N Series Stepper Motor Driver M2MD880N User Manual

Release Notes on N Series Multi-functional Micro-step Stepper Motor Driver User Manual

1/1 Product Features

1=Automatic parameter adjustable regulation
2=Supporting driver test running function
3=Supporting phase memory function
4=Supporting PLS+DIR and CW/CCW control signal
5=Supporting optocoupler isolation ERR signal output function and interaction with the upper computer
6=Supporting half-current function
7=Opto-isolation signal input, with pulse response frequency up to 400 KHz
the maximum micro-step is 256
8=With the protection function of over-voltage, under-voltage, over-current, overheat

1/2 Product Functions

M2MD880N stepper motor drivers adopt DSP single-chip 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 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 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.

Test running: If the driver is set to this status, it will automatically drive the motor at a speed of 80RPM. At this time, the output current are 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 supports “PLS + DIR” control signal and “CW/CCW” control signal input.

Over-voltage alarm: The driver will generate a high-voltage alarm if the internal bus voltage exceeds 85VDC. 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.

Short-circuit alarm: The driver will activate the over-current protection function in the case of short-circuit or wrong wiring of the motor to 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 15 VDC. To clear the alarm, reboot the driver.

Overheat alarm: The driver will generate a overheat alarm if the internal temperature reaches 80℃.

1/3 Scope of Application

The drivers are applicable to various medium and small automation equipmen 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, high accuracy, and high speed.

Chapter 2 Product Parameters and Installation

2.1 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	24~70VDC
Output current(peak, Unit: A)	2.4; 2.8; 3.2; 3.6; 4.0; 4.4; 4.8; 5.2; 5.6; 6.0; 6.4; 6.8; 7.2; 7.6; 8.
Micro step	2, 4, 5, 8, 10, 16, 20, 25, 32, 40, 50, 64, 100, 128, 200, 256
Input signal	PLS(CW), DIR(CCW), FREE; Current range: 6 ~16 mA
Control mode	PLS+DIR; CW/CCW
Output signal	ERR, open collector output, maximum current: 20mA
Protection	Over-voltage, under-voltage, short circuit, overheat

Table 2 Operating Environment

Cooling method		Nature 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°C ~ +40°C
	Storage temperature	-20°C ~ +70°C
Weight (net)		0.71Kg
Dimensions		140×96×52.5 mm
Ingress protection		IP20

2.2 Description of Wiring Terminal

Wiring terminals of the driver are divided into three types: control signal port, motor power cable port, and power input port.

The twisted pairs are recommended as signal lines for enhanced interference immunity in environments with strong electromagnetic interference. The definitions of the driver ports are detailed below:

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.
PLS-(CW-)	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
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. A direction signal shall be set up 20uS earlier than a 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 shall not be less than 1.25uS. The maximum input frequency of the pulse signal is 400 KHz
DIR-(CCW-)	
FREE+	This signal is offline signal. If the signal is at a high level, the driver turns off the power supply for the motor, and the motor rotor turns into Free status (Offline). Adequate measures must be adopted to prevent the motor from causing equipment damage or personal injury when it is in the offline status.
FREE-	
ERR+	Alarm output signal. This signal port is the optocoupler output port for open collector. When the driver has an exception alarm or power failure alarm, this signal port outputs a low-level signal. For this port, the maximum allowable input voltage is 30V DC. The maximum flow current is 20mA.
ERR-	

Table 4 Definition of Motor Power Port

Signal	Functional Description
A+	Phase A of motor. The switching between A+ and A- can change motor rotation direction.
A-	
B+	Phase B of motor. The switching between B+ and B- can change motor rotation direction.
B-	

