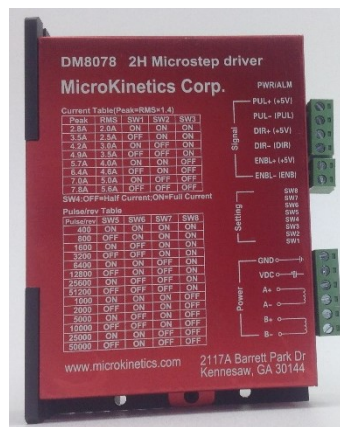


# DM8078<sup>tm</sup>

## Hardware Reference Manual



M036 – Rev A5  
June 8, 2023



3380 Town Point Drive, STE 330  
Kennesaw, GA 30144  
Tel: (770) 422-7845

[www.microkinetics.com](http://www.microkinetics.com)



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# 1 The DM8078 Driver

## 1.1 Features

The DM8078 is a single axis stepper motor driver. It can drive motors with up to 80 volts for excellent high-speed performance. The DM8078 driver can be used conjunction with our MN400™ products or with any controller capable of producing TTL compatible step and direction signals. Phase current is switch selectable from 16 different levels ranging from 1.4 to 7.8 amps.

The features of the DM8078 include:

- 14 user selectable step resolutions
- Anti-resonance circuitry for smooth operation
- Full over-current, overvoltage and over-temperature protection
- Opto-isolation for the input signals keeps high power noise from interfering with motion controller logic
- Bipolar chopper circuit provides the highest efficiency and motor performance
- Compact design for ease of placement

## 1.2 Specifications

Drive circuit .....	Constant current bipolar chopper
Input Frequency .....	0-300 KHz
Operating voltage range .....	24 ~ 80 VDC
Output current .....	1.8 – 7.8 Amps
Stepping modes .....	Microstepping
Current cutback .....	60% of full current when enabled
Step input signal .....	TTL compatible positive edge trigger
Direction input signal .....	TTL compatible
Motor control outputs .....	4 screw terminal motor connections
Current capability .....	7.8 amps per phase continuous
Physical dimensions .....	5.95" x 3.82" x 2.05"
Working temperature range .....	32° F ~ 122° F (0° C ~ 50° C)

## 2 General Information

### 2.1 Installation

The DM8078 driver was manufactured with ease-of-installation in mind.

- 1) Mount the DM8078 driver to any clean metal surface in an area where air is able to circulate. Forced air cooling is recommended if the driver is operating over 5 amps peak.
- 2) Connect the motor to the phase outputs (refer to Section 3.4).
- 3) Connect a PWR7205 or other suitable unregulated dc power supply to the power input ensuring correct polarity.
- 4) Connect a +5 VDC power source, step, and direction signals to the logic inputs.
- 5) Set the phase current (refer to Section 3.1).
- 6) Turn power on.

### 2.2 Safety Features

#### **Over-Current Protection**

If an accidental short occurs between PHASE-to-GROUND, PHASE-to-PHASE, or PHASE to VDC, the driver will shut down immediately. Normal driver operation will automatically resume when the short is removed.

#### **Short Circuit Protection**

Protection will be activated in case of short circuit between motor coils or between motor coil and ground

#### **Low-voltage and Over-voltage protection**

When power supply voltage is lower than 24 VDC, low-voltage protection will be activated and power indicator LED will blink. When power supply voltage exceeds 80 VDC, over-voltage protection will be activated and Alarm indicator LED will turn on.

#### **Normal Operation**

When none of the above conditions are in effect, the driver is functioning normally, the POWER LED will be lit and the programmed current will be delivered to the motor. To measure the current in a phase, put an Amp meter in the path of Phase A or Phase B outputs and pulse the step input once and observe the current value. The "idle" dip switch should be turned off for this measurement.

## 3 Configuration

### 3.1 Dip Switch Settings

The DM8078 dip switch block is used to configure the current and resolution on the board. To activate the function, slide the indicated switch toward the ON nomenclature. Pulse/Rev assumes a standard 200 full steps per revolution (1.8 Degree) motor.

