

# ACS ACTUATOR CONTROL SOLUTIONS

## SERVO DRIVE AND MOTORS

## STEPPER DRIVE AND MOTORS



**LINEAR SOLUTIONS MADE EASY**

# ACS – Actuator Control Solutions

## WHAT IS THE ACS?

The ACS is an extremely easy-to-use servo or stepper drive & controller developed specifically to be used with electric actuators. Simply select the configured Tolomatic actuator in the software to automatically set-up most of the necessary parameters to create motion in the desired linear units (mm or inch).

## BASIC CAPABILITIES:

- Operation Modes
  - » 4, 8, or 16 configurable move commands (absolute, incremental, jog, or home move types) with motion commanded via digital inputs.
  - » Analog input positioning mode (0-10Vdc or 4-20mA)
  - » Pneumatic mode replaces pneumatic valve operation for simple motion
  - » Modbus RTU over RS485 provides infinite positioning
- Adjustable motion profile parameters. Position, velocity, accel, decel, force parameters are Independently configurable for up to 16 moves.
- Force limiting
- Zone output based on position
- Configurable digital I/O (24Vdc Opto-Isolated, sourcing or sinking)
- Ability to reduce holding current for energy savings [Stepper]
- Compatible with most 24Vdc 2-phase stepper motors [Stepper]

## ETHERNET/IP OPTION

- Infinite positioning with EtherNet/IP CIP I/O commands
- Dual port with internal switch for daisy chaining
- Analog output echoing actuator position

## MODBUS TCP OPTION

- Infinite positioning with Modbus TCP commands
- Dual port with internal switch for daisy chaining
- Analog output echoing actuator position



## Motors

### SERVO

- NEMA23 & NEMA34

### STEPPER

- NEMA11, NEMA17 & NEMA23

# ACS – Features

Toll Free Phone (877) SERV098  
 Toll Free Fax (877) SERV099  
 www.electromate.com  
 sales@electromate.com

**ETHERNET (OPTION)**

Protocols:  
 • EtherNet/IP • Modbus TCP

**DUAL PURPOSE HEAT SINK**

- Removes heat from drive for optimal performance
- Panel mounting

**DIGITAL I/O**

- 8 Digital Inputs
- 4 Digital Outputs
- 24 Vdc Opto-Isolated
- Sourcing or Sinking
- Configurable Inputs

**ANALOG I/O**

- 0-10 Vdc or 4-20mA
- 1 Analog Input
- 1 Analog Output (optional)

**FEEDBACK**

- For Digital Encoder

**MOTOR POWER**

**Servo Drive**

- 10-60VDC Servo Motors
- 10 Arms Continuous / 20 Arms Peak

**Stepper Drive**

- 24VDC Stepper Motors

**LED INDICATORS**

- Motor Power & Fault indicators

**ACS POWER**

**Servo Drive**

- 10-60VDC

**Stepper Drive**

- 24VDC

**COM PORT**

**Servo Drive**

- USB Com Port

**Stepper Drive**

- RS232 Com Port

**RS485 COM PORT**

- Modbus RTU (Base Model)

## EASY TO USE CONFIGURATION SOFTWARE

**Windows® compliant**

**Digital I/O**

Inputs	Outputs
1 Enable	1 Motion Complete
2 Start Motion	2 Home Complete
3 Home	3 Fault
4 E-Stop	4 Zone
5 Move Select 1 (MS1)	
6 Move Select 2 (MS2)	
7 Move Select 3 (MS3)	
8 Move Select 4 (MS4)	

**Motion Profile**

Position: 4.685 in  
 Velocity: 1.00 in/sec  
 Accel: 100.0 in/sec<sup>2</sup>  
 Decel: 100.0 in/sec<sup>2</sup>  
 Force: 100.0 %

