Tolomatic™
EXCELLENCE *IN MOTION*

ACS ACTUATOR CONTROL SOLUTIONS

SERVO DRIVE AND MOTORS
STEPPER DRIVE AND MOTORS

EtherNet/IP™ Modbus

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]
- Brake output

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
- ODVA Conformant

MODBUS TCP OPTION

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

Motors

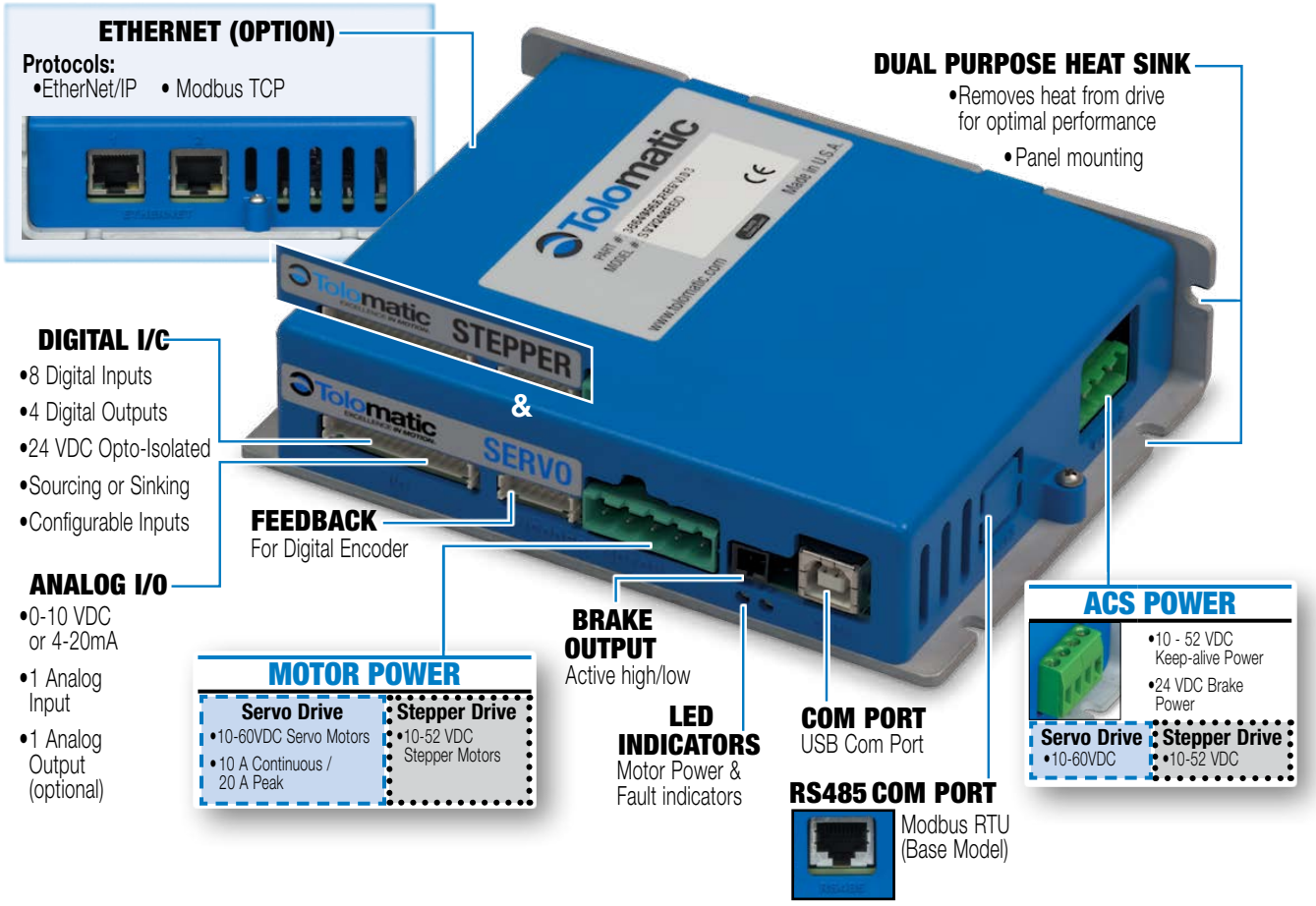
SERVO

- NEMA23 & NEMA34

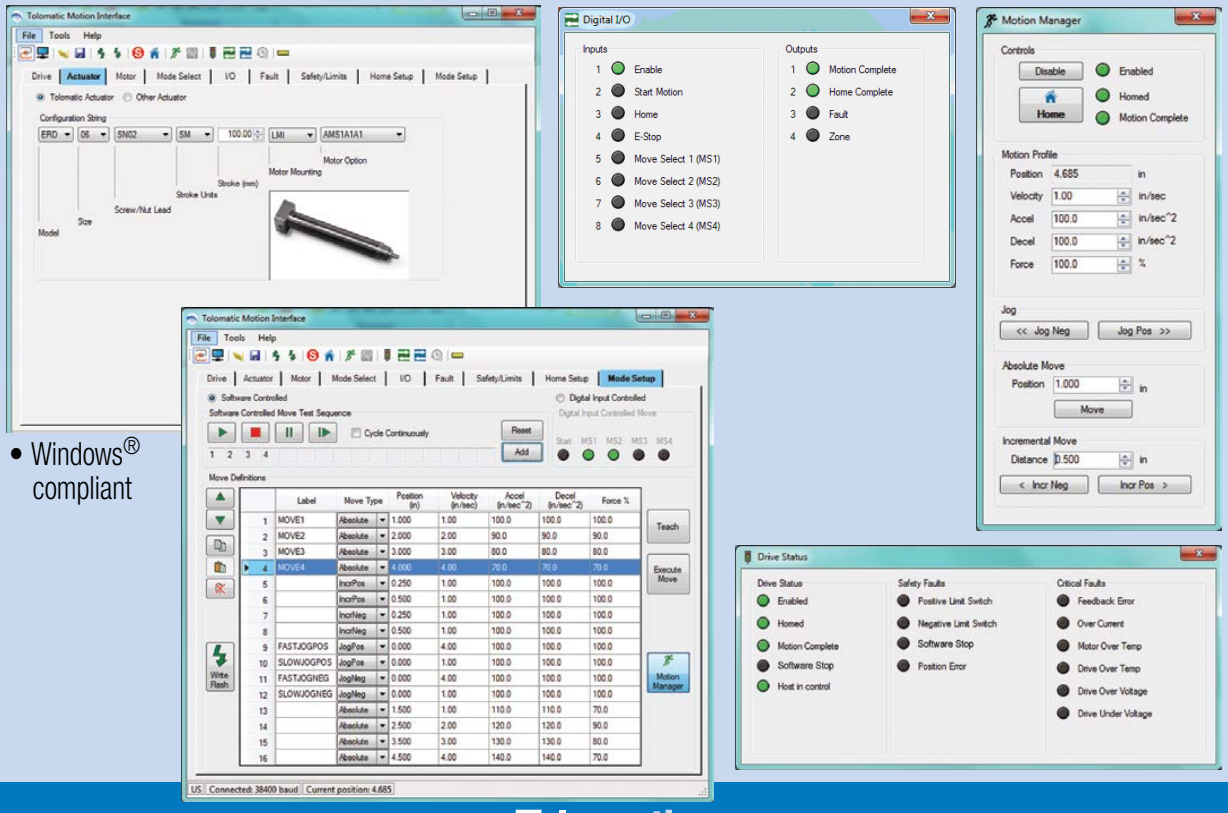
STEPPER

- NEMA17, NEMA23 & NEMA34

ACS – Features



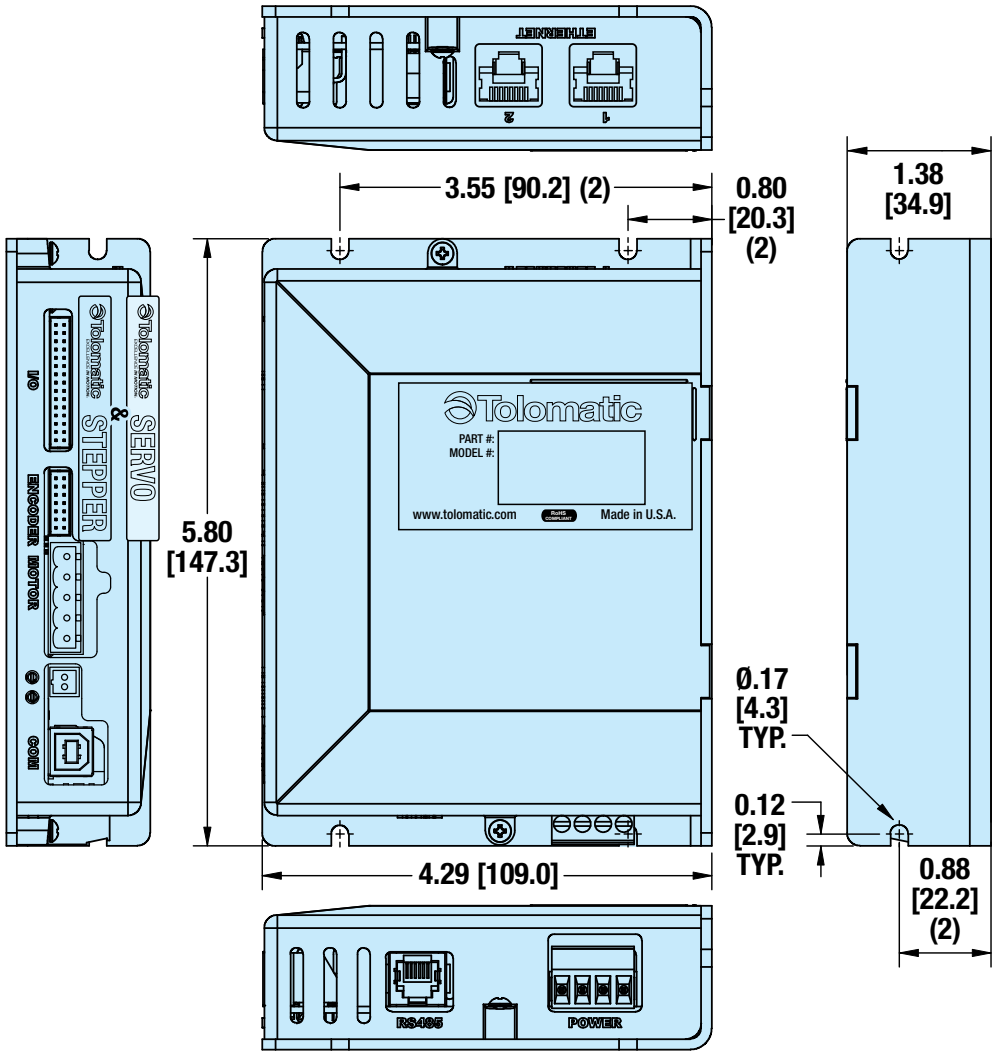
EASY TO USE CONFIGURATION SOFTWARE



• Windows® compliant

3D CAD available at www.tolomatic.com
Always use configurated CAD solid model to determine critical dimensions

ACS SERVO & STEPPER DRIVE/CONTROLLER DIMENSIONS



ACS Specifications

SERVO

DRIVE POWER	
Current - Continuous (Max)	10A
Current - Peak (Max)	20A
Voltage Nominal	10V - 60V
Over Voltage	65V
Under Voltage	9V
Absolute Maximum Voltage	70V
Logic Current Draw (24V)	200 mA

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
Weight	0.6 lb *(0.27 kg)*

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

STEPPER

DRIVE POWER	
Current - Max	10 Amps
Voltage Nominal	10 - 52V
Over Voltage	55V
Under Voltage	9V
