

# SERVOSTAR<sup>®</sup> S300 & S600

September 2004

[www.DanaherMotion.com](http://www.DanaherMotion.com)



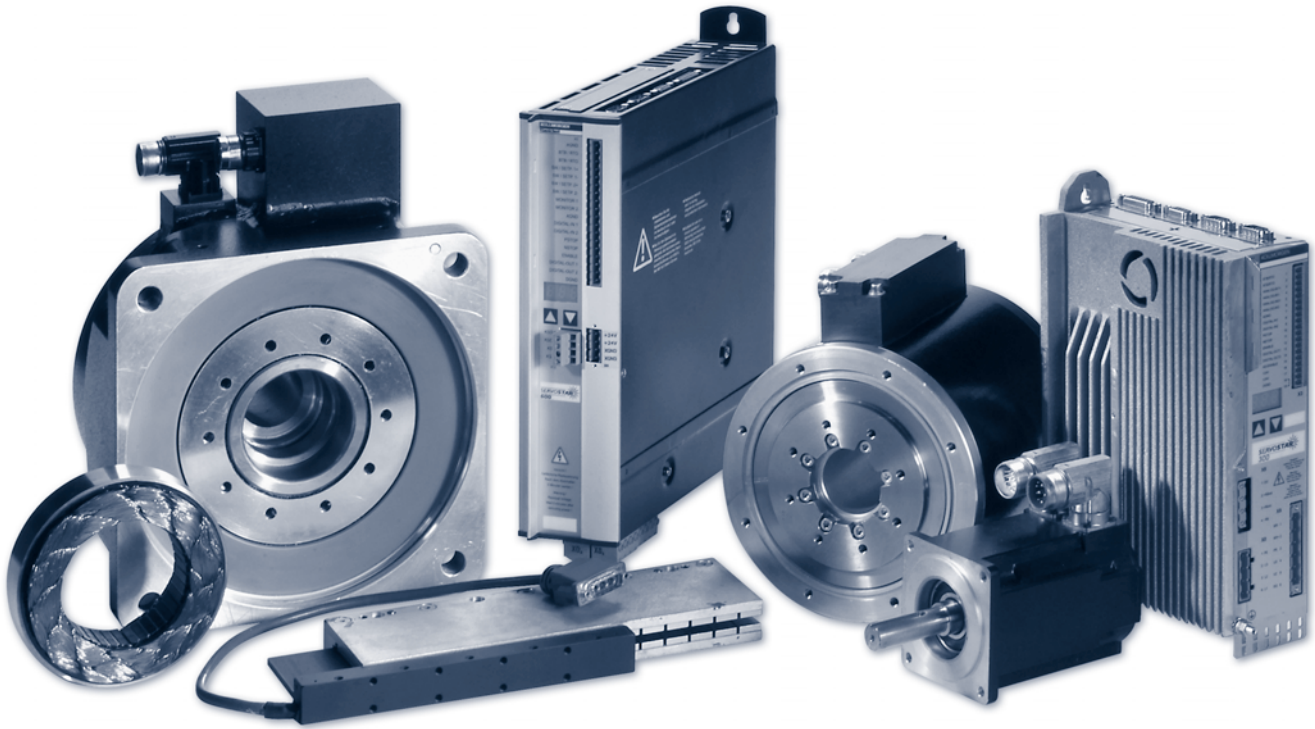
## Advanced, High Performance Servo Drives

The advanced Kollmorgen SERVOSTAR<sup>®</sup> S300 & S600 high performance servo drive series offers a broad power range for support of the extensive selection of Kollmorgen servomotors.

**KOLLMORGEN**

 **DANAHER**  
MOTION

Solutions by



## New Name, Established Brands

Danaher Motion's wide range of motion control systems and components offer customers an unprecedented choice in selecting the right solution to match their particular application requirements. Our product innovations have been improving the efficiency and productivity of complex manufacturing operations for over 60 years through trusted brand names such as Dover, Kollmorgen, Pacific Scientific, Portescap and Thomson in industries as diverse as semiconductor, aerospace and defense, mobile-off-highway, packaging, medical and robotics.

In addition, Danaher Motion, through Motion Engineering (MEI), offers powerful integrated motion control solutions with its industry-leading, multi-axis motion platforms and SynqNet™ communications network for ultra-reliable machine performance. From software and controller, through the communications network to drives and I/O devices, to mechanical and electro-mechanical products, Danaher Motion differentiates itself in the marketplace by designing standard and custom solutions to satisfy the most demanding application requirements.

Our growing family of leading motion control products and application expertise tells only half the story. With a worldwide service and support infrastructure, our field service engineers and support teams are available to assist whenever they are needed. It is part of Danaher Corporation's unrelenting focus on its customer. That's why more and more design engineers are turning to Danaher Motion to meet their motion control requirements.

## Danaher Motion Values

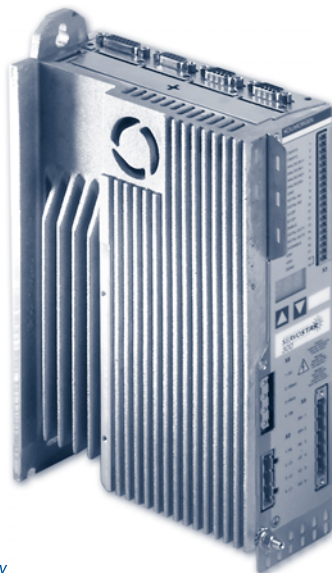
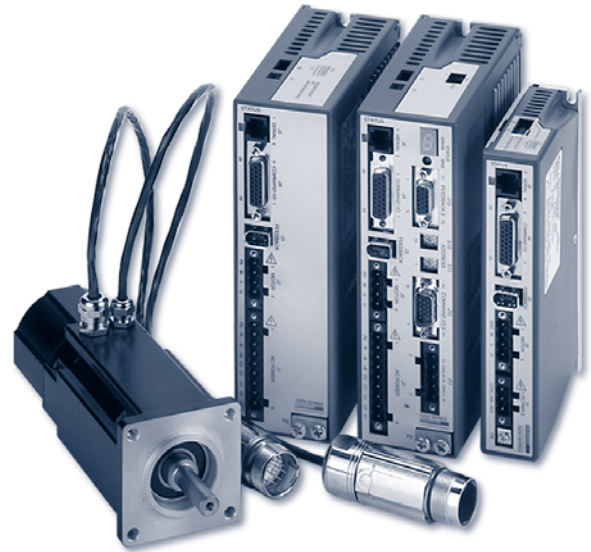
- Application Expertise
- Broad & Innovative Motion Control Products and Systems
- Customer Focus
- Customizable Products and Services
- Motion Control Pioneers with Global Staying Power
- Operational Excellence

## Continuous Improvement – It's the Danaher Way

At Danaher, we are passionate about continually improving our operations to bring increasing value to our customers. The Danaher Business System (DBS) helps us improve the efficiency of our manufacturing and product development processes. DBS is a team-based approach based on the principles of Kaizen that lets us continuously and aggressively eliminate waste in every aspect of our business operations. The DBS focuses our entire organization on achieving breakthrough results that create competitive advantage in quality, delivery and performance – advantages that we pass on to you, our customer.

Whatever your motion control requirements may be, Danaher Motion has a solution that is right for you. Our unsurpassed product selection and service means faster time to market, higher reliability and increased productivity. Let the experts at Danaher Motion put a world of motion control solutions at your fingertips.

Your World in Motion. Control It.



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The advanced Kollmorgen SERVOSTAR® S300 and S600 high performance servo drive series offers a broad power range for support of the extensive selection of Kollmorgen motors. With full support for all standard feedback device types in a single drive you get unprecedented flexibility to match your application needs. The most advanced servo drive features coupled with option cards that support leading fieldbuses, single axis controller capability and I/O expansion offer you the solution you need now and in the future.

- 115-480 VAC models
- 1.5-70 amp current ratings
- Support for standard rotary, conventional and CARTRIDGE DDR (Direct Drive Rotary) and DDL (Direct Drive Linear) motors
- Option card support for I/O expansion, single axis control, PROFIBUS, DEVICENET and SERCOS
- Built-in CANopen support
- 3 character display
- CE filters (up to 20 amp models)

## S300 & S600 servo drives offer compact size and advanced performance features:

### Compact Size

- Small footprint saves space
- Self-contained CE filters (to 20 amps)
- Full rated temperature cooling standard (no need for additional fans)
- Full size terminal blocks eliminate the need for terminal block adaptors or breakout strips

### Broad Range

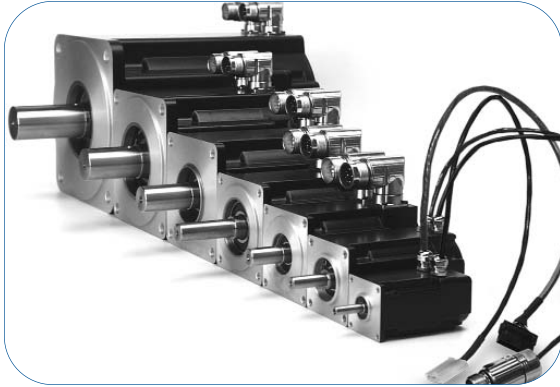
- 1.5, 3, 6, 10, 14, 20, 40 and 70 amp models
- 115/240 and 208/480 VAC input voltage models
- Standard support for resolver, sine encoder, and incremental encoder (S300 only)

### Advanced Features

- State Vector Modulation provides maximum power efficiency
- 4/16kHz update rate for velocity control algorithms
- Bode plots for advanced machine analysis
- DQ current control for maximum torque production
- Very-high voltage surge protection (>5000V)
- Velocity observer for rapid response
- Acceleration and velocity feed forward
- Full 28-bit velocity/position loop

### Easy Connectivity

- RS232 Communications standard
- Unique multi-drop configuration allows communication to multiple drives with one connection
- CANopen communications standard
- Built-in encoder equivalent output eliminates the need for an additional position feedback device
- Factory or field installable option cards can add additional I/O, DEVICENET, PROFIBUS or SERCOS communication and even provide full single axis control capability
- Analog +/- 10VDC, pulse/direction, master encoder and serial port I/O command options
- Windows™-based graphical user interface with step by step startup wizard



### AKM Series Servomotors

- Models from 0.16 to 53 N-m Continuous torque
- Speeds up to 8000 RPM
- 120, 240, 400 and 480 VAC ratings
- North American, European and Japanese mountings
- Incremental Encoder and Resolver feedback options
- Very smooth operation, low cogging
- Conservative thermal ratings



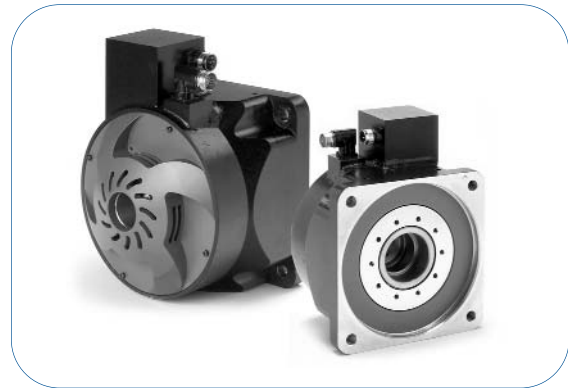
### Kollmorgen GOLDLINE® DDR (Direct Drive Rotary) Motors

- Models from 3.9 to 339 N-m Continuous torque
- Speeds up to 8000 RPM
- 120, 240, 400 and 480 VAC ratings
- Housed and frameless versions available
- Sine Encoder and Resolver feedback options
- Zero maintenance design
- Eliminates expensive mechanical gear boxes or belt systems
- Flat, compact design is extremely quiet



### Kollmorgen PLATINUM® DDL (Direct Drive Linear) Motors

- Models from 21 to 12023 N Continuous force
- Ironcore models for high force density
- Ironless models for Zero cogging, ultra-smooth motion
- Peak accelerations easily above 10g's
- High position accuracy and resolution
- Zero contact, zero maintenance, brushless design
- FM approved versions for hazardous environments
- Many available options



### Kollmorgen CARTRIDGE DDR™ (Direct Drive Rotary) Motors

- Two frame sizes, 9 inch and 13 inch
- Three stack lengths in each frame size
- Continuous torque from 50 to 504 N-m
- Peak torque from 120 to 1016 N-m
- Absolute position sine encoder with maximum resolution of 2,097,152 counts per revolution
- UL and CE agency certifications are standard
- High energy permanent magnet brushless DC configuration, utilizing a proprietary electromagnetic design, gives CARTRIDGE DDR™ motors more torque per volume than conventional DDR technology.



### Servo Control

- Easy to tune digital servo loops with automatic current and velocity tuning
- Advanced sinewave commutation technology provides smooth, precise low-speed control and high speed performance
- Velocity loop bandwidths to 400 Hz
- DQ Current control increases high speed peak torque performance for faster cycle rates
- Space Vector Modulation reduces normal power stage switching losses
- Command modes: Torque, Velocity, Position, Electronic Gearing Pulse Following, and Motion Tasking

### Easy Connectivity

- PROFIBUS-DP communication option card
- DeviceNet communication option card
- SERCOS communication option card
- CANopen communication standard on every base servo drive
- Built in encoder equivalent output can eliminate the need for an additional position feedback device
- RS232 communication with multi-drop configuration allows for a PC or PLC to communicate to multiple drives via single connection
- Analog  $\pm 10$  VDC, pulse/direction, master encoder, serial port, and I/O command options

### Robust Design

- ESD rugged circuit design and fully metallic compact enclosure for space-saving, modern appearance - minimizing electrical noise emission & susceptibility
- Full fault protection against short circuit, overvoltage, undervoltage, heatsink and motor overtemperature, overspeed, overcurrent, feedback loss, output phase to phase short, and ground short circuit
- UL , cUL listed, and CE
- Built-in line filter for CE (models up to 20 amp)
- Flash memory
- Operation range
  - Ambient 0 to 45°C (derated above ambient up to 55°C)
  - Storage -25°C to 55°C
- Humidity (non-condensing) max 85%

### Power Inputs

- S300 3 amp units 115/230V, 1 phase or 3 phase, 50 or 60 Hz
- S300 6 & 10 amp units 208-230V, 1 phase or 3 phase, 50 or 60 Hz
- S300 1,3 & 6 amp units 208-480V, 3 phase, 50 or 60 Hz
- S600 3,6,10,14,20,40 and 70 amp units 208-480V, 3 phase, 50 or 60 Hz
- Built-in line filter for CE requirements (models up to 20 amps)
- 24 Vdc @ 1 amp (3 amps with brake) for logic power

### Electrical Characteristics

- Closed loop velocity bandwidth up to 400 Hz
- Motor current ripple frequency 16 kHz
- Switching frequency 8 kHz
- Long term speed regulation (0.01%)
- Position loop update rate 250  $\mu$ s (4 kHz)
- Velocity loop update rate 62.5  $\mu$ s (16 kHz)
- Commutation update rate 62.5  $\mu$ s (16 kHz)
- SVM current loop update rate 62.5  $\mu$ s (16 kHz)

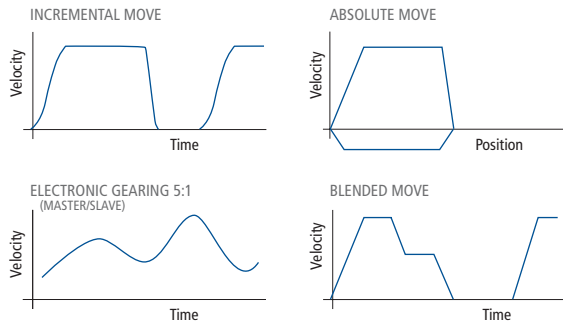
### Velocity Loop Compensation

- PI Plus controller (PDFF Format) or PI Controller
- Field tunable and digital repeatability
- Automatic velocity loop tuning available

### Position Loop Compensation

- Proportional loop with Feed Forward

## Motion Examples



## Application Examples

- Material handling
- Bottle making
- Packaging
- Soft positioning
- Robot
- Conveyor belt controlling
- Fast positioning
- Special cleaning process
- Part selection
- Glass processing
- Wirepuller
- Textile industry
- Printing
- Electronics
- Web converting
- Cut to length

## Windows Start-up Environment

- Graphical environment simplifies set up
- PC "Oscilloscope" for measuring real-time motion performance
- On-board Dynamic Signal Analyzer (DSA) generates Bode plots to improve servo tuning.

## Configurable I/O

- 2 configurable analog inputs: +/-10 V, 12 and 14 bit resolution
- 2 configurable analog outputs +/-10 V, 10 bit resolution (S600 only)
- 4 configurable digital inputs, 24 Vdc, PLC compatible
- 2 configurable digital outputs, 24 Vdc (open collector)
- Remote enable input, 24 Vdc, PLC compatible
- Drive Status Relay (BTB/RTO) contact, 24 Vdc, .5 amps

## I/O Option Card (Field installable)

- 14 predefined digital inputs, 24 Vdc, PLC compatible
- 8 predefined digital outputs, 24 Vdc, PLC compatible
- Simple plug in to top face of drive

## Motor Brake Control

- 24 Vdc optional holding brake can be controlled directly by the servo drive

## Regenerative Power Sharing

- Patented circuitry allows the DC bus from two or more drives to be connected together allowing regen power to be shared among multiple drives internally or externally using resistors

## Optional Built-in Safety Relay (AS-option)

- Switches off the power stage to ensure personnel safety and prevents an unintended restart of the drive, even in fault condition
- Allows DC bus to remain on during power stage shut down

## Position Feedback (Encoder Equivalent Output)

- Configurable encoder equivalent (ROD): A quad B with marker (zero) pulse, RS485 driver
- Configurable SSI (serial synchronous interface); max clock frequency is 1.5 MHz, RS485 driver
- Programmable resolution

## Motion Capabilities

The S300 & S600 can be configured to perform motion control that normally requires a fully programmable drive with a motion language. With the S300 and S600 there is no programming language to learn; the user only "fills in the blanks" to create common motion tasks

- Fully graphical programming environment
- Make decisions in real time
- Set and change parameters in real time
- Up to 256 total motion tasks (180 in ROM and 76 in RAM)
- More than 16 types of homing available
- Speed profile/registration control
- Adjustable S-curve acceleration
- Absolute and relative (index) moves
- Adjustable following-error window
- Adjustable window for the "In Position" signal
- Ability to link motion tasks (sequencing)

## Linked motion tasks are started:

- Immediately upon reaching a targeted position
- From a digital input upon reaching the targeted position
- At preset time delay after the targeted position is reached

## Gearing or Master/Slave Input

- Pulse command: pulse/direction or quadrature encoder format
- RS485 receivers
- Up to 16 slave servo drives can be connected
- Input ratio is configurable

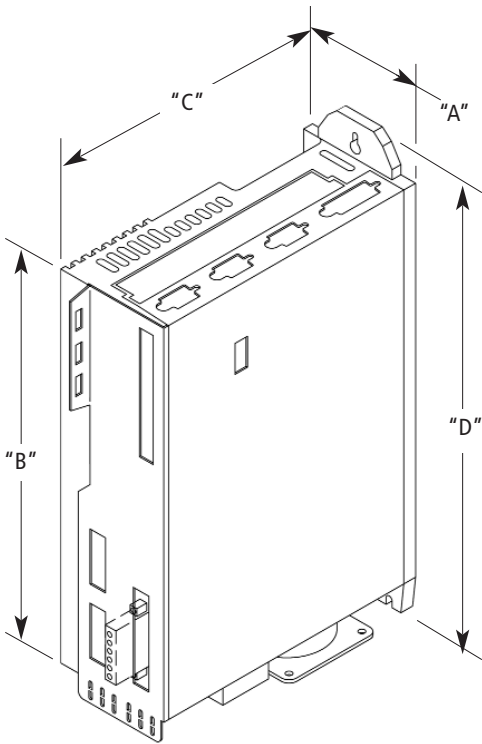
## S300 Drive Ratings

Model	S30361	S30661	S31061	S30101	S30301	S30601
Output Continuous Current Per Phase (RMS/phase)	3	6	10	1.5	3	6
Output Peak Current Per Phase	9 (2 sec)	15 (3 sec)	20 (5 sec)	4.5 (2 sec)	7.5 (3 sec)	12 (5 sec)
Rated Input Power (KVA) @ 120 VAC	.5	N/A	N/A	N/A	N/A	N/A
Rated Input Power (KVA) @ 240 VAC	1	2	3.5	.5	1	1.7
Rated Input Power (KVA) @ 480 VAC	N/A	N/A	N/A	1	2	3.5
Internal Power Dissipation Watts	35	60	90	40	60	90
AC Input Line Voltage	115-230 VAC 1 or 3 phase	208-230 VAC 1 or 3 phase	208-230 VAC 3 phase	208-480 VAC 3 phase	208-480 VAC 3 phase	208-480 VAC 3 phase
Continuous Regen Power						
Internal Watts	20	50	50	20	50	50
External Watts	250	250	250...750	400...1500	400...1500	400...1500

## S600 Drive Ratings

Model	S603	S606	S610	S610-30	S614	S620	S640	S670
Output Continuous Current Per Phase (RMS/phase)	3	6	10	10	14	20	40	70
Output Peak Current Per Phase (5 sec)	6	12	20	30	28	40	80	140
Rated Input Power (KVA) @ 480 VAC	2.3	4.6	8.1	16.6	11.6	16.6	30	50
Internal Power Dissipation Watts	40	60	90	90	160	200	400	700
AC Input Line Voltage (3 phase)	208-480 VAC	208-480 VAC	208-480 VAC	208-480 VAC	208-480 VAC	208-480 VAC	208-480 VAC	208-480 VAC
Continuous Regen Power								
Internal Watts	80	200	200	200	200	200	N/A	N/A
External Watts	500	1500	1500	1500	1500	1500	6000	6000



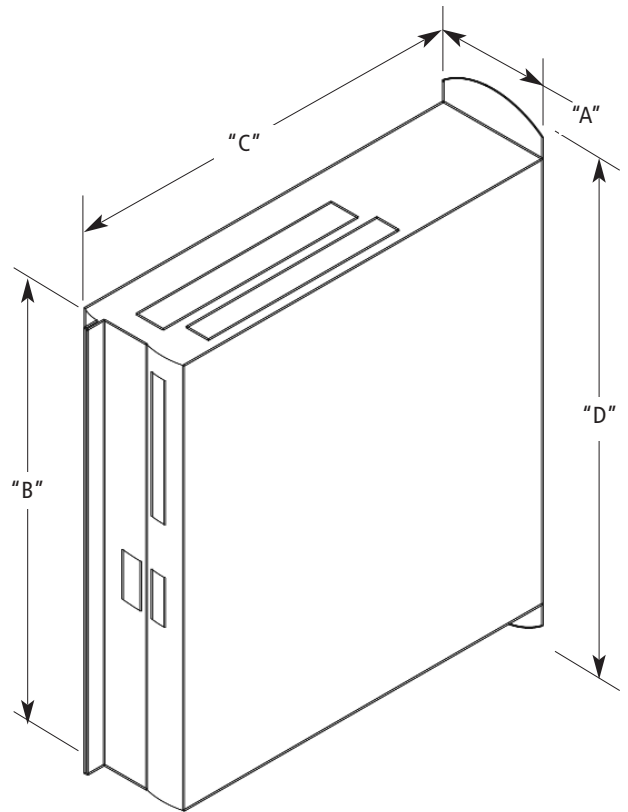


**S300 Series Servo Drives**

S300 Model	Size (amp)	Dim "A"	Dim "B"	Dim "C"		Dim "D"
				No Conn.	With Conn	
S30101	1.5	70 (2.8)	246 (9.6)	171 (6.7)	235 (9.2)	270 (10.6)
S30301	3	70 (2.8)	246 (9.6)	171 (6.7)	235 (9.2)	279 (11.0)
S30601	6	70 (2.8)	246 (9.6)	171 (6.7)	235 (9.2)	279 (11.0)
S30361	3	70 (2.8)	246 (9.6)	171 (6.7)	200 (7.9)	270 (10.6)
S30661	6	70 (2.8)	246 (9.6)	171 (6.7)	200 (7.9)	279 (11.0)
S31061	10	70 (2.8)	246 (9.6)	171 (6.7)	200 (7.9)	279 (11.0)

**S600 Series Servo Drives**

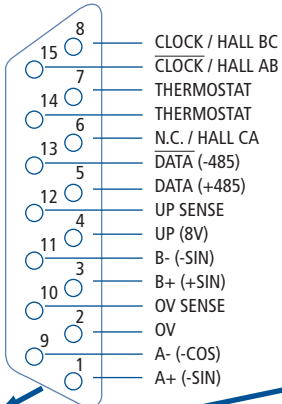
S600 Model	Size (amp)	Dim "A"	Dim "B"	Dim "C"		Dim "D"
				No Conn.	With Conn	
S603	3	70 (2.8)	275 (10.8)	265 (10.4)	273 (10.7)	325 (12.8)
S606	6	70 (2.8)	275 (10.8)	265 (10.4)	273 (10.7)	325 (12.8)
S610	10	70 (2.8)	275 (10.8)	265 (10.4)	273 (10.7)	325 (12.8)
S610-30	10	70 (2.8)	275 (10.8)	265 (10.4)	273 (10.7)	325 (12.8)
S614	14	100 (3.9)	275 (10.8)	265 (10.4)	273 (10.7)	325 (12.8)
S620	20	120 (4.7)	275 (10.8)	265 (10.4)	273 (10.7)	325 (12.8)
S640	40	250 (9.8)	495 (19.5)	300 (11.8)	325 (12.8)	375 (14.8)
S670	70	250 (9.8)	495 (19.5)	300 (11.8)	325 (12.8)	375 (14.8)



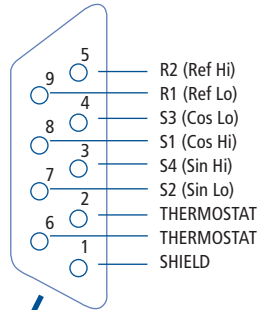
Note: S30101 and S30361 drives do not require a cooling fan.

