MDCSL100-050301
50V, 30A Sensorless Controller

User's Guide

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MDCSL100-050301 Driver Features

- Maximum Current Limit Setting from 10.0-30.0 Amps (peak)
- Internal or External Potentiometer Speed Control
- 2-Quadrant Operation
- Sensorless Motor Control
- Short Circuit Protection
- Requires 20-50 VDC
- TTL-CMOS Compatible Inputs
- Fault Out
- Brake, Disable and Direction Inputs
- Selectable Ramp Up/Down
- Detachable, Screw Type Terminal Block
- Compact Size (5.125" x 3.078" x 1.613")
- Dual Mounting Option

General Description

The MDCSL100-050301 driver is designed to drive DC brushless motors without using hall sensors at currents of up to 30A (peak) and 50V. The driver is protected against over current (cycle-by-cycle or latched) and under voltage. When an error occurs, a fault light notifies the user. If an error occurs, the fault output goes low to notify the user. Included on the driver is an internal potentiometer to control the maximum phase current allowed into the motor and an internal potentiometer to control the speed of the motor. An optional external potentiometer (10K) or external voltage (1-5VDC) can be used to control the speed as well. The direction of the motor can be preset by the direction control input. Other inputs to the drive include a run/stop and a motor freewheel input. When using the run/stop input, there are three ramp up profiles from standstill to select from. The run/stop input overrides all other inputs into the driver.

Fault Protection

If a motor current level exceeding the current limit set by the internal or external current limit potentiometer is produced, an over current latch is activated, shutting off the output and turning the fault output low (logic "0"). When a fault is detected, the driver turns off the motor current, the red FAULT LED alerts the user a fault occurred and the Fault Output (TB3 - Pin 5) goes low. The Fault Output is disabled, logic '1' output. This Fault protection alerts the user of the following conditions.

      1. Over Current. The driver is equipped with cycle-by-cycle current limiting or over current latch.

      2. Undervoltage Lockout activation at 9.1 VDC for the input voltage

Ordering Information

Part #	Description
MDCSL100-050301	Featured BLDC driver 30A, 50V
PSA24V2.7A	DC Power Supply 24VDC at 2.7 Amps
PSA40V4A	DC Power Supply 40VDC at 4 Amps
PSA40V8A	DC Power Supply 40VDC at 8 Amps
CBL-AA5420	Cable, 3 Pins 12in. Long, For External Pot

Specifications

Control Inputs: (TB2, Pins 3-5)
TTL-CMOS Compatible
Logic "0" = 0-0.8VDC
Logic "1" = OPEN
All three inputs (run/stop, freewheel and direction) are pulled up to through 10k ohm resistors.

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Specifications (cont.)

Freewheel: (TB2, Pin 5)
Logic "1" (open) - Motor is Enabled
Logic "0" - Motor is de-energized and will coast

Direction Control: (TB2, Pin 4)
Logic "1" (open) - Clockwise
Logic "0" - Counterclockwise

Run/Stop: (TB2, Pin 3)
Logic "1" (open) - Motor will not run and if running will come to a hard stop
Logic "0" - Motor will run and will accelerate according to ramp dip switch setting

Fault Output: (TB2, Pin 1)
5V Pull-up required.
Logic "1" (5V out) - Status good, normal operation.
Logic "0" - One of the three fault conditions listed in the 'Fault Protection' section has occurred.

Vcontrol: (TB2, Pin 2)
To control the speed of the motor with an external DC voltage, INT/EXT SPD switch (SW1-POS1) must be switched to the ON position. 0VDC (min) - 5VDC (max)

Output Current Rating:
Adjustable 10.0 - 30.0 amperes per phase maximum operating peak current
(5.0 - 15.0 amperes per phase maximum operating continuous current)

Power Requirements: (TB2, Pins 1 and 2)
20VDC (min) - 50VDC (max)

Operating Temperature
Heat Sink: 0°-70° C

The external speed control potentiometer must be 10K Ohms.

Heating Considerations
The temperature of the heat sink should never be allowed to rise above 70° C. If necessary, mount the unit to an additional heat sink or air should be blown across the heat sink to maintain suitable temperatures.

Commutation Sequence

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

120° Hall Spacing Sequence Forward

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

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)

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Motor Connection

Refer to the hookup diagram for typical driver applications. 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 six 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.

