

STEPPER MOTORS, DRIVES, & POWER SUPPLIES

1st Edition

LINEAR MOTION SOLUTIONS

Nook Industries, Inc. offers motion control components that become the tools that complete actuator system solutions.

The elements that make up a linear solution are motors, drives, and power supplies. Stepper motors can power ball screws, actuators, jacks, and linear modules. Nook delivers best-in-class components consistent with Nook quality and performance at the lowest cost, all from a single source.

Nook engineers have years of experience in providing solutions in linear motion and can help in the application of a complete solution.

INTEGRATED STEPPER MOTOR

Integrated stepper motors have a motion control component combined with built-in index feedback. This allows for two-phase stepping along with a high performance drive and a 1000 line mapping encoder. These features offer a closed-loop, cost effective means to control a Nook mechanical solution.

STEPPER MOTORS

Nook offers a wide variety of two-phase, low-inertia stepper motors in three basic NEMA frame sizes. Eleven different step motors (NEMA 17, 23, & 34) are stocked and available for quick delivery.

DRIVES

Nook features four drives specifically tuned for use with Nook stepper motors. These high-performance drives are based on the latest motion control technology. Advance features include reduced stepper noise, anti-resonance that optimizes torque and nulls mid-range instability. All this offers low-speed ripple smoothing and reduced motor heating.

SERIES 500

The Series 500 product line of actuators (both parallel mount and in-line mount) are designed with the appropriate-sized Nook stepper motor and optional drive as a complete assembly



PRECISION METRIC BALL SCREWS

Nook Precision Metric Ball Screws (PMBS™) are a perfect match for stepper motor-driven linear solutions. Nook offers end bearing supports which are designed to accommodate the full range of Nook NEMA 17, 23, and 34 steppers.



MODULAR LINEAR ACTUATORS

Rodless actuators are routinely supplied with stepper motors ranging from NEMA 17 to NEMA 34. They can be combined with ball screws, acme screws, or belt-driven actuators to offer a full linear solution.



WORM GEAR SCREW JACKS

Nook ActionJac™ Worm Gear Screw Jacks can be adapted to accept stepper motors from 1/4 ton to 2-1/2 ton. The resulting actuators will provide easy solutions with repeatable ultimate control. Contact Nook Engineering for complete solutions.



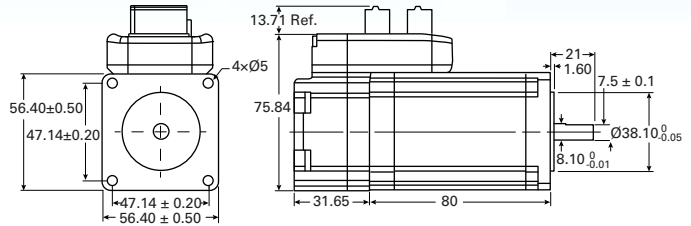
INTEGRATED STEPPER

NISS23-20

INTEGRATED STEP-SERV MOTOR/DRIVE/ENCODER

This new integrated stepper system is a compact, cost effective drive-plus-motor-with-feedback package. The 2-phase NEMA 23 step motor is integrated with an advanced DSP stepper drive and a magnetic encoder to save you space, time and money. Competitive products are called "easy" servo or "hybrid" servo, Nook offers this step motor/drive with feedback which we describe as Step-Serv.

Bonus: servo-tuning is not necessary, and a stepper does not "hunt" at rest like a conventional servo.



Dimensions in mm

DRIVE ELECTRICAL SPECIFICATIONS

	INPUT VOLTAGE (VDC)	OUTPUT CURRENT (A)	PULSE INPUT FREQUENCY (kHz)	PULSE VOLTAGE (V)	LOGIC SIGNAL CURRENT (mA)	ISOLATION-RESISTANCE (MΩ)
MIN	20	0	0	0	7	100
TYPICAL	36	-	200	5	10	-
MAX	50	6.0(Peak)	500	24	16	-

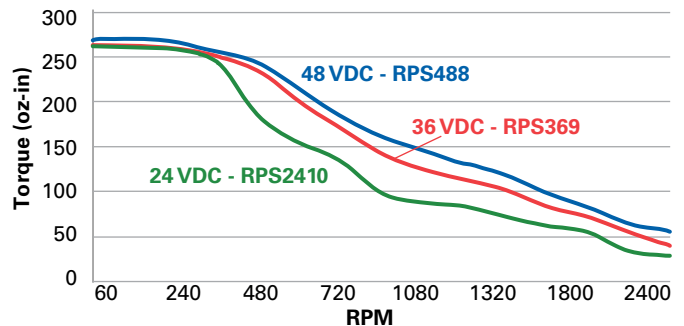
MOTOR MECHANICAL SPECIFICATIONS

	HOLDING TORQUE (N-m)	MOTOR + DRIVE LENGTH (mm)	WEIGHT (kg)
NISS23-20	20	111.62	1.25

NISS23-20

- A step/servo is an integrated motor, a complete brushless closed loop stepper system
- Closed-loop controls eliminate wiring, labor costs, and compatibility issues
- Integration yields compact size and reduced electrical interference
- 1000-line optical encoder position control
- High starting torque and quick response, smooth low speed motor movement
- Excellent response time, torque (30% over open loop)
- Load-dependent dynamic tuning keeps motor cool
- 2 N-m (285 oz-in) holding torque stepper motor
- Sixteen micro step resolution value from 200 to 51,200 steps per rev
- Isolated control inputs; no tuning for plug and play setup
- In-position and fault outputs to external motion controller
- Over voltage, over-current, and position-error protection

