2DM2280

The $2DM2280$ is a two phase digital stepper driver based on DSP. Its Micro step resolutions and output current are programmable. And it has advanced control algorithm, which can brings 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 $2DM2280$ to be an ideal solution for applications.

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

- 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 (via $RS232$)

- 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

Control Signal Input Ports

$DIR-$	$DIR+$	Direction signal, Compatible $5V..24V$
$PLS-$	$PLS+$	Pulse signal, Compatible $5V..24V$
$ENA-$	$ENA+$	Enable signal, Compatible $5V..24V$
$ALM-$	$ALM+$	Alarm output, "+"collector, "−"emiter

Power Interface Ports

$A-$	$A+$	Motor phase A
$B-$	$B+$	Motor phase B
$AC1$	$AC2$	Power $80..240Vac$

Technological Index

Input Voltage 80 240VAC

Output Current $8A$

Pulse Frequency max $200K$
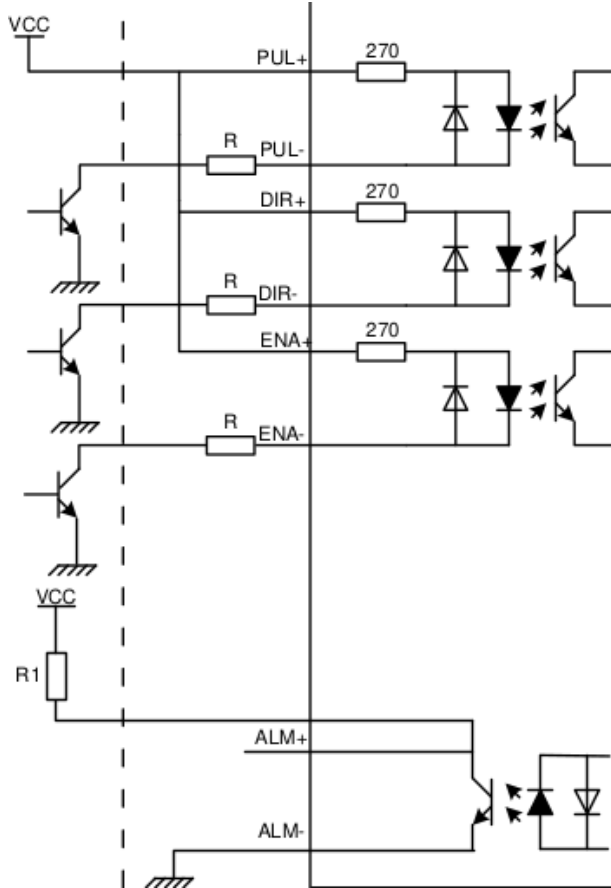
Communication rate $57.6Kbps$

Protection:

- Over current peak value $15A \pm 10\%$

- Over voltage value 350V

- The over position error range can be set with the HISU

Overall Dimensions (mm) $192 \times 127 \times 85$
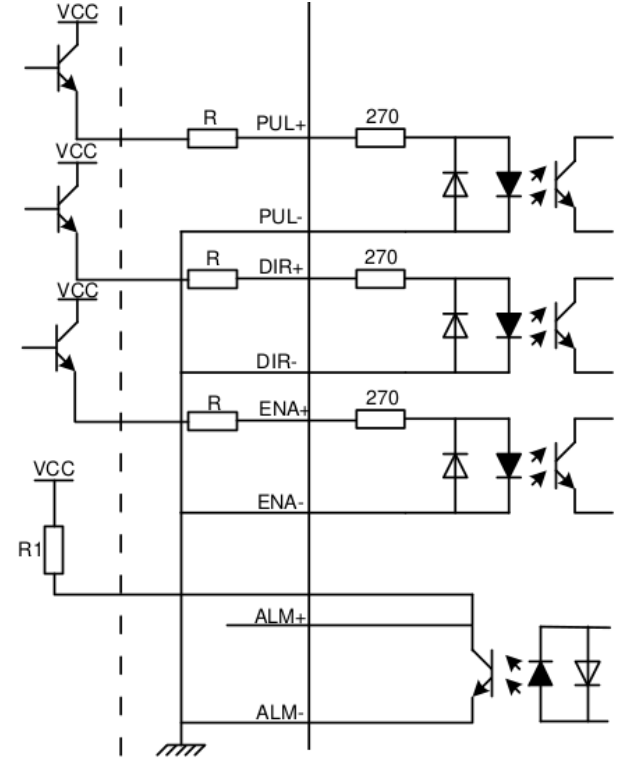
Weight Approximate $1500g$

