



CE (LVD and EMC\*)

## Direct-Drive Brushless Servo Systems

Each Dynaserv system consists of a brushless servo motor, microprocessor-based drive, power supply, and a brushless resolver or encoder for position feedback. The primary benefit of the Dynaserv System is high accuracy and torque without speed reducers. Additional advantages include:

- Faster settling time than a traditional servo motor and speed reducer system
- Smooth rotation at slow speeds
- A flat speed/torque curve for high controllability
- Ability to operate in a position, speed or torque control mode
- Built-in test mode simplifies optimum tuning

### G2 — Small Packaged, Digital Servo Drive!

- RS232 communication
- Auto-tuning
- Increased resolutions (up to 4,096,000 ppr)
- Repeatability to  $\pm 1$  arc second
- Utility software

### The Dynaserv Family

#### DR Series — Lowest Cost!

- Brushless resolver feedback
- 20 models: 4-, 6-, 8- or 10-inch diameter
- Resolutions to 819,200 steps/rev
- Torques to 370 ft-lb (500 Nm)
- Repeatability of  $\pm 5$  arc seconds
- Speeds up to 5 rps for DR5000

#### DM Series — Best Accuracy and Repeatability!

- Incremental encoder feedback
- 9 models: 4-, 6- or 10-inch diameter
- Resolutions to 1,024,000 steps/rev
- Torques to 150 ft-lb (200 Nm)
- Repeatability of  $\pm 2$  arc seconds
- Clean room operation
- DM1004 has axial and radial run-out of 0.01mm

#### M2 — Drive/Controller in a Single Package!

- Autotuning
- Controls all Dynaserv motors except D5000A Series
- Position feed forward (faster settling)
- PLC mode
- Fieldbus: Profibus, DeviceNet and CC Link
- Non-volatile RAM
- Configuration replication (flash memory)

\* EMC with proper filter and installation procedures.

**Integrate Direct Drive Servo Systems Into Your Next Application. Call 1-800-358-9070 Today.**

## Introduction

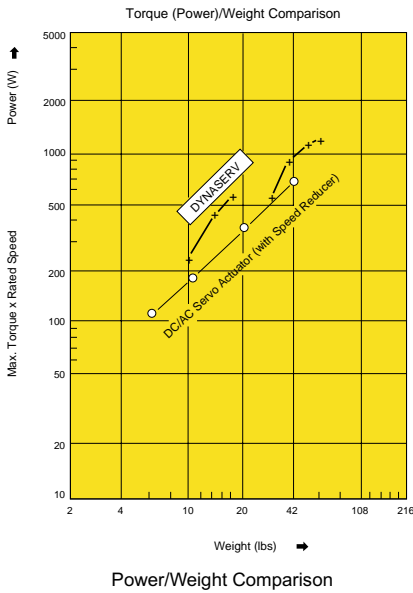
### The Dynaserv System Allows the User to Operate in One of Three Modes of Control:

- Position control – up to 4,096,000 steps/rev
- Speed control –  $\pm 10V$  Velocity command input
- Torque control – stable response at  $\pm 8V$  input

This type of flexibility combined with a high torque/weight ratio, high accuracy, faster settling times, high torque at high speed, smooth rotation, optimum tuning and clean operation all add up to cost effective high performance alternative to the traditional motor and speed reducer combinations.

### High Torque/Weight Ratio

The Dynaserv motors are designed with a permanent magnet constructed of rare-earth materials located at the center of the stator core.

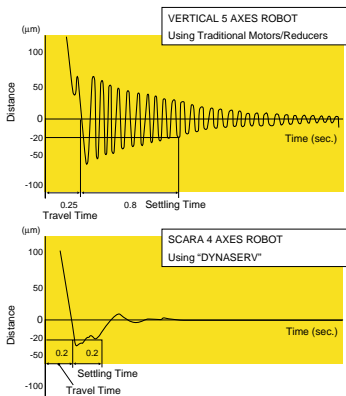


### High Precision

Dynaserv motors eliminate the backlash or hysteresis inevitable in using any speed reducer. Absolute positioning of 30 arc-sec is typical with a repeatability of  $\pm 1$  arc-sec.

### Faster Settling Time

The Dynaserv system reduces machine cycle times by decreasing settling times. This result is realized because of the "gearless" design and sophisticated "I-PD" control algorithm.



Settling Time comparison in Robot Application

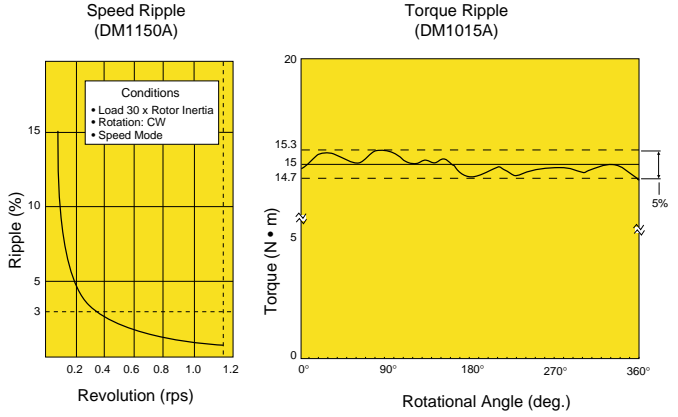
## DYNASERV

### High Torque at High Speed

The torque/speed curve of the various Dynaserv models is very flat. This results in high acceleration at high speeds (4.0 rps) with good controllability.

### Smooth Rotation

The very low velocity and torque ripple of the Dynaserv contribute to its excellent speed controllability.



Dynaserv Velocity/Torque Ripple

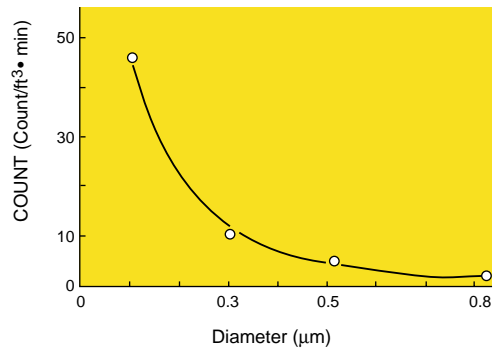
### Optimum Tuning

Dynaserv systems offer the user a tuning mode that simplifies the setting of optimum parameters for the actual load. Turning on the "test" switch on the front panel of the drive produces a test signal. Utilizing an oscilloscope the gain settings are quickly optimized by adjusting the digital switches and potentiometers on the front panel.

### Clean Operation

The Dynaserv system is brushless and gearless which results in a maintenance-free operation. With preparation, the DM Series can operate in Class 10 environments.

- Measured by: LPC-101 Particle Counter
- Made by: PMS Corp.
- Source: He-Ne Lazor Light
- Min. Resolution: 0.1 micro meter (Particle Diameter)
- Sampling: 0.1 Cubic feet/min.



Dust from Dynaserv (DM1045B)

## Introduction

The Dynaserv has provided solutions to a variety of applications such as:

### Assembly

- Base machine
- Pick and place
- Inserter/mounter

### Robots

- Handling
- Clean room
- Universal

### Transport

- Turn table
- Belt conveyor
- Three-dimensional warehouse

### Inspection and Measuring

- Three dimensional measuring
- Goniometer
- Non-destructive x-ray

### Work

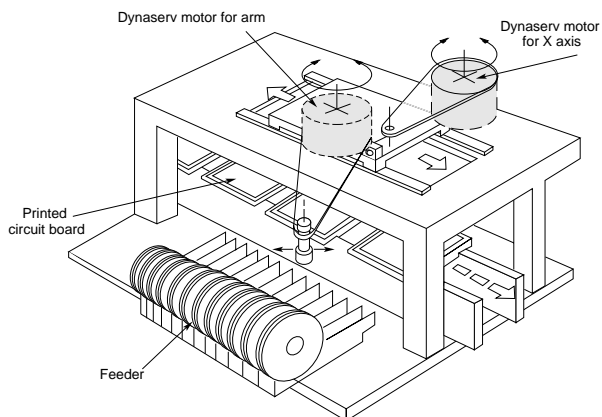
- Machining center work table
- Press roll feed
- Grinder table

### Commercial

- Printing machines
- Medical equipment
- Follow-up equipment

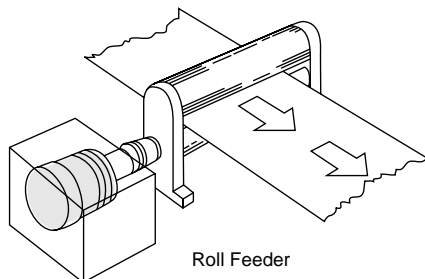
## Material Handling

By attaching a small arm or linkage to the Dynaserv, very high velocities can be attained. This type of design has been used on a wide variety of equipment, such as a chip mounting machine. On this machine accuracies of 30 arc-sec are maintained with very high arm speed.



## Feed-to-Length

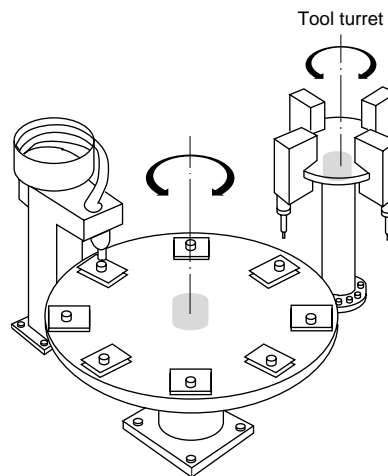
The Dynaserv system eliminates the need for gear reduction and allows for direct control of the nip roll in most feed-to-length applications. The ability to effectively control loads up to 100 times its own rotor inertia allows the Dynaserv to be applied in a variety of machines. The net result of specifying a Dynaserv system is increased repeatability of the feed material.



## DYNASERV

## Indexing/Rotary Positioning

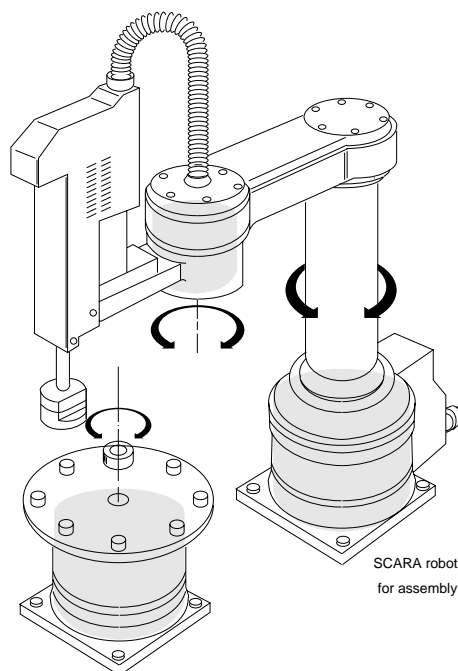
The Dynaserv has high accelerations lending itself to high speed point-to-point positioning applications requiring low cycle time. In scanning and inspection applications the outstanding low speed performance will be of merit.



Rotary table for assembly

## Robotics

Dynaserv direct drive motors were first developed to drive SCARA (Selective Compliance Assembly Robot Arm) in applications requiring repetitive and physically taxing operations.



Peripherals for robot

SCARA robot for assembly

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# Motor Construction and Operation

The torque is proportional to the square of the sum of the bias magnetic flux  $\Phi_m$ , due to the permanent magnet and the excitation magnetic flux of windings.

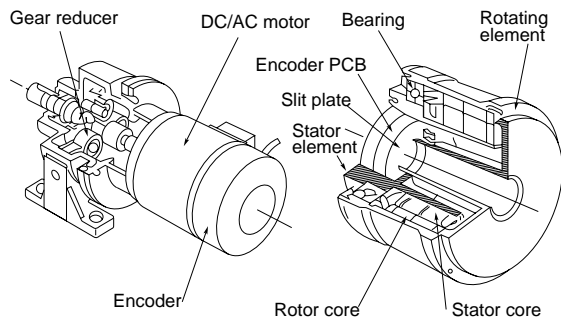
$$T \propto (\Phi_m + \Phi_c)^2$$

High torque is generated due to the following factors. First, the motor diameter is large. The tangential forces between rotor and stator act at a large radius, resulting in higher torque. Secondly, a large number of small rotor and stator teeth create many magnetic cycles per motor revolution. More working cycles means increased torque.

Direct drive systems couple the load of the system directly to the motor without the use of belts or gears. Most servo motors, brushed or brushless, often lack adequate torque or resolution to satisfy application needs. Therefore, mechanical means, such as gear reduction systems are implemented to meet system requirements. The Dynaserv can provide very high torque in a modest package size and solve many of the performance issues of the gear reducer. All this in a system that is as easy to use as a stepping motor.

The figure below shows the construction of the Dynaserv DM Series direct drive motor compared to a conventional motor with a gear reducer. As shown in the figure, the gear reducer relies on frictional contact to reduce the speed of the load. This gearing effectively increases torque and resolution but sacrifices speed and accuracy. The direct drive motor is brushless and gearless so it eliminates friction from its power transmission. Since the feedback element is coupled directly to the load, system accuracy and repeatability are greatly increased and backlash is eliminated.