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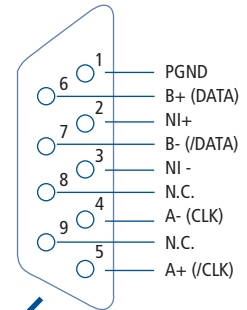
**X1 Encoder COMCODER**



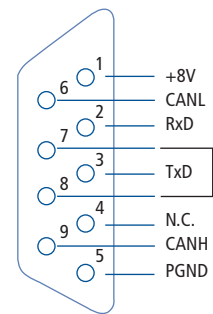
**X2 RESOLVER**



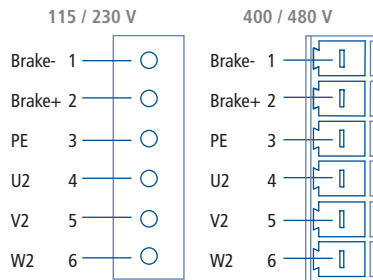
**X5 Encoder Equivalent Output**



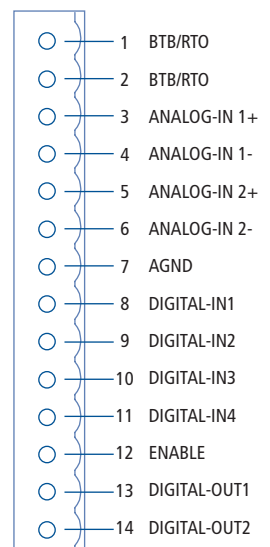
**X6 PC/CAN**



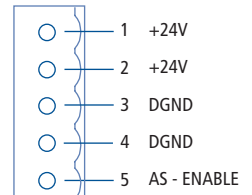
**X9 MOTOR/BRAKE**



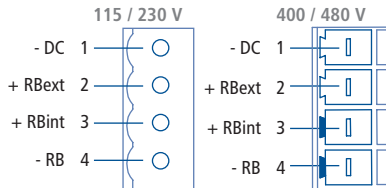
**X3 I/O**



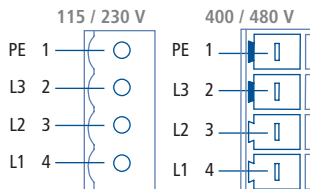
**X4 24 V**



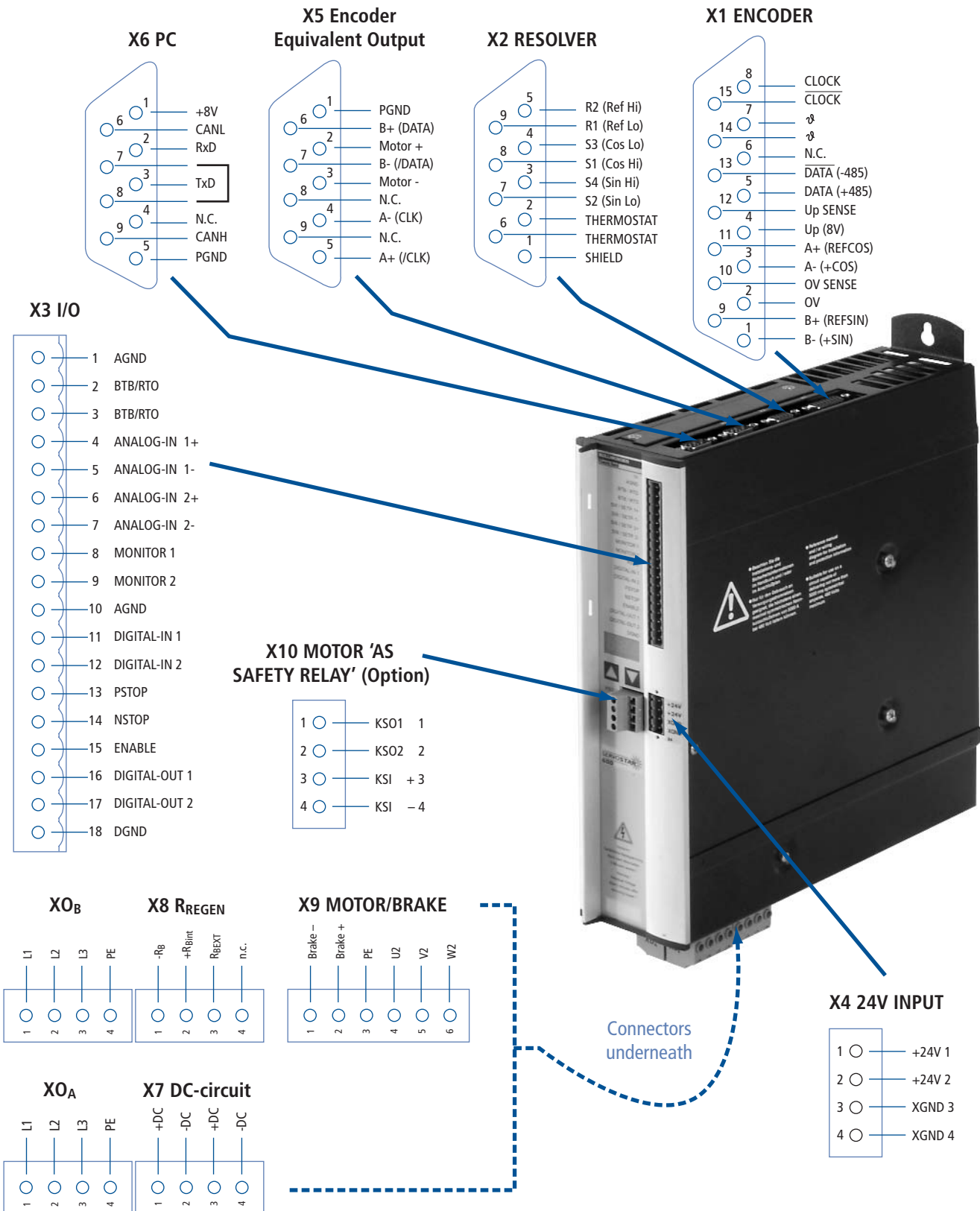
**X8 DC-BUS**



**X0 MAINS**

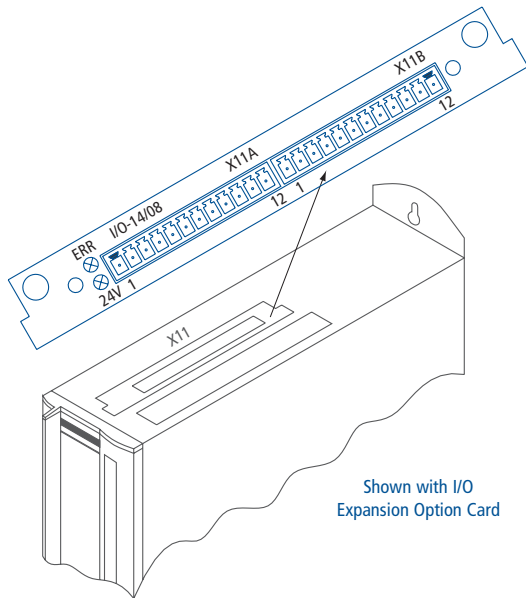


CODING KEYS



\* NOTE: Shows S603 to S620 drive connections. S640 & S670 have different motor and power connections and connector locations. (See manual for detail)

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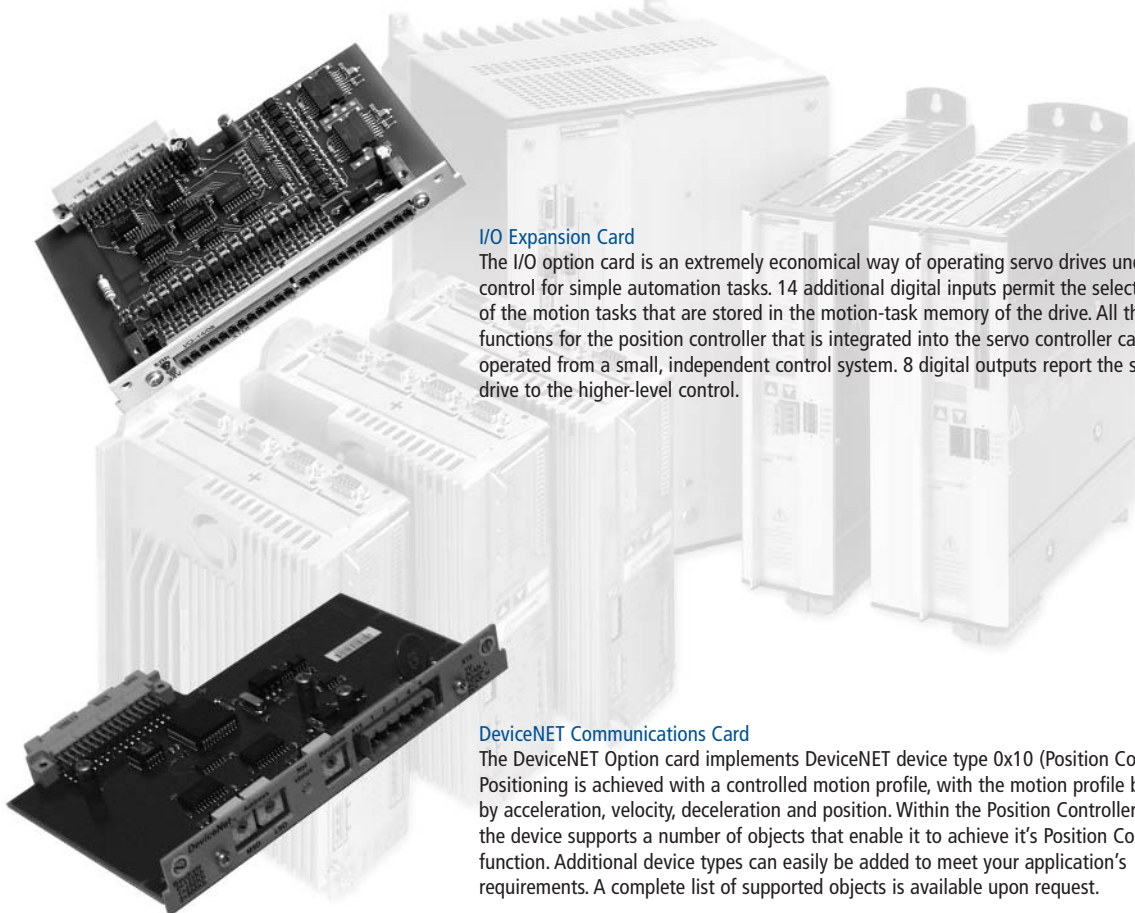


Shown with I/O  
Expansion Option Card

#### Option Card Overview

Increase the capability of your S300 and S600 servo drives with factory or field-installable option cards. Each card adds specific functionality from additional I/O to digital fieldbus communications to a fully programmable single-axis controller.

## Available Option Cards for S300 & S600 Drives



#### I/O Expansion Card

The I/O option card is an extremely economical way of operating servo drives under position control for simple automation tasks. 14 additional digital inputs permit the selection and start of the motion tasks that are stored in the motion-task memory of the drive. All the important functions for the position controller that is integrated into the servo controller can thus be operated from a small, independent control system. 8 digital outputs report the status of the drive to the higher-level control.

#### DeviceNET Communications Card

The DeviceNET Option card implements DeviceNET device type 0x10 (Position Controller). Positioning is achieved with a controlled motion profile, with the motion profile being defined by acceleration, velocity, deceleration and position. Within the Position Controller device type, the device supports a number of objects that enable it to achieve its Position Controller function. Additional device types can easily be added to meet your application's requirements. A complete list of supported objects is available upon request.



#### SERCOS Communications Card

The SERCOS Option Card provides an S300 or S600 servo drive with the ability to function as a SERCOS slave device in a SERCOS multi-axis motion control system. The option card has SERCOS fiber optic transmitter and receiver assemblies plus indicating LED's for receiving, transmitting and errors. Increase the capability of your S300 and S600 servo drives with factory or field-installable option cards. Each card adds specific functionality from additional I/O to digital fieldbus communications. The SAC option card turns the drive into a fully programmable single-axis controller.



#### PROFIBUS Communications Card

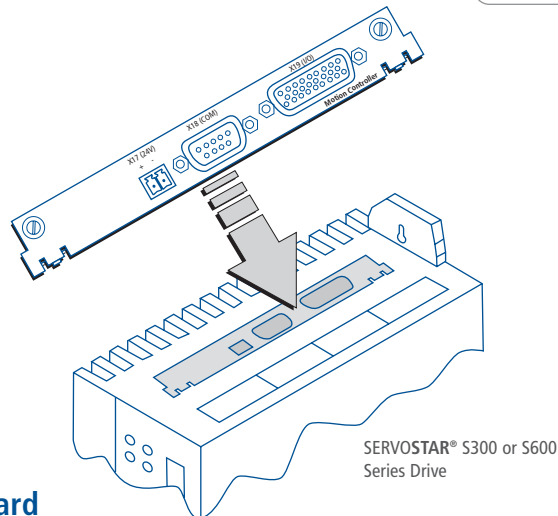
The S300 and S600 servo drives are capable of PROFIBUS communication with the addition of an optional PROFIBUS expansion card. Configured this way, the drive operates as a PROFIBUS DP slave with communication rates of up to 12 Mbits per second. One or more slaves may be controlled on a network by a PROFIBUS DP master.



#### SAC Single Axis Controller Card

The SAC Option Card converts a standard S300 or S600 servo drive into a fully programmable Single Axis Controller:

- 10 additional inputs, 5 additional outputs
- I/O is 24V optically isolated
- Electronic Gearing, Cams, PLS
- RS232/RS485 Half and Full Duplex
- MODBUS RTU
- Additional Serial Port
- One Development Environment for servo drive and control setup, and for building and debugging applications
- 30Kb non-volatile RAM
- Flash Disk for user programs
- Multi-Tasking, BASIC Language



## SAC Card Specifications Summary

### Motion

- Jog, incremental/absolute moves, non-zero final velocity, advanced stop/proceed
- Profile – Sine or Trapezoidal acceleration, automatic or manual jerk control
- Operating Modes:
  - Position – digital
  - Velocity – digital, analog
  - Torque – digital, analog
  - Master/Slave – gear, cam
  - PLS (Programmable limit switches)
  - Motion blending

### Input Power

- 12-28 VDC
- Draws 150 mA @ 24 V
- Must be installed in drive to operate

### Features – Benefits

Broad motion and program control feature set	<ul style="list-style-type: none"> <li>• Can replace simple machine control</li> <li>• High Performance distributed systems</li> </ul>
Modbus support	<ul style="list-style-type: none"> <li>• Interface to major HMIs &amp; automation controllers</li> <li>• Expand I/O using Modbus</li> </ul>
Part of the S300 & S600 family ... Scalable platform	<ul style="list-style-type: none"> <li>• One platform to learn &amp; document</li> <li>• Works with all Danaher Motion motors</li> </ul>
Extensive set of SW Tools	<ul style="list-style-type: none"> <li>• Easier to configure, program and troubleshoot</li> </ul>
Pluggable Option Card	<ul style="list-style-type: none"> <li>• Easily installed or replaced</li> </ul>
Integrated System	<ul style="list-style-type: none"> <li>• One SW Tool and documentation system for control &amp; drive</li> </ul>

### Faster Time To Market ... Higher Machine Value

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### Ordering Information

- Field installable: OPT-MN
- Installed in S300 or S600: Add "-MN" suffix to drive part number

**Terminal Block Adapter:** 768-026902-01

**Serial Cable with flat connector:** 928441  
(use when Terminal Block Adapter is installed)

### Communication & I/O

- Serial Port – (2) RS232/RS485
  - SAC Port - Configurable 9.6KB-115.2KB - Modbus RTU
  - Drive Port Supports RS232
- SAC - 10 In / 5 Out; 24 V Optically Isolated
- Drive - 4 In / 2 Out; 24 V Optically Isolated
- Drive Analog - S300 2 In; S600 2 In / 2 out

### Drive Ratings (Continuous RMS)

- 3A - 70A 230V
- 1.5A - 70A 400-480V

### Memory

- Flash memory –user programs and data – 0.5Mbytes
- RAM – execution environment – 16Mbytes SDRAM
- NVRAM – rapid storage of user data – 30Kbytes

## Control Software (BASIC Moves Development Studio)

**BASIC Moves Development Studio is a powerful, yet easy-to-use development environment. It has all the normal Windows™ attributes including desktop, tool bar, file management, etc.**

**BMD5 provides an environment that manages the whole development life cycle.**

### Start-up and Configuration

The System Configuration Tool provides a fill-in-the-blank process which sets the values and parameters that characterize the machine, including motor, feedback, units of measure, I/O and limits on velocities, acceleration, etc.

### Programming

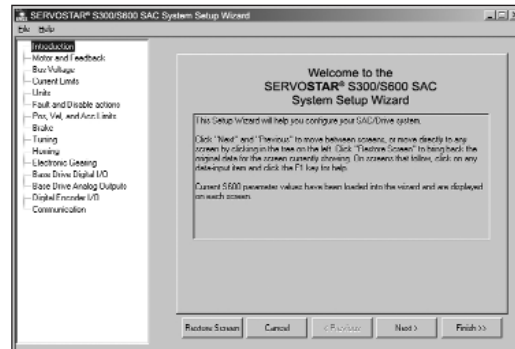
True Basic programming with motion extensions make this system easy to become competent with in a short period of time.

### Program Development & Management

Extensive utilities allow the management of multiple programs and use of time saving functions such as Libraries. Global Libraries allow functions or subroutines to be loaded at power up and accessed from any terminal window or program.

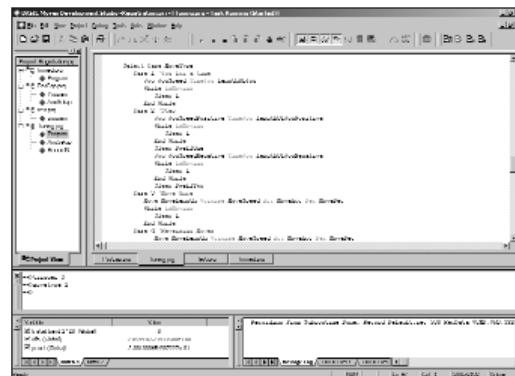
### Real Time User Interface

Program, Terminal, Watch and Message windows provide real time views and communication interfaces with the control. Record and Tuning are easy-to-use, graphic tools that deliver system viewing and optimization capabilities normally found in expensive 3<sup>rd</sup> party diagnostic products.



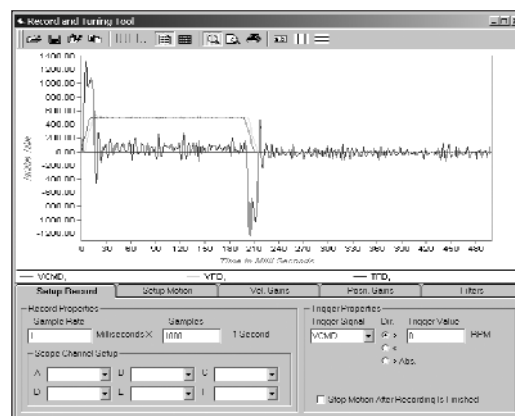
### System Setup Wizard

A step-by-step, fill-in-the-blank approach to set up the drive and control.



### Basic Moves Desktop

This view shows Project and Program windows at the top, below that a Terminal window for immediate commands, and the Watch and Message Log windows at the bottom. Programming is Basic with motion control extensions. The Terminal, Watch and Message windows are examples of the information and command capabilities in Basic Moves that allow you to reduce setup time and optimize the machine performance.



### Record & Tuning Tool

Basic system setup and tuning is done with a simple setup wizard. But when the application needs interaction with the servo control to achieve the highest performance, or overcome problems with the machine or process, we provide an advanced system with simple fill-in-the-blanks and superb graphic functionality. Among other features, the tool has a derivative function which can automatically display acceleration and jerk based on monitored velocity.

**BASIC Operators**

Bit-Wise Logical Operators .....	Band, Bor, Bnot, Bxor
Comparison operators .....	>, >= <=, <>, =
Logical Operators .....	And, Or, Xor, Not
Math Operators: .....	^, *, /, +, -

**Math (Double Precision Functions)**

Math functions .....	Abs, Exp, Int, Log, Mod, Round, Sgn, Shl, Shr, Sqrt
Trigonometric functions .....	Acos, Asin, Atan2, Atn, Cos, Sin, Tan

**String Manipulation**

Conversion functions .....	Chr\$, Str\$
Formatting functions .....	Space\$, String\$, LCase\$, UCase\$
Numeric to string conversion .....	Bin\$, Hex\$, Val
Sub-string manipulation .....	RTrim\$, LTrim\$, Asc, Instr, Left\$, Right\$, Mid\$, Len

**Program Structure and Flow Control**

Conditional statements .....	If ... Then ... Else, Select Case ... End Select
Loops .....	Do ... Loop, For ... Next, While ... End While
Program structure delimiters .....	Program ... End Program, Function ... End Function, Sub ... End Sub
Subroutines and libraries commands .....	Import, Call
Unconditional code branch .....	Goto

**Printing and Data Transfer**

Data transfer between tasks .....	Prompt, SendData
Formatted/unformatted print .....	Print, ?, PrintUsing, System.PrintMode, System.DoubleFormat,
Serial port print .....	Print #, PrintUsing #, PrintToBuff #, PrintUsingToBuff #
Serial port read .....	Input\$, Loc

**Task Control**

Application's main file .....	System.AutoStartTask
Load/Unload a task to/from RAM .....	Load, Unload
Task (Program) execution control .....	StartTask, KillTask, IdleTask, ContinueTask, StopTaskCycle, Pause, PauseTask, UnBreakable
User tasks' information .....	<Task>.State, <Task>.Status, TaskList

**Debugging**

Control task execution .....	StepIn, StepOut, StepOver
Manipulate breakpoints .....	AddBreakPoint, BreakPointList, ClearBreakPoint
Strings to control task execution .....	StepIn\$, StepOut\$, StepOver\$

**Recording and Listings**

List variables by types .....	VarList, CamList, EventList, PLSList
Real time recorder commands .....	Record, RecordOn, RecordOff, RecordClose, Recording
Strings to control task execution .....	StepIn\$, StepOut\$, StepOver\$

**Data Types**

32-bit integer .....	Long
ASCII string .....	String
Double-precision float .....	Double
Global variable declaration .....	Common Shared <var> As Long   Double   String   Note   Error   Cam   Pls   Semaphore
Local variable declaration .....	Dim <var> As Long   Double   String
Task variable declaration .....	Dim Shared <var> As Long   Double   String   Note   Error



## Error Handling

Asserting and logging errors.....	Logger <error name>,Throw
Error information .....	<Error>.Msg, <Error>.Num, <Task>.ErrorNumber, <Task>.Error, ErrorHistory, ErrorHistoryClear, System.Error, System.ErrorNumber,Task.Error\$
User error handlers.....	Try, OnError, OnSystemError

## System

Application resetting.....	Reset Tasks/All
Application variables management.....	DeleteVar , DeleteSem,ArraySize, Save
Application WatchDog mechanism .....	WdCycle,WdDelete ,WdInit
Delay task execution.....	Sleep
Event handler management .....	OnEvent, EventOn, EventOff, EventList, EventDelete
File management .....	Delete, Dir, Retrieve, Send
Filtering system messages.....	System.ErrorPrintLevel, System.MotionAssistance, System.ServicePrintlevel
NVRAM management commands.....	NvramFormat, LnvrasmSize,DnvrasmSize, Lnvrasm[X], Dnvrasm[X]
Onboard digital I/O control .....	System.Din, System.Dout
Semaphores handling .....	SemaphoreGive, SemaphoreTake
Serial Port Manager.....	Open, Close
System information .....	System.Clock, System.Information,Ver, MaxMemBlock,
Virtual entry station .....	VesExecute ,VesMessage

## Motion Commands and Properties

Axis configuration.....	Direction, DirectionExternal, Displacement,Absolute
Axis Simulation.....	Simulated
Blending command and monitoring.....	CP, DoubleMode
Enable property .....	Enable
Motion commands .....	Move, Jog, DigitalTorque, Stop, Proceed, Delay
Movement settling configuration.....	TimeSettle,TimeSettleMax, PESettle
Movement status flags.....	IsMoving, IsSettled, HomeStatus
Operational mode command.....	OpMode
Physical units factorization .....	AccelerationFactor, JerkFactor, PositionExternalFactor, PositionFactor,VelocityFactor,VelocityExternalFactor
Position monitoring properties .....	PositionCommand PositionFeedback, PositionExt, PositionError, Positionfinal, PositiontoGo
Rollover properties .....	PositionRollover, PositionRolloverEnable, PositionRolloverMin,Wrap
Task-axis exclusion commands.....	Attach, Detach,AttachedTo
Torque command parameters .....	AnalogTorqueScale,TimeToTorque,TimeTorque
Torque monitoring properties.....	TorqueCommand ,TorqueFeedback
Trajectory limit parameters .....	AccelerationMax, DecelerationMax,VelocityMax ,JerkMax, PositionMax, PositionMin, PositionMaxEnable, PositionMinEnable, PositionErrorSettle, PostionErrorMax,VelocityOverspeed,VelocityCruise,VelocityFinal
Trajectory physical override parameters .....	AccelerationRate, DecelerationRate,VelocityRate ,JerkRate,VelocityOverride
Trajectory physical parameters .....	Acceleration, Deceleration, Jerk, TimeAcceleration,TimeDeceleration, SmoothFactor,TimeJog
Trajectory stop and recovery definition commands.....	StartType, StopType, ProceedType, RescueMode
Velocity monitoring properties.....	VelocityCommand,VelocityFeedback,VelocityExternal,VelocityJog

## Gearing and Camming

Cam table handling commands .....	ActiveCam, CreateCamData, StoreCamData, DeleteCAM, LoadCamData, CheckCamMonotonic, FirstCam, FirstCam.Name, CamList, <Cam>Cycle, <Cam>Next, <Cam>Next.Name, <Cam>InUse, <Cam>IsMonotonic, <Cam>MasterData, <Cam>SlaveData, <Cam>Previous, <Cam>Previous.Name, CamOffset, CamCycle, Camindex, CamOffset, CamValue
Master-slave settings .....	GearRatio, MasterSource, Slave, SlaveLag, MasterSync

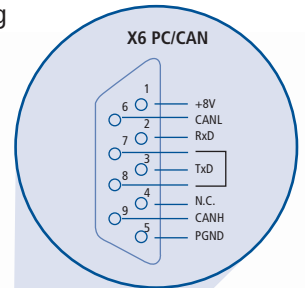
## Programmable Limit Switch ( PLS )

PLS handling commands.....	PLSEnable, PLSHysteresis, PLSOutput, PLSPolarity, PLSPosition , PLSRepeat, DeletePLS, PLSList, PLSsource
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All S300 & S600 servo drives support the CANopen protocol for communications as a standard feature, no option card or additional software is needed. A CANopen host (master) can communicate to one drive or as many 127 at rates up to 1Mbit/s with very low latency. CANopen is an open standard industrial networking protocol which includes motion control, I/O modules and many other devices.

