2DM415
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

2DM415 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;
◆　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

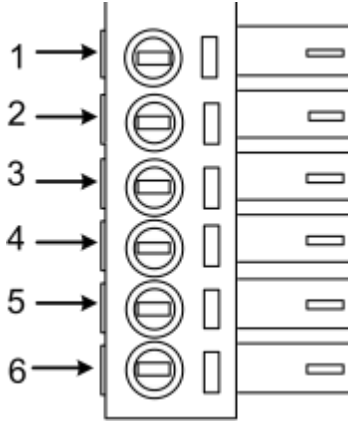## 3.1 Control signal input port
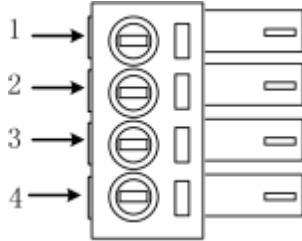
3.1.1 Control signal common positive connection method

terminal 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	

3.2 Power port

Pin number	identifying	Symbols	Definition	Explanation
1	Motor phase line	B-	Motor B-end	Motor B-phase winding
2		B+	Motor B+end	
3		A-	Motor A-end	Motor A-phase winding
4		A+	Motor A+end	
5	source Input end	VCC	Positive pole of power supply	DC18V～36V
6		GND	Negative pole of power	

			supply	

四、TECHNICAL INDEX

INPUT VOLTAGE	DC18V~36V
Maximum pulse frequency	200K
Default communication rate	57.6Kbps
protect	☞ Overcurrent action value \peak 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
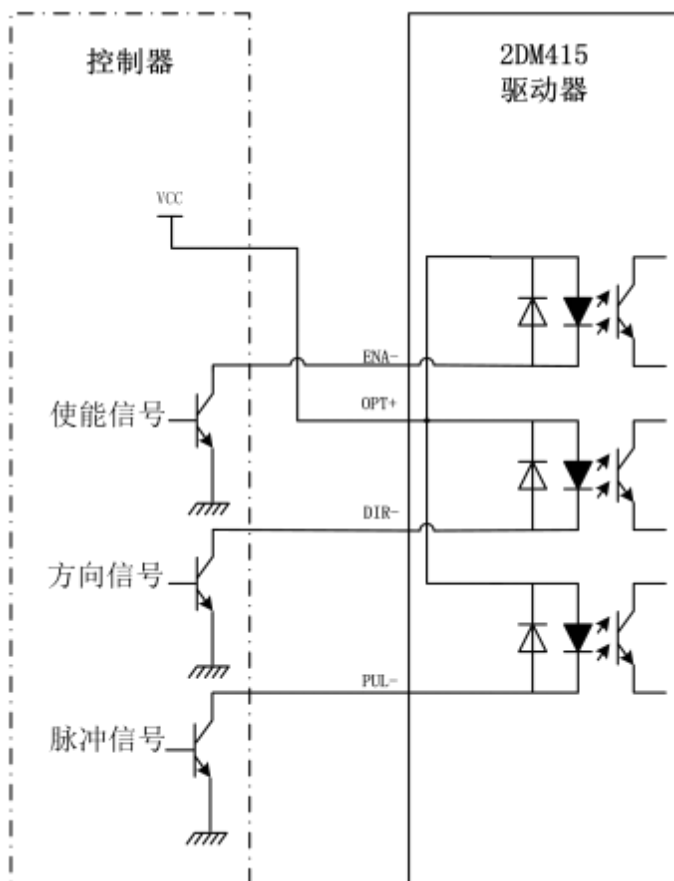
notice：

VCC is compatible with 5V~24V。

5.2 232 serial communication wiring diagram
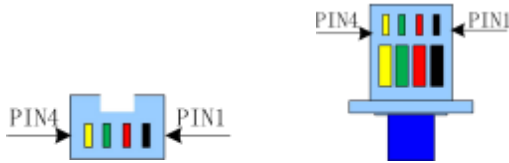
Crystal Head and Foot Position	define	illustrate
1	TXD	Sender
2	RXD	receiving end
4	+5V	For external HISU only
6	GND	Power supply ground

