3DM580S

USER MANUAL

CLOUDRAY
INDUSTRIAL SOLUTIONS

南京镭云智能科技有限公司

Cloudray (Nanjing) Laser Technology Co., Ltd.

Contents

1. Product Overview

Thank you for choosing Cloudray DM series digital step servo drive.

DM series stepper drive, which surpasses the performance of common analog stepper drive comprehensively based on the new 32-bit DSP platform developed by TI, and adopting the micro-stepping technology and PID current control algorithm design. The DM series stepper drives have the features of low noise, low vibration, low heating and high-speed high torque output, it is suitable for most stepper motors by integrated with the micro-stepping technology.

3DM580S type switch stepper drive is provided with the pulse train with S-shape acceleration/deceleration, and triggers the motor start-stop only by normal switching value..

Power supply	24 – 50VDC
Output Current	Up to 5.6 amps（peak value）
Current control	PID current control algorithm
Micro-stepping settings	DIP switch settings, 16 options
Speed range	Use the suitable motor， up to 3000rpm
Resonance suppression	Automatically calculate the resonance point and inhibit the IF vibration
Parameter adaption	Automatically detect the motor parameter when drive initialize, optimize the controlling performance
Pulse mode	Direction & pulse, CW/CCW double pulse, A/B orthogonal pulse
Pulse filtering	2MHz digital signal filter
Neutral current	Automatically halved the current after the motor stops running

We hope that our products with excellent performance can help you to complete the sports control program successfully.

Please read this technical manual before using the products.

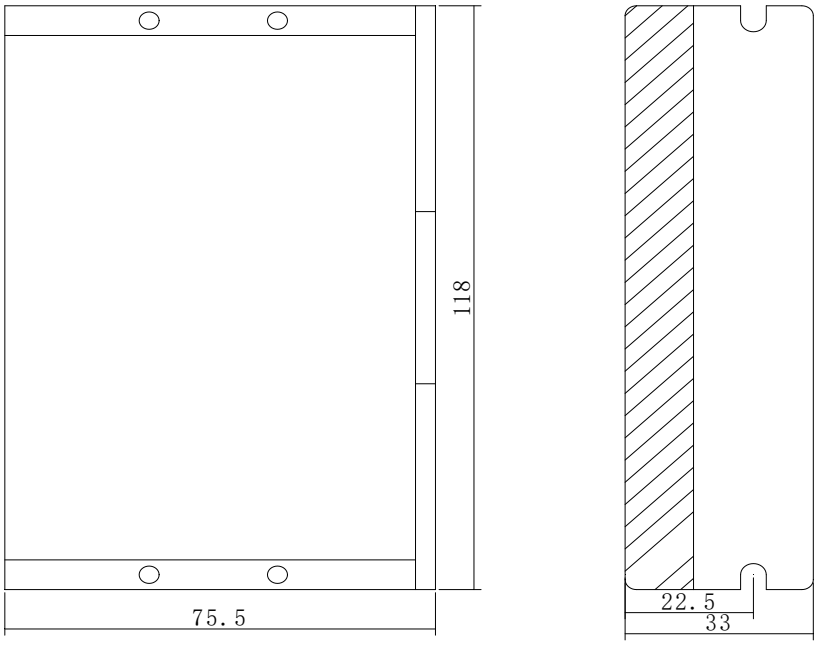
2. Application Environment and Installation

2.1 Environmental requirement

Item	Cloudray 3DM580S
Installation environment	Avoid dust, oil and corrosive environment

Vibration	0.5G（4.9m/s^2） Max
Operating temperature/humidity	0℃ ~ 45℃ / 90% RH or less (no condensation)
Storage and transportation temperature:	-10℃ ~ 70℃
Cooling	Natural cooling / away from the heat source
Waterproof grade	IP54

2.2 Drive installation dimensions



2.3 Drive installation requirements

Please install the drive vertically or horizontally, with its front facing forward, top facing upward to facilitate cooling.

During assembly, avoid drillings and other foreign matters falling inside the drive.

During assembly, please use M3 screw to fix.

When there is vibration source (such as a driller) close to the installation position, please use a vibrating absorber or a vibration resistant rubber gasket.

