



MDRIVE 34™ MOTOR+DRIVER *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: +12 to +75 VDC
- Cost Effective
- Extremely Compact
- 20 Microstep Resolutions up to 51,200 Steps Per Rev Including: Degrees, Metric, Arc Minutes
- Optically Isolated Input Options:
 - Universal +5 to +24 VDC Signals, Sourcing or Sinking
 - Differential +5 VDC Signals
- 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 Optical Encoder
 - Integrated Planetary Gearbox
 - Control Knob for Manual Positioning
 - Linear Slide
- 3 Rotary Motor Lengths Available
- Setup Parameters May Be Switched On-The-Fly
- Interface Options:
 - Pluggable Locking Wire Crimp
 - 12.0" (30.5cm) Flying Leads
- Graphical User Interface (GUI) for Quick and Easy Parameter Setup

DESCRIPTION

The **MDrive34Plus 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 MDrive34Plus 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 MDrive34Plus 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 MDrive34Plus accepts a broad input voltage range from +12 to +75 VDC, 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 MDrive34Plus uses a NEMA 34 frame size high torque brushless step motor integrated 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.

The versatile MDrive34Plus Microstepping is available in multiple configurations to fit various system needs. Rotary motor versions come in three lengths and may include an encoder, control knob, planetary gearbox or linear slide. Long life Acme screw linear actuators** are also available.

Connector style options give you choices for the best fit and features. Select from 12.0" (30.5cm) flying leads or locking wire crimp connectors.

MDrivePlus connectivity has never been easier with options ranging from **all-inclusive QuickStart Kits** to **individual interfacing cables** and **mating connector kits** to build your own cables. *See pg 5.*

The MDrive34Plus is a compact, powerful and cost effective motion control 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 MDrive34Plus from a computer's USB port. GUI access is via the IMS SPI Motor Interface available at 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^{Plus} MICROSTEPPING

STANDARD SPECIFICATIONS

INPUT VOLTAGE (+V)	Range	+12 to +75 VDC Power supply current requirements = 4A (maximum) per MDrive34Plus. Actual power supply current will depend on voltage and load.	
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 μ S	
	Clock Types	Step/Direction, Quadrature, Step Up/Step Down	
	Step Frequency	2 MHz Default / 5 MHz Max	
	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/ μ step), 21600 (1 arc minute/ μ step), 25400 (0.001mm/ μ step)
TEMP OUTPUT WARNING	Open-Drain Type	+5 to +24 VDC	50mA Current
THERMAL	Operating Temperature	Heat Sink	-40° to +75°C (non-condensing)
		Motor	-40° to +90°C (non-condensing)

SETUP PARAMETERS

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

All parameters are set using the supplied IMS 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)
SINGLE LENGTH	381 oz-in / 269 N-cm	10.9 oz-in / 7.7 N-cm	0.01416 oz-in-sec ² / 1.0 kg-cm ²	4.1 lb / 1.9 kg
DOUBLE LENGTH	575 oz-in / 406 N-cm	14.16 oz-in / 10.0 N-cm	0.02266 oz-in-sec ² / 1.6 kg-cm ²	5.5 lb / 2.5 kg
TRIPLE LENGTH	1061 oz-in / 749 N-cm	19.83 oz-in / 14.0 N-cm	0.04815 oz-in-sec ² / 3.4 kg-cm ²	8.8 lb / 4.0 kg

