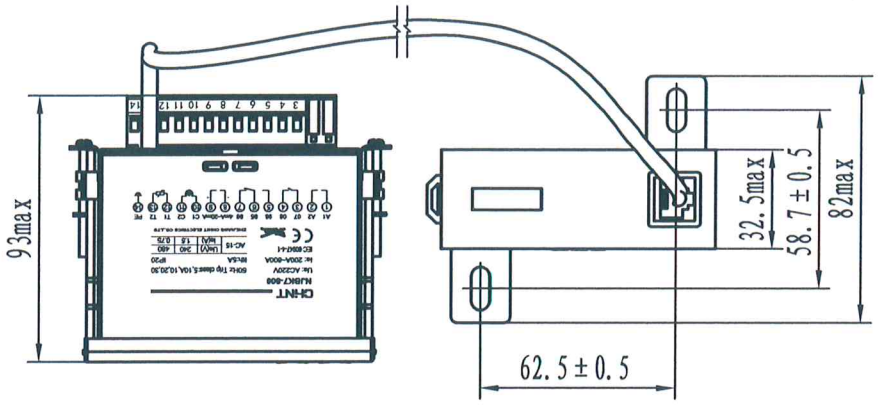
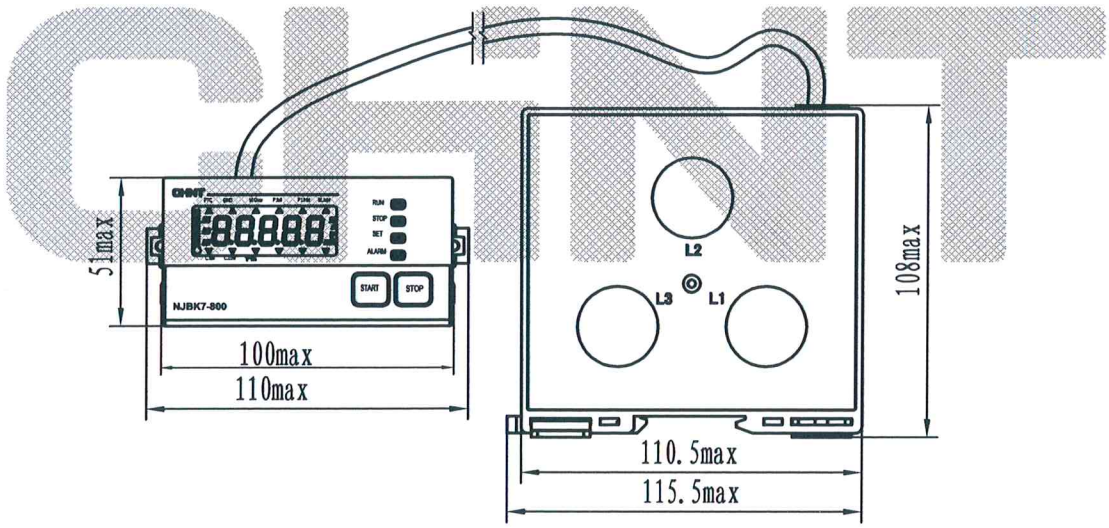


