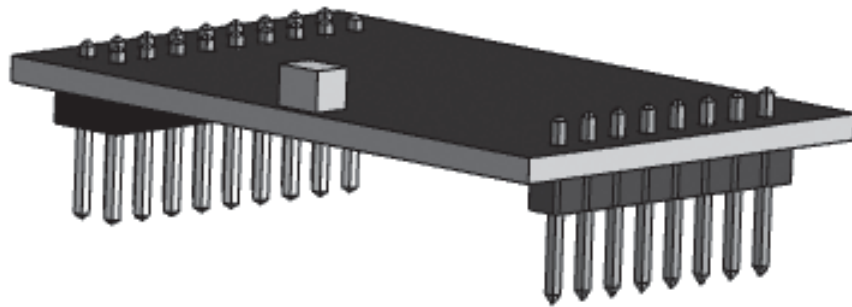


MDC020-050101 Series 50V, 10A Brushless Controller

User's Guide



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MDC020-050101 Driver Features

- Open Loop Operation
- 6 - 50VDC Voltage Range
- 0.75V to 5V External Voltage Speed Control
- 2-Quadrant Operation
- Hall Sensor Feedback
- Short Circuit Protection
- Maximum Current Limit at 10.0 Amps (peak)
- Enable and Direction Input
- TTL-CMOS Compatible Inputs
- Compact Size
- Easy Connectivity/Integration into Motherboard

General Description

The MDC020-050101 driver is designed to drive DC Brushless motors at currents of up to 10A (peak) and 50V. The driver operates in the basic open loop configuration with 120° DC Brushless motors. The driver is protected against over current, hall sensor error and under voltage. When an error occurs, a fault output is turned low logic '0' to notify the user. An external voltage (0.75-5VDC) is used to control the speed of the motor. The direction of the motor can be preset by the direction control input. The freewheel input overrides all other inputs into the driver. With two connector arrays arranged in a 2.54 mm pattern, it allows easy integration and connectivity to the MDC020-EVALBOARD or the OEM-side mother board.

Fault Protection

A shut down over current protection is provided when the motor current level exceeding the set peak current limit is produced, 10A max. When the over current protection is activated, the controller shuts off the outputs to the motor. The motor can be turned back on by releasing the load and toggling the Enable line (P2 - pin 22) or powering down and up the driver.

Ordering Information

Part #	Description
MDC020-050101	Featured BLDC driver 10A, 24V
PSEPM-0200-1-24V-8.4A	DC Power Supply 24VDC at 8.4 Amps
PSEPM-0200-1-48V-4.2A	DC Power Supply 48VDC at 4.2 Amps
MDC020-EVALBOARD	Evaluation Board for Board Level OEM BLDC and DC Speed Controllers MDC020-024031, MDC020-050101, MBDC020-24031, and MBDC020-050101

MDC020-050101 Terminals

P1:

Pin #	Description	Pin #	Description
1	Phase A	10	0VDC
2	Phase A	11	5V out
3	Phase B	12	No Connect
4	Phase B	13	Hall A
5	Phase C	14	0VDC
6	Phase C	15	Hall B
7	VHV	16	0VDC
8	VHV	17	Hall C
9	0VDC	18	PG OUT

P2:

Pin #	Description
19	Ready
20	No Connect
21	No Connect
22	Enable
23	Direction
24	0VDC
25	Current LIMIT
26	Vspeed

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 driver. **DO NOT CONNECT THE PHASES YET.** Turn on power and rotate the motor by hand. If the Ready output is a logic "0" (0V), the hall phases are incorrectly wired. If the Ready output is a logic "1" (5V) then the hall wires are connected correctly. Power the unit down and proceed to connect the motor phases. If the motor does not run or runs erratically, power down 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. The wiring of the motor phases should be separated from the hall and input connections to not allow a possible source of interference.

P1 Terminal Descriptions

VHV

This pin (P1 - pin 7,8) is the voltage supply for the driver with respect to 0VDC (P1 - pin 14, 16). A voltage from 6VDC (min) - 50VDC (max) is required to operate the driver.

5V OUT

This pin (P1 - pin 11) is the Hall Sensor Power Output: 5V @30mA maximum. Typical current draw from hall sensors in 20mA.

PG OUT

A 5V signal pulse out is available at a rate of 4 pulses for 1 revolution of an 8-pole motor, 3 pulses for 1 revolution of a 6-pole motor, and 2 pulses for 1 revolution of a 4-pole motor.

