



## MDRIVE 34™ MOTOR+DRIVER AC Plus MICROSTEPPING

### FEATURES

- Highly Integrated Microstepping Driver and NEMA 34 High Torque 1.8° Brushless Step Motor
- Advanced 2nd Generation Current Control for Exceptional Performance and Smoothness
- Single Supply: 120 or 240 VAC
- Cost Effective
- Extremely Compact
- High Positioning Accuracy
- No Tuning Required
- Stable at Low Speeds
- No Dithering at Zero Speed
- High Starting Torque
- Allows for Greater Inertia Mismatch
- Built-in Regeneration Circuitry
- 20 Microstep Resolutions up to 51,200 Steps Per Rev Including: Degrees, Metric, Arc Minutes
- Optically Isolated Logic Inputs will Accept +5 to +24 VDC Signals, Sourcing or Sinking
- Automatic Current Reduction
- Configurable:
  - Motor Run/Hold Current
  - Motor Direction vs. Direction Input
  - Microstep Resolution
  - Clock Type: Step and Direction, Quadrature, Step Up and Step Down
  - Programmable Digital Filtering for Clock and Direction Inputs
- Available Options:
  - Long Life Linear Actuators\*\*
  - Internal Differential Optical Encoder
  - Integrated Planetary Gearbox
  - Control Knob for Manual Positioning
  - IP65 Sealed Configuration
  - Linear Slide
- 3 Rotary Motor Lengths Available
- Setup Parameters May Be Switched On-The-Fly
- Standard Industrial Connectors:
  - Circular 19-Pin M23
  - Circular 3-Pin Euro AC
- Graphical User Interface (GUI) for Quick and Easy Parameter Setup

### DESCRIPTION

The **MDrive34AC Plus Microstepping** high torque integrated motor and step and direction driver is ideal for designers who want the simplicity of a motor with on-board electronics. The integrated electronics of the MDrive34AC Plus eliminate the need to run motor cabling through the machine, reducing the potential for problems due to electrical noise.

The unsurpassed smoothness and performance delivered by the MDrive34AC Plus Microstepping are achieved through IMS's advanced 2nd generation current control. By applying innovative techniques to control current flow through the motor, resonance is significantly dampened over the entire speed range and audible noise is reduced.

The MDrive34AC Plus accepts a broad input voltage range from 95 to 264 VAC, delivering enhanced performance and speed. Oversized input capacitors are used to minimize power line surges, reducing problems that can occur with long runs and multiple drive systems. An extended operating range of -40° to +75°C provides long life, trouble free service in demanding environments.

The MDrive34AC Plus uses a NEMA 34 frame size high torque brushless step motor combined with a microstepping driver, and accepts up to 20 resolution settings from full to 256 microsteps per full step, including: degrees, metric and arc minutes. These settings may be changed on-the-fly or downloaded and stored in nonvolatile memory with the use of a simple GUI which is provided. This eliminates the need for external switches or resistors. Parameters are changed via an SPI port.

For use in environments where exposure to chemical, dust and liquids may occur, a sealed MDrive34AC Plus Microstepping

unit with circular connectors meets IP65 specifications.\*\*

The versatile MDrive34AC Plus Microstepping is available in multiple configurations to fit various system needs. Three rotary motor lengths are available and may include an internal optical encoder, a control knob for manual positioning, an integrated planetary gearbox or a linear slide. Long life Acme screw linear actuator versions are also available.\*\*

Interface connections are accomplished using standard industrial circular connectors. And connectivity has never been easier with options ranging from **all-inclusive QuickStart Kits** to **individual interfacing cables**. See pg 4.

The MDrive34AC Plus is a compact, powerful and cost effective solution that will reduce system cost, design and assembly time for a large range of brushless step motor applications.

### CONFIGURING

The IMS Motor Interface software is an easy to install and use GUI for configuring the MDrive34AC Plus from a computer's USB port. GUI access is via the IMS SPI Motor Interface available at [www.imshome.com](http://www.imshome.com).

The IMS SPI Motor Interface features:

- Easy installation.
- Automatic detection of MDrive version and communication configuration.
- Will not set out-of-range values.
- Tool-tips display valid range setting for each option.
- Simple screen interfaces.