The CANopen connector is an easily accessed, standard nine pin D shell connector



## Basic Features implemented through CANopen

When working with the position controller that is integrated in the S300/600 drives, the following functions are available.

### S300 & S600 setup and general functions:

- Homing, set reference point
- Jogging, with a variable speed
- Provision of a digital setpoint for speed and torque control

### Positioning functions

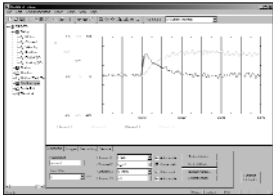
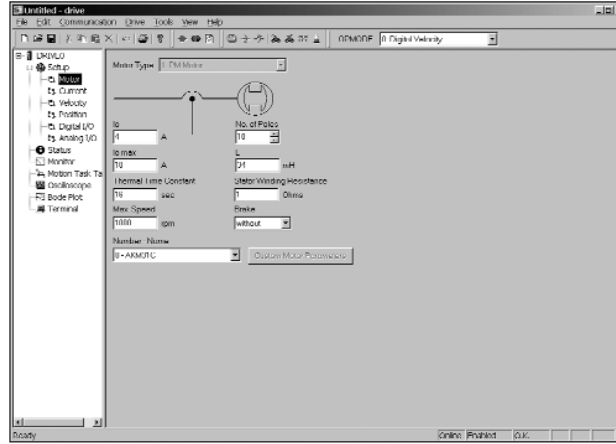
- Execution of a motion task from the motion block memory of the drive
- Execution of direct motion task
- Absolute trajectory

### Data transfer functions

Transmit a motion task to the motion block memory of the servo amplifier. A motion task consists of the following elements:

- Position setpoint (absolute task) or path setpoint (relative task)
- Speed setpoint
- Acceleration time, braking time, rate-of-change/jolt limiting (in preparation)
- Type of motion task (absolute/relative)
- Number of a following task (with or without pause)
- Read a motion task from the motion block memory of the drive
- Read actual values
- Read the error register
- Read the status register
- Read/write control parameters

MOTIONLINK® for Windows takes the fear out of setting up a servo system. Designed for the novice as well as the advanced user, MOTIONLINK lets users quickly set-up and fine tune system performance.



#### PC Oscilloscope:

For closely evaluating system performance MOTIONLINK includes the functionality of an oscilloscope. You can very easily excite the load then review performance graphically on your computer screen.

#### Direct Terminal Mode:

This mode turns your computer into a "dumb terminal." Variables or parameters can be monitored and changed using the S300 & S600's command language. This mode is ideal for advanced users who want to get directly in the "heart" of the drive.

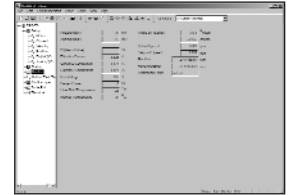


#### Tuning:

Velocity and position loop tuning is straight forward, allowing the novice user to achieve the best machine performance.

#### Monitor Mode:

Allows you to monitor key operation variables. Speed, torque, and other variables can be viewed in real PSEUDO time in linear gauge format.

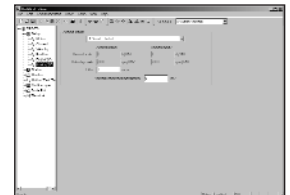


#### Auto Set-up:

MOTIONLINK auto set-up environment walks even the first time user through line voltage, motor, operation mode and load tuning to make system configuration friendly and fast.

#### Configuring I/O:

Inputs & Outputs are configurable to a wide variety of functions to configure the S300 & S600 to individual machine needs.



#### MOTIONLINK has many other features including:

- Saving drive configuration to disk
- Activating position limits
- Displaying amplifier status
- Setting acceleration amps
- Limiting max speed or torque

## SERVOSTAR® S600 Graphical Motion Tasking

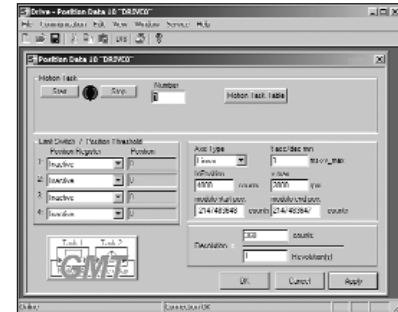
Graphical Motion Tasking (GMT) is an advanced feature that lets you program the SERVOSTAR® S600 as a single-axis positioner. You can command multiple motions, process I/O, make decisions, add time delays, and modify drive process variables. The environment is easy to use, allowing you to program in an intuitive flow-chart. Motion tasking has been supported by the S600 since the product's introduction in 1998. In its original form, Motion Tasking supported only chained moves in sequences executed either once or in infinite loops. Graphical Motion Tasking extends the capabilities of Motion Tasking by adding looping, comparing (<, =, >, etc.), calling functions, and setting process variables.

### Motion Capabilities

- Supports multiple motion types: trapezoidal, Sine<sup>2</sup> profiles, blended moves with time delays and I/O delays.
- Supports all SERVOSTAR S600 motion types

### Control Functions

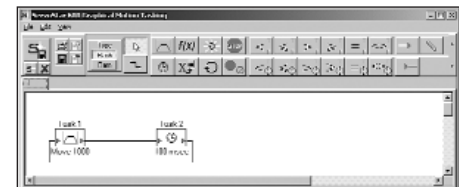
- Call function blocks
- Adjust or set process variables
- For loops
- Comparison blocks (>, <, ≥, ≤, =, ≠) using S600 internal variables
- Delay times
- Note blocks for flow documentation



The GMT Programming Environment

After installation, start the S600 user interface software. Click on the Position button from the main screen. At the top right, click on Position Data button and the Position Data dialog box (above) should appear. From this screen, click the GMT button at the bottom left to open the GMT programming environment.

\*Graphical Motion Tasking requires that one of the following option cards be installed:  
Extended I/O, DeviceNet,  
PROFIBUS or SERCOS.

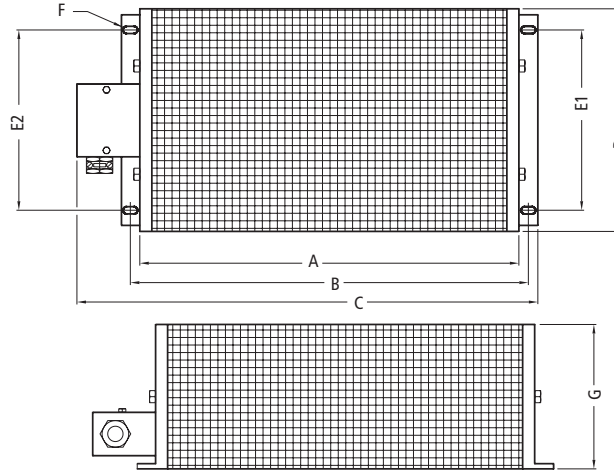
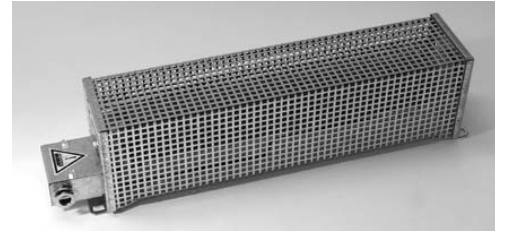


The Graphical Motion Tasking programming environment shown above has several controls at the top left, motion tasking blocks at the top right, and the GMT canvas at the bottom.

The figure above includes a simple GMT program that indefinitely repeats a 1000-count move followed by a 100 msec time delay.

## Resistive Regeneration Sizing

When internal regeneration is not enough, external regeneration is required. Shunt regeneration is required to dissipate energy that is pumped back into the DC bus during load deceleration. The amount of shunt regeneration required is a function of the sum of simultaneously decelerating loads. The loads need to be defined in terms of system inertia, maximum speed, and deceleration time. In addition, the duty cycle must be known. Contact the Danaher Motion Assistance Center for application assistance at 1-540-633-3400 or visit [www.DanaherMotion.com](http://www.DanaherMotion.com).

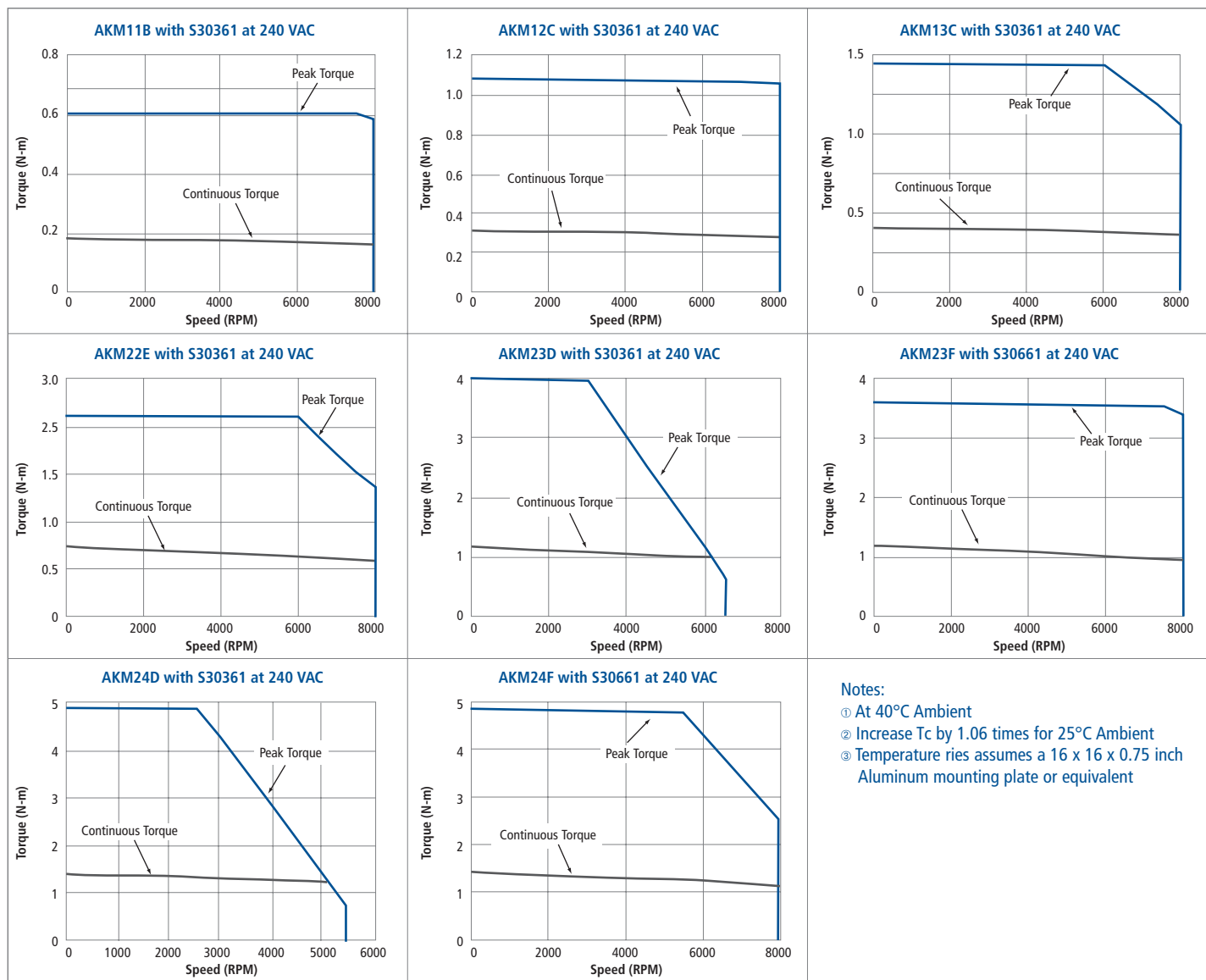


Model	Watts	Ohms	Amplifiers	A	B	C	D	E1	E2	F	G
BAR-250	250	33	S603, S606,	330(12.99)	390(15.35)	412(16.22)	66(2.60)	44(1.73)	35(1.38)	4.5x9(.20x.35)	77(3.03)
BAR-500	500	33	S610, S614, S620	400(15.75)	426(16.77)	486(19.13)	92(3.62)	64(2.52)	64(2.52)	6.5x9(.20x.35)	120(4.72)
BAR-1500	1500	33	S606, S610, S614, S620	500(19.69)	526(20.71)	586(23.07)	185(7.28)	150(5.90)	150(5.90)	6.5x9(.20x.35)	120(4.72)
BAS-2000	2000	15	S640	150 (5.90)	175 (6.89)	230(9.05)	490 (19.29)	380 (14.96)	380 (14.96)	10.5x13(.41x.51)	260(10.23)
BAS-3000	3000	15	S640	250 (9.84)	270 (10.63)	330(12.99)	490 (19.29)	380 (14.96)	380 (14.96)	10.5x13(.41x.51)	260(10.23)
BAS-6000	6000	15	S640	350 (13.78)	370 (14.56)	430(16.93)	490 (19.29)	380 (14.96)	380 (14.96)	10.5x13(.41x.51)	260(10.23)
BAS-2000	2000	10	S670	150 (5.90)	175 (6.89)	230(9.05)	490 (19.29)	380 (14.96)	380 (14.96)	10.5x13(.41x.51)	260(10.23)
BAS-3000	3000	10	S670	250 (9.84)	270 (10.63)	330(12.99)	490 (19.29)	380 (14.96)	380 (14.96)	10.5x13(.41x.51)	260(10.23)
BAS-6000	6000	10	S670	350 (13.78)	370 (14.56)	430(16.93)	490 (19.29)	380 (14.96)	380 (14.96)	10.5x13(.41x.51)	260(10.23)
BAR-300	300	66	S30361, S30661, S31061	200 (7.87)	226 (8.90)	349 (13.74)	92 (3.62)	64 (2.52)	64 (2.52)	6.5x12 (.25x.47)	120 (4.72)
BAR-600	600	66	S30661, S31061	400 (15.75)	426 (16.77)	549 (21.61)	92 (3.62)	64 (2.52)	64 (2.52)	6.5x12 (.25x.47)	120 (4.72)
BAR-1000	1000	66	S30661, S31061	600 (23.62)	626 (24.65)	749 (29.49)	92 (3.62)	64 (2.52)	64 (2.52)	6.5x12 (.25x.47)	120 (4.72)
BAR-300	300	91	S30101, S30301, S30601	200 (7.87)	226 (8.90)	349 (13.74)	92 (3.62)	64 (2.52)	64 (2.52)	6.5x12 (.25x.47)	120 (4.72)
BAR-600	600	91	S30301, S30601	400 (15.75)	426 (16.77)	549 (21.61)	92 (3.62)	64 (2.52)	64 (2.52)	6.5x12 (.25x.47)	120 (4.72)
BAR-1000	1000	91	S30301, S30601	600 (23.62)	626 (24.65)	749 (29.49)	92 (3.62)	64 (2.52)	64 (2.52)	6.5x12 (.25x.47)	120 (4.72)

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## AKM Motors & S300 Drives at 240 VAC

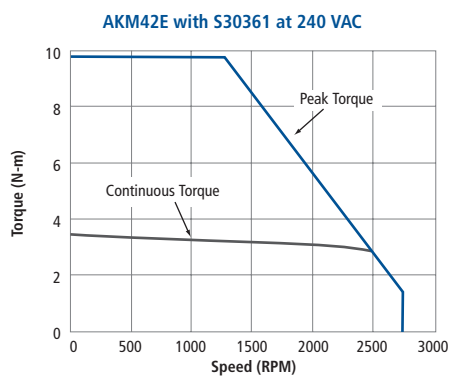
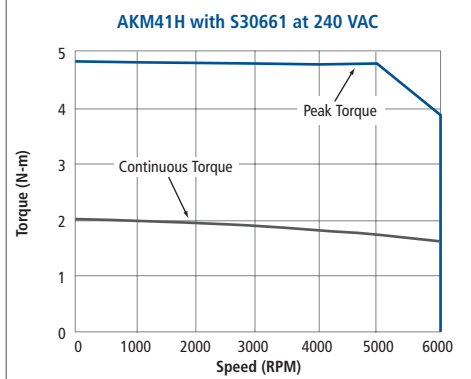
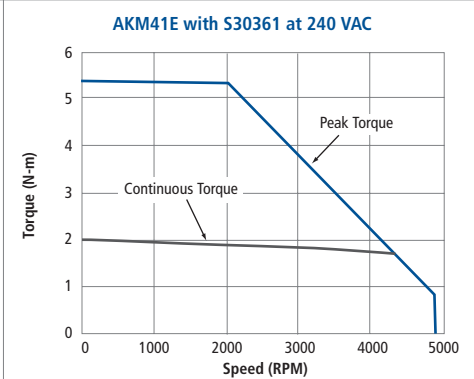
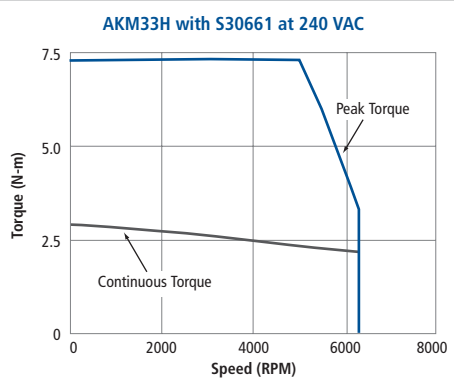
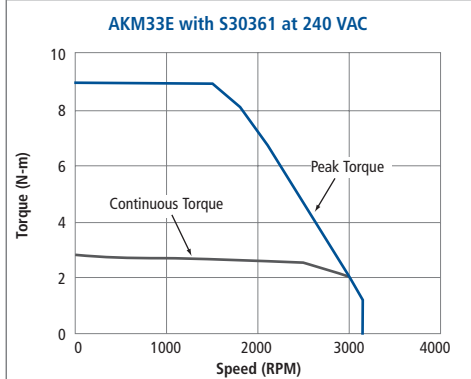
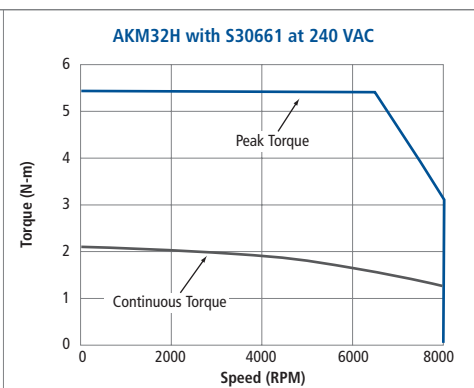
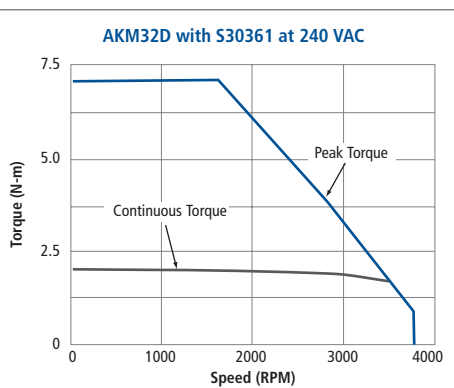
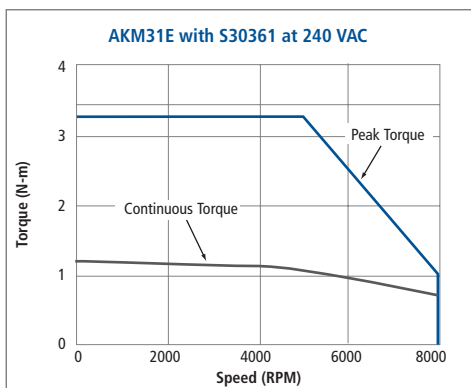
System Performance:	Symbol	Units	AKM11B	AKM12C	AKM13C	AKM22E	AKM23D	AKM23F	AKM24D	AKM24F
Cont. Stall Torque 100°C Rise	Tc	N-m (lb-in)	0.183 (1.62)	0.31 (2.74)	0.41 (3.62)	0.87 (7.71)	1.16 (10.2)	1.18 (10.4)	1.41 (12.4)	1.42 (12.6)
Cont. Stall Current 100°C Rise	Ic	Arms	1.16	1.51	1.48	2.73	2.19	4.31	2.21	3.89
Cont. Torque 60°C Rise	Tc	N-m (lb-in)	0.15 (1.29)	0.25 (2.19)	0.33 (2.89)	0.70 (6.2)	0.92 (8.2)	0.94 (8.4)	1.13 (10.0)	1.14 (10.1)
Peak Stall Torque	Tp	N-m (lb-in)	0.61 (5.39)	1.08 (9.54)	1.46 (12.9)	2.42 (21.4)	3.84 (34.0)	3.52 (31.2)	4.76 (42.1)	4.68 (41.4)
Peak Line Current	Ip	Arms	4.7	6.1	5.9	9.0	8.8	15.0	8.8	15.0
Maximum Speed	Nmax	RPM	8000	8,000	8,000	8,000	6,540	8,000	5,420	8,000
Weight	Wt	kg (lb)	0.35 (0.8)	0.49 (1.1)	0.63 (1.4)	1.1 (2.4)	1.38 (3.0)	1.38 (3.0)	1.66 (3.7)	1.66 (3.7)
Rotor Inertia	Jm	kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> )	0.017 (1.5E-05)	0.031 (2.7E-05)	0.045 (4.0E-05)	0.161 (1.4E-04)	0.216 (1.9E-04)	0.216 (1.9E-04)	0.27 (2.4E-04)	0.27 (2.4E-04)