Figure3 Outline drawing of current specification with 5A、10A、40A



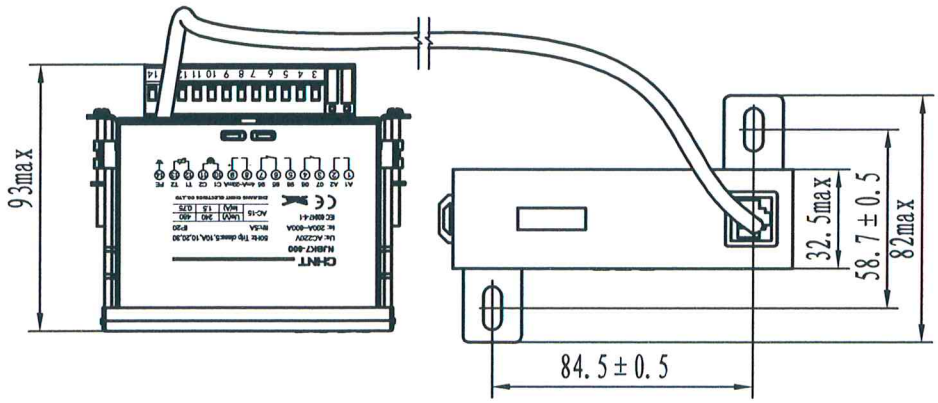


Figure4 Outline drawing of current specification with 100A

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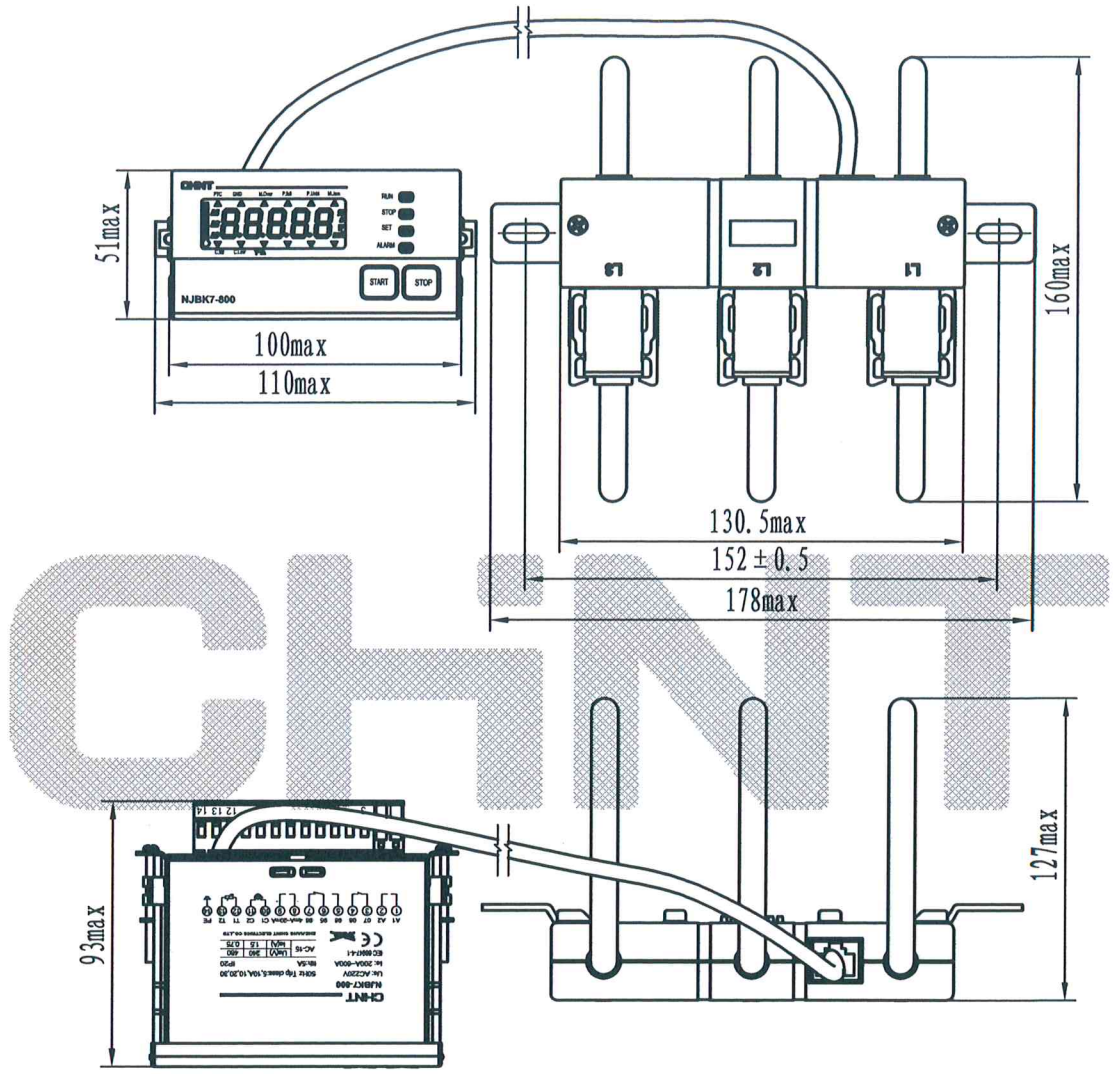