SPEED TORQUE CURVE



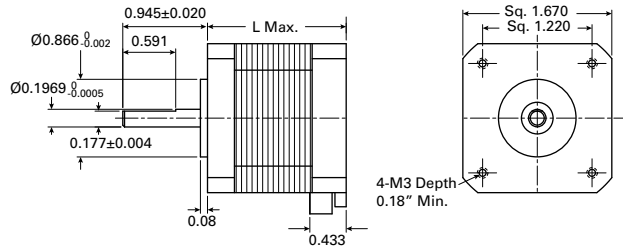
See page 11 for information about Nook Prower Supplies.

NEMA 17 MOTORS

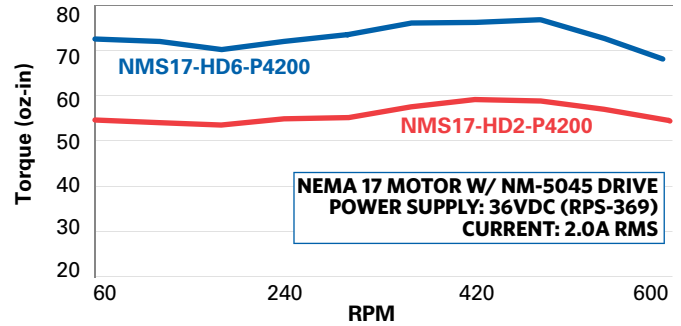
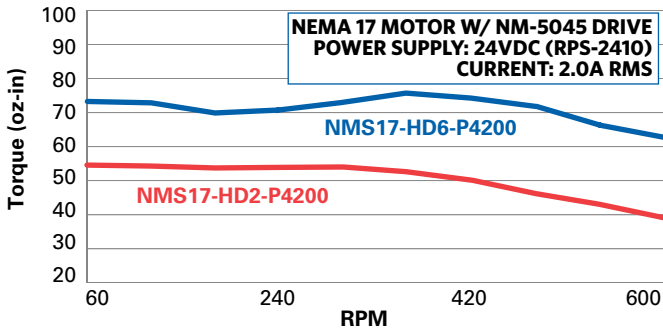
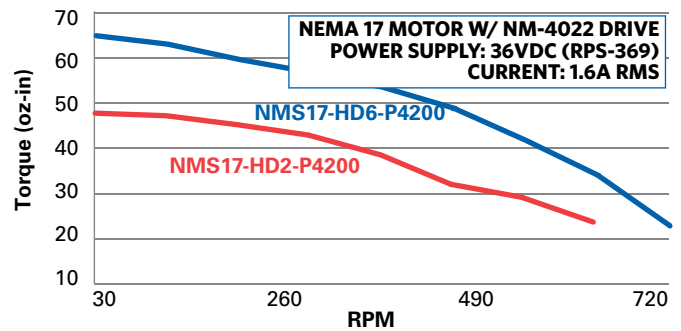
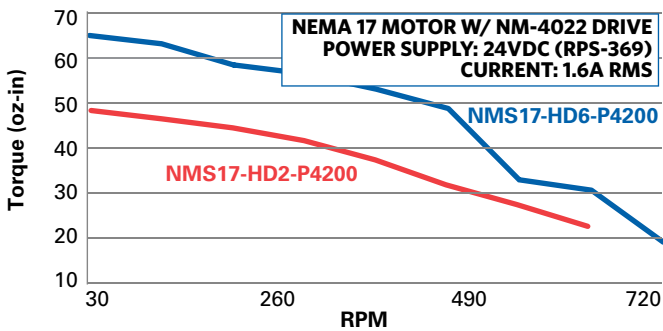
- PowerPlus technology: boosts efficiency and performance at all speeds
- Lower inertia rotors provide faster acceleration
- High voltage insulation for use with high voltage, high performance drives
- Low loss stators have better high speed performance
- Standard windings with high fill for more low speed torque



NEMA 17



MOTOR	L (in)	Rated Current (A)	Holding Torque (oz-in)	Plug or Leads	# of Leads	Rotor Inertia (oz-in ²)
NMS17-HD2-P4200	1.57	2	68	Plug	4	0.31
NMS17-HD6-P4200	1.90	2	89	Plug	4	0.45