## Conventional Motor/Gear Reducer vs. Dynaserv

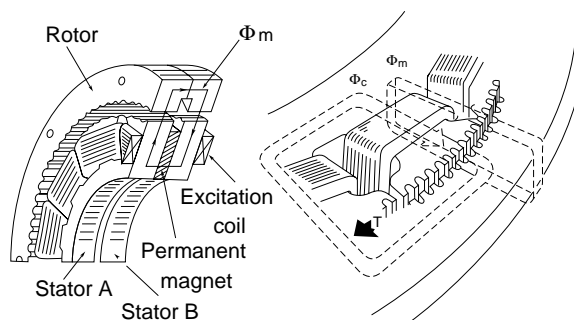


## DM Series

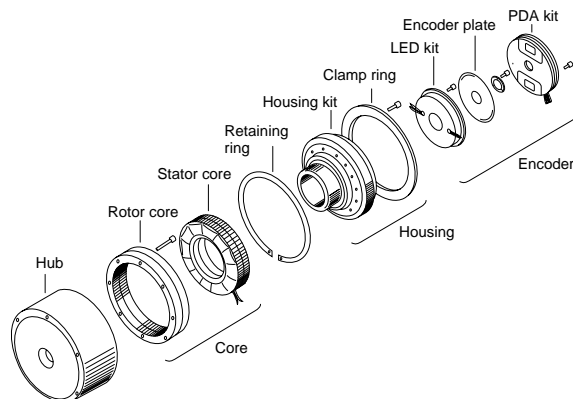
### Gear Reducer System Limitations

- Backlash limits positional accuracy
- Gearing causes a trade-off between speed and resolution
- Inefficiently transfers torque

## Magnetic Circuit



## Exploded View of the Dynaserv Motor Model DM



- Friction introduces inaccuracies and non-linearities
- Gearing reduces stiffness at the load

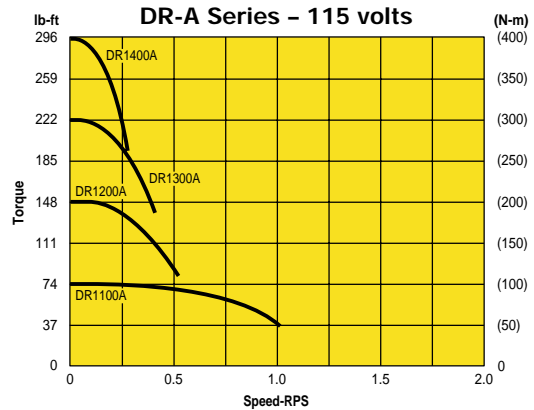
The motor contains precision bearings, magnetic components and integral feedback in a compact motor package. The motor is an outer rotor type, providing direct motion of the outside housing of the motor and thus the load. The cross roller bearings which support the rotor have high stiffness, to allow the motor to be connected directly to the load. In most cases it is not necessary to use additional bearings or connecting shafts.

# Selecting your Dynaserv

The normal principals of servo motor sizing apply to the Dynaserv, but there are a few special considerations to keep in mind.

## Peak Torque/Continuous Torque

The speed torque curves in this section represent the peak available torque. Continuous torques are approximately 2/3 of the peak value. Use one-half of peak torque for the DM1004.



## Inertia Matching

When selecting the right Dynaserv for your application, the inertia match between the motor and load is a critical factor. The specifications listed in this section are for a 30:1 load to rotor inertia ratio. The following table lists the recommended ratios for specific application types. Actual results will depend highly on the usage, so these values are just for reference purposes. It is always a good idea to add 30-50% safety margin in sizing calculations.

Application Types and Ratios	
Application Type	Max K Ratio ( $J_{load}/J_{motor}$ )
High throughput applications (printing machines, chip mounting)	5-10
General high speed applications (SCARA robot, transfer arms)	20-30
High speed but balanced load applications (Rotary Index, Rotary Tables)	50-100
High accuracy, slow speed applications (Measuring Equipment)	100-200

## Motor Types

When selecting the motor type, the decision comes down to a trade-off of resolution, accuracy, speed, and cost. Please use this table to match your specific application requirements to the correct direct drive motor. Keep in mind that these ratings are speculative and based only on the features of these three models. The lowest accuracy Dynaserv is still very accurate by normal motor standards.

Motor Types			
	DM Series	DR Series	DR5000 Series
Power	Lowest	Medium	Highest
Accuracy	Highest	Medium	Lowest
Motor Weight	Lowest	Medium	Highest
Resolution	Highest	Medium	Lowest
Cost	Medium	Lowest	Highest
Speed	Lowest	Medium	Highest

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# Application Considerations for using the Dynaserv Direct-Drive Brushless Servo Systems

## Sizing and Selection Considerations

- All Speed vs. Torque curves shown in Compumotor's Catalog and **Dynaserv User Guide** show peak torque. Use two-thirds of peak torque to calculate the available continuous torque. Use one-half for DM1004.
- If you require more than two-thirds of peak torque for short periods of time (low duty cycle applications), calculate RMS (root mean square) torque. make sure RMS torque is less than 2/3 of peak torque.
- Friction torque should not exceed 30% of a motor's peak torque.
- Dynaservs operate most efficiently with a balanced load. Overhung loads cannot exceed 148 ft-lbs for the DR-B and DM-B series motors. Overhung loads cannot exceed 15 ft-lbs for DR5000C series, 24 ft-lbs for the DM1004C and 20 ft-lbs for the DM1004B. These values should be derated by 33% for constant loads and 80–90% for intermittent loads (fatigue) to incorporate a safety margin.
- Always calculate the load-to-rotor inertia ratio before selecting a motor. The acceptable ratio is application- and motor-dependent. Applications requiring low cycle times and high accelerations need a lower ratio than slow-speed, continuous velocity applications. Refer to the acceptable inertia values for different application types on the previous page.

## Cabling Considerations

- The Dynaserv is not shipped with a power cable. This cable must be provided by the end user. The Dynaserv is shipped with a 50-pin Honda connector. Use this connector to construct a cable between the Indexer, Servo controller, or other input/output devices. Prefabricated cables for Compumotor indexers and servo controllers are available.
- The motor and feedback cables cannot exceed 30 meters in length.

## Mounting and Environmental Considerations

- Do not drill holes into the Dynaserv motor.
- The Dynaserv is an outer rotor motor. The rotating load must be mounted to the upper mounting surface (the rotor). The lower stator surface must be mounted to the rigid and stationary machine base.
- Install the motor in an appropriate location as the motor is not dust proof, watertight, or oil proof.

### Axial Compression and Tension Load Limits

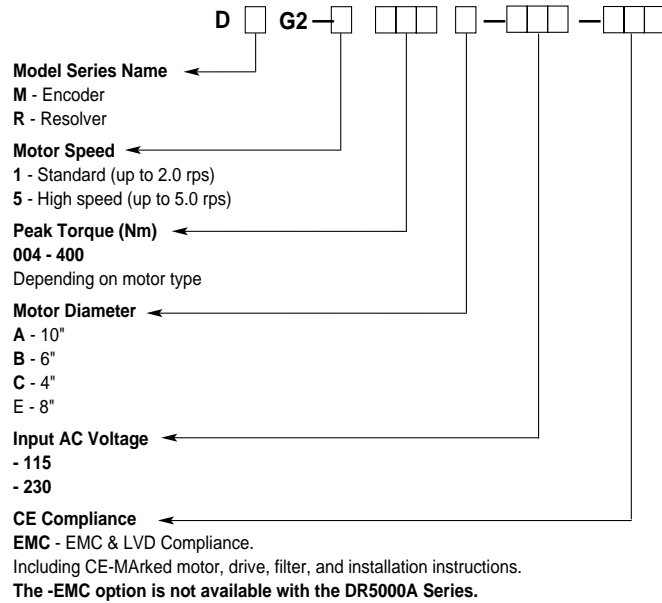
	Compression	Tension
DR5000C	1124 lbs	674 lbs
DR-B Series	6744 lbs	2248 lbs
DR-E, DR-A	8992 lbs	4496 lbs
DM1004B	440 lbs	154 lbs
DM1004C	770 lbs	770 lbs
DM-B	6600 lbs	2200 lbs
DM-A	8800 lbs	4400 lbs

These limits should be derated to incorporate a safety margin. If the load is intermittent and repetitive, derate these values by 80–90%.

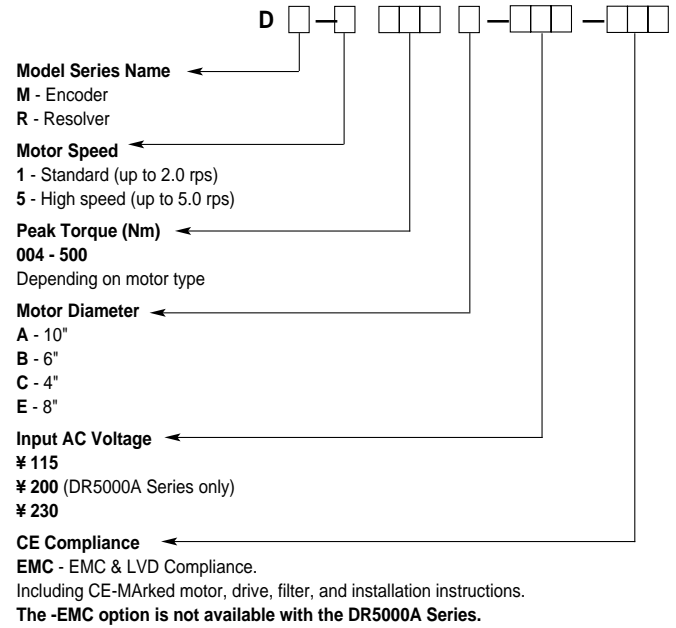
- If the motor is used with oscillating rotation movements with a small angle (50° or less), then perform a running-in operation with back-and-forth movements about 10 times, each move exceeding an angle of at least 90°. The running-in operation must be carried out every 10,000 times of back-and-forth oscillation movements in order to ensure proper lubrication of the bearings.

# How to Order – Linearserv and Dynaserv

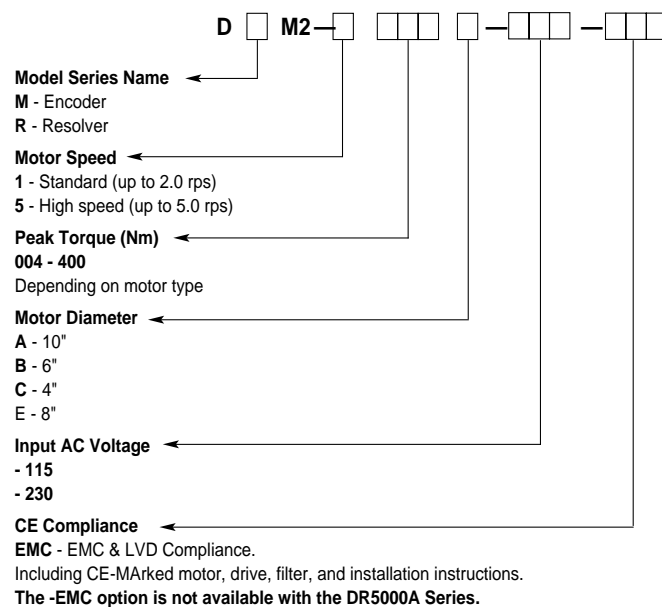
## How to Order – Dynaserv G2



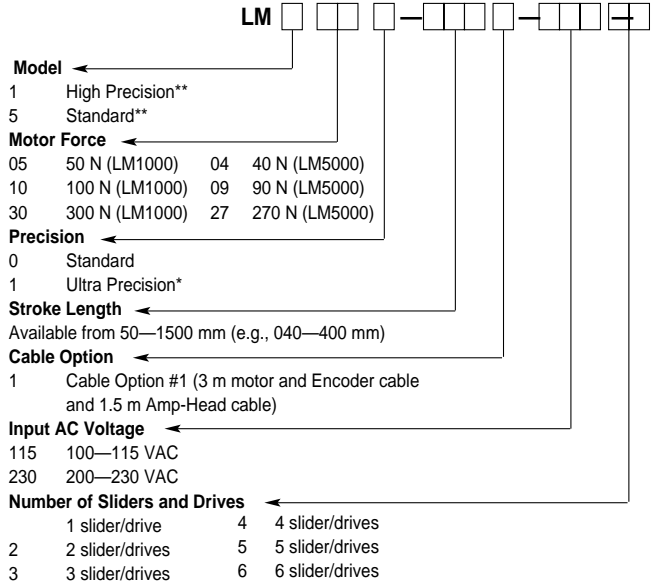
## How to Order – Dynaserv



## How to Order – Dynaserv M2



## How to Order – Linearserv



\* Available in the LM1000 Series

\*\* High rigidity versions are available for increased load and moment capabilities

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# Dynaserv G2



## Dynaserv G2 Digital Servo Drives

The Dynaserv G2 is a small-packaged, position-command-type (step-and-direction command input), new-generation digital servo amplifier. It is designed specifically to drive the Dynaserv direct-drive rotary and Linearserv direct-drive linear motors.

The G2 can be easily configured via RS232 using the G2 Utility on a PC or by using the optional hand-held Teach Pendant. The G2 is available in 500 watts and 2 kW power levels. It will run all the Dynaserv motors except the DR5000A series.

Servo tuning is simplified with the auto-tuning feature. No information is required to tune the servo; the auto-tuning

operation oscillates the rotor and measures the inertia and weight of the load, then automatically sets the optimum tuning parameters for servo control.