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## AKM Motors & S300 Drives at 240 VAC

System Performance:	Symbol	Units	AKM31E	AKM32D	AKM32H	AKM33E	AKM33H	AKM41E	AKM41H	AKM42E
Cont. Stall Torque 100°C Rise	Tc	N-m (lb-in)	1.2 (10.7)	2.04 (18.0)	2.1 (18.6)	2.79 (24.7)	2.88 (25.5)	2.02 (17.8)	2.06 (18.2)	3.42 (30.3)
Cont. Stall Current 100°C Rise	Ic	Arms	2.99	2.23	5.50	2.58	5.62	2.85	5.60	2.74
Cont. Torque 60°C Rise	Tc	N-m (lb-in)	0.96 (8.5)	1.63 (14.4)	1.68 (14.9)	2.23 (19.7)	2.30 (20.4)	1.62 (14.3)	1.65 (14.6)	2.74 (24.2)
Peak Stall Torque	Tp	N-m (lb-in)	3.24 (28.6)	7.05 (62.4)	5.36 (47.5)	8.95 (79.3)	7.35 (65.0)	5.33 (47.2)	4.78 (42.3)	9.72 (86.0)
Peak Line Current	Ip	Arms	9.0	8.9	15.0	9.0	15.0	9.0	15.0	9.0
Maximum Speed	Nmax	RPM	8,000	3,750	8,000	3,140	6,630	4,850	6,000	2,740
Weight	Wt	kg (lb)	1.55 (3.4)	2.23 (4.9)	2.23 (4.9)	2.90 (6.4)	2.90 (6.4)	2.44 (5.4)	2.44 (5.4)	3.39 (7.5)
Rotor Inertia	Jm	kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> )	0.33 (2.9E-04)	0.59 (5.2E-04)	0.59 (5.2E-04)	0.85 (7.5E-04)	0.85 (7.5E-04)	0.81 (7.2E-04)	0.81 (7.2E-04)	1.45 (1.3E-3)



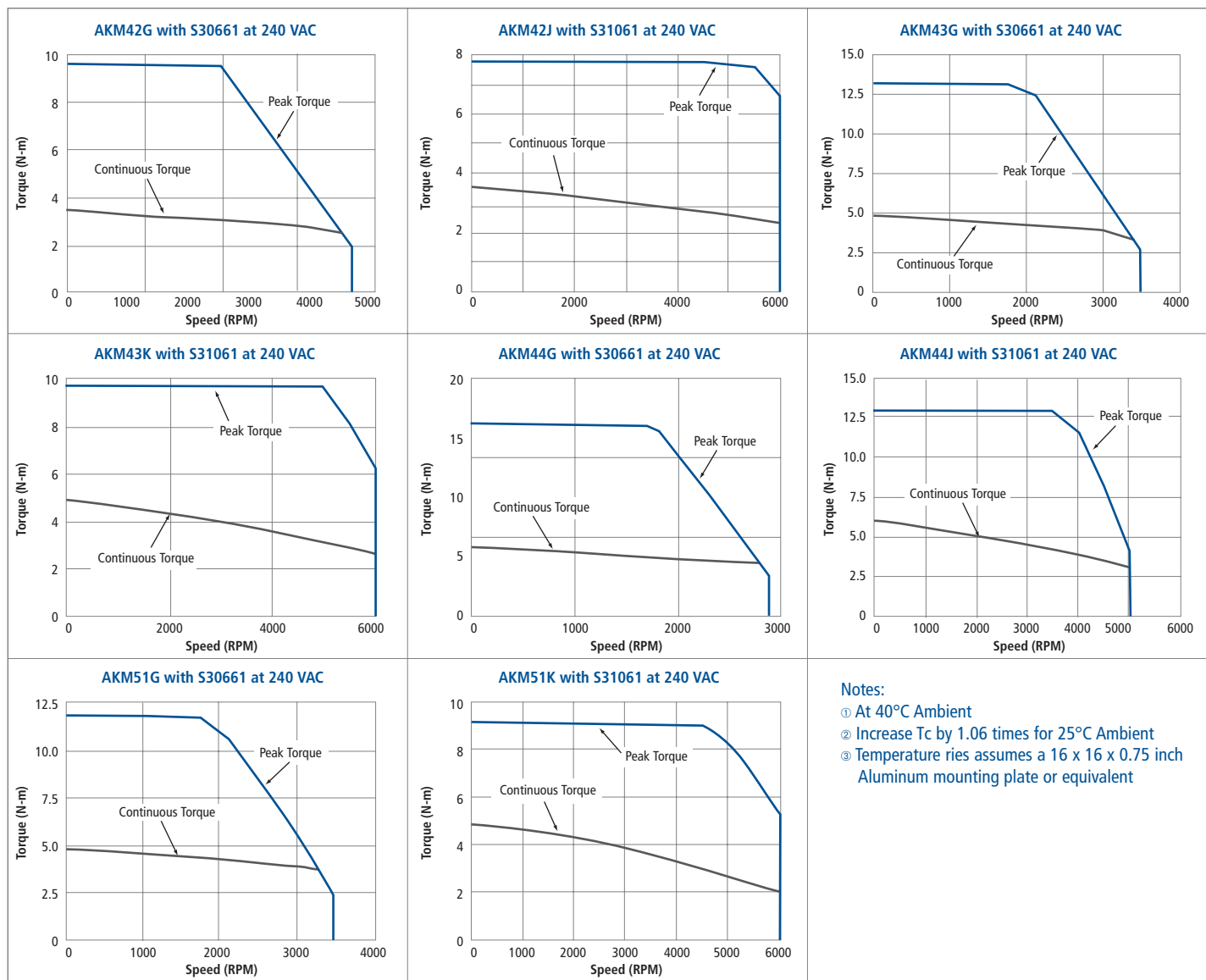
**Notes:**

- ① At 40°C Ambient
- ② Increase Tc by 1.06 times for 25°C Ambient
- ③ Temperature rises assumes a 16 x 16 x 0.75 inch Aluminum mounting plate or equivalent

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## AKM Motors & S300 Drives at 240 VAC

System Performance:	Symbol	Units	AKM42G	AKM42J	AKM43G	AKM43K	AKM44G	AKM44J	AKM51G	AKM51K
Cont. Stall Torque 100°C Rise	Tc	N-m (lb-in)	3.53 (31.2)	3.56 (31.5)	4.8 (42.5)	4.9 (43.4)	5.88 (52.0)	6.0 (53.1)	4.75 (42.1)	4.9 (43.4)
Cont. Stall Current 100°C Rise	Ic	Arms	4.8	8.4	4.87	9.6	5	8.8	4.84	9.4
Cont. Torque 60°C Rise	Tc	N-m (lb-in)	2.82 (25.0)	2.85 (25.2)	3.84 (34.0)	3.92 (34.7)	4.70 (41.6)	4.80 (42.5)	3.80 (33.6)	3.92 (34.7)
Peak Stall Torque	Tp	N-m (lb-in)	9.56 (84.6)	7.75 (68.6)	13.2 (116)	9.66 (85.5)	16.1 (142)	12.9 (114)	11.7 (104)	9.22 (81.6)
Peak Line Current	Ip	Arms	15.0	20.0	15.0	20.0	15.0	20.0	14.5	20.0
Maximum Speed	Nmax	RPM	4,660	6,000	3,470	6,000	2,890	5,010	3,480	6,000
Weight	Wt	kg (lb)	3.39 (7.5)	3.39 (7.5)	4.35 (9.6)	4.35 (9.6)	5.3 (11.7)	5.3 (11.7)	4.2 (9.3)	4.2 (9.3)
Rotor Inertia	Jm	kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> )	1.45 (1.28E-03)	1.45 (1.28E-03)	2.09 (1.85E-03)	2.09 (1.85E-03)	2.73 (2.42E-03)	2.73 (2.42E-03)	3.42 (3.03E-03)	3.42 (3.03E-03)

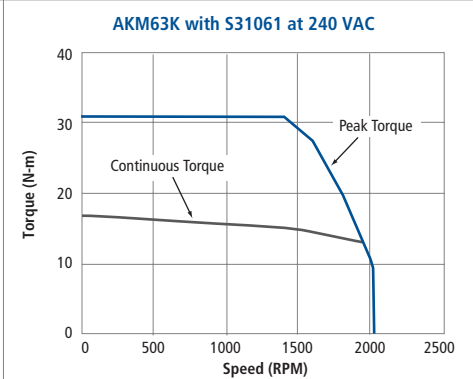
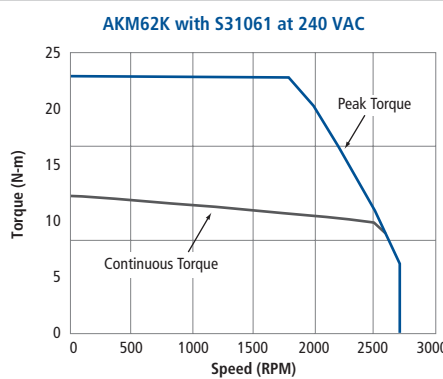
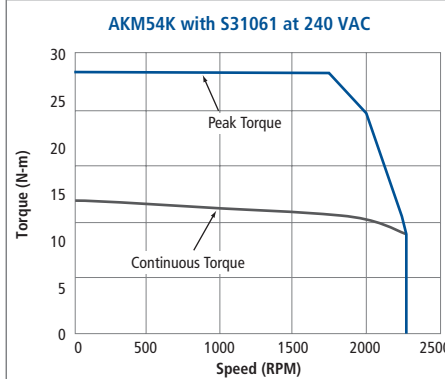
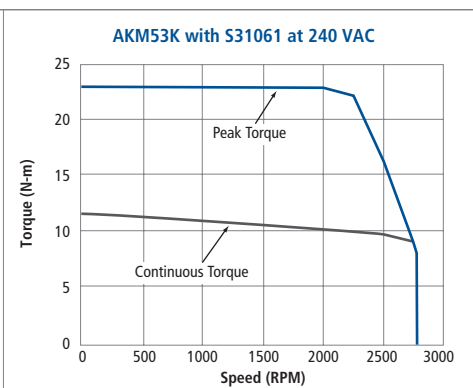
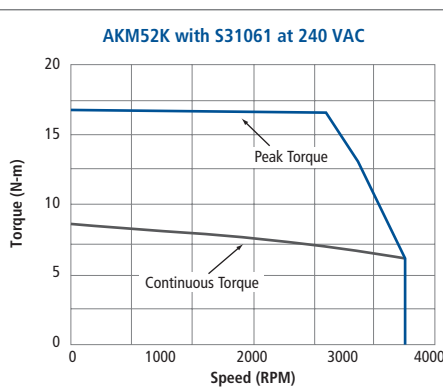
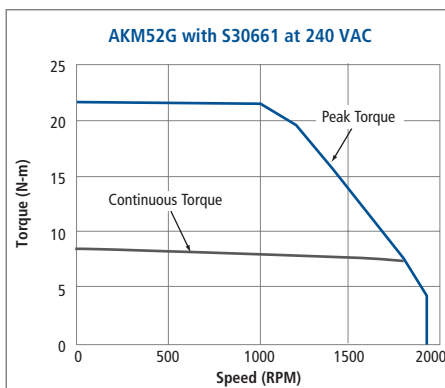


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## AKM Motors & S300 Drives at 240 VAC

System Performance:	Symbol	Units	AKM52G	AKM52K	AKM53K	AKM54K	AKM62K	AKM63K
Cont. Stall Torque 100°C Rise	Tc	N-m (lb-in)	8.43 (74.6)	8.6 (76.1)	11.6 (103)	14.4 (127)	12.2 (108)	16.8 (149)
Cont. Stall Current 100°C Rise	Ic	Arms	4.72	9.3	9.4	9.7	9.6	9.9
Cont. Torque 60°C Rise	Tc	N-m (lb-in)	6.74 (59.7)	6.88 (61.0)	9.28 (82.1)	11.5 (102.0)	9.72 (86.0)	13.4 (119.0)
Peak Stall Torque	Tp	N-m (lb-in)	21.5 (191)	16.9 (150)	22.9 (203)	28.1 (249)	22.7 (201)	31.0 (274)
Peak Line Current	Ip	Arms	14.2	20	20	20	20	20
Maximum Speed	Nmax	RPM	1,920	3,690	2,780	2,290	2,700	2,020
Weight	Wt	kg (lb)	5.8 (12.8)	5.8 (12.8)	7.4 (16.3)	9.0 (19.8)	8.9 (19.6)	11.1 (24.4)
Rotor Inertia	Jm	kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> )	6.22 (5.51E-03)	6.22 (5.51E-03)	9.12 (8.07E-03)	11.9 (10.6E-03)	16.9 (15.0E-03)	24.2 (21.4E-03)

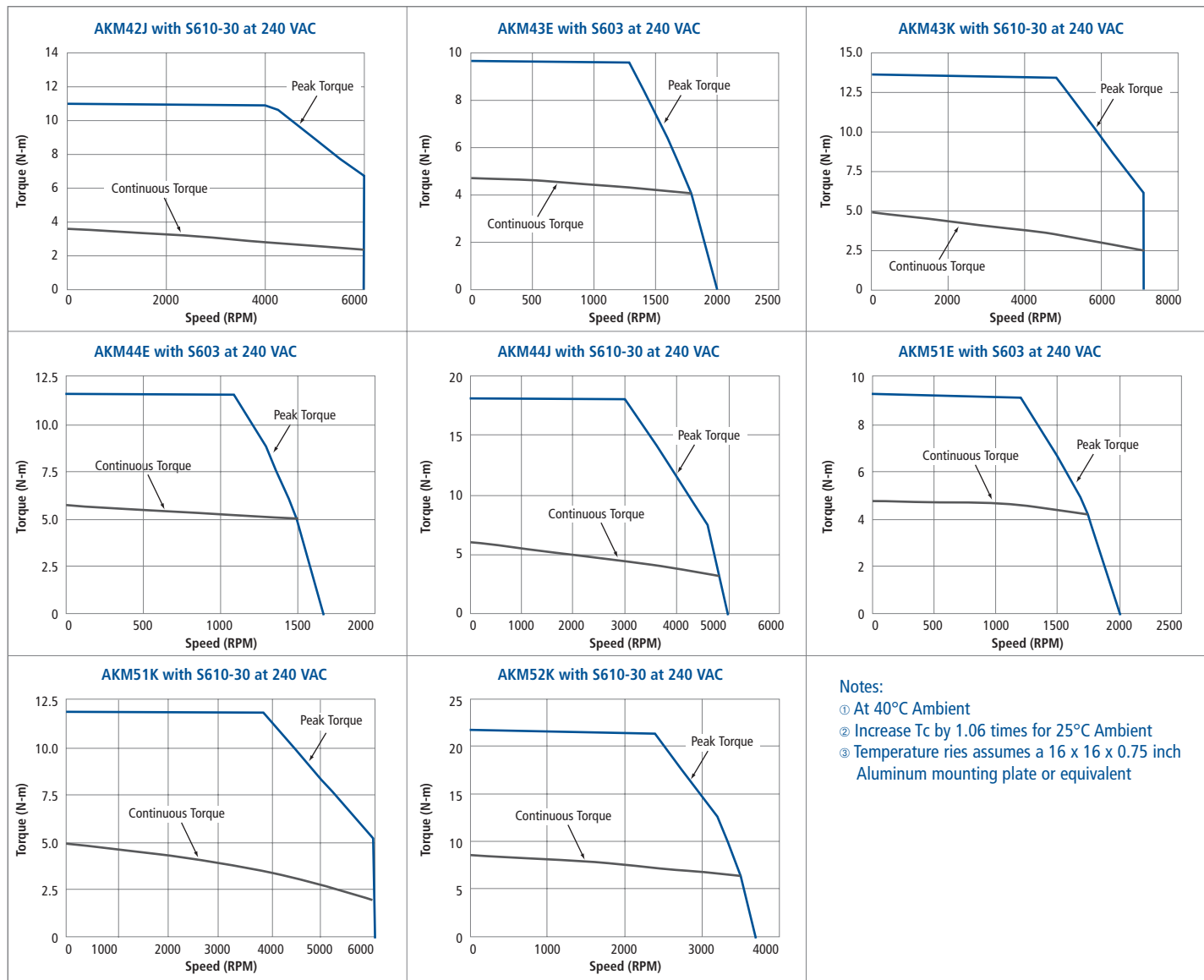


### Notes:

- ① At 40°C Ambient
- ② Increase Tc by 1.06 times for 25°C Ambient
- ③ Temperature rises assumes a 16 x 16 x 0.75 inch Aluminum mounting plate or equivalent

## AKM Motors & S600 Drives at 240 VAC

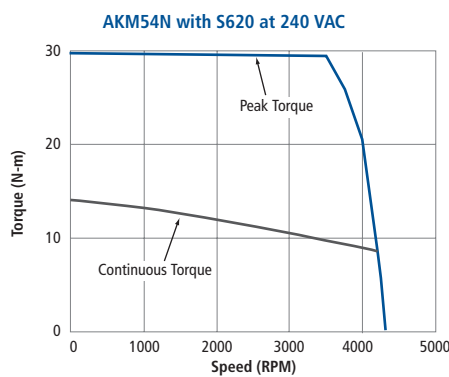
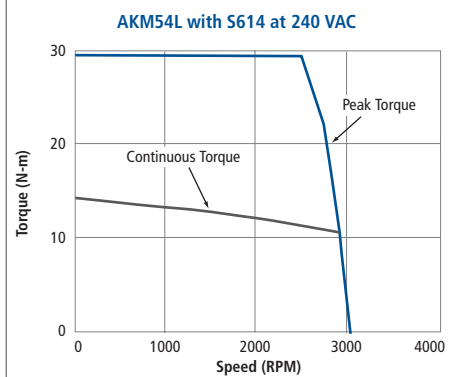
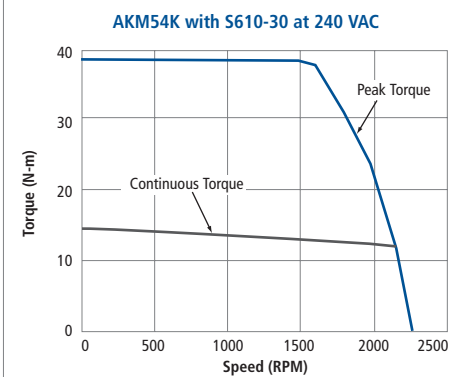
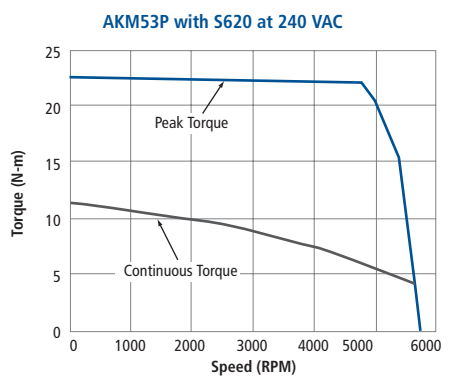
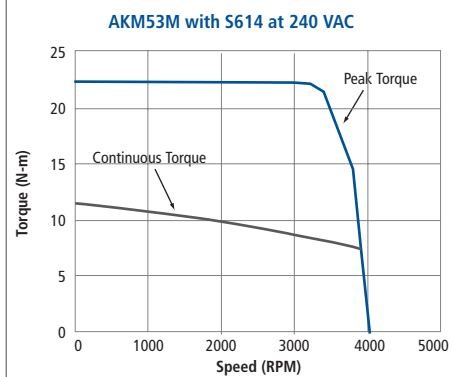
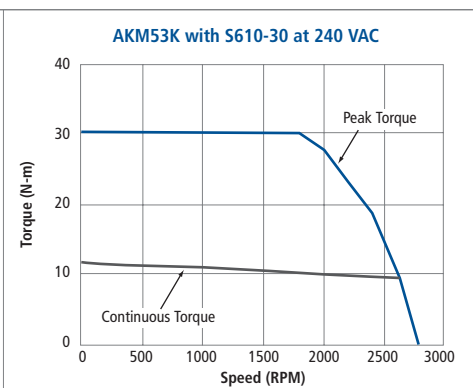
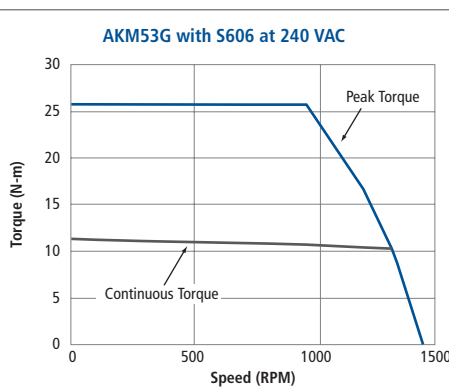
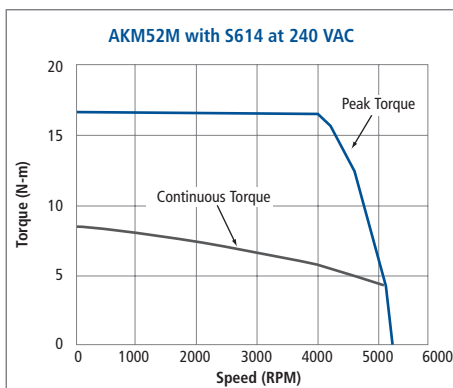
System Performance:	Symbol	Units	AKM42J	AKM43E	AKM43K	AKM44E	AKM44J	AKM51E	AKM51K	AKM52K
Cont. Stall Torque 100°C Rise	Tc	N-m (lb-in)	3.56 (31.5)	4.7 (41.6)	4.9 (43.4)	5.76 (51.0)	6.0 (53.1)	4.7 (41.6)	4.9 (43.4)	8.6 (76.1)
Cont. Stall Current 100°C Rise	Ic	Arms	8.4	2.8	9.6	2.9	8.8	2.8	9.4	9.3
Cont. Torque 60°C Rise	Tc	N-m (lb-in)	2.85 (25.2)	3.76 (33.3)	3.92 (34.7)	4.61 (40.8)	4.80 (42.5)	3.76 (33.3)	3.92 (34.7)	6.88 (61.0)
Peak Stall Torque	Tp	N-m (lb-in)	10.7 (94.5)	9.67 (85.6)	13.6 (120.0)	11.6 (103.0)	18.1 (160.0)	9.14 (80.9)	12.0 (106.0)	21.9 (194.0)
Peak Line Current	Ip	Arms	30.0	6.0	30.0	6.0	30.0	6.0	28.3	27.8
Maximum Speed	Nmax	RPM	6,000	2,000	6,000	1,680	5,010	2,010	6,000	3,690
Weight	Wt	kg (lb)	3.39 (7.5)	4.35 (9.6)	4.35 (9.6)	5.3 (11.7)	5.3 (11.7)	4.2 (9.3)	4.2 (9.3)	5.8 (12.8)
Rotor Inertia	Jm	kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> )	1.45 (1.28E-03)	2.09 (1.85E-03)	2.09 (1.85E-03)	2.73 (2.42E-03)	2.73 (2.42E-03)	3.42 (3.03E-03)	3.42 (3.03E-03)	6.22 (5.51E-03)



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## AKM Motors & S600 Drives at 240 VAC

System Performance:	Symbol	Units	AKM52M	AKM53G	AKM53K	AKM53M	AKM53P	AKM54K	AKM54L	AKM54N
Cont. Stall Torque 100°C Rise	Tc	N-m (lb-in)	8.6 (76.1)	11.4 (101.0)	11.6 (103.0)	11.4 (101.0)	11.4 (101.0)	14.4 (127.0)	14.1 (125.0)	14.1 (125.0)
Cont. Stall Current 100°C Rise	Ic	Arms	13.1	4.8	9.4	13.4	19.1	9.7	12.5	17.8
Cont. Torque 60°C Rise	Tc	N-m (lb-in)	6.88 (61.0)	9.10 (80.5)	9.28 (82.1)	9.10 (80.5)	9.10 (80.5)	11.5 (102.0)	11.3 (100.0)	11.3 (100.0)
Peak Stall Torque	Tp	N-m (lb-in)	16.7 (148.0)	25.8 (229.0)	30.2 (267.0)	22.1 (196.0)	22.2 (196.0)	38.4 (340.0)	29.5 (261.0)	29.6 (262.0)
Peak Line Current	Ip	Arms	28.0	12.0	28.1	28.0	40.0	29.2	28.0	40.0
Maximum Speed	Nmax	RPM	5,230	1,440	2,780	4,050	5,770	2,290	3,040	4,320
Weight	Wt	kg (lb)	5.8 (12.8)	7.4 (16.3)	7.4 (16.3)	7.4 (16.3)	7.4 (16.3)	9.0 (19.8)	9.0 (19.8)	9.0 (19.8)
Rotor Inertia	Jm	kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> )	6.22 (5.51E-03)	9.12 (8.07E-03)	9.12 (8.07E-03)	9.12 (8.07E-03)	9.12 (8.07E-03)	11.9 (10.5E-03)	11.9 (10.5E-03)	11.9 (10.5E-03)