**Switches 1 - 3:** Select the amount of phase current. (See table below.)

**Switch #4:** Idle mode OFF=Half Current after no activity for 1 second; ON=Full Current

**Switches 5 - 8:** Select the pulses/revolution. (see table below)

**Current Table (Peak = RMS x 1.4)**

Peak	RMS	SW1	SW2	SW3
2.8A	2.0A	ON	ON	ON
3.5A	2.5A	OFF	ON	ON
4.2A	3.0A	ON	OFF	ON
4.9A	3.5A	OFF	OFF	ON
5.7A	4.0A	ON	ON	OFF
6.4A	4.6A	OFF	ON	OFF
7.0A	5.0A	ON	OFF	OFF
7.8A	5.6A	OFF	OFF	OFF

**Pulse/Rev Table**

Pulse/Rev	SW5	SW6	SW7	SW8
400	ON	ON	ON	ON
800	OFF	ON	ON	ON
1600	ON	OFF	ON	ON
3200	OFF	OFF	ON	ON
6400	ON	ON	OFF	ON
12800	OFF	ON	OFF	ON
25600	ON	OFF	OFF	ON
51200	OFF	OFF	OFF	ON
1000	ON	ON	ON	OFF
2000	OFF	ON	ON	OFF
5000	ON	OFF	ON	OFF
10000	OFF	OFF	ON	OFF
25000	ON	ON	OFF	OFF
50000	OFF	ON	OFF	OFF

VDC:24~80 VDC

## 3.2 Control Inputs and Outputs

### Logic Inputs

The inputs are TTL and open-collector compatible. By default, the inputs are setup to be driven by an external +5 VDC capable of at least 30 mA. If TTL signals are used, simply connect the outputs of the logic gates to the Pulse+ and Dir+ inputs; the +5 VDC source should be the same one used to power the control logic; the negative inputs should be connected to GND. If open-collector outputs are used to drive the inputs, connect the collectors to the negative inputs and a +5 VDC source to the +5 V inputs. The emitters of the outputs should be connected to +5 VDC source reference.

- Step**            Used to step the motor. The stepping frequency range is from 0 to 16 KHz. The driver updates the motor position after a LO-to-HI transition occurs. The minimum pulse width (LO level) should be 50uS.
- Direction**      Used to indicate direction of rotation. When HI, counterclockwise rotation (as viewed from the rear of the motor) will occur and when LO, a clockwise rotation. Since phase labels (ie: A+, B-, ...) vary between motor manufacturers, your motor direction could be different. Simply swap Phase A wires to change the direction of your motors (ie: if your motor rotates CCW when DIR is HI, it will rotate CW if you swap the phase A wire with the A+ wire).

## 3.3 Power Input and Outputs

### Power Supply Input

A 24 ~ 80 VDC linear power supply should be connected to the +VDC and GND screw terminals. The supply should be a dc linear type (basically a transformer, bridge, and a large filter cap). Regulated and switching types should be avoided.

**Warning:**      Care should be taken when connecting the power supply. Reversing the polarity of the power supply connections WILL destroy the drive and is not covered under the warranty.

### Motor Driver Outputs

The motor driver outputs (A+, A-, B+, and B-) are used to connect the motors to the drive. The DM8078 is a bipolar current chopper type drive so 4, 6, and 8 lead stepper motors can be used: **5 lead motors cannot be used.** Refer to Section 3.4 for all the possible wiring combinations and choose the one that best suits your needs.

**Special Note:**    You can easily change the direction of rotation of any wiring scheme by swapping Phase A or Phase B connections, BUT NOT BOTH.



### 3.4 Stepper Motor Wiring Diagrams

#### 3.4.1 4 Lead motor connection

Four lead motors must be connected as shown.

