

GE  
Intelligent Platforms

# Motion Solutions

Flexible Solutions for  
Improved Machine Productivity

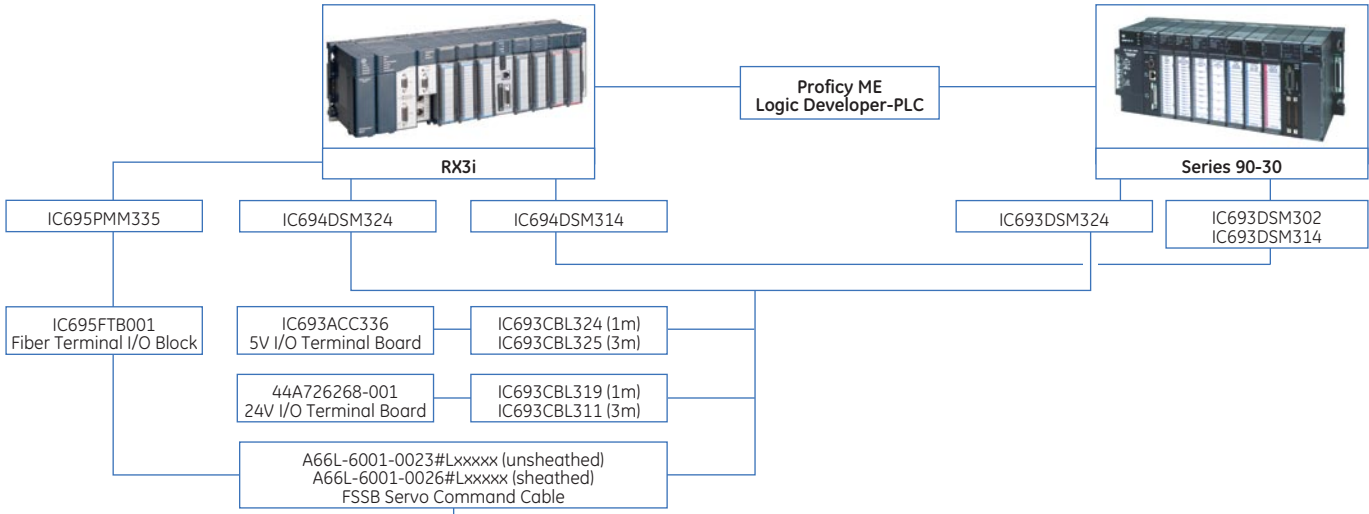


imagination at work

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## FANUC Digital Servos



### βi SERIES

- Motors** (cont-peak torque)
- β0.4/5000is (0.4-1 Nm)
  - β0.5/6000is (0.65-2.5 Nm)
  - β1/6000is (1.2-5 Nm)
  - β2/4000is (2-7 Nm)
  - β4/4000is (3.5-10 Nm)
  - β8/3000is (7-15 Nm)
  - β12/3000is (11-27 Nm)
  - β22/2000is (20-45 Nm)
- Amplifier Kits**
- IC800BIK020
  - IC800BIK020
  - IC800BIK020
  - IC800BIK040
  - IC800BIK040
- Encoder Cables**  
(Straight x=0; Right Angle x=7)
- CFDA-xWPB-0070-AZ (7m)
  - CFDA-xWPB-0070-AZ (7m)
  - CFDA-xWPB-0070-AZ (7m)
  - CFDA-xWPB-0070-AZ (7m)
  - CFDA-xWPB-0070-AZ (7m)
  - CFDA-xWPB-0070-AZ (7m)
  - CFDA-xWPB-0140-AZ (14m)
  - CFDA-xWPB-0140-AZ (14m)
  - CFDA-xWPB-0140-AZ (14m)
  - CFDA-xWPB-0140-AZ (14m)
  - CFDA-xWPB-0140-AZ (14m)
  - CFDA-xWPB-0140-AZ (14m)
- Power Cables**  
(Standard x=P; Shielded x=E)
- CP8B-1WxB-0070-AZ (7m)
  - CP3B-0WxB-0070-AZ (7m)
  - CP5B-0WxB-0070-AZ (7m)
  - CP6B-0WxB-0070-AZ (7m)
  - CP8B-1WxB-0140-AZ (14m)
  - CP3B-0WxB-0140-AZ (14m)
  - CP5B-0WxB-0140-AZ (14m)
  - CP6B-0WxB-0140-AZ (14m)
- Power & Brake Cable**  
(Standard x=P; Shielded x=E)
- CP9B-0WxB-0070-AZ (7m)
  - CP9B-0WxB-0140-AZ (14m)
- Brake Cables** (Optional)
- CB6N-5WPM-0070-AZ (7m)
  - CB4N-0WPM-0070-AZ (7m)
  - CB4N-0WPM-0070-AZ (7m)
  - CB4N-0WPM-0070-AZ (7m)
  - CB6N-5WPM-0140-AZ (14m)
  - CB4N-0WPM-0140-AZ (14m)
  - CB4N-0WPM-0140-AZ (14m)
- Encoder Battery** (Optional)
- Built-In (I-axis) Panel Mounted\*
  - IC800BBK021 IC800ABK001
  - IC800BBK021 IC800ABK001
  - IC800BBK021 IC800ABK001
  - IC800BBK021 IC800ABK001
  - IC800BBK021 IC800ABK001



### βHv SERIES

- Motors** (cont-peak torque)
- β2/4000is (2-7 Nm)
  - β4/4000is (3.5-10 Nm)
  - β8/3000is (7-15 Nm)
  - β12/3000is (11-27 Nm)
  - β22/2000is (20-45 Nm)
- Amplifier Kits**
- IC800BIHV010
  - IC800BIHV010
  - IC800BIHV020
  - IC800BIHV020
- Encoder Cables**  
(Straight x=0; Right Angle x=7)
- CFDA-xWPB-0070-AZ (7m)
  - CFDA-xWPB-0070-AZ (7m)
  - CFDA-xWPB-0070-AZ (7m)
  - CFDA-xWPB-0140-AZ (14m)
  - CFDA-xWPB-0140-AZ (14m)
  - CFDA-xWPB-0140-AZ (14m)
  - CFDA-xWPB-0140-AZ (14m)
- Power Cables**  
(Standard x=P; Shielded x=E)
- CP31-0WxB-0070-AZ (7m)
  - CP31-0WxB-0070-AZ (7m)
  - CP41-0WxB-0070-AZ (7m)
  - CP31-0WxB-0140-AZ (14m)
  - CP41-0WxB-0140-AZ (14m)
- Power & Brake Cable**  
(Standard x=P; Shielded x=E)
- CP21-0WxB-0070-AZ (7m)
  - CP21-0WxB-0140-AZ (14m)
- Brake Cables** (Optional)
- CB4N-0WPM-0070-AZ (7m)
  - CB4N-0WPM-0070-AZ (7m)
  - CB4N-0WPM-0070-AZ (7m)
  - CB4N-0WPM-0140-AZ (14m)
  - CB4N-0WPM-0140-AZ (14m)
  - CB4N-0WPM-0140-AZ (14m)
- Encoder Battery** (Optional)
- IC800BBK021
  - IC800BBK021
  - IC800BBK021
  - IC800BBK021



### αHv SERIES

- Motors** (cont-peak torque)
- α2/6000HVis (2-6 Nm)
  - α2/6000HVis (2-6 Nm)
  - α4/5000HVis (4-8.8 Nm)
  - α4/5000HVis (4-8.8 Nm)
  - α8/6000HVis (8-22 Nm)
  - α8/6000HVis (8-22 Nm)
  - α12/4000HVis (12-46 Nm)
  - α12/4000HVis (12-46 Nm)
  - α22/3000HVis (22-64 Nm)
  - α22/3000HVis (22-64 Nm)
  - α22/4000HVis (22-70 Nm)
  - α30/4000HVis (30-100 Nm)
  - α40/4000HVis (40-115 Nm)
  - α50/3000HVis (75-215 Nm)
- Amplifier Kits**
- IC800BIHV010
  - IC800BIHV040
  - IC800AIHV010
  - IC800AIHV040
  - IC800AIHV080
  - IC800AIHV180
- Dynamic Braking Module**
- ZA06B-6079-H401
- Encoder Cables**  
(Straight x=0; Right Angle x=3)
- CFDA-xWPB-0070-AZ (7m)
  - CFDA-xWPB-0070-AZ (7m)
  - CFDA-xWPB-0070-AZ (7m)
  - CFDA-xWPB-0070-AZ (7m)
  - CFDA-xWPB-0070-AZ (7m)
  - CFDA-xWPB-0140-AZ (14m)
  - CFDA-xWPB-0140-AZ (14m)
  - CFDA-xWPB-0140-AZ (14m)
  - CFDA-xWPB-0140-AZ (14m)
  - CFDA-xWPB-0140-AZ (14m)
  - CFDA-xWPB-0140-AZ (14m)
- Power Cables**  
(Standard x=P; Shielded x=E)
- CP21-0WxB-0070-AZ (7m)
  - CP21-0WxB-0070-AZ (7m)
  - CP31-0WxB-0070-AZ (7m)
  - CP31-0WxB-0070-AZ (7m)
  - CP41-0WxB-0070-AZ (7m)
  - CP41-0WxB-0070-AZ (7m)
  - CP91-0MxB-0070-AZ (7m)
  - CP21-0WxB-0140-AZ (14m)
  - CP21-0WxB-0140-AZ (14m)
  - CP31-0WxB-0140-AZ (14m)
  - CP31-0WxB-0140-AZ (14m)
  - CP41-0WxB-0140-AZ (14m)
  - CP41-0WxB-0140-AZ (14m)
  - CP41-0WxB-0140-AZ (14m)
  - CP91-0MxB-0140-AZ (14m)

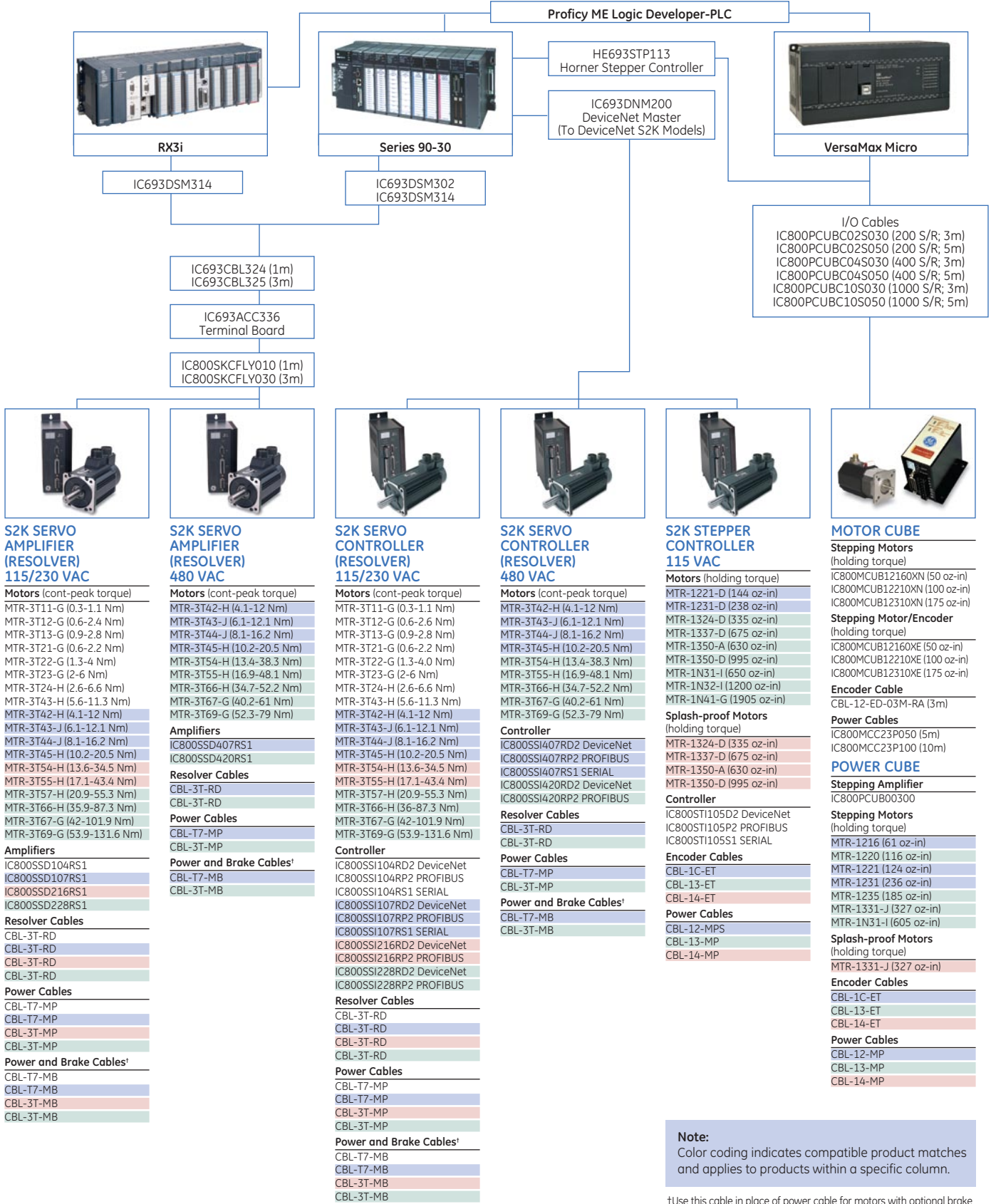
### αHv SERIES (con't)

- Brake Cables** (Optional)
- CB4N-0WPM-0070-AZ (7m)
  - CB4N-0WPM-0070-AZ (7m)
  - CB4N-0WPM-0070-AZ (7m)
  - CB4N-0WPM-0070-AZ (7m)
  - CB4N-0WPM-0140-AZ (14m)
  - CB4N-0WPM-0140-AZ (14m)
  - CB4N-0WPM-0140-AZ (14m)
  - CB4N-0WPM-0140-AZ (14m)
- Encoder Battery** (Optional)
- Built-In (I-axis) Panel Mounted\*
  - IC800BBK021 IC800ABK001
  - IC800BBK021 IC800ABK001
  - IC800BBK021 IC800ABK001
  - IC800BBK021 IC800ABK001
  - IC800BBK021 IC800ABK001
  - IC800BBK021 IC800ABK001
- Power Supply Kits**
- IC800PSHV011 (11kW)
  - IC800PSHV018 (18kW)
  - IC800PSHV030 (30kW)
  - IC800PSHV045 (45kW)

**Note:**  
Color coding indicates compatible product matches and applies to products within a specific series.

\*Each panel mounted battery pack can support up to 6 encoders  
†One PSM power supply can support up to six αHv amplifiers depending on the motor ratings. The power supply must be sized to match to system power requirements. See the section "Selecting a Power Supply" on page 73.

## Analog Servos and Steppers



# Motion Controllers

GE offers motion controllers for a broad range of applications and system configurations providing the flexibility to choose a system that optimizes performance and investment cost. Regardless of your requirements, GE has a motion controller to meet your requirements, from simple point-to-point indexing to complex multi-axis machine control.

## PACMotion Series

The PACMotion multi-axis motion controller, matched with world class FANUC digital servos, is designed to deliver unsurpassed machine productivity required for today's high-speed machines and lean manufacturing environments. Hosted by the powerful PACSystems RX3i controller, PACMotion is part of a complete automation control solution. Page 5

## DSM300 Series

The DSM300 series are multi-axis servo motion controller modules for the PACSystems® RX3i and Series 90®-30 PLCs. The DSM300 series can control FANUC digital servos or analog servos such as the VersaMotion series. Page 17

## S2K Series

The S2K series are stand-alone motion controllers available for brushless servo and stepping motor control and include an integral AC power supply and servo amplifier. Page 20



Feature	PACMotion	DSM300	S2K
Architecture	PAC-based	PLC-based	Stand-alone
Number of Axes	Up to 4 FANUC Digital Servos	DSM302: 2 Digital, 2 Analog DSM314: 2 Digital, 4 Analog DSM324: 4 Digital (Fiber Optic)	1
Dedicated Master Axis	Virtual or Incremental Encoder	No	No
Servo Command Interface	Fiberoptic	Fiberoptic/GEF Digital/Analog Velocity/Analog Torque	n/a
Position Feedback Type	Serial Encoder	Serial Encoder/Quadrature Encoder	Resolver
Motor Feedback Resolution (counts/rev)	64K, 128K, 1M	8K	4K
Motion Logic Program	Interrupt Driven Task in PAC	Separate Program in Module	Separate Program in Module
PAC/PLC High Speed Interrupts	3 (time or event)	No	n/a
Motion Program	Integrated Function Blocks or Structured Text	Separate Text Program	Separate Text Program
Motion Types			
Incremental Moves	Yes	Yes	Yes
Absolute Moves	Yes	Yes	Yes
Synchronized Start	Up to 8 axes	2 axes	No
Delayed Start	Up to 8 axes	No	No
Superimposed Motion	Yes	Yes	Yes
Jogging	Yes	Yes	Yes
Homing	Yes	Yes	Yes
Acc/Dec	Linear/ Programmable Jerk	Linear/Fixed Jerk	Linear/Fixed Jerk
Cam Function	Advanced	Basic	Basic
Cam Queuing	Yes	No	No
Cam Scaling	Master and Slave	No	No
Cam Phase Correction	Yes	Yes	No
Normalized Cam Profiles	Yes	No	No
Dynamic Cam Profile Changes	Yes	No	No
Cam Curve Fitting	1/2/3/5th order	1/2/3rd Order	1st Order
Ramping onto Cam Profile	Yes	No	No
Number of Cam Profiles	2048	99	1
Electronic Gearing (Follower)	Advanced	Basic	Basic
Digital Cam Switch	4 High Speed Outputs	No	No
Shortest Path Absolute Moves	Yes	No	No
Move Queuing and Blending	Advanced	Basic	Basic
Master/Slave Configuration	Up to 40 Axes over PLC Backplane	4-axes on module	Hardwired Encoder

## Motion Controllers

### PACMotion

#### PACMotion

The PACMotion controller is a versatile servo motion controller that combines the benefits of a highly integrated motion and machine logic solution with the performance, flexibility and scalability required for advanced machine automation. PACMotion is designed to deliver unsurpassed machine productivity required for today's high-speed machines and lean manufacturing environments. The 4-axis servo motion controller is built on a high performance hardware platform, with a new enhanced motion engine, operating system, and open standard integrated programming paradigm. Add to that world class reliability of FANUC servos and you have a motion system designed to give you the best productivity and accuracy possible.



#### Performance to Improve Machine Productivity

- Real-time synchronization of up to 40 axes
- Three high speed time-based or event-driven interrupts enable fast deterministic event response and synchronization
- Demand-driven data exchange model between the PACSystems RX3i CPU and PACMotion modules may significantly reduce scan time impact
- Digital cam switch (PLS) function with multi-track high-speed outputs with microsecond level response
- Reduced downtime with industry leading FANUC servos featuring MTBF ratings in excess of 400,000 hours
- Low MTTR FANUC servos require no tuning or parameter setting; over 5 million axes sold

#### Open and Integrated to Improve Engineering Productivity

- Single software development environment with shared tag database for logic, motion, I/O and operator interface
- Motion and machine logic in a common program greatly simplifies programming
- Motion function blocks and state model designed to comply with the PLCopen programming standard to reduce learning curve and training costs
- Buffer mode allows program logic to queue motion command sequences and specify or change the velocity transition between buffered moves on-the-fly
- Advanced diagnostic tools included in Proficy software speed diagnostics and machine time to market

#### Flexibility and Scalability

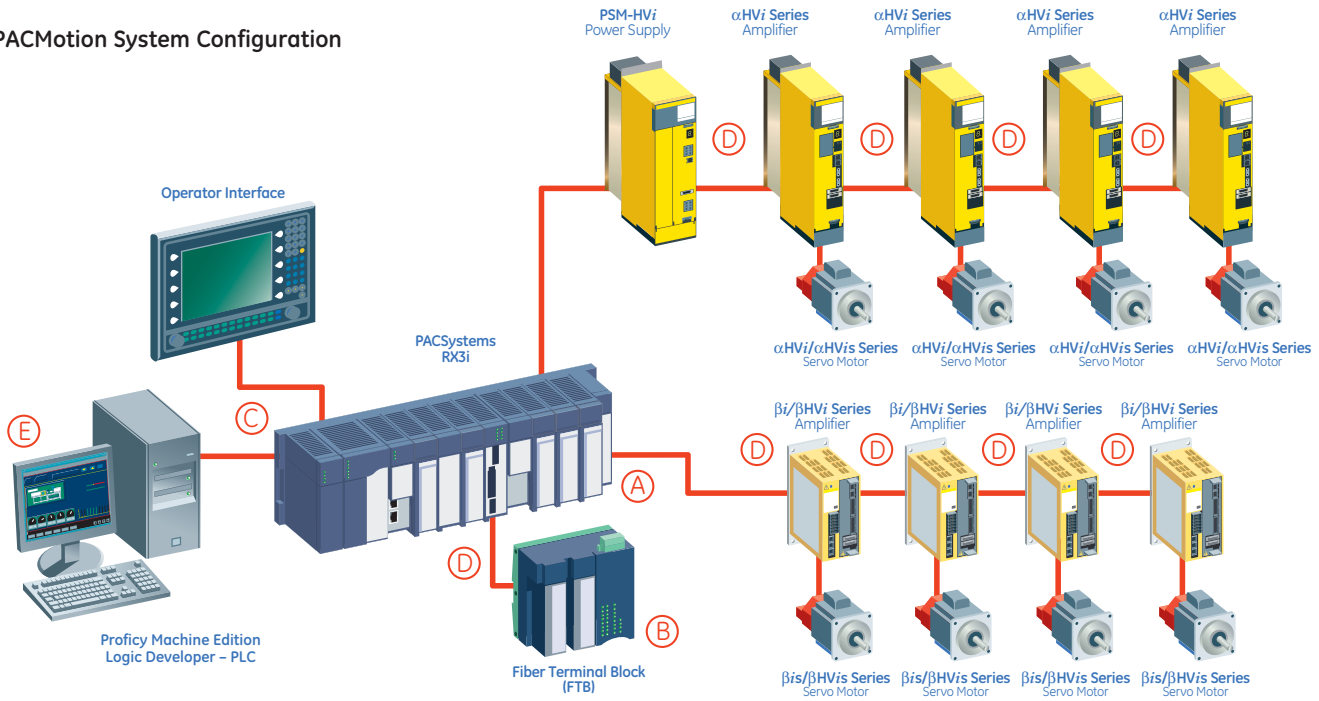
- Four servo axes per module; Up to 40 axes in a single PACSystems RX3i rack
- Built-in faceplate I/O and optional fiber I/O terminal block supports extensive user configurable digital and analog I/O
- Amplifiers and motion I/O can be physically distributed using noise immune fiber optic interfaces
- Virtual (time-based) or real (encoder) master axes over the backplane support advanced cam and electronic gearing applications for flexible electronic line shaft applications

## Motion Controllers

### PACMotion

Each PACMotion module can control up to 4 axes of GE  $\beta$ i,  $\beta$ HVi or  $\alpha$ HVi servos via a fiber optic command interface for superior noise immunity, especially in distributed systems. By combining the versatility of the GE PACSystems RX3i and QuickPanel operator interface products, GE provides customers with a complete integrated machine control solution. This single-source system results in such benefits as ease of integration and programming, shorter development cycles, and higher reliability.

#### PACMotion System Configuration



	Part Number	Description
A	IC695PMM335	PACMotion Motion Controller for RX3i
B	IC695FTB001	Optional Fiber Terminal Block (without terminal headers)
	IC695FTB1B032	Optional Fiber I/O Terminal Block (with screw terminal headers)
	IC695FTB1S032	Optional Fiber I/O Terminal Block (with spring clip terminal headers)
	IC695FTB1B132	Optional Fiber I/O Terminal Block (with extended shroud screw terminal headers)
	IC695FTB1S132	Optional Fiber I/O Terminal Block (with extended shroud spring clip terminal headers)
C	IC693CBL316	Serial Cable for Programming - 3m (1 per system)
D	ZA66L-6001-0023#L150R0	FSSB and FTB I/O Cable 0.15 Meter
	ZA66L-6001-0023#L300R0	FSSB and FTB I/O Cable 0.3 Meter
	ZA66L-6001-0023#L1R003	FSSB and FTB I/O Cable 1 Meter
	ZA66L-6001-0023#L2R003	FSSB and FTB I/O Cable 2 Meter
	ZA66L-6001-0023#L3R003	FSSB and FTB I/O Cable 3 Meter
	ZA66L-6001-0026#L1R003	FSSB and FTB I/O Cable Sheathed, 1 Meter
	ZA66L-6001-0026#L3R003	FSSB and FTB I/O Cable Sheathed, 3 Meter
	ZA66L-6001-0026#L5R003	FSSB and FTB I/O Cable Sheathed, 5 Meter
	ZA66L-6001-0026#L10R03	FSSB and FTB I/O Cable Sheathed, 10 Meter
	ZA66L-6001-0026#L20R03	FSSB and FTB I/O Cable Sheathed, 20 Meter
	ZA66L-6001-0026#L30R03	FSSB and FTB I/O Cable Sheathed, 30 Meter
	ZA66L-6001-0026#L50R03	FSSB and FTB I/O Cable Sheathed, 50 Meter
	ZA66L-6001-0026#L100R3	FSSB and FTB I/O Cable Sheathed, 100 Meter
	E	IC646MPP001
IC647MPP001		Logic Developer PLC Professional without GlobalCare. Complete with USB Hardware key
IC646MBP001		Machine Edition Professional Development Suite without GlobalCare. Complete with Software key
IC647MBP001		Machine Edition Professional Development Suite without GlobalCare. Complete with USB Hardware key

#### APPLICATIONS

- High-speed printing
- Packaging systems
- High-speed assembly
- Woodworking machinery
- Automotive assembly
- Material handling
- Web handling applications
- Infeed conveyors
- Labeling
- Filling

### PACMotion

#### PACMotion Controller Features

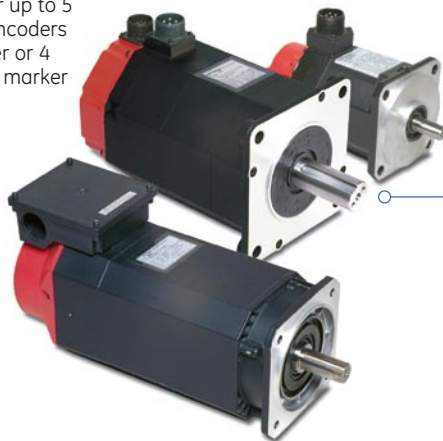
- Fast motion path (1ms) planning and position update rates (500µs) deliver improved accuracy and faster response to changing control requirements
- Unlike most PLC-based motion, PACMotion delivers consistent motion update rate regardless of the number of axes
- High reliability FANUC servos improve machine uptime
- High speed synchronization of up to 40 axis over the PACSystems RX3i backplane
- Advanced cam and gearing features for electronic line shaft applications
- Single software development environment for complete automation control solution simplifies programming
- Distributed architecture for greater machine flexibility—up to 100 meters between axes using noise immune fiber cables
- Optional Fiber Terminal Block allows distributed motion centric I/O to reduce wiring complexity and cost
- Two high-speed position capture inputs per axis for registration and sequence control

Unlimited master/slave synchronization of any axis to any other axis over the PACSystems RX3i backplane

Synchronized or delayed start of up to any 8 axes

#### Optional Fiber Terminal Block I/O

- DIN rail mounting
- Remote mount up to 100 meters
- 5V/24V/Analog I/O
- Unique ID prevents connection to wrong PACMotion module
- Configurable I/O functions can be assigned to each point
- Connection for up to 5 incremental encoders without marker or 4 encoders with marker pulse



Axis and Status LEDs

Hot-swap module in PACSystems RX3i rack

Fiber optic servo interface (up to 4 axes)

8 on-board 24V I/O

Fiber optic I/O interface

High density plug-on wiring headers available with spring clip or screw terminals and extended shroud (ordered separately)

#### βi and βHVi Servos

- 0.4 to 22 Nm cont. torque range
- 230 and 460 VAC models
- Noise immune fiber optic interface
- Absolute feedback with optional battery
- 64K or 128K count/rev serial encoder
- Optional holding brake

#### αHVi and αHVIs Series Servos

- 2 to 75 Nm cont. torque range
- 460 VAC line regenerative power supplies
- Noise immune fiber optic interface
- Absolute feedback with optional battery
- 1M count/rev serial encoder
- Optional holding brake



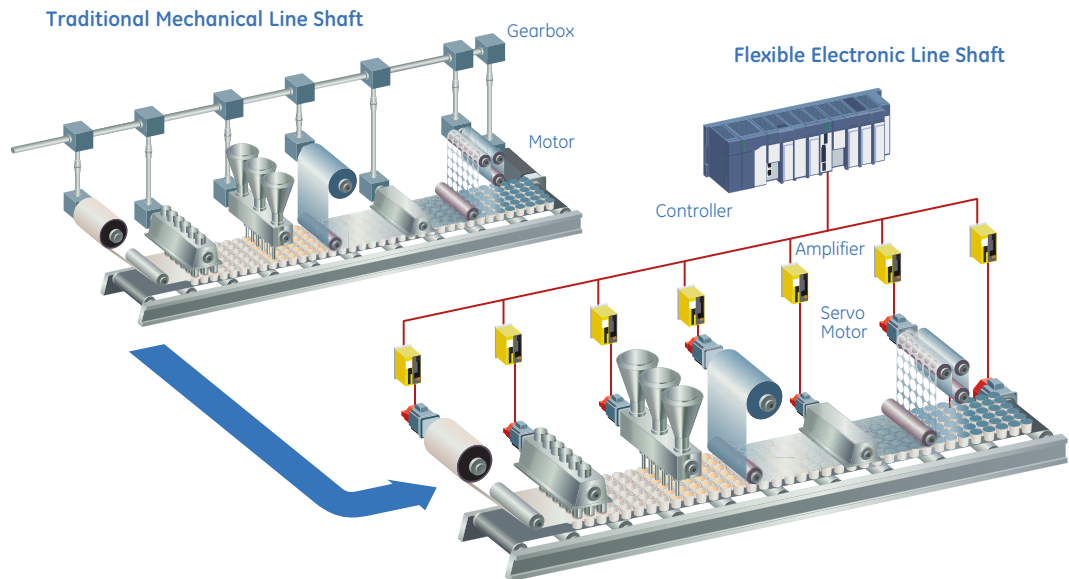
## Motion Controllers

### PACMotion

#### Packaging

Faster product turnover, greater variability and shorter production runs are at the heart of some key packaging machinery automation trends in industries such as pharmaceutical, food and beverage and consumer packaged goods. Today's automation systems must provide the flexibility and scalability to keep pace with this explosion of new product introductions, while delivering higher speed, accuracy and reliability to boost line productivity and asset utilization. End users and OEMs alike are now choosing innovation over supplier standardization in order to optimize machine performance. Partnering with automation suppliers who offer complete integrated control solutions can speed time to market and reduce development and deployment costs. Third generation packaging machines demand the PACMotion advantage...high performance multi-axis motion control tightly integrated with a Process Automation Controller (PAC), operator interface and extensive communications options all tied by one powerful software environment...PACMotion delivers.