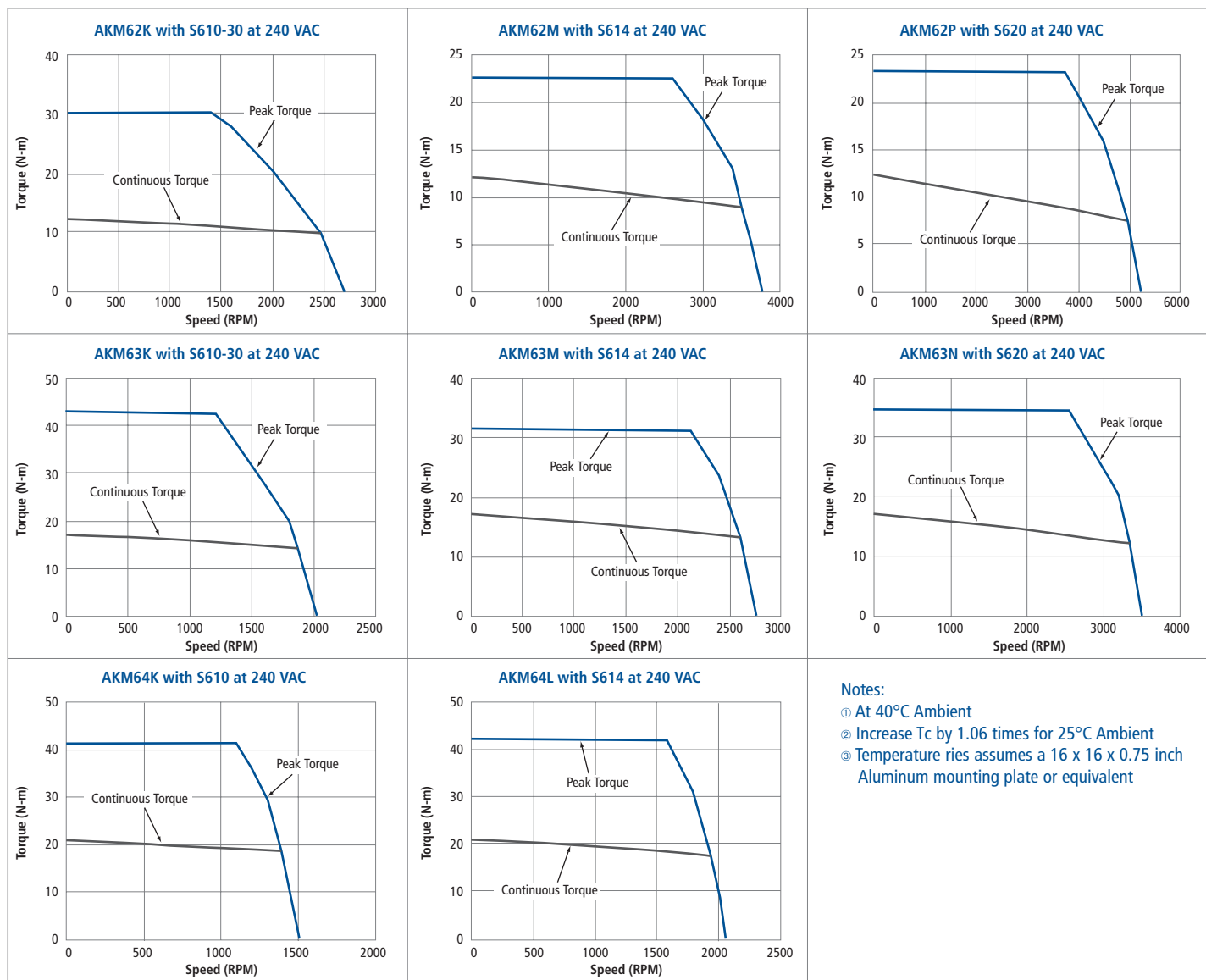
**Notes:**

- ① At 40°C Ambient
- ② Increase Tc by 1.06 times for 25°C Ambient
- ③ Temperature rises assumes a 16 x 16 x 0.75 inch Aluminum mounting plate or equivalent

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## AKM Motors & S600 Drives at 240 VAC

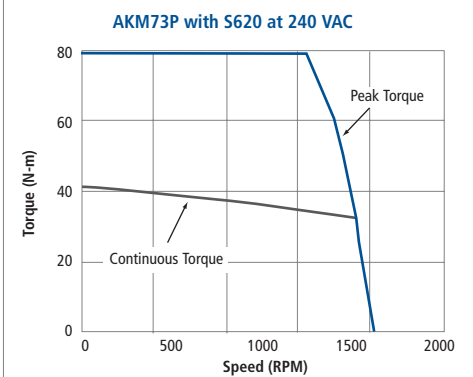
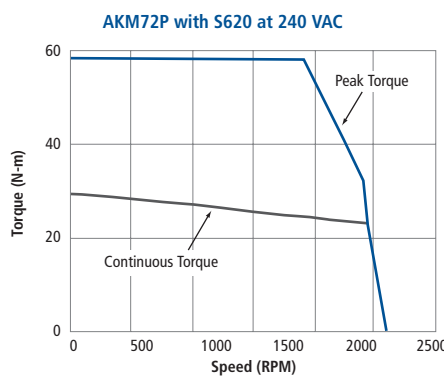
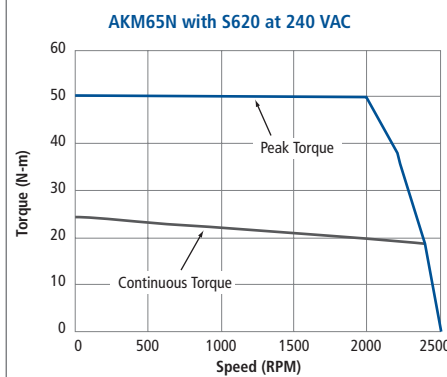
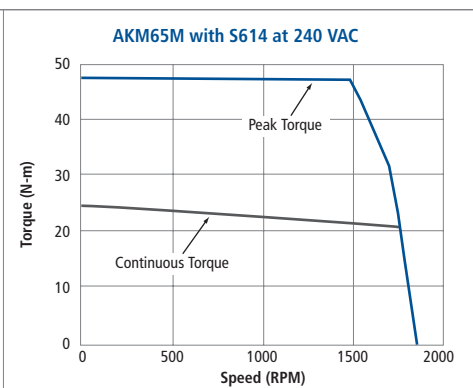
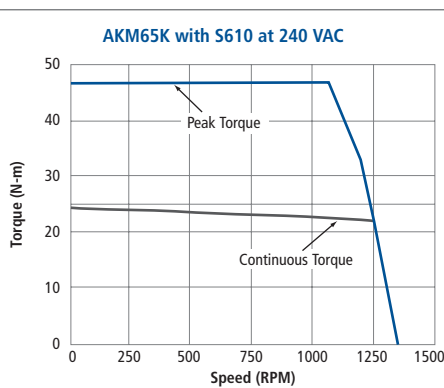
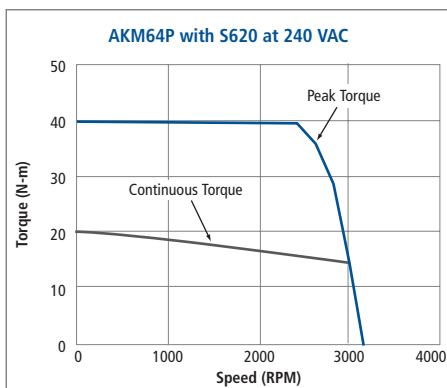
System Performance:	Symbol	Units	AKM62K	AKM62M	AKM62P	AKM63K	AKM63M	AKM63N	AKM64K	AKM64L
Cont. Stall Torque 100°C Rise	Tc	N-m (lb-in)	12.2 (108.0)	12.2 (108.0)	12.3 (109.0)	16.8 (149.0)	17.0 (150.0)	17.0 (150.0)	20.0 (184.0)	21.0 (186.0)
Cont. Stall Current 100°C Rise	Ic	Arms	9.6	13.4	18.8	9.9	13.8	17.4	9.2	12.8
Cont. Torque 60°C Rise	Tc	N-m (lb-in)	9.72 (86.0)	9.72 (86.0)	9.83 (87.0)	13.4 (119.0)	13.6 (120.0)	13.6 (120.0)	16.6 (147.0)	16.8 (149.0)
Peak Stall Torque	Tp	N-m (lb-in)	30.1 (267.0)	22.8 (201.0)	23.2 (206.0)	42.6 (377.0)	31.4 (278.0)	34.8 (308.0)	41.2 (365.0)	41.9 (371.0)
Peak Line Current	Ip	Arms	28.7	28.0	40.0	29.7	28.0	40.0	20.0	28.0
Maximum Speed	Nmax	RPM	2,700	3,770	5,250	2,020	2,770	3,500	1,510	2,080
Weight	Wt	kg (lb)	8.9 (19.6)	8.9 (19.6)	8.9 (19.6)	11.1 (24.4)	11.1 (24.4)	11.1 (24.4)	13.3 (29.3)	13.3 (29.3)
Rotor Inertia	Jm	kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> )	16.9 (15.0E-03)	16.9 (15.0E-03)	16.9 (15.0E-03)	24.2 (21.4E-03)	24.2 (21.4E-03)	24.2 (21.4E-03)	31.6 (28.0E-03)	31.6 (28.0E-03)



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## AKM Motors & S600 Drives at 240 VAC

System Performance:	Symbol	Units	AKM64P	AKM65K	AKM65M	AKM65N	AKM72P	AKM73P
Cont. Stall Torque 100°C Rise	Tc	N-m (lb-in)	20.4 (180.0)	24.8 (219.0)	25.0 (221.0)	24.3 (215.0)	29.4 (260.0)	41.6 (368.0)
Cont. Stall Current 100°C Rise	Ic	Arms	18.6	9.8	13.6	17.8	18.7	19.5
Cont. Torque 60°C Rise	Tc	N-m (lb-in)	16.3 (144.0)	19.8 (175.0)	20.0 (177.0)	19.4 (172.0)	23.5 (208.0)	33.3 (295.0)
Peak Stall Torque	Tp	N-m (lb-in)	40.2 (355.0)	46.8 (414.0)	47.6 (421.0)	50.2 (444.0)	58.4 (516.0)	79.4 (702)
Peak Line Current	Ip	Arms	40.0	20.0	28.0	40.0	40.0	40.0
Maximum Speed	Nmax	RPM	3,120	1,350	1,860	2,500	2,170	1,610
Weight	Wt	kg (lb)	13.3 (29.3)	15.4 (33.9)	15.4 (33.9)	15.4 (33.9)	19.7 (43.4)	26.7 (58.8)
Rotor Inertia	Jm	kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> )	31.6 (28.0E-03)	40.0 (35.4E-03)	40.0 (35.4E-03)	40.0 (35.4E-03)	64.5 (57.1E-03)	92.1 (81.5E-03)

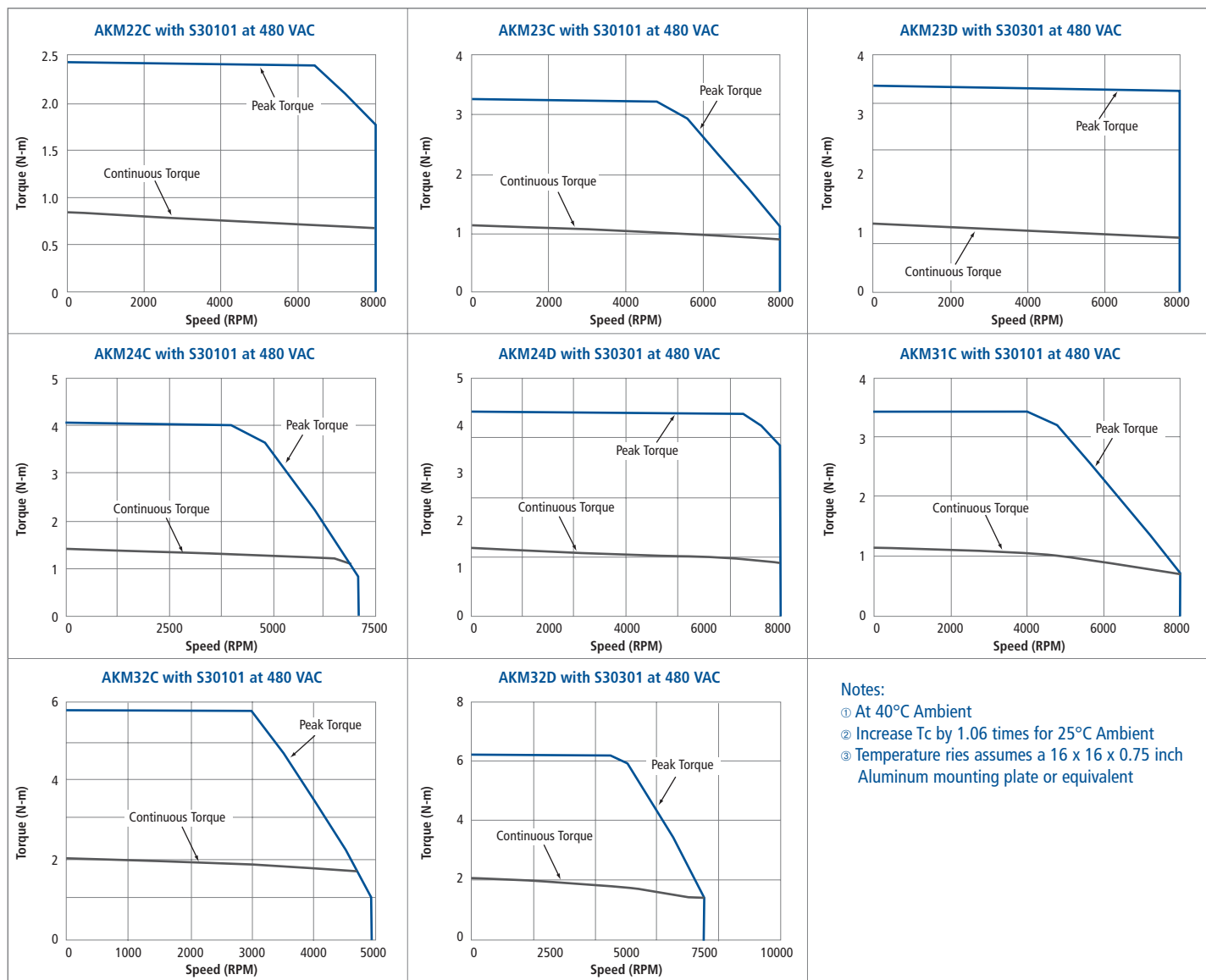


### Notes:

- ① At 40°C Ambient
- ② Increase Tc by 1.06 times for 25°C Ambient
- ③ Temperature rises assumes a 16 x 16 x 0.75 inch Aluminum mounting plate or equivalent

## AKM Motors & S300 Drives at 480 VAC

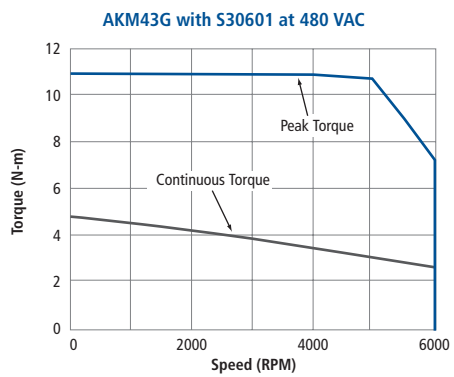
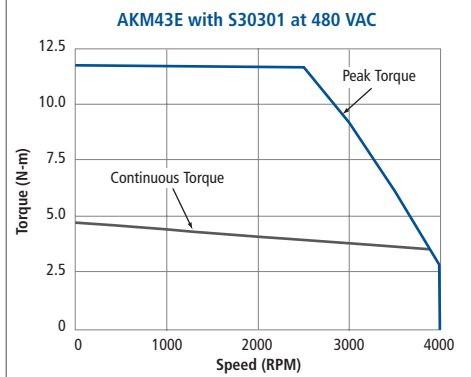
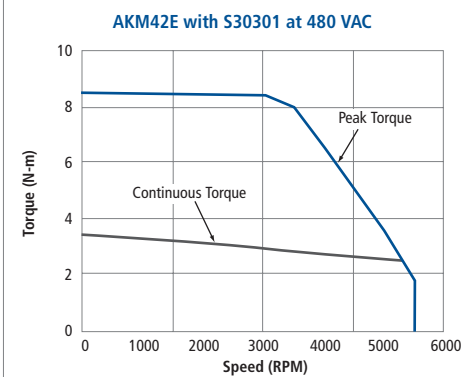
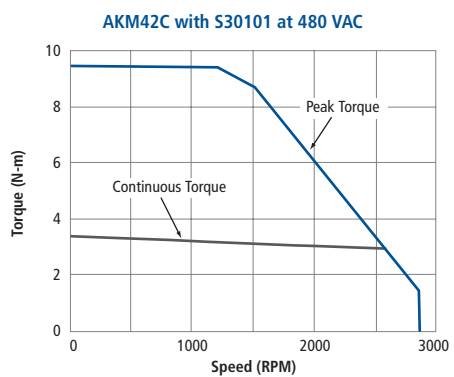
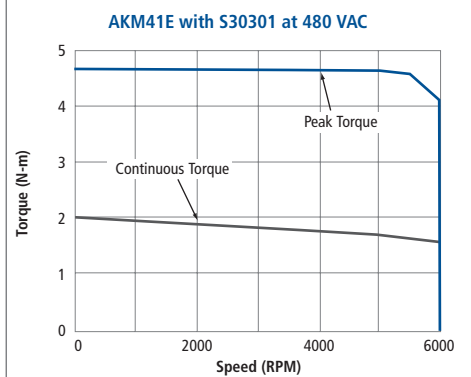
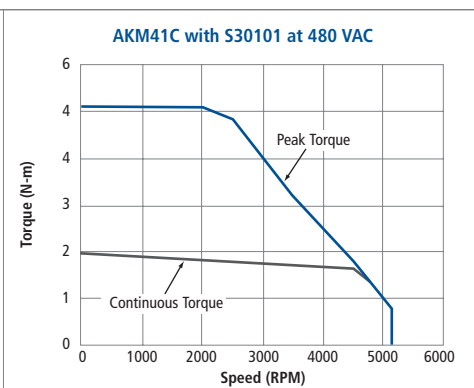
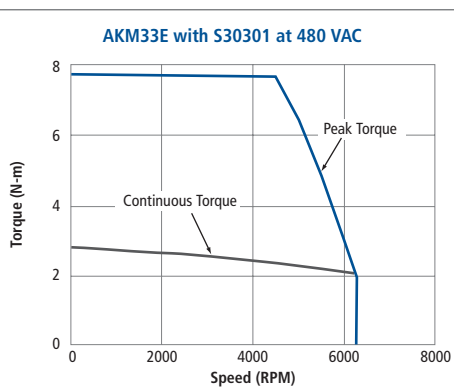
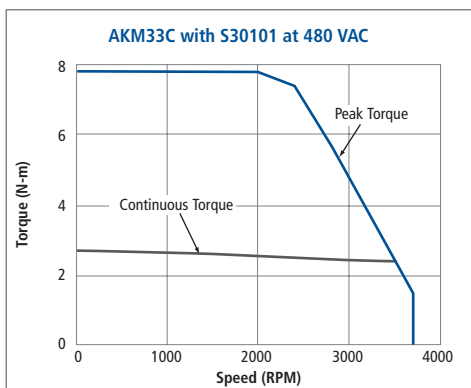
System Performance:	Symbol	Units	AKM22C	AKM23C	AKM23D	AKM24C	AKM24D	AKM31C	AKM32C	AKM32D
Cont. Stall Torque 100°C Rise	Tc	N-m (lb-in)	0.84 (7.5)	1.13 (10.0)	1.16 (10.2)	1.38 (12.2)	1.41 (12.4)	1.15 (10.2)	2.0 (17.7)	2.04 (18.0)
Cont. Stall Current 100°C Rise	Ic	Arms	1.39	1.41	2.19	1.42	2.21	1.37	1.44	2.23
Cont. Torque 60°C Rise	Tc	N-m (lb-in)	0.67 (5.9)	0.90 (8.0)	0.92 (8.2)	1.10 (9.8)	1.13 (10.0)	0.92 (8.1)	1.60 (14.2)	1.63 (14.4)
Peak Stall Torque	Tp	N-m (lb-in)	2.34 (20.7)	3.2 (28.4)	3.42 (30.2)	3.94 (34.9)	4.22 (37.3)	3.34 (29.6)	5.74 (50.8)	6.18 (54.7)
Peak Line Current	Ip	Arms	4.5	4.5	7.5	4.5	7.5	4.5	4.5	7.5
Maximum Speed	Nmax	RPM	8,000	8,000	8,000	7,090	8,000	8,000	4,930	7,510
Weight	Wt	kg (lb)	1.1 (2.4)	1.38 (3.0)	1.38 (3.0)	1.66 (3.7)	1.66 (3.7)	1.55 (3.4)	2.23 (4.9)	2.23 (4.9)
Rotor Inertia	Jm	kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> )	0.161 (0.14E-03)	0.216 (0.19E-03)	0.216 (0.19E-03)	0.27 (0.24E-03)	0.27 (0.24E-03)	0.33 (0.29E-03)	0.59 (0.52E-03)	0.59 (0.52E-03)



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## AKM Motors & S300 Drives at 480 VAC

System Performance:	Symbol	Units	AKM33C	AKM33E	AKM41C	AKM41E	AKM42C	AKM42E	AKM43E	AKM43G
Cont. Stall Torque 100°C Rise	Tc	N-m (lb-in)	2.71 (24.0)	2.79 (24.7)	1.95 (17.3)	2.02 (17.8)	3.35 (29.6)	3.42 (30.3)	4.7 (41.6)	4.8 (42.5)
Cont. Stall Current 100°C Rise	Ic	Arms	1.47	2.58	1.46	2.85	1.4	2.74	2.76	4.87
Cont. Torque 60°C Rise	Tc	N-m (lb-in)	2.17 (19.2)	2.23 (19.7)	1.56 (13.8)	1.62 (14.3)	2.68 (23.7)	2.74 (24.2)	3.76 (33.3)	3.84 (34.0)
Peak Stall Torque	Tp	N-m (lb-in)	7.83 (69.3)	7.7 (68.2)	5.12 (45.3)	4.64 (41.0)	9.37 (82.9)	8.41 (74.4)	11.7 (104.0)	10.9 (96.8)
Peak Line Current	Ip	Arms	4.5	7.5	4.5	7.5	4.5	7.5	7.5	12
Maximum Speed	Nmax	RPM	3,690	6,280	5,130	6,000	2,870	5,480	4,000	6,000
Weight	Wt	kg (lb)	2.9 (6.4)	2.9 (6.4)	2.44 (5.4)	2.44 (5.4)	3.39 (7.5)	3.39 (7.5)	4.35 (9.6)	4.35 (9.6)
Rotor Inertia	Jm	kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> )	0.85 (0.75E-03)	0.85 (0.75E-03)	0.81 (0.72E-03)	0.81 (0.72E-03)	1.45 (1.28E-03)	1.45 (1.28E-03)	2.09 (1.85E-03)	2.09 (1.85E-03)



