numatics®

# FLM Series

## Stepper Motors and Control Packages

*We're everywhere you need us to be!*

# Stepper Systems





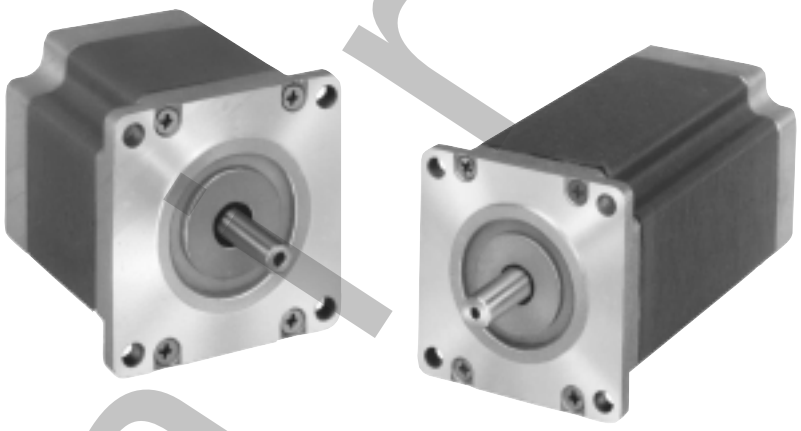

Rev. 11/03



ORDER ONLINE

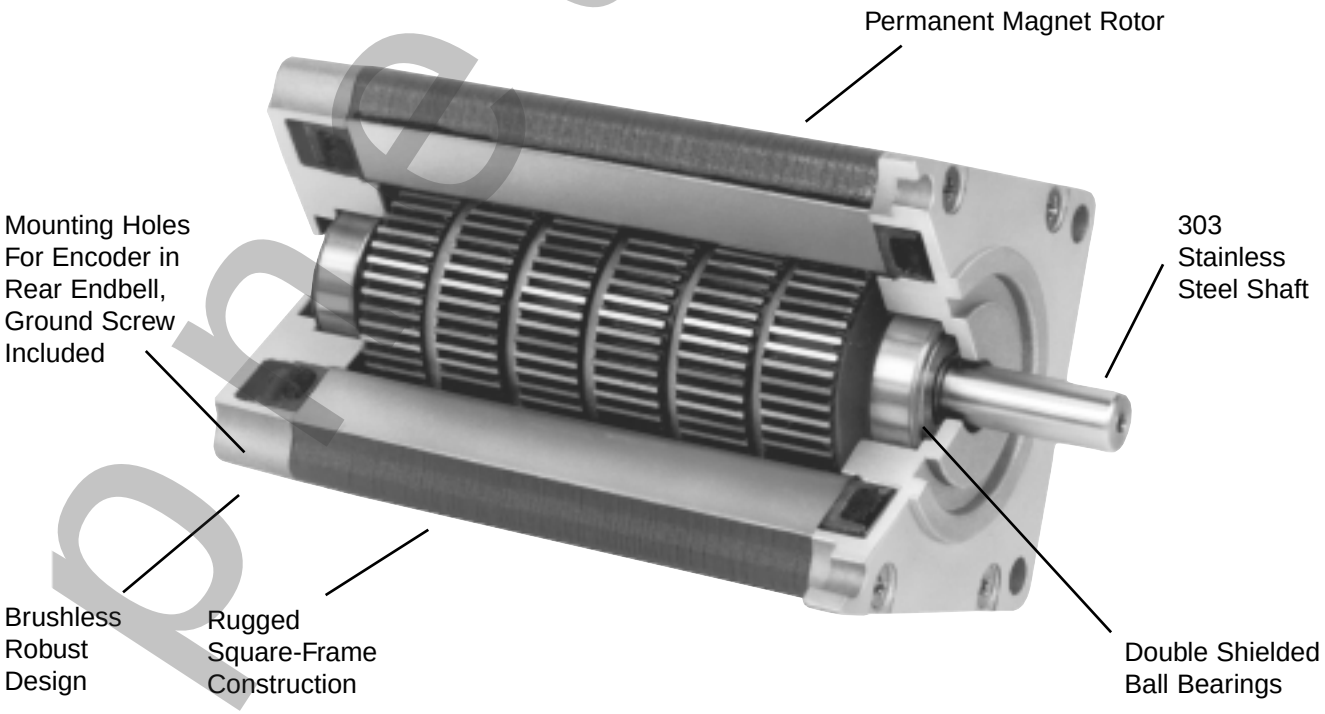
# FLM Series High Torque Brushless Stepper Motors

The FLM Series stepper motors are available in both NEMA 23 and 34 frame sizes. Winding confirmations increase motor compatibility with most step motor drives. The FLM Series are also compatible for most full, half and micro-stepping applications.



## Features

7 sizes with holding torque ratings from 68 to 1155 oz-in (48 to 816 Ncm)
NEMA 23 and 34 frame sizes available
± 2% typical step accuracy
Operate in full-step (1.8°) or half-step (0.9°) increments
Can be microstepped to achieve increments as small as .0072°
Can operate at rates to 20,000 steps per second (6000 rpm)
UL and Canadian Recognized
CE certification
Up to 200% rated torque reserve capacity for peak performance (limited duty cycle)
Can withstand over 2 times rated current without demagnetization
Motors available with optional encoder for closed loop applications
Wide range or windings available with 4 or 6 connections for use with bipolar or unipolar drives
Rugged construction to provide long life
Optional cast terminal box available





## How to Order

F LM 6 2 11 XX

**Motor Type**
F = Four Lead
S = Six Lead
T = Terminal Strip

**Motor Series**
6 = NEMA 23
9 = NEMA 34

**Motor Stacks**
0
1
2
3

**Encoder Options**
XX = No Encoder
E2 = 200 Line Count
E4 = 400 Line Count
E5 = 500 Line Count
E12 = 1200 Line Count

**Motor Windings**

| | |
|---|---|
| 02 | 08 |
| 03 | 10 |
| 04 | 11 |
| 05 | 13 |
| 07 | 14 |

Example order:

Part Number: FLM6211XX*
Part Description: Four leaded, NEMA 23 size motor with 2 stacks and standard motor windings, without encoder.

* When entering an order, DO NOT use spaces or dashes.

## Stepper Motor Cable Assemblies

### Stepper Motor to Drive Cable

16 AWG, Both Ends Unterminated

| P/N | DESCRIPTION |
|---|---|
| MC 010 | 10 Foot Length |
| MC 025 | 25 Foot Length |
| MC 050 | 50 Foot Length |

* For longer lengths, contact factory

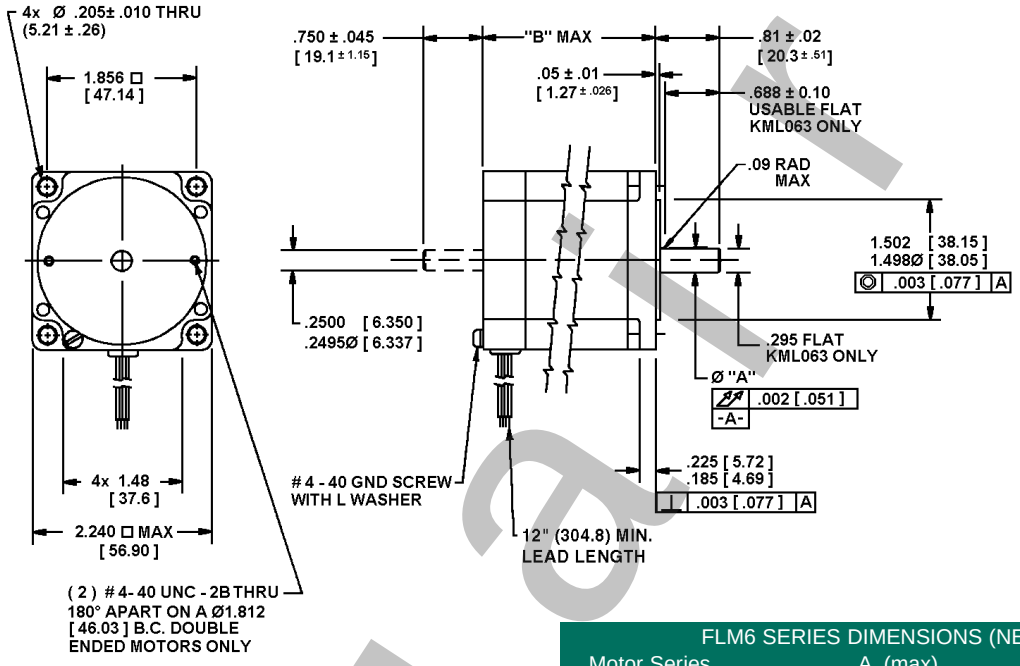
### Stepper Motor Encoder Cable

9 Pin “D” Male Connector One End, Unterminated Other End

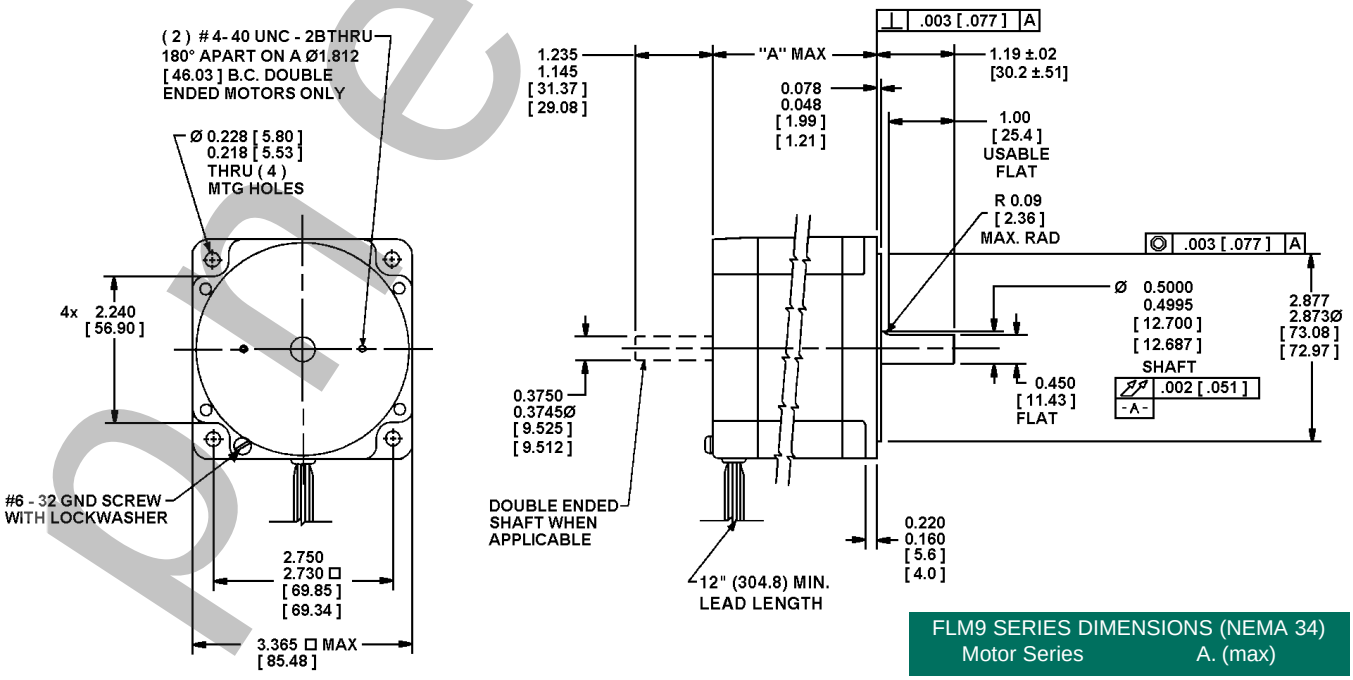
| P/N | DESCRIPTION |
|---|---|
| MEC 010 | 10 Foot Length |
| MEC 025 | 25 Foot Length |