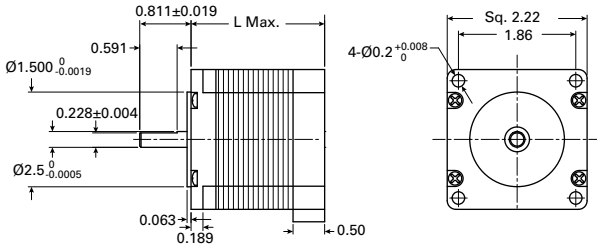


NEMA 23 MOTORS

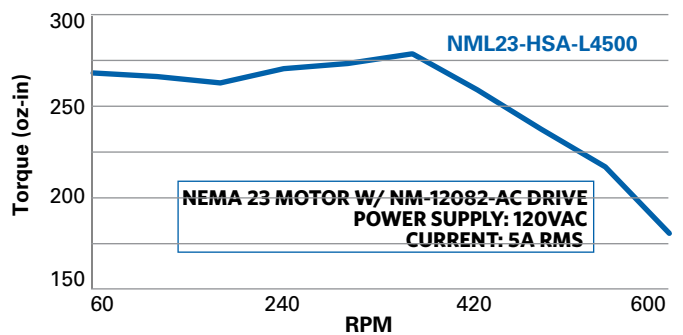
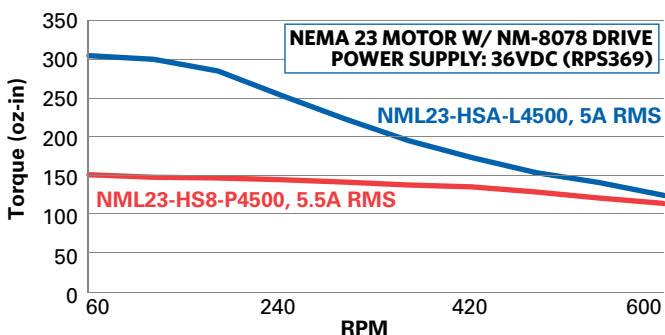
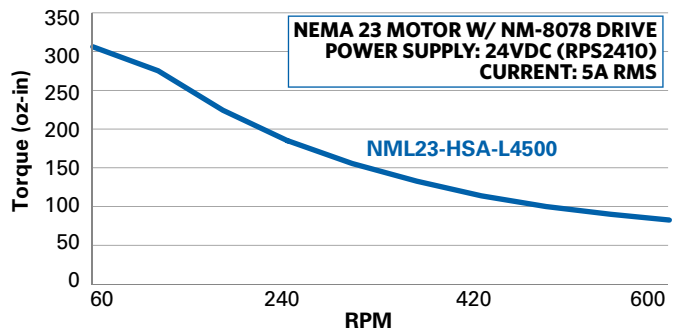
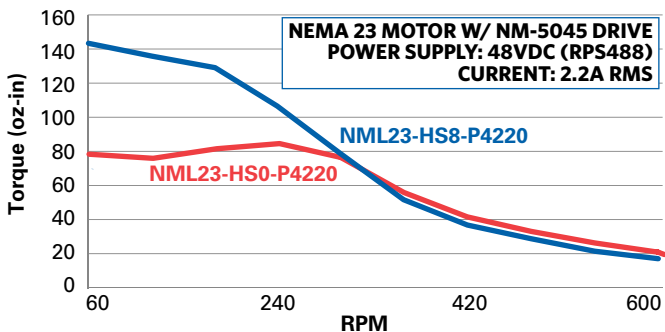
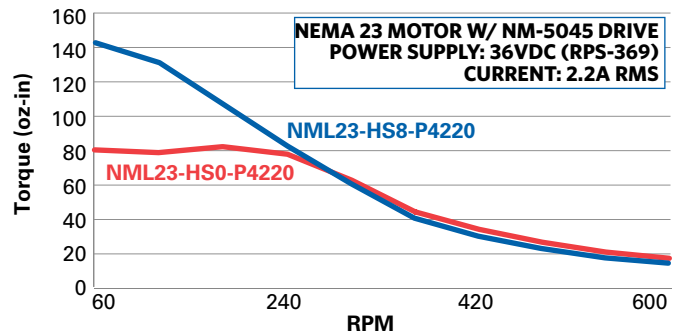
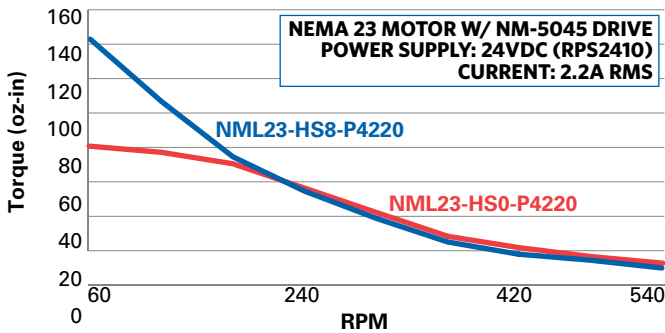
- PowerPlus technology: boosts efficiency and performance at all speeds
- Lower inertia rotors provide faster acceleration
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- Low loss stators have better high speed performance
- Standard windings with high fill for more low speed torque