\*\*Consult Factory for Availability.

# MDrive34*AC Plus* MICROSTEPPING

## STANDARD SPECIFICATIONS

INPUT VOLTAGE	Range	120 V MDrive – 95 to 132 VAC @ 50/60 Hz 240 V MDrive – 95 to 264 VAC @ 50/60 Hz		
ISOLATED INPUT	Step Clock, Direction and Enable			
	Voltage Range	+5 to +24 VDC Sourcing or Sinking		
MOTION	Digital Filter Range	50 nS to 12.9 μS (10 MHz to 38.8 kHz)		
	Clock Types	Step/Direction, Quadrature, Step Up/Step Down		
	Step Frequency (Max)	2 MHz		
	Resolution	Number of Settings	20	
		Steps Per Revolution	200, 400, 800, 1000, 1600, 2000, 3200, 5000, 6400, 10000, 12800, 20000, 25000, 25600, 40000, 50000, 51200, 36000 (0.01 deg/μstep), 21600 (1 arc minute/μstep), 25400 (0.001mm/μstep)	
TEMP OUTPUT WARNING	Open-Drain Type	+5 to +24 VDC	50 mA Current	
THERMAL	Operating Temperature	Heat Sink	–40° to +75°C (non-condensing)	
		Motor	–40° to +90°C (non-condensing)	
PROTECTION	Type	Thermal, Internal Fuse †		

† Designed for line-neutral systems.

## SETUP PARAMETERS

	Function	Range	Units	Default
<b>MHC</b>	Motor Hold Current	0 to 100	percent	5
<b>MRC</b>	Motor Run Current	1 to 100	percent	25
<b>MSEL</b>	Microstep Resolution	1, 2, 4, 5, 8, 10, 16, 25, 32, 50, 64, 100, 108, 125, 127, 128, 180, 200, 250, 256	$\mu$ steps per full step	256
<b>DIR</b>	Motor Direction Override	0/1	—	CW
<b>HCDT</b>	Hold Current Delay Time	0 or 2–65535	mSec	500
<b>CLK TYPE</b>	Clock Type	Step/Dir, Quadrature, Up/Down	—	Step/Dir
<b>CLK IOF</b>	Clock and Direction Filter	50 nS to 12.9 $\mu$ S (10 MHz to 38.8 kHz)	nS (MHz)	200 nS (2.5 MHz)
<b>USER ID</b>	User ID	Customizable	1–3 characters	IMS
<b>EN ACT</b>	Enable Active	High/Low	—	High
<b>WARN TEMP</b>	Over Temperature Warning	0 to 125°C	°C	80°C

All parameters are set using the supplied IMS SPI Motor Interface GUI and may be changed on-the-fly. An optional Communication Converter is recommended with first orders.

## MOTOR SPECIFICATIONS

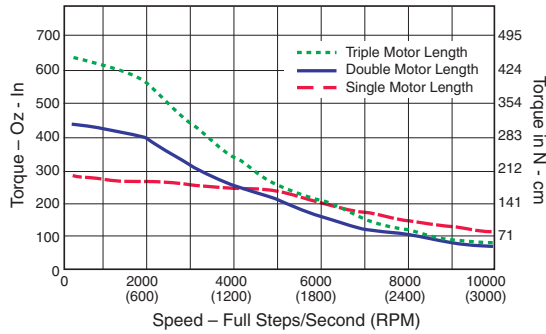
	Holding Torque	Detent Torque	Rotor Inertia	Weight (Motor+Driver)
<b>SINGLE LENGTH</b>	330 oz-in / 233 N-cm	10.9 oz-in / 7.7 N-cm	0.01416 oz-in-sec <sup>2</sup> / 1.0 kg-cm <sup>2</sup>	6.4 lb / 2.9 kg
<b>DOUBLE LENGTH</b>	500 oz-in / 353 N-cm	14.16 oz-in / 10.0 N-cm	0.02266 oz-in-sec <sup>2</sup> / 1.6 kg-cm <sup>2</sup>	7.7 lb / 3.5 kg
<b>TRIPLE LENGTH</b>	750 oz-in / 529 N-cm	19.83 oz-in / 14.0 N-cm	0.04815 oz-in-sec <sup>2</sup> / 3.4 kg-cm <sup>2</sup>	11.0 lb / 5.0 kg

