

DriveMax 17/23 C - DRV

Integrated NEMA 17/23 Stepper Motor + Closed-Loop Microstep Driver

Manual



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Revision History:

- 1.0 – First revision**
- 1.01 – Fixed opto-isolated output specification**
- 1.02 – Updated sample program and StepNLoop specifications**
- 1.03 – Updated voltage specification, SNL error range, micro-stepping, motor stack, motor specifications**

Firmware Compatibility:

V23

Software Compatibility:

V1.8

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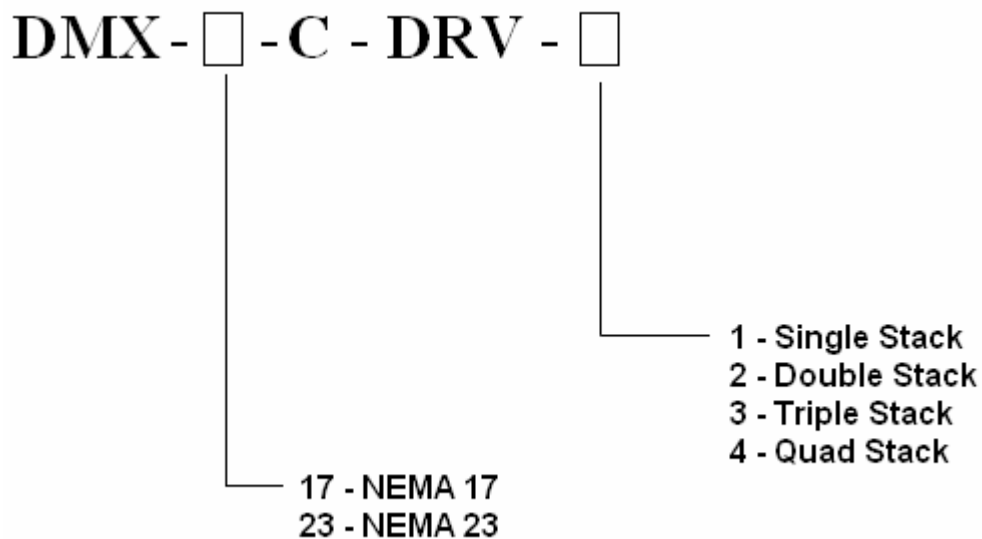
1. Introduction

DriveMax-C-DRV is an integrated single-package NEMA17 / NEMA23 stepper motor plus closed-loop microstep driver with built in encoder. Configuration of the driver is done through Arcus Technology's Dynamic Configurator using USB 2.0.

Features highlights of the DriveMax-C-DRV:

- Bipolar Micro Stepper Driver
- Built in encoder – 50 count (200 counts/rev with quadrature)
- Micro-stepping (in closed-loop operation): Fixed at 8
- Micro-stepping (in open-loop operation): 1, 2, 4, 8
- 12 to 35VDC Voltage Input
- Configurable 100mA to 2.5A Current Support
- Pulse/Dir/Enable Opto-isolated inputs
- Opto-isolated alarm and in position outputs
- Motor available in different sizes and windings
- Software Configurable Settings using USB based Dynamic Configurator.