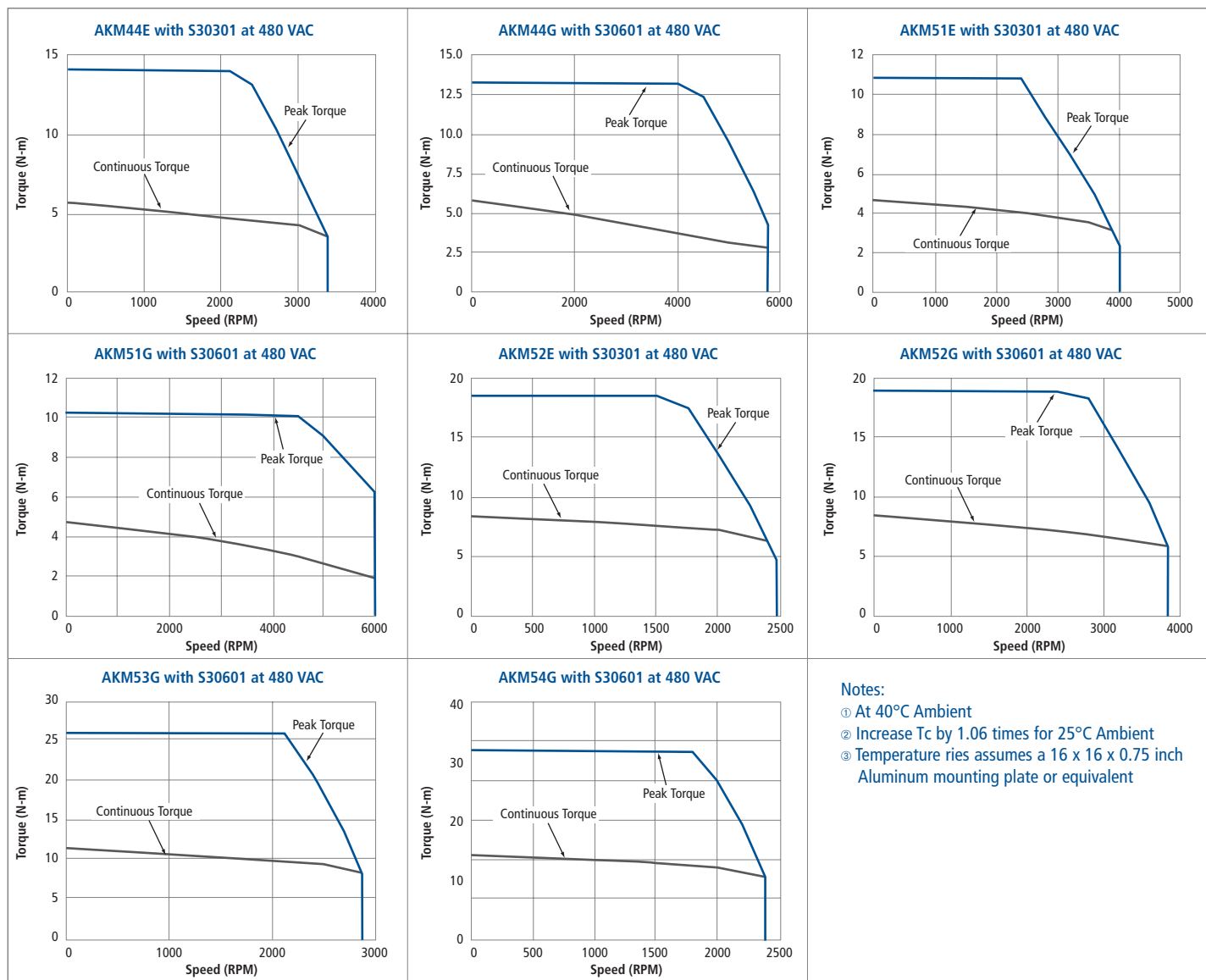
**Notes:**

- ① At 40°C Ambient
- ② Increase Tc by 1.06 times for 25°C Ambient
- ③ Temperature rises assumes a 16 x 16 x 0.75 inch Aluminum mounting plate or equivalent

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## AKM Motors & S300 Drives at 480 VAC

System Performance:	Symbol	Units	AKM44E	AKM44G	AKM51E	AKM51G	AKM52E	AKM52G	AKM53G	AKM54G
Cont. Stall Torque 100°C Rise	Tc	N-m (lb-in)	5.76 (51.0)	5.88 (52.0)	4.7 (41.6)	4.75 (42.1)	8.34 (73.8)	8.43 (74.6)	11.4 (101.0)	14.3 (126.0)
Cont. Stall Current 100°C Rise	Ic	Arms	2.85	5	2.75	4.84	2.99	4.72	4.77	4.98
Cont. Torque 60°C Rise	Tc	N-m (lb-in)	4.61 (40.8)	4.70 (41.6)	3.76 (33.3)	3.80 (33.6)	6.67 (59.0)	6.74 (59.7)	9.10 (80.5)	11.4 (101.0)
Peak Stall Torque	Tp	N-m (lb-in)	14.1 (125.0)	13.3 (118.0)	10.9 (96.1)	10.2 (90.4)	18.5 (164.0)	18.9 (168.0)	25.8 (229.0)	31.7 (280.0)
Peak Line Current	Ip	Arms	7.5	12	7.5	12	7.5	12	12	12
Maximum Speed	Nmax	RPM	3,370	5,790	4,010	6,000	2,470	3,840	2,880	2,390
Weight	Wt	kg (lb)	5.3 (11.7)	5.3 (11.7)	4.2 (9.3)	4.2 (9.3)	5.8 (12.8)	5.8 (12.8)	7.4 (16.3)	9.0 (19.8)
Rotor Inertia	Jm	kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> )	2.73 (2.42E-03)	2.73 (2.42E-03)	3.42 (3.03E-03)	3.42 (3.03E-03)	6.22 (5.51E-03)	6.22 (5.51E-03)	9.12 (8.07E-03)	11.9 (10.50E-03)



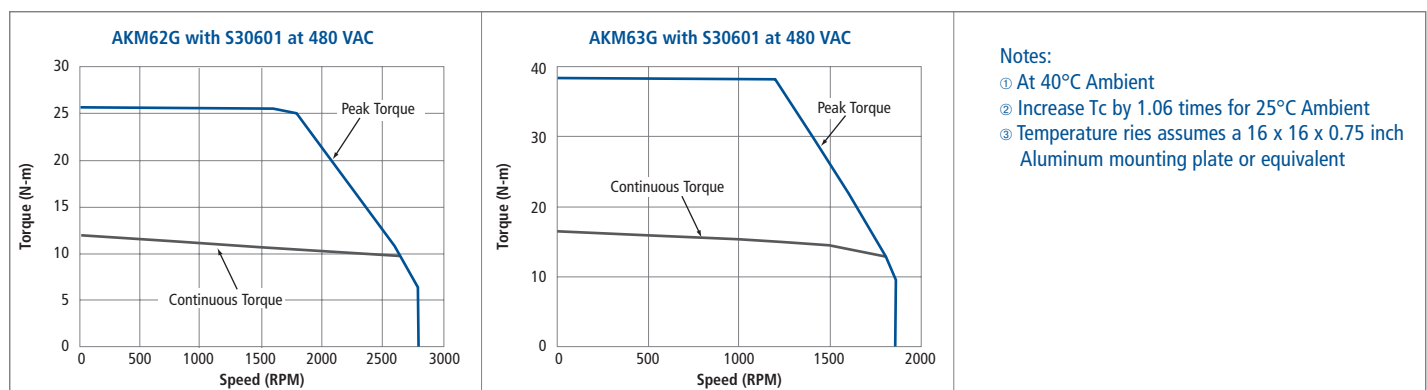
- Notes:
- ① At 40°C Ambient
  - ② Increase Tc by 1.06 times for 25°C Ambient
  - ③ Temperature rises assumes a 16 x 16 x 0.75 inch Aluminum mounting plate or equivalent

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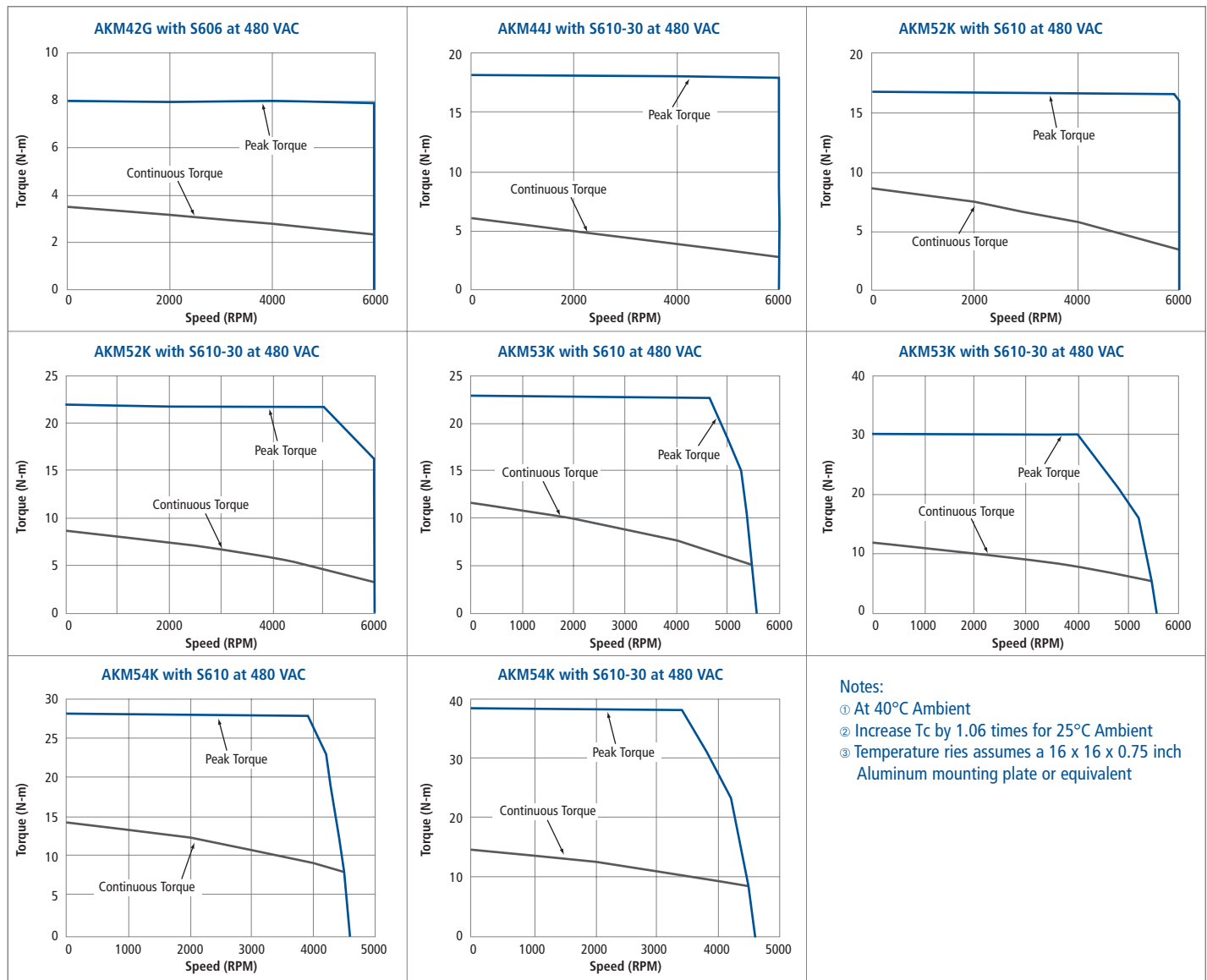
## AKM Motors & S300 Drives at 480 VAC

System Performance:	Symbol	Units	AKM62G	AKM63G
Cont. Stall Torque 100°C Rise	Tc	N-m (lb-in)	11.9 (106.0)	16.5 (146.0)
Cont. Stall Current 100°C Rise	Ic	Arms	11.9 (106.0)	16.5 (146.0)
Cont. Torque 60°C Rise	Tc	N-m (lb-in)	9.49 (84.0)	13.2 (117.0)
Peak Stall Torque	Tp	N-m (lb-in)	25.6 (227.0)	38.4 (340.0)
Peak Line Current	Ip	Arms	12	12
Maximum Speed	Nmax	RPM	2,790	1,860
Weight	Wt	kg (lb)	8.9 (19.6)	11.1 (24.4)
Rotor Inertia	Jm	kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> )	16.9 (15.0E-03)	24.2 (21.4E-03)



## AKM Motors & S600 Drives at 480 VAC

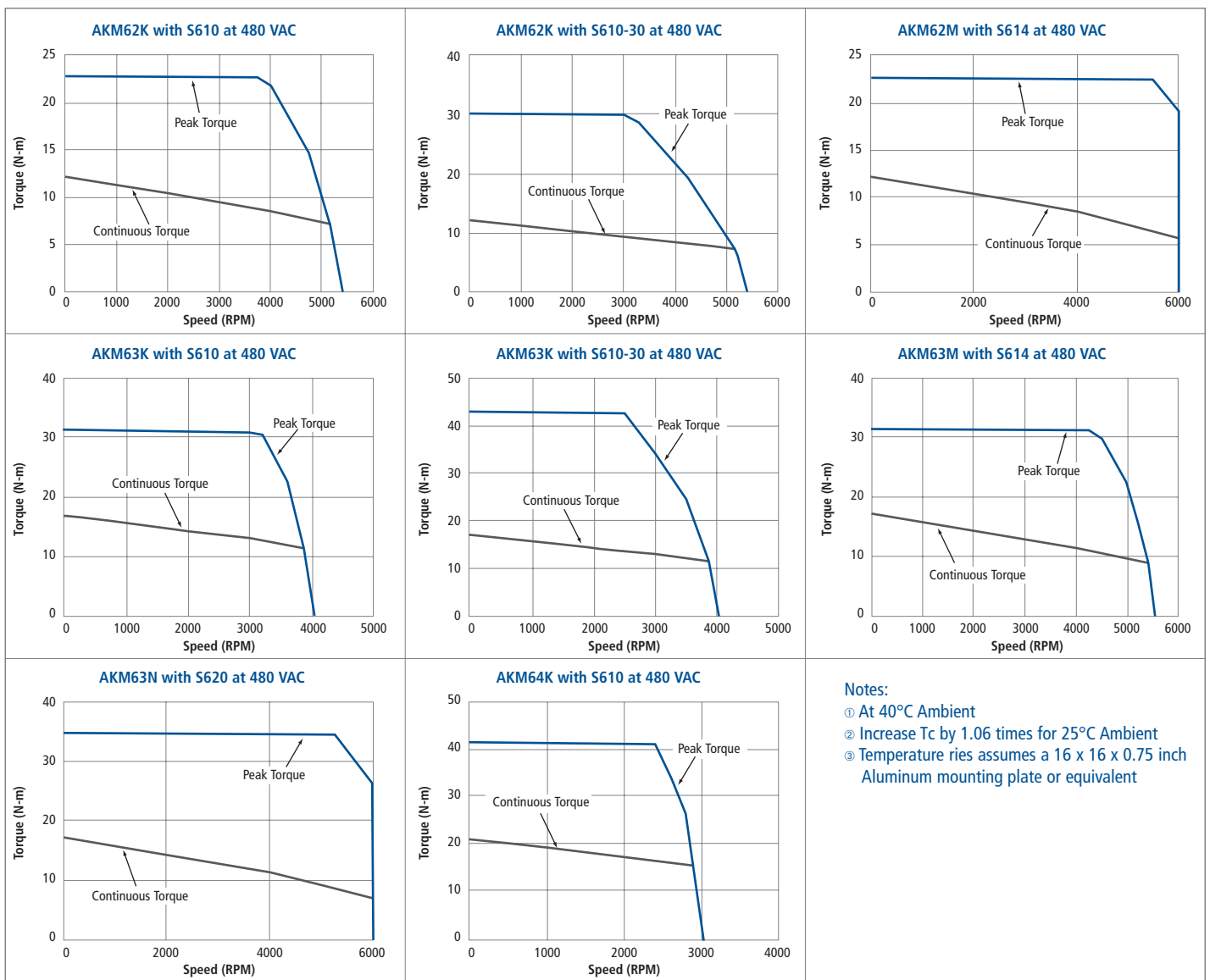
System Performance:	Symbol	Units	AKM42G	AKM44J	AKM52K	AKM52K	AKM53K	AKM53K	AKM54K	AKM54K
Cont. Stall Torque 100°C Rise	Tc	N-m (lb-in)	3.53 (31.2)	6.0 (53.1)	8.6 (76.1)	8.6 (76.1)	11.6 (103.0)	11.6 (103.0)	14.4 (127.0)	14.4 (127.0)
Cont. Stall Current 100°C Rise	Ic	Arms	4.8	8.8	9.3	9.3	9.4	9.4	9.7	9.7
Cont. Torque 60°C Rise	Tc	N-m (lb-in)	2.82 (25.0)	4.80 (42.5)	6.88 (61.0)	6.88 (61.0)	9.28 (82.1)	9.28 (82.1)	11.5 (102.0)	11.5 (102.0)
Peak Stall Torque	Tp	N-m (lb-in)	7.99 (70.7)	18.1 (160.0)	16.9 (150.0)	21.9 (194.0)	22.9 (203.0)	30.2 (267.0)	28.1 (249.0)	38.4 (340.0)
Peak Line Current	Ip	Arms	12.0	30.0	20.0	27.8	20.0	28.1	20.0	29.2
Maximum Speed	Nmax	RPM	6,000	6,000	6,000	6,000	5,550	5,550	4,590	4,590
Weight	Wt	kg (lb)	3.39 (7.5)	5.3 (11.7)	5.8 (12.8)	5.8 (12.8)	7.4 (16.3)	7.4 (16.3)	9.0 (19.8)	9.0 (19.8)
Rotor Inertia	Jm	kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> )	1.45 (1.28E-03)	2.73 (2.42E-03)	6.22 (5.51E-03)	6.22 (5.51E-03)	9.12 (8.07E-03)	9.12 (8.07E-03)	11.9 (10.6E-03)	11.9 (10.6E-03)



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## AKM Motors & S600 Drives at 480 VAC

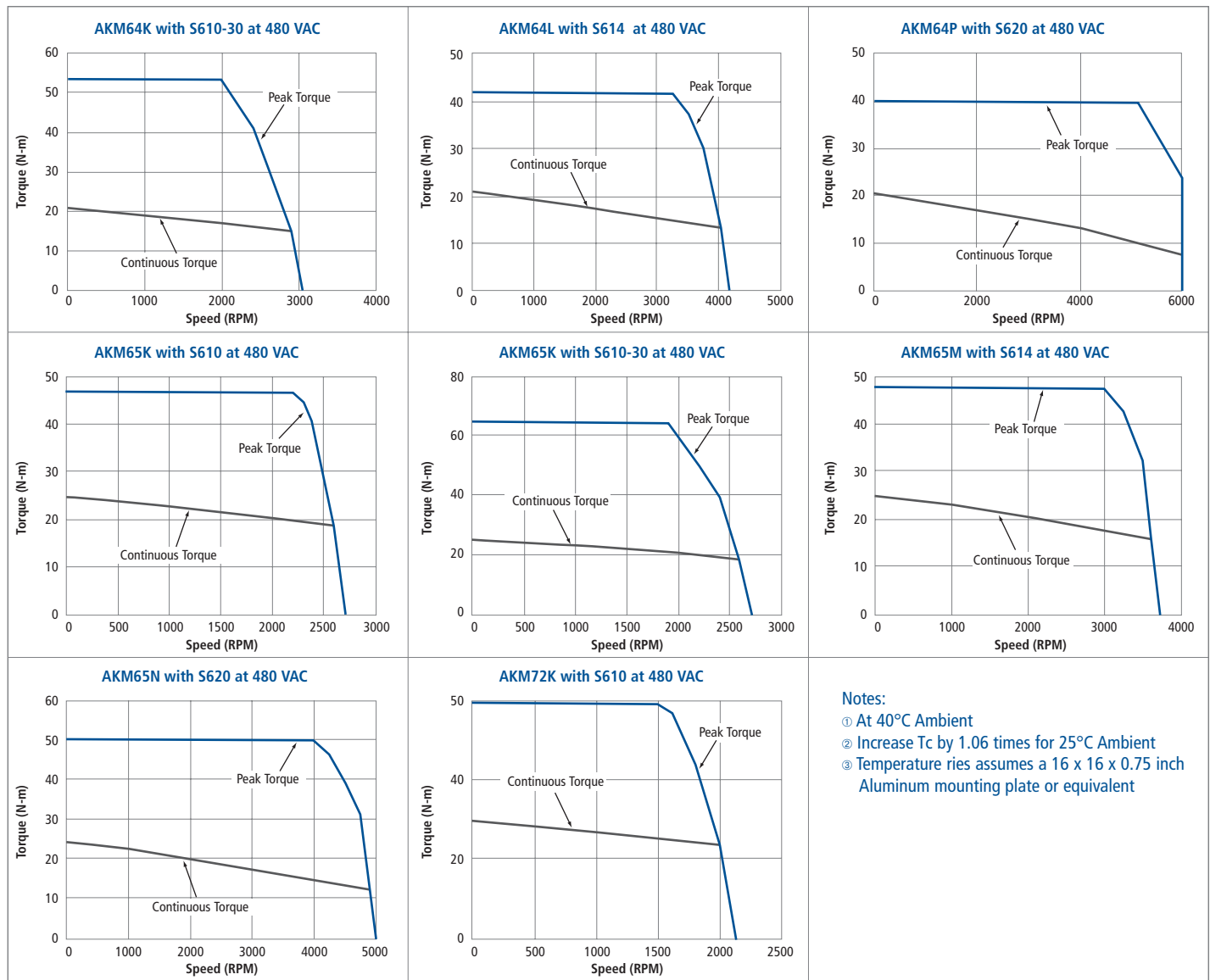
System Performance:	Symbol	Units	AKM62K	AKM62K	AKM62M	AKM63K	AKM63K	AKM63M	AKM63N	AKM64K
Cont. Stall Torque 100°C Rise	Tc	N-m (lb-in)	12.2 (108.0)	12.2 (108.0)	12.2 (108.0)	16.8 (149.0)	16.8 (149.0)	17.0 (150.0)	17.0 (150.0)	20.8 (184.0)
Cont. Stall Current 100°C Rise	Ic	Arms	9.6	9.6	13.4	9.9	9.9	13.8	17.4	9.2
Cont. Torque 60°C Rise	Tc	N-m (lb-in)	9.72 (86.0)	9.72 (86.0)	9.72 (86.0)	13.4 (119.0)	13.4 (119.0)	13.6 (120.0)	13.6 (120.0)	16.6 (147.0)
Peak Stall Torque	Tp	N-m (lb-in)	22.7 (201.0)	30.1 (267.0)	22.8 (201.0)	31.0 (274.0)	42.6 (377.0)	31.4 (278.0)	34.8 (308.0)	41.2 (365.0)
Peak Line Current	Ip	Arms	20.0	28.7	28.0	20.0	29.7	28.0	40.0	20.0
Maximum Speed	Nmax	RPM	5,400	5,400	6,000	4,030	4,030	5,550	6,000	3,030
Weight	Wt	kg (lb)	8.9 (19.6)	8.9 (19.6)	8.9 (19.6)	11.1 (24.4)	11.1 (24.4)	11.1 (24.4)	11.1 (24.4)	13.3 (29.3)
Rotor Inertia	Jm	kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> )	16.9 (15.0E-03)	16.9 (15.0E-03)	16.9 (15.0E-03)	24.2 (21.4E-03)	24.2 (21.4E-03)	24.2 (21.4E-03)	24.2 (21.4E-03)	31.6 (28.0E-03)



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## AKM Motors & S600 Drives at 480 VAC