Terminal and Dip Switch Descriptions

Pin #	Description
1	Phase A
2	Phase B
3	Phase C
4	Vin(20-50VDC)
5	GND

TB1: Power and Motor
Phase Terminals

Pin #	Description
1	PG OUT
2	Direction
3	Freewheel
4	Run/Stop
5	Fault Out
6	GND

TB3: Control Inputs and
Outputs

Jumper Settings

Function	SW1	SW2	SW3
Ramp Profile 1 (4 Sec)	---	Off	Off
Ramp Profile 2 (2 Sec)	---	Off	On
Ramp Profile 3 (1 Sec)	---	On	Off
Ramp Profile 4 (500mSec)	---	On	On
Internal Speed Control (SW1)	Off	---	---
External Speed Control (SW1)	On	---	---
Standard Product (Ready to Ship)	Off	Off	Off

Motor Freewheel
The motor freewheel feature allows the de-energizing of the motor phases. A high (open) input at this input causes the motor to run at the given speed, while a low at this input causes the motor to coast to a stop.

Motor Run/Stop
The motor run/stop feature allows the stopping of a motor by shorting out the bottom drives of the three phases. A low at this input allows the motor to run, while a high (open) input does not allow motor operation and if operating causes rapid deceleration.

Motor Direction
The motor direction feature allows the changing of the rotation of the motor. This input should not be changed while motion is in progress. A high (open) input causes the motor to turn in the CW direction, while a low at this input causes the motor to turn in the CCW direction.

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Speed Adjust Setting

There are two ways to set the speed on this drive. One is to use the on board potentiometer. The other is to use an external 10K potentiometer.   To use the on board potentiometer, set switch SW1 to the off position (default). To use the external 10K potentiometer or external 1V to 4V voltage speed setting, set switch SW1 to the on position. A voltage of 1V-4V to control the speed of the motor can be tied to the Pot Wiper connection of P1 with 0V tied to pin 6 of TB2 (GND). The maximum voltage that can be placed on the pot wiper with respect to ground is 6V.

The mating connector for the external 10K potentiometer is Molex part number 3-640440-3.
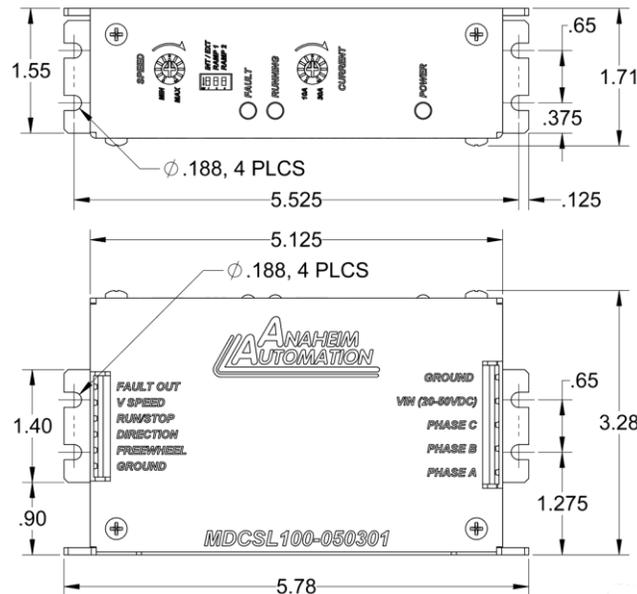
Fault Output

The Fault Output requires a 5V pull-up to work correctly. The Fault Output indicates an over current or failure in the motor/driver operation. The Fault Output is normally at a logic level 1(5V). If a fault occurs, the Fault Output will go to a logic level 0(0V).

Typical Hookup Drawing
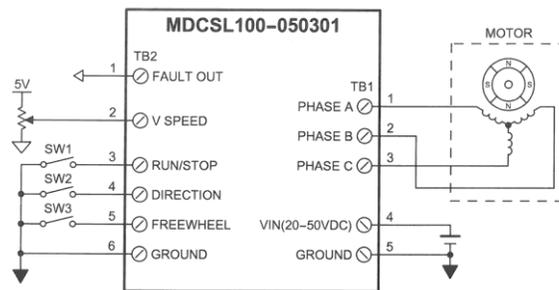
Dimensions

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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.

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