

DM805-AI Digital Stepper Drive

With Analogue 0-5V Input and Built-in Oscillator

Introduction

Motion Control Products Ltd (MCP)'s digital stepper drive DM805-AI is a digital stepper drive with built-in oscillator, featured in supporting 0-5V analogue signal for speed controls. Using the latest digital control algorithm, it brings a unique level of system smoothness, providing optimum torque and nulls mid-range instability. The self-test and auto-configuration technology offers optimum responses with different motors and easy-to-use. The driven motors can run with much smaller noise, lower heating, smoother movement than most of the drivers on the markets.

The three built-in potentiometers are used to pre-set and adjust the velocity, acceleration and deceleration. In 0-5V speed mode, the motor speed is controllable and follows the analogue 0-5V input. In high/low speed mode, the motor speed is selected by digital input and adjusted by the high/low speed potentiometers. The user can run the motor with the least configuration and connection. In position mode, the DM805-AI digital stepper drive can be used as a traditional stepper drive. There is a 5V power supply output for customer's use.

Its unique features make the DM805-AI an ideal solution for applications that require low-speed smoothness. Not only implemented in traditional stepper systems for positioning controls, the DM805-AI stepper drive has also been used widely in OEM applications for speed controls, especially in low-speed applications to replace brushless DC motors plus planetary gearboxes.

Features

- Anti-Resonance, provides optimum torque and nulls mid-range instability
- Motor self-test and parameter auto-setup technology, offers optimum responses with different motors
- Multi-Stepping allows a low resolution step input to produce a higher microstep output for smooth system performance
- Command Source: 0-5V, built-in potentiometer and pulse
- Two preset velocity and adjust by built-in potentiometer
- Preset acceleration/deceleration and adjust by built-in potentiometer
- Velocity control mode via 0-5V and position control mode via pulse Built-in pulse generator nulls external motion controller
- Supply voltage up to +80 VDC
- Output current programmable, from 0.3A -5.0A (RMS)
- TTL compatible and optically isolated digital input
- Automatic current reduction
- Over-voltage, over-current, phase-error protections

Applications

DM805-AI stepper drive is suitable for the application which needs to adjust the velocity via the potentiometer or analogue 0-5V command. It can work with the size NEMA 17/23/34 stepper motors to replace the brushless motor with gearbox, due to the nature of its high torque and less motor noise at low speed. It can be used in various kinds of machines, such as rotary heat exchange, conveyor belts, transport vehicle, laser cutters, laser markers, high precision X-Y tables, labeling machines and so on.



Electronic Specification $T_j = 25^{\circ}\text{C}/77^{\circ}\text{F}$

Parameters	DM805-AI		
	Minimum	Typical	Maximum
Input voltage (VDC)	+ 18	+ 60	+80
Logic signal current (mA)	7	10	16
Pulse input frequency (kHz)	0	-	200
Isolation resistance (M Ω)	500	-	-

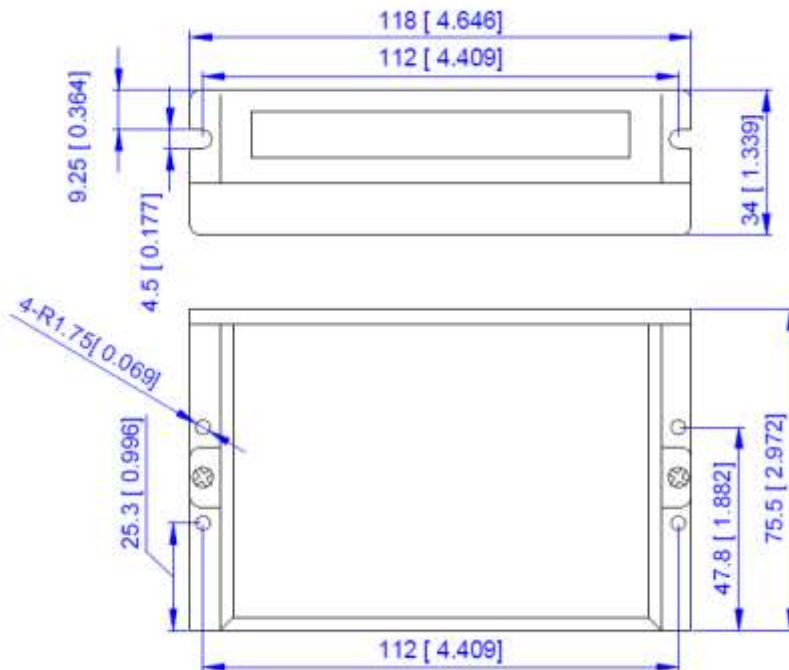
Velocity Control

Item		Specification	Dead Band	Resolution	Min	Max
Analogue input	0-5V Speed Mode	0-5 V	10 mV	10 mV	0 Rev/s	25 \pm 0.5 Rev/s
	External POT Mode		20 mV			
Accel / Decel / Ramp Potentiometer		0-25 turns	10 mV	10 mV	0.5 Rev/s ²	250 \pm 1 Rev/s ²
Low-Speed Potentiometer		0-25 turns	10 mV	10 mV	0 Rev/s	5 \pm 0.01 Rev/s
High-Speed Potentiometer		0-25 turns	10 mV	10 mV	0 Rev/s	25 \pm 0.5 Rev/s