When multiple drives are installed in the control cabinet, please pay attention to reserve enough space for sufficient heat dissipation. If necessary, you can configure cooling fans to ensure good heat dissipation conditions in the control cabinet.

3. Drive Port and Connection

3.1 Port function description

Function	Grade	Definition	Remarks
Power supply input port	V+	Input V+ power supply	AC 20~80V DC 24~100V
	V-	Input V- power supply	
Motor connection port	U	Motor UVW interface	
	V		
	W		
	NC		
Enable connection	ENA+	Enable control interface	3.3 ~ 24V level compatible
	ENA-		
Pulse connection	PUL+	Pulse input interface	
	PUL-		
	DIR+	Direction input interface	
	DIR-		

3.2 Power supply input

The power supply of the drive can be both AC power and DC power, and the input voltage range is AC 20~80V ,DC 24~100V. The AC power supply voltage should not exceed 80VAC. Do not directly connect to 220VAC mains! ! !

Input power polarity should not be reversed!!!

The drive's work mode is constant current control. The drive output the voltage to motor by changing the input power into PWM chopping wave when it is working. In this case, the input power will affect the performance of drive.

Power selection reference:

Voltage:

The stepper motor has the characteristic of torque decreasing as the motor speed increases, and the voltage of the input power supply will affect the declining amplitude of the motor torque at high speed. Increasing the voltage of the input power supply appropriately can increase the output torque of the motor at high speed. And use low voltage when it is low speed required, can lower motor's heating appropriately.

Current:

The work of the drive is to convert the input power supply with high voltage and low current to the low voltage and high current at both terminals of the motor winding.In this case, the current of power supply will be lower

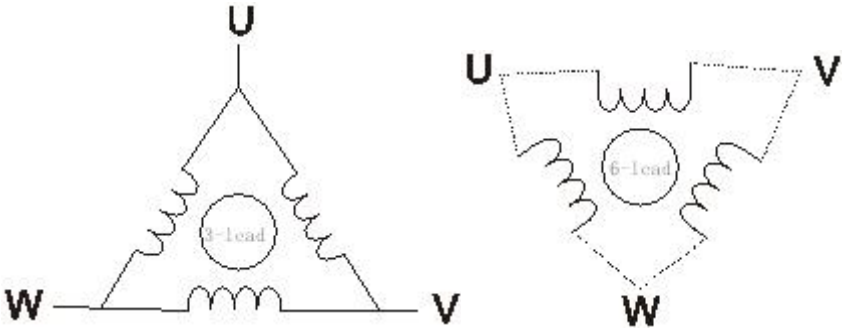
than the motor's.

The effects of regeneration voltage:

When the stepper motor is working, it also keeps the characteristics of the generator. At deceleration, the kinetic energy accumulated by the load is converted into electric energy, which will be superimposed on the drive circuit and the input power. In application, attention should be paid to the setting of acceleration and deceleration time to prevent the protection of the drive or power supply.

When the drive is powered off, similarly, the drive LED indicator will be on if the load is increased to allow the motor to move

3.3 Motor connection



The matching motor of the 3DM580S-IO drive is the low resistance and low inductance hybrid stepper motor.

The common 3-phase stepper motor's lead number are 3 and 6.

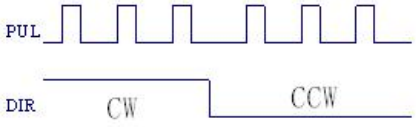
3.4 Control signal connection

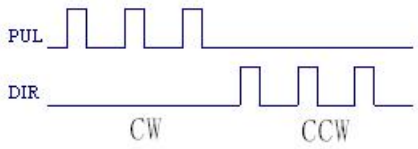
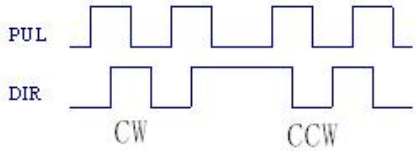
3.4.1 IN Port: connection for pulse command

The signal interface of standard DM series drive is switch.

The upper controller can be the pulse signal generating device, such as PLC, MCU, control card and controller.

