

User Manual

DM422T

2-Phase Digital Stepper Drive



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Record of Revisions

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1. Features

- Step & direction (PUL/DIR) or double pulse control
- Input voltage 12~50VDC
- 500 KHz max pulse input frequency
- 4 microstep resolutions via DIP switches
- 8 output current settings via DIP Switches
- Idle current reduction to 50% or 90% selection via SW4
- Smoothing mode setting
- Auto tuning setting
- Alarm output setting
- Anti-Resonance for optimal torque, extra smooth motion, low motor heating and noise
- Soft-start with no “jump” when powered on
- Optically isolated inputs with 5V or 24V
- Over-voltage and over-current protections

2. Specifications

2.1 Electrical Specifications

Parameters	DM422T			
	Min	Typical	Max	Unit
Output Current (Peak)	0.3	-	2.2	A
Supply Voltage	12	24/36	50	VDC
Logic signal current	7	10	16	mA
Pulse input frequency	0	-	500	kHz
Isolation resistance	100	-	-	MΩ

2.2 Environment

Cooling	Natural Cooling or Forced cooling	
Operating Environment	Environment	Avoid dust, oil fog and corrosive gases
	Humidity	40%RH – 90%RH
	Operating Temperature	0°C – 40°C (32°F - 109°F)
	Vibration	10-50Hz / 0.15mm
Storage Temperature	-20°C – 65°C (-4°F - 149°F)	
Weight	About 230g	

2.3 Mechanical Specifications

(unit: mm [1inch=25.4mm])

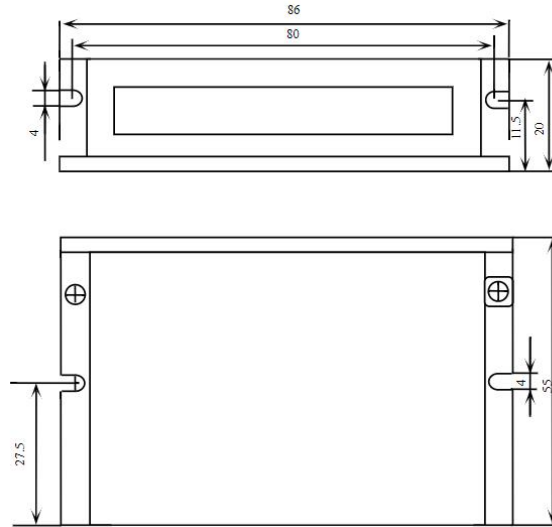


Figure 1 Mechanical specifications

Side mounting recommended for better heat dissipation

2.4 Elimination of Heat

- DM422T reliable working temperature should be $< 40^{\circ}\text{C}$ (109°F)
- It is recommended to use automatic idle-current mode to reduce motor heating. That means set the SW4 pin of DIP switch at “OFF” position.
- It is recommended to mount the drive vertically to maximize heat sink area. Use forced cooling method to cool if necessary.

3. Connection Pin Assignments and LED Indication

3.1 Control Connector

PIN	Details	
PUL-	Pulse and Direction Connection: (1) Optically isolated, high level 4.5-5V or 24V, low voltage 0-0.5V (2) Maximum 500 KHz input frequency (3) Duty cycle is recommended 50% (4) DIR signal requires advance PUL signal minimum 5 μs in single pulse mode (5) The factory setting of control signal voltage is 24V, must set dip switch if it is 5V (6) Enable Connection: default no connection	
DIR-		
COM+		
ENA-		
ALM+		(1) Maximum 30V/100mA output (2) Sinking or sourcing (3) The resistance between ALM+ and ALM- is low impedance as default, and will change to high when the drive goes into error protection.
ALM-		

3.2 Motor and Power Supply Connector

Pin Function	Details
GND	Power supply ground connection.
+Vdc	Power supply positive connection. Suggest 24/36VDC power supply voltage
A+, A-	Motor Phase A connections. Connect motor A+ wire to A+ Pin; motor A- wire to A-
B+, B-	Motor Phase B connections. Connect motor B+ wire to B+ Pin; motor B- wire to B-

3.3 LED Light Indication

There are two LED lights for DM422T. The GREEN one is the power indicator which will be always on generally. The RED one is a protection indicator which will flash 1-2 times in a 3-second period, when protection enabled for a DM422T. Different number of flashes indicates different protection type (read section 8 for detail).

4. Control Signal and Output Signal

4.1 Control Signal Connection

It is recommended adding an EMI line filter between the power supply and the drive to increase noise immunity for the drive in interference environments.