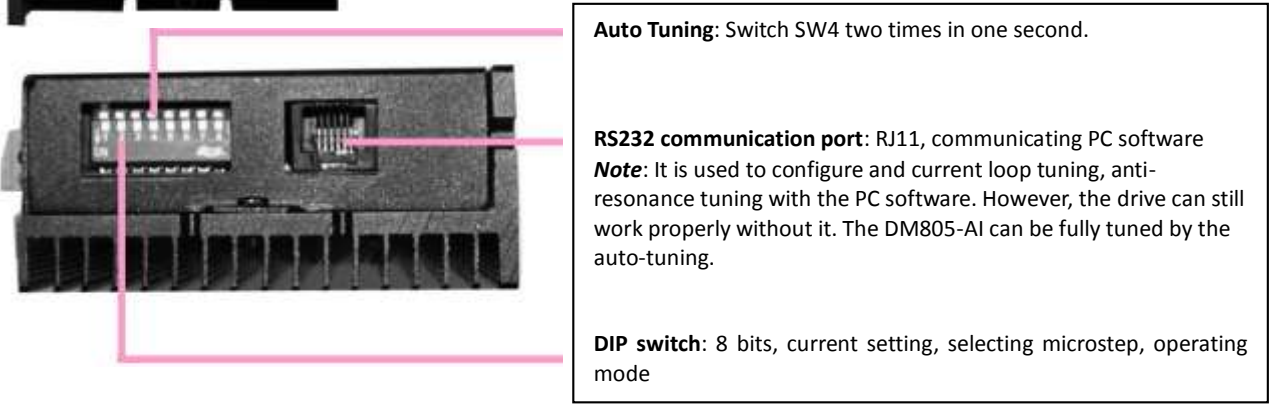
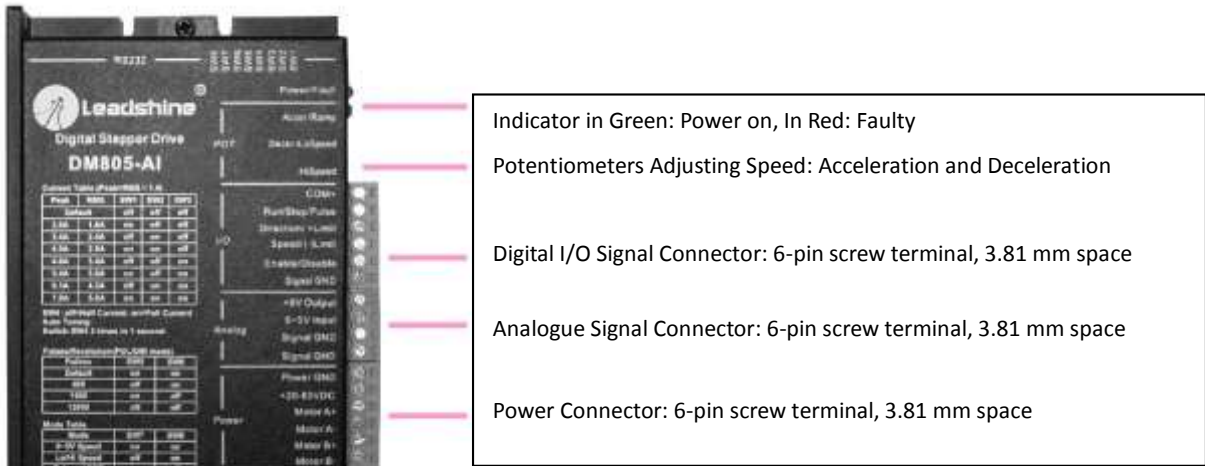
Operating Environment