2. Part Numbering



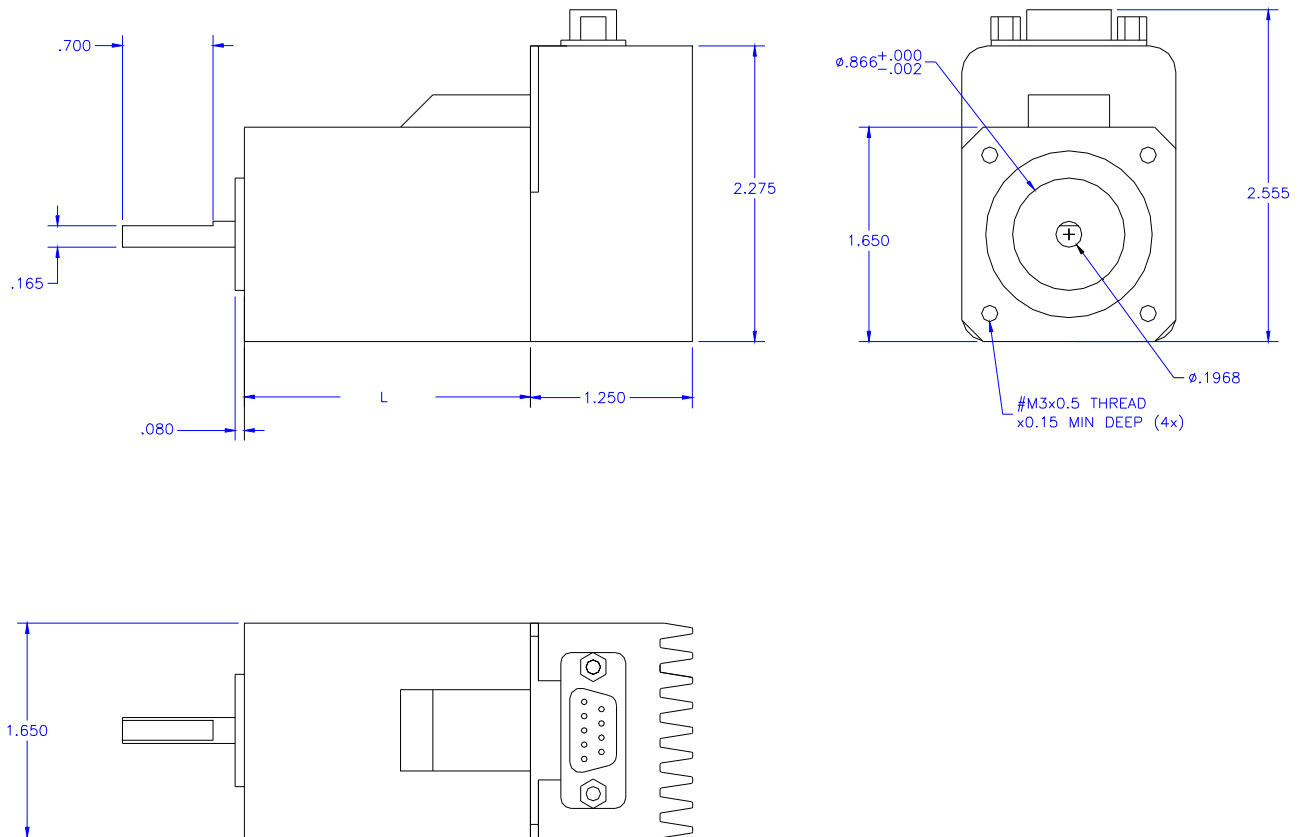
Motor Size – DriveMax-C-DRV is available in both NEMA 17 and NEMA 23 size frame motor

Motor Stack – NEMA 17 version is available in 2, 3 or 4 stack. NEMA 23 version is available in 2 or 3 stack.

Typically, a larger size motor can handle higher torque but is slower and requires higher current.

