



3DM2080

Digital Stepper Drive

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Manual



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## Contents

<b>1. Overview</b> .....	- 4 -
<b>2. Features</b> .....	- 4 -
<b>3. Ports Introduction</b> .....	- 5 -
3.1 Control Signal Input Ports.....	- 5 -
3.2 ALM signal output ports.....	- 5 -
3.3 Power Interface Ports.....	- 7 -
<b>4. Technological Index</b> .....	- 8 -
<b>5. Connections to Control Signal</b> .....	- 9 -
5.1 Connections to Common Anode.....	- 9 -
5.2 Connections to Common Cathode.....	- 10 -
5.3 Connections to Differential Signal.....	- 11 -
5.4 Connections to 232 Serial Communication Interface.....	- 12 -
5.5 Sequence Chart of Control Signals.....	- 12 -
<b>6. DIP Switch Setting</b> .....	- 13 -
6.1 Activate Edge Setting.....	- 13 -
6.2 Running Direction Setting.....	- 14 -
6.3 Micro steps Setting.....	- 14 -
<b>7. Faults alarm and LED flicker frequency</b> .....	- 15 -
<b>8. Appearance and Installation Dimensions</b> .....	- 17 -
<b>9. Typical Connection</b> .....	- 17 -
<b>10. Parameter Setting</b> .....	- 19 -
<b>11. Processing Methods to Common Problems and Faults</b> .....	- 24 -
11.1 Power on power light off.....	- 24 -
11.2 Power on red alarm light on.....	- 24 -
11.3 After input pulse signal but the motor not running.....	- 25 -

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## 1. Overview

The 3DM2080 is a three phase digital stepper driver based on DSP. Its Micro step resolutions and output current are programmable. And it has advanced control algorithm, which can bring a unique level of system smoothness, provides optimum torque and mid-range instability. The control algorithm of Multi-Stepping can make stepper motor has smooth system performance. The control algorithm of torque compensation can improve the torque of motor in the high speed. The control algorithm of motor self-test and parameter auto-setup technology offers optimum responses with different motors and easy-to-use. The control algorithm of smoothness can enhance the acceleration and deceleration of motor. Its unique features make the 3DM2080 to be an ideal solution for applications.

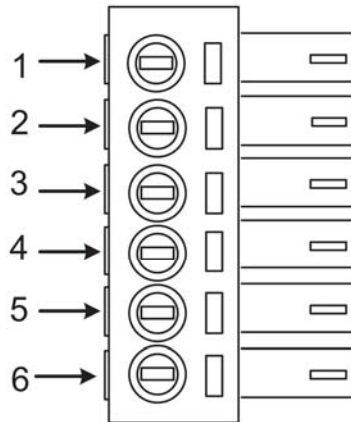
## 2. Features

- Parameter auto-setup and motor self-test
- Multi-Stepping inside
- Small noise, low heating, smooth movement
- Torque compensation in high speed
- Variable current control technology, High current efficiency
- Accelerate and decelerate control inside, Great improvement in smoothness of starting or stopping the motor

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- Support PUL/DIR and CW/CCW modes
  - Storage the position of motor
  - Optically isolated input and compatible with 5V or 24V
  - User-defined micro steps
  - Microstep resolutions and Output current programmable
  - Over current, over voltage and low voltage protection
  - Green light means running while red light means protection or off line

### 3. Ports Introduction

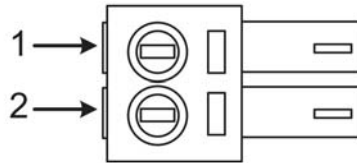
#### 3.1 Control Signal Input Ports



Port	Symbol	Name	Remark
1	DIR-	Direction signal-	Compatible with 5V or 24V
2	DIR+	Direction signal+	

