

DMX-K-DRV-11

Integrated Step Motor Driver & Basic Controller



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First edition, June 2007

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Revision History:

- 1.00 – 1st release
- 1.29 – 2nd release
- 1.30 – 3rd release
- 1.32 – 4th release
- 1.33 – 5th release
- 1.34 – 6th release
- 1.35 – 7th release

Firmware Compatibility:

†V24

†If your module's firmware version number is less than the listed value, contact Arcus for the appropriate documentation. Arcus reserves the right to change the firmware without notice.

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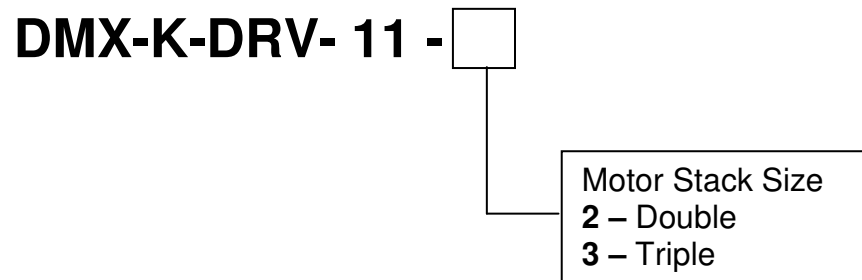
1. Introduction

DMX-K-DRV-11 is an integrated stepper driver and motor product. Feature highlights include an over temperature alarm output and dynamic configuration.

1.1. Features

- 12-24VDC voltage input
- 100mA to 2.0A peak current setting
- Full/Half/Quarter/16 microstep
- One clock (Pulse/Dir) or Two clock (CW/CCW) support
- 200K maximum pulse rate support
- 16K maximum pulse rate (controller mode)
- 4 selectable motion profiles (controller mode)
- Opto-isolated differential Pulse/Dir (CW/CCW) inputs
- Opto-isolated driver enable input
- Opto-isolated over-temperature alarm output
 - In position output (controller mode)
- NEMA 11 motor available in various stack sizes.

1.2. Part Numbering Scheme



Contacting Support

For technical support contact: support@arcus-technology.com.

Or, contact your local distributor for technical support.

2. Electrical and Thermal Specifications

Parameter	Min	Max	Units
Main Power Input ₁	+12	+24	V
	-	2.0	A
Forward Diode Current (PUL/DIR)	-	25	mA
Forward Diode Current (ENABLE)	-	45	mA
Operating Temperature ₂	-20	85	°C
Storage Temperature ₂	-55	150	°C

Table 2.0

₁ The supply current should match the driver current setting.

₂ Based on component ratings.