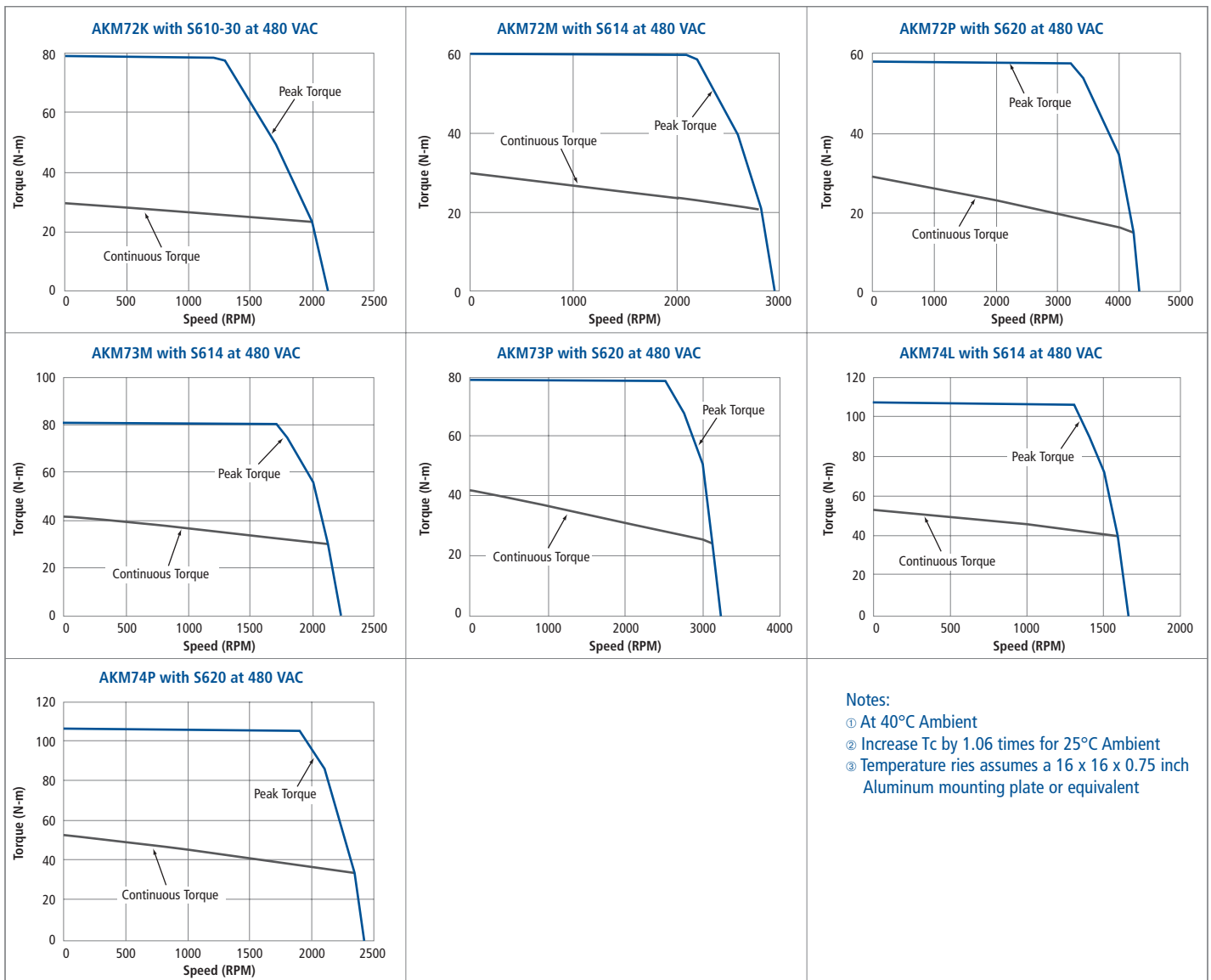
System Performance:	Symbol	Units	AKM64K	AKM64L	AKM64P	AKM65K	AKM65K	AKM65M	AKM65N	AKM72K
Cont. Stall Torque 100°C Rise	Tc	N-m (lb-in)	20.8 (184.0)	21.0 (186.0)	20.4 (180.0)	24.8 (219.0)	24.8 (219.0)	25.0 (221.0)	24.3 (215.0)	29.7 (263.0)
Cont. Stall Current 100°C Rise	Ic	Arms	9.2	12.8	18.6	9.8	9.8	13.6	17.8	9.3
Cont. Torque 60°C Rise	Tc	N-m (lb-in)	16.6 (147.0)	16.8 (147.0)	16.3 (144.0)	19.8 (175.0)	19.8 (175.0)	20.0 (177.0)	19.4 (172.0)	23.8 (211.0)
Peak Stall Torque	Tp	N-m (lb-in)	53.5 (474.0)	41.9 (371.0)	40.2 (355.0)	46.8 (414.0)	64.5 (571.0)	47.6 (421.0)	50.2 (444.0)	59.4 (526.0)
Peak Line Current	Ip	Arms	27.5	28.0	40.0	20.0	29.4	28.0	40.0	20.0
Maximum Speed	Nmax	RPM	3,030	4,160	6,000	2,710	2,710	3,720	5,000	2,130
Weight	Wt	kg (lb)	13.3 (29.3)	13.3 (29.3)	13.3 (29.3)	15.4 (33.9)	15.4 (33.9)	15.4 (33.9)	15.4 (33.9)	19.7 (43.4)
Rotor Inertia	Jm	kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> )	31.6 (28.0E-03)	31.6 (28.0E-03)	31.6 (28.0E-03)	40.0 (35.4E-03)	40.0 (35.4E-03)	40.0 (35.4E-03)	40.0 (35.4E-03)	64.5 (57.1E-03)



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## AKM Motors & S600 Drives at 480 VAC

System Performance:	Symbol	Units	AKM72K	AKM72M	AKM72P	AKM73M	AKM73P	AKM74L	AKM74P
Cont. Stall Torque 100°C Rise	Tc	N-m (lb-in)	29.7 (263.0)	30.0 (266.0)	29.4 (260.0)	42.0 (372.0)	41.6 (368.0)	53.0 (469.0)	52.5 (464.0)
Cont. Stall Current 100°C Rise	Ic	Arms	9.3	13.0	18.7	13.6	19.5	12.9	18.5
Cont. Torque 60°C Rise	Tc	N-m (lb-in)	23.8 (211.0)	24.0 (212.0)	23.5 (208.0)	33.6 (297.0)	33.3 (295.0)	42.4 (375.0)	42.0 (372.0)
Peak Stall Torque	Tp	N-m (lb-in)	79.2 (701.0)	59.8 (529.0)	58.4 (516.0)	80.7 (714.0)	79.4 (702.0)	108 (952.0)	106 (936.0)
Peak Line Current	Ip	Arms	27.8	28.0	40.0	28.0	40.0	28.0	40.0
Maximum Speed	Nmax	RPM	2,130	2,960	4,350	2,220	3,230	1,660	2,420
Weight	Wt	kg (lb)	19.7 (43.4)	19.7 (43.4)	19.7 (43.4)	26.7 (58.8)	26.7 (58.8)	33.6 (74.0)	33.6 (74.0)
Rotor Inertia	Jm	kg-cm <sup>2</sup> (lb-in-s <sup>2</sup> )	64.5 (57.1E-03)	64.5 (57.1E-03)	64.5 (57.1E-03)	94.1 (81.5E-03)	94.1 (81.5E-03)	120 (106.0E-03)	121 (106.0E-03)

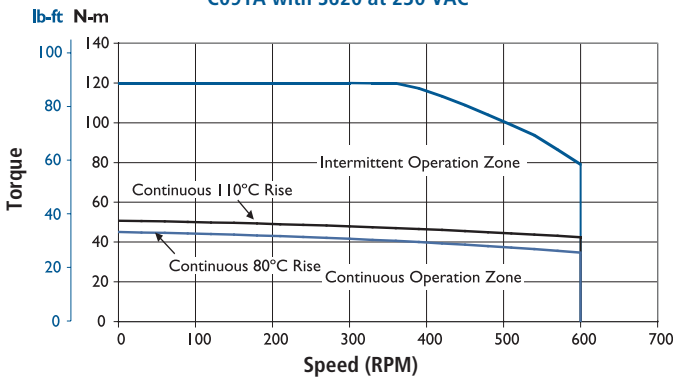


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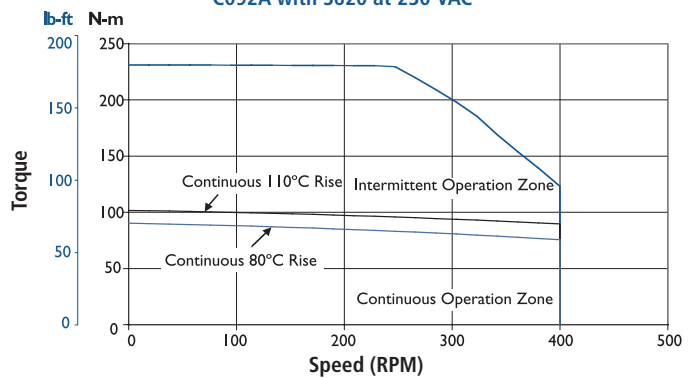
## CARTRIDGE DDR™ C09xA Motors & S620 Drives at 230 VAC

System Performance:	Symbol	Units	C091A	C092A	C093A
Cont. Torque 100°C Rise ①②③	Tc	N-m (lb-ft)	50.2 (37.0)	101 (74.8)	145 (107)
Cont. Line Current	Ic	Arms	12.8	15.3	17.4
Cont. Torque 80°C Rise ①②③	Tc	N-m (lb-ft)	44.7 (33.0)	90.2 (66.5)	129 (95.0)
Cont. Line Current	–	Arms	11.4	13.7	15.6
Peak Torque	Tp	N-m (lb-ft)	120 (88.2)	231 (170)	309 (228)
Peak Line Current	Ip	Arms	40.0	40.0	40.0
Maximum Speed	Nmax	RPM	600	400	300
Weight	Wt	kg (lb)	27.7 (61.0)	41.3 (91.0)	54.4 (120)
Rotor Inertia	Jm	kg-m <sup>2</sup> (lb-ft-s <sup>2</sup> )	0.028 (0.021)	0.047 (0.035)	0.066 (0.049)

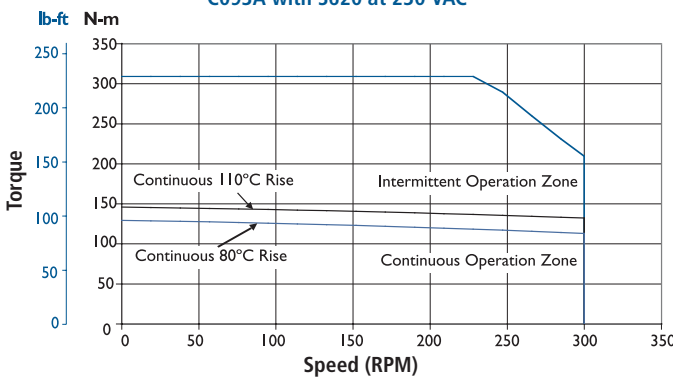
C091A with S620 at 230 VAC



C092A with S620 at 230 VAC



C093A with S620 at 230 VAC



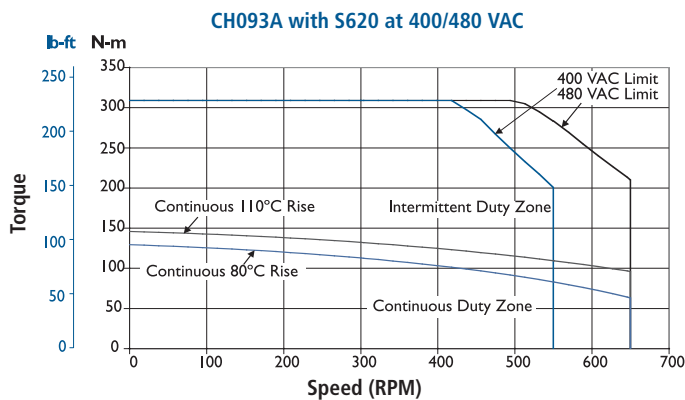
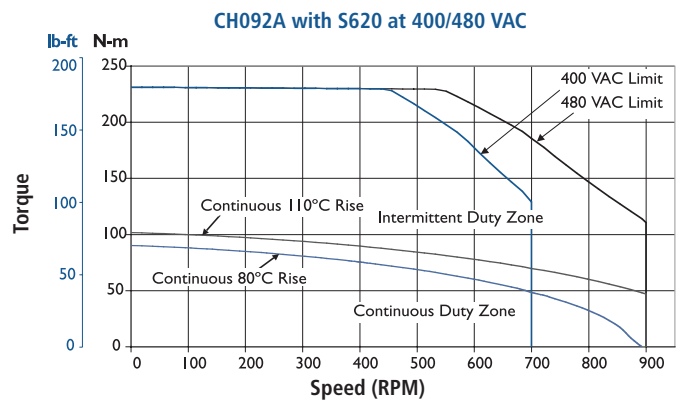
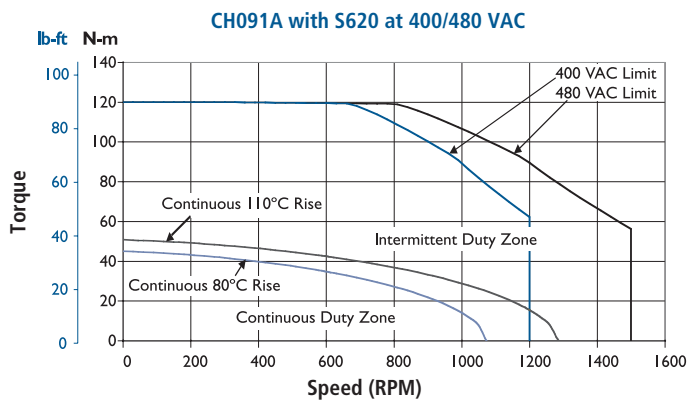
**Notes:**

- ① At 40°C Ambient
- ② Increase Tc by 1.06 times for 25°C Ambient
- ③ Temperature rises assumes a 16 x 16 x 0.75 inch Aluminum mounting plate or equivalent

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## CARTRIDGE DDR™ CH09xA Motors & S620 Drives at 400/480 VAC

System Performance:	Symbol	Units	CH091A	CH092A	CH093A
Cont. Torque 100°C Rise ①②③	T <sub>c</sub>	N-m (lb-ft)	50.2 (37.0)	101 (74.8)	145 (107)
Cont. Line Current	I <sub>c</sub>	Arms	12.8	15.3	17.4
Cont. Torque 80°C Rise ①②③	T <sub>c</sub>	N-m (lb-ft)	44.7 (33.0)	90.2 (66.5)	129 (95.0)
Cont. Line Current	–	Arms	11.4	13.7	15.6
Peak Torque	T <sub>p</sub>	N-m (lb-ft)	120 (88.2)	231 (170)	309 (228)
Peak Line Current	I <sub>p</sub>	Arms	40.0	40.0	40.0
Maximum Speed (400V)	N <sub>max</sub>	RPM	1200	700	550
Maximum Speed (480V)	N <sub>max</sub>	RPM	1500	900	650
Weight	W <sub>t</sub>	kg (lb)	27.7 (61.0)	41.3 (91.0)	54.4 (120)
Rotor Inertia	J <sub>m</sub>	kg-m <sup>2</sup> (lb-ft-s <sup>2</sup> )	0.028 (0.021)	0.047 (0.035)	0.066 (0.049)

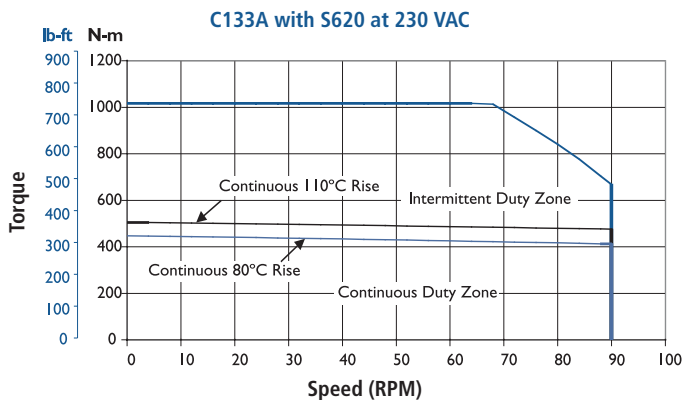
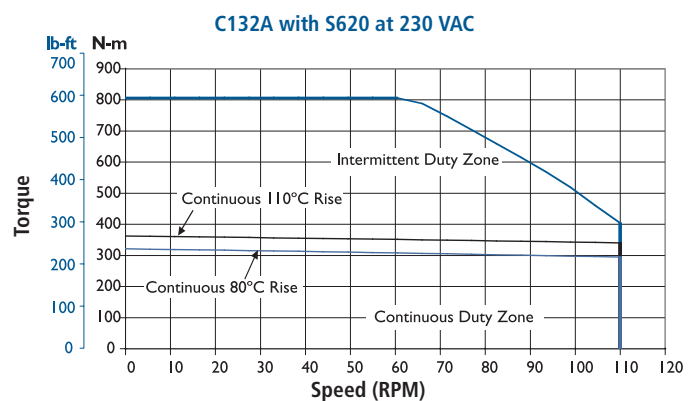
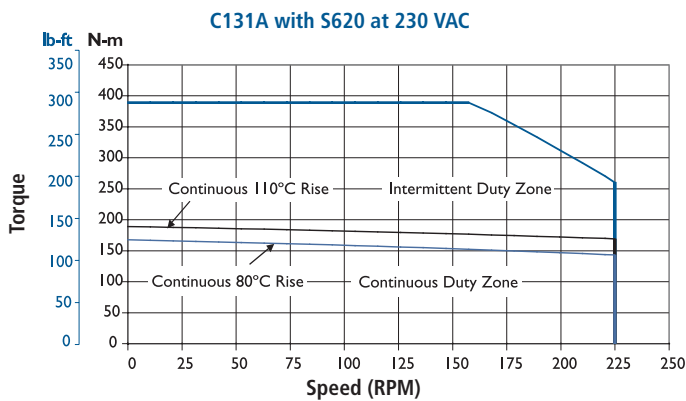


### Notes:

- ① At 40°C Ambient
- ② Increase T<sub>c</sub> by 1.06 times for 25°C Ambient
- ③ Temperature rise assumes a 16 x 16 x 0.75 inch Aluminum mounting plate or equivalent

## CARTRIDGE DDR™ C13xA Motors & S620 Drives at 230 VAC

System Performance:	Symbol	Units	C131A	C132A	C133A
Cont. Torque 100°C Rise ①②③	Tc	N-m (lb-ft)	188 (139)	361 (266)	504 (372)
Cont. Line Current	Ic	Arms	15.6	13.9	16.8
Cont. Torque 80°C Rise ①②③	Tc	N-m (lb-ft)	167 (123)	320 (236)	447 (330)
Cont. Line Current	–	Arms	13.8	12.4	14.9
Peak Torque	Tp	N-m (lb-ft)	389 (287)	806 (595)	1016 (750)
Peak Line Current	Ip	Arms	40.0	40.0	40.0
Maximum Speed	Nmax	RPM	225	110	90
Weight	Wt	kg (lb)	63.5 (140)	101 (223)	132 (292)
Rotor Inertia	Jm	kg-m <sup>2</sup> (lb-ft-s <sup>2</sup> )	0.124 (0.091)	0.225 (0.166)	0.302 (0.223)



**Notes:**

- ① At 40°C Ambient
- ② Increase Tc by 1.06 times for 25°C Ambient
- ③ Temperature rises assumes a 16 x 16 x 0.75 inch Aluminum mounting plate or equivalent

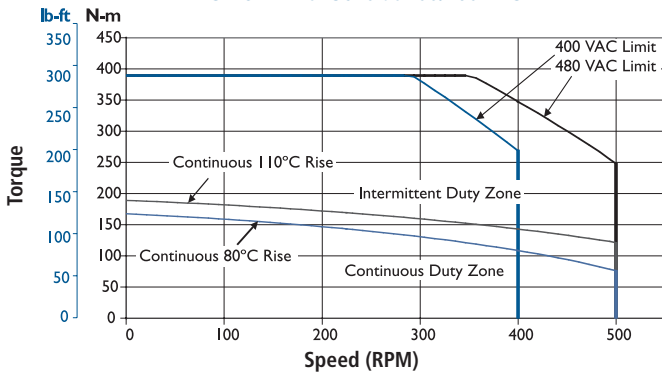
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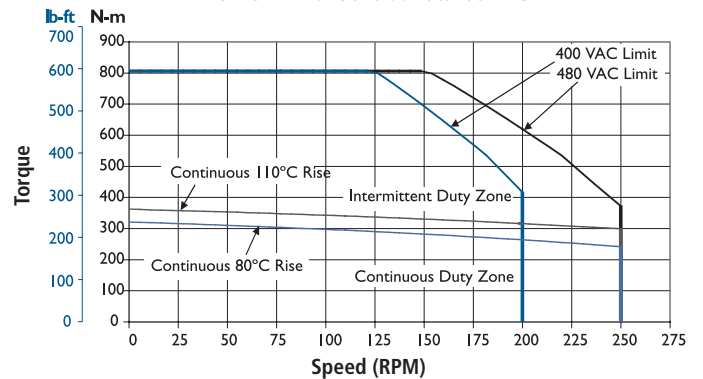
## CARTRIDGE DDR™ CH13xA Motors & S620 Drives at 400/480 VAC

System Performance:	Symbol	Units	CH131A	CH132A	CH133A
Cont. Torque 100°C Rise ①②③	Tc	N-m (lb-ft)	188 (139)	361 (266)	504 (372)
Cont. Line Current	Ic	Arms	15.6	13.9	16.8
Cont. Torque 80°C Rise ①②③	Tc	N-m (lb-ft)	167 (123)	320 (236)	447 (330)
Cont. Line Current	–	Arms	13.8	12.4	14.9
Peak Torque	Tp	N-m (lb-ft)	389 (287)	806 (595)	1016 (750)
Peak Line Current	Ip	Arms	40.0	40.0	40.0
Maximum Speed (400V)	Nmax	RPM	400	200	160
Maximum Speed (480V)	Nmax	RPM	500	250	200
Weight	Wt	kg (lb)	63.5 (140)	101 (223)	132 (292)
Rotor Inertia	Jm	kg-m <sup>2</sup> (lb-ft-s <sup>2</sup> )	0.124 (0.091)	0.225 (0.166)	0.302 (0.223)

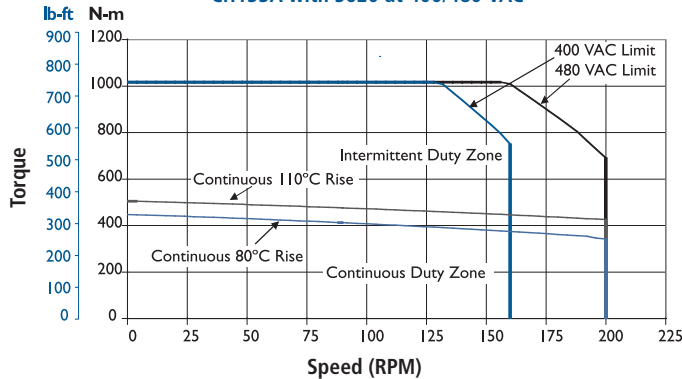
CH131A with S620 at 400/480 VAC



CH132A with S620 at 400/480 VAC



CH133A with S620 at 400/480 VAC



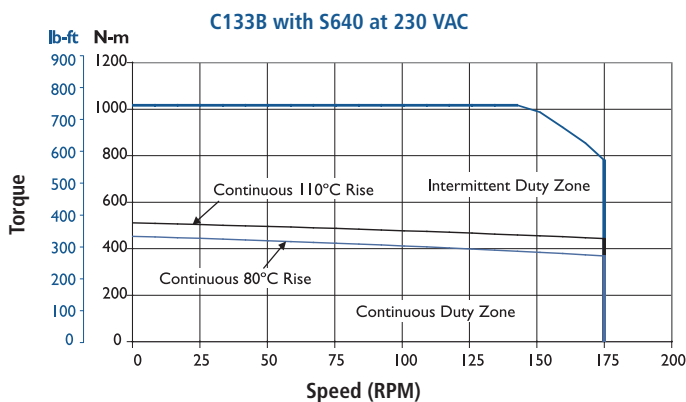
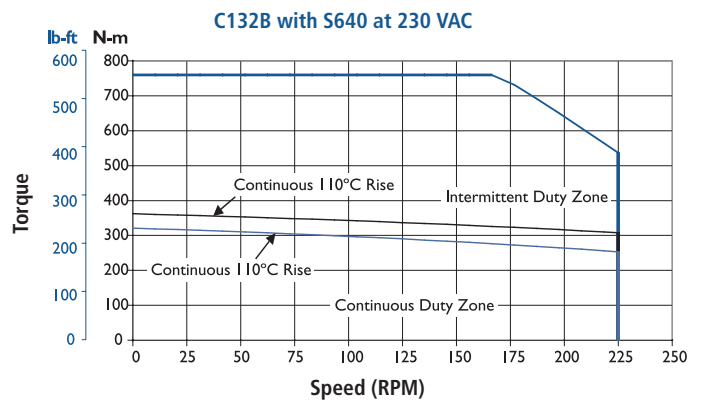
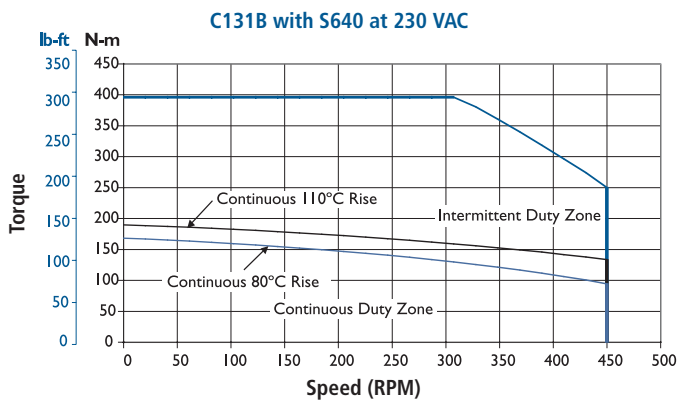
**Notes:**

- ① At 40°C Ambient
- ② Increase Tc by 1.06 times for 25°C Ambient
- ③ Temperature rises assumes a 16 x 16 x 0.75 inch Aluminum mounting plate or equivalent

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## CARTRIDGE DDR™ C13xB Motors (High Speed Winding) & S640 Drives at 230 VAC