Cooling	Natural Cooling or Forced cooling	
Operating Environment	Environment	Avoid dust, oil fog and corrosive gases
	Ambient Temperature	0 $^{\circ}$ C — 50 $^{\circ}$ C (32 $^{\circ}$ F — 122 $^{\circ}$ F)
	Humidity	40%RH — 90%RH
	Operating Temperature	70 $^{\circ}$ C (158 $^{\circ}$ F) Max
	Vibration	5.9m/s ² Max
Storage Temperature	-20 $^{\circ}$ C — 65 $^{\circ}$ C (-4 $^{\circ}$ F — 149 $^{\circ}$ F)	
Weight	Approx. 350g (12.34 oz)	

Outline Dimensions



Drive Interface



Protection Indications

Priority	Time(s) of ON	Sequence wave of RED LED	Description
1 st	1		Over-current protection
2 nd	2		Over-voltage protection

Connectors And Pins

The DM805-AI has three connectors, connector for digital I/O signals connections, connector for analog 0-5V signal connections and connector for power and motor connections. The three parameters are used to preset or adjust the speed, acceleration and deceleration ramp. They have different functions in different modes. The green indicator turns on when the drive is powered on. When error happens, the red indicator flashes periodicity to indicate the error type.

I/O Signal	0-5V Speed Mode	Lo/Hi Speed Mode	External POT mode	Pulse/Direction
Run/Stop/Pulse	Run/Stop	Run/Stop	Run/Stop	Pulse
Direction / +Limit	Direction	Direction	+Limit	Direction
Speed / (-)Limit	-Limit	Speed	-Limit	N/A

Digital I/O Signal Connector			
6-pin screw terminal, 3.81 mm space			
Pin	Name	I/O	Description
1	COM+	Power	+5V Power Input, common reference of all inputs
2	Run/Stop/Pulse	I	Run/Stop signal for 0-5V analogue, Lo/Hi Speed and External POT mode. In Pulse/Direction mode, it accepts pulse input.
3	Direction / +Limit	I	Direction input for 0-5V analogue, Lo/Hi Speed and Pulse/Direction mode. It is the +limit switch input in External POT mode. When +Limit is activated, the motor speed decelerates to zero in the acceleration set by Ramp potentiometer. The +Limit is only activated when the voltage applied to 0-5V input is 2.5-5V.
4	Speed / (-)Limit	I	Speed selection input in Lo/Hi speed mode. It is the -limit switch input in External POT and 0-5V Speed mode. When +Limit is activated, the motor speed decelerates to zero in the acceleration set by Ramp potentiometer. In External POT mode, the – Limit is activated only when the voltage applied to 0-5V input is 0-2.5V. In 0-5V speed mode, the –Limit is activated only when Direction input is connected to Signal GND.
5	Enable / Disable	I	This signal is used to enable or disable the power stage. Usually left it unconnected to enable the power stage.
6	Signal GND	GND	Signal ground. It is common with the power ground.

Analogue Signal Connector			
4-pin screw terminal, 3.81 mm space			
Pin	Name	I/O	Description
1	+5V Output	O	+5V Power Output, reference to signal ground
2	0-5V Input	I	Analogue 0-5V reference input
3	Signal GND	GND	Signal ground. It is common with the power ground.
4	Signal GND	GND	Signal ground. It is common with the power ground.

Power Connector			
6-pin screw terminal, 3.81 mm space			
Pin	Name	I/O	Description
1	Power GND	GND	Power ground
2	+20-80VDC	I	Power supply input, 24-72VDC recommended, leaving room for voltage fluctuation and back-EMF.
3	Motor A+	O	Motor Phase A+
4	Motor A-	O	Motor Phase A-
5	Motor B+	O	Motor Phase B+
6	Motor B-	O	Motor Phase B-

DIP Switch Settings

Operating Mode

Mode	SW7	SW8	Description
0~5V Speed	on	on	Analogue 0-5V Speed Mode
Lo/Hi Speed	off	on	Low and High Speed Mode
External POT	on	off	External Potentiometer Speed Mode
Pulse/Direction	off	off	Pulse and Direction Position Mode

Note: Cannot change mode on-the-fly and need to repower the drive.

Dynamic Current

PEAK	RMS	SW1	SW2	SW3
Default	Default	off	off	off
2.6A	1.8A	on	off	off
3.4A	2.8A	off	on	off
4.0A	2.4A	on	on	off
4.8A	3.4A	off	off	on
5.4A	3.8A	on	off	on
6.1A	4.3A	off	on	on
7.0A	5.0A	on	on	on

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

Microstep Resolution

Pulses/Rev.	SW5	SW6
Default	on	on
400	off	on
1600	on	off
12800	off	off

Note: It is only active in Pulse/Direction mode

Idle-Current

SW4 decides the idle current is reduced automatic or remains the same as the dynamic current setting.