#### 4 LEAD STEPPER MOTOR

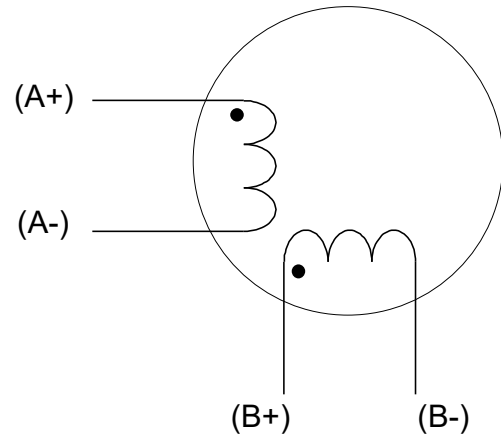


Figure 3.1 - 4 Lead Motor Connection

#### 3.4.2 6 Lead motor connection

Six lead motors can be connected in two configurations, center tap and series. In center tap mode (Figure 3.2), the motors will run at their normal current and torque ratings. In series mode (Figure 3.3), the motors will have greater low end torque ratings but will not run as fast as center tapped motors. In series mode, the motors should also be run at only 70% of their rated current to prevent overheating.

#### 6 LEAD STEPPER MOTOR CENTER TAPPED

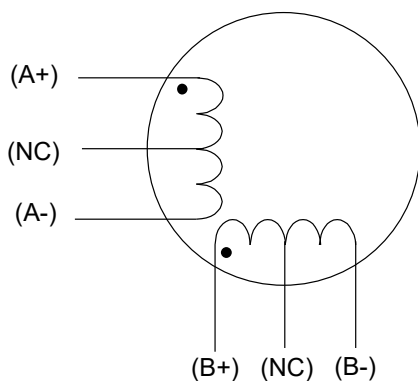


Figure 3.2 - 6 Lead Center Tapped

#### 6 LEAD STEPPER MOTOR SERIES CONNECTED

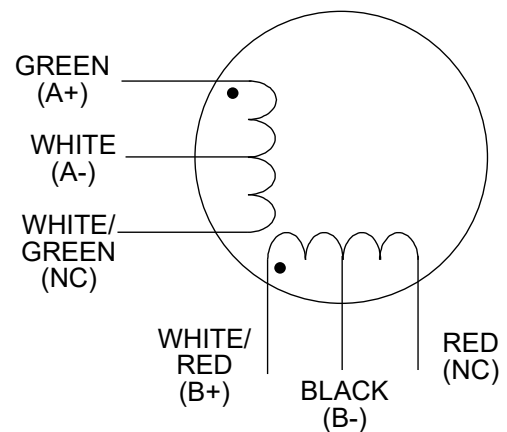
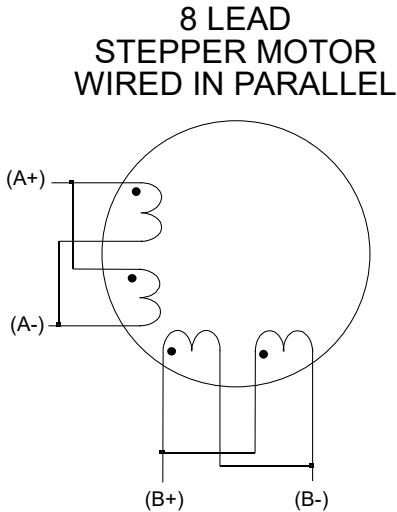


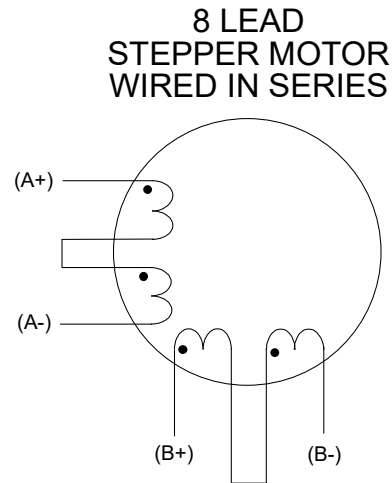
Figure 3.3 - 6 Lead Series

### 3.4.3 8 Lead motor connection

Eight lead motors can be connected in three configurations, parallel, series, and two of four windings. In parallel mode (Figure 3.5), the motor will run at 140% of its normal current rating, and will provide higher torque at higher speeds.