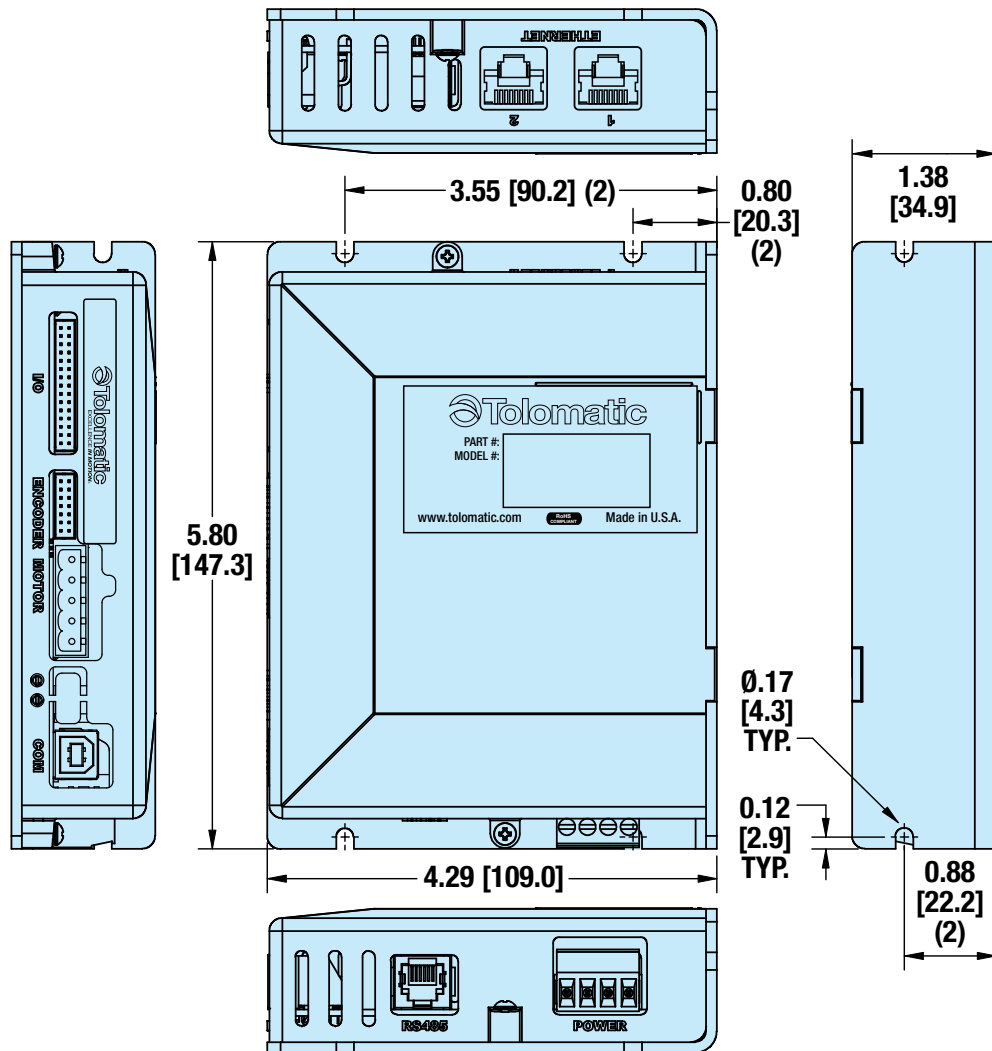
**Drive Status**

Drive Status	Safety Faults	Critical Faults
Enabled	Positive Limit Switch	Feedback Error
Homed	Negative Limit Switch	Over Current
Motion Complete	Software Stop	Motor Over Temp
Software Stop	Position Error	Drive Over Temp
Hot in control		Drive Over Voltage
		Drive Under Voltage

# ACS – Actuator Control Solutions

**DIMENSIONS**  3D CAD available at [www.tolomatic.com](http://www.tolomatic.com)

## ACS SERVO & STEPPER DRIVE/CONTROLLER DIMENSIONS



## ACS Specifications

### SERVO

DRIVE POWER	
Current - Continuous (Max)	10A
Current - Peak (Max)	20A
Over Voltage	65V
Under Voltage	9V
Absolute Maximum Voltage	70V
Logic Current Draw (24V)	200 mA

See ACS Hardware and Installation Guide (Servo #3604-4181) for more details.

### OPERATING CONDITIONS

Ambient Temperature	77°F, 25°C Nominal
Operating Temperature	32 - 104°F, 0 - 40°C
Storage Temperature	32-158°F, 0-70°C
Humidity	0 - 90% non-condensing

### STEPPER

DRIVE POWER	
Current - Max	4A
Voltage Nominal	20 - 28V
Over Voltage	30V
Under Voltage	18V
Absolute Maximum Voltage	35V
Logic Current Draw (24V)	100 mA

See ACS Hardware and Installation Guide (Stepper #3604-4173) for more details.

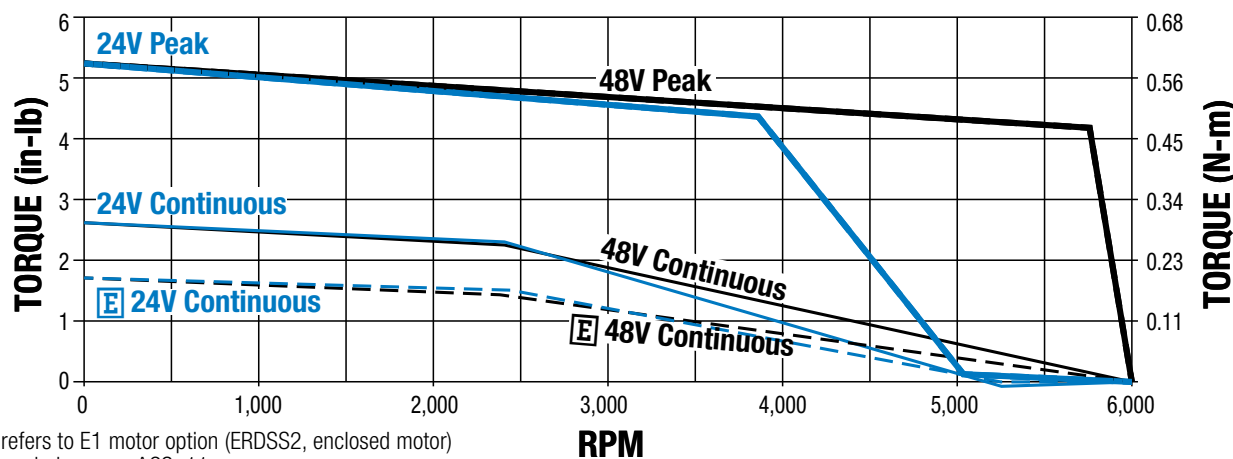
## MOTOR SPECIFICATIONS

	NEMA 23			NEMA 34	
	AMV2C1A1	AMV2C2A1	AMV2C3A1	AMV2D1A1	AMV2D2A1
Continuous Torque	2.63 in-lbs	4.25 in-lbs	4.29 in-lbs	5.9 in-lbs	9.87 in-lbs
Peak Torque	5.25 in-lbs	8.5 in-lbs	13 in-lbs	11.9 in-lbs	21.46 in-lbs
Resistance	0.23 Ohms	0.205 Ohms	0.616 Ohms	0.250 Ohms	0.208 Ohms
Inductance	0.244 mH	0.305 mH	0.915 mH	0.325 mH	0.399 mH
Torque Constant (Kt)	4.824 oz-in/A	8.189 oz-in/A	14.189 oz-in/A	11.068 oz-in/A	18.243 oz-in/A
Back EMF Constant (Ke)	3.570 V/kRPM	6.06 V/kRPM	10.5 V/kRPM	8.190 V/kRPM	13.5 V/kRPM
Max. Continuous Current	10 Amps	10 Amps	3.5 Amps	10 Amps	10 Amps
Max. RPM	6,000 RPM	6,000 RPM	6,000 RPM	5,000 RPM	5,000 RPM
Rotor Inertia	0.001 oz-in-s <sup>2</sup>	0.002 oz-in-s <sup>2</sup>	0.002 oz-in-s <sup>2</sup>	0.01 oz-in-s <sup>2</sup>	0.02 oz-in-s <sup>2</sup>
Motor Poles	8				
Max Case Temp	185°F (85°C)				