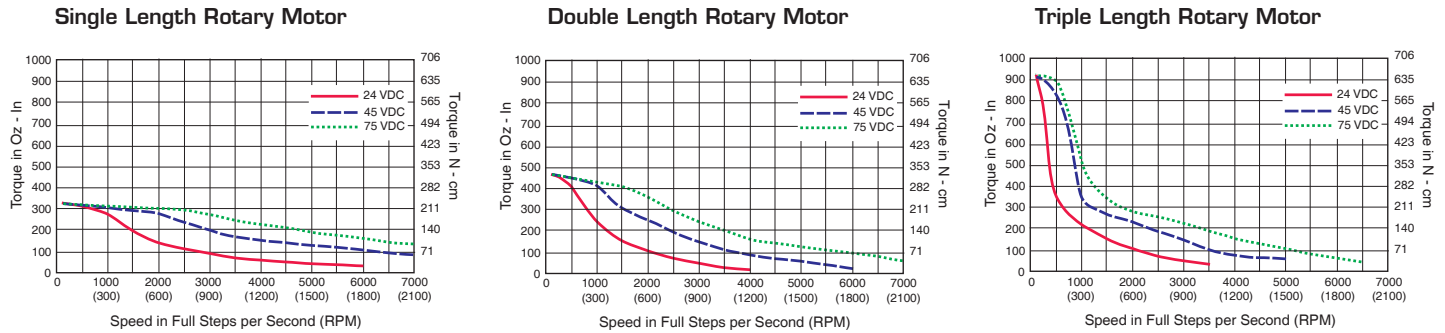
ENCODER SPECIFICATIONS

Line Counts and Part Numbers

	Line Count	DIFFERENTIAL ENCODER	SINGLE-END ENCODER
		Part Number	Part Number
INTERNAL OPTICAL ENCODER	100	EA	E1
	200	EB	E2
	250	EC	E3
	256	EW	EP
	400	ED	E4
	500	EH	E5
	512	EX	EQ
	1000	EJ	E6
	1024	EY	ER

NOTE:
MDrive34Plus with Pluggable Interface – available with Differential Encoder only.
MDrive34Plus with Flying Leads Interface – available with Differential or Single-End Encoder.

MOTOR PERFORMANCE — Speed-Torque



WIRE/PIN ASSIGNMENTS — MDrive34Plus Microstepping

Flying Leads Interface

P1: I/O & POWER CONNECTOR			
Flying Leads		Function	
Wire Colors	Wire Colors with Internal Encoder		
White	White	Optocoupler Reference	
Orange	Orange	Step Clock Input	
Blue	Blue	CW/CCW Direction Input	
Brown	Brown	Enable Input	
Black	Black	Power Ground	
Red	Red	+V (+12 to +75 VDC)	
	—	Differential Encoder	Single-End Encoder
	Yellow/Black	Ground	Ground
	Yellow/Violet	Index +	Index
	Yellow/Blue	Channel A +	Channel A
	Yellow/Red	+5 VDC Input	+5 VDC Input
	Yellow/Brown	Channel B +	Channel B
	Yellow/Gray	Index -	—
	Yellow/Green	Channel A -	—
	Yellow/Orange	Channel B -	—

P2: COMM CONNECTOR (SPI)		
10-Pin IDC	Function	
Pin 1	No Connect	
Pin 2	No Connect	
Pin 3	No Connect	
Pin 4	SPI Chip Select	
Pin 5	Communications Ground	
Pin 6	+5 VDC Output	
Pin 7	SPI Master Out – Slave In	
Pin 8	SPI Clock	
Pin 9	No Connect	
Pin 10	SPI Master In – Slave Out	

Pluggable Interface

P1: I/O & COMM CONNECTOR	
Pluggable Locking Wire Crimp	Function
Pin 1	No Connect
Pin 2	No Connect
Pin 3	Optocoupler Reference
Pin 4	Step Clock Input
Pin 5	Enable Input
Pin 6	CW/CCW Direction Input
Pin 7	+5 VDC Output
Pin 8	SPI Clock
Pin 9	Communications Ground
Pin 10	SPI Master Out – Slave In
Pin 11	SPI Chip Select
Pin 12	SPI Master In – Slave Out