- Form, fill and seal
- Smart conveyors
- Cartoning
- Wrapping
- Filling and capping
- High speed labeling
- Sorting/Diverting



#### Printing

Many of the trends driving automation changes in the packaging industry are mirrored by the printing industry. Shorter print runs with greater product variability require flexible, modular machine configurations, higher production speeds while maintaining accurate registration and quick start-up and changeover.

Shaftless press designs offer mechanical simplicity, reduced noise levels, improved flexibility and high reliability to reduce total cost of ownership. PACMotion is part of a complete automation system that tightly integrates line control, motion and operator interface functions in a single software environment, reducing the design cycle for new press designs or line retrofits. PACMotion delivers the performance and scalability required by today's printing lines.

- Flexographic
- Gravure
- Offset
- Winders/Unwinders
- Laminators
- Registration
- Dryer control
- Infeed rollers
- Draw rollers



# Motion Solutions

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## Motion Controllers

### PACMotion

#### Material Handling and High-Speed Assembly

Price pressure, smaller products and shorter life cycles in automotive, medical and electronic products require lean manufacturing lines with the flexibility to allow assemblers to reduce time to market for new products and build many product variations on the same line.

Smaller products require automation and motion control systems that can meet the increased assembly precision at ever increasing production speeds. System reliability is a crucial element to maintaining the high production rates necessary to reduce total cost per assembly.

PACMotion is part of a complete automation system that tightly integrates material handling and assembly line control, motion and operator interface functions in a single software environment, improving engineering productivity and delivering faster time to market. PACMotion delivers the precision and flexibility to meet demanding assembly and handling challenges.

- Engine/Transmission Assembly
- Transfer Lines
- Test Stands
- Rotary Dial Tables
- Electronic Assembly
- Adhesive Dispensing
- Smart Conveyors
- Baggage Handling Systems



#### Converting and Web Handling

Increasing line speed while reducing scrap is a critical factor in maintaining a competitive edge in the web handling and material converting applications. Greater product variability requires flexible modular control systems that enable instant changeover from one product run to the next. Adjusting for different web widths, repositioning edge guides and slitter position, changing cut length, and rewind tension must be fast and accurate. Servo control technology replaces traditional mechanical adjustments, allowing for precise and repeatable adjustments. Programmable jerk control reduces web breaks and film stretching while high servo response ensures fast corrections to web disturbances. PACMotion is part of an integrated automation system for device and I/O control, motion and operator interface to facilitate efficient programming and powerful diagnostics in a single software environment.

- Laminating
- Carton Folding
- Rotary Die Cutting
- Folder/Gluers
- Unwinders/Rewinders
- Slitter Positioning



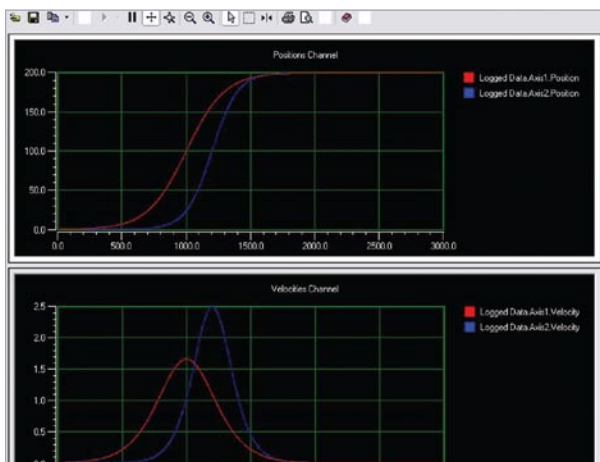
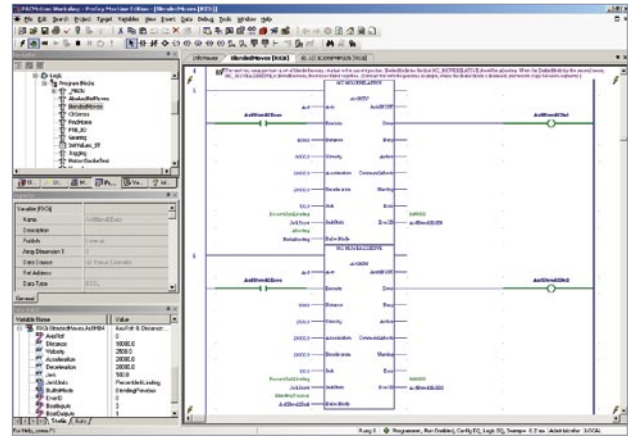
## Motion Controllers

### PACMotion

#### Open and Integrated to Improve Engineering Productivity

Synchronization of separate motion and logic programs and the lack of open motion programming standards can present a challenge even for simple motion applications. Proficy Machine Edition provides one tool for control, view, and motion and provides one universal engineering development environment for all programming, configuration, and diagnostics, resulting in faster time to solution, reduced training, and more compact, efficient design. The high level of PACMotion integration with the RX3i platform can significantly reduce system engineering and commissioning costs:

- Motion and machine logic in a common program greatly simplifies programming
- Motion function blocks and state model designed to comply with the PLCopen programming standard, reduce learning curve and training costs
- Buffer mode allows program logic to queue motion command sequences and specify or change the velocity transition between buffered moves on-the-fly
- All Proficy Machine Edition components— view, logic, and motion— share a common database and common objects across applications, including logic, scripts, and animation. Once a variable is created, it can easily be used in all other domains of the application.
- Proficy Machine Edition components share common development tools such as a common user interface, drag-and-drop editing, and takes full advantage of industry-standard technologies like MEL, COM/DOM, OPC and ActiveX.
- Proficy Machine Edition supports IEC languages such as Relay Ladder, Instruction List, Structured Text, Function Block, and SFC programming. In addition, C programming and Open Process are available.



#### Powerful Diagnostic Tools

The Data Logger supports the high-speed capture of up to 48 parameters per PACMotion module.

- Logging session can be single shot or continuous
- Sample rates as fast as 500  $\mu$ s
- Data collection can be set to start based on a trigger event
- Captured data is stored as PLC files and can be archived or viewed using the Data Logger Window

The Diagnostic Logic Block is a separate program that runs independently of the main application program.

- Uses the standard Ladder editor
- Can be executed with the PLC in the Run or Stop I/O Enabled mode
- Library of DLBs can be reused for functions such as machine troubleshooting, servo tuning, data logging, etc.
- DLBs can be saved as toolchest objects
- Program code can be cut/pasted between a DLB and the main program providing a convenient way to test new code segments

## Motion Controllers

### PACMotion

#### PACMotion Module Specifications

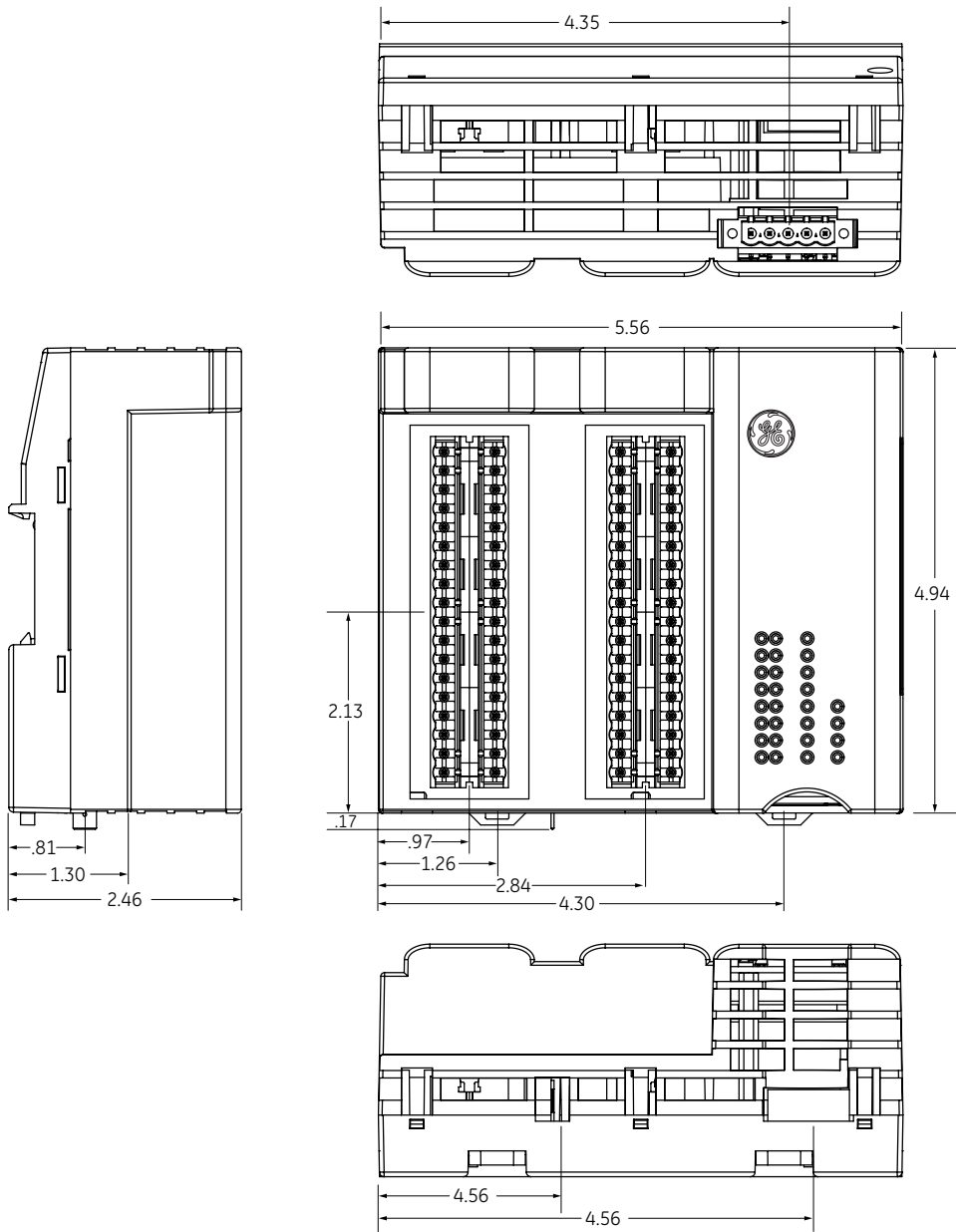
Specification	Details	Comments
Motion Path Planning	1 ms	Consistent update regardless of the number of axes in the system
Position Loop Update Rate	500 $\mu$ s	All axes in the RX3i rack are updated simultaneously
Velocity Loop Update Rate	125 $\mu$ s	All axes in the RX3i rack are updated simultaneously
Torque Loop Update Rate	62.5 $\mu$ s	All axes in the RX3i rack are updated simultaneously
Controlled Axes/Module	4	$\beta$ i, $\beta$ HVi or $\alpha$ HVi series servos are supported via a fiber optic interface
Master Axes/Module	1	Can be a virtual time-based or incremental encoder master
Servo Command Interface	Fiber Optic	50 Mb/s FANUC Serial Servo Bus (FSSB)
FSSB Cable Length	max. 100 meters between nodes	400 meters maximum for a 4 axis system
Maximum Axes per RX3i:		
DC Power Supplies	40 + 10 master axes	Requires 16 slot backplane, CPU and 4 DC power supplies
AC Power Supplies	32 + 8 master axes	Requires 16 slot backplane, CPU and 3 AC power supplies
Position Resolution:		
$\alpha$ HVi Series	1,048,576 counts/rev	—
$\beta$ i and $\beta$ HVi Series	65,536 or 131,072 counts/rev	$\beta$ 2i and larger motors support the higher resolution
Feedback Type	Incremental/Absolute Serial Encoder	Optional battery backup required for absolute feedback mode
Faceplate I/O:		
24V General Purpose Inputs	4 optically isolated; source/sink	—
24V High-Speed Inputs	2 optically isolated; source/sink	Open circuit detection; can be used to connect a quadrature master encoder (500 kHz max)
24V General Purpose Inputs/Outputs	2 optically isolated; source/sink	125 mA maximum output current each
Connector	Plug-on Screw Terminal	—
Floating Point Support	Yes	Double precision IEEE 754
Module Hot Insertion/Removal	Yes	—
Cam Profiles per Module	256 at one time	Up to 2048 profiles can be stored in the RX3i file system for use by any module
Synch/Delayed Start	Up to 8 axes	Axes can be on any module and are synchronized over the backplane
High Speed Position Capture	2 Inputs per axis	$\pm 1$ count = 10 $\mu$ s jitter

#### Fiber Terminal Block Specifications

Specification	Details	Comments
Mounting	35 mm DIN Rail	Must be mounted on a vertical surface for proper cooling
Dimensions:		
inches	5.56 W x 4.94 H x 2.46 D	—
mm	141.2 W x 125.5 H x 62.5	—
Interface to PACMotion Module	Fiber Optic Cable	Maximum cable length is 100 meters; Interface uses a unique ID for each PMM/FTB pair to prevent cross-connection
Terminal Header Options		
IC694TBS032	High Density 36 point Spring Clip Terminals	2 required per FTB (ordered separately); 14-26 AWG
IC694TBB032	High Density 36 point Captive Screw Terminals	2 required per FTB (ordered separately); 14-26 AWG
IC694TBS132	High Density Spring Clip Terminals, Extended Shroud	2 required per FTB (ordered separately); 14-28 AWG
IC694TBB132	High Density Captive Screw Terminals, Extended Shroud	2 required per FTB (ordered separately); 14-28 AWG
Power Requirements	19.2VDC –28.8VDC; 0.45 Amps @ 24V	one AWG #14 (2.1mm <sup>2</sup> ) or two AWG #16 (1.3mm <sup>2</sup> ) copper wires per terminal
24V Outputs (differential)	8 optically isolated; source; open load & short detection	2 groups of 4; 0.5 A max. per point; 4 A max. per group
24V General Purpose Inputs	16 optically isolated; source/sink	4 groups of 4
5V Outputs (differential)	4	RS422 Line Driver with short circuit protection; 48 mA max.
5V Inputs (differential/single-ended)	6	RS422 / RS485 Line Receiver with fault detection
5V Inputs (differential)	6	RS422 / RS485 Line Receiver with fault detection
Analog Inputs	2, $\pm$ 10V differential	14 bit resolution
Analog Outputs	2, $\pm$ 10V single-ended	12 bit resolution
24 V Power Output		Reverse polarity protected by replaceable fuse
5 V Power Output	0.5 amp max.	electronic overload protected
Quad Encoder Open Circuit Detection	Yes	—
I/O Function Assignment	Configurable	I/O functions are assigned during module hardware configuration

PACMotion

Fiber Terminal Block (FTB) Dimensions



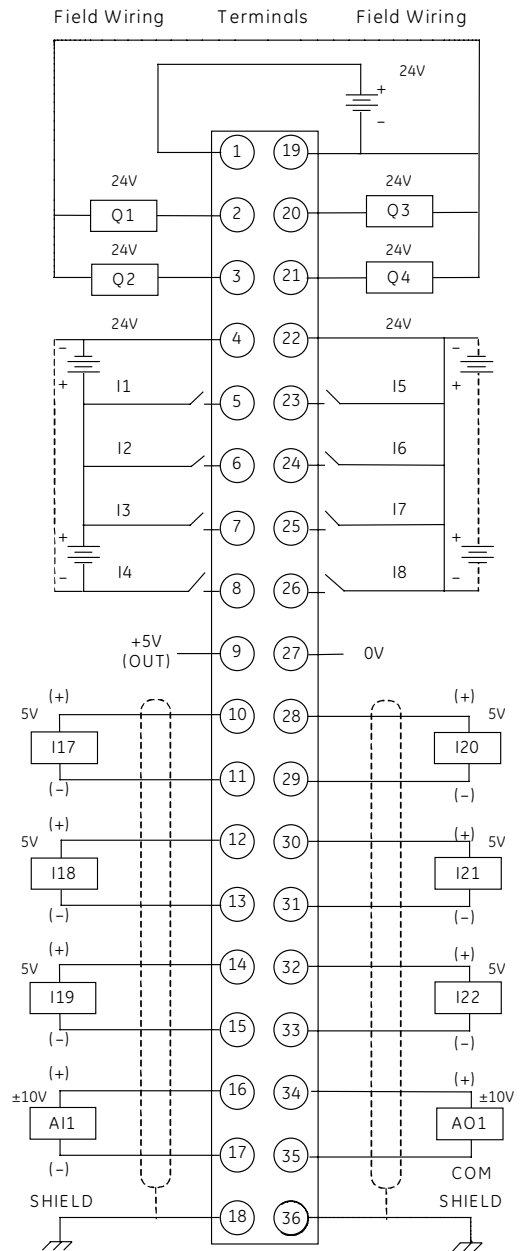
PACMotion

Fiber Terminal Block IC695FTB001 Wiring Diagram and Pin Assignments

FTB Terminal 1 Pin Assignments

Pin	Circuit Identifier	Circuit Type	Default Circuit Function
1	24V+	24V Output	Q1–Q4 Power
2	Q1	24 VDC (ESCP) Output	24V Output
3	Q2	24 VDC (ESCP) Output	24V Output
4	24-	24V-	I1–I4 Common
5	I1	24 VDC Input	Digital Input
6	I2	24 VDC Input	Digital Input
7	I3	24 VDC Input	Digital Input
8	I4	24 VDC Input	Digital Input
9	+5V (OUT)	+5V Output	External Power
10	I17+	5V Diff Input+	Fast Digital Input
11	I17-	5V Diff Input-	Fast Digital Input
12	I18+	5V Diff Input+	Fast Digital Input
13	I18-	5V Diff Input-	Fast Digital Input
14	I19+	5V Diff Input+	Fast Digital Input
15	I19-	5V Diff Input-	Fast Digital Input
16	AI1+	± 10V Analog Input	Analog In 1 (+)
17	AI1-	± 10V Analog Input	Analog In 1 (-)
18	Shield	Shield	Frame Ground
19	24V-	24V-	Q1–Q4 Common
20	Q3	24 VDC (ESCP) Output	24V Output
21	Q4	24 VDC (ESCP) Output	24V Output
22	24V-	24V-	I5–I8 Common
23	I5	24 VDC Input	Digital Input
24	I6	24 VDC Input	Digital Input
25	I7	24 VDC Input	Digital Input
26	I8	24 VDC Input	Digital Input
27	0V	0V	External Power
28	I20+	5V Diff Input+	Fast Digital Input
29	I20-	5V Diff Input-	Fast Digital Input
30	I21+	5V Diff Input+	Fast Digital Input
31	I21-	5V Diff Input-	Fast Digital Input
32	I22+	5V Diff Input+	Fast Digital Input
33	I22-	5V Diff Input-	Fast Digital Input
34	AO1+	±10V Analog Output	Analog Out 1
35	COM	±10V Analog Output	AO1 Common
36	Shield	Shield	Frame Ground

FTB Terminal 1 Wiring Diagram



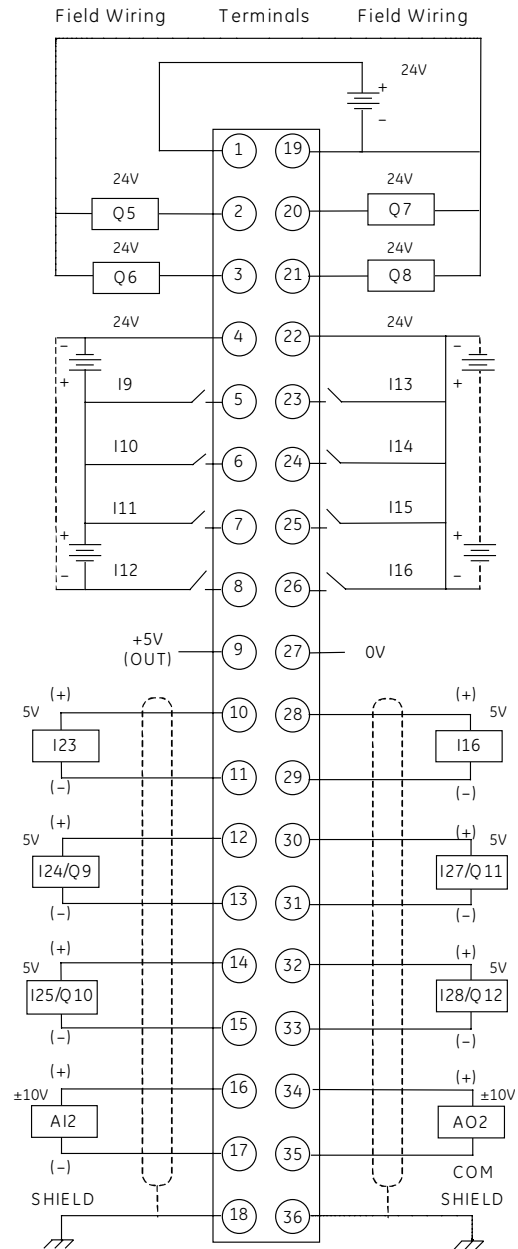
PACMotion

Fiber Terminal Block IC695FTB001 Wiring Diagram and Pin Assignments

FTB Terminal 2 Pin Assignments

Pin	Circuit Identifier	Circuit Type	Default Circuit Function
1	24V+	24V Output	Q5—Q8 Power
2	Q5	24 VDC (ESCP) Output	24V Output
3	Q6	24 VDC (ESCP) Output	24V Output
4	24V+	24V+	I9—I12 Common
5	I9	24 VDC Input	Digital Input
6	I10	24 VDC Input	Digital Input
7	I11	24 VDC Input	Digital Input
8	I12	24 VDC Input	Digital Input
9	+5V (OUT)	+5V OUT	External Power
10	I23+	5V Diff Input+	Fast Digital Input
11	I23-	5V Diff Input-	Fast Digital Input
12	I24+/Q9+	5V Diff Input+/5V Diff Output+	Fast Digital Input
13	I24-/Q9-	5V Diff Input-/5V Diff Output-	Fast Digital Input
14	I25+/Q10+	5V Diff Input+/5V Diff Output+	Fast Digital Input
15	I25-/Q10-	5V Diff Input-/5V Diff Output-	Fast Digital Input
16	AI2+	±10V Analog Input	Analog In 2 (+)
17	AI2-	±10V Analog Input	Analog In 2 (-)
18	SHIELD	Frame Ground	Shield
19	24V-	24V-	Q5—Q8 Common
20	Q7	24 VDC (ESCP) Output	24V Output
21	Q8	24 VDC (ESCP) Output	24V Output
22	24V+	24V+	I13—I16 Common
23	I13	24 VDC (ESCP) Input	Digital Input
24	I14	24 VDC (ESCP) Input	Digital Input
25	I15	24 VDC (ESCP) Input	Digital Input
26	I16	24 VDC (ESCP) Input	Digital Input
27	0V	0V	External Power
28	I26+	5V Diff Input	Fast Digital Input
29	I26-	5V Diff Input	Fast Digital Input
30	I27/Q11+	5V Diff Input+/5V Diff Output+	Fast Digital Input
31	I27/Q11-	5V Diff Input-/5V Diff Output-	Fast Digital Input
32	I28/Q12+	5V Diff Input+/5V Diff Output+	Fast Digital Input
33	I28/Q12-	5V Diff Input-/5V Diff Output-	Fast Digital Input
34	AO2+	± 10V Analog Output	Analog Output 2
35	COM	± 10V Analog Output	AO2 Common
36	SHIELD	Frame Ground	Shield

FTB Terminal 2 Wiring Diagram



## Motion Controllers

### PACMotion

#### Motion Functions

Function Block Name	Description
<b>Single Axis Administrative Function Blocks</b>	
MC_Power	Controls the Power Stage (MCON); causes all control loops to be closed and the control to be in the Standstill state ready to perform motion commands
MC_ReadStatus	Returns in detail the current axis status of the axis selected
MC_ReadAxisError	Indicates general axis errors not relating to the execution of Functions or Function Blocks; used to read a current error or warning on the axis
MC_ReadParameter	Returns the value of a parameter; used to read an axis parameter
MC_ReadParameters	Returns the values of parameters; used to read one or more axis parameters
MC_ReadBoolParameter	Returns the value of a Boolean parameter; used to read an axis parameter
MC_ReadBoolParameters	Returns the values of Boolean parameters; used to read one or more axis parameters
MC_ReadDwordParameters	Returns the values of 32 bit word parameters; used to read one or more axis parameters
MC_WriteParameter	Modifies the value of a parameter; used to write an axis parameter
MC_WriteParameters	Modifies multiple parameter values; used to write multiple axis parameters
MC_WriteBoolParameter	Modifies the value of a vendor specific parameter; used to write an axis parameter
MC_WriteBoolParameters	Modifies multiple Boolean parameter values; used to write multiple axis parameters
MC_WriteDwordParameters	Modifies multiple 32 bit word parameter values; used to write parameters that can not be expressed as real including packed bits
MC_ReadActualPosition	Used to read the actual axis position
MC_Reset	Makes the transition from the state ErrorStop to StandStill by resetting all internal axis-related errors; used to attempt to clear any errors on an axis and return it from the ErrorStop state to the Standstill state
MC_ModuleReset	Makes the transition from the state ErrorStop to StandStill by resetting all internal errors; used to attempt to clear any errors on a module and return any axes in the ErrorStop state to the Standstill state
MC_ReadDigitalInput	Gives access to the value of the input, referenced by the datatype INPUT_REF; provides the value of the referenced input (BOOL).
MC_ReadDigitalOutput	Gives access to the value of an output, referenced by the datatype OUTPUT_REF; provides the value of the referenced output (BOOL)
MC_WriteDigitalOutput	Writes a value to a discrete output once (with Execute), referenced by the datatype OUTPUT_REF
MC_SetPosition	Shifts the coordinate system of an axis by manipulating both the set-point position as well as the actual position of an axis with the same value without any movement caused. (Re-calibration with same following error).
MC_SetOverride	Sets the values of override for the whole axis, and all functions that are working on that axis
MC_ReadActualVelocity	Returns the value of the actual velocity as long as Enable (EN) is set
MC_ReadTorqueCommand	Returns the value of the torque command as long as Enable (EN) is set
MC_LibraryStatus	Provides the user with visibility into their cam-profile memory usage; provides the number of selected cam-profiles, the total number of bytes available, and the percentage of memory used
MC_ReadAnalogInput	Gives access to the value of an analog input, referenced by the datatype INPUT_REF
MC_ReadAnalogOutput	Gives access to the value of an analog output, referenced by the datatype OUTPUT_REF
MC_WriteAnalogOutput	Writes a value to an analog output once (with Execute), referenced by the datatype OUTPUT_REF
MC_ReadEventQueue	Returns the current PMM module event queue
MC_TouchProbe	Used to record an axis position at a strobe trigger event
MC_AbortTrigger	Used to abort MC_TouchProbe function blocks
MC_DigitalCamSwitch	Commands a group of discrete output bits to switch in analogy to a set of mechanical cam controlled switches connected to an axis
MC_DL_Configure	Specifies the configuration parameters for data logged on the PMM
MC_DL_Activate	Used to start data logging on the module in normal start mode
MC_DL_Get	Writes the data logged into a file specified by the DATALOG_FILE_REF input
MC_DL_Delete	Responsible for deleting data logger configuration from the PMM memory
<b>Single Axis Motion Function Blocks</b>	
MC_MoveAbsolute	Commands a controlled motion at a specified position
MC_MoveRelative	Commands a controlled motion of a specified distance relative to the actual position at the time of the execution
MC_MoveAdditive	Commands a controlled motion of a specified relative distance additional to the original commanded position in the discrete motion state
MC_MoveSuperimposed	Commands a controlled motion of a specified relative distance additional to an existing motion
MC_MoveVelocity	Commands a never ending controlled motion at a specified velocity
MC_Home	Commands the axis to perform the «search home» sequence
MC_Stop	Commands a controlled motion stop and transfers the axis to the state "Stopping"
MC_JogAxis	Jogs an axis forward or backward at the manual operation velocity and acceleration
MC_Halt	Commands a controlled motion stop



## Motion Controllers

### PACMotion

#### Motion Functions

##### Multiple Axis Administrative Function Blocks

MC_CamTableSelect	Selects the cam-tables (cam-profiles) by setting the pointers to the relevant tables
MC_CamTableDeselect	Deletes a cam-profile from the specified module to free memory

##### Multiple Axis Motion Function Blocks

MC_CamIn	Engages a cam
MC_CamOut	Disengages a slave axis from the master
MC_GearIn	Commands the slave axis velocity at a ratio of the master axis velocity
MC_GearOut	Used to disengage from a MC_GearIn function block
MC_Phasing	Provides dynamic phase shifting capability for cam profiles
MC_GearInPos	Commands a gear ratio between the position of the slave and master axes from the synchronization point onwards
MC_SyncStart	Identifies which axes should be started at the same time and how much time can elapse before the motion must start
MC_DelayedStart	Identifies which axes should be started with a delay relative to each other and how much time can elapse before the motion must start

##### PLC Support Function Blocks

MC_CamFileRead	Copies the contents of a cam file from the PLC file system into reference memory
MC_CamFileWrite	Copies cam data from reference memory to an existing cam file in the PLC file system, overwriting the original data in the cam file

## Motion Controllers

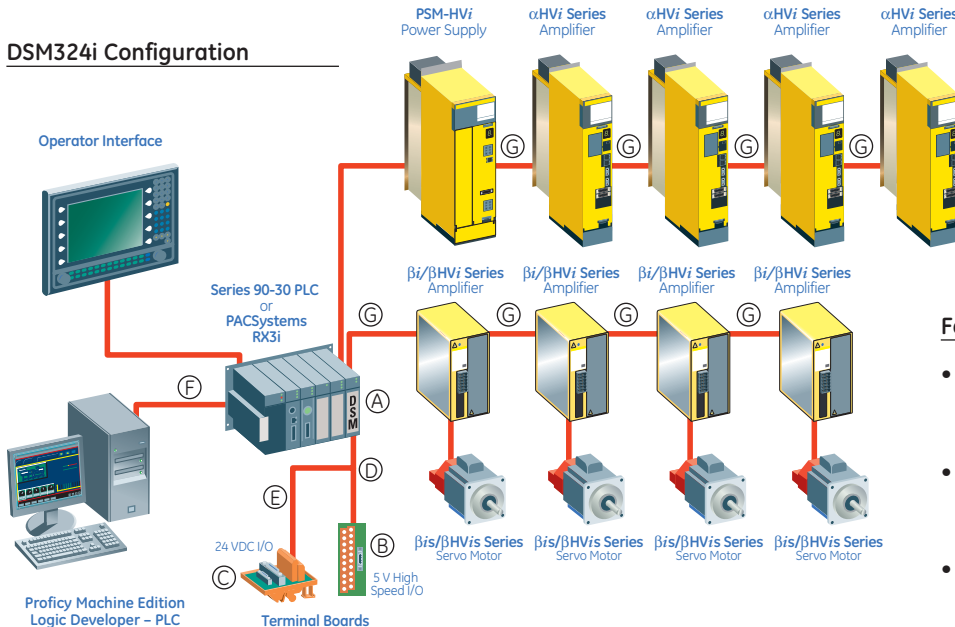
### DSM300 for Series 90-30 and PACSystems RX3i

#### DSM324i

The DSM324i can control up to 4 axes of  $\beta$ i,  $\beta$ HVi or  $\alpha$ HVi Servos via a fiberoptic command interface for superior noise immunity. By combining the versatility of the GE PLCs and GE operator interface products with GE servos, DSM324i provides customers with a complete solution. This single-source system results in such benefits as ease of integration and programming, shorter development cycles, and higher reliability.