SIZING SOFTWARE  
 AVAILABLE AT [WWW.TOLOMATIC.COM](http://WWW.TOLOMATIC.COM)  
**ACTUATOR**  
  
**SIZING**

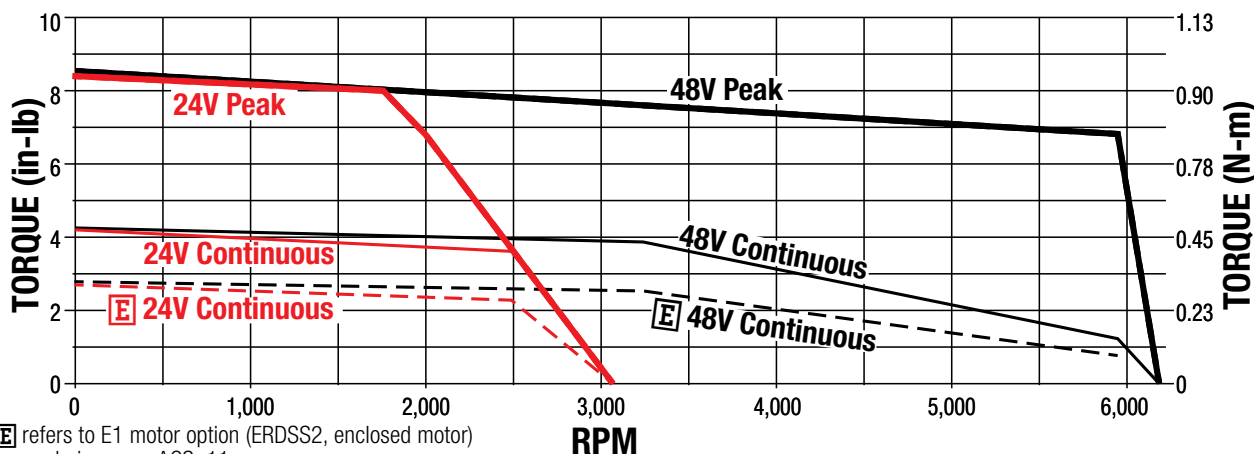
## PERFORMANCE DATA WITH ACS DRIVE/CONTROLLER