### Features

- Step and direction input only
- Resolver or encoder feedback
- Torques to 295 ft-lbs. (400 Nm)
- RS232 communication
- Auto-tuning
- Increased resolutions (up to 4,096,000 ppr)
- Repeatability to  $\pm 1$  arc second
- Homing operation
- LED diagnostics display
- Utility software



**G2**  
I/O Connections (CN4)  
36-Pin Honda

Pin No.	I/O Signals	Signal Name	Description
1	COMP1	Common power	Input power 12 to 24 VDC
2	COMN1	Common ground	Input power ground
3	OUT_DRDY	Driver ready	Turns ON when it is not in the error status
4	OUT_SRDY	Servo ready	Turns ON when it is in the servo ready state
5	OUT_BUSY	Busy	The status where operation cannot be performed according to the pulse train position command
6	OUT_XOVL	Overload signal	Turns OFF when overload occurs
7	OUT_OVER	Over signal	Turns ON when position deviation overflow or excessive velocity occurs
8	OUT_COIN	Position settling signal	Turns ON when the position deviation is within the settling width
9	UA_OUT+	Encoder output UP+ or A+	UP+ or A+, depending on the setting
10	UA_OUT-	Encoder output UP- or A-	UP- or A-, depending on the setting
11	UB_OUT+	Encoder output DOWN+ or A+	DOWN+ or A+, depending on the setting
12	UB_OUT-	Encoder output DOWN- or A-	DOWN- or A-, depending on the setting
13	Z_OUT+	Encoder output Z+	Homing Z_Channel
14	Z_OUT-	Encoder output Z-	Homing Z_Channel
15	PUA_IN+	Position command input pulse+	PLS+, UP+ or A+, depending on the setting
16	PUA_IN-	Position command input pulse-	PLS-, UP- or A-, depending on the setting
17	SDB_IN+	Sign (direction) command input pulse+	SIGN+, DOWN+ or B+, depending on the setting
18	SDB_IN-	Sign (direction) command input pulse-	SIGN-, DOWN- or B-, depending on the setting
19	IN_ERR_RESET	Error reset	Executes error status reset when setting from OFF to ON
20	IN_SERVO	Servo ON	Servo ON when activated
21	IN_MODE_START	Operation start command	Starts operation when setting from OFF to ON
22	IN_ABORT	Operation abort command	Stops operation when setting from OFF to ON
23	IN_MODEL_0	Operation mode number	
24	IN_MODEL_1	Operation mode number	
25	IN_POSW_0	Settling width selection	Switches the settling width
26	IN_POSW_1	Settling width selection	Switches the settling width
27	IN_GAIN	Velocity control bandwidth selection	Selects the velocity control bandwidth 1 or 2
28	IN_FN	Position control bandwidth selection	Changes the position control bandwidth 1 or 2
29	IN_PLS_DIRECT	Pulse direct or scaled selection	Selects direct pulse command input or scaled input pulse command
30	IN_PACT	Position control integral operation disabled	Disables the integral operation when ON
31	NC	No connection	
32	NC	No connection	
33	CRNT LMT IN+	Current limit	0V: 0% to 10V: 100%
34	CRNT LMT IN-	Current limit	0V: 0% to 10V: 100%
35	NC	No connection	
36	NC	No connection	

# Dynaserv M2



## Dynaserv Drive/Controller

The Dynaserv M2 drive/controller is a single-axis servo motor programmable drive/controller, designed to optimize the use of the Dynaserv direct drive motors. It incorporates a completely digital motion and position programmable controller with the well-established Dynaserv drive in a single package. It was designed to simplify the use of Dynaserv direct-drive servo motor system, especially in rotary indexing applications. The M2 uses the I-PD control algorithm for precise motion and position control. The "auto tuning" feature simplifies servo tuning and decreases system setup time. Improved settling time is realized due to the use of position feed forward and the close proximity of the controller and drive.

The Dynaserv M2 can be used with all the Dynaserv motors except the DR5000A series. RS232C and the PLC mode allow the user to manipulate the controller, with either a computer or a Programmable Logic Controller. Programs, parameters, configurations, and data settings can be stored in the Flash Read Only Memory (ROM). (Since Flash ROM does not require battery backup, it makes for a very safe method for storing valuable setup information).

The M2 Drive can be used to replace mechanical cam indexers and have the flexibility to change index number, index distance, acceleration, speed, etc., electronically, without replacing the dial indexer.

### Features

- Auto Tuning
- Position Feed Forward
- RS232 Communication
- PLC Mode
- LED Diagnostic Display
- Indicator Lamps
- Controls most DR or DM series motors
- Flash Read Only Memory(ROM)
- Windows 95/98 Utility Software (M2 Utility)

### Accessories

- CP7576S-020 RS232C 2 meter cable (IBM compatible)
- CP7802S-020 PLC 2 meter cable
- CP7902S-020 Sensor (Home, travel limits, etc.) 2-meter cable
- Teach Box wired remote control

*Please refer to the ordering information matrix  
on page 159*

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General Specifications

Type	500W type		2kW type			
Input power supply voltage	100 to 115V AC + 10%, -15% 50Hz/60Hz	200 to 230V AC + 10%, -15% 50Hz/60Hz	100 to 115V AC + 10%, -15% 50Hz/60Hz	200 to 230V AC + 10%, -15% 50Hz/60Hz	100 to 115V AC + 10%, -15% 50Hz/60Hz	200 to 230V AC + 10%, -15% 50Hz/60Hz
Maximum current consumption (KVA)	0.8		3.4		3.4	
Ambient operating air temperature and humidity	0 to 50°C, 20 to 90% RH, without condensation					
Ambient storage air temperature and humidity	-20 to 85°C, 20 to 90% RH, without condensation					
Operating environment	No corrosive gases and dust should be present.					
Mass (kg)	1.7		3.6		3.2	

\* Input voltage 100 to 115V AC: 1, 200 to 230V AC: 2

Function Specifications

Item	Specifications
Higher interface	RS232C interface (single channel communication, multi-channel communication) PLC interface (can be selected from the following four types at ordering: contact I/O, PROFIBUS-DP, CC-LINK, DeviceNet)
Input signal	Control input signal Emergency stop, servo command, start, stop, operation number, code input (BCD 2-digit), error reset, integral position control operation disable, interlock, velocity override selection, jog (+) command, job (-) command, M answer input etc.
	Mechanical input signal Homing signal, (+) direction hardware over-travel signal, (-) direction hardware over-travel signal
Output signal	Control input signal CPU ready, servo ready, operation under execution, error status, alarm status, position settling status, area signal 0, area signal 1, M code enable, code output (BCD 2-digit) etc.
	Mechanical input signal Brake signal
Position detector resolution	Rotating type DMA series: 4,096,000 pulses/rev DMB series: 2,621,440 pulses/rev DM1004 series: 2,621,440 pulses/rev DRA series: 1638400 pulses/rev DRB series: 1015808 pulses/rev DRE series: 1228800 pulses/rev DR5000B & C series: 557056 pulses/rev Linear Type Standard, high-stiffness series: 0.25 μm, high-speed, high-speed/high-stiffness series: 0.5 μm,
Coordinate system	Either rotational coordinates or linear coordinates can be selected. Command unit coordinate (rotating type): pulse, angle (1/100, 1/1000, 1/10000 degree), user setting unit (linear): pulse, angle (10μm, 1μm, 0.1μm), user setting units Operation unit: command unit, index Type A, index Type B
Control Algorithm	Method I-PD position control (position: integral proportional control, velocity: proportional control) Feed forward functions (position, velocity, acceleration) Filters (velocity command filter, velocity feedback filter, first order delay filter, notch filters)
	Adjustment Position control bandwidth: 1 Hz to 32Hz, Velocity control loop width: 5Hz to 200Hz Position integral limiter setting Feed forward percentages (position, velocity, acceleration) Filter settings (velocity command filter bandwidth, velocity feedback filter enable/disable, bandwidth, first order delay filter setting, notch filter setting)  Calculates proportional gain and acceleration feed forward gain of the velocity control part automatically based on measurement by the auto-tuning operation or manual setting of the load inertia/weight with respect to the settings of velocity control bandwidth and acceleration feed forward percentage.  Calculates position control bandwidth, velocity control loop bandwidth, and position integral limiting value automatically during execution of the auto-tuning operation or by manual setting of the servo stiffness.

**Specifications, continued**

Acceleration/deceleration control	<p>Trapezoidal move: Acceleration curve and deceleration curve can be selected individually. Acceleration time or deceleration time can be selected individually (with respect to the maximum velocity).</p> <p>Cam profile move: Cam profile selection (8 standard parts and 8 user parts)</p> <p>Acceleration curve or deceleration curve at velocity override change can be selected individually.</p> <p>Acceleration time or deceleration time at velocity override change can be selected individually (ratio to override is 100%).</p> <p>Feed time setting or maximum velocity setting</p> <p>Real time velocity override</p>
Operation function	<p>Jog move operation, test operation, auto-tuning operation, homing operation, signal search operation, index operation A, index operation B, table reference operation, program operation, MDI operation</p>
Program operation	<p>No. of program blocks:1000, No. of programs:100 (including 10 fixed programs).</p> <p>Parameters and reference monitors within a program.</p> <p>IF statements, FOR statements, WHILE statements, and subprogram calls.</p> <p>Variables (50 registration variables and 50 volatile variables).</p> <p>Step execution and repetitive.</p>

Item	Specifications
Protection functions	<p>Encoder/resolver error, power module error (over-voltage and over current), main power supply error, overload, maximum velocity, excessive position deviation, hardware over-travel, software over-travel (only for linear coordinate)</p>
Others	<p>M function (2-digit)</p> <p>Support software PC utility running under Windows</p> <p>Possible to connect the operation display pendant (optional)</p>
Monitor	<p>Analog signal monitor (velocity, general, torque/thrust command)</p> <p>For general monitoring, what is shown by the monitor can be selected by setting (position error, test operation response, position command value, current position value, position command differential value)</p> <p>Digital signal monitor (settling signal)</p> <p>Monitoring internal information by higher interface</p>



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**DR Series Motor Data**

		Model 1008B	Model 1015B	Model 1030B	Model 1045B	Model 1060B	Model 1070E	Model 1100E	Model 1130E	Model 1160E
Peak torque	ft-lbs (Nm)	6 (8)	11 (15)	22 (30)	33 (45)	44 (60)	52 (70)	74 (100)	96 (130)	118 (160)
Rated speed 115/230VAC	rps	2.0/2.0	2.0/2.0	1.5/2.0	1.0/2.0	1.0/1.5	1.5/2.0	1.0/1.5	0.5/1.0	0.5/1.0
Maximum power consumption 115/230VAC	KVA	0.7	1.0	1.8	1.8	1.8	2.0	2.3	2.5	2.8
Rotor inertia	oz-in <sup>2</sup> x 10 <sup>2</sup> (Kgm <sup>2</sup> x 10 <sup>-3</sup> )	7.9 (15)	11 (21)	13 (24)	14 (26)	18 (33)	46 (85)	55 (100)	68 (125)	77 (140)
Max resolution		507,904	507,904	507,904	507,904	507,904	614,400	614,400	614,400	614,400
Motor weight	lbs (kg)	13 (6)	20 (9)	24 (11)	29 (13)	35 (16)	49 (22)	57 (26)	70 (32)	79 (36)
Maximum static axial load*	lbs	6,744	6,744	6,744	6,744	6,744	8,992	8,992	8,992	8,992
• Compression	lbs	2,248	2,248	2,248	2,248	2,248	4,496	4,496	4,496	4,496
• Tension										
Maximum static overhung load*	ft-lb	148	148	148	148	148	295	295	295	295

**DR Series Motor Data**

		Model 1100A	Model 1200A	Model 1300A	Model 1400A
Peak torque	ft-lbs (Nm)	74 (100)	148 (200)	221 (300)	295 (400)
Rated speed, 115/230VAC	rps	1.0/1.0	0.5/1.0	0.25/0.5	0.25/0.5
Maximum power consumption, 115/230VAC	KVA	2.5	3.0	3.2	3.2
Rotor inertia	oz-in <sup>2</sup> x 10 <sup>2</sup> (Kgm <sup>2</sup> x 10 <sup>-3</sup> )	109 (200)	156 (285)	186 (340)	219 (400)
Maximum resolution		819,200	819,200	819,200	819,200
Motor weight	lbs (kg)	68 (31)	101 (46)	125 (57)	150 (68)
Maximum static axial load**	lbs	8,992	8,992	8,992	8,992
• Compression	lbs	4,496	4,496	4,496	4,496
• Tension					
Maximum Static Overhung Load*	ft-lb	295	295	295	295

\* When designing a system, de-rate the maximum load to the values shown below:

Application	De-rate Factor
Smooth, rotary motion	1/3
Intermittent press loading	1/5
Repetitive shock loading	1/10

**DR5000 Series—Motor Data**

		Model 5005C	Model 5010C	Model 5015C	Model 5030B	Model 5070B	Model 5300A	Model 5500A
Peak torque	ft-lbs	2.8	5.9	10.3	22	52	221	369
	(Nm)	(3.8)	(8)	(14)	(30)	(70)	(300)	(500)
Rated speed	rps	6	6	6	4	4	1.5	1.5
Rotor inertia	oz-in <sup>2</sup> x10 <sup>2</sup>	3.28	3.83	4.37	4.4	19.7	185.9	251.5
	(kgm <sup>2</sup> )x10 <sup>-3</sup>	(0.006)	(0.007)	(0.008)	(8)	(36)	(340)	(460)
Resolution	Steps/rev	212,992	212,992	212,992	278,528	278,528	425,984	425,984
Motor weight	lbs	11.0	13.2	15.4	15.4	38.5	121	165
	(kg)	(5.0)	(6.0)	(7.0)	(7.0)	(17.5)	(55)	(75)
Maximum static axial load**								
	• Compression	1124	1124	1124	6600	6600	8800	8800
	• Tension	674	674	674	2200	2200	4400	4400
Maximum static overhung load**	ft-lb	15	15	15	148	148	296	296
Maximum power consumption	KVA	1.0	1.0	1.0	3.1	3.1	5.5	7.5

Application	De-rate Factor
Smooth, rotary motion	1/3
Intermittent press loading	1/5
Repetitive shock loading	1/10

\*\* When designing a system, de-rate the maximum load to the value as shown at the left:

**DM Series – Motor Data**

		Model 1015B	Model 1030B	Model 1045B	Model 1050A	Model 1100A	Model 1150A	Model 1200A
Peak torque	ft-lbs	11	22	33	37	74	111	148
	(Nm)	(15)	(30)	(45)	(50)	(100)	(150)	(200)
Rated speed • rps	115VAC	2.0	2.0	1.0	1.0	1.0	0.5	0.5
	230VAC	2.0	2.0	2.0	1.0	1.0	1.0	1.0
Rotor inertia	oz-in <sup>2</sup> x 10 <sup>2</sup>	6.6	8.2	10.4	52.5	65.1	77.6	91.3
	(Kgm <sup>2</sup> ) x 10 <sup>-3</sup>	(12)	(15)	(19)	(96)	(119)	(142)	(167)
Maximum steps/rev		655,360	655,360	655,360	1,024,000	1,024,000	1,024,000	1,024,000
Motor weight*	lbs	12	17	21	32	42	53	64
	(kg)	(5.5)	(7.5)	(9.5)	(14.5)	(19)	(24)	(29)
Maximum static axial load**								
	• Compression	6,600	6,600	6,600	8,800	8,800	8,800	8,800
	• Tension	2,200	2,200	2,200	4,400	4,400	4,400	4,400
Max. static overhung load**		148	148	148	296	296	296	296
Max. power consumption	KVA	1.6	2.0	2.0	2.4	2.7	3.0	3.0