#### DSM324i Configuration



\*See servo amplifier section for motor cable information.

	Part Number	Description
A Motion Controller	IC693DSM324	DSM324i Motion Controller for Series 90-30
	IC694DSM324	DSM324i Motion Controller for PACSystems RX3i
B Terminal Boards	IC693ACC336	DSM324i 5V High Speed & Analog I/O Terminal Board (1 per module)
	44A726268-001	DSM324i 24V I/O Terminal Board (1 per module)
D I/O Interface Cables	IC693CBL324	ACC336 Terminal Board Interface Cable - 1m (1 per module)
	IC693CBL325	ACC336 Terminal Board Interface Cable - 3m (1 per module)
E	IC693CBL311	DSM324i to 44A726268-001 Terminal Board Cable - 3m (1 per module)
	IC693CBL319	DSM324i to 44A726268-001 Terminal Board Cable - 1m (1 per module)
F Communication Cables	IC693CBL316	Serial Cable for Programming - 3m (1 per system)
G Fiber Optic Cables	ZA66L-6001-0023#L150R0	FSSB and FTB I/O Cable 0.15 Meter
	ZA66L-6001-0023#L300R0	FSSB and FTB I/O Cable 0.3 Meter
	ZA66L-6001-0023#L1R003	FSSB and FTB I/O Cable 1 Meter
	ZA66L-6001-0023#L2R003	FSSB and FTB I/O Cable 2 Meter
	ZA66L-6001-0023#L3R003	FSSB and FTB I/O Cable 3 Meter
	ZA66L-6001-0026#L1R003	FSSB and FTB I/O Cable Sheathed, 1 Meter
	ZA66L-6001-0026#L3R003	FSSB and FTB I/O Cable Sheathed, 3 Meter
	ZA66L-6001-0026#L5R003	FSSB and FTB I/O Cable Sheathed, 5 Meter
	ZA66L-6001-0026#L10R03	FSSB and FTB I/O Cable Sheathed, 10 Meter
	ZA66L-6001-0026#L20R03	FSSB and FTB I/O Cable Sheathed, 20 Meter
	ZA66L-6001-0026#L30R03	FSSB and FTB I/O Cable Sheathed, 30 Meter
	ZA66L-6001-0026#L50R03	FSSB and FTB I/O Cable Sheathed, 50 Meter
	ZA66L-6001-0026#L100R3	FSSB and FTB I/O Cable Sheathed, 100 Meter

#### PLC Requirements

PLC Requirements: The RX3i or Series 90-30 PLC with Machine Edition Logic Developer PLC will support the DSM324i. Multiple DSM boards can be placed in PLC main, expansion, and remote racks. The use of DSM modules is limited by the power supply capacity and the number of words of %AI data supported by the selected CPU. Each axis of control requires a minimum of 40 words of %AI data and a maximum of 84 words of %AI data depending on the mode selected. DSM324i requires a Series 90-30 CPU with Release 10 or higher Firmware or an RX3i CPU with Release 2.8 or higher Firmware.

#### Features

- Distributed architecture for greater machine flexibility—up to 100 meters between axes
- Improved product accuracy with velocity feed-forward control and high-resolution feedback
- On-board Analog and Digital I/O (travel limits, home switch and high speed position capture)
- Flash firmware available from our website makes upgrades a snap
- Easy-to-use; all positioning, velocity and torque loops are closed in the controller. For properly sized drives, little or no servo tuning is required once the motor type code has been set
- DSM324i Local Logic Engine handles high speed logic decisions synchronous with motion update
- Cam & Electronic Gearing Modes for your more complex applications

#### APPLICATIONS

- Packaging machines
- High-speed conveyor lines
- Assembly machines
- Pick and place gantries
- Textile machines
- Coil/spool winding
- Adhesive applicators

## Motion Controllers

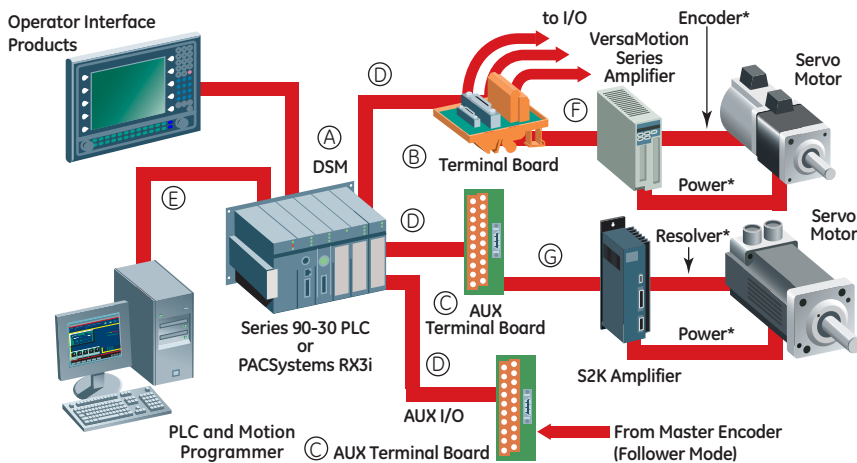
### DSM300 for Series 90-30 and PACSystems RX3i

#### DSM302/DSM314

The DSM300 Series is a family of motion controllers for GE Series 90-30 and PACSystems RX3i PLC controllers. The DSM302 is a versatile two-axis motion controller that works with any servo with an analog command interface. In addition, the DSM314 can control up to 4 servos with an analog velocity or torque command interface. The DSM302 or DSM314 is applicable in a broad range of single and multi-axis applications. By combining the versatility of the GE PLCs and GE operator interface products with GE servos, DSM302/314 provides customers with a complete solution, from the motor to the operator interface. This single-source system results in such benefits as ease of integration and programming, shorter development cycles, and higher reliability.



#### DSM302/314 Series



\*See servo amplifier section for motor cable information.

	Part Number	Description
A	Modules	IC693DSM302 DSM302 Motion Controller (2 axis) for Series 90-30
		IC693DSM314 DSM314 Motion Controller (4 analog/2 digital axes) for Series 90-30
		IC694DSM314 DSM314 Motion Controller (4 analog/2 digital axes) for RX3i
B	Terminal Boards	IC693ACC335 Digital Servo Axis Terminal Board (one per axis)
C		IC693ACC336 Analog Servo Axis Terminal Board (one per axis) Auxiliary Terminal Board (for follower applications)
D	Command Cables	IC693CBL324 Terminal Board Connection Cable - 1m (one per axis)
		IC693CBL325 Terminal Board Connection Cable - 3m (one per axis)
E	Communication Cables	IC693CBL316 Station Manager Serial Cable (one per motion system)
F	Digital Servo Cables	IC800CBL001 Servo Command Cable - 1m (one per axis)
		IC800CBL002 Servo Command Cable - 3m (one per axis)
G	Analog Servo Cables	IC800SKCFLYxxx S2K interface cables xxx=010 (1m), xxx=030 (3m)

#### PLC Requirements

PLC Requirements: Machine Edition Logic Developer PLC will support the DSM. Multiple DSM boards can be placed in PLC main, expansion, and remote racks. The use of DSM modules is limited by the power supply capacity and the number of words of %AI data supported by the selected CPU. Each axis of control requires a minimum of 40 words of %AI data and a maximum of 64 words (84 for 4 axis DSM314) of %AI data depending on the mode selected. DSM314 requires a CPU with Release 10 or higher Firmware.

#### Features

- Powerful processor with digital signal co-processor (DSP) provides a separate control loop processor that operates independently of PLC scan rates for fast servo loop updates
- Enhanced tracking accuracy with velocity feed-forward control and high-resolution feedback
- On-board I/O for travel limits, servo enable, home switch and position capture
- Flash firmware available from our website makes upgrades a snap
- In digital servo mode, all positioning, velocity and torque loops are closed in the controller. For properly sized drives, little or no servo tuning is required once the motor type code has been set
- Also works in analog mode with any quadrature encoder-based servo to provide a low-cost, high-performance servo system
- DSM314 Local Logic Engine handles high speed logic decisions synchronous with motion update
- Cam & Electronic Gearing Modes

#### APPLICATIONS

- High-speed conveyor lines
- Assembly machines
- Pick and place gantries
- Textile machines
- Coil/spool winding
- Adhesive applicators

# Motion Solutions

## Motion Controllers

### Feature Comparison

General	DSM302		DSM314		DSM324i	
	Standard	Follower	Standard	Follower	Standard	Follower
Number of Digital Servo Axes	2	2	2	2	4	4
Number of Analog Servo Axes	2	2	4	4	n/a	n/a
Analog Servo Command Types	Velocity	Velocity	Torque/Velocity	Torque/Velocity	n/a	n/a
Position Error Integrator	Yes	Yes	Yes	Yes	Yes	Yes
Position Capture Inputs/Axis	2 @ 5 V	2 @ 5 V	2 @ 5 V	2 @ 5 V	2 @ 5 V	2 @ 5 V
Position Capture Response	250µs	250µs	+/- 2 count plus 10µs	+/- 2 count plus 10µs	+/- 2 count plus 10µs	+/- 2 count plus 10µs

### Feedback

Position Feedback Options:						
Digital Servo Axis	GE Serial Encoder	GE Serial Encoder	GE Serial Encoder	GE Serial Encoder	GE Serial Encoder	GE Serial Encoder
Analog Servo Axis	Quadrature Encoder	Quadrature Encoder	Quadrature Encoder	Quadrature Encoder	n/a	n/a
Position Resolution (counts/Rev):						
Digital Servo Axis	8192	8192	8192	8192	8192	8192
Analog Servo Axis	Based on encoder	Based on encoder	Based on encoder	Based on encoder	n/a	n/a
Positioning Range (linear mode)	±8,388,607	±8,388,607	±536,870,911	±536,870,911	±536,870,911	±536,870,911
Master Feedback	n/a	Quadrature Encoder	n/a	Quadrature Encoder	n/a	Quadrature Encoder
Master Feedback Max Frequency	n/a	1MHz	n/a	1MHz	n/a	1MHz

### Motion Features

Positioning	Absolute Incremental	Absolute Incremental	Absolute Incremental	Absolute Incremental	Absolute Incremental	Absolute Incremental
Acceleration Types	Linear Jerk Limited	Linear Jerk Limited	Linear Jerk Limited	Linear Jerk Limited	Linear Jerk Limited	Linear Jerk Limited
Motion Types	Linear/Continuous	Continuous	Linear/Continuous	Continuous	Linear/Continuous	Continuous
Follower Modes	n/a	Velocity/Position/Winder	n/a	Velocity/Position	n/a	Velocity/Position
Cam Support	n/a	n/a	Yes	Yes	Yes	Yes
Local Logic Program	n/a	n/a	Yes	Yes	Yes	Yes

### PLC I/O References\*

%I	64	64	32/48/64/80	32/48/64/80	32/48/64/80	32/48/64/80
%Q	64	64	32/48/64/80	32/48/64/80	32/48/64/80	32/48/64/80
%AI	40/50/64	50/64	24/44/64/84	24/44/64/84	24/44/64/84	24/44/64/84
%AQ	6/9/12	9/12	3/6/9/12	3/6/9/12	3/6/9/12	3/6/9/12

\*DSM314 and DSM324i I/O References are based on the number of configured axes. Table data shown is for 1/2/3/4 axes.

### Hardware Features

I/O System	DSM302/314	DSM324i	Description
I/O Connectors	4 x 36 pin	1 x 36 pin; 1 x 24 pin	
Analog Output	4	2	12 bit resolution plus sign; ±10 VDC; 5mA max.
Analog Inputs (Analog Axes only)	8	2	15 bit resolution plus sign; ±10 VDC
SNP Comm Port	1 RJ11	1 RJ11	RS232 - SNP Protocol

Servo Series Supported	DSM302	DSM314	DSM324i
αHV i	No	No	α22HV is
αHV is	No	No	Yes
βis	No	No	Yes
βHV is	No	No	Yes

## Motion Controllers

### S2K Series

#### Stand-Alone, Digital Amplifier and Controller for Servo and Stepping Motors

The GE S2K Series products offer amplifier and motion control capability for brushless servo and stepping motor systems in a stand-alone integrated package. The S2K Series incorporate all-digital amplifier technology and fast servo update rates for enhanced performance. Advanced features such as electronic gearing and camming are supported. The DeviceNet implementation includes the ODVA defined position controller master/slave protocol as well as peer-to-peer control for multi-axis stand-alone systems. Models are also available with a Profibus DP-Slave implementation as well.



#### Features

- Resolver feedback
- Two module types available: brushless servo amplifier with integrated motion controller or stepping amplifier with integrated motion controller
- Wide torque range: servo systems from 2.7-477 lb-in (0.3-53.9 Nm) continuous, step-pers from 144-3074 oz-in (1-21.7 Nm). Standard features include all-digital, self-tuning servo amplifier and 50,000 microstepping amplifier
- 14 I/O points with DeviceNet or Profibus options or 21 I/O points (4.3 and 7.2 amp models only) when no network option is specified
- Full complement of diagnostic information provided via on-board, two-character LED or over network or serial communication options
- Includes point-to-point moves, jogging and advanced functions such as electronic gearing/camming and pulse based motion. The command set includes full logic, subroutines, variables and math functions in addition to I/O and network control.
- A multi-tasking operating system supports a broad range of application complexity... from simple to advanced program requirements
- Small, self-contained package conserves valuable panel space
- All quick-disconnect terminations for fast installation and change-over
- UL, cUL, and CE certifications

#### APPLICATIONS

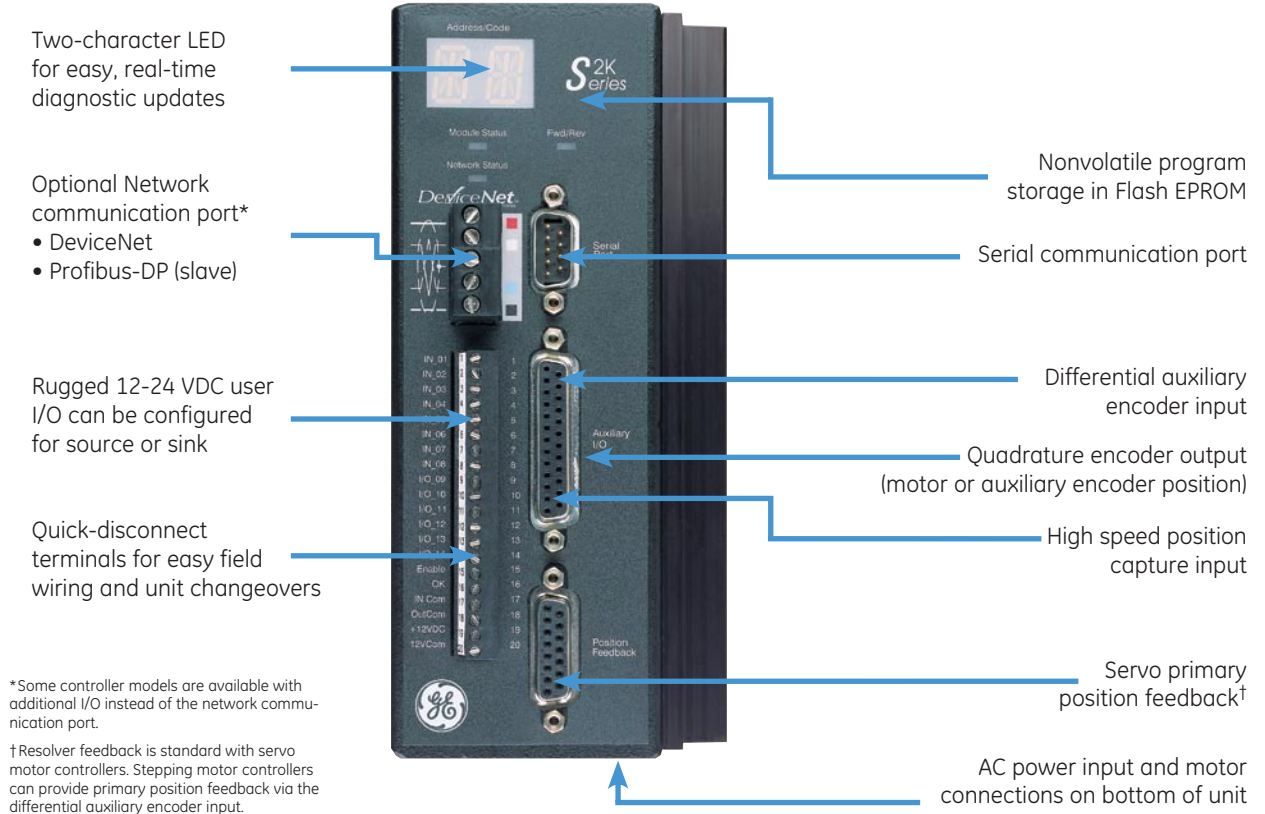
- Packaging machines
- Labeling machines
- Bag making machines
- Assembly
- Pick and place
- Flying cutoff
- Rotary tables
- Feed/cut to length
- Electronic line shafting
- Sorting conveyors
- and many more

## Motion Controllers

### S2K Series

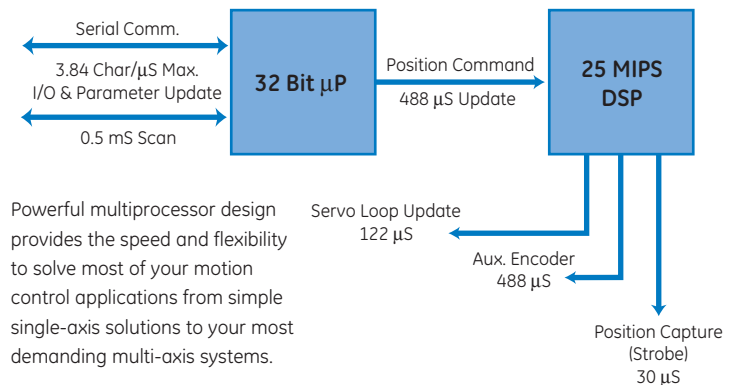
#### Single-Axis Controller Features

- Dynamic torque limiting
- Complex motion profiles including jerk limited acceleration
- Electronic gearing and camming
- Index and phase synchronization
- High speed registration/position capture for feed/cut to mark applications
- Secondary position feedback for compensation of slip and lost motion
- User configurable digital and analog I/O
- Powerful programming environment



### Dual Processor Architecture

#### Single-Axis Controllers



## Motion Controllers

### S2K Series Electrical Specifications

#### Power Specification

Specifications	Units	STI105	SSI104	SSI107	SSI216	SSI228	SSI407	SSI420	
AC Input Voltage Range	VAC	90-130, 1 phase	90-250, 1 or 3 phase		180-250, 3 phase		324-528, 3 phase		
AC Input Frequency Range	Hz	50-440							
PWM Frequency to Motor	kHz	16.4						8.2	
Min. Motor Inductance	mH	n/a	1 (per phase)						
Cont. Output Current	A <sub>rms</sub>	5/phase	4.3	7.2	16	28	7.2	20	
Peak Output Current	A <sub>rms</sub>	5/phase	8.6	14.4	32	56	10.8	20	
Max. Input Current 1-phase	A <sub>rms</sub>	10	7	15	n/a	n/a	n/a	n/a	
3-phase	A <sub>rms</sub>	n/a	4	8	18	30	8	22	
Max. Input Power	KVA @ Rated VAC	1.3	1.6	3.8	8.5	14.3	6.4	18	
Logic Input Power	VAC	n/a	n/a	90-250 @ 0.5 A			+18-30 VDC @ 1.5 A		
DC Power Outputs	VDC	+5 @ 0.25 A; +12 @ 0.5 A							

#### Digital Inputs and Outputs

Operating Range	12-24 VDC, 28.8 VDC maximum	
Interface Format	optically isolated, source/sink user-configurable	
Inputs	Number Available*	14 or 21 (max)
	Maximum Off Voltage	4 VDC
	Minimum On Voltage	10 VDC
	Load	2 kΩ
Outputs	Number Available*	6 or 10 (max)
	Maximum On Resistance	35Ω
	Maximum Load Current	100 mA
	Maximum Off Leakage Current	200 nA

\*Larger numbers available on models without a network port. Six of the I/O can be configured as either inputs or outputs.

#### Analog Inputs and Outputs

Operating Range	±10 VDC
Resolution	12 Bits (input)/8 Bits (output)
Input Impedance	50 kΩ
Output Current	5 mA
Number Available	2 Analog Inputs; 1 Analog Output

#### Auxiliary Encoder Input

Input Format	single-ended or differential; sine or square wave; quadrature, pulse/direction or cw/ccw pulse
Input Voltage Range	+5 to +15 VDC
Line Count Frequency	3 MHz maximum
Pulse Frequency	12 MHz maximum with 4X multiplier

#### Motor Resolver Feedback Input

Number Available	1
Resolution	4096 pulses per revolution
Maximum Speed	15,000 RPM
Type	Control Transmitter
Phase Shift	± 5.0 degrees @ 5kHz
Null Voltage	< 20 mV @ 5 kHz
Transformation Ratio	0.5

#### Serial Communication

Available Ports	1
Functions Supported	multi-purpose programming port
Format	RS-232*
Maximum Addressable Units	1
Communication Rate	1200, 9600, 19200 or 38400 baud
Maximum Distance from Host to Unit	50 feet
Flow Control	XON / XOFF

\*Plug-on RS-422/485 serial converter available. See ordering information.

# Motion Solutions

## Motion Controllers

### S2K Series

Communication Specifications	DeviceNet	Profibus® DP Slave
Number Available	1 port per unit	1 port per unit
Functions Supported	I/O slave messaging, position controller profile, and explicit peer-to-peer messaging	Profibus profile, multicast, broadcast
Number of Nodes	64 maximum	100 maximum
Input Power Requirements	11-25 VDC @ 40 mA maximum	none
Communication Rate	125, 250 or 500 Kbaud	9.6, 19.2, 45.45, 93.75, 187.5, 500, 1500, 3000, 6000, 12000 Kbaud
Length of Drop Line	20 feet maximum	
Length of Trunk Line	thin cable	328 feet maximum
	thick cable	328 feet maximum @ 500 Kbaud
		820 feet maximum @ 250 Kbaud
		1,640 feet maximum @ 125 Kbaud
		3936 feet @ 9.6 Kbaud

### Environmental Specifications

Operating Temperature, Free Air Ambient*	
SSI104, SSI105, SSI107	32 to 122°F (0 to 50°C)
SSI216, SSI228, SSI407, SSI420	32 to 104°F (0 to 40°C)
Storage and Shipping Temperature	-40 to 176°F (-40 to 80°C)
Relative Humidity	5 to 95% noncondensing
Enclosure Type	open
Altitude**	3300 feet (1000 m)

\* Assumes heatsink in vertical orientation.

\*\* Operation at higher altitudes requires controller derating. Please consult GE.

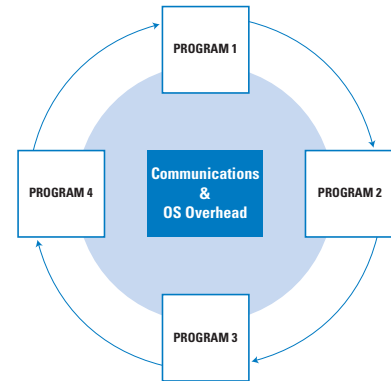


### S2K Series

#### Operating System

At the heart of the S2K Series controller is a powerful multi-tasking real-time operating system and comprehensive programming language. Up to four programs, one motion task and one communication task can be simultaneously executed. Time critical tasks can be executed in a separate program, and Program 4 acts as a fault handler that automatically executes on power-up or when a fault occurs. S2K controllers also support immediate mode operation where an external host can load registers or issue commands (over the serial or Network ports) that are executed in real time. This is a powerful feature for applications where program variables are determined on-the-fly based on process input and external events.

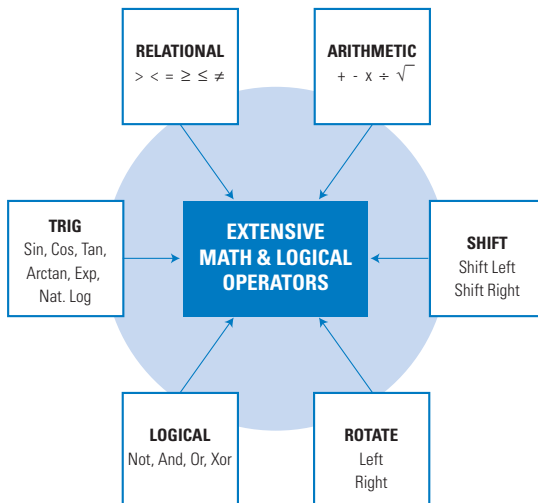
#### S2K Series Operating System



- Four user defined programs scheduled sequentially (round robin)
- Program 4 executes on power-up or when a fault occurs
- Any program can start/stop any other program
- All programs can utilize common motion blocks

#### Software Capabilities

The S2K Series integrated controller models allow up to 100 predefined motion blocks and four user defined programs. Programs and motion blocks are defined using Proficy<sup>®</sup>-Motion Developer Machine Edition, a powerful Microsoft Windows<sup>®</sup>-based utility that provides the resources to give users total application program management. The comprehensive programming language provides extensive math and logical operators, program flow control, I/O manipulation, network control and system status commands. Configuration and programming wizards simplify integration and reduce engineering time.



#### Application Programming Resources

Resources	S2K Controller
Flow control	
Labels per program	999
Nested GOSUBS per program	32
Variables	
Boolean	256
Floating point *, †	2,048
Integer *	4,096
String	144
Programs	
General purpose	3
Fault-handling	1
Countdown timers	8
Motion blocks	100
Concurrent task execution	6 maximum‡
Master axes per program	1
Flash EPROM Memory	
User programs & Cam tables	60 Kbytes
Variable	42 Kbytes

\* Integer and floating point variable memory space is shared; numbers are maximum for each but not for both concurrently. Floating point variables require twice the memory of integer variables. Thus, for example, if 1,000 floating point variables are used, 2,096 integer variables are possible.