### SPEED vs TORQUE - NEMA23 MOTOR, AMV2C1A1



**E** refers to E1 motor option (ERDSS2, enclosed motor)  
 see ordering page ACS\_11

### SPEED vs TORQUE - NEMA23 MOTOR, AMV2C2A1

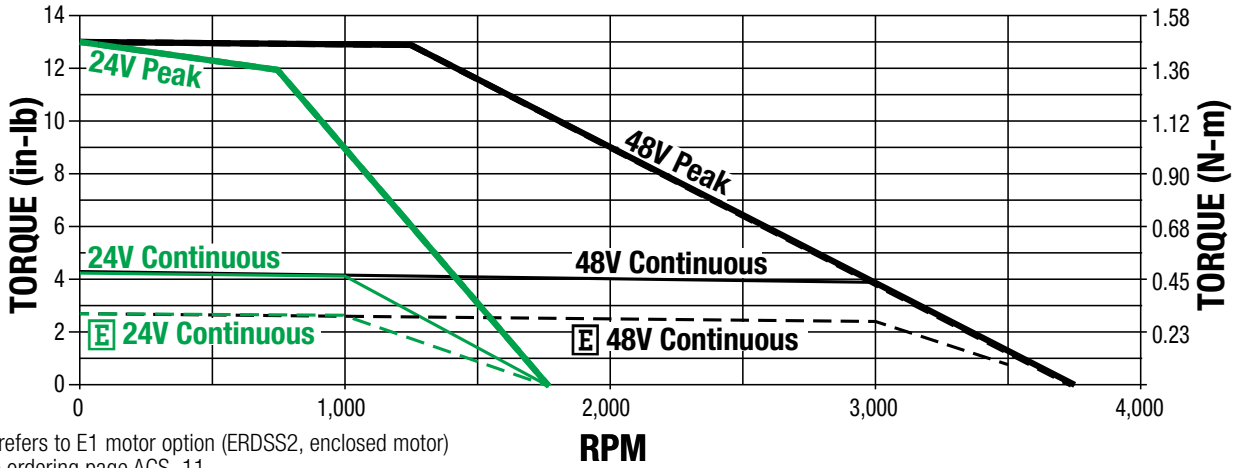


**E** refers to E1 motor option (ERDSS2, enclosed motor)  
 see ordering page ACS\_11

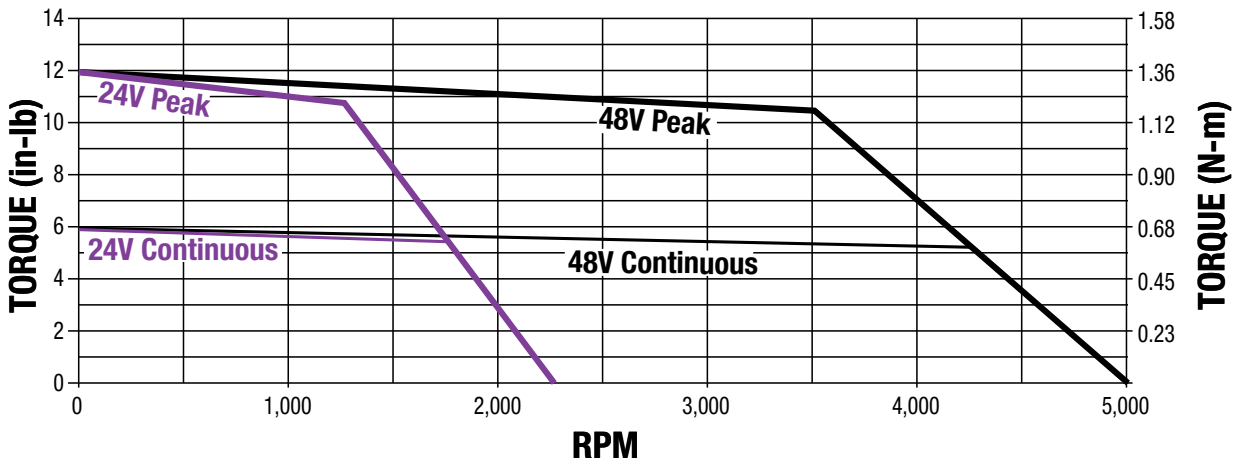
# Servo Motors

## PERFORMANCE DATA WITH ACS DRIVE/CONTROLLER

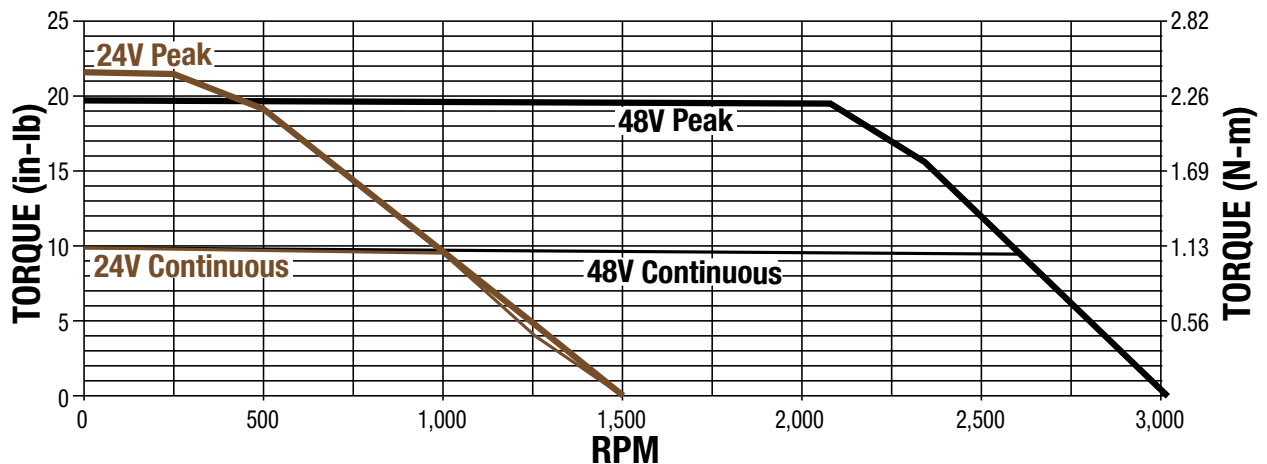
### SPEED vs TORQUE - NEMA23 MOTOR, AMV2C3A1