\*\* When designing a system, de-rate the maximum load to the values shown at the right:

Application	De-rate Factor
Smooth, rotary motion	1/3
Intermittent press loading	1/5
Repetitive shock loading	1/10

**Integrate Direct Drive Servo Systems Into Your Next Application. Call 1-800-358-9070 Today.**

**DM1004 Motor Data Specifications**

		DM1004B	DM1004C
Peak torque	ft-lbs	3	3
	(N-m)	(4)	(4)
Rated speed • rps	115VAC	2.5	2.5
	230VAC	2.5	2.5
Rotor inertia	oz-in <sup>2</sup> x 10 <sup>2</sup>	3.01	1.37
	(Kgm <sup>2</sup> ) x 10 <sup>-3</sup>	(5.5)	(2.5)
Maximum step	s/rev	655,360	655,360
Motor weight*	lbs	6.6	6.6
	(kg)	(3)	(3)
Maximum static axial load** • Compression • Tension	lbs (kg)	440 (200)	770 (350)
	lbs (kg)	154 (70)	770 (350)
Maximum static overhung load**	ft-lb (kg-m)	20 (2.7)	24.4 (3.3)
Maximum power consumption	KVA	0.3	0.3

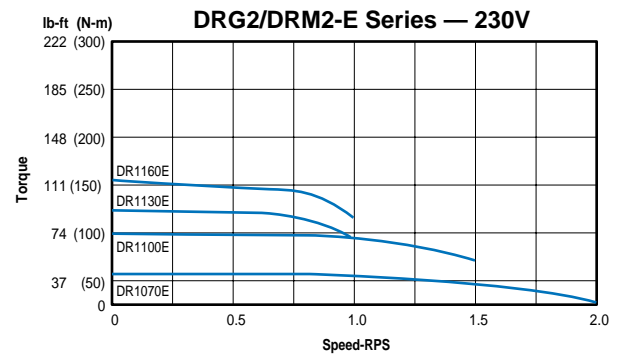
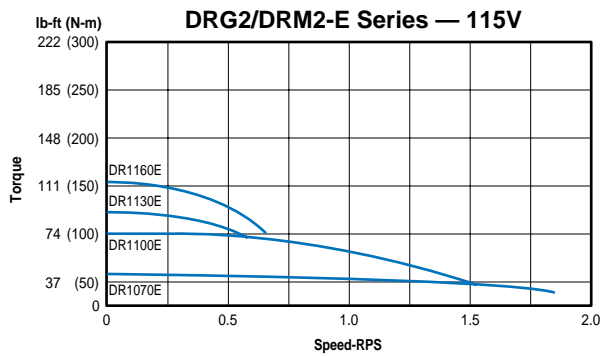
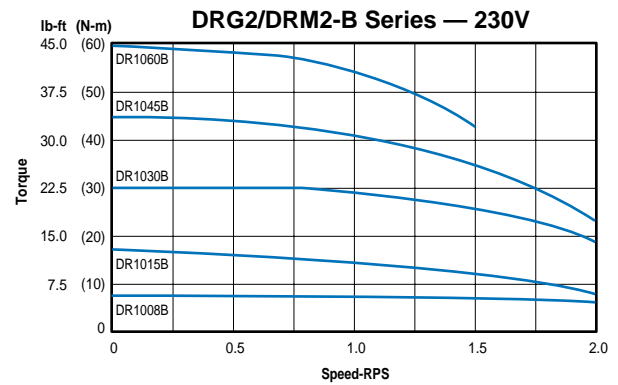
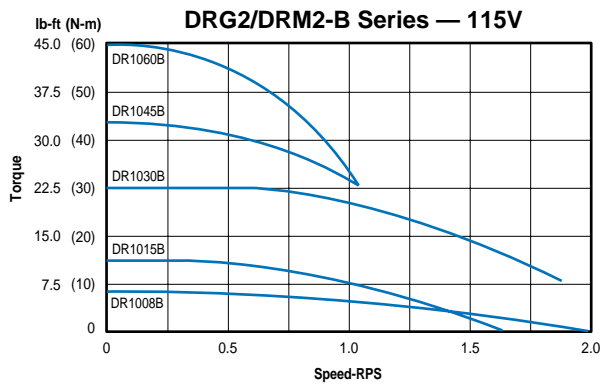
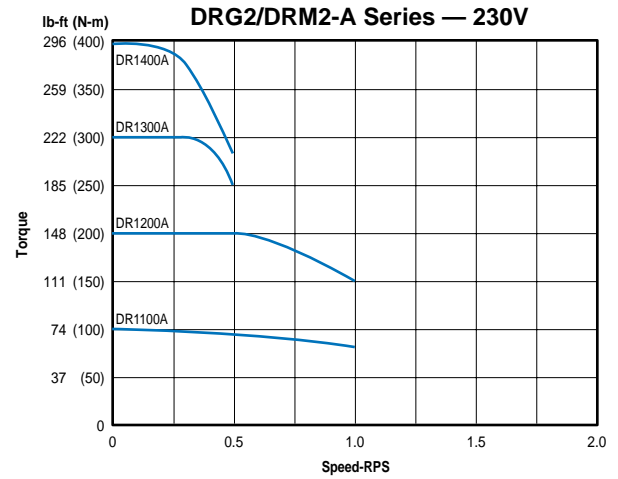
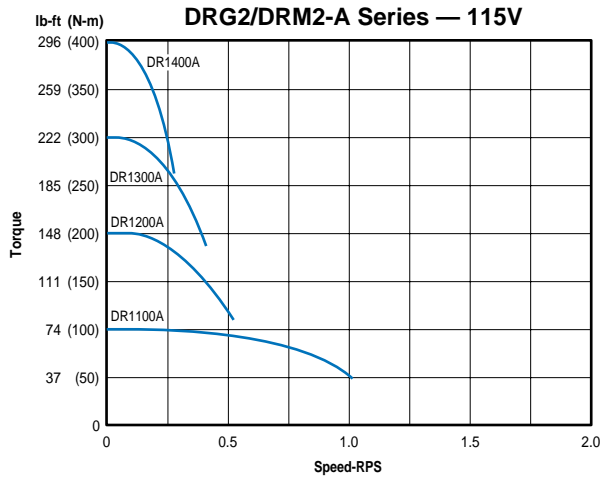
\*\* When designing a system, de-rate the maximum load to the values specified here:

Application	De-rate Factor
Smooth, rotary motion	1/3
Intermittent press loading	1/5
Repetitive shock loading	1/10

*Please refer to the ordering information matrix on page 159*

# Motor Speed-Torque Performance Curves

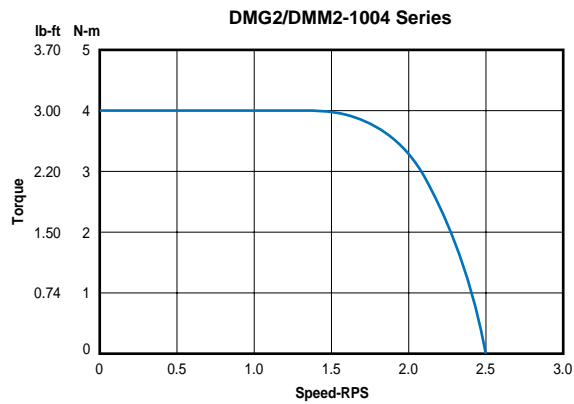
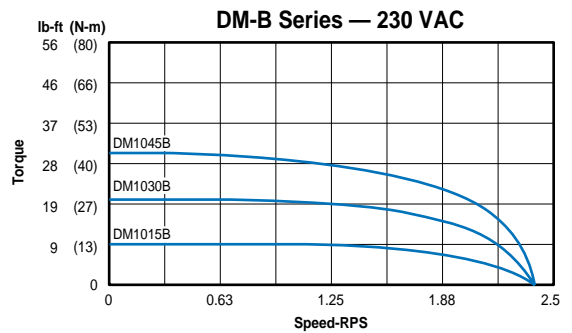
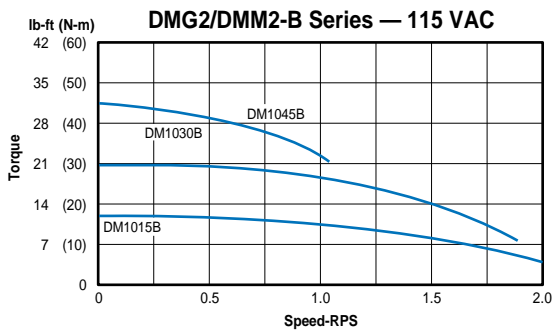
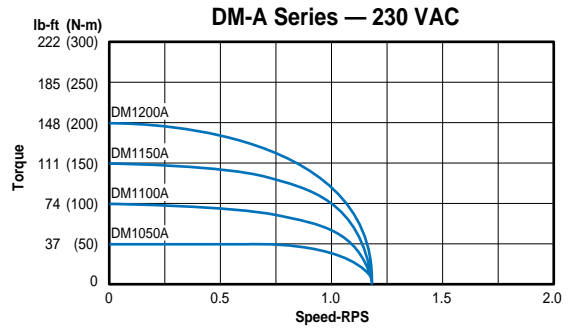
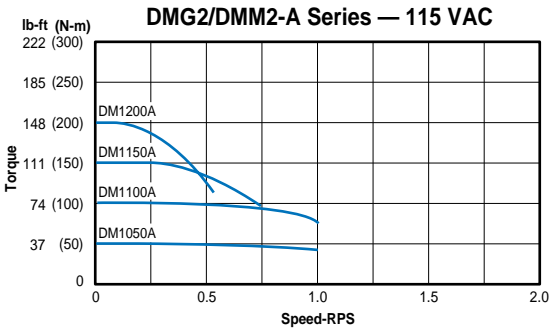
The speed-torque curves represent peak torque available.



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# Motor Speed-Torque Performance Curves

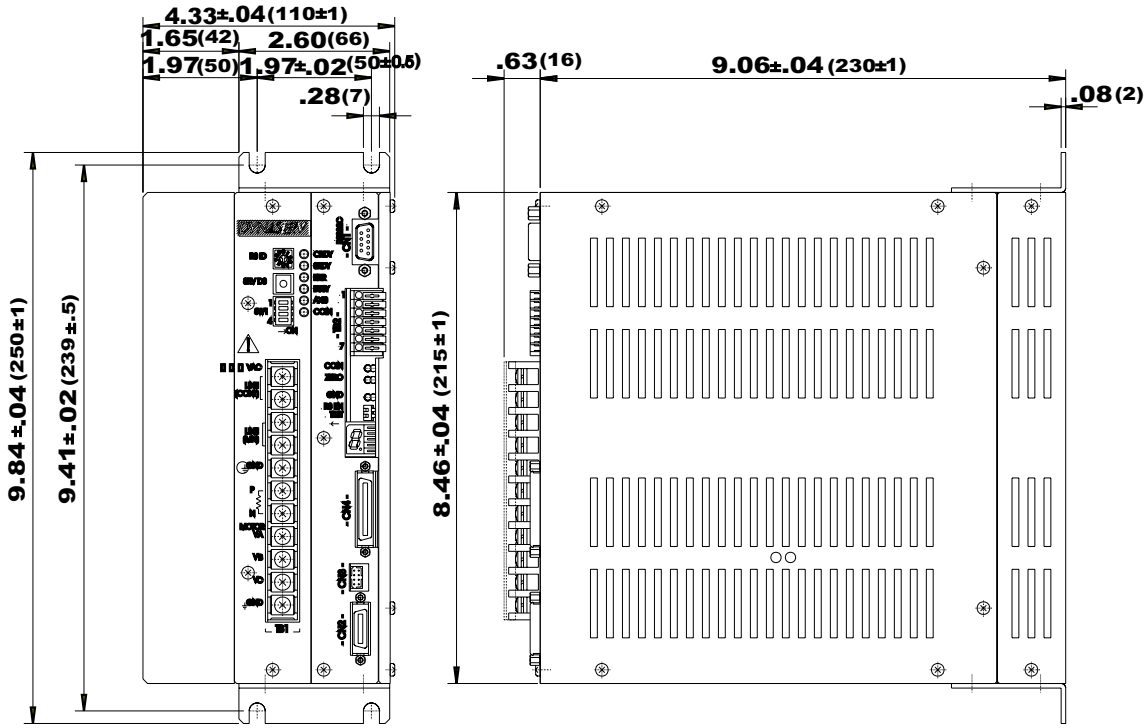
The speed-torque curves represent peak torque available.