5.3 Control signal timing diagram

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

8
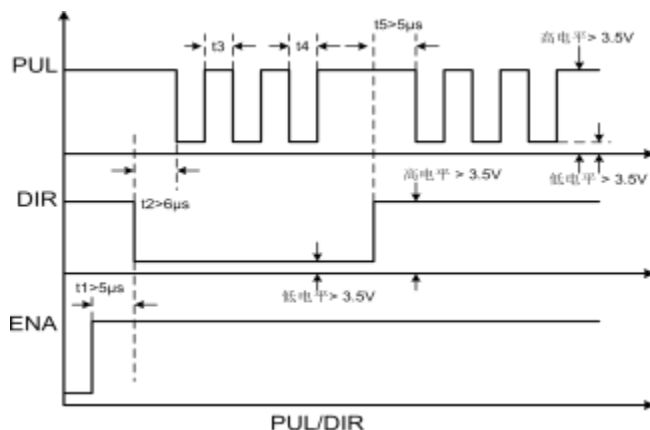
explantion：

（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.

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:

拔码开关 current				SW1	SW2	SW3
peak value	Valid value					
2.2A	1.57A			1	1	
0.21	0.15A			0	1	
0.42A	0.3A			1	0	
0.63A	0.45A			0	0	
0.84A	0.6A			1	1	0
1.05A	0.75A			0	1	0
1.26A	0.9A			1	0	0
1.50A	1.09A			0	0	0

6.1.2 Stop current setting

When the motor stops (i.e. stops supplying pulses), the stopping current is higher than the normal operation of the motor
When rotating, it should be reduced to effectively reduce the heating condition of the motor and driver.

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-defined subdivision function will be invalid, and the subdivision will be set by the dial switch.

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

拔码开关 细分	SW4	SW5	SW6
200	1	1	1
400	0	1	1

800	1	0	1
1600	0	0	1
3200	1	1	0
6400	0	1	0
12800	1	0	0
25600	0	0	0

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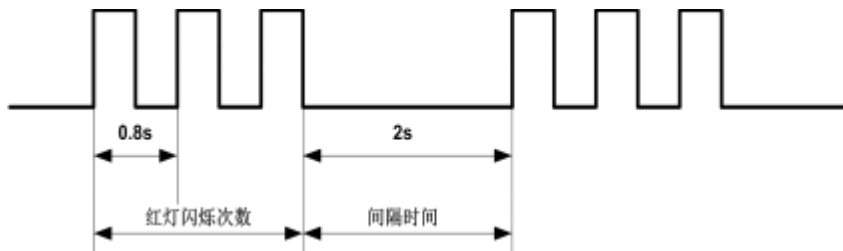
Number of red light flashes	Alarm Description
1	Drive overcurrent
2	Internal voltage reference error in the driver
3	Driver parameter upload error
4	The power supply voltage of the driver exceeds the maximum value

八、Installation dimensions
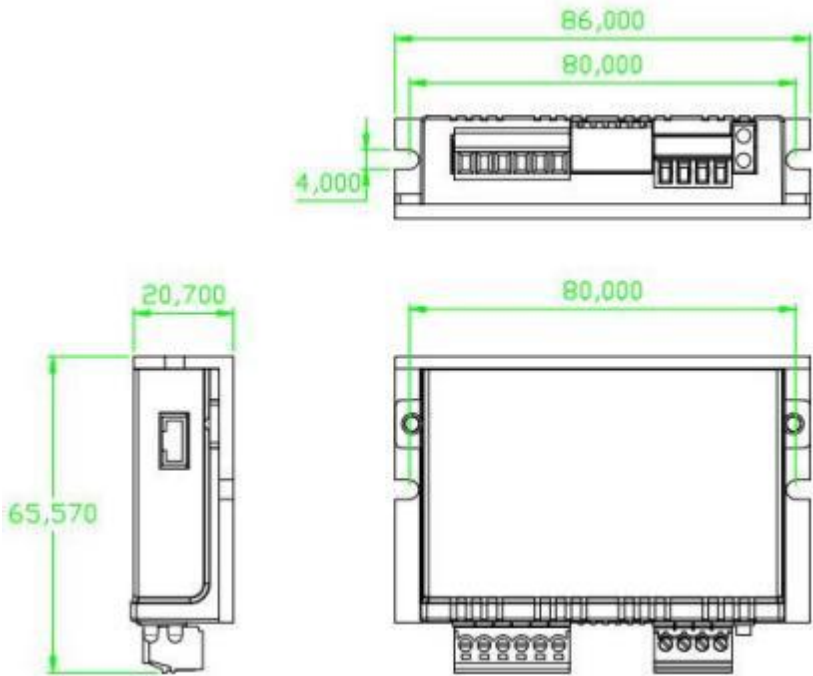
九、Wiring diagram