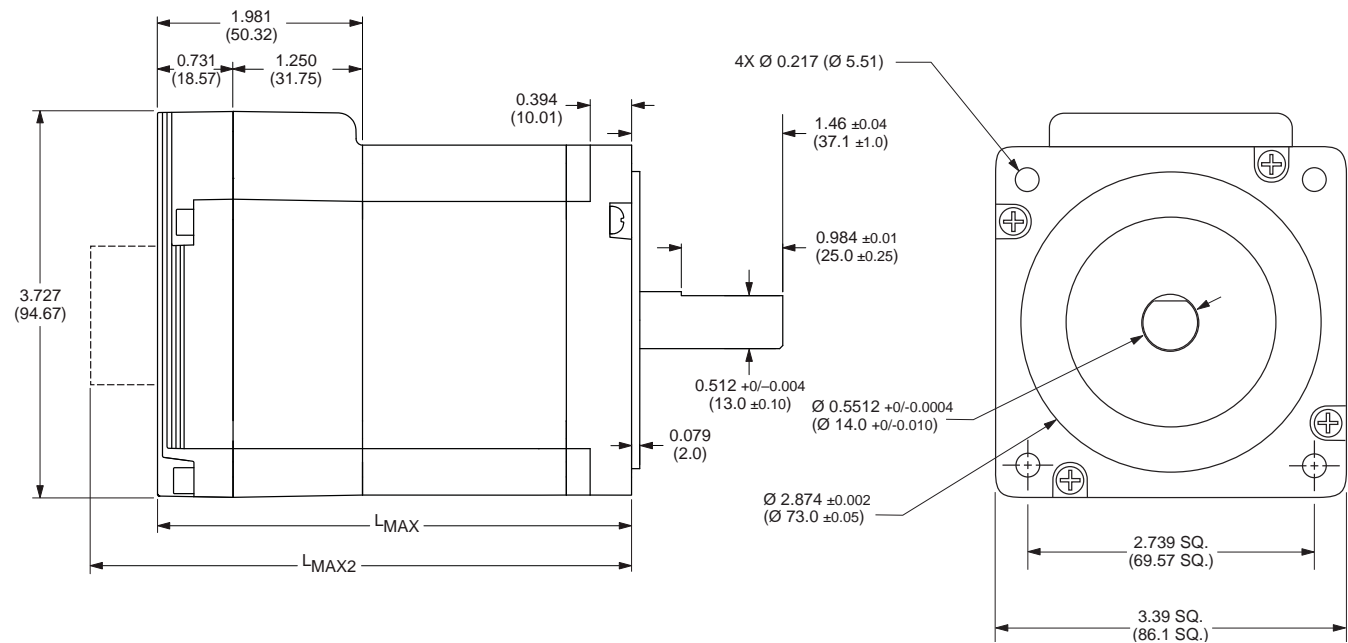
P3: POWER CONNECTOR	
Pluggable Locking Wire Crimp	Function
Pin 1	+V (+12 to +75 VDC)
Pin 2	Power Ground

P4: DIFFERENTIAL INTERNAL ENCODER (OPTIONAL)	
Friction Lock Wire Crimp	Function
Pin 1	Ground
Pin 2	Channel A +
Pin 3	Channel A -
Pin 4	Channel B +
Pin 5	Channel B -
Pin 6	Index +
Pin 7	Index -
Pin 8	+5 VDC Input
Pin 9	No Connect
Pin 10	No Connect

MECHANICAL SPECIFICATIONS

Dimensions in Inches (mm)

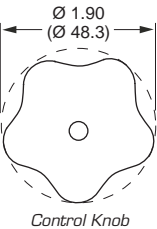
MDrive34Plus Microstepping



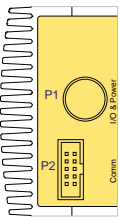
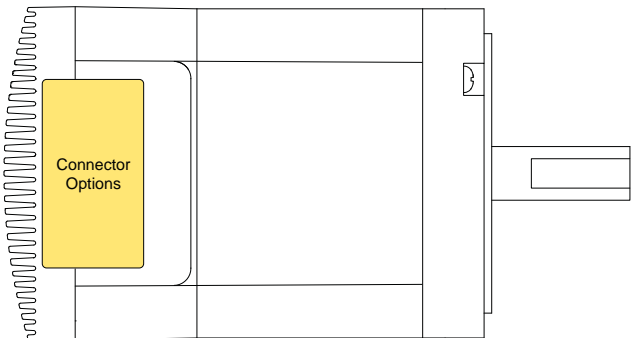
MDrive Lengths Inches (mm)