† Floating point variables use a 32-bit mantissa and are precise to 9 decimal digits.

‡ 4 programs, 1 motion block, 1 communication port.

## Motion Controllers

### S2K Series

#### Programming Language

The Generation D programming language consists of registers, commands and variables. Users familiar with the product will find the mnemonic form easy to use. Programs and motion blocks are developed using the registers and commands in the following list. A variety of flow control commands, conditional operators and subroutines allow simple or complex application program development.

#### Registers

Reg/Cmd	Class	Description	Reg/Cmd	Class	Description
!	Program	exits terminal window line editor	CCB	Motion	cam compile begin point
?	Diagnostic	reports value of register to the terminal window	CCE	Motion	cam compile end point
p1, p2	Operand	floating point operands	CCM	Motion	compiles cam motion
"p1", \$p2	Operand	string operands	CCP	Motion	cam compile start position
+	Operator	concatenate strings p1 and p2	CE	System	conversion error
+, -, *, /, **	Operator	arithmetic operators	CHANGEPW	System	prompts for password change
>, >=, <, <=, <	Operator	relational operators	CHR	Operator	converts ASCII character code to its associated character
16#p3	Operand	base 16 integer operand	CIE	System	computer interface format enable
2#p2	Operand	base 2 integer operand	CLL	Input/Output	clears line and positions cursor at beginning of line
ABS	Operator	absolute value of any floating point or integer operand	CLM	System	clears user memory; resets registers to defaults
ADDN	System	address of network port	CLS	Input/Output	clears display and positions cursor at home
ADDR	System	RTU port address	CMD	Axis	position controller command output
AI	Input/Output	analog input	CMO	Axis	commutation angle offset
AIB	Input/Output	analog input deadband	CMR	Axis	motor poles to resolver poles commutation ratio
AIN	Input/Output	network analog input	CNC	System	close network connection
AIO	Input/Output	analog input offset	COS	Operator	cosine trigonometric function of a floating point operand
AND	Operator	logical AND of two operands of the same type	CR	Input/Output	positions cursor at beginning of next line down
AO	Input/Output	analog output	CRH	Input/Output	positions cursor at home
AON	Input/Output	network analog output	CRM	Input/Output	remembers cursor position
AOP	Input/Output	power-up state of analog output	CRP	Input/Output	positions cursor
ASC	Operator	converts 1st character in string operand to ASCII code	CRR	Input/Output	positions cursor at remembered position
ATN	Operator	arctangent trigonometric function	CURC	Axis	continuous current
AUTORET	System	enables auto retrieving of user memory	CURCN	Axis	network continuous current
AUTOTUNE	System	automatically sets up control constants	CURP	Axis	peak current
BAUD	System	baud rate of serial port	CURS	Axis	power save current
BAUDN	System	data rate of network port	CURSN	Axis	network power save current
BIT	System	data bits of serial port	DEL	Operator	deletes characters from a string operand
BS	Input/Output	backspaces cursor	DEL	Program	deletes current statement in the terminal window line editor
CAE	Motion	cam enable	DGC	Diagnostic	loads diagnostic condition for printing
CAF	Motion	cam filter constant	DGE	Diagnostic	enables diagnostics
CAI	Motion	cam position register increment	DGI	Diagnostic	load diagnostic item to print
CAM	Motion	cam point	DGL	Diagnostic	prints diagnostic line of items
CAO	Motion	cam offset	DGO	Diagnostic	outputs diagnostic register value to serial port
CAP	Motion	cam shaft position	DGP	Diagnostic	prints diagnostic message to serial port
CAR	Motion	cam position register	DGS	Diagnostic	sets program to single step mode
CAS	Motion	cam scale factor	DGT	Diagnostic	sets program to trace mode
CAT	Motion	cam shaft position type	DI	Input/Output	digital input
CAZ	Motion	zeros cam table			

\* Indicates registers that cannot be set in a program

## Motion Controllers

### S2K Series

Reg/Cmd	Class	Description	Reg/Cmd	Class	Description
DIN	Input/Output	network digital input	HT	Motion	halts motion
DINA	Input/Output	network digital input register assignment	HTN	Motion	network halt
DIR*	Axis	direction of motor for forward moves	HWE	Motion	handwheel input enable
DIRN*	Axis	network direction of motor for forward moves	IF...GOSUB	Program	conditionally branches to specified subroutine label
DIRX	Axis	direction of auxiliary position	IF...GOTO	Program	conditionally branches to specified label
DIRXN	Axis	network direction of auxiliary position	IF...THEN	Program	conditionally executes next command in program
DIT	Input/Output	digital input filter time	IN	Input/Output	inputs register value from key buffer
DO	Input/Output	digital output	INS	Operator	inserts characters into a string operand
DOE	Input/Output	fault on digital output fault enable	IO	Input/Output	general I/O
DON	Input/Output	network digital output	IP	System	axis in position
DONA	Input/Output	network digital output register assignment	IPB	Axis	in-position band
DSE	System	display format enable	IPN	System	network in position
EG	Input/Output	positive-edge-sensitive digital input	ITB	Operator	converts integer operand to a binary string
EKB	Input/Output	empties key buffer	ITF	Operator	converts integer operand to a floating point number
END	Program	ends program or motion block and exits editor	ITH	Operator	converts integer operand to a hexadecimal string
EOT	Axis	encoder output type	ITS	Operator	converts integer operand to a string
EXM	Program	executes motion block	KA	Axis	acceleration feedforward
EXP(p1)	Operator	takes exponential of a floating point operand	KD	Axis	derivative control gain
EXP	Program	executes program	KEY	System	character in key buffer
EXVS	Program	executes command stored in string variable	KI	Axis	integral control gain
FALSE	Operand	Boolean operator equivalent to OFF or a logical 0	KL	Axis	motor inductance
FAULT	Program	enters editor at faulting statement	KLALL	Program	kills all programs
FC	System	fault code	KLP	Program	kills program
FCN	System	network fault code	KM	Axis	motor number (stepper only)
FCNN	System	network device fault code	KP	Axis	proportional control gain
FE	Axis	axis following error	KSN	Axis	network stall velocity threshold
FEB	Axis	following error bound	KSSN	Axis	network stall sensitivity
FI	System	fault input register	KT	Axis	filter time constant
FIN	Operator	find string p1 in string operand p2	KVN	Axis	network bus voltage
FIRMWARE	System	downloads firmware and saves in nonvolatile memory	KY	Input/Output	puts character into key buffer
FR	Axis	axis feedback resolution	KYA*	Input/Output	key assignment
FRC	Axis	axis feedback resolution for commutation	L	Program	makes last statement the current statement in line editor
FTI	Operator	converts floating point operand to an integer by rounding	LABEL	Program	makes statement at label the current statement in line editor
FTS	Operator	converts floating point operand to a string	LED	Input/Output	state of display LED
FUNCTION	Input/Output	goes to label associated with key pressed	LEN	Operator	computes the length of a string operand
GET	Input/Output	gets one character from key buffer	LFT	Operator	selects leftmost characters of a string
GOSUB	Program	unconditionally branches to specified subroutine label	LGN	Operator	takes natural log of any floating point operand
GOTO	Program	unconditionally branches to specified label	LOCK	Program	locks interpreter to program
GRB	Motion	gearing bound	LWR	Operator	converts string operand to lower case
GRD	Motion	gearing denominator	MAC	Motion	motion acceleration/deceleration
GRE	Motion	gearing enable	MACN	Motion	network motion acceleration/deceleration
GRF	Motion	gearing filter constant	MAP	Motion	motion acceleration/deceleration percentage
GRN	Motion	gearing numerator	MB	System	motion block executing
HSE	System	enables XON, XOFF handshake protocol for serial port	MDC	Motion	motion deceleration

\* Indicates registers that cannot be set in a program

# Motion Solutions

## Motion Controllers

### S2K Series

Reg/Cmd	Class	Description	Reg/Cmd	Class	Description
MDCN	Motion	network motion deceleration	PFE*	Axis	position feedback enable
MDP	Motion	motion deceleration percentage	PFL	Axis	position feedback backlash
MEMORY	System	reports memory remaining	PFN	Axis	position feedback numerator
MFA	Motion	motion feedrate acceleration/deceleration	PFT	Axis	position feedback correction time
MFD	Motion	motion feedrate deceleration	PHB	Motion	phase error bound
MFP	Motion	motion feedrate percentage	PHE	Motion	phase-locked loop enable
MID	Operator	selects middle characters of a string operand	PHG	Motion	phase gain
MJK	Motion	motion jerk percentage	PHL	Motion	phase length
MOTION	Program	edits motion block	PHM	Motion	phase multiplier
MOTORSET	System	automatically sets up motor constants	PHO	Motion	phase offset
MPA	Motion	absolute move position	PHP	Motion	phase position
MPI	Motion	incremental move position	PHR	Motion	phase error
MPL	Motion	move pulses	PHT	Motion	phase lockout time
MPN	Motion	network move position	PHZ	Motion	phase zero
MPO	Motion	offset move position	PIPN	System	network profile in progress
MPS	Motion	motion pulse start position	PLA*	Axis	axis position length
MT	Motion	motion type	PLX*	Axis	auxiliary position length
MTM	Motion	move time	POE	Axis	power output stage enable
MVL	Motion	motion velocity	POP	Program	pops "gosub" address from top of "gosub" stack
MVLN	Motion	network motion velocity	PROG	System	program executing
MVM	Motion	motion velocity for run to marker	PROGRAM	Program	edits program
MVP	Motion	motion velocity of pulse move	PSA	Axis	axis actual position
NCO	System	network connection open	PSAN	Axis	network axis actual position
NET	System	network connection available	PSC	Axis	command position
NOT	Operator	logical NOT operation of any Boolean or integer operand	PSCN	Axis	network command position
OFA	Axis	axis position offset	PSO	Axis	offset position
OFF	Operand	Boolean operator equivalent to FALSE or a logical 0	PSR	Axis	resolver position
OFX	Axis	auxiliary position offset	PSX	Axis	auxiliary position
ON	Operand	Boolean operator equivalent to TRUE or a logical 1	PUT	Input/Output	puts one character to serial port
OR	Operator	logical OR operation of two operand of the same type	PWE*	Axis	position register wrap enable
OTE	Axis	hardware overtravel enable	PZA	Axis	axis position synchronized
OTF	Axis	forward software overtravel	PZX	Axis	auxiliary position synchronized
OTR	Axis	reverse software overtravel	Q	Diagnostic	reports value of register
OUSN	Input/Output	output command to network port with status	QTX*	Axis	auxiliary quadrature type
OUT	Input/Output	outputs string expression to serial port	RDN	Motion	network run direction flag
OUTN	Input/Output	output command to network port	REM	Program	remark
OUTS	Input/Output	outputs screen to display	REPEAT	Program	repeats motion from start of motion block
PAR	System	parity of serial port	RETRIEVE	System	retrieves user memory
PASSWORD	System	prompts for password	RETURN	Program	returns from subroutine
PCA	Axis	axis position capture	REVISION	Diagnostic	reports firmware revision
PCX	Axis	auxiliary position capture	REVN	Diagnostic	network device revision
PFB	Axis	position feedback deadband	RGT	Operator	selects rightmost characters of a string operand
PFC	Axis	position feedback correction numerator	RHF	Motion	runs forward to home input
PFD	Axis	position feedback denominator	RHR	Motion	runs reverse to home input
			RIN	Motion	network run incremental flag
			RMF	Motion	runs forward to marker
			RMN	Motion	network run mode

\* Indicates registers that cannot be set in a program

## Motion Controllers

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Reg/Cmd	Class	Description	Reg/Cmd	Class	Description
RMR	Motion	runs reverse to marker	STVB...GOTO	Program	set Boolean variable and if variable wasn't set, GOTO label
ROF	Motion	runs forward to overtravel input	SUP	Program	suspends motion
ROL	Operator	rotates bits of an integer operand left by n number of places	SVL	Input/Output	saves screen lines
ROR	Motion	runs reverse to overtravel input	SVV	System	saves variables from RAM to nonvolatile memory
ROR	Operator	rotates bits of an integer operand right by n number of places (see ROL for operator description)	TAN	Operator	tangent trigonometric function of a floating point operand
RPA	Motion	runs to absolute position	TL	System	axis at torque limit
RPI	Motion	runs to incremental position	TLC	Axis	torque limit current
RPN	Motion	run profile of network device	TLE	Axis	torque limit enable
RPO	Motion	runs to offset position	TM	System	timer timed out flag
RSF	System	resets faults	TMR	System	timer
RSFN	System	reset network faults	TRC	Operator	convert a floating point operand to an integer by truncation
RSM	Program	resumes motion	TRUE	Operand	Boolean operator equivalent to ON or a logical 1
RSTSTK	Program	resets "gosub" stack to empty	UNLOCK	Program	unlocks interpreter from program
RTU	System	Remote terminal unit mode enable	UPR	Operator	converts a string operand to upper case
RTUF	System	Remote terminal unit communication flag	UPS	Input/Output	update screen
RTV	System	retrieves variables from nonvolatile memory to RAM	URA*	Axis	axis unit ratio numerator
RVF	Motion	runs to velocity forward	URB*	Axis	axis unit ratio denominator
RVR	Motion	runs to velocity reverse	URX*	Axis	auxiliary unit ratio
SAVE	System	saves user memory	VB	Variable	Boolean variable
SCAN	System	maximum scan time	VBN	Variable	network Boolean variable
SCRD	Input/Output	screen data	VF	Variable	floating point variable
SCRL	Input/Output	screen line	VFA*	System	floating point variable allocation
SCRP	Input/Output	screen position of data	VFN	Variable	network floating point variable
SECURE	System	secures user memory	VI	Variable	integer variable
SHL	Operator	arithmetic shift of integer operand of n places to the left	VIN	Variable	network integer variable
SHR	Operator	arithmetic shift of integer operand of n places to the right	VLA	Axis	axis velocity
SIN	Operator	sine trigonometric function of a floating point operand	VLAN	Axis	network axis velocity
SNI	Input/Output	scanned network input	VLAT	Axis	axis velocity filter time constant
SNIA	Input/Output	scanned network input address	VLX	Axis	auxiliary velocity
SQR	Operator	takes square root of positive integer or floating point operand	VLXT	Axis	auxiliary velocity filter time constant
SRA	System	axis status	VS	Variable	string variable
SRP	System	program status	VSN	Variable	network string variable
SRS	System	system status	WAIT	Program	waits for expression to be true
ST	Motion	stops motion	WAIT...WHEN...GOTO	Program	waits for expression to be true or when expression becomes true goes to label
STEP	Motion	step input	X	Program	steps through program/motion block
STF(p1)	Operator	converts a string operand to a floating point number	XOR	Operator	logical XOR function of two operands of the same type
STF	System	sets fault			
STFN	System	network sets fault			
STI	Operator	converts a string operand to an integer			
STM	System	start time of timer			
STN	Motion	network stop			

\* Indicates registers that cannot be set in a program

## Motion Controllers

### S2K Series

#### Controller Diagnostics

The S2K Series products include a 2-character LED on the front panel for real-time diagnostic updates. The information is displayed in an easy-to-remember, mnemonic format. Multiple faults are displayed on a round robin basis. The diagnostic information is listed in the following table:

#### LED Status Display Codes

Display Code	Status	Description
OK	okay	Drive enabled, CPUs and operating system functional
CC	faulted	Motor regeneration circuit over current
DT	faulted	Controller over temperature
EC	faulted	Motor regeneration circuit excessive duty cycle
EI	faulted	Excessive command increment
FE	faulted	Excess following error
FL	faulted	Feedback Lost (servo only)
LE	faulted	Lost enable
MT	faulted	Motor over temperature (servo only)
OC	faulted	Motor over current (servo only)
OV	faulted	Motor over voltage
PF	faulted	Power failure
PO	faulted	Position register overflow
SF	faulted	Software fault
UV	faulted	Motor under voltage
0-63	ok/faulted	DeviceNet node address/fault code
•	ok/faulted	Flashing decimal indicates serial communication traffic

Multiple codes are alternately displayed in sequential order.

Hardware Resources	S2K Controller
Master axes	1
Auxiliary encoder input	1
Digital inputs	8 <sup>†</sup> or 11 <sup>‡</sup>
Digital inputs/outputs	6 <sup>†</sup> or 10 <sup>‡</sup>
Analog inputs	2
Analog outputs	1
Serial ports	1
Network connection	1
Servo motor torque range	0.84 to 477 lb-in (0.09-53.9 Nm)
Stepping motor torque range	94-780 oz-in (0.67-5.51 Nm)

<sup>†</sup>14 total digital I/O lines are available on models with a network; 8 lines are inputs; 6 lines can be configured as inputs or outputs

<sup>‡</sup>On units with additional I/O instead of network port, 21 total digital I/O lines are available; 11 lines are inputs; 10 lines can be configured as inputs or outputs

#### Hardware Capabilities

The S2K Series servo and stepping controllers provide a complete set of standard hardware resources.

Most on-board I/O can be configured by the user for application specific usage. An auxiliary encoder input can be used as a master input for electronic gearing/camming functions or for axis position feedback from an encoder mounted at the load.

In addition to the standard RS-232 serial port, machine designers may choose either the DeviceNet network option, Profibus-DP Slave network option or additional digital I/O to suit their application needs.

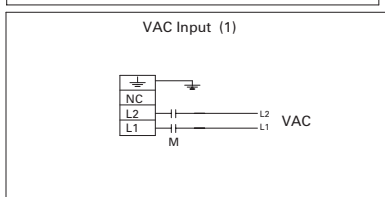
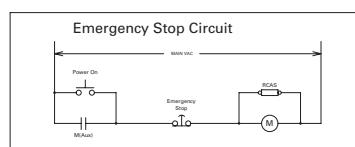
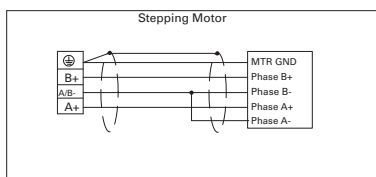
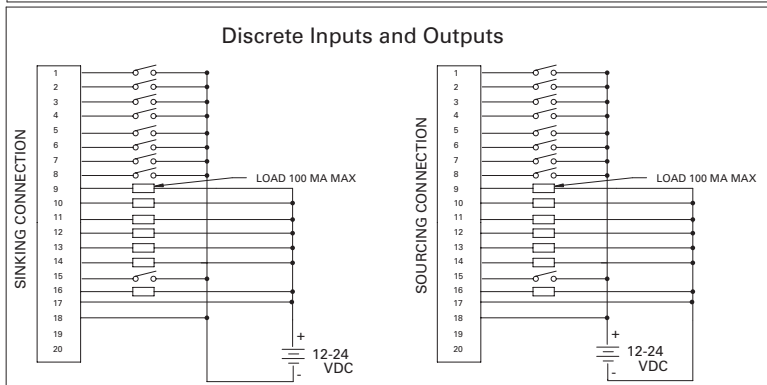
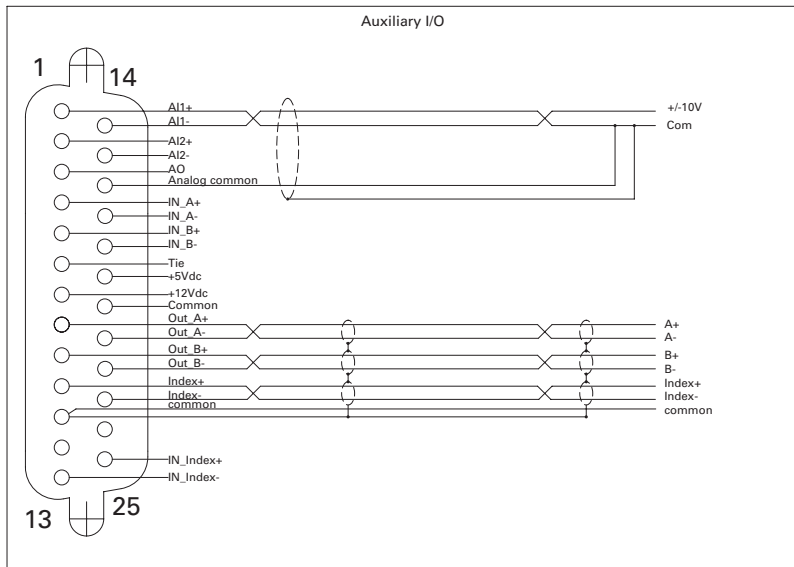
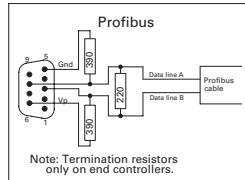
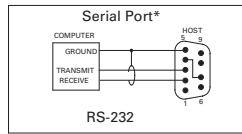
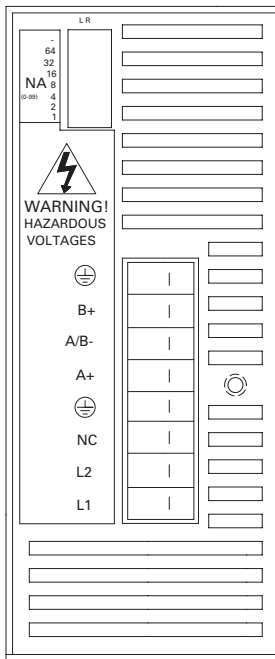
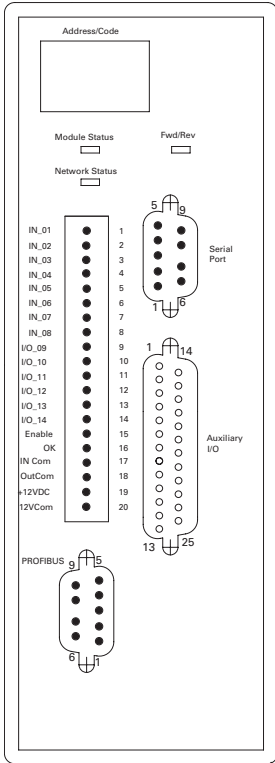
The S2K Series can control a wide torque range within a single model. The reduced package size and the extensive processing power provides motion control solutions for your most demanding applications.

### S2K Series

#### User Control Connections

#### S2K Model: ST1105 (Profibus Communication)

#### IC800ST1105P2



Profibus Address	1	2	4	8	16	32
(NA) 0	R	R	R	R	R	R
1	R	R	R	R	R	R
2	R	R	R	R	R	R
3	R	R	R	R	R	R
4	R	R	R	R	R	R
5	R	R	R	R	R	R
6	R	R	R	R	R	R
7	R	R	R	R	R	R
8	R	R	R	R	R	R
9	R	R	R	R	R	R
10	R	R	R	R	R	R
11	R	R	R	R	R	R
12	R	R	R	R	R	R
13	R	R	R	R	R	R
14	R	R	R	R	R	R
15	R	R	R	R	R	R
16	R	R	R	R	R	R
17	R	R	R	R	R	R
18	R	R	R	R	R	R
19	R	R	R	R	R	R
20	R	R	R	R	R	R
21	R	R	R	R	R	R
22	R	R	R	R	R	R
23	R	R	R	R	R	R
24	R	R	R	R	R	R
25	R	R	R	R	R	R
26	R	R	R	R	R	R
27	R	R	R	R	R	R
28	R	R	R	R	R	R
29	R	R	R	R	R	R
30	R	R	R	R	R	R
31	R	R	R	R	R	R
32	R	R	R	R	R	R
33	R	R	R	R	R	R
34	R	R	R	R	R	R
35	R	R	R	R	R	R
36	R	R	R	R	R	R
37	R	R	R	R	R	R
38	R	R	R	R	R	R
39	R	R	R	R	R	R
40	R	R	R	R	R	R
41	R	R	R	R	R	R
42	R	R	R	R	R	R
43	R	R	R	R	R	R
44	R	R	R	R	R	R
45	R	R	R	R	R	R
46	R	R	R	R	R	R
47	R	R	R	R	R	R
48	R	R	R	R	R	R
49	R	R	R	R	R	R
50	R	R	R	R	R	R
51	R	R	R	R	R	R
52	R	R	R	R	R	R
53	R	R	R	R	R	R
54	R	R	R	R	R	R
55	R	R	R	R	R	R
56	R	R	R	R	R	R
57	R	R	R	R	R	R
58	R	R	R	R	R	R
59	R	R	R	R	R	R
60	R	R	R	R	R	R
61	R	R	R	R	R	R
62	R	R	R	R	R	R
63	R	R	R	R	R	R
Profibus address	0-63	R X				64 -
	64-99	L X				

**REMARKS:**

(1) Input power 90 to 130 VAC, 50-440 Hz  
1 phase @ 10 Amps.

(2) Must turn off power before changing settings.  
R= right (closed)  
L= left (open)

**\*Note:**

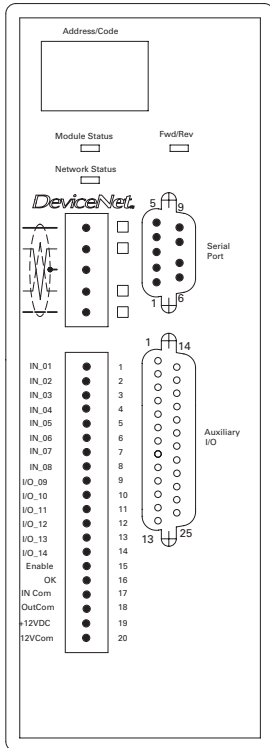
The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

### S2K Series

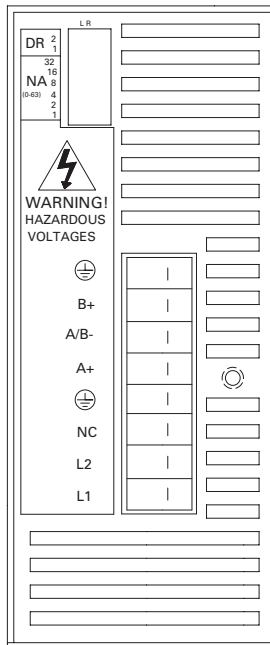
#### User Control Connections

#### S2K Model: STI105 (DeviceNet Communication)

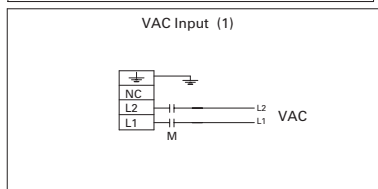
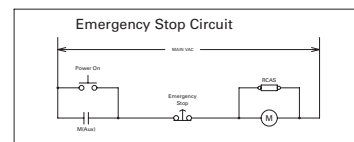
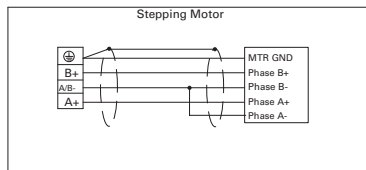
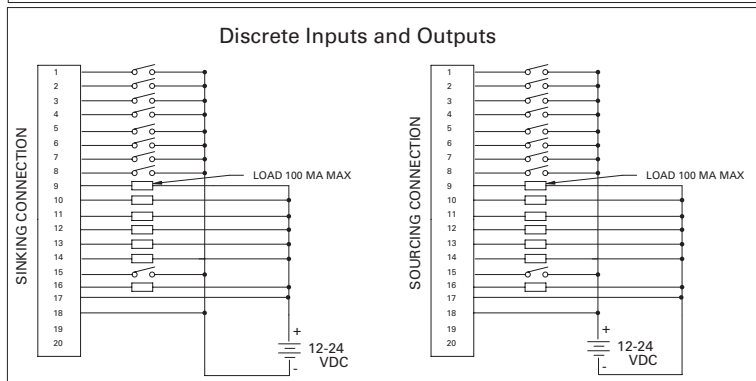
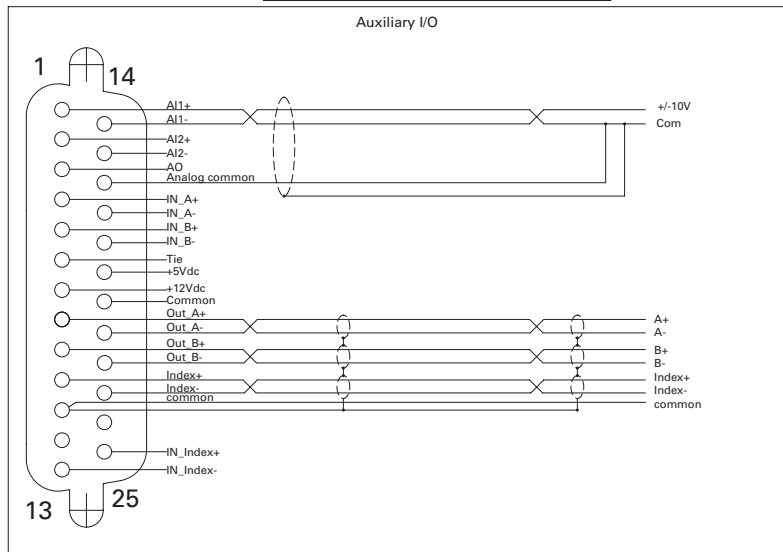
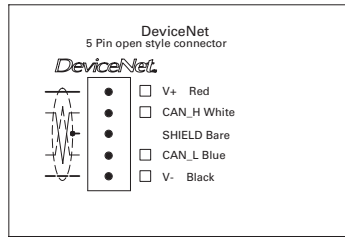
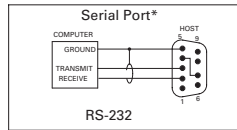
IC800STI105D2



FRONT VIEW



BOTTOM VIEW



REMARKS:

(1) Input power 90 to 130 VAC, 50-440 Hz  
1 phase @ 10 Amps.