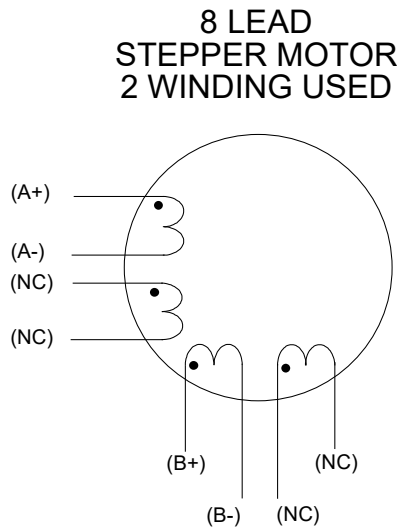


**Figure 3.5 - 8 Lead Parallel**



**Figure 3.6 - 8 Lead Series**

In series mode (Figure 3.6), the motor will have greater torque capability at low speeds but the torque will drop off sharply as speed increases. In series mode, the motors should be run at only 70% of their rated current to prevent overheating. The half coil method (Figure 3.7) uses only half of the windings available on the motor and should be driven at the rated current for the motor.



**Figure 3.7 - 8 Lead Half Coil**

## 4 Technical Support

Should you need help in identifying and correcting a problem, the MicroKinetics engineering staff is ready to assist you during business hours. You should refer to the documentation and verify any described adjustments before calling. Be prepared to supply the model number of all components and any software and/or dip switch or jumper settings.

### 4.1 How to Obtain Technical Support

Technical support is available as follows:

#### Via Email

Email MicroKinetics with a description of problem symptoms to [helpdesk@microkinetics.com](mailto:helpdesk@microkinetics.com). Emails are reviewed and answered daily.

#### Via Telephone

Call our main line directly and request Hardware Tech Support. The phone number is 770-422-7845.