Absolute Maximum Voltage	60V
Logic Current Draw (24V)	200 mA

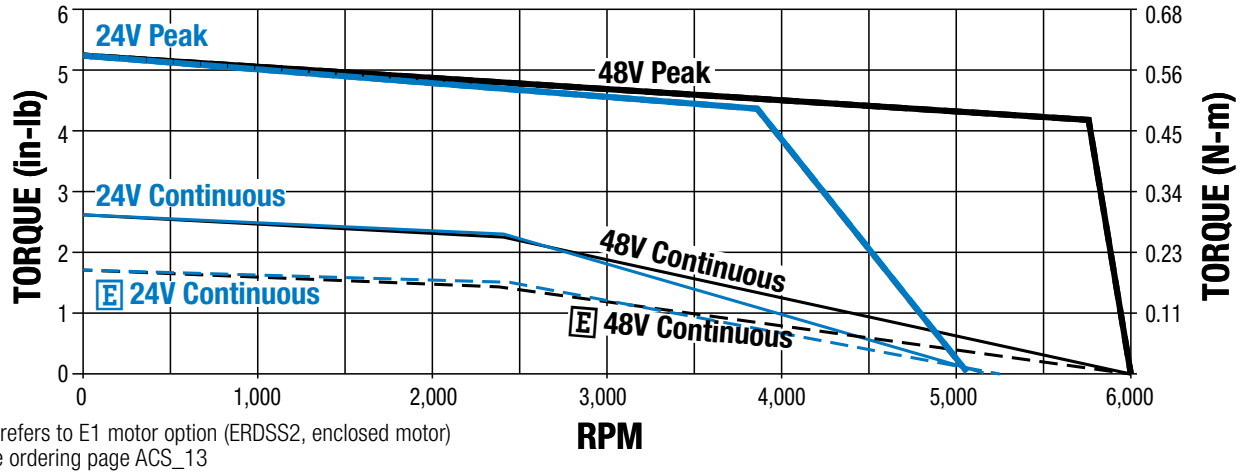
See ACS Hardware and Installation Guide (Stepper #3604-4183) for more details.

MOTOR SPECIFICATIONS

	Units		NEMA 23						NEMA 34			
			AMV2C1A1		AMV2C2A1		AMV2C3A1		AMV2D1A1		AMV2D2A1	
Continuous Torque	in-lbs	*N-m*	2.613	*0.30*	4.43	*0.50*	7.156	*0.81*	5.988	*0.68*	9.875	*1.12*
Peak Torque	in-lbs	*N-m*	5.225	*0.59*	8.86	*1.00*	15.3	*1.73*	12.0	*1.36*	19.75	*2.23*
Resistance	Ohms		0.23		0.205		0.616		0.25		0.208	
Inductance	mH		0.244		0.305		0.915		0.325		0.399	
Torque Constant (Kt)	in-lbs/A	*N-m/A*	0.3	*0.034*	0.511	*0.058*	0.886	*0.100*	0.692	*0.078*	1.14	*0.129*
Back EMF Constant (Ke)	V/kRPM		3.570		6.06		10.5		8.190		13.5	
Max. Continuous Current	Amps		10		10		9.32		10		10	
Max. RPM	RPM		6,000		6,000		6,000		5,000		5,000	
Rotor Inertia	lb-in^2	*kg-mm^2*	0.024	*7.02*	0.048	*14.05*	0.048	*14.05*	0.241	*70.53*	0.507	*148.37*
Motor Weight	lb	*kg*	1.38	*0.63*	2.05	*0.93*	2.05	*0.93*	3.10	*1.41*	4.60	*2.09*
Motor Poles			8									
Max Case Temp			185°F *(85°C)*									
Encoder			Differential 500 lines/rev (2000 counts per rev)									

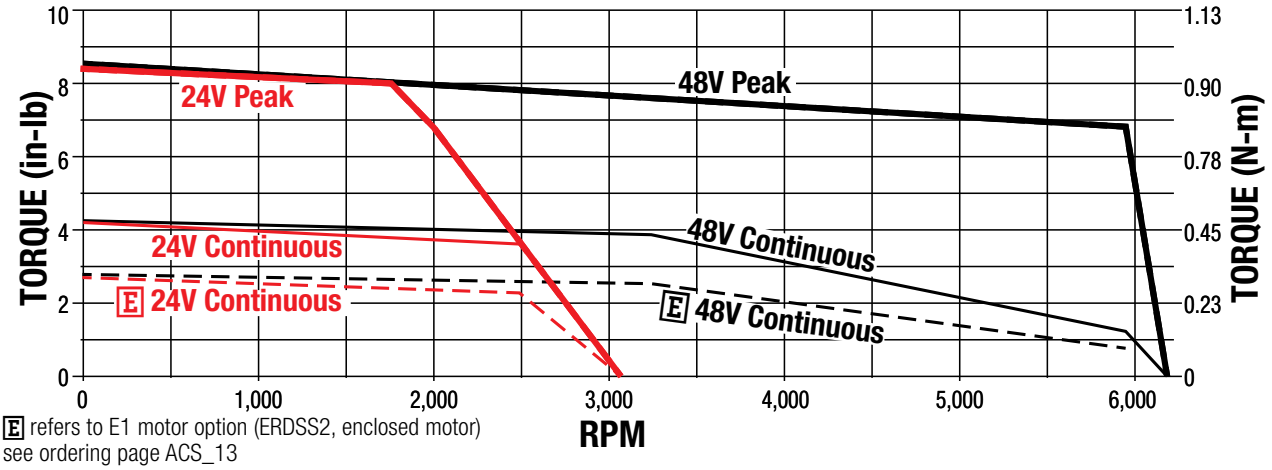
PERFORMANCE DATA WITH ACS DRIVE/CONTROLLER