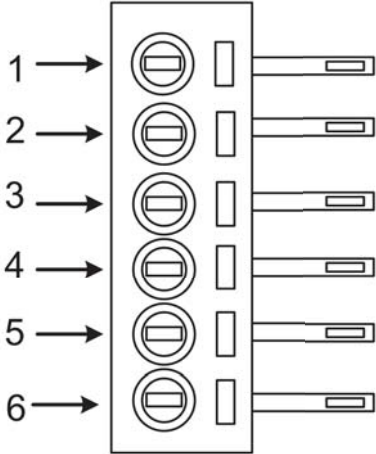
3	PLS-	Pulse signal -	Compatible with 5V or 24V
4	PLS+	Pulse signal +	
5	ENA-	Enable signal -	Compatible with 5V or 24V
6	ENA+	Enable signal +	

### 3.2 ALM signal output ports



Port	Symbol	Name	Remark
1	ALM+	Alarm output +	
2	ALM-	Alarm output -	

### 3.3 Power Interface Ports



Port	Identification	Symbol	Name	Remark
1	Motor Phase Wire Input Ports	U	Phase U	Motor Phase
2		V	Phase V	
3		W	Phase W	
4	NC	NC	No Contact	
5	Power Input Ports	AC1	AC80V-260V	
6		AC2		

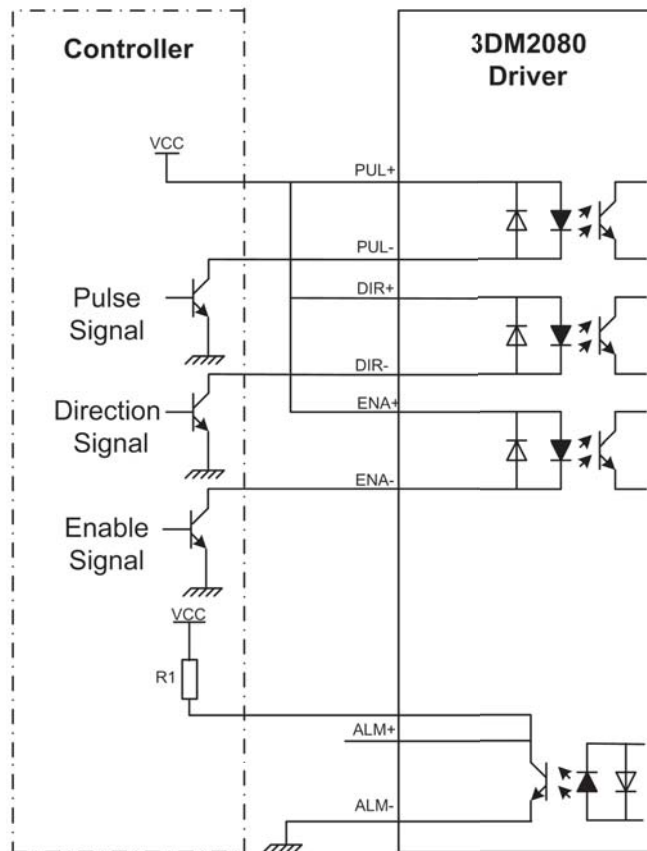
#### 4. Technological Index

Input Voltage	80~260VAC	
Output Current	8A	
Pulse Frequency max	200K	
Communication rate	57.6Kbps	
Protection	ℓ Over current peak value 15A±10% ℓ Over voltage value 400VDC	
Overall Dimensions (mm)	192×127×85	
Weight	Approximate 1500g	
Environment Specifications	Environment	Avoid dust, oil fog and corrosive gases
	Operating Temperature	+70°C Max
	Storage Temperature	-20°C ~+80°C
	Humidity	40~90%RH
	Cooling method	Natural cooling or forced air cooling

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## 5. Connections to Control Signal