System Performance:	Symbol	Units	C131B	C132B	C133B
Cont. Torque 100°C Rise ①②③	Tc	N-m (lb-ft)	190 (140)	361 (266)	504 (372)
Cont. Line Current	Ic	Arms	29.2	29.6	32.7
Cont. Torque 80°C Rise ①②③	Tc	N-m (lb-ft)	168 (124)	320 (236)	451 (333)
Cont. Line Current	–	Arms	25.9	26.3	29.0
Peak Torque	Tp	N-m (lb-ft)	396 (292)	759 (560)	1017 (750)
Peak Line Current	Ip	Arms	80.0	80.0	80.0
Maximum Speed	Nmax	RPM	450	225	175
Weight	Wt	kg (lb)	63.5 (140)	101 (223)	132 (292)
Rotor Inertia	Jm	kg-m <sup>2</sup> (lb-ft-s <sup>2</sup> )	0.124 (0.091)	0.225 (0.166)	0.302 (0.223)



**Notes:**

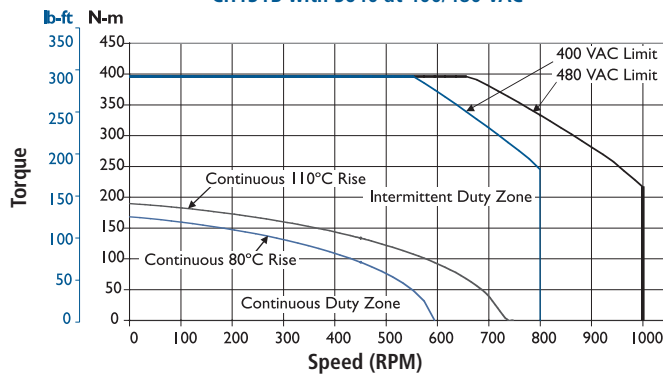
- ① At 40°C Ambient
- ② Increase Tc by 1.06 times for 25°C Ambient
- ③ Temperature rise assumes a 16 x 16 x 0.75 inch Aluminum mounting plate or equivalent

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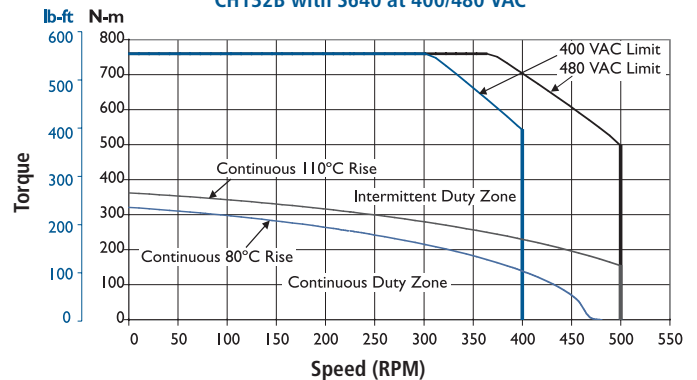
## CARTRIDGE DDR™ CH13xB Motors (High Speed Winding) & S640 Drives at 400/480 VAC

System Performance:	Symbol	Units	CH131B	CH132B	CH133B
Cont. Torque 100°C Rise ①②③	T <sub>c</sub>	N-m (lb-ft)	190 (140)	361 (266)	504 (372)
Cont. Line Current	I <sub>c</sub>	Arms	29.2	29.6	32.7
Cont. Torque 80°C Rise ①②③	T <sub>c</sub>	N-m (lb-ft)	168 (124)	320 (236)	451 (333)
Cont. Line Current	–	Arms	25.9	26.3	29.0
Peak Torque	T <sub>p</sub>	N-m (lb-ft)	396 (292)	759 (560)	1017 (750)
Peak Line Current	I <sub>p</sub>	Arms	80.0	80.0	80.0
Maximum Speed (400V)	N <sub>max</sub>	RPM	800	400	350
Maximum Speed (480V)	N <sub>max</sub>	RPM	1000	500	400
Weight	W <sub>t</sub>	kg (lb)	63.5 (140)	101 (223)	132 (292)
Rotor Inertia	J <sub>m</sub>	kg-m <sup>2</sup> (lb-ft-s <sup>2</sup> )	0.124 (0.091)	0.225 (0.166)	0.302 (0.223)

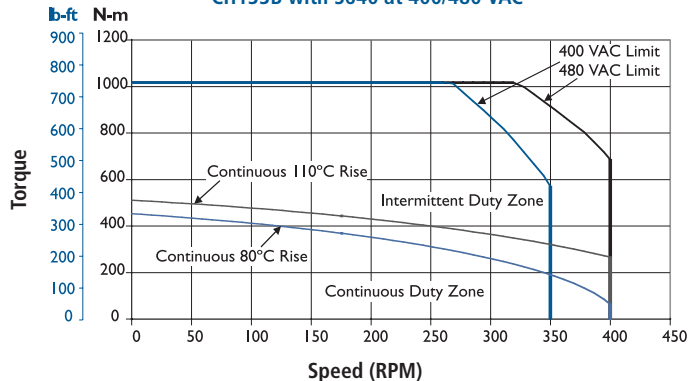
### CH131B with S640 at 400/480 VAC



### CH132B with S640 at 400/480 VAC

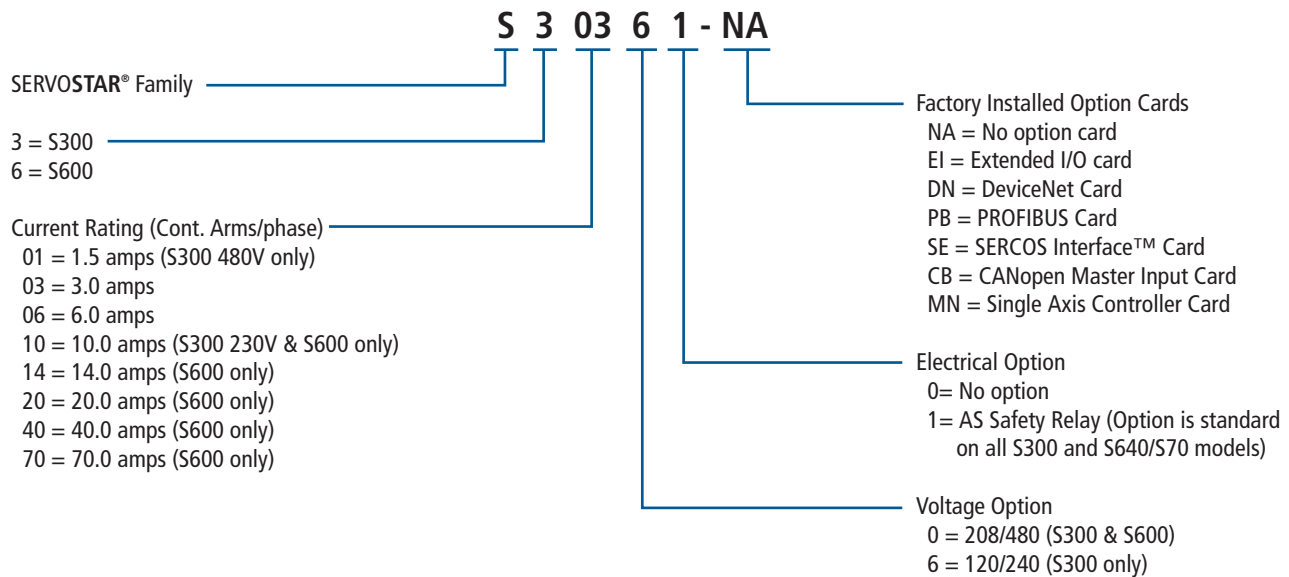


### CH133B with S640 at 400/480 VAC



#### Notes:

- ① At 40°C Ambient
- ② Increase T<sub>c</sub> by 1.06 times for 25°C Ambient
- ③ Temperature rise assumes a 16 x 16 x 0.75 inch Aluminum mounting plate or equivalent



## Accessories

### Option Cards:

OPT-EI = Extended I/O card for field installation  
 OPT-DN = DeviceNet Card for field installation  
 OPT-PB = PROFIBUS Card for field installation  
 OPT-SE = SERCOS Card for field installation  
 OPT-CB = CANopen Master Input Card for field installation  
 OPT-MN = Single Axis Controller Card for field installation

### External Regeneration Resistors:

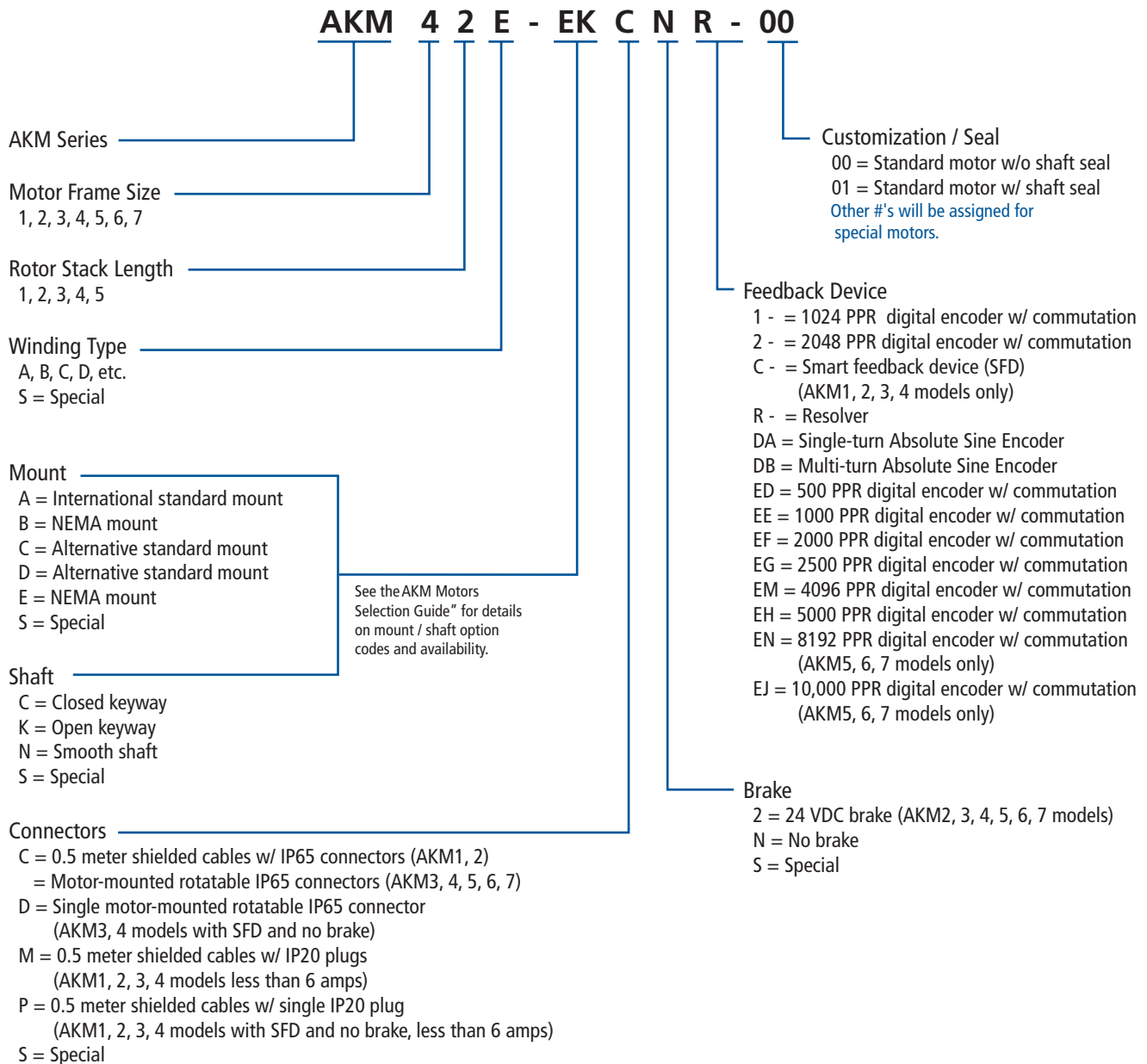
BAR-300-66 = 300 Watts, 66 Ohms (for S30361, S30661, S31061)  
 BAR-600-66 = 600 Watts, 66 Ohms (for S30661, S31061)  
 BAR-1000-66 = 1000 Watts, 66 Ohms (for S30661, S31061)  
 BAR-300-91 = 300 Watts, 91 Ohms (for S30101, S30301, S30601)  
 BAR-600-91 = 600 Watts, 91 Ohms (for S30301, S30601)  
 BAR-1000-91 = 1000 Watts, 91 Ohms (for S30301, S30601)  
 BAR-250-33 = 250 Watts, 33 Ohms (for S603, 606, 610, 614, 620)  
 BAR-500-33 = 500 Watts, 33 Ohms (for S603, 606, 610, 614, 620)  
 BAR-1500-33 = 1500 Watts, 33 Ohms (for S606, 610, 614, 620)  
 BAR-2000-15 = 2000 Watts, 15 Ohms (for S640)  
 BAR-3000-15 = 3000 Watts, 15 Ohms (for S640)  
 BAR-6000-15 = 6000 Watts, 15 Ohms (for S640)  
 BAR-2000-10 = 2000 Watts, 10 Ohms (for S670)  
 BAR-3000-10 = 3000 Watts, 10 Ohms (for S670)  
 BAR-6000-10 = 6000 Watts, 10 Ohms (for S670)

### Mains Line Filters and Chokes:

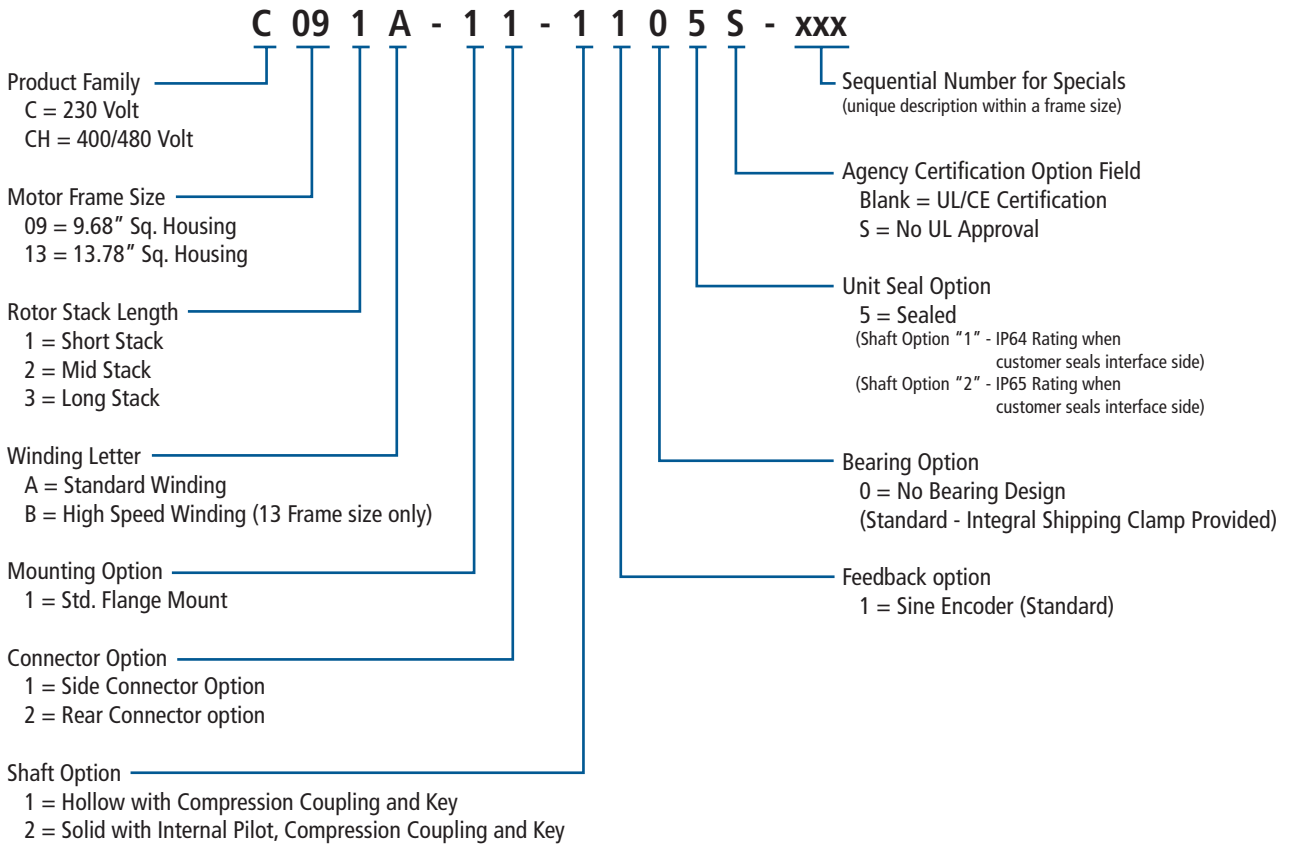
LF-42 = 42 Amp Mains Interference Suppression Filter 3EF-42 (for S640)  
 LF-75 = 75 Amp Mains Interference Suppression Filter 3EF-75 (for S670)  
 LF-100 = 100 Amp Mains Interference Suppression Filter 3EF-100 (for S640)  
 LF-130 = 130 Amp Mains Interference Suppression Filter 3EF-130 (for S640/S670)  
 3YL-20 = Motor Choke (S603, 606, 610, 614, and 620)  
 LC-60 = 60 Amp, .5mH Mains Choke 3LO.5-60 (for S640)  
 LC-75 = 75 Amp, .4mH Mains Choke 3LO.5-60 (for S670)  
 LC-100 = 100 Amp, .3mH Mains Choke 3LO.5-60 (for S640)  
 LC-130 = 130 Amp, .2mH Mains Choke 3LO.5-60 (for S640/S670)

### Communications Cables/Connectors:

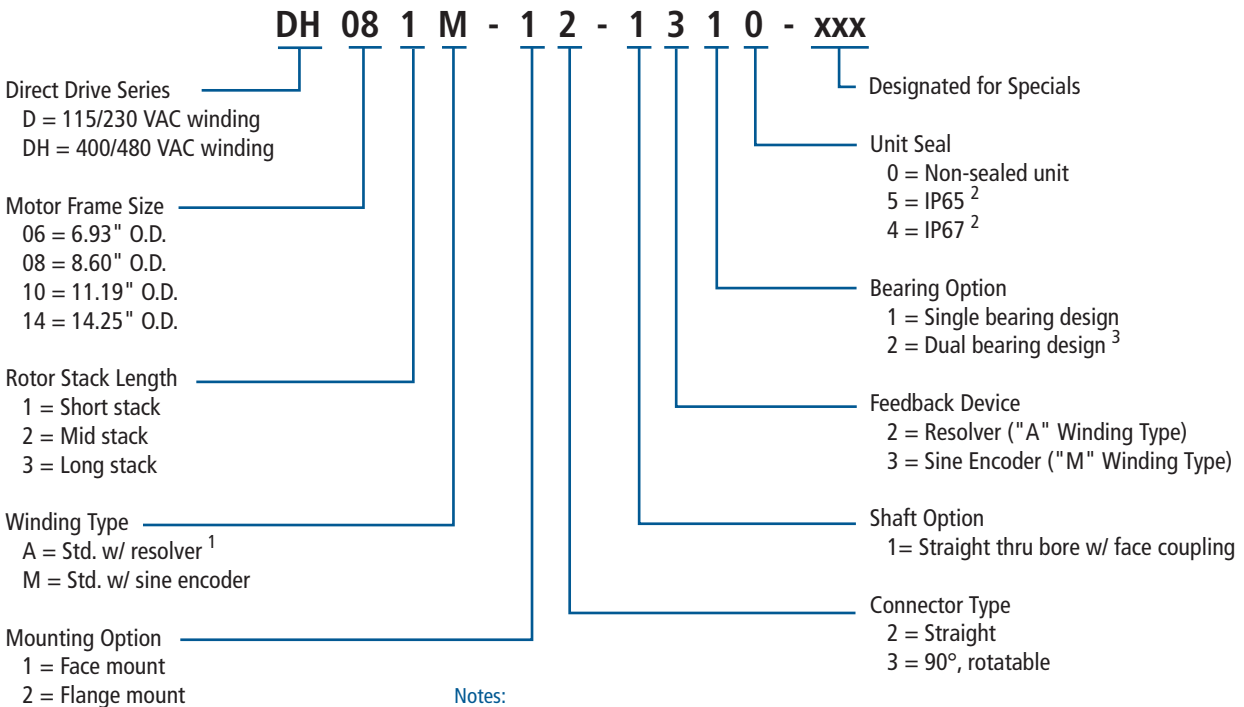
A-922505 = RS-232 communications cable  
 A-SR6Y = RS-232 Multi-link cable for connecting PC to up to 4 drives  
 CAN-LPT1 = CAN Dongle (Parallel Port)  
 CAN-USB = CAN Dongle (USB Port)  
 CAN-002 = CAN Dongle Cable  
 S6-HALL = HALL Dongle (S600 only)  
 CON-S3X0L = Mating connector for X0 (S30x61 only)  
 CON-S3X0H = Mating connector for X0 (S30x01 only)  
 CON-S3X3 = Mating connector for X3 (S300 only)  
 CON-S3X4 = Mating connector for X4 (S300 only)  
 CON-S3X8L = Mating connector for X8 (S30x61 only)  
 CON-S3X8H = Mating connector for X8 (S30x01 only)  
 CON-S3X9L = Mating connector for X9 (S30x61 only)  
 CON-S3X9H = Mating connector for X9 (S30x01 only)  
 CON-S6X0A = Mating connector for X0A (S600 only)  
 CON-S6X0B = Mating connector for X0B (S600 only)  
 CON-S6X1 = Mating connector for X1 (S600 only)  
 CON-S6X2 = Mating connector for X2 (S300/S600)  
 CON-S6X3 = Mating connector for X3 (S600 only)  
 CON-S6X4 = Mating connector for X4 (S600 only)  
 CON-S6X4A = Mating connector for X4A (S640/S670 only)  
 CON-S6X7 = Mating connector for X7 (S600 only)  
 CON-S6X8 = Mating connector for X8 (S600 only)  
 CON-S6X9 = Mating connector for X9 (S600 only)



CARTRIDGE DDR™ Series Servomotors



Kollmorgen GOLDLINE® DDR Series Servomotors

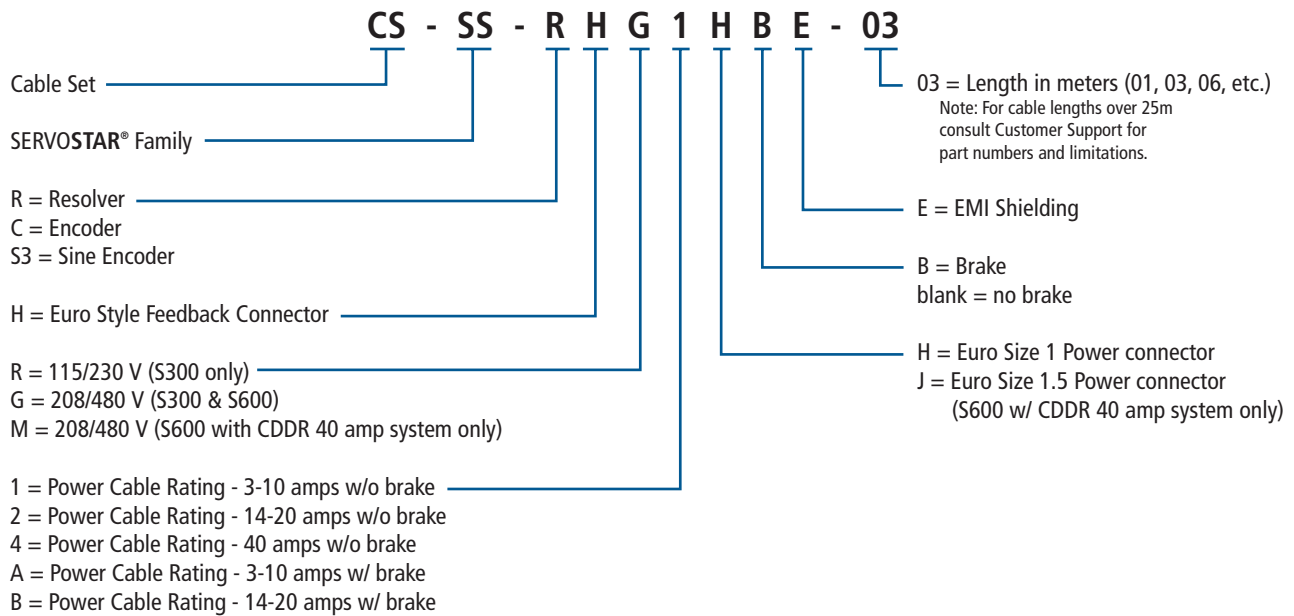


Notes:

<sup>1</sup> All models except D14x & DH14x. <sup>2</sup> Resolver models only. <sup>3</sup> Standard on D143 & DH143 models.

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## Build a Danaher Motion Cable Set



Note: Cable current ratings are the continuous value of the motor matched with the continuous value of the drive.

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