	ON	OFF
SW4	The motor idle current reduces automatically when there is no pulse applied to the drive	The motor idle current is the same as the dynamic current when there is no pulse applied to the drive

Auto Configuration by SW4

Switch SW4 two times in one second to auto-configure the drive's current loop parameter

Potentiometers

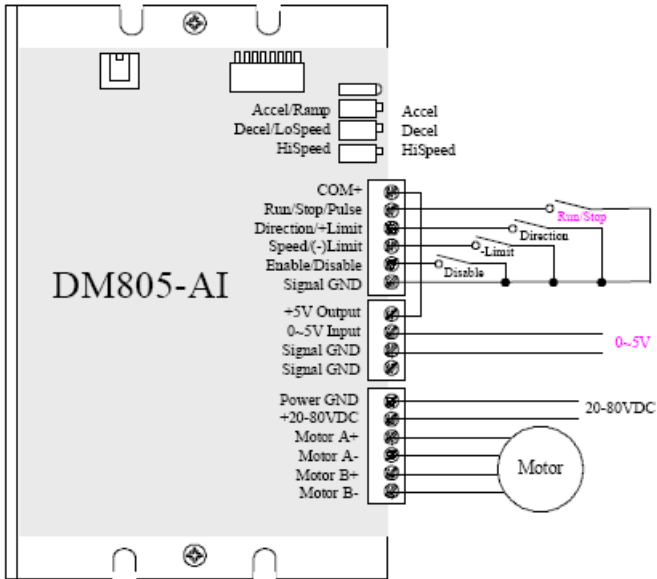
Potentiometer	0-5V Speed Mode	Lo/Hi Speed Mode	External POT mode	Pulse/Direction
Accel / Ramp	Acceleration	Ramp	Acceleration	N/A
Decel / LoSpeed	Deceleration	Low Speed	Deceleration	N/A
HiSpeed	High Speed	High Speed	High Speed	N/A

RS232 Communication Port

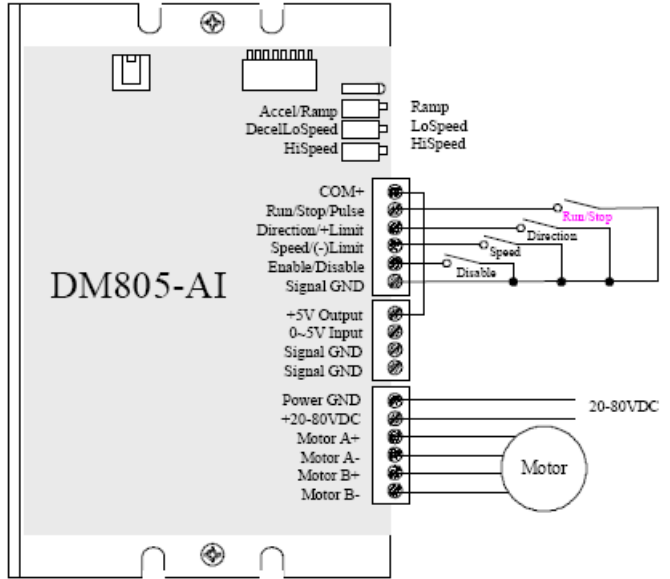
It is used to configure and current loop tuning, anti-resonance tuning with the PC software. However, the drive can still work properly without it. The DM805-AI can be fully configured by the auto-tuning by DIP switch SW4.

Typical Connections

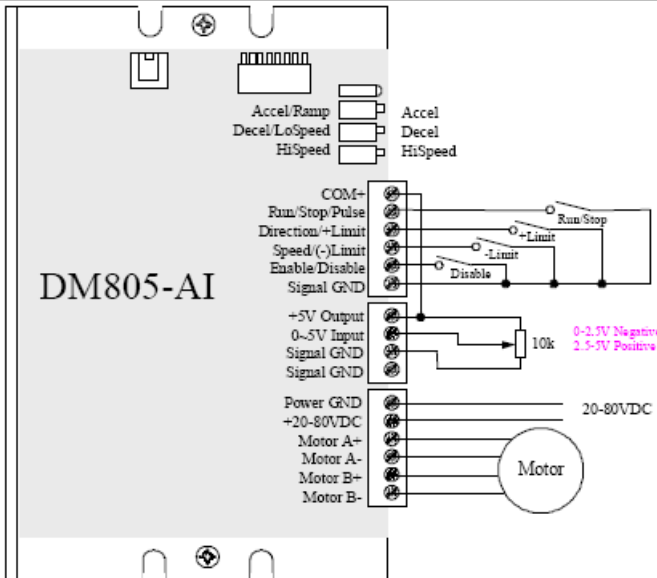
0-5V Speed Mode



Low/High Speed Mode



External POT Mode



Pulse/Direction Mode