3. Dimensions

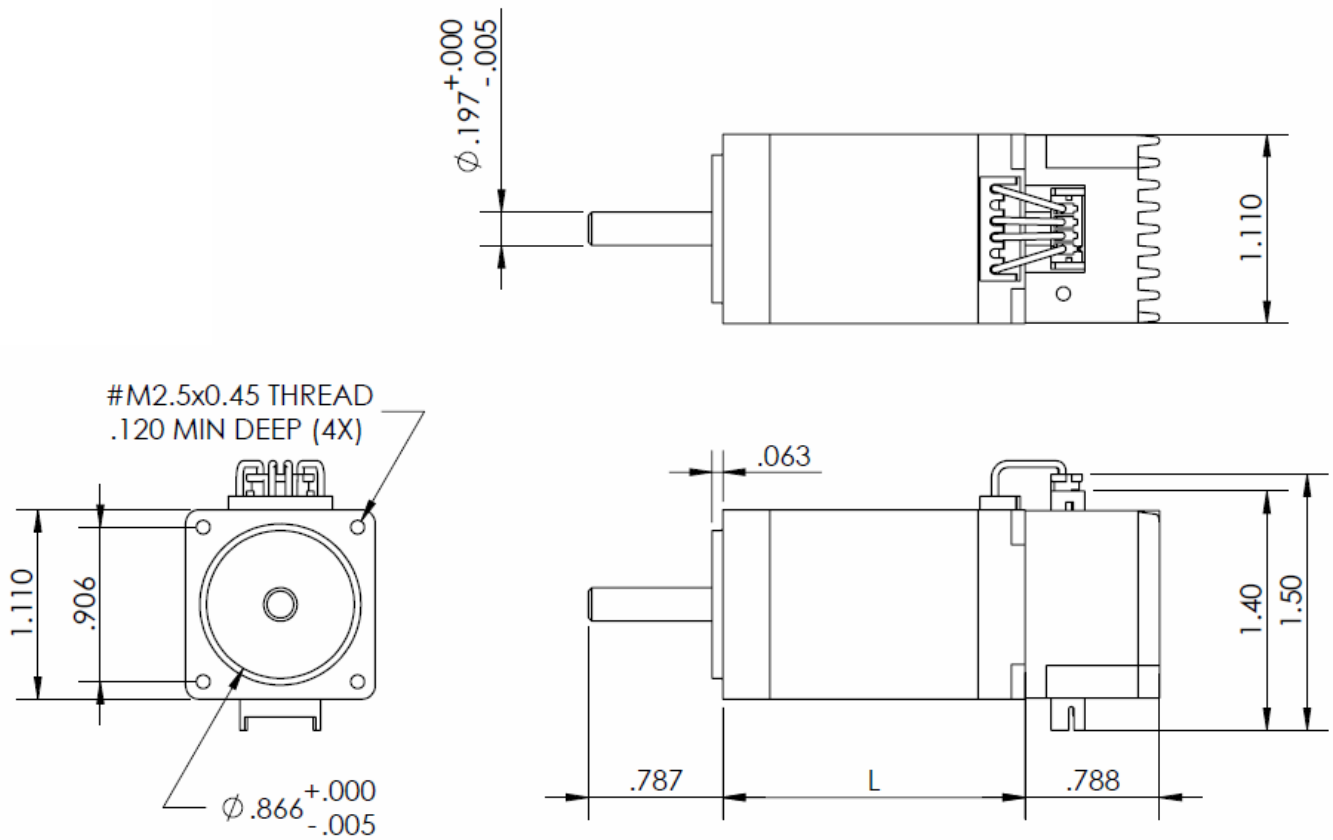


Figure 3.0

NEMA 11 Models	L (inches)
DMX-K-DRV-11-2 (double stack)	1.77
DMX-K-DRV-11-3 (triple stack)	2.01

Table 3.0

4. Connectivity

4.1. 10-Pin Connector (2mm)

DMX-K-DRV-11 comes with a single 10 pin connector shown below.



Figure 4.0

Pin #	Wire Color	In/O ut	Name	Description
1	Green/White	I	PUL- (CW-)	Negative pulse input / Negative clockwise input
2	Green	I	PUL+ (CW+)	Positive pulse input / Positive clockwise input
3	Blue/White	I	DIR- (CCW-)	Negative direction input / Negative counter-clockwise input
4	Blue	I	DIR+ (CCW+)	Positive direction input / Positive counter-clockwise input
5	Orange	I	OPTO	Opto-supply for enable input
6	Orange/White	I	ENABLE	Enable motor input
7	Gray	NC	NC	Reserved. Do not connect
8	White/Red	O	ALARM	Alarm output
9	Black	I	GND	Power input ground
10	Red	I	V+	Power Input +12 to +24 VDC

Table 4.0

Description: Female 10 pin 2mm dual row
 Manufacturer: HIROSE
 Part Number: DF11-10DS-2C (10 pin female connector)
 DF11-2428SC (female socket pin)