NEMA 23



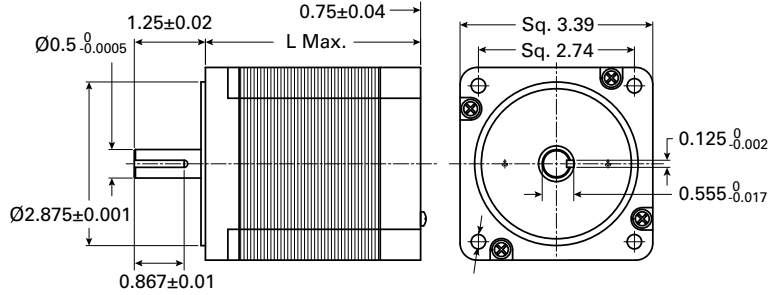
MOTOR	L (in)	Rated Current (A)		Holding Torque (oz-in)	Plug or Leads	# of Leads	Rotor Inertia (oz-in ²)
		Series	Parallel				
NML23-HS0-P4220	1.54	2.2	120	120	Plug	4	0.66
NML23-HS8-P4220	2.17	2.2	210	210	Plug	4	1.2
NML23-HS8-L4550	2.17	5.5	210	210	Leads	4	1.2
NML23-HSA-L4500	3.03	5.5	330	330	Leads	4	2.1



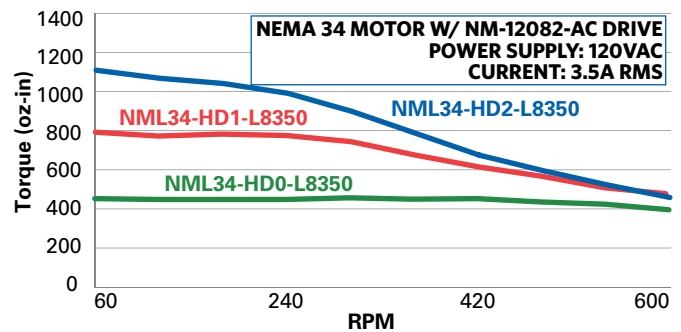
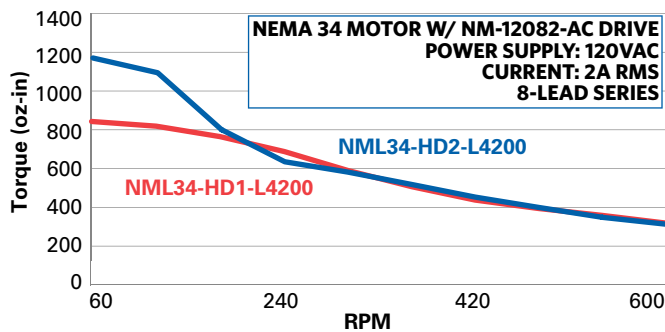
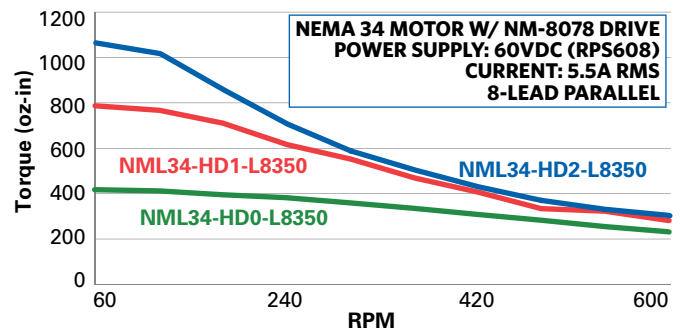
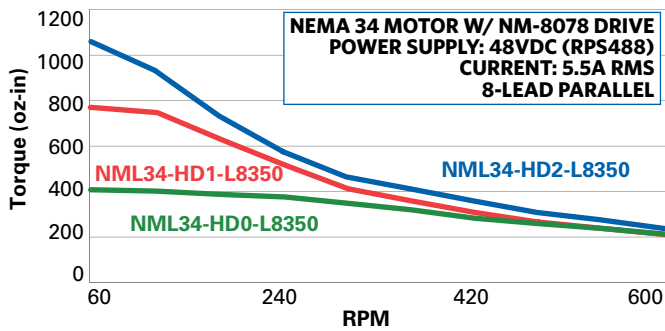
NEMA 34 MOTORS

- PowerPlus technology: boosts efficiency and performance at all speeds
- Lower inertia rotors provide faster acceleration
- High voltage insulation for use with high voltage, high performance drives
- Low loss stators have better high speed performance
- Standard windings with high fill for more low speed torque