The pulse level that R86 drive can be used: 3.3V-24V (**no need to connect resistor**)

Pulse&Direction（PUL + DIR）	

Dual Pulse （CW +CCW）	
Orthogonal Pulse（A/B）	

3. 4.2 ENA port: enable/disable

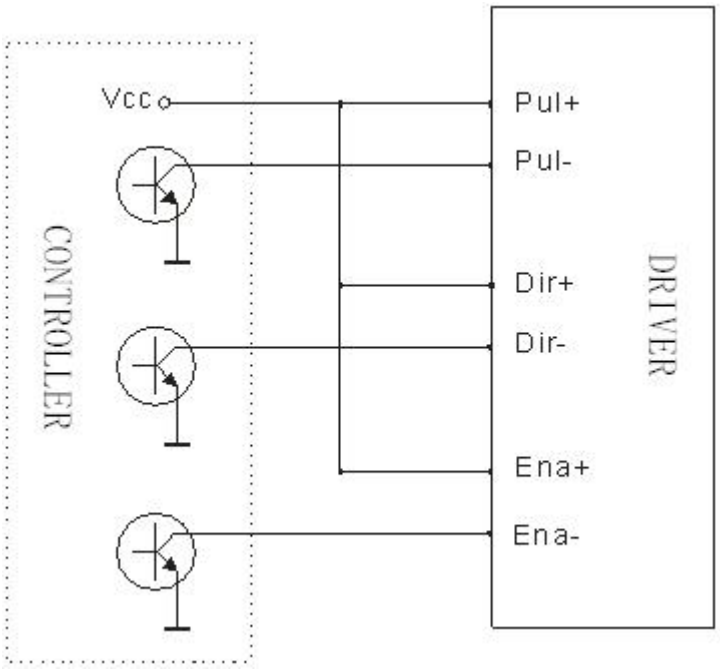
When the default optocoupler is off, the drive outputs the current to the motor. When the internal optocoupler is on, the drive will cut off the current of each phase of the motor so that the motor is in a free state, and the stepper pulse can not be responded.

When the motor is in the wrong state, ， the drive can be restarted by ENA input。The existing fault should be cleared at first. Then input a trailing edge signal to ENA terminal. After that, the drive can be excitation again and running.

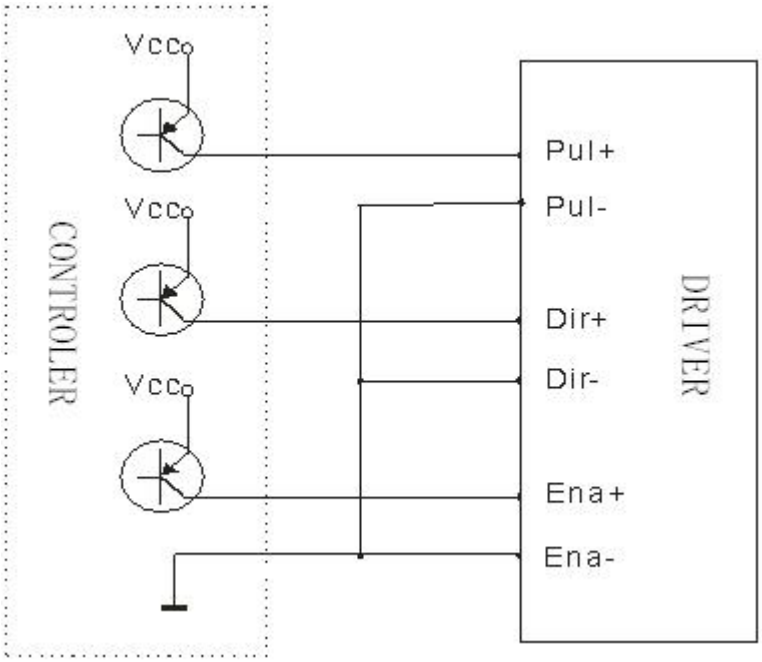
The level logic of the enable signal can be set to the opposite. The logic is opposite with above mentioned.