4.2. DMX-K-DRV-11 Interface Circuit

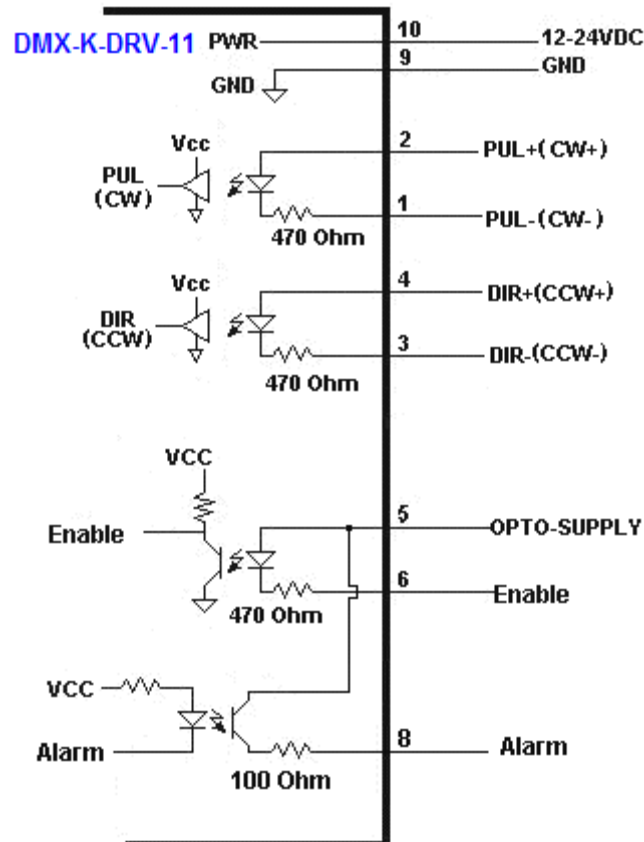


Figure 4.1

4.2.1. Pulse/Dir (CW/CCW) Inputs

DMX-K-DRV-11 supports both one-clock (PULSE/DIR) and two-clock (CW/CCW) inputs.

One-clock uses the PUL signal as the pulse train input position control and the DIR signal as the direction input signal for direction control.

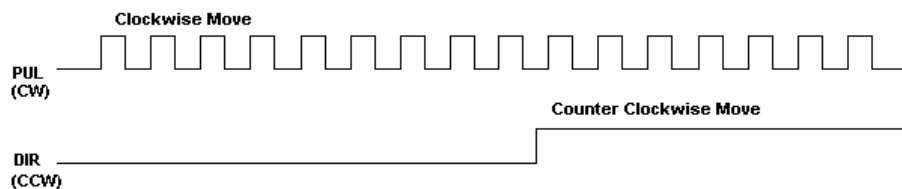


Figure 4.2

Two-clock uses CW as the clockwise pulse input and CCW as the counter clockwise pulse input for position control.

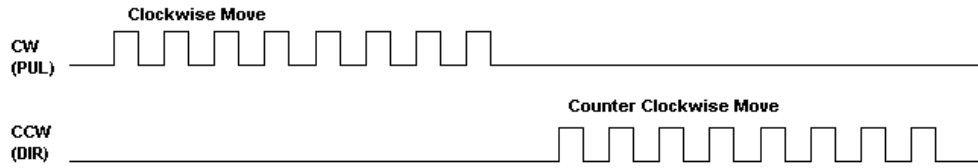


Figure 4.3

Depending on the direction polarity setting, actual direction of the rotation can be configured for the application.

Pulse/Dir (CW/CCW) inputs are opto-isolated differential inputs with a 470 Ohm resistor. Figure 4.4 shows the detailed schematic of the opto-isolated pulse and direction inputs.

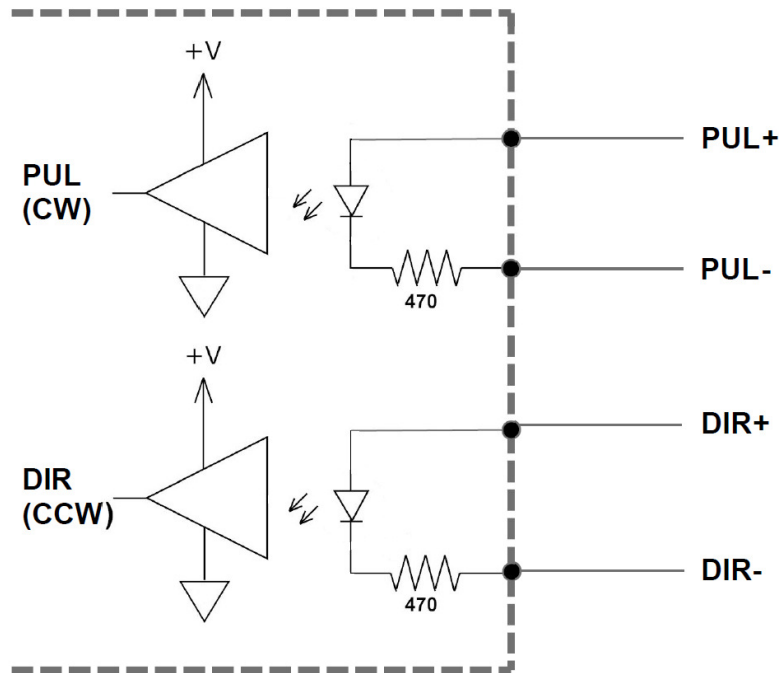


Figure 4.4

Figure 4.5 shows an example of wiring the pulse and direction inputs with a differential output.