Figure5 Outline drawing of current specification with 400A、800A

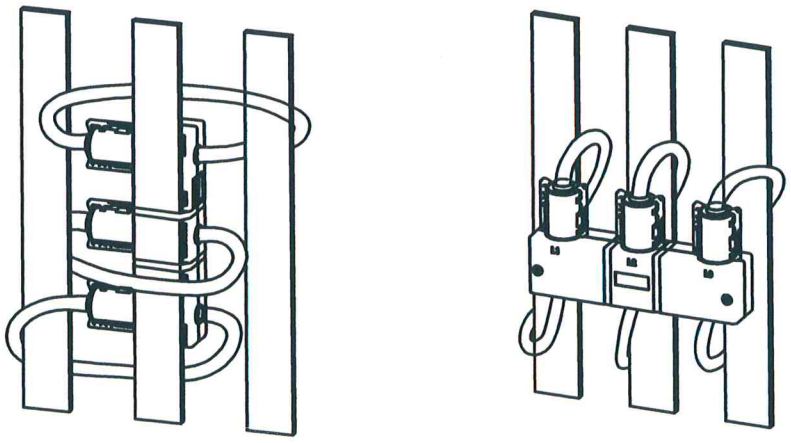

Figure6 Installation method for Luo style coil transformer

4.4 See Figure 7 for opening size.

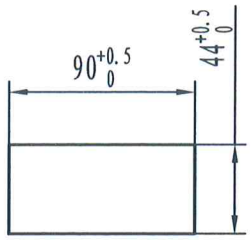

Figure7 opening size

5 Typical Wiring Diagram

Typical wiring diagram see Figure8~Figure11.