# Dimensions

top dimensions = inches
bottom dimensions (in parenthesis) = millimeters




| FLM6 SERIES DIMENSIONS (NEMA 23) | | |
|---|---|---|
| Motor Series | A. (max) | B. (max) |
| FLM 60 | 0.2500/0.2495 (6.350/6.337) | 1.64 (44.7) |
| FLM 61 | 0.2500/0.2495 (6.350/6.337) | 2.21 (56.2) |
| FLM 62 | 0.2500/0.2495 (6.350/6.337) | 3.06 (77.8) |
| FLM 63 | 0.3125/0.3120 (7.938/7.924) | 4.06 (103.2) |

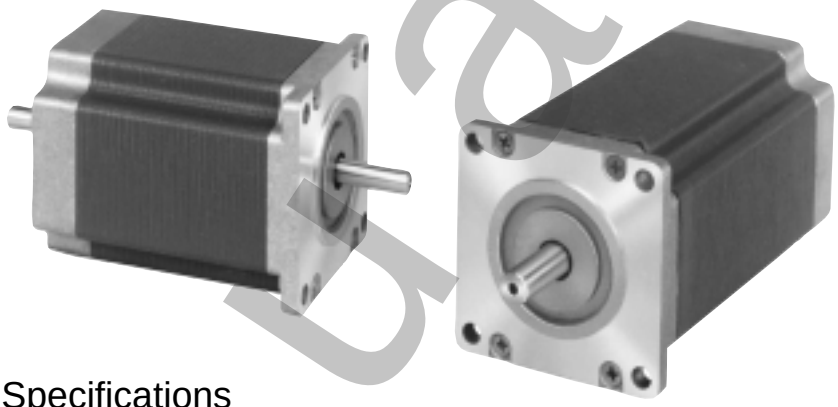



| FLM9 SERIES DIMENSIONS (NEMA 34) | |
|---|---|
| Motor Series | A. (max) |
| FLM 91 | 2.57 (65.3) |
| FLM 92 | 3.77 (95.3) |
| FLM 93 | 4.97 (126.3) |



# High Torque Step Brushless Motor Specifications

| MOTOR SERIES | HOLDING TORQUE AT RATED CURRENT (MINIMUM) OZ-IN (NCM) UNIPOLAR | BIPOLAR | INERTIA OZ-IN-SEC2 (KG-CM2) | ROTOR OVERHANG LOAD LBS (KG) | MAXIMUM THRUST LOAD LBS (KG) | MAXIMUM TORQUE (TYPICAL) OZ-IN (NCM) | RESIDUAL MOTOR WEIGHT LBS (KG) |
|---|---|---|---|---|---|---|---|
| FLM 60 | 54 (38) | 68 (48) | 0.00154 (.108) | 15 (6.81) | 25 (11.35) | 2 (1.41) | 1.03 (.47) |
| FLM 61 | 128 (90) | 170 (120) | 0.0034 (.24) | 15 (6.81) | 25 (11.35) | 3 (2.11) | 1.6 (0.73) |
| FLM 62 | 188 (134) | 250 (177) | 0.0056 (.395) | 15 (6.81) | 25 (11.35) | 6 (4.24) | 2.3 (1.04) |
| FLM 63 | 263 (186) | 350 (247) | 0.0084 (.593) | 15 (6.81) | 25 (11.35) | 7 (4.94) | 3.2 (1.45) |
| FLM 91 | 305 (215) | 385 (272) | 0.016 (1.13) | 25 (11.35) | 50 ( 22.7) | 10 (7.06) | 3.8 (1.73) |
| FLM 92 | 610 (431) | 770 (544) | 0.031 (2.19) | 25 (11.35) | 50 (22.7) | 15 (10.6) | 6.2 (2.82) |
| FLM 93 | 915 (646) | 1155 (816) | 0.047 (3.32) | 25 (11.35) | 50 (22.7) | 23 (16.2) | 8.7 (3.95) |



# Stepper Motor Specifications

| MOTOR TYPE | NUMBER OF LEADS | CURRENT IN AMPS | VOLTAGE (VDC) | RESISTANCE (OHMS) | INDUCTANCE (MH) |
|---|---|---|---|---|---|
| FLM 6002 | 4 | 1.05 | 3.76 | 3.58 | 15.80 |
| FLM 6005 | 4 | 2.70 | 1.71 | 0.636 | 2.53 |
| FLM6008 | 4 | 4.00 | 1.11 | 0.277 | 1.00 |
| FLM6011 | 4 | 5.30 | 0.98 | 0.186 | 0.63 |
| FLM 6103 | 4 | 1.40 | 4.19 | 3.00 | 15.50 |
| FLM 6105 | 4 | 2.70 | 2.30 | 0.851 | 5.07 |
| FLM 6111 | 4 | 5.40 | 1.34 | 0.248 | 1.14 |
| FLM 6203 | 4 | 1.50 | 4.40 | 2.93 | 16.90 |
| FLM 6207 | 4 | 3.30 | 2.48 | 0.75 | 3.38 |
| FLM 6213 | 4 | 6.60 | 1.40 | 0.212 | 0.847 |
| FLM 6304 | 4 | 1.80 | 5.00 | 2.75 | 17.00 |
| FLM 6307 | 4 | 3.30 | 3.29 | 0.997 | 5.20 |
| FLM 6313 | 4 | 6.60 | 1.85 | 0.280 | 1.54 |
| FLM 9105 | 4 | 2.70 | 3.00 | 1.11 | 11.40 |
| FLM 9107 | 4 | 3.30 | 2.52 | 0.764 | 7.52 |
| FLM 9113 | 4 | 6.60 | 1.26 | 0.191 | 1.88 |
| FLM 9207 | 4 | 3.25 | 3.48 | 1.07 | 11.20 |
| FLM 9213 | 4 | 6.50 | 1.74 | 0.268 | 2.86 |
| FLM 9307 | 4 | 3.40 | 4.90 | 1.44 | 17.90 |
| FLM 9308 | 4 | 4.00 | 3.95 | 0.988 | 12.80 |
| FLM 9310 | 4 | 5.10 | 3.21 | 0.629 | 8.31 |
| FLM 9314 | 4 | 6.80 | 2.45 | 0.36 | 4.48 |

## Stepper Motor Specifications continued

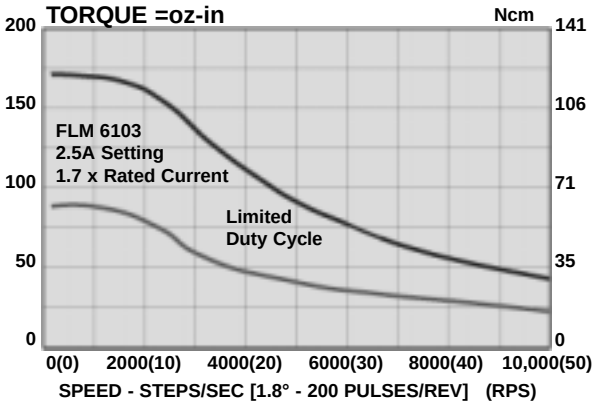
Temperature Rise . . . . . 80 C (176 F) or less as measured by the change in resistance method when both phases are energized with constant rated current

Motor Case Temperature . . . . . 100 C (212 F ) max.

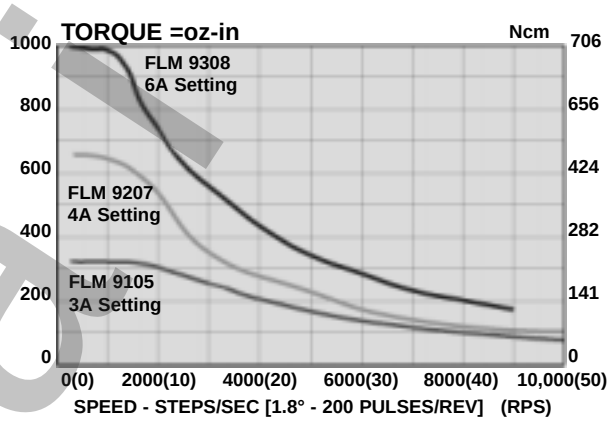
Ambient Temperature Range . . . . . -40 C to +65 C (-40 F to 149 F )

Dielectric Strength . . . . . sufficient to withstand 500 Vrms @ 60 Hz applied winding to winding and 1200 Vrms applied winding to the frame for one second min.

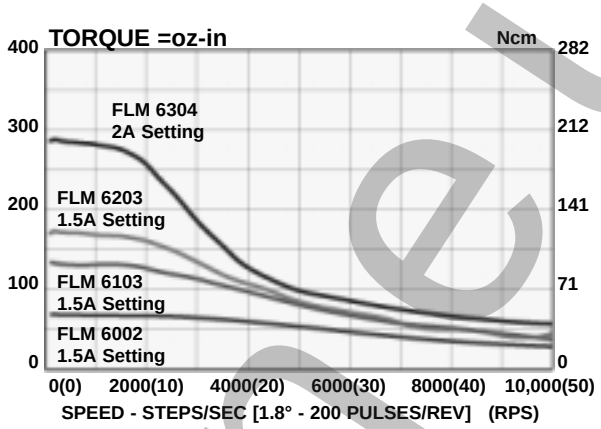
Insulation Resistance . . . . . 100 Megaohms or more with 500 Vdc applied between the winding and the frame



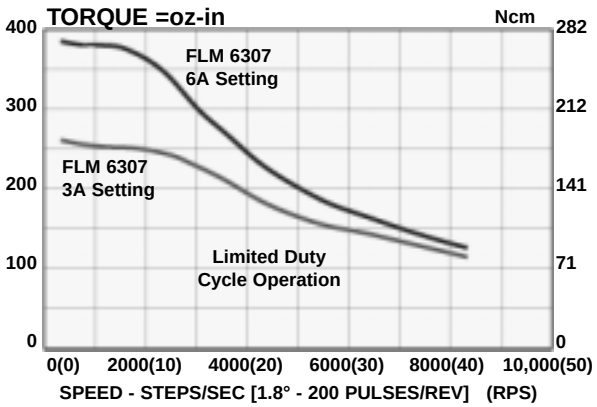

**FLM 61 Motor with NSDP6C Drive**




**FLM 90 Series Motors with NSDP6C Drive**

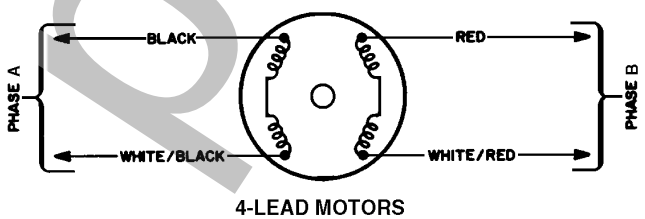



**FLM Series Motors with NSDP6C Drive**



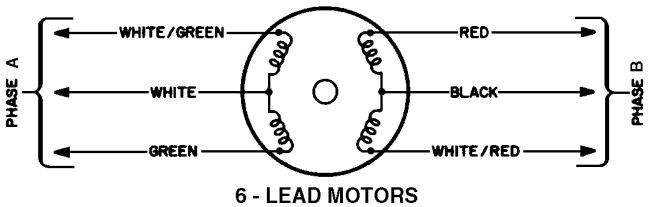

**FLM 6307 vs FLM 6307 with 2X Boost, NSDP6C Drive**

## Wiring Diagrams




4-LEAD MOTORS

**Bipolar Configuration**




6 - LEAD MOTORS

**Optional Unipolar Configuration**



# Step Motor Drive Component and Packages

3.