8-pole motor RPM = 15 * PG OUT (in Hz)

6-pole motor RPM = 20 * PG OUT (in Hz)

4-pole motor RPM = 30 * PG OUT (in Hz)

P2 Terminal Descriptions

Ready

When NO fault or disable occurs, this output will be a logic “1” (5V). When a fault occurs, this output will be a logic “0” (0V) under these conditions:

1. Invalid Sensor Input Code
2. Over Current. The driver is equipped with cycle-by-cycle current limiting or over current latch.

Enable

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

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 input causes the motor to turn in the CW direction, while a low (open) at this input causes the motor to turn in the CCW direction.

Current Limit

The current limit input is used for setting the motor current in the range of 0.5-10A peak (0.25-5A continuous). The current limit value should be set below the rated motor current (max continuous current). To set the current limiting value, an external resistor (at least 62.5mW) between current limiting input (P2 - pin 25) and ground (P1 - pin 14, 16) must be added as shown in table below.

Current Limit Resistor Values

Current Limit	Resistor
10A	Input Floating
9A	220Kohms
8A	91Kohms
7A	56Kohms
6A	36Kohms
5A	24Kohms

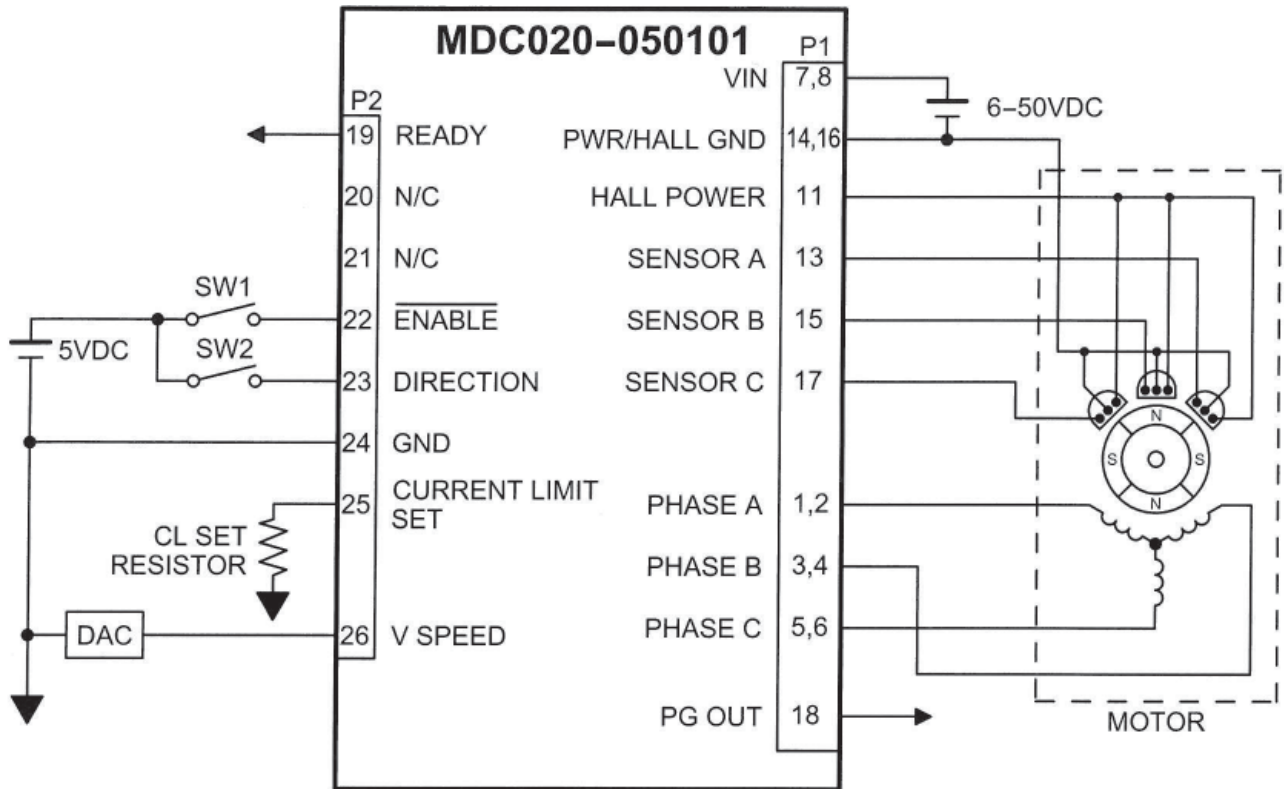
Current Limit Resistor Values

Current Limit	Resistor
4A	16Kohms
3A	10Kohms
2A	5.6Kohms
1A	2.7Kohms
0.5A	1.2Kohms