### 5.1 Connections to Common Anode



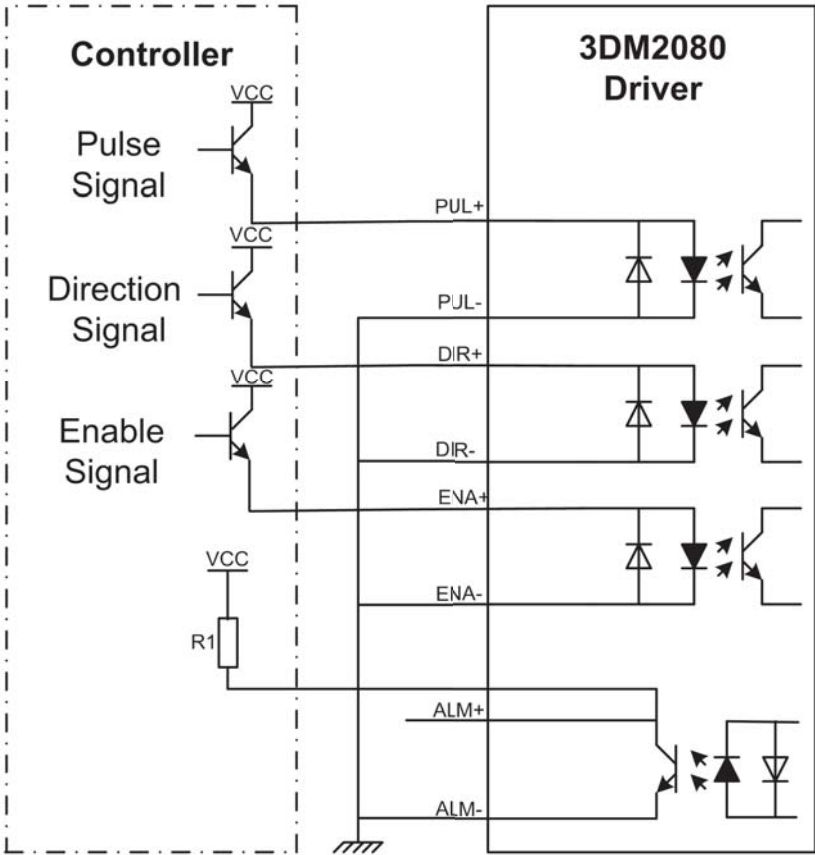
**Remark:**

VCC is compatible with 5V or 24V;

R1(3~5K) must be connected to control signal terminal.



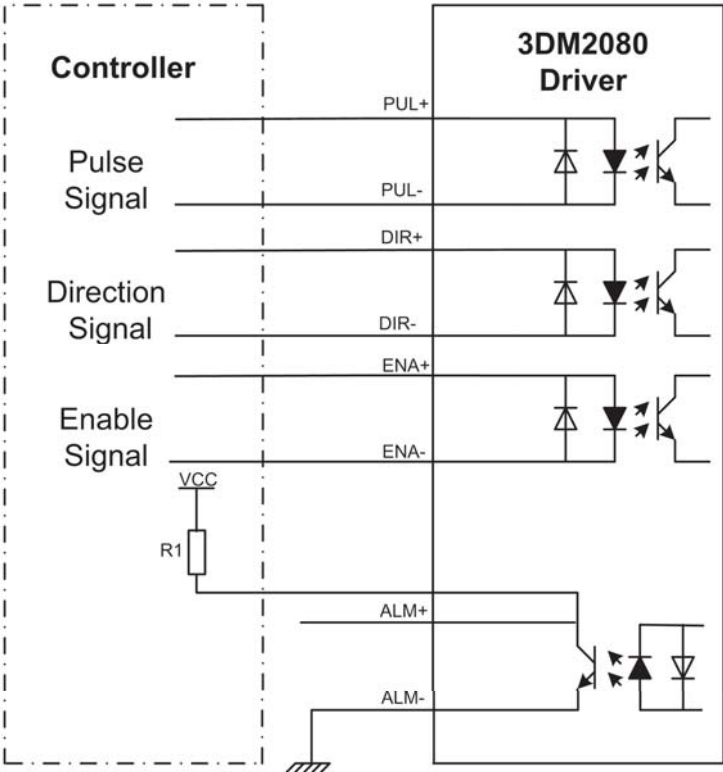
5.2 Connections to Common Cathode



Remark:

VCC is compatible with 5V or 24V;  
 R1(3~5K) must be connected to control signal terminal.

