MDC020-024031 Series
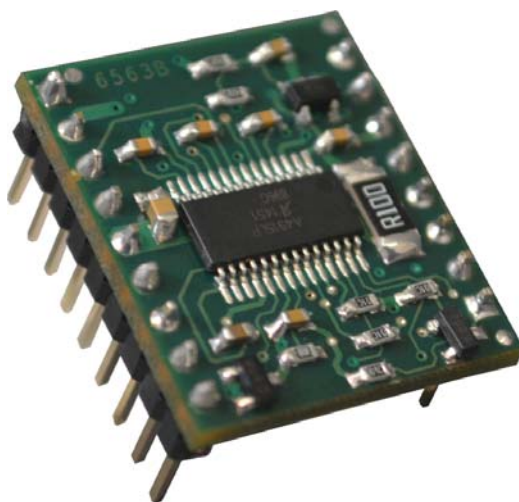# 24V, 3A Brushless Controller

User's Guide

ANAHEIM AUTOMATION

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MDC020-024031 Driver Features

- Open Loop Operation
- 8 - 24VDC Voltage Range
- 0.75V to 4V External Voltage Speed Control
- 2-Quadrant Operation
- Hall Sensor Feedback
- Short Circuit Protection
- Maximum Current Limit at 3.0 Amps (peak)
- Freewheel and Direction Input
- TTL-CMOS Compatible Inputs
- Compact Size
- Easy Connectivity/Integration into Motherboard

General Description

The MDC020-024031 driver is designed to drive DC Brushless motors at currents of up to 3A (peak) and 24V. The driver operates in the basic open loop configuration with 120° DC Brushless motors. The driver is protected against over current (cycle-by-cyle), hall sensor error and under voltage. When an error occurs, a fault output is turned on to notify the user. An external voltage (0.75-4VDC) 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 cycle-by-cycle over current protection is provided when the motor current level exceeding the 3.0A peak current limit s is produced. When the over current protection is activated, the controller shuts off the outputs to the motor.

Ordering Information

Part #	Description
MDC020-024031	Featured BLDC driver 3A, 24V
PSAM24V2.7A	DC Power Supply 24VDC at 2.7 Amps
PSAM48V1.3A	DC Power Supply 48VDC at 1.3 Amps
MDC020-EVALBOARD	Evaluation Board for Board Level OEM BLDC and DC Speed Controllers MDC020-024031, MDC020-050101, MBDC020-24031, and MBDC020-050101

Terminal Descriptions

P1:

Pin #	Description
1	Phase A
2	Phase B
3	Phase C
4	VHV
5	0VDC
6	5V out
7	Hall A
8	Hall B
9	Hall C

P2:

Pin #	Description
10	Ready
11	No Connect
12	No Connect
13	Enable
14	Direction
15	0VDC
16	Current LIMIT
17	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) hen 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.

VHV

This pin (P1 - pin 4) is the voltage supply for the driver with respect to 0VDC (P1 - pin 5). A voltage from 8VDC (min) - 24VDC (max) is required to operate the driver.

5V OUT

This pin (P1 - pin 6) is the Hall Sensor Power Output: 5V @30mA maximum. Typical current draw from hall sensors in 20mA.

Ready
When NO fault or disable occurs, this output will be a logic "1" (5V). When a fault or disable occurs, this output will be a logic "0" (0V) under these conditions:
1. Invalid Sensor Input Code or 0V on Vspeed.
2. The motor is disabled by a low signal at the Enable input (P2 - pin 13).
3. Over Current. The driver is equipped with cycle-by-cycle current limiting or over current latch.
4. Undervoltage Lockout activation at 9.1VDC for the input voltage and 4.5VDC for Hall Sensor voltage.

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 continuous motor current in the range of 0.5-3A. 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 16) and ground (P2 - pin 15) must be added as shown in table above.

Current Limit Resistor Values

| Current Limit	Resistor
3A	Input Floating
2.5A	47Kohms
2A	10Kohms
1.5A	4.7Kohms
1A	2.2Kohms
0.5A	470ohms