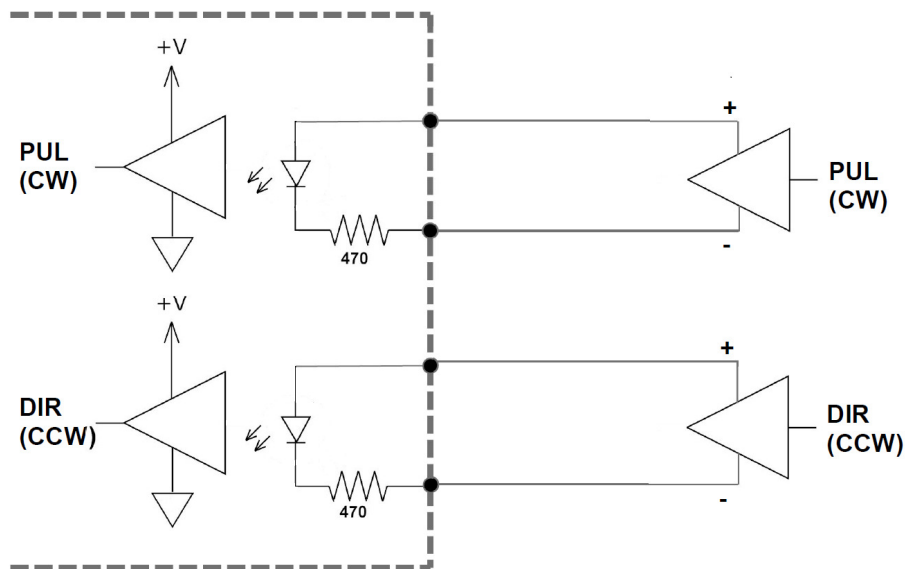


Figure 4.5

Figure 4.6 shows an example of wiring the pulse and direction inputs with an open-collector output.

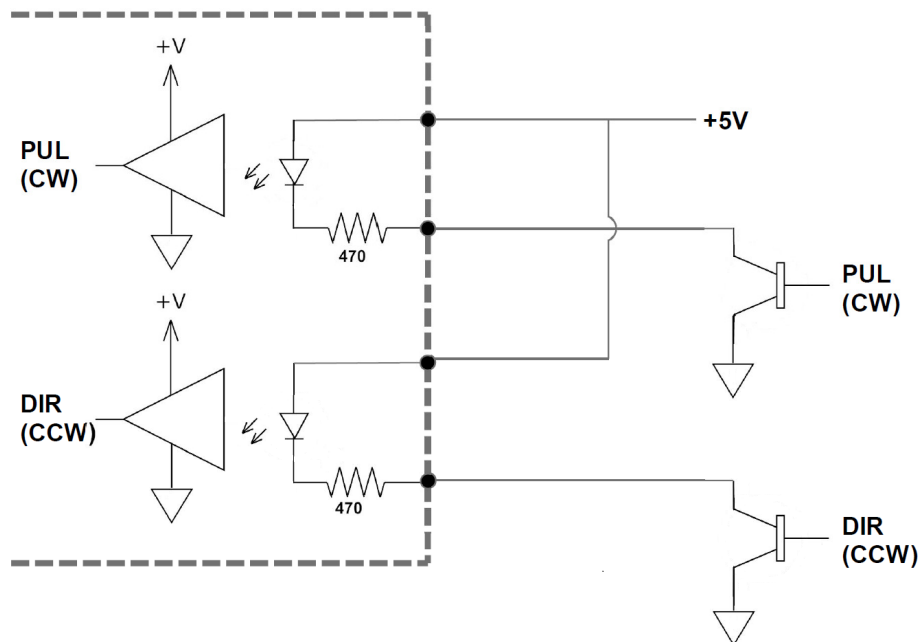


Figure 4.6

Important Note: The recommended voltage between the differential inputs is 5V. An additional current limiting resistor is required to support larger voltages.

4.2.2. Enable Input

Enable input is an opto-isolated input with a 470 Ohm resistor and diode. Figure 4.7 shows the detailed schematic of the opto-isolated enable input.