Motor Length	L _{MAX} SINGLE SHAFT, INTERNAL ENCODER or LINEAR ACTUATOR VERSION	L _{MAX2} CONTROL KNOB VERSION
Single	3.81 (96.77)	4.52 (114.81)
Double	4.60 (116.84)	5.31 (134.87)
Triple	6.17 (156.72)	6.88 (174.75)

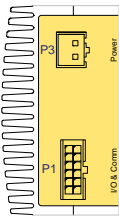
L_{MAX2} Option



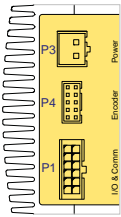
Connector Options



Flying Leads



Pluggable Locking Wire Crimp



Pluggable Locking Wire Crimp with Internal Encoder

Connectivity details:
www.imshome.com/cables_cordsets.html

ORDER INFORMATION — MDrive34Plus 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 Converters

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

Mates to connector:

10-Pin IDCMD-CC300-001
12-Pin Wire CrimpMD-CC303-001

Prototype Development Cables

Speed test/development with pre-wired mating connectors that have flying leads other end. Length 10.0' (3.0m).

Mates to connector:

12-Pin Wire CrimpPD12-1434-FL3
10-Pin Wire CrimpPD10-3400-FL3
2-Pin Wire CrimpPD02-3400-FL3

new Mating Connector Kits

Use to build your own cables. Kits contain 5 mating shells with pins. Cable not supplied. Manufacturer's crimp tool recommended.

Mates to connector:

12-Pin Wire CrimpCK-03
10-Pin Wire CrimpCK-02
2-Pin Wire CrimpCK-05

Kit contains 5 mating connectors that press fit onto ribbon cable. Cable not supplied.

10-Pin IDCCK-01

OPTIONS

Linear Actuator**

The MDrive34Plus 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

Internal Encoder

Internal optical encoders are offered factory-mounted with the MDrive34Plus Microstepping. Refer to the Encoder Specifications section for available styles, line counts and part numbers. All encoders come with an index mark.

Control Knob

The MDrive34Plus is available with a factory-mounted rear control knob for manual shaft positioning.

Planetary Gearbox

Efficient, low maintenance planetary gearboxes are offered assembled with the MDrive34Plus. 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.

** Consult Factory for Availability.

Connectivity details: www.imshome.com/cables_cordsets.html

PART NUMBERING

Plus
flying leads
interface

K **MDM1FSD34** **7** - **OPTION**

QuickStart Kit
details above

P1: I/O & Power
12" Flying Leads

P2: Communications
10-Pin IDC Connector

Motor
A = Single Length & Linear Actuator**
B = Double Length
C = Triple Length

Example #1: Part Number **MDM1FSD34A7** is an MDrive34Plus Microstepping with 12" flying leads I/O & power interface, SPI communications with 10-pin IDC connector, and NEMA 34 single length motor.

Plus
pluggable
interface

K **MDM1CS** **34** **7** - **OPTION**

QuickStart Kit
details above

P3: Power
2-Pin Locking Wire Crimp

P4: Optional Encoder
L = 10-Pin Encoder Interface
Z = No Encoder

P1: I/O & Communications
12-Pin Locking Wire Crimp

Motor
A = Single Length & Linear Actuator**
B = Double Length
C = Triple Length

Example #2: Part Number **MDM1CSL34A7** is an MDrive34Plus Microstepping with 12-pin I/O & communications interface, 2-pin power connector, and NEMA 34 single length motor.