Connections to Common Anode

Remark:
V_{CC} is compatible with $5V$ or $24V$;
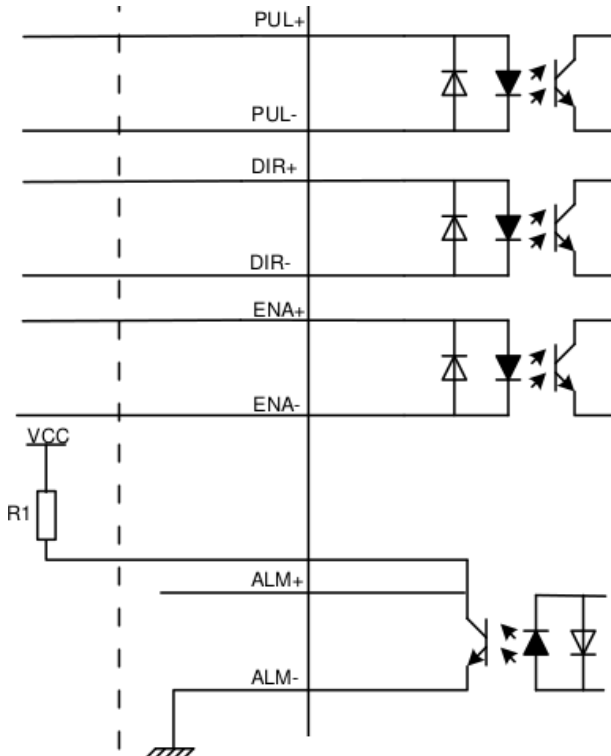$R(3\ldots5K)$ must be connected to control signal terminal.

Connections to Common Cathode

Remark:
V_{CC} is compatible with $5V$ or $24V$;
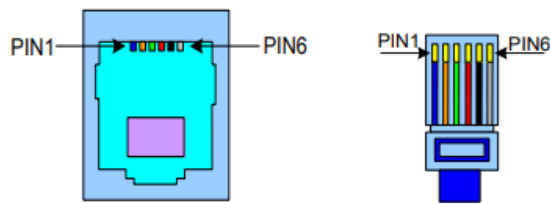$R(3\ldots5K)$ must be connected to control signal terminal.

Connections to Common Anode

Remark:
V_{CC} is compatible with $5V$ or $24V$;
$R(3\ldots5K)$ must be connected to control signal terminal.

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

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:
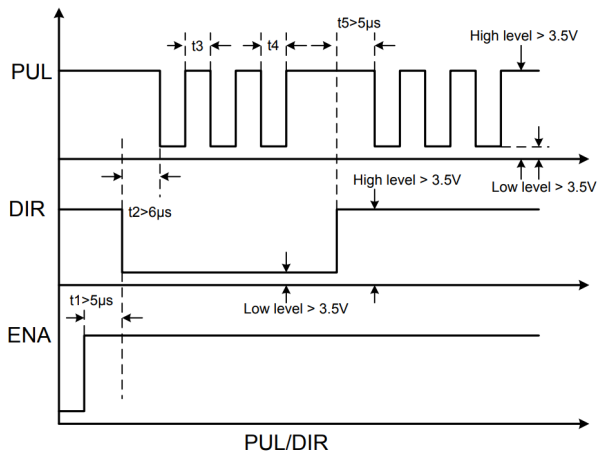

Remark:

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 $2.5\mu s$.

