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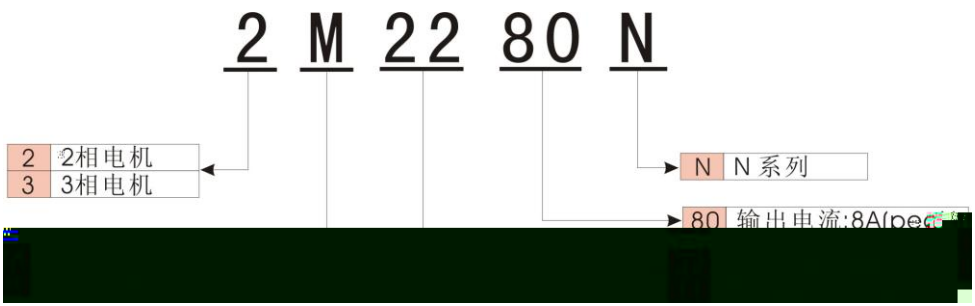


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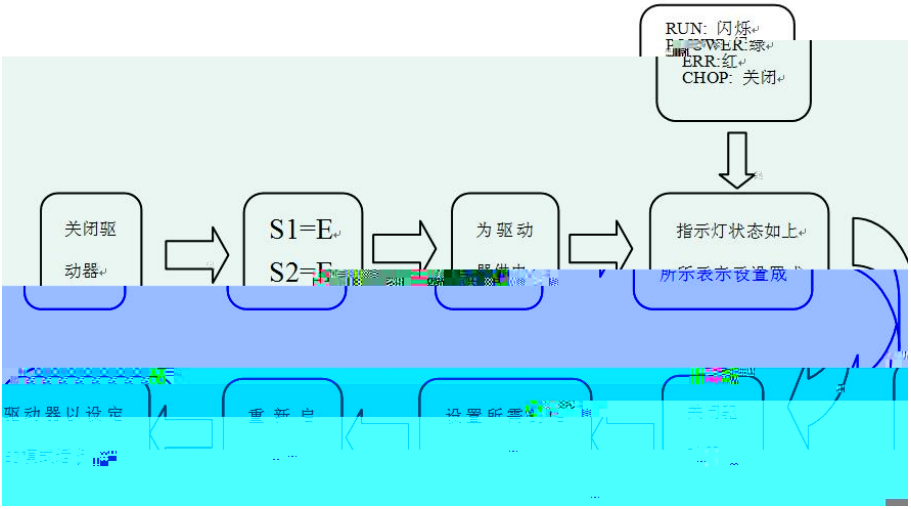


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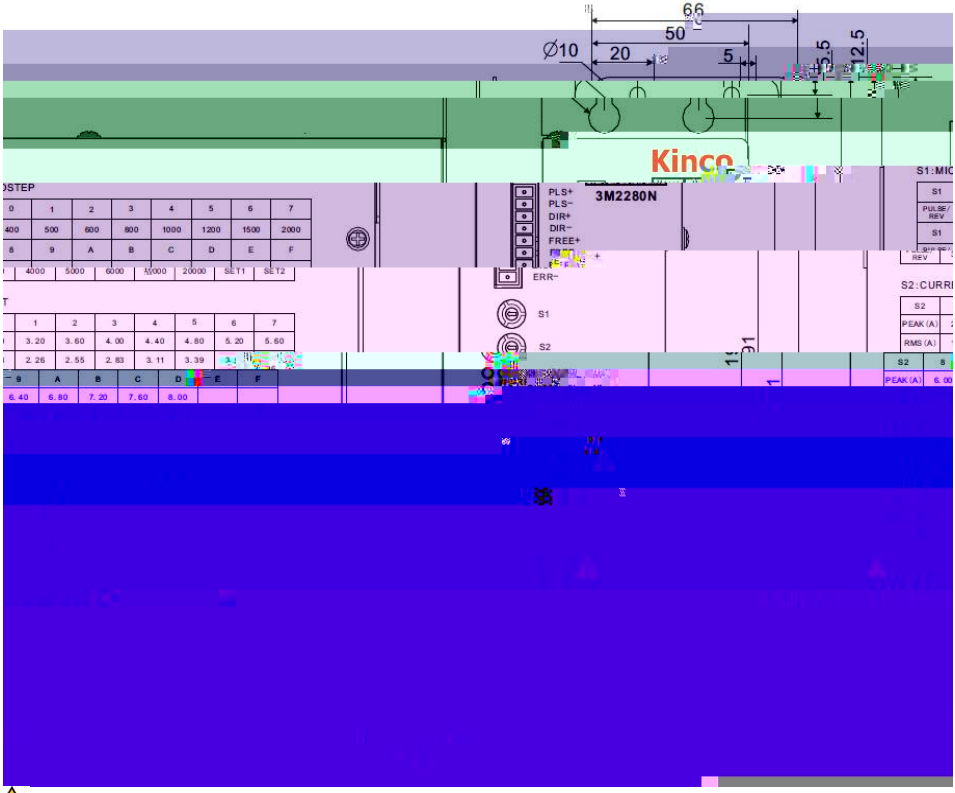


