MSD880 Microstepping Drive

Introduction

MSD880 is a high performance microstepping drive based on pure-sinusoidal current control technology. Owing to the above technology and the self-adjustment technology (self-adjust current control parameters) according to different motors, the driven motors can run with reduced noise, lower heating, smoother movement and better performance at higher speed than most of the drives in the market. It is suitable for driving 2-phase and 4-phase hybrid stepper motors.

Features

- Supply voltage up to +80VDC
- Output current up to 7.8A
- Pulse input frequency up to 300 KHz
- TTL compatible and optically isolated input
- Automatic idle-current reduction

- 16 selectable resolutions in decimal and binary, up to 51,200 steps/rev
- Support PUL/DIR and CW/CCW modes
- Suitable for 2-phase and 4-phase motors
- Short-voltage, over-voltage and over-current protection

Applications

It is suitable for a wide range of stepper motors from NEMA 17 to 43 and can be used for various kinds of machinery such as X-Y tables, labelling machines, laser cutters, engraving machines and pick-place devices. It is particularly useful for the applications where low vibration, high speed and high precision are required.

Electronical Specification (Tj = 25ºC/77ºF)

Parameters	MSD880			
	Unit	Min	Typical	Max
Output Current	Amps	1.8	-	7.8
Supply voltage (DC)	VDC	+24	+68	+80
Logic signal current	mA	7	10	16
Pulse input frequency	KHz	0	-	300
Isolation resistance	MΩ	500	-	-

Operating Environment and Other Specifications

Cooling	Natural Cooling or Forced cooling	
Operating Environment	Environment	Avoid dust, oil fog and corrosive gases
	Ambient Temperature	0ºC ~ 50ºC
	Humidity	40%RH－90%RH
	Operational Temperature	70 ºC Max.
	Vibration	5.9m/s^2 Max
Storage Temperature	-20ºC ~ 65ºC	
Weight	Approx. 570g (20.10 oz)	

Mechanical Specifications (in mm [inch], 1 inch = 25.4 mm)
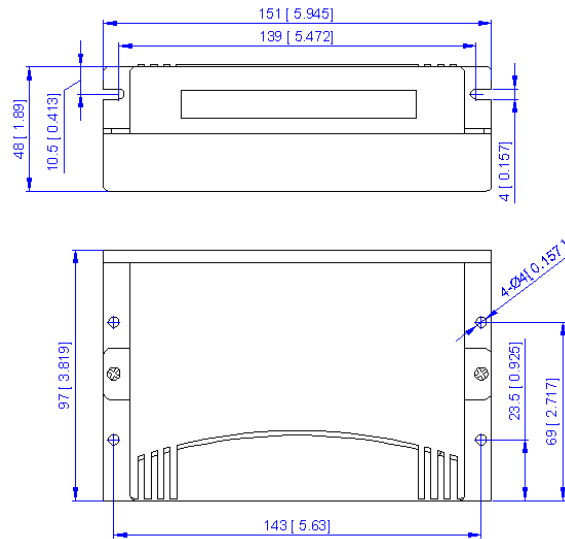
**** Recommend to use side mounting for better heat dissipation

Pin Assignment and Description

The MSD880 stepper drive has two connectors, connector P1 for control signals connections, and connector P2 for power and motor connections. The following tables are brief descriptions of the two connectors on MSD880 stepper drive. For more details, please refer to our **MSD880 Stepper Drive Manual Version 1.0**

Connector P1 configurations

| Pin Function	Details
PUL+	**Pulse signal**: In single pulse (pulse/direction) mode, this input represents pulse signal, active at each rising or falling edge (set by inside jumper J3); 4-5V when PUL-HIGH, 0-0.5V when PUL-LOW. In double pulse mode (pulse/pulse), this input represents clockwise (CW) pulse, active at high level or low level (set by inside jumper J3). For reliable response, pulse width should be longer than 1.5µs. Series connect resistors for current-limiting when +12V or +24V used.
PUL-	
DIR+	**Direction signal:** In single-pulse mode, this signal has low/high voltage levels, representing two directions of motor rotation; in double-pulse mode (set by inside jumper J1), this signal is counter-clock (CCW) pulse, active at high level or low level (set by inside jumper J3). For reliable motion response, DIR signal should be ahead of PUL signal by 5µs at least. 4-5V when DIR-HIGH, 0-0.5V when DIR-LOW. Please note that motion direction is also related to motor-drive wiring match. Exchanging the connection of two wires for a coil to the drive will reverse motion direction.
DIR-	
ENA+	**Enable signal**: This signal is used for enabling/disabling the drive. High level (NPN control signal, PNP and Differential control signals are on the contrary, namely Low level for enabling.) for enabling the drive and low level for disabling the drive. Usually left **UNCONNECTED (ENABLED)**.
ENA-	

Selecting Effective Pulse Edge or Effective Level and Control Signal Mode

There are two jumpers J1 and J3 inside the MSD880 specifically for selecting effective pulse edge or effective level and control signal mode, as shown below. Default setting is PUL/DIR mode and upward-rising edge effective.