### SPEED vs TORQUE - NEMA34 MOTOR, AMV2D1A1



### SPEED vs TORQUE - NEMA34 MOTOR, AMV2D2A1

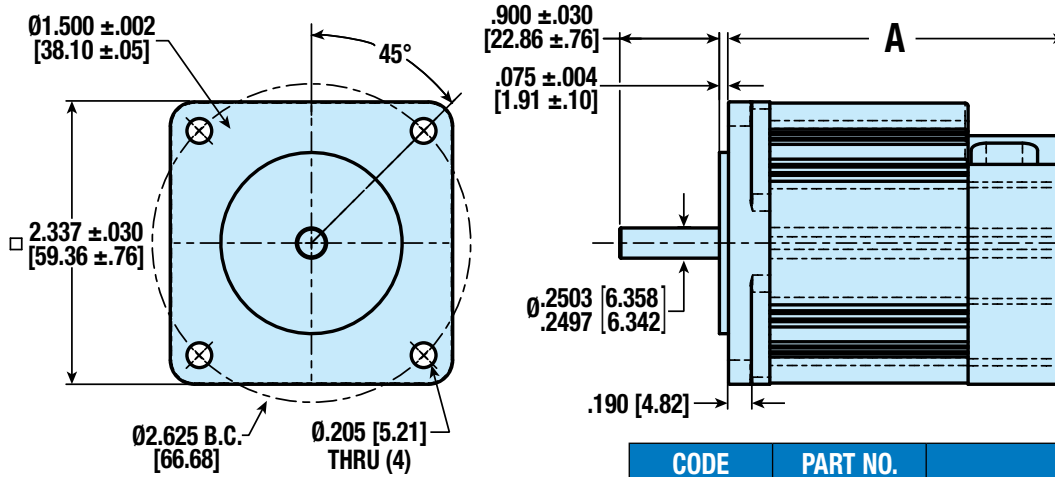


# Servo Motors

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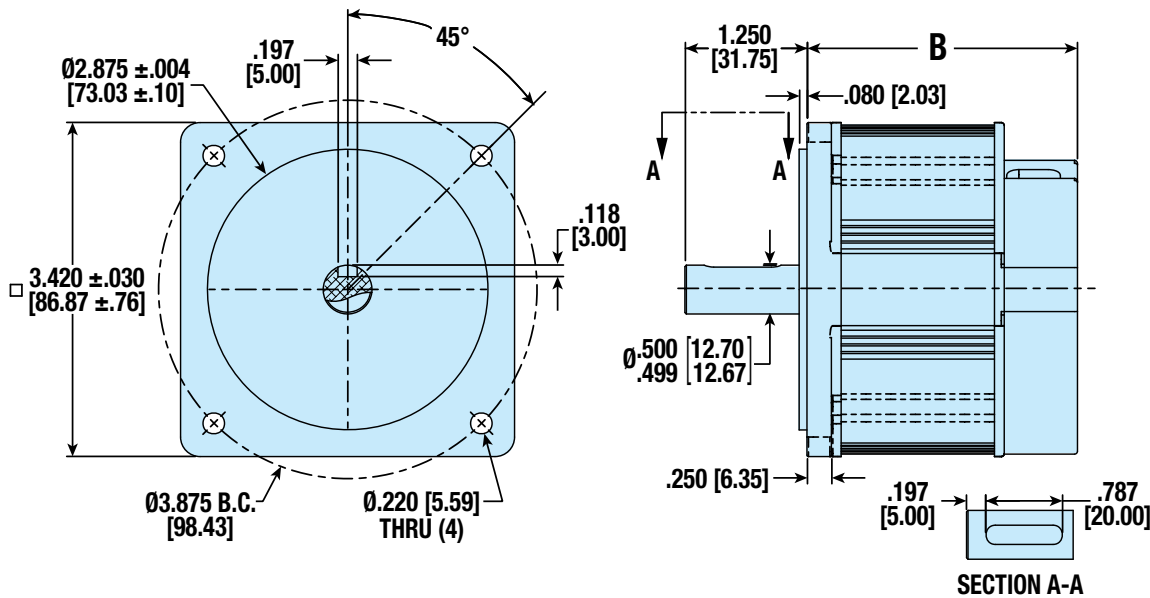
## TOLOMATIC MOTOR DIMENSIONS 3D CAD available at [www.tolomatic.com](http://www.tolomatic.com)

### NEMA23 DIMENSIONS



CODE	PART NO.	A
AMV2C1A1	3604-1845	2.790" [70.87mm] ± 0.100" [2.54mm]
AMV2C2A1	3604-1847	3.540" [89.92mm] ± 0.100" [2.54mm]
AMV2C3A1	3604-1846	3.540" [89.92mm] ± 0.100" [2.54mm]

### NEMA34 DIMENSIONS



CODE	PART NO.	B
AMV2D1A1	3604-1849	2.770" [70.36mm] ± 0.100" [2.54mm]
AMV2D2A1	3604-1851	3.510" [89.15mm] ± 0.100" [2.54mm]

# Stepper Motors

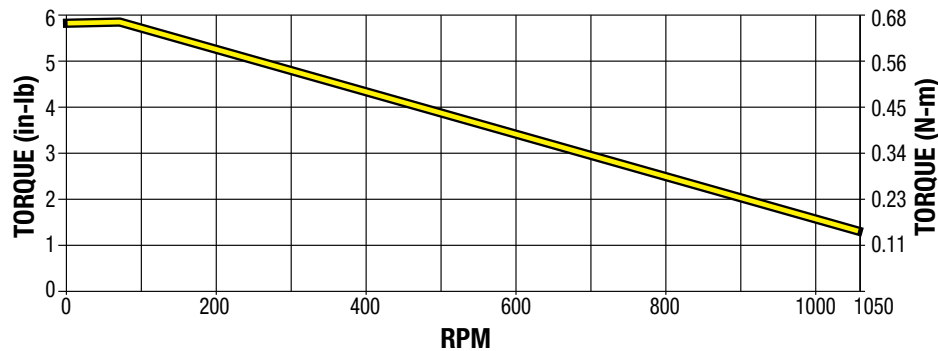


## MOTOR SPECIFICATIONS

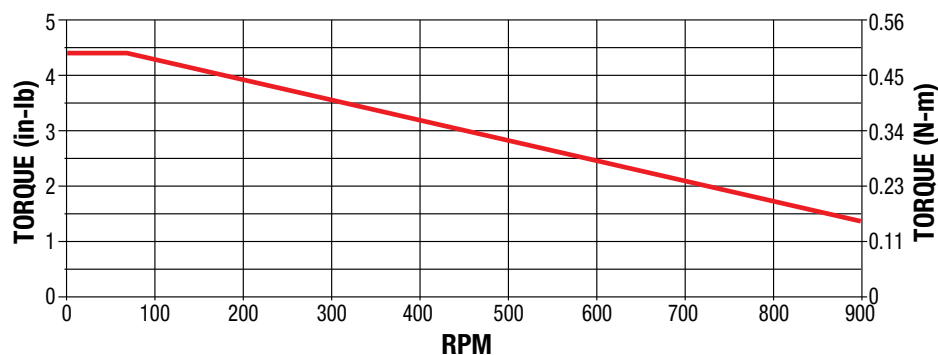
Specifications	NEMA 11		NEMA 17		NEMA 23	
Motor Type	Bipolar Stepper, 1.8° per Step					
Encoder	Differential; 500 line (2000 count post quad)					
Resistance	3.5 Ω		2.4 Ω		1.5 Ω	
Inductance	2.3 mH		4.5 mH		3.7 mH	
Rated Current	1 Arms		1.5 Arms		2 Arms	
Maximum Torque	0.813 in-lbs	0.092 N-m	4.4 in-lbs	0.497 N-m	6.25 in-lbs	0.706 N-m
Maximum RPM	1500 RPM		900 RPM		1050 RPM	
Degree per Step	1.8°		1.8°		1.8°	
Rotor Inertia	0.006 lb-in <sup>2</sup>	17.588 g-cm <sup>2</sup>	0.028 lb-in <sup>2</sup>	81.939 g-cm <sup>2</sup>	0.075 lb-in <sup>2</sup>	219.481 g-cm <sup>2</sup>