NEMA 34



MOTOR	L (in)	Rated Current (A)		Holding Torque (oz-in)	# of Leads	Rotor Inertia (oz-in ²)
		Series	Parallel			
NML34-HD1-L4200	3.82	2.0		1000	4	8.8
NML34-HD2-L4200	4.96	2.0		1400	4	13.0
NML34-HD0-L8350	2.64	3.5	7.0	540	8	3.5
NML34-HD1-L8350	3.82	3.5	7.0	1000	8	6.0
NML34-HD2-L8350	4.96	3.5	7.0	1400	8	8.4



DRIVES

NM-4022

INTRODUCTION

The NM-4022 is a versatile, fully digital stepping drive based on a DSP with an advanced control algorithm. It brings a unique level of system smoothness, provides optimum torque, and nulls mid-range instability. Motor auto-identification and parameter auto-configuration technology offers optimum response with different motors. The NM-4022 allows step motors to run with much lower noise and heat while still creating smoother motion than other stepping drives on the market.

APPLICATIONS

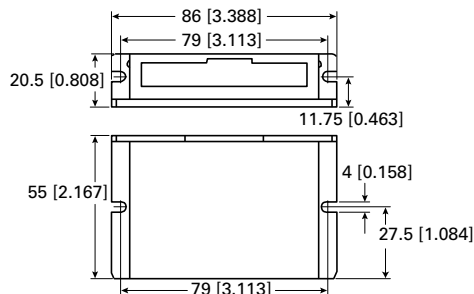
The NM-4022 stepper drive can automatically identify 100% of stall of current motors at 300 RPM or above, and send fault signals back to a motion controller or other sensing device. This stepper drive also adopts advanced features like electronic damping, anti-resonance, start-up smoothing, and multi-stepping. With input voltage ranging from 20-40 VDC and output current of 0.5-2.2A peak, it is capable of driving a wide range of 2-phase stepper motors. Its multi-stepping feature allows a low resolution step input to produce a much higher microstep output for smooth and quiet motor movement.

Ideal for use with Nook NEMA 17 step motors in various applications ranging from medical machines, laser cutters, laser markers, X-Y tables, labeling machines, etc. Its unique features make the NM-4022 an ideal solution for applications that require low-speed smoothness.



MOTOR CONNECTOR

A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse the default motor direction.



CURRENT SETTING

Output current is programmable in software configured mode from 0.3A to 2.2A. When not in software configured mode, operating current is set by SW 1,2,3 of the DIP switch. DIP switch current settings range from 0.5A to 2.2A. Select a current setting closest to your motor's required current

MOTORS	PEAK	RMS	SW1	SW2	SW3
	Software Configured		on	on	on
	0.5A	0.35A	off	on	on
	0.7A	0.5A	on	off	on
	1.0A	0.7A	off	off	on
	1.3A	0.9A	on	on	off
	1.6A	1.2A	off	on	off
	1.9A	1.4A	on	off	off
NMS17-HD2-P4200 NMS17-HD6-P4200	2.2A	1.6A	off	off	off

MICROSTEP SETTING

NM-4022 microstep resolution is programmable from 200 up to 6400 steps per revolution. When not in software configured mode, microstep resolution is set by SW 5 and 6 of the DIP switch. In order to avoid losing steps, do not change the microstep resolution on the fly.

CONTROL SIGNALS

OPTO is for the opto-coupler power supply and typically a +5V PUL is used for the pulse command signal. DIR is for the direction of the control signal, and ENA is used for the enable/disable control signal. Series connect resistors for current-limiting when +12V or +24V is used.

	OUTPUT CURRENT (A)	INPUT VOLTAGE (VDC)	LOGIC SIGNAL CURRENT (mA)	PULSE INPUT FREQ. (kHz)	ISOLATION RESISTANCE (MΩ)
Min	0.3	20	7	0	500
Typ	-	-	10	-	-
Max	2.2 (1.6 RMS)	40	16	75	-

DRIVES (Continued)

NM-5045

INTRODUCTION

The NM-5045 is a high performance 2-phase digital stepper drive that utilizes an advanced DSP and current control algorithm. The drive will accept step & direction and/or CW/CCW control commands and is simple to implement.

APPLICATIONS

The NM-5045 stepper drive can automatically identify 100% of stall of current motors at 300 RPM or above, and send fault signals back to a motion controller or other sensing device. This stepper drive also adopts advanced features like electronic damping, anti-resonance, start-up smoothing, and multi-stepping. With input voltage ranging from 20-50VDC and output current of 1.40-4.5A peak, it is capable of driving a wide range of 2-phase stepper motors. Its multi-stepping feature allows a low resolution step input to produce a much higher microstep output for smooth and quiet motor movement.

Nook offers several matched stepper motors for the NM-5045 with optimized configurations stored in the stepper drive. The user only needs to use the motor rotary switch to select the correct motor. Consult the speed vs. torque curves on pages 4-6 for motor sizing.

MOTOR CONNECTOR

A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse the default motor direction.