(2) Must turn off power before changing settings.  
R= right (closed)  
L= left (open)

DIP Switch Positions (2)

Device Net Address	1	2	4	8	16	32
0	R	R	R	R	R	R
1	L	R	R	R	R	R
2	R	L	R	R	R	R
3	L	L	R	R	R	R
4	R	L	L	R	R	R
5	L	L	L	R	R	R
6	R	L	L	L	R	R
7	L	L	L	L	R	R
8	R	R	L	L	R	R
9	L	R	L	L	R	R
10	R	L	R	L	R	R
11	L	L	R	L	R	R
12	R	L	L	R	L	R
13	L	L	L	R	L	R
14	R	L	L	L	R	R
15	L	L	L	L	R	R
16	R	L	L	L	R	R
17	L	L	L	L	R	R
18	R	L	R	L	R	R
19	L	L	R	L	R	R
20	R	L	R	L	R	R
21	L	L	R	L	R	R
22	R	L	L	R	L	R
23	L	L	L	R	L	R
24	R	L	R	L	R	R
25	L	L	R	L	R	R
26	R	L	R	L	R	R
27	L	L	R	L	R	R
28	R	L	R	L	R	R
29	L	L	R	L	R	R
30	R	L	L	R	L	R
31	L	L	L	R	L	R
32	R	L	R	L	R	R
33	L	L	R	L	R	R
34	R	L	R	L	R	R
35	L	L	R	L	R	R
36	R	L	R	L	R	R
37	L	L	R	L	R	R
38	R	L	R	L	R	R
39	L	L	R	L	R	R
40	R	L	R	L	R	R
41	L	L	R	L	R	R
42	R	L	R	L	R	R
43	L	L	R	L	R	R
44	R	L	R	L	R	R
45	L	L	R	L	R	R
46	R	L	R	L	R	R
47	L	L	R	L	R	R
48	R	L	R	L	R	R
49	L	L	R	L	R	R
50	R	L	R	L	R	R
51	L	L	R	L	R	R
52	R	L	R	L	R	R
53	L	L	R	L	R	R
54	R	L	R	L	R	R
55	L	L	R	L	R	R
56	R	L	R	L	R	R
57	L	L	R	L	R	R
58	R	L	R	L	R	R
59	L	L	R	L	R	R
60	R	L	R	L	R	R
61	L	L	R	L	R	R
62	R	L	R	L	R	R
63	L	L	R	L	R	R

Device Net Baud Rate	1	2
125K	R	R
250K	L	R
500K	R	L
N/A	L	L

**\*Note:**  
The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

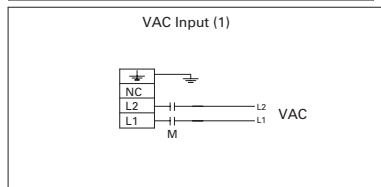
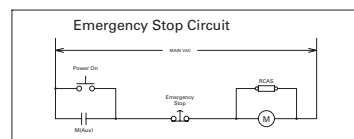
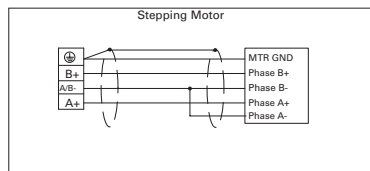
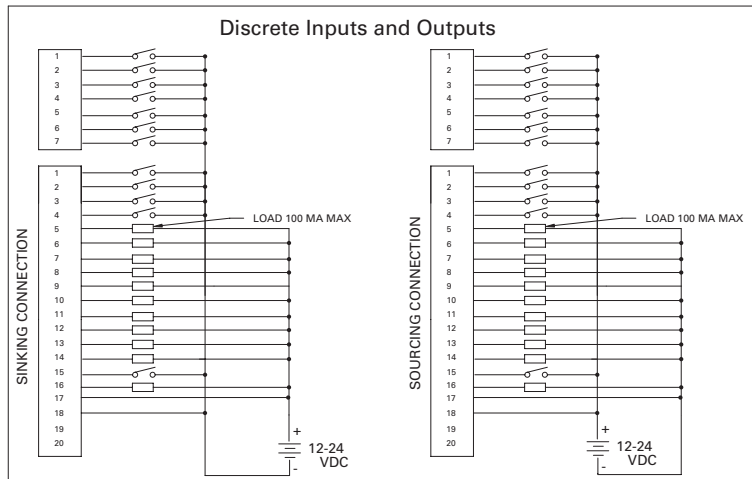
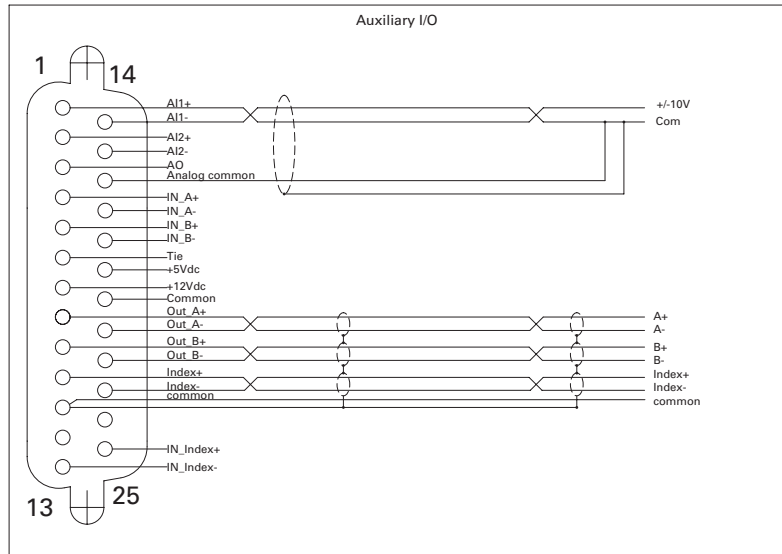
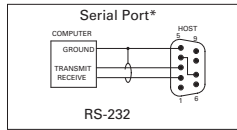
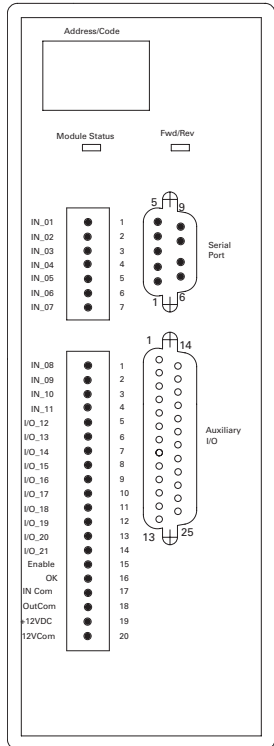


### S2K Series

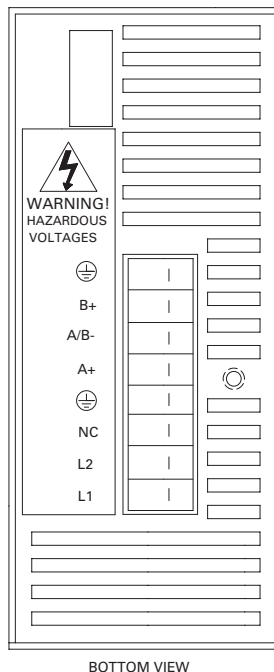
#### User Control Connections

#### S2K Model: STI105 (Serial Communication)

#### IC800STI105S1



**REMARKS:**  
 (1) Input power 90 to 130 VAC, 50-440 Hz  
 1 phase @ 10 Amps.



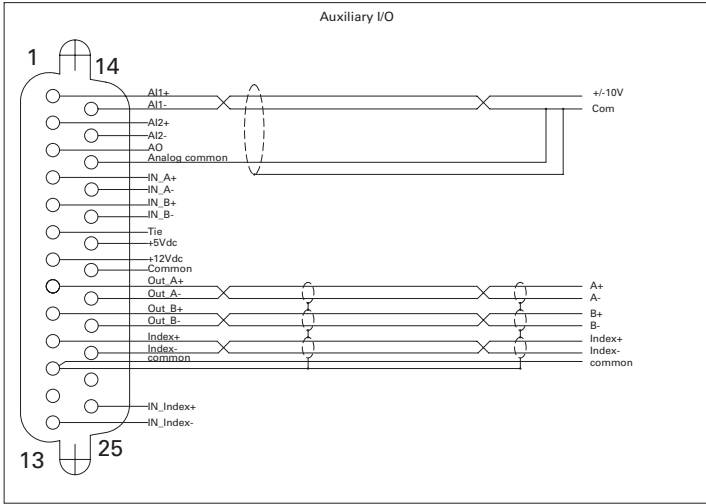
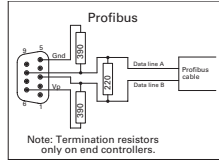
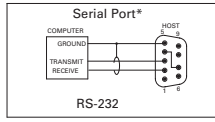
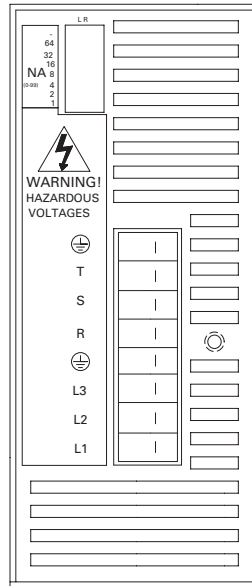
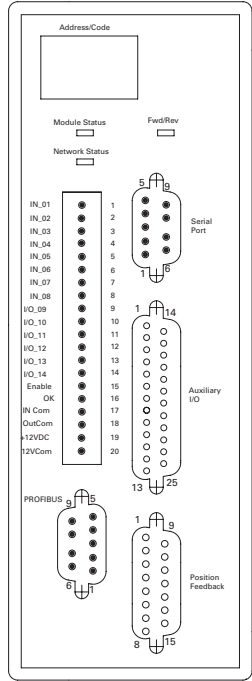
**\*Note:**  
 The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

### S2K Series

#### User Control Connections

#### S2K Model: SSI104 (Profibus Communication)

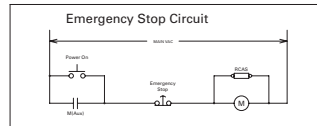
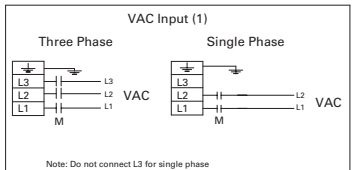
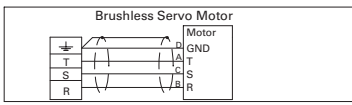
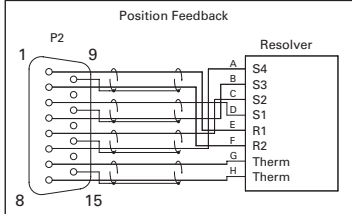
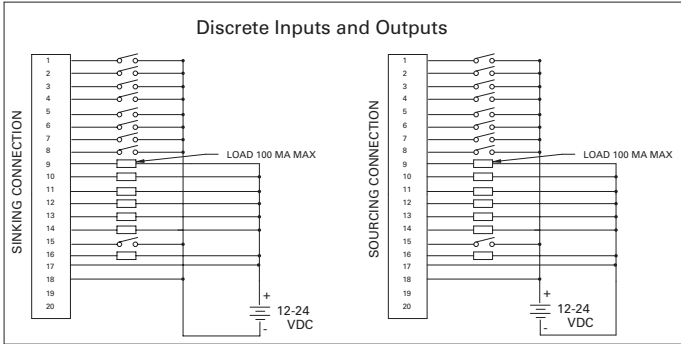
IC800SSI104RP2



**DIP Switch Positions (2)**

Profibus Address	1	2	4	8	16	32
(NA)	0	64	R	R	R	R
	1	65	L	R	R	R
	2	66	R	L	R	R
	3	67	L	L	R	R
	4	68	R	R	L	R
	5	69	L	R	L	R
	6	70	R	L	L	R
	7	71	L	L	L	R
	8	72	R	R	R	L
	9	73	L	R	L	R
	10	74	R	L	L	R
	11	75	L	L	L	R
	12	76	R	R	L	R
	13	77	L	R	L	R
	14	78	R	L	L	R
	15	79	L	L	L	R
	16	80	R	R	R	L
	17	81	L	R	R	L
	18	82	R	L	R	L
	19	83	L	L	R	L
	20	84	R	L	L	R
	21	85	L	R	L	R
	22	86	R	L	L	R
	23	87	L	L	L	R
	24	88	R	R	R	L
	25	89	L	R	L	R
	26	90	R	L	L	R
	27	91	L	L	L	R
	28	92	R	R	L	R
	29	93	L	L	L	R
	30	94	R	L	L	R
	31	95	L	L	L	R
	32	96	R	R	R	L
	33	97	L	R	L	R
	34	98	R	L	L	R
	35	99	L	L	L	R
	36	-	R	R	L	R
	37	-	L	R	L	R
	38	-	R	L	R	L
	39	-	L	L	R	L
	40	-	R	R	R	L
	41	-	L	R	L	R
	42	-	R	L	L	R
	43	-	L	L	L	R
	44	-	R	L	L	R
	45	-	L	L	L	R
	46	-	R	L	L	R
	47	-	L	L	L	R
	48	-	R	R	L	R
	49	-	L	R	L	R
	50	-	R	L	L	R
	51	-	L	L	L	R
	52	-	R	R	L	R
	53	-	L	L	L	R
	54	-	R	L	L	R
	55	-	L	L	L	R
	56	-	R	R	L	R
	57	-	L	R	L	R
	58	-	R	L	L	R
	59	-	L	L	L	R
	60	-	R	L	L	R
	61	-	L	L	L	R
	62	-	R	L	L	R
	63	-	L	L	L	R

Profibus address 0-63 R X 64-99 L X



**REMARKS:**

(1) Input power 90 to 250 VAC, 50-440 Hz  
1 phase @ 10 Amps, 3 phase @ 6 Amps

(2) Must turn off power before changing settings.  
R= right (closed)  
L= left (open)

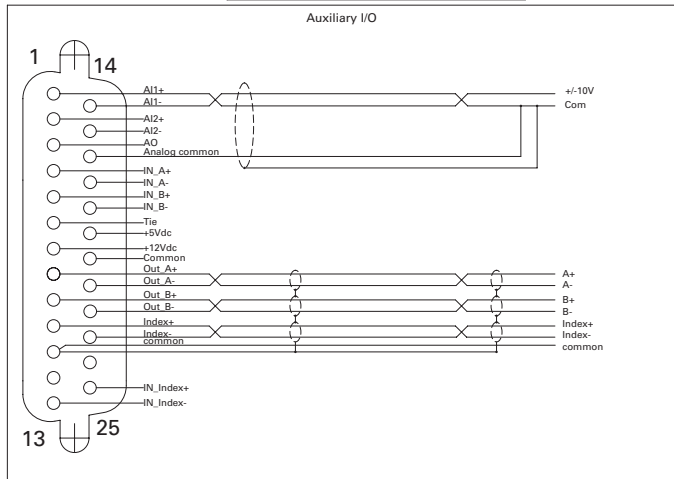
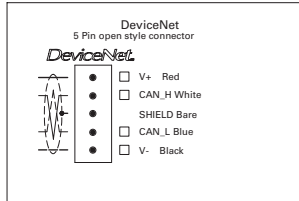
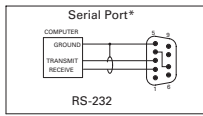
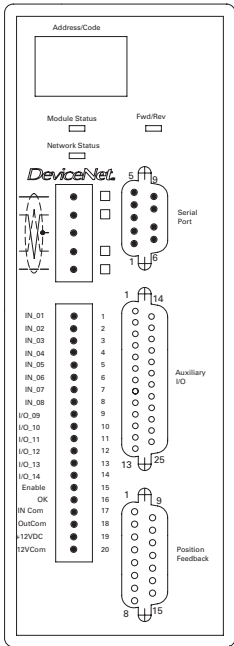
**\*Note:**  
The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

### S2K Series

#### User Control Connections

#### S2K Model: SSI104 (DeviceNet Communication)

IC800SSI104RD2



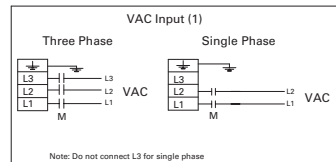
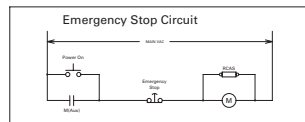
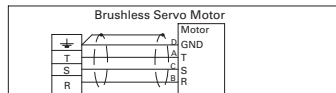
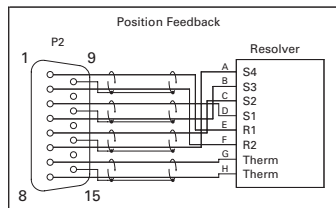
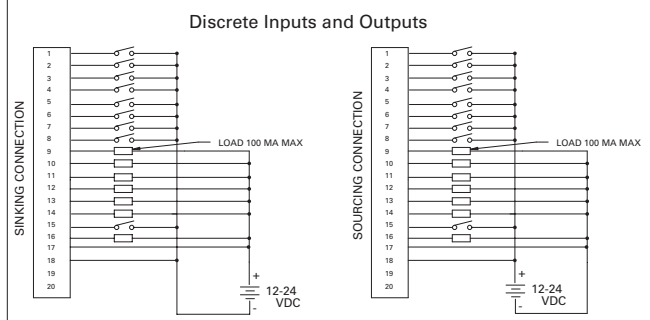
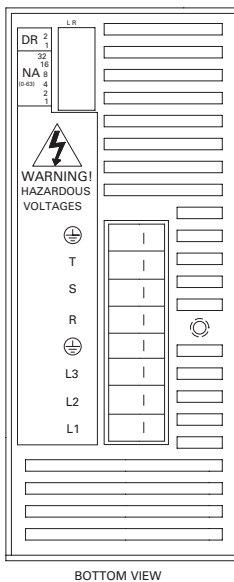
**DIP Switch Positions (2)**

Device Net Address	1	2	4	8	16	32
0	R	R	R	R	R	R
1	L	R	R	R	R	R
2	R	L	R	R	R	R
3	L	L	R	R	R	R
4	R	L	R	R	R	R
5	L	R	L	R	R	R
6	R	L	L	R	R	R
7	L	L	L	R	R	R
8	R	R	L	R	R	R
9	L	R	R	L	R	R
10	L	R	L	L	R	R
11	L	R	L	L	R	R
12	R	R	L	L	R	R
13	L	R	L	L	R	R
14	R	L	L	L	R	R
15	L	L	L	L	R	R
16	R	R	L	L	R	R
17	L	R	L	L	R	R
18	R	L	R	L	R	R
19	L	L	R	L	R	R
20	R	R	L	L	R	R
21	R	R	L	L	R	R
22	R	L	L	L	R	R
23	L	L	L	L	R	R
24	R	R	L	L	R	R
25	L	R	L	L	R	R
26	R	L	L	L	R	R
27	L	L	L	L	R	R
28	R	R	L	L	R	R
29	L	R	L	L	R	R
30	R	L	L	L	R	R
31	L	L	L	L	R	R
32	R	R	L	L	R	R
33	L	R	L	L	R	R
34	R	L	L	L	R	R
35	L	L	L	L	R	R
36	R	R	L	L	R	R
37	L	R	L	L	R	R
38	R	L	L	L	R	R
39	L	L	L	L	R	R
40	R	R	L	L	R	R
41	L	R	L	L	R	R
42	R	L	L	L	R	R
43	L	L	L	L	R	R
44	R	R	L	L	R	R
45	L	R	L	L	R	R
46	R	L	L	L	R	R
47	L	L	L	L	R	R
48	R	R	L	L	R	R
49	L	R	L	L	R	R
50	R	L	L	L	R	R
51	L	L	L	L	R	R
52	R	R	L	L	R	R
53	L	R	L	L	R	R
54	R	L	L	L	R	R
55	L	L	L	L	R	R
56	R	R	L	L	R	R
57	L	R	L	L	R	R
58	R	L	L	L	R	R
59	L	L	L	L	R	R
60	R	R	L	L	R	R
61	L	R	L	L	R	R
62	R	L	L	L	R	R
63	L	L	L	L	R	R

Device Net Baud Rate	1	2
125K	R	R
250K	L	R
500K	R	L
N/A	L	L

(DR)



**REMARKS:**

(1) Input power 80 to 250 VAC, 50-440 Hz  
1 phase @ 10 Amps, 3 phase @ 6 Amps

(2) Must turn off power before changing settings.  
R= right (closed)  
L= left (open)

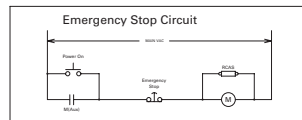
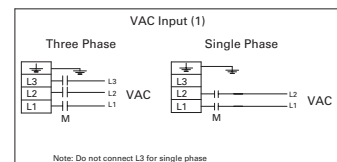
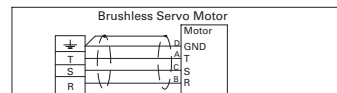
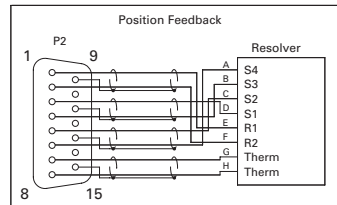
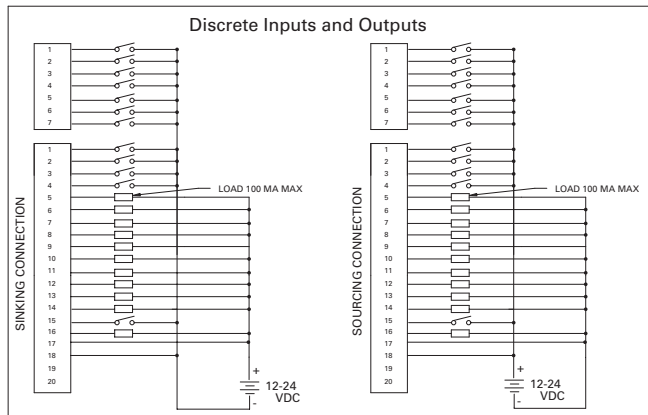
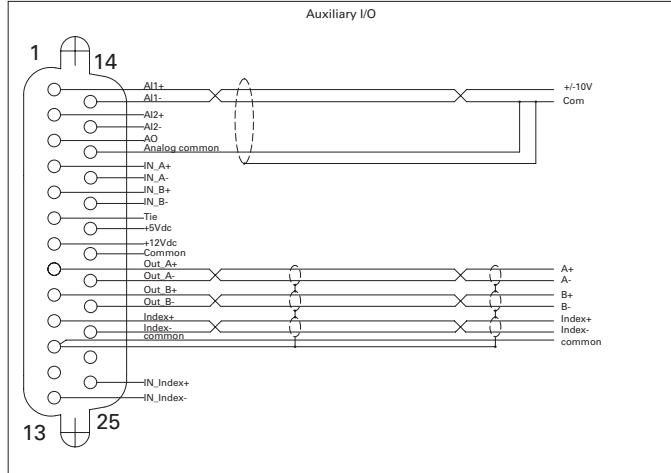
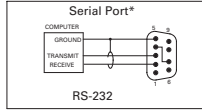
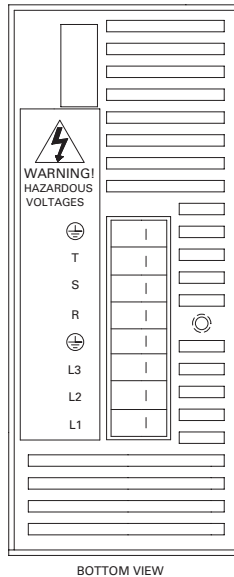
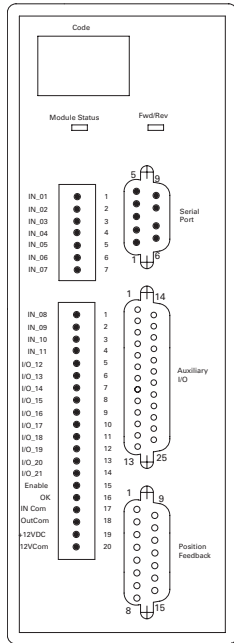
**\*Note:**  
The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

### S2K Series

#### User Control Connections

#### S2K Model: SSI104 (Serial Communication)

IC800SSI104RS1



**REMARKS:**

- (1) Input power 90 to 250 VAC, 50-440 Hz
- 1 phase @ 10 Amps, 3 phase @ 6 Amps

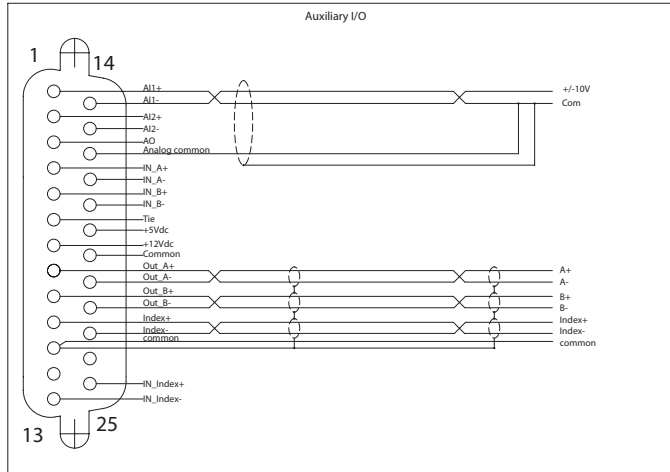
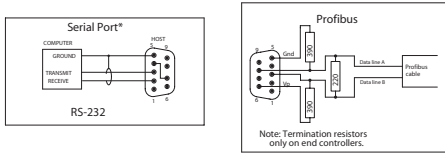
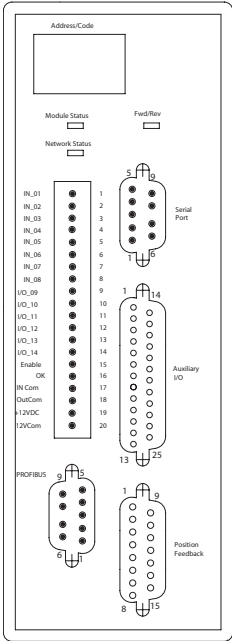
**\*Note:**

The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

### S2K Series

#### User Control Connections S2K Model: SSI107 (Profibus Communication)

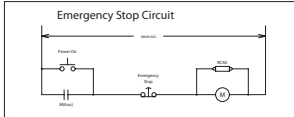
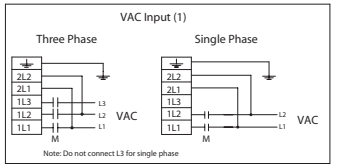
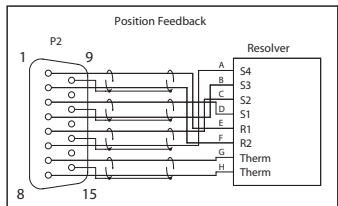
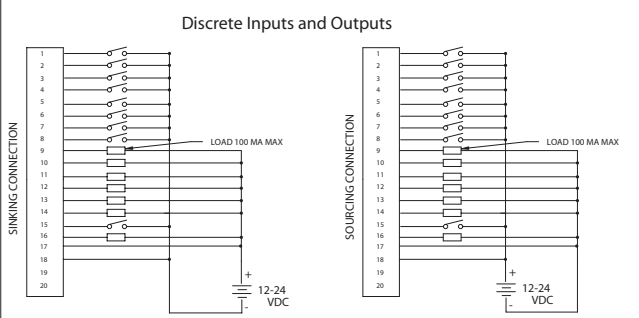
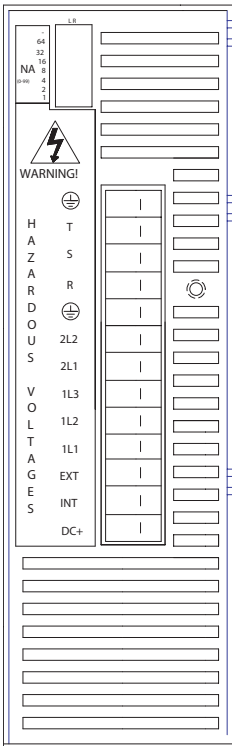
IC800SSI107RP2



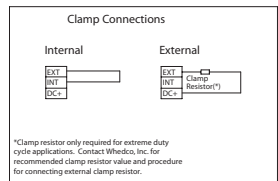
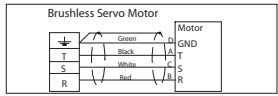
**DIP Switch Positions (2)**

Profibus Address	1	2	4	8	16	32
(NA) 0 64	R	R	R	R	R	R
1 65	L	R	R	R	R	R
2 66	R	L	R	R	R	R
3 67	L	L	R	R	R	R
4 68	R	L	R	R	R	R
5 69	L	L	R	R	R	R
6 70	R	L	R	R	R	R
7 71	L	L	R	R	R	R
8 72	R	R	L	R	R	R
9 73	L	R	L	R	R	R
10 74	R	L	R	L	R	R
11 75	L	L	R	L	R	R
12 76	R	L	R	L	R	R
13 77	L	L	R	L	R	R
14 78	R	L	R	L	R	R
15 79	L	L	R	L	R	R
16 80	R	R	L	R	R	R
17 81	L	R	L	R	R	R
18 82	R	L	R	L	R	R
19 83	L	L	R	L	R	R
20 84	R	R	L	R	R	R
21 85	L	R	L	R	R	R
22 86	R	L	R	L	R	R
23 87	L	L	R	L	R	R
24 88	R	R	L	R	R	R
25 89	L	R	L	R	R	R
26 90	R	L	R	L	R	R
27 91	L	L	R	L	R	R
28 92	R	R	L	R	R	R
29 93	L	R	L	R	R	R
30 94	R	L	R	L	R	R
31 95	L	L	R	L	R	R
32 96	R	R	L	R	R	R
33 97	L	R	L	R	R	R
34 98	R	L	R	L	R	R
35 99	L	L	R	L	R	R
36 -	R	R	L	R	R	R
37 -	L	R	L	R	R	R
38 -	R	L	R	L	R	R
39 -	L	L	R	L	R	R
40 -	R	R	L	R	R	R
41 -	L	R	L	R	R	R
42 -	R	L	R	L	R	R
43 -	L	L	R	L	R	R
44 -	R	R	L	R	R	R
45 -	L	R	L	R	R	R
46 -	R	L	R	L	R	R
47 -	L	L	R	L	R	R
48 -	R	R	L	R	R	R
49 -	L	R	L	R	R	R
50 -	R	L	R	L	R	R
51 -	L	L	R	L	R	R
52 -	R	R	L	R	R	R
53 -	L	R	L	R	R	R
54 -	R	L	R	L	R	R
55 -	L	L	R	L	R	R
56 -	R	R	L	R	R	R
57 -	L	R	L	R	R	R
58 -	R	L	R	L	R	R
59 -	L	L	R	L	R	R
60 -	R	R	L	R	R	R
61 -	L	R	L	R	R	R
62 -	R	L	R	L	R	R
63 -	L	L	R	L	R	R

Profibus address 0-63 R X  
64-99 L X



**REMARKS:**  
(1) Input power 90 to 250 VAC, 50-440 Hz 1 phase @ 15 Amps, 3 phase @ 8 Amps  
(2) Must turn off power before changing settings.  
R: right (closed)  
L: left (open)



\*Clamp resistor only required for extreme duty cycle applications. Contact Wiedia, Inc. for recommended clamp resistor value and procedure for connecting external clamp resistor.