## ENCODER SPECIFICATIONS

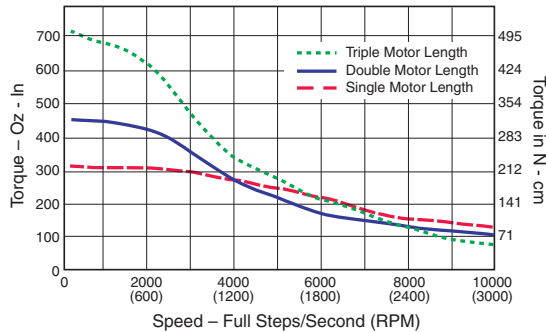
INTERNAL DIFFERENTIAL OPTICAL ENCODER	Pin Assignments		Line Count	Part Number
	19-Pin M23 Connector	Function		
	Pin 3	Index +	100	EA
	Pin 4	Channel B +	200	EB
	Pin 5	Channel B –	250	EC
	Pin 7	Channel A +	256	EW
	Pin 14	Index –	400	ED
	Pin 15	Channel A –	500	EH
			512	EX
			1000	EJ
			1024	EY

## SPEED-TORQUE

MDrive34AC – 120VAC



MDrive34AC – 240VAC



## PIN ASSIGNMENTS

P1: I/O & COMM (SPI) CONNECTOR

M23 Circular (Male)	Function	Function with Encoder
Pin 1	Optocoupler Reference	Optocoupler Reference
Pin 2	Enable Input	Enable Input
Pin 3	No Connect	Index +
Pin 4	No Connect	Channel B +
Pin 5	No Connect	Channel B -
Pin 6	No Connect	No Connect
Pin 7	No Connect	Channel A +
Pin 8	SPI Master Out – Slave In	SPI Master Out – Slave In
Pin 9	SPI Chip Select	SPI Chip Select
Pin 10	+5 VDC Output	+5 VDC Output
Pin 11	Communications Ground	Communications Ground
Pin 12	Shell Connect	Shell Connect
Pin 13	CW/CCW Direction Input	CW/CCW Direction Input
Pin 14	No Connect	Index -
Pin 15	No Connect	Channel A -
Pin 16	SPI Clock	SPI Clock
Pin 17	SPI Master In – Slave Out	SPI Master In – Slave Out
Pin 18	Step Clock Input	Step Clock Input
Pin 19	Temp Output Warning	Temp Output Warning

