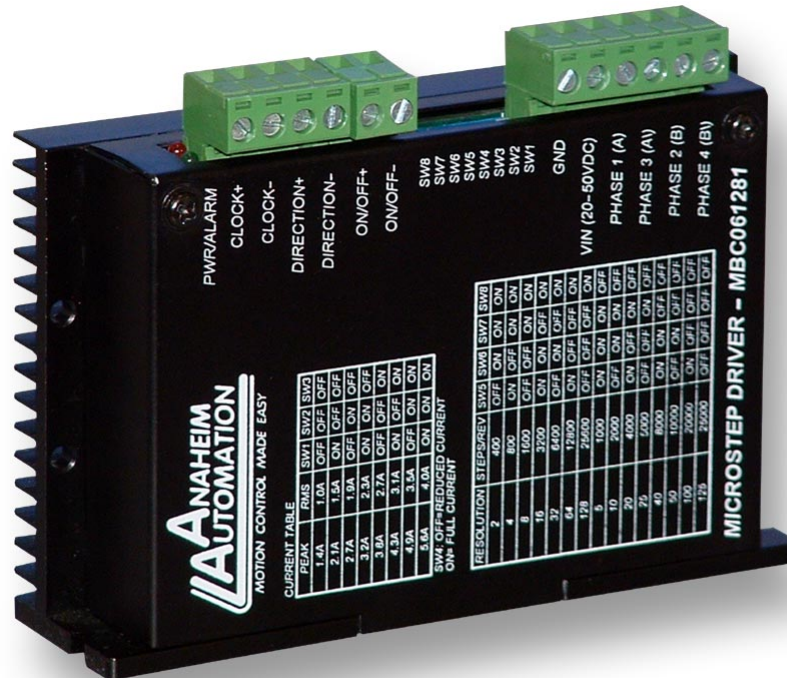


# MBC061281 Bipolar Microstep Driver

## User's Guide



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## MBC061281 Microstep Driver Features

- **Size 4.646"L x1.400"W x 3.400"H**
- **Output Current 5.6 Amps Peak**
- **400 to 25,600 steps/rev**
- **Over-Voltage, Under Voltage and Short Circuit Protection**
- **Selectable Stand Still Current Reduction**
- **No Minimum Inductance**
- **Optical Isolation**
- **Motor ON/OFF input**

### Introduction

The MBC061281 Microstep Driver has an output current capability of 1.4 Amps minimum to 5.6 Amps maximum (Peak Rating). The MBC061281 driver operates on a DC voltage of 20-50 Volts. The inputs are optically isolated with a minimum sourcing of 15.0 mA per input @+5VDC. The clock input is set to receive either positive or negative edge clocks with a maximum frequency of 400KHz. The MBC061281 driver offers direction control and motor current ON/OFF capabilities. The Reduce Current Enabled automatically reduces motor current to 60% of set value after the last step is made (1sec delay). The driver has built-in features to indicate power on (Green LED) and fault conditions (Red LED).

With the MBC061281, various step resolutions can be implemented by the onboard dip switch. These divisions range from 400 steps per revolution to 25,600 steps per revolution. The bipolar drive configuration handles 4, 6 and 8 lead motors. Protection devices have been added to this driver for *Short-Circuit*, *Motor Mis-Wire*, *Over-Voltage* and *Under Voltage* conditions.

### Pin Descriptions

The inputs on the MBC061281 are optically isolated with the anode (+) and cathode (-) both brought out to the user. With no current going through the opto-diode, the input is considered high. To enable the input a minimum of 7.0 mA needs to be sourced or sunked through the opto-diode. This is done simply by placing a voltage of +5VDC across the two inputs of the opto-diode. If sourcing current into the inputs, then all three cathodes (-) should be tied together and grounded as shown in Figure 2. If sinking current, then all three anodes (+) should be tied together to the +voltage as shown in Figure 1.

## Electrical Specifications

### Absolute Maximum Ratings

Power Input Voltage: 50 VDC  
Output Current: 5.6 AMPS PEAK  
Max Plate Temperature: 65° C  
Storage Temperature: -20° to +65° C  
Humidity: 90% RH  
Signal Input Voltage: +5.5V at 16mA

Item	Min	Typ	Max	Units
Input Voltage (Power)	20	48	50	VDC
Phase Output Current	1.0		4.0	A (RMS)
Phase Output Current	1.4		5.6	A (PEAK)
Logic Signal Voltage	3.5	5	5.5	VDC
Logic Signal Current	7	13	16	mA
Clock Frequency	0		400	kHz
Low Pulse Width	1.2			uSec
Operation Temperature	0		65	C

## TB1 and TB2: 4 and 2 Pin Terminal Description

Pin #	Description
1	<b>Step Clock Input Anode (+):</b> A positive going edge on this isolated input advances the motor one increment. The size of the increment is dependent on the Microstep Select Inputs of Switch 1.
2	<b>Step Clock Input Cathode (-)</b>
3	<b>Direction Anode (+):</b> This isolated input is used to change the direction of the motor. Physical direction also depends on the connection of the motor windings.
4	<b>Direction Cathode (-)</b>
1	<b>ON/OFF Anode (+):</b> This isolated input is used to enable and disable the output section of the driver. When HIGH (open) the outputs are enabled.
2	<b>ON/OFF Cathode (-)</b>

## TB3: 6 Pin Terminal Description

Pin #	Description
1	<b>GND:</b> Power Return
2	<b>VIN:</b> (+20 to +50VDC)
3	<b>Phase <math>\bar{A}</math>:</b> Phase 1 of the Step Motor
4	<b>Phase A:</b> Phase 3 of the Step Motor
5	<b>Phase <math>\bar{B}</math>:</b> Phase 2 of the Step Motor
6	<b>Phase B:</b> Phase 4 of the Step Motor

## Optically Isolated Inputs

The following inputs to the MBC061281 are Optically Isolated.

Item	Pin #
Clock	1 & 2 (TB1)
Direction	3 & 4 (TB1)
On/Off	1 & 2 (TB2)

To enable an input, apply a DC voltage source of +5VDC. The Anodes (+) are pins 1,3,and 5 and the Cathodes (-) are pins 2, 4, and 6. The change of the enable signal must be ahead of the direction signal by at least 5 uSeconds. The Direction signal must be ahead of the step clock signal by at lease 5 uSeconds.

# Hook Up Drawings

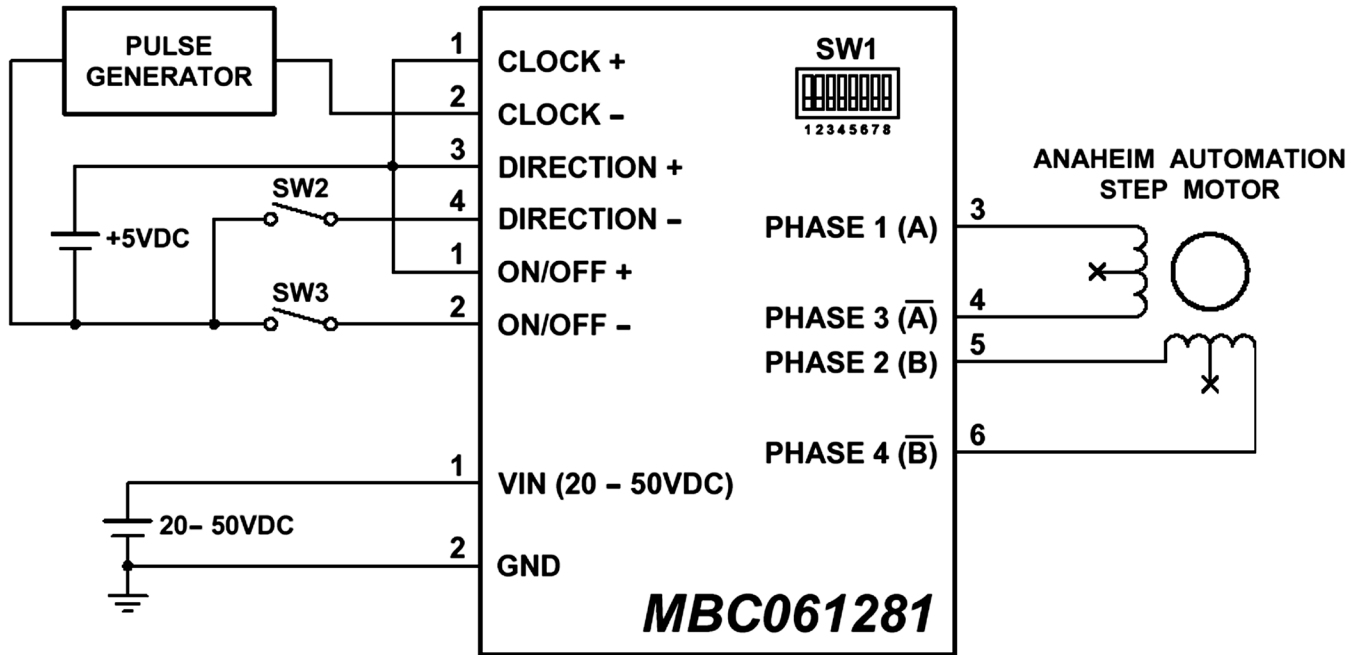


Figure 1: Hook up for current sinking inputs

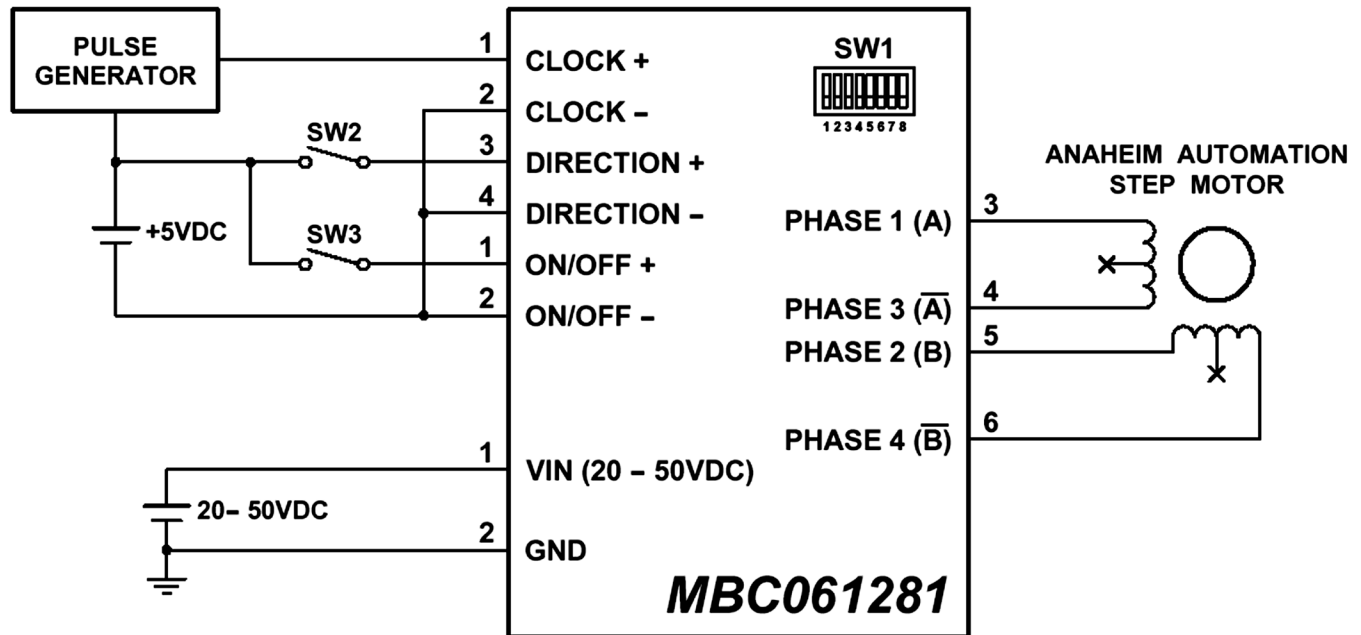


Figure 2: Hook up for current sourcing inputs

## Motor Selection

The MBC061281 is a Bipolar Microstep Driver that is compatible with both Bipolar and Unipolar Motor Configurations, (i.e. 8 and 4 lead motors, and 6 lead center tapped motors).

Step motors with low current ratings and high inductance will perform better at low speeds, providing higher low-end torque. Motors with high current ratings and low inductance will perform better at higher speeds, providing more high-end torque. Higher voltages will cause the current to flow faster through the motor coils. This in turn means higher step rates can be achieved. *Care should be taken not to exceed the maximum voltage of the driver.*

Since the MBC061281 is a constant current source, it is not necessary to use a motor that is rated at the same voltage as the supply voltage. What is important is that the MBC061281 is set to the appropriate current level based on the motor being used. Refer to the following chart for setting the current potentiometer based on the current code in the part number of the motor. Examples of motor part numbers are shown below. Anaheim Automation offers a comprehensive line of step motors in NEMA sizes 08,11,14, 15, 17, 23, 24, 34 and 42 frame sizes. Contact the factory to verify motor compatibility with the MBC061281.

## Step Motor Current Setting Guide

Motor Example	Motor Current Number Code	Unipolar Rating	Series Peak Rating	Parallel Peak Rating	Series Current Setting	Parallel Current Setting
23D102S	02	1.0A	1.0A	2.0A	OFF,OFF,OFF	ON,OFF,OFF
23L303D-LW8	03	1.5A	1.5A	3.0A	OFF,OFF,OFF	OFF,ON,OFF
34N104S-LW8	04	2.0A	2.0A	4.0A	ON,OFF,OFF	OFF,OFF,ON
23L4005D-LW8	05	2.5A	2.5A	5.0A	OFF,ON,OFF	OFF,ON,ON
34A106B	06	3.0A	3.0A	6.0A	OFF,ON,OFF	ON,ON,ON
34N207S-LW8	07	3.5A	3.5A	7.0A	ON,ON,OFF	ON,ON,ON
34K108S-LW8	08	4.0A	4.0A	8.0A	OFF,OFF,ON	---
42N209S-CB	09	4.5A	4.5A	9.0A	ON,OFF,ON	---
23L310S-LW8	10	5.0A	5.0A	10.0A	OFF,ON,ON	---
34D311D	11	5.5A	5.5A	11.0A	ON,ON,ON	---
42K112S-CB	12	6.0A	6.0A	12.0A	ON,ON,ON	---
34D213S	13	6.5A	6.5A	13.0A	---	---
34N314S-LW8	14	7.0A	7.0A	14.0A	---	---
42N115D-CB	15	7.5A	7.5A	15.0A	---	---
34K416S-LW8	16	8.0A	8.0A	16.0A	---	---
42D119D	19	9.5A	9.5A	19.0A	---	---
42N322S-CB	22	11.0A	11.0A	22.0A	---	---
42D225S	25	12.5A	12.5A	25.0A	---	---

**Anaheim Automation offers motor cable, making hook-ups quick and easy!  
Contact the factory or visit our website for more motor and cable offerings.**

## Microstep Selection (SW1 Settings)

Switches 5, 6, 7 and 8, of the DIP switch select the number of microsteps per step. The following table shows the standard resolution values along with the associated positions for the dip switches. The standard waveforms are sinusoidal.

Resolution	Steps/Rev	SW 5	SW 6	SW 7	SW 8
2	400	OFF	ON	ON	ON
4	800	ON	OFF	ON	ON
8	1600	OFF	OFF	ON	ON
16	3200	ON	ON	OFF	ON
32	6400	OFF	ON	OFF	ON
64	12800	ON	OFF	OFF	ON
128	25600	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
125	25000	OFF	OFF	OFF	OFF

## Setting the Output Current

The output current on the MBC061281 is set by Switches 1, 2 and 3. The position determines the per phase peak output current of the driver. The relationship between the output current and the switch settings are as follows.

Peak Current	RMS Current	SW 1	SW 2	SW 3
1.4A	1.0A	OFF	OFF	OFF
2.1A	1.5A	ON	OFF	OFF
2.7A	1.9A	OFF	ON	OFF
3.2A	2.3A	ON	ON	OFF
3.8A	2.7A	OFF	OFF	ON
4.3A	3.1A	ON	OFF	ON
4.9A	3.5A	OFF	ON	ON
5.6A	4.0A	ON	ON	ON

## Reduced Current Setting

Switch 4 is used for enabling or disabling the reduced current ant standstill. When this switch is off, the driver will be in reduced current setting and the standstill current will be 60% of the set motor current. When this switch is on, the driver will not be in reduced mode and the standstill current will be 100% of the set motor current.

## Determining Output Current

The output current for the motor used when microstepping is determined differently from that of a full/half step unipolar driver. In the MBC061281, a sine/cosine output function is used in rotating the motor. The output current for a given motor is determined by the motor's current rating and the wiring configuration of the motor. There is a current adjustment potentiometer used to set the output current of the MBC061281. This sets the peak output current of the sine/cosine waves. The specified motor current (which is the unipolar value) is multiplied by a factor of 1.0, 1.4, or 2.0 depending on the motor configuration (series, half-coil, or parallel).

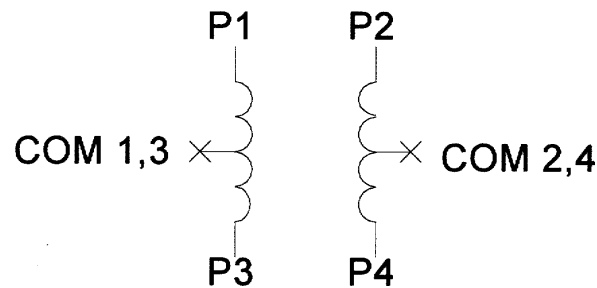
## Step Motor Configurations

Step motors can be configured as 4, 6, or 8 leads. Each configuration requires different currents. Refer to the lead configurations and the procedures to determine their output current.

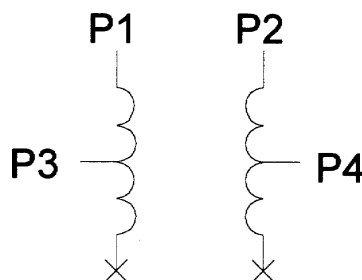
**WARNING!** Step motors will run hot even when configured correctly. Damage may occur to the motor if a higher than specified current is used. Most specified motor currents are maximum values. Care should be taken to not exceed these ratings.

### 6 Lead Motors

When configuring a 6 lead motor in a **series configuration** (connected from end to end with the center tap floating) use the specified per Phase (or unipolar) current rating to determine the current setting potentiometer value.

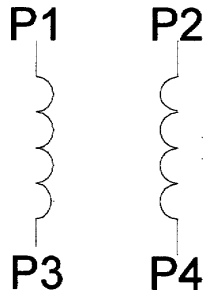


When configuring a 6 lead motor in a **half-coil configuration** (connected from one end of the coil to the center tap), multiply the specified per Phase (or unipolar) current rating by 1.4 to determine the current setting potentiometer value. This configuration will provide more torque at higher speeds when compared to the series configuration.



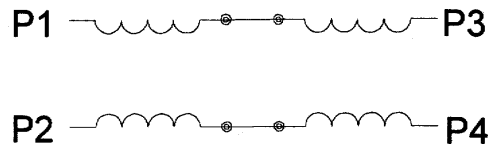
## 4 Lead Motors

Multiply the specified **series** motor current by 1.4 to determine the current adjustment potentiometer value. Four Lead Motors are usually rated with their appropriate series current, as opposed to the *Phase Current*, which is the rating for 6 and 8 lead motors.

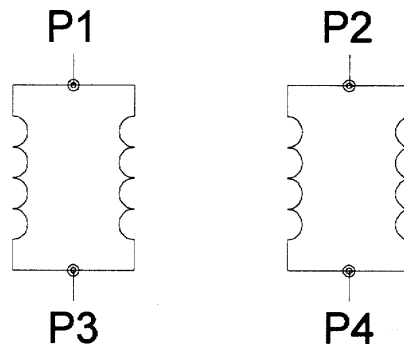


## 8 Lead Motors

**Series Connection:** When configuring the motor windings in series, use the per Phase (or unipolar) current rating to determine the current setting potentiometer value.



**Parallel Connection:** When configuring the motor windings in parallel, multiply the per Phase (or unipolar) current rating by 2.0 to determine the current setting potentiometer value.



**NOTE:** After the current has been determined, according to the motor connections above, use Table 3 to choose the proper setting for the current setting potentiometer.



## Connecting the Step Motor

Phase 1 (A) and 3 (A) of the Step Motor is connected between pins 3 and 4 on the motor connector (TB3). Phase 2 (B) and 4 (B) of the Step Motor is connected between pins 5 and 6 on the motor connector (TB3). Refer to Figures 1 and 2 for TYPICAL APPLICATION HOOK-UP.

**NOTE:** The physical direction of the motor with respect to the direction input will depend on the connection of the motor windings. To reverse the direction of the motor with respect to the direction input, switch the wires on Phase 1 (A) and Phase 3 (A).

**WARNING:** Do not connect or disconnect motor wires while power is applied! Doing so will cause an extremely high back-EMF voltage surge which could possibly destroy the driver.

## Short-Circuit, Mis-Wire, and Over-Current Conditions

If there is a condition that causes an over current in the driver phase transistors, the alarm indicator LED will turn red and power will be shut off to the motor. To reset the drive turn power off, check wiring, and turn power back on.

## Over-Voltage and Under-Voltage Conditions

When the power supply voltage exceeds +52VDC, protection will be activated and the alarm indicator LED will turn red. When the power supply voltage is lower than +20VDC, the driver will not work properly.

## Dimension Drawing

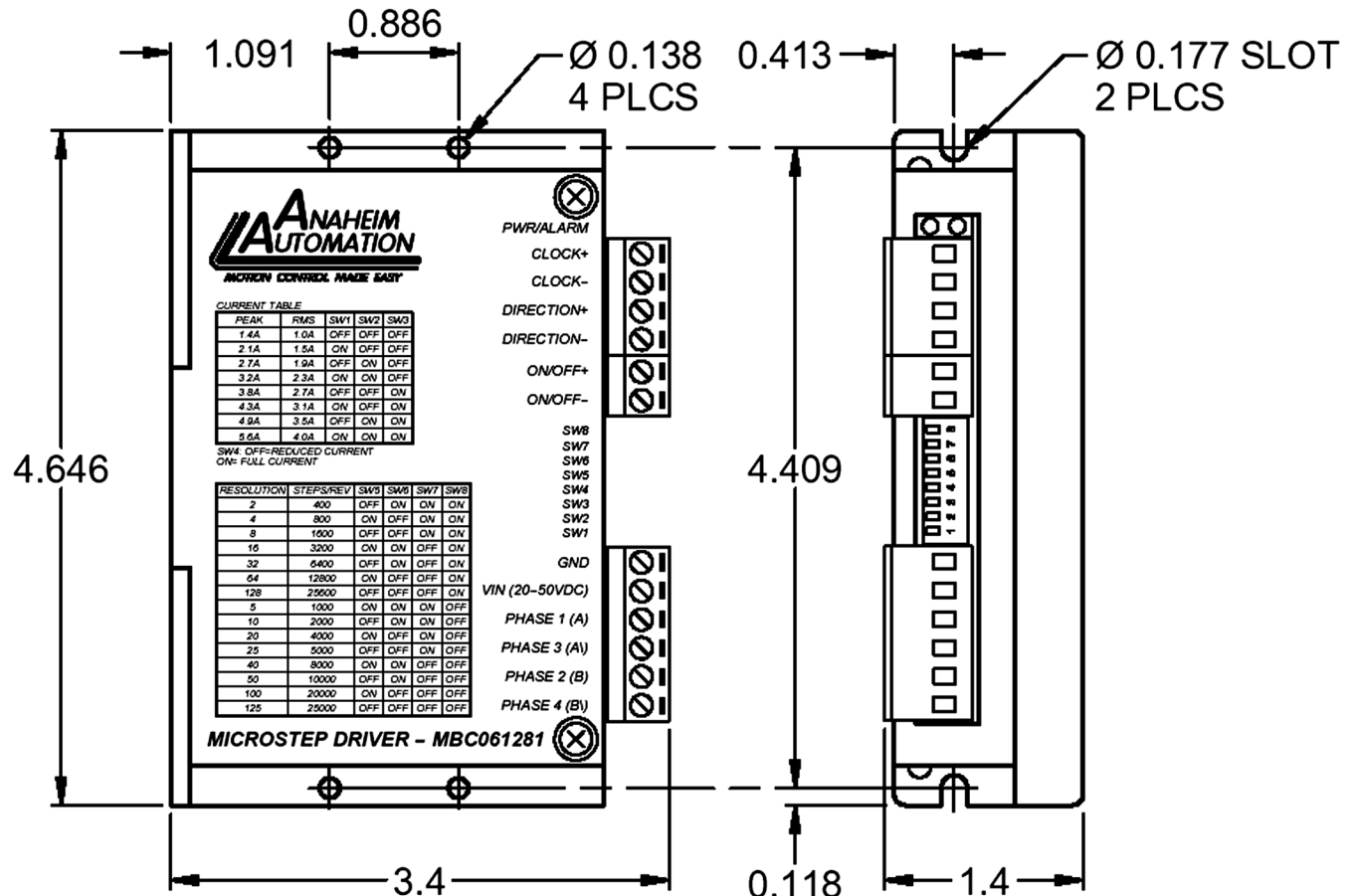


Figure 3: MBC061281 Dimensions

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If you should require technical support or if you have problems using any of the equipment covered by this manual, please read the manual completely to see if it will answer the questions you have. Be sure to refer to the TROUBLESHOOTING section of this manual. If you need assistance beyond what this manual can provide, contact your Local Distributor where you purchased the unit, or contact the factory direct.

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