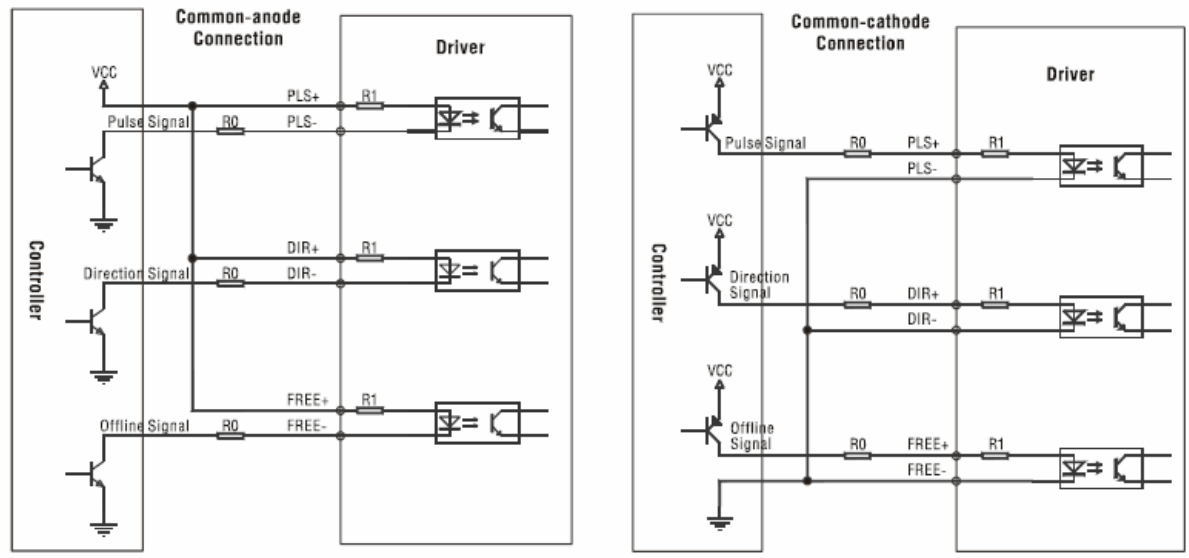
Table 5 Definition of Power Input Port

V+	Power input ports for the driver. Input voltage is range from 24VDC~70VDC.
GND-	

2.3 Wiring Diagram

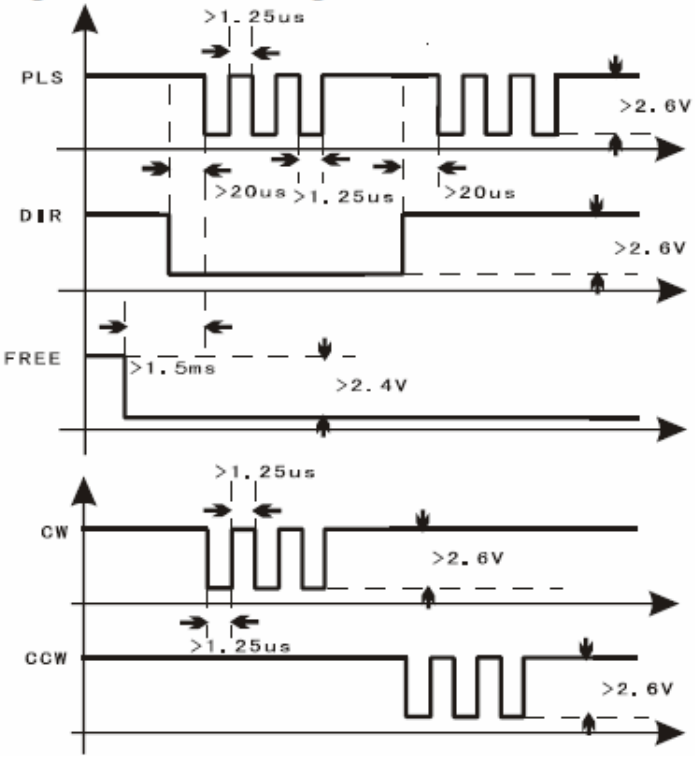
If control signal is at 12VDC, 1 K resistor can be connected. The current at the input port of the driver must be within 6~16 mA; otherwise, it may cause damage to the equipment. ERR signal is open collector output and requires an external power supply. The maximum external voltage cannot exceed 30V. Never connect the ERR signal port in reversed polarity; otherwise, it may cause damage to the port.

The input circuits of all control signals of the driver have been reliably isolated through optocoupler elements, which minimize the interference from external electrical noises.
In the figure, R0 is an external current limit resistor used to curb the input signal current of the driver. When control signal is at 24VDC, a 2K resistor can be connected; when the



Control Signal Wiring Diagram

2.4 Time Sequence Diagram of Control Signal



Precautions on Control Signal:

The maximum frequency of the input pulse is 400 KHz.
A direction signal shall be set up 20uS earlier than a pulse signal.

A free signal shall be set up 1.5ms earlier than a pulse signal.

Precautions on Wiring:

To avoid interference on the driver, the power cables (phase wires and power cables of the driver) shall be isolated from the signal cables (for a distance of at least 10cm) when connecting wires for the driver.

It is recommended that the twisted pairs be adopted for control signal cables for the driver, and the shielding layer be grounded reliably (to the true ground of the driver and equipment).