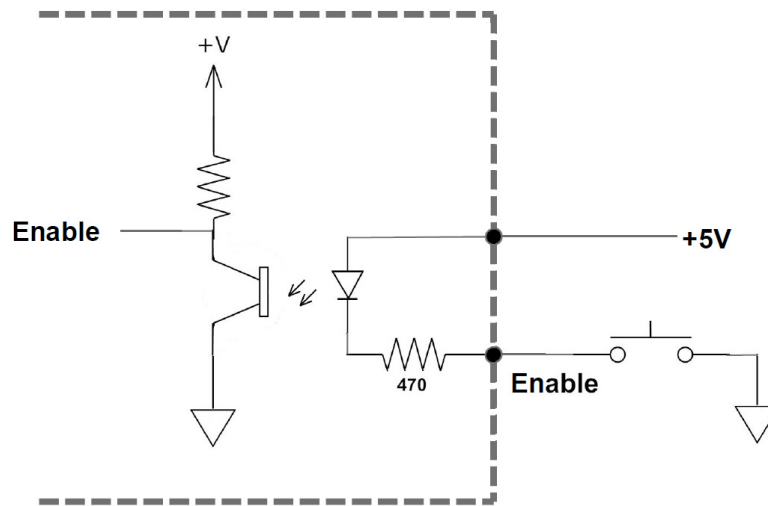


Figure 4.7

4.2.3. Alarm Output

Alarm output is an opto-isolated output with a 100 Ohm resistor. Figure 4.8 shows a wiring example of the opto-isolated alarm output.

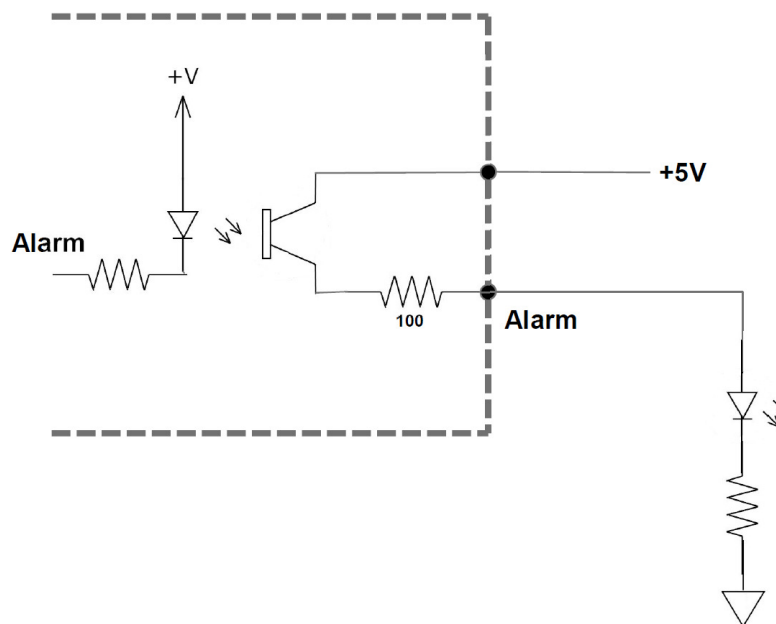


Figure 4.8

5. Stepper Motor Specifications

5.1. Operating Temperature

Electronic components used in the DMX-K-DRV-11 have a maximum ambient operating temperature of **85 C°**. DMX-K-DRV-11 electronics are potted with heat-conductive compound to the housing to evenly distribute the heat and reduce any hot spots in the driver. The housing also has integrated fins to better dissipate the heat.

DMX-K-DRV-11 should be mounted securely to a metallic bracket that can also act as a heat-sink. During operation, the step motor section typically becomes hotter than the driver section. Having the step motor mounted to a heat sink will help dissipate the heat generated by the step motor.

DMX-K-DRV-11 mounting orientation should be such that the fins are oriented vertically for better convection and heat dissipation. See Figure 5.0 below.