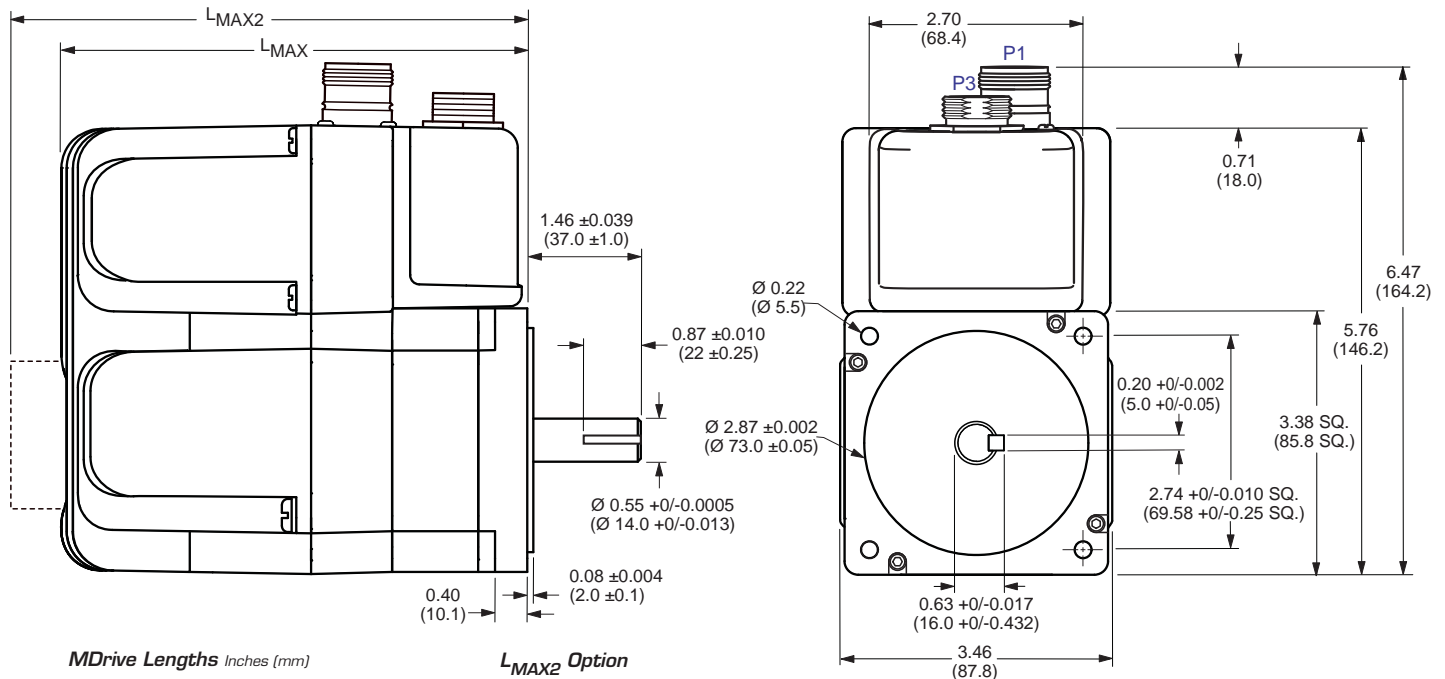
P3: POWER CONNECTOR

Euro AC (Male)	Function
Pin 1	Chassis Ground
Pin 2	AC Power Line
Pin 3	AC Power Neutral

## MECHANICAL SPECIFICATIONS

Dimensions in Inches (mm)

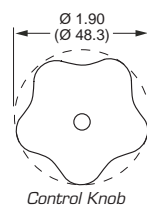
### MDrive34AC Plus



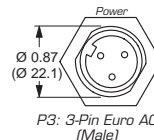
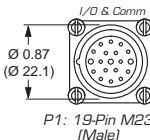
MDrive Lengths Inches (mm)

	LMAX	LMAX2
Motor Length		
Single	6.1 (155.0)	7.1 (180.4)
Double	6.9 (174.3)	7.9 (199.7)
Triple	8.4 (214.3)	9.4 (239.7)

LMAX2 Option



Connectors



## ORDER INFORMATION — MDrive34AC Plus Microstepping

### CONNECTIVITY

**new**

#### QuickStart Kit

For rapid design verification, all-inclusive QuickStart Kits have communication converter, prototype development cable(s), instructions and CD for MDrivePlus initial functional setup and system testing.

**new**

#### Communication Converter

Electrically isolated, in-line converter pre-wired with mating connector to conveniently set/program communication parameters for a single MDrivePlus via a PC's USB port. Length 12.0" (3.6m).

*Mates to connector:*

19-Pin M23 .....MD-CC301-001

#### Prototype Development Cables

Speed test/development with pre-wired mating connectors that have flying leads other end. Single-ended cordsets are PVC jacketed with foil shield and unconnected drain wire. Length 13.0' (4.0m).

*Mates to connector:*

19-Pin M23

Straight Termination .....MD-CC100-000

Right Angle Termination .....MD-CC101-000

3-Pin Euro AC

Straight Termination .....MD-CC200-000

Right Angle Termination .....MD-CC201-000

\*\*Consult Factory for Availability.

‡ Not Available with Sealed -65 Versions.

Connectivity details: [www.imshome.com/cables\\_cordsets.html](http://www.imshome.com/cables_cordsets.html)

### OPTIONS

#### Linear Actuator\*\*

The MDrive34AC Plus is offered with numerous linear actuator styles and options to satisfy a broad range of linear motion applications. Contact the factory for details or see: [www.imshome.com/mdriveplus\\_linear\\_actuator.html](http://www.imshome.com/mdriveplus_linear_actuator.html)

#### Internal Encoder

Internal differential optical encoders are offered factory-mounted with the MDrive34AC Plus Microstepping. Refer to the Encoder Specifications section for available line counts. All encoders come with an index mark.

