CENTURION DSA DRIVES AND MOTORS

MOTION SOLUTIONS PRODUCT GUIDE

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Giddings & Lewis

Centurion DSA Drives and Motors
Motion Solutions Product Guide

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Version 1.0

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CENTURION DSA DRIVES AND MOTORS
MOTION SOLUTIONS PRODUCT GUIDE

Centurion™ DSA Drives and Accessories

230 VAC Standard Size

230 VAC Micro Size

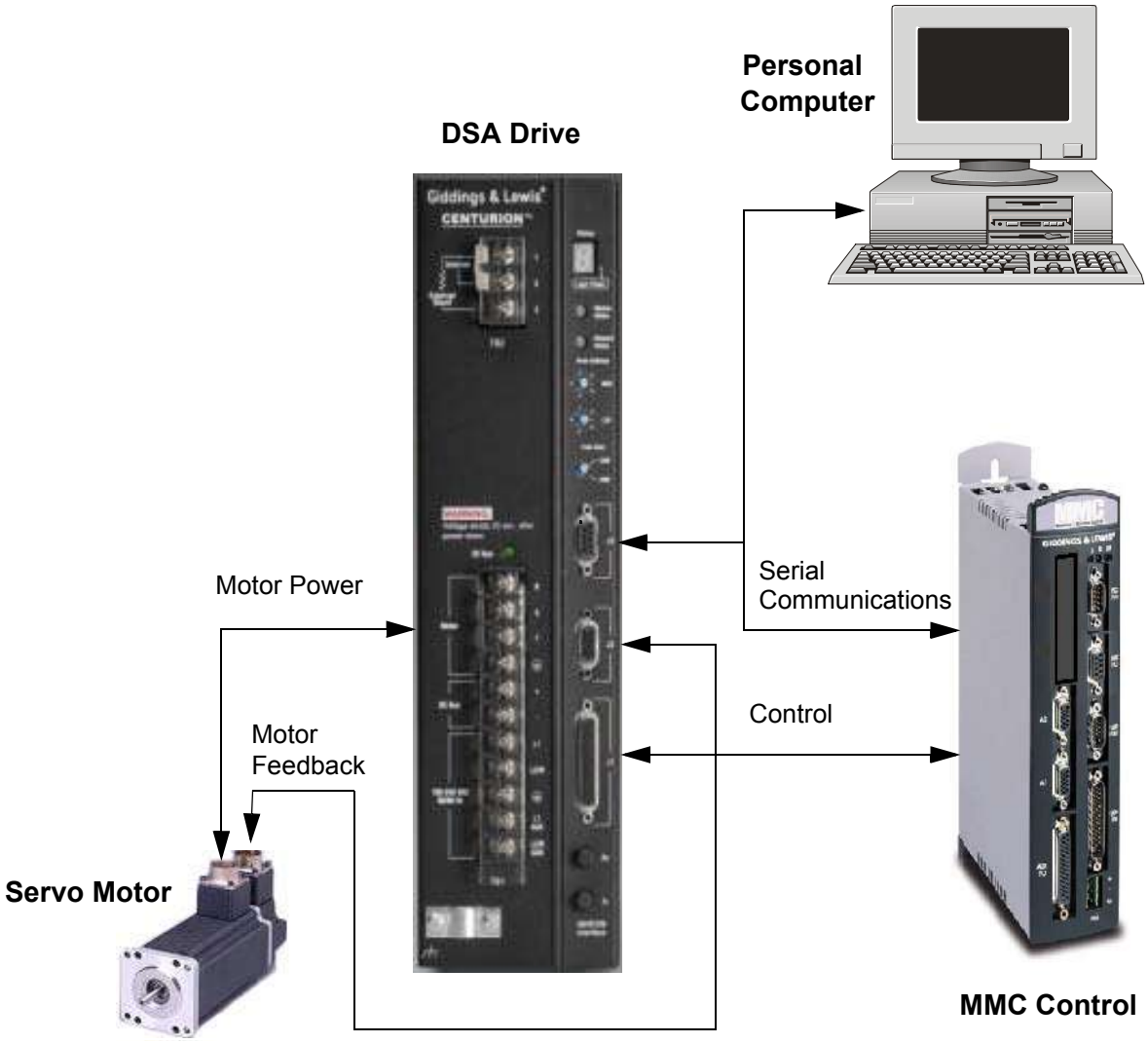
460 VAC Standard Size

The DSA family of servo amplifiers provides both 230 VAC and 460 VAC solutions for applications ranging from 500 watts to 22 kilowatts of power. The common control design allows interchangeable cabling between the various drive packages. Common features and functionality throughout the family simplifies application.

DSA - Digital Servo Drives

The Giddings & Lewis Centurion DSA line is a family of versatile universal drives. These feature-rich, high performance drives offer flexibility in a wide range of applications. The DSA is called a universal drive because of its ability to act as an analog input velocity servo, variable speed drive, stepper drive replacement or master encoder follower complete with electronic gearing. Optional positioning drives (-P) provide complete single axis motion control solutions with internal storage of up to 64 selectable index moves. The SERCOS communication option (-S) provides a fiber optic motion communication network for applications of up to 32 synchronized axes.

The Windows based interface, DSAPro, provides you with a powerful configuration and diagnostic tool to improve your productivity when integrating DSA Drives into your machine. The common cabling, functionality and interface throughout the DSA family will drive down your life cycle costs when you standardize on the Centurion DSA drives.



The Centurion DSA has the unique flexibility to operate a wide variety of motors so you can optimize the motor/drive system for your application. Through DSAPro, a Giddings & Lewis standard motor file can be selected with the click of the mouse. The drive then automatically configures itself as an AC brushless servo drive. The majority of the motor families come standard with a 2000 line incremental encoder but also have a high resolution option. This single and multiturn absolute high resolution encoder, used in conjunction with a DSA drive, provides superior low speed performance for the most demanding applications.

Universal Drive

- Can be configured for a variety of command sources:
  - Analog velocity input
  - Preset positions, torques, or velocities
  - Step and direction
  - Master encoder following
  - Digital serial commands
- Drives brushless motors by simple set-up
- The same features, cabling and performance available in a range of both micro drives and standard sized drives

Easy Set-up and Maintenance

- Windows-based DSAPro software provides a complete set of troubleshooting and diagnostic tools.
- All setup and tuning parameters are saved in a non-volatile personality module.
- All drive configuration and tuning parameters can be set up off-line and saved to disk..

Industry Leading Performance

- Advanced speed control algorithms for superior control
- Velocity loop bandwidth up to 400Hz
- High frequency and high resolution encoder input capability

Reliability

- Tested for vibration, shock, humidity and temperature
- Built in protection circuitry safeguards your system
- Wireless construction
- Highly integrated hardware design with custom ASICS and Intelligent Power Modules (IPM)

Global Standards

- UL and cUL listed
- CE marked for European requirements for low voltage and electromagnetic compatibility directives
- Designed and manufactured in an ISO9001 certified plant

Micro DSA Drive Features

The Micro DSA drives deliver full-featured flexibility and performance in a very compact size. This space-saving drive is also a time saver with its easy to use Windows-based DSAPro software tool. For superior performance in a variety of power ratings and sizes, the Micro DSA is the one drive that can do it all.

- Available in 0.5 kW, 1.0 kW and 2.0 kW continuous output power ratings
- Superior performance and functionality of larger drives in a package 1/4 of their size
- 100 to 240V AC single phase input
- Choice of command source:
  - +/- 10V analog input
  - Step/direction input (also step up/step down) with electronic gearing
  - Auxiliary master encoder input with electronic gearing
  - Sixty-four preset positions/speeds/torques selected via six digital input lines
  - SERCOS motion network
  - RS-232/485 commands
- External active shunt available
- Phase to phase and phase to ground short circuit protection
- Drives sinusoidal AC brushless motors
- Advanced control algorithms for leading edge velocity loop bandwidth. All current, velocity, and position loops are digital
- Large scale integration with custom ASICs and IPMs for performance and reliability
- Internally shielded output filter for electromagnetic compatibility (EMC)
- 8 user-selectable, optically isolated digital inputs and 4 outputs (sourcing/active high)
- 1 relay output
- 1 analog input for external current limit
- 1 analog output for variable monitoring or torque sharing
- Serial port for RS232/485 host communications
- Scalable motor encoder output
- UL, cUL listed and CE marked

NOTE: The use of an external AC line filter, and Giddings & Lewis shielded cables are required for CE compliance.

DSA100/230 VAC Drive Features

The DSA100 standard sized drives deliver full-featured flexibility and an impressive range of power and performance. Whether you need an analog input velocity servo, a variable speed drive, a stepper drive replacement, or a master encoder follower, the DSA100 is the one drive that can do it all.

- Available in 3.0, 7.5 and 15 kW continuous output power ratings
- 100 to 240 VAC single phase input (single phase or three phase for the 75 amp version
- Drives sinusoidal AC brushless motors
- Choice of command source:
  - +/- 10V analog input
  - Step/direction input (also step up/step down) with electronic gearing
  - Auxiliary master encoder input with electronic gearing
  - Sixty-four preset positions/speeds/torques selected via six digital input lines
  - SERCOS motion network
  - RS-232/485 commands
- Feedback options: Incremental encoder, single turn high res (1,000,000 cts. rev), multiturn absolute (1,000,000 cts/rev)
- Phase to phase and phase to ground short circuit protection
- Internal or external resistive shunt
- Auxiliary AC input to power logic only
- Advanced design for leading edge velocity loop bandwidth, all digital current, velocity and position loops
- Large scale integration with custom ASICs and IPMs for performance and reliability
- Flash memory for simple field upgrades
- Personality module to store set-up parameters and simplify drive replacement
- Wireless construction for reliability
- Internally shielded filters for electromagnetic compatibility (EMC)
- 8 inputs, 4 outputs, 1 relay output
- 1 analog input for external current limit
- 1 analog output for variable monitoring or torque sharing
- 1 serial connector for RS232 serial or RS485 multi-dropping and host communications
- Scalable motor encoder output
- UL, cUL listed and CE marked

NOTE: The use of an external AC line filter and Giddings & Lewis shielded cables are required for CE compliance.

DSA 460 VAC Drive Features

The DSA460 standard sized drives deliver full-featured flexibility and an impressive range of power and performance. Whether you need an analog input velocity servo, a variable speed drive, a stepper drive replacement, or a master encoder follower, the DSA is the one drive that can do it all.

- Available in 3.0, 5.0, 10.0, 15, and 22 kW continuous output power ratings
- 207 - 258V AC three phase input
- Drives sinusoidal AC brushless motors
- Choice of command source:
  - +/- 10V analog input
  - Step/direction input (also step up/step down) with electronic gearing
  - Auxiliary master encoder input with electronic gearing
  - Sixty-four preset positions/speeds/torques selected via six digital input lines
  - SERCOS motion network
  - RS-232/485 commands
- Feedback options: incremental encoder, single-turn high res (1,000,000 cts/rev}, multiturn absolute (1,000,000 cts/rev)
- Phase to phase and phase to ground short circuit protection
- Internal or external resistive shunt
- Auxiliary AC input to power logic only
- Advanced design for leading edge velocity loop bandwidth, all digital current, velocity and position loops
- Large scale integration with custom ASICs and IPMs for performance and reliability
- Flash memory for simple field upgrades
- Personality module to store set-up parameters and simplify drive replacement
- Wireless construction for reliability
- Internally shielded filters for electromagnetic compatibility (EMC)
- 8 inputs, 4 outputs and 1 relay output
- 1 analog input for external current limit
- 1 analog output for variable monitoring or torque sharing
- 1 serial connector for R232 serial or RS485 multi-dropping and host communications
- Scalable motor encoder output
- UL, cUL listed and CE marked

NOTE: The use of an external AC line filter and Giddings & Lewis shielded cables are required for CE compliance.

Optional SERCOS Feature for DSA Drives

With the optional SERCOS interface, the DSA drives can be configured to operate as a slave device on a SERCOS ring. High-speed fiber optic communication allows up to thirty-two axes per ring. Wiring between the controller and the drive is greatly simplified. Noise problems are eliminated.

The DSA SERCOS drives deliver full-featured flexibility and an impressive range of power and performance.

- Available in all package sizes: Micro, Standard 230 VAC, and Standard 460 VAC
- Available in .5, 1.0, 2.0, 3.0, 7.5, 15, and 22 kW continuous output power ratings
- 100 to 240 VAC single phase input (single phase or three phase for the 75 amp version) and 460 VAC version
- Drives sinusoidal AC brushless motors
- Auxiliary master encoder input
- Phase-to-phase and phase-to-ground short circuit protection
- Internal or external resistive shunt
- Auxiliary AC input to power logic only
- Advanced design for leading edge control
- All digital current, velocity and position loops
- Large scale integration with custom ASICs and IPMs for performance and reliability
- Flash memory for simple field upgrades
- Wireless construction for reliability
- Internally shielded filters for electromagnetic compatibility (EMC)
- Scalable motor encoder input and output
- UL, cUL listed and CE marked

  NOTE: the use of an external AC line filter and Giddings and Lewis shielded cables are required for CE compliance

Other features which can be accessed through SERCOS IDNs:

- Eight dedicated optically isolated digital inputs, which include two high-speed inputs for registration or probing
- One analog input for monitoring feedback from dancer, tension, or pressure measuring devices

DSAPro

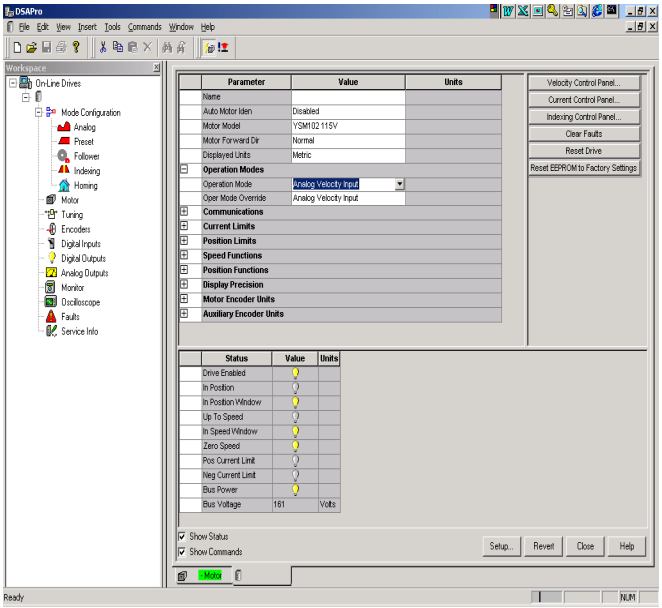
DSAPro is a convenient point-and-click software interface for customizing the features in the Centurion DSA drives to best fit your application. Suitable for any PC with Windows 95 or later system software. It is used to configure, monitor, and troubleshoot a servo system. The on-line help and quick startup windows will simplify your setup while tools such as the on-screen digital oscilloscope provide simplified tuning and diagnosis. It also provides a full array of on-screen meters and other software tools for rapid debugging and measurement. DSA drive keeps error messages in its own non-volatile message buffer to save time in tracking down a problem. In systems with multiple drives, DSAPro can simultaneously display status and configuration screens for all drives that are on an RS485 or RS232 link. DSAPro can also be used off-line to configure a drive and save the set-up to disk for later downloading to a drive.

The commands available in DSAPro can be obtained by contacting Giddings & Lewis Technical Support.

DSAPro Sample Screens

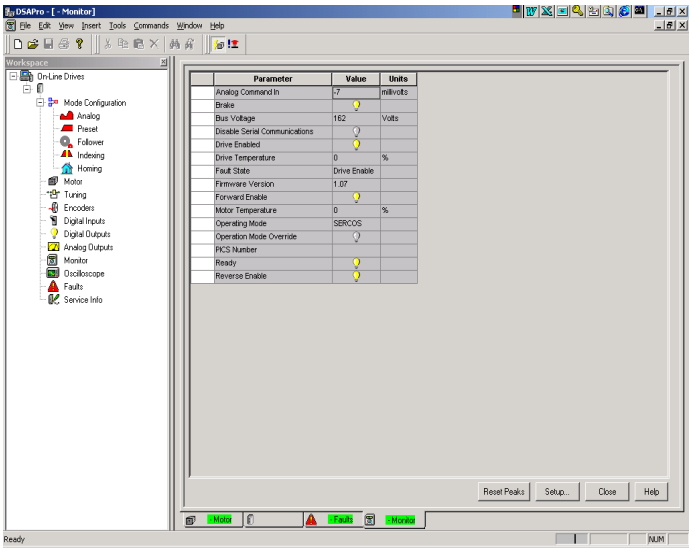
DSAPro has a complete set of easy to understand windows available from its pull down menus. Examples of DSAPro screens are shown below. (The examples shown are using a Centurion DSA drive.)

Modes of Operation



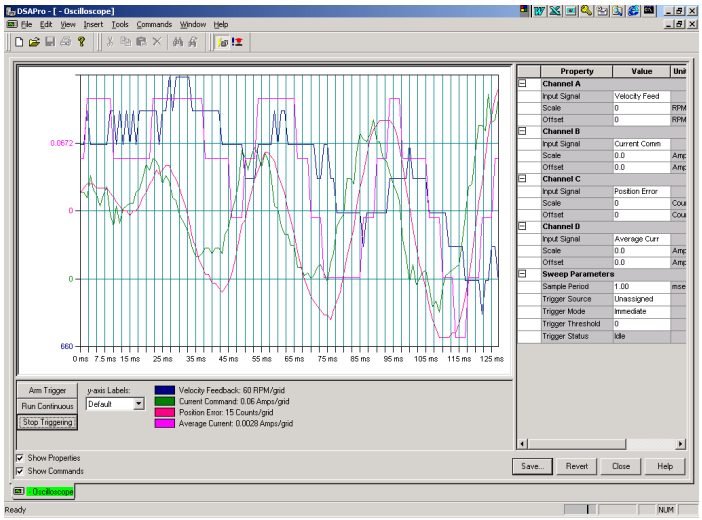
Modes of Operation - Choosing the desired setup for the servo drive is simple. Navigate to the desired setup using Explorer like tools. Select items from pulldown menus, or simply check a box to enable the feature.

Diagnostic Capabilities



Diagnostic Capabilities - Diagnostics are simple data displays with light indicators for inputs, outputs and status. Virtually all data and status information can be accessed by simply clicking on the "Setup" button, then browsing for the information you wish to display.

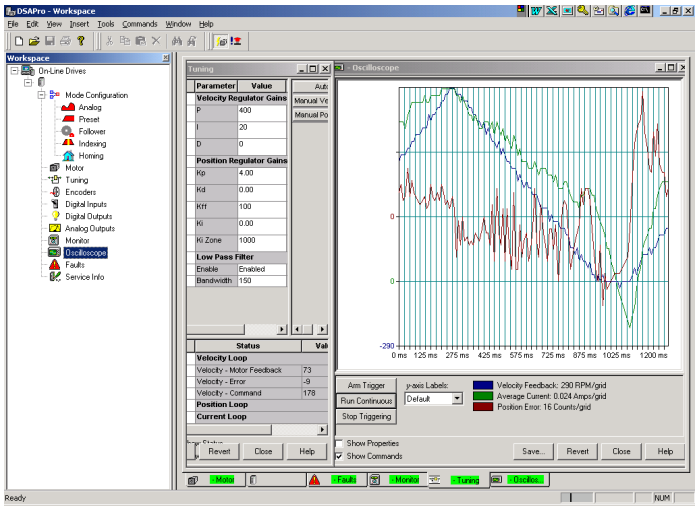
Oscilloscope



Built-In Four-Channel Oscilloscope.

The four-channel oscilloscope allows the user to capture all important information from the servo drive. The oscilloscope can be set up to capture the usual velocity, current, and position signals. Additionally, the inputs and outputs can be captured and displayed. Virtually all drive information can be captured and displayed on the oscilloscope. The captured data can also be saved as ASCII text for further analysis.

Tuning



Tuning.

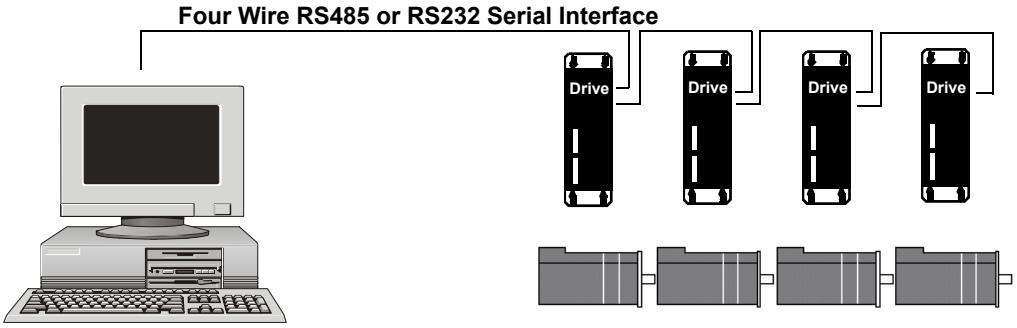
The system is easily and accurately tuned by using the simple PID tuning adjustment window, and the oscilloscope features.

Part Number
DSA Pro - M.1300.7655

Host Mode

The DSA's Host Command protocol provides optional drive configuration using the drive's Serial Communications Interface. This powerful feature allows your controller to access all of the drive's digital controls using sequences of ASCII characters. The protocol includes error checking to ensure the integrity of the transmitted commands.

In installations which have multiple axes, up to 99 DSA Drives can be addressed by a host computer. These drives communicate with the host computer using a four wire RS-485 or two wire RS-232 interface. The Host Command protocol includes specific drive addressing which allows the host to communicate with all the connected drives concurrently.



PC Configuration

DSA Requirements:

- IBM-compatible PC with Pentium or higher microprocessor
- Windows 95, 98, 2000 or Windows NT 4.0 operating system (or higher)
- 24 MB RAM (or higher)
- 50 MB hard disk space
- VGA monitor running in standard 640x480 resolution (SGVA 800x600 resolution recommended
- One CD-ROM drive
- Windows-compatible mouse with mouse driver
- One serial port to communicate with the drive
- A second serial port if using a serial mouse
- Microsoft Internet Explorer browser 4.0 or higher required to access on-line help (IE is included in Windows 98 and Windows 2000)

DSA Drive Specifications

General Power Specifications and Requirements

The tables below list general power specifications and requirements for the DSA 230V drives.

Specification	Description		
	DSA007-230-x	**DSA015-230-x**	**DSA030-230-x**
AC Input Voltage[1]	100-240V_{rms} Single Phase		
AC Input Frequency	47 - 63 Hz		
AC Input Current Nominal Maximum inrush (230V AC input)	5A_{rms} 100A (0-peak)	9A_{rms} 100A (0-peak)	18A_{rms} 100A (0-peak)
Output Peak Current	7.5A (0-peak)	15A (0-peak)	30A (0-peak)
Continuous Output Current	2.5A (0-peak)	5A (0-peak)	10A (0-peak)
Energy Absorption Capability 115V AC input 230V AC input	 125 Joules 51 Joules		
Continuous Power Output 115V AC input 230V AC input	 0.25 kW 0.5 kW	 0.5 kW 1.0 kW	 1.0 kW 2.0 kW

Specification	Description		
	DSA130-230-x	**DSA175-230-x**	**DSA1150-230-x**
AC Input Voltage[1]	100-240V_{rms} Single Phase	100-240V_{rms} Three Phase	
AC Input Frequency	47 - 63 Hz		
Main AC Input Current Nominal, Maximum inrush, 230V AC input	28A_{rms} 50A_{rms}	30A_{rms} 50A_{rms}	46A_{rms} 68A_{rms}
Auxiliary AC Input Current Nominal, 115V AC input Nominal, 230V AC input Maximum inrush, 115V AC input Maximum inrush, 230V AC input	1.0A_{rms} 0.5A_{rms} 47A (0-peak) 95A (0-peak)	1.0A_{rms} 0.5A_{rms} 47A (0-peak) 95A (0-peak)	1.0A_{rms} 0.5A_{rms} 47A (0-peak) 95A (0-peak)
Continuous Output Current	15A (0-peak)	35A (0-peak)	65A (0-peak)
Intermittent Output Current	30A (0-peak)	75A (0-peak)	150A (0-peak)
Internal Shunt Continuous power Peak power	 50W 4.5 kW	 50W 10 kW	 180W 18 kW
External Shunt Minimum resistance Continuous power Peak power	 30 Ohms 2.4 kW 6 kW	 16.5 Ohms 4 kW 10 kW	 9 Ohms 8 kW 19 kW
Energy Absorption Capability 115V AC input 230V AC input	 203 Joules 96 Joules	 321 Joules 151 Joules	 563 Joules 265 Joules
Continuous Power Output 115V AC input 230V AC input	 1.5 kW 3 kW	 3.75 kW 7.5 kW	 7.5 kW 15 kW

[1]Specification is for nominal voltage. The absolute limits are ±10%, or 88-265V_{rms}

The table below lists general power specifications and requirements for the DSA 460V drives .

Specification	Description				
	DSA014-460-x	**DSA022-460-x**	**DSA046-460-x**	**DSA068-460-x**	**DSA094-460-x**
AC Input Voltage[1]	230-480V_{rms} Three Phase				
AC Input Frequency	47 - 63 Hz				
Main AC Input Current[2] Nominal, 460V AC input Maximum inrush, 460V AC input	$4A_{rms}$ $6A_{rms}$	$7A_{rms}$ $6A_{rms}$	$14A_{rms}$ $6A_{rms}$	$20A_{rms}$ $6A_{rms}$	$28A_{rms}$ $6A_{rms}$
Auxiliary AC Input Current Nominal, 230V AC input Nominal, 360V AC input Nominal, 480V AC input Maximum inrush, 230V AC input Maximum inrush, 480V AC input	$0.55A_{rms}$ $0.35A_{rms}$ $0.25A_{rms}$ 47A (0-peak)[3] 68A (0-peak)[3]	$0.55A_{rms}$ $0.35A_{rms}$ $0.25A_{rms}$ 47A (0-peak)[3] 68A (0-peak)[3]	$0.55A_{rms}$ $0.35A_{rms}$ $0.25A_{rms}$ 47A (0-peak)[3] 68A (0-peak)[3]	$0.55A_{rms}$ $0.35A_{rms}$ $0.25A_{rms}$ 47A (0-peak)[3] 68A (0-peak)[3]	$0.55A_{rms}$ $0.35A_{rms}$ $0.25A_{rms}$ 47A (0-peak)[3] 68A (0-peak)[3]
Continuous Output Current	7A (0-peak)	11A (0-peak)	23A (0-peak)	34A (0-peak)	47A (0-peak)
Intermittent Output Current	14A (0-peak)	22A (0-peak)	46A (0-peak)	68A (0-peak)	94A (0-peak)
Internal Shunt Continuous power Peak power	100W 5.3 kW	100W 5.3 kW	200W 16 kW	200W 25.6 kW	400W 32 kW
External Shunt Minimum resistance Continuous power Peak power	120 Ohms 3 kW 5.3 kW	120 Ohms 5 kW 5.3 kW	40 Ohms 10 kW 16 kW	25 Ohms 15 kW 25.6 kW	20 Ohms 22 kW 32 kW
Energy Absorption Capability 230V AC input with 230V motor 230V AC input with 460V motor 460V AC input	58 Joules 517 Joules 219 Joules	58 Joules 517 Joules 219 Joules	88Joules 776Joules 329 Joules	117 Joules 1034 Joules 439 Joules	234 Joules 2069 Joules 878Joules
Continuous Power Output 230V AC input 460V AC input	1.5 kW 3.0 kW	2.5 kW 5.0 kW	5.0 kW 10 kW	7.5 kW 15 kW	11 kW 22 kW

[1] Specification is for nominal voltage. The absolute limits are ±10%, or 207-528V_{rms}.

[2] The DSAxxx-460-x drives are limited to three contactor cycles per minute.

[3] 400 ms half wave sine

Physical and Environmental

The table below lists physical and environmental specifications and requirements.

Specification	Description
Weight DSA007-230-x DSA015-230-x DSA030-230-x DSA130-230-x DSA175-230-x DSA1150-230-x DSA014-460-x DSA022-460-x DSA046-460-x DSA068-460-x DSA094-460-x	 1.8 kg (4.1 lbs) 2.1 kg (4.6 lbs) 2.1 kg (4.6 lbs) 6.2 kg (13.6 lbs) 9.3 kg (20.6 lbs) 14.1 kg (31.0 lbs) 8.55 kg (18.8 lbs) 8.55 kg (18.8 lbs) 10.44 kg (22.96 lbs) 10.44 kg (22.96 lbs) 14.1 kg (31 lbs)
Operating Temperature	0^{o} C to 55^{o} C (32^{o} F to 131^{o} F)
Storage Temperature	-40^{o} C to 70^{o} C (-40^{o} F to 158^{o} F)
Humidity	5% to 95% non-condensing
Altitude	1500 m (5000 ft) Derate 3% for each 300 m above 1500m
Vibration Operating/Non-operating	5 to 2000 Hz, 2.5 g peak, 0.015 in. maximum displacement
Shock Non-operating	15 g 11 ms half sine
UL Listed to U.S. and Canadian safety standards	UL 508 C File E145959

Power Dissipation

Use the following table to size an enclosure and calculate required ventilation for the DSA Drive. Typical heat losses run approximately one-half maximum power losses. The maximum power losses are shown below.

Model Name	Maximum Loss (Watts)
DSA007-230, -S, -P	48 + dissipative shunt
DSA015-230, -S, -P	48 + dissipative shunt
DSA030-230, -S, -P	50 + dissipative shunt
DSA130-230, -S, -P	150 + dissipative shunt
DSA175-230, -S, -P	300 + dissipative shunt
DSA1150-230, -S, -P	500 + dissipative shunt
DSA014-460, -S, -P	175 + dissipative shunt
DSA022-460, -S, -P	175 + dissipative shunt
DSA046-460, -S, -P	350 + dissipative shunt
DSA068-460, -S, -P	350 + dissipative shunt
DSA094-460, -S, -P	600 + dissipative shunt

Control

The table below lists control specifications.

Specification	Description
Commutation	3 Phase Sinusoidal, Space Vector Modulated (SVM)
Current Regulator	Digital PI 125 µsec update rate
Velocity Regulator	Digital PID - 250 µsec update rate
Position Regulator	Digital PID with feed-forward - 1 mS update rate

Inputs and Outputs

The table below lists I/O specifications.

Specification	Description
Digital Inputs	8 Optically Isolated 12-24V Inputs, Active High, Current Sinking
Digital Outputs	4 Optically Isolated 12-24V Outputs, Active High, Current Sourcing
Relay Output	1 Normally Open Relay - 30V DC Maximum Voltage, 1A Maximum Current
I/O Response	100 µsec
Digital I/O Firmware Scan Period	1 mS
Analog Inputs COMMAND ILIMIT	 14 bit A/D, ±10V 10 bit A/D, 0 to 10V
Analog Output	+10V, 8 bits, 2 mA maximum

Serial Communication

The table below lists the serial communication specifications.

Specification	Description
Serial	1 RS-232/RS-422/RS-485 Port
Baud Rates	1200, 2400, 4800, 9600, 19200, and 38400 baud
Frame Format	7 Data, Even Parity, One Stop
	7 Data, Odd Parity, One Stop
	8 Data, No Parity, One Stop
	8 Data, Even Parity, One Stop
	8 Data, Odd Parity, One Stop

Motor Feedback

The table below lists motor feedback specifications.

Specification	Description
Encoder Types	Incremental, Sine/Cosine, Intelligent, and Absolute
Maximum Input Frequency	100 kHz (Sine/Cosine Input)
	2.5 MHz (TTL Input) per channel
Commutation Startup	Hall Sensor or None

Auxiliary Feedback

The table below lists auxiliary feedback specifications.

Specification	Description
Input Modes	A quad B, Step/Direction, CW/CCW
Input Types	Differential, single-ended, open collector[1]
Maximum Signal Frequency	2.5 MHz

[1] Differential input types are recommended.

Connectors

The table below lists connector specifications..

Connector	Specification	Description
J1	User Input/Output	44-pin high-density D-shell
J2	Motor Feedback Connector	15-pin high-density D-shell
J3	Serial Port Connector	9-pin standard D-shell

SERCOS Communication

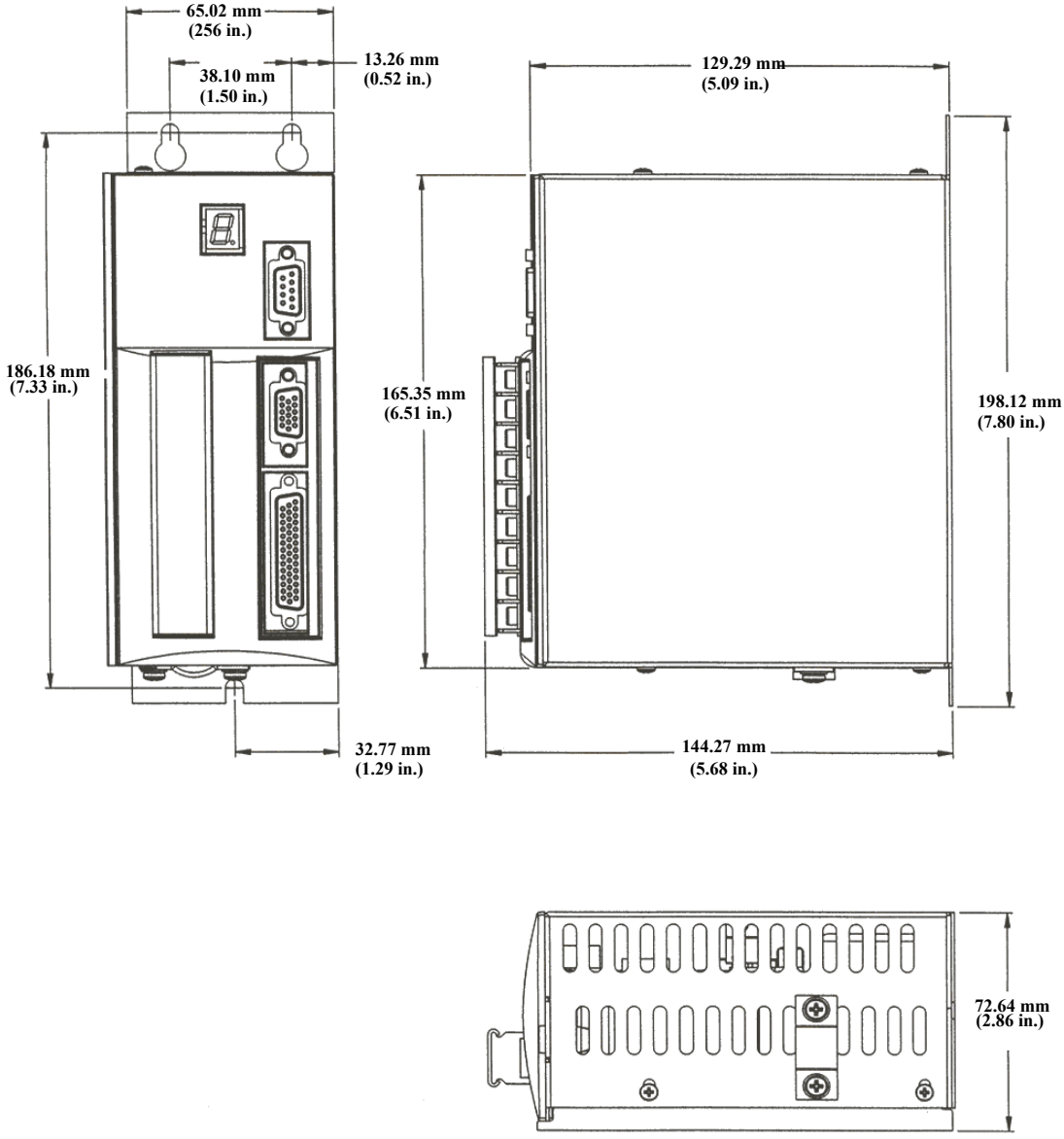
The table below lists SERCOS communication specifications.

Specification	Description
Data Rates	2M baud, 4M baud, and 8M baud
Node Addresses	01-99

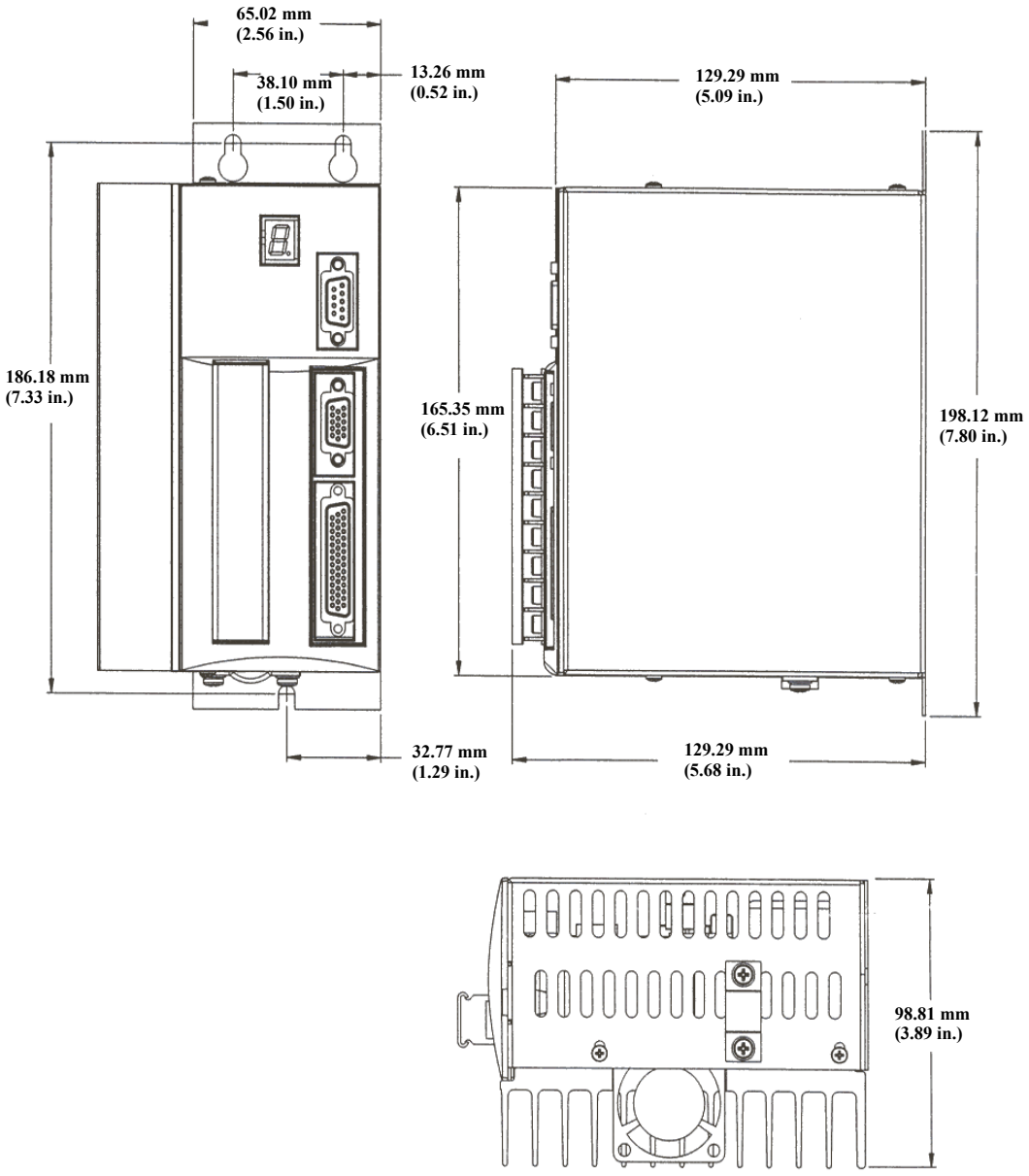
DSA Drive Dimensions

The following diagrams show the dimensions and mounting hole locations for the DSA Drives.

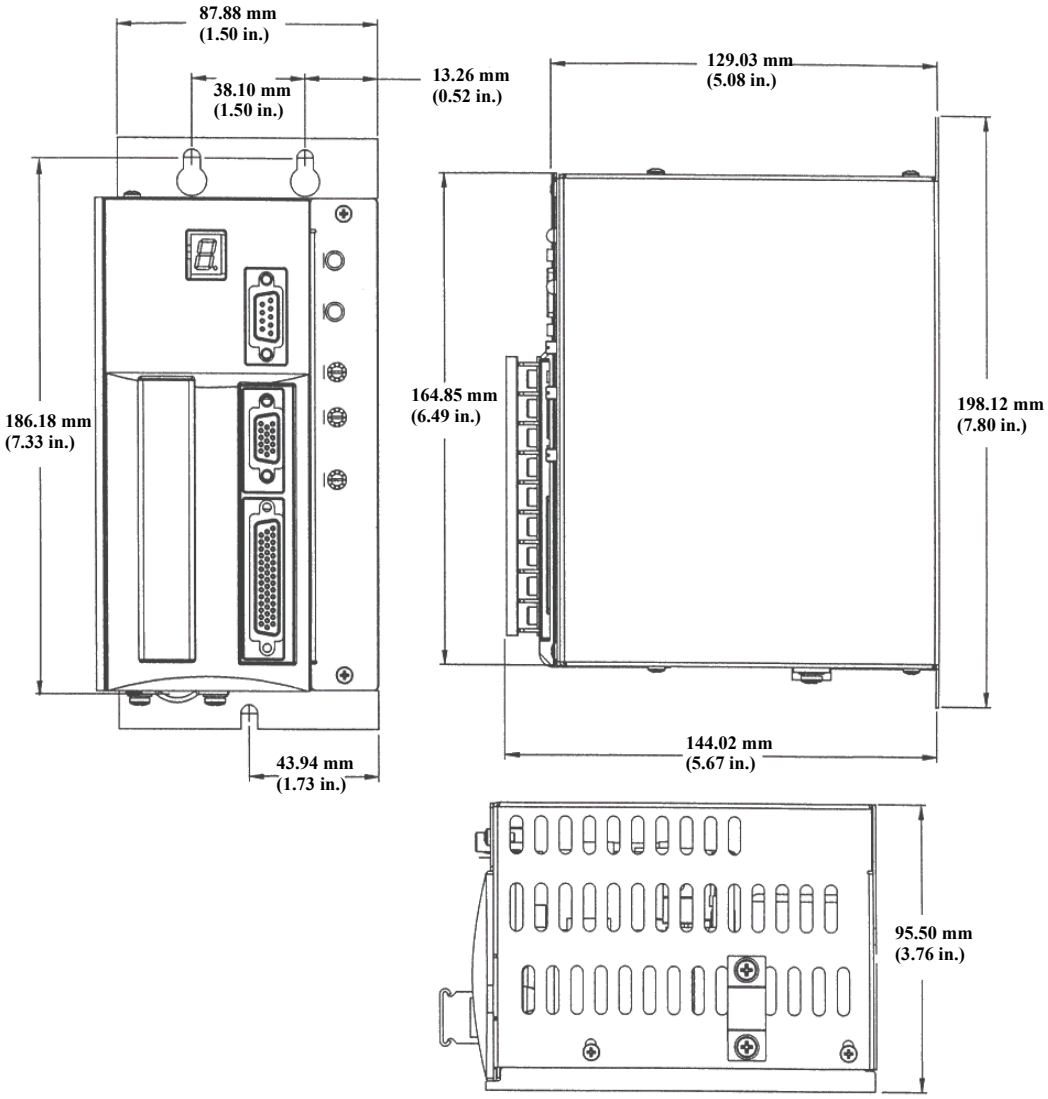
Dimensions and Mounting Diagram DSA007, -P



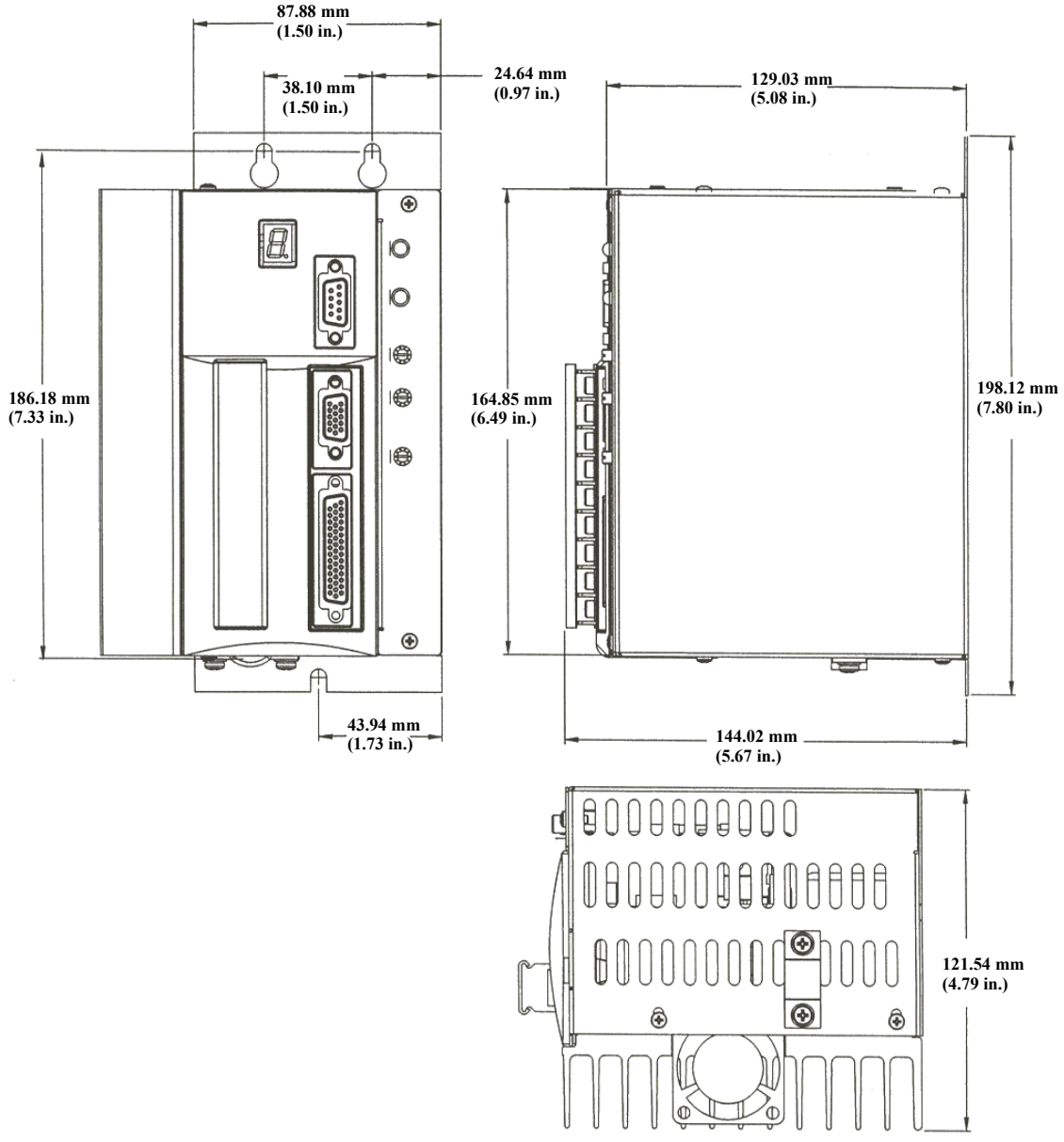
Dimensions and Mounting Diagram DSA015, DSA030, -P



Dimensions and Mounting Diagram DSA007S

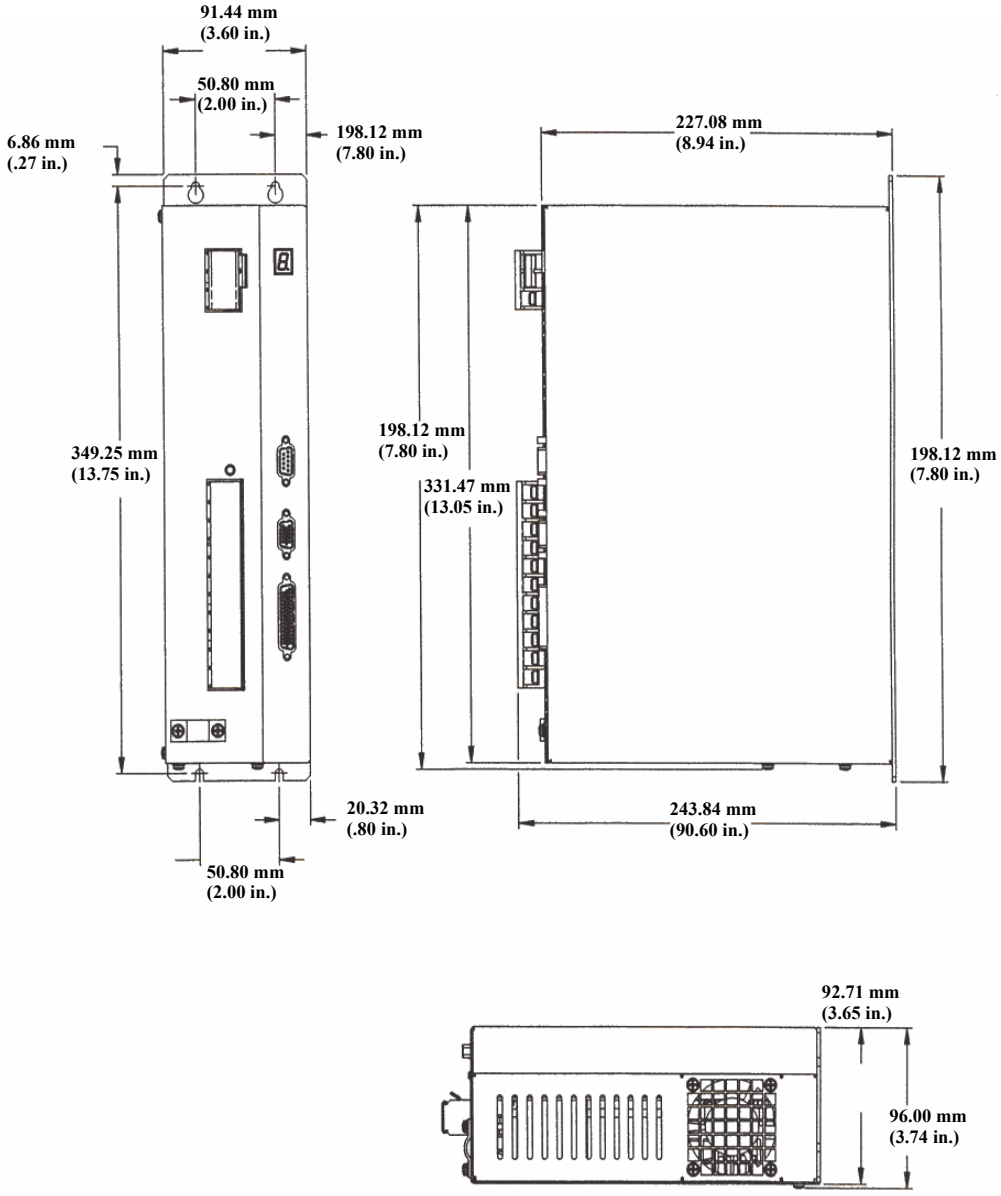


Dimensions and Mounting Diagram DSA015S, DSA030S

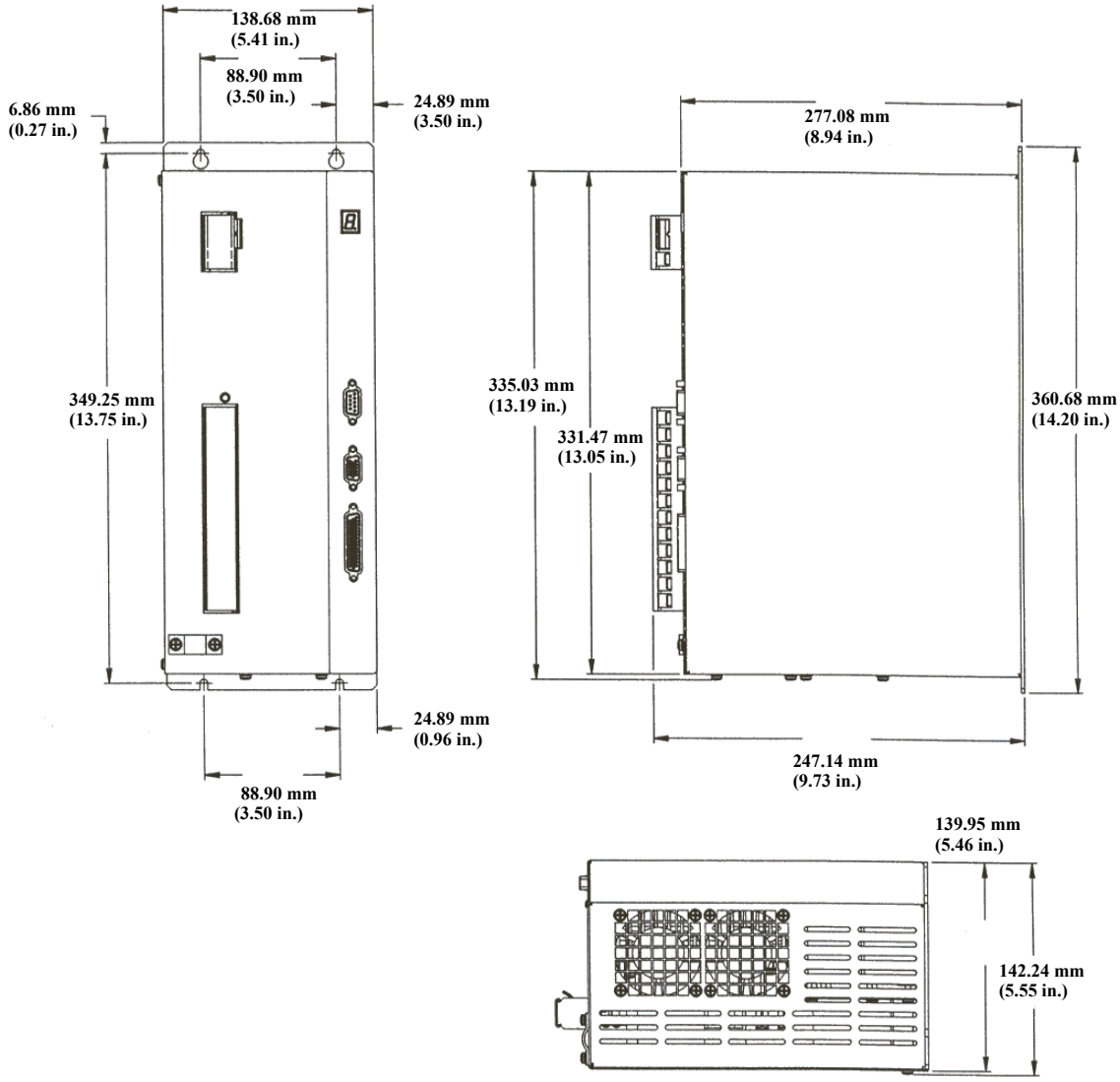


Fan only on 2kW units

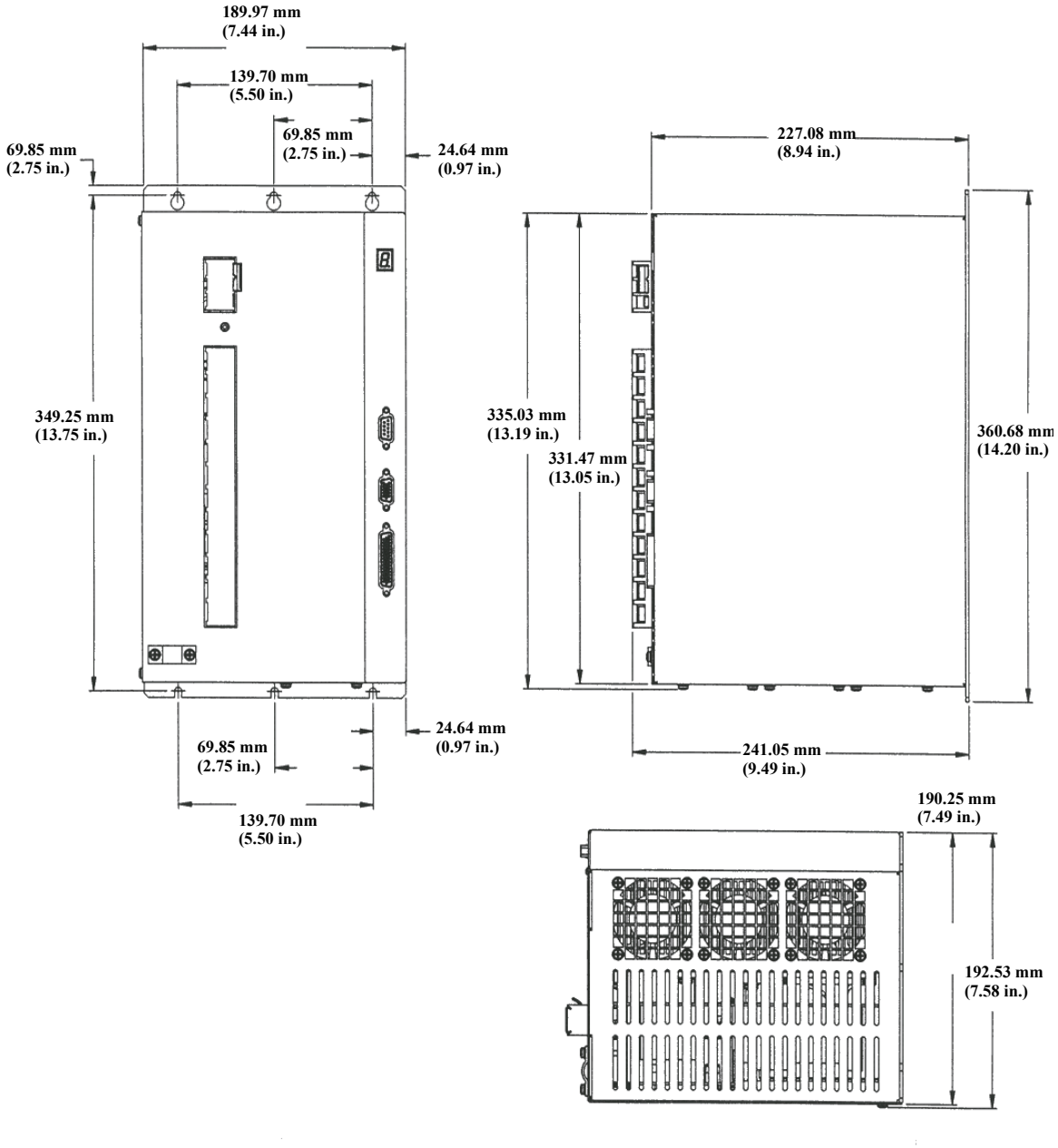
Dimensions and Mounting Diagram DSA130-230, -P, -S