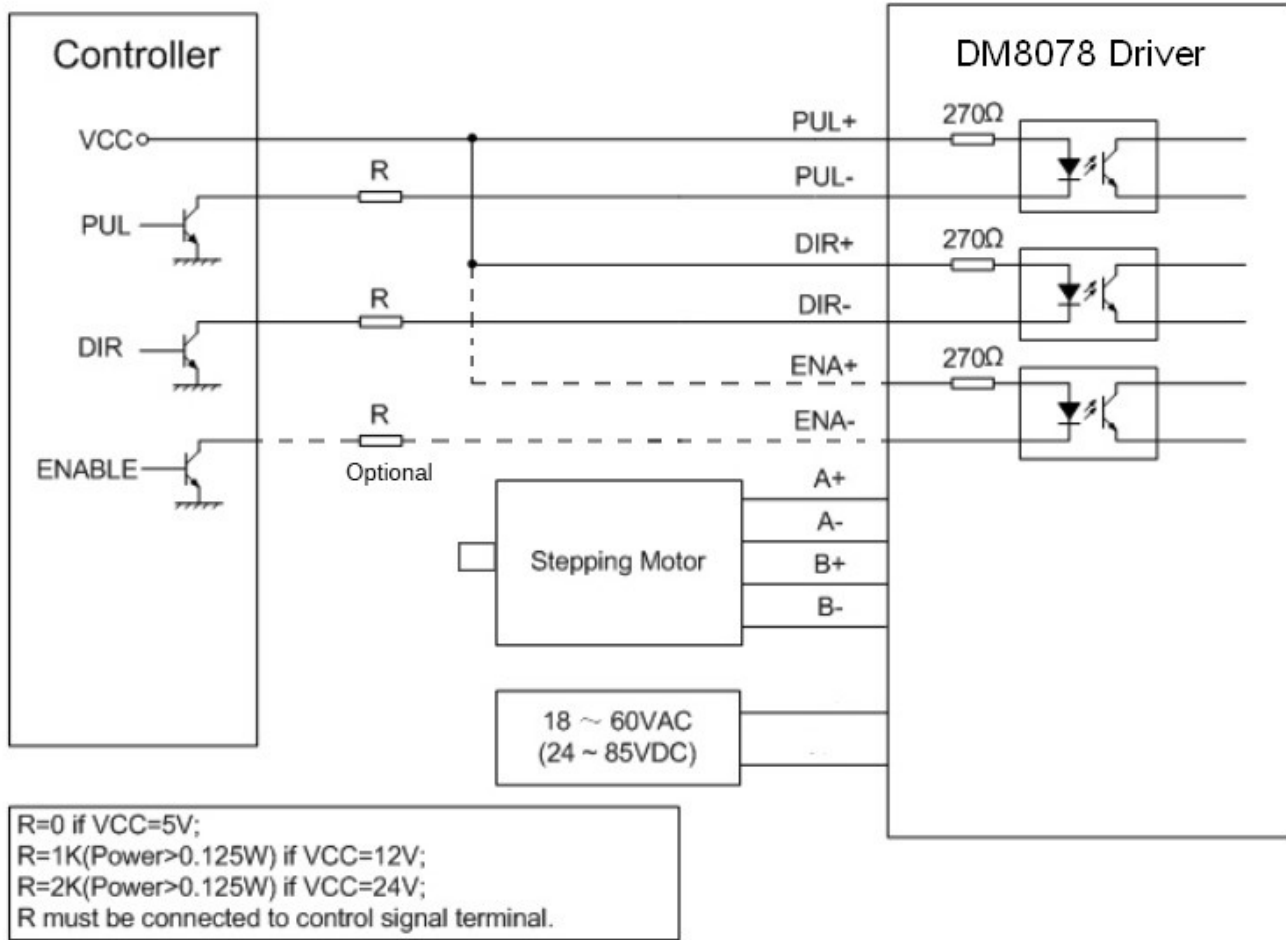
### 4.2 Product Return Procedure

The technical support staff can determine if the problem requires returning the product for testing and can give you an RMA (Return Merchandise Authorization) number to write on the outside of the package for proper routing. This improves repair turnaround time.

When returning an electronic product, always pack in the original antistatic bag. If original packaging