1. Depending upon the application, a power supply may be required. The PS-Series power supply supplies unregulated power to the various drives. Each power supply is capable of converting 120V or 240V AC power to low voltage DC power.

2. NMC's NSMD-Series modular drives deliver up to 8 amperes of output current. The modular drive unit develops the maximum torque performance from Numatics FLM-Series stepper motors. Each modular drive will require a power supply to provide the required input current.

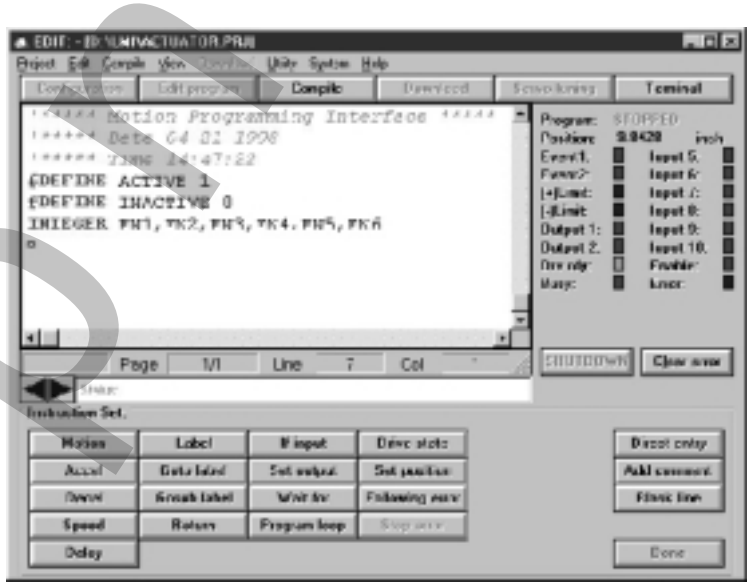
3. The NSMC Series is a programmable motion controller utilizing a very basic Windows based programming language. The NSMC has 16 inputs (8 isolated and 8 non-isolated) and 8 outputs (4 isolated and 4 non-isolated).

4. NMC's controller packages offer greater flexibility and convenience. The controller package includes the power supply, driver and controller in one unit which provides less space requirements, less wiring and less headaches.

5. DMP software is used across all Numatics controllers. This Windows® based software is point and click, simple and easy with no special programming codes to memorize.

2.

4.




5.



# NSMD4 Modular Drive

This modular bipolar chopping drive is designed to provide up to 3.5 amps of current which develops maximum speed and torque performance from the Numatics Motion Control FLM Series
stepper motors. The NSMD4 is a full and half step drive. It is capable of 400 steps per revolution, ideal for limited frequency controller pulse rates. The NSMD4 is designed to operate at reduced temperatures. Therefore, an additional heat sink is not required in most applications. We recommend the drive package to be mounted flat to the system enclosure.

## Features:

- Full and half stepping
- Multiple mounting surfaces
- Advanced control circuitry
- Switch selectable current levels to 3.5 amps
- 40 Vdc
- Bi-polar switching four phase step motor drive
- Over-voltage protection
- Full short circuit protection
- Optically isolated inputs
- Windings OFF function
- Easy access screw clamp terminals
- Efficient thermal design for longer life
- MOSFET power devices
- LED fault light

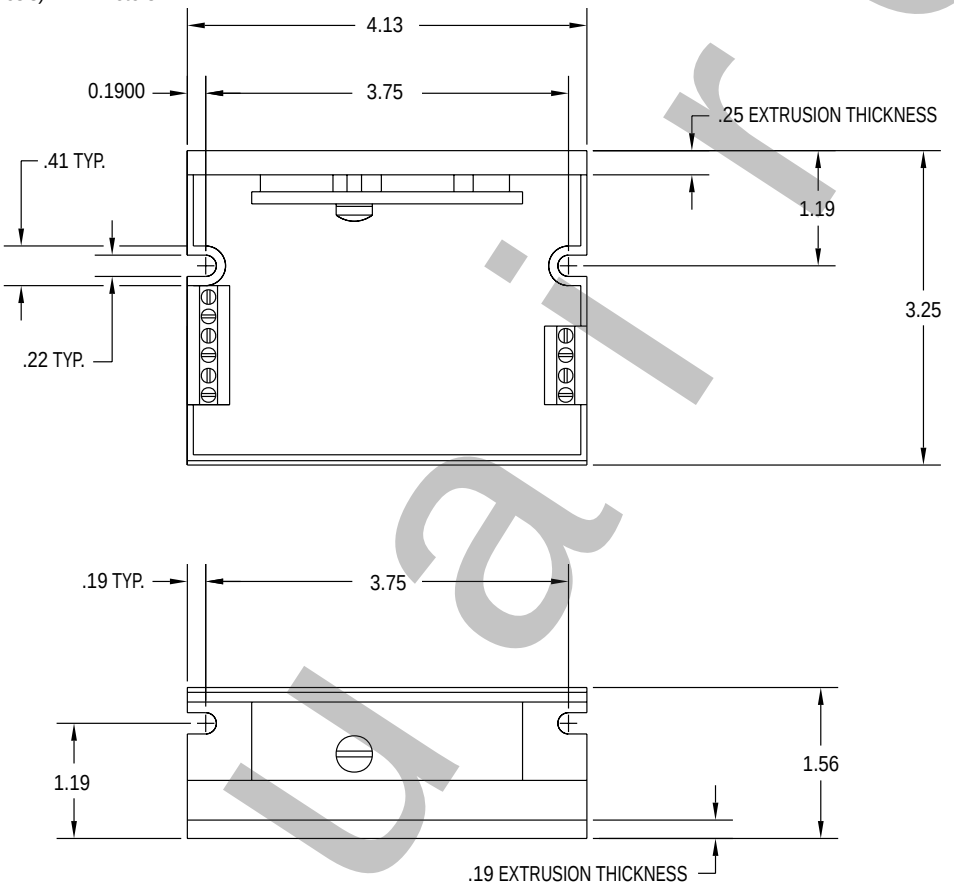
## Specifications:

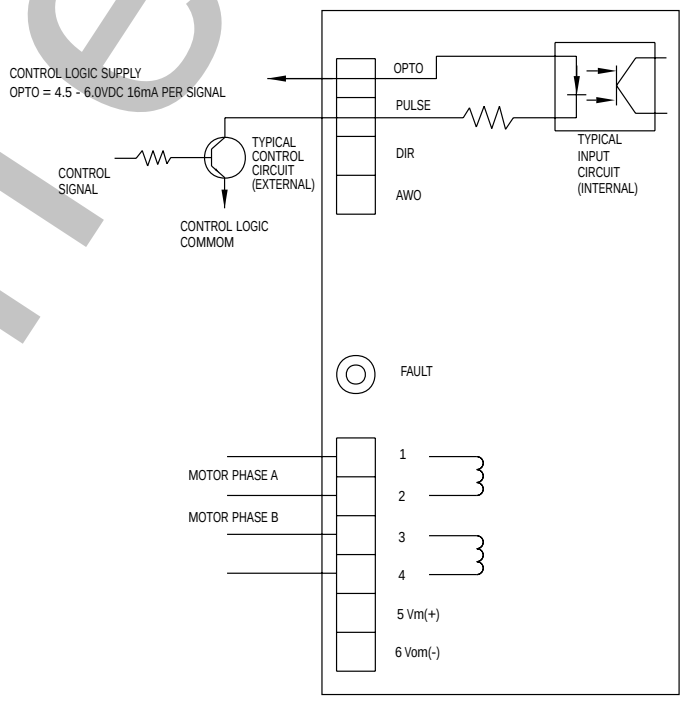
| | |
|---|---|
| Input Power Required | 24 Vdc unregulated power supply |
| Max Drive Dissipation | 35 watts |
| Recommended Power Supply | Numatics Motion Control # PS30VDC5A |
| Drive Type | modular dc power input bipolar chopping drive |
| Chop Frequency | 20Kz minimum (above audible range) |
| Output Device Type | FET |
| Phases | Two phases |
| Output Current | .5 to 3.5 amps by .5 amp increments |
| Output Resolution | full step @ 200 ppr<br>half step @ 400 ppr |
| Pulse Input | input type – sinking, high speed optocoupler<br>max rise time – 1 microsecond<br>max fall time – 1 microsecond<br>signal active (steps) on low-high transition (.2mA to 16 mA sink) |
| All Other Inputs | input type – sinking, opto-coupler<br>delay time < 25 microseconds |
| Short Circuited Protected | phase to phase & ground to ground |
| Unbalanced Phase Protection | Yes (ground) |
| Under Voltage Protection | Yes |
| Transient Over Voltage Protection | Yes |
| Operating Temperature | +32°F to 122°F (0 to 50°C) |
| Max Heat Sink Temperature | 158°F (70°C) |
| Storage Temperature | -40°F to 167°F (-40°C to +75°C) |
| Humidity | 95% max. non-condensing |
| Altitude | 10,000 feet (3048 m) above sea level |
| Motor Series | Numatics Motion Control FLM-Series |
| Minimum Phase Inductance | .5mH |
| Maximum Phase Resistance (including leads) | Rmax = .25 x Vdc supply/I setting |



