2DM420

Digital stepper driver

User manual

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Preface

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Version	Writer	Approved
V1.0	R&D	R&D

Directory

一、overview

2DM420 is a digital two-phase stepper drive, controlled by the latest 32-bit ARM processor. This digital driver has peripheral subdivision, current, and auxiliary function dialing, which users can freely set according to their needs. The advanced drive control algorithm is written internally to ensure the precise and stable operation of the stepper motor in various speed ranges. Among them, the built-in subdivision algorithm can make the motor run smoothly at low speeds; The medium to high speed torque compensation algorithm can maximize the torque of the motor at medium to high speeds; The parameter self-tuning algorithm can adapt to various motors and maximize motor performance; Built in smoothing algorithm, which can greatly improve the acceleration and deceleration performance of the motor. In summary, this digital drive can meet most applications and is a highly cost-effective sport，Control the product.

二、characteristic

◆ Parameter self-tuning and motor adaptation;
◆ Built in high precision, low vibration, low heat generation, and smooth low-speed operation;
◆ Medium and high speed torque compensation;
◆ Current vector control, high current efficiency;
◆ Built in acceleration and deceleration control to improve smoothness of start stop;
◆ Single and double pulse control modes can be selected;
◆ Memory of motor operating position;

◆ Input signal differential optocoupler isolation, compatible with 5V~24V;

◆ Users can customize segmentation;

◆ Overcurrent protection, overvoltage protection;

◆ Automatic detection, flexible selection of pulse edge counting method;

◆ Green light indicates operation, red light indicates protection or offline;

三、Port Description

3.1 Control signal input port
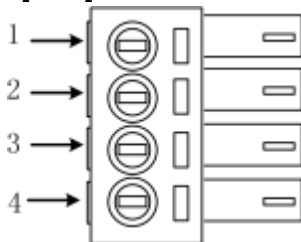
3.1.1 Control signal common positive connection method

Pin number	grade	Name	illustrate
1	ENA-	Enable input negative	Compatible with 5V~24V levels
2	OPT+	Public upright	
3	DIR-	Pulse input negative	Compatible with 5V~24V levels
4	PLS-	Pulse input negative	

3.1.2 Control signal differential signal connection method

Pin number	grade	Name	illustrate

1	DIR-	Direction input negative	Compatible with 5V~24V levels
2	DIR+	Direction input positive	
3	PLS-	Pulse input negative	Compatible with 5V~24V levels
4	PLS+	Pulse input positive	

3.2 Power port
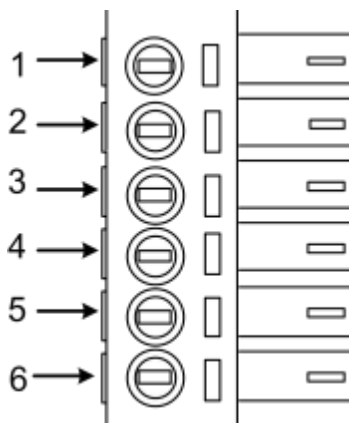
Pin number	identifying	grade	Name	illustrate
1	电机相线	B-	电机 B-端	电机 B 相绕组
2		B+	电机 B+端	
3		A-	电机 A-端	电机 A 相绕组
4		A+	电机 A+端	
5	电源 输入端	VCC	电源正极	DC18V~36V
6		GND	电源负极	

四、TECHNICAL INDEX

INPUT VOLTAGE	DC18V~36V	
Maximum pulse frequency	200K	
Default communication rate	57.6Kbps	
protect	☞Peak overcurrent action value 6A ± 10% ☞Overvoltage voltage action value 50VDC	
External dimensions （mm）	118×75.5×34	
weight	Approximately 260g	
使用环境	occasion	Try to avoid dust, oil mist, and corrosive gases as much as possible
	operation temperature	0~70℃
	storage temperature	−20℃~+80℃
	humidity	40~90%RH
	Cooling method	Natural cooling or forced cold air