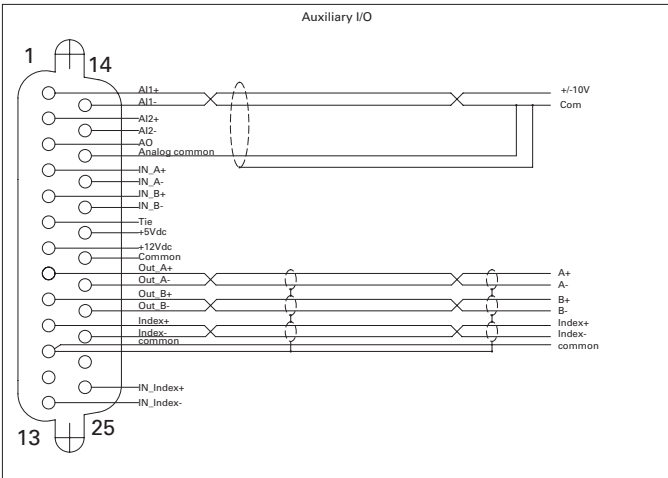
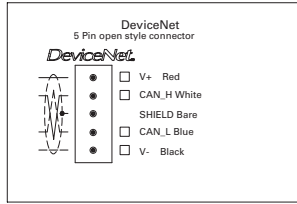
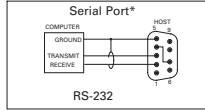
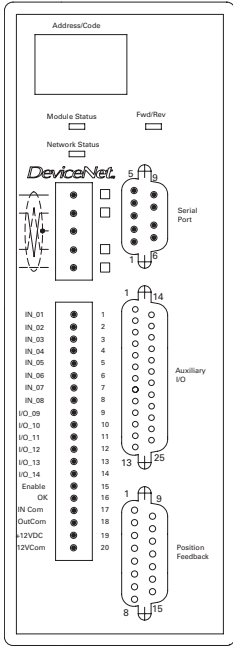
**\*Note:**  
The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

### S2K Series

#### User Control Connections

#### S2K Model: SSI107 (DeviceNet Communication)

IC800SSI107RD2



**\*Note:**

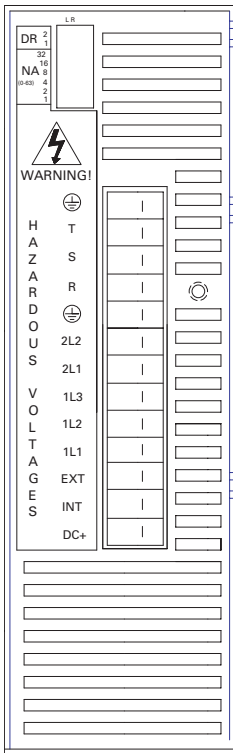
The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

**DIP Switch Positions (2)**

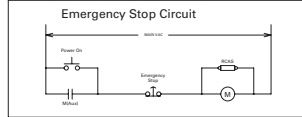
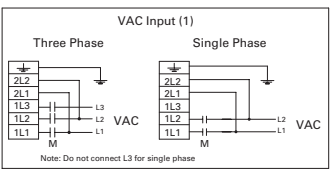
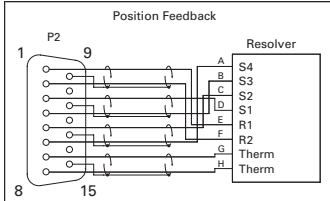
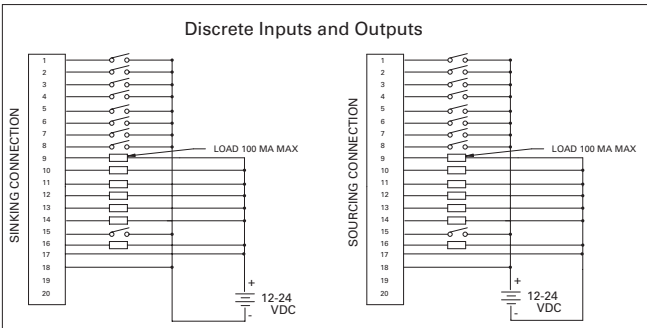
Device Net Address	1	2	4	8	16	32
(NA)	0	R	R	R	R	R
1	L	R	R	R	R	R
2	R	L	R	R	R	R
3	L	L	R	R	R	R
4	R	L	L	R	R	R
5	L	L	L	R	R	R
6	R	L	L	L	R	R
7	L	L	L	L	R	R
8	R	R	L	L	R	R
9	L	R	L	L	R	R
10	R	L	R	L	R	R
11	L	L	L	L	R	R
12	R	L	L	L	R	R
13	L	R	L	L	R	R
14	R	L	L	L	R	R
15	L	L	L	L	R	R
16	R	R	L	L	R	R
17	L	R	L	L	R	R
18	R	L	R	L	R	R
19	L	L	R	L	R	R
20	R	R	L	L	R	R
21	L	L	L	L	R	R
22	R	L	L	L	R	R
23	L	L	L	L	R	R
24	R	R	L	L	R	R
25	L	R	L	L	R	R
26	R	L	R	L	R	R
27	L	L	L	L	R	R
28	R	L	L	L	R	R
29	L	R	L	L	R	R
30	R	L	L	L	R	R
31	L	L	L	L	R	R
32	R	R	L	L	R	R
33	L	R	L	L	R	R
34	R	L	R	L	R	R
35	L	L	R	L	R	R
36	R	R	L	L	R	R
37	L	L	L	L	R	R
38	R	L	L	L	R	R
39	L	L	L	L	R	R
40	R	R	L	L	R	R
41	L	R	L	L	R	R
42	R	L	R	L	R	R
43	L	L	L	L	R	R
44	R	L	L	L	R	R
45	L	L	L	L	R	R
46	R	L	L	L	R	R
47	L	L	L	L	R	R
48	R	R	L	L	R	R
49	L	R	L	L	R	R
50	R	L	R	L	R	R
51	L	L	L	L	R	R
52	R	L	L	L	R	R
53	L	L	L	L	R	R
54	R	L	L	L	R	R
55	L	L	L	L	R	R
56	R	R	L	L	R	R
57	L	R	L	L	R	R
58	R	L	R	L	R	R
59	L	L	L	L	R	R
60	R	L	L	L	R	R
61	L	L	L	L	R	R
62	R	L	L	L	R	R
63	L	L	L	L	R	R

Device Net Baud Rate (DR)	1	2
125K	R	R
250K	L	R
500K	R	L
N/A	L	L

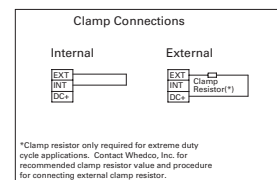
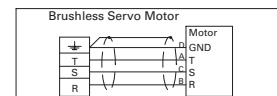
FRONT VIEW



BOTTOM VIEW



REMARKS:  
(1) Input power 90 to 250 VAC, 50-440 Hz  
1 phase @ 15 Amps, 3 phase @ 8 Amps  
(2) Must turn off power before changing settings.  
R= right (closed)  
L= left (open)

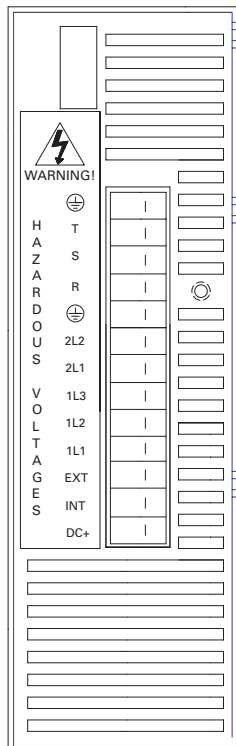
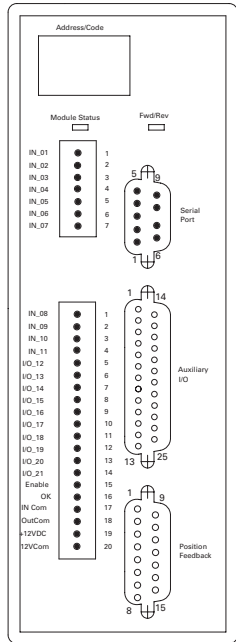


### S2K Series

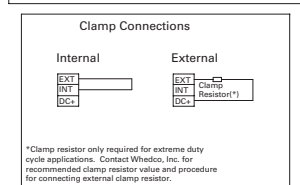
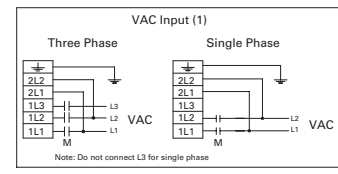
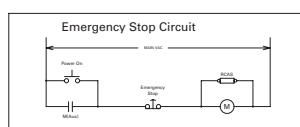
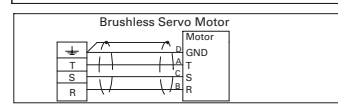
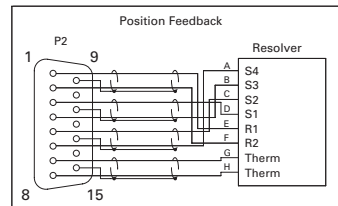
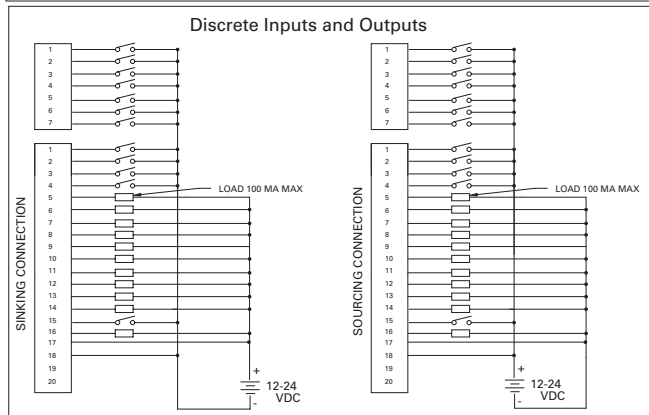
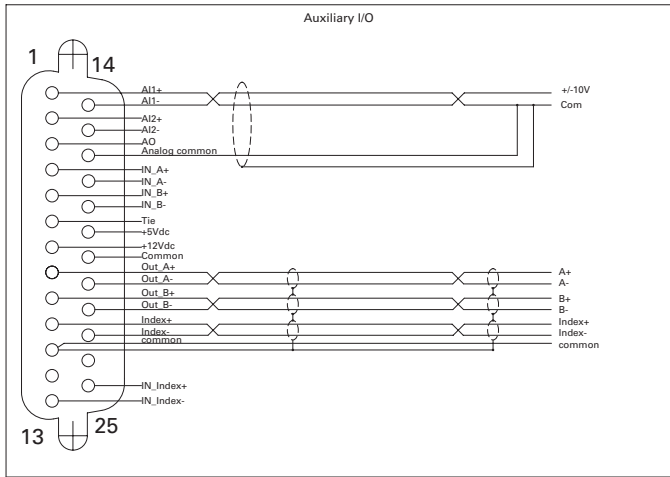
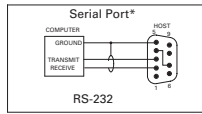
#### User Control Connections

#### S2K Model: SSI107 (Serial Communication)

IC800SSI107RS1



**BOTTOM VIEW**



**REMARKS:**

- (1) Input power 90 to 250 VAC, 50-440 Hz
- 1 phase @ 15 Amps, 3 phase @ 8 Amps

**\*Note:**

The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

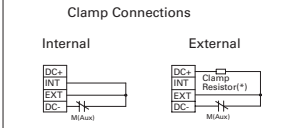
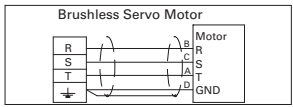
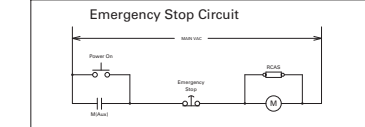
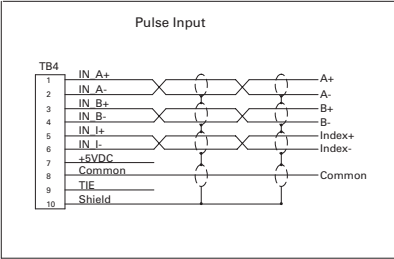
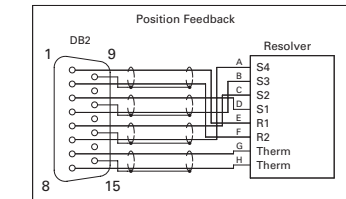
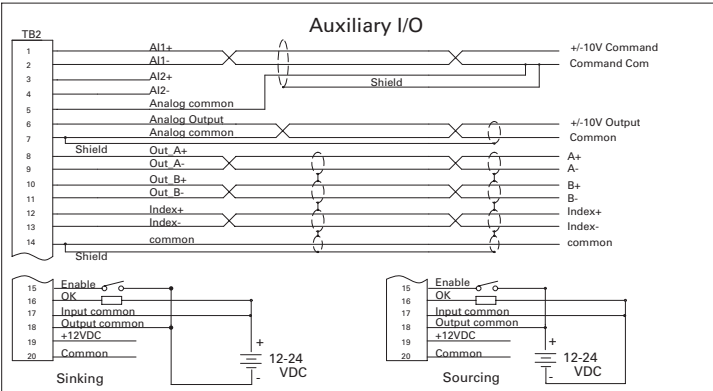
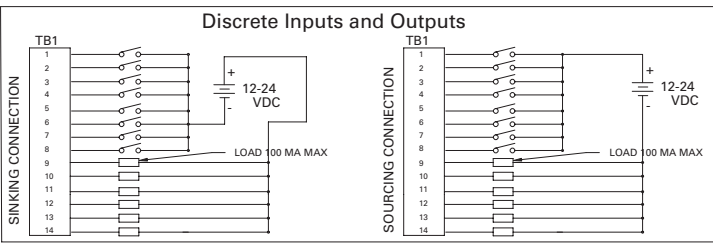
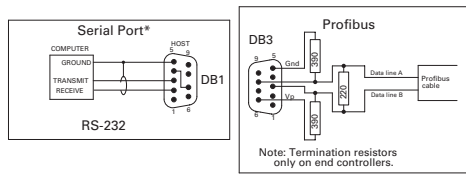
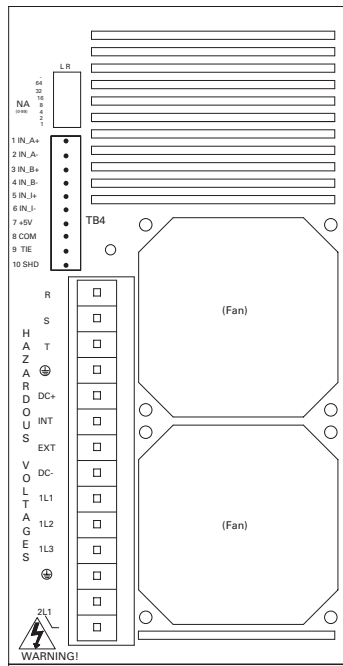
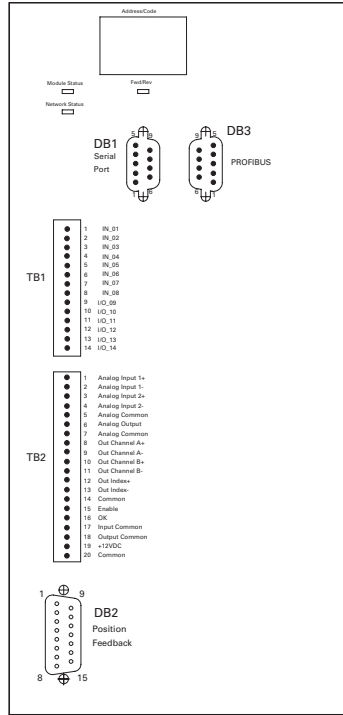
### S2K Series

#### User Control Connections

#### S2K Models: SSI216 and SSI228 (Profibus Communications)

IC800SSI216RP2

IC800SSI228RP2



\*Clamp resistor only required for extreme duty cycle applications. Contact GE Fanuc for recommended clamp resistor value and procedure for connecting external clamp resistor.

**REMARKS:**

(1) Input power 180 to 250 VAC  
3 phase 50-440 Hz @ 18 Amps for IC800SSI216RP2A  
3 phase 50-440 Hz @ 30 Amps for IC800SSI228RP2A

(2) Must turn off power before changing settings.

R= right (closed)  
L= left (open)

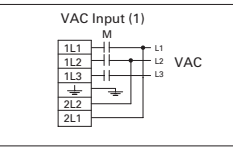
**DIP Switch Positions (2)**

Profibus Address 1 2 4 8 16 32

(NA) 0	64	R	R	R	R	R	R
1	65	L	R	R	R	R	R
2	66	R	L	R	R	R	R
3	67	L	L	R	R	R	R
4	68	R	L	L	R	R	R
5	69	L	L	L	R	R	R
6	70	R	L	L	L	R	R
7	71	L	L	L	L	R	R
8	72	R	R	L	L	R	R
9	73	L	R	L	L	R	R
10	74	R	L	L	L	R	R
11	75	L	L	L	L	R	R
12	76	R	L	L	L	R	R
13	77	L	L	L	L	R	R
14	78	R	L	L	L	R	R
15	79	L	L	L	L	R	R
16	80	R	R	L	L	R	R
17	81	L	L	L	L	R	R
18	82	R	L	L	L	R	R
19	83	L	L	L	L	R	R
20	84	R	L	L	L	R	R
21	85	L	L	L	L	R	R
22	86	R	L	L	L	R	R
23	87	L	L	L	L	R	R
24	88	R	L	L	L	R	R
25	89	L	L	L	L	R	R
26	90	R	L	L	L	R	R
27	91	L	L	L	L	R	R
28	92	R	L	L	L	R	R
29	93	L	L	L	L	R	R
30	94	R	L	L	L	R	R
31	95	L	L	L	L	R	R
32	96	R	R	L	L	R	R
33	97	L	L	L	L	R	R
34	98	R	L	L	L	R	R
35	99	L	L	L	L	R	R
36	-	R	L	L	L	R	R
37	-	L	L	L	L	R	R
38	-	R	L	L	L	R	R
39	-	L	L	L	L	R	R
40	-	R	L	L	L	R	R
41	-	L	L	L	L	R	R
42	-	R	L	L	L	R	R
43	-	L	L	L	L	R	R
44	-	R	L	L	L	R	R
45	-	L	L	L	L	R	R
46	-	R	L	L	L	R	R
47	-	L	L	L	L	R	R
48	-	R	L	L	L	R	R
49	-	L	L	L	L	R	R
50	-	R	L	L	L	R	R
51	-	L	L	L	L	R	R
52	-	R	L	L	L	R	R
53	-	L	L	L	L	R	R
54	-	R	L	L	L	R	R
55	-	L	L	L	L	R	R
56	-	R	L	L	L	R	R
57	-	L	L	L	L	R	R
58	-	R	L	L	L	R	R
59	-	L	L	L	L	R	R
60	-	R	L	L	L	R	R
61	-	L	L	L	L	R	R
62	-	R	L	L	L	R	R
63	-	L	L	L	L	R	R

Profibus address 64 -

0-63 R X  
64-99 L X



**\*Note:**

The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.



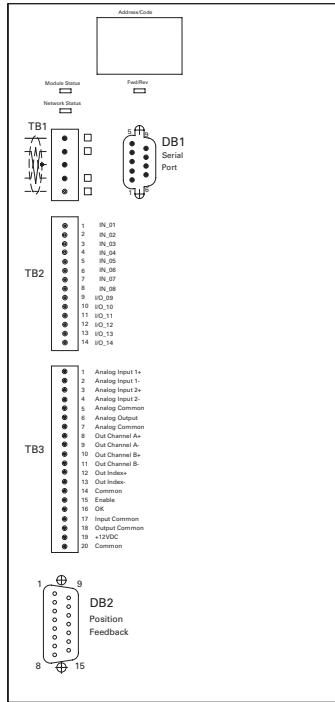
### S2K Series

#### User Control Connections

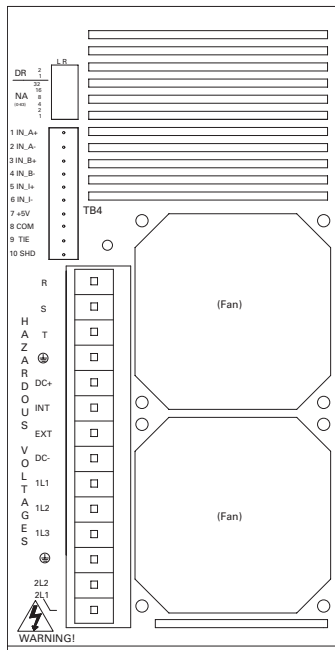
#### S2K Models: SSI216 and SSI228 (DeviceNet Communications)

IC800SSI216RD2

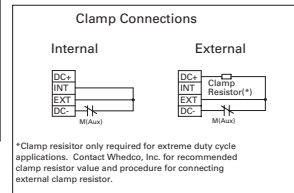
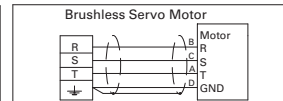
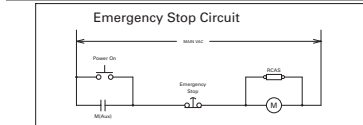
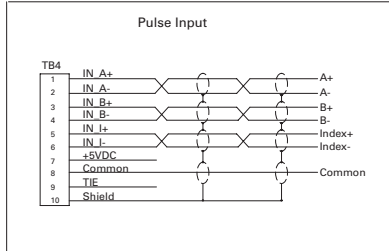
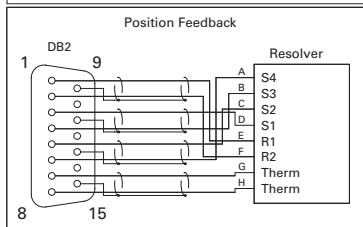
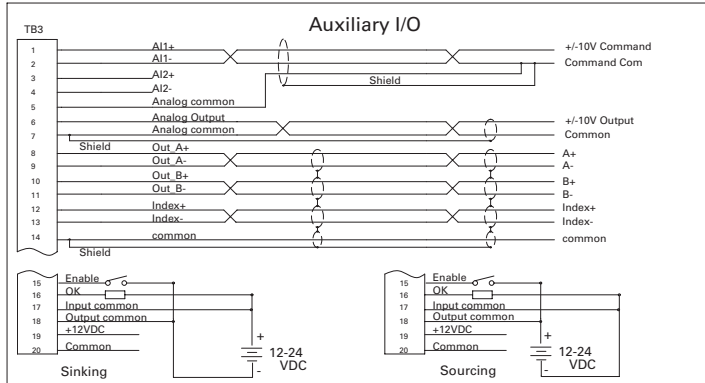
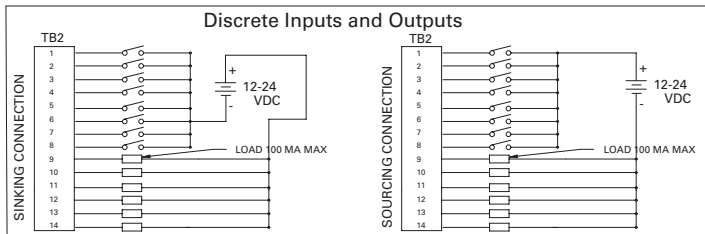
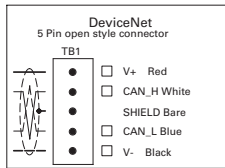
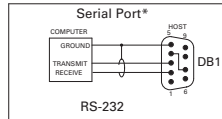
IC800SSI228RD2



FRONT VIEW



BOTTOM VIEW



\*Clamp resistor only required for extreme duty cycle applications. Contact Whedco, Inc. for recommended clamp resistor value and procedure for connecting external clamp resistor.