## PERFORMANCE DATA WITH ACS DRIVE/CONTROLLER

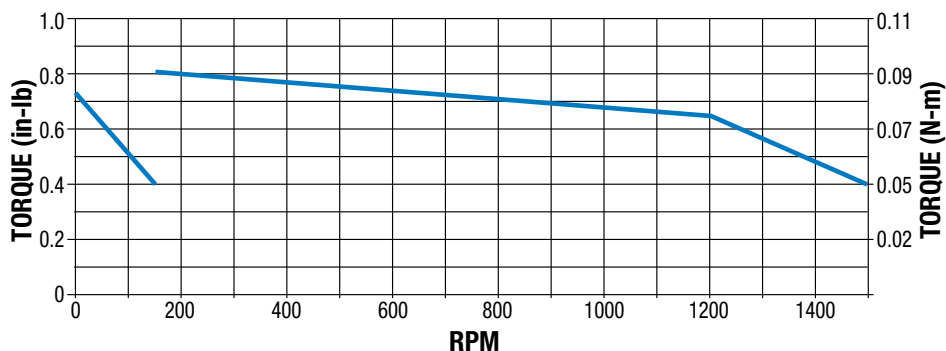
### SPEED vs TORQUE - NEMA23 MOTOR



### SPEED vs TORQUE - NEMA17 MOTOR



### SPEED vs TORQUE - NEMA11 MOTOR





# Stepper Motors

Toll Free Phone (877) SERV098

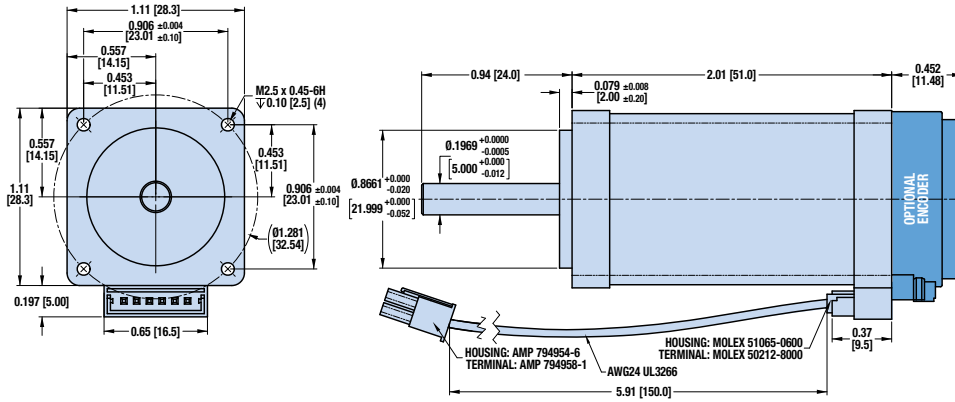
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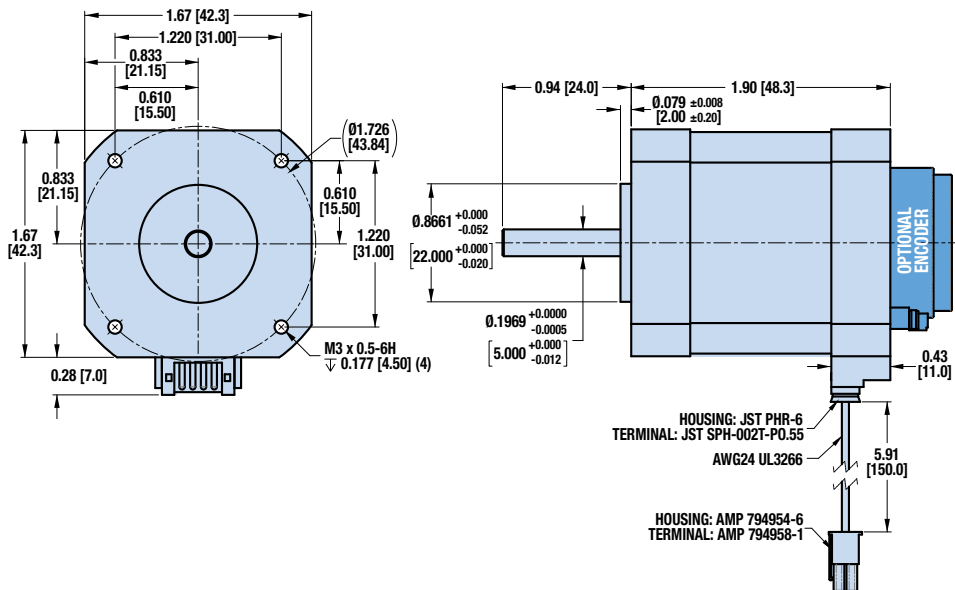
## TOLOMATIC MOTOR DIMENSIONS 3D CAD available at www.tolomatic.com

### NEMA11 DIMENSIONS



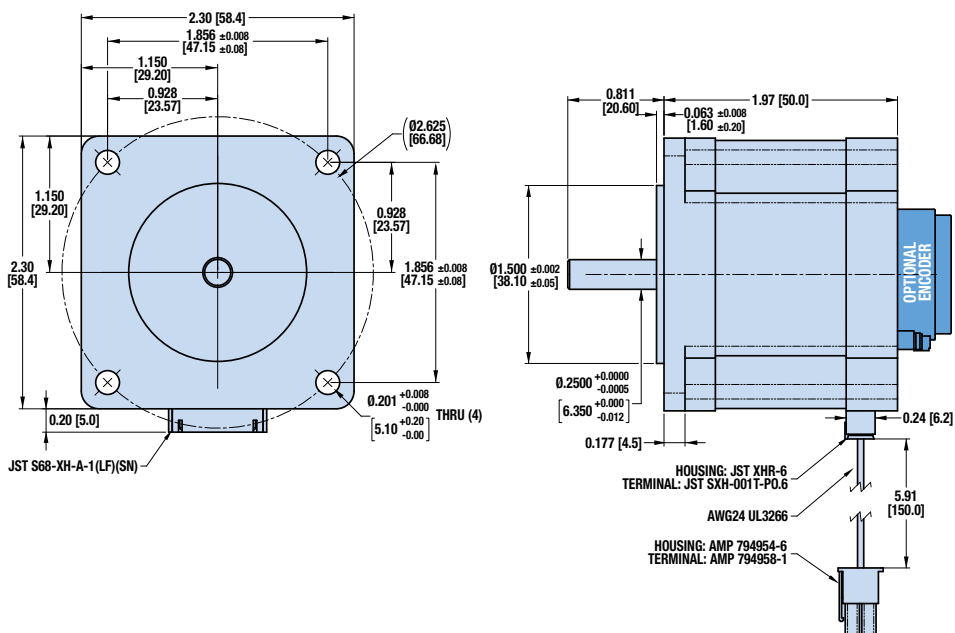
Code	Description
AMS1A1C1	NEMA11 motor no encoder
AMS1A1A1	NEMA11 motor with encoder