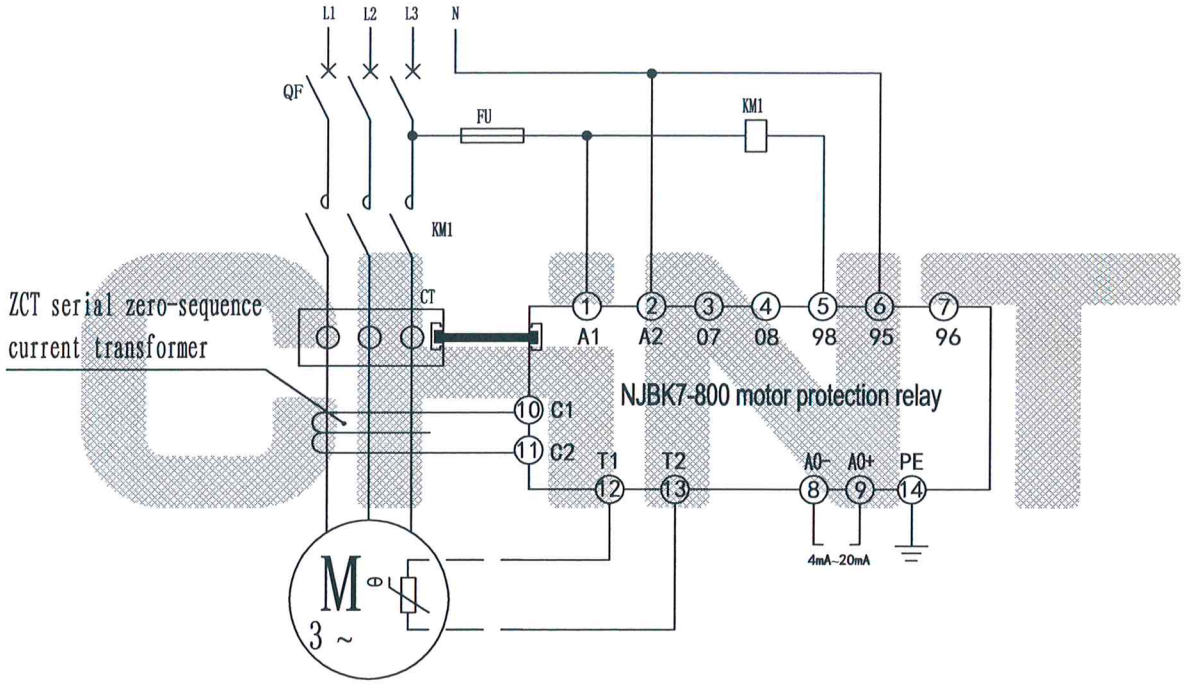

Figure8 Wiring diagram for direct start

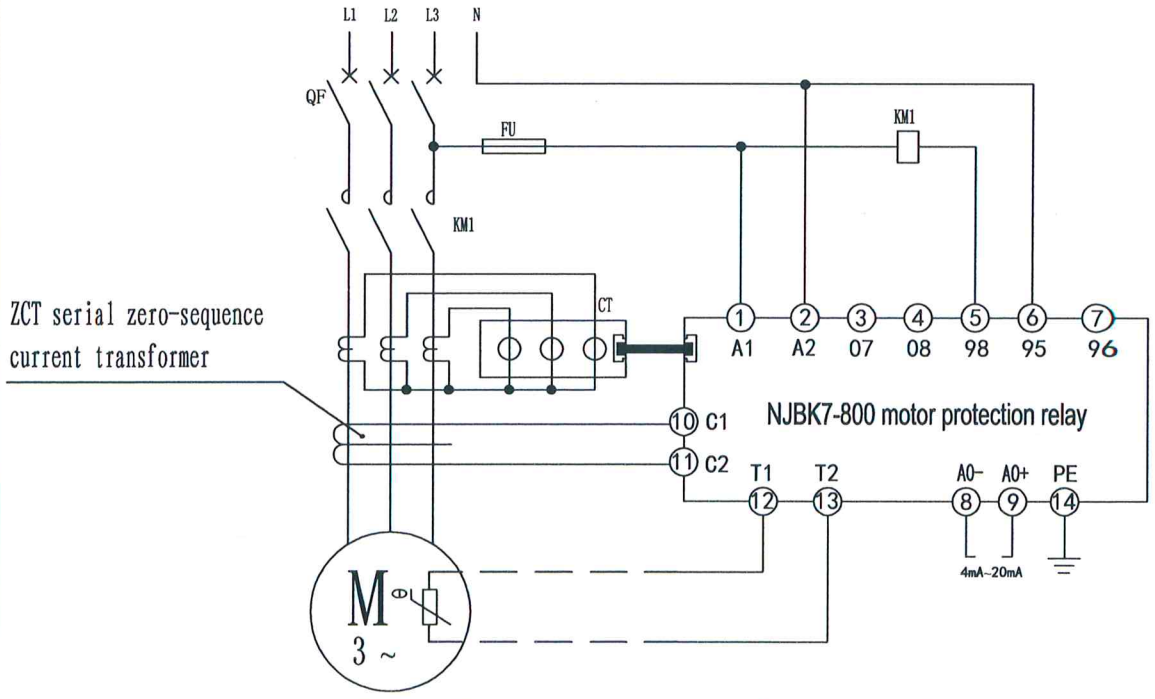

Figure9 Wiring diagram for secondary-current direct start

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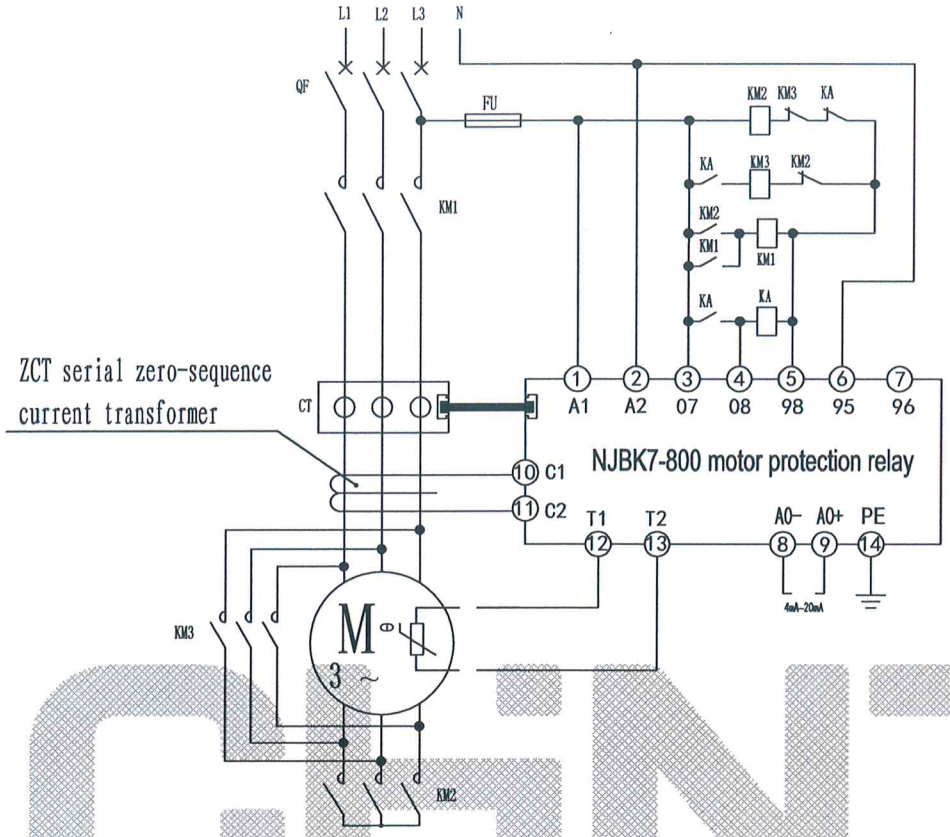