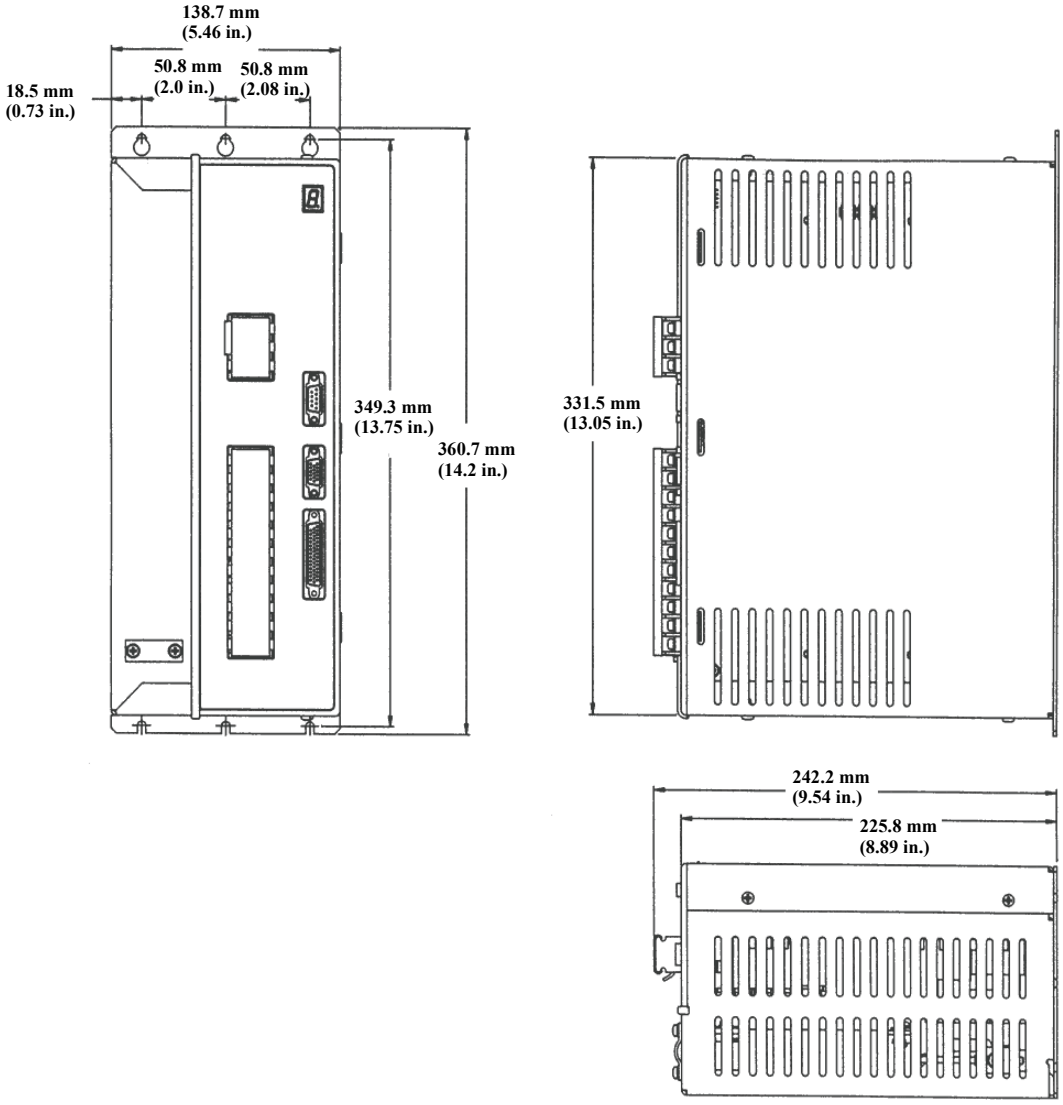
Dimensions and Mounting Diagram DSA175-230, -P, -S



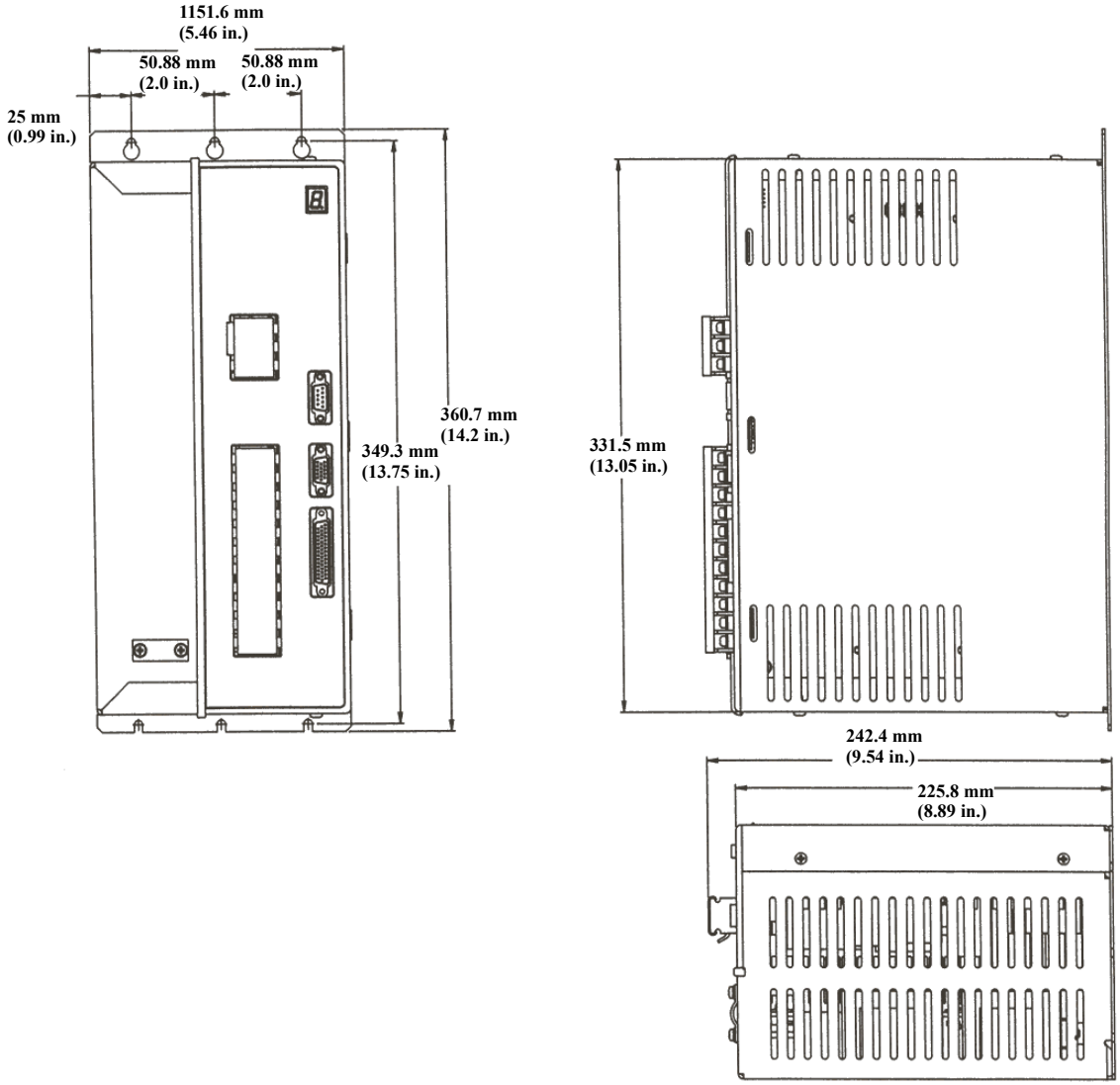
Dimensions and Mounting Diagram DSA1150-230, -P, -S



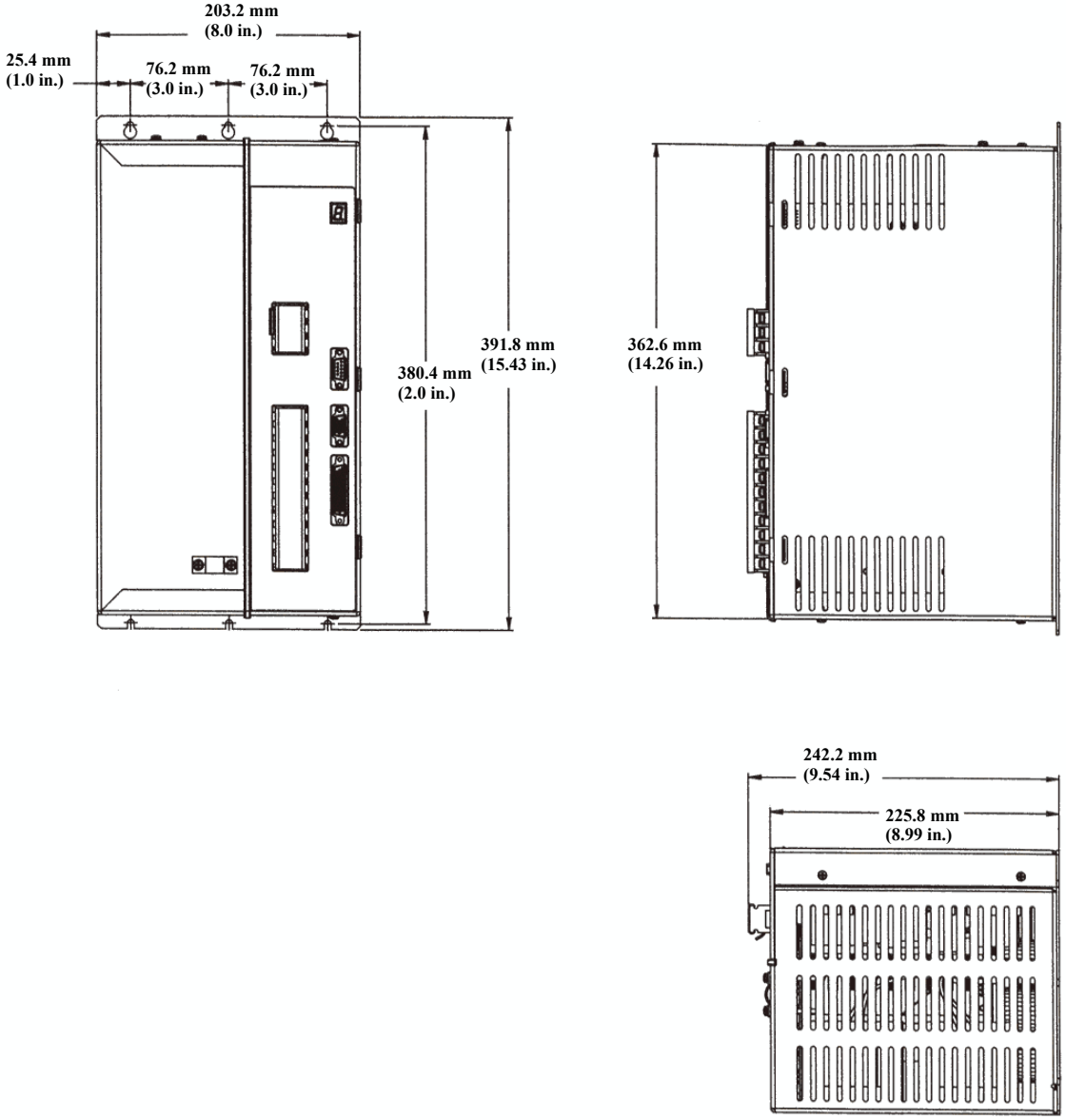
Dimensions and Mounting Diagram DSA014-460, DSA022-460, -P, -S



Dimensions and Mounting Diagram DSA046-460, DSA-68-460, -P, -S



Dimensions and Mounting Diagram DSA094-460, -P, -S



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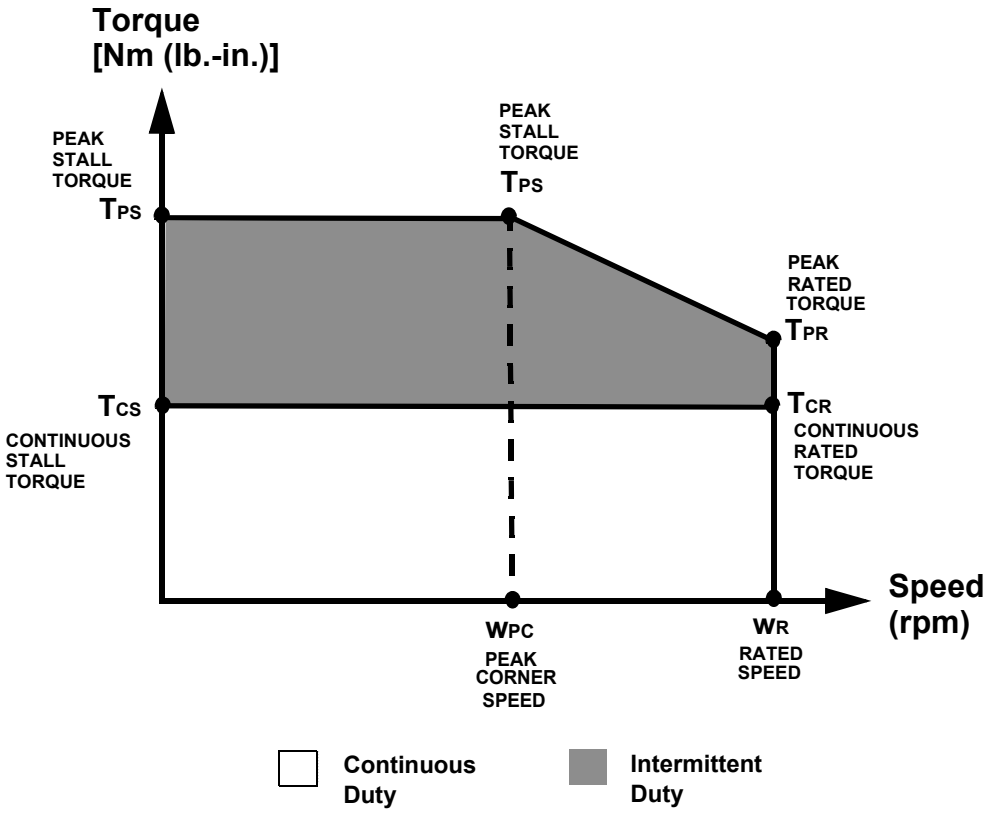


The performance characteristics of a motor/drive combination are illustrated by a torque/speed range. The shaded areas represent continuous duty and intermittent duty zones for the system.

Drive and Motor Performance Curve

Continuous Duty Zone

The system can operate continuously anywhere within this zone, provided the ambient temperature is 40 degrees Celsius or less and the motor is mounted properly.

Intermittent Duty Zone

The peak torque is limited by the motor characteristics and the maximum current that the drive can produce.

Definitions

TCS - The torque that the motor can produce continuously at zero speed.

TPS- The maximum torque that the motor will produce.

TCR - The maximum torque that the motor can produce at the rated speed.

WR - Rated motor speed.

WPC - Peak torque is constant up to this speed.

Motor/Drive Performance Data, 115V ac, 165V dc bus

Motor Model	Drive Model	Cont. Stall Torque T_{CS}[1] Nm (lb.-in.)	Cont. Rated Torque T_{CR}[1] Nm (lb.-in.)	Peak Stall Torque T_{PS} [1] Nm (lb.-in.)	Peak Rated Torque T_{PR} [1] Nm (lb.-in.)	Rated Speed W_R [1] rpm	Peak Corner Speed W_{PC} [1] rpm	Cont. Stall Current Ics	Inertia J kgm^2 ($lb.-in-S^2$)
NSM Series[2]									
NSM2302	DSA007	0.2 (1.7)	0.2 (1.46)	0.5 (4.7)	0.5 (4.7)	6000	6000	2.70	0.000009 (0.00008)
NSM2304	DSA007	0.4 (3.5)	0.4 (3.5)	1.1 (10)	1.1 (10.0)	5000	3500	2.70	0.00002 (0.00016)
	DSA015	0.5 (4.4)	0.4 (3.9)	1.4 (13)	1.4 (12.5)	4500	2800	2.70	0.00002 (0.00016)
YSM Series[2]									
YSM102-115V	DSA007	0.17 (1.5)	0.1 (1.3)	0.48 (4.3)	0.5 (4.3)	4500	4500	2.1	0.0000031 (0.000027)
YSM103-115V	DSA015	0.35 (3.1)	0.3 (2.3)	1.0 (8.6)	1.0 (8.6)	4500	4500	3.1	0.0000051 (0.000045)
YSM206-115V	DSA030	0.69 (6.1)	0.5 (4.4)	1.92 (17)	1.9 (17)	4500	4500	6.1	0.000015 (0.00013)
YSM212-115V	DSA030	1.35 (12)	1.1 (9.6)	3.8 (33.7)	1.9 (17)	3800	3500	5.2	0.000025 (0.00023)
YSM323-230V	DSA030	2.5 (22.5)	1.9 (17.2)	7.12 (63)	4.5 (40)	2500	2000	8.1	0.000064 (.00056)

[1] See page 28 for definitions of ratings.

[2] In a 40° C ambient, with motors mounted on aluminum heatsinks. Motors NSM 2302/2304: 0.25" x 8" x 8", YSM 102/103: 0.125" x 6" x 6", YSM 206/212: 0.250" x 8" x 8", YSM 323: 0.25" x 10" x 10".

Note: For complete Speed/Torque Curves, refer to the motor information tables at *http://www.glcontrols.com*.

Motor/Drive Performance Data, 230V ac, 310V dc bus

Motor Model	Drive Model	Cont. Stall Torque T_{CS}[1] Nm (lb.-in.)	Cont. Rated Torque T_{CR}[1] Nm (lb.-in.)	Peak Stall Torque T_{PS}[1] Nm (lb.-in.)	Peak Rated Torque T_{PR} [1] Nm (lb.-in.)	Rated Speed W_R[1] rpm	Peak Corner Speed W_{PC}[1] rpm	Cont. Stall Current Ics	Inertia J kgm^2 ($lb.-in-S^2$)
LSM Series									
LSM54-3-602	DSA007	0.33 (3)	0.18 (1.6)	1.32 (12)	.42 (3.69)	6000	1900	1.0	0.00003 (0.0000029)
LSM63-6-602	DSA007	0.70 (6)	0.44 (3.9)	2.42 (21)	.73 (6.5)	6000	3100	2.1	0.00001 (0.00011)
LSM63-12-602	DSA015	1.40 (12)	0.84 (7.4)	5.3 (46.9)	2.48 (22)	6000	2750	4.1	0.00002 (0.00017)
LSM75-21-602	DSA030	2.36 (21)	1.34 (11.9)	8.8 (78)	1.34 (11.9)	6000	1500	5.5	0.00003 (0.00029)
LSM75-29-602	DSA030	3.30 (29)	2.00 (17.7)	12.00 (106)	2.00 (17.7)	6000	1950	8.3	0.00004 (0.00039)
LSM100-22-454	DSA015	2.50 (22)	2.10 (18.6)	10.12 (90)	3.60 (31.9)	2250	1250	3.3	0.00012 (0.0011)
LSM100-35-454	DSA015	4.00 (35)	3.25 (28.8)	10.62 (94)	5.10 (45.1)	2250	1750	5.0	0.00014 (0.0013)
LSM100-46-454	DSA030	5.20 (46)	4.23 (37.4)	16.00 (142)	7.00 (62.0)	2250	1500	6.4	.00017 (0.0015)
LSM130-78-454	DSA130	8.80 (78)	7.10 (62.8)	22.40 (198)	10.80 (95.6)	2250	1850	10.7	0.00041 (0.0036)
LSM130-102-304	DSA030	11.50 (102)	10.0 (88.5)	32.43 (287)	14.00 (123.9)	1500	1400	9.6	0.00055 (0.0049)
MSM Series									
MSM100-6-604	DSA007	0.70 (6)	0.7 (6)	2.86 (25)	1.0 (8.9)	3000	1850	2.0	0.00015 (0.0013)
MSM100-14-604	DSA015	1.50 (14)	1.45 (12.8)	6.78 (60)	3.60 (31.9)	3000	2000	3.4	0.00021 (0.0019)
MSM115-34-404	DSA015	3.80 (34)	3.70 (32.7)	11.54 (102)	4.0 (35.4)	2000	1300	4.5	0.00057 (0.0050)
MSM115-62-404	DSA030	7.00 (62)	6.90 (61.1)	22.00 (195)	8.0 (70.8)	2000	1500	7.8	0.00102 (0.0090)
MSM115-89-404	DSA130	10.00 (89)	9.50 (84.1)	25.13 (222)	11.0 (97.4)	2000	1600	10.9	0.00157 (0.0139)
MSM165-93-204	DSA030	10.50 (93)	10.30 (91.2)	34.00 (301)	10.5 (92.9)	1000	550	6.2	0.00224 (0.0198)
MSM165-146-304	DSA130	16.50 (146)	15.70 (138.9)	30.98 (274)	16.0 (141.6)	1500	1200	13.6	0.00360 (0.0319)

[1] See page 28 for definitions of ratings
Note: For complete Speed/Torque Curves, refer to the motor information tables at *http://www.glcontrols.com*.

Motor/Drive Performance Data, 230V ac, 325V dc bus (cont.)									
Motor Model	**Drive Model**	**Cont. Stall Torque T_{CS}[1] Nm (lb.-in.)**	**Cont. Rated Torque T_{CR}[1] Nm (lb.-in.)**	**Peak Stall Torque T_{PS}[1] Nm (lb.-in.)**	**Peak Rated Torque T_{PR}[1] Nm (lb.-in.)**	**Rated Speed W_R[1] rpm**	**Peak Corner Speed W_{PC}[1] rpm**	**Cont. Stall Current Ics**	**Inertia J kgm^2 ($lb.-in-S^2$)**
NSM Series[2]									
NSM2302	DSA007	0.2 (1.7)	0.2 (1.46)	0.5 (4.7)	0.5 (4.7)	6000	6000	2.7	0.000009 (0.00008)
NSM2304	DSA007	0.4 (3.5)	0.4 (3.5)	1.1 (10)	1.1 (10.0)	6000	6000	2.7	0.00002 (0.00016)
	DSA015	0.5 (4.4)	0.4 (3.9)	1.4 (13.0)	1.4 (12.5)	6000	6000	2.7	0.00002 (0.00016)
NSM3406	DSA015	0.8 (6.8)	0.5 (4.3)	2.1 (18.5)	2.1 (18.5)	6000	6000	5.0	0.00008 (0.0007)
NSM3412	DSA015	1.6 (13.8)	1.4 (12)	4.1 (36.0)	1.7 (15)	5500	4000	5.2	0.00015 (0.0013)
NSM4214	DSA015	2.0 (17.7)	1.8 (16)	5.7 (45.0)	2.3 (20)	4500	3500	6.0	0.00024 (0.0021)
NSM4220	DSA030	2.5 (22.0)	1.7 (15)	7.1 (63.0)	5.6 (50)	5000	4000	11.0	0.00035 (0.0031)
	DSA130	2.9 (26.0)	1.7 (15)	7.1 (63.0)	5.6 (50)	5000	4000	11.0	0.00035 (0.0031)
NSM5630	DSA030	3.4 (30.0)	2.9 (26)	10.7 (95.0)	8.5 (75)	4000	3000	11.0	0.0009 (0.008)
	DSA130	3.8 (34.0)	2.9 (26)	10.7 (95.0)	8.5 (75)	4000	3000	11.0	0.0009 (0.008)
NSM5637	DSA030	4.5 (40.0)	4.0 (35)	13.0 (120)	4.0 (35)	4000	3000	11.5	0.0011 (0.01)
	DSA130	5.2 (46.0)	4.0 (35)	13.0 (120)	4.0 (35)	4000	3000	11.5	0.0011 (0.01)
NSM5647	DSA030	5.9 (52.0)	4.5 (40)	17.0 (150)	10.6 (94)	3000	2000	10.5	0.0015 (0.013)
	DSA130	6.0 (53.0)	4.5 (40)	17.0 (150)	10.6 (94)	3000	2000	10.5	0.0015 (0.013)

[1] See page 28 for definitions of ratings

[2] In a 40° C ambient with motors mounted on aluminum heatsinks. Motors NSM 2302/2304: 0.25" x 8" x 8", NSM 3406/3412: 0.25" x 10" x 10", NSM 4214/4220/5630/5637/5647: 0.50" x 12" x 12".

Note: For complete Speed/Torque Curves, refer to the motor information tables at *http://www.glcontrols.com*.

Motor/Drive Performance Data, 230V ac, 325V dc bus (cont.)									
Motor Model	**Drive Model**	**Cont. Stall Torque T_{CS}[1] Nm (lb.-in.)**	**Cont. Rated Torque T_{CR}[1] Nm (lb.-in.)**	**Peak Stall Torque T_{PS}[1] Nm (lb.-in.)**	**Peak Rated Torque T_{PR}[1] Nm (lb.-in.)**	**Rated Speed W_R[1] rpm**	**Peak Corner Speed W_{PC}[1] rpm**	**Cont. Stall Current Ics**	**Inertia J kgm² (lb.-in-S²)**
HSM Series[2]									
HSM205	DSA110	0.57 (5.0)	0.5 (4.2)	1.2 (10)	1.2 (10)	6000	6000	5.0	0.000015 (0.00013)
HSM307	DSA015	0.79 (7.0)	0.7 (6.5)	2.49 (22)	0.7 (6.5)	5000	3000	3.5	0.000030 (0.00027)
HSM320	DSA030	2.26 (20)	1.8 (16)	4.97 (44)	5.0 (44)	5000	5000	9.5	0.000080 (0.00072)
HSM430	DSA030	3.4 (30)	2.9 (26)	8.3 (73)	6.8 (60)	4000	4000	8.0	0.00025 (0.0022)
HSM460	DSA130	6.8 (60)	5.4 (48)	13.6 (120)	9.6 (85)	4000	2000	16.0	0.00046 (0.0041)
	DSA175	6.8 (60)	5.4 (48)	21.5 (190)	9.6 (85)	4000	3000	16.0	0.00046 (0.0041)
HSM490	DSA130	9.9 (88)	8.2 (73)	20.3 (180)	11.5 (102)	3000	2000	17.0	0.00068 (0.0060)
	DSA175	9.9 (88)	8.2 (73)	30.5 (270)	13.6 (120)	3000	1500	17.0	0.00068 (0.0060)
HSM610	DSA175	12.4 (110)	7.9 (70)	32.8 (290)	16.9 (150)	3000	2000	23.0	0.0014 (0.012)
HSM620	DSA175	21.4 (190)	8.5 (75)	40.7 (360)	22.6 (200)	3000	2000	45.0	0.0024 (0.021)
	DSA1150	24.4 (216)	14.0 (124)	54.2 (480)	33.9 (300)	3000	2500	45.0	0.0024 (0.021)
HSM630	DSA1150	33.9 (300)	16.9 (150)	79.1 (700)	44.1 (390)	3000	2000	65.0	0.0034 (0.030)
HSM835	DSA1150	39.55 (350)	23.4 (207)	67.8 (600)	67.8 (600)	2000	2000	54.0	0.0063 (.056)
HSM845	DSA1150	50.85 (450)	29.5 (261)	108 (960)	71.2 (630)	2000	1500	70.0	0.0094 (.083)

[1] See page 28 for definitions of ratings

[2] In a 40° C ambient with motors mounted on aluminum heatsinks. Motors HSM 307/320: .25" x 10" x 10", HSM 430, 460, 490: 0.5" x 12" x 12", HSM 610/ 620/ 630/ 835/ 845: 1" x 12" x 12".

Note: For complete Speed/Torque Curves, refer to the motor information tables at *http://www.glcontrols.com*.

Motor/Drive Performance Data, 230V ac, 325V dc bus (cont.)									
Motor Model	**Drive Model**	**Cont. Stall Torque T_{CS}[1] Nm (lb.-in.)**	**Cont. Rated Torque T_{CR}[1] Nm (lb.-in.)**	**Peak Stall Torque T_{PS}[1] Nm (lb.-in.)**	**Peak Rated Torque T_{PR}[1] Nm (lb.-in.)**	**Rated Speed W_R[1] rpm**	**Peak Corner Speed W_{PC}[1] rpm**	**Cont. Stall Current Ics**	**Inertia J kgm² (lb.-in-S²)**
FSM Series[2]									
FSM430	DSA030	3.5 (31)	3.3 (29)	11.3 (100)	3.3 (29)	3600	2000	8.0	0.0010 (0.009)
FSM460	DSA030	5.2 (46)	4.5 (40)	13.6 (120)	4.5 (40)	3600	2500	15.9	0.0021 (0.019)
	DSA130	6.9 (61)	6.0 (53)	13.6 (120)	8.0 (71)	4000	3000	15.9	0.0021 (0.019)
FSM490	DSA130	9.3 (82)	8.0 (71)	19.2 (170)	10.4 (92)	3000	2000	15.9	0.0032 (0.029)
	DSA175	9.3 (82)	8.0 (71)	19.2 (170)	10.4 (92)	3000	2800	15.9	0.0032 (0.029)
FSM610	DSA175	13.0 (115)	12.0 (106)	31 (75)	18.1 (160)	3000	2200	22.8	0.0064 (0.057)
FSM620	DSA175	19.8 (175)	17.5 (155)	39.5 (350)	39.5 (350)	3000	2500	35.3	0.0107 (0.095)
	DSA1150	19.8 (175)	17.5 (155)	39.5 (350)	39.5 (350)	3000	3000	35.3	0.0107 (0.095)
FSM630	DSA175	23.7 (210)	21.5 (190)	49.7 (440)	21.5 (190)	3000	2000	47.0	0.0162 (0.144)
	DSA1150	23.7 (210)	21.5 (190)	56.5 (500)	56.5 (500)	3000	3000	47.0	0.0162 (0.144)
YSM Series[2]									
YSM102-230V	DSA007	0.17 (1.5)	0.1 (1.3)	0.48 (4.3)	0.5 (4.3)	4500	4500	1.2	0.0000031 (0.000027)
YSM103-230V	DSA007	0.35 (3.1)	0.3 (2.3)	0.97 (8.6)	1.0 (8.6)	4500	4500	1.8	0.0000051 (0.000045)
YSM206-230V	DSA015	0.69 (6.1)	0.5 (4.4)	1.92 (17)	1.9 (17)	4500	4500	3.6	0.000015 (0.00013)
YSM212-230V	DSA015	1.35 (12)	1.1 (9.6)	3.8 (33.7)	1.9 (17)	4500	3500	4.1	0.000026 (0.00023)
YSM323-230V	DSA030	2.5 (22.5)	1.9 (17.2)	7.12 (63)	4.5 (40)	4500	3500	8.1	0.000064 (0.00056)

[1] See page 28 for definitions of ratings

[2] In a 40° C ambient with motors mounted on aluminum heatsinks. Motors FSM 430/460/490: 0.5" x 12" x 12". Motors YSM 102/103: 0.125" x 6" x 6", YSM 206/212: 0.250" x 8" x 8", YSM 323: 0.250" x 10" x 10".

Note: For complete Speed/Torque Curves, refer to the motor information tables at *http://www.glcontrols.com*.

Motor/Drive Performance Data, 230V ac, 325V dc bus (cont.)									
Motor Model	**Drive Model**	**Cont. Stall Torque T_{CS}[1] Nm (lb.-in.)**	**Cont. Rated Torque T_{CR}[1] Nm (lb.-in.)**	**Peak Stall Torque T_{PS}[1] Nm (lb.-in.)**	**Peak Rated Torque T_{PR}[1] Nm (lb.-in.)**	**Rated Speed W_R[1] rpm**	**Peak Corner Speed W_{PC}[1] rpm**	**Cont. Stall Current Ics**	**Inertia J kgm² (lb.-in-S²)**
XSM Series[2]									
XSM100-14-502	DSA015-230	1.58 (14)	1.24 (11)	3.61 (32)	1.47 (13)	5000	2700	4.85	.000044 (0.00039)
XSM100-14-302	DSA007-230	1.24 (11)	1.24 (11)	2.94 (26)	1.47 (13)	3000	1900	3.20	.000044 (0.00039)
	DSA015-230	1.58 (14)	1.47 (13)	3.61 (32)	1.47 (13)	3000	1400	3.20	.000044 (0.00039)
XSM100-27-502	DSA030-230	3.05 (27)	2.15 (19)	7.91 (70)	2.15 (19)	5000	2200	9.0	.000078 (0.00069)
XSM100-27-352	DSA015-230	2.48 (22)	2.26 (20)	6.44 (57)	2.6 (20)	3500	2250	6.1	.000078 (0.00069)
	DSA030-230	3.05 (27)	2.26 (20)	7.91 (70)	2.6 (20)	3500	1850	6.1	.000078 (0.00069)
XSM100-37-502	DSA130-230	4.18 (37)	3.39 (30)	9.60 (85)	3.39 (30)	5000	2500	12.0	.00012 (0.0010)
	DSA175-230	4.18 (37)	3.39 (30)	11.1 (98)	3.95 (35)	5000	2400	12.0	.00012 (0.0010)
XSM115-42-502	DSA130-230	4.74 (42)	3.95 (35)	10.2 (90)	4.74(42)	5000	3300	12.7	.00026 (0.0023)
	DSA175-230	4.74 (42)	3.95 (35)	13.5 (120)	5.20 (46)	5000	3050	12.7	.00026 (0.0023)
XSM115-53-502	DSA130-230	5.42 (48)	4.29 (38)	10.2 (90)	6.33 (56)	5000	3600	16.8	.00038 (0.0033)
	DSA175-230	5.99 (53)	4.29 (38)	19.8 (175)	8.36 (74)	5000	3200	16.8	.00038 (0.0033)
XSM115-55-352	DSA130-230	6.21 (55)	4.97 (44)	14.7 (130)	7.34 (65)	3500	2100	12.2	.00038 (0.0033)
	DSA175-230	6.21 (55)	4.97 (44)	19.8 (175)	9.04 (80)	3500	2300	12.2	.00038 (0.0033)
XSM130-53-502	DSA130-230	5.08 (45)	4.29 (38)	9.26 (82)	4.29 (38)	5000	3500	17.5	.00028 (0.0024)
	DSA175-230	5.99 (53)	4.29 (38)	13.5 (120)	5.20 (46)	5000	3000	17.5	.00028 (0.0024)
XSM130-53-402	DSA130-230	5.99 (53)	4.97 (44)	11.3 (100)	5.87 (52)	4000	2800	15.0	.00028 (0.0024)
	DSA175-230	5.99 (53)	4.97 (44)	13.5 (120)	6.78 (60)	4000	3000	15.0	.00028 (0.0024)
XSM130-72-402	DSA130-230	6.21 (55)	6.10 (54)	11.3 (100)	8.58 (76)	4000	3500	19.5	.0004 (0.0036)
	DSA175-230	8.13 (72)	6.10 (54)	20.3 (180)	10.7 (95)	4000	2650	19.5	.0004 (0.0036)

[1] See page 28 for definitions of ratings

[2] In a 40° C ambient with motors mounted on aluminum heatsinks. Motors XSM 100/115/130/165: 0.5" x 12" x 12".

Note: For complete Speed/Torque Curves, refer to the motor information tables at *http://www.glcontrols.com*.

Motor/Drive Performance Data, 230V ac, 325V dc bus (cont.)									
Motor Model	**Drive Model**	**Cont. Stall Torque T_{CS}[1] Nm (lb.-in.)**	**Cont. Rated Torque T_{CR}[1] Nm (lb.-in.)**	**Peak Stall Torque T_{PS}[1] Nm (lb.-in.)**	**Peak Rated Torque T_{PR}[1] Nm (lb.-in.)**	**Rated Speed W_R[1] rpm**	**Peak Corner Speed W_{PC}[1] rpm**	**Cont. Stall Current Ics**	**Inertia J kgm² (lb.-in-S²)**
XSM Series[2] (cont.)									
XSM130-74-282	DSA130-230	8.36 (74)	6.55 (58)	17.5 (155)	6.55 (56)	2800	1850	13.4	.0004 (0.0036)
	DSA175-230	8.36 (74)	6.55 (58)	20.3 (180)	9.04 (80)	2800	1700	13.4	.0004 (0.0036)
XSM130-90-302	DSA130-230	8.25 (73)	8.25 (73)	15.8 (140)	10.2 (90)	3000	2500	18.4	.00052 (0.0046)
	DSA175-230	10.2 (90)	8.36 (74)	27.1 (240)	13.5 (120)	3000	1900	18.4	.00052 (0.0046)
XSM130-90-152	DSA030-230	10.2 (90)	9.60 (85)	27.1 (240)	11.3 (100)	1500	900	9.4	.00052 (0.0046)
XSM165-95-402	DSA175-230	10.7 (95)	5.9 (52)	24.0 (212)	5.9 (52)	4000	1500	23	.00078 (0.0069)
	DSA1150-230	10.7 (95)	8.1 (72)	24.3 (215)	9.0 (80)	4000	2000	23	.00078 (0.0069)
XSM165-172-402	DSA175-230	19.4 (172)	12.5 (111)	48.6 (430)	19.2 (170)	4000	2000	41.5	.00147 (0.013)

[1] See page 28 for definitions of ratings

[2] In a 40° C ambient with motors mounted on aluminum heatsinks. Motors XSM 100/115/130/165: 0.5" x 12" x 12".

Note: For complete Speed/Torque Curves, refer to the motor information tables at *http://www.glcontrols.com*.

Motor/Drive Performance Data, 460V ac, 620V dc bus

Motor Model	Drive Model	Cont. Stall Torque T_{CS}[1] Nm (lb.-in.)	Cont. Rated Torque T_{CR}[1] Nm (lb.-in.)	Peak Stall Torque T_{PS}[1] Nm (lb.-in.)	Peak Rated Torque T_{PR}[1] Nm (lb.-in.)	Rated Speed W_R[1] rpm	Peak Corner Speed W_{PC}[1] rpm	Cont. Stall Current Ics	Inertia J kgm² (lb.-in-S²)
LSM Series									
LSM100-22-454	DSA014-460	2.5 (22)	1.9 (16.8)	9 (84)	3.6 (31.9)	4500	2700	3.3	0.00012 (0.0011)
LSM100-35-454	DSA014-460	4.0 (35)	2.5 (22.1)	10 (88)	5.1 (45.1)	4500	3650	5.0	0.00014 (0.0013)
LSM100-46-454	DSA014-460	5.2 (46)	2.9 (25.7)	11 (94)	7.0 (62.0)	4500	3900	6.4	0.00017 (0.0015)
LSM130-78-454	DSA022-460	8.8 (78)	5.0 (44.3)	16 (145)	10.8 (95.6)	4500	4100	10.7	0.00041 (0.0036)
LSM130-102-304	DSA022-460	11.5 (102)	7.7 (68.1)	24 (211)	18.9 (167.3)	3000	2950	9.6	0.00055 (0.0049)
LSM165-119-454	DSA046-460	13.5 (119)	7.2 (63.7)	33 (294)	14.0 (123.9)	4500	3450	16.4	0.00092 (0.0081)
LSM165-173-304	DSA046-460	19.5 (173)	12.6 (111.5)	48 (424)	25.7 (227.4)	3000	2400	16.5	0.00128 (0.0113)
LSM165-221-454	DSA068-460	25.0 (221)	11.0 (97.4)	51 (448)	28.3 (250.5)	4500	3900	30.3	0.00165 (0.0146)
LSM215-301-304-	DSA068-460	34.0 (301)	21.0 (185.9)	66 (588)	41.0 (362.9)	3000	2500	30.4	0.00425 (0.0376)
LSM215-451-204	DSA068-460	51.0 (45)	37.0 (327.5)	101 (897)	61.4 (543.4)	2000	1650	29.7	0.00600 (0.0531)
LSM215-589-204	DSA094-460	66.5 (589)	45.0 (398.3)	137 (1212)	88.0 (778.8)	2000	1700	38.9	0.00770 (0.0681)
MSM Series									
MSM100-6-604	DSA014-460	0.7 (6)	0.54 (4.8)	3.3 (29.2)	1.2 (11.0)	6000	3000	2.0	0.00015 (0.0013)
MSM100-14-604	DSA014-460	1.5 (14)	1.0 (8.9)	6 (56)	3.4 (30.1)	6000	4250	3.4	0.00021 (0.0019)
MSM115-34-404	DSA014-460	3.8 (34)	3.4 (30.1)	11 (95)	3.8 (33.6)	4000	2800	4.5	0.00057 (0.0050)
MSM115-62-404	DSA014-460	7.0 (62)	5.6 (49.6)	11 (101)	7.0 (62.0)	4000	3700	7.8	0.00102 (0.0090)
	DSA022-460	7.0 (62)	5.6 (49.6)	13 (112)	7.0 (62.0)	4000	3600	7.8	0.00102 (0.0090)
MSM115-89-404	DSA022-460	10.0 (89)	6.9 (61.1)	18 (163)	8.0 (70.8)	4000	3550	10.9	0.00157 (0.0139)
MSM165-93-204	DSA014-460	10.5 (93)	10.3 (91.2)	20 (176)	10.8 (95.6)	2000	1700	6.2	0.00224 (0.0198)
MSM165-146-304	DSA046-460	16.5 (146)	13.4 (118.6)	47 (420)	14.6 (129.2)	3000	1900	13.6	0.00360 (0.0319)
MSM215-221-304	DSA046-460	25.0 (221)	19.9 (176.1)	49 (438)	21.0 (185.9)	3000	2250	20.5	0.00740 (0.0655)
MSM215-319-304	DSA068-460	36.0 (319)	24.6 (217.7)	73 (645)	26.3 (232.8)	3000	2200	28.7	0.01080 (0.0956)
MSM215-407-304	DSA094-460	46.0 (407)	27.1 (239.8)	102 (907)	29.1 (257.5)	3000	2050	36.6	0.01410 (0.1248)
MSM215-505-304	DSA094-460	57.0 (505)	28.1 (248.7)	102 (905)	28.3 (250.5)	3000	2350	45.5	0.01750 (0.1549)

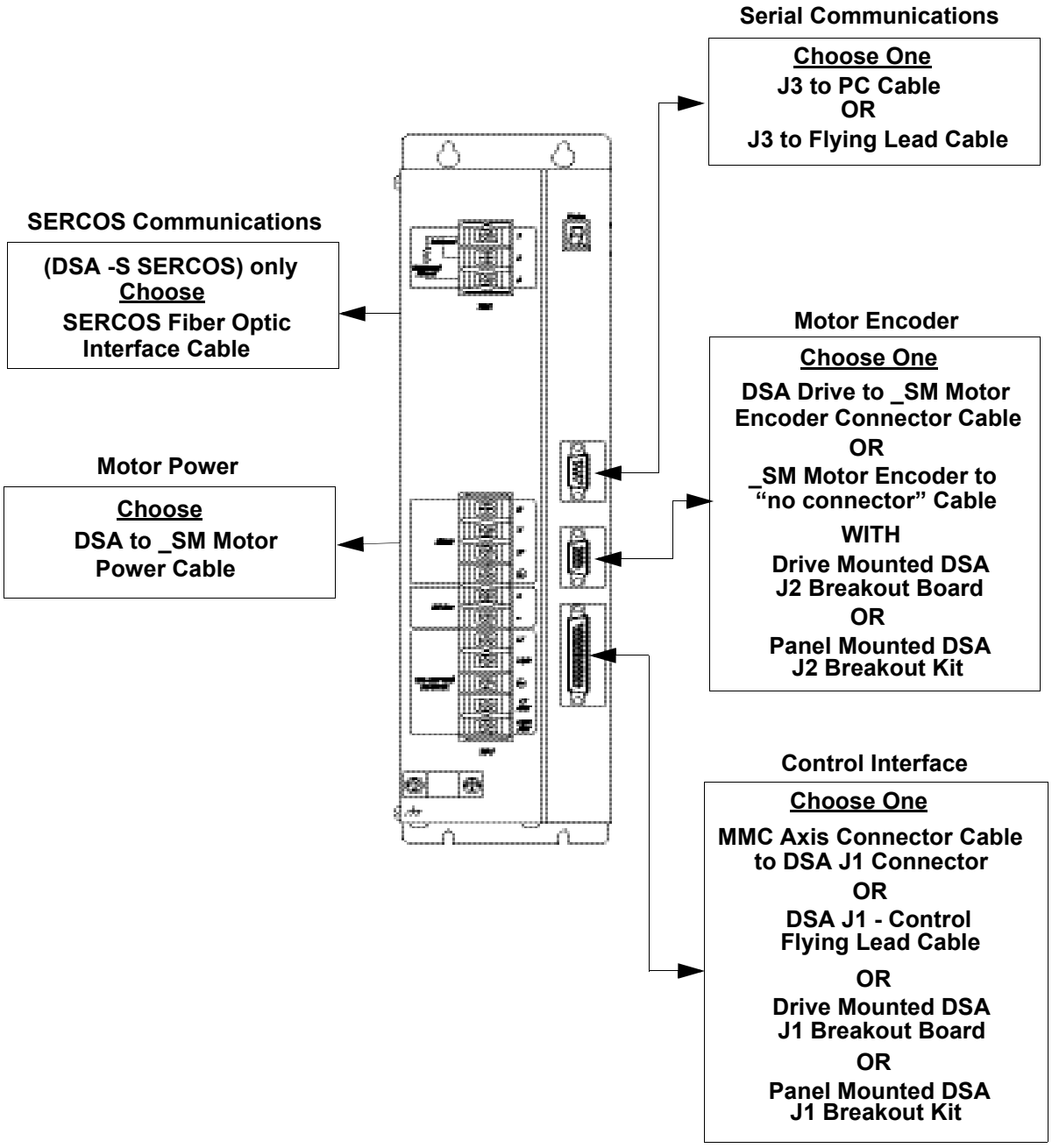
[1] See page 28 for definitions of ratings
Note: For complete Speed/Torque Curves, refer to the motor information tables at *http://www.glcontrols.com*.

Motor/Drive Performance Data, 460V ac, 540V dc bus (cont.)									
XSM Series[2]									
Motor Model	**Drive Model**	**Cont. Stall Torque T_{CS}[1] Nm (lb.-in.)**	**Cont. Rated Torque T_{CR}[1] Nm (lb.-in.)**	**Peak Stall Torque T_{PS}[1] Nm (lb.-in.)**	**Peak Rated Torque T_{PR}[1] Nm (lb.-in.)**	**Rated Speed W_R[1] rpm**	**Peak Corner Speed W_{PC}[1] rpm**	**Cont. Stall Current Ics**	**Inertia J kgm² (lb.-in-S²)**
XSM100-14-504	DSA014-460	1.58 (14)	1.47 (13)	3.61 (32)	1.69 (15)	5000	3000	2.3	0.000044 (0.00039)
XSM100-27-504	DSA014-460	3.05 (27)	2.82 (25)	7.91 (70)	2.82 (25)	5000	2200	4.2	0.000078 (0.00069)
XSM100-37-504	DSA014-460	4.18 (37)	3.39 (30)	9.26 (82)	4.41 (39)	5000	3300	5.7	0.00012 (0.001)
	DSA022-460	4.18 (37)	3.39 (30)	11.1 (98)	4.75 (42)	5000	2750	5.7	0.00012 (0.001)
XSM115-42-504	DSA014-460	4.74 (42)	3.61 (32)	9.83 (87)	5.88 (52)	5000	4100	6.3	0.00026 (0.0023)
	DSA022-460	4.74 (42)	3.61 (32)	13.5 (120)	6.78 (60)	5000	3600	6.3	0.00026 (0.0023)
XSM115-58-504	DSA022-460	6.55 (58)	4.29 (38)	15.2 (135)	10.4 (92)	5000	4300	9.2	0.00038 (0.0033)
	DSA046-460	6.55 (58)	4.29 (38)	19.8 (175)	10.4 (92)	5000	3700	9.2	0.00038 (0.0033)
XSM130-50-504	DSA022-460	5.65 (50)	4.07 (36)	12.6 (112)	7.00 (62)	5000	3300	8.1	0.000028 (0.0024)
	DSA046-460	5.65 (50)	4.07 (36)	13.5 (120)	7.01 (62)	5000	3300	8.1	0.000028 (0.0024)
XSM130-73-304	DSA014-460	8.25 (73)	6.78 (60)	16.4 (145)	9.15 (81)	3000	2300	6.7	0.0004 (0.0036)
	DSA022-460	8.25 (73)	6.78 (60)	20.3 (180)	9.15 (81)	3000	1900	6.7	0.0004 (0.0036)
XSM130-73-404	DSA022-460	8.25 (73)	6.21 (55)	16.4 (145)	12.1 (107)	4000	3400	9.9	0.0004 (0.0036)
	DSA046-460	8.25 (73)	6.21 (55)	20.3 (180)	12.1 (107)	4000	2900	9.9	0.0004 (0.0036)
XSM130-90-304	DSA022-460	10.2 (90)	8.36 (74)	22.6 (200)	15.9 (141)	3000	2500	9.1	0.00052 (0.0046)
	DSA046-460	10.2 (90)	8.36 (74)	27.1 (240)	16.4 (145)	3000	2200	9.1	0.00052 (0.0046)
XSM165-95-404	DSA068-460	10.7 (95)	6.3 (56)	23.2 (205)	6.3 (56)	4000	1500	11.5	0.000783 (0.0069)
XSM165-172-404	DSA068-460	19.4 (172)	12.4 (110)	45.2 (400)	15.3 (135)	4000	2000	20.5	0.0014 (0.013)
XSM215-325-304	DSA068-460	36.7 (325)	18.6 (165)	72.3 (640)	32.2 (285)	3000	1500	32.1	0.004 (0.0354)
XSM215-425-304	DSA094-460	48.0 (425)	16.4 (145)	101.1 (895)	45.2 (400)	3000	2000	38.5	0.0058 (0.051)
XSM215-531-304	DSA094-460	60.0 (531)	20.3 (180)	108.5 (960))	67.8 (600)	3000	1500	48.0	0.00775 (0.0685)

[1] See page 28 for definitions of ratings.

[2] In a 40° C ambient with motors mounted on aluminum heatsinks. Motors XSM 100/115/130/165: 0.5" x 12" x 12", XSM 215: 1.0" x 12" x 12".

Note: For complete Speed/Torque Curves, refer to the motor information tables at *http://www.glcontrols.com*.



Giddings and Lewis offers a full range of interconnect options to complete your DSA drive system. Select the high quality, plug-and-play cable sets for easy installation. With their 360 degree shielding these cables provide superior noise immunity. Direct connect control interface cables deliver plug-and-play interface to Giddings & Lewis MMC and MMC for PC controls. Drive mount and panel mount breakout boards are available for custom wired applications.