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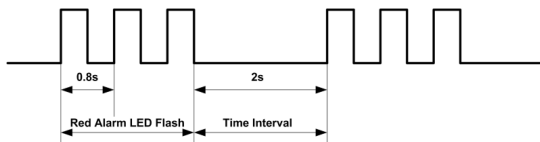
Flicker Frequency	Description to the Faults
1	Error occurs when the motor coil current exceeds the drive's current limit.
2	Voltage reference error in the drive
3	Parameters upload error in the drive
4	Error occurs when the input voltage exceeds the drive's voltage limit.
5	Wrong wiring of motor.

Appearance and Installation Dimensions
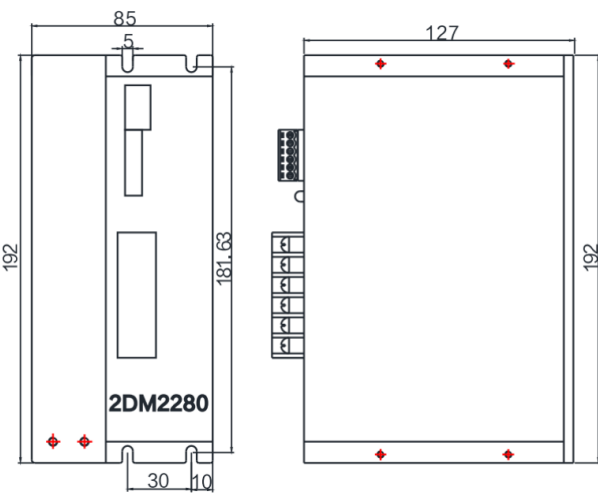
Current Setting

| 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

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

Micro steps Setting

Dial switch / Micro steps	SW5	SW6	SW7	SW8
Default	1	1	1	1
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

Typical Connection

Here is the typical connection of 2DM2280.
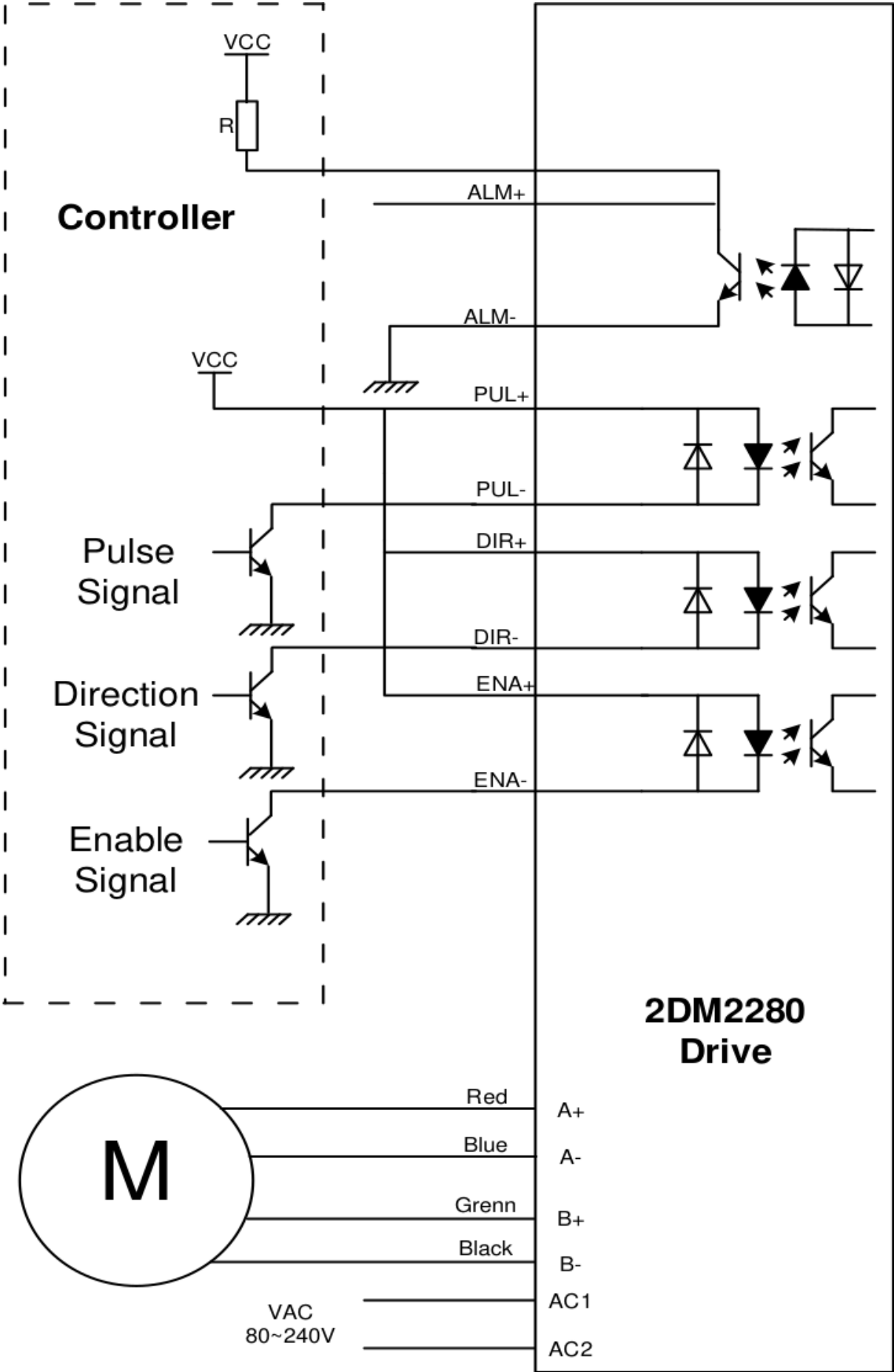
Parameter Setting