Figure10 Wiring diagram for star delta start

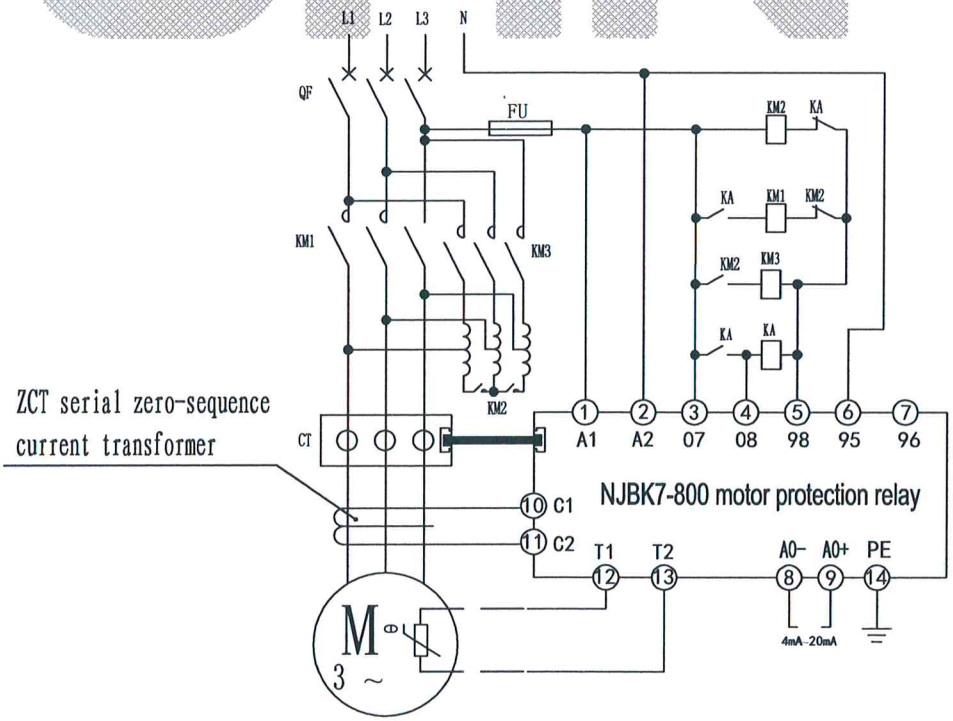

Figure11 Wiring diagram for auto voltage-reduction start

6 Setting

6.1 Setting current

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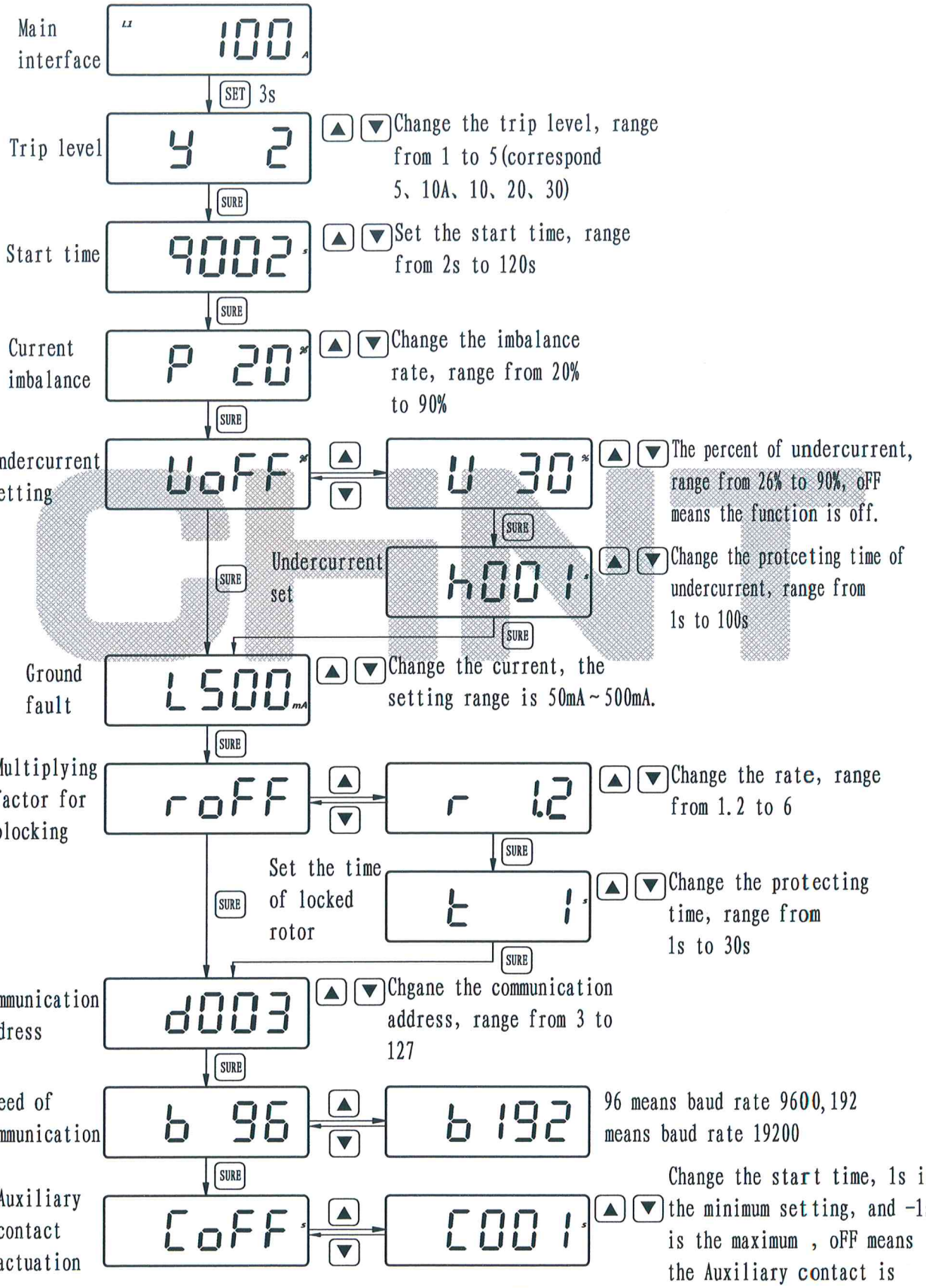
6.2 Protection parameter setting



NOTE: Set the protector in stop mode, when the set is off , press 3s on the SET key to return the main interface , If the button is not pressed for more than 30 seconds in SET mode, the device will automatically return to the RUN or STOP mode.