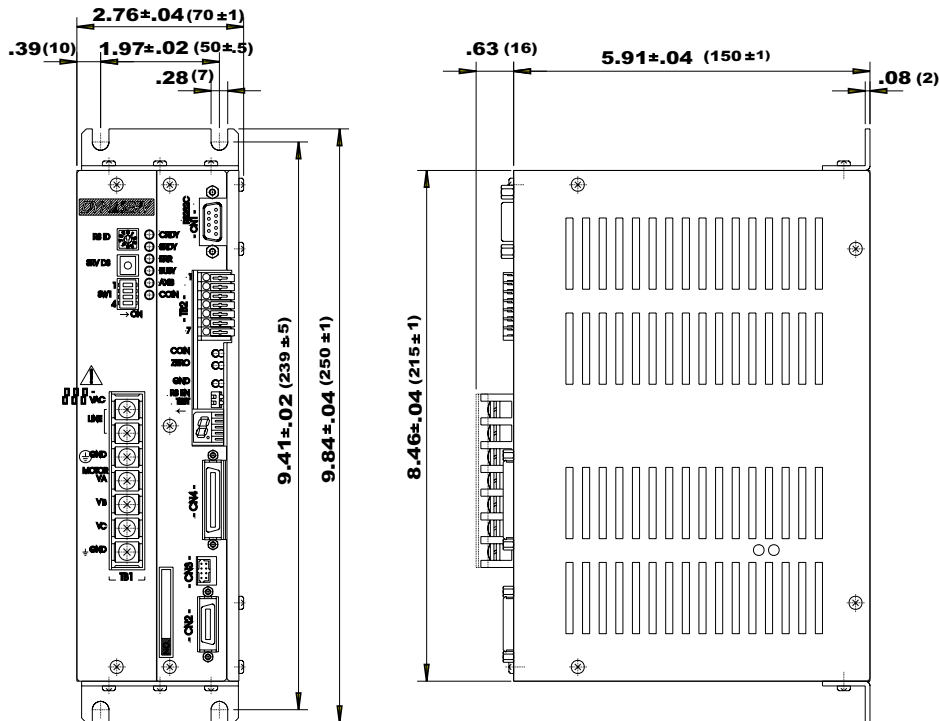
## G2 Drive Dimensional Drawings

Dimensions in inches (mm)

### Dynaserv G2/M2 2kW with Regen



### Dynaserv G2/M2 2kW with Regen



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# Dynaserv DR Series



## Direct-Drive Brushless Servo Systems

CE (LVD and EMC\*)

The Dynaserv DR Series provides the user with a high-performance direct-drive servo system with resolver feedback. Each of the thirteen models includes a direct-drive motor, integral resolver, microprocessor-based drive and a 10-foot motor-to-drive cable.

The DR Series motor is brushless and without gears allowing for long, maintenance-free operation. The cross roller bearing design can support up to 4 tons of compression load and 370 ft-lbs of overhung load. The center hole in the motor is up to 6 inches in diameter and can be used to simplify system wiring.

The user can elect to operate the DR Series in either a position, velocity or torque mode. In the position mode, the drive accepts step and direction input from any Compumotor indexer or user-supplied pulse source. Operating in the velocity mode requires a  $\pm 10\text{VDC}$  input and torque mode requires a  $\pm 8.5\text{VDC}$  input.

High performance closed loop operation is obtained with a sophisticated I-PD digital and analog control algorithm. The analog velocity loop provides high bandwidth for excellent system response. The digital position loop simplifies position control and optimizes system accuracy. A built-in test mode and position/velocity monitors allow for convenient and efficient tuning.

The DR Drive is fully protected against open and short circuits, overcurrent, overvoltage and overtemperature. A seven segment LED indicator provide the user with the status and diagnostic information from the front panel.

### Features

- Brushless direct drive motor with 10 foot cable
- 20 models available in 4-, 6-, 8- or 10-inch diameters
- Resolver feedback
- Torques to 370 ft-lbs (500 Nm)
- Resolutions to 819,200 steps/rev
- Supports 4 tons of compression load

- Microprocessor control of I-PD control algorithm
- Analog velocity loop/digital position loop
- Built-in test mode for easy tuning
- Diagnostic LED display
- Step and direction input/position control
- $\pm 10\text{V}$  for velocity control,  $\pm 8.5\text{V}$  for torque control
- Gain settings can be changed "on the fly"
- Configurable position accuracy to reduce system settling time
- Complete system, ready for operation
- Also compatible with M2 controller/drive

### Accessories

- **Compumotor Controllers**  
The Dynaserv is compatible with all Compumotor controllers
- **Bases**  
Mounting bases to simplify mounting to a flat surface (DR-B Series only)
- **Dynamic Braking**  
Capacitor type or Speed-switching type for each motor size
- **Precision Machining**  
Axial and radial run-out of .01, .02 or .005 mm is available on most Dynaserv models. Standard axial and radial run-out for all motors is 0.1 mm
- **Mechanical Braking**  
Most motors can be ordered with mechanical brakes for power down, or emergency use. Not available with DR-1008B and DR-E series
- DR5000B and DR5000C Series only: line filters for CE installations
- Interface cables for use with Compumotor's 6K and 6000 Series controllers

\* EMC with proper filter and installation procedures.

**Specifications**

Parameter	Value																		
<b>Performance</b>	Repeatability Accuracy: ±5 arc-sec, ±10 arc-sec for DR5000B and DR5000C ±30 arc-sec DRA Series ±45 arc-sec, ±90 arc-sec for DR5000B, DRB, DRE and DR5000A Series Max stepping rate: 1,600,000 steps/sec																		
<b>Power</b>	Volts (se note): ±50 arc-sec for DR5000C Range: +10% to -15% Current: 20 amps max																		
<b>Inputs</b>	Command interface: • Step input: Low going low pulse, 150 nanoseconds minimum pulse width • Direction: Logic high = CW rotation, Logic low = CCW rotation Analog input: ±10V command signal for velocity control, ±8.5V command signal for torque control																		
<b>Outputs</b>	Encoder output: A/B encoder output 400 kHz max																		
<b>Environmental</b>	<table border="0"> <tr> <td></td> <td><b>Driver</b></td> <td><b>Motor</b></td> </tr> <tr> <td>Weight</td> <td>13.2 lb (6 kg), 24 lb (11 kg) DR5000A</td> <td>See Table Below</td> </tr> <tr> <td>Operating</td> <td>32° to 122° F (0° to 50°C)</td> <td>32° to 113° F max (0° to 45°C)</td> </tr> <tr> <td>Storage</td> <td>-4° to 185° F (-20° to 85°C)</td> <td>-4° to 185° F (-20° to 85°C)</td> </tr> <tr> <td>Humidity</td> <td>20 to 90% noncondensing</td> <td>20 to 85% noncondensing</td> </tr> <tr> <td></td> <td colspan="2">No corrosive gases. Dust free atmosphere. The Dynaserv is not waterproof, oil proof or dust proof.</td> </tr> </table>		<b>Driver</b>	<b>Motor</b>	Weight	13.2 lb (6 kg), 24 lb (11 kg) DR5000A	See Table Below	Operating	32° to 122° F (0° to 50°C)	32° to 113° F max (0° to 45°C)	Storage	-4° to 185° F (-20° to 85°C)	-4° to 185° F (-20° to 85°C)	Humidity	20 to 90% noncondensing	20 to 85% noncondensing		No corrosive gases. Dust free atmosphere. The Dynaserv is not waterproof, oil proof or dust proof.	
	<b>Driver</b>	<b>Motor</b>																	
Weight	13.2 lb (6 kg), 24 lb (11 kg) DR5000A	See Table Below																	
Operating	32° to 122° F (0° to 50°C)	32° to 113° F max (0° to 45°C)																	
Storage	-4° to 185° F (-20° to 85°C)	-4° to 185° F (-20° to 85°C)																	
Humidity	20 to 90% noncondensing	20 to 85% noncondensing																	
	No corrosive gases. Dust free atmosphere. The Dynaserv is not waterproof, oil proof or dust proof.																		

NOTE: Volts 115VAC 1 phase, all except DR5000A/B; 230VAC 1 phase, all except DR5000A; 200VAC 3 phase, DR5000A

**DR Series Motor Data**

		Model 1008B	Model 1015B	Model 1030B	Model 1045B	Model 1060B	Model 1070E	Model 1100E	Model 1130E	Model 1160E
<b>Peak torque</b>	ft-lbs (Nm)	6 (8)	11 (15)	22 (30)	33 (45)	44 (60)	52 (70)	74 (100)	96 (130)	118 (160)
<b>Rated speed, 115/230VAC</b>	rps	2.0/2.0	2.0/2.0	1.5/2.0	1.0/2.0	1.0/1.5	1.5/2.0	1.0/1.5	0.5/1.0	0.5/1.0
<b>Maximum power consumption</b>	KVA	0.7	1.0	1.8	1.8	1.8	2.0	2.3	2.5	2.8
<b>Rotor inertia</b>	oz-in <sup>2</sup> x 10 <sup>2</sup> (Kgm <sup>2</sup> x 10 <sup>-3</sup> )	7.9 (15)	11 (21)	13 (24)	14 (26)	18 (33)	46 (85)	55 (100)	68 (125)	77 (140)
<b>Max resolution</b>		507,904	507,904	507,904	507,904	507,904	614,400	614,400	614,400	614,400
<b>Motor weight*</b>	lbs (kg)	13 (6)	20 (9)	24 (11)	29 (13)	35 (16)	49 (22)	57 (26)	70 (32)	79 (36)
<b>Maximum static axial load**</b>	lbs	6,744	6,744	6,744	6,744	6,744	8,992	8,992	8,992	8,992
• Compression	lbs	2,248	2,248	2,248	2,248	2,248	4,496	4,496	4,496	4,496
• Tension										
<b>Maximum static overhung load**</b>	ft-lb	148	148	148	148	148	295	295	295	295

**DR Series Motor Data**

		Model 1100A	Model 1200A	Model 1300A	Model 1400A
<b>Peak torque</b>	ft-lbs (Nm)	74 (100)	148 (200)	221 (300)	295 (400)
<b>Rated speed, 115/230VAC</b>	rps	1.0/1.0	0.5/1.0	0.25/0.5	0.25/0.5
<b>Maximum power consumption, 115/230VAC</b>	KVA	2.5	3.0	3.2	3.2
<b>Rotor inertia</b>	oz-in <sup>2</sup> x 10 <sup>2</sup> (Kgm <sup>2</sup> x 10 <sup>-3</sup> )	109 (200)	156 (285)	186 (340)	219 (400)
<b>Maximum resolution</b>		819,200	819,200	819,200	819,200
<b>Motor weight*</b>	lbs (kg)	68 (31)	101 (46)	125 (57)	150 (68)
<b>Maximum static axial load**</b>	lbs	8,992	8,992	8,992	8,992
• Compression	lbs	4,496	4,496	4,496	4,496
• Tension					
<b>Maximum Static Overhung Load*</b>	ft-lb	295	295	295	295

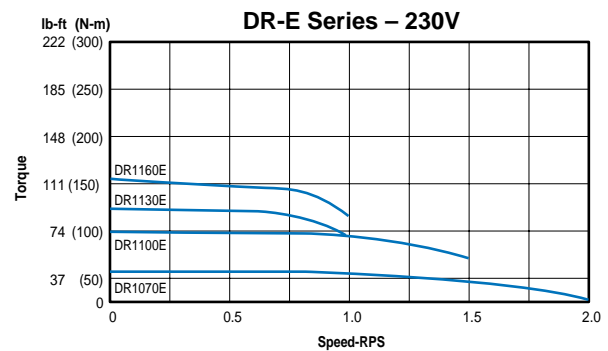
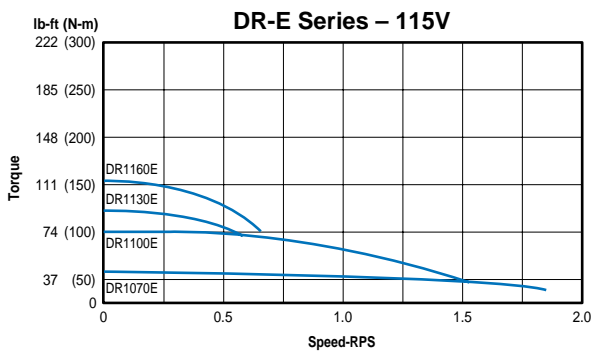
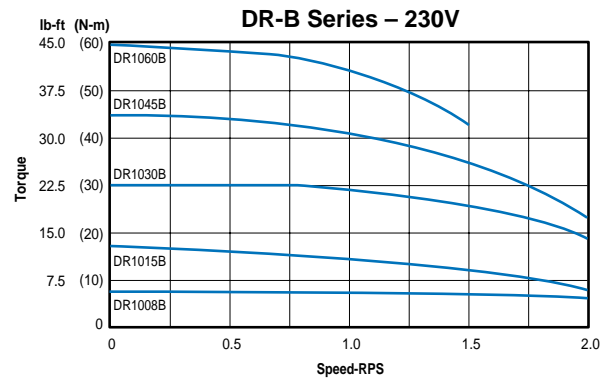
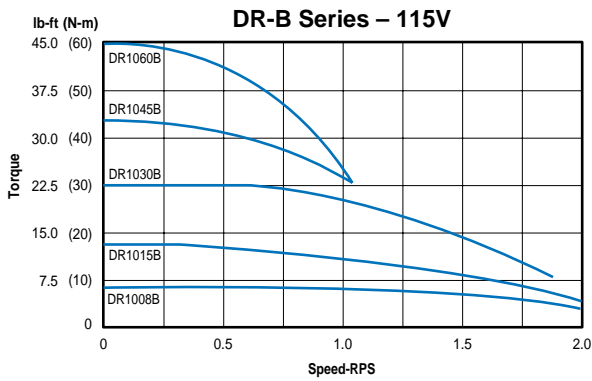
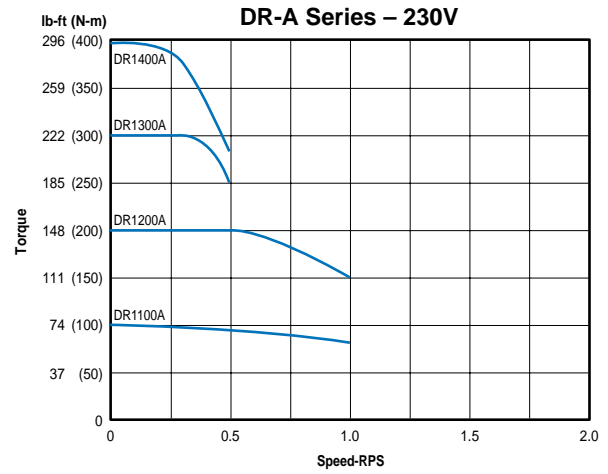
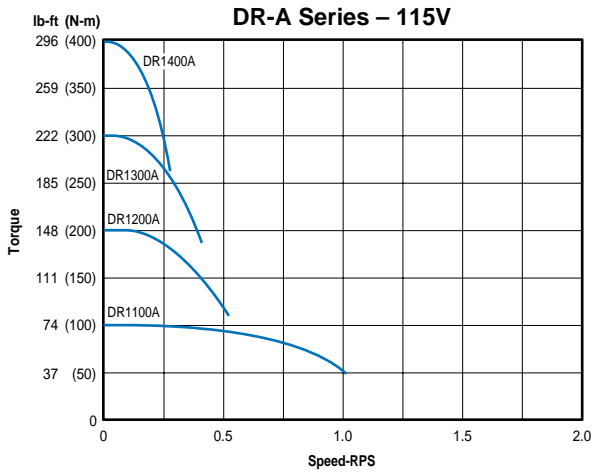
\*\* When designing a system, de-rate the maximum load to the values shown below:

Application	De-rate Factor
Smooth, rotary motion	1/3
Intermittent press loading	1/5
Repetitive shock loading	1/10

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# Motor Speed-Torque Performance Curves

The speed-torque curves represent peak torque available, continuous torques are approximately 2/3 of the peak value.