3. 4.3 Examples for control signal connection

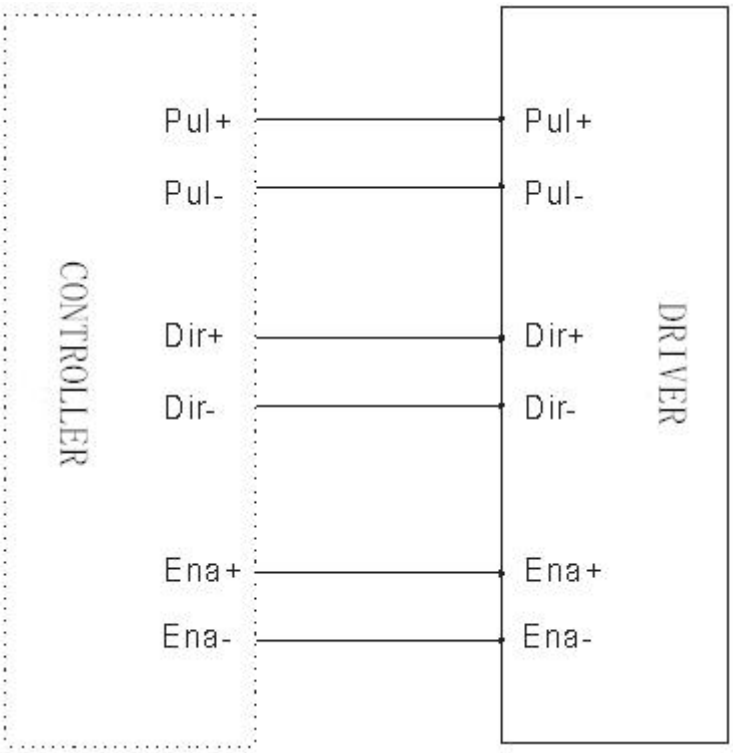
Common Anode



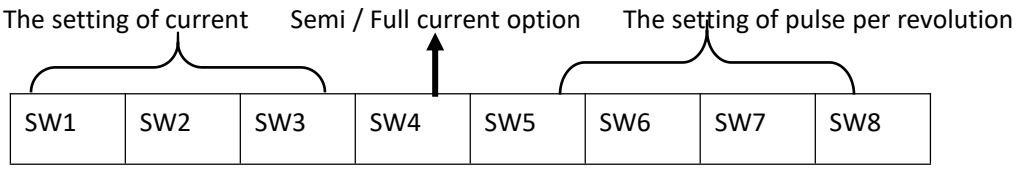
Common Cathode



Difference



4. The setting of DIP switches and operating parameters



4.1 The setting of current

Peak Current	SW1	SW2	SW3	SW4	备注
Default	off	off	off	off	Other Current can be custom-made
2.5	on	off	off	off	
2.9	off	on	off	off	
3.2	on	on	off	off	
3.6	off	off	on	off	
4.0	on	off	on	off	
4.5	off	on	on	off	
4.9	on	on	on	off	
5.3	off	off	off	on	
5.7	on	off	off	on	
6.2	off	on	off	on	
6.4	on	on	off	on	
6.9	off	off	on	on	
7.3	on	off	on	on	
7.7	off	on	on	on	
8.0	on	on	on	on	

DIP SW1, SW2, SW3, SW4 are used to set current which is output from drive to motor.

Generally, the current setting is the motor rated current. If your system has high request to the heating, please decrease the current properly to lower the motor's heating, but at the same time, the output torque will be lower. If you don't need the motor running continuous, you can increase the current to higher the torque. But be minded that the current can not be 1.5times over than the rated current.

4.2 The setting of pulse per revolution

Stepping count/revolution	SW6	SW7	SW8	Remarks
Default	on	on	on	Other Subdivision can be custom-made
6400	off	on	on	
500	on	off	on	
1000	off	off	on	
2000	on	on	off	
4000	off	on	off	
5000	on	off	off	
10000	off	off	off	

DIP SW6, SW7, SW8 are used to set the speed when the motor is triggered. Built-in S-type acceleration and deceleration.

When the switch is closed, the motor accelerates to the set speed.

When the switch is off, the motor decelerates and stops.

4.2 Motor direction selection

DIP SW5 is used to set the running direction of the motor under the initial pulse.

The "off" means that the motor direction is counterclockwise when inputting the initial pulse;

The "on" means that the motor direction is clockwise when inputting the initial pulse.