### NEMA17 DIMENSIONS



Code	Description
AMS1B1C1	NEMA17 motor no encoder
AMS1B1G1	NEMA17 motor no encoder
AMS1B1A1	NEMA17 motor with encoder
AMS1B1E1	NEMA17 motor with encoder

### NEMA23 DIMENSIONS




Code	Description
AMS1C1C1	NEMA23 motor, no encoder
AMS1C1G1	NEMA23 motor, no encoder
AMS1C1A1	NEMA23 motor, with encoder
AMS1C1E1	NEMA23 motor, with encoder


# ACS – Service Parts Ordering

## ACS DRIVE/CONTROLLER, CABLES & MOTOR REPLACEMENT PARTS

	Part No.	Description	
1.	3604-9661	ACS Servo Drive/Controller (basic)	
	3604-9662	ACS Servo Drive/Controller, EtherNet/IP (Analog Output)	
	3604-9663	ACS Servo Drive/Controller, Modbus TCP (Analog Output)	
1.	3604-9651	ACS Stepper Drive/Controller (model ST0324SD)	
	3604-9654	ACS Stepper Drive/Controller, EtherNet/IP (Analog Output)	
	3604-9655	ACS Stepper Drive/Controller, Modbus TCP (Analog Output)	
2.	3604-1842	Servo - Motor Power/Encoder Cable (3 m)	
	3604-1843	Servo - Motor Power/Encoder Cable (5 m)	
2.	3604-1766	Stepper - Motor Power Cable (3 m)	
	3604-1767	Stepper - Motor Power Cable (5 m)	
3.	3604-1768	Stepper - Encoder Cable (3 meter length)	
	3604-1769	Stepper - Encoder Cable (5 meter length)	
4.	3604-1770	I/O Cable (3 meter length)	
	3604-1771	I/O Cable (5 meter length)	
5.	3604-9526	Tolomatic Motion Interface CD	
	3604-1852	Servo - USB Type B Cable	
5.	3604-9044	Stepper - Starter Kit (includes RJ 12 cable; D-Sub to RJ converter; USB to RS232 Converter and Tolomatic Motion Interface CD)	
		3604-9526	Tolomatic Motion Interface CD
		3604-1795	USB to RS232 Converter
		3604-9043	RJ cable and D-Sub to RJ Converter Combo

SERVO MOTORS		
Code	Part No.	Description
AMV2C1A1	3604-1845	NEMA23 motor, 1 stack with Encoder, No Brake
AMV2C1A2	3600-9810	NEMA23 motor, 1 stack with Encoder / 5:1 Gearhead
AMV2C1A3	3600-9811	NEMA23 motor, 1 stack with Encoder / 10:1 Gearhead
AMV2C1E1	2192-9130	NEMA23 motor, 1 stack with Encoder, No Brake W/SS2 Option
AMV2C2A1	3604-1847	NEMA23 motor, 2 stack with Encoder, No Brake
AMV2C2A2	3600-9812	NEMA23 motor, 2 stack with Encoder / 5:1 Gearhead
AMV2C2A3	3600-9813	NEMA23 motor, 2 stack with Encoder / 10:1 Gearhead
AMV2C2E1	2192-9150	NEMA23 motor, 2 stack with Encoder, No Brake W/SS2 Option
AMV2C3A1	3604-1846	NEMA23 motor, 3 stack with Encoder, No Brake
AMV2C3A2	3600-9814	NEMA23 motor, 3 stack with Encoder / 5:1 Gearhead
AMV2C3A3	3600-9815	NEMA23 motor, 3 stack with Encoder / 10:1 Gearhead
AMV2C3E1	2192-9140	NEMA23 motor, 3 stack with Encoder, No Brake W/SS2 Option
AMV2D1A1	3604-1849	NEMA34 motor, 1 stack with Encoder, No Brake
AMV2D1A2	3600-9816	NEMA34 motor, 1 stack with Encoder / 5:1 Gearhead
AMV2D1A3	3600-9817	NEMA34 motor, 1 stack with Encoder / 10:1 Gearhead
AMV2D2A1	3604-1851	NEMA34 motor, 2 stack with Encoder, No Brake
AMV2D2A2	3600-9818	NEMA34 motor, 2 stack with Encoder / 5:1 Gearhead
AMV2D2A3	3600-9819	NEMA34 motor, 2 stack with Encoder / 10:1 Gearhead

**Servo**  
 **Servo-NOTE: Items 1,2,4 & 5 from table above are recommended for complete ACS system. Order items 1,2,4 & 5 by part numbers**

**Stepper**  
 **Stepper-NOTE: All 5 items from table above are recommended for complete ACS system. Order items 1-5 by part numbers**