Drive, Motor and Cable Combinations

Micro Drives		
DSA007-230 .5kW		
Motor Model	**Motor Power Cable**	**Feedback Cable**
LSM54-3-602	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM63-6-602	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
MSM100-6-604	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
NSM2302	PWR-NSM-001M-MCS-000-16-4A	ENC-NSM-001M-MCS-DCA-28-AA
NSM2304	PWR-NSM-001M-MCS-000-16-4A	ENC-NSM-001M-MCS-DCA-28-AA
YSM102 115V	PWR-YSM-001M-MCS-000-16-4A	ENC-YSM-001M-MCS-DCA-28-AA
YSM102 230V	PWR-YSM-001M-MCS-000-16-4A	ENC-YSM-001M-MCS-DCA-28-AA
YSM103 230V	PWR-YSM-001M-MCS-000-16-4A	ENC-YSM-001M-MCS-DCA-28-AA
XSM100-14-302	PWR-XSM-001M-MCS-000-16-4A	ENC-XSM-001M-MCS-DCA-28-AA
DSA015-230 1kW		
Motor Model	**Motor Power Cable**	**Feedback Cable**
LSM63-12-602	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM100-22-454	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM100-35-454	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
MSM100-14-604	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
MSM115-34-404	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
NSM2304	PWR-NSM-001M-MCS-000-16-6A	ENC-NSM-001M-MCS-DCA-28-AA
NSM3406	PWR-NSM-001M-MCS-000-16-4A	ENC-NSM-001M-MCS-DCA-28-AA
NSM3412	PWR-NSM-001M-MCS-000-16-4A	ENC-NSM-001M-MCS-DCA-28-AA
NSM4214	PWR-NSM-001M-MCS-000-16-4A	ENC-NSM-001M-MCS-DCA-28-AA
YSM103 115V	PWR-YSM-001M-MCS-000-16-6A	ENC-YSM-001M-MCS-DCA-28-AA
YSM206 230V	PWR-YSM-001M-MCS-000-16-6A	ENC-YSM-001M-MCS-DCA-28-AA
YSM212 230V	PWR-YSM-001M-MCS-000-16-6A	ENC-YSM-001M-MCS-DCA-28-AA
HSM307	PWR-H&F-001M-MCS-000-16-4A	ENC-H&F-001M-MCS-DCA-28-AA
XSM100-14-502	PWR-XSM-001M-MCS-000-16-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM100-14-302	PWR-XSM-001M-MCS-000-16-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM100-27-352	PWR-XSM-001M-MCS-000-16-4A	ENC-XSM-001M-MCS-DCA-28-AA

Micro Drives (cont.)		
DSA030-230 2kW		
Motor Model	**Motor Power Cable**	**Feedback Cable**
LSM75-21-602	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM75-29-602	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM100-46-454	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM130-102-304	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
MSM115-62-404	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
MSM165-93-204	PWR-L&M-001M-MCS-000-14-6H	ENC-L&M-001M-MCS-DCA-26-AA
NSM4220	PWR-NSM-001M-MCS-000-16-4A	ENC-NSM-001M-MCS-DCA-28-AA
NSM5630	PWR-NSM-001M-MCS-000-16-4A	ENC-NSM-001M-MCS-DCA-28-AA
NSM5637	PWR-NSM-001M-MCS-000-16-4A	ENC-NSM-001M-MCS-DCA-28-AA
NSM5647	PWR-NSM-001M-MCS-000-16-4A	ENC-NSM-001M-MCS-DCA-28-AA
YSM206 115V	PWR-YSM-001M-MCS-000-16-4A	ENC-YSM-001M-MCS-DCA-28-AA
YSM212 115V	PWR-YSM-001M-MCS-000-16-4A	ENC-YSM-001M-MCS-DCA-28-AA
YSM323 230V	PWR-YSM-001M-MCS-000-16-4A	ENC-YSM-001M-MCS-DCA-28-AA
HSM320	PWR-H&F-001M-MCS-000-16-4A	ENC-H&F-001M-MCS-DCA-28-AA
HSM430	PWR-H&F-001M-MCS-000-14-4A	ENC-H&F-001M-MCS-DCA-28-AA
FSM430	PWR-H&F-001M-MCS-000-14-4A	ENC-H&F-001M-MCS-DCA-28-AA
FSM460	PWR-H&F-001M-MCS-000-14-4A	ENC-H&F-001M-MCS-DCA-28-AA
XSM100-27-502	PWR-XSM-001M-MCS-000-16-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM100-27-352	PWR-XSM-001M-MCS-000-16-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM130-90-152	PWR-XSM-001M-MCS-000-16-4A	ENC-XSM-001M-MCS-DCA-28-AA

Standard 230V Drives		
DSA130-230 3kW		
Motor Model	**Motor Power Cable**	**Feedback Cable**
LSM130-78-454	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
MSM115-89-404	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
MSM165-146-304	PWR-L&M-001M-MCS-000-14-6H	ENC-L&M-001M-MCS-DCA-26-AA
NSM4220	PWR-NSM-001M-MCS-000-16-4A	ENC-NSM-001M-MCS-DCA-28-AA
NSM5630	PWR-NSM-001M-MCS-000-16-4A	ENC-NSM-001M-MCS-DCA-28-AA
NSM5637	PWR-NSM-001M-MCS-000-16-4A	ENC-NSM-001M-MCS-DCA-28-AA
NSM5647	PWR-NSM-001M-MCS-000-16-4A	ENC-NSM-001M-MCS-DCA-28-AA
HSM460	PWR-H&F-001M-MCS-000-14-4A	ENC-H&F-001M-MCS-DCA-28-AA
HSM490	PWR-H&F-001M-MCS-000-14-4A	ENC-H&F-001M-MCS-DCA-28-AA
FSM460	PWR-H&F-001M-MCS-000-14-4A	ENC-H&F-001M-MCS-DCA-28-AA
FSM490	PWR-H&F-001M-MCS-000-14-4A	ENC-H&F-001M-MCS-DCA-28-AA
XSM100-37-502	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM115-42-502	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM115-53-502	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM115-55-352	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM130-53-502	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM130-53-402	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM130-72-402	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM130-74-282	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM130-90-302	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA

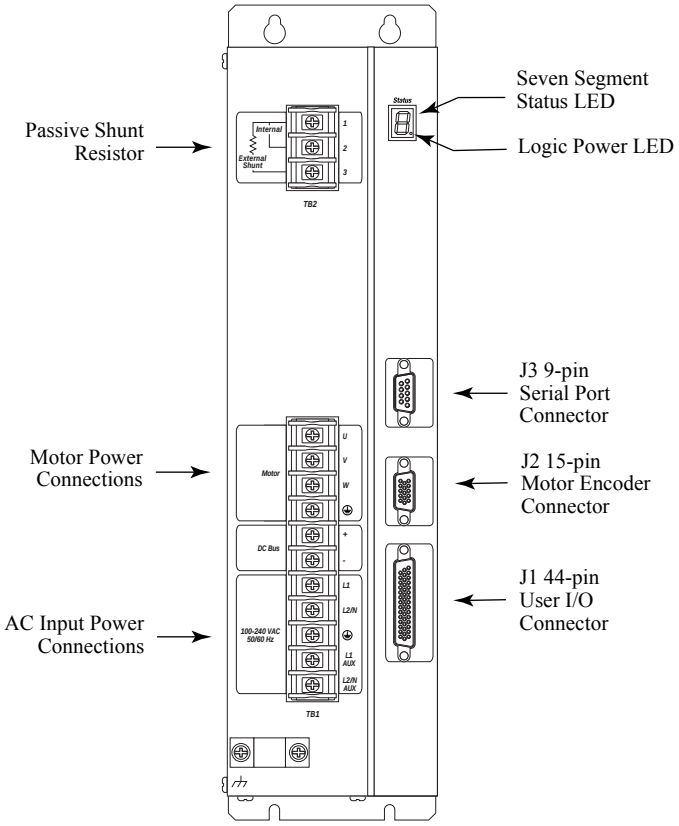
Standard 230V Drives (cont.)		
DSA175-230 7.5kW		
Motor Model	**Motor Power Cable**	**Feedback Cable**
HSM460	PWR-H&F-001M-MCS-000-14-4A	ENC-H&F-001M-MCS-DCA-28-AA
HSM490	PWR-H&F-001M-MCS-000-14-4A	ENC-H&F-001M-MCS-DCA-28-AA
HSM610	PWR-H&F-001M-MCS-000-10-4A	ENC-H&F-001M-MCS-DCA-28-AA
HSM620	PWR-H&F-001M-MCS-000-10-4A	ENC-H&F-001M-MCS-DCA-28-AA
FSM490	PWR-H&F-001M-MCS-000-14-4A	ENC-H&F-001M-MCS-DCA-28-AA
FSM610	PWR-H&F-001M-MCS-000-10-4A	ENC-H&F-001M-MCS-DCA-28-AA
FSM620	PWR-H&F-001M-MCS-000-10-4A	ENC-H&F-001M-MCS-DCA-28-AA
FSM630	PWR-H&F-001M-MCS-000-10-4A	ENC-H&F-001M-MCS-DCA-28-AA
XSM100-37-502	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM115-42-502	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM115-53-502	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM115-55-352	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM130-53-502	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM130-53-402	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM130-72-402	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM130-74-282	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM130-90-302	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM165-95-402	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA
XSM165-172-402	PWR-XSM-001M-MCS-000-10-4A	ENC-XSM-001M-MCS-DCA-28-AA
DSA1150-230 15kW		
Motor Model	**Motor Power Cable**	**Feedback Cable**
HSM620	PWR-H&F-001M-MCS-000-10-4A	ENC-H&F-001M-MCS-DCA-28-AA
HSM630	PWR-H&F-001M-MCS-000-10-4A	ENC-H&F-001M-MCS-DCA-28-AA
HSM835	Consult factory	ENC-H&F-001M-MCS-DCA-28-AA
HSM845	Consult factory	ENC-H&F-001M-MCS-DCA-28-AA
FSM620	PWR-H&F-001M-MCS-000-10-4A	ENC-H&F-001M-MCS-DCA-28-AA
FSM630	PWR-H&F-001M-MCS-000-10-4A	ENC-H&F-001M-MCS-DCA-28-AA
XSM165-95-402	PWR-XSM-001M-MCS-000-14-4A	ENC-XSM-001M-MCS-DCA-28-AA

460V Drives		
DSA014-460 3kW		
Motor Model	**Motor Power Cable**	**Feedback Cable**
MSM100-6-604	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
MSM100-14-604	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
MSM115-34-404	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
MSM165-93-204	PWR-L&M-001M-MCS-000-14-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM100-22-454	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM100-35-454	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM100-46-454	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
XSM100-14-504	PWR-L&M-001M-MCS-000-16-6H	ENC-XSM-001M-MCS-DCA-28-AA
XSM100-27-504	PWR-XSM-001M-MCS-000-16-6H	ENC-XSM-001M-MCS-DCA-28-AA
XSM100-37-504	PWR-XSM-001M-MCS-000-16-6H	ENC-XSM-001M-MCS-DCA-28-AA
XSM115-42-504	PWR-XSM-001M-MCS-000-16-6H	ENC-XSM-001M-MCS-DCA-28-AA
XSM130-73-304	PWR-XSM-001M-MCS-000-16-6H	ENC-XSM-001M-MCS-DCA-28-AA

460V Drives (cont.)		
DSA022-460 5kW (cont.)		
Motor Model	**Motor Power Cable**	**Feedback Cable**
MSM115-62-404	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
MSM115-89-404	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM130-78-454	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM130-102-304	PWR-L&M-001M-MCS-000-16-6H	ENC-L&M-001M-MCS-DCA-26-AA
XSM100-37-504	PWR-XSM-001M-MCS-000-16-4H	ENC-XSM-001M-MCS-DCA-28-AA
XSM115-42-504	PWR-XSM-001M-MCS-000-16-4H	ENC-XSM-001M-MCS-DCA-28-AA
XSM115-58-504	PWR-XSM-001M-MCS-000-16-4H	ENC-XSM-001M-MCS-DCA-28-AA
XSM130-50-504	PWR-XSM-001M-MCS-000-16-4H	ENC-XSM-001M-MCS-DCA-28-AA
XSM130-73-304	PWR-XSM-001M-MCS-000-16-4H	ENC-XSM-001M-MCS-DCA-28-AA
XSM130-73-404	PWR-XSM-001M-MCS-000-16-4H	ENC-XSM-001M-MCS-DCA-28-AA
XSM130-90-304	PWR-XSM-001M-MCS-000-16-4H	ENC-XSM-001M-MCS-DCA-28-AA
DSA046-460 10kW		
Motor Model	**Motor Power Cable**	**Feedback Cable**
MSM165-146-304	PWR-L&M-001M-MCS-000-14-6H	ENC-L&M-001M-MCS-DCA-26-AA
MSM215-221-304	PWR-L&M-001M-MCS-000-14-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM165-119-454	PWR-L&M-001M-MCS-000-14-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM165-173-304	PWR-L&M-001M-MCS-000-14-6H	ENC-L&M-001M-MCS-DCA-26-AA
XSM115-58-504	PWR-XSM-001M-MCS-000-16-4H	ENC-XSM-001M-MCS-DCA-26-AA
XSM130-50-504	PWR-XSM-001M-MCS-000-16-4H	ENC-XSM-001M-MCS-DCA-26-AA
XSM130-73-404	PWR-XSM-001M-MCS-000-16-4H	ENC-XSM-001M-MCS-DCA-26-AA
XSM130-90-304	PWR-XSM-001M-MCS-000-16-4H	ENC-XSM-001M-MCS-DCA-26-AA
DSA068-460 15kW		
Motor Model	**Motor Power Cable**	**Feedback Cable**
MSM215-319-304	PWR-L&M-001M-MCS-000-12-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM165-221-454	PWR-L&M-001M-MCS-000-12-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM215-301-304	PWR-L&M-001M-MCS-000-12-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM215-451-204	PWR-L&M-001M-MCS-000-12-6H	ENC-L&M-001M-MCS-DCA-26-AA
XSM165-172-404	PWR-XSM-001M-MCS-000-14-4H	ENC-XSM-001M-MCS-DCA-28-AA
XSM165-95-404	PWR-XSM-001M-MCS-000-14-4H	ENC-XSM-001M-MCS-DCA-28-AA
XSM215-325-304	PWR-XSM-001M-MCS-000-08-4H	ENC-XSM-001M-MCS-DCA-28-AA
DSA094-460 22kW		
Motor Model	**Motor Power Cable**	**Feedback Cable**
MSM215-407-304	PWR-L&M-001M-MCS-000-08-6H	ENC-L&M-001M-MCS-DCA-26-AA
MSM215-505-304	PWR-L&M-001M-MCS-000-08-6H	ENC-L&M-001M-MCS-DCA-26-AA
LSM215-589-204	PWR-L&M-001M-MCS-000-08-6H	ENC-L&M-001M-MCS-DCA-26-AA
XSM215-425-304	PWR-XSM-001M-MCS-000-08-4H	ENC-XSM-001M-MCS-DCA-28-AA
XSM215-531-304	PWR-XSM-001M-MCS-000-08-4H	ENC-XSM-001M-MCS-DCA-28-AA

DSA Drive Connectors, Cables and Accessories

DSA Drive Front Panel Connections



Serial Port Connector

The following table provides the signal descriptions and pin-outs for the J3 serial port (9-pin) connector.

J3 Pin	Description	Signal
1	RS-422/RS-485 Input+	RCV+
2	RS-232 Input	RCV
3	RS-232 Output	XMT
4	RS-422/RS-485 Output+	XMT+
5	Common	COM
6	Reserved	–
7	RS-422/RS-485 Input-	RCV-
8	RS-422/RS-485 Output-	XMT-
9	Reserved	–

I/O Connector

The following table provides the signal descriptions and pin-outs for the J1 I/O (44-pin) connector.

J1 Pin	Description	Signal
1	Auxiliary Encoder Power Out (+5V)	EPWR
2	Common	ECOM
3	Reserved	–
4	Auxiliary Encoder Ch A+	AX+
5	Auxiliary Encoder Ch A+	AX-
6	Auxiliary Encoder Ch B+	BX+
7	Auxiliary Encoder CH B-	BX-
8	Auxiliary Encoder Ch I+	IX+
9	Auxiliary Encoder Ch I-	IX-
10	Unbuffered Motor Encoder Ch A+	AM+
11	Unbuffered Motor Encoder Ch A-	AM-
12	Unbuffered Motor Encoder Ch B+	BM+
13	Unbuffered Motor Encoder Ch B-	BM-
14	Unbuffered Motor Encoder Ch I+	IM+
15	Unbuffered Motor Encoder Ch I-	IM-
16	Buffered Motor Encoder Ch A+	AMOUT +
17	Buffered Motor Encoder Ch A-	AMOUT-
18	Buffered Motor Encoder Ch B+	BMOUT +
19	Buffered Motor Encoder Ch B-	BMOUT-
20	Buffered Motor Encoder Ch I+	IMOUT+
21	Buffered Motor Encoder Ch I-	IMOUT-
22	Common	ACOM

J1 Pin	Description	Signal
23	Programmable Analog Output	AOUT
24	Analog Current Limit Input	ILIMIT
25	Command +	COMMAND+
26	Command -	COMMAND-
27	I/O Common	IOCOM
28	I/O Common	IOCOM
29	I/O Power	IOPWR
30	I/O Power	IOPWR
31	Digital Input 1	INPUT1
32	Digital Input 2	INPUT2
33	Digital Input 3	INPUT3
34	Digital Input 4	INPUT4
35	Digital Input 5	INPUT5
36	Digital Input 6	INPUT6
37	Digital Input 7	INPUT7
38	Digital Input 8	INPUT8
39	Digital Output 1	OUTPUT1
40	Digital Output 2	OUTPUT2
41	Digital Output 3	OUTPUT3
42	Digital Output 4	OUTPUT4
43	Normally Open Relay Output+	RELAY+
44	Normally Open Relay Output-	RELAY-

Motor Encoder Connector

The following table provides the signal descriptions and pin-outs for the J2 motor encoder (15-pin) connector.

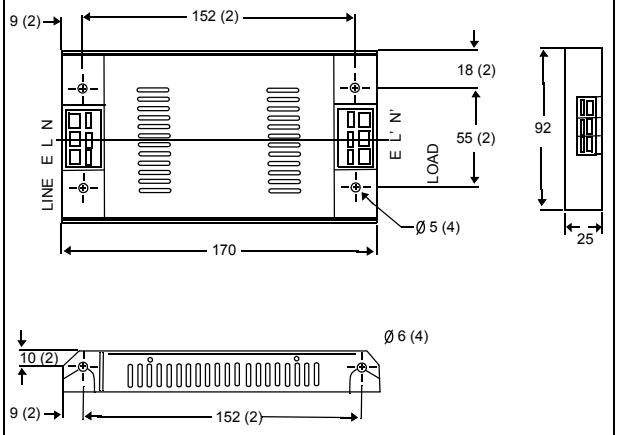
J2 Pin	Description	Signal
1	Channel A+	AM+
2	Channel A-	AM-
3	Channel B+	BM+
4	Channel B-	BM-
5	Channel I+	IM+
6	Common	ECOM
7	Encoder Power (+9V)	EPWR_9V
8	Commutation Channel S3	S3
9	Positive Overtravel Limit	+LIMIT
10	Channel I-	IM-
11	Thermostat	TS
12	Commutation Channel S1	S1
13	Commutation Channel S2	S2
14	Encoder Power (+5V)	EPWR_5V
15	Negative Overtravel Limit	-LIMIT

AC Line Filters

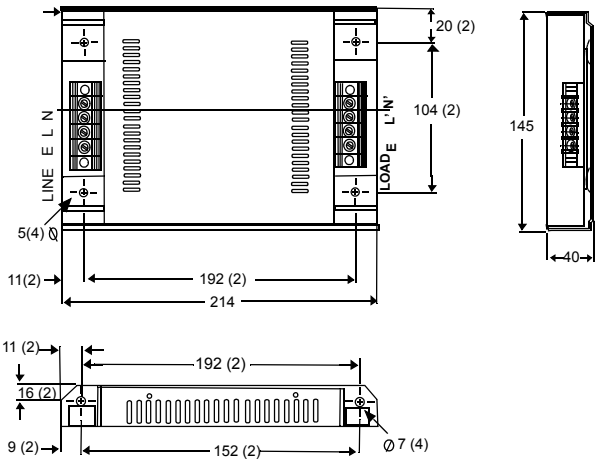
Part Numbers for AC Line Filters

AC Line Filters (Required for EMC Compliance)		
Current	**For Drive Model**	**Part Number**
I = 6A single phase	DSA007	M.1015.6922
I = 10A single phase	DSA015, DSA110	M.1015.6917
I = 23A single phase	DSA030, DSA120	M.1015.6918
I = 36A single phase	DSA130, DSA175	M.1015.7969
I = 36A three phase	DSA130, DSA175	M.1015.7970
I = 50A single phase	For multiple drives on one filter. Combined drive input currents may not exceed filter current rating.	M.1015.7971
I = 80A three phase	For multiple DSA175 drives on one filter. Combined drive input currents may not exceed filter current.	M.1015.7972
I = 23 three phase	For DSA 460V drives	M.1302.3056
I = 30 three phase	For DSA 460V drives	M.1302.3057
I = 50 three phase	For DSA 460 V drives	M.1302.3058

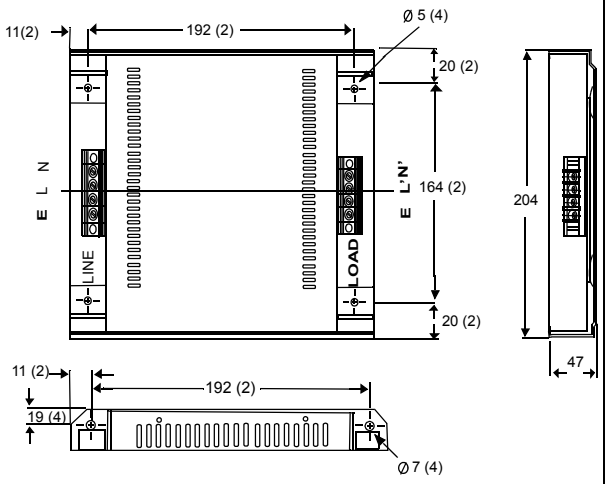
Dimensions for AC Line Filters



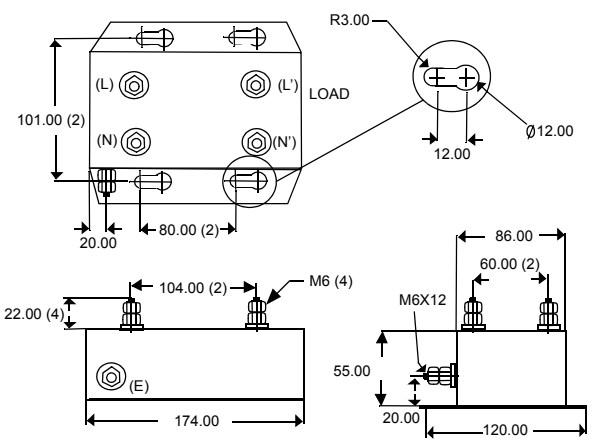
M.1015.6922



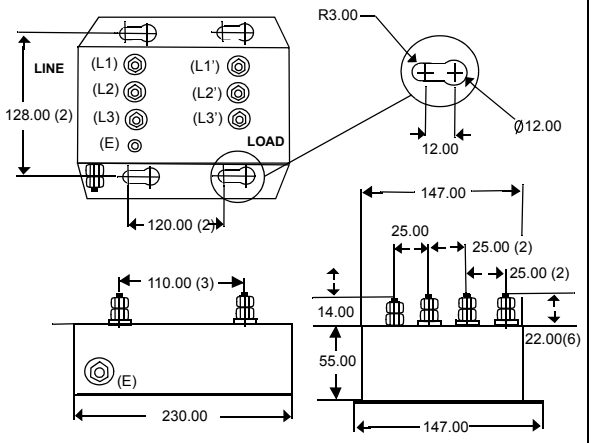
M.1015.6917



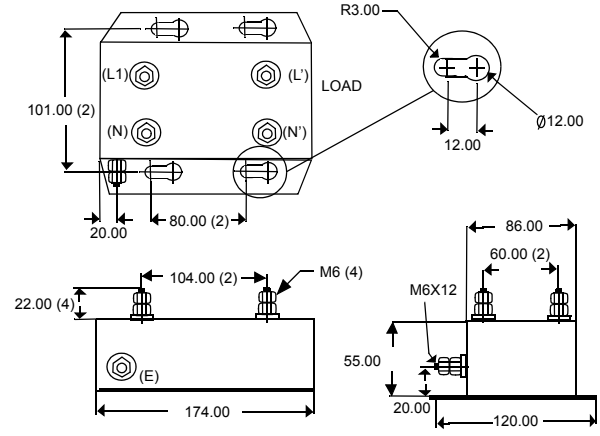
M.1015.6918



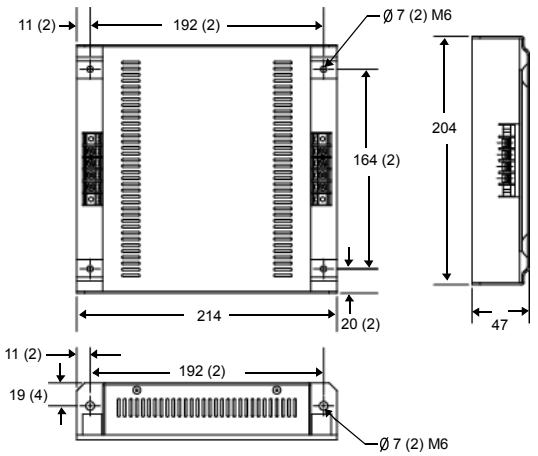
M.1015.7971



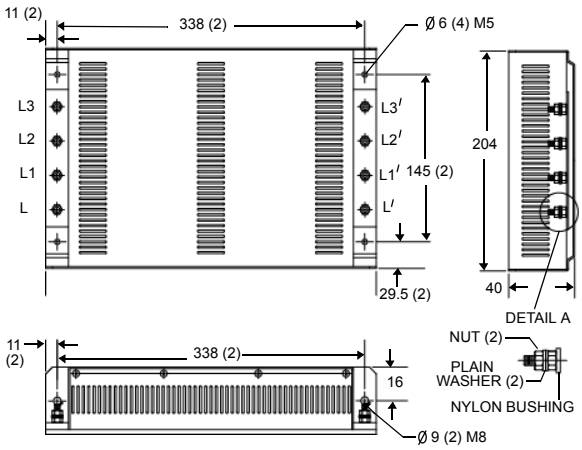
M.1015.7970



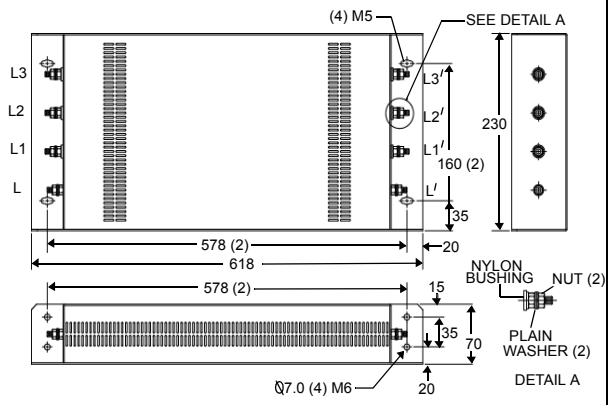
M.1015.7969



M.1302.3056



M.1302.3057



M.1302.3058

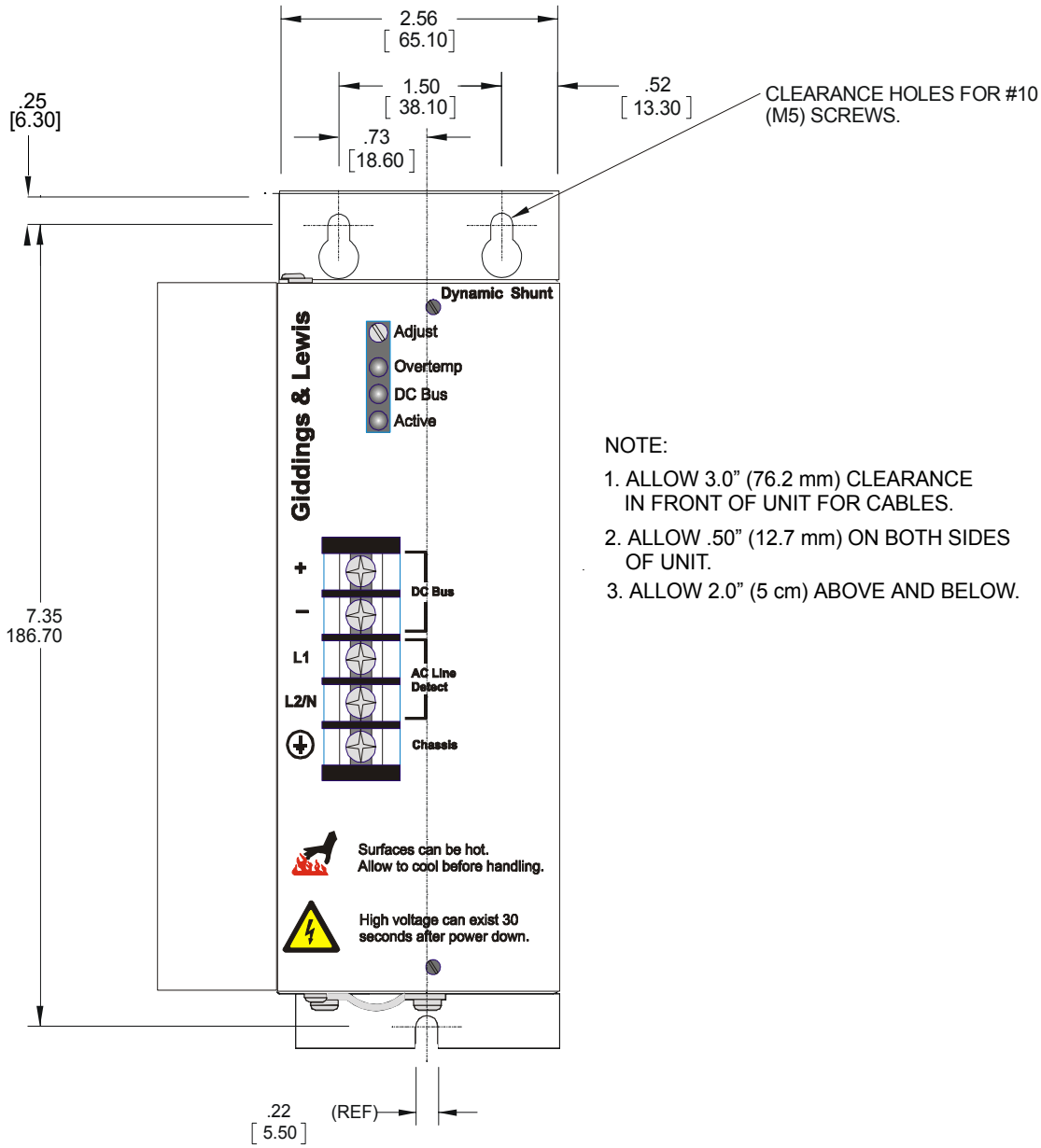
External Shunts

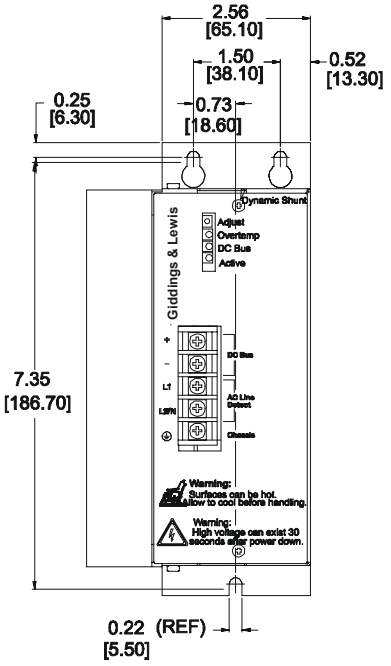
Part Numbers for External Shunts

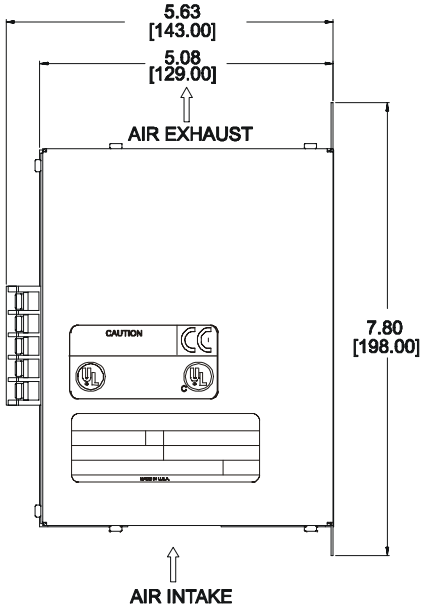
Description	Part No.
MicroDSA Series Shunt	
DSA Series Passive Shunt 460 Volt, 900 Watt, 120 Ohms	M.1301.8818
Passive Shunt 460 Volt, 900 Watt, 40 Ohms	M.1301.8819
Passive Shunt 460 Volt, 900 Watt, 25 Ohms	M.1301.8870
Passive Shunt 460 Volt, 1800 Watt, 40 Ohms	M.1301.8871
Passive Shunt 460 Volt, 1800 Watt, 25 Ohms	M.1301.8872
Passive Shunt 460 Volt, 1800 Watt, 20 Ohms	M.1301.8873

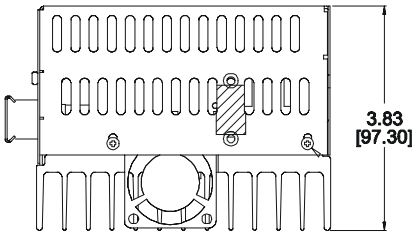
Dimensions for External Shunts

MicroDSA Series Dynamic Shunt Dimensions





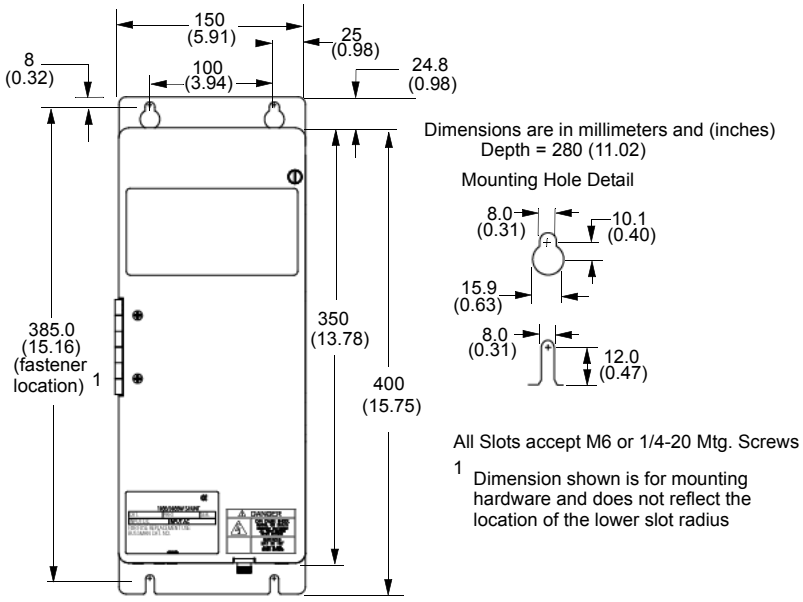


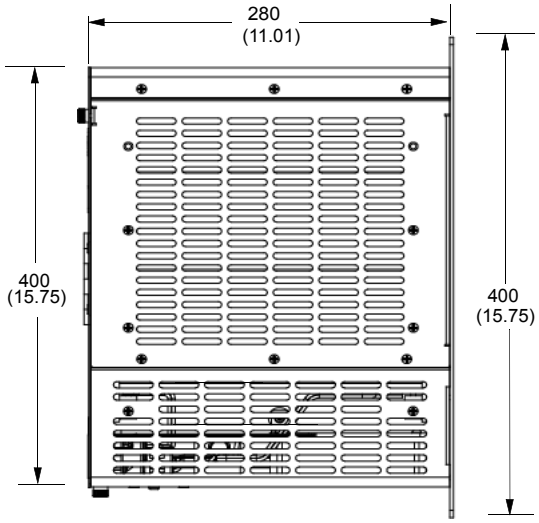


NOTES:

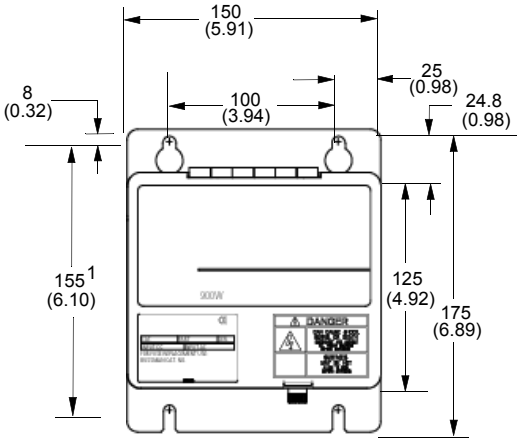
1. MUST CONFORM TO SPEC. 7058-9978.
2. MINIMUM UNOBSTRUCTED SURROUNDING SPACE FOR COOLING AIR INTAKE AND FAN EXHAUST ARE:
   - 5 cm (2 in.) ABOVE
   - 5 cm (2 in.) BELOW
   - 1.25 cm (0.5 in.) SIDES
   - 2.5 cm (1.0 in.) IN FRONT FOR WIRE CLEARANCE

1800 Watt DSA Series Dynamic Shunt Dimensions





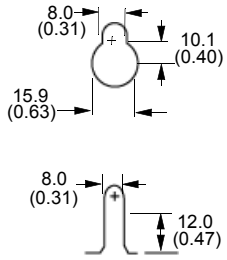
900 Watt DSA Series Shunt Kit



Dimensions are in millimeters and (inches)

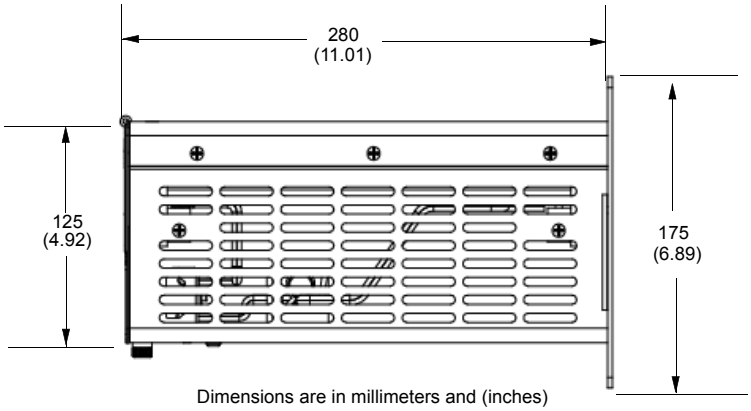
Depth = 280 (11.02)

Mounting Hole Detail



All Slots accept M6 or 1/4-20 Mtg. Screws

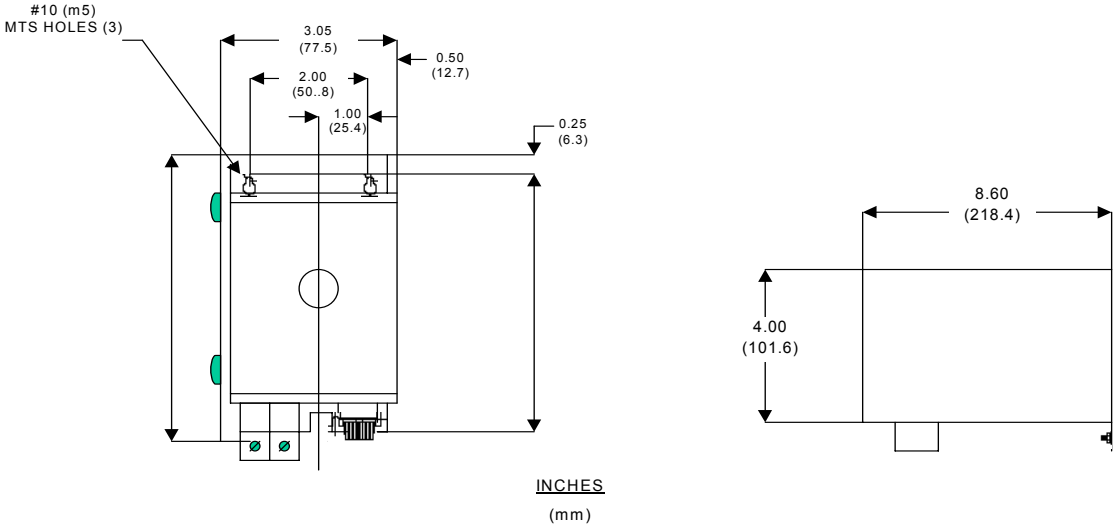
[1] Dimension shown is for mounting hardware and does not reflect the location of the lower slot radius



Dimensions are in millimeters and (inches)

300 Watt DSA Series Shunt

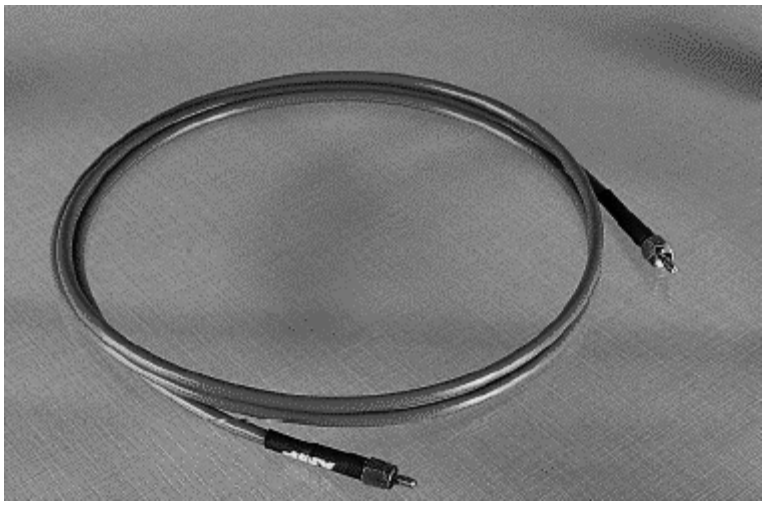
DSA130 Shunt - Description	Part No.
300 Watts Continuous, 600 Watts Peak	M.1015.7838



SERCOS Fiber Optic Cables

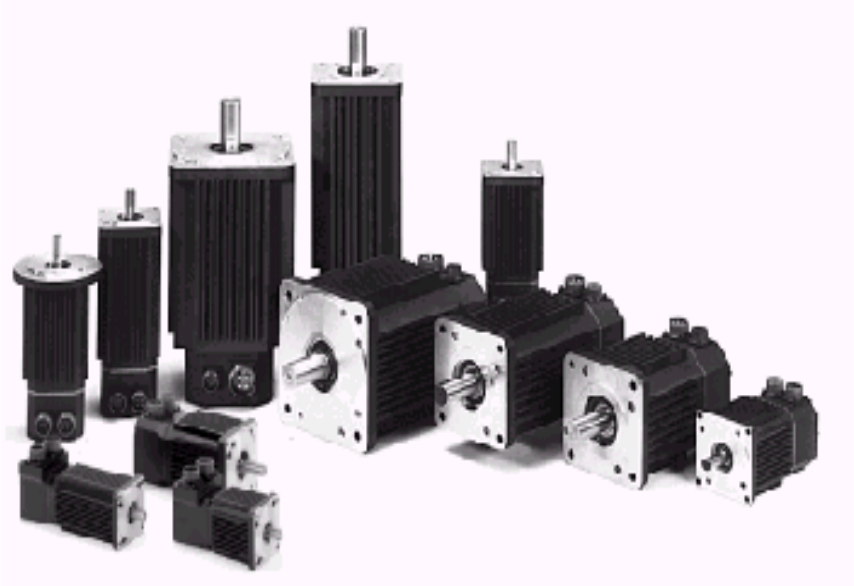
Description	Material Number	
Standard Cable	M.1016.9743	(Material Number is for 1-foot length. Call your Giddings & Lewis representative for other lengths.)
Heavy Duty Cable	M.1016.9758	(Material Number is for 1-foot length. Call your Giddings & Lewis representative for other lengths.)

Heavy Duty SERCOS Fiber Optic Cable



CENTURION DSA DRIVES AND MOTORS MOTION SOLUTIONS PRODUCT GUIDE

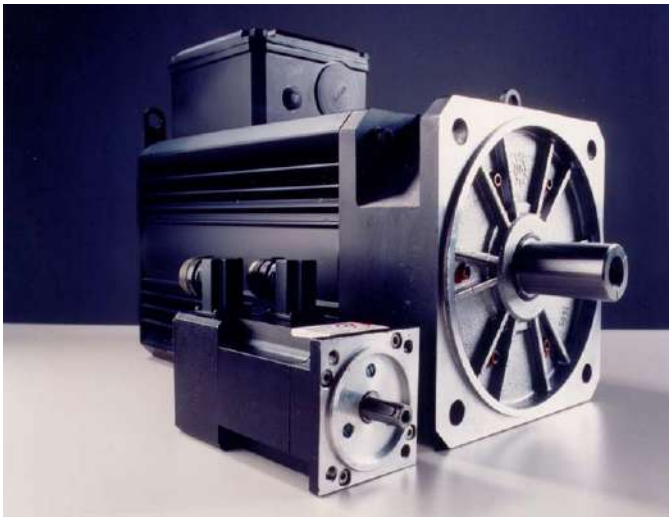
Centurion™ Brushless Servo Motors



Guide to Brushless Motor Section:

Giddings & Lewis

LSM Brushless Servo Motors



Typical Applications

- "Smart" conveyors
- Packaging machinery
- Punch press/material feeding
- Robotic pick and place
- High duty cycle applications

Characteristics

- High acceleration and peak torques
- High speed point-to-point positioning
- Environmentally rugged

Standard Features

- High energy neodymium magnet rotors provide high acceleration/deceleration
- Temperature sensors built into windings allow intelligent shut down in overload conditions
- Unique stator design provides optimal thermal transfer allowing successful automation of high hit rate, demanding applications
- Use direct mount pinions and belt pulleys for cost-effective application
- Standard cable sets simplify machine design, build and commissioning
- Incremental encoder standard, high resolution and multi-turn absolute encoder available
- Machine design simplified using standard gearboxes and mounting plates
- Industrial packaging insures reliable operation in harsh environments
- UL, cUL and CE Mark allow worldwide application
- Maintenance-free design manufactured in ISO9000 facility
- Use available CAD (.DXF) drawings for easy design into your machine

LSM Motor And Performance Data

230 Volt Motors

Motor Model	LSM54-3-602		LSM63-6-602		LSM63-12-602		LSM75-21-602		LSM75-29-602	
Mechanical Data										
Rotor Moment of Inertia	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2
	.00003	.0000029	.00011	.000013	.00017	.00002	.00029	.000033	.00039	.000044
Motor Net Weight	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
	1.5	.7	3.1	1.4	4.0	1.8	6.8	3.1	8.6	3.9
Winding Data										
KT (Nm/Amp)	.35		.35		.36		.42		.40	
K_E Voltage Constant[2] (V/kRPM)	43		43		43		49		49	
Winding Resistance Ph to phase @ 25°C	30.29		8.49		3.68		2.26		1.32	
Winding Inductance Phase to phase (mH)	57.5		26.2		13.0		17.9		12.4	

460 Volt Motors

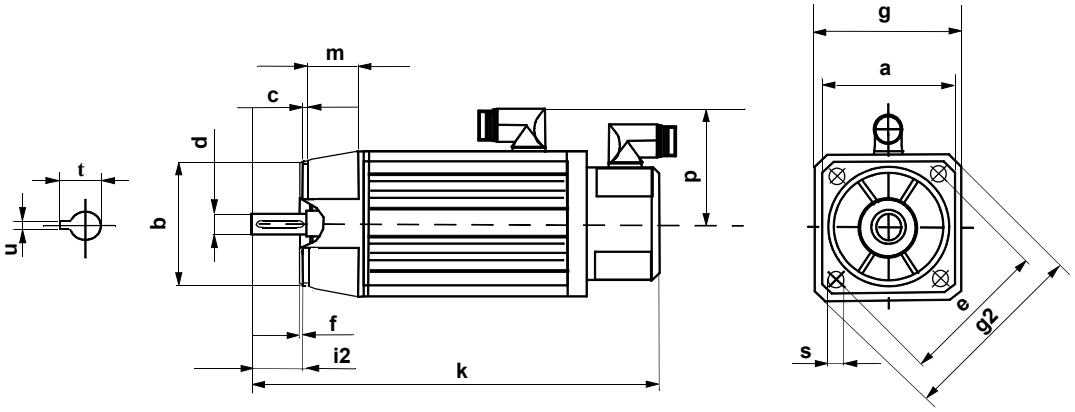
Motor Model	LSM100-22-454		LSM100-35-454		LSM100-46-454		LSM130-78-454		LSM130-102-304		LSM165-119-454		LSM165-173-304		LSM165-221-454		LSM215-301-304		LSM215-451-204		LSM215-589-204	
Mechanical Data																						
Rotor Moment of Inertia	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2
	.001	.00011	.0013	.000144	.0015	.00017	.0036	.00041	.0049	.00055	.0081	.00092	.0113	.00128	.0146	.00165	.0376	.00425	.0531	.0060	.0681	.0077
Motor Net Weight	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
	9.3	4.2	11.7	5.3	13.9	6.3	22	10.0	26	11.8	35.7	16.2	41.2	18.7	46.3	21.0	68.4	31.0	84.9	38.5	100.3	45.5
Winding Data																						
K_T (Nm/Amp)[1]	.82		.86		.88		.88		1.28		.87		1.29		.91		1.22		1.84		1.84	
K_E (V/KRPM) Voltage Constant	99		103		106		107		154		105		1.56		109		147		222		222	
Winding Resistance Ph to phase @ 135°C	10.7		5.9		3.9		1.68		2.2		0.76		0.98		0.33		0.38		0.50		0.31	
Winding Inductance Phase to phase (mH)	25.8		16.8		12.44		8.46		12.4		6.68		9.6		3.6		6.94		10.0		7.4	

[1]Peak value of per phase sine wave amps

[2]Peak value of sinusoidal phase to phase Volts

Note: LSM 55, 63 motors have 1000 Line encoder as standard

LSM Standard Motor Dimensions



Shaft End Threaded Hole		
Motor	**Thread**	**Thread Depth**
LSM100-XXX	M5 x 0.8 mm	12.5
LSM130-XXX	M8 x 1.25 mm	19
LSM165-XXX	M10 x 1.5 mm	22
LSM215-XXX	M12 x 1.75 mm	28

Note: Motors manufactured to millimeter dimensions

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	Dimensions															
	Flange							Shaft			Motor					
Model	**a** mm	**b** mm	**c** mm	**e** mm	**f** mm	**i2** mm	**s** mm	**d** mm	**u** mm	**u+d-t (key depth)** mm	**k[1]** mm	**k-i2[1] (length from face)** mm	**p** mm	**m** mm	**g** mm	**g2** mm
LSM54-3-602	45	40	6	54	2.5	20	4.4	9	3	1.8	119	99	59.5	50	55	75.5
LSM63-6-602	55	40	6	63	2.5	20	5.4	9	3	1.8	124	104	60	56	55	75.5
LSM63-12-602											154	134				
LSM75-21-602	70	60	8	75	2.5	23	5.5	11	4	2.5	171	148	67	56	70	94
LSM75-29-602											201	178				
LSM100-22-454	90/94	80	8	100	3	30	7	14	5	3	235	205	77	NA[2]	94	115
LSM100-35-454											265	235				
LSM100-46-454											295	265				
LSM130-78-454	120	110	9	130	3.5	50	9	24	8	5	320	270	90	28	115	150
LSM130-102-304											358	308				
LSM165-119-454	142	130	10	165	3.5	58	12	28	8	5	338	280	126	31.4	142	186
LSM165-173-304											388	330				
LSM165-221-454											428	370				
LSM215-301-304	190	180	12	215	4	80	14	38	10	7	400	320	150	37	190	250
LSM215-451-204											452	372				
LSM215-589-204											504	424				

[1]Add 38mm for LSM54 motors with brake, 42mm for LSM63 motors with brake, 49mm for LSM75 motors with brake, 67mm for LSM100 motors with brake, 79mm for LSM130 motors with brake, 78mm for LSM165 motors with brake, 113mm for LSM215 motors with brake. Add 25mm for LSM75 motor with Sin/Cos feedback. LSM100-215 are the same length with Sin/Cos feedback.

[2]Not Applicable

Motors manufactured to millimeter dimensions shown. Inch dimensions can be obtained by dividing by 25.4. For further motor detail, engineering specification drawings are available.
Sin/Cos feedback is used with Single turn high resolution (-S) and Multiturn high resolution (-M) feedback options.

LSM Motor Connector Ordering Information

Ordering options include the following:

- 24 VDC Brake (Consult factory for brake motor availability)
- 1000 Line encoder is standard for LSM 55 and 63 motors
- Single turn high resolution
- Multi-turn high resolution

Consult the factory for information on any of these items.

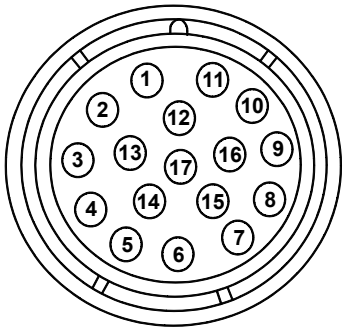
Note: Optional configurations or encoder line counts have extended lead times and additional charges.

Note: All options are not available.

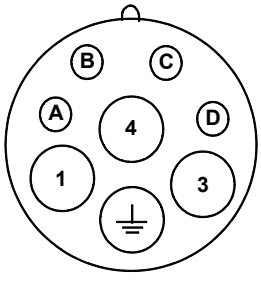
Connector	Part Number
Power Connectors	
Size 1, 16AWG	M.1302.0479
Size 1.5, 8-16AWG	M.1302.1998
Size 1.5, 6-10AWG	M.1302.1999
Encoder Feedback Connector	
17 Pin	M.1302.0510

LSM Motor Connector Data Tables

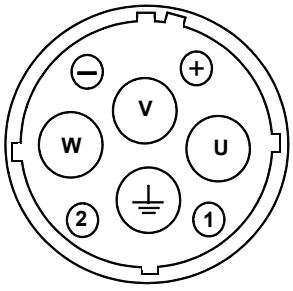
Feedback Connector			
Pin	**2000 Line Encoder**	**High Resolution Encoder (SRS 50)**	**Absolute Encoder (SRM 50)**
1	A+	Sine +	Sine +
2	A-	Sine -	Sine -
3	B+	Cos +	Cos +
4	B-	Cos -	Cos -
5	I+	485 +	485 +
6	I-	485 -	485 -
7	GND	GND	GND
8	Reserved	Reserved	Reserved
9	No connection	8-12 VDC	8-12 VDC
10	+5VDC	No Connection	No Connection
11	Common	Common	Common
12	Reserved	Reserved	Reserved
13	Temp +	Temp +	Temp +
14	Temp -	Temp -	Temp -
15	Hall A	No Connection	No Connection
16	Hall B	No Connection	No Connection
17	Hall C	No Connection	No Connection



Motor Power Connector					
Size 1 Power Connector		**Size 2 Power**		**Size 3 Power**	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	R	U	R	U	R
2	GND	GND	GND	GND	GND
3	T	W	T	W	T
4	S	V	S	V	S
A	Brake +	+	Brake +	+	Brake +
B	Brake -	-	Brake -	-	Brake -
C		1		1	
D		2		2	



Size 1; I < 13.5 Amps RMS



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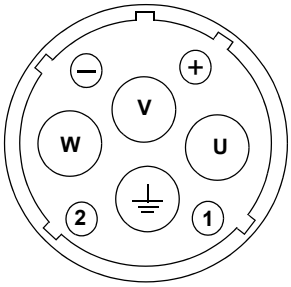


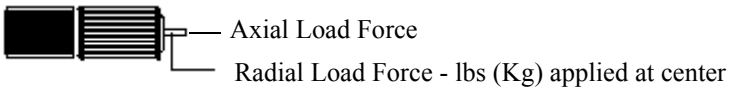
Size 3; I < 97 Amps RMS

Standard Motor Radial Load Force Ratings For LSM Motors

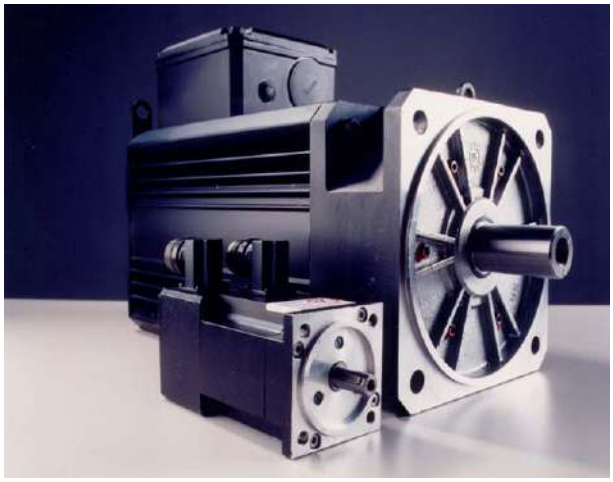
Motors are capable of operating with the maximum radial or maximum axial shaft loads listed in the following tables. Radial loads are applied midway along the shaft extension. The table represents 20,000-hour L10 bearing fatigue life. This 20,000-hour life does not account for possible application-specific life reduction that may occur due to bearing grease contamination from external sources.

RADIAL LOAD FORCE RATINGS (Maximum Radial Load)														
	500 RPM		1000 RPM		2000 RPM		3000 RPM		4000 RPM		5000 RPM		6000 RPM	
	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)	kg	(lb)
LSM54	24	53	23	51	22	48	21	47	21	46	20	44	20	43
LSM63	28	61	27	60	26	58	25	55	24	53	24	52	23	50
LSM75	29	65	29	63	28	62	27	59	26	57	25	56	24	54
LSM100	56	123	56	123	48	106	42	94	36	80	34	76	33	73
LSM130	127	281	91	202	68	151	58	129	53	118	49	110	45	101
LSM165	147	325	107	236	76	168	63	140	56	123	46	103	43	95
LSM215	214	472	158	348	112	247	89	196	76	168	63	140	58	129

Note: The axial Load Force must always be zero.



MSM Brushless Servo Motors



Typical Applications

- Web and film processing
- Machine tool/metal cutting
- Textile machinery
- CAM replacements

Characteristics

- Higher inertia matching capability
- Heavy duty continuous operations
- Environmentally rugged

Standard Features

- High energy neodymium magnet rotors provide high acceleration/deceleration
- Temperature sensors built into windings allow intelligent shut down in overload conditions
- Unique stator design provides optimal thermal transfer allowing successful automation of high hit rate, demanding applications
- Use direct mount pinions and belt pulleys for cost-effective application
- Standard cable sets simplify machine design, build and commissioning
- Incremental encoder standard, high resolution and multi-turn absolute encoder available
- Machine design simplified using standard gearboxes and mounting plates
- Industrial packaging insures reliable operation in harsh environments
- UL, cUL and CE Mark allow worldwide application
- Maintenance-free design manufactured in ISO9000 facility
- Use available CAD (.DXF) drawings for easy design into your machine

MSM Motor And Performance Data

Motor Model	MSM100-6-604		MSM100-14-604		MSM115-34-404		MSM115-62-404		MSM115-89-404		MSM165-93-204		MSM165-146-304		MSM215-221-304		MSM215-319-304		MSM215-407-304		MSM215-505-304	
Mechanical Data																						
Rotor Moment	$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$	$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$	$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$	$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$	$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$	$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$	$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$	$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$	$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$	$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$	$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$
of Inertia	.0013	.00015	.0019	.00021	.0050	.00057	.0089	.0010	.0142	.0016	.0195	.0022	.0319	.0036	.0655	.0074	.0956	.0108	.1248	.0141	.0175	.1549
Motor	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
Net Weight	10.8	4.9	13.0	5.9	14.6	6.6	18.7	8.5	24.3	11.0	26.5	12.0	35.9	16.3	57.3	26.0	72.8	33.0	88.2	40.0	108	49
Winding Data																						
K_T Torque (Nm/Amp) Constant @ 25°C[1]	.46		.52		.95		.99		1.03		1.86		1.34		1.36		1.36		1.4		1.39	
KE Voltage Constant[3] (V/KRPM)	55		62		115		120		123		225		161		164		164		170		168	
Winding Resistance Ph to phase @ 25°C	24.4		9.0		8.4		3.4		2.0		5.7		1.56		0.76		0.40		0.28		0.24	
Winding Inductance Phase to phase (mH)	48		22.0		32.0		16.8		12.0		60.0		18.5		15.8		10.6		8.2		6.5	

[1]Peak value of per phase sine wave amps

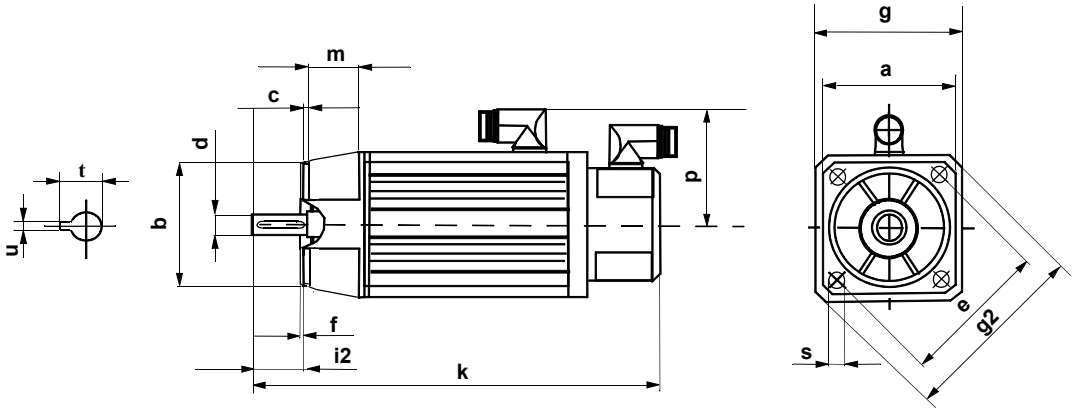
[2]Peak value of per phase square wave amps

[3]Peak value of sinusoidal phase to phase Volts

[4]At 125° C winding temperature, in a 40° C ambient, Motors, motors MSM100-115, 490 mounted on 12.5mm x 250mm x 250mm, Motors MSM165-215 mounted on 25mm x 400mm x 400mm aluminum heat sink

[5]With 230 VAC line voltage input

MSM Standard Motor Dimension



Shaft End Threaded Hole		
Motor	**Thread**	**Thread Depth**
MSM100-XXX	M5 x 0.8 mm	12.5
MSM115-XXX	M6 x 1.0 mm	16
MSM165-XXX	M8 x 1.25 mm	19
MSM215-XXX	M12 x 1.75 mm	28

Note: Motors manufactured to millimeter dimensions

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	Dimensions															
	Flange							Shaft			Motor					
Model	**a** mm	**b** mm	**c** mm	**e** mm	**f** mm	**i2** mm	**s** mm	**d** mm	**u** mm	**u+d-t (key depth)** mm	**k[1]** mm	**k-i2[1] (length from face)** mm	**p** mm	**m** mm	**g** mm	**g2** mm
MSM100-6-604	90	80	8	100	3	30	7	14	5	3	224	194	81	27	99	120
MSM100-14-604	-	-	-	-	-	-	-	-	-	-	249	219	-			
MSM115-34-404	105	95	8	115	3	40	9	19	6	3.5	277	237	90	27	115	150
MSM115-62-404	-	-	-	-	-	-	-	-	-	-	317	277				
MSM115-89-404	-	-	-	-	-	-	-	-	-	-	357	317				
MSM165-93-204	142	130	12	165	3.5	50	12	24	8	5	316	266	126	32	142	186
MSM165-146-304	-	-	-	-	--	-	-	-	-	-	366	316				
MSM215-221-304	190	180	13	215	4	58	14	32	10	7	367	309	150	45	190	250
MSM215-319-304	-	-	-	-	-	-	-	-	-	-	415	357	-			
MSM215-407-304	-	-	-	-	-	-	-	-	-	-	463	405	-			
MSM215-505-304	-	-	-	-	-	-	-	-	-	-	511	453	-			

[1] Add 3mm for MSM100 motors with Sin/Cos feedback, 0 mm for MSM115 motors with Sin/Cos feedback, 21mm for MSM215 motors with Sin/Cos feedback, 22mm for MSM165 motors with Sin/Cos feedback.