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6.3 Motor starts

6.3.1 Motor starts without auto voltage-reduction or star delta

When connecting over according to the figure 8 or 9, start the switch QF, press the START button, the contact 95、98 of protector close, the AC contactor KM1 is start working。when you press the STOP button, the AC contactor KM1 stop working , then。the motor stop. Figure 12 showing the action time.

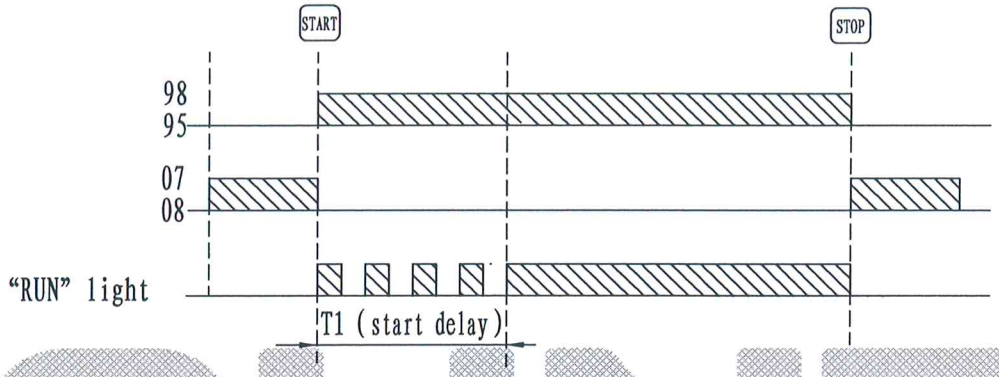
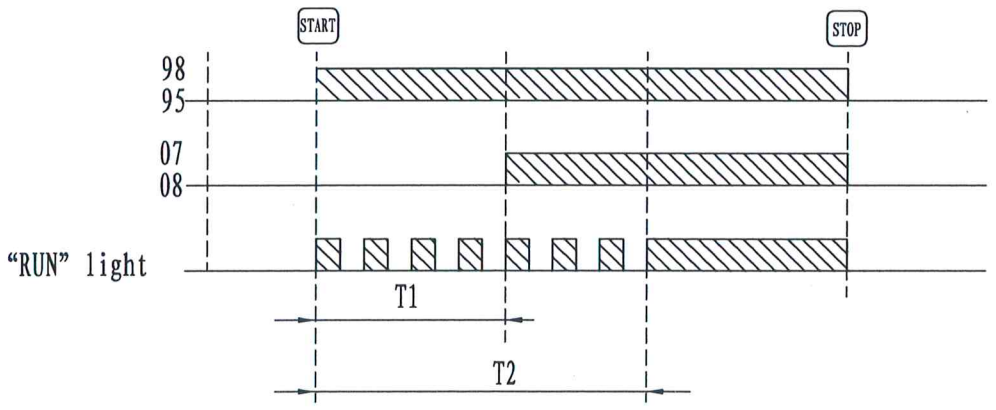