CURRENT SETTING

Output current is programmable in software configured mode from 0.5A to 4.5A. When not in software configured mode, operating current is set by SW 1,2,3 of the DIP switch. DIP switch current settings range from 1.4A to 4.5A. Select a current setting closest to your motor's required current

MOTORS	PEAK	RMS	SW1	SW2	SW3
	Software Configured		on	on	on
	1.40A	1.00A	off	on	on
	1.96A	1.40A	on	off	on
	2.38A	1.70A	off	off	on
NMS17-HD2-P4200 NMS17-HD6-P4200 NML34-HD1-L4200 NML34-HD2-L4200	2.80A	2.00A	on	on	off
NML23-HS0-P4220 NML23-HS8-P4220	3.08A	2.20A	off	on	off
	3.78A	2.70A	on	off	off
	4.50A	3.21A	off	off	off

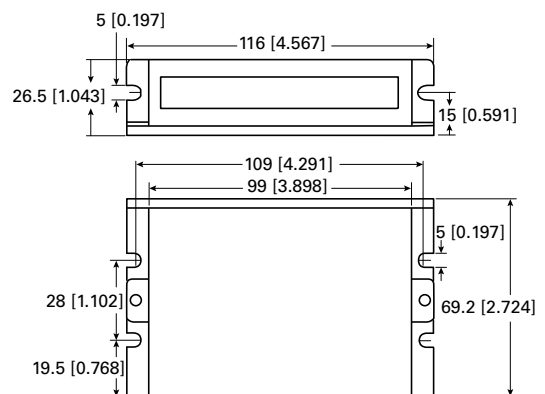
MICROSTEP SETTING

Microstep resolution is programmable. When not in software configured mode, microstep resolution is set by SW5,6 of the DIP switch. In order to avoid losing steps, do not change the microstep resolution on the fly.

CONTROL SIGNALS

Typically a +5V PUL is used for the pulse command signal. DIR is for the direction of the control signal, ENA is used for the enable/disable control signal, and FLT used for the fault signal. Series connect resistors for current-limiting when +12V or +24V is used.

	OUTPUT CURRENT (A)	INPUT VOLTAGE (VDC)	LOGIC SIGNAL CURRENT (mA)	PULSE INPUT FREQ. (kHz)	ISOLATION RESISTANCE (MΩ)
Min	1.46	20	7	0	500
Typ	-	36	10	-	-
Max	4.2 (2.2 RMS)	50	16	200	-



AUTOMATION TECHNOLOGY & CONTROL

LINEAR MOTION SOLUTIONS

NM-8078

INTRODUCTION

Like the smaller Nook drives the NM-8078 also uses an advanced DSP and current control algorithm. This is a higher power high performance 2-phase digital stepper drive. The NM-8078 will take step & direction and/or CW/CCW control commands, and is very simple to implement.

APPLICATIONS

The NM-8078 stepper drive can automatically identify 100% of stall of driven motors at 300 RPM or above, and send fault signals back to a motion controller or other sensing device. This stepper drive also adopts advanced features like electrical damping, anti-resonance, start-up smoothing, multi-stepping. With input voltage of 20 - 80 VDC and output current of 1.46 – 7.80A peak, it is capable of driving a wide range of 2-phase stepper motors with high precision and extreme smoothness. Its multi-stepping feature allows a low resolution step input to produce a much higher microstep output for smooth and quiet motor movement.

Nook offers several matched stepper motors for the NM-8078 with their optimized configurations stored in the stepper drive. The user only needs to use the motor rotary switch to select the right motor, and the NM-8078 will automatically load the pre-set parameters. Consult the speed vs torque curves on pages 4-6 for motor sizing.

For advanced users, Nook can provide software for performance fine-tuning. The user can tune a stepper motor's three resonance areas (usually around 1 rps, 2 rps, and 4 rps) to reduce noise and vibration, set microstep resolution to any value from 200 to 104,000 (increase by 200), and configure output current to any value of 0.5 - 7.80A (increased by 0.1A); and idle current of 1-100% of output current.

MOTOR CONNECTOR

A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse default motion direction.



CURRENT SETTING

Output current is programmable. When not in software configured mode, operating current is set by SW1,2,3 of the DIP switch. Up to 2.2A. Select a current setting closest to your motor's required current.

MOTORS	PEAK	RMS	SW1	SW2	SW3
	Software Configured		on	on	on
	1.40A	1.00A	off	on	on
NMS17-HD2-P4200 NMS17-HD6-P4200 NML34-HD1-L4200 NML34-HD2-L4200	2.8A	2.0A	on	off	on
NML23-HS0-P4220 NML23-HS8-P4220	3.1A	2.2A	off	off	on
NML34-HD0-L8350* NML34-HD1-L8350* NML34-HD2-L8350*	4.9A	3.5A	on	on	off
	5.6A	4.0A	off	on	off
NML23-HAS-L4500	7.0A	5.0A	on	off	off
NML23-HS8-L4550	7.8A	5.5A	off	off	off