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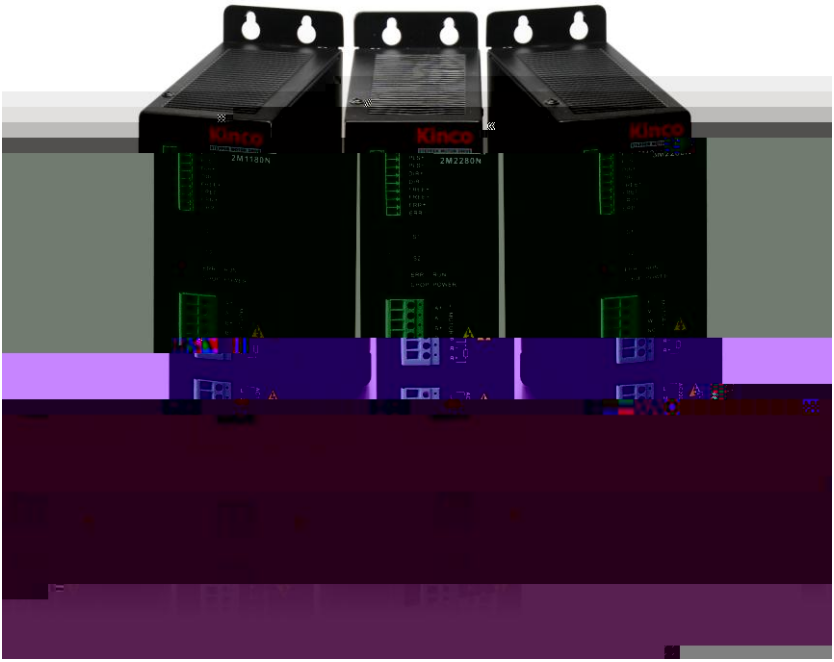
+ A± Œ86-755-26585555
ô ,ó Ö86-755-26616372
http://www.kinco.cn
Email: sales@kinco.cn

# Kinco ® N Series Stepper Motor Driver

# 3M2280N

## User Manual

Version: V1.0




Kinco Electric(Shenzhen) Ltd

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Release Notes on N Series Multi -functional Micro -step Stepper Motor Driver User Manual
Products involved: 3M2280N stepper motor drivers.
Version: V1.2
Date: Nov. 08. 2013

| Revision History | | |
|---|---|---|
| Version | Date | Description |
| V1.0 | 2010-5-20 | |
| V1.1 | 2011-10-13 | |
| V1.2 | 2013-11-08 | Use new factory address |

# Chapter 1 Safety Pre cautions

For the sake of personal safety and avoidance of property loss, please read these safety precautions carefully before test running and use of the driver.

The following safety measures must be strictly followed:

- Read this user manual carefully.
- Observe safety precautions strictly.
- After being powered on, the voltage in side 3M2280N driver is about 300VDC. The high voltage still exists 60 seconds after the power supply is cut off . Before performing any wiring or check operation, use a multimeter to verify that the voltage on the driver terminals is safe; otherwise, the electric shock may occur.
- Never connect wires while the driver and the motor are working; otherwise, the electric shock may occur.
- Do not remove the housing of the driver when the power is on or the driver is working; otherwise, the electric shock may occur.
- To avoid personal injury and property loss, only qualified and service-trained personnel can operate the driver.
- Follow related technical specifications and electric installation standards during installation. The driver must be securely grounded with the cross section of the ground cable not less than 1.25 $mm^2$.
- Do not insert any o d mm

# Chapter 2 Product Overview

## 2.1 Product Acceptance

Upon receiving the product, please check the following items:

- Make sure the driver model is consistent with that ordered.
- Unpack the product and make sure it is free from damage and no part is missing.
- Make sure all set screws in the driver are securely tightened.
- Check the received product against the packing list and contact our customer service

## 2.4 Product Functions Describetion

3M2280N stepper motor drivers adopt DSP single-chip microcomputer as its control core, which greatly enriches their applications. Meanwhile, the intelligent firmware design frees the users from complicated function setting steps and delivers the optimum performance of the motors easily.