Specifications

Value

Performance	Repeatability	DR5000A ±5 arc-sec	DR5000B ±10 arc-sec	DR5000C ±10 arc-sec
	Accuracy	±45 arc-sec	±90 arc-sec	±50 arc-sec
Power	Max stepping rate	1,600,000 steps/sec	1,400,000 steps/sec	
	Volts	200VAC, 3 Phase, 50/60 Hz	230VAC, 1 Phase, 50/60 Hz	115VAC 50/60 Hz
	Range	+10% to -15%	+10% to -15%	+10% to -15%
Inputs (all models)	Current	20 Amps	20 Amps	20 Amps
	Command interface	Step and direction-Position control ±10VDC velocity control; ±8VDC torque control low going pulse, 150 nanosecond minimum pulse width Logic high = CW rotation Logic low = CCW rotation ±10VDC max 5 to 24 volts pullup		
Outputs (all models)	Encoder output	A, B Quadrature signal (400KHz max) Z Channel-"A": to 104 pulses/rev-"B": to 68 pulses/rev TTL		
	Other outputs (in position, alarm, etc.)			
Environmental	Weight	<b>Driver</b> 24 lbs (11 kg)	<b>Motor</b> See Table below	
	• DR5000A	13.2 lbs (6 kg)	See Table below	
	• DR5000B	13.2 lbs (6 kg)	See Table below	
	• DR5000C			
Operating	0-50°C	0-45°C		
• Temperature	20-90%-Non-condensing	20-85%-Non-condensing		
• Humidity				
Storage	-20-85°C	-20-85°C		
• Temperature	20-90%-Non-condensing	20-85%-Non-condensing		
• Humidity	No corrosive gases. Dust-free atmosphere. The Dynaserv is not waterproof, oil proof or dust proof.			
Environment	13.2 lbs (6 kg)	See below		

DR5000 Series-Motor Data

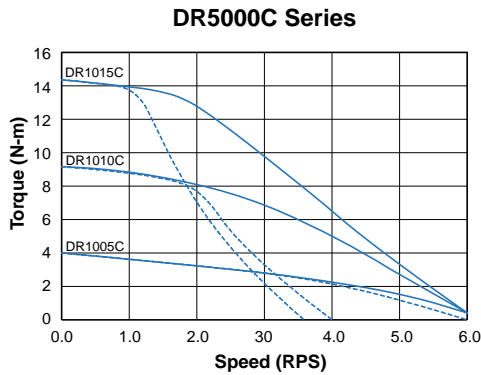
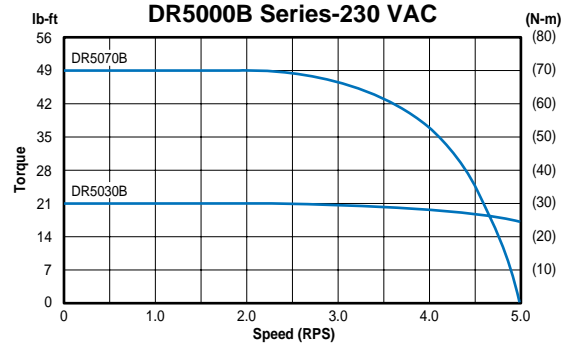
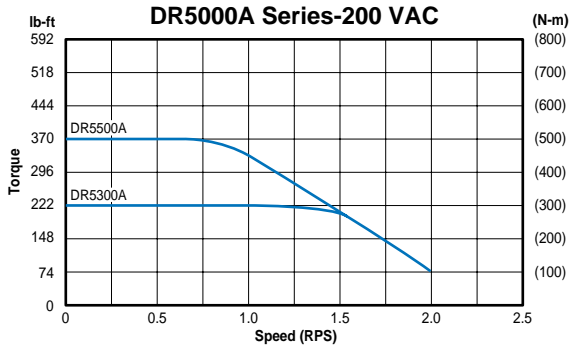
		Model 5005C	Model 5010C	Model 5015C	Model 5030B	Model 5070B	Model 5300A	Model 5500A
Peak torque	ft-lbs	2.8	5.9	10.3	22	52	221	369
	(Nm)	(3.8)	(8)	(14)	(30)	(70)	(300)	(500)
Rated speed	rps	6	6	6	4	4	1.5	1.5
Rotor inertia	oz-in <sup>2</sup> x10 <sup>2</sup>	3.28	3.83	4.37	4.4	19.7	185.9	251.5
	(kgm <sup>2</sup> )x10 <sup>-3</sup>	(0.006)	(0.007)	(0.008)	(8)	(36)	(340)	(460)
Resolution	Steps/rev	212,992	212,992	212,992	278,528	278,528	425,984	425,984
Motor weight	lbs	11.0	13.2	15.4	15.4	38.5	121	165
	(kg)	(5.0)	(6.0)	(7.0)	(7.0)	(17.5)	(55)	(75)
Maximum static axial load**	• Compression	1124	1124	1124	6600	6600	8800	8800
	• Tension	674	674	674	2200	2200	4400	4400
		15	15	15	148	148	296	296
Maximum static overhung load**	ft-lb	15	15	15	148	148	296	296
Maximum power consumption	KVA	1.0	1.0	1.0	3.6	3.6	5.5	7.5

\*\* When designing a system, de-rate the maximum load to the value as shown at the left:

Application	De-rate Factor
Smooth, rotary motion	1/3
Intermittent press loading	1/5
Repetitive shock loading	1/10

# Motor Speed-Torque Performance Curves

The speed-torque curves represent peak torque available, continuous torques are approximately 2/3 of the peak value.

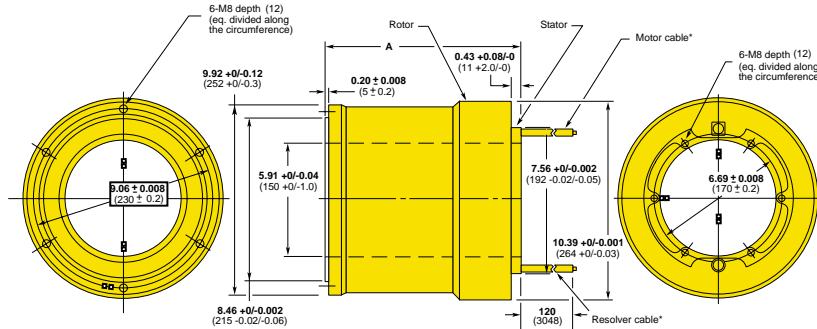


--- 110-115V    — 200-230V

# DR Series Dimensional Drawings

## DR-A Series

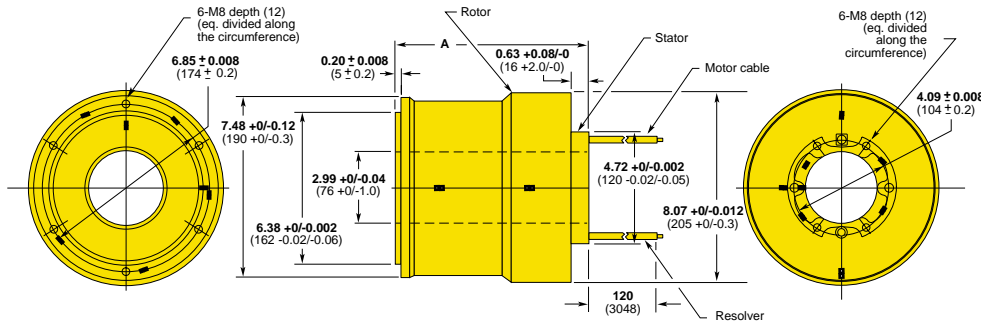
Dimensions in inches (mm)



Model	A	
DR1100A	7.28 $\pm$ 0.04	(185 $\pm$ 1)
DR1200A	9.84 $\pm$ 0.04	(250 $\pm$ 1)
DR1300A	11.97 $\pm$ 0.04	(304 $\pm$ 1)
DR1400A	14.09 $\pm$ 0.04	(358 $\pm$ 1)

## DR-E Series

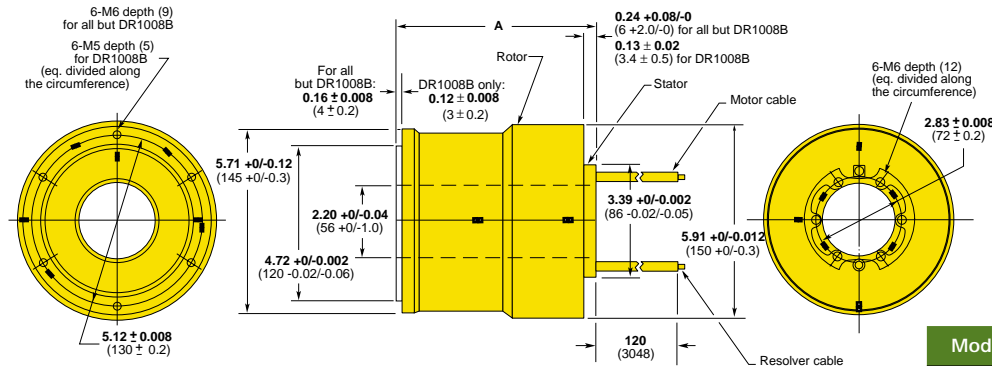
Dimensions in inches (mm)



Model	A	
DR1070E	7.20 $\pm$ 0.04	(183 $\pm$ 1)
DR1100E	8.27 $\pm$ 0.04	(210 $\pm$ 1)
DR1130E	9.57 $\pm$ 0.04	(243 $\pm$ 1)
DR1160E	10.67 $\pm$ 0.04	(271 $\pm$ 1)

## DR-B Series

Dimensions in inches (mm)



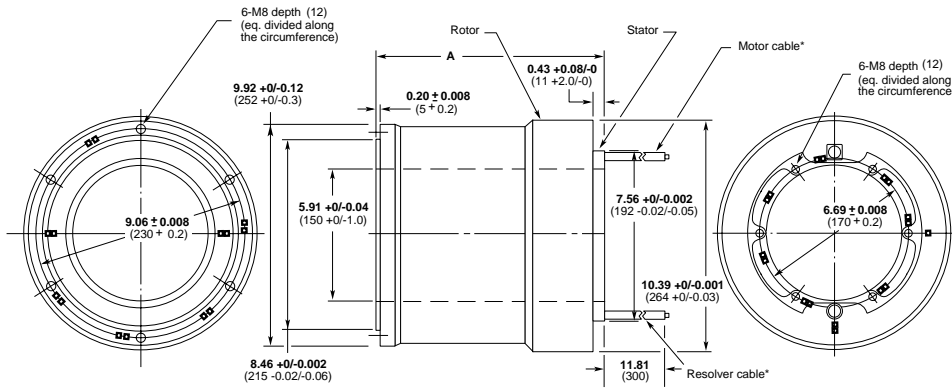
Model	A	
DR1008B	3.35 $\pm$ 0.04	(85 $\pm$ 1)
DR1015B	4.84 $\pm$ 0.04	(123 $\pm$ 1)
DR1030B	5.94 $\pm$ 0.04	(151 $\pm$ 1)
DR1045B	7.05 $\pm$ 0.04	(179 $\pm$ 1)
DR1060B	8.15 $\pm$ 0.04	(207 $\pm$ 1)

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# Dimensional Drawings

## DR5000A Series

Dimensions in inches (mm)

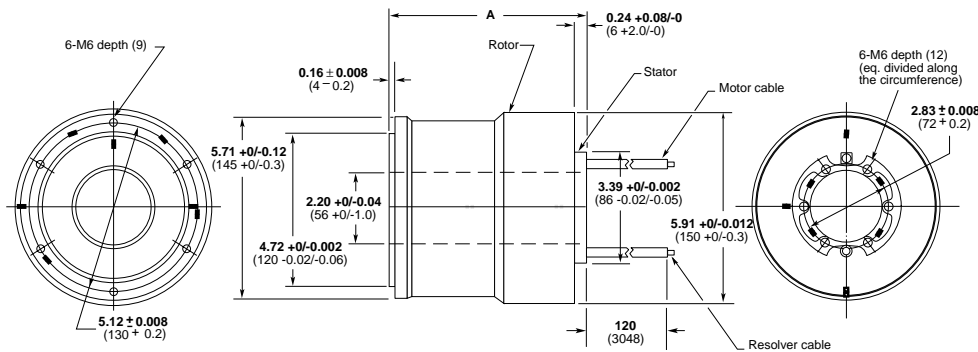


Note: Motor and resolver cables for DR5000-A Series are 11.81 in (300 mm) in length.