※ The initial pulse is the testing pulse used when developing the drive software; Please refer to the actual running direction of the motor.

4.3 Pulse filtering function selection

DIP SW6 is used to set the pulse filtering function of drive.

The “off” means the pulse filtering function is off;

The “on” means the pulse filtering function is on.

※ The pulse filtering function is the filtering action by the drive upon the input commands. When the filtering function is on, the drive will smoothen the input pulse command to make the acceleration and deceleration of motor softer, but this will also cause certain delay of the pulse command.

Filtering time setting: The default time of filtering function is 6.4ms, and the software can change the time below the 25.6ms.

4.4 Pulse mode selection

DIP SW7 is used to set the pulse command mode of drives.

The “off” means pulse + direction (single pulse) mode; the “on” means double pulse mode.

※ When you need to set the drive pulse mode to A/B orthogonal pulse mode, set the pulse mode check function to A/B orthogonal pulse mode in the testing software and turn on SW7.

4.5 Open/closed loop selection

DIP SW8 is used to set the drive control mode.

The “off” means the closed loop control mode;

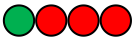
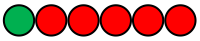
The “on” means the open loop control mode.

※

※ **The above parameters are set for the DIP switches**; For other parameters, please refer to Appendix A: Application Instructions for Testing Software

5. Drive working status LED indication

LED status	Drive status

	Green indicator is on for long time	Drive not enabled
	Green indicator is flickering	Drive working normally
	One green indicator and one red indicator	Drive overcurrent
	One green indicator and two red indicators	Drive input power overvoltage
	One green indicator and three red indicators	The internal voltage of the drive is wrong
	One green and four red indicators	Tracking error exceeds limits
	One green and five red indicators	Encoder phase error

6. Common Faults and Troubleshooting

Phenomenon	Possible situations	Solutions
Motor does not work	Power indicator is off	Check the power supply circuit for normal power supply
	The motor rotor is locked but the motor does not work	Pulse signal is weak; increase the signal current to 7-16mA
	The speed is too slow	Select the right micro-stepping
	Drive is protected	Solve the alarm and re-power
	Enable signal problem	Pull up or disconnect the enable signal
	Command pulse is incorrect	Check whether the upper computer has pulse output
The steering of motor is wrong	The rotary direction of motor is reverse	Adjust the DIP SW5
	The motor cable is disconnected	Check the connection
	The motor has only one direction	Pulse mode error or DIR port damaged
Alarm indicator is on	The motor connection is wrong	Check the motor connection
	The motor connection and encoder connection are wrong	Check the sequence of encoder connection
	The voltage is too high or too low	Check the power supply

The position or speed is wrong	The signal is disturbed	Eliminate interference for reliable grounding
	The command input is incorrect	Check the upper computer instructions to ensure the output is correct
	The setting of Pulse per revolution is wrong	Check the DIP switch status and correctly connect the switches
	Encoder signal is abnormal	Replace the motor and contact the manufacturer
The drive terminal burned up	Short circuit between terminals	Check power polarity or external short circuit
	Internal resistance between terminals is too large	Check whether there is any solder ball due to excessive addition of solder on the wire connections
The motor is out of tolerance	Acceleration and deceleration time is too short	Reduce command acceleration or increase drive filtering parameters
	Motor torque is too low	Select the motor with high torque
	The load is too heavy	Check the load weight and quality and adjust the mechanical structure
	The current of power supply is too low	Replace the appropriate power supply

Appendix A. Guarantee Clause

A.1 Warranty period: 18 months

We provide quality assurance for one year from the date of delivery and free maintenance service for our products during the warranty period.

A.2 Exclude the following:

■ Improper connection, such as the polarity of the power supply is reversed and insert/pull the motor connection when the power supply is connected.

■ Beyond electrical and environmental requirements.

■ Change the internal device without permission.

A.3 Maintenance process

For maintenance of products, please follow the procedures shown below:

(1) Contact our customer service staff to get the rework permission.

(2) The written document of the drive failure phenomenon is attached to the goods, as well as the contact information and mailing methods of the sender.

Mailing address:

Post code:

Tel.: