

# BSCKB1-120081 120VAC, 8A Speed Controller with Integrated Speed Pot and Function Switches

## User's Guide



**ANAHEIM AUTOMATION**

4985 E Landon Drive, Anaheim, CA 92807  
e-mail: [info@anaheimautomation.com](mailto:info@anaheimautomation.com)

(714) 992-6990 fax: (714) 992-047  
website: [www.anaheimautomation.com](http://www.anaheimautomation.com)

## **BSCKB1-120081 Speed Controller Features**

- Maximum Current Limit from 2.0-8.0 Amps (peak)
- Potentiometer Speed Control
- Internal Max and Base Speed Adjustment
- 2-Quadrant Operation
- Hall Sensor Feedback
- Constant Velocity Mode
- Short Circuit Protection
- Requires 85-135 VAC
- Integrated Power, Brake and Direction Switches

## **General Description**

The BSCKB1-120081 is a speed controller that has the MDCKB1-120081 driver integrated inside and is designed to drive DC Brushless motor at currents of up to 8A (peak) and 160V. The drive is protected against over current (cycle-by-cycle), hall sensor error and under voltage. Included on the driver are internal potentiometers to control the maximum phase current allowed into the motor, the maximum speed of the motor, the base speed of the motor and closed loop compensation. In addition, there are integrated power, brake and directional switches and a speed control potentiometer to adjust the motor speed.

## **Fault Protection**

This driver is equipped with protection.

1. Invalid Hall Sensor Input code
2. Over Current. The driver is equipped with cycle-by-cycle current limiting
3. Undervoltage Lockout activation at 30VAC for the input voltage and 4.5VDC for Hall Sensor power output voltage.

## Specifications

### Output Current Rating:

Adjustable 2.0 - 8.0 amperes per phase maximum operating peak current  
(1.0 - 4.0 amperes per phase maximum operating continuous current)

### Power Requirements:

85VAC (min) - 135VAC (max)

### Operating Temperature:

Driver Heat Sink: 0° - 70°C

### Hall Sensor Power Output:

6.25V @ 30mA maximum. Typical current draw from hall sensors is 20mA.  
All three Hall Sensor inputs are pulled up through 20K ohm resistors.  
Only the Motor Hall Power wire should be tied here.

## Commutation Sequence

	Step					
	1	2	3	4	5	6
Phase A	+	Z	-	-	Z	+
Phase B	Z	+	+	Z	-	-
Phase C	-	-	Z	+	+	Z
Hall A	1	1	0	0	0	1
Hall B	0	1	1	1	0	0
Hall C	0	0	0	1	1	1

120° Hall Spacing Sequence Forward

	Step					
	1	2	3	4	5	6
Phase A	-	Z	+	+	Z	-
Phase B	Z	-	-	Z	+	+
Phase C	+	+	Z	-	-	Z
Hall A	1	1	0	0	0	1
Hall B	0	1	1	1	0	0
Hall C	0	0	0	1	1	1

120° Hall Spacing Sequence Reverse

+ = Top Transistor ON, Bottom Transistor OFF, Current Flows into this wire

- = Top Transistor OFF, Bottom Transistor ON, Current Flows out of this wire

Z = Top Transistor OFF, Bottom Transistor OFF, No current into or out of this wire (High Impedance)

## Motor Connection

Refer to the hookup diagram for typical driver applications. When connecting a motor for the first time, connect the hall sensor wires (5 of them) to the appropriate spot on the terminal block. **DO NOT CONNECT THE PHASES YET.** Turn on power and rotate the motor by hand, check to see if the red fault light comes on (Be sure to do this while the cover is off so that you can see the red fault light). If there is no fault light, power the unit down and proceed to connect the motor phases. If the motor does not run or runs erratically, power down and check the speed potentiometer and make sure the phases are connected correctly. There are only 6 different ways to connect the phase wires, and normally only two will allow the motor to rotate, but only one is correct. If the direction of the motor is changed and the no-load current of the motor is approximately the same and the motor runs smoothly in both directions then the phase wires are correct. If the motor still runs erratically, adjust the close loop compensation potentiometer R11.

The wiring of the motor phases should be separated from the hall and input connections to not allow a possible source of interface.

### Closed Loop Compensation and Rated Motor Speed Range Adjustment:

1. Start with setting the speed potentiometer to 50%, closed loop adjustment potentiometer R11 at 50%, minimum motor speed potentiometer R25 at 50%, maximum motor speed potentiometer R17 at 50%, and current limit potentiometer R23 at 100%. The motor might be cogging at first.

POT #	Description	Setting
R11	CLADJ	50%
R14	RAMP	50%
R17	Max Speed	50%
R25	Min Speed	50%
R23	Current Unit	100%

2. If the motor is cogging, slowly lower closed loop adjustment potentiometer R11 until the motor stops cogging and operates smoothly. The motor should not be stalled, running maximum open loop speed, or cogging. R11 must be set where the motor should be running smoothly. If the motor is not cogging, proceed to step 3.
3. Set the speed potentiometer to 50%. Set the minimum motor speed by adjusting potentiometer R25 according to user application. The minimum running speed should be set to a speed higher than 0RPM. The run/stop switch should be used to brake the motor for 0RPM.
4. Slowly raise the external speed potentiometer to 100%. The motor may be operating at maximum open loop speed.
5. Set the maximum rated motor speed by adjusting potentiometer R17 according to user application. If R17 is set to the maximum setting and a slower speed is required, adjust R11 for slower maximum motor speed.

Note: A different speed range, maximum speed, or minimum speed can be attained by further adjusting R11, R17, and R25.

## Speed Adjust Setting

The maximum speed of the motor is set by adjusting R17. The minimum speed of the motor is set by adjusting R25. The speed potentiometer is used to adjust the motor speed between the set minimum and maximum speed.

## Motor Run/Brake

The motor run/brake switch allows the stopping or braking of a motor by shorting out the bottom drives of the three phases.

## Motor Direction

The motor direction switch allows the changing of the rotation of the motor. This switch should not be changed while motion is in progress.

**Note: Avoid changing the direction of rotation when the motor is already running in any one direction.**

The following instructions must be followed to prevent permanent drive failure due to over-current conditions that exist in dynamic direction reversals of the motor:

1. Stop the motor by releasing the short on the Run/Stop input
2. Wait for at least 500mS
3. Change the direction with the DIRECTION input
4. Run the motor by shorting the Run/Stop input

**Note: Avoid changing the direction of rotation when the motor is already running in any one direction.**

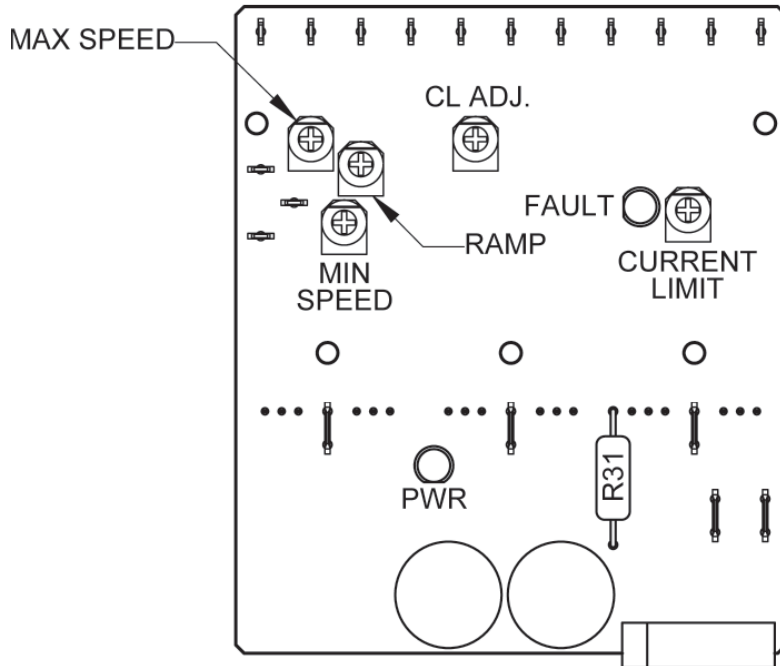
The following instructions must be followed to prevent permanent drive failure due to over-current conditions that exist in dynamic direction reversals of the motor:

1. Stop the motor with the Run/Brake switch
2. Wait for a least 500mS
3. Change the direction with the DIRECTION switch
4. Run the motor with the Run/Brake switch

## Heating Considerations

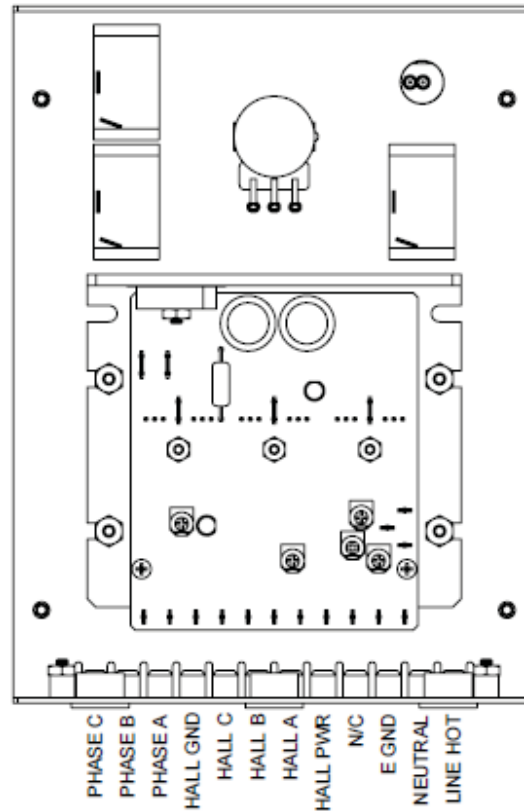
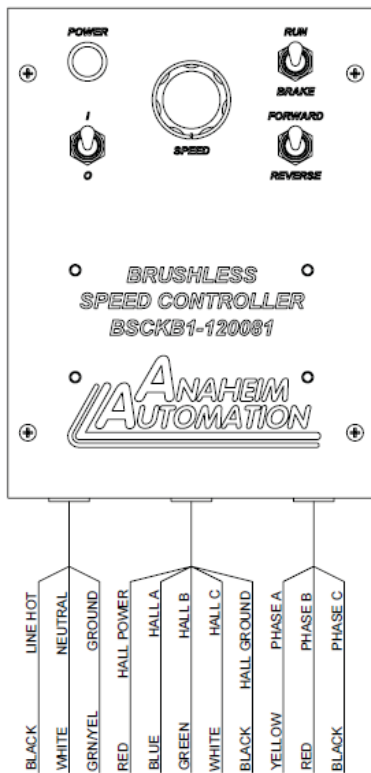
The temperature of the heat sink should never be allowed to rise above 70 degrees Celsius. This may occur with motor currents higher than 6A. If necessary, mount the unit to an additional heat sink or air should be blown across the unit to maintain suitable temperatures.