(Note: J2 inside the drive is used to reverse the default rotation direction.)
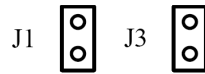
J1   J3

(a) J1, J3 open circuit

PUL/DIR mode and active at rising edge (NPN)
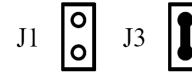
J1   J3

(b) J1 open circuit, J3 short circuit

PUL/DIR mode and active at falling edge (NPN)

J1   J3

(c) J1 short circuit, J3 open circuit

CW/CCW mode and active at low level

(The fixed level)

J1   J3

(d) J1, J3 short circuit

CW/CCW mode and active at high level

(The fixed level)

Connector P2 Configurations

Signal	Functions
GND	DC Power ground
+V	DC power supply +24VDC ~ +80VDC, including voltage fluctuation and EMF voltage.
A+, A-	Motor Phase A
B+, B-	Motor Phase B

Setting Drive Output Current and Microstep Resolution

This drive uses an 8-bit DIP switch to set microstep resolution and motor operating current, as shown below:

Dynamic Current   Microstep resolution

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |

Standstill current (half / full)
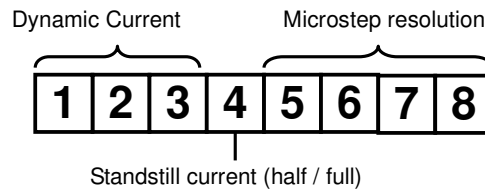
Current Setting

The first three bits (SW1, SW2 and SW3) of the DIP switch are used to set the dynamic current. Select a setting closest to your motor's required current.

Dynamic Current Setting:

Peak current (A)	RMS Current	SW1	SW2	SW3
2.8	2.0 A	ON	ON	ON
3.5	2.5 A	OFF	ON	ON
4.2	3.0 A	ON	OFF	ON
4.9	3.5 A	OFF	OFF	ON
5.7	4.1 A	ON	ON	OFF
6.4	4.6 A	OFF	ON	OFF
7.0	5.0 A	ON	OFF	OFF
7.8	5.6 A	OFF	OFF	OFF

Notes: Due to motor inductance, the actual current in the coil may be smaller than the dynamic current setting, particularly under high speed condition.

Standstill Current

SW4 is used for standstill current setting. **OFF** means the standstill current is set to be half of the selected dynamic current and **ON** means standstill current is set to be the same as the selected dynamic current.

The standstill current of MSD880 will be automatically reduced to 60% of the selected dynamic current setting one second after the last pulse. Theoretically, this will reduce motor heating to 36% (due to $P=I^2 * R$) of the original value. If the application needs a different standstill current, please contact Motion Control Products Ltd for more advice.
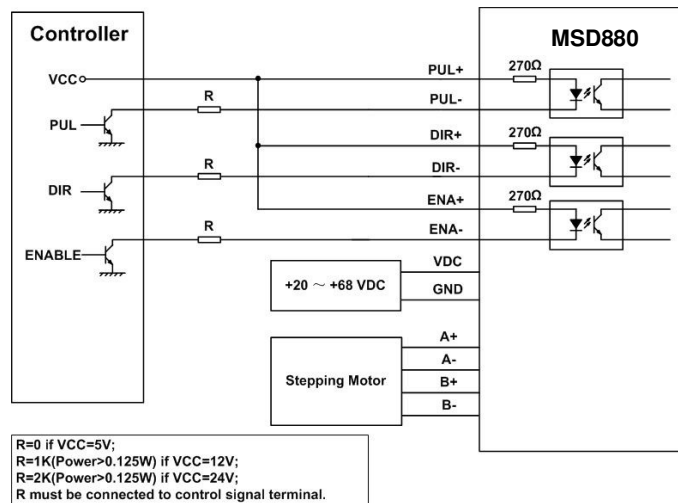
Microstep Resolution Selection

Microstep resolution is set by SW5, SW6, SW7 and SW8 of the DIP switch as shown in the following table:

Microsteps/Full Step	Microsteps/rev. (for 1.8°motor)	SW5	SW6	SW7	SW8
2	400	ON	ON	ON	ON
4	800	OFF	ON	ON	ON
8	1600	ON	OFF	ON	ON
16	3200	OFF	OFF	ON	ON
32	6400	ON	ON	OFF	ON
64	12800	OFF	ON	OFF	ON
128	25600	ON	OFF	OFF	ON
256	51200	OFF	OFF	OFF	ON
5	1000	ON	ON	ON	OFF
10	2000	OFF	ON	ON	OFF
20	4000	ON	OFF	ON	OFF
25	5000	OFF	OFF	ON	OFF
40	8000	ON	ON	OFF	OFF
50	10000	OFF	ON	OFF	OFF
100	20000	ON	OFF	OFF	OFF
200	40000	OFF	OFF	OFF	OFF

Typical Connections

A complete stepper system should include stepper motor, stepper drive, power supply and controller (pulse generator). The following figure is the typical connections of MSD880 stepper drive.