Vspeed
A voltage is used to control the speed of the motor, the 0.75V to 4V voltage can be tied on Vspeed (P2 - pin 17) with respect to 0VDC (P2- Pin 15). The maximum voltage amplitude that can be placed on Vspeed is 5.5V. A voltage exceeding 5.5V will cause damage to the driver.
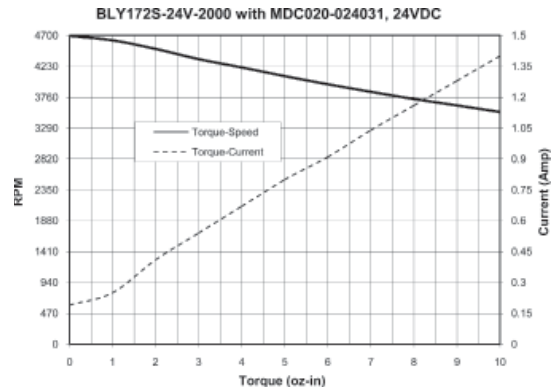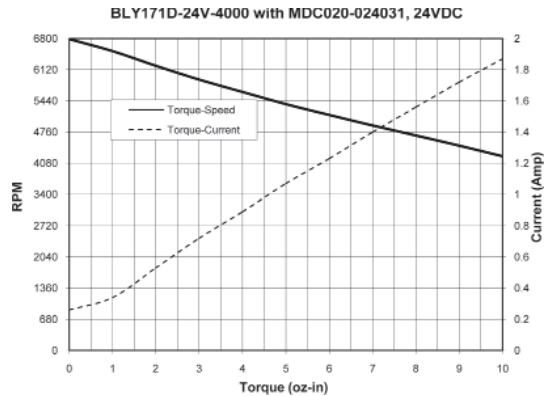
Typical Wiring Diagram
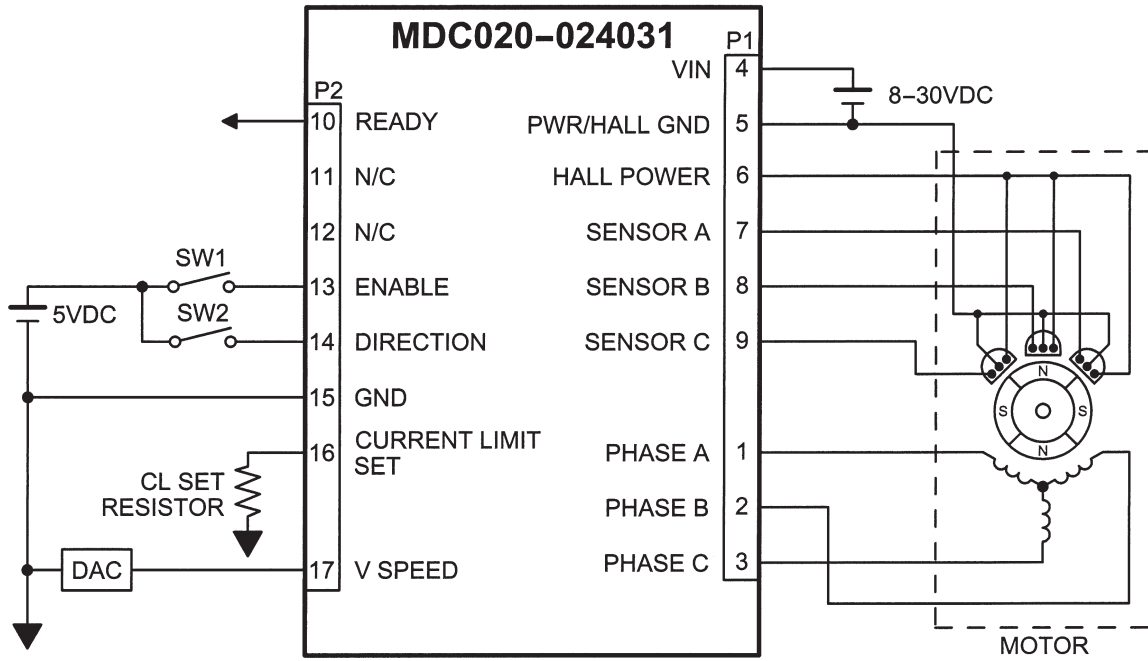
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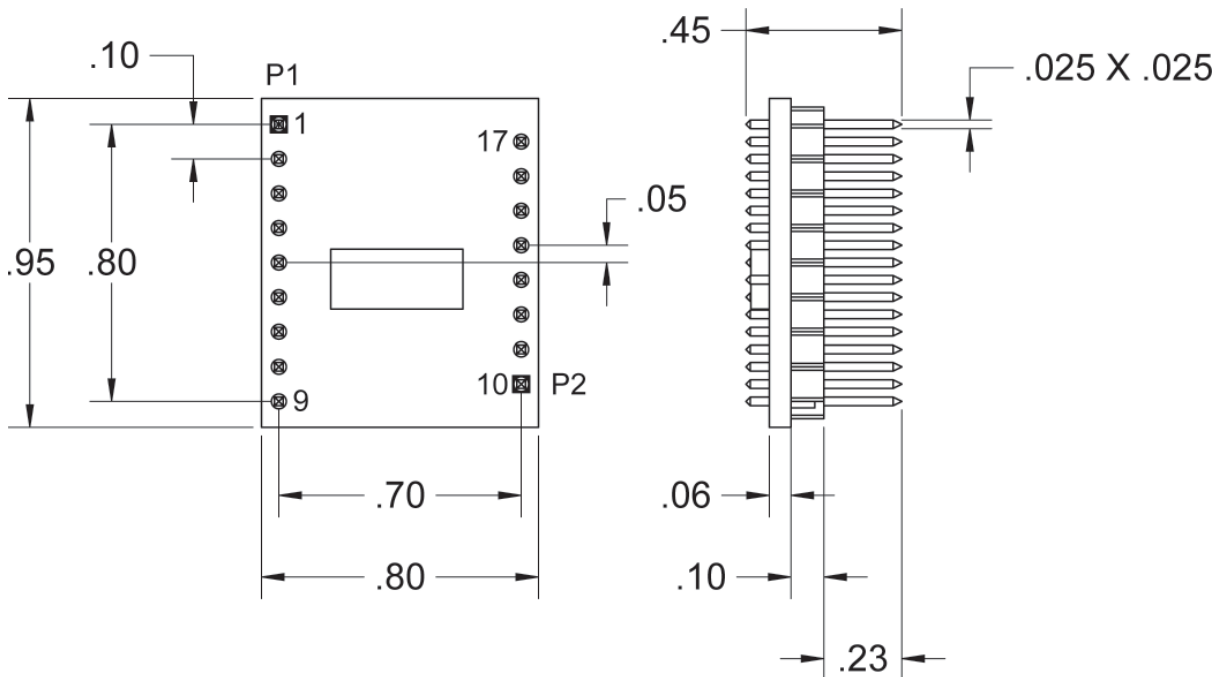
Torque Speed Curves

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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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