## Quick Disconnect/Potentiometer Location

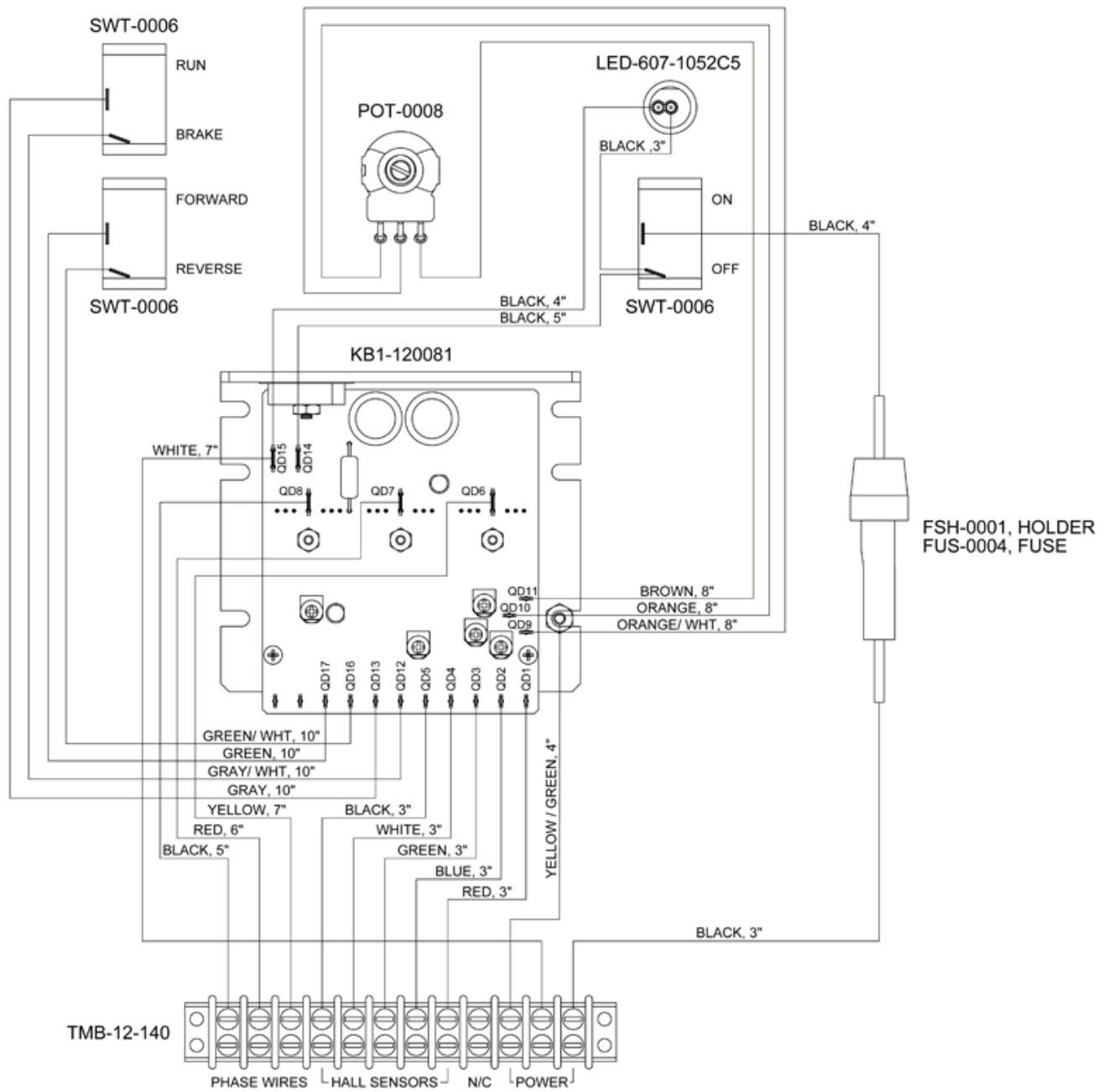


POT#	Description
R11	CLADJ
R14	RAMP
R17	Max Speed
R23	Current Limit
R25	Min Speed