Motors manufactured to millimeter dimensions shown. Inch dimensions can be obtained by dividing by 25.4. For further motor detail, engineering specification drawings are available.

Sin/Cos feedback is used with Single turn high reslolution (-S) and Multiturn high resolution (-M) feedback options.

Brake motors are the same length as non-brake motors.

MSM Motor Connector Ordering Information

Ordering options include the following:

- 24 VDC Brake (Consult factory for brake motor availability)
- Single turn high resolution
- Multi-turn high resolution

Consult the factory for information on any of these items.

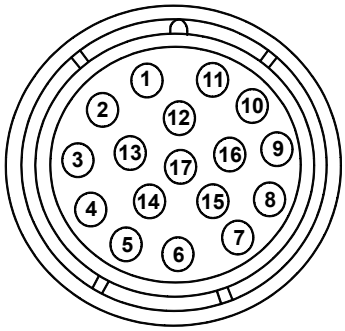
Note: Optional configurations or encoder line counts have extended lead times and additional charges.

Note: All options are not available.

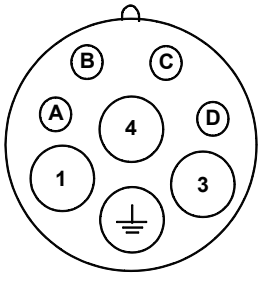
Connector	Part Number
Power Connectors	
Size 1, 16AWG	M.1302.0479
Size 1.5, 8-16AWG	M.1302.1998
Size 1.5, 6-10AWG	M.1302.1999
Encoder Feedback Connector	
17 Pin	M.1302.0510

MSM Motor Connector Tables

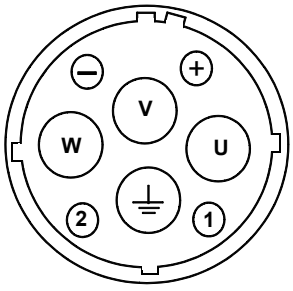
Feedback Connector			
Pin	**2000 Line Encoder**	**High Resolution Encoder (SRS 50)**	**Absolute Encoder (SRM 50)**
1	A+	Sine +	Sine +
2	A-	Sine -	Sine -
3	B+	Cos +	Cos +
4	B-	Cos -	Cos -
5	I+	485 +	485 +
6	I-	485 -	485 -
7	GND	GND	GND
8	Reserved	Reserved	Reserved
9	No connection	8-12 VDC	8-12 VDC
10	+5VDC	No Connection	No Connection
11	Common	Common	Common
12	Reserved	Reserved	Reserved
13	Temp +	Temp +	Temp +
14	Temp -	Temp -	Temp -
15	Hall A	No Connection	No Connection
16	Hall B	No Connection	No Connection
17	Hall C	No Connection	No Connection



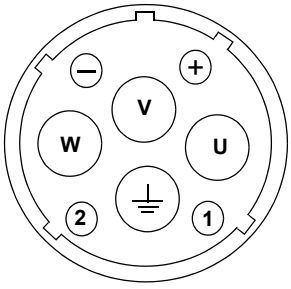
Motor Power Connector					
Size 1 Power Connector		**Size 2 Power**		**Size 3 Power**	
Pin	**Signal**	**Pin**	**Signal**	**Pin**	**Signal**
1	U	U	U	U	U
2	GND	GND	GND	GND	GND
3	V	W	V	V	V
4	W	V	W	W	W
A	Brake +	+	Brake +	+	Brake +
B	Brake -	-	Brake -	-	Brake -
C		1		1	
D		2		2	



Size 1; I < 13.5 Amps RMS



Size 1.5; I < 44 Amps RMS



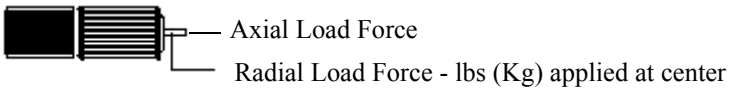
Size 3; I < 97 Amps RMS

Standard Motor Radial Load Force Ratings For MSM Motors

Motors are capable of operating with the maximum radial or maximum axial shaft loads listed in the following tables. Radial loads are applied midway along the shaft extension. The table represents 20,000-hour L10 bearing fatigue life. This 20,000-hour life does not account for possible application-specific life reduction that may occur due to bearing grease contamination from external sources.

Motor	500 RPM		1000 RPM		2000 RPM		3000 RPM		4000 RPM		5000 RPM		6000 RPM	
	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb
MSM100	84	185	65	143	50	112	44	98	38	85	36	80	34	76
MSM115	95	211	82	182	63	139	54	119	48	106	44	98	42	93
MSM165	122	269	89	197	67	148	56	123	48	107	45	101	42	93
MSM215	209	469	163	359	122	269	101	224	86	191	81	179	77	170
MSM307	51.4	113	40.9	90	32.3	71	28.2	62	25.5	56	53	24.1		

Note: The axial Load Force must always be zero.



NSM Brushless Servo Motors

Typical Applications

- Semi-conductor manufacturing
- Material handling
- Web processing
- Robotics
- Packaging machinery

Standard Features

- Rugged industrial construction
- High torque to size ratio
- High energy ring magnet rotor
- Integral encoder
- Provision for optional shaft seal
- NEMA 23, 34, 42, 56 style mounting frames

NSM Series Motor and Performance Data

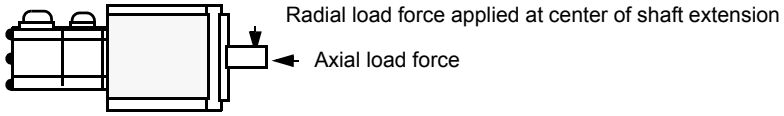
Motor Model	NSM2302		NSM2304		NSM3406		NSM3412		NSM4214		NSM4220		NSM5630		NSM5637		NSM5647	
Mechanical Data																		
Rotor Moment of Inertia	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2
	0.00008	.000009	.00016	0.00002	0.0007	0.00008	0.0013	0.00015	0.0021	0.00024	0.0031	0.00035	0.008	0.0009	0.01	0.0011	0.013	0.0015
Motor Net Weight	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
	2.3	1.0	3.4	1.5	5.7	2.6	7.6	3.5	10.4	4.7	13.0	5.9	20.0	9.1	24.2	11.0	28.7	13.0
Friction Torque	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	0.11	0.012	0.13	0.014	0.19	0.021	0.31	0.035	0.38	0.043	0.406	0.046	0.688	0.078	0.875	0.1	0.938	0.11
Winding Data																		
Sine Wave K_T Torque Constant @ 25°C[1]	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A
	0.73	.08	1.6	0.18	1.5	0.17	3.0	0.34	3.6	0.41	2.5	0.28	3.5	.38	4.4	.50	5.6	.63
Sq Wave K_T Torque Constant @ 25°C[2]	0.80	0.09	1.8	0.20	1.6	0.18	3.3	0.37	4.0	0.45	2.7	0.31	3.7	0.42	4.8	0.54	6.2	0.70
KE Voltage Constant[3]	10 V/kRPM		22 V/kRPM		21 V/kRPM		41 V/kRPM		49 V/kRPM		34 V/kRPM		47 V/kRPM		60 V/kRPM		77 V/kRPM	
Winding Resistance Ph to phase @ 25°C	3.18		4.9		2.2		2.7		2.8		0.77		0.89		1.0		1.23	
Winding Inductance Phase to phase (ohms)	4.1 mH		8.1 mH		6.1 mH		8.6 mH		11.0 mH		2.9 mH		4.3 mH		5.2 mH		7.0 mH	
Thermal Resistance[4]	3.0°C/watt		2.2°C/watt		1.6°C/watt		1.2°C/watt		1.1°C/watt		0.83°C/watt		0.81°C/watt		0.76°C/watt		0.70°C/watt	
System Ratings																		
	DSA 007		DSA 007/015		DSA 015		DSA 015		DSA 015		DSA 030		DSA 030		DSA 030		DSA030	
Max. Continuous Operation Speed RPM	6000		6000		6000		5500		4500		5000		4000		4000		3000	
Continuous Stall Torque	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	1.6	0.2	3.5/4.4	0.4/0.5	6.8	0.8	13.8	1.6	15.5	2.0	22.0	2.5	30.0	3.4	40.0	4.5	52.0	5.9
Peak Torque	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	4.6	0.5	10/13	1.1/1.4	18.5	2.1	36.0	4.1	45.0	5.7	63.0	7.1	95.0	10.7	120	13.0	150	17.0
Drive Model											DSA 130		DSA130		DSA 130		DSA 130	
Max. Continuous Operation Speed RPM											5000		4000		4000		3000	
Continuous Stall Torque											lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
											26.0	2.9	34.0	3.8	46.0	5.2	53.0	6.0
Peak Torque											lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
											63.0	7.1	95.0	10.7	120	13.6	150	16.9

[1]Peak value of per phase sine wave amps [2]Peak value of per phase square wave amps [3]Peak value of sinusoidal phase to phase volt [4]Motor mounted on .5" x 12" x 12" (1.2 x 30 x 30 cm) aluminum heat sink.

Motors are capable of carrying an axial load in most applications. The following table provides guidelines for 20,000 hour bearing life with a specified radial load applied to the center of the shaft. Please consult with Giddings & Lewis regarding loads, operating speeds and bearing life in your particular application to ensure the proper selection of motors.

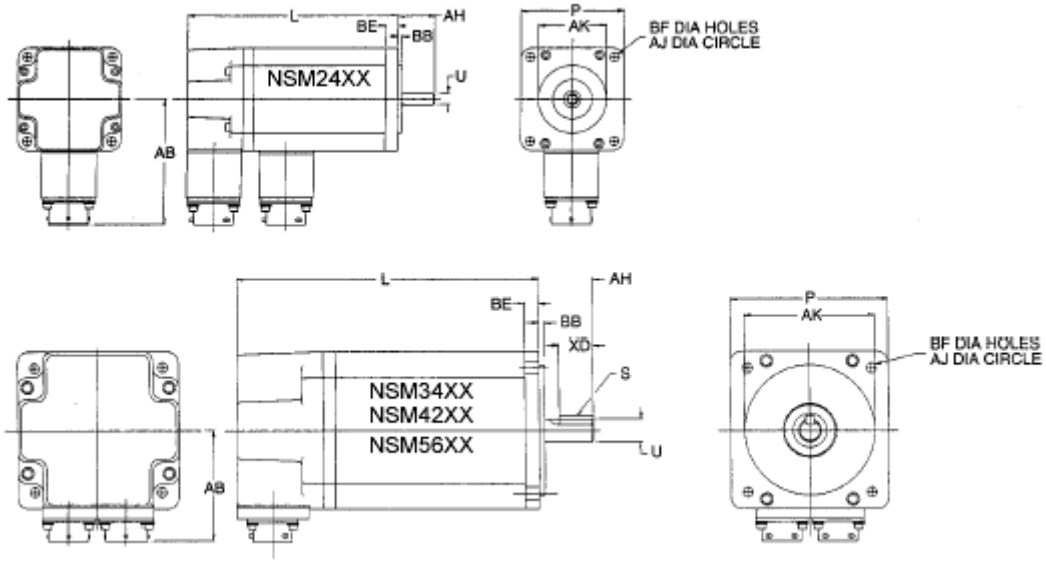
STANDARD RADIAL LOAD FORCES RATINGS

MOTOR	500 rpm lb (kg)	1000 rpm lb (kg)	2000 rpm lb (kg)	3000 rpm lb (kg)	4000 rpm lb (kg)	5000 rpm lb (kg)	6000 rpm lb (kg)
NSM2302	17 (8)	16(7)	14 (6)	12 (6)	11 (5)	9 (4)	8 (3)
NSM2304	19(9)	17 (8)	15 (7)	14 (6)	12 (5)	10 (5)	8 (4)
NSM3406	103 (47)	82 (37)	65 (29)	56 (26)	51 (23)	48 (22)	45 (20)
NSM3412	113 (51)	89 (40)	71 (32)	62 (28)	56 (26)	53 (24)	49 (22)
NSM4214	137 (62)	109 (49)	86 (39)	76 (34)	68 (31)	64 (29)	
NSM4220	146 (66)	116 (52)	92 (41)	80 (36)	73 (33)	68 (31)	
NSM5630	188 (85)	149 (67)	118 (53)	103 (47)	94 (43)		
NSM5637	197 (89)	156 (71)	124 (56)	108 (49)	98 (45)		
NSM5647	203 (92)	161 (73)	128 (58)	112 (51)			



NOTE: When motor shaft has no radial load, axial load rating = 100% of radial load rating above.
When motor shaft has both a radial load and an axial load, axial load rating = 44% of radial load rating above.

NSM Motor Dimensions



Model	AB	AH	AJ	AK	BB	BE	BF	L
	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in
NSM2302	69/2.75	21/.81[1]	67/2.625	38/1.50[2]	2/.09	7/.275	5/.205	118/4.634
NSM2304	69/2.75	21/.81[1]	67/2.625	38/1.50[2]	2/.09	7/.275	5/.205	156/6.134
NSM3406	64/2.48	30/1.19[1]	98/3.875	73/2.875[4]	3/.12	8/.315	6/.220	147/5.67
NSM3412	64/2.48	30/1.19[1]	98/3.875	73/2.875[4]	3/.12	8/.315	6/.220	173/6.67
NSM4214	63/2.45	35/1.38[1]	126/4.95	56/2.187[7]	3/.12	10/.394	7/.280	174/6.845
NSM4220	63/2.45	35/1.38[1]	126/4.95	56/2.187[7]	3/.12	10/.394	7/.280	200/7.845
NSM5630	76/2.96	50/1.97[1]	149/5.875	114/4.50[8]	3/.12	12/.472	9.5/.375 in UNC	199/7.825
NSM5637	76/2.96	50/1.97[1]	149/5.875	114/4.50[8]	3/.12	12/.472	9.5/.375 in UNC	225/8.825
NSM5647	76/2.96	50/1.97[1]	149/5.875	114/4.50[8]	3/.12	12/.472	9.5/.375 in UNC	250/9.825

Model	LA	LB	P	S	U	XD
	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in
NSM2302	62/2.43	106/4.05	58/2.27	N/A	6/.25[3]	N/A
NSM2304	100/3.93	141/5.55	58/2.27	N/A	6/.25[3]	N/A
NSM3406	124/4.87	N/A	89/3.48	3.2 x 3.2/0.125 x 0.125[5]	13/.5[3]	20/.75[6]
NSM3412	149/5.87	N/A	89/3.48	3.2 x 3.2/0.125 x 0.125[5]	13/.5[3]	20/.75[6]
NSM4214	152/5.99	N/A	102/4.0	4.8 x 4.8/0.1875 x 0.1875[5]	16/.625[3]	25/0.94[6]
NSM4220	178/6.99	N/A	102/4.0	4.8 x 4.8/0.1875 x 0.1875[5]	16/.625[3]	25/0.94[6]
NSM5630	178/7.0	N/A	127/5.0	4.8 x 4.8/0.1875 x 0.1875[5]	19/.75[3]	40/1.5[6]
NSM5637	203/8.0	N/A	127/5.0	4.8 x 4.8/0.1875 x 0.1875[5]	19/.75[3]	40/1.5[6]
NSM5647	229/9.0	N/A	127/5.0	4.8 x 4.8/0.1875 x 0.1875[5]	19/.75[3]	40/1.5[6]

[1]Tolerance is ±0.03/0.76, [2]-0.005/0.05, [3]-0.005/0.13 diameter, [4]-0.006/0.15, [5]-0.002/0.005 width -0.014/0.36 depth, [6]-0.06/1.5, [7]-0.001/0.025 diameter, [8]-0.003/0.076

NOTE: Motors are manufactured to inch dimensions. Millimeter dimensions are approximate conversions from inches.

NSM Motor Encoder Data

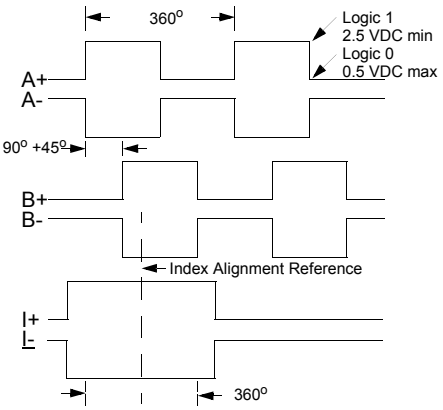
Encoders are factory aligned and must not be adjusted outside the factory.

Encoder Specifications		
Item	**NSM23XX**	**NSM34XX, NSM42XX and NSM56XX**
Line Count	1000 (1) (2)	2000 (1)
Supply Voltage	5 VDC	5 VDC
Supply Current	175 mA max.	300 mA max.
Line Driver	LM339	26LS31
Line Driver Output	TTL	A, B, I signals: Logic 1 =2.5 VDC min @ 20 mA DC source, Logic 0 = 0.5 VDC max @ 20 mA DC sink. HALL signals: Logic 1 = 3.5 VDC min @ 1mA DC source, Logic 0 = 0.5 VDC max @ 5mA DC sink.
Index Pulse	Refer to diagrams below (No key for physical reference)	When facing the motor, the key is oriented $90^{o}\pm10$ clockwise (mechanical) from connectors

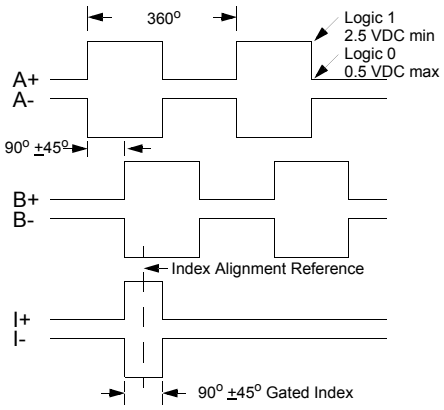
(1) Standard line count before quadrature.
(2) NSM23XX encoder lacks Absolute Signal (ABS)

Encoder Outputs

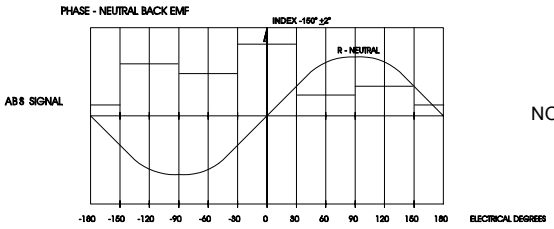
NSM23XX Encoder Output



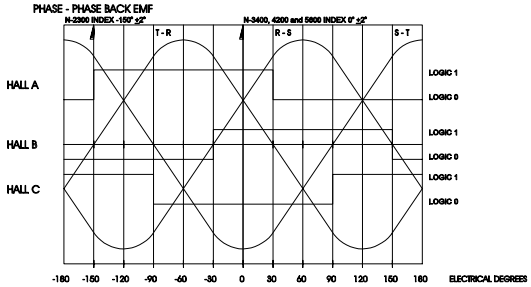
NSM34XX, 42XX and 56XX Encoder Output



Encoder Phase-to-Neutral and Phase-to-Phase Waveforms



NOTE: NSM34XX, NSM42XX and NSM56XX



NOTE: Hall and ABS signals are in electrical degrees.
For 4 pole commutation,
360° mechanical = 720° electrical.

NSM Motor Connector Ordering Information

Ordering options include the following:

- 24 VDC Brake (Consult factory for brake motor availability)
- Encoder Line Count - 2,000 or 5,000 line
- Motor Winding Voltage - 115 V or 230 V Drive Input Voltage

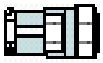
Consult the factory for information on any of these items.

Note: Options are not available on all sizes. Using optional configurations or encoder line counts may extend lead times and involve additional charges.

Note: 5000 line count encoder, motor top speed is limited to 3600 RPM due to frequency output limit of encoder-check drive system configuration data for any additional restrictions imposed by drive input.

NSM Connector Data

MOTOR MATING CONNECTORS



Description	Part Number
Mating Power	M.1015.8056
Mating Encoder	M.1015.8057

NSM MOTOR SHAFT SEAL KITS

Description	Part Number
NSM 2300 Series	M.1300.0422
NSM 3400 Series	M.1015.8058
NSM 4200 Series	M.1015.8059
NSM 5600 Series	M.1300.0003

YSM Brushless Servo Motors

Typical Applications

- Robotics
- Material handling
- Specialty machinery
- Medical and laboratory equipment
- X-Y tables
- Light packaging machines
- Office machinery
- Postal sorting

Standard Features

- 115V and 230V windings
- Popular metric mounting dimensions
- Three frame sizes, 10 models
- Torque range 1.5 - 22 lb-in (.17 - 2.5 Nm)
- Motor mounted optical encoder with differential line driver data (2,000 line) and commutation signals
- Low inertia rotor
- High energy neodymium magnets
- 4500 rpm maximum
- Optional internally mounted spring set, magnetic release 24 VDC holding brake
- IP-43 package

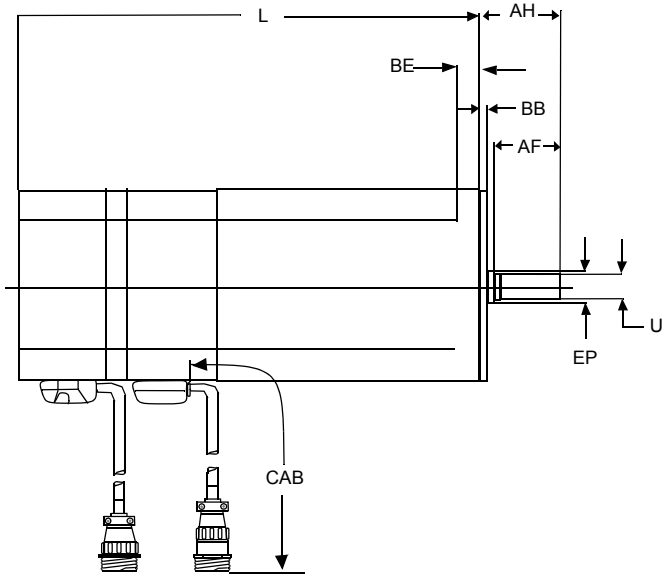
YSM Motors And Performance Data

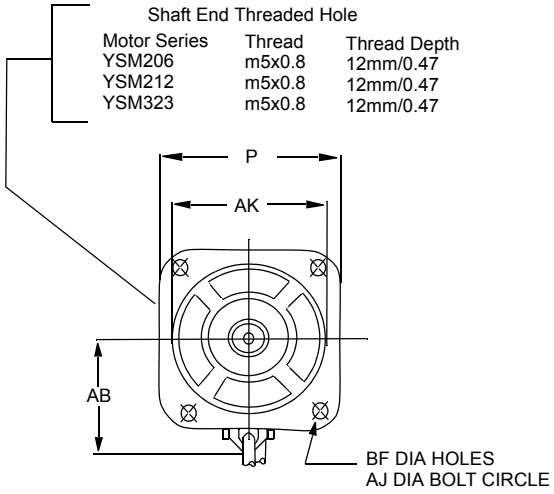
Motor Model	YSM102 115/230		YSM103 115/230		YSM206 115/230		YSM212 115/230		YSM323 230	
Mechanical Data										
Rotor Moment of Inertia	lb-in-s^2 .000027	kg-m^2 .0000031	lb-in-s^2 .000045	kg-m^2 .0000051	lb-in-s^2 .000127	kg-m^2 .000014	lb-in-s^2 .00023	kg-m^2 .000026	lb-in-s^2 .00056	kg-m^2 .000064
Rotor Moment of Inertia (Brake Motors)	.000034	.0000039	.000052	.0000059	.00018	.000020	.00028	.000032	.00062	.000069
Motor Net Weight	lb 1.2	kg 0.54	lb 1.5	kg 0.68	lb 3.0	kg 1.36	lb 4.2	kg 1.90	lb 7.8	kg 3.54
Damping	lb-in/kRPM 0.022	Nm/kRPM 0.002	lb-in/kRPM 0.03	Nm/kRPM 0.003	lb-in/kRPM 0.08	Nm/kRPM 0.009	lb-in/kRPM 0.10	Nm/kRPM 0.01	lb-in/kRPM 0.19	Nm/kRPM 0.021
Friction Torque	lb-in 0.04	Nm 0.005	lb-in 0.06	Nm 0.007	lb-in 0.20	Nm 0.022	lb-in 0.29	Nm 0.03	lb-in 0.64	Nm 0.072
Winding Data	**YSM102**		**YSM103**		**YSM206**		**YSM212**		**YSM323**	
	115V	230V	115V	230V	115V	230V	115V	230V	115V and 230V	
Sine Wave K_T Torque Constant @ 25°C (1)	lb-in/A Nm/A 0.73 0.08	lb-in/A Nm/A 1.46 0.16	lb-in/A Nm/A 1.02 0.11	lb-in/A Nm/A 1.8 0.21	lb-in/A Nm/A 0.9 0.1	lb-in/A Nm/A 1.97 0.22	lb-in/A Nm/A 2.1 0.24	lb-in/A Nm/A 3.3 0.37	lb-in/A 2.9	Nm/A 0.370
Square Wave K_T Torque Constant @ 25°C (2)	0.8 0.09	1.6 0.18	1.1 0.12	2.0 0.22	1.0 0.11	2.2 0.24	2.4 0.27	3.6 0.41	3.2	0.360
KE Voltage Constant (3)	10 V/kRPM	20 V/kRPM	14 V/kRPM	25 V/kRPM	13 V/kRPM	27V/kRPM	29 V/kRPM	45 V/kRPM	40 V/kRPM	
Winding Resistance phase to phase @ 25°C (ohms)	4.6	18.8	3.2	8.9	0.79	3.2	1.32	2.9	.78	
Winding Inductance phase to phase	5.5 mH	22.3 mH	3.8 mH	11.5 mH	2.7 mH	12 mH	5.1 mH	12.4 mH	6 mH	
Thermal Resistance (4)	2.3°C/watt		2.2°C/watt		1.3°C/watt		1.3°C/watt		0.85°C/watt	
Encoder Resolution (P/R)	2000		2000		2000		2000		2000	
System Ratings (5)	**YSM102**		**YSM103**		**YSM206**		**YSM212**		**YSM323**	
Centurion Micro DSA Drive Line — Drive Model	115V DSA007	230V DSA007	115V DSA015	230V DSA007	115V DSA030	230V DSA015	115V DSA030	230V DSA015	115V and 230V DSA030	DSA030
Max. Continuous Operating Speed	4500 RPM		4500 RPM		4500 RPM		3800 RPM	4500 RPM	2500 RPM	4500 RPM
Continuous Stall Torque	lb-in Nm 1.5 0.17	lb-in Nm 1.5 0.17	lb-in Nm 3.1 0.35	lb-in Nm 3.1 0.35	lb-in Nm 6.1 0.69	lb-in Nm 6.1 0.69	lb-in Nm 12 1.35	lb-in Nm 12 1.35	lb-in Nm 22.5 2.5	lb-in Nm 22.5 2.5
Peak Torque	4.3 0.48	4.3 0.48	8.6 0.97	8.6 0.97	17 1.92	17 1.92	33.7 3.8	33.7 3.8	63 7.12	63 7.12

[1]Peak value of per phase sine wave amps [2]Peak value of per phase square wave amps [3]Peak value of sinusoidal phase to phase Volts [4]At 125° C winding temperature, in a 40° C ambient, with motors mounted on aluminum heat-sinks: Motors 102/103:.125" x 6" x 6", Motors 206/212: .250" x 8" x 8", Motor 323: .25" x 10" x 10" [5]Ambient temperature is 0° C to 40°C for motors and 0° C to 50° C for drives

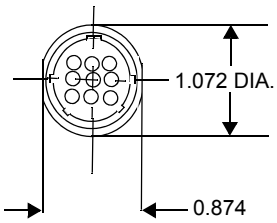
YSM Standard Motor Dimensions

YSM102, YSM103, YSM206, YSM212, YSM323

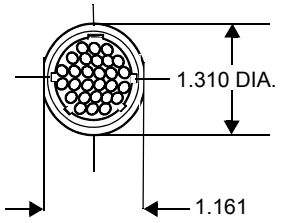




Motor Feedback
For all YSM-Series Motors



Motor Power
For all YSM-Series Motors



Model	AB	AJ	AK	P	U	EP	AH	BB	BE	BF	AF	CAB	L	with Brake
	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in
YSM102	30/1.18	46/1.81	30/1.18	40/1.57	8/0.31	-	25/0.98	2.5/0.10	5/0.20	4.5/0.18	-	1000/39.37	70/2.75	108/4.25
YSM103	30/1.18	46/1.81	30/1.18	40/1.57	8/0.31	-	25/0.98	2.5/0.10	5/0.20	4.5/0.18	-	1000/39.37	88/3.46	126/4.96
YSM206	41/1.61	70/2.75	50/1.97	60/2.36	14/0.55	-	30/1.18	3/0.12	6/0.24	5.5/0.22	-	1000/39.37	95/3.74	133/5.24
YSM212	41/1.61	70/2.75	50/1.97	60/2.36	14/0.55	-	30/1.18	3/0.12	6/0.24	5.5/0.22	-	1000/39.37	123/4.84	161/6.34
YSM323	52/2.05	90/3.54	70/2.75	80/3.15	16/0.63	19/0.75	40/1.57	3/0.12	8/0.31	6.5/0.25	35/1.38	1000/39.37	140/5.57	180/7.09

Motors are manufactured to millimeter dimensions shown. Inch dimensions shown are approximate conversions from millimeters.
For further motor detail, engineering specification drawings are available upon request.

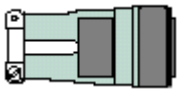
YSM Motor Connector Ordering Information

Ordering options include the following:

- 24 VDC Brake (Consult factory for brake motor availability)
- Motor Winding Voltage - 115 V or 230 V Drive Input Voltage
- Various NEMA style frame sizes

MOTOR MATING CONNECTORS

CONNECTOR KITS FOR YSM MOTORS



All YSM Motors
M.1301.4098

This kit includes connector, pins, and backshell for both the power and encoder connectors.

YSM Connector Data
All YSM

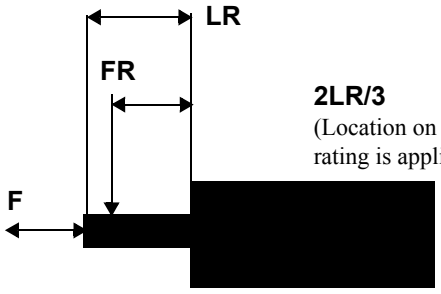
Motor Power Connector	
Pin	**Signal**
1	Phase R
2	Phase S
3	Phase T
4	-
5	Ground
6	-
7	Brake + [1]
8	-
9	Brake + [1]

[1]No connection for nonbrake motors

Motor Feedback	
Pin	**Signal**
1-8	-
9	A+
10	A-
11	B+
12	B-
13	I+
14	I-
15	HALL A+
16	HALL A-
17	HALL B+
18	HALL B-
19	HALL C+
20	HALL C-
21	--
22	+5 VDC
23	Com
24	Encoder Case
25	--
26	--
27	--
28	--

YSM Brake and Shaft Load Data

Motor	Brake Holding Torque	Current at 24 VDC	Shaft Radial Load (FR)	Shaft Axial Load (F)
YSM102	0.157 Nm		10 kg	3 kg
YSM103	0.32 Nm	Consult	10 kg	3 kg
YSM206	0.637 Nm	Factory	20 kg	8 kg
YSM212	1.27		25 kg	10 kg
YSM323	2.38 Nm		35 kg	20 kg



2LR/3
(Location on shaft where rating is applied)

NOTE: Above mating connector kit is not CE compliant. Please contact the factory for more information.

FSM Medium Inertia Brushless Servo Motors

Typical Applications

- Web and film processing
- Machine tool/metal cutting
- Textile machinery
- CAM replacements

Characteristics

- Higher inertia matching capability
- Heavy duty continuous operations
- Environmentally rugged

Standard Features

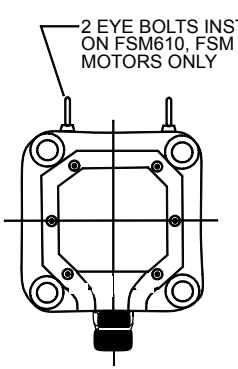
- Compact design is mechanically interchangeable with the FSM family
  Two frame sizes - six models
- Continuous torque from 31 to 245 lb-in (3.5 to 28 Nm)
- Speeds to 4000 RPM
- Ferrite permanent magnet rotors provide approximately four times greater rotor inertia than the FSM family for matching larger load inertias
- Internal thermal switch indicates overheating
- Motor mounted optical encoder includes 2000 quadrature pulses, index pulse and standard commutation channels for trapezoidal drives
- Water tight MS connections are compatible with standard cable assemblies; in addition, the extruded aluminum housing and environmental connectors provide an IP65 package (with the addition of the optional shaft seal kit)
- Economical, compact design ready for harsh environments
- Optional spring-set holding brakes available with 24 VDC or 90 VDC
- Axially trapped front bearing in a steel insert for long life at high speeds
- Vibration: 2.5 g peak 30-200 Hz
- Shock: 10.0 g peak 6 msec duration
- CE and UL recognized

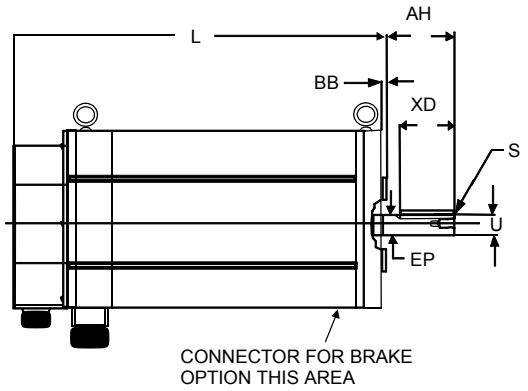
FSM Motor And Performance Data

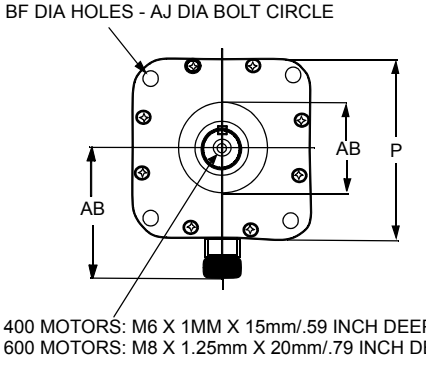
Motor Model		FSM430		FSM460		FSM490		FSM610		FSM620		FSM630	
Mechanical Data													
Rotor Moment of Inertia		$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$	$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$	$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$	$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$	$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$	$lb\text{-}in\text{-}s^2$	$kg\text{-}m^2$
		.009	.0010	.019	.0021	.029	.0032	.057	.0064	.095	.0107	.144	.0162
Rotor Moment of Inertia (Brake Motors)		.010	.0011	.020	.0022	.030	.0033	.061	.007	.098	.011	.147	.017
Motor Net Weight		lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
		19.6	8.9	31.0	14.1	42.0	14.1	49.2	22.3	68.2	30.9	95.2	43.2
Damping		lb-in/kRPM	Nm/kRPM	lb-in/kRPM	Nm/kRPM	lb-in/kRPM	Nm/kRPM	lb-in/kRPM	Nm/kRPM	lb-in/kRPM	Nm/kRPM	lb-in/kRPM	Nm/kRPM
		.5	.06	.94	.10	1.3	.15	1.4	.16	2.1	.24	3.3	.37
Friction Torque		lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
		.56	.063	.94	.11	1.5	.17	1.5	.17	2.1	.24	4.1	.46
Winding Data													
Sine Wave K_T Torque Constant @ 25°C[1]		lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A
		4.8	.54	4.8	.54	6.5	.73	6.3	.71	6.2	.70	6.5	.73
Sq Wave K_T Torque Constant @ 25°C[2]		5.3	.60	5.3	.60	7.1	.80	6.9	.78	6.8	.80	7.1	.81
KE Voltage Constant[3]		66 V/kRPM		66 V/kRPM		89 V/kRPM		86 V/kRPM		85 V/kRPM		89 V/kRPM	
Winding Resistance - Phase to phase @ 25°C (ohms)		2.24		.89		.98		.51		.26		.16	
Winding Inductance - Phase to phase		6.8 mH		3.3 mH		3.4 mH		3.3 mH		1.7 mH		1.1 mH	
Thermal Resistance[4]		.63°C/watt		.48°C/watt		.40°C/watt		.45°C/watt		.37°C/watt		.30°C/watt	
System Ratings													
Centurion Micro DSA Drive Line	(Sinusoidal Current)	DSA030		DSA030									
	Max. Cont. Operating Speed[5]	3600 RPM		3500 RPM		N/A		N/A		N/A		N/A	
		lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	Continuous Stall Torque[4]	31	3.5	46	5.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Peak Torque	100	11.3	120	13.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Centurion DSA100 Drive Line	(Sinusoidal Current)	n/a		DSA130		DSA130/175		DSA175		DSA175/1150		DSA175/1150	
	Max. Cont. Operating Speed[5]	n/a		4000 RPM		3000 RPM		3000 RPM		3000 RPM		3000 RPM	
		n/a	n/a	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	Continuous Stall Torque[4]	n/a	n/a	61	6.9	82/82	9.3/9.3	115	13	175/175	19.8/19.8	210/210	23.7/23.7
	Peak Torque	n/a	n/a	120	13.6	170/170	19.2/19.2	275	31	350/350	39.5/39.5	440/500	49.7/56.5

[1]Peak value of per phase sine wave amps [2]Peak value of per phase square wave amps [3]Peak value of sinusoidal phase to phase volts [4]At 125°C winding temperature, in a 40°C ambient, with motor mounted on.5" x 12" x 12" (1.2 x 30 x 30 cm) aluminum heat sink [5]With 230 VAC line voltage input FSM Standard Motor Dimensions

FSM Standard Motor Dimensions





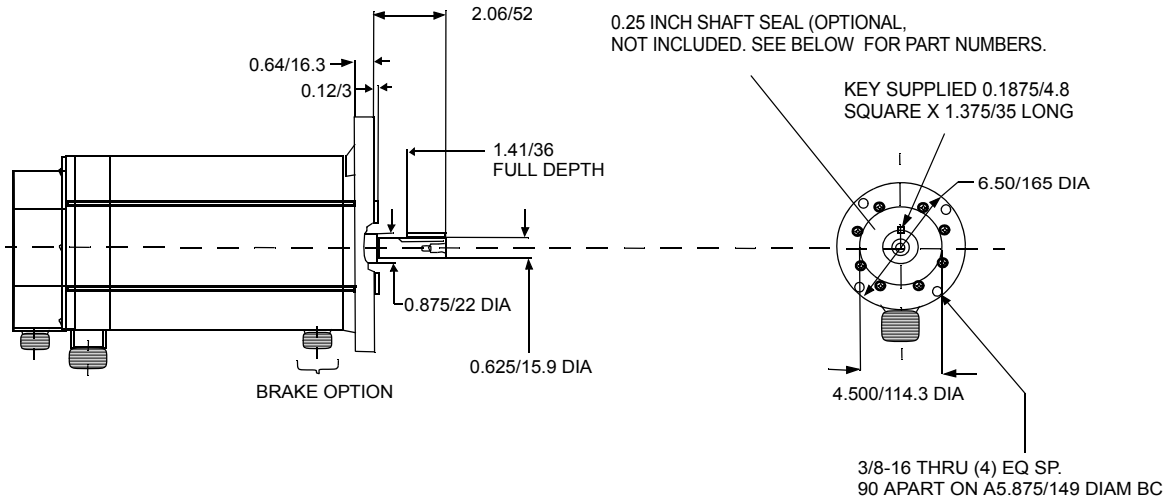


Model	AB	AJ	AK	P	U	EP	AH	BB	BF	XD	S	L	with Brake
	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in
FSM430	102/4.02	145/5.71	110/4.33	127/5.00	19/.75	22.2/8.75	50/1.97	3/.12	10/.39	38/1.49	6X6/.24X.24	194/7.64	257/10.12
FSM460	102/4.02	145/5.71	110/4.33	127/5.00	19/.75	22.2/8.75	50/1.97	3/.12	10/.39	38/1.49	6X6/.24X.24	272/10.71	335/13. 19
FSM490	102/4.02	145/5.71	110/4.33	127/5.00	19/.75	22.2/8.75	50/1.97	3/.12	10/.39	38/1.49	6X6/.24X.24	350/13.78	413/16.26
FSM610	131/5.16	200/7.87	114.3/4.50	173/6.81	35/1.38	36.5/1.438	80/3.15	4.16	13.5/53	60/2.36	10X8/.39X.32	255/10.04	326/12.83
FSM620	131/5.16	200/7.87	114.3/4.50	173/6.81	35/1.38	36.5/1.438	80/3.15	4.16	13.5/53	60/2.36	10X8/.39X.32	320/12.60	390/15.35
FSM630	131/5.16	200/7.87	114.3/4.50	173/6.81	35/1.38	36.5/1.438	80/3.15	4.16	13.5/53	60/2.36	10X8/.39X.32	420/16.53	490/19.29

MOTORS ARE MANUFACTURED TO MILLIMETER DIMENSIONS SHOWN. INCH DIMENSIONS SHOWN ARE APPROXIMATE CONVERSIONS FROM MILLIMETERS.
FOR FURTHER MOTOR DETAIL, ENGINEERING SPECIFICATION DRAWINGS ARE AVAILABLE UPON REQUEST.

NEMA 56C ON FSM400 MOTORS

	L	L with Brake
FSM430 FSM460	7.64/144 10.71/272	10.12/257 13.19/335
FSM490	13.78/350	16.26/413



FSM Motor Connector Ordering Information

Ordering options include the following:

- 24 or 90 VDC Brake (Consult factory for brake motor availability)
- Encoder Line Count - 1,000, 2,000, 5,000, 500, or 3,000 line
- Special order motor windings available
- Various NEMA style frame sizes

Consult the factory for information on any of these items.
NOTE: Options are not available on all sizes. Optional configurations or encoder line counts have extended lead times and additional charges.

Motor Mating Connectors

MS Conn Kits FSM Motor Power:

	Straight	Right Angle
FSM400	M.1015.7801	M.1015.7802
FSM600	M.1015.7804	M.1015.7805

MS Conn Kit FSM Encoder Feedback:

FSM Encoder Feedback

Straight
M.1015.7808

Right Angle
M.1015.7809

MS Conn Kit FSM Brake Power:

Brake Power

Straight
M.1015.7813

Right Angle
M.1015.7815

FSM Motor Shaft Seal Kits:

FSM400: M.1015.7904
FSM600: M.1015.7905

Shaft seals generally require the presence of a lubricant to reduce premature wear.

NOTE: Above mating connector kits are not CE compliant. Please contact the factory for more information.

FSM Connector Data

FSM400, 600

Motor Encoder Connector	
Pin	**Signal**
A	A+
B	A-
C	B+
D	B-
E	I+
F	I-
G	ENCODER CASE
H	ABS
J	+5VDC
K	-5VDC
L	COM
M	COM
N	Hall B
P	Hall C
R	TS+
S	TS-
T	Hall A

ALL FSM

Motor Power Connector	
Pin	**Signal**
A	R
B	S
C	T
D	MOTOR CASE

Motor Brake Connector	
PIN	**SIGNAL**
A	BR+
B	BR-

HSM Low Inertia Brushless Servo Motors

Typical Applications

- "Smart" conveyors
- Packaging machinery
- Punch press/material feeding
- Robotic pick and place
- High duty cycle applications

Characteristics

- High acceleration and peak torques
- High speed point-to-point positioning
- Environmentally rugged

Standard Features

- Compact Design is mechanically interchangeable with the HSM400 and HSM600 motors
- Five frame sizes – twelve models
- Continuous torque from 5 to 450 lb-in (0.5 to 50 Nm)
- Speeds to 6000 RPM
- Neodymium-iron-boron permanent magnet rotors provide low inertias and high accelerations
- Internal thermal switch indicates overheating
- Motor mounted optical encoder includes 2000 quadrature pulses, index pulse and standard commutation channels for trapezoidal drives
- Watertight MS connections are compatible with standard cable assemblies; in addition, the extruded aluminum housing and environmental connectors provide an IP65 package (with the addition of the optional shaft seal kit)
- Economical, compact design ready for harsh environments
- Optional spring-set holding brakes available with 24 VDC or 90 VDC
- Axially trapped front bearing (in a steel insert in HSM4XX-, HSM6XX and HSM8XX series) for long life at high speeds
- Vibration: 2.5 g peak 30-2000 H
- Shock: 10.0 g peak 6 msec duration
- CE and UL recognized

HSM Motor And Performance Data

Motor Model	HSM205		HSM307		HSM320		HSM430		HSM460		HSM490		HSM610		HSM620		HSM630		HSM835		HSM845	
Mechanical Data																						
Rotor Moment of Inertia	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2
	.00013	.000015	.00027	.000030	.00072	.000080	.0022	.00025	.0041	.00046	.0060	.00068	.012	.0014	.021	.0024	.030	.0034	.056	.0063	.083	.0094
Rot. Mom. of In (Brake Motors)	-	-	.00034	.000038	.00079	.000089	.0029	.00033	.0048	.00054	.0067	.00076	.015	.0017	.024	.0027	.033	.0037	.082	.0093	.109	.012
Motor Net Weight	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
	4.9	2.2	5.8	2.6	8.4	3.8	13.7	6.2	20.1	9.1	26.9	12.2	40.4	18.3	59.4	27.0	76.8	34.8	97.0	44.1	123.6	56.1
Damping	lb-in/ kRPM	Nm/ kRPM	lb-in/ kRPM	Nm/ kRPM	lb-in/ kRPM	Nm/ kRPM	lb-in/ kRPM	Nm/ kRPM	lb-in/ kRPM	Nm/ kRPM	lb-in/ kRPM	Nm/ kRPM	lb-in/ kRPM	Nm/kRPM	lb-in/kRPM	Nm/kRPM	lb-in/kRPM	Nm/ kRPM	lb-in/kRPM	Nm/kRPM	lb-in/kRPM	Nm/kRPM
	.06	.007	.09	.010	.12	.014	.30	.034	.40	.045	.60	.068	.90	.10	1.4	.16	1.7	.19	3.4	.38	3.8	.43
Friction Torque	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	.12	.014	.12	.014	.25	.028	.30	.034	.60	.068	1.2	.14	1.2	.14	2.1	.24	3.2	.36	2.8	.32	3.5	.40
Winding Data																						
Sine Wave K_T Torque Constant @ 25°C[1]	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A
	1.17	.13	2.5	.28	2.5	.28	4.4	.50	4.4	.50	6.6	.74	6.0	.68	5.8	.66	6.2	.70	7.6	.86	8.2	.92
Sq Wave K_T Torque Constant @ 25°C[2]	1.3	.14	2.7	.31	2.7	.31	4.8	.54	4.8	.54	7.2	.81	6.6	.74	6.4	.72	6.8	.77	8.3	.94	9.0	1.0
KE Voltage Constant[3]	16 V/kRPM		34 V/kRPM		343 V/kRPM		60 V/kRPM		60 V/kRPM		90 V/kRPM		82 V/kRPM		80 V/kRPM		85 V/kRPM		104 V/kRPM		112 V/kRPM	
Winding Resistance Ph to phase @ 25°C	2.6 ¾		6.6 ¾		1.3 ¾		2 ¾		0.69 ¾		0.90 ¾		0.49 ¾		0.18 ¾		0.12 ¾		0.13 ¾		0.10 ¾	
Winding Inductance Phase to phase	4.1 mH		12 mH		3.4 mH		9 mH		3.3 mH		5.4 mH		4.4 mH		2.2 mH		1.2 mH		2.5 mH		2.4 mH	
Thermal Resistance[4]	1.45°C/watt		1.2°C/watt		0.89°C/watt		0.79°C/watt		0.57°C/watt		0.48°C/watt		0.34°C/watt		0.31°C/watt		0.24°C/watt		0.23°C/watt		0.21°C/watt	
System Ratings																						
Drive Model	DSA015		DSA015		DSA030		DSA030		DSA130/175		DSA130/175		DSA175/1150		DSA175/1150		DSA1150		DSA1150		DSA1150	
Max. Cont. Operating Speed (RPM)[5]	6000		5000		5000		4000		4000/4000		3000/3000		3000		3000		3000		2000		2000	
	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
Continuous Stall Torque[4,]	5.0	0.57	7	0.79	20	2.26	30	3.39	60/60	6.78/ 6.78	88/88	9.9/9.9	110	12.4	190/216	21.4/24.4	300	33.9	350	39.55	450	50.85
Peak Torque[9]	14.0	1.6	22	2.49	44	4.97	73	8.25	120/ 190	13.5/ 21.47	180/270	20.3/ 30.5	290	32.8	360/480	40.7/54.2	700	79.1	600	67.8	960	108

[1]Peak value of per phase sine wave amps

[2]Peak value of per phase square wave amps

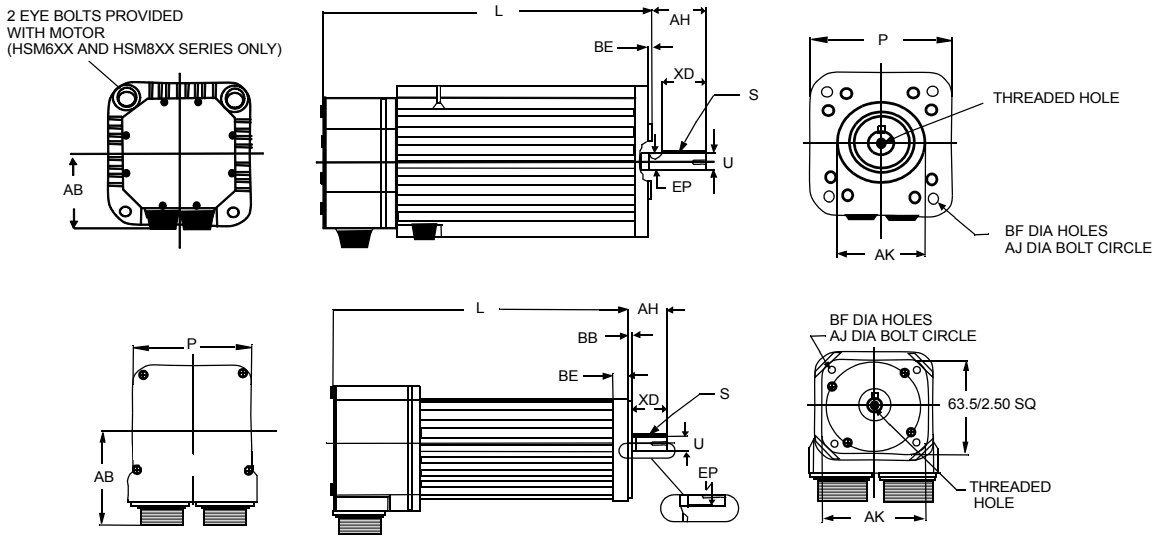
[3]Peak value of sinusoidal phase to phase Volts

[4]At 125° C winding temperature, in a 40° C ambient, Motors 307, 320 mounted on .25" x 10" x 10", motors 430, 460, 490 mounted on 0.5" x 12" x 12", Motors, 610, 620, 630, 835, 845 on a 1.0" x 12" x 12" aluminum heat sink.

[5]With 230 VAC line voltage input

HSM Standard Motor Dimensions

HSM300, HSM400, HSM600, HSM800



Shaft End Threaded Hole

Motor	Thread	Thread Depth
HSM200	M3 x 0.5mm	10mm/.39in
HSM300	M4 x 0.7mm	10mm/.39in
HSM400	M6 x 1.0mm	15mm/.59in
HSM600	M8 x 1.25mm	20mm/.79
HSM800	M8 x 1.25mm	20mm/.79in

NOTE: Motors manufactured to millimeter dimensions.

Model	AB	AH	AJ	AK	BB	BE	BF
	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in
HSM205	75/2.95	23/0.93[3]	75/2.95	60/2.36[1]	2.4/0.09[4]	15.2/.60	5.8/0.23
HSM307	75/2.95	30/1.18[3]	100/3.94	80/3.15[1]	3/.12[4]	10.9/.43	7/.28
HSM320	75/2.95	30/1.18[3]	100/3.94	80/3.15[1]	3/.12[4]	10.9/.43	7/.28
HSM430	76/3.00	50/1.97[3]	145/5.71	110/4.33[5]	3/.12[4]	15.5/.61	10/.39
HSM460	76/3.00	50/1.97[3]	145/5.71	110/4.33[5]	3/.12[4]	15.5/.61	10/.39
HSM490	76/3.00	50/1.97[3]	145/5.71	110/4.33[5]	3/.12[4]	15.5/.61	10/.39
HSM610	101/4.00	80/3.15[3]	200/7.87	114.3/4.50[5]	4/.16[4]	21.3/.84	13.5/.53
HSM620	101/4.00	80/3.15[3]	200/7.87	114.3/4.50[5]	4/.16[4]	21.3/.84	13.5/.53
HSM630	101/4.00	80/3.15[3]	200/7.87	114.3/4.50[5]	4/.16[4]	21.3/.84	13.5/.53
HSM835	112/4.41	85/3.35[3]	265/10.43	230/9.06[8]	4/.16[4]	22.4/.88	15/.59
HSM845	112/4.41	85/3.35[3]	265/10.43	230/9.06[8]	4/.16[4]	22.4/.88	15/.59

Model	EP	L	L Brake	P	S	U	XD
HSM205	12/0.47	197/7.7	-	80/3.15	4x4/.16x.16	11/0.43[2]	18/0.71
HSM307	15/0.59	172/6.77	211/8.31	89/3.50	5x5/.20x.20	14/0.55[2]	20/0.79
HSM320	15/0.59	223/8.77	262/10.31	89/3.50	5x5/.20x.20	14/0.55[2]	20/0.79
HSM430	20/0.79	213/8.39	266/10.47	121/4.76	6x6/.24x.24	19/0.75[6]	40/1.57
HSM460	20/0.79	264/10.39	317/12.48	121/4.76	6x6/.24x.24	19/0.75[6]	40/1.57
HSM490	20/0.79	315/12.40	368/14.49	121/4.76	6x6/.24x.24	19/0.75[6]	40/1.57
HSM610	38/1.50	277/10.91	330/12.99	178/7.01	10x8/.39x.31	35/1.38[7]	60/2.36
HSM620	38/1.50	353/13.90	406/15.98	178/7.01	10x8/.39x.31	35/1.38[7]	60/2.36
HSM630	38/1.50	429/16.89	482/17.40	178/7.01	10x8/.39x.31	35/1.38[7]	60/2.36
HSM835	45/1.77	375/14.76	478/18.82	241/9.49	12x8/.47x.31	42/1.65[7]	60/2.36
HSM845	45/1.77	426/16.77	529/20.83	241/9.49	12x8/.47x.31	42/1.65[7]	60/2.36

[1]Tolerance is -0.03/-0.0012 [2]Tolerance is -0.01/-0.0004 [3]Tolerance is +/- 0.5/ +/- 0.0196 [4] Tolerance is +/- 0.2 / +/-0.0079 [5]Tolerance is -0.035/-0.0014
[6]Tolerance is -0.013/-0.0051 [7] Tolerance is -0.16/-0.006 [8]Tolerance is -0.46/-0.0181
Motors are manufactured to millimeter dimensions shown. Inch dimensions shown are approximate conversions from millimeters.
For further motor detail, engineering specification drawings are available upon request.

HSM Motor Connector Ordering Information

Ordering options include the following:

- 24 or 90 VDC Brake (Consult factory for brake motor availability)
- Encoder Line Count* - 1,000, 2,000, or 5,000** line
- Various NEMA style frame sizes

Consult the factory for information on any of these items.

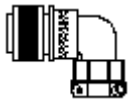
*NOTE: Optional configurations or encoder line counts have extended lead times and additional charges.

**NOTE: 5000 Line count encoder motor top speed is limited to 3600 RPM due to frequency output limit of encoder. Check drive system configuration data for any additional restrictions imposed by drive input.

NOTE: All options are not available.