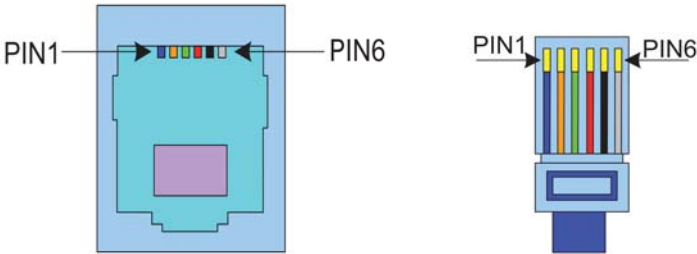
5.3 Connections to Differential Signal



**Remark:**

VCC is compatible with 5V or 24V;  
R1(3~5K) must be connected to control signal terminal.

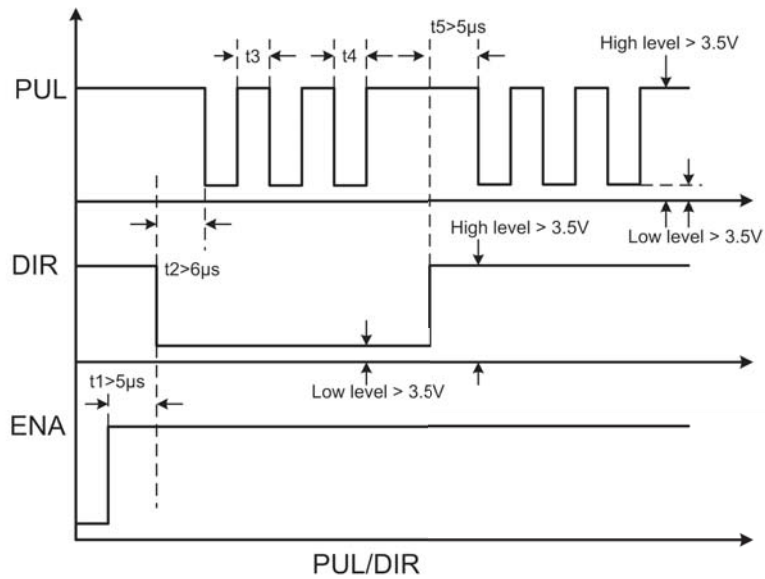
**5.4 Connections to 232 Serial Communication Interface**



Crystal Head foot	Definition	Remark
1	TXD	Transmit Data
2	RXD	Receive Data
4	+5V	Power Supply to HISU
6	GND	Power Ground

**5.5 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:



**Remark:**

- a.  $t_1$ : ENA must be ahead of DIR by at least  $5 \mu s$ . Usually, ENA+ and ENA- are NC (not connected).
- b.  $t_2$ : DIR must be ahead of PUL active edge by  $6 \mu s$  to ensure correct direction;
- c.  $t_3$ : Pulse width not less than  $2.5 \mu s$ ;
- d.  $t_4$ : Low level width not less than  $2.5 \mu s$ .

## 6. DIP Switch Setting

### 6.1 Current Setting

The current setting is in the following table.

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Dial switch Current	SW1	SW2	SW3
Default	0	0	0
2. 2A	1	0	0
3. 2A	0	1	0
4. 5A	1	1	0
5. 2A	0	0	1
6. 3A	1	0	1
7. 2A	0	1	1
8. 2A	1	1	1

### **6.2 Standstill current Setting**

SW4 is used for setting the standstill current , “off” means the standstill current is set to be half of the selected dynamic current or other current, which can be set by the HISU, the details can be seen in the tenth sections. while “on” means the standstill current is set to be the same as the selected dynamic current.