- Motor auto adaptation: The driver can automatically detect the electrical parameters (e.g., inductance and resistance) of the motor connected with the driver, trace the status of motor in real time, and automatically adjust the driver parameters settings according to the detected motor status to deliver the optimum driving performance. If it is not the first time for the driver to drive the motor, please run the driver under no load before connecting the motor. Then, the driver will clear the motor parameters which stored before. Turn off the power, connect the motor, and turn on the power again; the driver will automatically detect the optimum drive parameters for the current motor.
- Phase memory : The driver will keep the phase of the motor in the case of power failure with the motor. Therefore, it prevents the error caused by motor jitter upon power-on on some application occasions. The kept phase will be lost if the motor is replaced or the motor still rotates after the driver stops.
- Half current func tion: If the half current setting is effective. After the motor stops rotation and locks tight, the driver will reduce the phase current of the motor by a half in 1.5 seconds. Strongly recommended to use this function!!!
- Test running: If the driver is set to this status, it will automatically drive the motor at a speed of 60RPM. At this time, the output current is the set value and the subdivision setting becomes invalid. This function is used to check whether the driver status is normal.
- PLS+DIR and CW/CCW compatible input: The control signal input port of the driver

- Over-voltage alarm: The driver will generate a high-voltage alarm if the internal bus voltage exceeds 395 VDC. At this time, turn off the power supply in time and reboot the driver to clear the alarm. If the over-voltage alarm occurs frequently, it is recommended that the input voltage be tuned down or a driver with absorption function be adopted.
- Short circuit alarm: The driver will activate the short circuit protection function in the case of short-circuit or wrong wiring of the motor or driver, so as to prevent the damage to the driver. In this case, turn off the power supply in time and check the wiring of the motor. To clear the alarm, reboot the driver.
- Under-voltage alarm: The driver will generate a low-voltage alarm if the internal bus voltage goes below 200 VDC in the case of the 2M2280N driver or 90VDC in the case

of the 2M1180N driver. To clear the alarm, reboot the driver.

- Overheat alarm: The driver will generate a overheat alarm if the internal temperature reaches 75 .
- Miss-connection protection: The driver will generate a miss-connect alarm if the wiring between the driver and the motor is wrong. To clear the alarm, reconnect the wires correctly.

2.5 Scope of Application

The drivers are applicable to various large and medium automation equipment and instruments, including engraving machines, labeling machines, cutting machines, numerical control machine tools, and plotters. They are ideal choices for users in search of low vibration, low noise and high accuracy.

To achieve the optimum performance, KINCO 110 and 130 series stepper motors are recommended.

# Chapter 3 Product Parameters and Installation

## 3.1 Product Parameters

Please learn carefully the driver parameters before use. Make sure the power supply and operating environment conform to relevant requirements.

Table 1 Electrical Specifications

| Parameter | Description |
|---|---|
| Input voltage | 3M2280N: Single-phase 220V AC +/-15% (50Hz)(187VAC~253VAC) |
| Phase current(peak, unit: A) | 2.8, 3.2, 3.6, 4.0, 4.4, 4.8, 5.2, 5.6, 6, 6.4, 6.8, 7.2, 7.6 8.0 |
| Micro step(unit: pulse/rev) | 400, 500, 600, 800, 1000, 1200, 1500, 2000, 3000, 4000, 5000, 6000, 10000, 20000 |
| Input signal | Three control signal ports: PLS(CW)/DIR(CCW)/FRE; current range: 6 ~16 mA |
| Control signal input method | PLS+DIR; CW/CCW |
| Output signal | ERR, open collector output, max current: 10 mA. |
| Protection | Over-voltage, under-voltage, short circuit, and overheat protection |
| Absorbing circuit* | Need customize, used to absorb the energy feed back by the motor |