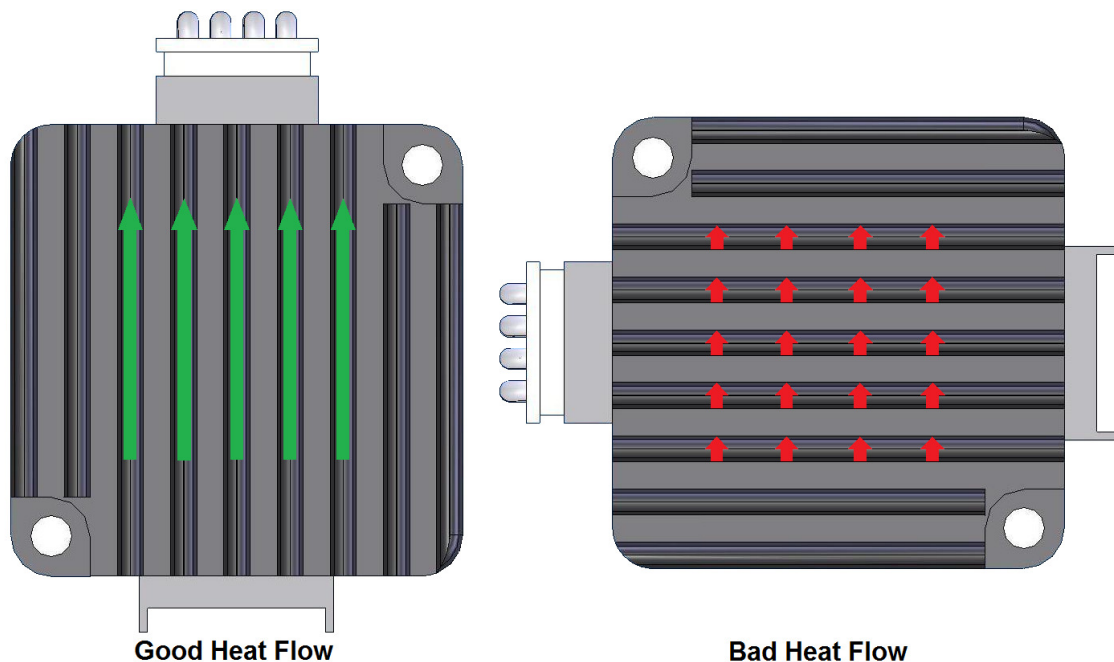


Figure 5.0

5.2. General Stepper Motor Specifications

Following chart shows the specifications of standard step motors used for DMX-K-DRV-11 products. All standard DMX-K-DRV-11 step motors are 1.8 degree bipolar step motors.

Stack Size	Max Amp/ Phase	Resistance / Phase	Inductance / Phase	Inertia
Double	1.8A	1.3 Ohm	0.8 mH	0.07 oz-in ²
Triple	1.8A	1.9 Ohm	1.7 mH	0.1 oz-in ²

Table 5.0

Stack Size	Max Axial Force	Max Radial Force
Double	5N	8N
Triple	5N	8N

Table 5.1

5.3. Stepper Motor Torque

The torque output of the DMX-K-DRV-11 will vary depending on the supply voltage, driver current, motor type, and target speed of the motor.

Increasing the drive current will increase the torque output, however the operating temperature will also increase. While decreasing the drive current will reduce the torque output, it will help reduce the operating temperature as well. Each application will need to adjust this setting to find the desired driver output.

Using a higher voltage to power the DMX-K-DRV-11 will allow the motor to run at faster speeds. Note that increasing the voltage will not increase the maximum holding torque of the motor.

Stepper motors in general will drop off in torque as the target speed of the motor is increased. The following torque curve shows the expected torque output based on the motor speed of the DMX-K-DRV-11.