#### Control Knob‡

For manual shaft positioning, a factory-mounted rear control knob is available.

#### Planetary Gearbox

Efficient, low maintenance planetary gearboxes are offered factory-mounted. Refer to details and part numbers on the back cover.


#### Linear Slide

Integrated linear slides are available factory installed for precision linear movement. Screw leads are 0.1", 0.2", 0.5" or 1.0" of travel per rev. Slides are 12.0" (30.5cm) to 42.0" (106.7cm) long. Contact factory for custom lengths. Refer to separate datasheet or web site for complete details.

### PART NUMBERING

*Plus*  
base version

*Plus - 65*  
IP65 sealed



**K** **MDM**   **MSZ34**       **OPTION**

QuickStart Kit details above

MDrive Version

1 = Plus

2 = Plus-65 (sealed)

Input Voltage

1 = 120 Volt

2 = 240 Volt

Motor

A = Single Length & Linear Actuator\*\*

B = Double Length

C = Triple Length

P3: Power, 3-Pin Euro AC Connector

P1: I/O & Communications, 19-Pin M23 Circular Connector

**Example #1:** Part Number **MDM1MSZ34B2** is an MDrive34AC Plus Microstepping with 19-pin M23 circular I/O & SPI communications interface, NEMA 34 double length motor and 240 input voltage.

\*\*Consult Factory for Availability.

### OPTIONS

#### Linear Actuator\*\* -L

For complete product specifications, see: [www.imshome.com/mdriveplus\\_linear\\_actuator.html](http://www.imshome.com/mdriveplus_linear_actuator.html)

#### Internal Encoder -E

Refer to encoder specifications section for line counts and part numbers.

Example: **MDM1MSZ34B2-EX** adds an internal 512-line differential optical encoder with index mark to example #1.

#### Control Knob -N

Example: **MDM1MSZ34B2-N** adds a rear control knob to example #1. *Not available with sealed -65 versions.*

#### Planetary Gearbox -G

Refer to gearbox page for complete table of ratios and part numbers.

Example: **MDM1MSZ34B2-G1A2** adds a 1-stage planetary gearbox with 5.18:1 ratio to example #1. Add -F for optional NEMA flange.

#### Linear Slide -R

<p><u>Screw Lead</u> (inches/rev)</p> <p>A = 0.10" (2.54mm)</p> <p>B = 0.20" (5.08mm)</p> <p>C = 0.50" (12.7mm)</p> <p>D = 1.00" (25.4mm)</p>	<p><u>Standard Screw Lengths</u> 12", 18", 24", 36" or 42"</p> <p><i>For Custom Lengths, Consult Factory</i></p>
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Example: **MDM1MSZ34B2-RA12** adds a Linear Slide with 0.10" screw lead, 12" long to example #1.

## MDrive34AC PLUS WITH PLANETARY GEARBOX

The MDrive34AC Plus is available with a Planetary Gearbox option developed to increase torque at lower speeds, enable better inertia matching and produce finer positional resolutions. These efficient, low maintenance Planetary Gearbox come fully assembled with the MDrive and are offered in a large number of reduction ratios in 1-, 2- and 3-stage configurations. An optional NEMA Output Flange allows mounting the Planetary Gearbox to the load using a standard NEMA bolt circle. Planetary Gearbox may be combined with other MDrive34AC Plus options, however are unavailable with Linear Actuators.