Table 2 Operating En vironment

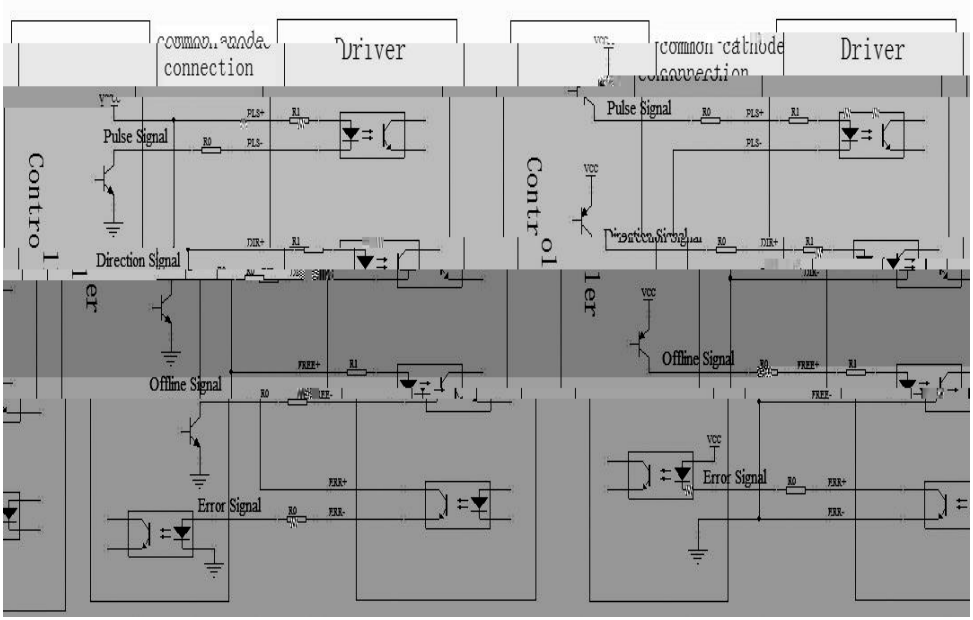
| Cooling method | | Forced air cooling |
|---|---|---|
| Environment | Operation environment | Avoid the environment with great amount of metallic powder, oil mist, or erosive gases. |
| | Operation humidity | <85%, RH (non-condensing or water drops) |
| | Operation temperature | 0 ℃ ~ +40 ℃ |
| | Storage temperature | -20 ℃ ~ +70 ℃ |
| Weight (net) | | 1.5Kg |
| Dimensions | | 201mm×147mm×66mm |

Table 3 Definition of Control Signal Port

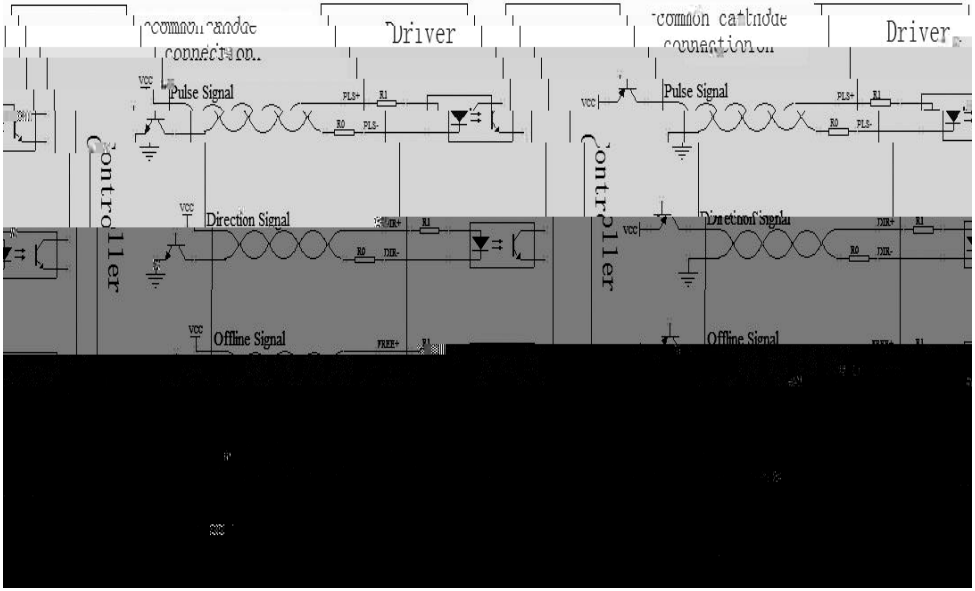
| Signal | Functional Description |
|---|---|
| PLS+(CW+) | Pulse signal. In the PLS+DIR control signal mode, the signal is the pulse control signal and the rising edge is effective. In the CW/CCW control signal mode, the signal is the forward rotation control signal and the rising edge is effective. The high-level time shall not be less than 1.25uS to ensure reliable response of the internal optocoupler. The maximum input frequency of the pulse signal is 400 KHz |
| PLS-(CW-) | |
| DIR+(CCW+) | In the PLS+DIR control signal mode, the signal is direction control signal, and the driver sets the rotation direction of the motor by detecting the level of this signal. The signal value of the effective moment in the rising edge of pulse signal. In the CW/CCW control signal mode, the signal is the reverse rotation control signal and the rising edge is effective. To ensure reliable response of the internal optocoupler, the high-level time in this mode |