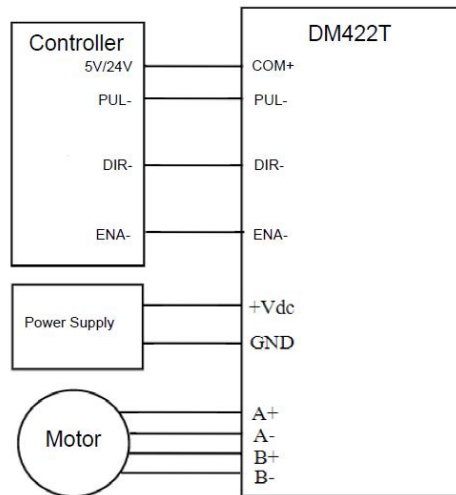


Figure 4: Typical Connections

Notes:

- (1) ENA signal is no-connected as default;
- (2) Control signal amplitude is 24 V as default. If it is 12 V, please set dip switch to 5 V first, then connect 1K Ω resistor; if it is 5V, please set to 5V.
- (3) The ports of DM422T are not compatible with the controllers with common cathode ports (STEP, DIR, ENA, GND)

4.2 Alarm Output Connection

When over voltage or over current protection happens, DM422T red status LED light will blink and the impedance state between ALM+ and ALM- will change (from low to high or high to low depending on configuration) and can thus be detected. Fault output connection is optional, and it can be connected either in sinking or sourcing.

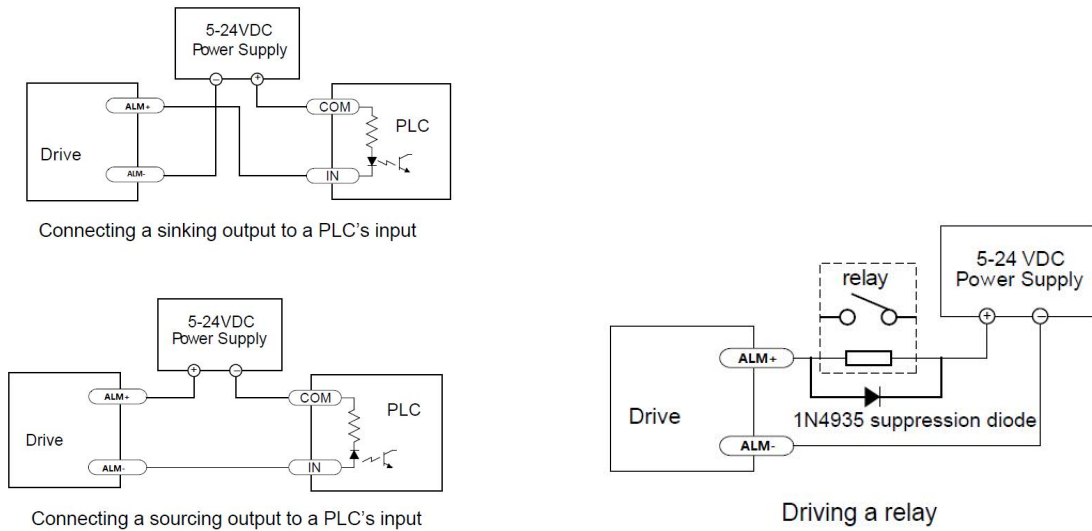


Figure 6 Fault Connection

5. Motor Connection

The DM422T can drive 2-phase and 4-phase bipolar hybrid stepper motors.

The 4 lead motors are the least flexible and easy to connect. The output current from drive that is multiply the specified phase current by 1.4 to determine the peak output current.

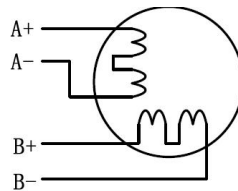
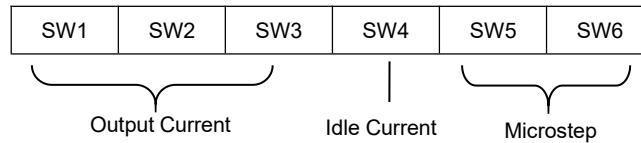


Figure 7 4-lead Motor Connections

6. DIP Switch Configurations

The DM422T has 6-bit, 4-bit DIP switch and a 1-bit DIP switch. The first 6-bit is used to configure settings of micro step resolution, output current, motor standstill current as shown below.



The 5V/24V dip switch is located on the top, used to configure the voltage of control signals. For the safety of optically coupled, the factory setting is 24V.