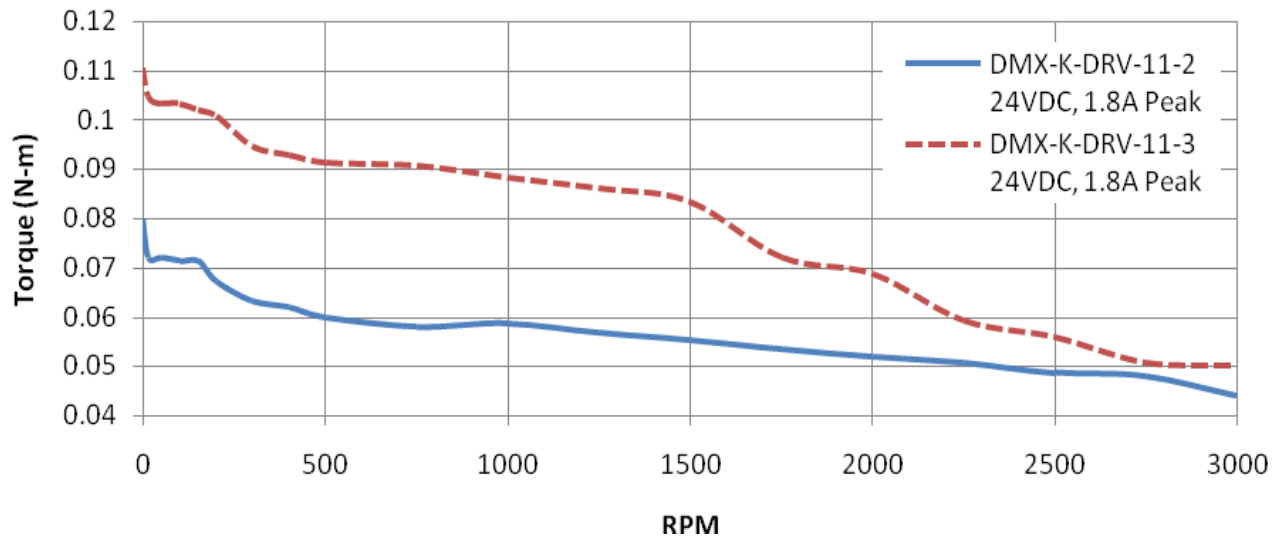


Figure 5.1

6. Stepper Motor Driver Specifications

6.1. Microstep

The standard DMX-K-DRV-11 motor is a 1.8 degree motor, which translates to 200 full steps per revolution. These steps can be divided with microstepping to increase position resolution. The available microstep settings and their corresponding resolution can be found in Table 6.0.

Microstep	Steps/Revolution
Full Step	200
Half Step	400
Quarter Step	800
1/16 Step	3200

Table 6.0

6.2. Current Control

DMX-K-DRV-11 has a configurable current setting from 100mA to 2.0A peak current.

Driver current is set to Run Current when the pulse input is detected and remains in run current while the pulse input is detected.

Once the pulse input has been idle for the duration defined by the Idle Time, the Idle Current will be used to hold the motor in position. The holding torque of the DMX-K-DRV-11 will be defined by the Idle Current.

6.3. Over Temperature Alarm

DMX-K-DRV-11 has a temperature sensor to detect over heating of the driver. Temperature sensing is done only when the driver is enabled. When the temperature goes over the over-temperature alarm value 70 C°, the Alarm Output is turned on. If the temperature goes below the 68 C°, the alarm output is turned off. If the temperature goes over 75 C°, the driver is automatically turned off and remained off until the temperature goes below 68 C°.

The automatic temperature shutdown feature can be enabled or disabled during the configuration process. Refer to Section 7 for further details.

For additional information regarding temperature precautions, refer to section 5.1.

For details on the over temperature alarm, see Figure 6.0.

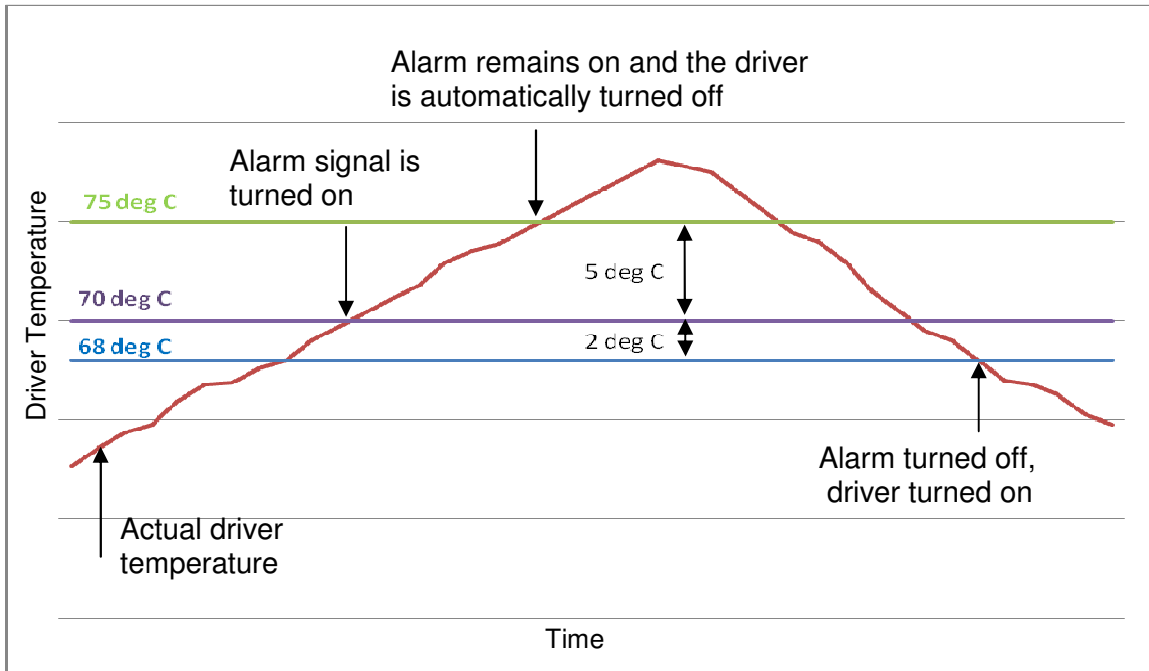


Figure 6.0

7. Driver Configuration

DMX-K-DRV-11 uses patented Dynamic Configuration Method to read and write the driver parameters using the control signals (Pulse, Dir, Enable, and Alarm) of the driver. Dynamic Configuration eliminates the need for jumpers, switches, resistors, potentiometers and communication port for reading and setting the driver parameters. This results in a simple and cost-effective device.