NOTE: Above mating connector kits are not CE compliant. Please contact the factory for more information.

Motor Mating Connectors

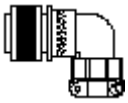


Straight	Motor	Right Angle
M.1015.7798	**HSM200 & HSM300**	M.1015.7799
M.1015.7801	**HSM400**	M.1015.7802
M.1015.7804	**HSM600**	M.1015.7805
M.1015.7807	**HSM800**	M.1300.3509

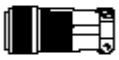
Brake Power Connectors

Straight
M.1015.7813

Right Angle
M.1015.7815

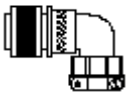


Encoder Feedback Connectors



Straight
M.1015.7808

Right Angle
M.1015.7809



HSM Motor Shaft Seal Kits

HSM200:	M.1300.3484
HSM300:	M.1007.0803
HSM400	M.1015.6923
HSM600	M.1015.6924
HSM800	M.1300.3485

Shaft seals generally require the presence of a lubricant to reduce premature wear.

HSM200, 300, 400, 600, 800 Connector Data

Motor Encoder Connector	
Pin	**Signal**
A	A+
B	A-
C	B+
D	B-
E	I+
F	I-
G	Encoder Case
H	ABS
J	+5VDC
K	-5VDC
L	COM
M	COM
N	Hall B
P	Hall C
R	TS+
S	TS-
T	Hall A

ALL HSM Connector Data

Motor Power Connector	
Pin	**Signal**
A	R
B	S
C	T
D	Motor Case

Motor Brake Connector (Option)	
Pin	**Signal**
A	BR+
B	BR-

Application Guidelines For HSM, FSM, YSM, NSM Brake Motors

Brake Operation

The brakes offered as options in Giddings & Lewis motors are designed for holding the motor shaft at 0 RPM, up to the rated brake holding torque. The brakes are spring-set type and release when voltage is applied to the brake coil.

The brakes are not designed for stopping rotation of the motor shaft.

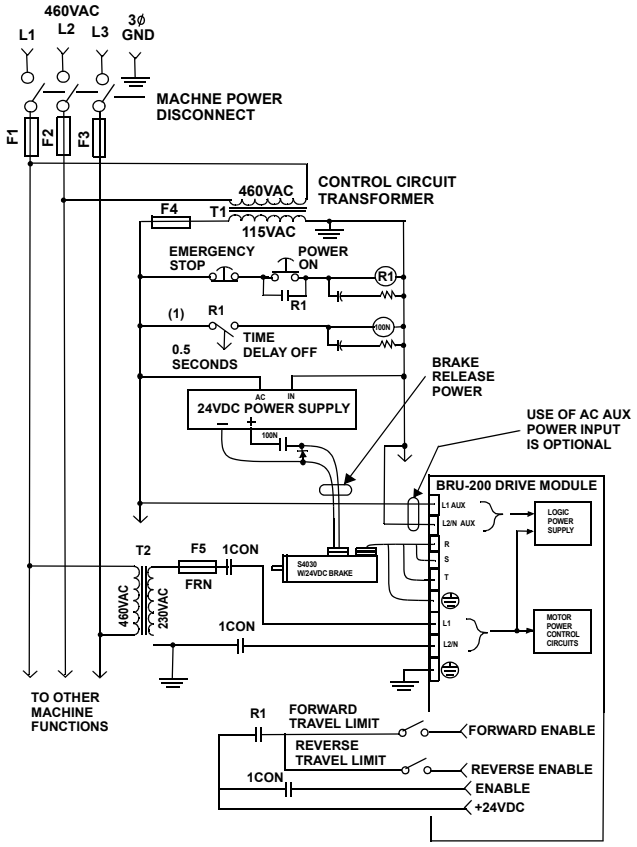
The primary method of stopping motor shaft rotation is to command the servo drive to decelerate the motor to 0 RPM. Servo drive inputs Command, Forward Enable, and Reverse Enable can be used to stop motor shaft rotation per timing and connection examples shown below.

Use of these brakes as stopping brakes will increase brake pad wear, increase rotational mechanical backlash, and reduce brake life.

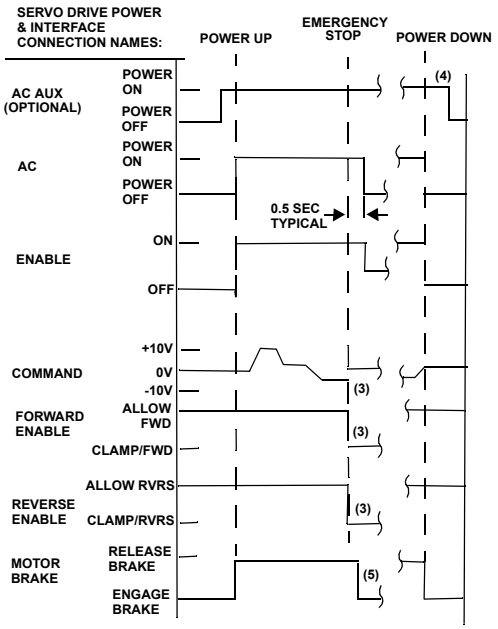
For an Emergency Stop condition, the servo drive should be used to decelerate the motor to 0 RPM before engaging the brake.

The brake should not be engaged until the servo drive has decelerated the motor to 0 RPM for an Emergency Stop condition.

Machine Wiring Example Showing Connections to DSA Drive Module



Power Up/Down Timing Examples of External Connections to DSA Drive Module



The previous drawing is intended as an example only. It does not show all interlocks required for safe operation of the equipment.

(1) Time delay off contacts allow time for drive module to decelerate motor to 0 RPM before power to motor control circuits is removed.

(2) Relay R1 contacts may be connected to Forward and Reverse Enable interface circuits as shown when no position controller is used. When the MMC or PiC900 is used, these R1 contacts would be connected to the position controller emergency stop input.

(3) For emergency stop, Command should be immediately set to 0.0 VDC and/or Forward and Reverse Enable inputs set to clamp, to decelerate motor to 0 RPM before power to drive module is removed.

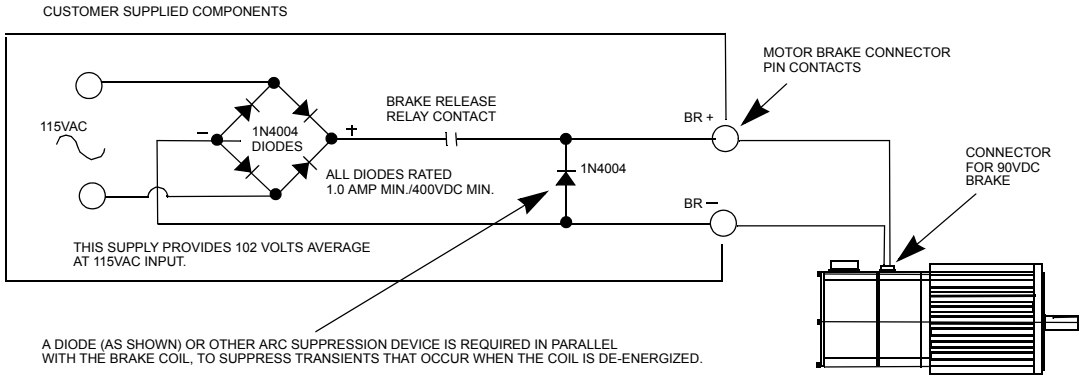
(4) The only requirement for non-emergency power down sequence is to insure that the motor shaft is at 0 RPM before engaging the optional motor brake.

(5) The brake available as an option on HSM Series and FSM Series motors is a holding brake, and is not rated for repeated use as a stopping brake.

Brake Data For HSM and FSM Motors

Motor	Maximum Backlash (Brake Engaged)	Holding Torque (LB/IN)	Holding Torque NM	Coil Current at 24VDC	Coil Current at 90VDC
HSM300	1 degree, 30 minutes	20	2.26	0.6 ADC	0.21 ADC
HSM400, FSM400	44 minutes	90	10.2	0.88 ADC	0.26 ADC
HSM600, FSM600	29 minutes	300	22.6	1.13 ADC	0.33 ADC
HSM800	21 minutes	450	50.8	2.2 ADC	0.62 ADC

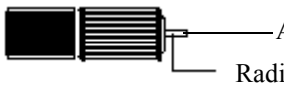
BRAKE VOLTAGE TOLERANCE: 24 VDC: 21.6 TO 27.6 VDC 90 VDC: 85 TO 115 VDC. DC or rectified AC voltage may be used to energize the brake coil.



Standard Motor Radial Load Force Ratings For NSM, HSM and FSM Motors

(Loads applied at center of shaft) For 20,000 HR Bearing Life

Motor	500 RPM		1000 RPM		2000 RPM		3000 RPM		4000 RPM		5000 RPM		6000 RPM	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
NSM2302	17	8	16	7	14	6	12	6	11	5	9	4	8	3
NSM2304	19	9	17	8	15	7	14	6	12	5	10	5	8	4
NSM3406	103	47	82	37	65	29	56	26	51	23	48	22	45	20
HSM205	105	47.7	84	38.2	66	30.0	58	26.4	53	24.1	49	22.3	45	20.5
HSM307	113	51.4	90	40.9	71	32.3	62	28.2	56	25.5	53	24.1		
NSM3412	113	51	89	40	71	32	62	28	56	26	53	24	49	22
HSM320	126	57.3	101	45.9	79	21.6	69	31.4	63	28.6	59	26.8		
NSM4214	137	62	109	49	86	39	76	34	68	31	64	29		
NSM4220	146	66	116	52	92	41	80	36	73	33	68	31		
HSM430	169	76.8	152	69.1	120	54.5	105	47.7	95	43.2				
NSM5630	188	85	149	67	118	53	103	47	94	43				
NSM5637	197	89	156	71	124	56	108	49	98	45				
FSM430	203	92.3	161	73.2	129	58.6	113	51.4	101	45.9				
NSM5647	203	92	161	73	128	58	112	51						
HSM460	205	93.2	164	74.5	129	58.6	113	51.4	103	46.8				
FSM460	229	104.1	184	83.6	144	65.5	126	57.3	116	52.7				
HSM490	215	97.7	173	78.6	137	62.3	118	53.6	108	49.1				
FSM490	244	110.9	194	88.2	154	70.0	133	60.5	121	55.0				
HSM610	435	197.7	345	156.8	274	124.5	240	109.1						
FSM610	428	194.5	341	155.0	268	121.8	236	107.3						
HSM620	469	213.2	375	170.5	296	134.5	259	117.7						
FSM620	465	211.4	368	167.3	293	133.2	255	115.9						
HSM630	495	225.0	390	177.3	311	141.4	270	122.7						
FSM630	495	225.0	390	177.3	311	141.4	270	122.7						
HSM835	495	225.0	394	179.1	311	141.4								
HSM845	518	235.4	413	187.7	326	148.2								



NOTE: Motors are capable of carrying an axial load in most applications per the following general guidelines which should be used only as an approximation. Please consult with Giddings & Lewis to discuss your application loads to ensure the proper selection of motors.

- When motor shaft has no radial load, Axial load rating = 100% of radial load rating from table above.
- When motor shaft has both a radial load and an axial load, axial load rating = 44% of radial load rating from table above.

XSM Low Inertia Brushless Servo Motors

Typical Applications

- "Smart" conveyors
- Packaging machinery
- Punch press/material feeding
- Robotic pick and place
- High duty cycle applications

Characteristics

- High acceleration and peak torques
- High speed point-to-point positioning
- Environmentally rugged

Standard Features

- High energy neodymium magnet rotors provide high acceleration/deceleration in minimum
- Temperature sensors built into windings allow intelligent shut down in overload conditions
- Unique stator design provides optimal thermal transfer allowing successful automation of high hit rate, demanding applications
- Use direct mount pinions and belt pulleys for cost-effective-application
- Standard cable sets simplify machine design, build and commissioning
- Incremental encoder standard, high resolution and multi-turn absolute encoder available
- Machine design simplified using standard gearboxes and mounting plates
- Industrial packaging insures reliable operation in harsh environments
- UL, cUL and CE Mark allow worldwide application
- Maintenance-free design manufactured in ISO9000 facility
- Use available CAD (.DXF) drawings for easy design into your machine

XSM Motor Performance Data

Motor Model	XSM 100-14-502		XSM 100-14-302		XSM 100-27-502		XSM 100-27-352		XSM 100-37-502		XSM 115-42-502		XSM 115-53-502		XSM 115-55-352		XSM 130-53-502		XSM 130-53-402	
Mechanical Data																				
Rotor Moment of Inertia	lb-in-s^2 .00037	kg-m^2 .000042	lb-in-s^2 .00037	kg-m^2 .000042	lb-in-s^2 .00067	kg-m^2 .000076	lb-in-s^2 .00067	kg-m^2 .000076	lb-in-s^2 .00097	kg-m^2 .00011	lb-in-s^2 .0023	kg-m^2 .00026	lb-in-s^2 .0034	kg-m^2 .00038	lb-in-s^2 .0034	kg-m^2 .00038	lb-in-s^2 .0024	kg-m^2 .00027	lb-in-s^2 .0024	kg-m^2 .00027
Motor Net Weight	lb 5.7	kg 2.6	lb 5.7	kg 2.6	lb 7.9	kg 3.6	lb 7.9	kg 3.6	lb 10	kg 4.6	lb 9.3	kg 4.2	lb 12	kg 5.5	lb 12	kg 5.5	lb 13	kg 5.9	lb 13	kg 5.9
Winding Data																				
KE Voltage Constant[3] (V/ kRPM)	52		80		52		72		52		52		52		76		52		62	
Winding Resistance Ph to phase @ 25°C	4.7		12		1.8		3.9		1.2		1.0		0.63		1.3		.58		0.88	
Winding Inductance Phase to phase (mH)	25		55		12		24		7.5		5.6		3.6		7.5		5.6		7.6	

Motor Model	XSM 130-72-402		XSM 130-74-282		XSM 130-90-152		XSM 130-90-302		XSM 100-14-504		XSM 100-27-504		XSM 100-37-504		XSM 115-42-504		XSM 115-58-504		XSM 130-50-504		XSM 130-73-404	
Mechanical Data																						
Rotor Moment of Inertia	lb-in-s^2 .0034	kg-m^2 .00028	lb-in-s^2 .0034	kg-m^2 .00038	lb-in-s^2 .0044	kg-m^2 .0005	lb-in-s^2 .0044	kg-m^2 .0005	lb-in-s^2 .00037	kg-m^2 .00004	lb-in-s^2 .00069	kg-m^2 .00008	lb-in-s^2 .001	kg-m^2 .00012	lb-in-s^2 .0023.	kg-m^2 .00026	lb-in-s^2 .0033	kg-m^2 .00038	lb-in-s^2 .0024	kg-m^2 .00028	lb-in-s^2 .0036	kg-m^2 .0004
Motor Net Weight	lb 16	kg 7.3	lb 16	kg 7.3	lb 8.6	kg 19	lb 19	kg 8.6	lb 5.8	kg 2.7	lb 8.0	kg 3.7	lb 10	kg 4.6	lb 9.4	kg 4.3	lb 12	kg 5.5	lb 13	kg 5.9	lb 16	kg 7.3
Winding Data																						
KE Voltage Constant[3] (V/ kRPM)	62		92		173		86		96		96		96		100		100		96		115	
Winding Resistance Ph to phase @ 25°C	0.51		1.2		2.6		.75		20		7.5		4.61		3.8		2.4		2.5		2	
Winding Inductance Phase to phase (mH)	4.7		12		30		7.5		93		42		28		21		13		21		18	

Motor Model	XSM 130-73-304		XSM 130-90-304		XSM 165-95-404		XSM 165-172-404		XSM 215-325-304		XSM 215-425-304		XSM 215-531-304		XSM 165-95-402		XSM 165-172-402	
Mechanical Data																		
Rotor Moment of Inertia	lb-in-s^2 .0036	kg-m^2 .0004	lb-in-s^2 .0046	kg-m^2 .00052	lb-in-s^2 .0069	kg-m^2 .00078	lb-in-s^2 .013	kg-m^2 .00147	lb-in-s^2 .0354	kg-m^2 .004	lb-in-s^2 .051	kg-m^2 .0058	lb-in-s^2 .0685	kg-m^2 .00775	lb-in-s^2 .0069	kg-m^2 .00078	lb-in-s^2 .013	kg-m^2 .00147
Motor Net Weight	lb 16	kg 7.3	lb 19	kg 8.6	lb 21.5	kg 9.8	lb 33	kg 15	lb 59	kg 26.8	lb 77	kg 35	lb 89	kg 40.5	lb 21.5	kg 9.8	lb 33	kg 15
Winding Data																		
KE Voltage Constant[3] (V/ kRPM)	180		158		130		130		168		168		168		65		65	
Winding Resistance Ph to phase @ 25°C	4.2		2.6		1.49		.65		.349		.254		.189		.4		.167	
Winding Inductance Phase to phase (mH)	41		25		27		13		11		7.2		5.5		7.0		3.3	

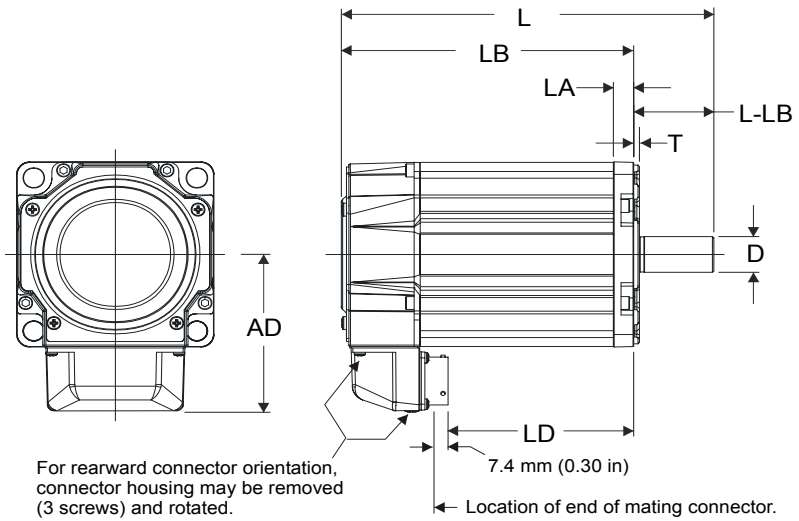
[1]Peak value of per phase sine wave amps

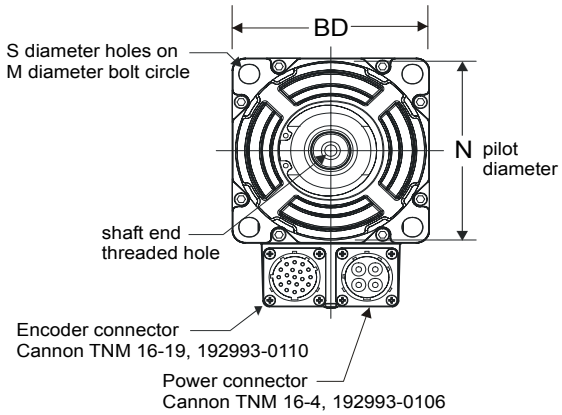
[2]Peak value of per phase square wave amps

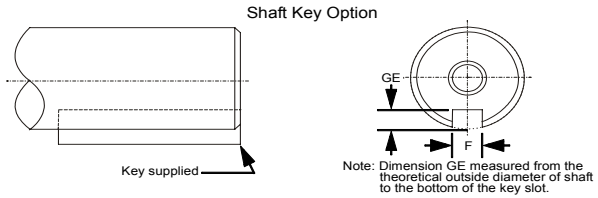
[3]Peak value of sinusoidal phase to phase Volts

[4]At 125° C winding temperature, in a 40° C ambient, Motors XSM100-165 mounted on 0.5” x 12” x 12”, Motors XSM215 mounted on 1” x 12” x 12” aluminum heat sink

XSM Standard Motor Dimensions







Shaft End Threaded Hole

Motor	Thread	Thread Depth
XSM100-14, 27, 37	M5 x .08 mm	12.5 mm (0.49 in.)
XSM 115-42, 53/55	M6 x 1.0 mm	16 mm (0.63 in.)
XSM130-53, 72/74, 90	M8 x 1.25 mm	19 mm (0.75 in)
XSM165-95, 172	M10 x 1.5-6 mm	22 mm (0.87 in)
XSM215-325, 425, 531	M12 x 1.75 mm	28.0 mm (1.10 in.)

Note: Motors manufactured to millimeter dimensions

DIMENSIONS														
	AD	BD	D	F	GE	L	LA	LB	L-LB	M	N	S	T	TOLERANCES
Model	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in
XSM100-14	80.9 (3.19)	89.4 (3.52)	16.0 (0.6299)	5.0 (0.197)	30 (0.118)	163.9 (6.46)	9.9 (0.39)	123.9 (4.88)	40.0 (1.575)	100 (3.937)	80 (3.150)	7.0 (0.276)	2.87 (0.113)	D: +0.008/-0.003 (+0.0003/ 0.0001) L-LB: ±0.7 (±0.028) N: +0.012/-0.007 (+0.0005/- 0.0003) S: +0.36/-0.0 (+0.014/-0.0)
XSM100-27						189.3 (7.46)		149.3 (5.88)						
XSM100-37						214.7 (8.46)		174.7 (6.88)						
XSM115-42	83.9 (3.30)	98.3 (3.87)	19.0 (0.7480)	3.5 (0.14)	6.0 (0.2)	185.7 (7.32)	10.2 (0.40)	145.7 (5.74)	40.0 (1.575)	115 (4.528)	95 (3.7402)	10.0 (0.394)	2.87 (0.113)	D: +0.009/-0.004 (+0.0004/- 0.0002) L-LB: ±0.7 (±0.028) N: +0.013/-0.009 (+0.0005/- 0.0004) S: +0.36/-0.0 (+0.014/-0.0)
XSM115-53/55						211.1 (8.32)		171.1 (6.74)						
XSM130-53	91.5 (3.60)	113.7 (4.48)	24.0 (0.9449)	8.0 (0.315)	4.0 (0.158)	199 (7.84)	12.2 (0.48)	149 (5.87)	50 (1.969)	130 (5.118)	110 (4.3307)	10.0 (0.394)	3.38 (0.133)	
XSM130-72/74						224.4 (8.84)		174.4 (6.87)						
XSM130-90						249.8 (9.84)		199.8 (7.87)						
XSM165-95,	Non-Brake 106.2 (4.18) 24Vdc Brake 105.4 (4.15)	143.5 (5.65)	28.0 (1.1024)	8.0 (0.315)	4.10 (0.1615)	233 (9.173)	13.97 (0.55)	173 (6.81)	60 (2.362)	165.0 (6.496)	130 (5.1181)	12 (0.481)	3.38 (0.133)	D: +0.009/-0.004 (+0.0003/ 0.0002) F: -0.0036 (-0.0002) GE: ±0.10 (±0.0035) L-LB: ±0.7 (±0.028) N: +0.014/-0.009 (+0.0006/- 0.0003) S: +0.43/-0.0 (±0.008)
XSM 165-172						283.8 (11.173)		223.8 (8.81)						
XSM215-325	Non-Brake 142.9 (5.625) 24Vdc Brake 141.1 (5.56	184.60 (7.27)	38.001 (1.4961)	10.00 (0.3937)	5.10 (0.201)	303.6 (11.95)	17.80 (0.70)	223.6 (8.80)	80 (3.150)	215.00 (8.465)	180.00 (7.0866)	14.175 (8.465)	3.86 (0.152)	D: +0.006/-0.0 (±0.0006/-0.0) F: +0.0/-0.036 (+0.0/-0.0014) GE: ±0.10 (±0.004) L-LB: ±0.7 (±0.028) N: +0.014/-0.009 (+0.0006/- 0.0004) S: +0.215 (±0.008)
XSM215-425						354.4 (13.95)		274.4 (10.8)						
XSM215-531						405.2 (15.95)		325.2 (12.8)						

[1]Tolerance is -0.03/-0.0012 [2]Tolerance is -0.01/-0.0004 [3]Tolerance is +/- 0.5/ +/- 0.0196 [4] Tolerance is +/- 0.2 / +/-0.0079 [5]Tolerance is -0.035/-0.0014 [6]Tolerance is -0.013/-0.0051 [7] Tolerance is -0.16/-0.006

[8]Tolerance is -0.46/-0.0181

Motors are manufactured to millimeter dimensions shown. Inch dimensions shown are approximate conversions from millimeters.

For further motor detail, engineering specification drawings are available upon request.

XSM Motor Connector Ordering Information

Ordering options include the following:

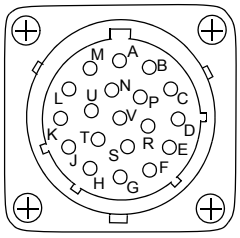
- 24VDC (Consult factory for brake motor availability)
- Encoder Line Count* - 2,000, line
- Single and line multiturn high resolution encoders yielding up to 1,048,576 counts per revolution

*Note: Optional configurations or encoder line counts may have extended lead times and additional charges. Not all options are available with all motor sizes.

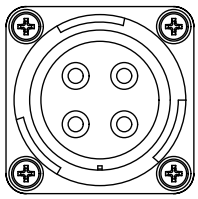
Item	Motor Model	Part No.	Cable
Power Connector	XSM100, 115, 130, 165	M.1301.4035	CONN-PWR-XSM-ST-10
	XSM215	M.1301.9160	CONN-PWR-XSM-ST-08
Encoder Connector	All XSM motors	M.1301.4036	CONN-ENC-XSM-ST-22
Brake Connector	All XSM motors	M.1301.4037	CONN-BRK-XSM-ST-14
Motor Shaft Seal Kits	XSM100	M.1301.4031	N/A
	XSM115	M.1301.4032	N/A
	XSM130	M.1301.4033	N/A
	XSM165	M.1301.9161	N/A
	XSM215	M.1301.9162	N/A

XSM Connector Data

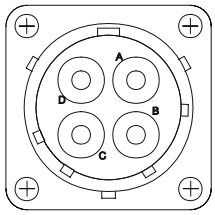
Feedback Connectors



ITT Cannon
TNM 16-19, 192993



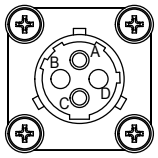
ITT Cannon
CA-COM 24-22P



ITT Cannon
TNM16-4, 192993-0106

Pin	2000 Line Encoder	High Resolution Encoder for XSM 230VAC Motor	High Resolution Encoder for XSM 460VAC Motor
A	A+	Sin+	Sin+
B	A-	Sin-	Sin-
C	B+	Cos+	Cos+
D	B-	Cos-	Cos-
E	I+	Data+	Data+
F	I-	Data-	Data-
G	GROUND	Reserved	Reserved
H	ABS		
J	Reserved		
K	+5VDC	+5VDC	
L	Common	Common	
M	Reserved	Reserved	
N			+9VDC
P			Common
R	TS+	TS+	TS+
S	TS	TS-	TS-
T	S1	Reserved	Reserved
U	S2		
V	S3		

Power/Brake Connectors



ITT Cannon
TNM 10-4

Power Connector	
Pin	**Signal**
A	PHASE R
B	PHASE S
C	PHASE T
D	GROUND

Brake Connector	
Pin	**Signal**
A	BR+
B	Reserved
C	BR-
D	Reserved

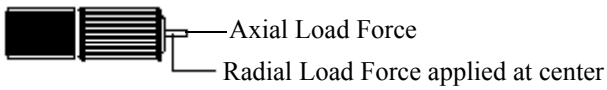
Standard Motor Radial Load Force Ratings For XSM Motors

Motors are capable of operating with the maximum radial or maximum axial shaft loads listed in the following tables. Radial loads are applied midway along the shaft extension. The table represents 20,000-hour L10 bearing fatigue life. This 20,000-hour life does not account for possible application-specific life reduction that may occur due to bearing grease contamination from external sources

RADIAL LOAD FORCE RATINGS (Maximum Radial Load)							
MOTOR	**500 rpm kg (lb)**	**1000 rpm kg (lb)**	**2000 rpm kg (lb)**	**3000 rpm kg (lb)**	**3500 rpm kg (lb)**	**4000 rpm kg (lb)**	**5000 rpm kg (lb)**
XSM100-14	78 (171)	62 (136)	49 (108)	-	40 (89)	-	36 (79)
XSM100-27	87 (192)	69 (152)	55 (121)	-	45 (100)	-	40 (89)
XSM100-37	-	74 (163)	59 (129)	-	49 (107)	-	43 (95)
XSM115-42	-	78 (172)	62 (136)	-	51 (113)	-	45 (100)
XSM115-53/55	106 (234)	84 (186)	67 (148)	-	55 (122)	-	49 (109)
XSM130-53	-	97 (213)	77 (169)	67 (147)	64 (140)	61 (134)	56 (124)
XSM130-72/74	133 (292)	105 (232)	84 (184)	73 (161)	-	66 (146)	-
XSM130-90	140 (309)	111 (245)	89 (195)	77 (170)	-	-	-
XSM165-95	-	127 (280)	100 (222)	88 (194)	-	80 (176)	-
XSM165-172	-	143 (316)	114 (251)	99 (219)	-	90 (199)	-
XSM215-325	253 (552)	200 (442)	159 (351)	139 (307)	-	-	-
XSM215-425	275 (607)	219 (482)	173 (382)	151 (334)	-	-	-
XSM215-531	291 (641)	230 (509)	183 (404)	160 (353)	-	-	-

AXIAL LOAD FORCE RATINGS (Maximum Radial Load)							
MOTOR	**500 rpm kg (lb)**	**1000 rpm kg (lb)**	**2000 rpm kg (lb)**	**3000 rpm kg (lb)**	**3500 rpm kg (lb)**	**4000 rpm kg (lb)**	**5000 rpm kg (lb)**
XSM100-14	30 (66)	23 (50)	16 (36)	-	13 (29)	-	11 (24)
XSM100-27	34 (74)	25 (56)	19 (41)	-	15 (32)	-	13 (28)
XSM100-37	-	27 (59)	20 (44)	-	16 (35)	-	13 (29)
XSM115-42	-	36 (80)	27 (59)	-	21 (47)	-	18 (39)
XSM115-53/55	52 (115)	39 (86)	29 (63)	-	22 (49)	-	19 (42)
XSM130-53	-	31 (68)	23 (50)	19 (42)	18 (39)	17 (37)	15 (33)
XSM130-72/74	45 (100)	34 (74)	25 (55)	21 (46)	-	19 (41)	-
XSM130-90	49 (107)	36 (80)	27 (59)	22 (49)	-	-	-
XSM165-95	-	42 (94)	30 (68)	26 (58)	-	22 (50)	-
XSM165-172	-	48 (107)	35 (79)	30 (66)	-	26 (58)	-
XSM215-325	89 (197	66 (146)	48 (107)	41 (90)	-	-	-
XSM215-425	98 (217)	72 (159)	53 (118)	45 (99)	-	-	-
XSM215-531	104 (230)	77 (169)	34 (125)	47 (104)	-	-	-

AXIAL LOAD FORCE RATINGS (Zero Radial Load)							
MOTOR	**500 rpm kg (lb)**	**1000 rpm kg (lb)**	**2000 rpm kg (lb)**	**3000 rpm kg (lb)**	**3500 rpm kg (lb)**	**4000 rpm kg (lb)**	**5000 rpm kg (lb)**
XSM100-14	49 (109)	36 (80)	27 (59)	-	21 (47)	-	18 (40)
XSM100-27	49 (109)	36 (80)	27 (59)	-	21 (47)	-	18 (40)
XSM100-37	-	36 (80)	27 (59)	-	21 (47)	-	18 (40)
XSM115-42	-	51 (112)	38 (83)	-	30 (65)	-	25 (55)
XSM115-53/55	69 (152)	51 (112)	38 (83)	-	30 (65)	-	25 (55)
XSM130-53	-	51 (112)	38 (83)	31 (69)	30 (65)	28 (61)	25 (55)
XSM130-72/74	69 (152)	51 (112)	38 (83)	31 (69)	-	28 (61)	-
XSM130-90	69 (152)	51 (112)	38 (83)	31 (69)	-	-	-
XSM165-95	-	67 (149)	49 (109)	41 (92)	-	26 (81)	-
XSM165-172	-	67 (149)	49 (109)	41 (92)	-	26 (81)	-
XSM215-325	136 (300)	99 (219)	74 (163)	62 (137)	-	-	-
XSM215-425	136 (300)	99 (219)	74 (163)	62 (137)	--	-	-
XSM215-531	136 (300)	99 (219)	74 (163)	62 (137)	--	-	-



CENTURION DSM DRIVES AND MOTORS

MOTION SOLUTIONS PRODUCT GUIDE

Material Number M.1301.4207
Version 1.0

Giddings & Lewis

Centurion DSM Drives and Motors
Motion Solutions Product Guide

NOTE

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Version 1.0

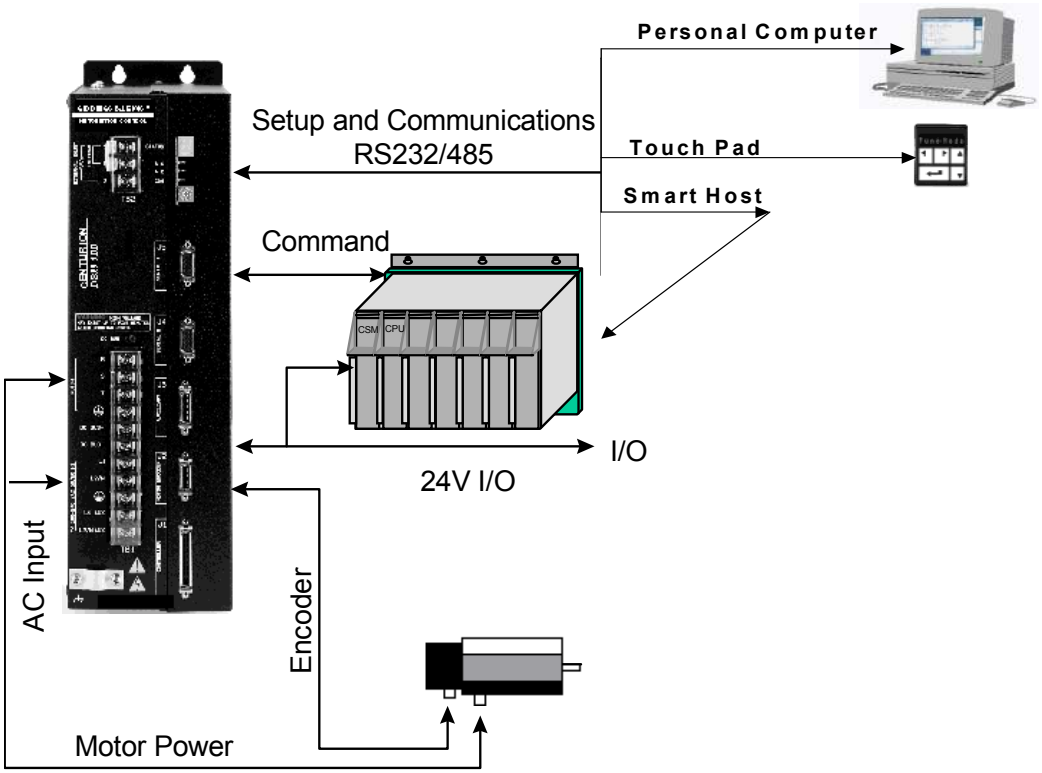
Table of Contents:
Centurion™ DSM Drives and Motors Product Guide

MOTION SOLUTIONS PRODUCT GUIDE

Centurion™ DSM Drives, Motors, and Accessories

DSM100 - Digital Servo Drives

The Giddings & Lewis Centurion DSM line is a family of versatile universal drives. These feature-rich, high performance drives offer flexibility in a wide range of applications. The DSM is called a universal drive because of its ability to run both brushless servo motors and induction motors and because of its ability to act as an analog input velocity servo, variable speed drive, stepper drive replacement or master encoder follower complete with electronic gearing. The Windows based interface, DSMPro, provides you with a powerful configuration and diagnostic tool to improve your productivity when integrating DSM Drives into your machine. The common cabling, functionality and interface throughout the DSM family will drive down your life cycle costs when you standardize on the Centurion DSM drives.



The Centurion DSM100 has the unique flexibility to operate a wide variety of motors so you can optimize the motor/drive system for your application. Through DSMPro or the optional Touch-Pad, a Giddings & Lewis standard motor file can be selected with the click of the mouse or the push of a button. The drive then automatically configures itself as either an AC brushless servo drive or a high performance vector drive. The majority of the motor families come standard with a 2000 line incremental encoder but also have a 5000 line option. This higher resolution encoder, used in conjunction with a DSM100 drive, provides superior low speed performance for the most demanding applications. And to complement the full functionality and superior performance, the DSM100 drives, cable and motor systems have been third-party tested and certified to the CE EMC requirements.

Universal Drive

- Can be configured for a variety of command sources:
  - Analog velocity input
  - Preset positions, torques, or velocities
  - Step and direction
  - Master encoder following
  - Digital serial commands
- Drives either brushless or induction motors by simple set-up
- The same features, cabling and performance available in a range of both micro drives and standard sized drives

Easy Set-up and Maintenance

- Windows-based DSMPro software provides a complete set of troubleshooting and diagnostic tools.
- All setup and tuning parameters are saved in a non-volatile personality module.
- All drive configuration and tuning parameters can be set up off-line and saved to disk.
- Optional TouchPad MMI provides convenient alternative to DSMPro for the factory floor.

Industry Leading Performance

- Advanced low-speed control algorithm for superior control
- Velocity loop bandwidth up to 400Hz
- High frequency encoder input capability

Reliability

- Tested for vibration, shock, humidity and temperature
- Built in protection circuitry safeguards your system
- Wireless construction
- Highly integrated hardware design with custom ASICS and Intelligent Power Modules (IPM)

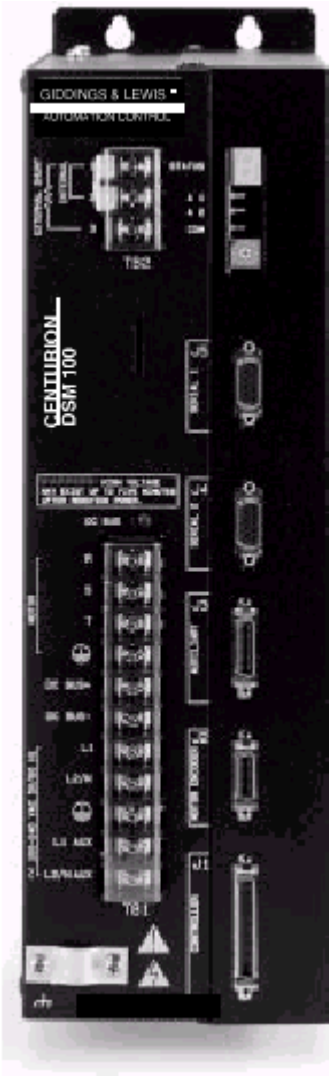
Global Standards

- UL and cUL listed
- CE marked for European requirements for low voltage and electromagnetic compatibility directives
- Designed and manufactured in an ISO9001 certified plant

DSM100 Drive Features

The DSM100 standard sized drives deliver full-featured flexibility and an impressive range of power and performance. Whether you need an analog input velocity servo, a variable speed drive, a stepper drive replacement, or a master encoder follower, the DSM100 is the one drive that can do it all.

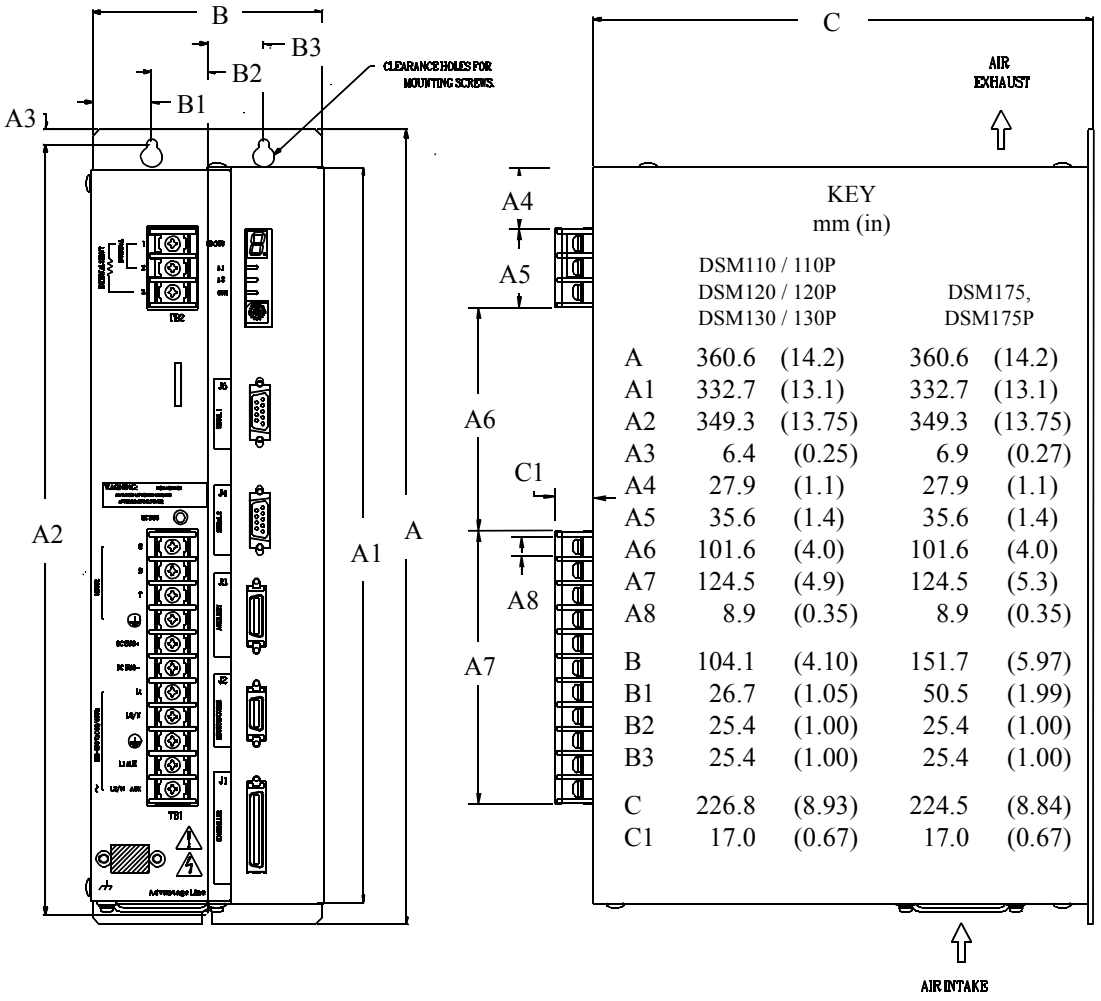
- Available in 1.0, 2.0, 3.0, 7.5 and 15 kW continuous output power ratings
- 100 to 240V AC single phase input (single phase or three phase for the 75 amp version
- Drives either sinusoidal AC brushless or induction motors
- Choice of command source:
  - +/- 10V analog input
  - Step/direction input (also step up/step down) with electronic gearing
  - Auxiliary master encoder input with electronic gearing
  - Eight preset positions/speeds/torques selected via 3 digital input lines
  - RS-232/485 commands
- Phase to phase and phase to ground short circuit protection
- Internal or external resistive shunt
- Auxiliary AC input to power logic only
- Built-in power supplies (including 24V I/O supply) – no external source required except AC line
- DC bus available externally for power leveling or use of shared power supplies
- Advanced multi-processor design for leading edge velocity loop bandwidth, all digital current, velocity and position loops
- Large scale integration with custom ASICs and IPMs for performance and reliability
- Flash memory for simple field upgrades
- Removable personality module to store set-up parameters and simplify drive replacement
- Wireless construction for reliability
- Internally shielded filters for electromagnetic compatibility (EMC)
- 4 dedicated I/O plus 8 user-selectable optically isolated digital inputs and outputs (active high)
- 2 analog inputs for external current limit
- 2 analog outputs for variable monitoring or torque sharing
- 2 serial connectors to simplify RS485 multi-dropping and host communications
- Scalable motor encoder output
- UL, cUL listed and CE marked



NOTE: The use of an external AC line filter and Giddings & Lewis shielded cables are required for CE compliance.

DSM 100 Dimensions

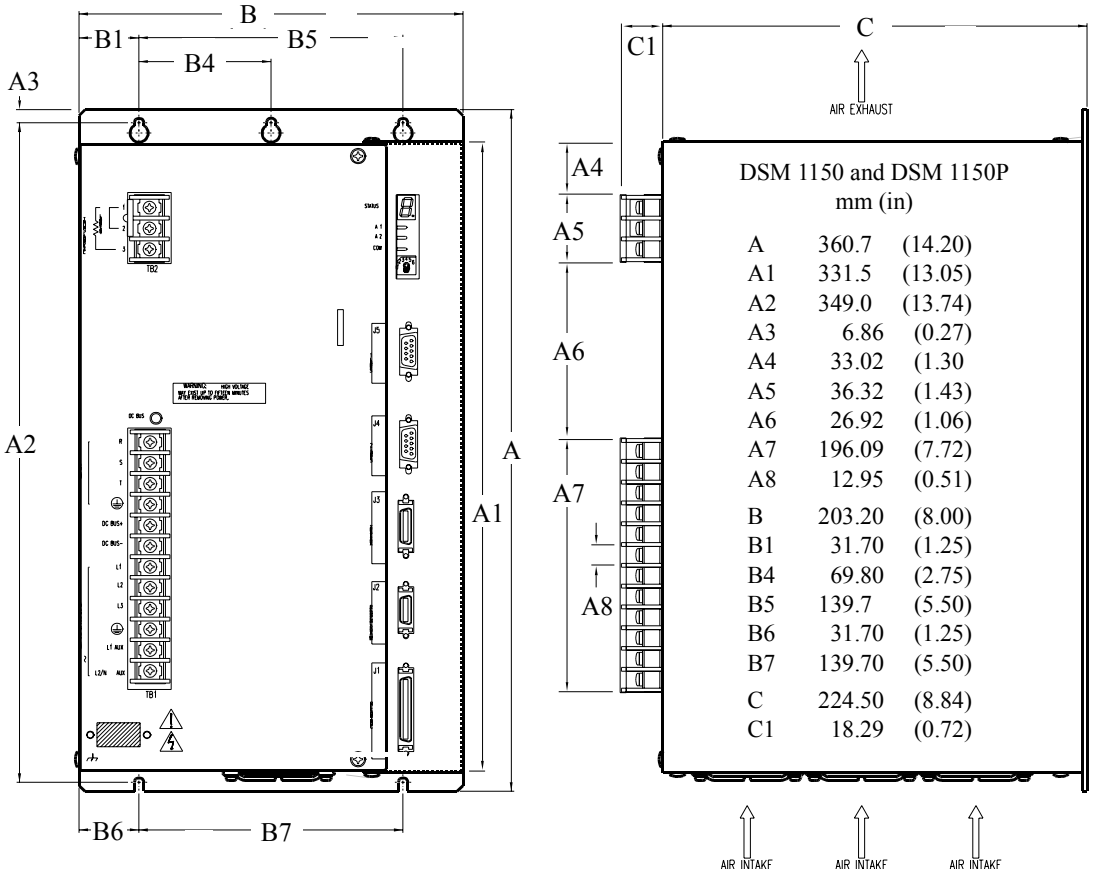
DSM100 Dimensions (Standard Drives)
DSM110, DSM120, DSM130, DSM175



KEY
mm (in)

	DSM110 / 110P DSM120 / 120P DSM130 / 130P		DSM175, DSM175P	
A	360.6	(14.2)	360.6	(14.2)
A1	332.7	(13.1)	332.7	(13.1)
A2	349.3	(13.75)	349.3	(13.75)
A3	6.4	(0.25)	6.9	(0.27)
A4	27.9	(1.1)	27.9	(1.1)
A5	35.6	(1.4)	35.6	(1.4)
A6	101.6	(4.0)	101.6	(4.0)
A7	124.5	(4.9)	124.5	(5.3)
A8	8.9	(0.35)	8.9	(0.35)
B	104.1	(4.10)	151.7	(5.97)
B1	26.7	(1.05)	50.5	(1.99)
B2	25.4	(1.00)	25.4	(1.00)
B3	25.4	(1.00)	25.4	(1.00)
C	226.8	(8.93)	224.5	(8.84)
C1	17.0	(0.67)	17.0	(0.67)

DSM1150



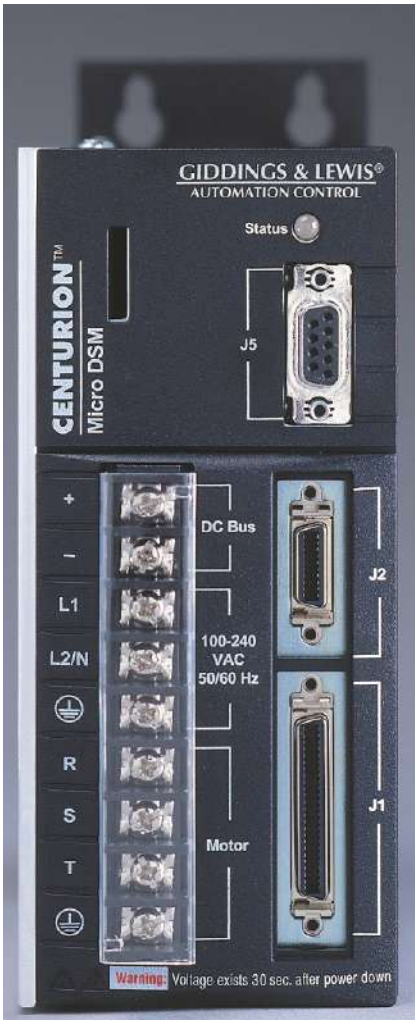
DSM 1150 and DSM 1150P
mm (in)

A	360.7	(14.20)
A1	331.5	(13.05)
A2	349.0	(13.74)
A3	6.86	(0.27)
A4	33.02	(1.30
A5	36.32	(1.43)
A6	26.92	(1.06)
A7	196.09	(7.72)
A8	12.95	(0.51)
B	203.20	(8.00)
B1	31.70	(1.25)
B4	69.80	(2.75)
B5	139.7	(5.50)
B6	31.70	(1.25)
B7	139.70	(5.50)
C	224.50	(8.84)
C1	18.29	(0.72)

Micro DSM Drive Features

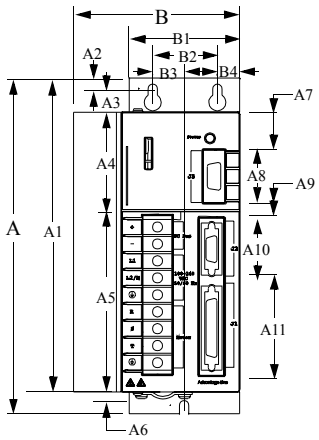
The Micro DSM drives deliver full-featured flexibility and performance in a very compact size. This space-saving drive is also a time saver with its easy to use Windows-based DSMPro software tool. For superior performance in a variety of power ratings and sizes, the Micro DSM is the one drive that can do it all.

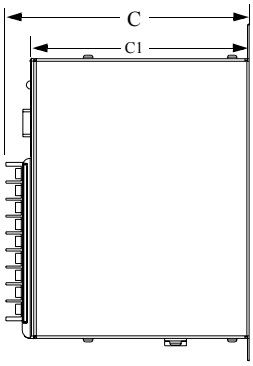
- Available in 0.5 kW, 1.0 kW and 2.0 kW continuous output power ratings
- Superior performance and functionality of larger drives in a package 1/4 of their size
- 100 to 240V AC single phase input
- Choice of command source:
  - +/- 10V analog input
  - Step/direction input (also step up/step down) with electronic gearing
  - Auxiliary master encoder input with electronic gearing
  - Eight preset positions/speeds/torques selected via 3 digital input lines
  - RS-232/485 commands
- External active shunt available
- Phase to phase and phase to ground short circuit protection
- Drives sinusoidal AC brushless motors
- DC bus available externally for power leveling
- Advanced control algorithms for leading edge velocity loop bandwidth. All current, velocity and position loops are digital
  - Speed range 8000:1
  - Velocity regulation +/-0.44 RPM with 5000 PPR encoder
- Large scale integration with custom ASICs and IPMs for performance and reliability
- Internally shielded output filter for electromagnetic compatibility (EMC)
- 4 dedicated I/O plus 5 user-selectable optically isolated digital inputs and outputs (sourcing/active high)
- 1 analog input for external current limit
- 1 analog output for variable monitoring or torque sharing
- Serial port for RS232/485 host communications
- Scalable motor encoder output
- UL, cUL listed and CE marked



NOTE: The use of an external AC line filter, and Giddings & Lewis shielded cables are required for CE compliance.

Micro DSM Dimensions
DSM007 Mounting Dimensions

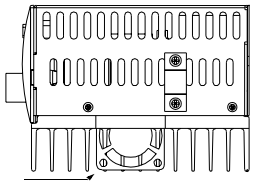




Minimum Unobstructed Surrounding Space

for Cooling and Exhaust Air
Above 50.8 mm (2 inches)
Below 50.8 mm (2 inches)
Sides 12.5 mm (0.5 inches)

for Cable Bend Radius
Front 76.2 mm (3 inches)



NOTE: Fan on DSM-015 only

	Dimension				Dimension	
	mm	inches			mm	inches
A	198.12	7.80		B	97.30	3.83
A1	184.9	7.28		B1	65.02	2.56
A2	6.35	0.25		B2	38.10	1.50
A3	13.0	0.51		B3	18.54	0.73
A4	6.07	2.39		B4	13.21	0.52
A5	94.49	3.72		B5	5.58	0.22
A6[a]	5.0	0.20				
A7	22.10	0.87		C	146.05	5.75
A8	31.75	1.25		C1	129.03	5.08
A9	8.64	0.34				
A10	31.75	1.25				
A11	57.15	2.25				

a. Power Cable bracket extends up to 20mm (0.80 inches)

Optional SERCOS Feature for DSM100 Drives

With the optional SERCOS card, the DSM drives can be configured to operate as a slave device on a SERCOS ring. High-speed fiber optic communication allows up to eight axes per ring. Wiring between the controller and the drive is greatly simplified. Noise problems are eliminated.DSM100 SERCOS Drive Features

The DSM100 SERCOS standard-sized drives deliver full-featured flexibility and an impressive range of power and performance. Whether you need a servo drive, a variable speed drive, or a stepper drive replacement, the DSM100 SERCOS is the one drive that can do it all.

- Available in 1.0, 2.0, 3.0, 7.5, and 15 kW continuous output power ratings
- 100 to 240V AC single phase input (single phase or three phase for the 75 amp version)
- Drives either sinusoidal AC brushless or induction motors
- Auxiliary master encouder input with electronic gearing
- Phase-to-phase and phase-to-ground short circuit protection
- Internal or external resistive shunt
- Auxiliary AC input to power logic only
- Built-in power supplies (including 24V I/O supply); no external source required except AC line
- DC bus available externally for power leveling or use of shared power supplies
- Advanced multi-processor design for leading edge velocity
- Loop bandwidth, all digital current, velocity and position loops
- Large scale integration with custom ASICs and IPMs for performance and reliability
- Flash memory for simple field upgrades
- Removable personality module to store set-up parameters and simplify drive replacement
- Wireless construction for reliability
- Internally shielded filters for electromagnetic compatibility (EMC)
- Scalable motor encoder output
- UL, cUL listed and CE marked

  NOTE: the use of an external AC line filter and Giddings and Lewis shielded cables are required for CE compliance

Other features which can be accessed through SERCOS IDNs:

- Four dedicated optically isolated digital inputs, which include two high-speed inputs for registration or probing
- Four dedicated optically isolated digital outputs
- Two relay outputs
- Three analog inputs for monitoring feedback from dancer, tension, or pressure measuring devices
- Two analog inputs for variable monitoring, torque sharing, or controlling an open loop spindle

Optional Positioning Feature for DSM100 and MicroDSM Drives

With the optional positioning feature, the DSM drives can be configured to act as simple controllers for point-to-point positioning applications. The positioning feature includes:

- Built-in home routine
- Position distance move
- Position absolute move
- Position registered distance move

Applications where this positioning capability could provide the motion control solution include:

Rotary Tables	Feed-to-Length	Pick and Place Machines
Material Feeders	Roll Stock Processors	Wafer Handling Machines
Material Handling	Lane Diverters	Wire-Cutting Operations
Intelligent Conveyors	Punch Press	Clutch-Brake Replacements
Intelligent Setup Axis		Pneumatic Cylinder Replacements

Overview

The positioning drives can be configured to execute up to eight different trapezoidal position moves initiated by the digital I/O, TouchPad, or an unlimited number of positions through the host command language. The position mode does not require a command source from a motion controller or PLC.

The drives are designed to support three different types of position moves:

- Incremental - Distance move executed relative to current position
- Absolute - Position move executed in reference to the home position
- Registration - Distance move executed relative to the registration sensor digital input

The positioning drives are capable of storing up to eight individual position moves. Additionally, a ninth ‘RAM’ position move exists for use with the serial host command language. This allows you to continually download new parameter information. The drives are designed to provide maximum flexibility by allowing you to define the following parameters for each individual position move:

- Position Type - Incremental, Absolute, or Registration
- Distance (Position) - Value indicates the length of travel or position (for absolute position) for the position move
- Batch Count - Determines the number of times the position will automatically execute. A value of zero will execute the move continuously.
- Dwell Time - Sets the length of time the drive will hold position between execution periods.
- Registration Distance - Determines the relative length of travel the drive will execute after the registration sensor digital input is detected. *Registration distance is only active if a registration position type is selected*.
- Velocity - Sets the commanded velocity the drive will use when executing the position move
- Acceleration - Value used as the rate of speed increase during execution of the position move
- Deceleration - Value used as the rate of speed decrease during execution of the position move
- Action When Complete - Allows you to configure the drive to start a different position move when the current move has completed its execution. You can create a series of position moves to execute automatically (or with a Start Index Input), reducing the need to use the Preset Select Inputs.