3. Dimensions

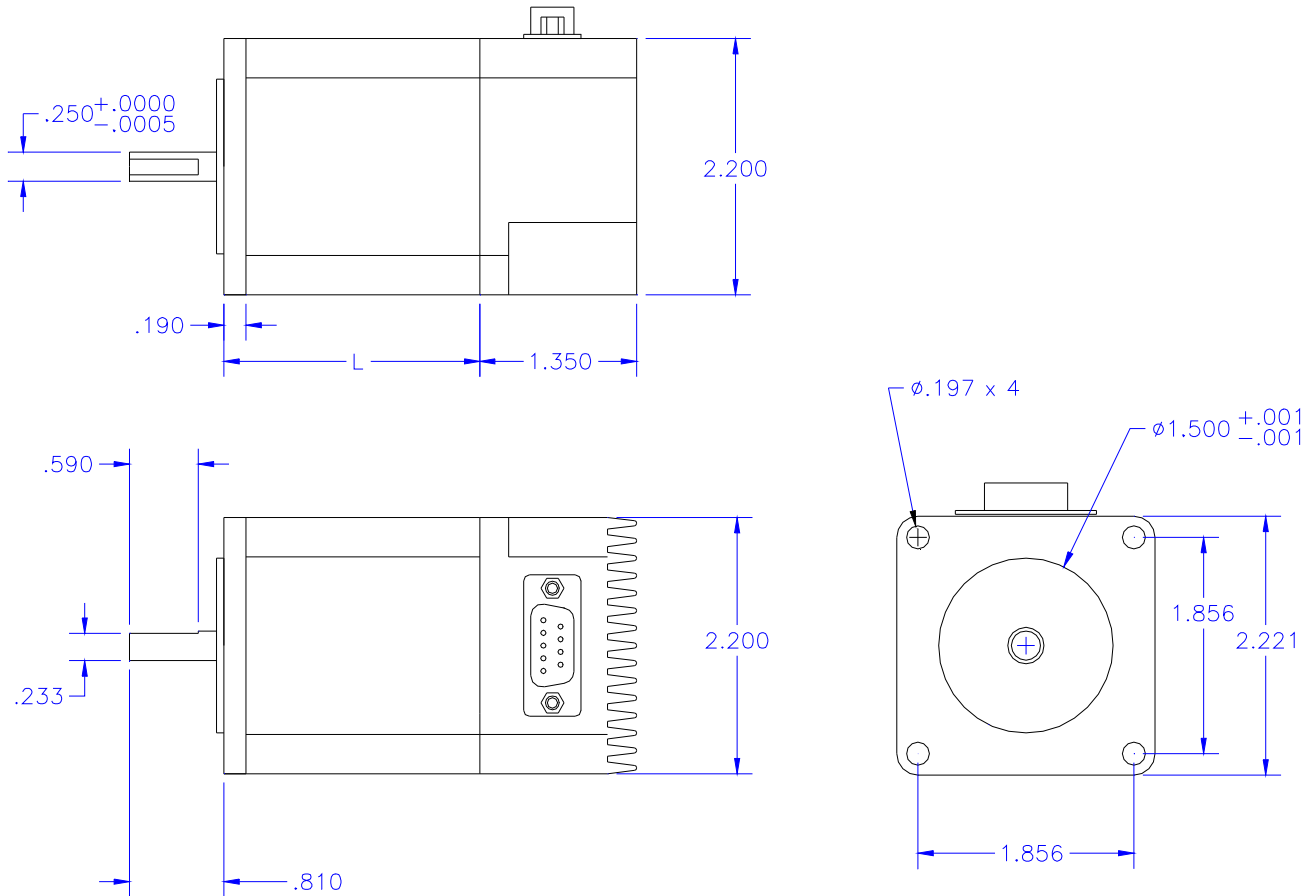
DMX-17-C-DRV



All dimensions are in inches

Model	L (inches)
DMX-17-C-DRV-2	1.58
DMX-17-C-DRV-3	1.89
DMX-17-C-DRV-4	2.36

DMX-23-C-DRV



All dimensions are in inches

Model	L - Motor Length
DMX-23-C-DRV-2 (Double Stack)	2.2 inch
DMX-23-C-DRV-3 (Triple Stack)	3.1 inch

4. Motor Specifications

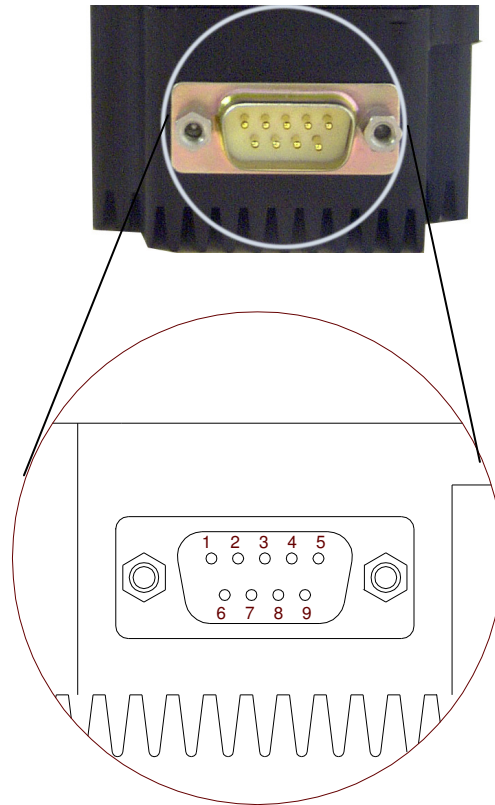
The following chart shows the specifications of the standard step motors used for DriveMax-C-DRV products. All standard step motors are 1.8 degree bi-polar step motors.

NEMA Size	Stack Size	Max Amp / Phase	Holding Torque	Resistance / Phase	Inductance / Phase	Inertia
17	Double	1.7A	0.44 N-m	1.5 Ohm	3.0 mH	0.28 oz-in ²
	Triple	2.0A	0.59 N-m	1.4 Ohm	2.7 mH	0.37 oz-in ²
	Quad	2.0A	0.89 N-m	2.0 Ohm	3.3 mH	0.56 oz-in ²
23	Double	2.8A†	1.22 N-m	0.9 Ohm	2.5 mH	1.5 oz-in ²
	Triple	2.8A†	2.08 N-m	1.1 Ohm	3.8 mH	2.6 oz-in ²

Even though NEMA 23 motors are rated for 2.8A, maximum current DriveMax-C-DRV supports is 2.5A.