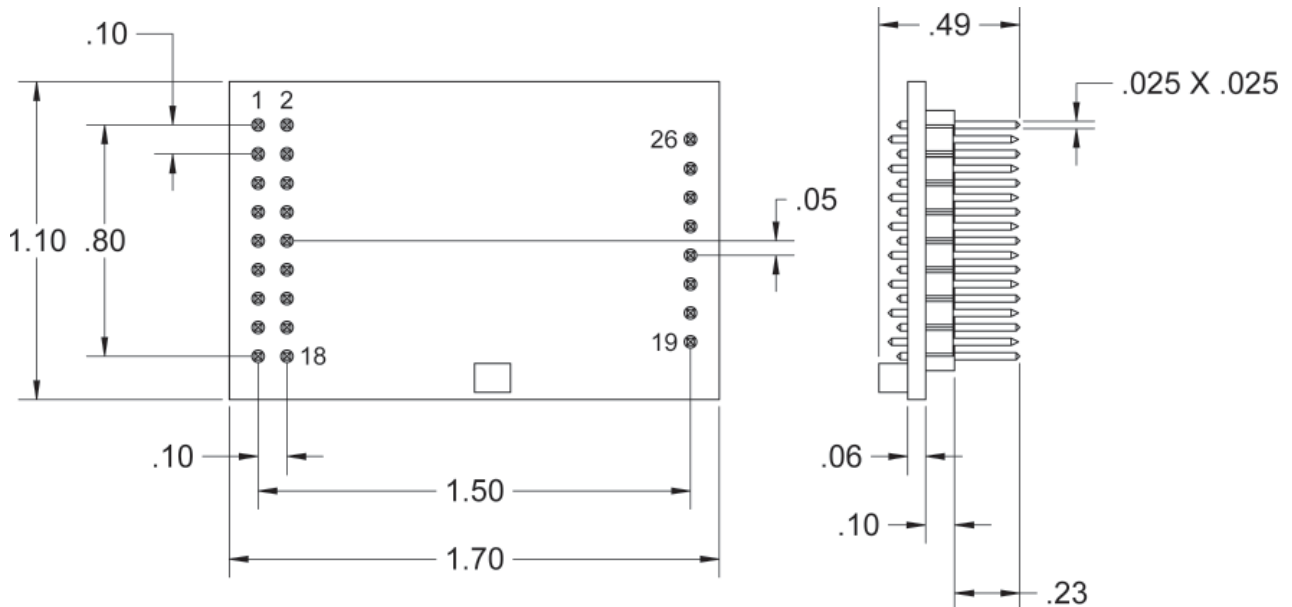
Vspeed

A voltage is used to control the speed of the motor, the 0.75V to 5V voltage can be tied on Vspeed (P2 - pin 26) with respect to 0VDC (P2- Pin 14, 16). The maximum voltage amplitude that can be placed on Vspeed is 5.5V. A voltage exceeding 5.5V will cause damage to the driver.

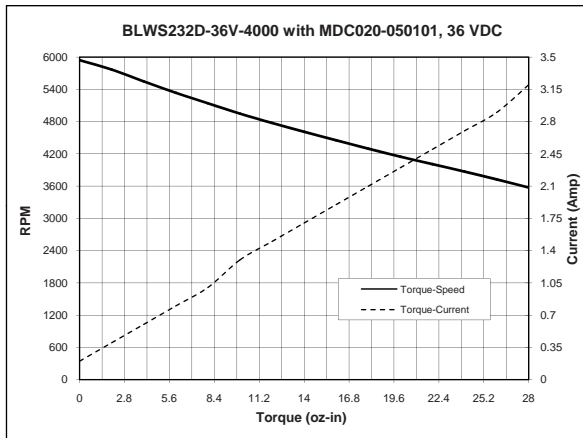
Typical Wiring Diagram



Dimensions



Torque Speed Curve



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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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