## 3.3 Wiring Diagram

General Way Control Signal Wiring Di agram




Twisted -pair Way Control Signal Wiring Di agram



- The input circuits of all control signals of the driver have been reliably isolated through
-

### 3.4 Time Sequence Diagram of Control Signal

⚠ Precautions on Control Signal:

1. The maximum frequency of the input pulse is 400 KHz.
2. Disable direction signal change during pulse signal rise time.
3. A free signal shall be set up 1ms earlier than a pulse signal.

⚠ Precautions on Wiring:

1. To avoid interference on the driver, the strong current cables (phase wires and power cables of the driver) shall be isolated from the weak current cables (for a distance of at least 10cm) when connecting wires for the driver.
2. It is recommended that the

Setting flow chart:

1. Auto Run setting flow

## 3.6 Installation of the Driver

Mechanical Dimensions

⚠ Precautions on Installation:

- It is recommended that the driver be mounted on a side and kept in an upright position, so as to maintain a well ventilated installation environment. Never block or cover the air vents of the driver; otherwise, the normal use of the driver may be prevented by possible frequent overheat alarms.
- For better heat dissipation, two drivers shall be installed at a clearance of at least 50mm.

1. With an ingress protection class of IP20, the driver shall be installed in an industry-compliant indoor switching cabinet; failure to do so may cause damage to the driver or personal injury.

z Enhanced heat dissipation is required if the driver generates overheat alarms frequently. A fan may be installed in a position close to the driver for forced cooling and heat dissipation, so as to ensure the driver works in an allowabl temperature range.

# Chapter 4 FAQ

## 4.1 Indications of Driver Indicators

N series stepper motor drivers are equipped with complete protection circuits to protect their safety to the greatest extent possible. In addition, the rich indications of indicators help the user to learn the working status of the driver in time.

Indications of Indicators:

| Alarm | Indicator | | | | Motor Status |
|---|---|---|---|---|---|
| | Power | Run | Error | Chop | |
| Internal power failure | Off | Off | Off | Off | The motor power supply disconnects and the motor shaft releases |
| Single-chip microcomputer resetting | On | On | On | On | The motor power supply disconnects and the motor shaft releases |
| Hardware error | On | Off | On | On | The motor power supply disconnects and the motor shaft releases |

⚠ Note:

- Blinking slowly means blinking at a frequency of 0.5 Hz, and blinking quickly means blinking at a frequency of 5Hz.
- To clear any alarm of the driver, it is necessary to disconnect the power supply and then reboot the driver.
- In the case of any alarm, it is necessary to cut the power supply off in time, and never touch the driver and motor when the power supply of the driver is on.
- Except for the normal running, test running, and absorbing status, the driver ERR signal will output a low level.
- If any indication not covered in the above table occurs, please contact our customer service personnel.

4.2 FAQ on the Driver and Stepper Motor

1. What is the maximum allowable surface temperature for a stepper motor?

The excessively high temperature will demagnetize the magnetic materials of a stepper motor and as a result, cause lower torque or out of step of the motor. Therefore, the maximum allowable surface temperature of a stepper motor depends on the demagnetization point of different magnetic materials. In general, the demagnetization point for magnetic materials is above 130ºC, so it is normal if the surface temperature of a stepper motor remains at 80ºC - 90ºC.

2. How to calculate output power of a stepper motor?

The output power of a stepper motor varies with the rotation speed and is generally measured by torque. The calculation formula for output power of a stepper motor is: P= ³ 0; where, Ù. ³ +2 , ndicates the angular speed and M indicates the output torque.

3. What is the subdivision function of the driver intended for?

The subdivision function of a stepper motor driver is a kind of electronic damping technology. It has three distinctive functions:

A. It enhances the control accuracy due to the subdivision of step angles.

B. Subdivision is the best method to suppress the low-frequency oscillation of the motor.

C. It can enhance the motor torque to some exten Ä

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Ki