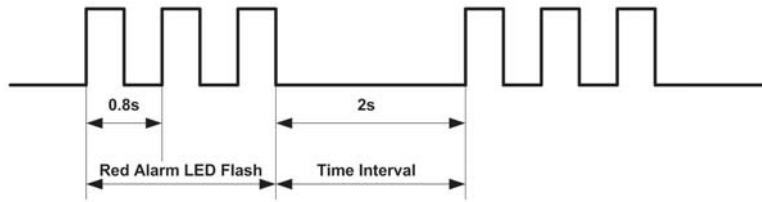
### **6.3 Micro steps Setting**

The micro steps setting is in the following table. And the micro steps can be also setting through the HISU. The details can be seen in the tenth sections.

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Dial switch Micro steps	SW5	SW6	SW7	SW8
400	0	0	0	1
500	0	0	0	1
600	1	0	0	1
800	1	0	0	0
1000	0	1	0	1
1600	0	1	0	0
2000	1	1	0	0
3200	0	0	1	0
4000	1	0	1	0
5000	1	1	0	1
6000	0	0	1	1
6400	0	1	1	0
7500	1	0	1	1
8000	1	1	1	0
10000	0	1	1	1
30000	1	1	1	1

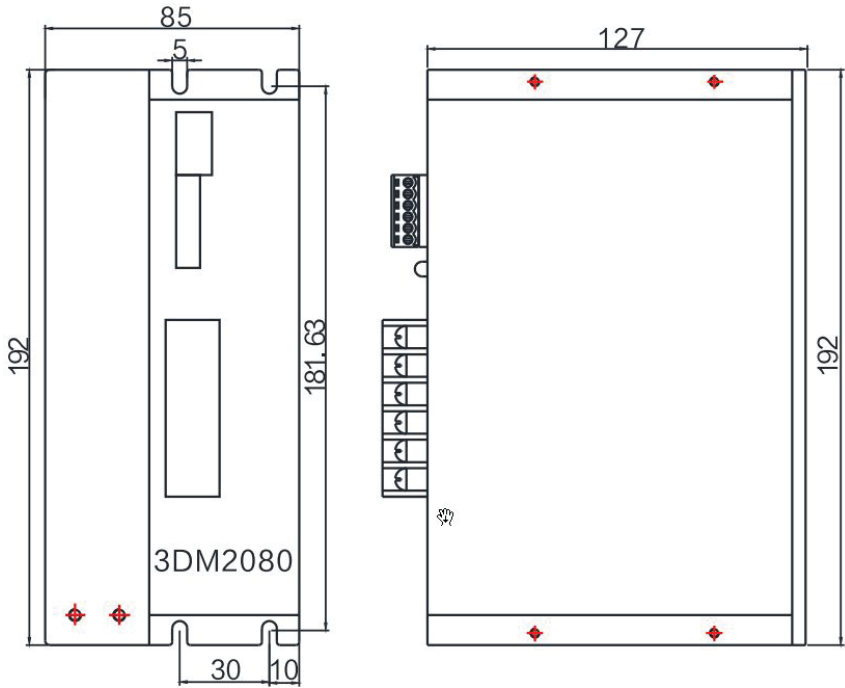
## 7. Faults alarm and LED flicker frequency



Flicker Frequency	Description to the Faults
1	Error occurs when the motor coil current exceeds the drive's current limit.
2	Voltage reference error in the drive
3	Parameters upload error in the drive
4	Error occurs when the input voltage exceeds the drive's voltage limit.
5	Wrong wiring of motor.