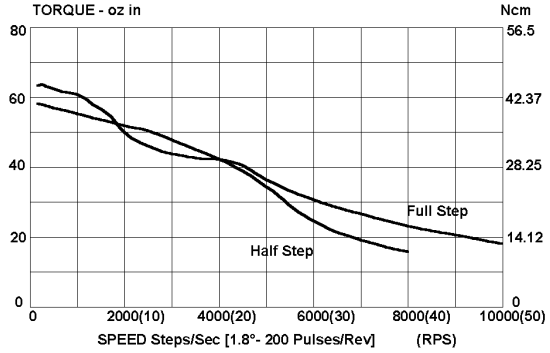
# NSMD4 Dimension and Wiring Diagram

top dimensions = inches
bottom dimensions (in parenthesis) = millimeters

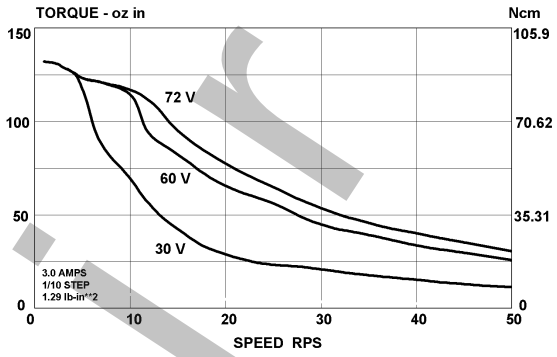


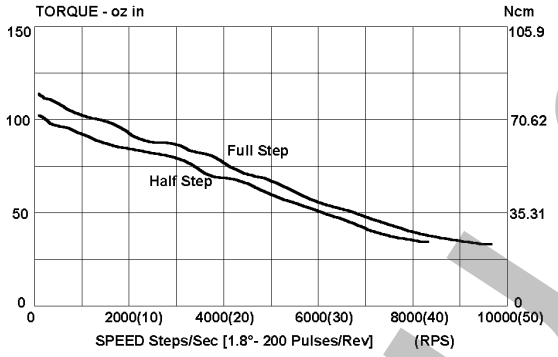
# NSMD4 Motor Torque Curves



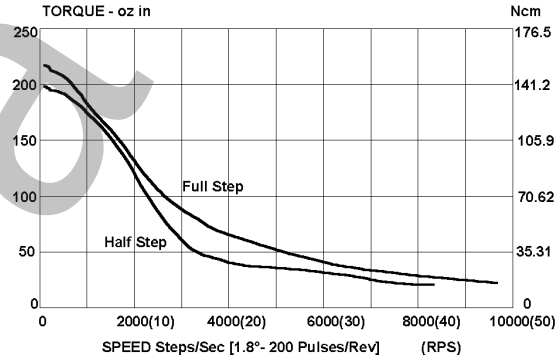

**FLM6005, 2.5 AMP, 36 V BUS**



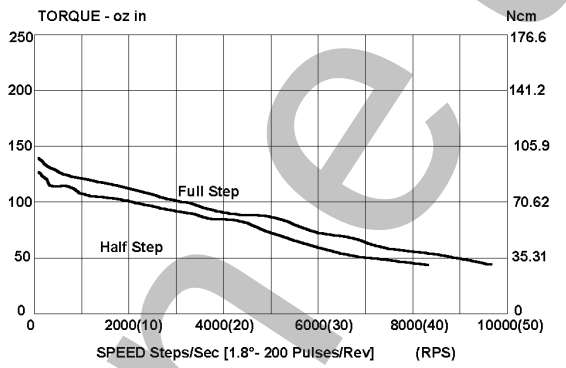

**FLM6105, 2.5 AMP, 36 V BUS**



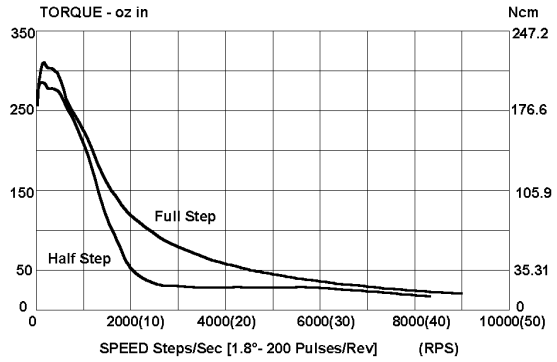

**FLM6111, 3.5 AMP, 36 V BUS**



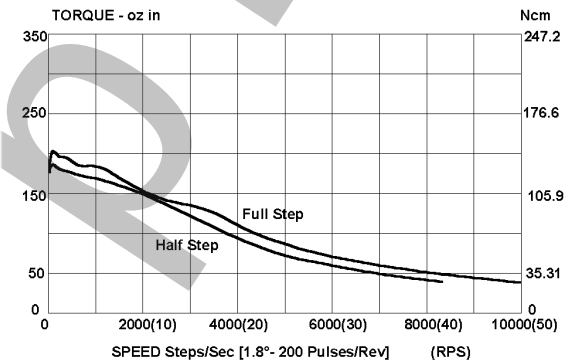

**FLM6207, 3.0 AMP, 36 V BUS**



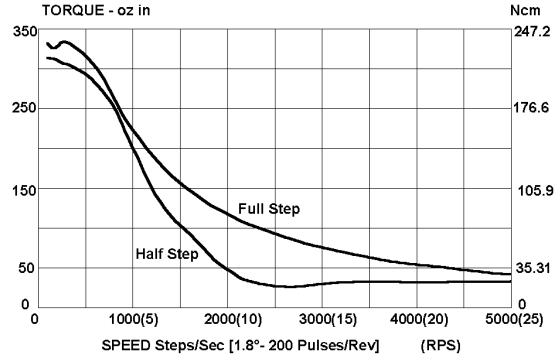

**FLM6213, 3.5 AMP, 36 V BUS**




**FLM6307, 3.0 AMP, 36 V BUS**




**FLM6313, 3.5 AMP, 36 V BUS**




**FLM9107, 3.0 AMP, 36 V BUS**



# NSMD8 Modular Translator Drive

This modular bi-polar PWM drive is designed to provide up to 8 amps of current which develops maximum speed and torque performance from the Numatics Motion Control FLM Series stepper motors. The NSMD8 is a full and half step drive providing up to 20,000 micro steps per revolution for smooth slow speed operation. The NSMD8 is designed to operate at reduced temperatures. If motor current is rated at 4 amps or above a heat sink will be required. Reference NMC Part Number HSMD8.

## Features:

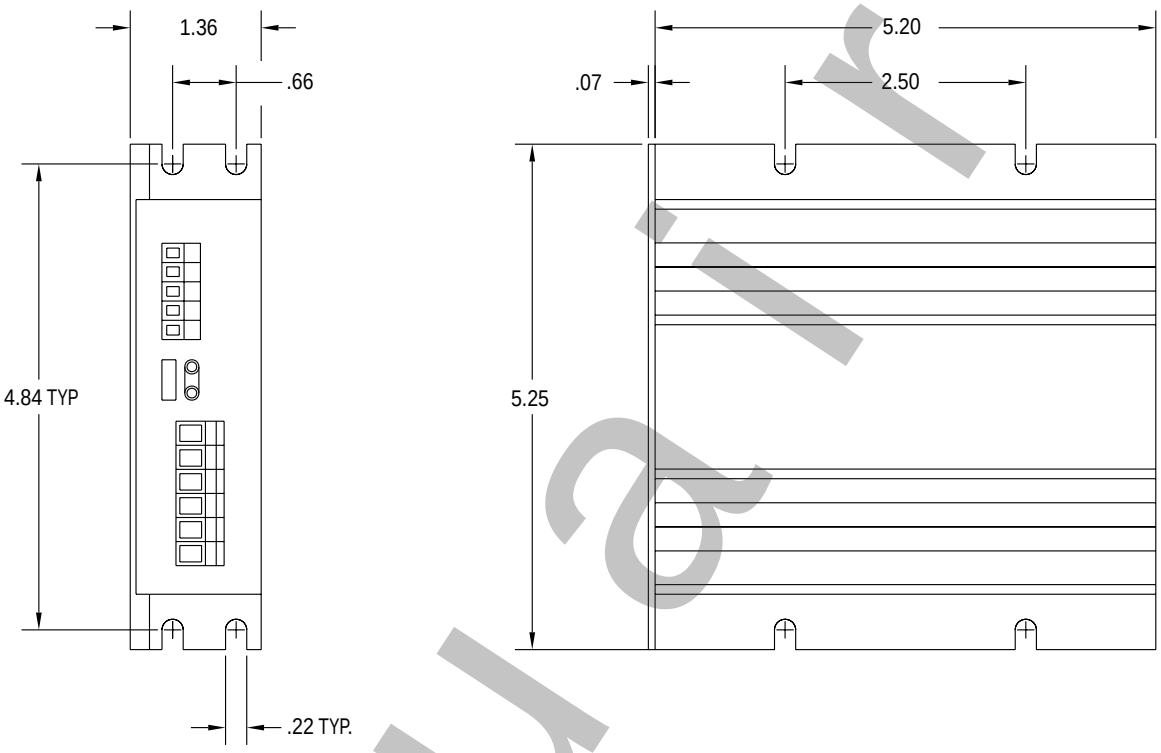
- Full, half and micro stepping to 20,000 steps
- Multiple mounting surfaces
- Switch selectable current levels 3 to 8 amps
- Single input voltage 20 to 80 VDC
- Bipolar switching four phase step motor drive
- Over-voltage protection
- Full short circuit protection
- Optically isolated inputs
- Windings OFF and Reduced Current inputs
- Easy access screw clamp terminals
- Auto Reduce Motor Current at standstill selectable
- MOSFET power devices
- LED fault light

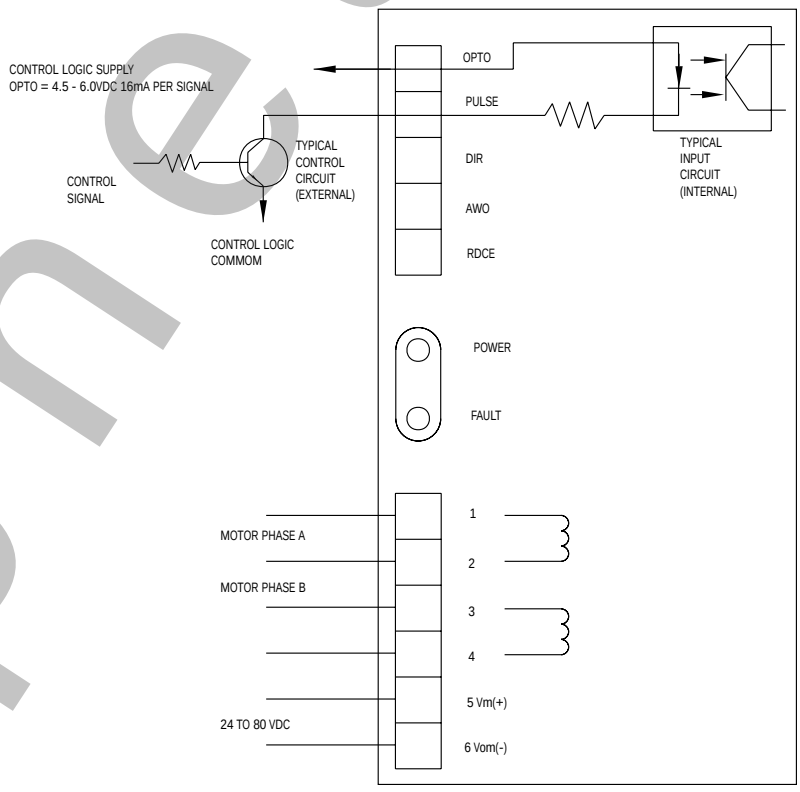
## Specifications:

| | |
|---|---|
| Input Power Required | 20 to 80 Vdc unregulated power supply |
| Max Drive Dissipation | 40 watts |
| Recommended Power Supply | Numatics Motion Control # PS55VDC7A |
| Drive Type | modular DC power input bipolar chopping drive |
| Chop Frequency | 24Kz minimum (above audible range) |
| Output Device Type | MOSFET |
| Phases | two phase micro stepping output |
| Output Current | 3 to 8 amps by 1 amp increments |
| Output Resolution | full step @ 200 ppr, 1/2 (400 ppr) 1/5 (1,000 ppr) 1/10 (2,000 ppr) 1/20 (4,000 ppr) 1/25 (5,000 ppr) 1/50 (10,000 ppr) 1/100 (20,000 ppr) |
| Pulse Input | input type – sinking, high speed optocoulper max rise time – 1 microsecond max fall time – 1 microsecond signal active steps on low-high transition (.2mA to 16 mA sink) |
| All Other Inputs | delay time < 50 microseconds |
| Direction Input | delay time < 5 microseconds |
| Short Circuited Protected | phase to phase & ground to ground |
| Unbalanced Phase Protection | Yes (ground) |
| Over Voltage Protection | Yes |
| Transient Over Voltage Protection | Yes |
| Over Temperature Protection | Yes |
| Operating Temperature | +32°F to 122°F (0° to 50°C) |
| Max Heat Sink Temperature | 158°F (70°C) |
| Storage Temperature | -40°F to 167°F (-40°C to +75°C) |
| Humidity | 85% max. non-condensing |
| Altitude | 6,600 feet (2,000 m) above sea level |
| Motor Series | Numatics Motion Control FLM-Series |
| Minimum Phase Inductance | .5mH |
| Maximum Phase Resistance (including leads) | Rmax= .25 x Vdc supply/I setting |