Due to endurance of heavy current, conductors with cross-section no less than 1.5mm^2 are recommended for the motor cabling, or even thicker ones as appropriate.

It is strictly forbidden to connect wires while the power is on; otherwise, it may cause equipment damage and personal injury. Please note that the power line of the motor still carries heavy current even if the motor is in the locked status. Pull out or connect the wire forcibly may cause equipment damage and personal injury.

The length of bare wires at the inputs of the power line of the motor and the power input cable of the driver shall be around 10mm; it may result in poor contact if the length is too short and may cause electric shock if the length is too long.

3.5 DIP Switch Settings

The 10 bit DIP switch is used to enable the test running function, the half current function, and to chosen of the “DIR+PLS” or “CW/CCW” control mode.

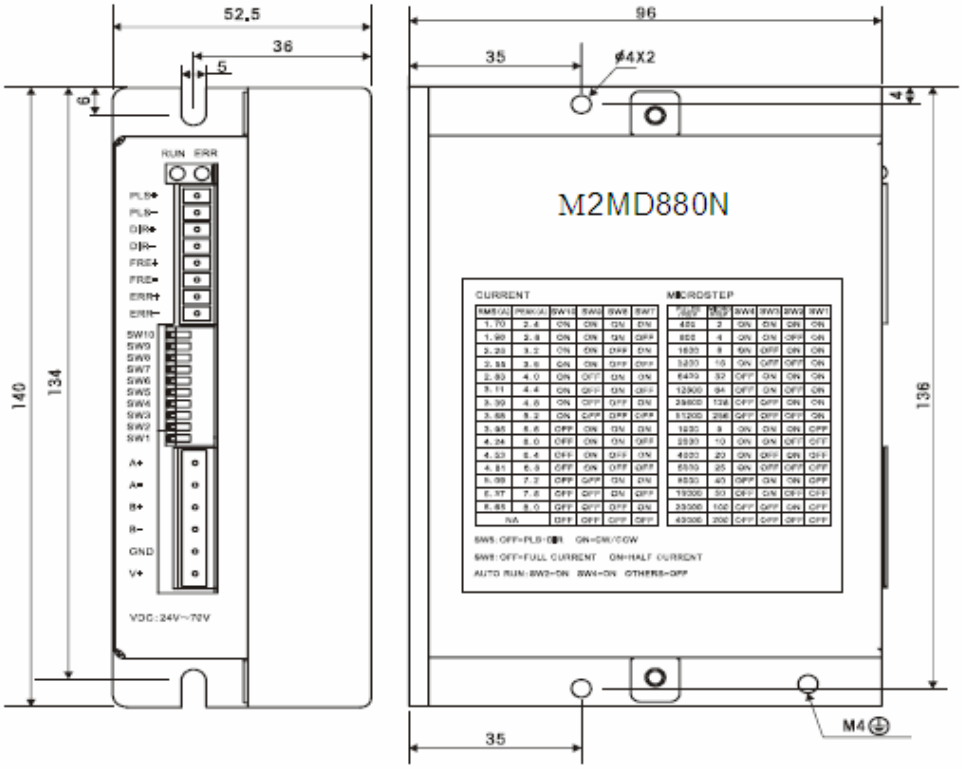
1. Control mode select: SW5=ON, “DIR+PLS” mode; SW5=OFF, “CW/CCW” mode.
2. Half current function: SW6= on, enable; SW6=off, disable.
3. Test running enable: SW2=ON, SW4=ON, others=OFF

Precautions on rotary switch:

When setting the status of the DIP switch, do not apply an axial force; otherwise, it may cause damage to the DIP switch.

Micro step setting					Current setting, unit A(Peak)				
SW2	SW3	SW4	**SW1=ON**	**SW1=OFF**	SW7	SW8	SW9	**SW10=ON**	**SW10=OFF**
On	On	On	2	5	On	On	On	2.4	5.6
Off	On	On	4	10	Off	On	On	2.8	6.0
On	Off	On	8	20	On	Off	On	3.2	6.4
Off	Off	On	16	25	Off	Off	On	3.6	6.8
On	On	Off	32	40	On	On	Off	4.0	7.2
Off	On	Off	64	50	Off	On	Off	4.4	7.6
On	Off	Off	128	100	On	Off	Off	4.8	8
Off	Off	Off	256	200	Off	Off	Off	5.2	NA

2.6 Installation of the Driver



Mechanical Dimensions (Unit: mm)