Part No.	Description
2190-1304	Input Power Connector

STEPPER MOTORS		
Code	Part No.	Description
AMS1A1C1	3604-1779	NEMA11 motor no encoder (ERD06)
AMS1A1A1	3604-1780	NEMA11 motor with encoder (ERD06)
AMS1B1C1 AMS1B1G1	3604-1775	NEMA17 motor no encoder (ERD10)
AMS1B1A1 AMS1B1E1	3604-1776	NEMA17 motor with encoder (ERD10)
AMS1C1C1 AMS1C1G1	3604-1777	NEMA23 motor, no encoder (ERD15)
AMS1C1A1 AMS1C1E1	3604-1778	NEMA23 motor, with encoder (ERD15)

# Servo Ordering

## DRIVE

**SV 20 48 UD CR53**

SERVO ORDER CODE	
<b>SV</b>	Tolomatic ACS Servo Drive

CURRENT	
<b>20</b>	20 Amp

VOLTAGE	
<b>48</b>	Voltage

DRIVE ORDER CODE	
<b>UD</b>	Standard/Basic Drive with ModBus RTU over RS485
<b>ED</b>	Standard/Basic Drive with EtherNet /IP
<b>MD</b>	Standard/Basic Drive with Modbus TCP

CABLE(S) ORDER CODE	
<b>CR3</b> [_]	Cable(s) of 3m Length
<b>CR5</b> [_]	Cable(s) of 5m Length
[ <b>2</b> ]	Motor and Encoder Cables
[ <b>3</b> ]	Motor, Encoder and I/O Cables
[ <b>5</b> ]	I/O Cables

## MOTOR

**AM V2 C1 A1**

MOTOR ORDER CODE	
<b>AM</b>	Tolomatic Motor

MOTOR TYPE	
<b>V2</b>	Servo Motor

FRAME SIZE	
<b>C1</b>	23 Frame Motor, 1 stack
<b>C2</b>	23 Frame Motor, 2 stack
<b>C3</b>	23 Frame Motor, 2 stack
<b>D1</b>	34 Frame Motor, 1 stack
<b>D2</b>	34 Frame Motor, 2 stack

MOTOR OPTIONS	
<b>A1</b>	Encoder
<b>A2</b>	Encoder / 5:1 Gearhead
<b>A3</b>	Encoder / 10:1 Gearhead
<b>E1</b>	Encoder with SS2 option

# Stepper Ordering

## DRIVE

**ST 03 24 SD CR53**

STEPPER ORDER CODE	
<b>ST</b>	Tolomatic ACS Stepper Drive

CURRENT	
<b>03</b>	Current

VOLTAGE	
<b>24</b>	Voltage

DRIVE ORDER CODE	
<b>SD</b>	Standard/Basic Drive with ModBus RTU over RS485
<b>ED</b>	Standard/Basic Drive with EtherNet /IP
<b>MD</b>	Standard/Basic Drive with Modbus TCP

CABLE(S) ORDER CODE	
<b>CR3</b> [_]	Cable(s) of 3m Length
<b>CR5</b> [_]	Cable(s) of 5m Length
[ <b>1</b> ]	Motor Cable
[ <b>2</b> ]	Motor and Encoder Cables
[ <b>3</b> ]	Motor, Encoder and I/O Cables
[ <b>4</b> ]	Motor and I/O Cables
[ <b>5</b> ]	I/O Cables

## MOTOR

**AM S1 B1 E1**

MOTOR ORDER CODE	
<b>AM</b>	Tolomatic Motor

MOTOR TYPE	
<b>S1</b>	Stepper Motor

FRAME SIZE	
<b>A1</b>	11 Frame Motor (ERD06)
<b>B1</b>	17 Frame Motor (ERD10)
<b>C1</b>	23 Frame Motor (ERD15)

MOTOR OPTIONS	
<b>A1</b>	Encoder
<b>C1</b>	No Encoder
<b>E1</b>	Encoder with SS2 option
<b>G1</b>	No Encoder SS2 option

 **NOTE: Each ERD size has only one motor size choice**

# THE TOLOMATIC DIFFERENCE

What you expect from the industry leader:



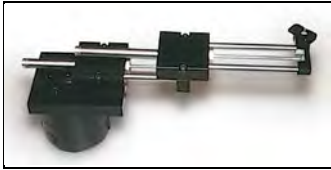
## EXCELLENT CUSTOMER SERVICE & TECHNICAL SUPPORT

Our people make the difference! Expect prompt, courteous replies to all of your application and product questions.



## INDUSTRY LEADING DELIVERIES

Tolomatic continues to offer the fastest delivery of standard catalog products. Modified and custom products ship weeks ahead of the competition.



## INNOVATIVE PRODUCTS

From standard catalog products... to modified products... to completely unique custom products, Tolomatic designs and builds the best solutions for your challenging applications.



## ONLINE SIZING & SELECTION SOFTWARE

Online sizing that is easy to use, accurate and always up-to-date. Input your application data and the software will determine a Tolomatic electric actuator to meet your requirements.



## 3D MODELS & 2D DRAWINGS AVAILABLE ON THE WEB

Easy to access CAD files are available in many popular formats.

### PNEUMATIC PRODUCTS



RODLESS CYLINDERS: Band Cylinders, Cable Cylinders, MAGNETICALLY COUPLED CYLINDERS/SLIDES; GUIDED ROD CYLINDER SLIDES

"FOLDOUT" BROCHURE #9900-9075  
PRODUCTS BROCHURE #9900-4028

### ELECTRIC PRODUCTS



ROD & GUIDED ROD STYLE ACTUATORS, HIGH THRUST ACTUATORS, SCREW & BELT DRIVE RODLESS ACTUATORS, MOTORS, DRIVES AND CONTROLLERS

"FOLDOUT" BROCHURE #9900-9074  
PRODUCTS BROCHURE #9900-4016

### POWER TRANSMISSION PRODUCTS



GEARBOXES: Float-A-Shaft®, Slide-Rite®; DISC CONE CLUTCH; CALIPER DISC BRAKES

"FOLDOUT" BROCHURE #9900-9076  
PRODUCTS BROCHURE #9900-4029



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