# NSMD8 Dimensions and Wiring Diagram

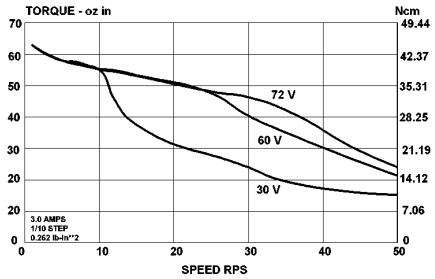
top dimensions = inches
bottom dimensions (in parenthesis) = millimeters



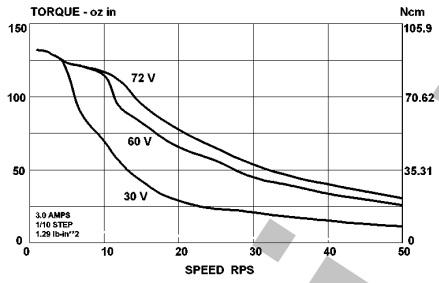





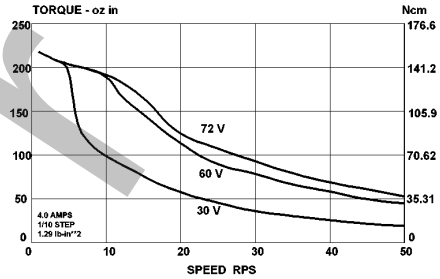
# NSMD8 Motor Torque Curves



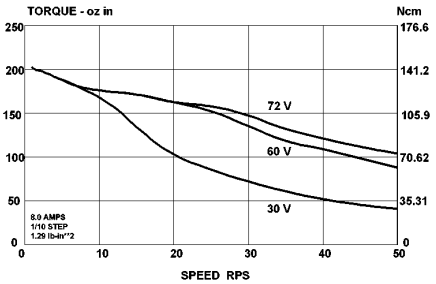

**FLM6005 Motor, 3.0 Amp**



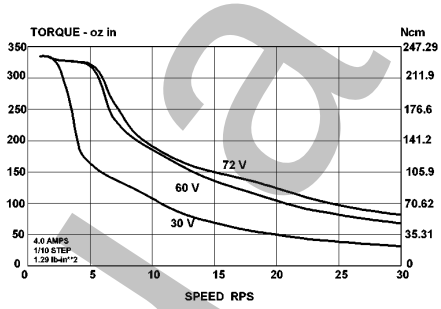

**FLM6105 Motor, 3.0 Amp**



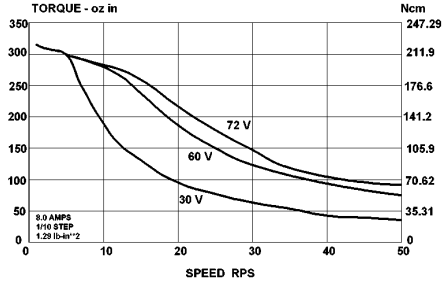

**FLM6207 Motor, 4.0 Amp**



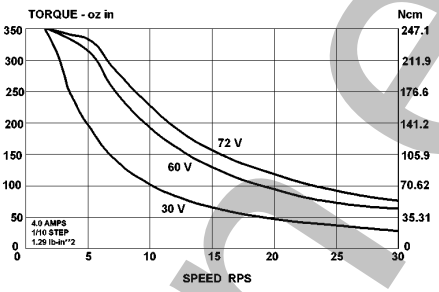

**FLM6213 Motor, 8.0 Amp**



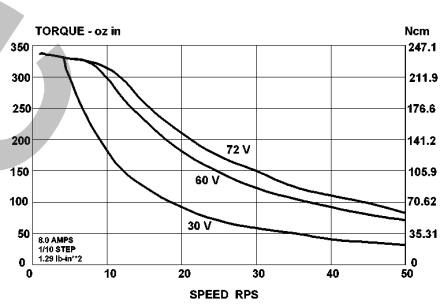

**FLM6307 Motor, 4.0 Amp**



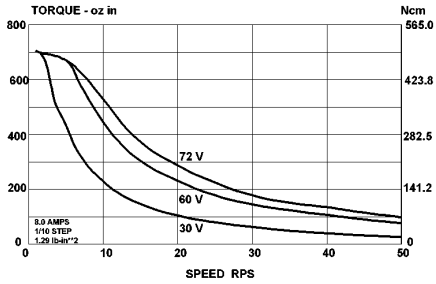

**FLM6313 Motor, 8.0 Amp**



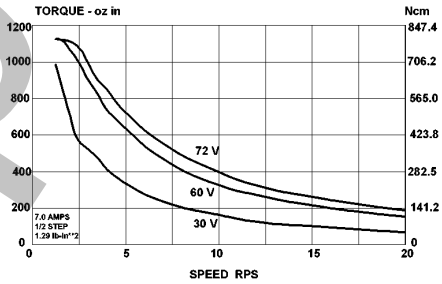

**FLM9107 Motor, 4.0 Amp**



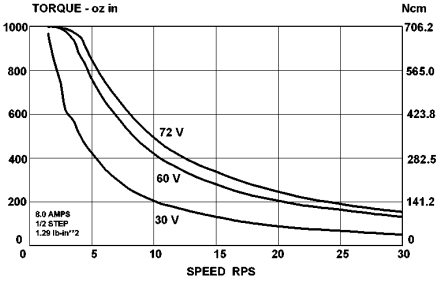

**FLM9113 Motor, 8.0 Amp**




**FLM9213 Motor, 8.0 Amp**




**FLM9310 Motor, 7.0 Amp**




**FLM9314 Motor, 8.0 Amp**

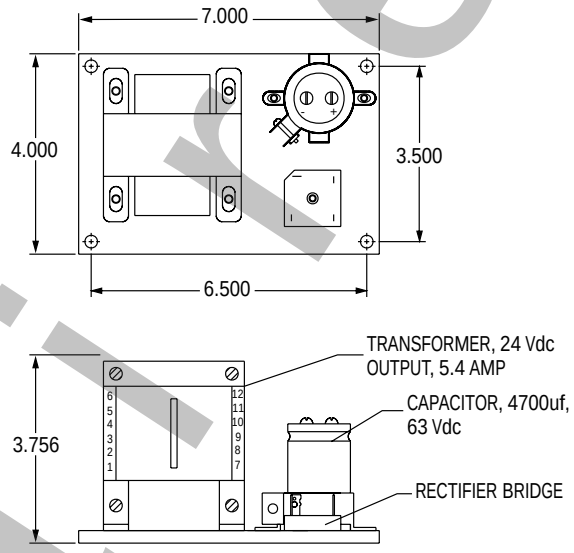
## PS30VDC5A Power Supply

Is an easy solution to supply unregulated power to the NSMD4 Translator Drive. This assembly includes all components for a 30 Vdc unregulated power supply. This power supply is capable of converting 120 Vac and 240 Vac, at 50/60 Hz.

User must provide hook up connections using a minimum of 16 AWG wire. NMC also recommends that the customer supply a 2 amp time delay, 250 V fuse to be added to the AC input power circuit if another fuse is not already in place.

The PS30VDC5A power supply is an open chassis design for proper airflow. All components are mounted on an aluminum plate. The plate has four holes for mounting, 1/4 inch screws are recommended.

The following diagrams give details on how to wire the power supply for both 120 V and 240V input supply.




## PS55VDC7A Power Supply

Is an easy solution to provide unregulated power to the NSMD8 Translator Drive. This assembly includes all components for a 55.5 Vdc unregulated power supply. This power supply is capable of converting 120 Vac and 240 Vac at 55/60 Hz. The PS55VDC7A power supply utilizes a toroidal transformer for compact size and low EMI/RFI radiation.

The PS55VDC7A is an open frame, bulkhead mount unit with front facing terminal strip and fuse position for easy access. The power supply can be mounted vertically or horizontally. DO NOT mount unit upside down.

**AC Input Connections:**
Before connecting AC power to the power supply, input voltage needs to be identified, 120 Vac or 240 Vac. The input voltage will determine which terminals will be used. The chart below will identify the corresponding terminals.

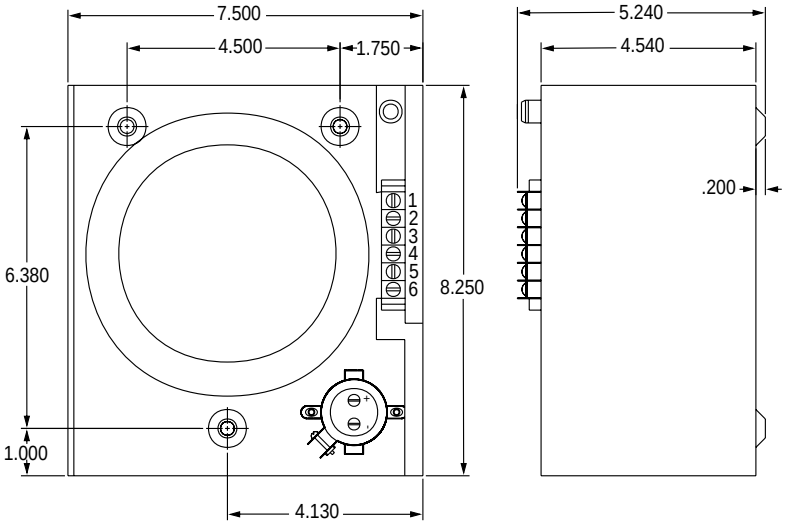
120 Vac Input:

| | |
|---|---|
| Terminal 1 | HOT |
| Terminal 2 | COMMON |
| Terminal 4 | CHASSIS GROUND |

240 Vac Input:

| | |
|---|---|
| Terminal 1 | HOT |
| Terminal 3 | COMMON |
| Terminal 4 | CHASSIS GROUND |

NOTE: Terminal 4, CHASSIS GROUND should always be connected to the AC system ground for safe operation.




**DC Output Connections:**
Connections for the DC output are terminals 5 (+) and 6(-) on the terminal strip. Keep the wiring between the drive and the motor as short as possible. Twist the two wires together using approximately six twists per foot.

numatics®

Stepper Systems

# Model NSMC Motion Controller

The NSMC Motion Controller is an economical open chassis design controller with built-in power supply for controlling stepper systems. The NSMC Controller utilizes a basic type programming language for easy programming. This windows based program is a graphical point and click program with English type text for simplicity and ease of use. There is no requirement to learn new programming skills.

The NSMC is designed with 8 inputs and 4 outputs, both optically isolated and 8 inputs and 4 output, non optically isolated. For applications utilizing digital encoder feedback (to indicate motor position to controller) the NSMC has an encoder input for closed loop operation, differential or single ended.

The NSMC also includes two methods of serial communication. Port 1 is the HOST port, configurable for RS-232 or RS-485. Port 2 is used for differential RS485 four wire user communications.