五、Control signal wiring

5.1 Control signal single ended common anode wiring
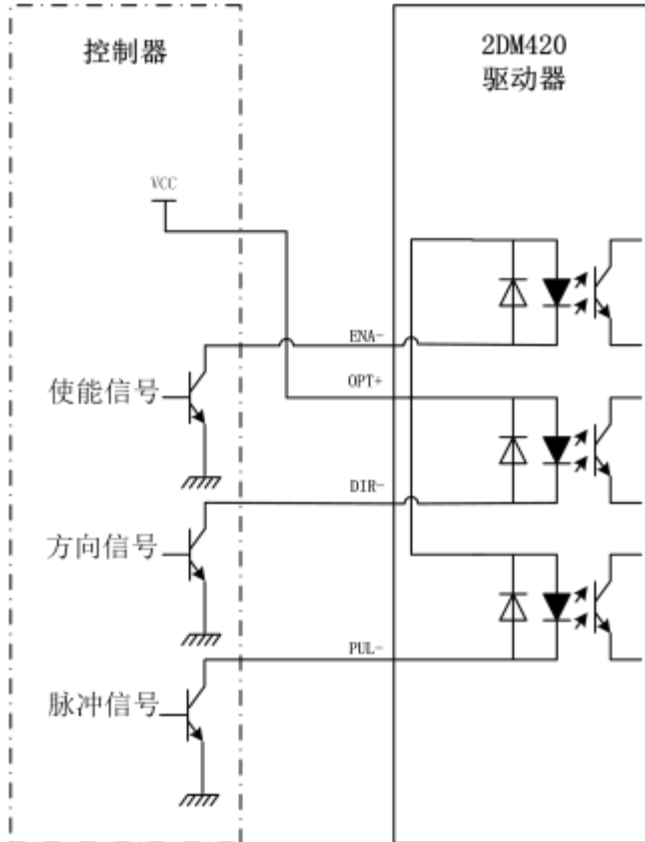
notice：
VCC is compatible with 5V~24V.

5.2 Differential wiring method for control signals
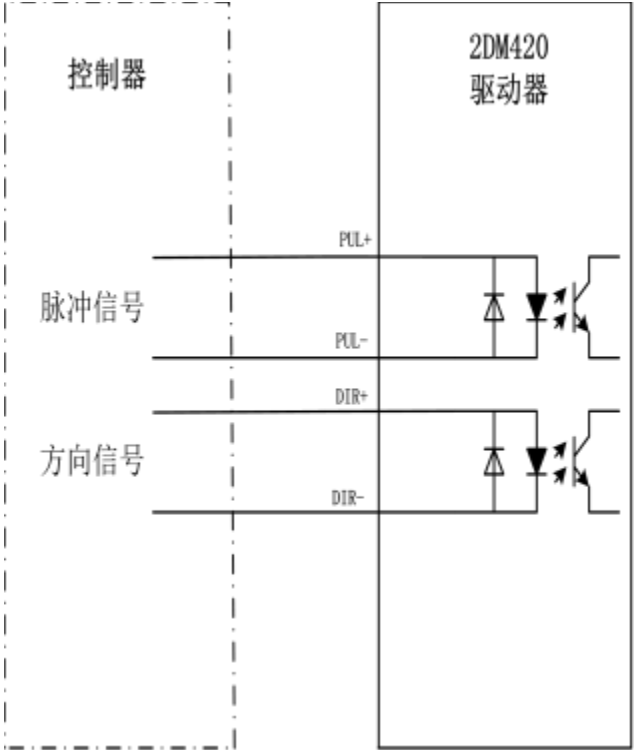
notice：
VCC is compatible with 5V~24V.

5.3 232 serial communication wiring diagram
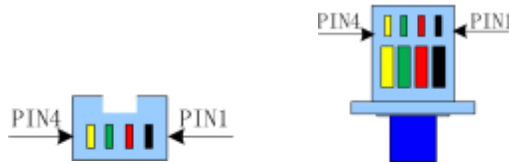
Crystal Head and Foot Position	define	illustrate
1	GND	Power supply ground
2	+5V	For external HISU only
3	RXD	receiving end
4	TXD	Sender

5.4 Control signal timing diagram

To avoid some misoperations and deviations, PUL, DIR, and ENA should meet the requirements of one Set r equirements, as shown in the following figure:
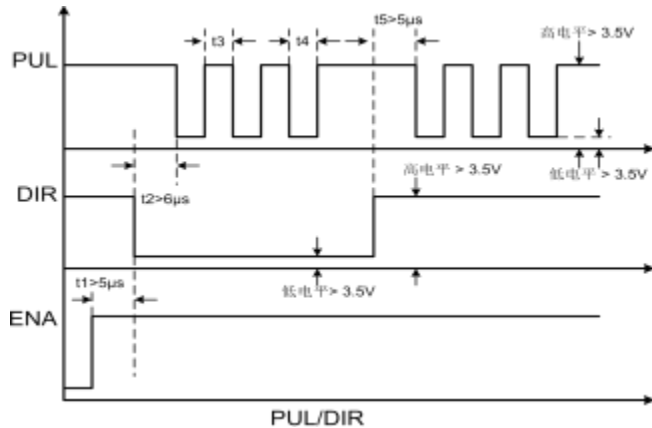
explantion：

(1) T1: ENA (enable signal) should have a minimum advance DIR of 5 μ s. Confirm

For high. In general, it is recommended to use ENA+and ENA - suspended.