*series

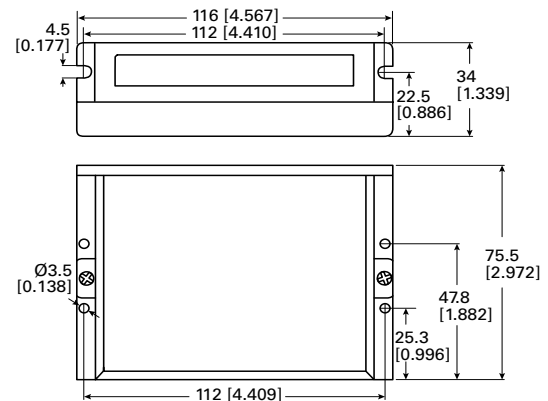
MICROSTEP SETTING

NM-8078 microstep resolution is programmable from 200 up to 25600 steps per revolution. When not in software configured mode, microstep resolution is set by SW 5, 6 of the DIP switch. In order to avoid losing steps, do not change the microstep resolution on the fly.

CONTROL SIGNALS

Typically a +5V PUL is used for the pulse command signal. DIR is for the direction control signal. ENA is for the enable/disable control signal while FLT is used for the fault signal. Series connect resistors for current-limiting when +12V or +24V is used.

	OUTPUT CURRENT (A)	INPUT VOLTAGE (VDC)	LOGIC SIGNAL CURRENT (mA)	PULSE INPUT FREQ. (kHz)	ISOLATION RESISTANCE (MΩ)
Min	1.40	20	7	0	500
Typ	-	48	10	-	-
Max	7.0 (RMS)	70	16	200	-





DRIVES (Continued)
NM-12082-AC
INTRODUCTION

The NM-12082-AC is a high voltage, digital stepping drive based on a DSP with advanced control algorithm. It brings a unique level of system smoothness, providing optimum torque and nulls mid-range instability. Motor auto-test and parameter auto-configuration technology offers optimum responses with different motors and is easy-to-use. The driven motors can run with much less noise, lower heating, smoother movement than most of the drivers on the market. Its unique features make the NM-12082-AC an ideal solution for applications that require low-speed smoothness. The NM-12082-AC will accept step & direction and/or CW/CCW control commands.

APPLICATIONS

The NM-12082-AC stepper drive can automatically identify 100% of stall current of motors at 300 RPM or above, and send fault signals back to a motion controller or other sensing device. This stepper drive also adopts advanced features like electronic damping, anti-resonance, start-up smoothing, and multi-stepping. With input voltages ranging from 80-150 VAC and output current of 2.8-8.2A peak, it is capable of driving a wide range of 2-phase stepper motors. Its multi-stepping feature allows a low resolution step input to produce a much higher microstep output for smooth and quiet motor movement.

Nook offers several matched stepper motors for the NM-12082-AC with optimized configurations stored in the drive. The user only needs to use the motor rotary switch to select the correct motor. Consult the speed vs. torque curves on pages 4-6 for motor sizing.

MOTOR CONNECTOR

A+, A- and B+, B- are for motor connections. Exchanging the connection of two wires for a coil to the drive will reverse the default motor direction.



CURRENT SETTING

Output current is programmable in software configured mode from 0.5 to 8.2A. When not in software configured mode, operating current is set by SW 1, 2, 3 of the DIP switch. DIP switch current settings range from 2.8 to 8.2A. Select a current setting closest to your motor's required current.

MATCHING MOTORS	PEAK	RMS	SW1	SW2	SW3
	Software Configured		off	off	off
NML34-HD1-L4200 NML34-HD2-L4200	2.8A	2.0A	on	off	off
NML23-HS0-P4220 NML23-HS8-P4220	3.1A	2.2A	off	on	off
NML34-HD0-L8350 NML34-HD1-L8350 NML34-HD2-L8350	4.9A	3.5A	on	on	off
	5.6A	4.0A	off	off	on
NML23-HAS-L4500	7.0A	5.0A	on	off	on
NML23-HS8-L4550	7.8A	5.5A	off	on	on
	7.8A	5.9A	on	on	on

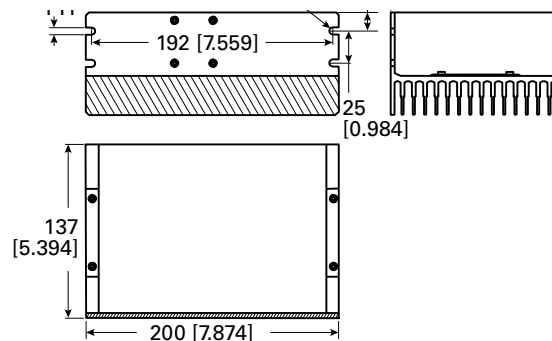
MICROSTEP SETTING

NM-12082-AC microstep resolution is programmable from 200 up to 25600 steps per revolution. When not in software configured mode, microstep resolution is set by SW5, 6, 7, and 8 of the DIP switch. In order to avoid losing steps, do not change the microstep resolution on the fly.