## Features:

110 to 240V ±10% AC input
12Vdc I/O power supply
16 bit microprocessor
Windows based programming
Additional I/O
Optically Isolated I/O
  8 inputs and 4 outputs
Non-optically isolated I/O
  8 inputs and 4 outputs
One 0 to 10V analog input (10 bits)
2-Serial ports RS232 & RS485 up to 38k baud
Built-in AC line filter and MOV's
Closed loop modes for stall detection, position verification and correction
LED fault lights
IEC 1000-4-4 standards for electrical noise compliance
UL recognized and CE pending

## Specifications:

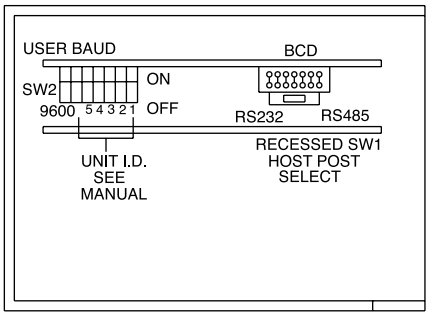
Input Power Required . . . . . 95 to 265 Vac, 50/60 Hz
Power Dissipation . . . . . 10 watts
AC Current . . . . . 0.5 amperes
Fuse Rating . . . . . 250 Volts, 2 amperes
Isolated Digital I/O . . . . . 12 Vdc internal
I/O power 11.5 to 14 Vdc @ 100 mA
or user supplied 5 to 24 Vdc
Inputs (IN1 through IN8)
  Sink Mode . . . . . on stage voltage range (+Vopto = 12Vdc) 0V to + 6Vdc
input current (Vin = 0V) 6 mA
  Source Mode . . . . . on stage voltage range (-Vopto = 0V) 4.5V to 24V
input current (Vin = 12Vdc) 6mA
  Response Time (sink or source) . . . . . opto turn on delay: 10µS typical
opto turn off delay: 75µS typical
Programmable Outputs (sink mode only)
  OUT1 through OUT4 . . . . . continuous current rating per output: 250mA max.
. . . . . maximum collector voltage: 25V
. . . . . on stage voltage @ 250mA: 1.5V max.
Encoder . . . . . +5 Vdc
  Power Supply Output . . . . . +5Vdc (±5%) @ 100mA current
  Signal Inputs . . . . . TTL level, single ended or differential
. . . . . channels A and B in phase quadrature
  Input Current . . . . . A+,A-,B+,B-,Z+,Z- @ ±5mA min.
Analog Inputs
  Voltage Range . . . . . 0 to 10 V reference to GND
  Resolution . . . . . 10 bits or 9.77mV
  Absolute Accuracy . . . . . ±0.3V worst case
  Sample Rate . . . . . 500 Hz min.
  Bandwidth . . . . . 100 Hz max.
Operating Temperature . . . . . +32°F to +122°F (0°C to +50°C)
Storage Temperature . . . . . -40°F to +167°F (-40°C to +75°C)
Humidity . . . . . 95% maximum, non condensing
Altitude . . . . . 10,000 feet (3,048 meters) max.

Non-Isolated I/O IN9 through IN16:
These inputs may be used with open collector outputs without an external supply by connecting the output device common (ground) to signal ground on the unit, and the open collector to the input pin. An internal resistor to +5Vdc is provided.
  Logic High Input Level . . . . . 25V > Vsource > 4.5V, or open circuit
  Logic Low Input Level . . . . . 1.2V max.
  Logic Low Current With Input @ GND . . . . . -1mA max.

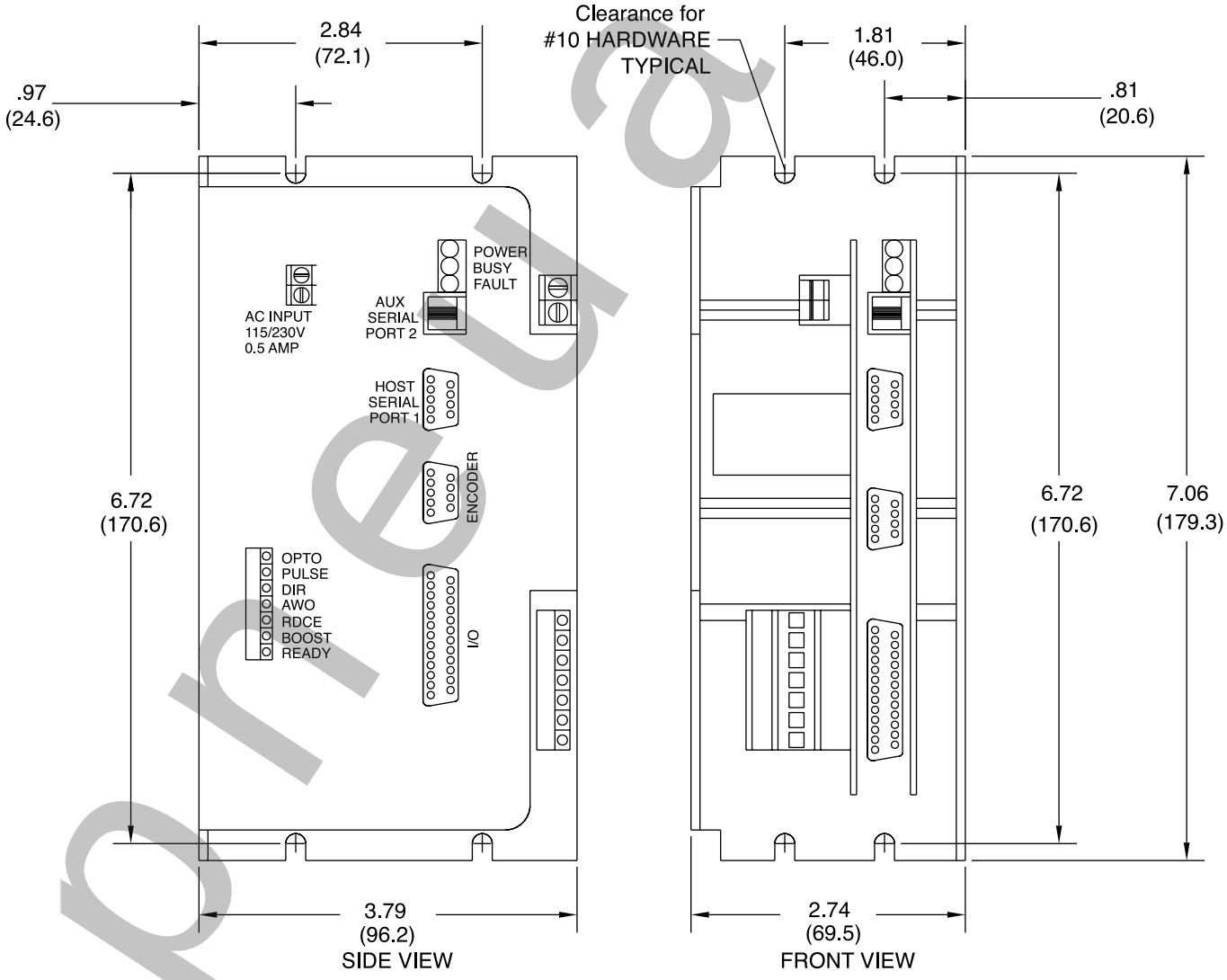
OUT5 through OUT8: These are open collector, sink only TTL outputs, and are NOT isolated from the unit's +5V logic supply. Proper care must be taken to ensure noise is not injected onto these signals. The user I/O supply must be referenced to GND on the controller.
  Active Output Current . . . . . 0.6V max. @ 20mA
  Permissible Output Current . . . . . 20mA
  Permissible Output Voltage . . . . . 24Vdc

# NSMC Dimensions and Wiring Diagram

top dimensions = inches
bottom dimensions (in parenthesis) = millimeters




TOP VIEW





# NSDP6 Motor Drive Package

The NSDP6 Motor Drive is a packaged drive system which includes the driver and power supply in one device. The package concept eliminates individual components, reduces control cabinet space and eliminates hard wiring of an independent power supply. The line operated high voltage dc bus (180V) develops high speed and high torque. The NSDP6 is designed with switch selected current control. Current control is selectable from 1 to 6 amps, eliminating the need for a current sense resistor while facilitating simple drive to motor matching.

The NSDP6 is a flexible drive package with a capable range of 200 full steps to 50,000 micro-steps per revolution. This provides for smooth low speed operation.

## Features:

- Full, Half and Micro-stepping
- 6 amp packaged drive selectable from 1 to 6 amps
- Bipolar chopper design 4 phase stepper drive
- Switch selectable micro stepping
- Optically isolated inputs
- Boost, Reduce and Windings Off functions
- Drive ready output
- Push to test, self test function
- LED fault lights
- Meets IEC 801-4 (level 3) standard for immunity against electrical interference (noise) in industrial applications
- UL recognized for use in US and Canada

## Specifications:

| | |
|---|---|
| Input Power Required | 90 to 135 Vac, 50/60 Hz |
| Max Drive Dissipation | 50 watts |
| Drive Type | packaged line operated bipolar chopper drive |
| Chop Frequency | 40 KHz typical (above audible range) |
| Output Device Type | MOSFET and IGBT |
| Number of Phases | two phase output, full, half and microstep |
| Output Current | 1 to 6 amps in 1/2 and 1 amp increments |
| Output Resolution | full step (200 ppr), half step (400ppr), 1/5 (1,000ppr), 1/10 (2,000 ppr), 1/16 (3,200 ppr) 1/36 (7,200 ppr) 1/50 (10,000 ppr), 1/100 (20,000 ppr), 1/125 (25,000 ppr) and 1/250 (50,000 ppr) |
| Pulse Inputs | input type sinking high speed optocoupler<br>max frequency – 1 megahertz<br>max rise time – 1 microsecond<br>max fall time – 1 microsecond<br>signal active steps on low<br>to high transition (.2mA to 16 mA sink) |
| All Other Inputs | input type – Sinking, optocoupler<br>delay time - < 50 microseconds |
| Short Circuit Protection | Yes |
| Unbalanced Phase Protection (ground) | Yes |
| Over Voltage Protection | Yes |
| Over Temperature Protection | Yes |
| Operating Temperature | +32° F to +122° F (0° C to + 50°C) |
| Maximum Heat Sink Temperature | +158°F (+70°C) |
| Storage Temperature | -40° F to +167° F (-40° C to +75°C) |
| Humidity | 95% maximum, noncondensing |
| Altitude | 10,000 feet (3,048) max. above sea level |
| Motor Series | Numatics Motion Control FLM-Series |
| Phase Inductance Range | 8 mH to 64 mH |
| Max Phase Resistance | 20 ohms at 6 amps setting (including motor leads) |