7.1. Configuration Cables

The DMX-CFG-USB-K117 cable is used to configure the DMX-K-DRV-11. This 10-pin cable allows communication with the software detailed in section 7.2 to set driver parameters.

7.2 .Software

Make sure that the USB driver is installed properly before attempting to run the configuration software.

See the DMX-CFG-USB Cables manual for details on configuration. Figure 7.0 shows the configuration interface.

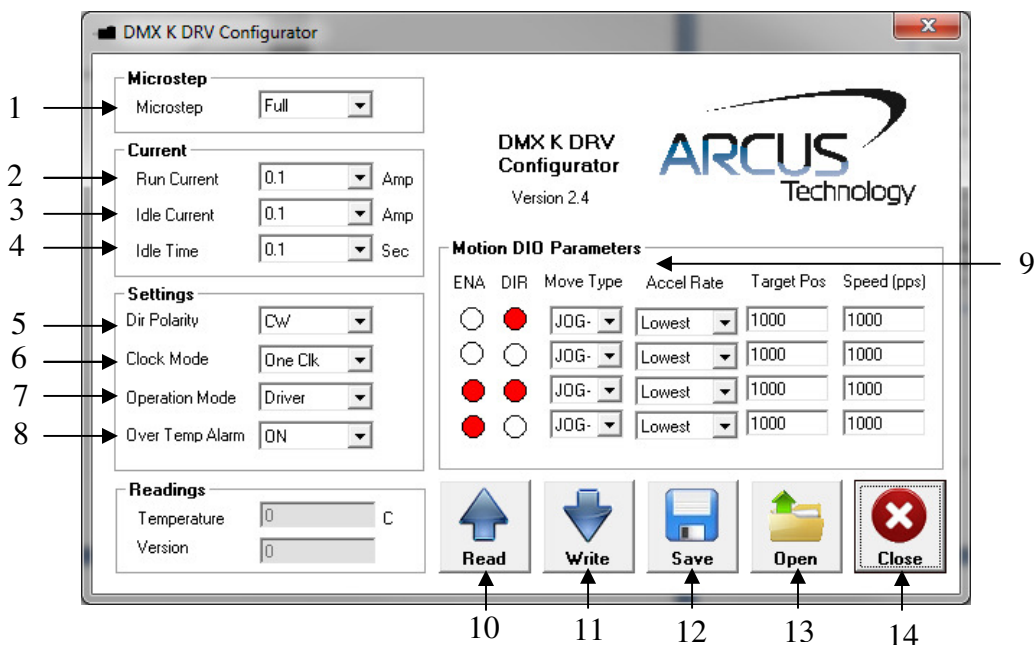


Figure 7.0

1. **Microstep Setting** - Full, Half (1/2), Quarter (1/4), Sixteen(1/16)2.
2. **Run Current** - 100mA to 2.5A peak current
3. **Idle Current** - 100mA to 2.5A peak current.
4. **Idle Time** - 100 msec to 10 sec.
5. **Direction Polarity** - Toggles direction polarity.
6. **Clock mode** - One-clock or Two-clock mode.
7. **Controller or Driver mode:**

- A. Driver mode requires pulse and direction signals to move the motor.
 - B. Controller mode uses the Enable and Direction inputs to specify a set of motion parameters and the Pulse input to start and stop motion.
8. **Over Temperature Shutdown** - Determines whether or not the DMX-K-DRV-11 disables when the temperature rises above a specified threshold. See Figure 7.0 for details.
9. **DIO motion parameters** - Up to four motion profiles can be set and used when the DMX-K-DRV-11 is in controller mode.
10. **Read** - Reads settings from the device and displays them.
11. **Write** - Writes the displayed settings to the device.
12. **Save** - Save driver settings to a text file.
13. **Open** - Load previously saved driver settings from a text file.
14. **Close** - Exit the configurator.

7.3. Default Settings – Driver Mode

μ Step	Run Current (A)	Idle Current (A)	Idle Time (ms)	Dir	Clock	Mode	Over Temp Shutdown
16	1.0	0.5	500	CW	One	Driver	ON

Table 7.0

Contact Information

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The information in this document is believed to be accurate at the time of publication but is subject to change without notice.