Model	A
DR5300A	12.2 $\pm$ 0.04 (309 $\pm$ 1)
DR5500A	16.4 $\pm$ 0.04 (417 $\pm$ 1)

## DR5000B Series

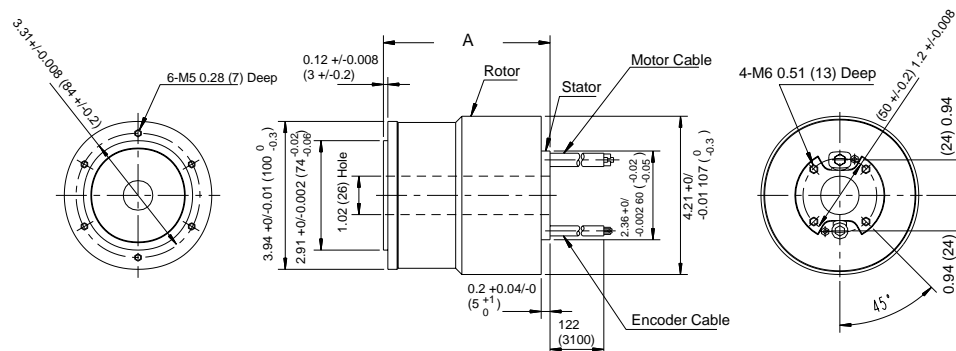
Dimensions in inches (mm)



Model	A
DR5030B	7.24 $\pm$ 0.04 (184 $\pm$ 1)
DR5070B	9.45 $\pm$ 0.04 (240 $\pm$ 1)

## DR5000C Series

Dimensions in inches (mm)



Model	A
DR5005C	4.45 $\pm$ 0.04 (113 $\pm$ 1)
DR5010C	5.51 $\pm$ 0.04 (140 $\pm$ 1)
DR5015C	6.57 $\pm$ 0.04 (167 $\pm$ 1)

# DR Series Pinout Lists

## Indexer 50-pin Honda

Pin No.	Signal
1-8	Servo stiffness input (FC0-FC8)
9-12	Position end pulse width input (POSW1, POSW0)
13	A+ output
14	A- output
15	Servo ready + output
16	Servo ready - output
17	Velocity monitor + output
18	Velocity monitor - output
19	Direction - input
20	Direction + input
21	Integral capacitor reset + input
22	Integral capacitor reset - input
23	Servo on - input
24	Servo on + input
25-26	Integral/proportional action input
27	In position + output
28	In position - output
29	B+ output
30	B- output
31	TLIM/TFF (option)
32	AGND
33-38	Gain selection inputs - low, medium, high
39	CPU reset + input
40	CPU reset - input
41	Counter overflow + output
42	Counter overflow - output
43	Z+ output
44	Z- output
45	Step + input
46	Step - input
47	Overload + output
48	Overload - output
49	Analog input ( $\pm 10V$ )
50	Analog input GND

## Motor Screw Terminal

Pin No.	Signal
1	Motor A
2	Motor B
3	Motor C
4	GND

## Power Screw Terminal

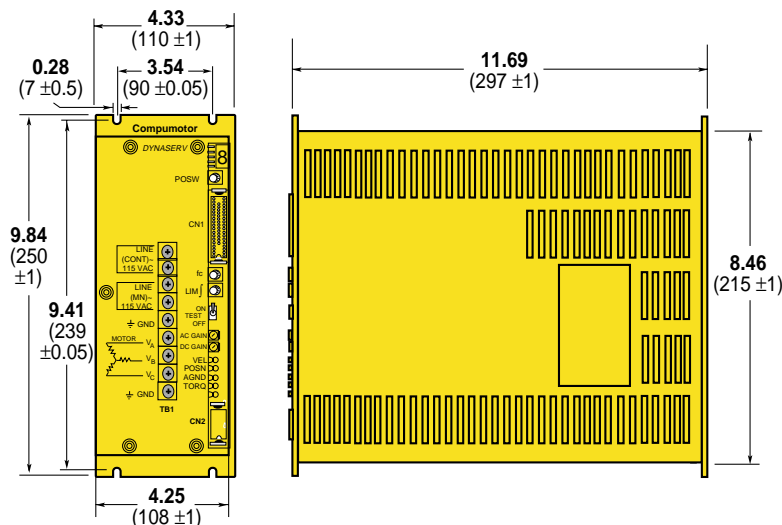
Pin No.	Signal
1	115 or 230VAC line-control
2	115 or 230VAC neutral-control
3	115 or 230VAC line-main
4	115 or 230VAC neutral-main
5	115 or 230VAC GND

## Resolver Honda Connector

Pin No.	Signal
1	+S0 (Brown/White)
1	+S180 (Green/White)
2	-S0 (Brown)
3	-S180 (Green)
4	Shield
5	FG (Black)
6	+C0 (Orange/White)
6	+C180 (Blue/White)
7	-C0 (Orange)
8	-C180 (Blue)

# DR Series Drive Dimensions

Dimensions in inches (mm)



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# DR5000 Series Pin-Out Lists

## CN-1 Controller Connections 50-Pin Honda

Pin No.	Signal
1-8	Servo stiffness input (FC0-FC8)
9-12	Position end pulse width input (POSW1, POSW0)
13	A+ output
14	A- output
15	Servo ready + output
16	Servo ready - output
17	Velocity monitor + output
18	Velocity monitor - output
19	Direction - input
20	Direction + input
21	Integral capacitor reset + input
22	Integral capacitor reset - input
23	Servo on - input
24	Servo on + input
25-26	Integral/proportional action input
27	In position + output
28	In position - output
29	B+ output
30	B- output
31	No connection
32	No connection
33-38	Gain selection inputs - low, medium, high
39	CPU reset + input
40	CPU reset - input
41	Counter overflow + output
42	Counter overflow - output
43	Z+ output
44	Z- output
45	Step + input
46	Step - input
47	Overload + output
48	Overload - output
49	Analog input ( $\pm 10V$ )
50	Analog input GND

## Power Screw Terminal DR5000A (200VAC 3 $\phi$ )

Pin No.	Signal
1	Phase 1 (main)
2	Phase 2 (main)
3	Phase 3 (main)
4	Line (control)
5	Neutral (control)
6	GND
7	Motor A
8	Motor B
9	Motor C
10	GND

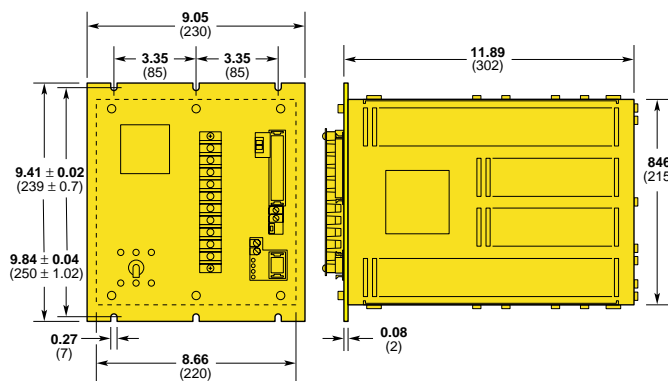
## Power Screw Terminal DR5000B (230VAC 1 $\phi$ )

Pin No.	Signal
1	Line (control)
2	Neutral (control)
3	Line (main)
4	Neutral (main)
5	GND
6	Motor A
7	Motor B
8	Motor C
9	GND

## Resolver Honda Connector

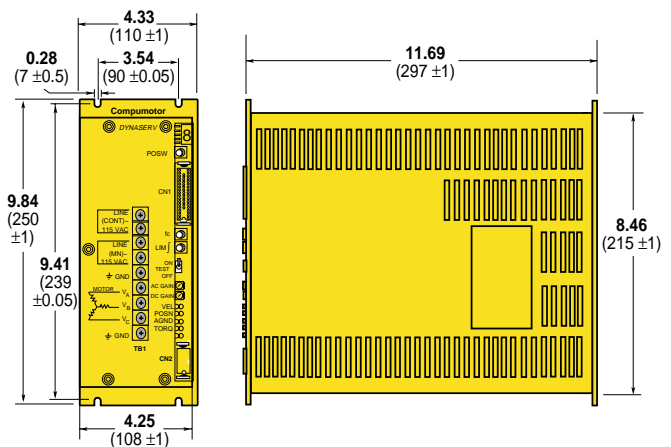
Pin No.	Signal
1	+S0 (Brown/White)
1	+S180 (Green/White)
2	-S0 (Brown)
3	-S180 (Green)
4	Shield
5	FG (Black)
6	+C0 (Orange/White)
6	+C180 (Blue/White)
7	-C0 (Orange)
8	-C180 (Blue)

Dimensions in inches (mm)



DR5000 A

Dimensions in inches (mm)



DR5000 B

Please refer to the ordering information matrix on page 159

# Dynaserv DM Series



## Direct-Drive Brushless Servo Systems

CE (LVD and EMC\*)

The Dynaserv DM Series is a high-performance, direct-drive servo system with optical encoder feedback. Each DM Model consists of a brushless direct drive motor, integral encoder, microprocessor-based drive and a 10-foot motor-to-drive cable.

The DM Series can be operated in either a position, velocity or torque mode. In the position mode the drive accepts step and direction input. Operating in the velocity requires  $\pm 10\text{VDC}$  or torque mode requires a  $\pm 8\text{VDC}$  input. Dynaserv systems are compatible with Compumotor indexers and servo controllers.

The DM Series motor is brushless and without gears, allowing for long maintenance-free operation. The cross roller bearing design can support up to 4 tons of compression load and 295 ft-lbs of overhung load. The center hole in the motor is up to 2.3 inches in diameter and can be used to simplify system wiring.

The drive is fully protected against open and short circuits, overcurrent, overvoltage and overtemperature. A seven segment LED indicator provides the user with status and diagnostic information from the front panel.

High performance closed loop operation is obtained with a sophisticated I-PD digital and analog control algorithm. The analog velocity loop provides high bandwidth for excellent system response. The digital position loop simplifies position convenient control and optimizes system accuracy. A built-in test mode and position/velocity monitors allow for convenient and efficient tuning.

### Features

- Brushless direct drive motor with 10 foot cable
- 9 models available in 4-, 6- or 10-inch diameters
- Incremental encoder feedback
- Torques to 150 ft-lbs (200 Nm)
- Resolutions to 1,024,000 steps/rev
- Supports 4 tons of compression load

- DM1004 has axial and radial run-out of 0.01 mm
- Microprocessor control of I-PD control algorithm
- Analog velocity loop/digital position loop
- Built-in test mode for easy tuning
- Diagnostic LED display
- Step and direction input/position control
- $\pm 10\text{V}$  input/velocity control
- $\pm 8.5\text{V}$  input/torque mode
- Gain settings can be changed "on the fly"
- Can operate in Class 10 clean room applications with proper preparation
- Configurable position accuracy to reduce system settling time
- Complete system, ready for operation
- Compatible with Dynaserv M2 controller/drive

### Accessories

- Compumotor Controllers  
The Dynaserv is compatible with all Compumotor controllers.
- Dynamic Braking  
Capacitor type or Speed-switching type for each motor size.
- Precision Machining  
Axial and radial run-out of .01, .02 or .005 mm is available on most Dynaserv models. Standard axial and radial run-out for all motors is 0.1mm.
- Mechanical Braking  
Most motors can be ordered with mechanical brakes for power down, or emergency use.
- Line filters for CE installations.\*
- Interface cables for use with Compumotor's 6K and 6000 Series controllers.

\* EMC with proper filter and installation procedures.

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**DM Series – Motor Data**

		Model 1015B	Model 1030B	Model 1045B	Model 1050A	Model 1100A	Model 1150A	Model 1200A
Peak torque	ft-lbs	11	22	33	37	74	111	148
	(Nm)	(15)	(30)	(45)	(50)	(100)	(150)	(200)
Rated speed • rps	115VAC	2.0	2.0	1.0	1.0	1.0	0.5	0.5
	230VAC	2.0	2.0	2.0	1.0	1.0	1.0	1.0
Rotor inertia	oz-in <sup>2</sup> x 10 <sup>2</sup>	6.6	8.2	10.4	52.5	65.1	77.6	91.3
	(Kgm <sup>2</sup> ) x 10 <sup>-3</sup>	(12)	(15)	(19)	(96)	(119)	(142)	(167)
Maximum steps/rev		655,360	655,360	655,360	1,024,000	1,024,000	1,024,000	1,024,000
Motor weight*	lbs	12	17	21	32	42	53	64
	(kg)	(5.5)	(7.5)	(9.5)	(14.5)	(19)	(24)	(29)
Maximum static axial load** • Compression • Tension	lbs	6,600	6,600	6,600	8,800	8,800	8,800	8,800
	lbs	2,200	2,200	2,200	4,400	4,400	4,400	4,400
Max. static overhung load**		148	148	148	296	296	296	296
Max. Power Consumption	KVA	1.6	2.0	2.0	2.4	2.7	3.0	3.0

\* Drive weight is 13.2 lbs (6 kgs)

\*\* When designing a system, de-rate the maximum load to the values shown at right:

Application	De-rate Factor
Smooth, rotary motion	1/3
Intermittent press loading	1/5
Repetitive shock loading	1/10

**DM1004 Motor Data Specifications**

		DM1004B	DM1004C
Peak torque	ft-lbs	3	3
	(N-m)	(4)	(4)
Rated speed • rps	115VAC	2.5	2.5
	230VAC	2.5	2.5
Rotor inertia	oz-in <sup>2</sup> x 10 <sup>2</sup>	3.01	1.37
	(Kgm <sup>2</sup> ) x 10 <sup>-3</sup>	(5.5)	(2.5)
Maximum step	s/rev	655,360	655,360
Motor weight*	lbs	6.6	6.6
	(kg)	(3)	(3)
Maximum static axial load** • Compression • Tension	lbs (kg)	440 (200)	770 (350)
	lbs (kg)	154 (70)	770 (350)
Maximum static overhung load**	ft-lb (kg-m)	20 (2.7)	24.4 (3.3)
Maximum power consumption	KVA	0.3	0.3

\* Drive weight is 4 lbs (1.8 kgs)

\*\* When designing a system, de-rate the maximum load to the values specified at right:

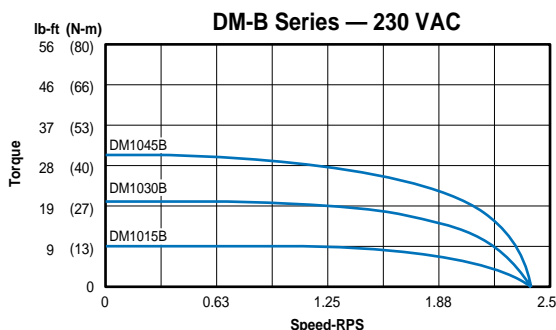
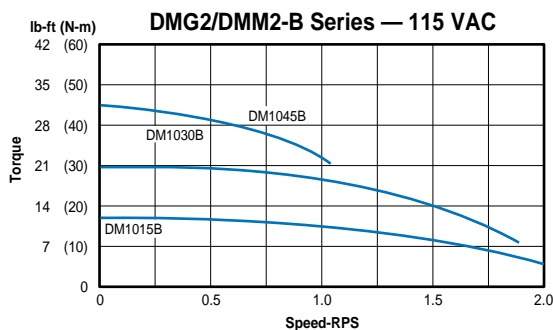
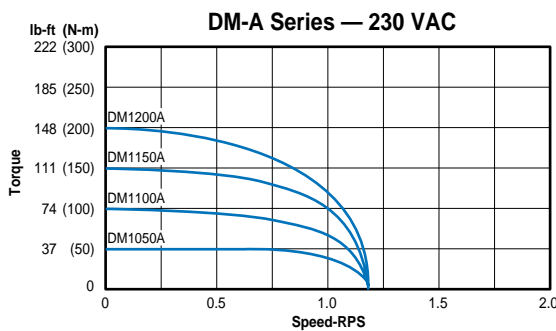
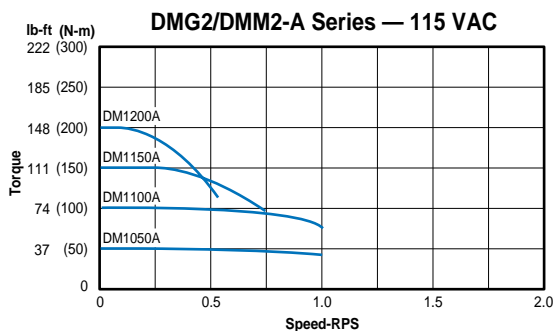
Application	De-rate Factor
Smooth, rotary motion	1/3
Intermittent press loading	1/5
Repetitive shock loading	1/10

**DM Series – Specifications**

Parameter	Value		
Performance	Repeatability	±2 arc-sec; DM1004: ±5 arc-sec	
	Accuracy	±25 arc-sec; ±60 arc-sec DM1004 (std); ±20 arc-sec (optional)	
	Max stepping rate	1,600,000 steps/sec	
Power	Volts	115VAC, 1-phase or 230VAC, 1-phase, 50/60Hz	
	Range	+10% to -15%	
	Current	20 amps max	
Inputs	Command interface		
	Step input	Low going low pulse, 150 nanoseconds minimum pulse width	
	Direction	Logic high = CW rotation Logic low = CCW rotation	
	Analog input	±10V command signal	
Outputs	Encoder output	A/B encoder output 400 kHz max	
Environmental	<b>Driver</b>	<b>Motor</b>	
	Weight	13.2 lb (6 kg), DM1004 4 lb (1.8 kg)	See page 95
	Operating	32° to 122° F (0° to 50°C)	32° to 113° F max (0° to 45°C)
	Storage	-4° to 185° F (-20° to 85°C)	-4° to 185° F (-20° to 85°C)
	Humidity	20 to 90% noncondensing No corrosive gases. Dust-free atmosphere. The Dynaserv is not water proof, oil proof or dust proof.	20 to 85% noncondensing

## Motor Speed-Torque Performance Curves

The speed-torque curves represent peak torque available, continuous torques are approximately two-thirds of the peak value.



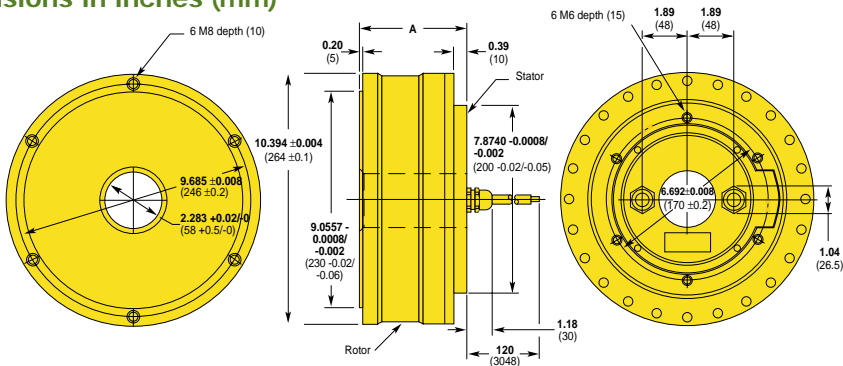
*Please refer to the ordering information matrix on page 159*

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# DM Series Motor Dimensions

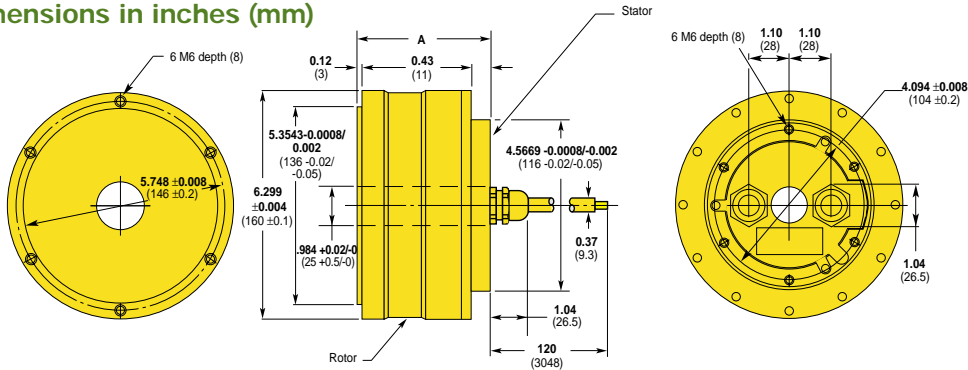
## DM-A Series

Dimensions in inches (mm)



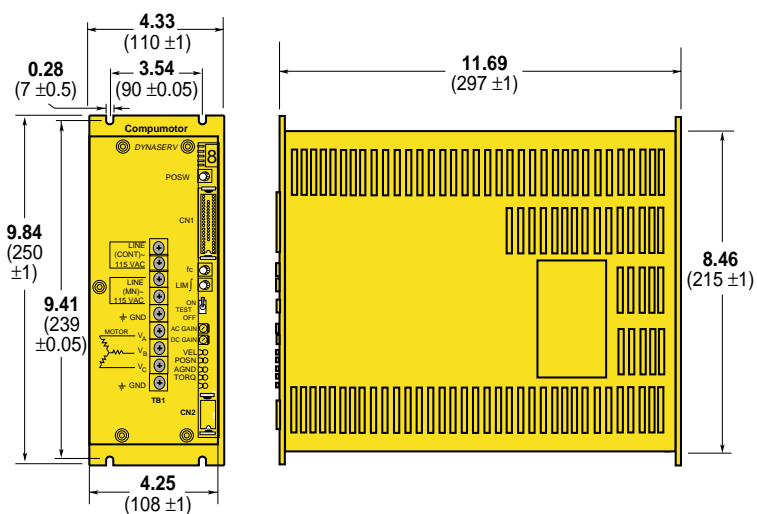
## DM-B Series

Dimensions in inches (mm)



## DM Series Drive Dimensions

Dimensions in inches (mm)

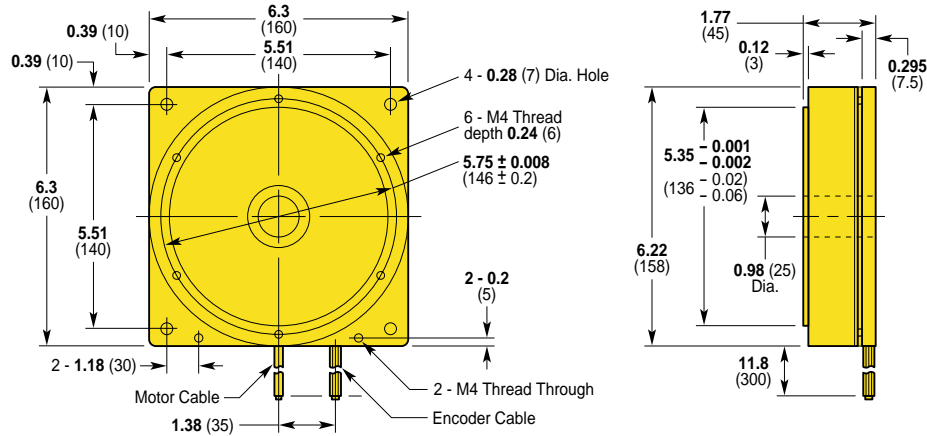


Please refer to the ordering information matrix

# DM1004B & DM1004C Motor Dimensions

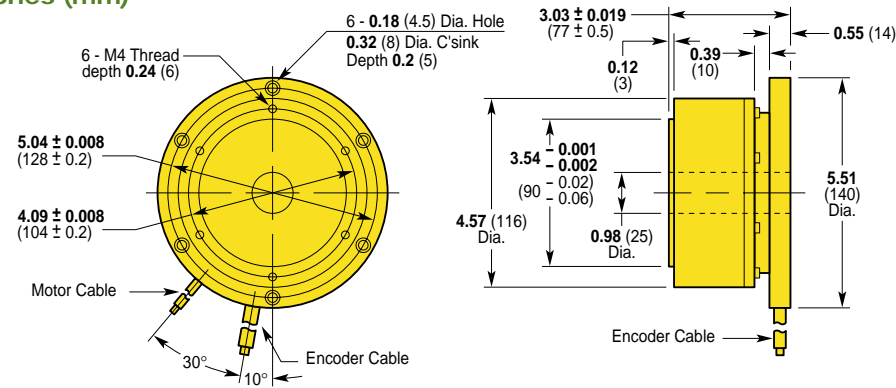
## DM1004B

Dimensions in inches (mm)



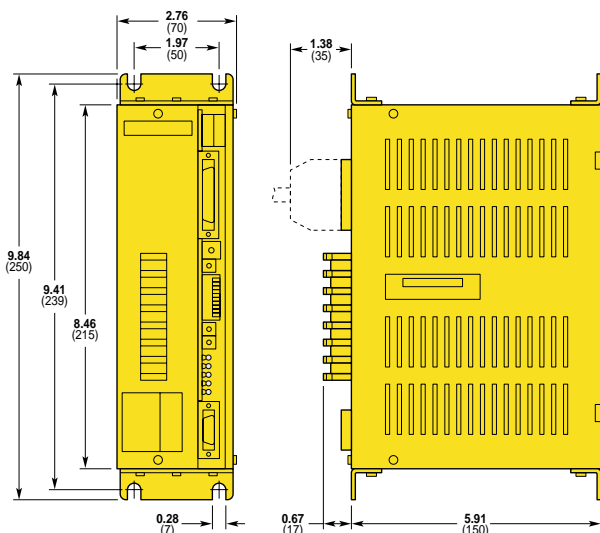
## DM1004C

Dimensions in inches (mm)



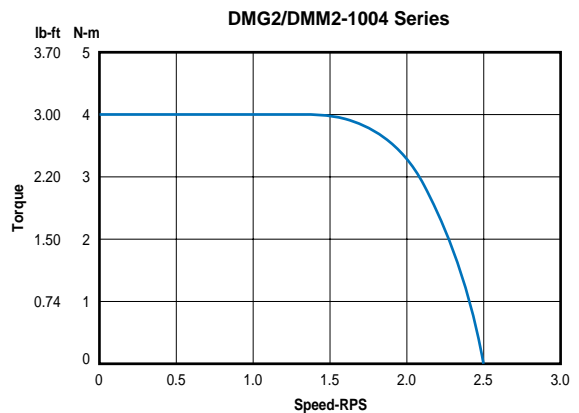
## DM1004B & DM1004C Drive Dimensions

Dimensions in inches (mm)



## Speed-Torque Curve

The speed/torque curves represent peak torque available; continuous torques are approximately 1/2 of the peak value.



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# DM Series Pinout Lists

## Indexer 50-pin Honda

Pin No.	Signal
1-8	Servo stiffness input (FC0-FC8)
9-12	Position end pulse width input (POSW1, POSW0)
13	A+ output
14	A- output
15	Servo ready + output
16	Servo ready - output
17	Velocity monitor + output
18	Velocity monitor - output
19	Direction - input
20	Direction + input
21	Integral capacitor reset + input
22	Integral capacitor reset - input
23	Servo on - input
24	Servo on + input
25-26	Integral/proportional action input
27	In position + output
28	In position - output
29	B+ output
30	B- output
31	TLIM/TFF (option)
32	AGND
33-38	Gain selection inputs - low, medium, high
39	CPU reset + input
40	CPU reset - input
41	Counter overflow + output
42	Counter overflow - output
43	Z+ output
44	Z- output
45	Step + input
46	Step - input
47	Overload + output
48	Overload - output
49	Analog input ( $\pm 10V$ )
50	Analog input GND

## Power-120 or 230VAC Screw Terminal

Pin No.	Signal
1	115 or 230 line-control
2	115 or 230 neutral-control
3	115 or 230 line-main
4	115 or 230 neutral-main
5	GND

## Motor Screw Terminal

Pin No.	Signal
1	Motor A
2	Motor B
3	Motor C
4	GND

## Encoder 16-pin Honda

Pin No.	Signal
1	Red
2	Black
3	Blue
4	Blue/White
5	Brown
6	Brown/White
7	Green
8	Green/White
9	Orange
10	Orange/White
11	Shield