is not available, wrap in aluminum foil and place in container with protection to withstand shipping and handling. Always insure product with shipping company for full value.

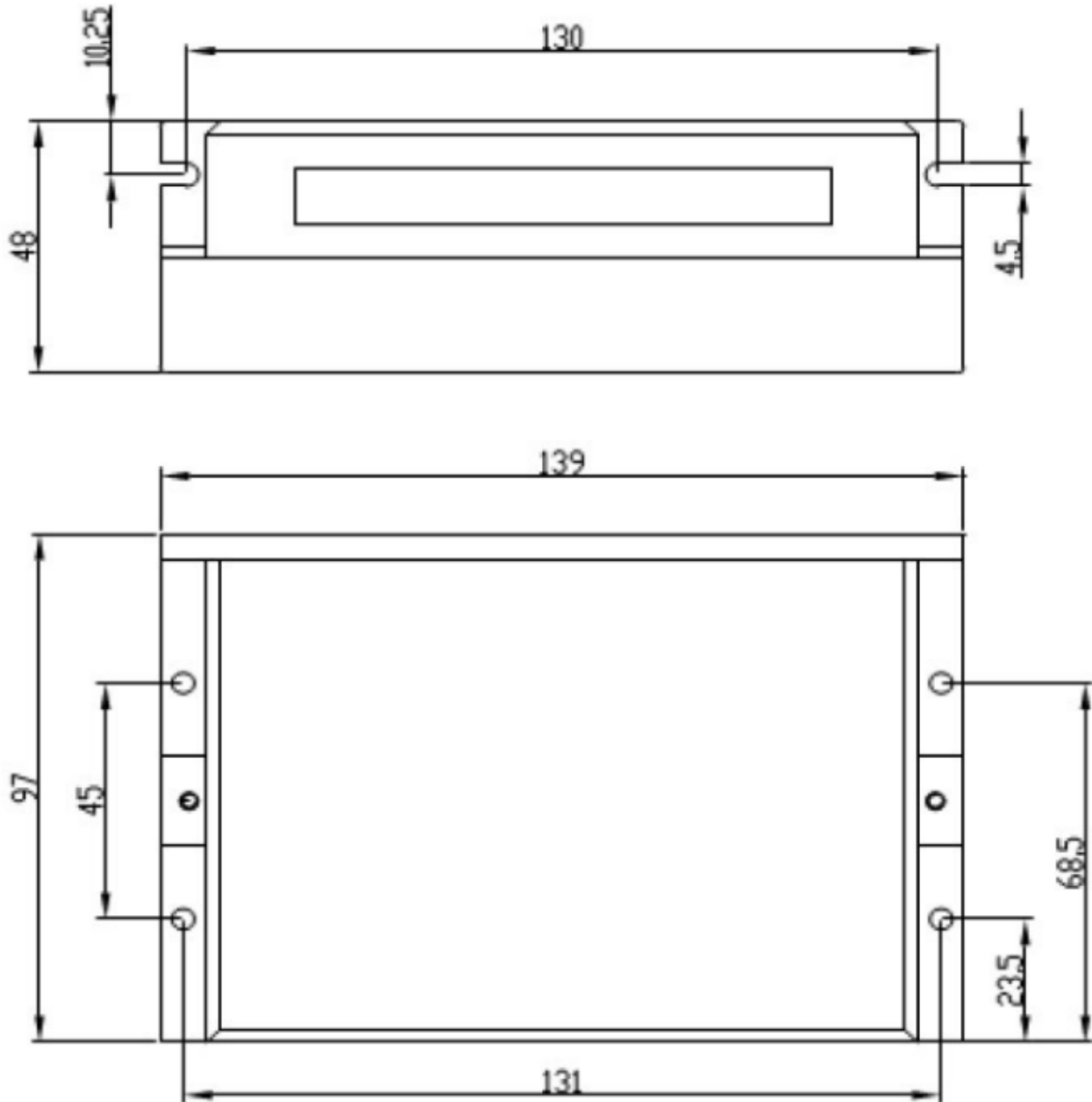
If a product is returned to us for repair, is tested and found to operate within the rated specifications, a nominal testing fee will apply. Please inquire as to the testing charge at the time you obtain the RMA number.