6.1 Microstep Resolution Configurations

Microstep resolution is set by SW5, 6 of the DIP switches as shown in the following table. **Note: "default" means the parameters can be set by GUI tuning software.**

Microstep	Steps/rev.(for 1.8°motor)	SW5	SW6
4	1000 (default)	ON	ON
8	1600	OFF	ON
16	3200	ON	OFF
32	6400	OFF	OFF

6.2 Output Current Configurations

The first three bits (SW1, 2, 3) of the DIP switch are used to set the dynamic current. Select a setting closest to your motor's required current. **Note:** "default" means the parameters can be set by GUI tuning software.

6.2.1 Dynamic Current Configurations

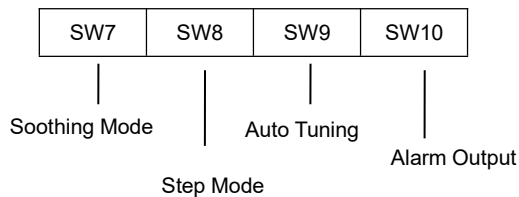
Peak Current	RMS Current	SW1	SW2	SW3
0.3A	0.21A (default)	ON	ON	ON
0.5A	0.35A	OFF	ON	ON
0.7A	0.49A	ON	OFF	ON
1.0A	0.71A	OFF	OFF	ON
1.3A	0.92A	ON	ON	OFF
1.6A	1.13A	OFF	ON	OFF
1.9A	1.34A	ON	OFF	OFF
2.2A	1.56A	OFF	OFF	OFF

6.2.2 Idle Current Configuration

SW4 is used to set motor idle current percentage. At OFF position it means the standstill current is set to be 50% of the selected output current. At ON position it means standstill current is set to be 90%.

The current automatically reduced to 50% of the selected dynamic current 0.4 second after the last pulse.

6.3 Additional Configurations



SW7: Smoothing Mode

SW7=off, Disable smoothing mode

SW7=on, Enable smoothing mode

SW8: Step Mode

SW8=off, single pulse, Step & direction

SW8=on, Double pulse, CW/CCW

SW9: Auto Tuning

SW9=off, Enable auto tuning

SW9=on, Disable auto tuning

SW10: Alarm Output

SW10=off, Low impedance between ALM+ and ALM- in normal operation

SW10=on, High impedance between ALM+ and ALM- in normal operation

7. Sequence Chart of Control Signals

In order to avoid some fault operations and deviations, PUL, DIR and ENA should abide by some rules, shown as following diagram:

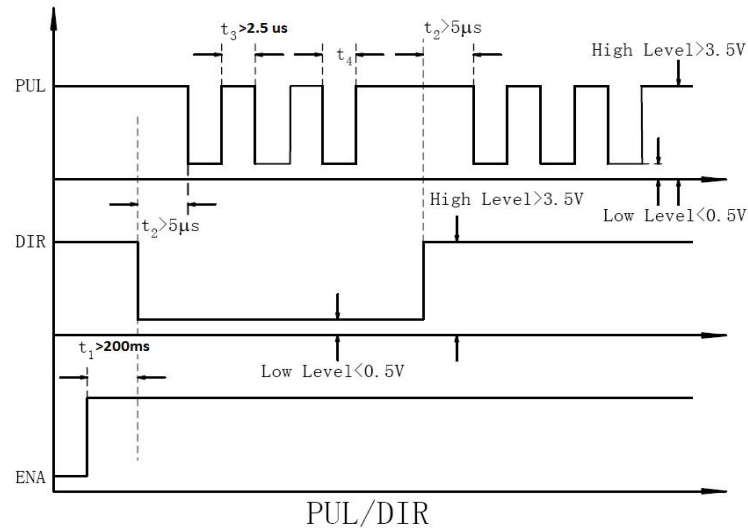


Figure 9 Sequence charts of control signals

Remark:

- t_1 : ENA must be ahead of DIR by at least 200ms. Usually, ENA+ and ENA- are NC (not connected). See “Connector P1 Configurations” for more information.
- t_2 : DIR must be ahead of PUL effective edge by 5 μ s to ensure correct direction;
- t_3 : Pulse width not less than 2.5s;
- t_4 : Low level width not less than 2.5s;
- Duty cycle of Pulse signal is recommending 50%.

8. Protection Functions

To improve reliability, the drive incorporates some built-in protections features.

Priority	Time(s) of Blink	Sequence wave of red LED	Description
1st	1		Over-current protection activated when peak current exceeds the limit.
2nd	2		Over-voltage protection activated when drive working voltage is greater than 60VDC
3rd	3		Reserved.

When above protections are active, the motor shaft will be free or the red LED blinks. Reset the drive by repowering it to make it function properly after removing above problems.