### Planetary Gearbox Parameters

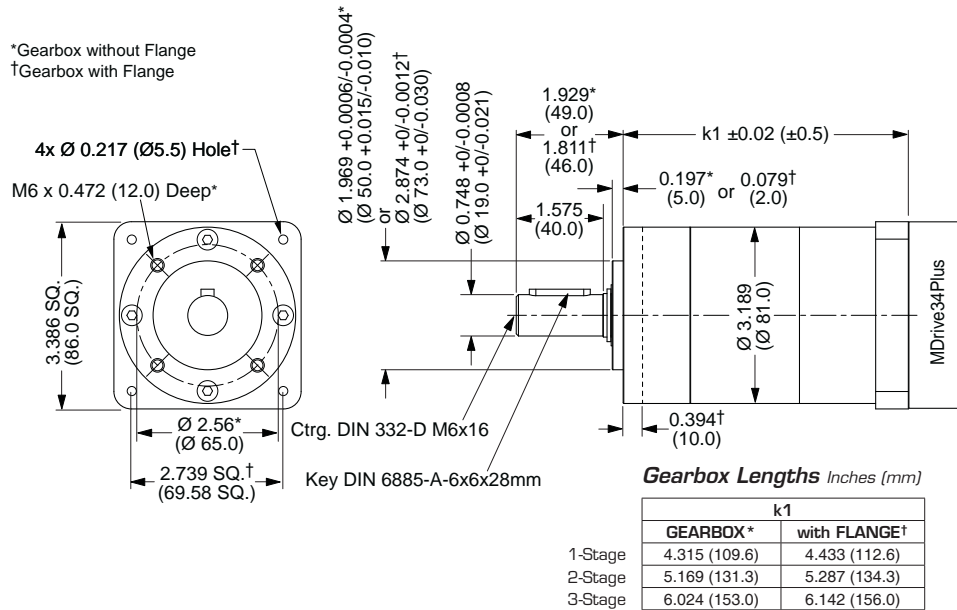
	Permitted Output Torque (oz-in/Nm)	Gearbox Efficiency	Maximum Backlash	Output Side with Ball Bearing			
				Maximum Load (lb-force/N)		Weight (oz/g)	
				Radial	Axial	Gearbox	with Flange
<b>1-STAGE</b>	2832/20.0	0.80	1.0°	90/400	18/80	64.4/1827	66.7/1890
<b>2-STAGE</b>	8496/60.0	0.75	1.5°	135/600	27/120	89.5/2538	92.6/2625
<b>3-STAGE</b>	16992/120.0	0.70	2.0°	225/1000	45/200	114.6/3248	118.5/3360

### Ratios and Part Numbers

Planetary Gearbox	Ratio (Rounded)	Part Number**
<b>1-Stage</b>	3.71:1	G1A1
<b>1-Stage</b>	5.18:1	G1A2
<b>1-Stage</b>	6.75:1	G1A3
<b>2-Stage</b>	13.73:1	G1A4
<b>2-Stage</b>	15.88:1	G1A5
<b>2-Stage</b>	18.37:1	G1A6
<b>2-Stage</b>	19.20:1	G1A7
<b>2-Stage</b>	22.21:1	G1A8
<b>2-Stage</b>	25.01:1	G1A9
<b>2-Stage</b>	26.85:1	G1B1
<b>2-Stage</b>	28.93:1	G1B2
<b>2-Stage</b>	34.98:1	G1B3
<b>2-Stage</b>	45.56:1	G1B4
<b>3-Stage</b>	50.89:1	G1B5
<b>3-Stage</b>	58.86:1	G1B6
<b>3-Stage</b>	68.07:1	G1B7
<b>3-Stage</b>	71.16:1	G1B8
<b>3-Stage</b>	78.72:1	G1B9
<b>3-Stage</b>	92.70:1	G1C1
<b>3-Stage</b>	95.18:1	G1C2
<b>3-Stage</b>	99.51:1	G1C3
<b>3-Stage</b>	107.21:1	G1C4
<b>3-Stage</b>	115.08:1	G1C5
<b>3-Stage</b>	123.98:1	G1C6
<b>3-Stage</b>	129.62:1	G1C7
<b>3-Stage</b>	139.14:1	G1C8
<b>3-Stage</b>	149.90:1	G1C9
<b>3-Stage</b>	168.85:1	G1D1
<b>3-Stage</b>	181.25:1	G1D2
<b>3-Stage</b>	195.27:1	G1D3
<b>3-Stage</b>	236.10:1	G1D4
<b>3-Stage</b>	307.55:1	G1D5

### Planetary Gearbox for MDrive34AC Plus

Dimensions in Inches (mm)



\*\*Include optional planetary gearbox by adding -G plus 3 characters to the end of an MDrive part number.

#### U.S.A. SALES OFFICES

##### Eastern Region

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e-mail: dweisenberger@imshome.com

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