The parameter setting method of $2DM2280$ drive is to use a $HISU$ adjuster through the $RS232$ 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.

Mode	Definition	Range	Dime- nsion	Drive Restart	Default Value
P1	Current loop K_p	$0-4000$	1	Y	4000
P2	Current loop K_i	$0-1000$	1	Y	100
P3	Damping coefficient	$0-500$	1	N	100
P4	Amplitude of firs resonance point	$0-100$	1	N	0
P5	Phase of first resonance point	$0-100$	1	N	0
P6	Amplitude of second resonance point	$0-100$	1	N	0
P7	Phase of second resonance point	$0-100$	1	N	0
P8	Amplitude of third resonance point	$0-100$	1	N	0
P9	Phase of third resonance point	$0-100$	1	N	0
P10	Enable signal level	$0-1$	1	N	1
P11	Reserved				
P12	Reserved				
P13	Command Type	$0-1$	1	Y	0
P14	User-defined micro steps	$4-1000$	50	Y	0
P15	Time of standstill current	$0-4000$	$1ms$	Y	1000
P16	Percentage of standstill current	$0-100$	1	Y	50
P17	Speed smoothness	$0-10$	1	Y	0
P18	Enable of position memory	$0-1$	1	Y	0
P19	User-defined resistance of motor	$0-100$	mh	Y	0
P20	User-defined inductance of motor	$0-100$	$0.1Ohm$	Y	0
P21	Result of position memory	$0-128$	1		0
P22	Time of enable position memory	$0-100$	$1s$	Y	5

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

Current loop K_p (P1) & Current loop K_i (P2)

The **P1** and **P2** is used to set K_p and K_i of Current loop at the moment of power-on. When the motor is turning, the K_p and K_i is got by the Self-tuning algorithm.

Current loop K_p

Increase Kp to make current rise fast. Proportional Gain determines the response of the drive to setting command. Low Proportional Gain provides a stable system (doesn't oscillate), has low stiffness, and the current error, causing poor performances in tracking current setting command in each step. Too large proportional gain values will cause oscillations and unstable system.

Current loop K_i

Adjust K_i to reduce the steady error. Integral Gain helps the drive to overcome static current errors. A low or zero value for Integral Gain may have current errors at rest. Increasing the integral gain can reduce the error. If the Integral Gain is too large, the system may "hunt" (oscillate) around the desired position.

Damping coefficient (P3)

This parameter is used to change the damping coefficient in case of the desired operating state is under resonance frequency.This parameter is useful in high speed.

Amp $1-3$ & Phase $1-3$ (P4,P5,P6,P7,P8,P9)

$2DM2280$ Driver provides robust anti-resonance control to stop the vibrations and maintain equilibrium.