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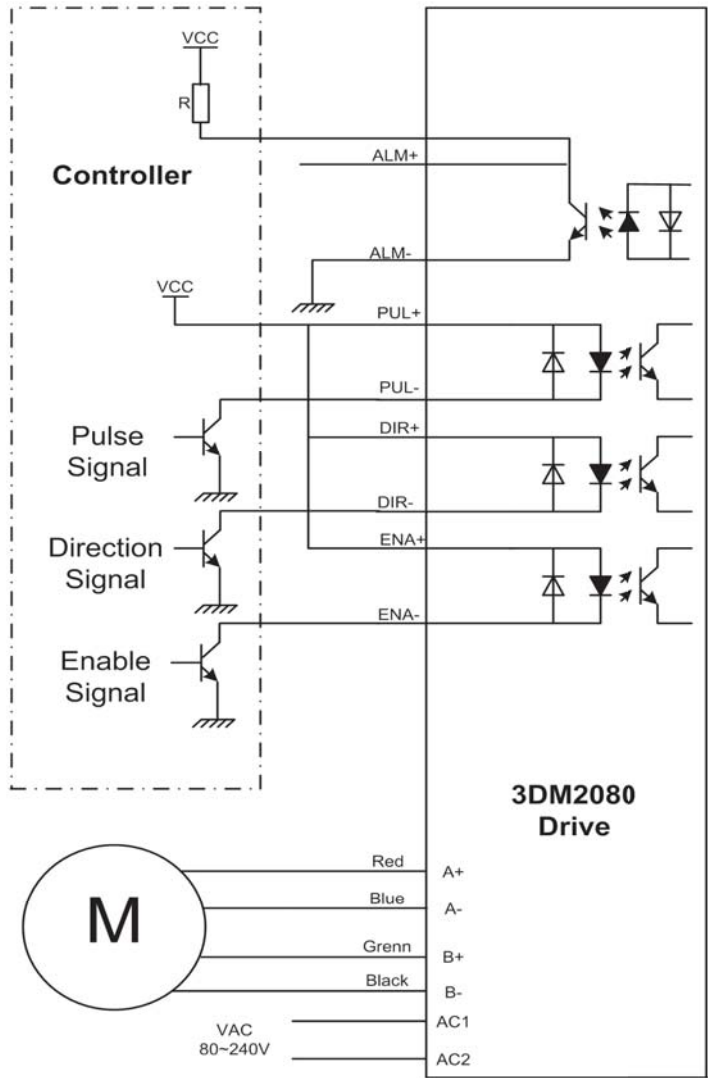
## 8. Appearance and Installation Dimensions



## 9. Typical Connection

Here is the typical connection of 3DM2280.





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## 10. Parameter Setting

The parameter setting method of 3DM2080 drive is to use a HISU adjuster through the 232 serial communication ports, only in this way we can set the parameters we want. There are a set of best default parameters to the corresponding motor which are carefully adjusted by our engineers, users only need refer to the following table, specific condition and set the correct parameters.

**Actual value = Set value × the corresponding dimension**

Mode	Definition	Range	Dimension	Drive Restart	Default Value
P1	Current loop Kp	0—4000	1	Y	500
P2	Current loop Ki	0—1000	1	Y	100
P3	Damping coefficient	0—500	1	N	200
P4	See the inductance of motor by motor self-test		0.1mh		
P5	Reserved				
P6	Amplitude of resonance point	0—1000	0.001	N	10
P7	Phase of resonance point	0—1000	0.001	N	50
P8	Reserved				
P9	Reserved				
P10	Enable signal level	0—1	1	N	1
P11	Reserved				

<b>P12</b>	Alarm out level	0—1	1	Y	0
<b>P13</b>	Command Type	0—1	1	Y	0
<b>P14</b>	User-defined micro steps	4—1000	50	Y	0
<b>P15</b>	Time of standstill current	0—4000	1ms	N	1000
<b>P16</b>	Percentage of standstill current	0—100	1	Y	50
<b>P17</b>	Speed smoothness	0—10	1	Y	0
<b>P18</b>	Enable of position memory	0—1	1	Y	1
<b>P19</b>	User-defined inductance of motor	0—100	mh	Y	0
<b>P20</b>	User-defined resistance of motor	0—100	0.1Ohm	Y	0
<b>P21</b>	Result of position memory	0—128	1		0
<b>P22</b>	PUL filter	0—10	1	Y	3
<b>P23</b>	Lack phase detect enable	0—1	1	Y	0
<b>P24</b>	Initial current saturation	0-10	0.1A	N	2
<b>P25</b>	Erasure DSP				