5. Connectors

DriveMax-C-DRV uses standard D-SUB 9 connector interface as shown on the picture below.

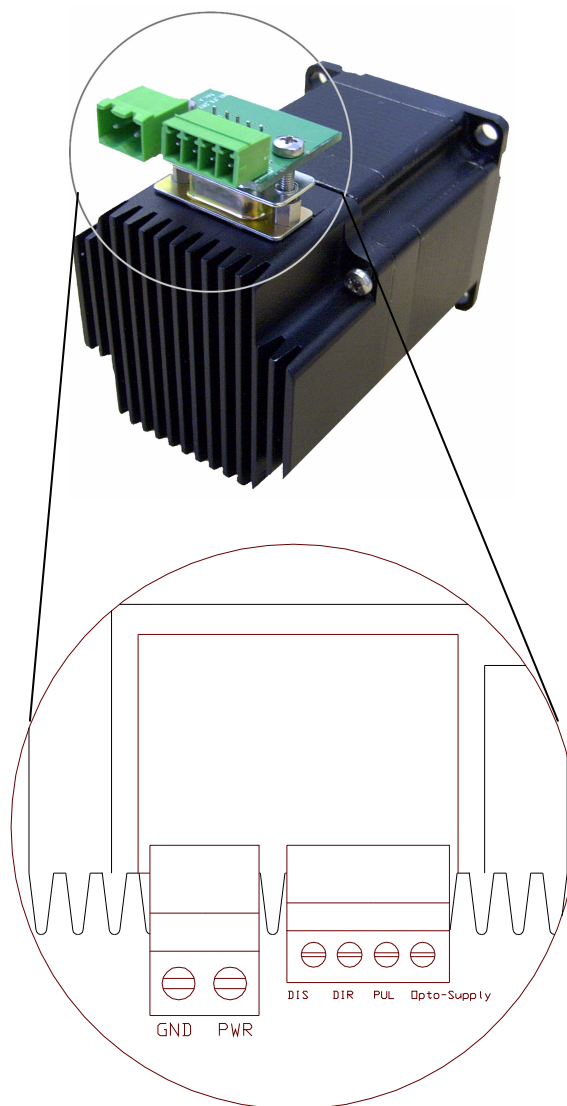


DB9 Connector Information

Pin #	Name	Description
1	Power	Power supply input (+12 VDC to +35 VDC)
2	Pulse	Pulse (Step) opto-isolated input
3	Enable	Enable opto-isolated input
4	Alarm	Alarm opto-isolated output
5	+5V	+5V output (from onboard voltage regulator)
6	Ground	Ground
7	Direction	Direction opto-isolated input
8	In Position	In position opto-isolated output
9	Opto-supply	Opto-supply input (+5 VDC)

Interface Board Pin Information

DriveMax-C-DRV is available with optional interface board as shown below.



Two pin Connector

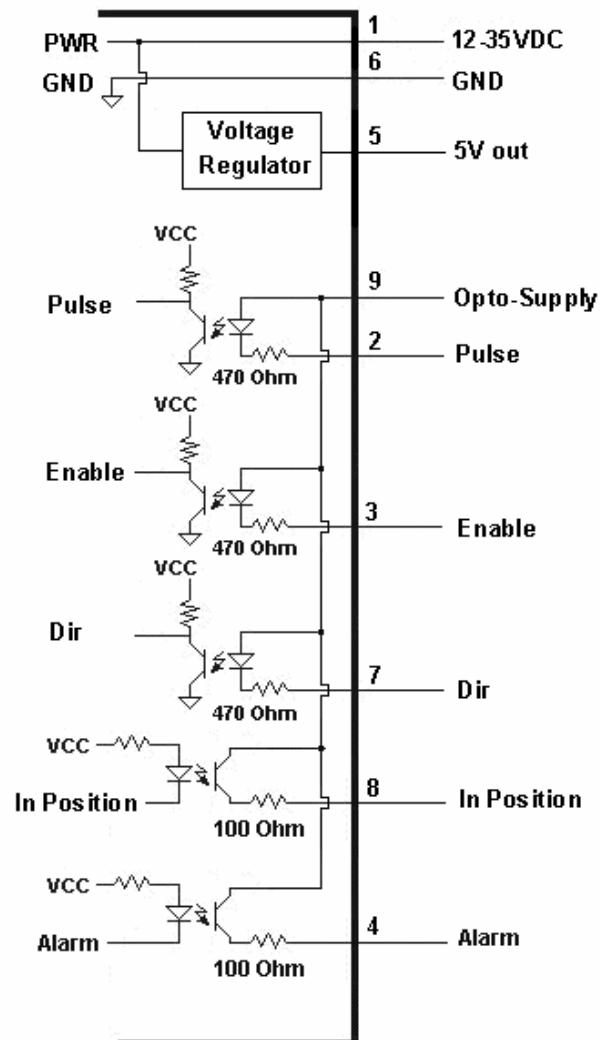
Name	Description
GND	Ground
PWR	Power +12V to +35VDC