SPEED vs TORQUE - NEMA23 MOTOR, AMV2C1A1



E refers to E1 motor option (ERDSS2, enclosed motor)
see ordering page ACS_13

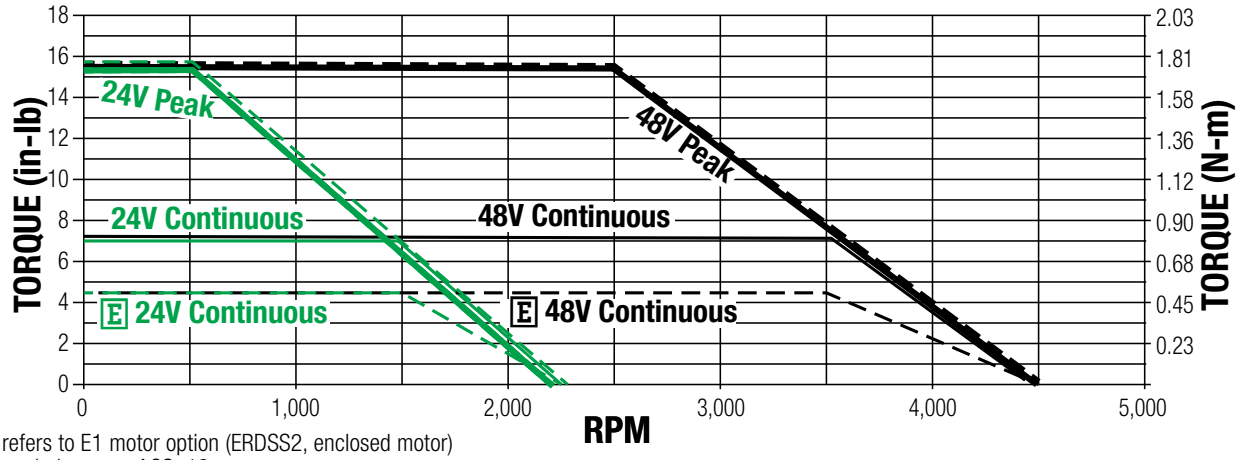
SPEED vs TORQUE - NEMA23 MOTOR, AMV2C2A1



E refers to E1 motor option (ERDSS2, enclosed motor)
see ordering page ACS_13

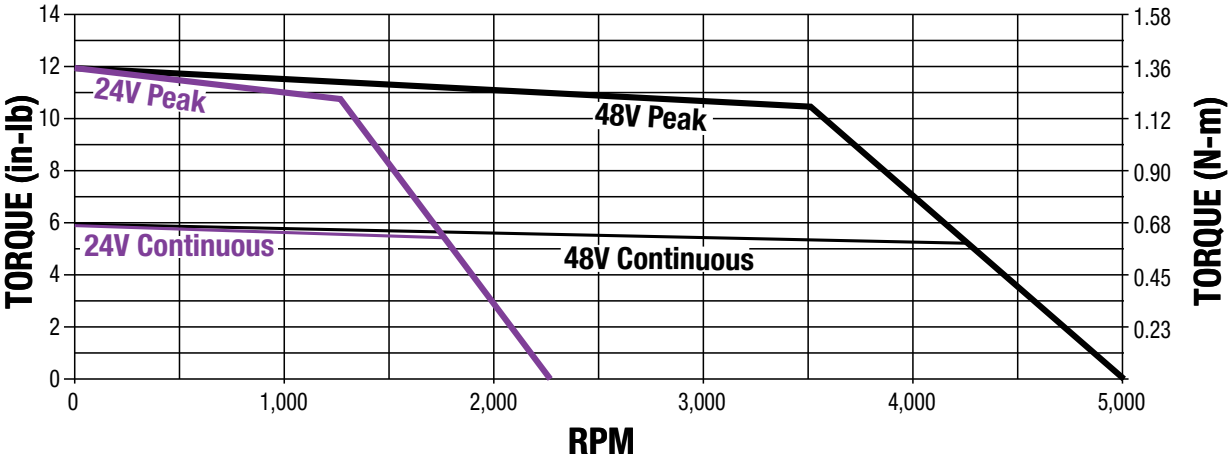
PERFORMANCE DATA WITH ACS DRIVE/CONTROLLER

SPEED vs TORQUE - NEMA23 MOTOR, AMV2C3A1

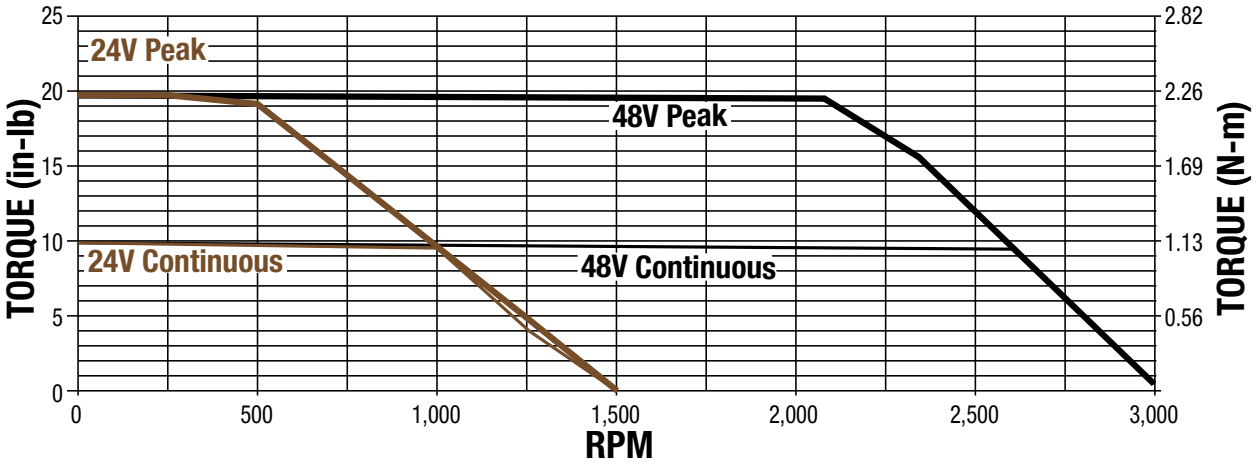


E refers to E1 motor option (ERDSS2, enclosed motor)
see ordering page ACS_13

SPEED vs TORQUE - NEMA34 MOTOR, AMV2D1A1



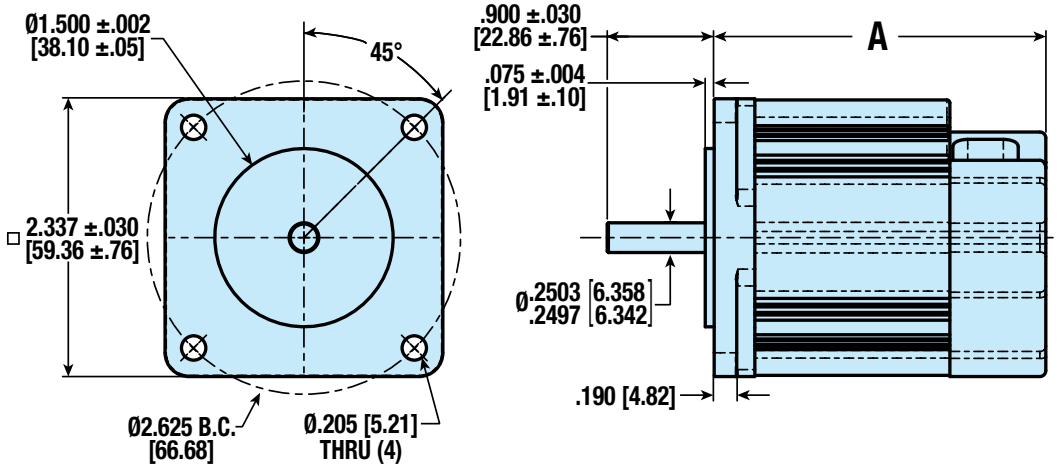
SPEED vs TORQUE - NEMA34 MOTOR, AMV2D2A1