(2) T2: At least advance PUL counting edge 6 for DIR μ Determine its status High or low.

(3) T3: Pulse width not less than 2.5 μ S.

(4) T4: Low level width not less than 2.5 μ S.

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六、DIP switch setting

6.1 SW DIP Switch Description

The SW dial switch is mainly used for setting the current size and subdivision. Users can set it according to their actual needs, and each adjustment must be powered on again to ensure the set value is effective.

6.1.1 Current dialing settings

The SW current dial settings are shown in the table below:

DIP current		SW1	SW2	SW3
peak value	Valid value			
0.9A	0.64A	1	1	1
1.20A	0.85A	0	1	1
1.50A	1.06A	1	0	1
1.80A	1.27A	0	0	1
2.10A	1.49A	1	1	0
2.40A	1.70A	0	1	0
2.70A	1.91A	1	0	0
3.0A	2.12A	0	0	0

6.1.2 Stop current setting

When the motor stops (i.e. stops giving pulses), the current can be set by SW4. Off indicates that the stopping current is reduced compared to when the motor is running normally, and on indicates that the stopping current is the same as when the motor is running normally. It is generally recommended to set SW4 to off to effectively reduce the heating conditions of the motor and driver. The P15 parameter of the debugging board can be set to change how long the current starts to decrease after stopping the pulse, with a default value of 50ms; set up

The P16 parameter of the debugging board can change the percentage of current reduction, which defaults to a decrease 50%.

6.1.3 Subdivision dialing settings

The subdivision of the drive is set by the dial switch, as shown in the table below. In addition, when the subdivision dial table cannot meet the user's needs, the user can customize subdivision through the debugging board. If the parameter P14 is set to 4-1000, the driver subdivision will be 4 * 50-1000 * 50. When the debugging board parameter P14 is set to 0, the user can customize subdivision

The sub function fails, and the sub function is set by the toggle switch.

The SW subdivision dialing settings are shown in the table below:

DIP subdivision	SW5	SW6	SW7	SW8
400	0	1	1	1
800	1	0	1	1
1600	0	0	1	1
3200	1	1	0	1
6400	0	1	0	1
12800	1	0	0	1
25600	0	0	0	1
1000	1	1	1	0
2000	0	1	1	0
4000	1	0	1	0
5000	0	0	1	0
8000	1	1	0	0
10000	0	1	0	0
20000	1	0	0	0
25000	0	0	0	0

七、Error alarm and LED flashing frequency
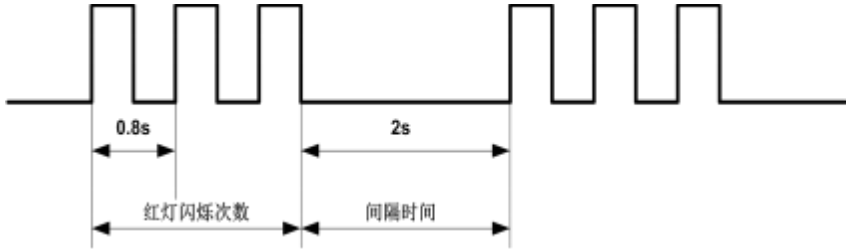
Number of red light flashes	Alarm Description
1	Drive overcurrent
2	Internal voltage reference error in the driver
3	Driver parameter upload error
4	The power supply voltage of the driver exceeds the maximum value