Home Routine with Positioning Drives

The home routine in the positioning drives allows you to home the axis without the use of a supervisory device. Using DSMPro, you can select a home routine to satisfy your application.

1. Home to Sensor/Then Marker - When the home routine is initiated, the drive will accelerate the motor to the defined homing velocity and look for the sensor/switch assigned to digital input #2. After the switch is seen, the drive defines the next marker (encoder index pulse) as the home position.
2. Home to Marker - When the home routine is initiated, the drive will define the next marker pulse as the home position.
3. Home to Sensor - When the home routine is initiated, the drive will define the input assigned at input #2 as the home position.

For all types of homing, an Offset Move Distance can also be defined which will move the axis the specified distance from the home marker and define that new position as the home position.

You can define the following parameters for the home routine:

- Homing Type - Home to sensor/then marker, home to marker, home to sensor
- Homing Velocity - Velocity at which the home routine will execute
- Homing Accel/Decel - Acceleration and deceleration values used in the home routine
- Offset Move Distance - User specified distance the axis moves relative to the home marker. The final destination then becomes the home position.
- Home Position - Defines the home position to any value
- Auto-Start Homing - If the auto-start homing box is checked in DSMPro, the home routine will execute automatically on the first enable or on a hard reset. You can also initiate the home routine by using the ‘Start Homing’ assignable digital input.

Digital I/O and Positioning Drives

The positioning mode of operation requires the use of the assignable digital I/O or the serial host command language. The DSM drives have the following assignable digital inputs/outputs available.

	Number of assignable optically isolated digital	
	Inputs	**Outputs**
MicroDSM - DSM007, 015, 030	3 (4*)	2
Standard DSM - DSM110, 120, 130, 175, 1150	4 (5*)	4

*The release of positioning redefines the dedicated fault reset digital input to be assignable. This provides you with another available input for positioning.

Host Mode Control with Positioning Drives

The positioning mode of operation, like the other operating modes, is designed to be useful within a serial host control environment. A special 'RAM' position whose parameters are not stored in non-volatile memory may be used for host positioning control when position parameters require continual changing. The 'RAM' position and non-volatile memory position parameters are all configurable through the host command language. The host may also override the digital input controls to force host mode control and initiate all positioning through the host command language.

DSMPro with Positioning Drives

DSMPro version 1.4 or higher is required for use with the positioning drives. Drive parameter files created with non-positioning drives cannot be used with positioning drives and vice versa.

Touch Pad with Positioning Drives

All positioning parameters may be configured through the use of the five-key, eight character TouchPad. A 'Start Index' and a 'Start Homing' capability is also available on the TouchPad.

Additional Drive Features

These features have also been added to the DSM drives.

- Flash EPROM in MicroDSM Drives - provides the ability to field download new firmware revisions in MicroDSM drives as previously provided in the standard DSM drives.
- Reduction in Voltage Required in MicroDSM Drives - The positioning drives require an input voltage of 11 to 28V to operate the digital I/O.
- Analog Position Operation Mode - An analog position mode allows position control of the motor based on an analog ±10V input. This operation mode will be useful in high performance valve applications that require the use of an accurate servo control.

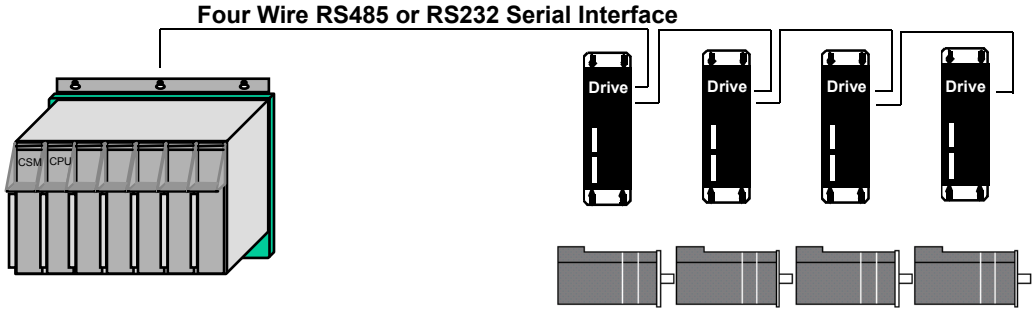
Part Numbers for Positioning Drives

Drive	Part Number
DSM007P	M.1016.1627 (old # 401-56451-50)
DSM015P	M.1016.1629 (old # 401-56452-50)
DSM030P	M.1016.1631 (old # 401-56453-50)
DSM110P	M.1015.7919 (old # 401-34400-50)
DSM120P	M.1015.7921 (old # 401-34401-50)
DSM130P	M.1015.7923 (old # 401-34402-50
DSM175P	M.1015.7925 (old # 401-34403-50)
DSM1150P	M.1015-7927 (old # 401-34404-50)

Host Mode

The DSM100's Host Command protocol provides optional drive configuration using the drive's Serial Communications Interface. This powerful feature allows your controller to access all of the drive's digital controls using sequences of ASCII characters. The protocol includes error checking to ensure the integrity of the transmitted commands.

In installations which have multiple axes, up to 32 DSM100 Drives can be addressed by a host computer. These drives communicate with the host computer using a four wire RS-485 or two wire RS-232 interface. The Host Command protocol includes specific drive addressing which allows the host to communicate with all the connected drives concurrently.



PC Configuration

The minimum PC configuration required for DSMPro software is:

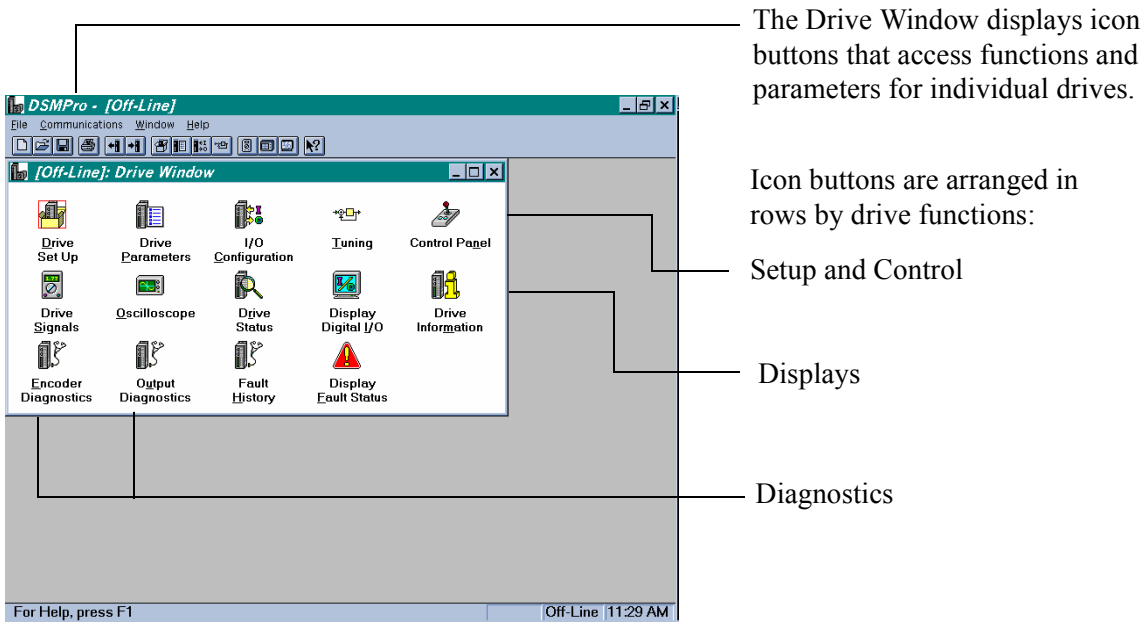
- 386 based IBM compatible PC with hard disk with 2 MB of available hard disk space to load DSMPro
- 4 MB of memory minimum
- Microsoft® Windows™ version 3.1 or higher
- 3.5", 1.44 MB floppy disk drive
- RS -232 serial port
- VGA monitor

DSMPro

DSMPro is a convenient point-and-click software interface for customizing the features in the Centurion DSM100 drives to best fit your application. Suitable for any PC with Windows, it is used to configure, monitor, and troubleshoot a servo system. The on-line help and quick start-up windows will simplify your setup while tools such as the on-screen digital oscilloscope provide simplified tuning and diagnosis. It also provides a full array of on-screen meters and other software tools for rapid debugging and measurement. DSMPro keeps error messages in its own non-volatile message buffer to save time in tracking down a problem. And in systems with multiple drives, DSMPro can simultaneously display status and configuration screens for all drives that are on an RS485 or RS232 link. DSMPro can also be used off-line to configure a drive and save the set-up to disk for later downloading to a drive.

DSMPro Drive Window

The Drive Window becomes active after communications with a drive are established or DSMPro enters the off-line mode.

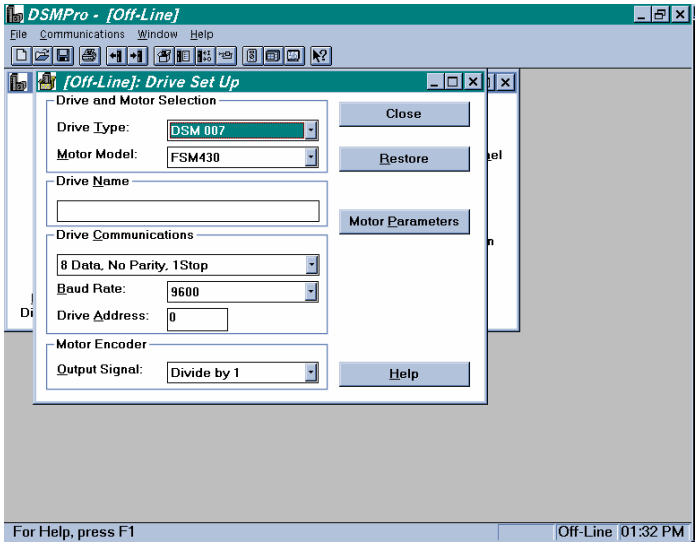


The Drive Window is the main window for performing functions in DSMPro. It is a functionally easy method to visually setup, run, evaluate and diagnose one or more servo systems. The commands available in DSMPro are described on the following pages.

DSMPro Sample Screens

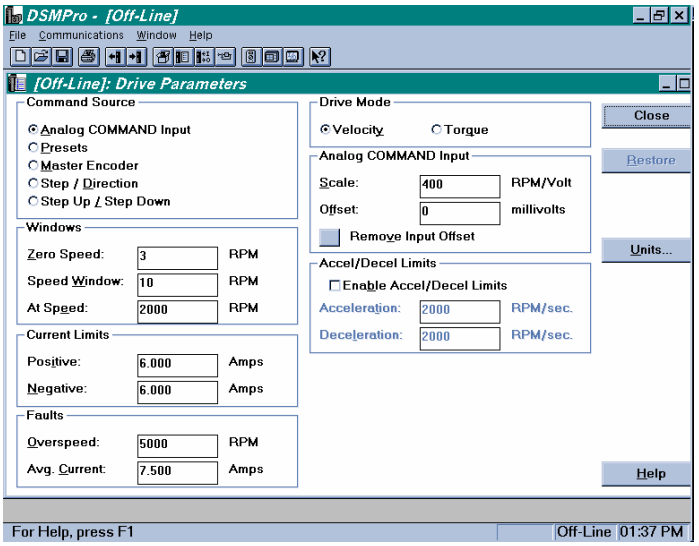
DSMPro has a complete set of easy to understand windows available from its pull down menus. Examples of DSMPro screens are shown below. (The examples shown are using a Centurion DSM100 drive.)

Drive Setup



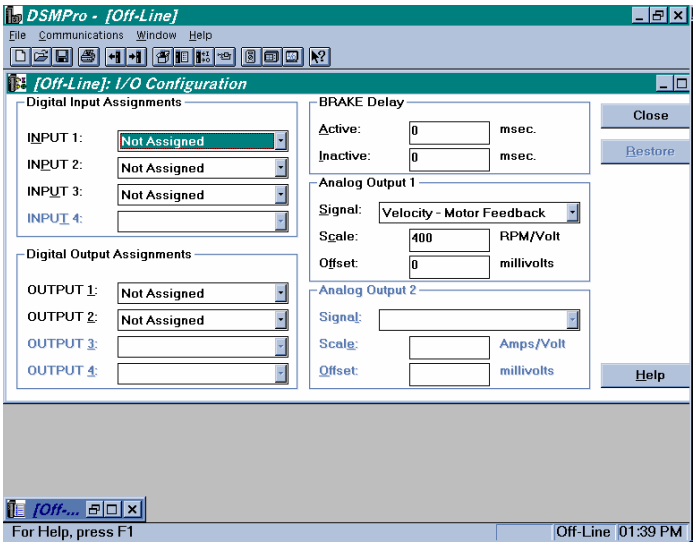
This Drive Set Up dialog box is automatically displayed when DSM-Pro is connected to an uninitialized drive. Usually, the only parameter requiring selection is the motor model number for operation with the drive.

Drive Parameters



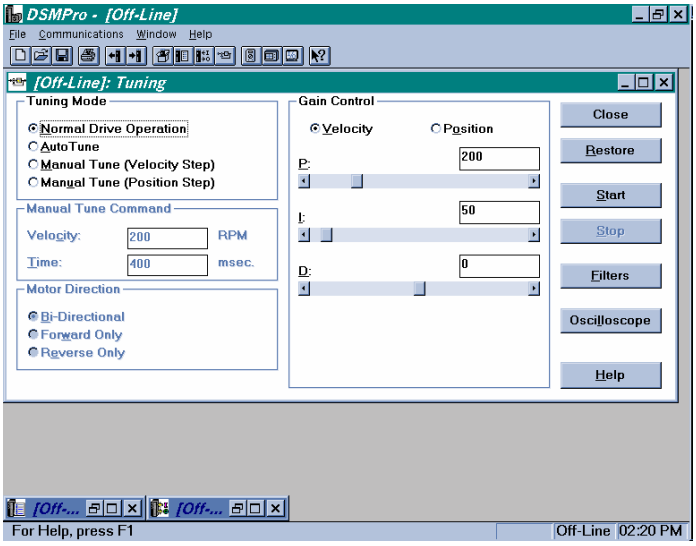
The Drive Parameters window accesses common operating parameters for the drive including the command source, current limits, and fault thresholds. This window, along with the I/O Configuration window, defines the necessary drive parameters for an application.

I/O Configuration



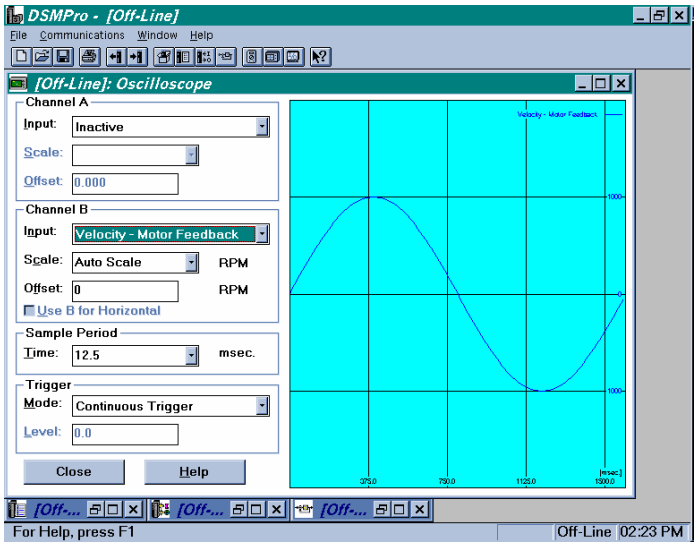
The I/O Configuration window assigns functions to digital inputs, digital outputs, and analog outputs. The active and inactive brake delays are also set on this screen.

Tuning



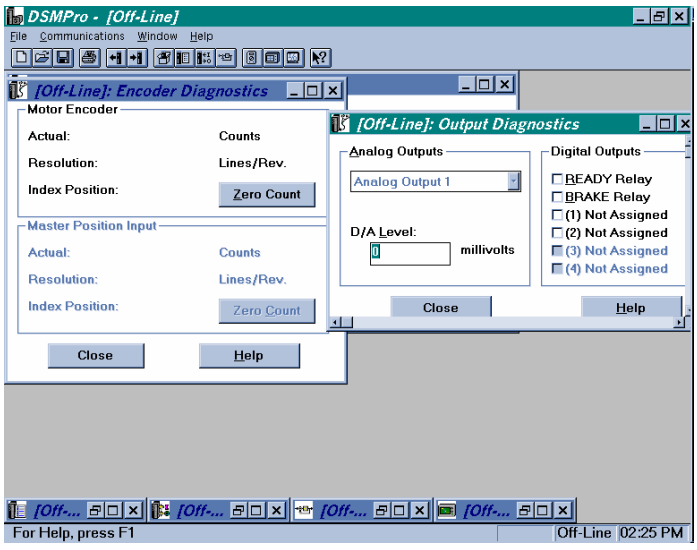
For quick set-ups, DSMPro has one button auto-tuning. For critical tuning requirements, a built-in function generator allows manual adjustment for optimization of the velocity and position loop gains.

Oscilloscope



The digital oscilloscope provides on-line monitoring of any drive parameter. Its functions include positive and negative triggering, continuous tracing, A vs. B display and independent channel scaling and offset.

Diagnostics

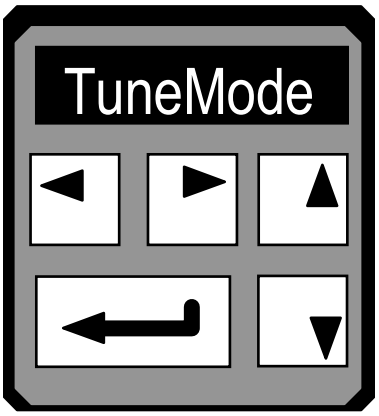


The Diagnostics screens provide fast verification of various I/O conditions and allow you to check functions and machine wiring by exercising the digital outputs.

A fault history provides complete information on past conditions and a fault check screen provides instant status on any error conditions.

Part Number
M.1017.0586 (old # 502-60036-00)
Included on PiCPro for Windows Applications CD

TouchPad



The TouchPad is a convenient alternative to using DSMPro for drive set-up and monitoring. The small TouchPad module plugs directly into the front of the drive where its eight character dot matrix display and five keys provide access to almost all the same functions available in DSMPro.

The TouchPad is an excellent diagnostic and monitoring tool for use on the factory floor. One TouchPad can support several drives because it is independent of the drive and can be quickly attached and removed.

TouchPad Commands

Commands are entered by pressing a single key or combination of keys. Two modes of operation are available. Display mode allows you to move through the TouchPad Command tree to each parameter. Modify mode allows you to monitor and change each parameter. Most parameters can be modified or viewed while the drive is either running or disabled.

Part Number
M.1015.7928 (old # 401-34405-00)

DSM100 Specifications (Standard Drives)

Characteristic	Specifications					
Part Number						
DSM110	M.1015.7918 (old # 401-34400-00)					
DSM120	M.1015.7920 (old # 401-34401-00)					
DSM130	M.1015.7922 (old # 401-34402-00)					
DSM175	M.1015.7924 (old # 401-34403-00)					
DSM1150	M.1015.7926 (old # 401-34404-00)					
General	DSM110	DSM120	DSM130	DSM175 (1ϕ input)	DSM175 (3ϕ input)	DSM1150 (3ϕ input)
Peak Output Current (Amps)	10	20	30	50	75	150
Continuous Output Current (Amps)	5	10	15	15	35	65
Continuous Output Power (kW)	1.0	2.0	3.0	3.0	7.5	15.0
Continuous Shunt Power	50 W	50 W	50 W	50 W	50 W	180W
Peak Shunt Power	4.5 kW	4.5 kW	4.5 kW	10.0 kW	10.0 kW	19.0 kW
Continuous Shunt Power External (max.)	2.4 kW	2.4 kW	2.4 kW	4.0 kW	4.0 kW	8.0 kW
Peak Shunt Power External (max.)	6.0 kW	6.0 kW	6.0 kW	10.0 kW	10.0 kW	19.0 kW
Input						
Continuous Input Current (Amps)	10	19	28	28	28	46
Input Voltage	100 to 240V AC RMS nominal					
Input Frequency	47-63 Hz					
Command Sources						
Analog Velocity Input	+/- 10 Volt					
Presets	8 presets, binary selection by digital inputs					
Step and direction, Step Up/Step Down	1 MHz maximum frequency Differential or single ended line drivers					
Master Encoder Following	1 MHz maximum line frequency Differential or single ended line drivers					
Digital Serial Commands	Via serial port and DSM host language					

Serial Communication Port	
Type	RS-232, four-wire RS-485
Baud Rate	1200 to 19,200 baud
Multiple Drive Addressing	Up to 32 drives, 10 using front panel rotary dip switch
Control Loops	
Modes	Torque, velocity and position control
Type	All loops digital
Velocity Loop bandwidth (maximum)	400 Hz
Inputs and Outputs	
Selectable Digital Inputs	4 optically isolated, 24 Volt, active high User-selectable as: Drive Mode Select, Integrator Inhibit, Follower Enable, Forward Enable, Reverse Enable, Preset Select, Analog Override
Selectable Digital Outputs	2 optically isolated, 24 Volt, active high, short circuit protected User-selectable as: In Position, Within Position Window, Zero Speed, Within Speed Window, At Speed, Current Limit, Drive Enable, Bus Charged, various fault indications
Dedicated Digital Inputs	Enable, Fault Reset (Optically isolated, 24 Volt, active high)
Dedicated Relay Outputs	Ready/Not Faulted, Brake Output
Analog Inputs	1 external analog current limit, 0 to 10 Volt
Analog Outputs	1 user programmable, +/- 10 Volt
Encoder Output	1 MHz maximum line frequency Differential Line Drivers Scalable by 1, 1/2, 1/4, 1/8
Motor Feedback	Incremental encoder

Connector					
Serial	9 pin D-Shell				
Control and Feedback	20 and 50 pin high density Mini D				
Power	Screw terminal block				
Environmental					
Storage Temperature	-40°C to 70°C				
Operating Temperature	-5°C to 55°C				
Humidity	5% to 90%, non-condensing				
Altitude	1500 m/5000ft				
Vibration	10 to 2000 Hz at 2 g				
Shock	15 g 11 msec half sine				
Weight	DSM110	DSM120	DSM130	DSM175	DSM1150
	13.78 lbs (5.80 kg)	14.02 lbs (6.36 kg)	14.28 lbs (6.48 kg)	21.32 lbs (9.67 kg)	30.9 lbs (14.06 kg)

Micro DSM Specifications

Characteristic	Specifications		
Part Number			
DSM007	M.1016.1626 (old # 401-56451-00)		
DSM015	M.1016.1628 (old # 401-56452-00)		
DSM030	M.1016.1630 (old # 401-56453-00)		
General	DSM007	DSM015	DSM030
Peak Output Current (Amps)	7.5	15	30
Continuous Output Current (Amps)	2.5	5	10
Continuous Output Power (kW)	0.5	1.0	2.0
Continuous Shunt Power External (with external shunt kit)[1]	300 W	300 W	300 W
Peak Shunt Power External (with external shunt kit) [1]	2.2 kW	2.2 kW	2.2 kW
Input			
Continuous Input Current (Amps)	5	9	18
Input Voltage	100 to 240V AC RMS nominal		
Input Frequency	47-63 Hz		
Command Sources			
Analog Velocity Input	+/- 10 Volt		
Presets	8 presets, binary selection by digital inputs		
Step and direction, Step Up/Step Down	1 MHz maximum frequency Differential or single ended line drivers		
Master Encoder Following	1 MHz maximum line frequency Differential or single ended line drivers		
Digital Serial Commands	Via serial port and DSM Drive host language		

Serial Communication Port	
Type	RS-232, four-wire RS-485
Baud Rate	1200 to 19,200 baud
Multiple Drive Addressing	Up to 32 drives
Control Loops	
Modes	Torque, velocity and position control
Type	All loops digital
Velocity Loop bandwidth (maximum)	300 Hz
Inputs and Outputs	
Selectable Digital Inputs	3 optically isolated, 24 Volt, active high User-selectable as: Drive Mode Select, Integrator Inhibit, Follower Enable, Forward Enable, Reverse Enable, Preset Select, Analog Override
Selectable Digital Outputs	2 optically isolated, 24 Volt, active high, short circuit protected User-selectable as: In Position, Within Position Window, Zero Speed, Within Speed Window, At Speed, Current Limit, Drive Enable, Bus Charged, various fault indications
Dedicated Digital Inputs	Enable, Fault Reset (Optically isolated, 24 Volt, active high)
Dedicated Relay Outputs	Ready/Not Faulted, Brake Output
Analog Inputs	1 external analog current limit, 0 to 10 Volt
Analog Outputs	1 user programmable, +/- 10 Volt
Encoder Output	1 MHz maximum line frequency Differential Line Drivers Scalable by 1, 1/2, 1/4, 1/8
Motor Feedback	Incremental encoder

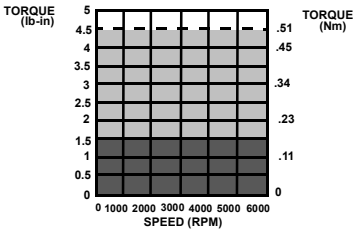
Connectors			
Serial	9 pin D-Shell		
Control and Feedback	20 and 50 pin high density Mini D		
Power	Screw terminal block		
Environmental			
Storage Temperature	-40°C to 70°C		
Operating Temperature	-5°C to 55°C		
Humidity	5% to 90%, non-condensing		
Altitude	1500 m/5000 ft.		
Vibration	10 to 2000 Hz at 2g		
Shock	15 g 11 msec half sine		
Weight	DSM007	DSM015	DSM030
	3.7 lbs (1.68 kg)	4.47 lbs (2.03 kg)	4.41 lbs (2.0 kg)

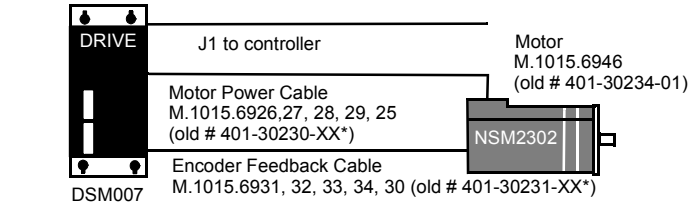
[1]Applications having a combination of fast deceleration rates and an inertia mismatch of greater than 10:1 should consider the external shunt kit. Consult factory with detailed application information.

DSM100 With NSM Series Motors

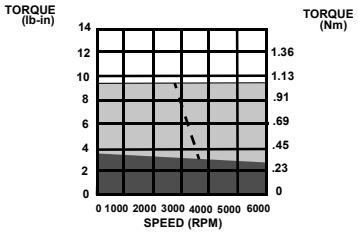
Choose a system with an NSM Series motor when the application requires low cost and medium inertia. Cable part numbers shown are for straight cable. Some connectors are also available in right angle

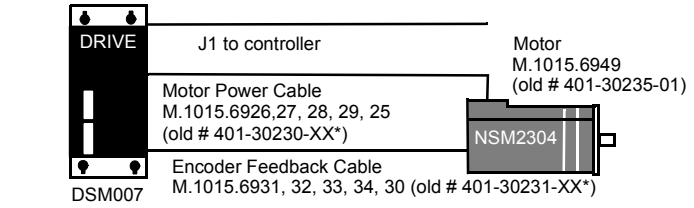
DSM007/NSM2302 @ 115VAC



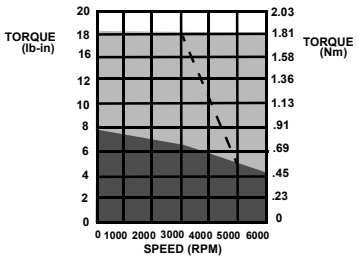


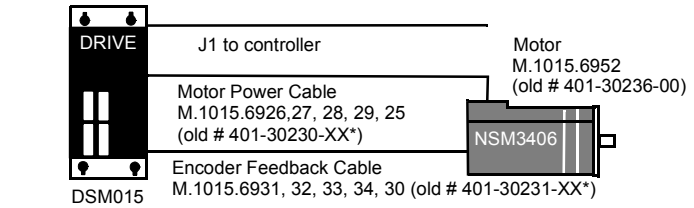
DSM007/NSM2304 @ 115VAC



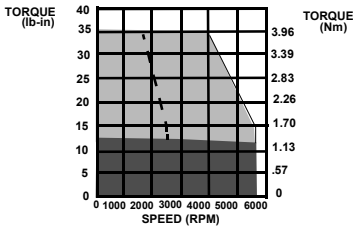


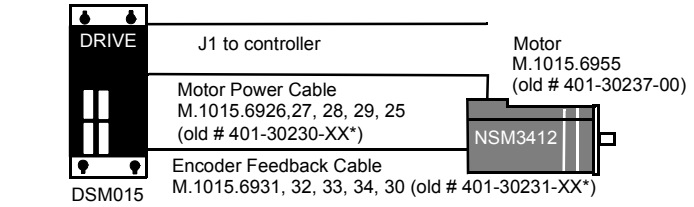
DSM015/NSM3406 @ 230VAC



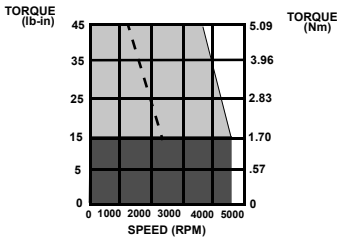


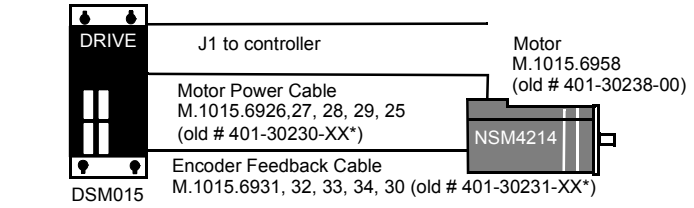
DSM015/NSM3412 @ 230VAC





DSM015/NSM4214 @ 230VAC





Detailed Motor Information Located in Brushless Motor Section

System Speed Torque Characteristics

Drive Module Input Voltage = 230 VAC RMS

= Intermittent Operating Region

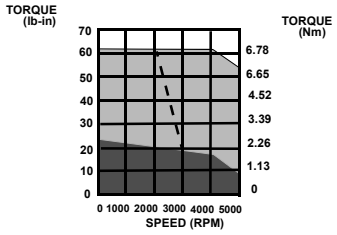
= Continuous Operating Region

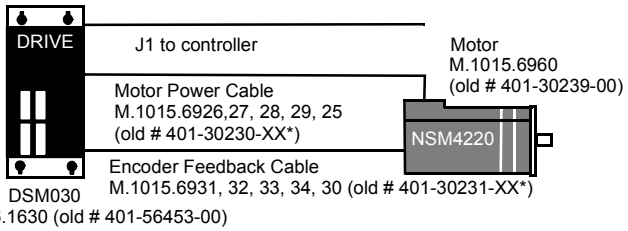
*Last two digits select standard cable lengths of: 10 ft. (3.0m) - 10, 25 ft. (7.7m) - 25, 50 ft. (15.0m) - 50, 75 ft. (23.0m) - 75, 100 ft. (31m) - 00

- - - - = Drive Operation with 115 VAC RMC Input Voltage

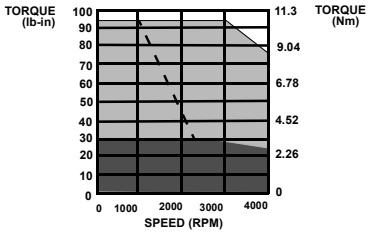
NOTE: Serial interface cables cannot exceed 50 ft.

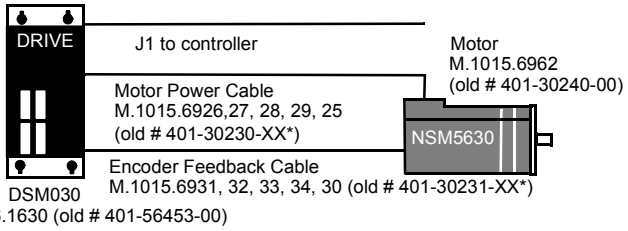
DSM030/NSM4220 @ 230VAC



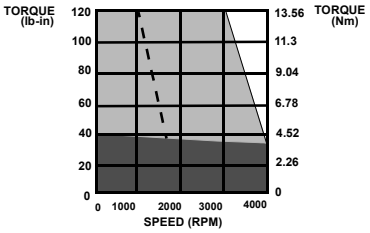


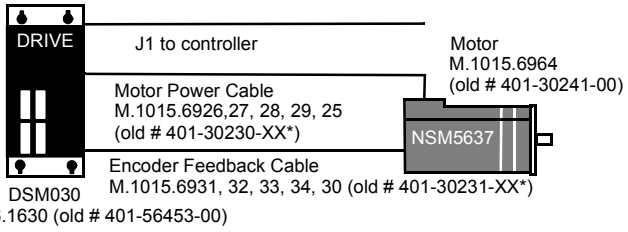
DSM030/NSM5630 @ 230VAC



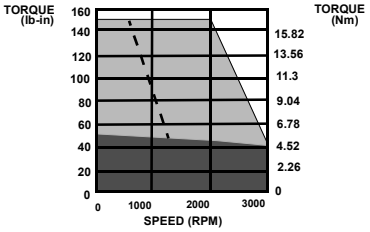


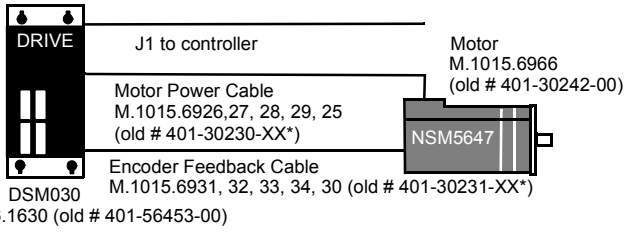
DSM030/NSM5637 @ 230VAC





DSM030/NSM5647 @ 230VAC





Detailed Motor Information Located in Brushless Motor Section

System Speed Torque Characteristics

Drive Module Input Voltage = 230 VAC RMS

= Intermittent Operating Region

= Continuous Operating Region

- - - - = Drive Operation with 115 VAC RMC Input Voltage

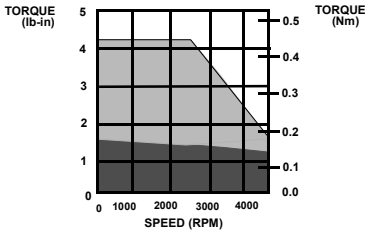
*Last two digits select standard cable lengths of: 10 ft. (3.0m) - 010, 25 ft. (7.7m) - 025, 50 ft. (15.0m) - 050, 75 ft. (23.0m) - 075, 100 ft. (31m) - 00

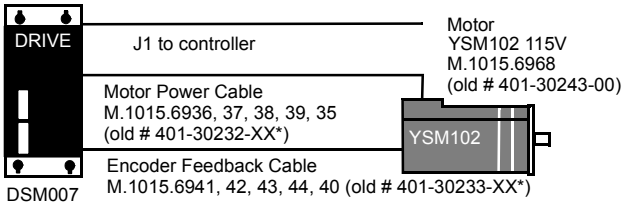
NOTE: Serial interface cables cannot exceed 50 ft.

DSM100 With YSM Series Motors

Choose a system with a YSM Series motor when the application requires small size, low inertia and high acceleration. Cable part numbers shown are for straight cable. Right angle cable is also available

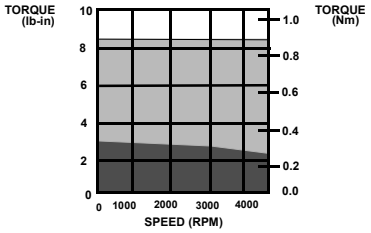
DSM007/YSM102 @ 115VAC

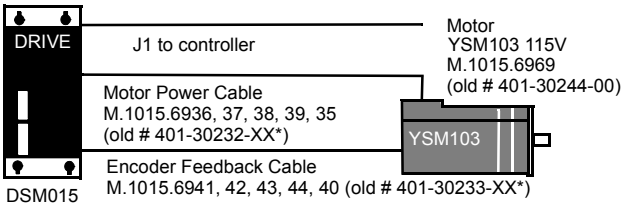




DSM007
M.1016.1626 (old # 401-56451-00)

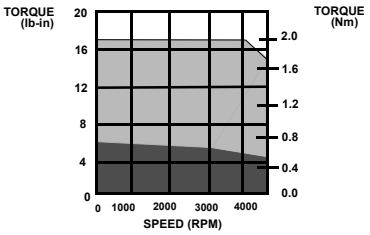
DSM015/YSM103 @ 115VAC

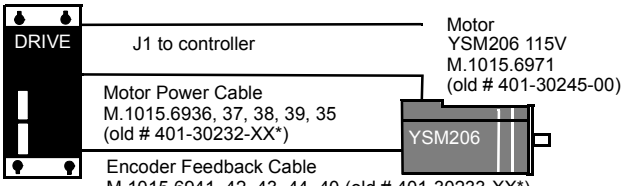




DSM015
M.1016.1628 (old # 401-56452-00)

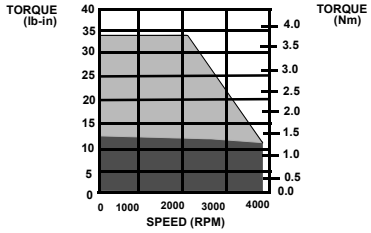
DSM030/YSM206 @ 115VAC

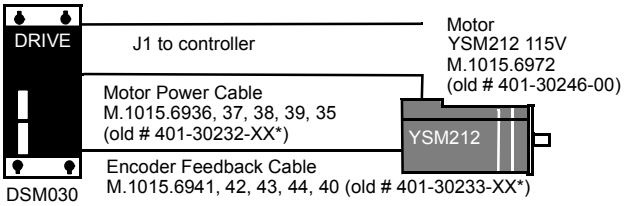




DSM030
M.1016.1630 (old # 401-56453-00)

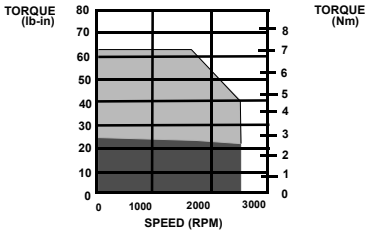
DSM030/YSM212 @ 115VAC

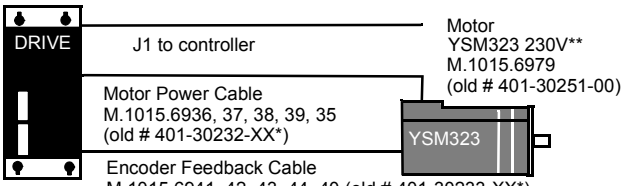




DSM030
M.1016.1630 (old # 401-56453-00)

DSM030/YSM323 @ 115VAC**





DSM030
M.1016.1630 (old # 401-56453-00)

**YSM 230V motor used for this 115V applicaiton.

Detailed Motor Information Located in Brushless Motor Section

System Speed Torque Characteristics

Drive Module Input Voltage = 230 VAC RMS

= Intermittent Operating Region

= Continuous Operating Region

= Drive Operation with 115 VAC RMC Input Voltage

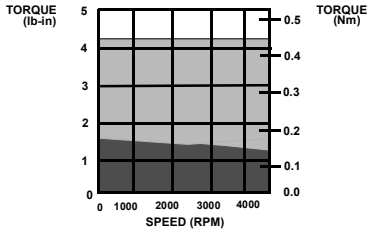
*Last two digits select standard cable lengths of: 10 ft. (3.0m) - 010
25 ft. (7.7m) - 025, 50 ft. (15.0m) - 050, 75 ft. (23.0m) - 075, 100 ft. (31m) - 00

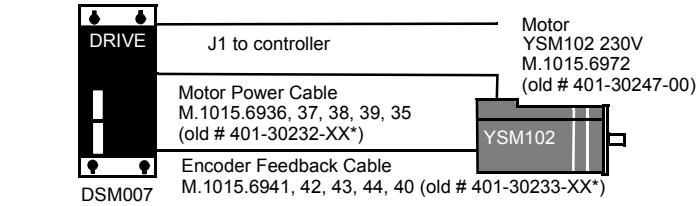
NOTE: Serial interface cables cannot exceed 50 ft.

Centurion DSM100 With 230V YSM Series Motors

Choose a system with a YSM Series motor when the application requires small size, low inertia and high acceleration.

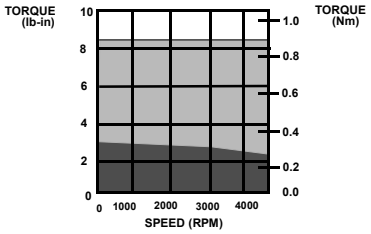
DSM007/YSM102 @ 230VAC

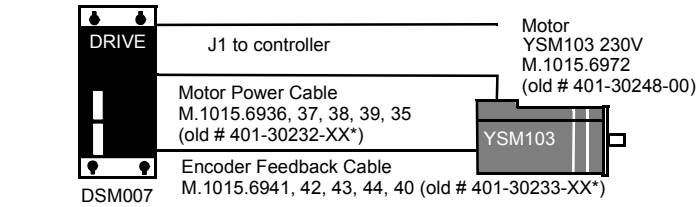




DSM007
M.1016.1626 (old # 401-56451-00)

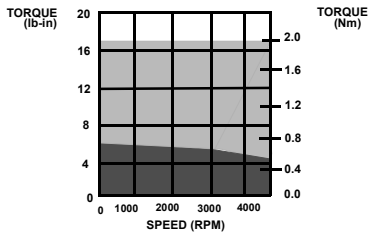
DSM007/YSM103 @ 230VAC

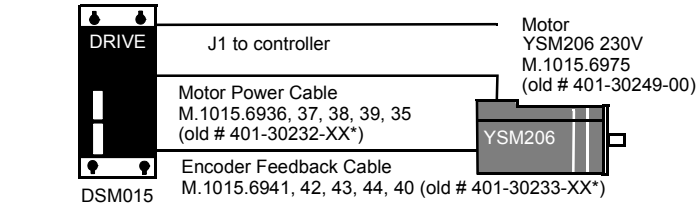




DSM007
M.1016.1626 (old # 401-56451-00)

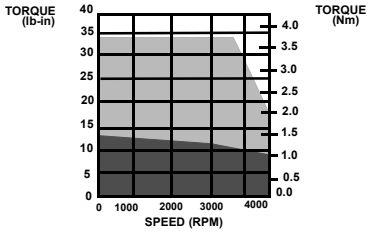
DSM015/YSM206 @ 230VAC

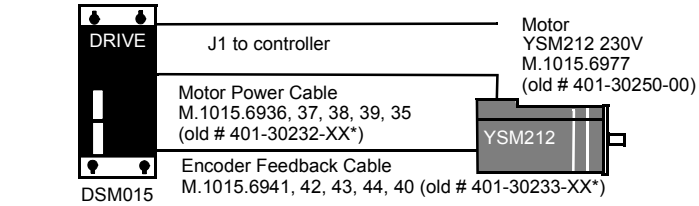




DSM015
M.1016.1628 (old # 401-56452-00)

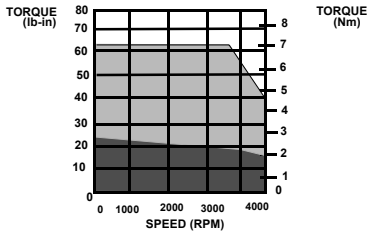
DSM015/YSM212 @ 230VAC

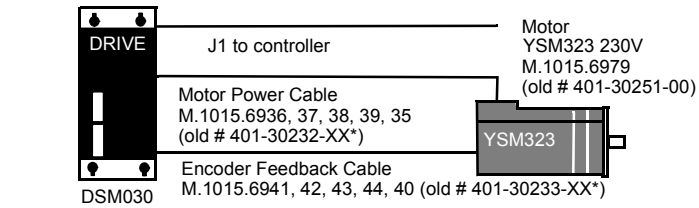




DSM015
M.1016.1628 (old # 401-56452-00)

DSM030/YSM323 @ 230VAC





DSM030
M.1016.1630 (old # 401-56453-00)

Detailed Motor Information Located in Brushless Motor Section

System Speed Torque Characteristics

Drive Module Input Voltage = 230 VAC RMS

= Intermittent Operating Region

= Continuous Operating Region

= Drive Operation with 115 VAC RMC Input Voltage

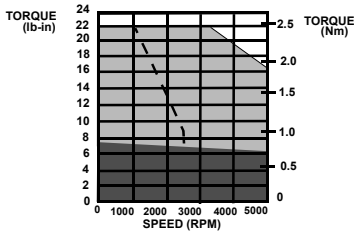
*Last two digits select standard cable lengths of: 10 ft. (3.0m) - 010, 25 ft. (7.7m) - 025, 50 ft. (15.0m) - 050, 75 ft. (23.0m) - 075, 100 ft. (31m) - 00

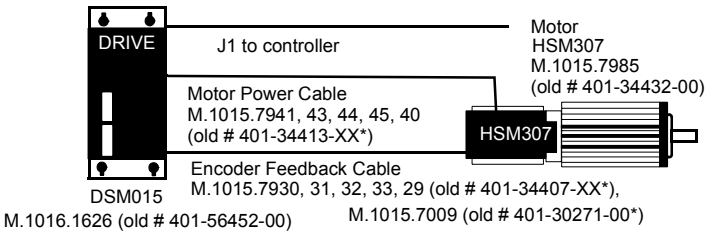
NOTE: Serial interface cables cannot exceed 50 ft.

DSM100 With HSM Series Motors

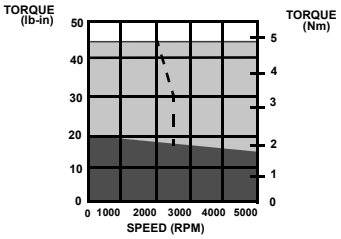
Choose a system with an HSM Series motor when the application requires low inertia, high acceleration and peak torque. Cable part numbers shown are for straight cable. Some connectors are also available in right angle.

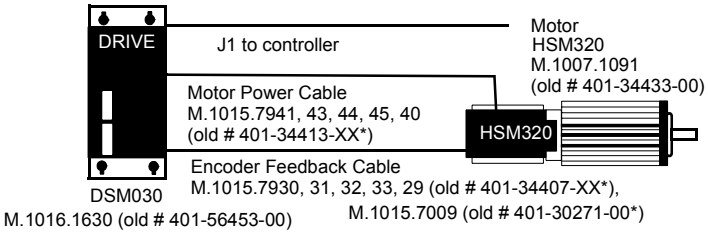
DSM015/HSM307 @ 230VAC



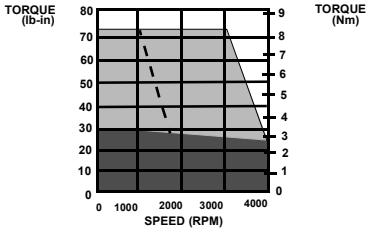


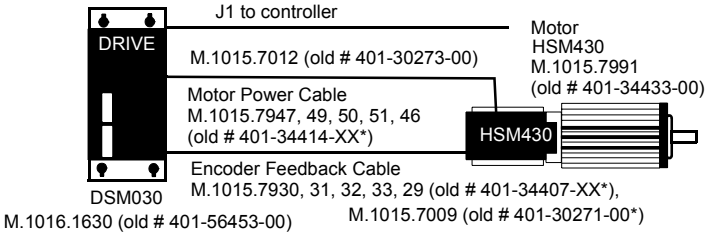
DSM030/HSM320 @ 230VAC



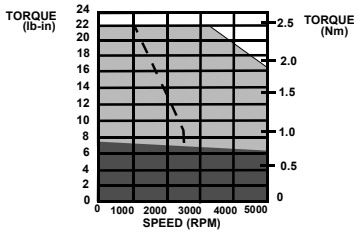


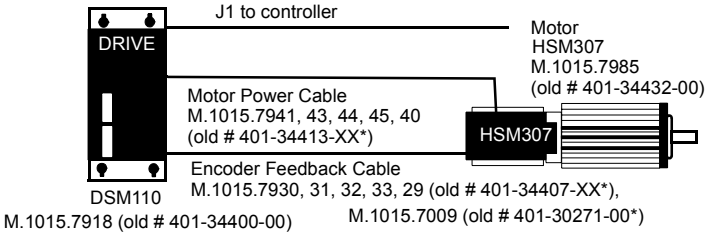
DSM030/HSM430 @ 230VAC



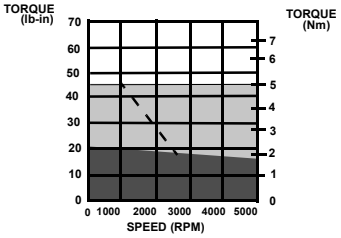


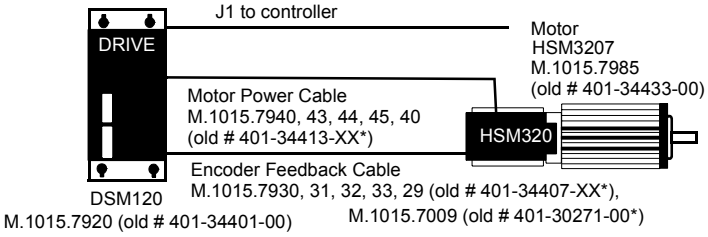
DSM110/HSM307 @ 230VAC





DSM120/HSM320 @ 230VAC





Detailed Motor Information Located in Brushless Motor Section

System Speed Torque Characteristics

Drive Module Input Voltage = 230 VAC RMS

= Intermittent Operating Region

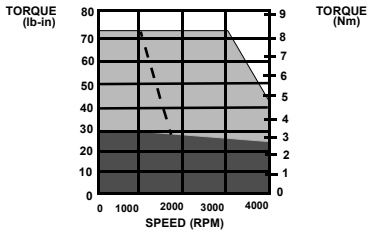
= Continuous Operating Region

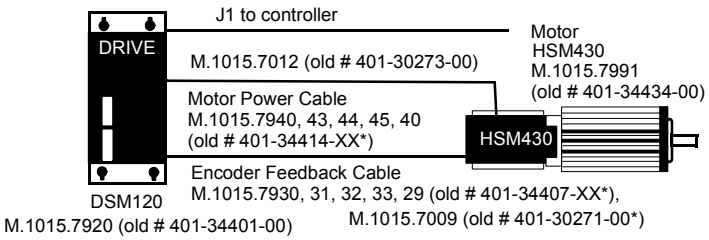
*Last two digits select standard cable lengths of: 10 ft. (3.0m) - 10, 25 ft. (7.7m) - 25, 50 ft. (15.0m) - 50, 75 ft. (23.0m) - 75, 100 ft. (31m) - 00, 150 ft. (45m) 7X-00

= Drive Operation with 115 VAC RMC Input Voltage

NOTE: Serial interface cables cannot exceed 50 ft.

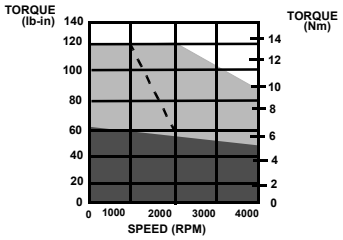
DSM120/HSM430 @ 230VAC

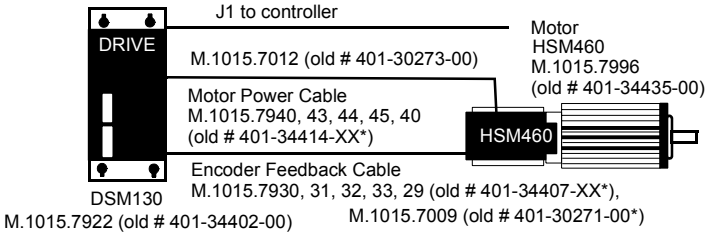




DSM120
M.1015.7920 (old # 401-34401-00)

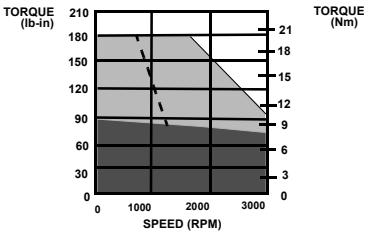
DSM130/HSM460 @ 230VAC

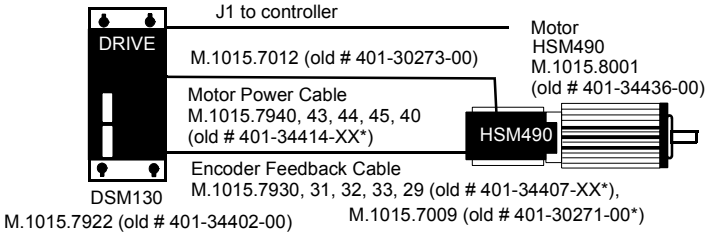




DSM130
M.1015.7922 (old # 401-34402-00)

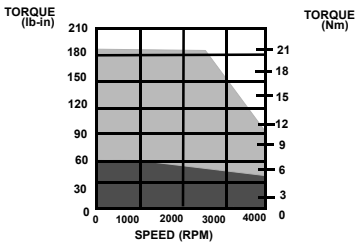
DSM130/HSM490 @ 230VAC

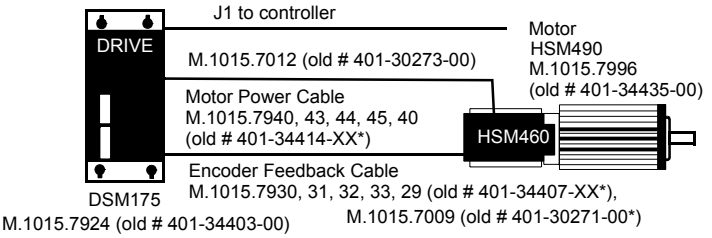




DSM130
M.1015.7922 (old # 401-34402-00)

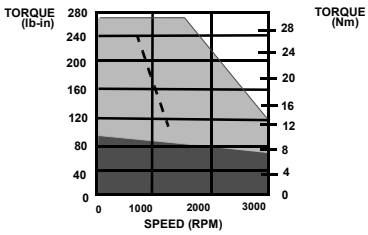
DSM175/HSM460 @ 230VAC

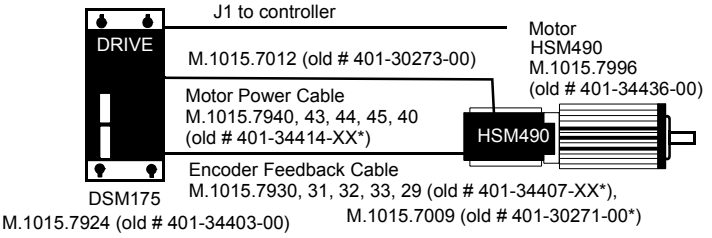




DSM175
M.1015.7924 (old # 401-34403-00)

DSM175/HSM490 @ 230VAC





DSM175
M.1015.7924 (old # 401-34403-00)

Detailed Motor Information Located in Brushless Motor Section

System Speed Torque Characteristics

= Intermittent Operating Region

*Last two digits select standard cable lengths of: 10 ft. (3.0m) - 10, 25 ft. (7.7m) - 25, 50 ft. (15.0m) - 50, 75 ft. (23.0m) - 75, 100 ft. (31m) - 00, 150 ft. (45m) 7X-00

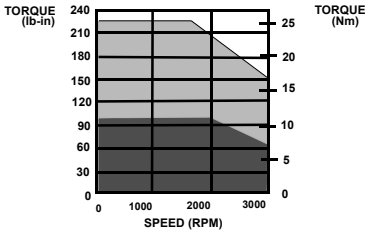
Drive Module Input Voltage = 230 VAC RMS

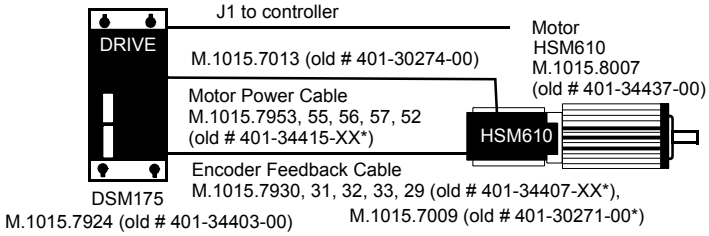
= Continuous Operating Region

= Drive Operation with 115 VAC RMC Input Voltage

NOTE: Serial interface cables cannot exceed 50 ft.