Figure 12 timing-sequence diagarm

6.3.2 Motor starts with auto voltage-reduction or star delta

Make sure that the auxiliary contact is not in status of OFF. When connecting over according to the figure 10 or 11, start the switch QF, press the START button, the contact 95、98 of protector close, When the time of auxiliary contact arrive the contact 07、08 close。when you press the STOP button, the contact 95、98 of protector open, auxiliary contact 07、08 open. Figure 13 showing the action time.



NOTE: T1: action time of auxiliary contact; T2: start time.

Figure 13 timing-sequence diagarm

6.4 Running status

The protector has four status, running、stop、setting、alarm. when the protector turns on , the default status is stop。When press START button, the protector is in running status. The protector will not distinguish the failure of overload , locked rotor protection, undercurrent in start time. when the start time is over, the protector will distinguish all of the failures. If there is failure happening, the protector will go in to the status of alarm, if you press the STOP button,

the protector will go in to the status of stop. If the protector is in setting status and return in any status , it will return to the last status.

NOTE: Press the START button before the protector turns on , when the power is on in 1s , it will go into status of running. If the power is on in the next time , it will keep the running status; Press the STOP button before the protector turns on , when the power is on in 1s , it will go into status of stop. If the power is on in the next time , it will keep the stop status.

7 Function and characteristic

7.1 Set the parameters by button with current、trip level、locked rotor 、start delay ,etc.

7.2 Show the information by LED display with current、setting parameters、malfunction ,etc.

7.3 Show the current status (running、malfunction、stop、set) by LED display.

7.4 Start、stop、star delta can be controlled by one key.

7.5 Overload protection, locked rotor protection, phase failure protection, three-phase imbalance protection, undercurrent protection, grounding protection , PTC temperature protection and communication failure protection are available.

7.6 The host adopted panel installation while the transformer is rail installation or by screw.

7.7 The terminals are pluggable that is easy for connecting.

7.8 Abundant current specification, suit for motors with different power.

7.9 4mA~20mA current loop transmitter interface.

7.10 Modbus communication function, monitor and control in long distance.

8 Action Characteristics

8.1 Inverse time lag operation

When the current value exceeds 1.05 times of the setting current value, the protector will enable the inverse time lag overload protection and perform analog caculation of heat accumulatin and actuation time of motor according to overload multiple of overload current. After the accumulated heat reaches a certain level, the protector will cut off the AC contactor to protect the motor. Table 3 and Figure 14 for the relation between overload current and time.

Table 3 Inverse time lag operation characteristics

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

8.2 Rotor locking operation characteristic

If the maximum current ⩾ setting current value × set multiplying factor for rotor locking, the protector will operate, and the actuation time will be the set actuation time for rotor locking.

8.3 Phase failure operation characteristic

If the current value of any phase of the three phases is 25% lower than the current that is setting, the protector will operate with the actuation time ⩽3s.