八、Installation dimensions
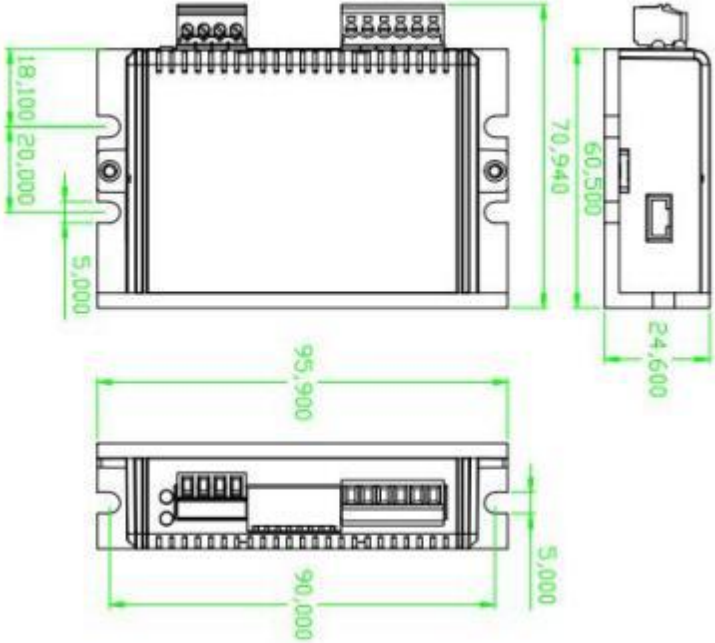
九、Wiring diagram

The reference for 2DM420 shown in the figure：
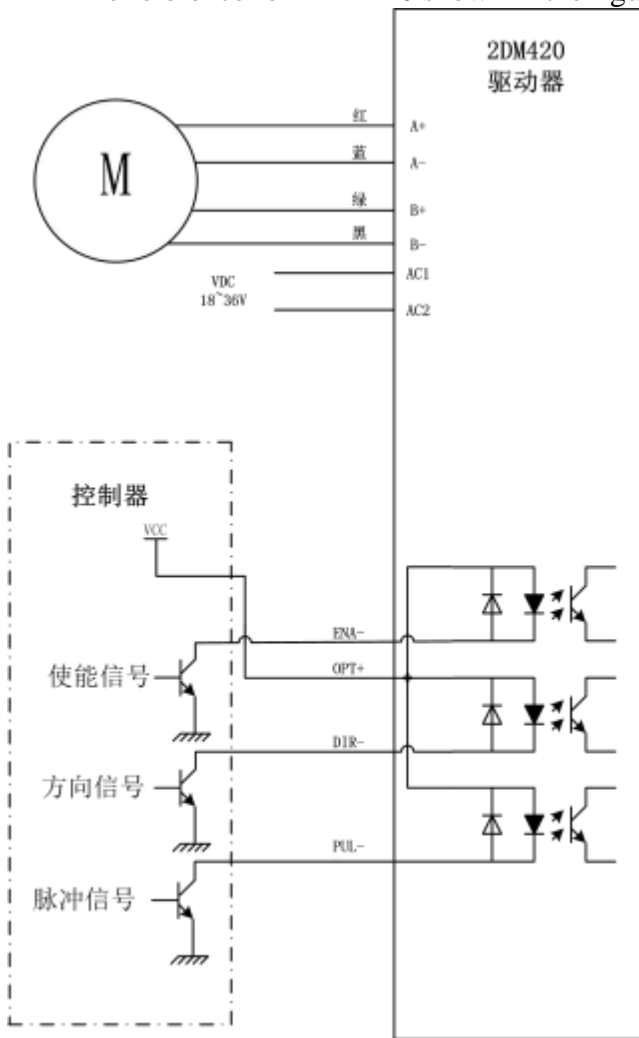
十、Parameter settings

Parameter setting method for 2DM420 driver: Through the RS232 serial communication port of the HISU debugger, a dedicated debugging board is used to complete the parameter setting. There is a set of default factory configuration parameters corresponding to the best motor inside the driver, and users only need to adjust the internal parameters of the driver according to the specific usage situation, specific parameters and functions

As shown in the table below：

The actual value of the parameter=set value *corresponding dimension

Serial Number	name	range	dimension	Restart driver	default parameter
P1	Current loop ratio	0-4000	1	Yes	1000
P2	Current loop integration	0-1000	1	Yes	100
P3	System damping coefficient	0-500	1	No	100
P4	First resonance point amplitude	0-100	1	No	0
P5	Phase of the first resonance point	0-100	1	No	0
P6	Second resonance point amplitude	0-100	1	No	0
P7	Phase of the second resonance point	0-100	1	No	0
P8	Damping coefficient	0-1000	1	No	120
P9	Damping coefficient				160
P10	Enable signal level	0-1	1	No	0