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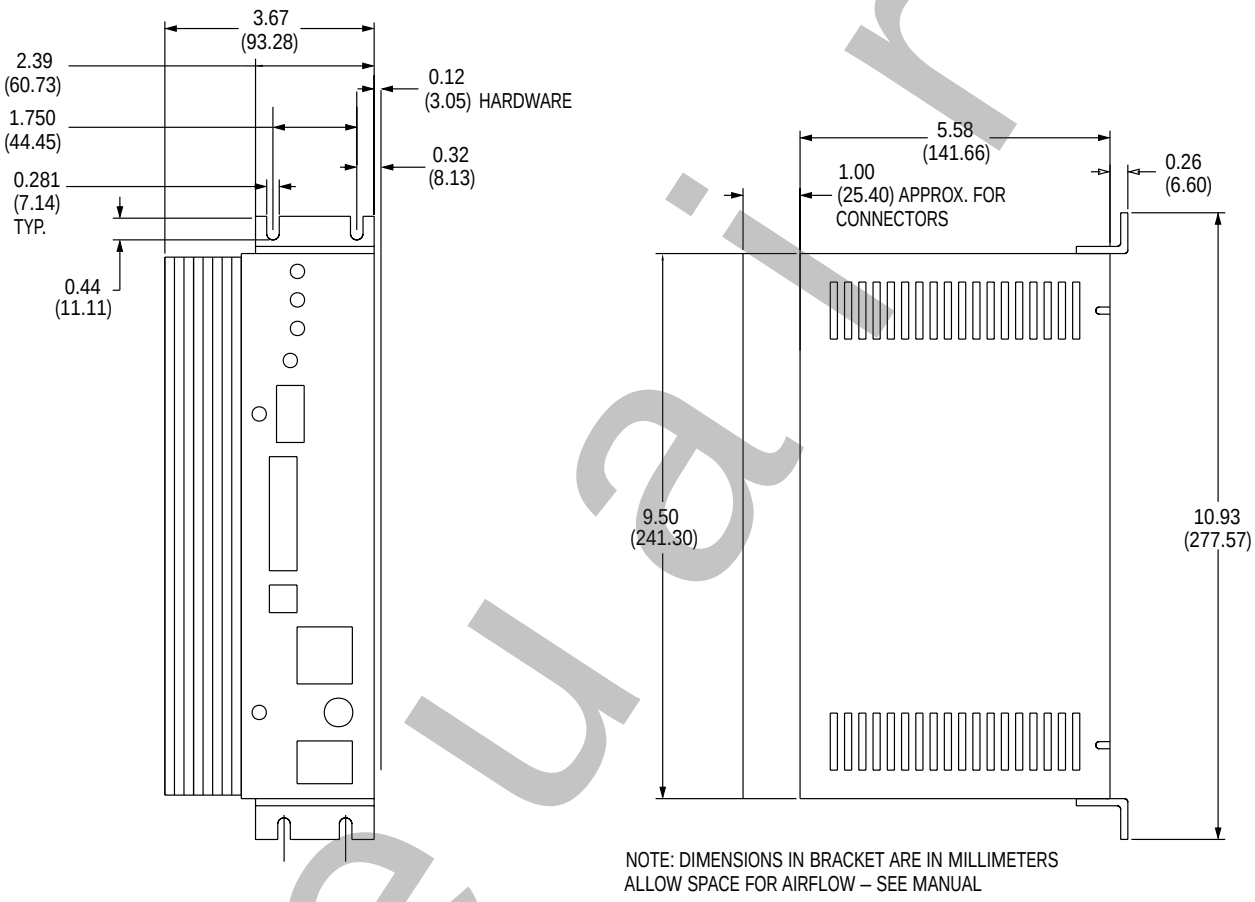
# NSDP6 Motor Drive Package

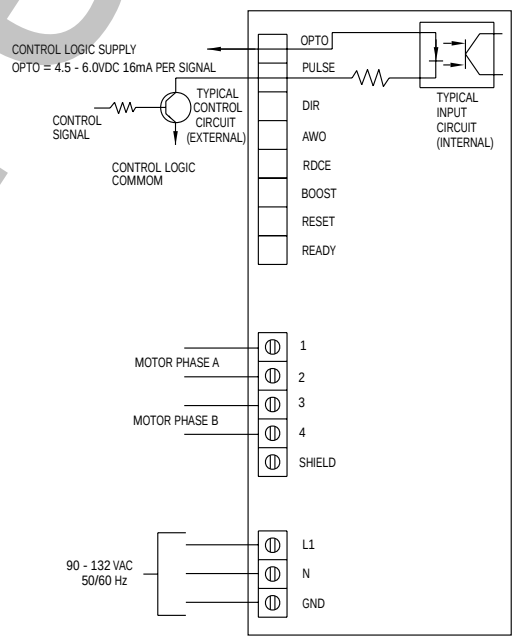
## Dimensions

top dimensions = inches
bottom dimensions (in parenthesis) = millimeters



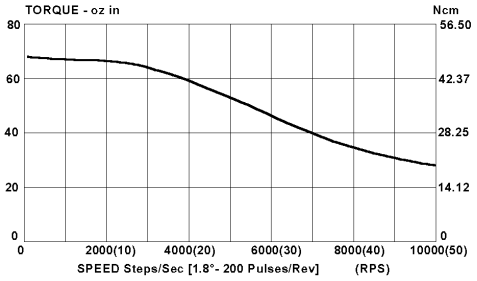

NOTE: DIMENSIONS IN BRACKET ARE IN MILLIMETERS
ALLOW SPACE FOR AIRFLOW – SEE MANUAL

## External Connections

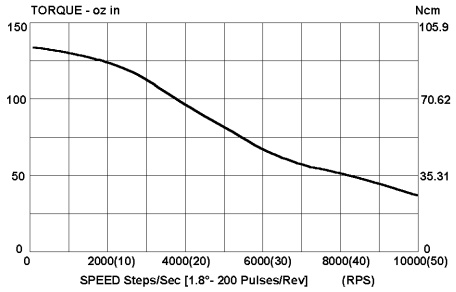




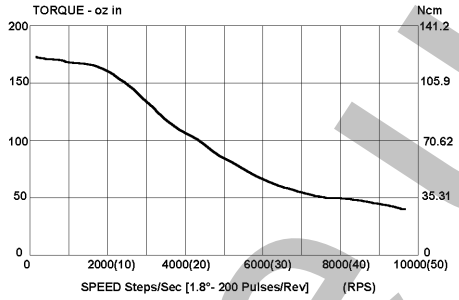
# NSDP6 Motor Torque Curves



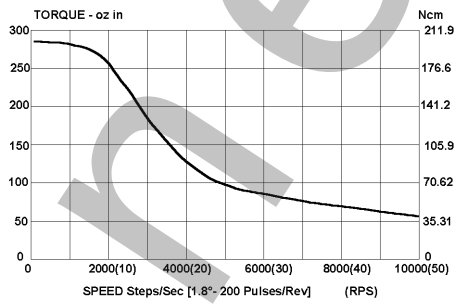

**FLM6002 Motor, 1.5 Amp**



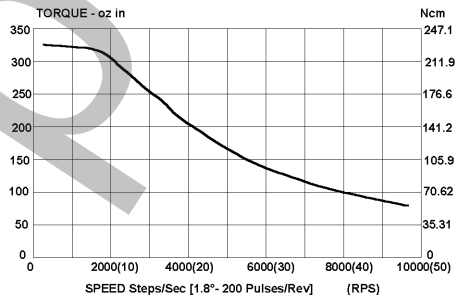

**FLM6103 Motor, 1.5 Amp**



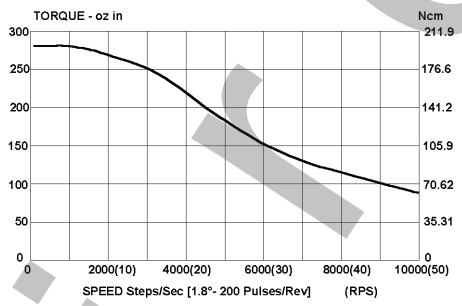

**FLM6203 Motor, 1.5 Amp**



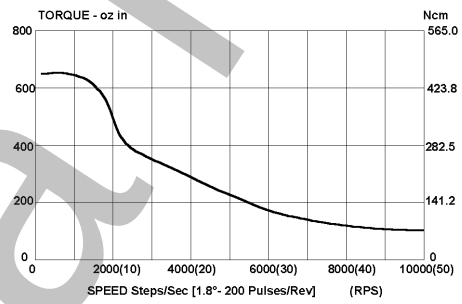

**FLM6304 Motor, 2.0 Amp**



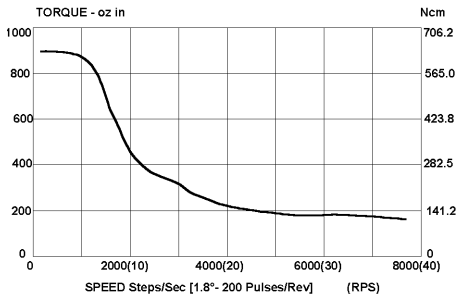

**FLM9105 Motor, 3.0 Amp**



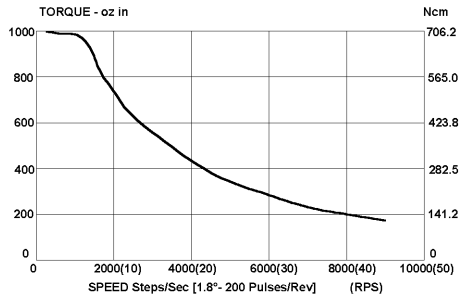

**FLM9107 Motor, 3.0 Amp**




**FLM9207 Motor, 4.0 Amp**




**FLM9308 Motor, 4.0 Amp**




**FLM9310 Motor, 6.0 Amp**

numatics®

Stepper Systems

# NSDP6C Motor Drive Controller Package

The NSDP6C Controller Motor Drive Package is a complete controller system, which includes a controller, driver and power supply in one device. The NSDP6C is the same as the NSDP6 drive package except the NSDP6C has a built-in 16 bit micro processor controller. The package concept eliminates individual components, reduces control cabinet space and eliminates hard wiring between components. The NSDP6C is designed with switch selected current control. Current control is selectable from 1 to 6 amps, eliminating the need for a current sense resistor while facilitating simple drive to motor matching.

The NSDP6C comes standard with SUB D connectors. However, an external wiring card (NMC Part Number WC-6C) is available for terminated wire connections, as shown in photograph.

## Features:

- 8 Inputs and 4 Outputs, Optically Isolated
- 8 Inputs and 4 Outputs, Non-Isolated
- 1 Input, 0-10V Analog
- 12V DC I/O Power Supply
- Encoded Input for Closed Loop Operation
- 6 amp packaged drive selectable from 1 to 6 amps
- Boost, Reduce and Windings Off functions
- Drive ready output
- Push to test, self test function
- LED fault lights
- Meets IEC 1000-4-4 Standards for electrical noise compliance
- UL recognized for use in US and Canada

Specifications:

Input Power Required . . . . . 90 to 132 Vac, 50/60 Hz
AC Current . . . . . 7 amperes
Max Drive Dissipation . . . . . 50 watts
Fuse Rating . . . . . 250 volts, 8 amperes
Number of Phases . . . . . Two phase output, full, half and microstep
Output Resolution . . . . . Preset to 1/64 of a step or 12,800 microsteps/rev.
Isolated Digital I/O . . . . . 12Vdc internal power (11.5 to 14 Vdc @ 100 mA)
If user supplied 5 - 24 Vdc
Inputs (IN1 - IN8) . . . . . Sink Mode (+Vopto = 12Vdc)
On stage voltage range (Vin) 0V to +6Vdc
Input current (Vin = 0V) -6mA
Source Mode . . . . . On stage voltage range (Vin) 4.5V - +24Vdc
Input current (Vin = 12Vdc) 6mA
Response Time Both Sink or Source . . . . . Opto Turn On Delay 10µS typical
Opto Turn Off Delay 75µS typical
Programmable Outputs Sink Mode
(OUT1 - OUT4) . . . . . Continuous current rating per output 250mA max
Maximum collector voltage 25V max
On stage voltage @ 250mA 1.5V max

Non-Isolated I/O
Inputs (IN9 - IN16) . . . . . These inputs may be used with open collector outputs without an external supply by connecting the output device common (ground) to signal ground on the unit, and the open collector to the input pin. An internal pullup resistor to + 5V is provided.
Logic High Input Level . . . . . 25V > Vsource > 4.5V, or open circuit
Logic Low Input Level . . . . . 1.2V max
Logic Low Current with Input @ GND . . . . . -1mA max
Outputs (OUT5 - OUT8) . . . . . These are open collector, sink only TTL outputs. They are not isolated from the units +5V logic supply. Proper care must be taken to ensure noise is not injected into these signals. The user I/O supply must be referenced to GND on the collector.
Active Output Voltage . . . . . 0.6 V max @ 20mA
Permissible Output Current . . . . . 20mA
Permissible Output Voltage . . . . . 24Vdc

Serial Communications
Port 1 . . . . . Configurable for RS232 or RS485 four wire communications via a switch. Port 1 is designated as the HOST communications port and can be used to daisy chain up to 32 units in RS485 mode.
Port 2 . . . . . Serial port 2 is used for differential RS485 four wire USER communications.