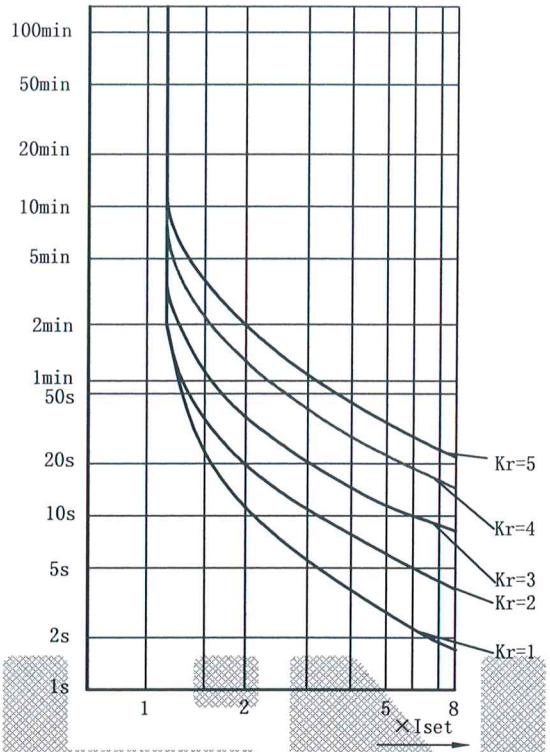


Figure14 time-current characteristic curve

8.4 Current imbalance operation characteristic

If the three-phase current value of main loop conforms to following formula, the protector will operate, with the actuation time≤3s.

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

Hereinto:

I_i —— current value of every phase;

I_{avg} —— average value of three phase current。

8.5 Undercurrent protection characteristic

If the minimum current ≤ setting current value × set multiplying factor for undercurrent, the protector will operate, and the actuation time will be the set actuation time for undercurrent.

8.6 Ground protection operation characteristic

The protector performs ground fault protection through the external zero-sequence transducer. When the zero-sequence current is in range of (0.9~1.1)set current , the protector will operate, with the actuation time ≤1s.

8.7 Temperature protection feature

The protector performs overheating protection by detecting the resistance of PTC thermal resister built in stator winding of the motor. If the resistance of PTC thermal resister is ≤ 750Ω, the protector will not actuate. If the resistance of PTC thermal is rising from 1650Ω to 4000Ω, the protector will actuate,with the actuation time≤1s. If the resistance of PTC thermal is from 750Ω to 1650Ω,the protector can be reset. If you do not want to use this function , the terminals T1、T2 should be short linked.

8.8 Communication failure protection characteristic

The protector is connected with transformer by cable , if the cable drop off or damaged, the protector will protect ,action time ≤3s.

9 Other

9.1 4mA~20mA analog transformation interface: 20mA corresponds to two times the setting current value of protector. For instance: when the current value is set to 15A, the current value that the value of 20mA corresponds to will be 30A; and 4mA corresponds to 0A. See the figure 15.

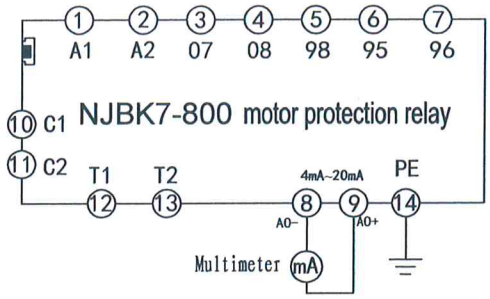


Figure15 4mA~20mA analog transformation interface text diagarm

9.2 The line that connecting the host and transformer should be less than 3 meters. Our standard length is 1m, if you want others please customize.

9.3 Communication. the protector is provided with RS485 interface supporting Modbus protocol. If the communication network is required, please contact us, and we'll provide you with detailed communication specification for protector.

9.4 Heat accumulation: when the protector is running, it will go into thermal equilibrium after some time in 1.05 rate of setting current, then the signal of thermal equilibrium will be shown on the screen。See the figure 16.

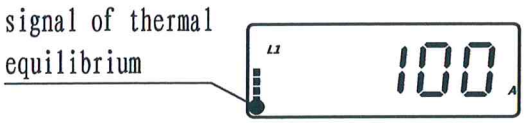


Figure16 signal of thermal equilibrium

9.5 The host of protector can recognize the transformer automatically, if you want to change the transformer, please operate when the power is off, then turn on the protector , its setting current will return back to the minumum of the range of setting current with the transformer.

9.6 When the actual operation current value is lower than 25% of the minimum setting current value, the protector will indicate 0A.

9.7 The display error is ±5% when the current is in setting current. if the current is higher than setting current , the display error will increase.

10 Precautions

10.1 Installation and debugging must be performed by professionals. Non-professional personnel are not allowed to detach the protector in order not to cause danger or influence the normal operation of protector.

10.2 The external start-stop line shall be as short as possible and shall not be laid in the same conduit with wires for strong current in order to avoid interference. Please use shielded wire if long cable is required.

10.3 The operating environment shall meet the requirements of protector for operating environment. This protector shall not be used in the environment with vibration, impact, corrosion, fine dust, static electricity, intense magnetic field interference, high temperature, high humidity and direct sunlight.

10.4 If the protector is used with inverter , the display error will increase.

10.5 The protector should be far away from strong magnetic field like walkie talkie, at lesat 3m.

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