P11	Initial direction selection	0-1	1	No	1
P12	reserve				
P13	Pulse type selection				0
P14	User defined segmentation	4-1000	50	Yes	0
P15	Stop Half Flow Time	0-4000	1ms	Yes	100
P16	Stop current percentage	0-100	1	Yes	50

P17	Instruction smoothing coefficient	0-10	1	Yes	5
P18	Position memory enable	0-1	1	Yes	0
P19	User defined motor inductance	0-100	mh	Yes	0
P20	User defined motor resistance	0-100	0.1Ω	Yes	0
P21	Location memory results	0-128	1		0
P22	Position memory activation time	Reserve			
P23	reserve				
P24	Current percentage setting	0-130	1		100

This driver has a total of 22 parameters that can be adjusted:

Parameters P1 and P2 are used to set the proportional and integral parameters of the current loop at the moment of power on. When the P1 parameter is 1000, the proportional and integral parameters of the current loop during motor operation Automatically obtained by self-tuning algorithm.

Parameter P3 is used to adjust the system damping coefficient to enhance the torque of the motor at medium and high speeds, while also suppressing vibration.

Parameters P4, P5, P6, P7, P8, and P9 are used to eliminate the resonance point of the motor,

respectively. Among them, P4, P5, P6, and P7 are used to eliminate vibration of the motor when the speed is below 4 revolutions per second, while P8 and P9 are used to eliminate vibration when the motor speed is around 4 revolutions per second

Vibration of.

Parameter P10, used for enabling level selection. 0 indicates that the enabling signal is at a high level. Yes, the motor is in offline mode. 1 indicates that the enabling signal is at a low level. The motor is in offline mode

Offline status.

Parameter P11, used for initial direction selection, where 1 indicates the initial direction is counterclockwise and 0 indicates the initial direction is clockwise.

Parameter P12, reset.

Parameter P13, pulse type selection, set to 1, Yes pulse direction, set

When set to 0, Yes dual pulse mode.

Parameter P14, used for user-defined segmentation. When set to 0, it indicates the use of dials

The code switch is set to subdivide, and when set to 4-1000, it indicates that the subdivided values are:

4 * 50~1000 * 50, for example, if P14 is set to 80, then the drive subdivision is set to 80 * 50=4000 subdivision, and the subdivision set by the DIP switch does not work.

Parameter P15, used to set how long the pulse stops before the current starts to decrease.

Parameter P16, used to set the percentage of current reduction.

Parameter P17, instruction smoothing coefficient.
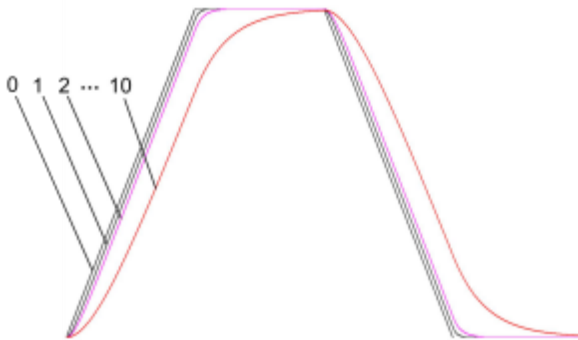
Parameter P18 is used to enable the position memory function, which remembers the motor phase when power is

off to prevent motor vibration during the next power on.
0 indicates that the position memory function is not enabled,
1 indicates enabling the position memory function.

Parameter P19, used for users to set their own motor inductance. 0 indicates enabling the self identification algorithm to automatically identify the motor inductance, while other values indicate not enabling the identification algorithm,
Using user set inductance parameters.

Parameter P20, used for users to set their own motor resistance. 0 indicates enabling self identification algorithm to automatically identify motor resistance, while other values indicate not enabling identification algorithm
Method, using user set resistance parameters.

Parameter P21, used to view position memory results.

Parameter P22, reset.

Parameter P23, reset.

Parameter P24, current percentage setting. If the current value Ip is dialed, set P24
If the value is a, then the actual current value Itr=Ip * a/100.

十一、Common problems and troubleshooting

11.1 The power light is not on

■ Input power failure, please check the power circuit Voltage YesNo too low

11.2 Power on with red light warning
■ Motor power phase line YesNo connection

■ Driver input power supply voltage YesNo too high or too low

11.3 Does not rotate after pulse input

■ The wiring of the pulse input terminal of the driver is YesNo reliable

- ■ The input method YesNo in the drive system
  configuration is related to pulse input
- ■ Motor YesNo enable release