3D CAD available at www.tolomatic.com
Always use configurated CAD solid model to determine critical dimensions

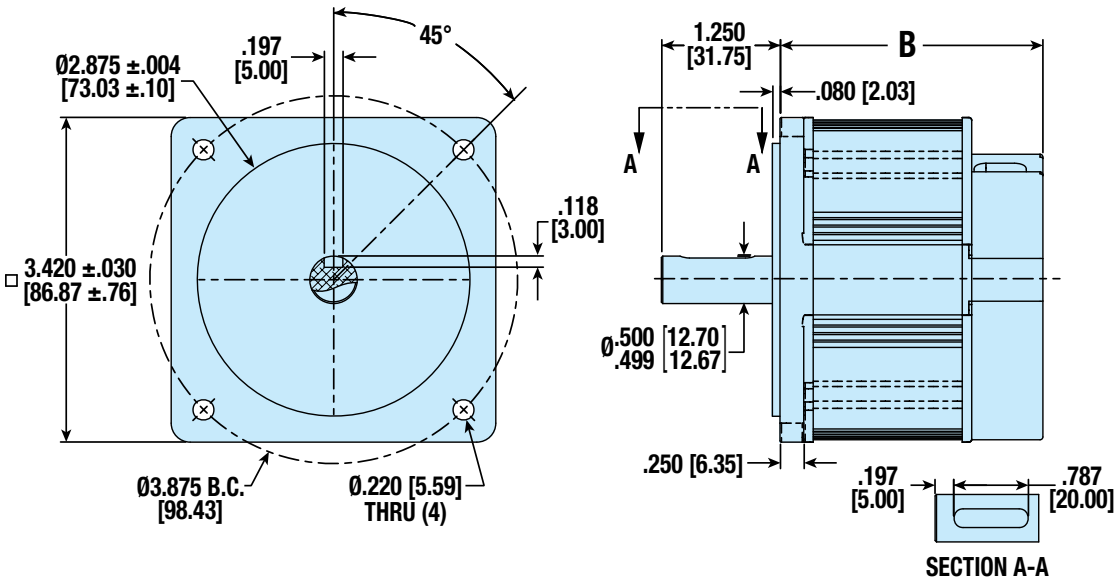
DIMENSIONS

NEMA23 DIMENSIONS



A
2.790" [70.87mm] ± 0.100" [2.54mm] – AMV2C1A1
3.540" [89.92mm] ± 0.100" [2.54mm] – AMV2C2A1
3.540" [89.92mm] ± 0.100" [2.54mm] – AMV2C3A1

NEMA34 DIMENSIONS



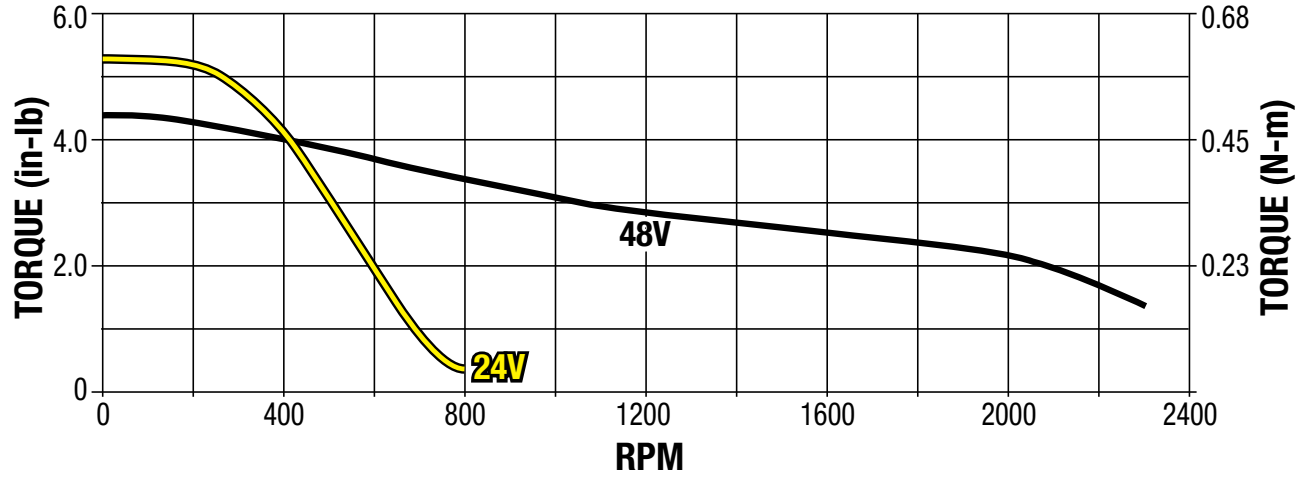
B
2.770" [70.36mm] ± 0.100" [2.54mm] – AMV2D1A1
3.510" [89.15mm] ± 0.100" [2.54mm] – AMV2D2A1

MOTOR SPECIFICATIONS

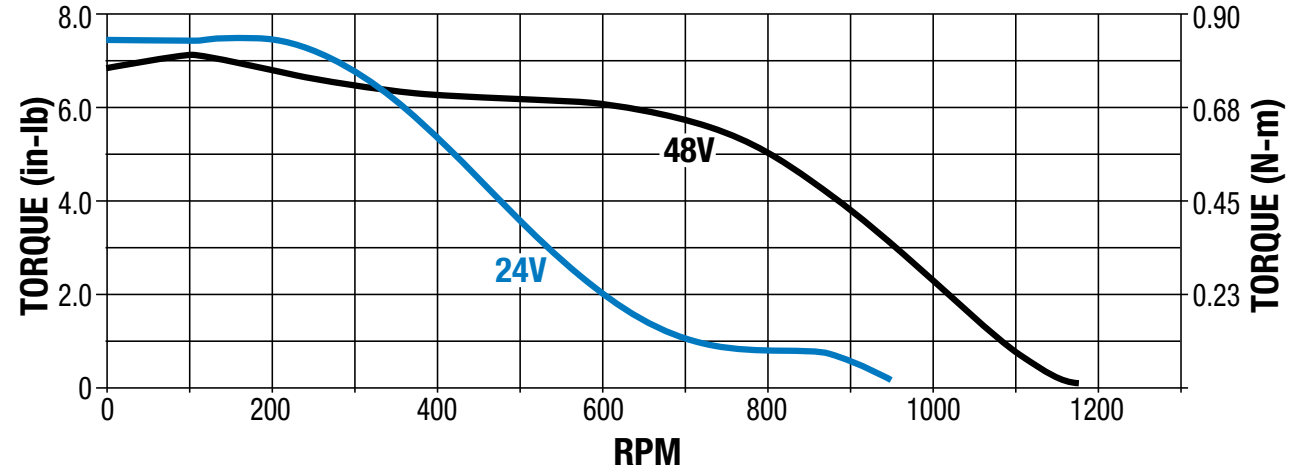
Specifications	Units		NEMA 17		NEMA 23 1STK		NEMA 23 2STK		NEMA 34 1STK		NEMA 34 2STK	
Resistance	Ohms		2.4		1.5		0.39		0.138		0.188	
Inductance	mH		4.5		3.7		1.53		1.13		2	
Rated Current	Amps-Peak/Phase		1.5		2		5		10		10	
Max. Torque	in-lbs	*N-m*	5.26	*0.59*	7.53	*0.85*	13.4	*1.51*	24.3	*2.75*	53.0	*6.0*
Maximum RPM			2000		1200		2000		2000		1850	
Degree per Step			1.8°		1.8°		1.8°		1.8°		1.8°	
Rotor Inertia	lb-in^2	*kg-mm^2*	0.028	*8.19*	0.075	*21.95*	0.133	*38.92*	0.324	*94.82*	0.546	*159.78*
Motor Weight	lb	*kg*	0.79	*0.36*	1.21	*0.55*	2.20	*1.00*	3.53	*1.60*	5.95	*2.70*
Motor Type			Bipolar Stepper, 1.8° per Step									
Encoder			Differential; 500 line/rev (2000 count post quad)/rev									