CONTROL SIGNALS

Typically a +5V PUL is used for the pulse command signal. DIR is for the direction of the control signal, and ENA is used for the enable/disable control signal. FAULT is used for the fault control signal. Series connect resistors for current-limiting when +12V or +24V is used.

	OUTPUT CURRENT (A)	INPUT VOLTAGE (VDC)	LOGIC SIGNAL CURRENT (mA)	PULSE INPUT FREQ. (kHz)	ISOLATION RESISTANCE (MΩ)
Min	0.5	80	7	0	500
Typ	-	110	10	-	-
Max	8.2 (5.9 RMS)	150	20	200	-

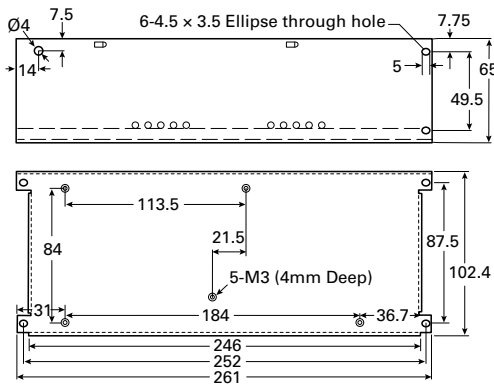


POWER SUPPLIES

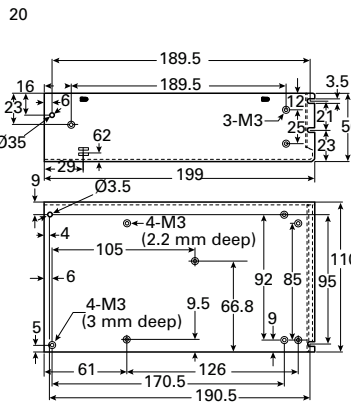
- Specifically designed to power stepper and servo systems
- High efficiency and output power up to 500W
- Input voltage of 85-132 and / or 176-265 AC
- Output voltage of 24/36/48/60 VDC
- Quick response to constant current changes
- Able to take voltage charge back in stepper/ servo systems
- Short circuit, over-current, over-voltage and short-voltage protection

	POWER INPUT	OUTPUT (VDC)	RATED POWER (W)	SIZE (mm)	WEIGHT (kg)
RPS2410	115/220VAC±10%	24	240	199 × 110 × 50	0.8
RPS369	120/220VAC±10%	36	360	215 × 113.6 × 50	0.88
RPS488	115/220VAC±10%	48	400	215 × 113.6 × 50	0.88
RPS608	220VAC±10%	60	500	261 × 102.4 × 65	1.14

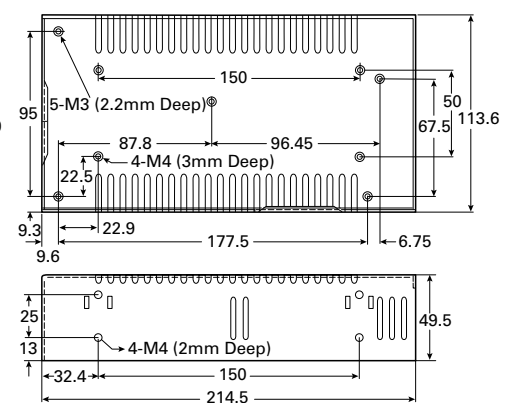
RPS2410



RPS369 & RPS488



RPS608



PRECISION METRIC BALL SCREWS (PMBS™)

Nook Industries has always been a leader in developing high-quality linear motion components and systems to meet the ever-increasing demand for precision linear motion. Precision-rolled ball screws have long been a hallmark of Nook Industries, and the latest innovations from Nook Industries are Precision Metric Ball Screws (PMBS™). They are manufactured in the United States to meet the increasing demand for metric ball screws in the global market.

The PMBS™ product line offers linear lead accuracy classes of T10, T7, T5, and T3, which comply with the ISO 3408 ball screw standard. All ball nuts are precision ground and engineered to operate with precision rolled ball screws or precision ground (T3) ball screws.

Nook offers both preloaded and non-preloaded ball nuts in multiple configurations; Flanged, V-Threaded, and Cylindrical Keyed mounting options are able to satisfy virtually all applications. The flanged ball nuts are manufactured to the DIN 69 051. Non-preloaded ball nuts

are available from stock and can easily be mounted in the field for ease of assembly.

Consult factory or Nook website to design end machining and bearing mounts for ease of applications. Check engineering section of the catalog to verify application data to assure product performance.

FEATURES:

- Utilizing precision thread-rolling technology
- Wide range of diameters and leads
- T3, T5, T7, and T10 lead accuracy per ISO 3408-3
- DIN-style flanges
- Preloaded and clearance nuts
- State-of-the-art ball return mechanisms
- 3 different styles available: Integral-flange, V-thread, and Cylindrical keyed.
- Integral wipers





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