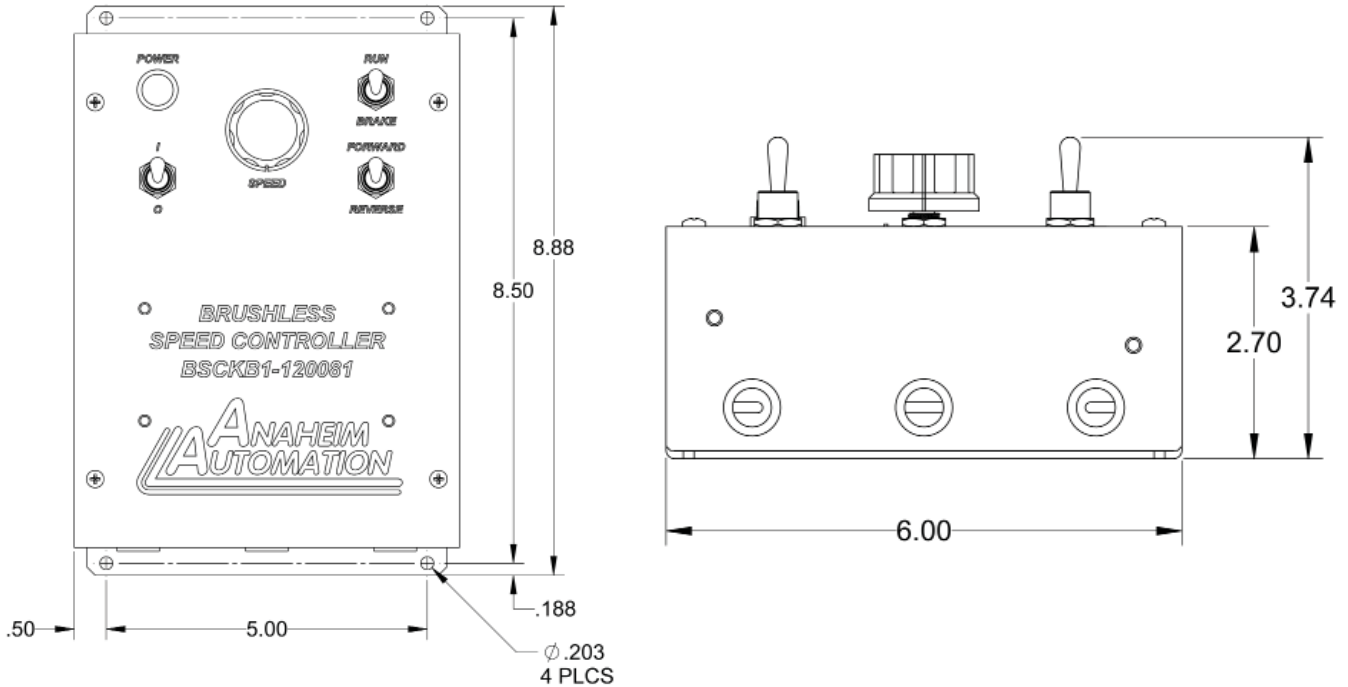
## Hook-Up Diagram



# Internal Wiring Diagram



## Dimensions



### COPYRIGHT

Copyright 2013 by Anaheim Automation. All rights reserved. No part of this publication may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language, in any form or by any means, electronic, mechanical, magnetic, optical, chemical, manual, or otherwise, without the prior written permission of Anaheim Automation, 4985 E Landon Drive, Anaheim, CA 92807.

### DISCLAIMER

Though every effort has been made to supply complete and accurate information in this manual, the contents are subject to change without notice or obligation to inform the buyer. **In no event will Anaheim Automation be liable for direct, indirect, special, incidental, or consequential damages arising out of the use or inability to use the product or documentation.**

Anaheim Automation's general policy does not recommend the use of its' products in life support applications wherein a failure or malfunction of the product may directly threaten life or injury. Per Anaheim Automation's Terms and Conditions, the user of Anaheim Automation products in life support applications assumes all risks of such use and indemnifies Anaheim Automation against all damages.

### LIMITED WARRANTY

All Anaheim Automation products are warranted against defects in workmanship, materials and construction, when used under Normal Operating Conditions and when used in accordance with specifications. This warranty shall be in effect for a period of twelve months from the date of purchase or eighteen months from the date of manufacture, whichever comes first. **Warranty provisions may be voided if products are subjected to physical modifications, damage, abuse, or misuse.**

Anaheim Automation will repair or replace at its' option, any product which has been found to be defective and is within the warranty period, provided that the item is shipped freight prepaid, with previous authorization (RMA#) to Anaheim Automation's plant in Anaheim, California.

### TECHNICAL SUPPORT

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. If you need assistance beyond what this manual can provide, contact your Local Distributor where you purchased the unit, or contact the factory direct.