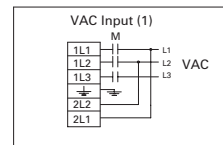
**REMARKS:**

- (1) Input power 180 to 250 VAC  
3 phase 50-440 Hz @ 18 Amps for IC800SSI216RD2A  
3 phase 50-440 Hz @ 30 Amps for IC800SSI228RD2A
- (2) Must turn off power before changing settings.  
R= right (closed)  
L= left (open)

DIP Switch Positions (2)	
Device Net Address	1 2 4 8 16 32
0	R R R R R R
1	L R R R R R
2	R L R R R R
3	L L R R R R
4	R R L R R R
5	L R L R R R
6	R R L L R R
7	L L L R R R
8	R R R L R R
9	L R R L R R
10	R R R L L R
11	L R R L L R
12	R R L L L R
13	L R L L L R
14	R L L L L R
15	L L L L L R
16	R R R R L R
17	L R R R L R
18	R R R L L R
19	L R R L L R
20	R R L L L R
21	L R L L L R
22	R L L L L R
23	L L L L L R
24	R R R R L R
25	L R R R L R
26	R R R L L R
27	L R R L L R
28	R R L L L R
29	L R L L L R
30	R L L L L R
31	L L L L L R
32	R R R R L R
33	L R R R L R
34	R R R L L R
35	L R R L L R
36	R R L L L R
37	L R L L L R
38	R R L L L R
39	L L L L L R
40	R R R R L R
41	L R R R L R
42	R R R L L R
43	L R R L L R
44	R R L L L R
45	L R L L L R
46	R L L L L R
47	L L L L L R
48	R R R R L R
49	L R R R L R
50	R R R L L R
51	L R R L L R
52	R R L L L R
53	L R L L L R
54	R L L L L R
55	L L L L L R
56	R R R R L R
57	L R R R L R
58	R R R L L R
59	L R R L L R
60	R R L L L R
61	L R L L L R
62	R L L L L R
63	L L L L L R

Device Net	
Baud Rate	1 2
125K	R R
250K	L R
500K	R L
N/A	L L



**\*Note:**

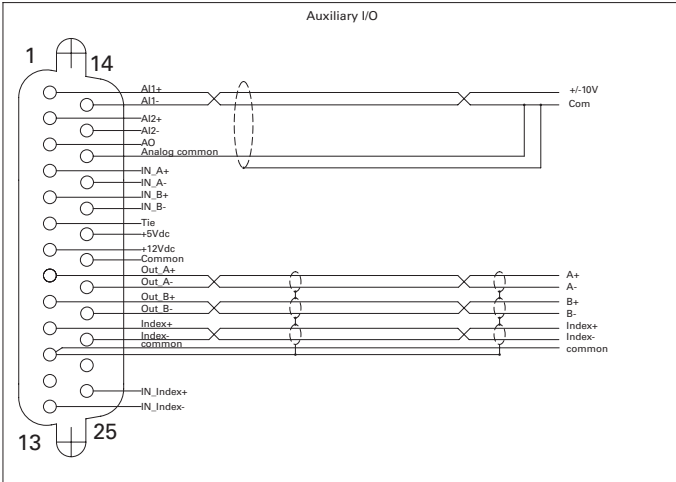
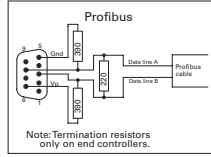
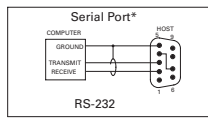
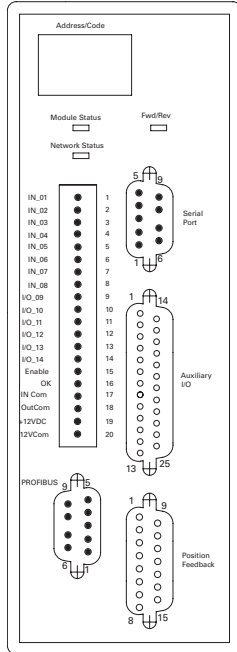
The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

### S2K Series

#### User Control Connections

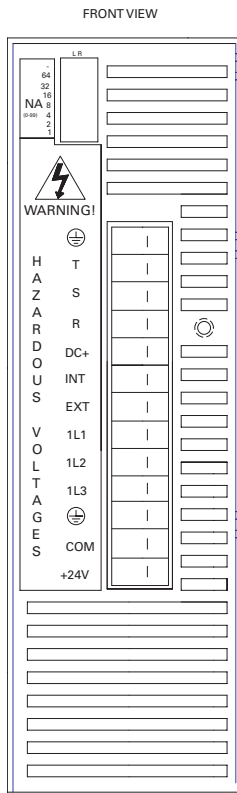
#### S2K Model: SSI407 (Profibus Communications)

#### IC800SSI407RP2

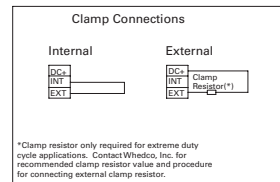
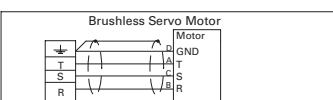
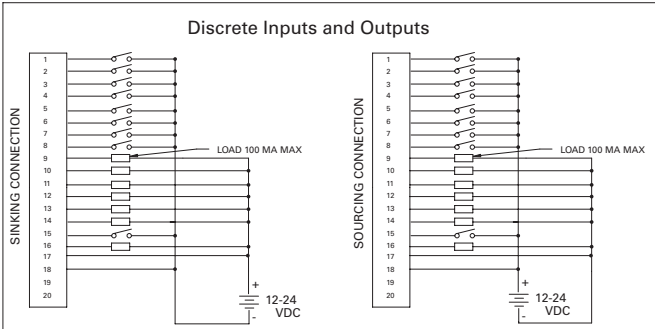


DIP Switch Positions (2)	
Profibus Address	1 2 4 8 16 32
(NA) 0 64	R R R R R R
1 65	L R R R R R
2 66	R L R R R R
3 67	L L R R R R
4 68	R R L R R R
5 69	L R L R R R
6 70	R L L R R R
7 71	L L L R R R
8 72	R R R L R R
9 73	L R R L R R
10 74	R L R L R R
11 75	L L R L R R
12 76	R R L L R R
13 77	L R L L R R
14 78	R L L L R R
15 79	L L L L R R
16 80	R R R R L R
17 81	L R R R L R
18 82	R L R R L R
19 83	L L R R L R
20 84	R R L R L R
21 85	L R L R L R
22 86	R L L R L R
23 87	L L L R L R
24 88	R R R L L R
25 89	L R R L L R
26 90	R L R L L R
27 91	L L R L L R
28 92	R R L L L R
29 93	L R L L L R
30 94	R L L L L R
31 95	L L L L L R
32 96	R R R R L L
33 97	L R R R L L
34 98	R L R R L L
35 99	L L R R L L
36 -	R R R R L L
37 -	L R R R L L
38 -	R L R R L L
39 -	L L R R L L
40 -	R R L R L L
41 -	L R L R L L
42 -	R L L R L L
43 -	L L L R L L
44 -	R R L L L L
45 -	L R L L L L
46 -	R L L L L L
47 -	L L L L L L
48 -	R R R R L L
49 -	L R R R L L
50 -	R L R R L L
51 -	L L R R L L
52 -	R R L R L L
53 -	L R L R L L
54 -	R L L R L L
55 -	L L L R L L
56 -	R R R R L L
57 -	L R R R L L
58 -	R L R R L L
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60 -	R R L R L L
61 -	L R L R L L
62 -	R L L R L L
63 -	L L L R L L

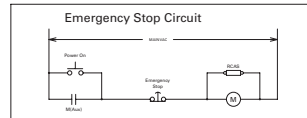
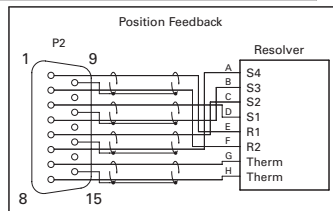
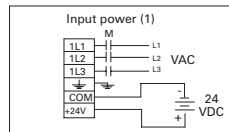
Profibus address 0-63 R X  
64-99 L X



BOTTOM VIEW



\*Clamp resistor only required for extreme duty cycle applications. Contact Whedco, Inc. for recommended clamp resistor value and procedure for connecting external clamp resistor.



#### REMARKS:

- (1) Input motor power 324 to 528 VAC  
3 phase 50-60 Hz @ 3 Amps  
Input logic power 18 to 28.8 VDC @ 2 Amps
- (2) Must turn off power before changing settings.  
R= right (closed)  
L= left (open)

#### \*Note:

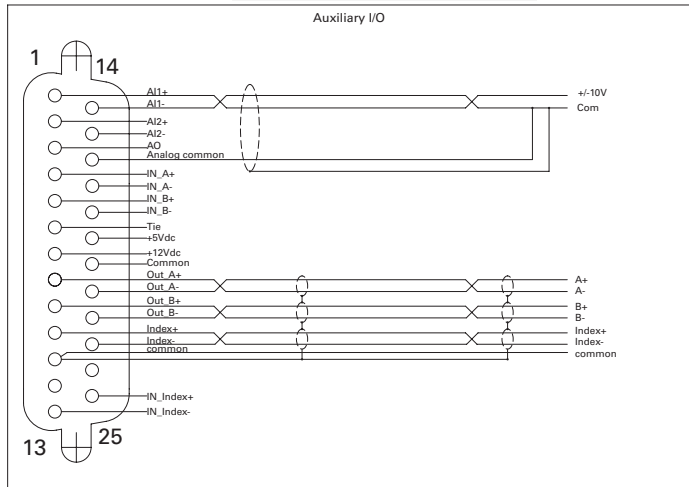
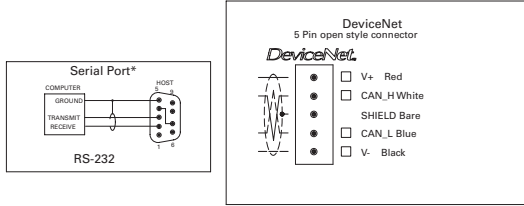
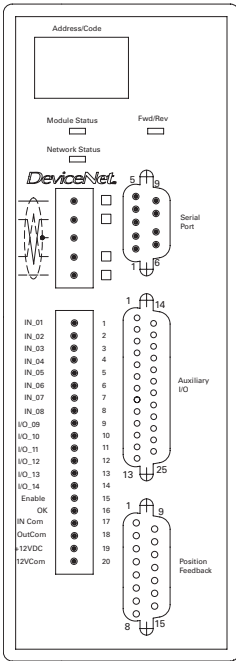
The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

### S2K Series

#### User Control Connections

#### S2K Model: SSI407 (DeviceNet Communications)

IC800SSI407RD2

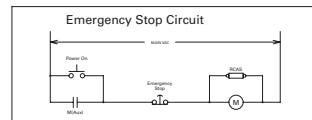
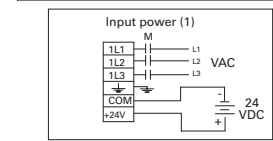
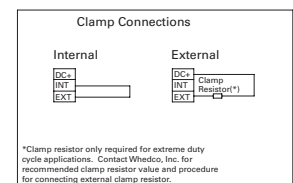
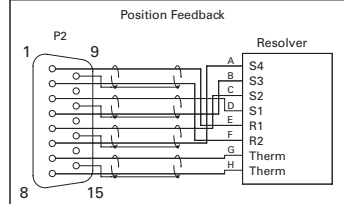
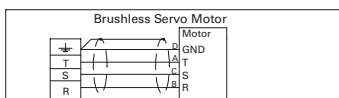
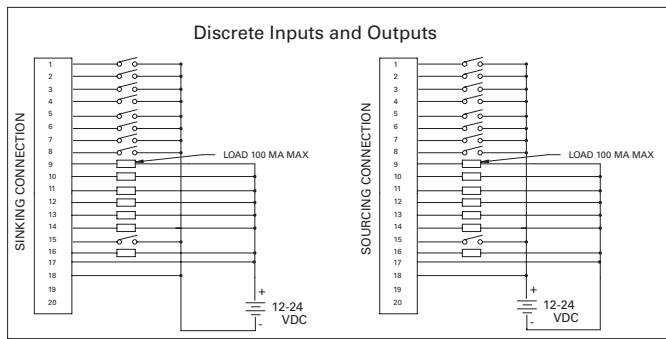
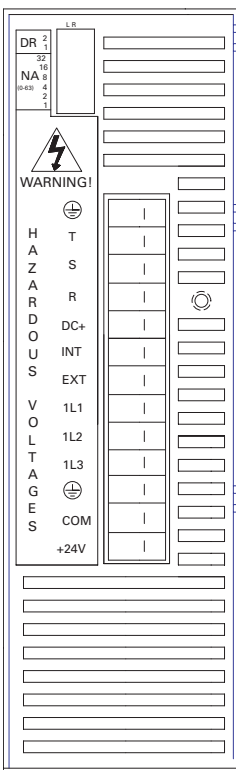


**DIP Switch Positions (2)**

Device Net Address	1	2	4	8	16	32
0	R	R	R	R	R	R
1	L	R	R	R	R	R
2	R	L	R	R	R	R
3	L	L	R	R	R	R
4	R	L	L	R	R	R
5	L	L	L	R	R	R
6	R	L	L	L	R	R
7	L	L	L	L	R	R
8	R	R	L	L	R	R
9	L	R	L	L	R	R
10	R	L	L	L	R	R
11	L	L	L	L	R	R
12	R	R	L	L	R	R
13	L	R	L	L	R	R
14	R	L	L	L	R	R
15	L	L	L	L	R	R
16	R	R	L	L	R	R
17	L	R	L	L	R	R
18	R	L	L	L	R	R
19	L	L	L	L	R	R
20	R	R	L	L	R	R
21	L	R	L	L	R	R
22	R	L	L	L	R	R
23	L	L	L	L	R	R
24	R	R	L	L	R	R
25	L	R	L	L	R	R
26	R	L	L	L	R	R
27	L	L	L	L	R	R
28	R	R	L	L	R	R
29	L	R	L	L	R	R
30	R	L	L	L	R	R
31	L	L	L	L	R	R
32	R	R	L	L	R	R
33	L	R	L	L	R	R
34	R	L	L	L	R	R
35	L	L	L	L	R	R
36	R	R	L	L	R	R
37	L	R	L	L	R	R
38	R	L	L	L	R	R
39	L	L	L	L	R	R
40	R	R	L	L	R	R
41	L	R	L	L	R	R
42	R	L	L	L	R	R
43	L	L	L	L	R	R
44	R	R	L	L	R	R
45	L	R	L	L	R	R
46	R	L	L	L	R	R
47	L	L	L	L	R	R
48	R	R	L	L	R	R
49	L	R	L	L	R	R
50	R	L	L	L	R	R
51	L	L	L	L	R	R
52	R	L	L	L	R	R
53	L	L	L	L	R	R
54	R	R	L	L	R	R
55	L	R	L	L	R	R
56	R	L	L	L	R	R
57	L	L	L	L	R	R
58	R	R	L	L	R	R
59	L	R	L	L	R	R
60	R	L	L	L	R	R
61	L	L	L	L	R	R
62	R	R	L	L	R	R
63	L	L	L	L	R	R

Device Net Baud Rate	1	2
125K	R	R
250K	L	R
500K	R	L
N/A	L	L



**REMARKS:**

(1) Input motor power 324 to 528 VAC  
 3 phase 50-440 Hz @ 8 Amps  
 Input logic power 18 to 28.8 VDC @ 2 Amps

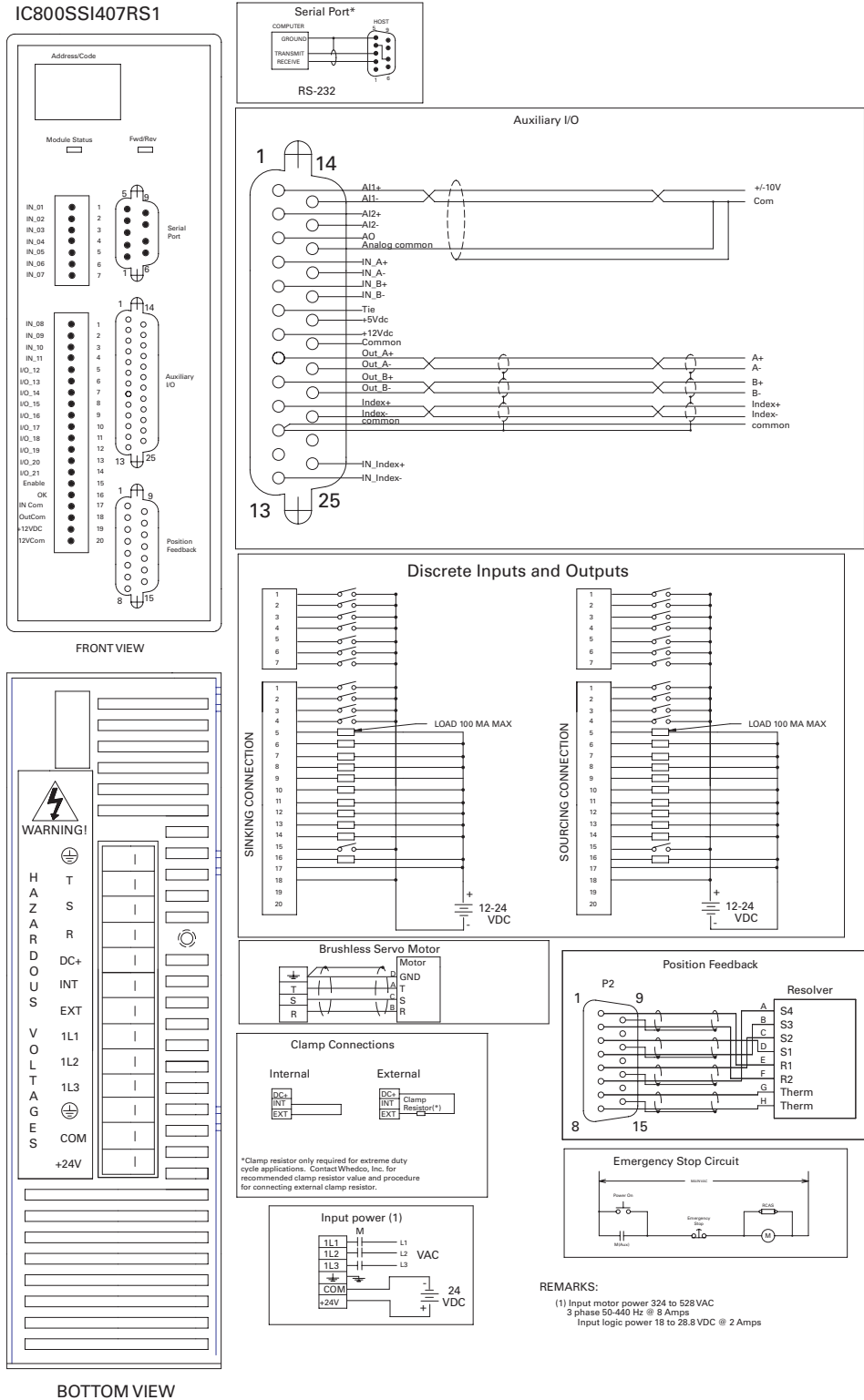
(2) Must turn off power before changing settings.  
 R= Right (closed)  
 L= left (open)

**\*Note:**  
 The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

### S2K Series

#### User Control Connections

#### S2K Model: SSI407 (Serial Communication)



**REMARKS:**  
(1) Input motor power 324 to 528 VAC  
3 phase 50-440 Hz @ 8 Amps  
Input logic power 18 to 28.8 VDC @ 2 Amps

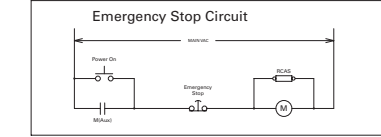
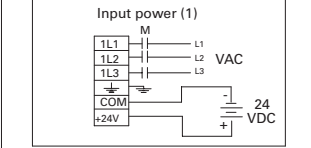
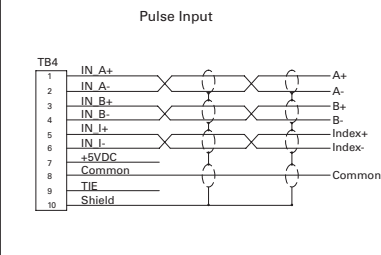
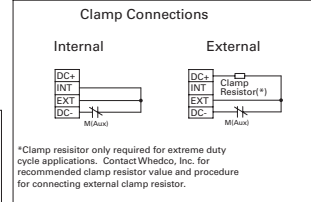
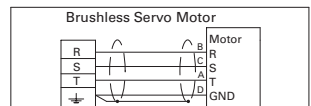
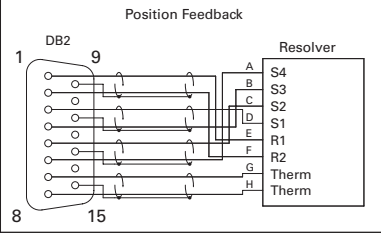
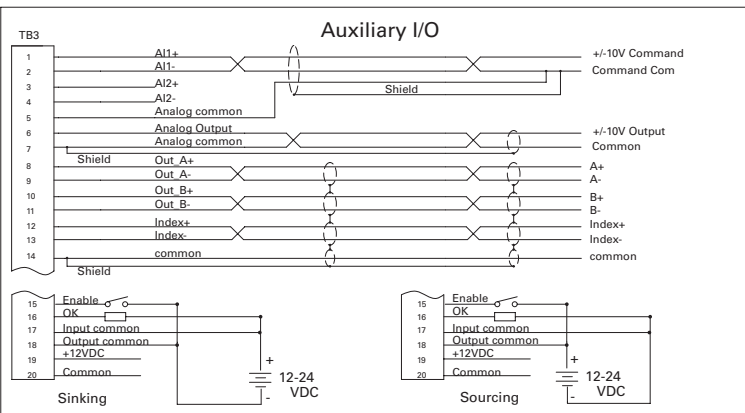
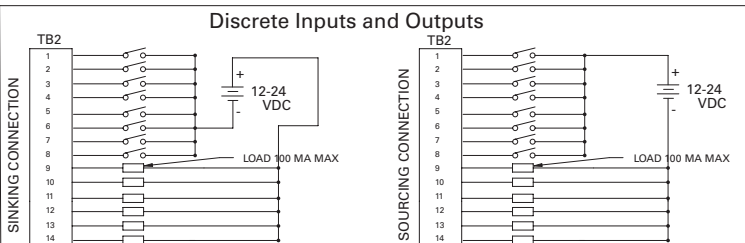
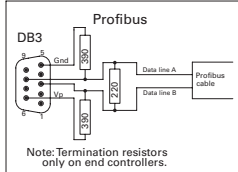
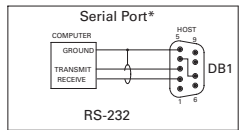
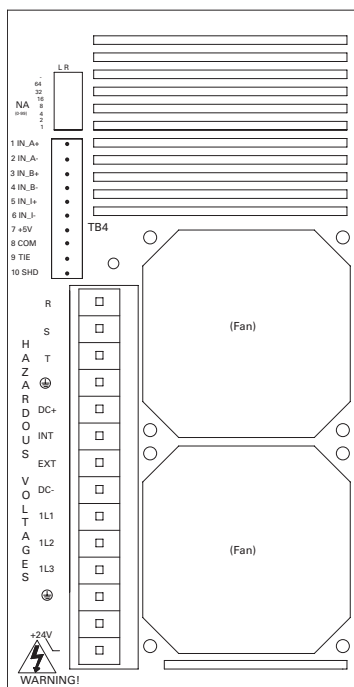
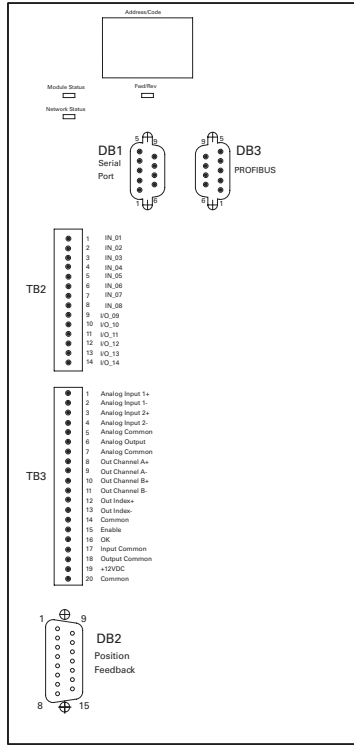
**\*Note:**  
The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

### S2K Series

#### User Control Connections

#### S2K Model: SSI420 (Profibus Communication)

#### IC800SSI420RP2



**REMARKS:**

(1) Input motor power 324 to 528 VAC  
3 phase 50-440 Hz @ 22 Amps  
Input logic power 18 to 28.8 VDC @ 2 Amps

(2) Must turn off power before changing settings.  
R= right (closed)  
L= left (open)

**DIP Switch Positions (2)**

Profibus Address	1	2	4	8	16	32
(NA) 0 64	R	R	R	R	R	R
1 65	L	R	R	R	R	R
2 66	R	L	R	R	R	R
3 67	L	L	R	R	R	R
4 68	R	R	L	R	R	R
5 69	L	R	L	R	R	R
6 70	R	L	L	R	R	R
7 71	L	L	L	R	R	R
8 72	R	R	R	L	R	R
9 73	L	R	R	L	R	R
10 74	R	L	R	L	R	R
11 75	L	L	R	L	R	R
12 76	R	L	L	R	R	R
13 77	L	R	L	L	R	R
14 78	R	L	L	L	R	R
15 79	L	L	L	L	R	R
16 80	R	R	L	L	R	R
17 81	L	R	L	L	R	R
18 82	R	L	R	L	R	R
19 83	L	L	R	L	R	R
20 84	R	R	L	L	R	R
21 85	L	L	L	L	R	R
22 86	R	L	L	L	R	R
23 87	L	R	L	L	R	R
24 88	R	L	L	L	R	R
25 89	L	R	L	L	R	R
26 90	R	L	L	L	R	R
27 91	L	R	L	L	R	R
28 92	R	L	L	L	R	R
29 93	L	L	L	L	R	R
30 94	R	L	L	L	R	R
31 95	L	R	L	L	R	R
32 96	R	R	L	L	R	R
33 97	L	L	L	L	R	R
34 98	R	L	L	L	R	R
35 99	L	R	L	L	R	R
36 -	R	R	L	L	R	R
37 -	L	L	L	L	R	R
38 -	R	L	L	L	R	R
39 -	L	L	L	L	R	R
40 -	R	R	L	L	R	R
41 -	L	R	L	L	R	R
42 -	R	L	L	L	R	R
43 -	L	L	L	L	R	R
44 -	R	L	L	L	R	R
45 -	L	L	L	L	R	R
46 -	R	L	L	L	R	R
47 -	L	L	L	L	R	R
48 -	R	R	L	L	R	R
49 -	L	R	L	L	R	R
50 -	R	L	L	L	R	R
51 -	L	L	L	L	R	R
52 -	R	L	L	L	R	R
53 -	L	L	L	L	R	R
54 -	R	L	L	L	R	R
55 -	L	L	L	L	R	R
56 -	R	L	L	L	R	R
57 -	L	L	L	L	R	R
58 -	R	L	L	L	R	R
59 -	L	L	L	L	R	R
60 -	R	L	L	L	R	R
61 -	L	L	L	L	R	R
62 -	R	L	L	L	R	R
63 -	L	L	L	L	R	R

Profibus address: 0-63 R X, 64-99 L X

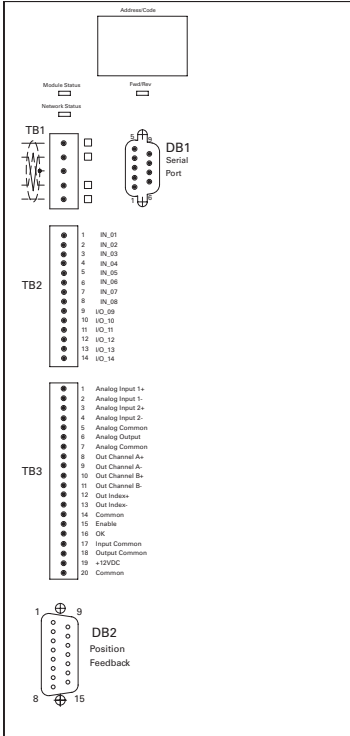
**\*Note:**  
The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

### S2K Series

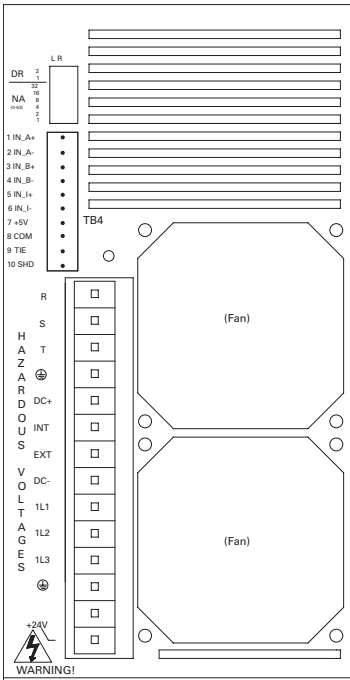
#### User Control Connections

#### S2K Model: SSI420 (DeviceNet Communication)

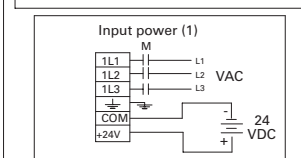
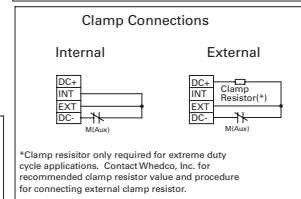
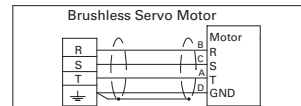
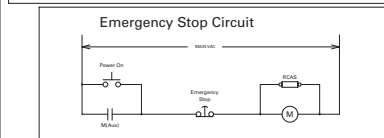
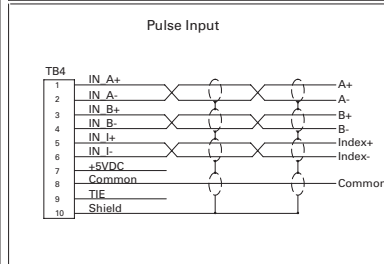
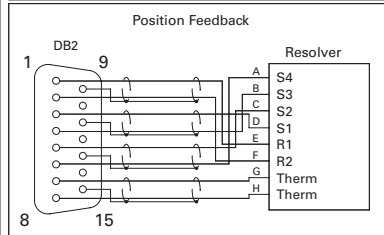
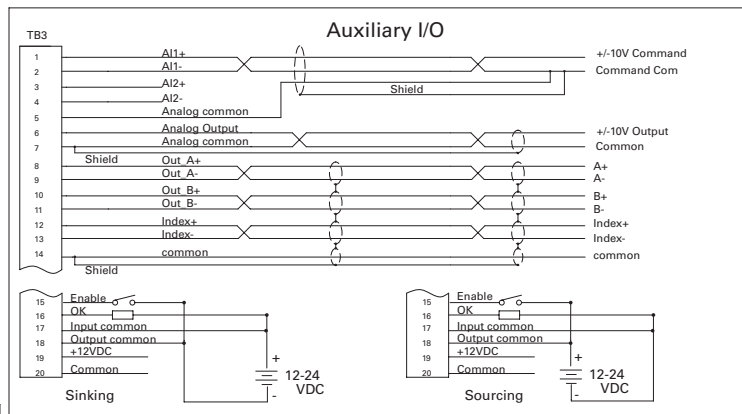
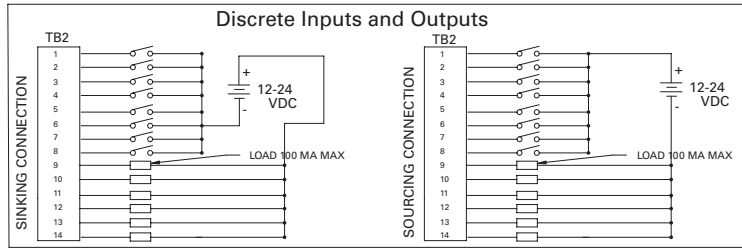
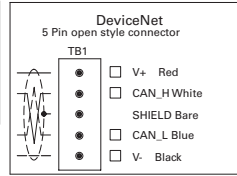
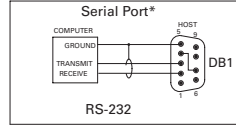
#### IC800SSI420RD2



FRONT VIEW



BOTTOM VIEW



**REMARKS:**

(1) Input motor power 324 to 528 VAC  
3 phase 50-440 Hz @ 22 Amps  
Input logic power 18 to 28.8 VDC @ 2 Amps

(2) Must turn off power before changing settings.  
R= right (closed)  
L= left (open)

**DIP Switch Positions (2)**

Device Net Address	1	2	4	8	16	32
0	R	R	R	R	R	R
1	L	R	R	R	R	R
2	R	L	R	R	R	R
3	L	L	R	R	R	R
4	R	L	L	R	R	R
5	L	R	L	R	R	R
6	R	L	L	R	R	R
7	L	L	R	R	R	R
8	R	L	R	R	R	R
9	L	R	L	R	R	R
10	R	L	L	R	R	R
11	L	R	L	R	R	R
12	R	L	L	R	R	R
13	L	R	L	R	R	R
14	R	L	L	R	R	R
15	L	R	L	R	R	R
16	R	L	R	R	R	R
17	L	R	L	R	R	R
18	R	L	L	R	R	R
19	L	R	L	R	R	R
20	R	L	L	R	R	R
21	L	R	L	R	R	R
22	R	L	L	R	R	R
23	L	R	L	R	R	R
24	R	L	L	R	R	R
25	L	R	L	R	R	R
26	R	L	L	R	R	R
27	L	R	L	R	R	R
28	R	L	L	R	R	R
29	L	R	L	R	R	R
30	R	L	L	R	R	R
31	L	R	L	R	R	R
32	R	L	L	R	R	R
33	L	R	L	R	R	R
34	R	L	L	R	R	R
35	L	R	L	R	R	R
36	R	L	L	R	R	R
37	L	R	L	R	R	R
38	R	L	L	R	R	R
39	L	R	L	R	R	R
40	R	L	L	R	R	R
41	L	R	L	R	R	R
42	R	L	L	R	R	R
43	L	R	L	R	R	R
44	R	L	L	R	R	R
45	L	R	L	R	R	R
46	R	L	L	R	R	R
47	L	R	L	R	R	R
48	R	L	L	R	R	R
49	L	R	L	R	R	R
50	R	L	L	R	R	R
51	L	R	L	R	R	R
52	R	L	L	R	R	R
53	L	R	L	R	R	R
54	R	L	L	R	R	R
55	L	R	L	R	R	R
56	R	L	L	R	R	R
57	L	R	L	R	R	R
58	R	L	L	R	R	R
59	L	R	L	R	R	R
60	R	L	L	R	R	R
61	L	R	L	R	R	R
62	R	L	L	R	R	R
63	L	R	L	R	R	R

Device Net Baud Rate	1	2
125K	R	R
250K	L	R
500K	R	L
N/A	L	L

**\*Note:**  
The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

### S2K Series is Ready to Network

#### DeviceNet

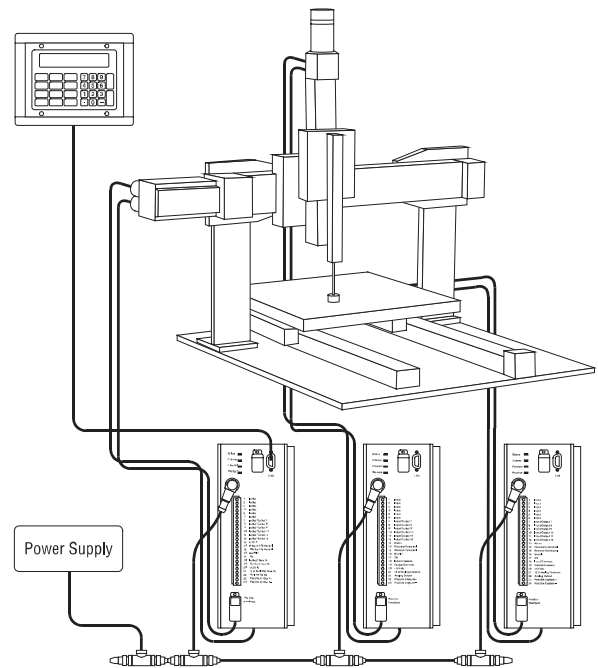
A dedicated DeviceNet port is an optional feature of the S2K controllers. The controller includes full DeviceNet implementation to facilitate the addition of motion control to industrial systems designed in a DeviceNet master/ slave or peer-to-peer control architecture.