Amp1 and **Phase1** is Phase adjustment for $1st$ and Amplitude adjustment for $1st$ resonance area respectively. Usually between $0.6rps$ and $1.2rps$.

Amp2 and **Phase2** is Phase adjustment for $2nd$ and Amplitude adjustment for $2nd$ resonance area respectively. Usually between $1.2rps$ and $2.4rps$.

Amp3 and **Phase3** is Phase adjustment for $3nd$ and Amplitude adjustment for $3nd$ resonance area respectively. Usually between $2.4rps$ and $4.8rps$.

Enable signal level (P10)

This parameter is set to control the Enable Input signal level. 0 means high, while 1 means low.

User-defined micro steps (P14)

This parameter is set of user-defined micro steps. The actual micro steps = the set value $\times 50$. For example, if the parameter is $P14 = 4$, the micro steps is $4 \times 50 = 800$. But $P14 = 0$ means micro steps is set by the outer DIP switches.

Time of standstill current (P15)

This parameter is set the time when the standstill current is set to be half of the selected dynamic current or other current.

Percentage of standstill current (P16)

This parameter is set the percentage of standstill current.

Speed smoothness (P17)

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.
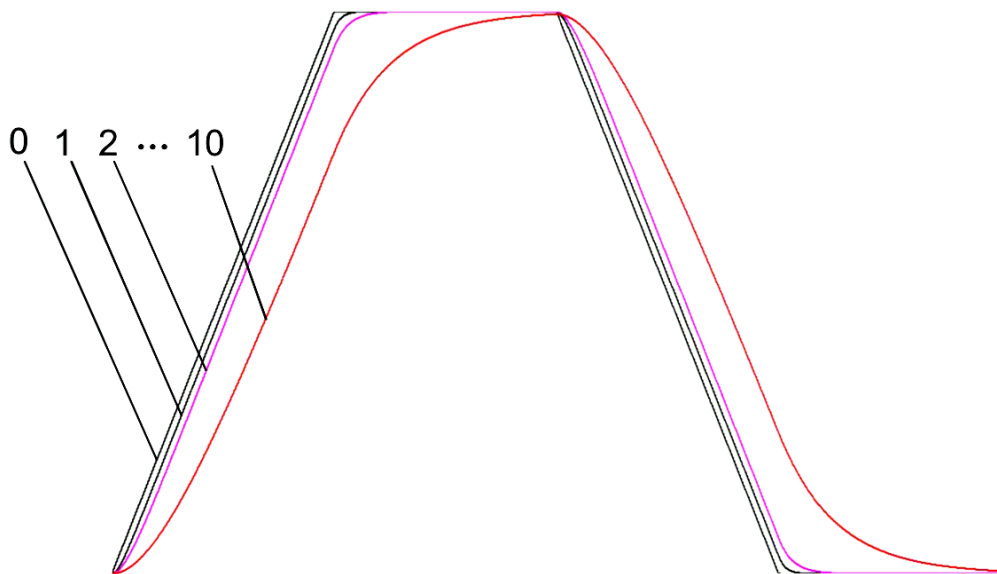
Enable of position memory (P18)

This parameter is set to enable the function of position memory. $P18 = 0$ means disable, while $P18 = 1$ means enable. If set 1, the $2DM2280$ can remember the position of motor in the next time of power on.

User-defined inductance of motor (P19)

This parameter is set the inductance of motor. $P19 = 0$ means $2DM2280$ gets the inductance by control algorithm of Parameter auto-setup, while $P19 > 0$ means $2DM2280$ gets the inductance through user sets.

User-defined resistance of motor (P20)

This parameter is set the resistance of motor. $P20 = 0$ means $2DM2280$ gets the resistance by control algorithm of Parameter auto-setup, while $P20 > 0$ mean $2DM2280$ gets the resistance through user sets.

Result of position memory (P21)

This parameter is set to control the smoothness of Display the result of position memory

Time of enable position memory (P22)

This parameter is set of the time when enable the position memory. The time is mean the space of time to stop plus input.

Processing Methods to Common Problems and Faults

Power on power light off

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

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.

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.