There are total 22 parameter configurations, use the HISU to download the configured parameters to the drive, the detail descriptions to every parameter configuration are as follows:

Item	Description
<b>Current loop Kp</b> <b>Current loop Ki</b>	The P1 and P2 is used to set Kp and Ki of Current loop Kp at the moment of power-on. If you set the Kp is 500, the Kp and Ki is got by the Self-tuning algorithm. But when you set the Kp is not 500, the Kp and Ki is the values which you set.
<b>Damping coefficient</b>	This parameter is used to change the damping coefficient in case of the desired operating state is under resonance frequency.
<b>Amplitude</b>  <b>Phase of resonance point</b>	Amplitude and Phase is adjustment for resonance, and compensate torque in high speed.
<b>Enable signal level</b>	This parameter is set to control the Enable input signal level, 0 means low, while 1 means high.
<b>Alarm out level</b>	This parameter is set to control the Alarm output signal level. 0 means the transistor is cut off when the drive is alarm, but when it comes to not, the

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	transistor becomes conductive. 1 means opposite to 0.
<b>User-defined micro steps</b>	This parameter is set of user-defined micro steps. The actual micro steps = the set value $\times$ 50. For example, if the parameter is 4, the micro steps is $4 \times 50 = 800$ . But If this parameter is 0, which means micro steps is set by the outer DIP switches.
<b>Time of standstill current</b>	This parameter is set the time when the standstill current is set to be half of the selected dynamic current or other current,
<b>Percentage of standstill current</b>	This parameter is set the percentage of standstill current.
<b>Speed smoothness</b>	This parameter is set to control the smoothness of the speed of the motor while acceleration or deceleration, the larger the value, the smoother the speed in acceleration or deceleration.

<b>Enable of position memory</b>	<p>This parameter is set to enable the function of position memory. 0 means disable, while 1 means enable. If set 1, the 2DM2280 can remember the position of motor in the next time of power on.</p>
<b>Command Type</b>	<p>This parameter is set to choice the PUL/DIR mode or CW/CCW mode. 0 means PUL/DIR mode, while means CW/CCW mode.</p>
<b>User-defined resistance of motor</b>	<p>This parameter is set the resistance of motor. 0 means 3DM2080 gets the resistance by control algorithm of Parameter auto-setup, while other parameter means 3DM2080 gets the resistance through user sets.</p>
<b>User-defined inductance of</b>	<p>This parameter is set the inductance of motor. 0 means 3DM2080 gets the inductance by control</p>

<b>motor</b>	algorithm of Parameter auto-setup, while other parameter means 3DM2080 gets the inductance through user sets.
<b>Result of position memory</b>	This parameter is set to control the smoothness of Display the result of position memory
<b>Time of enable position memory</b>	This parameter is set of the time when enable the position memory. The time is mean the space of time to stop plus input.
<b>PUL filter</b>	This parameter is set the filter coefficient of PUL.
<b>Lack phase detect enable</b>	This parameter is to enable the function of lack phase test. 0 means enable,1 meas disable.
<b>Initial current saturation</b>	This parameter is to set the Initial current saturation.
<b>Erasure DSP</b>	<b>If this parameter is 25,The DSP will be erased.</b>

## 11. Processing Methods to Common Problems and Faults

### 11.1 Power on power light off

- ◆ No power input, please check the power supply circuit. The voltage is too low.



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### **11.2 Power on red alarm light on**

- ◆ Please check the motor is connected with the drive.
- ◆ The stepper digital drive is over voltage or under voltage. Please lower or increase the input voltage.

### **11.4 After input pulse signal but the motor not running**

- ◆ Please check the input pulse signal wires are connected in reliable way.
- ◆ Please make sure the input pulse mode is corresponding with the real input mode.
- ◆ The Driver is disabled