Four pin connector

Name	Description
ENA	Enable Input
DIR	Direction Input
PUL	Pulse Input
Opto-Supply	Opto Supply Input +5VDC

6. Electrical Information

DMX-C-DRV Interface Circuit



Pulse/Dir/Enable Opto-isolated Inputs

Pulse (pin 2), Direction (pin 7), and Enable (pin 3) signals are opto-isolated inputs. In order for these signals to be triggered, +5VDC opto-supply input (pin 9) is required. Current limiting resistor of 470 Ohm used for each of the Pulse, Direction, and Enable signals. For opto-supply greater than +5VDC, additional current limiting resistor is required.

Direction Signal

Direction signal is an opto-isolated input. If there is no connection to direction signal, the motor will rotate in clockwise direction when viewing at the front face of the motor. When the direction is connected to ground, the rotating is in counter clockwise direction.

Enable Signal

Enable signal is an opto-isolated input. If there is no connection to enable signal, the driver is enabled by default. Only when the enable signal is connected to the ground of the opto-supply input, the driver is disabled and motor is free.

Alarm/In Position Opto-isolated Outputs

Alarm (pin 4) and In Position (pin 8) signals are opto-isolated outputs. In order for these signals to be triggered, +5VDC opto-supply input (pin 9) is required. Current limiting resistor of 100 Ohm used for each of the Alarm and In Position signals. For opto-supply greater than +5VDC, additional current limiting resistor is required.

Power Input

Power Supply Voltage Input:	12VDC to 35VDC
Power Supply Current Requirement:	2.5A

+5VDC Output

+5VDC voltage output (pin 5) is available for powering the ControlMax plug in controller only. Any other use is not recommended.

7. Configuration

DriveMax-C-DRV configuration is done using Arcus Technology’s patent-pending Dynamic Configurator through the same DB9 connector that is used for driver control.

Open-Loop Configuration

DriveMax-C-DRV module has the option to operate in open-loop mode. In this mode, no position correction is performed.

The following configurable settings are stored in the flash memory of the driver.

Open-Loop configuration parameters

Setting	Range	Description
Microstep	1, 2, 4, 8	Microstep setting from Full (1) to Eighth (8) is available. If closed-loop operation is chosen, only microstep setting of 8 can be used.
Run Current	100mA to 2.5A in 100mA increment	Run Current is the current that is used during motion. When pulse input is detected while in Idle mode, the current is immediately set to Run Current value.
Idle Current	100mA to 2.5A in 100mA increment	Idle Current is set when no pulse input is detected for period of time set in the Idle Time. Idle Current is used to lower the current supply to the motor while idle. Lower current means lower power usage and lower motor temperature. To disable the Idle Current, set the Idle Current same as the Run Current value.
Idle Time	100mSec to 10Sec in 100mSec increment	When no pulse input is detected for the period specified by Idle Time, the driver current is set to Idle mode.

During open-loop configuration, be sure to disable the closed-loop feature.

StepNLoop Closed Loop Configuration

DriveMax-C-DRV has the option to operate in closed-loop mode. In this mode StepNLoop closed-loop algorithm allows for accurate positioning of the motor using the integrated encoder.

StepNLoop control performs the following operations:

- 1) Position Delta monitoring: Delta position is the difference between the actual and the target position. When the Delta goes over the allowed Error Range, the motor is stopped and the StepNLoop Status goes into the “stall” error state. In this situation, the alarm output will be triggered.
- 2) Position Correction at the end of the move: Correction of the motor position is done at the end of any targeted move.