PERFORMANCE DATA WITH ACS DRIVE/CONTROLLER

SPEED vs TORQUE - NEMA17 MOTOR - AMS1BIC1



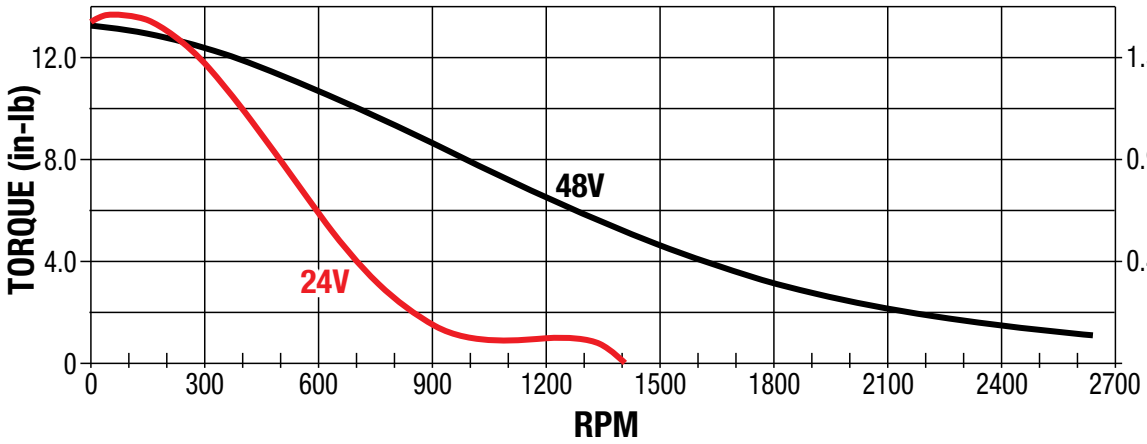
SPEED vs TORQUE - NEMA23 1 STACK MOTOR - AMS1C1C1



NOTE: E1 & G1 Motor Options (SS2) are limited to 24V operation.

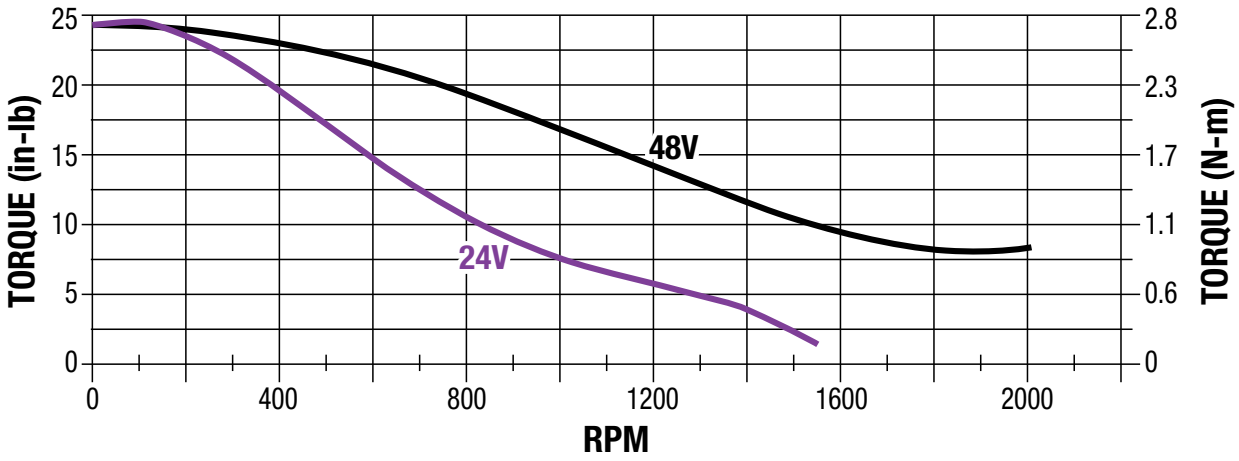
PERFORMANCE DATA WITH ACS DRIVE/CONTROLLER

SPEED vs TORQUE - NEMA23 2 STACK MOTOR - AMS1C2C1

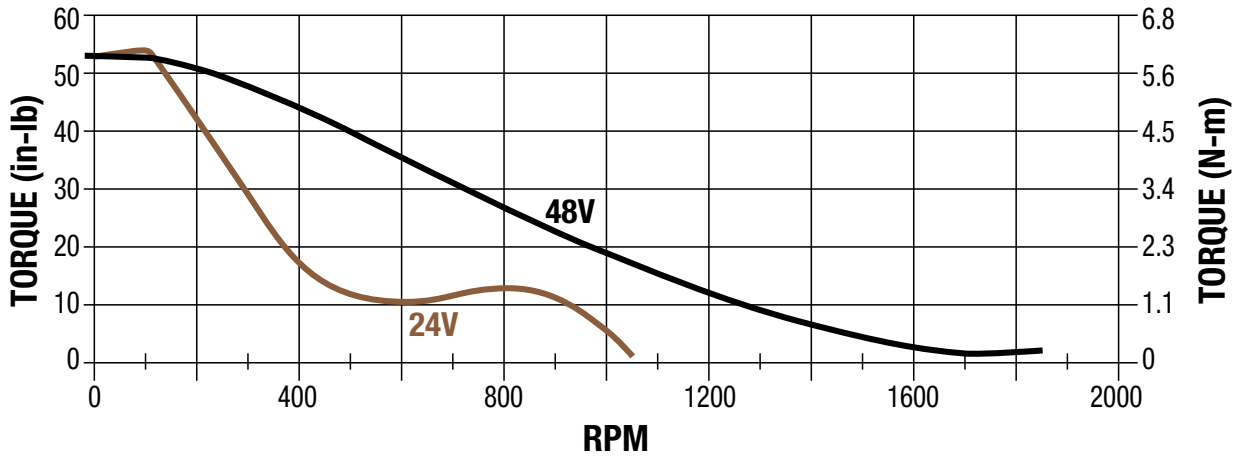


NOTE: E1 & G1 Motor Options (SS2) are limited to 24V operation.

SPEED vs TORQUE - NEMA34 1 STACK MOTOR - AMS1D1C1



SPEED vs TORQUE - NEMA34 2 STACK MOTOR - AMS1D2C1



Stepper Motors

3D CAD available at www.tolomatic.com
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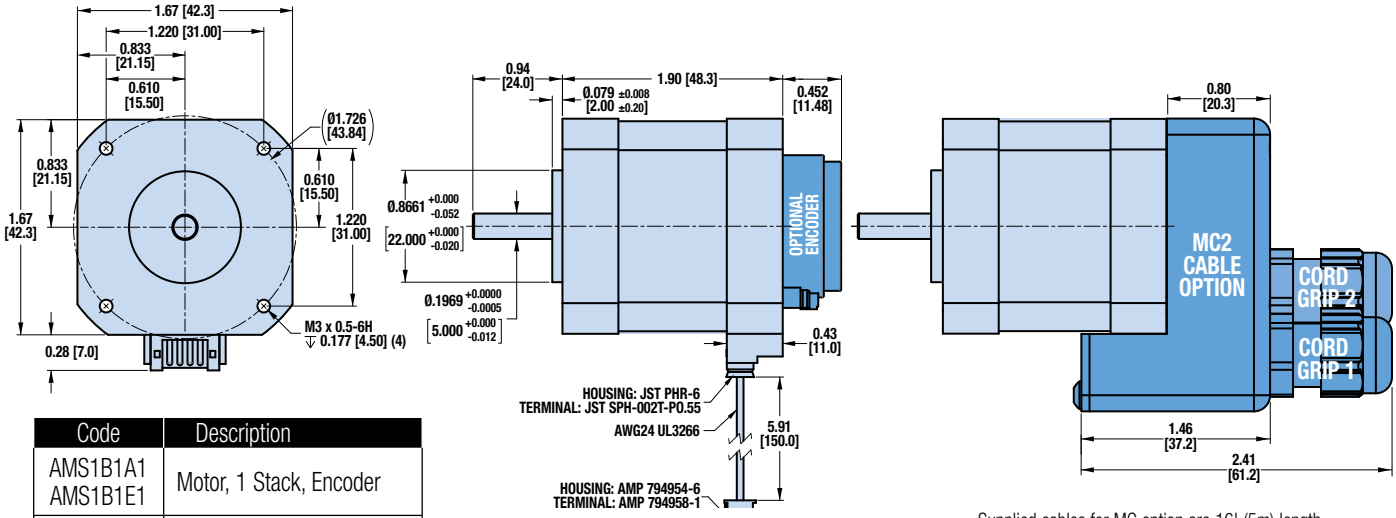
DIMENSIONS