** Consult Factory for Availability.

OPTIONS

Linear Actuator**

-L

For complete product specifications, see:
www.imshome.com/mdriveplus_linear_actuator.html

Internal Encoder

-E

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

Example: **MDM1CSL34A7-EH** adds an internal 500-line count differential optical encoder with index mark to example #2, which is interfaced via a 10-pin friction lock wire crimp connector.

Control Knob

-N

Example: **MDM1CSL34A7-N** adds a rear control knob for manual positioning to example #2.

Planetary Gearbox

-G

-F
Optional NEMA Flange

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

Example: **MDM1CSL34A7-G1A2** adds a 1-stage planetary gearbox with 5.18:1 ratio to example #2. Add -F for optional NEMA flange.

Linear Slide

-R

Screw Lead

(inches/rev)

A = 0.10" (2.54mm)

B = 0.20" (5.08mm)

C = 0.50" (12.7mm)

D = 1.00" (25.4mm)

Standard Screw Lengths

12", 18", 24", 36" or 42"

For Custom Lengths, Consult Factory

Example: **MDM1CSL34A7-RA12** adds a Linear Slide with 0.10" screw lead, 12" long to example #2.

MDrive34PLUS WITH PLANETARY GEARBOX

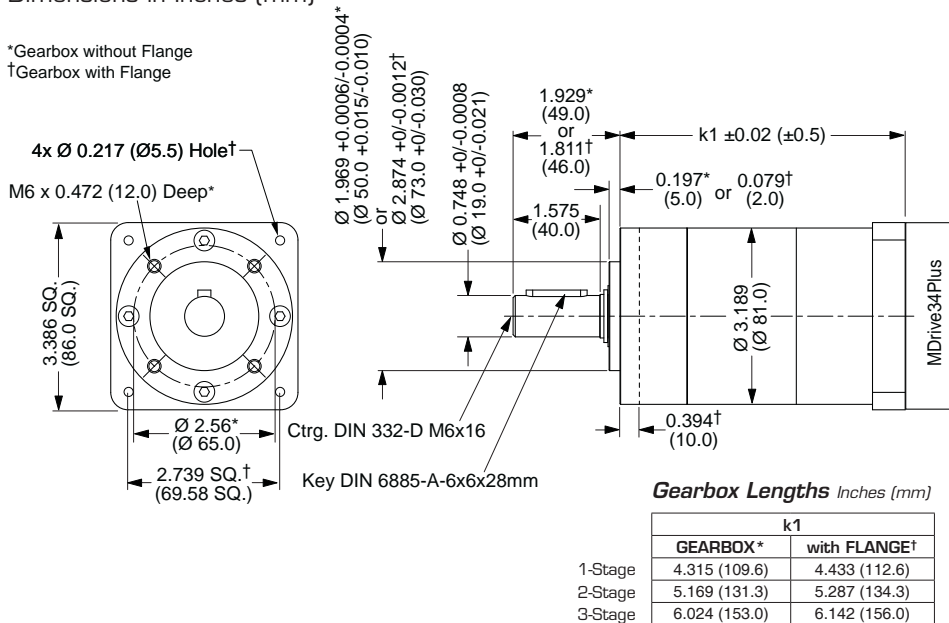
The MDrive34Plus is available with a Planetary Gearbox option developed to increase torque at lower speeds, enable better inertia matching and produce finer positional resolutions. These efficient, low maintenance Planetary Gearbox come fully assembled with the MDrive and are offered in a large number 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 MDrive34Plus 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
1-STAGE	2832/20.0	0.80	1.0°	90/400	18/80	64.4/1827	66.7/1890
2-STAGE	8496/60.0	0.75	1.5°	135/600	27/120	89.5/2538	92.6/2625
3-STAGE	16992/120.0	0.70	2.0°	225/1000	45/200	114.6/3248	118.5/3360

Planetary Gearbox for MDrive34Plus

Dimensions in Inches (mm)



Ratios and Part Numbers

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

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

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