The following configurable settings are stored in the flash memory of the driver.

Closed-Loop configuration parameters

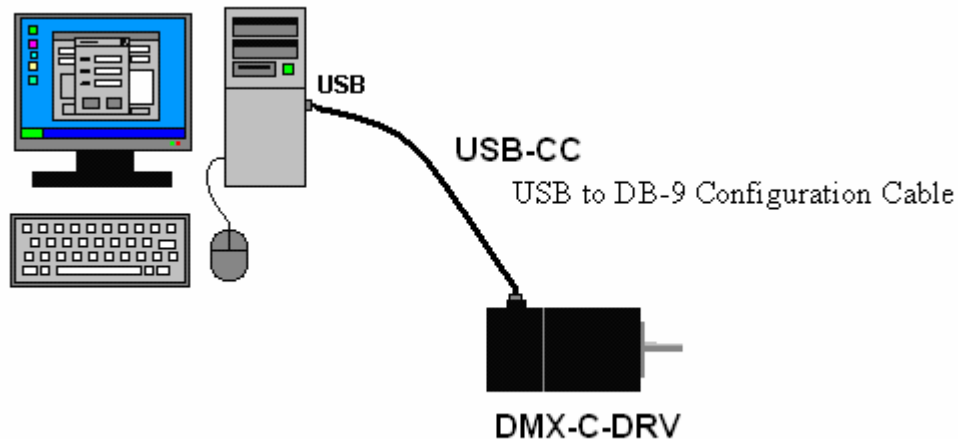
Setting	Range	Description
Enable Closed Loop	0 or 1	Enable/Disable StepNLoop closed-loop algorithm.
Microstep	8	If closed-loop operation is chosen, only microstep setting of 8 can be chosen.
Run Current	100mA to 2.5A in 100mA increment	Run Current is the current that is used during motion. When pulse input is detected while in Idle mode, the current is immediately set to Run Current value.
Idle Current	100mA to 2.5A in 100mA increment	Idle Current is set when no pulse input is detected for period of time set in the Idle Time. Idle Current is used to lower the current supply to the motor while idle. Lower current means lower power usage and lower motor temperature. To disable the Idle Current, set the Idle Current same as the Run Current value.
Idle Time	100mSec to 10Sec in 100mSec increment	When no pulse input is detected for the period specified by Idle Time, the driver current is set to Idle mode.
Tolerance Range	10 pulses to 2000 pulses in 10 pulse increment	When the actual encoder position is within desired encoder position by this tolerance range, no position correction is done.
Error Range	100 pulses to 2000 pulses in 10 pulse increment	When the actual encoder position is within desired encoder position by this error range, position correction is done when idle. If the actual encoder position is outside of correction range, the motor status goes to error state.
Max Attempt	1 to 100 attempts	This is the maximum number of correction tries that the controller will attempt. If the correction cannot be done within this number of tries, the motor status goes to error state.
Correction Speed	Low, Medium, High	Correction speed of StepNLoop Algorithm. <ul style="list-style-type: none"> - Low: - Medium: - High:
Encoder Polarity	0 or 1	Encoder polarity for magnetic encoder

During closed-loop configuration, be sure to enable the closed-loop feature.

Configuration of the DriveMax parameters is done using a DB9 to USB configuration cable (USBCC) that is USB powered and does not require any external power.

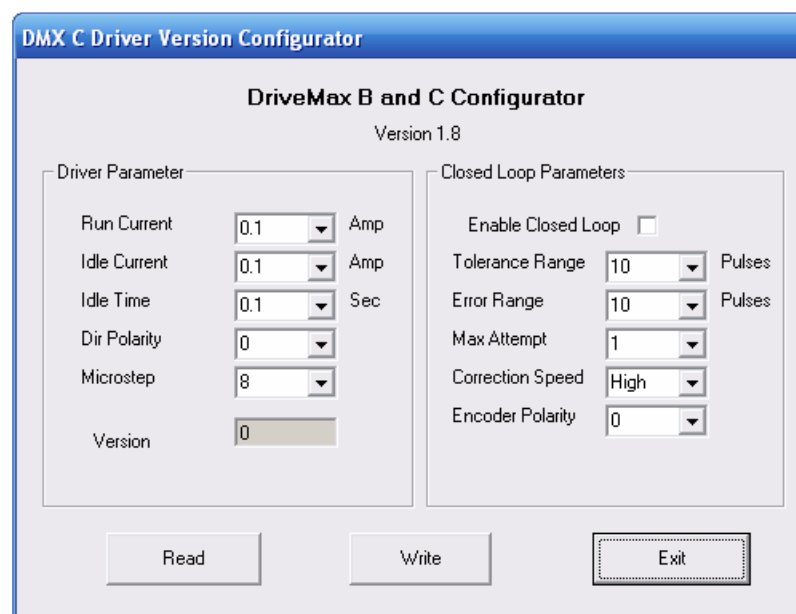


Simply connect the configuration cable between the DB9 connector of the DriveMax and USB port of PC as shown below:



Configuration cable part number	USBCC
USB Driver	Performax USB Driver downloadable from the Arcus website

DriveMax-C-DRV comes with simple and easy to use Windows configuration program as shown below to read and write DMX17/23C-DRV parameters.



Steps to run configuration program

- 1) If running for the first time, download and install the latest Performax USB Driver from the Arcus support website. Once the USB driver is installed, it does not need to be installed again.
- 2) Plug in the configuration cable. If plugged in for the first time, follow the typical USB device configuration steps.
- 3) Start the DriveMax configuration program.
- 4) Plug in the DB9 connector to DB9 of the DriveMax and read or write the parameters.
- 5) When writing the parameter is done, the values are permanently stored in Flash memory that are loaded and used at the power up.

Default DMX-C-DRV Parameters

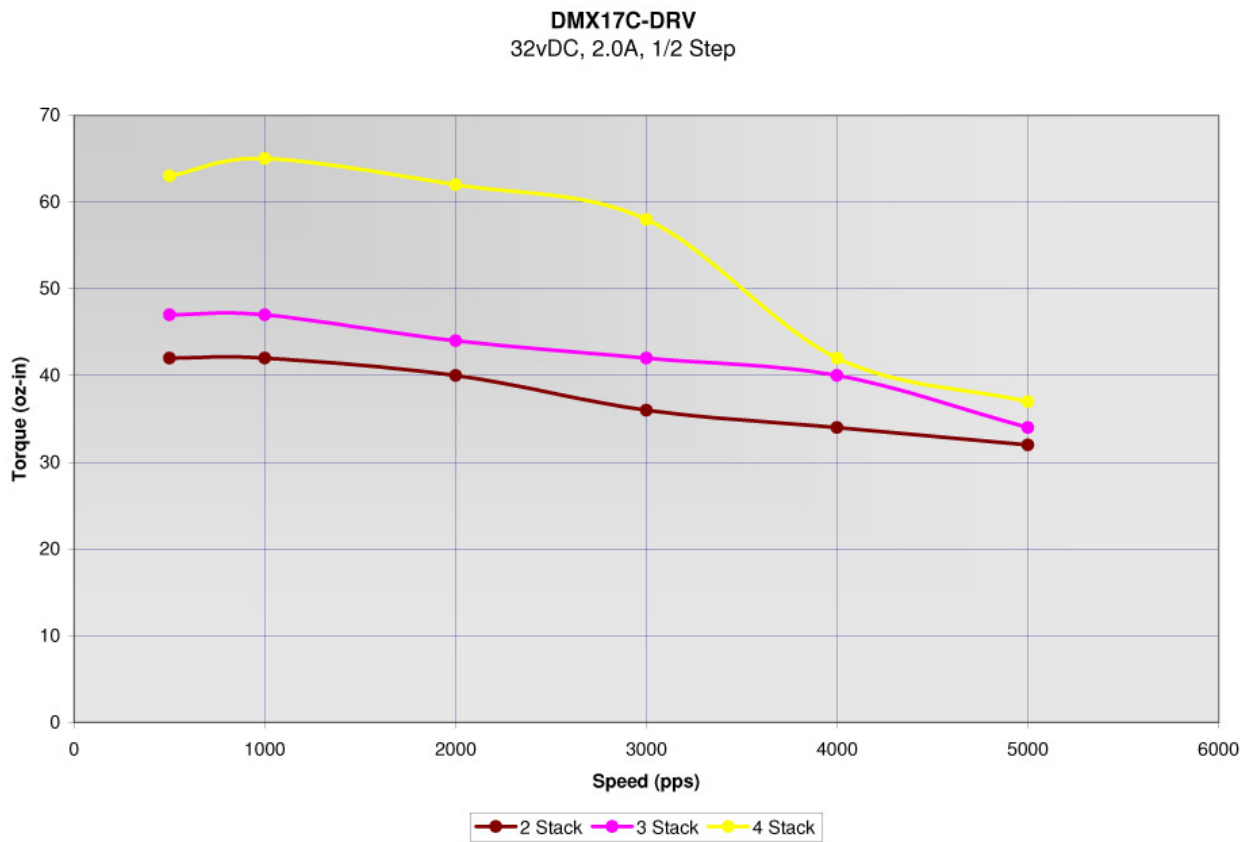
Product	Micro-Step	Run Current (Amp)	Idle Current (Amp)	Idle Time (msec)	Direction Polarity
DMX-17-C-DRV-2	8	1.6	0.5	500	CW
DMX-17-C-DRV-3	8	1.6	0.5	500	CW
DMX-17-C-DRV-4	8	1.6	0.5	500	CW
DMX-23-C-DRV-2	8	2.2	1	500	CW
DMX-23-C-DRV-3	8	2.2	1	500	CW