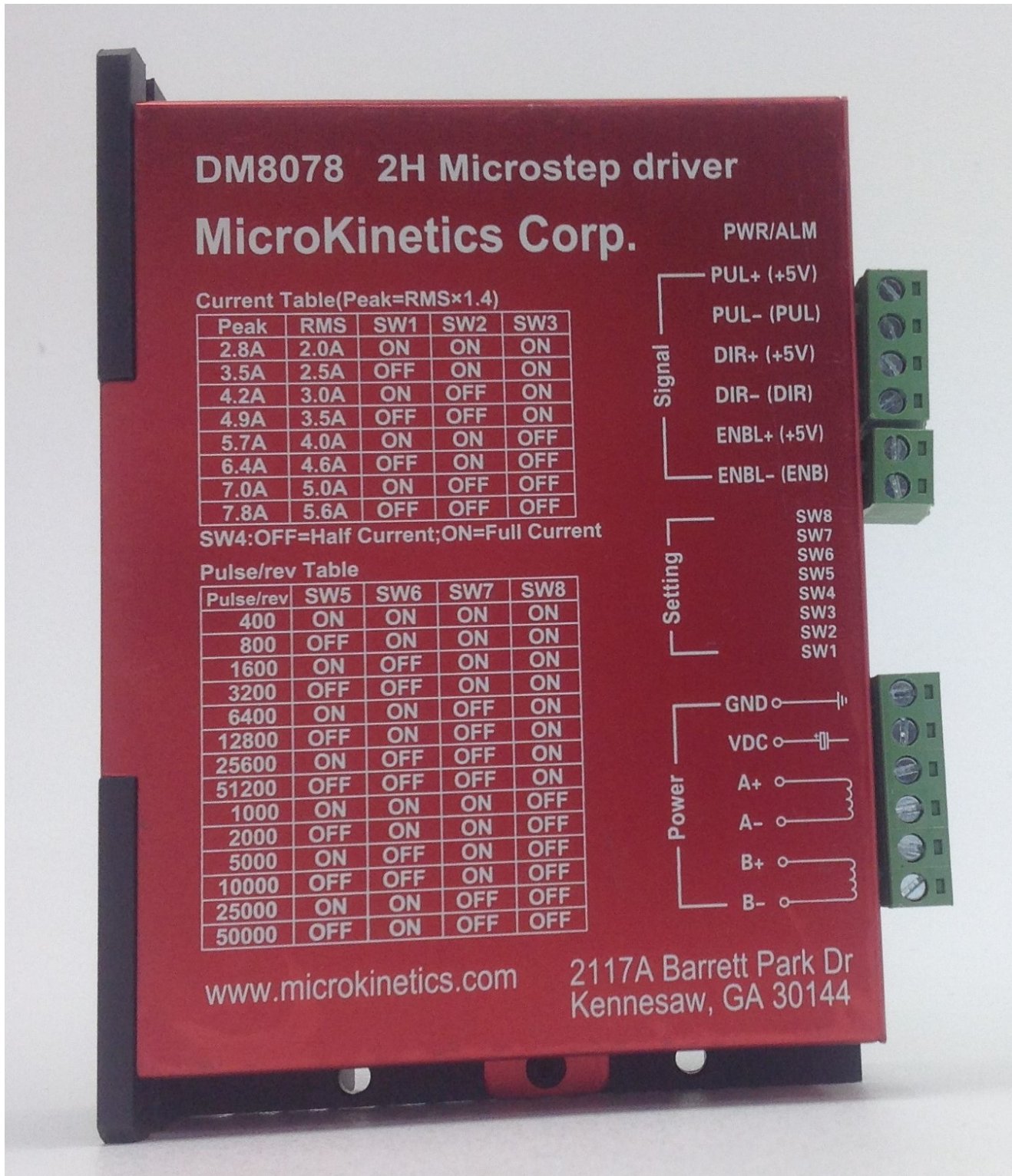
## Appendix A – Typical Wiring Diagram



## Appendix B – Mechanical Outline

All dimensions in millimeters (mm). Mounting hole and slots accept 4mm or 8-32 screws.





# DM8078 2H Microstep driver

## MicroKinetics Corp.

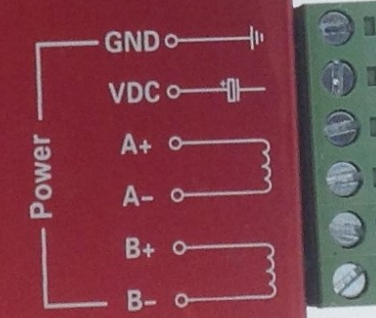
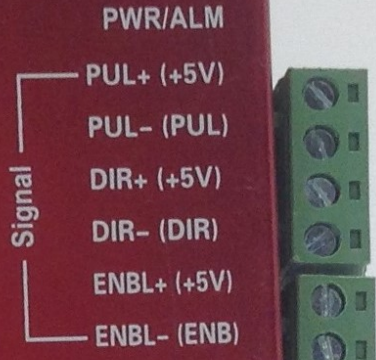
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4.9A	3.5A	OFF	OFF	ON
5.7A	4.0A	ON	ON	OFF
6.4A	4.6A	OFF	ON	OFF
7.0A	5.0A	ON	OFF	OFF
7.8A	5.6A	OFF	OFF	OFF

SW4:OFF=Half Current;ON=Full Current

Pulse/rev Table

Pulse/rev	SW5	SW6	SW7	SW8
400	ON	ON	ON	ON
800	OFF	ON	ON	ON
1600	ON	OFF	ON	ON
3200	OFF	OFF	ON	ON
6400	ON	ON	OFF	ON
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25600	ON	OFF	OFF	ON
51200	OFF	OFF	OFF	ON
1000	ON	ON	ON	OFF
2000	OFF	ON	ON	OFF
5000	ON	OFF	ON	OFF
10000	OFF	OFF	ON	OFF
25000	ON	ON	OFF	OFF
50000	OFF	ON	OFF	OFF



www.microkinetics.com

2117A Barrett Park Dr  
Kennesaw, GA 30144