Encoder Connection . . . . . Provide power and inputs for a digital encoder interface to indicate motor position to the controller.
Encoder +5Vdc . . . . . Power Supply Output +5Vdc (±5%) @ 100mA current
Encoder Signal Inputs TTL Level Single ended or differential; channels A and B in phase quadrant
Input Current . . . . . A+, A-, B+,B-,Z+,Z- ±5mA min

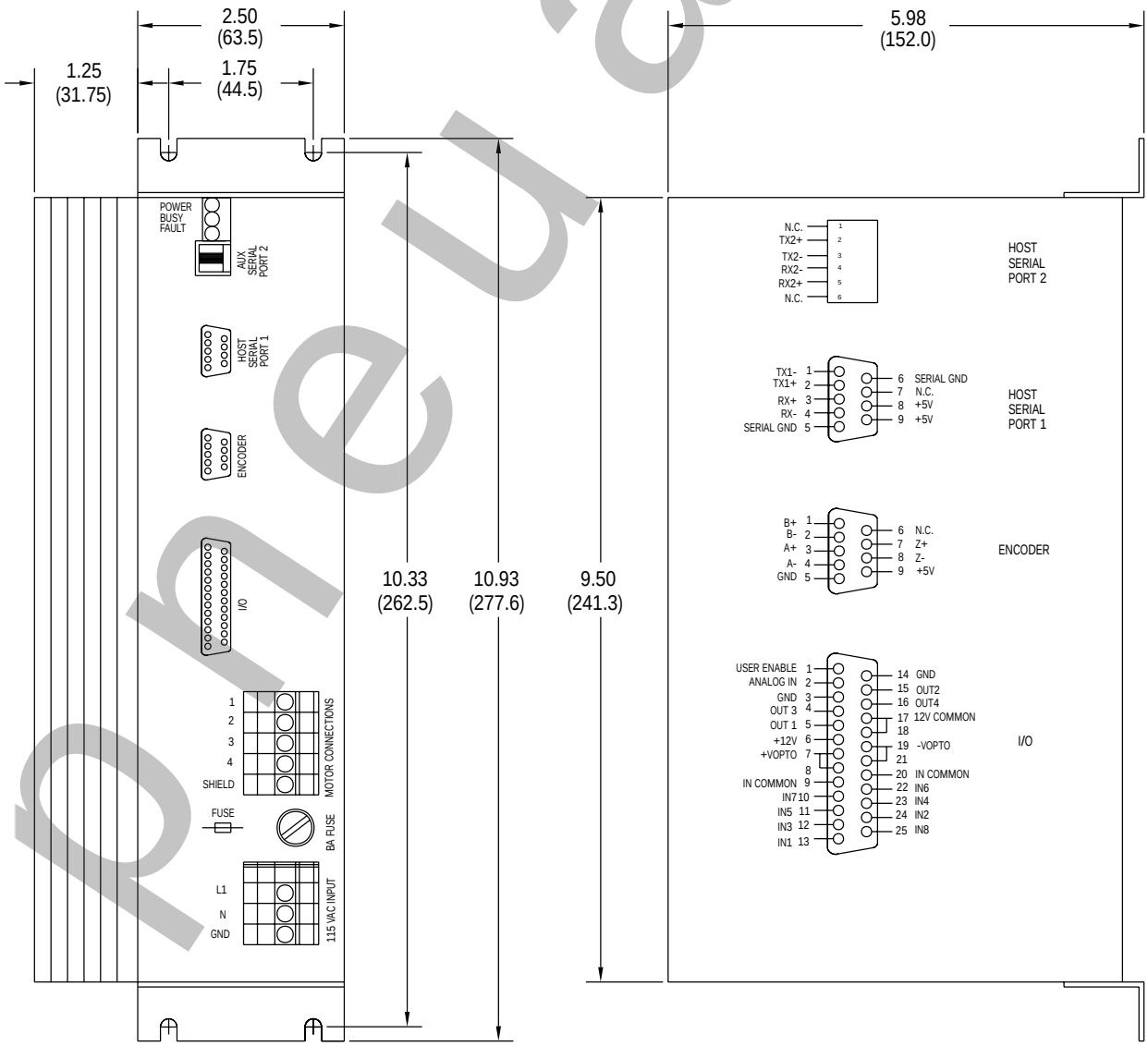


Analog Input
- Voltage Range . . . . . 0 to 10V reference to ground
- Resolution . . . . . 10 bits or 9.77mV
- Absolute Accuracy . . . . . ±0.3V worst case
- Sample Rate . . . . . 500 Hz min
- Band width . . . . . 100 Hz max

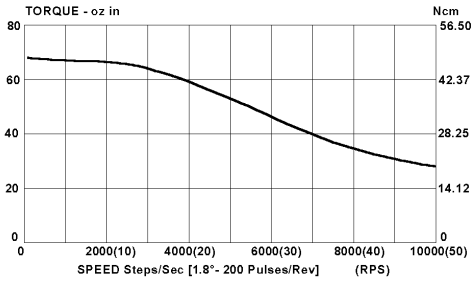
Pulse Inputs . . . . . I
Short Circuit Protection . . . . . Yes
Unbalanced Phase Protection (ground) . . . . . Yes
Over Voltage Protection . . . . . Yes
Over Temperature Protection . . . . . Yes
Operating Temperature . . . . . +32°F to +122°F (0°C to + 50°C)
Maximum Heat Sink Temperature . . . . . +158°F (+70°C)
Storage Temperature . . . . . -40°F to +167°F (-40°C to + 75°C)
Humidity . . . . . 95% Maximum, noncondensing
Altitude . . . . . 10,000 feet (3,048) max. above sea level
Motor Series . . . . . NMC FLM-Series
Phase Inductance Range . . . . . 8 mH to 64 mH
Max Phase Resistance . . . . . 20 ohms at 6 amps setting (including motor leads)

## Dimensions

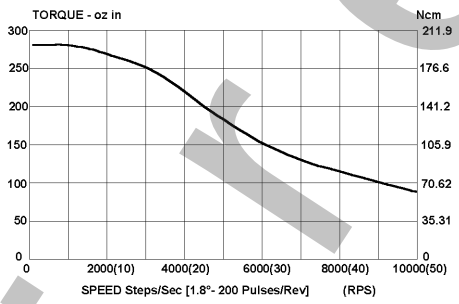
top dimensions = inches
bottom dimensions (in parenthesis) = millimeters



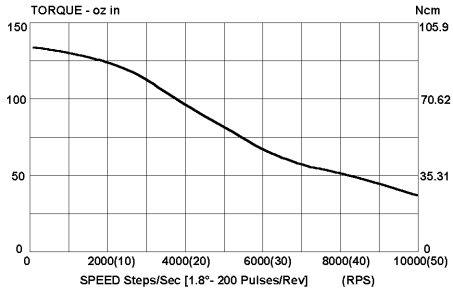
# NSDP6C Motor Torque Curves



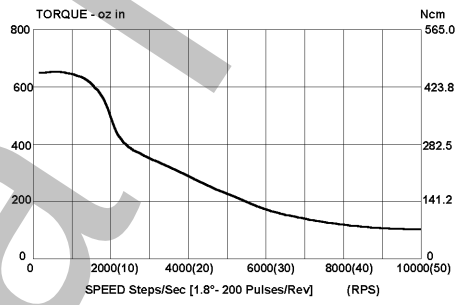

**FLM6002 Motor, 1.5 Amp**



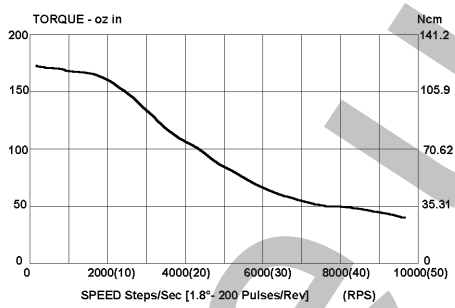

**FLM9107 Motor, 3.0 Amp**



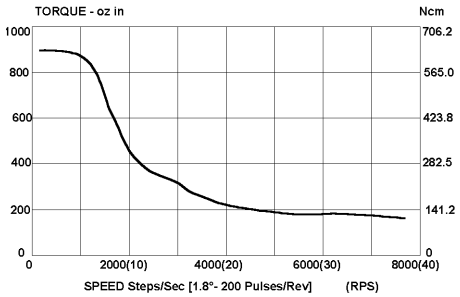

**FLM6103 Motor, 1.5 Amp**



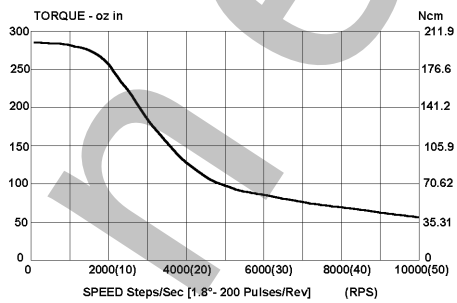

**FLM9207 Motor, 4.0 Amp**



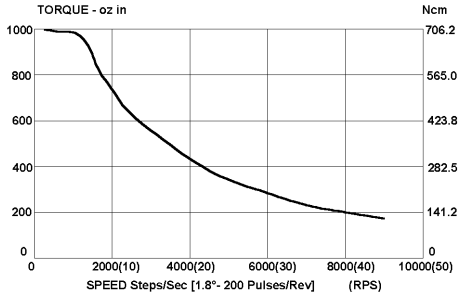

**FLM6203 Motor, 1.5 Amp**



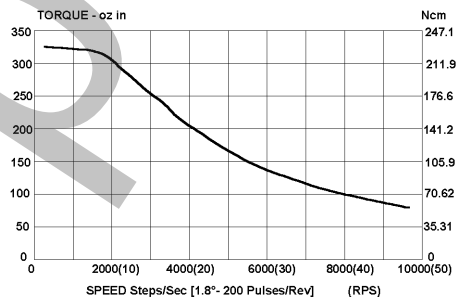

**FLM9308 Motor, 4.0 Amp**




**FLM6304 Motor, 2.0 Amp**




**FLM9310 Motor, 6.0 Amp**




**FLM9105 Motor, 3.0 Amp**