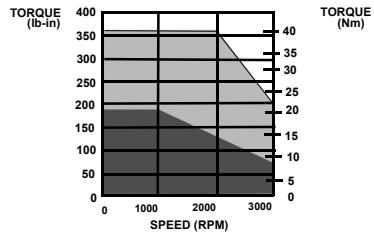
DSM175/HSM610 @ 230VAC

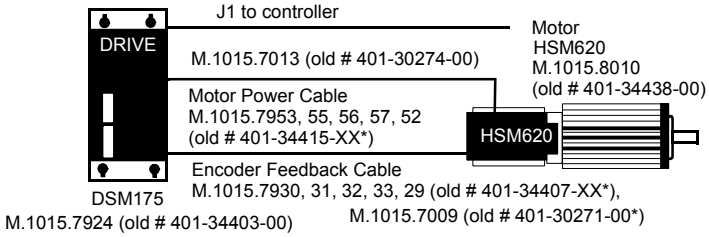




DSM175
M.1015.7924 (old # 401-34403-00)

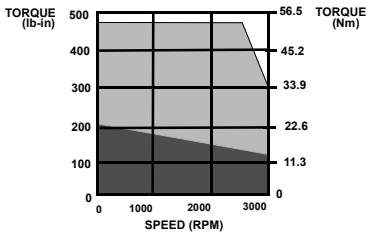
DSM175/HSM620 @ 230VAC

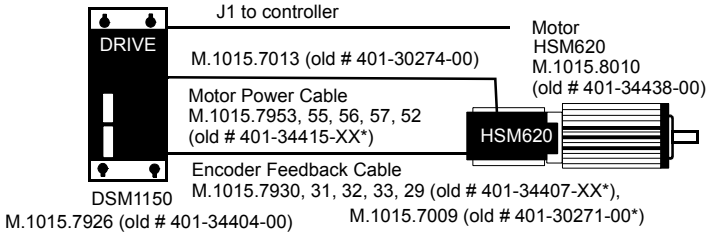




DSM175
M.1015.7924 (old # 401-34403-00)

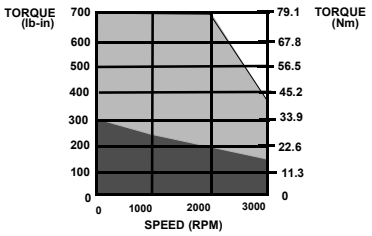
DSM1150/HSM620 @ 230VAC

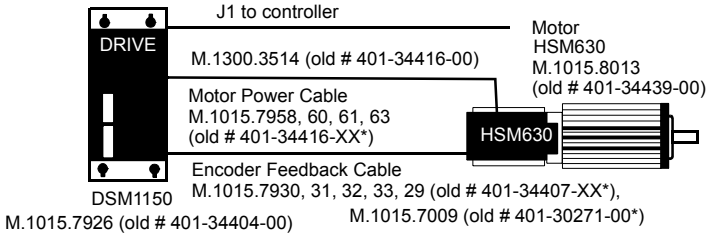




DSM1150
M.1015.7926 (old # 401-34404-00)

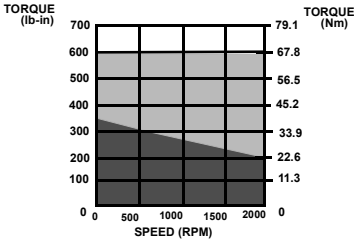
DSM1150/HSM630 @ 230VAC

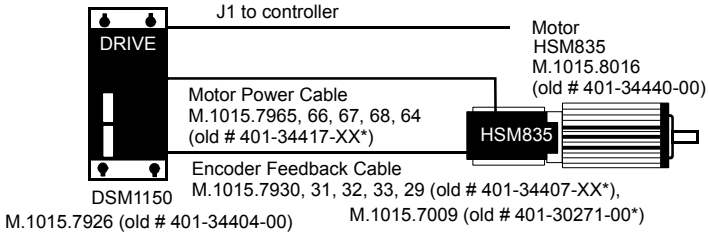




DSM1150
M.1015.7926 (old # 401-34404-00)

DSM1150/HSM835 @ 230VAC





DSM1150
M.1015.7926 (old # 401-34404-00)

Detailed Motor Information Located in Brushless Motor Section

System Speed Torque Characteristics

= Intermittent Operating Region

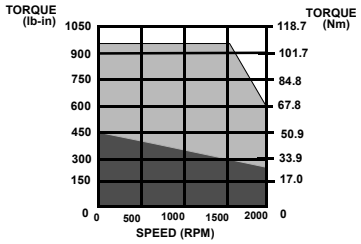
*Last two digits select standard cable lengths of: 10 ft. (3.0m) - 10, 25 ft. (7.7m) - 25, 50 ft. (15.0m) - 50, 75 ft. (23.0m) - 75, 100 ft. (31m) - 00, 150 ft. (45m) 7X-00

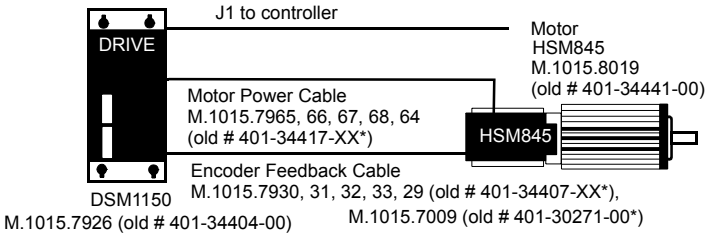
Drive Module Input Voltage = 230 VAC RMS = Continuous Operating Region

= Drive Operation with 115 VAC RMC Input Voltage

NOTE: Serial interface cables cannot exceed 50 ft.

DSM1150/HSM845 @ 230VAC





Detailed Motor Information Located in Brushless Motor Section

System Speed Torque Characteristics = Intermittent Operating Region

Drive Module Input Voltage = 230 VAC RMS = Continuous Operating Region

= Drive Operation with 115 VAC RMC Input Voltage

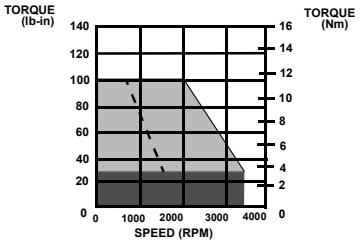
*Last two digits select standard cable lengths of: 10 ft. (3.0m) - 10, 25 ft. (7.7m) - 25, 50 ft. (15.0m) - 50, 75 ft. (23.0m) - 75, 100 ft. (31m) - 00, 150 ft. (45m) 7X-00

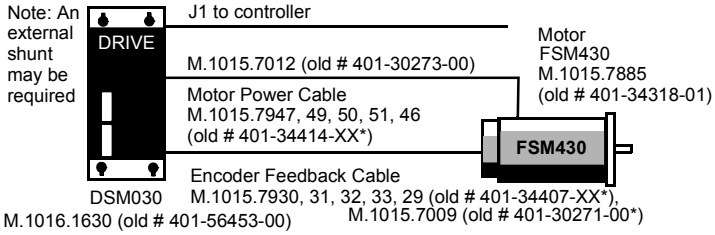
NOTE: Serial interface cables cannot exceed 50 ft.

DSM100 With FSM Series Motors

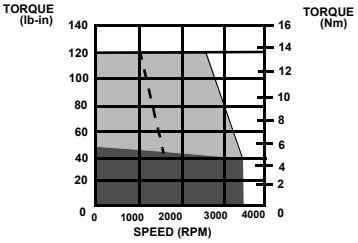
Choose a system with an FSM motor when the application requires medium inertia matching.

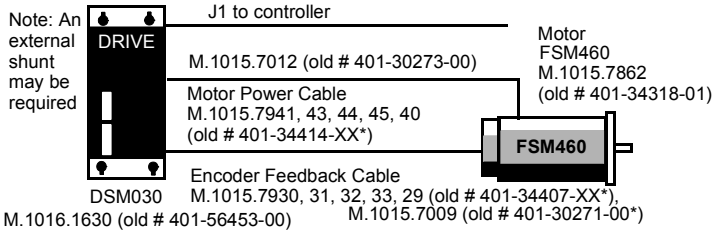
DSM030/FSM430 @ 230 VAC



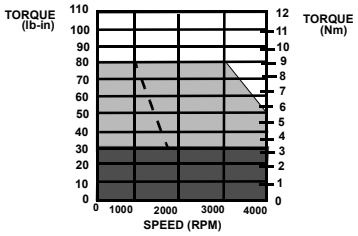


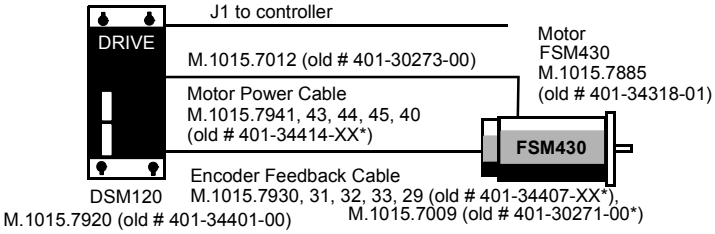
DSM030/FSM460 @ 230 VAC



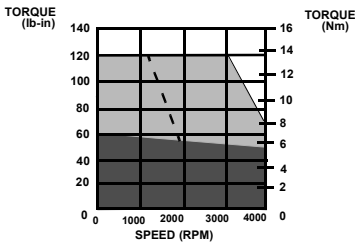


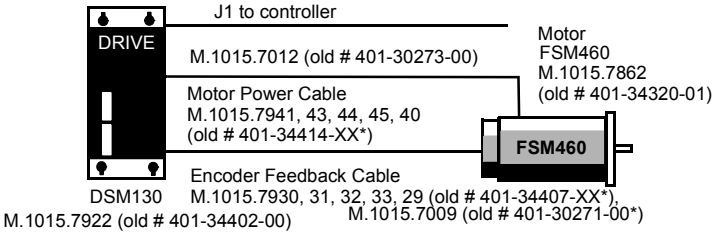
DSM120/FSM430 @ 230 VAC



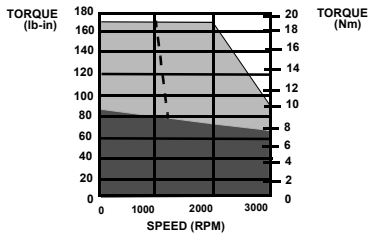


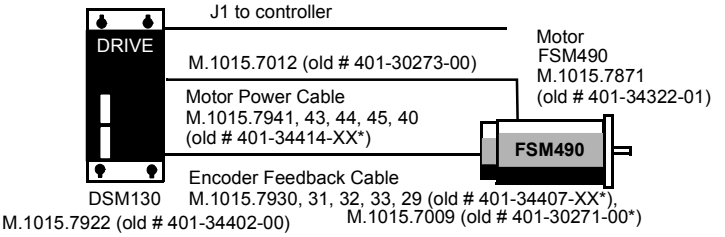
DSM130/FSM460 @ 230 VAC





DSM130/FSM490 @ 230 VAC





Detailed Motor Information Located in Brushless Motor Section

System Speed Torque Characteristics

Drive Module Input Voltage = 230 VAC RMS

= Intermittent Operating Region

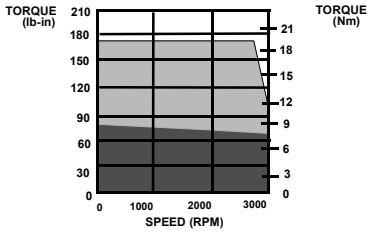
= Continuous Operating Region

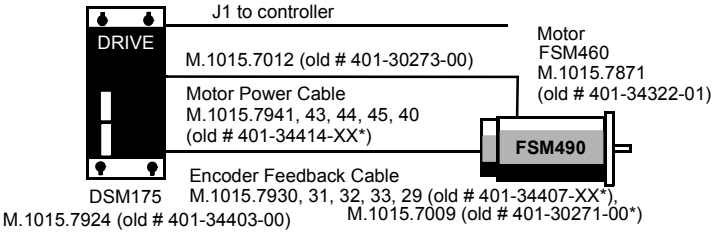
= Drive Operation with 115 VAC RMC Input Voltage

*Last two digits select standard cable lengths of: 10 ft. (3.0m) - 10, 25 ft. (7.7m) - 25, 50 ft. (15.0m) - 50, 75 ft. (23.0m) - 75, 100 ft. (31m) - 00, 150 ft. (45m) 7X-00

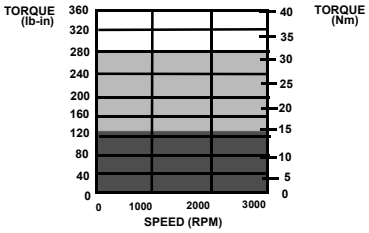
NOTE: Serial interface cables cannot exceed 50 ft.

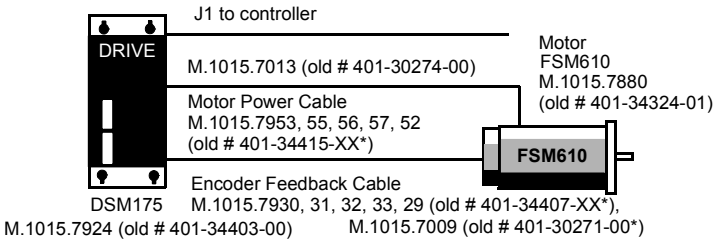
DSM175/FSM490 @ 230 VAC



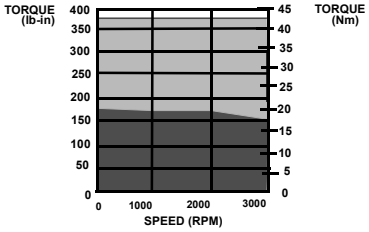


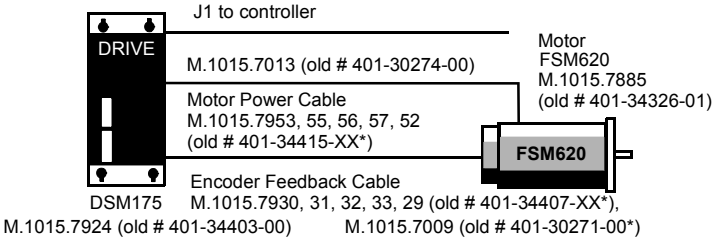
DSM175/FSM610 @ 230 VAC



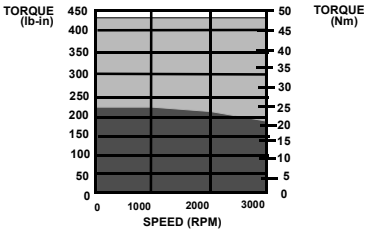


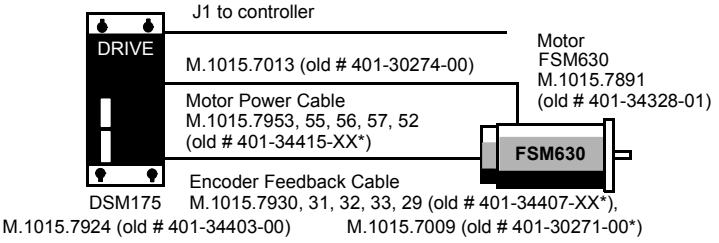
DSM175/FSM620 @ 230 VAC



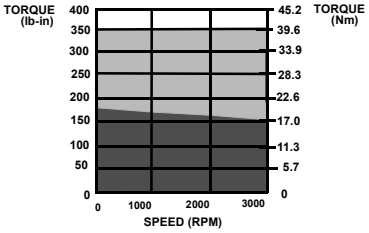


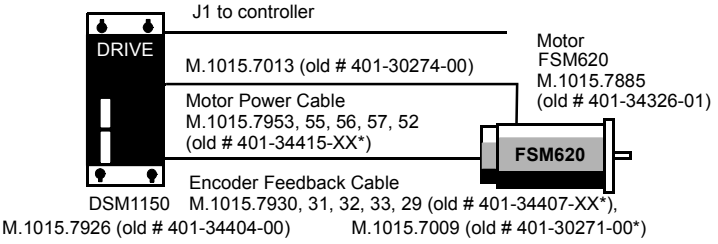
DSM175/FSM630 @ 230 VAC





DSM1150/FSM620 @ 230 VAC





Detailed Motor Information Located in Brushless Motor Section

System Speed Torque Characteristics

Drive Module Input Voltage = 230 VAC RMS

= Intermittent Operating Region

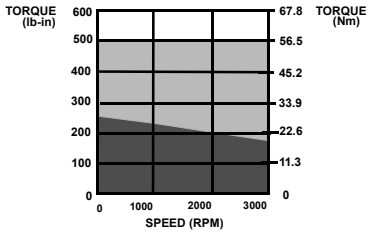
= Continuous Operating Region

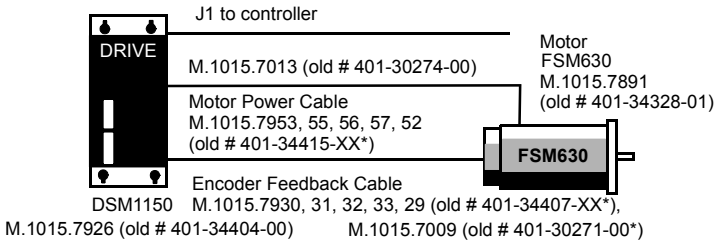
= Drive Operation with 115 VAC RMC Input Voltage

*Last two digits select standard cable lengths of: 10 ft. (3.0m) - 10, 25 ft. (7.7m) - 25, 50 ft. (15.0m) - 50, 75 ft. (23.0m) - 75, 100 ft. (31m) - 00, 150 ft. (45m) 7X-00

NOTE: Serial interface cables cannot exceed 50 ft.

DSM1150/FSM630 @ 230 VAC





Detailed Motor Information Located in Brushless Motor Section

System Speed Torque Characteristics

Drive Module Input Voltage = 230 VAC RMS

= Intermittent Operating Region

= Continuous Operating Region

= Drive Operation with 115 VAC RMC Input Voltage

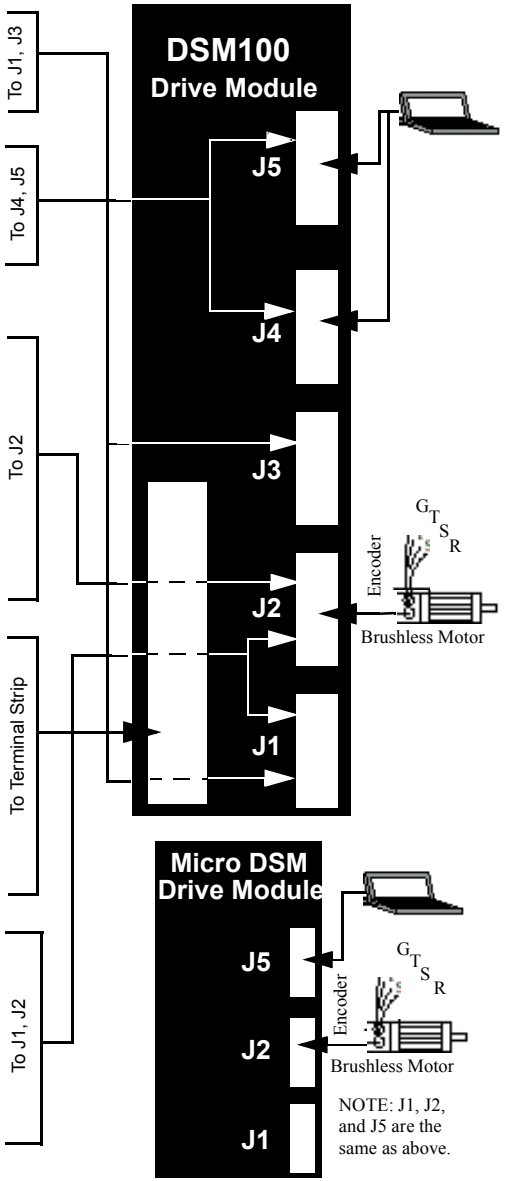
*Last two digits select standard cable lengths of: 10 ft. (3.0m) - 10, 25 ft. (7.7m) - 25, 50 ft. (15.0m) - 50, 75 ft. (23.0m) - 75, 100 ft. (31m) - 00, 150 ft. (45m) 7X-00

NOTE: Serial interface cables cannot exceed 50 ft.

Cables and Accessories

Interface Cables	Part Number(s) Located on Page
J1 to customer supplied connector (pigtail)	39
J3 to cust supp conn (pt)	39
Serial Interface Cables*	
J4 or J5 to PC (RS232 9-pin D connector)	39
J4 or J5 to cust supp conn (pt))	39
J4 or J5 to J4 or J5 (1ft/30cm length) (RS485 multi-drop communications)	39
Encoder Feedback Cables*	
J2 to FSM, HSM Series Motor	40
FSM or HSM to cust supp conn (pt)	40
J2 to YSM Series Motor	40
YSM J3 to cust supp conn (pt))	40
J2 to NSM Series Motor	40
NSM to cust supp conn (pt)	40
J2 to cust supp conn (pt)	40
Motor Power Cables	
Drive to 200/300 HSM Series	41
Drive to 400 FSM, HSM	41
Drive to 600 FSM, HSM	41
Drive to 630 FSM, HSM	41
Drive to 800 HSM, SSM Series	41
Drive to YSM Series	41
Drive to NSM Series	42
Breakout Boards	
J1 to 50 Pin Terminal Strip (includes 3 ft/1m cable and mounting hardware)	42
J2 to 25 Pin Terminal Strip (includes 3 ft/1m cable and mounting hardware)	42

***NOTE:** Serial interface cables and DSM Micro size encoder cables cannot be longer than 50 ft. (15m).



J4/J5 Serial Ports		
1	RCV+	RS485
2	RCV	RS232
3	XMT	RS232
4	XMT+	RS485
5	COM	
6	RSVD	
7	RCV-	RS485
8	XMT-	RS485
9	RSVD	

J3 Auxiliary Port
Same as J1 Pins 1-26

J2 Encoder	
1	Enc Pwr
2	Enc Com
3	Enc Pwr
4	Enc Com
5	Enc Pwr Sense +
6	Enc Pwr Sense -
7	Mot Enc IP Ch A+
8	Mot Enc IP Ch A-
9	Mot Enc IP Ch B+
10	Mot Enc IP Ch B-
11	Mot Enc IP ChI+_
12	Mot Enc IP Ch I-
13	Hall A
14	Hall B
15	Hall C
16	Absolute Position
17	RSVD
18	RSVD
19	Thermal Switch +

J1 Controller			
1	Enc Pwr	26	Isolated +24V DC
2	Enc Com	27	Pos Cur Limit
3	Enc Pwr	28	Analog Com
4	Enc Com	29	Neg Cur Limit
5	Isolated +24V DC	30	Analog OP 1
6	Isolated +24VCom	31	Analog OP 2
7	Mot OP ChA+	32	Select IP 1
8	Mot OP Ch A-	33	Select IP 2
9	Mot OP ChB+	34	Select IP 3
10	Mot OP Ch B-	35	Select IP 4
11	Mot OP Ch I+	36	RSVD
12	Mot OP Ch I-	37	RSVD
13	Isolated 24V Com	38	RSVD
14	Aux Ch A+	39	RSVD
15	Aux Ch A-	40	RSVD
16	Aux Ch B+	41	RSVD
17	Aux Ch B-	42	Select OP 1
18	Aux Ch I+	43	Select OP 2
19	Aux Ch I-	44	Select OP 3
20	Drive Enable	45	Select OP 4
21	Fault Reset	46	RSVD
22	Analog Cmd+	47	RSVD
23	Analog Cmd-	48	RSVD
24	Drive Ready+	49	Brake Enab +
25	Drive Ready-	50	Brake Enab -

DSM Screw Terminal Converters	Part Number on Page
J1 Terminal Converter	42
J2 Terminal Converter	42

DSM 100 Cables and Accessories - Part Numbers

Note: Refer to the Giddings & Lewis Price List for a complete list of part numbers for the various cable lengths including straight and right angle connectors.

Interface Cables		
Description	**Length**	**Part Number**
J1 to customer supplied connector (pigtail)	10’	M.1015.7937 (old # 401-34411-10)
	25’	M.1015.7938 (old 3 401-34411-25)
	50’	M.1300.3513 (old #401-34411-50)
	75’	M.1015.7939 (old # 401-34411-75)
J3 to customer supplied connector (pigtail)	10’	M.1015.7936 (old # 401-34410-10)
	25’	M.1300.3510 (old # 401-34410-25)
	50’	M.1300.3511 (old # 401-34410-50)
	75	M.1300.3512 (old # 401-34410-75)

Serial Interface Cables		
Description	**Length**	**Part Number**
J4 or J5 to PC (RS232 9-pin D connector)	10’	M.1016.9514 (old # 502-04020-10)
	25’	M.1016.9515 (old # 502-04020-25)
	50’	M.1016.9516 (old # 502-04020-50)
J4 or J5 to customer supplied connector (pigtail)	10’	M.1015.7973 (old # 401-34423-10)
	25’	M.1300.3515 (old # 401-34423-25)
	50’	M.1300.3516 (old # 401-34423-50)
J4 or J5 to J4 or J5 (1ft/30cm length) (for RS485 Multi-Drop Communications)	N/A	M.1016.9517 (old # 502-04021-01)

Encoder Feedback Cables		
Description	**Length**	**Part Number**
J2 to FSM or HSM Series Motor	10’	M.1015.7930 (old # 401-34407-10)
	25’	M.1015.7931 (old # 401-34407-250
	50’	M.1015.7932 (old # 401-34407-50)
	75’	M.1015.7933 (old # 401-34407-75)
	100’	M.1015.7929 (old # 401-34407-00)
	150’	M.1015.7009 (old # 401-30271-00)
FSM or HSM to customer supplied connector (pigtail)	10’	M.1015.7980 (old # 401-34425-10)
	25’	M.1015.7981 (old # 401-34425-25)
	50’	M.1015.7982 (old # 401-34425-50)
	75’	M.1015.7983 (old # 401-34425-75)
	100’	M.1015.7979 (old # 401-34425-00)
	150’	M.1015.7011 (old # 401-30272-00)
J2 to YSM Series Motor	10’	M.1015.6941 (old # 401-30233-10)
	25’	M.1015.6942 (old # 401-30233-25)
	50’	M.1015.6943 (old # 401-30233-50)
	75’	M.1015.6944 (old # 401-30233-75)
	100’	M.1015.6940 (old # 401-30233-00)
YSM J3 to customer supplied connector (pigtail)	10’	M.1015.6986 (old # 401-30253-10)
	25’	M.1015.6987 (old # 401-30253-25)
	50’	M.1015.6988 (old # 401-30253-50)
	75’	M.1015.6989 (old # 401-30253-75)
	100’	M.1300.3508 (old # 401-30253-00)
J2 to NSM Series Motor (straight)	10’	M1015.6931 (old # 401-30231-10)
	25’	M1015.6932 (old # 401-30231-25)
	50’	M.1015.6933 (old # 401-30231-50)
	75’	M.1015.6934 (old # 401-30231-75)
	100’	M.1015.6930 (old # 401-30231-00)
NSM Series Motor to customer supplied connector (pigtail)	10’	M.1015.6931 (old # 401-30252-10)
	25’	M1015.6983 (old # 401-30252-25)
	50’	M.1015.6984 (old # 401-30252-50)
	75’	M.1015.6985 (old # 401-30252-75)
	100’	M.1015.6981 (old # 401-30252-00)
J2 to customer supplied connector (pigtail)	10’	M.1015.7975 (old # 401-34424-10)
	25’	M1015.7976 (old # 401-34424-25)
	50’	M.1015.7977 (old # 401-34424-50)
	75’	M.1015.7978 (old # 401-34424-75)
	100’	M.1015.7974 (old # 401-34424-00)

Motor Power Cables		
Description	**Length**	**Part Number**
Drive to 200/300 HSM Series Motor	10’	M.1015.7941 (old # 401-34413-10)
	25’	M.1015.7943 (old # 401-34413-25)
	50’	M.1015.7944 (old # 401-34413-50)
	75’	M.1015.7945 (old # 401-34413-75)
	100’	M.1015.7940 (old # 401-34413-00)
Drive to 400 HSM or FSM Series Motor	10’	M.1015.7947 (old # 401-34414-10)
	25’	M.1015.7949 (old # 401-34414-25)
	50’	M.1015.7950 (old # 401-34414-50)
	75’	M.1015.7951 (old # 401-34414-75)
	100’	M.1015.7946 (old # 401-34414-00)
	150’	M.1015.7012 (old # 401-30273-00)
Drive to 600 HSM or FSM Series Motor	10’	M.1015.7953 (old # 401-34415-10)
	25’	M.1015.7955 (old # 401-34415-25)
	50’	M.1015.7956 (old # 401-34415-50)
	75’	M.1015.7957 (old # 401-34415-75)
	100’	M.1015.7952 (old # 401-34415-00)
	150’	M.1015.7013 (old # 401-30274-00)
Drive to 630 HSM or FSM Series Motor	10’	M.1015.7958 (old # 401-34416-10)
	25’	M.1015.7960 (old # 401-34416-25)
	50’	M.1015.7961 (old # 401-34416-50)
	75’	M.1015.7963 (old # 401-34416-75)
	100’	M.1300.3514 (old # 401-34416-00)
Drive to 800 HSMor SSM Series Motor	10’	M.1015.7965 (old # 401-34417-10)
	25’	M.1015.7966 (old # 401-34417-25)
	50’	M.1015.7967 (old # 401-34417-50)
	75’	M.1015.7968 (old # 401-34417-75)
	100’	M.1300.7964 (old # 401-34417-00)
Drive to YSM Series Motor	10’	M.1015.6936 (old # 401-30232-10)
	25’	M.1015.6937 (old # 401-30232-25)
	50’	M.1015.6938 (old # 401-30232-50)
	75’	M.1015.6939 (old # 401-30232-75)
	100’	M.1015.6935 (old # 401-30232-00)

Drive to NSM Series Motor	10’	M.1015.6926 (old # 401-30230-10)
	25’	M.1015.6927 (old # 401-30230-25)
	50’	M.1015.6928 (old # 401-30230-50)
	75’	M.1015.6929 (old # 401-30230-75)
	100’	M.1015.6925 (old # 401-30230-00)

Breakout Boards	
Description	**Part Number**
J1 to 50 Pin Terminal Strip (includes 3ft/1m cable and mounting hardware)	M.1015.7935 (old # 401-34409-00)
J2 to 25 Pin Terminal Strip (includes 3ft/1m cable and mounting hardware)	M.1015.7934 (old # 401-34408-00)

DSM Screw Terminal Converters	
Description	**Part Number**
J1 Terminal Converter	M.1016.9545 (old # 502-04051-00)
J2 Terminal Convertor	M.1016.9581 (old # 502-04076-00)

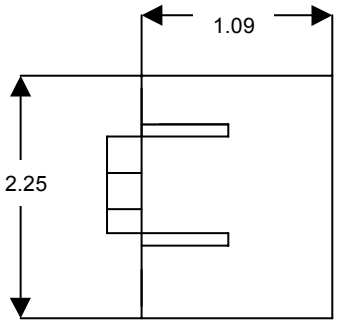
DSM Options and Accessories

Touch Pad

Touch Pad

M.1015.7928 (old # 401-34405-00)

Touch Pad Dimensions



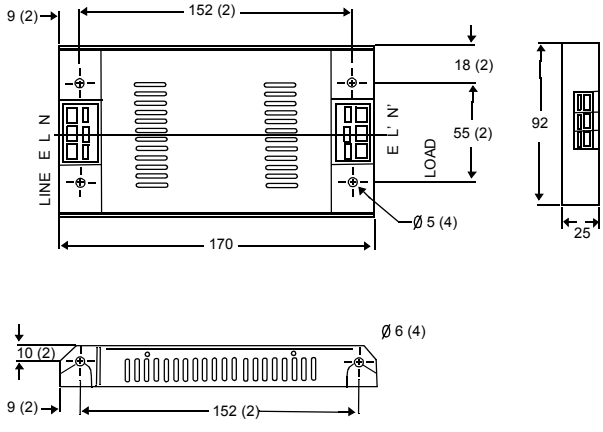
2.00

AC Line Filters

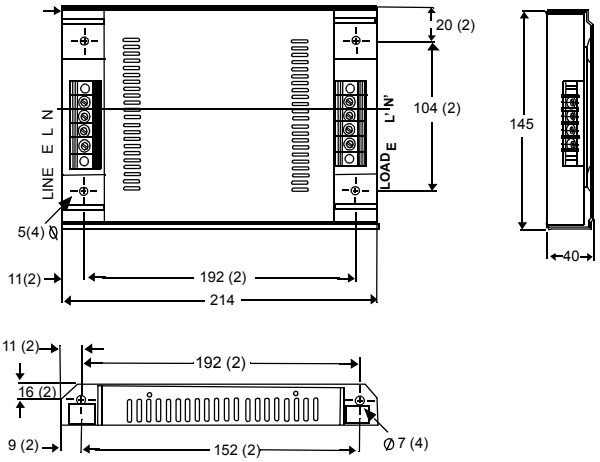
AC Line Filters Specifications

AC Line Filters (Required for EMC Compliance)		
Current	**Model**	**Part Number**
I = 6A 1ϕ	DSM007	M.1015.6922 (old # 401-30222-00)
I = 10A 1ϕ	DSM015, DSM110	M.1015.6917 (old # 401-30216-00)
I = 23A 1ϕ	DSM030, DSM120	M.1015.6918 (old # 401-30217-00)
I = 36A 1ϕ	DSM130, DSM175 1ϕ	M.1015.7969 (old # 401-34418-00)
I = 36A 3ϕ	DSM130, DSM175	M.1015.7970 (old # 401-34419-00)
I = 50A 1ϕ	For multiple drives on one filter. Combined drive input currents may not exceed filter current rating.	M.1015.7971 (old # 401-34420-00)
I = 70A 3ϕ	For multiple DSM175 drives on one filter. Combined drive input currents may not exceed filter current	M.1015.7972 (old # 401-34421-00)

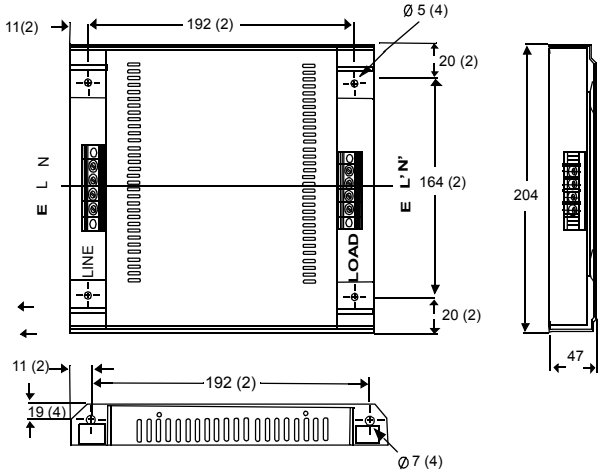
AC Line Filters Dimensions



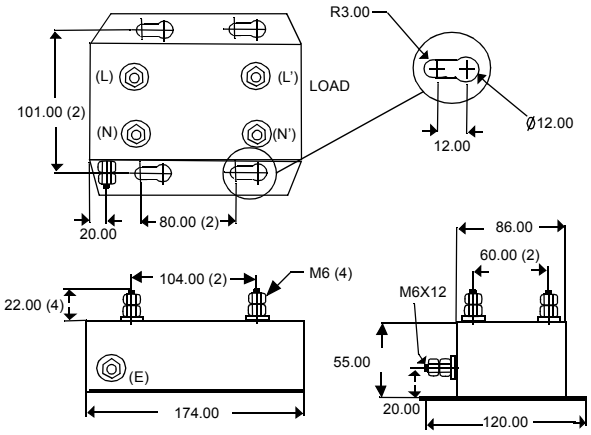
M.1015.6922 (old # 401-30222-00)



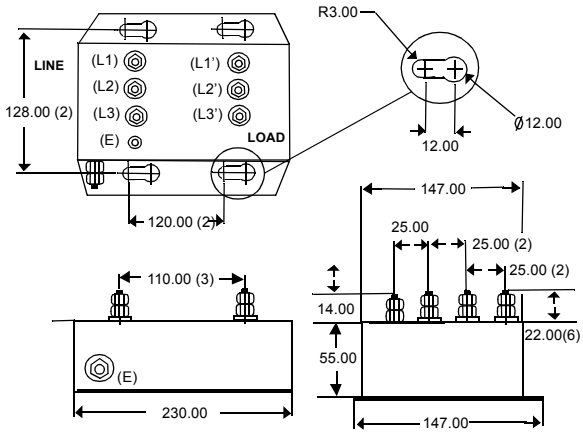
M.1015.6917 (old # 401-30216-00)



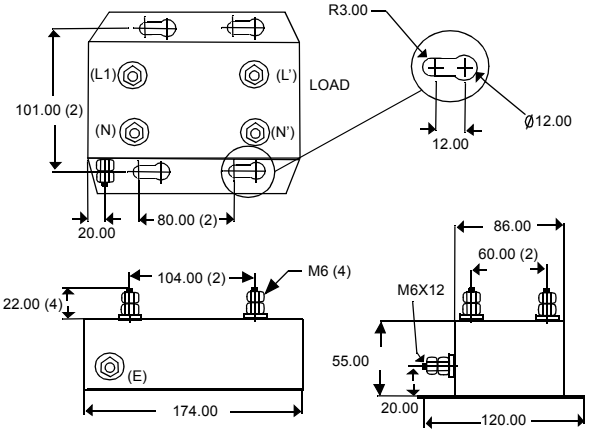
M.1015.6918 (old # 401-30217-00)



M.1015.7971 (old # 401-34420-00)



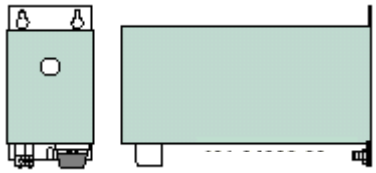
M.1015.7970 (old # 401-34419-00)



M.1015.7969 (old # 401-34418-00)

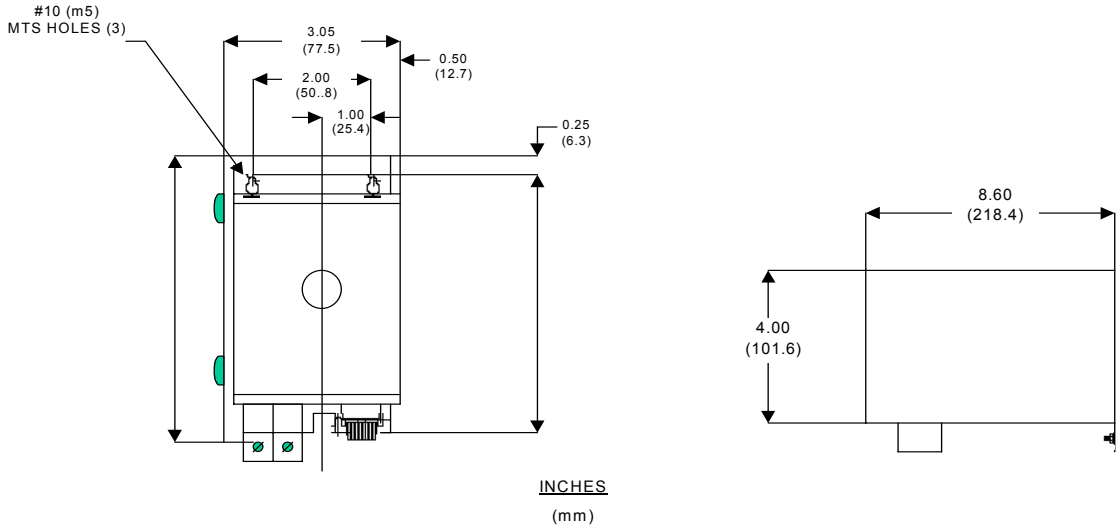
External Shunt Resistor Kit for DSM110, 120, and 130

External Shunt Resistor Kit for DSM110, 120, and 130



M.1015.7838 (old # 401- 34308-00)

300 Watts Continuous
600 Watts Peak
Includes built-in fuse and hook-up wire



Dimensions for External Shunt Resistor Kit for DSM110, 120 and 130

Shunt Resistor Kit for MicroDSM Drives DSM007, DSM015 and DSM030

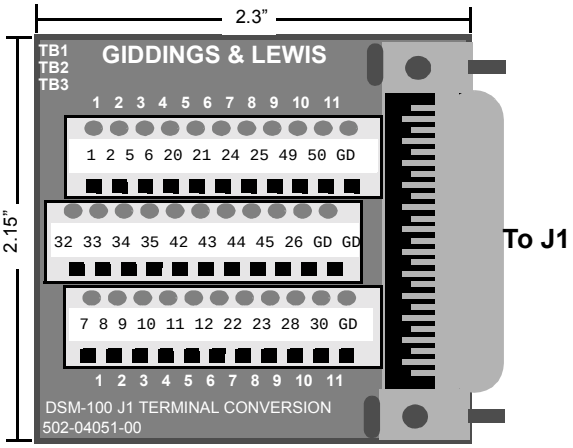
Please contact the factory for details on the Shunt Resistor Kit for MicroDSM Drive Models DSM007, DSM015 and DSM030.

DSM100 Terminal Convertors

There are two screw terminal convertors available that simplify wire termination to the DSM100 or MicroDSM drives. They are described below.

J1 Screw Terminal Convertor

The J1 Screw Terminal Convertor is attached to the J1 connector on the DSM100 or MicroDSM drive. The screw terminal pins have been reassigned for your wire termination convenience. The terminal strips are numbered non-sequentially to match the pin assignments in the manual.



Part No.: M.1016.9545 (old # 502-04051-00)

NOTE

A special screwdriver with a 0.4 x 2.5 mm blade tip must be used to make the connections. When tightening screws, torque to 0.22 - 0.25 Nm.

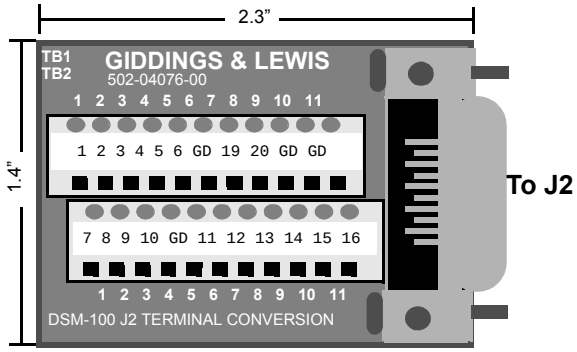
The recommended wire gauge is 30 - 16 AWG UL.

J1 Mini D-Pin Numbers	Terminal Strip Numbers	Signal
Top Connector (TB1)		
1	TB1-1	+5 VDC
2	TB1-2	5 COM/SHIELD
5	TB1-3	isolated 24 VDC
6	TB1-4	isolated 24 COM/SHIELD
20	TB1-5	ENABLE
21	TB1-6	RESET
24	TB1-7	READY+
25	TB1-8	READY-
49	TB1-9	BRAKE+
50	TB1-10	BRAKE-
GD	TB1-11	SHIELD
Middle Connector (TB2)		
32	TB2-1	IN1 24 VDC
33	TB2-2	IN2 24 VDC
34	TB2-3	IN3 24 VDC
35	TB2-4	IN4 24 VDC
42	TB2-5	OUT1 24 VDC
43	TB2-6	OUT2 24 VDC
44	TB2-7	OUT3 24 VDC
45	TB2-8	OUT4 24 VDC
46	TB2-9	isolated 24 VDC
GD	TB2-10	isolated 24 COM/SHIELD
GD	TB2-11	SHIELD
Bottom Connector (TB3)		
7	TB3-1	A
8	TB3-2	A/
9	TB3-3	B
10	TB3-4	B/
11	TB3-5	I
12	TB3-6	I/
22	TB3-7	VCS+
23	TB3-8	VCS-
28	TB3-9	ANLG COM
30*	TB3-10	ANLG OUT A
GD	TB3-11	SHIELD

*Not available on Micro DSM

J2 Screw Terminal Convertor

The J2 Screw Terminal Convertor is attached to the J2 connector on the DSM100 or MicroDSM drive. The screw terminal pins have been reassigned for your wire termination convenience. The terminal strips are numbered non-sequentially to match the pin assignments in the manual.



Part No.: M.1016.9581 (old # 502-04076-00)

NOTE

A special screwdriver with a 0.4 x 2.5 mm blade tip must be used to make the connections. When tightening screws, torque to 0.22 - 0.25 Nm.

The recommended wire gauge is 30 - 16 AWG UL.

J2 Mini D-Pin Numbers	Terminal Strip Numbers	Signal
Top Connector (TB1)		
1	TB1-1	+5 VDC
2	TB1-2	5 COM
3	TB1-3	+5 VDC
4	TB1-4	5 COM
5	TB1-5	5 VDC SENSE+
6	TB1-6	5 VDC SENSE-
GD	TB1-7	SHIELD
19	TB1-8	TEMP+
20	TB1-9	TEMP-
GD	TB1-10	SHIELD
GD	TB1-11	SHIELD
Bottom Connector (TB2)		
7	TB2-1	A
8	TB2-2	A/
9	TB2-3	B
10	TB2-4	B/
GD	TB2-5	SHIELD
11	TB2-6	I
12	TB2-7	I/
13	TB2-8	U
14	TB2-9	V
15	TB2-10	W
16	TB2-11	ABS

SERCOS Fiber Optic Cables

Description	Length	Part Number
Standard Cable	1’	M.1016.9743 (old # 502-04170-01)
	3’	M.1016.9744 (old # 502-04170-03)
	5’	M.1016.9745 (old # 502-04170-05)
	10’	M.1016.9747 (old # 502-04170-10)
	15’	M.1016.9749 (old # 502-04170-15)
	25’	M.1016.9753 (old # 502-04170-25)
Heavy Duty Cable	.05 Meters (1.5’)	M.0106.9758 (old # 502-04171-01)
	1 Meter (3.3’)	M.0106.9760 (old # 502-04171-03)
	2 Meters (6.6’)	M.0106.9763 (old # 502-04171-06)
	3 Meters (9.9’)	M.0106.9767 (old # 502-04171-10)
	5 Meters (16.5’)	M.0106.9773 (old # 502-04171-16)
	10 Meters (32.5’)	M.0106.9784 (old # 502-04171-32)

FIGURE 1. Heavy Duty SERCOS Fiber Optic Cable

Centurion Brushless Servo Motors - General

Guide to Brushless Motor Section:

Motor Family	Torque Range	Attributes	Page
Light Industrial Applications			
NSM Series	1.6 to 47 lb-in (0.18 to 5.3 Nm)	Compact NEMA mount	51
YSM Series	1.5 to 22 lb-in (0.17 to 2.5 Nm)	Compact, low inertia	51
Factory Automation Applications			
FSM Series	31 to 245 lb-in (3.5 to 28 Nm)	Medium inertia	51
HSM Series	5 to 450 lb-in (0.5 to 50 Nm)	Low inertia	51

NSM Brushless Servo Motors

Typical Applications

- Semi-conductor manufacturing
- Material handling
- Web processing
- Robotics
- Packaging machinery

Standard Features

- Rugged industrial construction
- High torque to size ratio
- High energy ring magnet rotor
- Integral encoder
- Provision for optional shaft seal
- NEMA 23, 34, 42, 56 style mounting frames

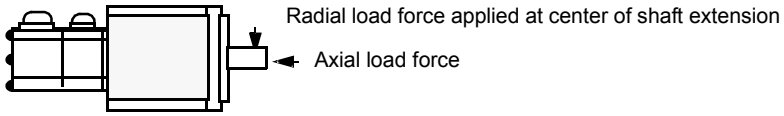
NSM Series Motor And Performance Data

Motor Model	NSM2302		NSM2304		NSM3406		NSM3412		NSM4214		NSM4220		NSM5630		NSM5637		NSM5647	
Mechanical Data																		
Rotor Moment of Inertia	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2
	0.00008	.000009	.00016	0.00002	0.0007	0.00008	0.0013	0.00015	0.0021	0.00024	0.0031	0.00035	0.008	0.0009	0.01	0.0011	0.013	0.0015
Motor Net Weight	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
	2.3	1.0	3.4	1.5	5.7	2.6	7.6	3.5	10.4	4.7	13.0	8.9	20.0	9.1	24.2	11.0	28.7	13.0
Friction Torque	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	0.11	0.012	0.13	0.014	0.19	0.021	0.31	0.035	0.38	0.043	0.406	0.046	0.688	0.078	0.875	0.1	0.938	0.11
Winding Data																		
Sine Wave K_T Torque Constant @ 25°C[1]	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A
	0.73	.08	1.6	0.18	1.5	0.17	3.0	0.34	3.6	0.41	2.5	0.28	3.5	.38	4.4	.50	5.6	.63
Sq Wave K_T Torque Constant @ 25°C[2]	0.80	0.09	1.8	0.20	1.6	0.18	3.3	0.37	4.0	0.45	2.7	0.31	3.7	0.42	4.8	0.54	6.2	0.70
KE Voltage Constant[3]	10 V/kRPM		24 V/kRPM		20 V/kRPM		40 V/kRPM		46 V/kRPM		33 V/kRPM		48 V/kRPM		60 V/kRPM		78 V/kRPM	
Winding Resistance Ph to phase @ 25°C	3.18 ¾		4.9 ¾		2.2 ¾		2.7 ¾		2.8¾		0.77 ¾		0.89 ¾		1.0 ¾		1.23 ¾	
Winding Inductance Phase to phase	4.1 mH		8.1 mH		6.1 mH		8.6 mH		11.0 mH		2.9 mH		4.3 mH		5.2 mH		7.0 mH	
Thermal Resistance[4]	3.0°C/watt		2.2°C/watt		1.6°C/watt		1.2°C/watt		1.1°C/watt		0.83°C/watt		0.81°C/watt		0.76°C/watt		0.70°C/watt	
System Ratings[5]																		
	DSM 007		DSM 007/015		DSM 015		DSM 015		DSM 015		DSM 030		DSM 030		DSM 030		DSM030	
Max. Continuous Operation Speed RPM	6000		6000		6000		5500		4500		5000		4000		4000		3000	
Continuous Stall Torque	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	1.6	0.2	3.5/4.4	0.4/0.5	6.8	0.8	13.8	1.6	15.5	2.0	22.0	2.5	30.0	3.4	40.0	4.5	52.0	2.0
Peak Torque	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	4.6	0.5	10/13	1.1/1.4	18.5	2.1	36.0	4.1	45.0	5.7	63.0	7.1	95.0	10.7	120	13.0	150	17.0
	DSM 110		DSM 110		DSM120		DSM 120		DSM 120		DSM 130		DSM130		DSM 130		DSM 130	
Max. Continuous Operation Speed RPM	6000		6000		6000		5500		5000		5000		4000		4000		3000	
Continuous Stall Torque	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	1.7	0.2	4.4	0.5	6.8	0.8	13.8	1.6	18.0	2.0	26.0	0.4	34.0	0.8	46.0	1.6	53.0	5.9
Peak Torque	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	4.7	0.5	13.0	1.4	18.5	2.1	36.0	4.1	50.0	5.7	63.0	1.4	95.0	2.1	120	4.1	150	5.7

[1]Peak value of per phase sine wave amps [2]Peak value of per phase square wave amps [3]Peak value of sinusoidal phase to phase volt [4]Motor mounted on .5" x 12" x 12" (1.2 x 30 x 30 cm) aluminum heat sink. [5]Motor windings designed for 115V drive input voltage. .

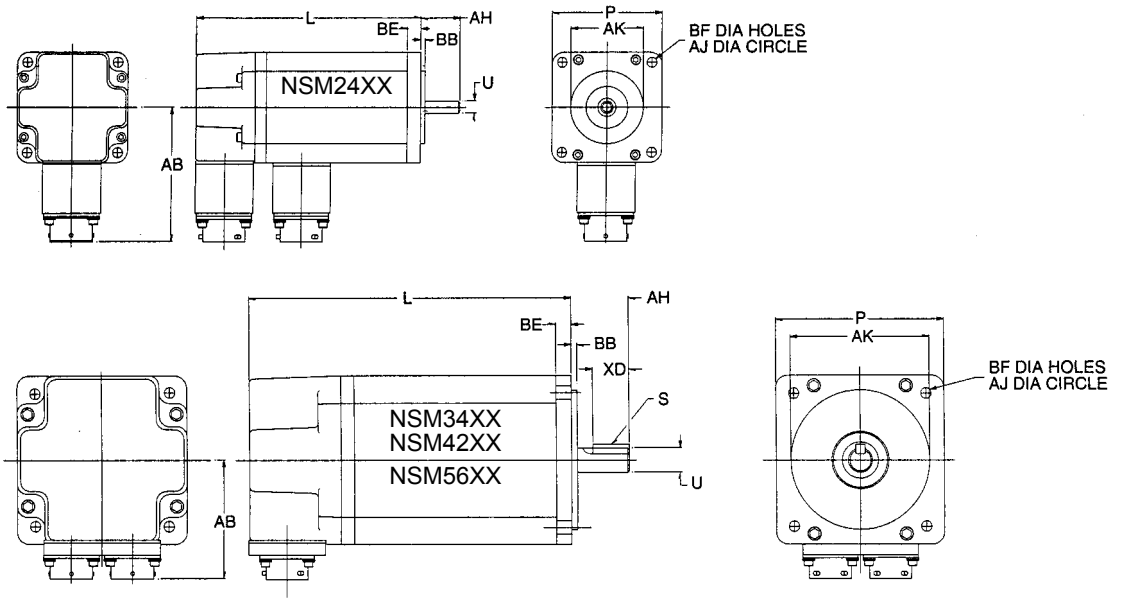
Motors are capable of carrying an axial load in most applications. The following table provides guidelines for 20,000 hour bearing life with a specified radial load applied to the center of the shaft. Please consult with Giddings & Lewis regarding loads, operating speeds and bearing life in your particular application to ensure the proper selection of motors.

STANDARD RADIAL LOAD FORCE RATINGS							
MOTOR	500 rpm lb (kg)	1000 rpm lb (kg)	2000 rpm lb (kg)	3000 rpm lb (kg)	4000 rpm lb (kg)	5000 rpm lb (kg)	6000 rpm lb (kg)
NSM2302	17 (8)	16(7)	14 (6)	12 (6)	11 (5)	9 (4)	8 (3)
NSM2304	19(9)	17 (8)	15 (7)	14 (6)	12 (5)	10 (5)	8 (4)
NSM3406	103 (47)	82 (37)	65 (29)	56 (26)	51 (23)	48 (22)	45 (20)
NSM3412	113 (51)	89 (40)	71 (32)	62 (28)	56 (26)	53 (24)	49 (22)
NSM4214	137 (62)	109 (49)	86 (39)	76 (34)	68 (31)	64 (29)	
NSM4220	146 (66)	116 (52)	92 (41)	80 (36)	73 (33)	68 (31)	
NSM5630	188 (85)	149 (67)	118 (53)	103 (47)	94 (43)		
NSM5637	197 (89)	156 (71)	124 (56)	108 (49)	98 (45)		
NSM5647	203 (92)	161 (73)	128 (58)	112 (51)			



NOTE: When motor shaft has no radial load, axial load rating = 100% of radial load rating above.
When motor shaft has both a radial load and an axial load, axial load rating = 44% of radial load rating above.

NSM Motor Dimensions



Model	AB	AH	AJ	AK	BB	BE	BF	L
	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in
NSM2302	69/2.75	21/.81[1]	67/2.625	38/1.50[2]	2/.09	7/.275	5/.205	118/4.634
NSM2304	69/2.75	21/.81[1]	67/2.625	38/1.50[2]	2/.09	7/.275	5/.205	156/6.134
NSM3406	64/2.48	30/1.19[1]	98/3.875	73/2.875[4]	3/.12	8/.315	6/.220	147/5.67
NSM3412	64/2.48	30/1.19[1]	98/3.875	73/2.875[4]	3/.12	8/.315	6/.220	173/6.67
NSM4214	63/2.45	35/1.38[1]	126/4.95	56/2.187[7]	3/.12	10/.394	7/.280	174/6.845
NSM4220	63/2.45	35/1.38[1]	126/4.95	56/2.187[7]	3/.12	10/.394	7/.280	200/7.845
NSM5630	76/2.96	50/1.97[1]	149/5.875	114/4.50[8]	3/.12	12/.472	9.5/.375 in UNC	199/7.825
NSM5637	76/2.96	50/1.97[1]	149/5.875	114/4.50[8]	3/.12	12/.472	9.5/.375 in UNC	225/8.825
NSM5647	76/2.96	50/1.97[1]	149/5.875	114/4.50[8]	3/.12	12/.472	9.5/.375 in UNC	250/9.825

Model	LA	LB	P	S	U	XD
	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in
NSM2302	62/2.43	106/4.05	58/2.27	N/A	6/.25[3]	N/A
NSM2304	100/3.93	141/5.55	58/2.27	N/A	6/.25[3]	N/A
NSM3406	124/4.87	N/A	89/3.48	3.2 x 3.2/0.125 x 0.125[5]	13/.5[3]	20/.75[6]
NSM3412	149/5.87	N/A	89/3.48	3.2 x 3.2/0.125 x 0.125[5]	13/.5[3]	20/.75[6]
NSM4214	152/5.99	N/A	102/4.0	4.8 x 4.8/0.1875 x 0.1875[5]	16/.625[3]	25/0.94[6]
NSM4220	178/6.99	N/A	102/4.0	4.8 x 4.8/0.1875 x 0.1875[5]	16/.625[3]	25/0.94[6]
NSM5630	178/7.0	N/A	127/5.0	4.8 x 4.8/0.1875 x 0.1875[5]	19/.75[3]	40/1.5[6]
NSM5637	203/8.0	N/A	127/5.0	4.8 x 4.8/0.1875 x 0.1875[5]	19/.75[3]	40/1.5[6]
NSM5647	229/9.0	N/A	127/5.0	4.8 x 4.8/0.1875 x 0.1875[5]	19/.75[3]	40/1.5[6]

[1]Tolerance is ±0.03/0.76, [2]-0.005/0.05, [3]-0.005/0.13 diameter, [4]-0.006/0.15, [5]-0.002/0.005 width -0.014/0.36 depth, [6]-0.06/1.5, [7]-0.001/0.025 diameter, [8]-0.003/0.076

NOTE: Motors are manufactured to inch dimensions. Millimeter dimensions are approximate conversions from inches.