The reference for 2DM41 shown in the figure：

5 is
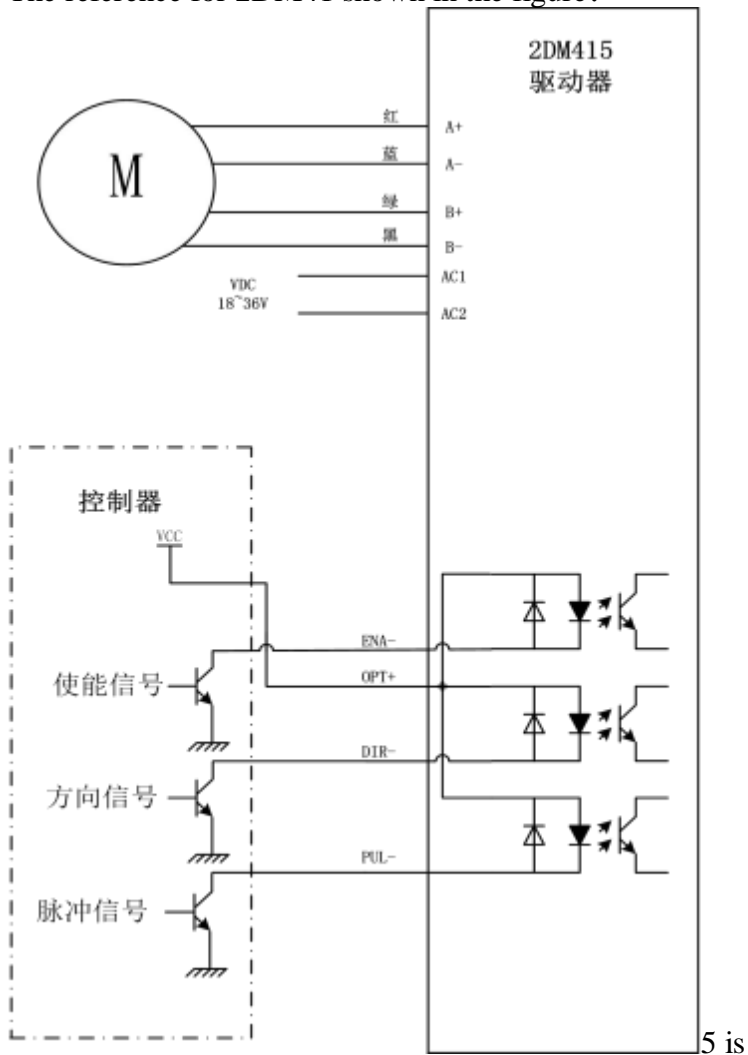
十、Parameter settings

Parameter setting method for 2DM415 driver: Through the RS232 serial communication port of the HISU debugger, a dedicated debugging board is used to complete the parameter setting. The driver has a set of default factory configuration parameters corresponding to the best motor, 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	reserve				
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, reserve.

Parameter P13, reserve.

Parameter P14, used for user-defined segmentation. When set to 0, it indicates the use of a dial switch to set segmentation. When set to 4-1000, it indicates that the segmentation is respectively 4 * 50~1000 * 50, for example, if P14 is set to 80, then the drive subdivision is set to 80 * 50=4000 subdivisions, and the subdivisions set by the dial switch do not work at this time.

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.
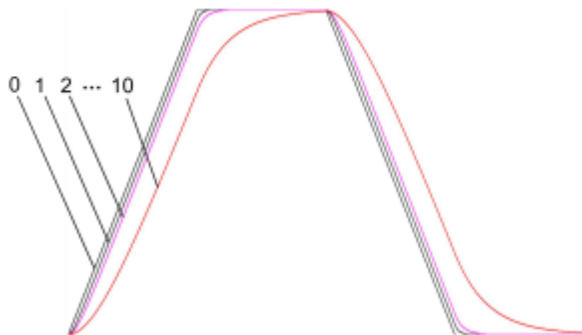
Parameter P18 is used to enable the position memory function, which remembers the motor phase when power is off to prevent motor vibration during the next power on. 0 indicates that the position memory function is not enabled,
1 indicates enabling the position memory function.

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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, reserve.

Parameter P23, reserve.

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