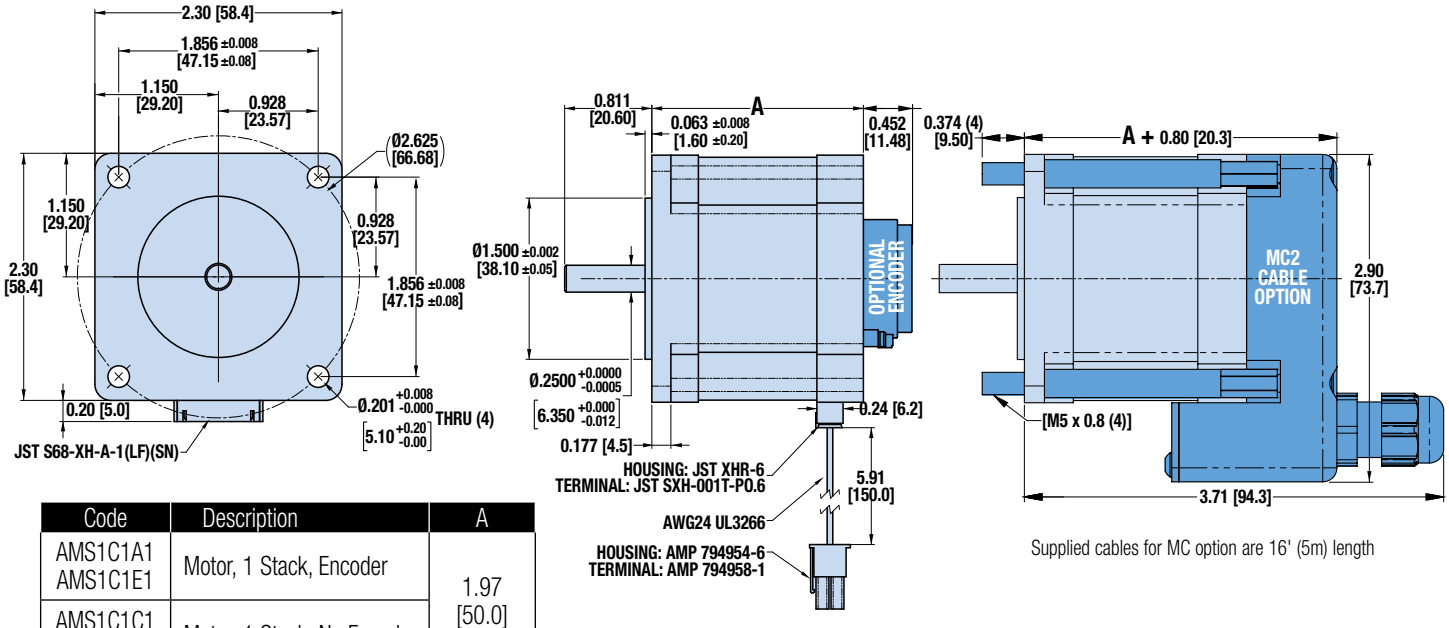
NEMA17 DIMENSIONS



Code	Description
AMS1B1A1 AMS1B1E1	Motor, 1 Stack, Encoder
AMS1B1C1 AMS1B1G1	Motor, 1 Stack, No Encoder

Supplied cables for MC option are 16' (5m) length

NEMA23 DIMENSIONS



Code	Description	A
AMS1C1A1 AMS1C1E1	Motor, 1 Stack, Encoder	1.97 [50.0]
AMS1C1C1 AMS1C1G1	Motor, 1 Stack, No Encoder	
AMS1C2A1 AMS1C2E1	Motor, 2 Stack, Encoder	3.03 [77.0]
AMS1C2C1 AMS1C2G1	Motor, 2 Stack, No Encoder	

Supplied cables for MC option are 16' (5m) length

3D CAD available at www.tolomatic.com
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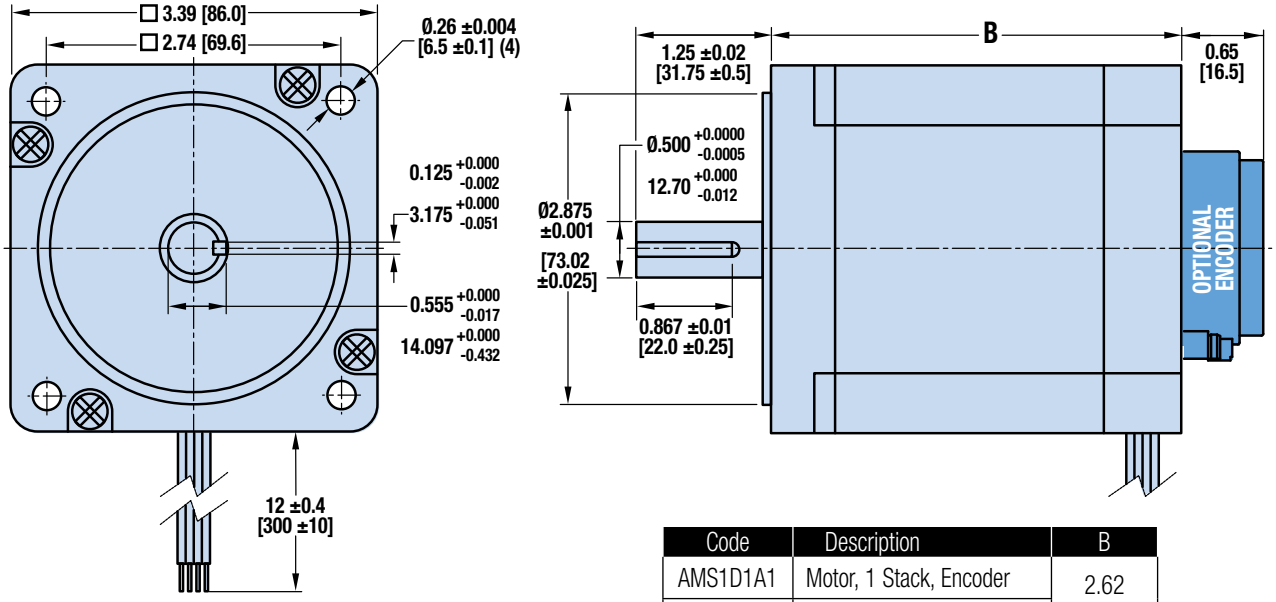
DIMENSIONS

NEMA34 DIMENSIONS



Code	Description	B
AMS1D1A1	Motor, 1 Stack, Encoder	2.62 [66.6]
AMS1D1C1	Motor, 1 Stack, No Encoder	
AMS1D2A1	Motor, 2 Stack, Encoder	3.82 [97.0]
AMS1D2C1	Motor, 2 Stack, No Encoder	

Electronic Motor Brake

SPECIFICATIONS

The electronic motor brake is available in NEMA 23 & 34 frame sizes.

It fits on 23 & 34 frame stepper and servo motors see dimensional drawings to confirm shaft size and other dimensions.

The brake is recommended for vertical or inclined applications where there can be no backdrive during power off.

When 24 VDC is connected, the brake will be deactivated and the motor can turn freely. It is recommended to use the brake only as a holding brake and not as an emergency brake.

The Electronic Motor Brake comes with a 5m cable with M8 connector.

NEMA FRAME SIZE	HOLDING TORQUE	INPUT SHAFT DIA.	OUTPUT SHAFT DIA.	CONNECTION	CURRENT @24VDC	WEIGHT (W/O CABLE)	IP RATING
	in-lbs	inch	inch			lb	
	[Nm]	*[mm]*	*[mm]*		Amp	*[kg]*	
23	13.28	0.250	0.250	M8	0.45 Amp	0.99	IP55
	[1.5]	*[6.35]*	*[6.35]*			*[0.45]*	
34	15.05	0.500	0.500	M8	0.23 Amp	3.13	IP55
	[1.7]	*[12.7]*	*[12.7]*			*[1.42]*	

Recommended torque clamping Screw 2.5 ft-lbs [3.4 Nm]

Electronic Motor Brakes are primarily sold as part of a complete assembly including actuator and motor. Tolomatic will install and test the completed actuator, Electronic Motor Brake, and motor assembly before shipping. **Call Tolomatic if you wish to install an Electronic Motor Brake on an existing actuator.**

Contact Tolomatic for other motor mounting options.

(⚠ Tolomatic assumes no responsibility that an electronic motor brake will fit or perform with your motor or actuator if sold separately.)