Default DMX-C-DRV Closed-Loop Parameters

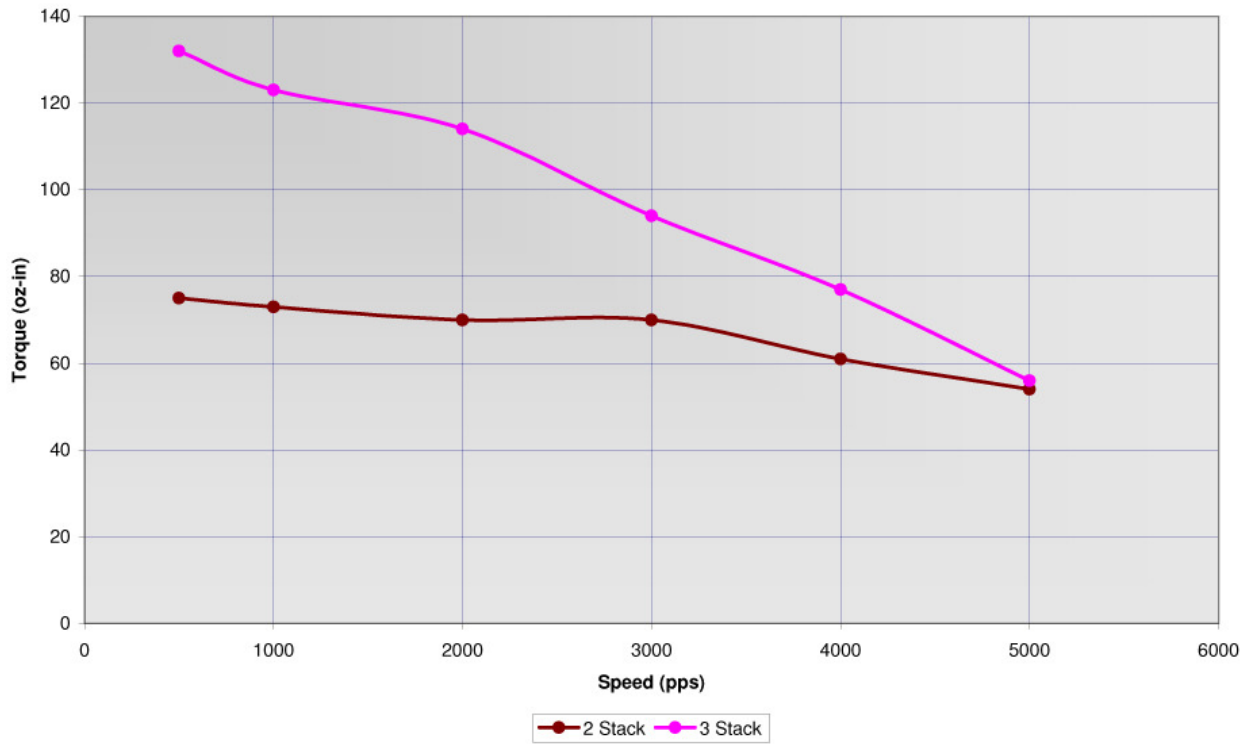
Same for all motor and stack sizes

Closed-Loop Parameter	Value
Enable Closed-Loop	On
Tolerance Range	100
Error Range	1000
Max Attempt	10
Correction Speed	High
Encoder Polarity	1

8. Speed/Torque Curve



DMX23C-DRV
32vDC, 2.5A, 1/2 Step



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