NSM Motor Encoder Data

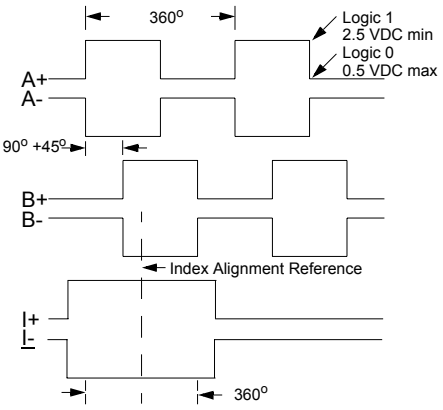
Encoders are factory aligned and must not be adjusted outside the factory.

ENCODER SPECIFICATIONS		
	NSM23XX	NSM34XX, NSM42XX and NSM56XX
Line Count	1000 (1) (2)	2000 (1)
Supply Voltage	5 VDC	5 VDC
Supply Current	175 mA max.	300 mA max.
Line Driver	LM339	26LS31
Line Driver Output	TTL	A, B, I signals: Logic 1 =2.5 VDC min @ 20 mA DC source, Logic 0 = 0.5 VDC max @ 20 mA DC sink. HALL signals: Logic 1 = 3.5 VDC min @ 1mA DC source, Logic 0 = 0.5 VDC max @ 5mA DC sink.
Index Pulse	Refer to diagrams below (No key for physical reference)	When facing the motor, the key is oriented $90^{o}\pm10$ clockwise (mechanical) from connectors

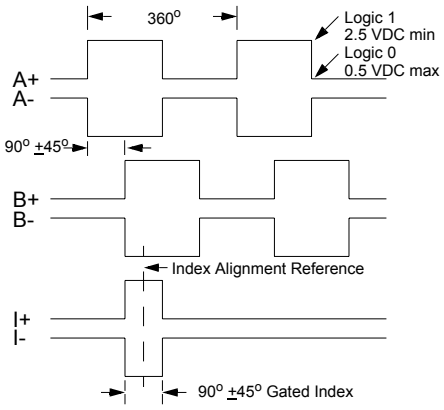
(1) Standard line count before quadrature.
(2) NSM23XX encoder lacks Absolute Signal (ABS)

Encoder Outputs

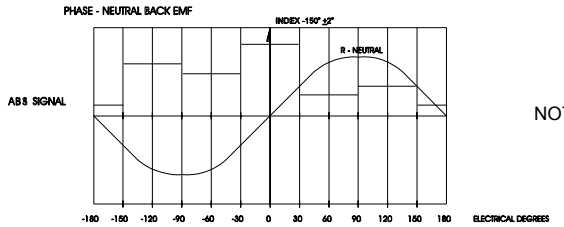
NSM23XX Encoder Output



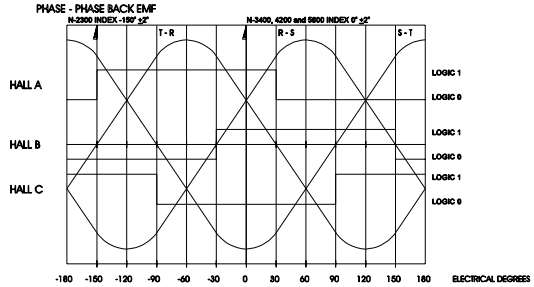
NSM34XX, 42XX and 56XX Encoder Output



Encoder Phase-to-Neutral and Phase-to-Phase Waveforms



NOTE: NSM34XX, NSM42XX and NSM56XX



NOTE: Hall and ABS signals are in electrical degrees.
For 4 pole commutation,
360° mechanical = 720° electrical.

NSM Motor Connector and Ordering Options

Ordering options include the following:

- 24 VDC Brake (Consult factory for brake motor availability)
- Encoder Line Count - 2,000 or 5,000 line
- Motor Winding Voltage - 115 V or 230 V Drive Input Voltage
- Continuous Torque Capability

Consult the factory for information on any of these items.

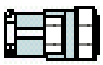
NOTE: Options are not available on all sizes.

Optional configurations or encoder line counts have extended lead times and additional charges.

NOTE: 5000 line count encoder, motor top speed is limited to 3600 RPM due to frequency output limit of encoder-check drive system configuration data for any additional restrictions imposed by drive input.

NSM Connector Data

MOTOR MATING CONNECTORS



Description	Part Number
Mating Power	M.1016.8056 (old # 401-34508-00)
Mating Encoder	M.1016.8057 (old # 401-34509-00)

NSM MOTOR SHAFT SEAL KITS

Description	Part Number
NSM 2300 Series	M.1300.0422 (old # 401-34510-00)
NSM 3400 Series	M.1015.8058 (old # 401-34511-00)
NSM 4200 Series	M.1015-8059 (old # 401-34512-00)
NSM 5600 Series	M.1300.0003 (old # 401-34513-00)

YSM Brushless Servo Motors

Typical Applications

- Robotics
- Material handling
- Specialty machinery
- Medical and laboratory equipment
- X-Y tables
- Light packaging machines
- Office machinery
- Postal sorting

Standard Features

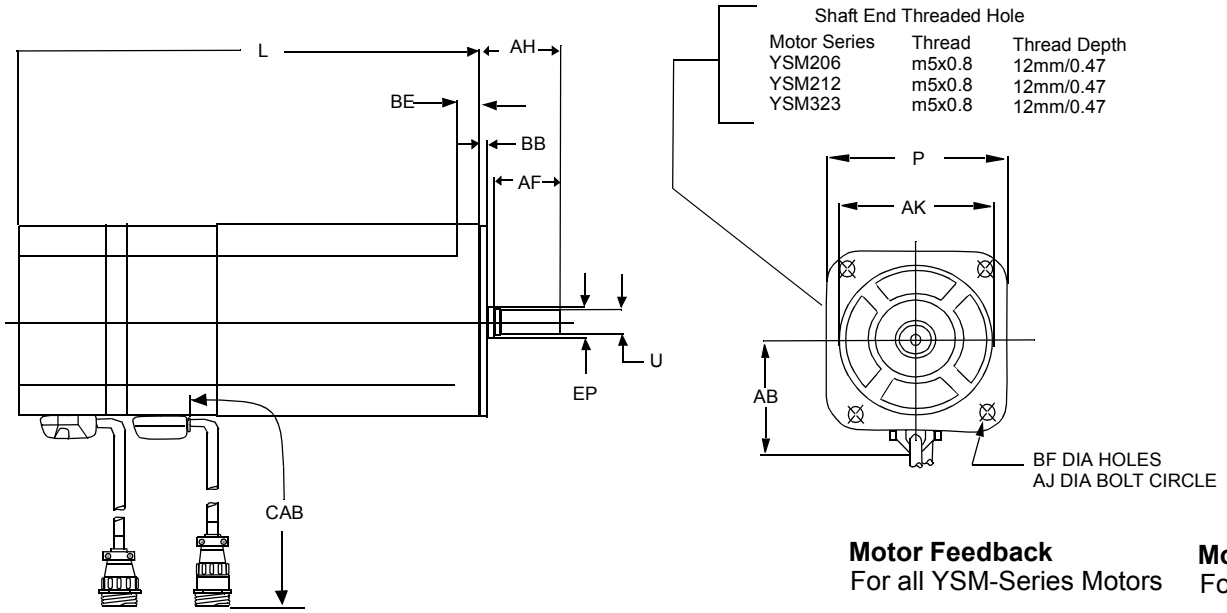
- 115V and 230V windings
- Popular metric mounting dimensions
- Three frame sizes, 10 models
- Torque range 1.5 - 22 lb-in (.17 - 2.5 Nm)
- Motor mounted optical encoder with differential line driver data (2,000 line) and commutation signals
- Low inertia rotor
- High energy neodymium magnets
- 4500 rpm maximum
- Optional internally mounted spring set, magnetic release 24 VDC holding brake
- IP-43 package

YSM Motors And Performance Data

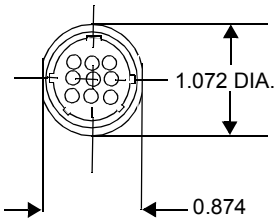
Motor Model	YSM102 115/230		YSM103 115/230		YSM206 115/230		YSM212 115/230		YSM323 115/230	
Mechanical Data										
Rotor Moment of Inertia	lb-in-s^2 .000027	kg-m^2 .0000031	lb-in-s^2 .000045	kg-m^2 .0000051	lb-in-s^2 .000127	kg-m^2 .000014	lb-in-s^2 .00023	kg-m^2 .000025	lb-in-s^2 .00056	kg-m^2 .000064
Rotor Moment of Inertia (Brake Motors)	.000034	.0000039	.000052	.0000059	.00018	.000020	.00028	.000032	.00062	.000069
Motor Net Weight	lb 1.2	kg 0.54	lb 1.5	kg 0.68	lb 3.0	kg 1.36	lb 4.2	kg 1.90	lb 7.8	kg 3.54
Damping	lb-in/kRPM 0.022	Nm/kRPM 0.002	lb-in/kRPM 0.03	Nm/kRPM 0.003	lb-in/kRPM 0.08	Nm/kRPM 0.009	lb-in/kRPM 0.10	Nm/kRPM 0.01	lb-in/kRPM 0.19	Nm/kRPM 0.021
Friction Torque	lb-in -	Nm -	lb-in 0.06	Nm 0.007	lb-in 0.20	Nm 0.022	lb-in 0.29	Nm 0.03	lb-in 0.64	Nm 0.072
Winding Data	**YSM102**		**YSM103**		**YSM206**		**YSM212**		**YSM323**	
	115V	230V	115V	230V	115V	230V	115V	230V	115V and 230V	
Sine Wave K_T Torque Constant @ 25°C (1)	lb-in/A 0.73	Nm/A 0.08 / lb-in/A 1.46 / Nm/A 0.16	lb-in/A 1.02	Nm/A 1.11 / lb-in/A 1.8 / Nm/A 0.21	lb-in/A 0.9	Nm/A 0.1 / lb-in/A 1.97 / Nm/A 0.22	lb-in/A 2.1	Nm/A 0.24 / lb-in/A 3.3 / Nm/A 0.37	lb-in/A 2.9	Nm/A 3.3
Square Wave K_T Torque Constant @ 25°C (2)	0.8	0.09 / 1.6 / 0.18	1.98	0.22 / 1.1 / 0.13	1.0	0.11 / 2.2 / 0.24	2.4	0.27 / 3.6 / 0.41	3.2	3.6
KE Voltage Constant (3)	10 V/kRPM	20 V/kRPM	14 V/kRPM	25 V/kRPM	13 V/kRPM	27V/kRPM	29 V/kRPM	45 V/kRPM	40 V/kRPM	
Winding Resistance Ph to phase @ 25°C	4.6 ¾	18.8 ¾	3.2 ¾	8.9 ¾	0.79 ¾	3.2 ¾	1.32 ¾	2.9 ¾	.78 ¾	
Winding Inductance Phase to phase	5.5 mH	22.3 mH	3.8 mH	11.5 mH	2.7 mH	12 mH	5.1 mH	12.4 mH	6 mH	
Thermal Resistance (4)	2.3°C/watt		2.2°C/watt		1.3°C/watt		1.3°C/watt		0.85°C/watt	
Encoder Resolution (P/R)	2000		2000		2000		2000		2000	
System Ratings (5)	**YSM102**		**YSM103**		**YSM206**		**YSM212**		**YSM323**	
enturion Micro DSM Drive Line Sinusoidal Current	115V DSM007	230V DSM007	115V DSM015	230V DSM007	115V DSM030	230V DSM015	115V DSM030	230V DSM015	115V and 230V DSM030	DSM030
Max. Continuous Operating Speed	4500 RPM		4500 RPM		4500 RPM		3800 RPM	4500 RPM	2500 RPM	4500 RPM
Continuous Stall Torque	lb-in 1.5	Nm 0.17 / lb-in 1.5 / Nm 0.17	lb-in 3.1	Nm 0.35 / lb-in 3.1 / Nm 0.35	lb-in 6.1	Nm 0.69 / lb-in 6.1 / Nm 0.69	lb-in 12	Nm 1.35 / lb-in 12 / Nm 1.35	lb-in 22.5	Nm 2.5 / lb-in 22.5 / Nm 2.5
Peak Torque	4.3	0.48 / 4.3 / 0.48	8.6	0.97 / 8.6 / 0.97	17	1.92 / 17 / 1.92	33.7	3.8 / 33.7 / 3.8	63	7.12 / 63 / 7.12
Centurion DSM100 Drive Line Sinusoidal Current	DSM110	DSM110	DSM110	DSM110	DSM110	DSM120	DSM120	DSM110	DSM120	DSM120
Maximum Cont Operating Speed	4500 RPM		4500 RPM		4500 RPM		3800 RPM	4500 RPM	2500 RPM	4500 RPM
Continuous Stall Torque	lb-in 1.5	Nm 0.17 / lb-in 1.5 / Nm 0.17	lb-in 3.1	Nm 0.35 / lb-in 3.1 / Nm 0.35	lb-in 6.1	Nm 0.69 / lb-in 6.1 / Nm 0.69	lb-in 12	Nm 1.35 / lb-in 12 / Nm 1.35	lb-in 22.5	Nm 2.5 / lb-in 22.5 / Nm 2.5
Peak Torque	4.3	0.48 / 4.3 / 0.48	8.6	0.97 / 8.6 / 0.97	16.6	1.87 / 17 / 1.92	30	3.4 / 33.7 / 3.8	53	6.0 / 63 / 7.12

[1]Peak value of per phase sine wave amps [2]Peak value of per phase square wave amps [3]Peak value of sinusoidal phase to phase Volts [4]At 125° C winding temperature, in a 40° C ambient, with motors mounted on aluminum heat-sinks: Motors 102/103:.125" x 6" x 6", Motors 206/212: .250" x 8" x 8", Motor 323: .25" x 10" x 10" [5]Ambient temperature is 0° C to 40°C for motors and 0° C to 50° C for drives

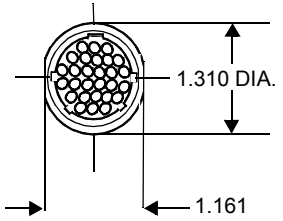
YSM102, YSM103, YSM206, YSM212, YSM323



Motor Feedback
For all YSM-Series Motors



Motor Power
For all YSM-Series Motors



Model	AB	AJ	AK	P	U	EP	AH	BB	BE	BF	AF	CAB	L	with Brake
	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in
YSM102	30/1.18	46/1.81	30/1.18	40/1.57	8/0.31	-	25/0.98	2.5/0.10	5/0.20	4.5/0.18	-	1000/39.37	70/2.75	108/4.25
YSM103	30/1.18	46/1.81	30/1.18	40/1.57	8/0.31	-	25/0.98	2.5/0.10	5/0.20	4.5/0.18	-	1000/39.37	88/3.46	126/4.96
YSM206	41/1.61	70/2.75	50/1.97	60/2.36	14/0.55	-	30/1.18	3/0.12	6/0.24	5.5/0.22	-	1000/39.37	95/3.74	133/5.24
YSM212	41/1.61	70/2.75	50/1.97	60/2.36	14/0.55	-	30/1.18	3/0.12	6/0.24	5.5/0.22	-	1000/39.37	123/4.84	161/6.34
YSM323	52/2.05	90/3.54	70/2.75	80/3.15	16/0.63	19/0.75	40/1.57	3/0.12	8/0.31	6.5/0.25	35/1.38	1000/39.37	140/5.57	180/7.09

Motors are manufactured to millimeter dimensions shown. Inch dimensions shown are approximate conversions from millimeters.
For further motor detail, engineering specification drawings are available upon request.

YSM Motor and Connector Ordering Information

Ordering options include the following:

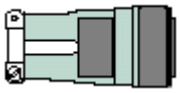
- 24 VDC Brake (Consult factory for brake motor availability)
- Motor Winding Voltage - 115 V or 230 V Drive Input Voltage
- Various NEMA style frame sizes

Consult the factory for information on any of these items.

MOTOR MATING CONNECTORS

CONNECTOR KITS FOR YSM MOTORS

Consult factory to order.



ALL YSM MOTORS

This kit includes connector, pins, and backshell for both the power and encoder connectors.

YSM Connector Data
All YSM

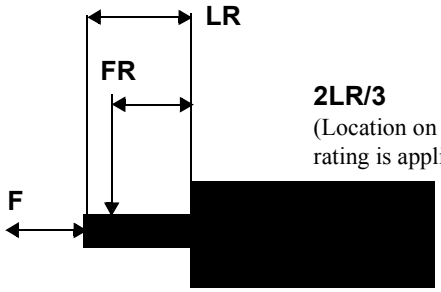
Motor Power Connector	
Pin	**Signal**
1	Phase R
2	Phase S
3	Phase T
4	-
5	Ground
6	-
7	Brake + [1]
8	-
9	Brake + [1]

[1]No connection for nonbrake motors

Motor Feedback	
Pin	**Signal**
1-8	-
9	A+
10	A-
11	B+
12	B-
13	I+
14	I-
15	HALL A+
16	HALL A-
17	HALL B+
18	HALL B-
19	HALL I+
20	HALL I-
21	--
22	+5 VDC
23	Com
24	Encoder Case
25	--
26	--
27	--
28	--

YSM Brake and Shaft Load Data

Motor	Brake Holding Torque	Current at 24 VDC	Shaft Radial Load (FR)	Axial Load (F)
YSM102	0.157 Nm		10 kg	3 kg
YSM103	0.32 Nm	Consult	10 kg	3 kg
YSM206	0.637 Nm	Factory	20 kg	8 kg
YSM212	1.27		25 kg	10 kg
YSM323	2.38 Nm		35 kg	20 kg



NOTE: Above mating connector kit is not CE compliant. Please contact the factory for more information.

FSM Medium Inertia Brushless Servo Motors

Typical Applications

- Web and film processing
- Machine tool/metal cutting
- Textile machinery
- CAM replacements

Characteristics

- Higher inertia matching capability
- Heavy duty continuous operations
- Environmentally rugged

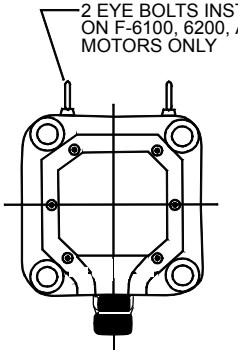
Standard Features

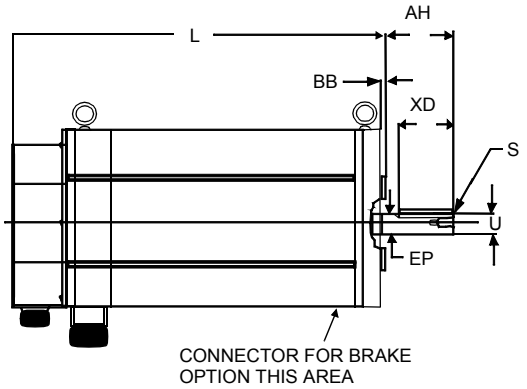
- Compact design is mechanically interchangeable with the HSM family
  Two frame sizes - six models
- Continuous torque from 31 to 245 lb-in (3.5 to 28 Nm)
- Speeds to 4000 RPM
- Ferrite permanent magnet rotors provide approximately four times greater rotor inertia than the HSM family for matching larger load inertias
- Internal thermal switch indicates overheating
- Motor mounted optical encoder includes 2000 quadrature pulses, index pulse and standard commutation channels for trapezoidal drives
- Water tight MS connections are compatible with standard cable assemblies; in addition, the extruded aluminum housing and environmental connectors provide an IP65 package (with the addition of the optional shaft seal kit)
- Economical, compact design ready for harsh environments
- Optional spring-set holding brakes available with 24 VDC or 90 VDC windings
- Axially trapped front bearing in a steel insert for long life at high speeds
- Vibration: 2.5 g peak 30-200 Hz
- Shock: 10.0 g peak 6 msec duration
- UL recognized

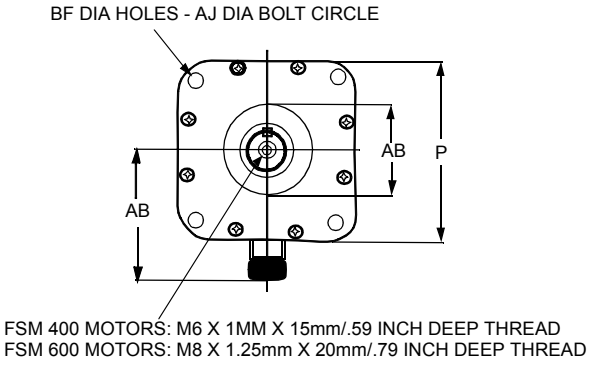
FSM Motor And Performance Data

Motor Model		FSM430		FSM460		FSM490		FSM610		FSM620		FSM630	
Mechanical Data													
Rotor Moment of Inertia		lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2	lb-in-s^2	kg-m^2
		.009	.0010	.019	.0021	.029	.0032	.057	.0064	.095	.0107	.144	.0162
Rotor Moment of Inertia (Brake Motors)		.010	.0011	.020	.0022	.030	.0033	.061	.007	.098	.011	.147	.017
Motor Net Weight		lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
		19.6	8.9	31.0	14.1	42.0	14.1	49.2	22.3	68.2	30.9	95.2	43.2
Damping		lb-in/kRPM	Nm/kRPM	lb-in/kRPM	Nm/kRPM	lb-in/kRPM	Nm/kRPM	lb-in/kRPM	Nm/kRPM	lb-in/kRPM	Nm/kRPM	lb-in/kRPM	Nm/kRPM
		.5	.06	.94	.10	1.3	.15	1.4	.16	2.1	.24	3.3	.37
Friction Torque		lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
		.56	.063	.94	.11	1.5	.17	1.5	.17	2.1	.24	4.1	.46
Winding Data													
Sine Wave K_T Torque Constant @ 25°C[1]		lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A	lb-in/A	Nm/A
		4.8	.54	4.8	.54	6.5	.73	6.3	.71	6.2	.70	6.5	.73
Sq Wave K_T Torque Constant @ 25°C[2]		5.3	.60	5.3	.60	7.1	.80	6.9	.78	6.8	.80	7.1	.81
KE Voltage Constant[3]		66 V/kRPM		66 V/kRPM		89 V/kRPM		86 V/kRPM		85 V/kRPM		89 V/kRPM	
Winding Resistance - Ph to ph @ 25°C		2.24 ¾		.89 ¾		.98 ¾		.51 ¾		.26 ¾		.16 ¾	
Winding Inductance - Phase to phase		6.8 mH		3.3 mH		3.4 mH		3.3 mH		1.7 mH		1.1 mH	
Thermal Resistance[4]		.63°C/watt		.48°C/watt		.40°C/watt		.45°C/watt		.37°C/watt		.30°C/watt	
System Ratings[8]													
enturion Micro DSM Drive Line	(Sinusoidal Current)	DSM030		DSM030									
	Max. Cont. Operating Speed[5]	3600 RPM		3500 RPM		N/A		N/A		N/A		N/A	
		lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	Continuous Stall Torque[4]	31	3.5	46	5.2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Peak Torque	100	11.3	120	13.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Centurion DSM100 Drive Line	(Sinusoidal Current)	DSM120		DSM130		DSM130/175		DSM175		DSM175/1150		DSM175/1150	
	Max. Cont. Operating Speed[5]	4000 RPM		4000 RPM		3000 RPM		3000 RPM		3000 RPM		3000 RPM	
		lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	Continuous Stall Torque[4]	31	3.5	61	6.9	82/82	9.3/9.3	125	14.1	175/175	19.8/19.8	210/210	23.7/23.7
	Peak Torque	80	9.0	120	13.6	170/19.2	18.6/19.2	280	31.6	350/350	39.5/39.5	440/500	49.7/56.5
Centurion ASM100 Drive Line	(Square Wave Current)	AS120		AS130		AS130		N/A		N/A		N/A	
	Max. Cont. Operating Speed[5]	2000 RPM		1500 RPM		1500 RPM		N/A		N/A		N/A	
		lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	Continuous Stall Torque[4]	29	3.3	58	6.5	78	8.8	N/A	N/A	N/A	N/A	N/A	N/A
	Peak Torque	100	11.3	135	15.3	170	19.2	N/A	N/A	N/A	N/A	N/A	N/A

[1]Peak value of per phase sine wave amps [2]Peak value of per phase square wave amps [3]Peak value of sinusoidal phase to phase volts [4]At 125°C winding temperature, in a 40°C ambient, with motor mounted on.5" x 12" x 12" (1.2 x 30 x 30 cm) aluminum heat sink [5]With 230 VAC line voltage input FSM Standard Motor Dimensions



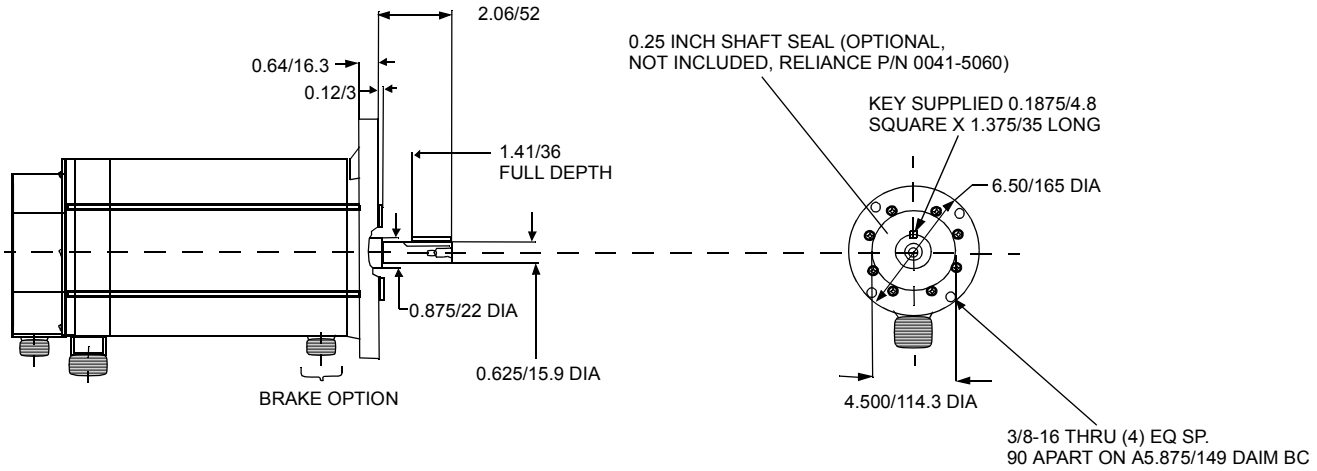




Model	AB	AJ	AK	P	U	EP	AH	BB	BF	XD	S	L	with Brake
	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in
FSM430	102/4.02	145/5.71	110/4.33	127/5.00	19/.75	22.2/8.75	50/1.97	3/.12	10/.39	38/1.49	6X6/.24X.24	194/7.64	257/10.12
FSM460	102/4.02	145/5.71	110/4.33	127/5.00	19/.75	22.2/8.75	50/1.97	3/.12	10/.39	38/1.49	6X6/.24X.24	272/10.71	335/13. 19
FSM490	102/4.02	145/5.71	110/4.33	127/5.00	19/.75	22.2/8.75	50/1.97	3/.12	10/.39	38/1.49	6X6/.24X.24	350/13.78	413/16.26
FSM610	131/5.16	200/7.87	114.3/4.50	173/6.81	35/1.38	36.5/1.438	80/3.15	4.16	13.5/53	60/2.36	10X8/.39X.32	255/10.04	326/12.83
FSM620	131/5.16	200/7.87	114.3/4.50	173/6.81	35/1.38	36.5/1.438	80/3.15	4.16	13.5/53	60/2.36	10X8/.39X.32	320/12.60	390/15.35
FSM630	131/5.16	200/7.87	114.3/4.50	173/6.81	35/1.38	36.5/1.438	80/3.15	4.16	13.5/53	60/2.36	10X8/.39X.32	420/16.53	490/19.29

MOTORS ARE MANUFACTURED TO MILLIMETER DIMENSIONS SHOWN. INCH DIMENSIONS SHOWN ARE APPROXIMATE CONVERSIONS FROM MILLIMETERS.
FOR FURTHER MOTOR DETAIL, ENGINEERING SPECIFICATION DRAWINGS ARE AVAILABLE UPON REQUEST.

NEMA 56C ON FSM400 MOTORS



FSM Motor And Connector Ordering Information

Ordering options include the following:

- 24 or 90 VDC Brake (Consult factory for brake motor availability)
- Encoder Line Count - 1,000, 2,000, 5,000, 500, or 3,000 line
- Special order motor windings available
- Various NEMA style frame sizes

Consult the factory for information on any of these items.
NOTE: Options are not available on all sizes. Optional configurations or encoder line counts have extended lead times and additional charges.

Motor Mating Connectors

MS Conn Kits FSM Motor Power:

	Straight	Right Angle
FSM400	M.1015.7801 (old # 401-34270-00)	M.1015.7802 (old # 401-34270-90)
FSM600	M.1015.7804 (old # 401-34271-00)	M.1015.7805 (old # 401-34271-90)

MS Conn Kit FSM Encoder Feedback:

FSM Encoder Feedback

Straight
M.1015.7808
(old # 401-34273-00)

Right Angle
M.1015.7809
(old # 401-34273-00)

MS Conn Kit FSM Brake Power:

Brake Power

Straight
M.1015.7813
(old # 401-34276-00)

Right Angle
M.1015.7815
(old # 401-34276-90)

FSM Motor Shaft Seal Kits:

FSM400: M.1015.7904 (old # 401-34339-00)
FSM600: M.1015.7905 (old # 401-34340-00)

Shaft seals generally require the presence of a lubricant to reduce premature wear.

NOTE: Above mating connector kits are not CE compliant. Please contact the factory for more information.

FSM Connector Data

FSM400,600

Motor Encoder Connector	
Pin	**Signal**
A	A+
B	A-
C	B+
D	B-
E	I+
F	I-
G	ENCODER CASE
H	ABS
J	+5VDC
K	-5VDC
L	COM
M	COM
N	Hall B
P	Hall C
R	TS+
S	TS-
T	Hall A

ALL FSM

Motor Power Connector	
Pin	**Signal**
A	R
B	S
C	T
D	MOTOR CASE

Motor Brake Connector	
PIN	**SIGNAL**
A	BR+
B	BR-

HSM Low Inertia Brushless Servo Motors

Typical Applications

- "Smart" conveyors
- Packaging machinery
- Punch press/material feeding
- Robotic pick and place
- High duty cycle applications

Characteristics

- High acceleration and peak torques
- High speed point-to-point positioning
- Environmentally rugged

Standard Features

- Compact Design is mechanically interchangeable with the FSM400 and FSM600 motors
- Five frame sizes – twelve models
- Continuous torque from 5 to 450 lb-in (0.5 to 50 Nm)
- Speeds to 6000 RPM
- Neodymium-iron-boron permanent magnet rotors provide low inertias and high accelerations
- Internal thermal switch indicates overheating
- Motor mounted optical encoder includes 2000 quadrature pulses, index pulse and standard commutation channels for trapezoidal drives
- Watertight MS connections are compatible with standard cable assemblies; in addition, the extruded aluminum housing and environmental connectors provide an IP65 package (with the addition of the optional shaft seal kit)
- Economical, compact design ready for harsh environments
- Optional spring-set holding brakes available with 24 VDC or 90 VDC windings
- Axially trapped front bearing (in a steel insert in H-4000, H-6000 and H-8000 series) for long life at high speeds
- Vibration: 2.5 g peak 30-2000 H
- Shock: 10.0 g peak 6 msec duration
- UL recognized

HSM Motor And Performance Data

Motor Model	HSM205		HSM307		HSM320		HSM430		HSM460		HSM490		HSM610		HSM620		HSM630		HSM835		HSM845	
Mechanical Data																						
Rotor Moment of Inertia	lb-in-s^2 .00013	kg-m^2 .000015	lb-in-s^2 .00027	kg-m^2 .000030	lb-in-s^2 .00072	kg-m^2 .000080	lb-in-s^2 .0022	kg-m^2 .00025	lb-in-s^2 .0041	kg-m^2 .00046	lb-in-s^2 .0060	kg-m^2 .00068	lb-in-s^2 .012	kg-m^2 .0014	lb-in-s^2 .021	kg-m^2 .0024	lb-in-s^2 .030	kg-m^2 .0034	lb-in-s^2 .056	kg-m^2 .0063	lb-in-s^2 .083	kg-m^2 .0094
Rot. Mom. of In (Brake Motors)	-	-	.00034	.000038	.00079	.000089	.0029	.00033	.0048	.00054	.0067	.00076	.015	.0017	.024	.0027	.033	.0037	.082	.0093	.109	.012
Motor Net Weight	lb 4.9	kg 2.2	lb 5.8	kg 2.6	lb 8.4	kg 3.8	lb 13.7	kg 6.2	lb 20.1	kg 9.1	lb 26.9	kg 12.2	lb 40.4	kg 18.3	lb 59.4	kg 27.0	lb 76.8	kg 34.8	lb	kg	lb 123.6	kg 56.1
Damping	lb-in/ kRPM .06	Nm/ kRPM .007	lb-in/ kRPM .09	Nm/ kRPM .010	lb-in/ kRPM .12	Nm/ kRPM .014	lb-in/ kRPM .30	Nm/ kRPM .034	lb-in/ kRPM .40	Nm/ kRPM .045	lb-in/kRPM .60	Nm/ kRPM .068	lb-in/kRPM .90	Nm/kRPM .10	lb-in/kRPM 1.4	Nm/kRPM .16	lb-in/kRPM 1.7	Nm/kRPM .19	lb-in/kRPM 3.4	Nm/kRPM .38	lb-in/kRPM 3.8	Nm/kRPM .43
Friction Torque	lb-in .12	Nm .014	lb-in .12	Nm .014	lb-in .25	Nm .028	lb-in .30	Nm .034	lb-in .60	Nm .068	lb-in 1.2	Nm .14	lb-in 1.2	Nm .14	lb-in 2.1	Nm .24	lb-in 3.2	Nm .36	lb-in 2.8	Nm .32	lb-in 3.5	Nm .40
Winding Data																						
Sine Wave K_T Torque Constant @ 25°C[1]	lb-in/A 1.17	Nm/A .13	lb-in/A 2.5	Nm/A .28	lb-in/A 2.5	Nm/A .28	lb-in/A 4.4	Nm/A .50	lb-in/A 4.4	Nm/A .50	lb-in/A 6.6	Nm/A .74	lb-in/A 6.0	Nm/A .68	lb-in/A 5.8	Nm/A .66	lb-in/A 6.2	Nm/A .70	lb-in/A 7.6	Nm/A .86	lb-in/A 8.2	Nm/A .92
Sq Wave K_T Torque Constant @ 25°C[2]	1.3	.14	2.7	.31	2.7	.31	4.8	.54	4.8	.54	7.2	.81	6.6	.74	6.4	.72	6.8	.77	8.3	.94	9.0	1.0
KE Voltage Constant[3]	16 V/kRPM		34 V/kRPM		343 V/kRPM		60 V/kRPM		60 V/kRPM		90 V/kRPM		82 V/kRPM		80 V/kRPM		85 V/kRPM		104 V/kRPM		112 V/kRPM	
Winding Resistance Ph to phase @ 25°C	2.6 ¾		6.6 ¾		1.3 ¾		2 ¾		0.69 ¾		0.90 ¾		0.49 ¾		0.18 ¾		0.12 ¾		0.13 ¾		0.10 ¾	
Winding Inductance Phase to phase	4.1 mH		12 mH		3.4 mH		9 mH		3.3 mH		5.4 mH		4.4 mH		2.2 mH		1.2 mH		2.5 mH		2.4 mH	
Thermal Resistance[4]	1.45°C/watt		1.2°C/watt		0.89°C/watt		0.79°C/watt		0.57°C/watt		0.48°C/watt		0.34°C/watt		0.31°C/watt		0.24°C/watt		0.23°C/watt		0.21°C/watt	

[1]Peak value of per phase sine wave amps

[2]Peak value of per phase square wave amps

[3]Peak value of sinusoidal phase to phase Volts

[4]At 125° C winding temperature, in a 40° C ambient, Motors 307, 320 mounted on .25" x 10" x 10", motors 430, 460, 490 mounted on 0.5" x 12" x 12", Motors 610, 620, 630, 835, 850 mounted on 1" x 12" x 12" aluminum heat sink

[5]With 230 VAC line voltage input

HSM Motor And Performance Data (Continued)

System Ratings[8]		HSM205		HSM307		HSM320		HSM430		HSM460		HSM490		HSM610		HSM620		HSM630		HSM835		HSM845	
Centurion Micro DSM Drive Line	(Sinusoidal Current)			DSM015		DSM030		DSM030															
	Max. Cont. Operating Speed[5]	N/A		5000 RPM		5000 RPM		4000 RPM		N/A		N/A		N/A		N/A		N/A		N/A		N/A	
		lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	Continuous Stall Torque[4,]	-	-	7	0.79	20	2.26	30	3.39	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Peak Torque[9]	-	-	22	2.49	44	4.97	73	8.25	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Centurion DSM100 Drive Line	(Sinusoidal Current)	DSM110		DSM110		DSM120		DSM120		DSM130/175		DSM130/175		DSM175/ 1150		DSM175		DSM1150		DSM1150		DSM1150	
	Max. Cont. Operating Speed[5]	6000 RPM		5000 RPM		5000 RPM		4000 RPM		4000/4000 RPM		3000/3000 RPM		3000 RPM		3000 RPM		3000 RPM		2000 RPM		2000 RPM	
		lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	Continuous Stall Torque[4,]	5.0	0.56	7.0	0.79	20	2.26	30	3.39	60/60	6.78/ 6.78	88/88	9.9/9.9	100	11.30	190/ 216	21.4/ 24.4	325	36.7	350	39.55	450	50.85
	Peak Torque	11	1.24	22	2.48	44	4.97	73	8.2	120/ 190	13.5/ 21.47	180/270	19.8/ 122.7	225	25.42	360/ 480	40.7/ 54.2	700	79.1	620	70.06	1100	124.3
Centurion ASM100 Drive Line	(Square Wave Current)	AS110		AS110		AS120		AS120		AS130		AS130		N/A		N/A		N/A		N/A		N/A	
	Max. Cont. Operating Speed[5]	6000 RPM		3500 RPM		3500 RPM		2000 RPM		2000 RPM		1500 RPM		N/A		N/A		N/A		N/A		N/A	
		lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm	lb-in	Nm
	Continuous Stall Torque[4,]	4.75	.53	6.65	.75	19	2.15	28.5	3.22	57	6.44	85.5	9.66	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Peak Torque	16	1.8	26	2.9	60	6.78	100	11.3	120	13.5	175	19.7	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

[1]Peak value of per phase sine wave amps

[2]Peak value of per phase square wave amps

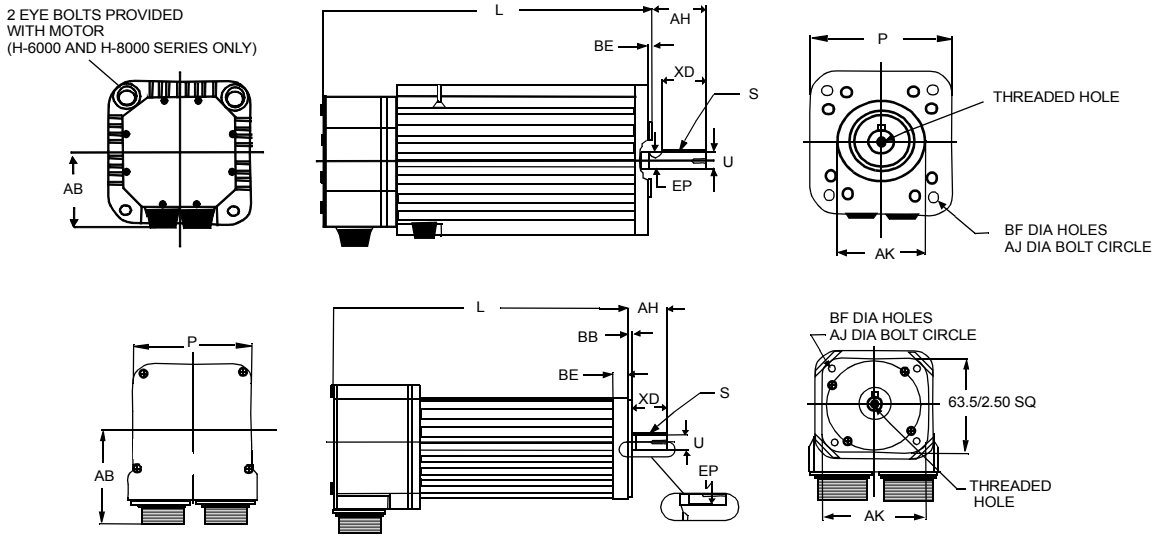
[3]Peak value of sinusoidal phase to phase Volts

[4]At 125° C winding temperature, in a 40° C ambient, Motors 307, 320 mounted on .25” x 10” x 10”, motors 430, 460, 490 mounted on 0.5” x 12” x 12”, Motors 610, 620, 630, 835, 850 mounted on 1” x 12” x 12” aluminum heat sink

[5]With 230 VAC line voltage input

HSM Standard Motor Dimensions

HSM300, HSM400, HSM600, HSM800



Shaft End Threaded Hole

Motor	Thread	Thread Depth
HSM200	M3 x 0.5mm	10mm/.39in
HSM300	M4 x 0.7mm	10mm/.39in
HSM400	M6 x 1.0mm	15mm/.59in
HSM600	M8 x 1.25mm	20mm/.79
HSM800	M8 x 1.25mm	20mm/.79in

NOTE: Motors manufactured to millimeter dimensions.

Model	AB	AH	AJ	AK	BB	BE	BF
	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in	mm/in
HSM205	75/2.95	23/0.93[3]	75/2.95	60/2.36[1]	2.4/0.09[4]	15.2/.60	5.8/0.23
HSM307	75/2.95	30/1.18[3]	100/3.94	80/3.15[1]	3/.12[4]	10.9/.43	7/.28
HSM320	75/2.95	30/1.18[3]	100/3.94	80/3.15[1]	3/.12[4]	10.9/.43	7/.28
HSM430	76/3.00	50/1.97[3]	145/5.71	110/4.33[5]	3/.12[4]	15.5/.61	10/.39
HSM460	76/3.00	50/1.97[3]	145/5.71	110/4.33[5]	3/.12[4]	15.5/.61	10/.39
HSM490	76/3.00	50/1.97[3]	145/5.71	110/4.33[5]	3/.12[4]	15.5/.61	10/.39
HSM610	101/4.00	80/3.15[3]	200/7.87	114.3/4.50[5]	4/.16[4]	21.3/.84	13.5/.53
HSM620	101/4.00	80/3.15[3]	200/7.87	114.3/4.50[5]	4/.16[4]	21.3/.84	13.5/.53
HSM630	101/4.00	80/3.15[3]	200/7.87	114.3/4.50[5]	4/.16[4]	21.3/.84	13.5/.53
HSM835	112/4.41	85/3.35[3]	265/10.43	230/9.06[8]	4/.16[4]	22.4/.88	15/.59
HSM845	112/4.41	85/3.35[3]	265/10.43	230/9.06[8]	4/.16[4]	22.4/.88	15/.59
Model	**EP**	**L**	**L Brake**	**P**	**S**	**U**	**XD**
HSM205	12/0.47	197/7.7	-	80/3.15	4x4/.16x.16	11/0.43[2]	18/0.71
HSM307	15/0.59	172/6.77	211/8.31	89/3.50	5x5/.20x.20	14/0.55[2]	20/0.79
HSM320	15/0.59	223/8.77	262/10.31	89/3.50	5x5/.20x.20	14/0.55[2]	20/0.79
HSM430	20/0.79	213/8.39	266/10.47	121/4.76	6x6/.24x.24	19/075[6]	40/1.57
HSM460	20/0.79	264/10.39	317/12.48	121/4.76	6x6/.24x.24	19/075[6]	40/1.57
HSM490	20/0.79	315/12.40	368/14.49	121/4.76	6x6/.24x.24	19/075[6]	40/1.57
HSM610	38/1.50	277/10.91	330/12.99	178/7.01	10x8/.39x.31	35/1.38[7]	60/2.36
HSM620	38/1.50	353/13.90	406/15.98	178/7.01	10x8/.39x.31	35/1.38[7]	60/2.36
HSM630	38/1.50	429/16.89	482/17.40	178/7.01	10x8/.39x.31	35/1.38[7]	60/2.36
HSM835	45/1.77	375/14.76	478/18.82	241/9.49	12x8/.47x.31	42/1.65[7]	60/2.36
HSM845	45/1.77	426/16.77	529/20.83	241/9.49	12x8/.47x.31	42/1.65[7]	60/2.36

[1]Tolerance is -0.03/-0.0012 [2]Tolerance is -0.01/-0.0004 [3]Tolerance is +/- 0.5/ +/- 0.0196 [4] Tolerance is +/- 0.2 / +/-0.0079 [5]Tolerance is -0.035/-0.0014
[6]Tolerance is -0.013/-0.0051 [7] Tolerance is -0.16/-0.006 [8]Tolerance is -0.46/-0.0181
Motors are manufactured to millimeter dimensions shown. Inch dimensions shown are approximate conversions from millimeters.
For further motor detail, engineering specification drawings are available upon request.

HSM Motor And Connector Ordering Information

Ordering options include the following:

- 24 or 90 VDC Brake (Consult factory for brake motor availability)
- Encoder Line Count* - 1,000, 2,000, or 5,000** line
- Various NEMA style frame sizes

Consult the factory for information on any of these items.

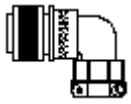
*NOTE: Optional configurations or encoder line counts have extended lead times and additional charges.

**NOTE: 5000 Line count encoder motor top speed is limited to 3600 RPM due to frequency output limit of encoder. Check drive system configuration data for any additional restrictions imposed by drive input.

NOTE: All options are not available.

NOTE: Above mating connector kits are not CE compliant. Please contact the factory for more information.

Motor Mating Connectors

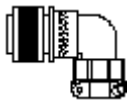


Straight	Motor	Right Angle
M.1015.7798 (old # 401-34269-00)	**HSM200 & HSM300**	M.1015.7799 (old # 401-34269-90)
M.1015.7801 (old # 401-34270-00)	**HSM400**	M.1015.7802 (old # 401-34270-90)
M.1015.7804 (old # 401-34271-00)	**HSM600**	M.1015.7805 (old # 401-34271-90)
M.1015.7807 (old # 401-34272-00)	**HSM800**	M.1300.3509 (old # 401-34272-90)

Brake Power Connectors

Straight
M.1015.7813
(old # 401-34276-00)

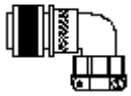
Right Angle
M.1015.7815
(old # 401-34276-90)



Encoder Feedback Connectors

Straight
M.1015.7808
(old # 401-34273-00)

Right Angle
M.1015.7809
(old # 401-34273-90)



HSM Motor Shaft Seal Kits

HSM200:	M.1300.3484 (old # 401-30225-00)
HSM300:	M.1007.0803 (old # 401-30226-00)
HSM400	M.1015.6923 (old # 401-30227-00)
HSM600	M.1015.6924 (old # 401-30228-00)
HSM800	M.1300.3485 (old # 401-30229-00)

Shaft seals generally require the presence of a lubricant to reduce premature wear.

HSM200, 300, 400, 600, 800 Connector Data

Motor Encoder Connector	
Pin	**Signal**
A	A+
B	A-
C	B+
D	B-
E	I+
F	I-
G	Encoder Case
H	ABS
J	+5VDC
K	-5VDC
L	COM
M	COM
N	Hall B
P	Hall C
R	TS+
S	TS-
T	Hall A

ALL HSM Connector Data

Motor Power Connector	
Pin	**Signal**
A	R
B	S
C	T
D	Motor Case

Motor Brake Connector (Option)	
Pin	**Signal**
A	BR+
B	BR-

SSM REPLACEMENT

Note: HSM motors only are shown in this catalog. For motors interchangeable with the SSM ABS encoder signals, contact our factory.

Application Guidelines For HSM, FSM, YSM, NSM Brake Motors

Brake Operation

The brakes offered as options in Giddings & Lewis motors are designed for holding the motor shaft at 0 RPM, up to the rated brake holding torque. The brakes are spring-set type and release when voltage is applied to the brake coil.

The brakes are not designed for stopping rotation of the motor shaft.

The primary method of stopping motor shaft rotation is to command the servo drive to decelerate the motor to 0 RPM. Servo drive inputs Command, Forward Enable, and Reverse Enable can be used to stop motor shaft rotation per timing and connection examples shown below.

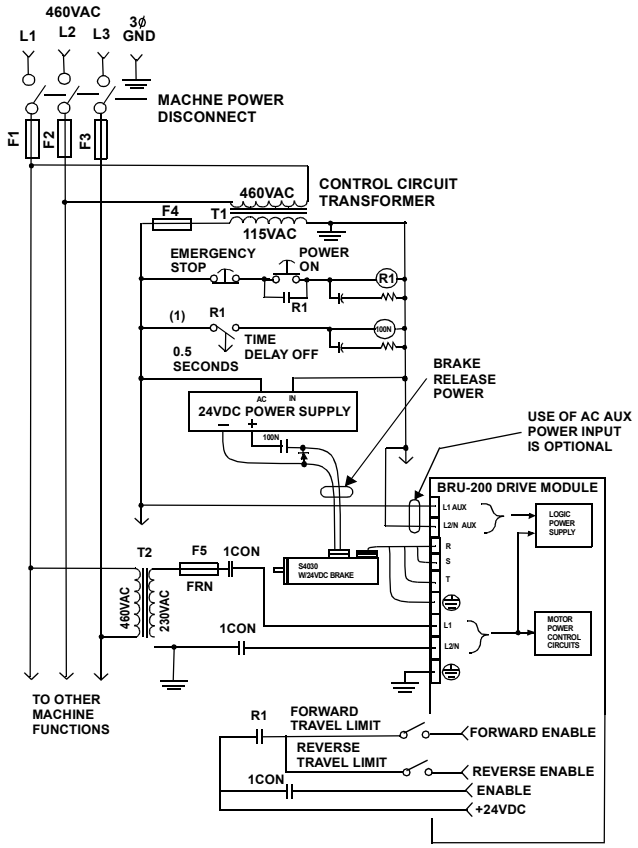
The brakes provided can withstand occasional use as stopping brakes for system main power failures which may occur.

Repeated use of these brakes as stopping brakes will increase brake pad wear, increase rotational mechanical backlash, and reduce brake life.

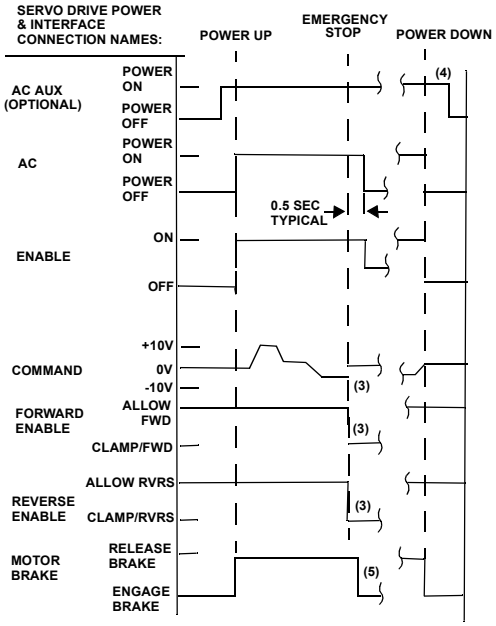
For an Emergency Stop condition, the servo drive should be used to decelerate the motor to 0 RPM before engaging the brake.

The brake should not be engaged until the servo drive has decelerated the motor to 0 RPM for an Emergency Stop condition.

Machine Wiring Example Showing Connections to DSM Drive Module



Power Up/Down Timing Examples of External Connections to DSM Drive Module



This drawing is intended as an example only. It does not show all interlocks required for safe operation of the equipment.

(1) Time delay off contacts allow time for drive module to decelerate motor to 0 RPM before power to motor control circuits is removed.

(2) Relay R1 contacts may be connected to Forward and Reverse Enable interface circuits as shown when no position controller is used. When the BRU-200 is used with a PRO-Series or CNC Position Controller, these R1 contacts would be connected to the position controller emergency stop input.

(3) For emergency stop, Command should be immediately set to 0.0 VDC and/or Forward and Reverse Enable inputs set to clamp, to decelerate motor to 0 RPM before power to drive module is removed.

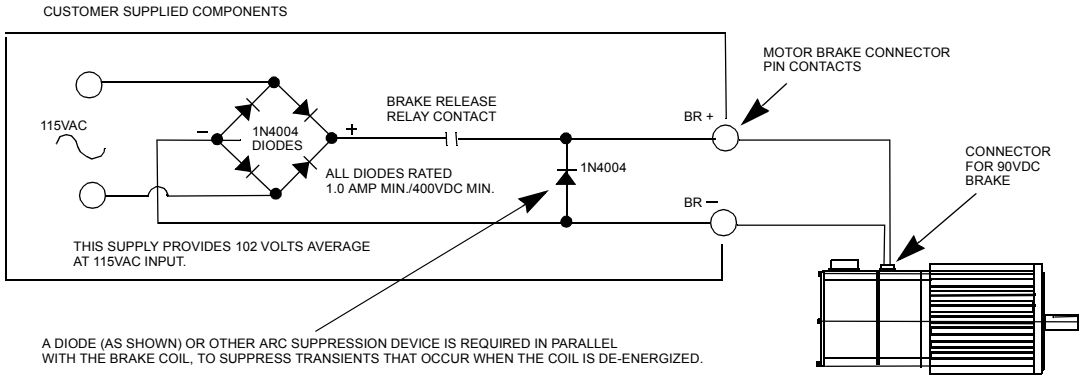
(4) The only requirement for non-emergency power down sequence is to insure that the motor shaft is at 0 RPM before engaging the optional motor brake.

(5) The brake available as an option on H-Series and F-Series motors is a holding brake, and is not rated for repeated use as a stopping brake.

Brake Data For HSM and FSM Motors

Motor	Maximum Back-lash (Brake Engaged)	Holding Torque (LB/IN)	Holding Torque NM	Coil Current at 24VDC	Coil Current at 90VDC
HSM300	1 degree, 30 minutes	20	2.26	0.6 ADC	0.21 ADC
HSM400, FSM400	44 minutes	90	10.2	0.88 ADC	0.26 ADC
HSM600, FSM600	29 minutes	300	22.6	1.13 ADC	0.33 ADC
HSM800	21 minutes	450	50.8	2.2 ADC	0.62 ADC

BRAKE VOLTAGE TOLERANCE: 24 VDC: 21.6 TO 27.6 VDC 90 VDC: 85 TO 115 VDC. DC or rectified AC voltage may be used to energize the brake coil.



Standard Motor Radial Load Force Ratings For HSM and FSM Motors

(Loads applied at center of shaft) For 20,000 HR Bearing Life

	500 RPM		1000 RPM		2000 RPM		3000 RPM		4000 RPM		5000 RPM		6000 RPM	
	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg	lb	kg
NSM2302	17	8	16	7	14	6	12	6	11	5	9	4	8	3
NSM2304	19	9	17	8	15	7	14	6	12	5	10	5	8	4
NSM3406	103	47	82	37	65	29	56	26	51	23	48	22	45	20
HSM205	105	47.7	84	38.2	66	30.0	58	26.4	53	24.1	49	22.3	45	20.5
HSM307	113	51.4	90	40.9	71	32.3	62	28.2	56	25.5	53	24.1		
NSM3412	113	51	89	40	71	32	62	28	56	26	53	24	49	22
HSM320	126	57.3	101	45.9	79	21.6	69	31.4	63	28.6	59	26.8		
NSM4214	137	62	109	49	86	39	76	34	68	31	64	29		
NSM4220	146	66	116	52	92	41	80	36	73	33	68	31		
HSM430	169	76.8	152	69.1	120	54.5	105	47.7	95	43.2				
NSM5630	188	85	149	67	118	53	103	47	94	43				
NSM5637	197	89	156	71	124	56	108	49	98	45				
FSM430	203	92.3	161	73.2	129	58.6	113	51.4	101	45.9				
NSM5647	203	92	161	73	128	58	112	51						
HSM460	205	93.2	164	74.5	129	58.6	113	51.4	103	46.8				
FSM460	229	104.1	184	83.6	144	65.5	126	57.3	116	52.7				
HSM490	215	97.7	173	78.6	137	62.3	118	53.6	108	49.1				
FSM490	244	110.9	194	88.2	154	70.0	133	60.5	121	55.0				
HSM610	435	197.7	345	156.8	274	124.5	240	109.1						
FSM610	428	194.5	341	155.0	268	121.8	236	107.3						
HSM620	469	213.2	375	170.5	296	134.5	259	117.7						
FSM620	465	211.4	368	167.3	293	133.2	255	115.9						
HSM630	495	225.0	390	177.3	311	141.4	270	122.7						
FSM630	495	225.0	390	177.3	311	141.4	270	122.7						
HSM835	495	225.0	394	179.1	311	141.4								
HSM845	518	235.4	413	187.7	326	148.2								

Radial Load Force - lbs (Kg) applied at center

NOTE: Motors are capable of carrying an axial load in most applications per the following general guidelines which should be used only as an approximation. Please consult with Giddings & Lewis to discuss your application loads to ensure the proper selection of motors.

- When motor shaft has no radial load, Axial load rating = 100% of radial load rating from table above.
- When motor shaft has both a radial load and an axial load, axial load rating = 44% of radial load rating from table above.