Electronic Motor Brake

SIZE: **ALL**

3D CAD available at www.tolomatic.com
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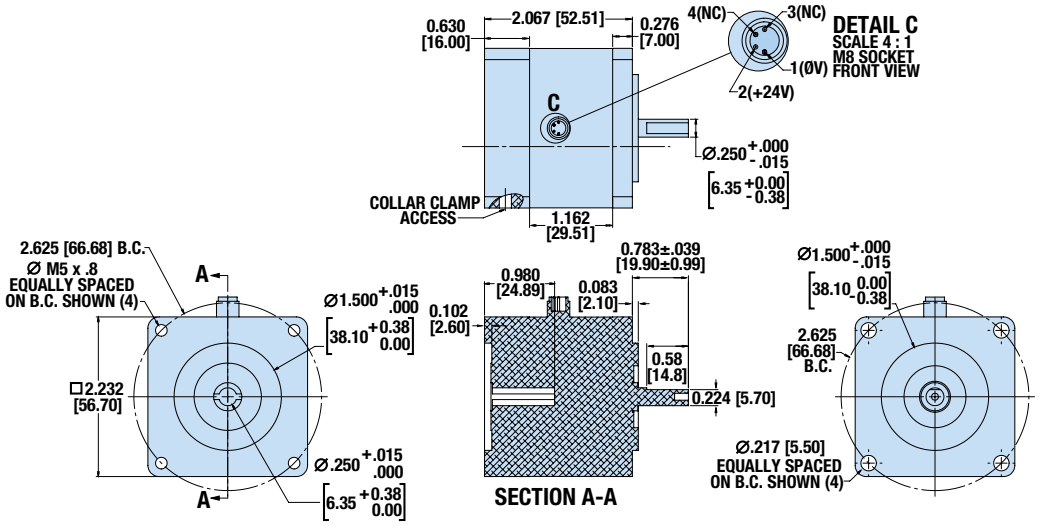
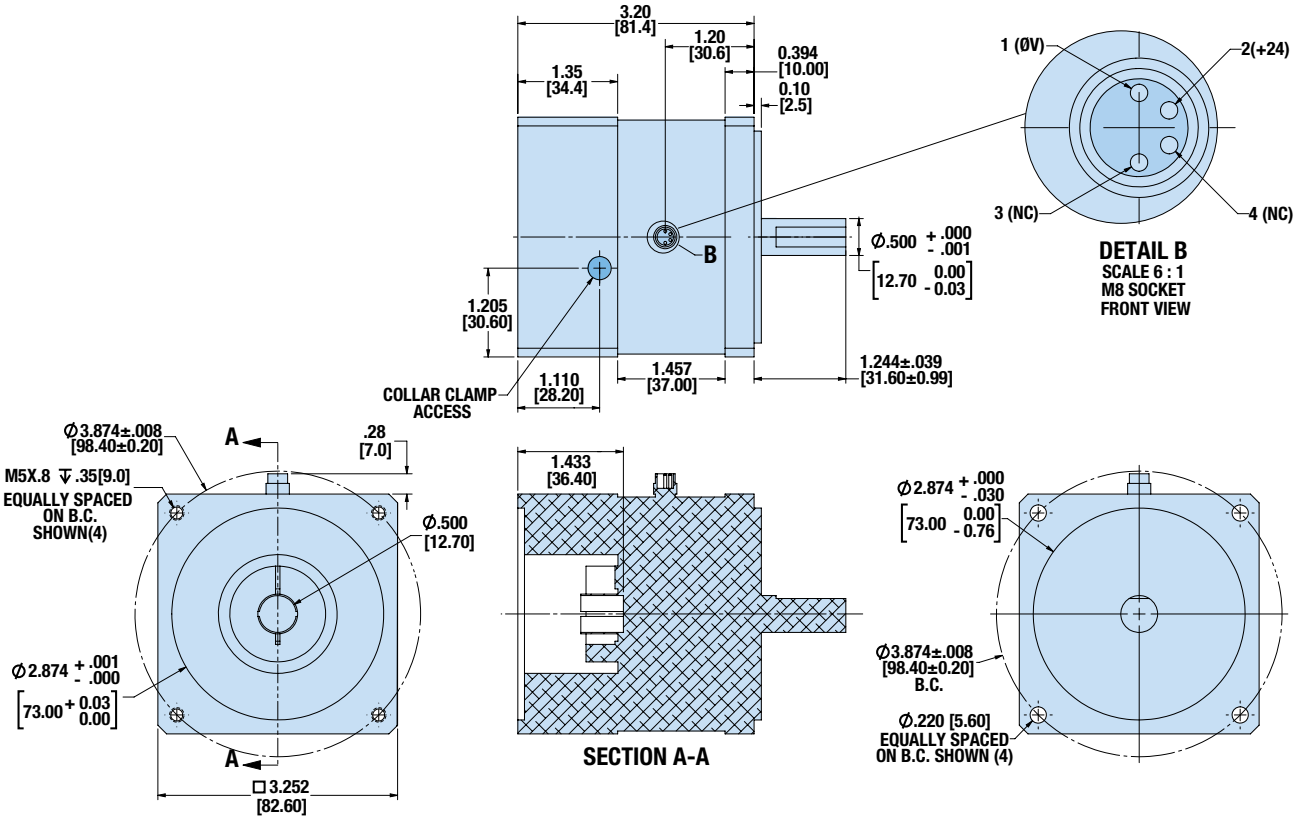
DIMENSIONS

NEMA23 DIMENSIONS



NEMA34 DIMENSIONS



ACS – Service Parts Ordering

ACS DRIVE/CONTROLLER, CABLES & MOTOR REPLACEMENT PARTS

SERVO MOTORS			
Code	Part No.	Frame Size	Description
AMV2C1A1	3604-1845	Nema 23	Motor, 1 Stack, Encoder, Winding B
AMV2C2A1	3604-1847	Nema 23	Motor, 2 Stack, Encoder, Winding B
AMV2C3A1	3604-1846	Nema 23	Motor, 2 Stack, Encoder, Winding A
AMV2D1A1	3604-1849	Nema 34	Motor, 1 Stack, Encoder, Winding B
AMV2D2A1	3604-1851	Nema 34	Motor, 2 Stack, Encoder, Winding B

Servo **Servo-NOTE: Items 1,2,4,5 & 6 from table below are recommended for complete ACS system. Order items 1,2,4,5 & 6 by part numbers**

Stepper **Stepper-NOTE: All 6 items from table below are recommended for complete ACS system. Order items 1-6 by part numbers**

Part No.	Description
2190-1304	Input Power Connector

STEPPER MOTORS			
Code	Part No.	Frame Size	Description
AMS1B1A1 AMS1B1E1	3604-1776	Nema 17	Motor, 1 Stack, Encoder
AMS1B1C1 AMS1B1G1	3604-1775	Nema 17	Motor, 1 Stack, No Encoder
AMS1C1A1 AMS1C1E1	3604-1778	Nema 23	Motor, 1 Stack, Encoder
AMS1C1C1 AMS1C1G1	3604-1777	Nema 23	Motor, 1 Stack, No Encoder
AMS1C2A1 AMS1C2E1	3604-1955	Nema 23	Motor, 2 Stack, Encoder
AMS1C2C1 AMS1C2G1	3604-1954	Nema 23	Motor, 2 Stack, No Encoder
AMS1D1A1	3604-1957	Nema 34,	Motor, 1 Stack, Encoder
AMS1D1C1	3604-1956	Nema 34,	Motor, 1 Stack, No Encoder
AMS1D2A1	3604-1962	Nema 34	Motor, 2 Stack, Encoder
AMS1D2C1	3604-1961	Nema 34	Motor, 2 Stack, No Encoder

ACCESSORIES		
	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.	3604-9665	ACS Stepper Drive/Controller
	3604-9666	ACS Stepper Drive/Controller, EtherNet/IP (Analog Output)
	3604-9667	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)
	3604-1943	Servo - Motor Power/Encoder Cable (10 m)
2.	3604-1708	Stepper - Motor Power Cable (3 m)
	3604-1709	Stepper - Motor Power Cable (5 m)
	3604-1710	Stepper - Motor Power Cable (10 m)
2.	3604-2228	34 Stepper - Motor Power Cable (3 m)
	3604-2229	34 Stepper - Motor Power Cable (5 m)
	3604-2230	34 Stepper - Motor Power Cable (10 m)

ACCESSORIES		
	Part No.	Description
3.	3604-1768	17,23 Stepper - Encoder Cable (3 meter length)
	3604-1769	17,23 Stepper - Encoder Cable (5 meter length)
	3604-1969	17,23 Stepper - Encoder Cable (10 meter length)
	3604-1971	34 Stepper - Encoder Cable (3 meter length)
	3604-1972	34 Stepper - Encoder Cable (5 meter length)
	3604-1973	34 Stepper - Encoder Cable (10 meter length)
4.	3604-1770	I/O Cable (3 meter length)
	3604-1771	I/O Cable (5 meter length)
	3604-1965	Replacement Brake Cable (3 meter length)
	3604-1949	Replacement Brake Cable (5 meter length)
	3604-1966	Replacement Brake Cable (10 meter length)
5.	3604-9526	Tolomatic Motion Interface CD
	3604-1852	Servo - USB Type B Cable
6.	2180-1163	Shunt Regulator 50W, 24-80 VDC

Ordering

sizeit.tolomatic.com for fast, accurate actuator selection

DRIVE

A C S V 2 0 4 8 U D C R 5 3

SERVO or STEPPER ORDER CODE

SV	Tolomatic ACS Servo Drive
ST	Tolomatic ACS Stepper Drive

CURRENT

10	Current (Stepper)
20	20 Amp (Servo)

VOLTAGE

48	48 / 24 Volts

DRIVE ORDER CODE

UD	Standard/Basic Drive with ModBus RTU over RS485
ED	Standard/Basic Drive with EtherNet /IP
MD	Standard/Basic Drive with Modbus TCP

CABLE(S) ORDER CODE

CR3[_]	Cable(s) of 3m Length
CR5[_]	Cable(s) of 5m Length
CR10[_]	Cable(s) of 10m Length
[1]	Motor Cable
[2]	Motor and Encoder Cables
[3]	Motor, Encoder and I/O Cables**
[4]	Motor and I/O Cables**
[5]	I/O Cables**

**I/O Cables are 3 meter length - for 5 meter I/O cable order via part number (3604-1771)

MOTOR

A M V 2 C 1 A 1

MOTOR ORDER CODE

AM	Tolomatic Motor

MOTOR TYPE

V2	Servo Motor
S1	Stepper Motor

STEPPER FRAME SIZE

B1*†	17 Frame Motor
C1†	23 Frame 1 Stack Motor
C2	23 Frame 2 Stack Motor
D1	34 Frame 1 Stack Motor
D2	34 Frame 2 Stack Motor

SERVO FRAME SIZE

C1	23 Frame Motor, 1 stack
C2	23 Frame Motor, 2 stack
C3	23 Frame Motor, 2 stack
D1	34 Frame Motor, 1 stack
D2	34 Frame Motor, 2 stack

ENCODER/BRAKE

Code	Encoder	Brake	SS2§
A	Yes	–	–
B	Yes	Yes	–
C	–	–	–
D	–	Yes	–
§E	Yes	–	Yes
§G	–	–	Yes

GEARHEAD*

Code	Gearhead	Output Frame Size	Input Frame Size
1	No reduction		
2	5:1	Equal Frame Size	
3	10:1	Equal Frame Size	
4	5:1	23	34
5	10:1	23	34
6	3:1	Equal Frame Size	
7	3:1	23	34

*NOTE: Gearheads not available for the 17 frame motors

†NOTE: MC Cable Option available for 17 & 23 frame 1 stack motors ONLY

§SS2 Applies only to (ERD10, ERD15 & ERD20) SS2 option actuators see ERD catalog 2190-4000 for complete details

The Tolomatic Difference Expect More From the Industry Leader:

INNOVATIVE PRODUCTS

Unique linear actuator solutions with Endurance Technology℠ to solve your challenging application requirements.

FAST DELIVERY

The fastest delivery of catalog products... Built-to-order with configurable stroke lengths and flexible mounting options.

ACTUATOR SIZING

Online sizing that is easy to use, accurate and always up-to-date. Find a Tolomatic electric actuator to meet your requirements.

YOUR MOTOR HERE

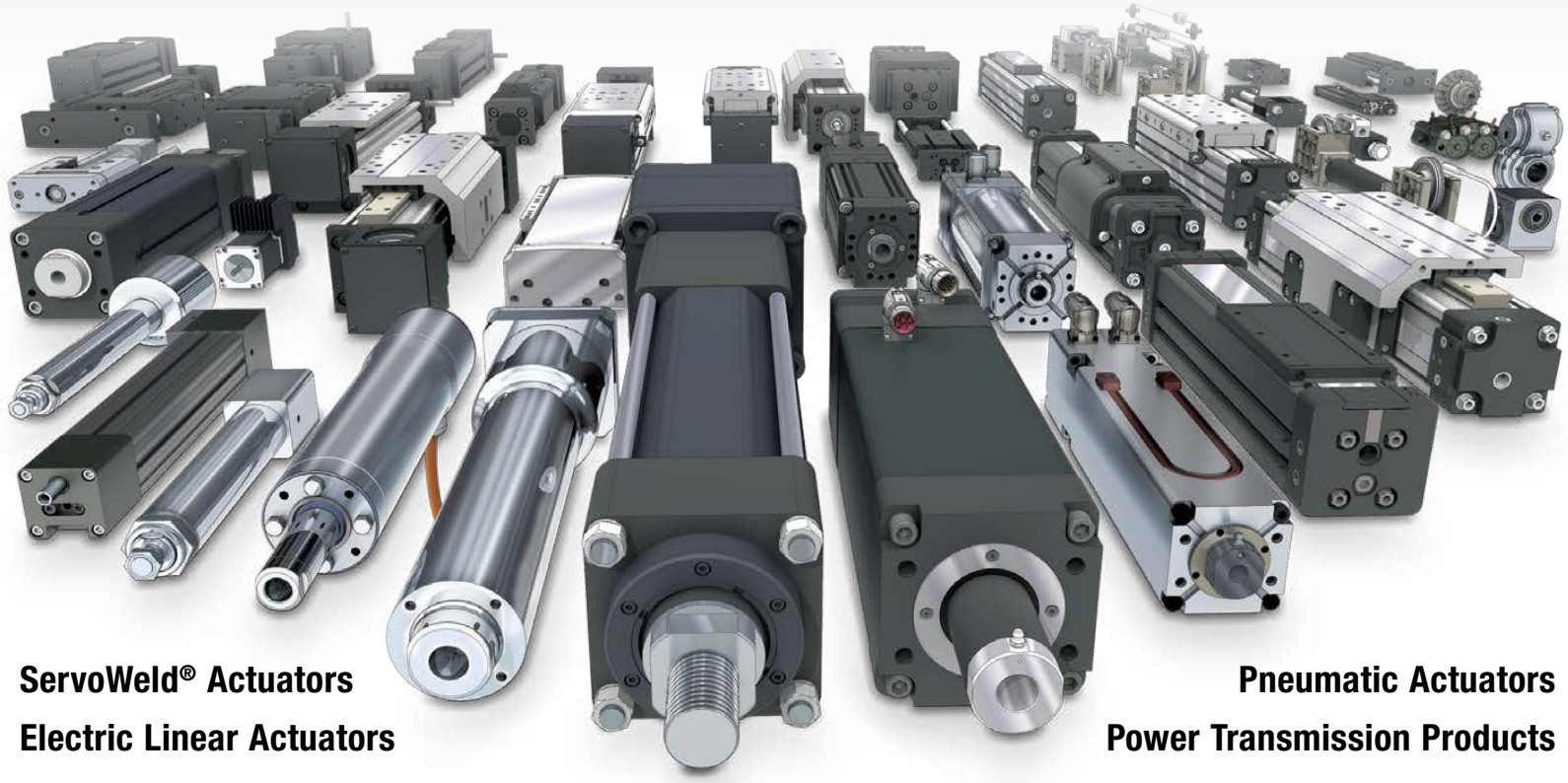
Match your motor with compatible mounting plates that ship with any Tolomatic electric actuator.

LIBRARY

Easy to access CAD files available in the most popular formats to place directly into your assembly.

TECHNICAL SUPPORT

Extensive motion control knowledge: Expect prompt, courteous replies to any application and product questions from Tolomatic's industry experts.



ServoWeld® Actuators

Electric Linear Actuators

Pneumatic Actuators

Power Transmission Products

Tolomatic™

EXCELLENCE *IN MOTION*

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