Peer-to-peer architecture offers users a quick, economic way to create a multi-axis, stand-alone system. In a peer-to-peer or distributed control system, S2K controllers communicate directly with each other over the trunkline without having to wait their turn in the scan list, resulting in a rapid response time for inter-axis data exchange. Neither a DeviceNet master controller nor knowledge of DeviceNet communication protocol is required to use peer-to-peer communications.

#### Peer-to-Peer Gantry Control System

The gantry drawing shown to the right illustrates a multi-axis pick-and-place system designed with a single DeviceNet trunkline to connect devices and coordinate motion control. Utilizing DeviceNet to manage multiple axes of control in industrial automation equipment keeps point-to-point wiring and system components to a minimum.

Users can mix and match any S2K Series servo and stepping controllers from the product family on a single DeviceNet network.



#### Serial Communications

The S2K Motion Controller includes a multi-purpose RS232 serial port. The serial port has configurable settings for baud rate, data bits and parity and supports software flow control. A variety of commands associated with the serial port and string manipulation are provided and the port supports ASCII serial or RTU Slave protocol modes. Using the port in one mode prohibits usage in the other however, program control is provided to switch between serial port modes.

#### ASCII Protocol

Primarily the ASCII serial port is designed to be a programming and de-bugging interface and can be used in terminal or data modes. ASCII is the default mode of the serial port and may be used for many functions;

- Configuration and programming
- Downloading new S2K firmware
- Loading and storing programs and motion blocks
- Monitoring variable and register data via ASCII terminal or Motion Developer
- Interfacing to serial devices such as RF tag readers, digital scales, bar code readers or serial printers.

#### RTU Protocol

In RTU mode S2K motion controller can communicate to a Remote Terminal Unit (RTU) master, such as an HMI. The S2K RTU Slave protocol allows the RTU Master to:

- Read/Write single bits (Boolean) VB1-VB256
- Read/Write signed words (Integer) V11-VI4096
- Read/Write signed double words (DINT) VI1-VI4096
- Read/Write floating-point variables VF1-VF2047
- Read Text (String variables 128 characters each) VS1-VS144

#### PROFIBUS-DP

PROFIBUS is an open, vendor-independent field-bus standard for a wide range of applications in industrial automation, including motion control. The PROFIBUS specification defines the technical characteristics of a serial field bus system that links distributed digital controllers on the network, from field level to cell level. It is a multi-master system that allows the joint operation of several automation, engineering or visualization systems with their distributed peripherals on one bus. The S2K is available as a Profibus DP slave device and uses the Profibus profile's Type 2 Octet-String 20 — the 20-byte data string.

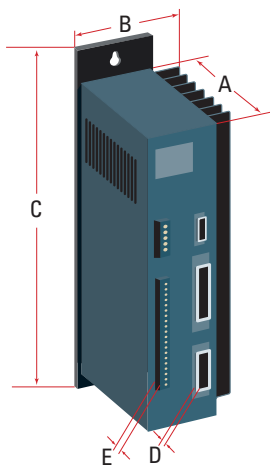
Slave devices do not have bus access rights and can acknowledge receipt of messages or send messages to the master upon request. A PROFIBUS-DP network may have up to 127 stations with up to 32 stations per bus segment. The S2K controllers accommodate station addresses 0 - 99 and communicate via cyclic data transfer, the process by which data and parameters are transferred between master and slave. The master can also initiate global commands (multicast and broadcast) when event-controlled synchronization of the slaves is required. The S2K Motion Controller supports global messages such as clear data, auto baud, freeze/unfreeze and sync/unsync.

### S2K Series

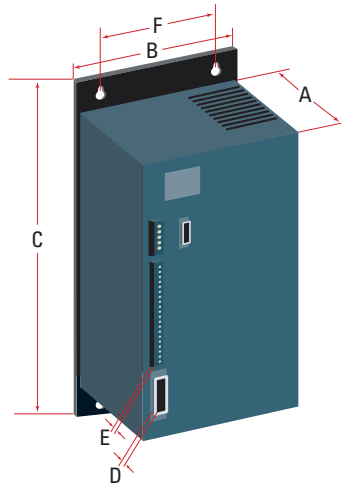
#### Mechanical Dimensions

Dimension	Feature	STI105	SSI107	SSI216	SSI407	SSI420
		SSI104		SSI228		
n/a	Weight lb (kg)	4.0 (1.8)	7.0 (3.18)	13 (5.9)	6.0 (2.7)	14 (6.4)
A	Depth in (mm)	6.05 (153.7)	8.15 (207.0)	10.15 (257.8)	8.15 (207)	10.15 (258)
B	Width in (mm)	3.20 (81.3)	3.45 (87.6)	5.25 (133.4)	4.35 (110.5)	5.25 (133.4)
C	Height in (mm)	8.50 (215.9)	8.50 (215.9)	12.20 (309.9)	8.50 (215.9)	12.20 (309.9)
D	Position Feedback Connector Depth in (mm)	2.7 (68.6)	2.7 (68.6)	2.7 (68.6)	1.26 (32)	1.26 (32)
E	User I/O Connector Depth in (mm)	0.75 (19.1)	0.75 (19.1)	0.75 (19.1)	0.75 (19.1)	0.75 (19.1)
F	Center to center spacing between adjacent mounting holes	n/a	n/a	3.66 (92.96)	n/a	3.66 (92.96)

#### S2K Series Servo and Stepping Motor Controllers



STI105, SSI104, SSI107, SSI407

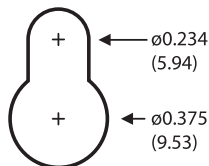


SSI216, SSI228, SSI420

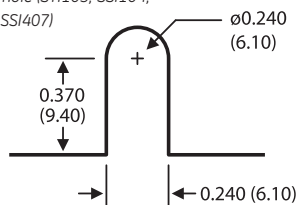
#### Mounting hole dimensions in (mm)

Top hole (all models)

Bottom hole (SSI216, SSI228, SSI420)



Bottom hole (STI105, SSI104, SSI107, SSI407)





## Motion Controllers

### S2K Series

#### Ratings and Ordering Information

##### Stepper Models

IC800STI105D2	5 Amp, 115/230 VAC S2K Stepper Controller, Encoder Feedback, DeviceNet
IC800STI105P2	5 Amp, 115/230 VAC S2K Stepper Controller, Encoder Feedback, Profibus
IC800STI105S1	5 Amp, 115/230 VAC S2K Stepper Controller, Encoder Feedback, Extended I/O

##### Servo Models for MTR-Series Motors (Resolver Feedback)

IC800SSI104RD2	4.3 Amp, 115/230 VAC S2K Controller, Resolver Feedback, DeviceNet
IC800SSI104RP2	4.3 Amp, 115/230 VAC S2K Controller, Resolver Feedback, Profibus
IC800SSI104RS1	4.3 Amp, 115/230 VAC S2K Controller, Resolver Feedback, Extended I/O
IC800SSI107RD2	7.2 Amp 115/230 VAC S2K Controller, Resolver Feedback, DeviceNet
IC800SSI107RP2	7.2 Amp 115/230 VAC S2K Controller, Resolver Feedback, Profibus
IC800SSI107RS1	7.2 Amp 115/230 VAC S2K Controller, Resolver Feedback, Extended I/O
IC800SSI216RD2	16 Amp, 230 VAC S2K Controller, Resolver Feedback, DeviceNet
IC800SSI216RP2	16 Amp, 230 VAC S2K Controller, Resolver Feedback, Profibus
IC800SSI228RD2	28 Amp, 230 VAC S2K Controller, Resolver Feedback, DeviceNet
IC800SSI228RP2	28 Amp, 230 VAC S2K Controller, Resolver Feedback, Profibus
IC800SSI407RD2	7.2 Amp, 460 VAC S2K Controller, Resolver Feedback, DeviceNet
IC800SSI407RP2	7.2 Amp, 460 VAC S2K Controller, Resolver Feedback, Profibus
IC800SSI407RS1	7.2 Amp 460 VAC S2K Controller, Resolver Feedback, Extended I/O
IC800SSI420RD2	20 Amp, 460 VAC S2K Controller, Resolver Feedback, DeviceNet
IC800SSI420RP2	20 Amp, 460 VAC S2K Controller, Resolver Feedback, Profibus

##### Accessories

73006589	Hand Held I/O Simulator for 4.3 and 7.2A Models
IC800SLR001	50Ω, 100W External Regeneration Resistor Kit
IC800SLR002	100Ω, 225W External Regeneration Resistor Kit
IC800SLR003	20Ω, 300W External Regeneration Resistor Kit
IC800SLR004	15Ω, 1000W External Regeneration Resistor Kit
TRM-JAUX-03	S2K Auxiliary I/O Breakout Terminal Board, 3 ft cable*
TRM-JAUX-10	S2K Auxiliary I/O Breakout Terminal Board, 10 ft cable*
IC800MBUSADP	RS232 to 422/485 Serial Converter for Modbus RTU Communications

\*Required for Encoder feedback to S2K stepper controller when using CBL-13-ET or CBL-14-ET encoder cable.

#### Cables and Connectors

Cables in several lengths are available from GE for motor to amplifier connections and various other amplifier functions. It is strongly recommended that you use the cables available from GE as shown below. GE does not ship mating power or feedback connectors for the MTR-Series Motors with the motor. See appropriate motor section of this catalog for motor connector information.

S2K Series Cable/Connector	GE Catalog Number	Description
Aux. I/O Interface	IC800SKCIxxx IC800SKCFLYxxx	Interface Cable, S2K Auxiliary I/O to 44A726268-001 Terminal Board Assembly, 1 m or 3 m Interface Cable, S2K Auxiliary I/O connector to Flying Leads, 1 m or 3 m
Serial	IC800SKCS030	S2K Serial Communication Cable for PC (Motion Developer) Interface, 3 m
MTR-Series Motor Resolver*	CBL-3T-RD-xx	Resolver Cable, S2K to MTR-3T Series Servo Motor, xx=10, 20 or 30 feet
MTR-Series Motor Power*	CBL-3T-MP-xx CBL-T7-MP-xx	Power Cable, S2K to MTR-3T5x and 3T6x Servo Motors, xx=10, 20 or 30 feet Power Cable, S2K to MTR-3T1x, 3T2x and 3T4x Servo Motors, xx=10, 20 or 30 feet
MTR-Series Motor Brake	CBL-3T-MB-xx CBL-T7-MB-xx	Power/Brake Cable, S2K to MTR-3T5x and 3T6x Servo Motors with Brake, xx=10, 20 or 30 feet Power/Brake Cable, S2K to MTR-3T1x, 3T2x and 3T4x Servo Motors with Brake, xx=10, 20 or 30 feet
Commutating Encoder Connector	CBL-3C-L1D-FLY-XX TRM-21006664	Encoder cable, S2K to flying leads for connection of quadrature encoder with hall tracks, xx=10, 20 or 30 feet. Connector, 7 Point 4.3/5/7.2 Amp S2K Extended Digital I/O (S1 Modules)
Connector	TRM-21006666	Connector, 14 Point Screw Terminal, S2K Digital I/O
Connector	TRM-21006667	Connector, 20 Point Screw Terminal, S2K Digital I/O
Connector	TRM-21006669	Connector, 4.3/5/7.2 Amp, 115/230V S2K Motor Power
Connector	TRM-21006670	Connector, 4.3 Amp, 115/230V S2K AC Power

\*For stepper motor cables, see Stepping Motor Cable and Amplifier Compatibility section of this catalog.

# Servo Amplifiers

## VersaMotion® Series

The VersaMotion family of servo amplifiers offers a cost effective solution for a broad range of motion applications. These versatile amplifiers support stand-alone positioning capability using up to 8 stored motion profiles, or can be connected to any motion controller using an analog or pulse command interface. The VersaMotion Servo Amplifiers are matched for use with the VersaMotion Servo Motors. Pages 116 and 117.



## $\alpha$ and $\beta i$ Series

The all digital  $\alpha$  and  $\beta i$  Series Servo Amplifiers, with over five million installed worldwide, offer superior reliability and performance for unprecedented mean time between failure. They are available in a wide range of ratings for use with GE DSM300 Series motion controllers, and are matched for use with the  $\alpha$  and  $\beta i$  Series Servo Motors. Pages 95, 96, 106 and 107.



## S2K Series

For systems using a DSM300 or third-party motion controller or where only speed or torque control are required, GE offers the S2K Servo Amplifiers. These brushless servos cover a wide torque range (2.7-477 in-lb/0.3-53.9 Nm) and offer high servo response to meet your most demanding application requirements. The S2K Series Amplifiers are matched for use with the MTR Series motors. Pages 123 and 124.



## Servo Amplifiers

### VersaMotion\*

The VersaMotion family of servo amplifiers offers a cost effective solution for a broad range of motion applications. These versatile amplifiers support simple stand-alone positioning capability using up to 8 stored motion profiles or can be connected to any motion controller using an analog or pulse command interface. A built-in touchpad and display provides convenient access to configuration parameters and system information. The serial interface supports multi-drop system configurations and Modbus communication protocol.

Amplifier setup can be accomplished using the VersaMotion software included with Proficy Machine Edition or using the convenient front panel keypad.

#### Key Features:

- Versatile analog (speed or torque) or pulse command interface
- Position/Speed/Torque modes
- Dual control modes
- Standalone single-axis position control mode for simple point-to-point motion control
- Electronic gearing with user-defined ratio
- External JOG function
- Speed/Torque limit operation
- Built-in keypad/display for setup and diagnostics
- Motor settling time below 1 ms for fast response
- Low speed stability and performance: less than 0.5% error at 1 RPM
- 10msec acceleration time from running without load  
-/+ 3000 RPM

#### Built-in Functions:

- Simple stand-alone point-to-point positioning control with 8 internal stored position settings (positions can be changed over Modbus for greater application flexibility)
- Move to Home function
- Position Teaching capability
- Incremental encoder feedback (2500 ppr/10,000 counts/rev)
- User-definable Acceleration/Deceleration with jerk limiting (s-curve)
- Feed step control function
- Modbus Slave serial port (RS-485/RS-422) for reading and writing parameters from Machine Edition or updating stored position set points from a host controller.



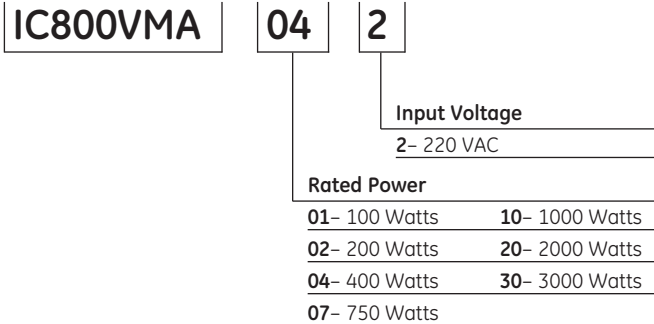
#### Machine Edition VersaMotion Set-up Features:

- Configuration Parameter Editor (clear, read, write functions) and initial configuration wizard
- Calculation tools to determine proper conversion from encoder counts to desired user programming units
- Three channel digital oscilloscope to display and record drive status on-line
- Alarm history and status monitor diagnostic screens
- Digital I/O set-up, monitoring and forcing. Each I/O point can be individually set to one of the built-in functions (45 digital input functions and 11 digital output functions)

## Servo Amplifiers

### VersaMotion\*

#### Servo Amplifier Part Number Sequence



Example: IC800VMA042 is a 400 Watt 220 VAC servo amplifier

#### Amplifier Specifications

Part Number	IC800VMA012	IC800VMA022	IC800VMA042	IC800VMA072	IC800VMA102	IC800VMA202	IC800VMA302
Rated Output Power	100W	200W	400W	750W	1000W	2000W	3000W
Voltage/ Frequency	Three-phase or Single-phase 220VAC; 50/60 Hz	Three-phase or Single-phase 220VAC; 50/60 Hz	Three-phase or Single-phase 220VAC; 50/60 Hz	Three-phase or Single-phase 220VAC; 50/60 Hz	Three-phase or Single-phase 220VAC; 50/60 Hz	Three-phase 220VAC; 50/60 Hz	Three-phase 220VAC; 50/60 Hz
Permissible Voltage Fluctuation	Three-phase: 170 ~ 255VAC Single-phase: 200 ~ 255VAC	Three-phase: 170 ~ 255VAC Single-phase: 200 ~ 255VAC	Three-phase: 170 ~ 255VAC Single-phase: 200 ~ 255VAC	Three-phase: 170 ~ 255VAC Single-phase: 200 ~ 255VAC	Three-phase: 170 ~ 255VAC Single-phase: 200 ~ 255VAC	Three-phase: 170 ~ 255VAC	Three-phase: 170 ~ 255VAC
Cooling System	Convection	Convection	Convection	Fan Cooling	Fan Cooling	Fan Cooling	Fan Cooling
Electronic Gear Ratio	Gear Ratio = N/M where N: 1~32767, M: 1:32767 (1/50<N/M<200)	Gear Ratio = N/M where N: 1~32767, M: 1:32767 (1/50<N/M<200)	Gear Ratio = N/M where N: 1~32767, M: 1:32767 (1/50<N/M<200)	Gear Ratio = N/M where N: 1~32767, M: 1:32767 (1/50<N/M<200)	Gear Ratio = N/M where N: 1~32767, M: 1:32767 (1/50<N/M<200)	Gear Ratio = N/M where N: 1~32767, M: 1:32767 (1/50<N/M<200)	Electronic gear N/M multiple N: 1~32767, M: 1:32767 (1/50<N/M<200)

#### Amplifier

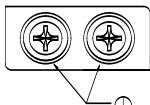
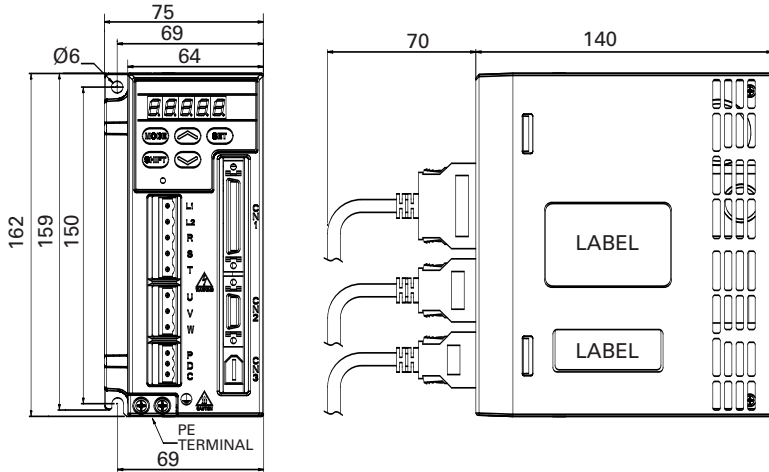
Permissible Frequency Fluctuation	50 / 60 Hz +/-5%
Resolution/Quadrature Feedback Counts	2500 ppr / 10000 cpr
Control Modes	Position/Velocity/Torque
Dynamic Brake	Built-in
Position Control Mode:	
Maximum Input Pulse Frequency	500KPPS (Line Driver) / Maximum 200KPPS (Open Collector)
Pulse Type	Pulse/Direction; CW/CCW; A/B Phase
Command Source	External pulse train/ Internal parameters
Torque Limit Operation	Yes
Feed Forward Compensation	Yes
Analog Commands: Voltage Range	0 to +/-10 VDC
Torque and Velocity Control Mode Command Source	External analog signal / Discrete set points stored by internal parameters
Speed Control Range	1:5000
Speed Control Frequency Response	Maximum 450 Hz
Torque Control Mode Permissible Time for Overload	8 seconds under 200% rated output
Communications Interface	RS-232 / RS-485 / RS-422
Environmental	
Altitude	Altitude 1000 meters above sea level or lower
Operating Temperature	0 to 55°C (Forced cooling for operation above 55°C)
Storage Temperature	-20°C to 65°C
Humidity	0 to 90% (Non condensing)
Vibration	<20 Hz: 9.8 m/sec/sec (1G); 20 to 50 Hz: 5.88 m/sec/sec (0.6 G)
Standards	CE (IEC/EN 61800-5-1), UL/cUL (508C), TUV, C-tick

Servo Amplifiers

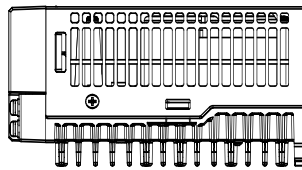
VersaMotion<sup>+</sup>

Dimensions

IC800VMA012, IC800VMA022, IC800VMA042

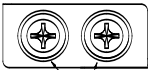
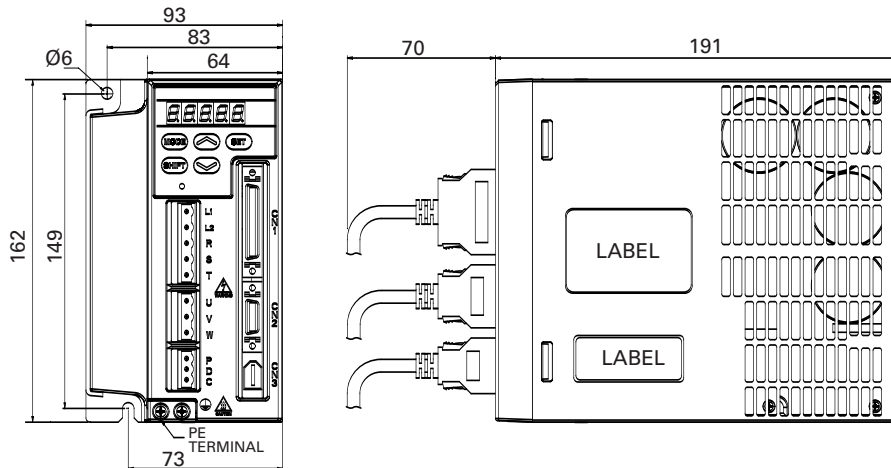


SCREW: M4x 0.7  
MOUNTING SCREW TORQUE: 14(kgf-cm)

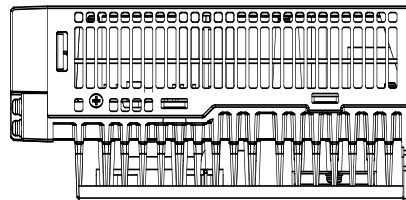


Dimensions shown in mm

IC800VMA072, IC800VMA102



SCREW: M4x 0.7  
MOUNTING SCREW TORQUE: 14(kgf-cm)



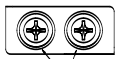
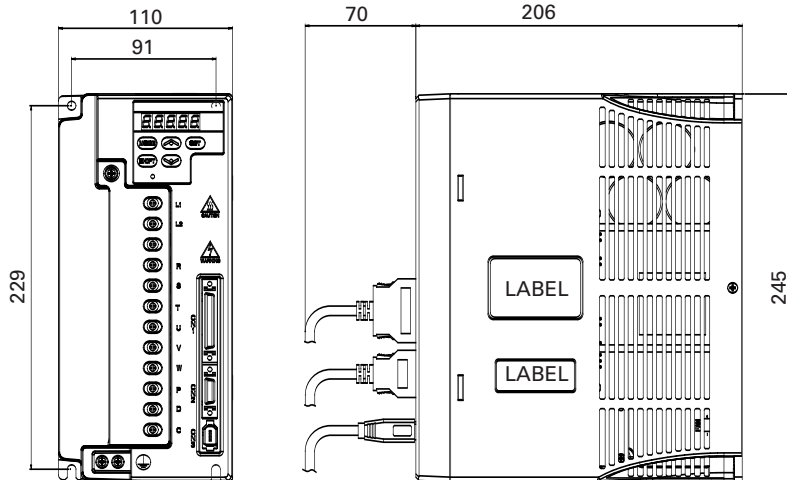
Dimensions shown in mm

Servo Amplifiers

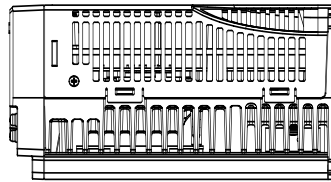
VersaMotion\*

Dimensions

IC800VMA202, IC800VMA302

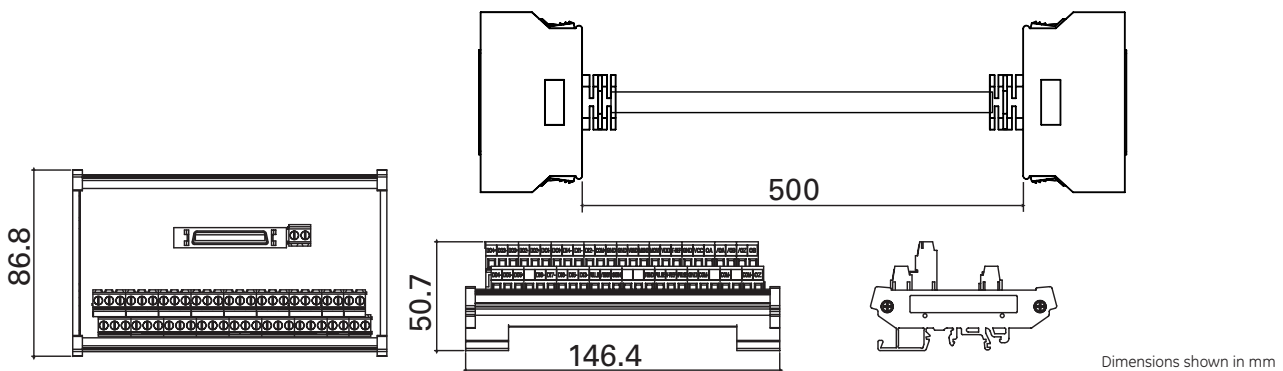


SCREW: M4x 0.7  
MOUNTING SCREW TORQUE: 14(kgf-cm)



Dimensions shown in mm

Optional Cable and Terminal Block

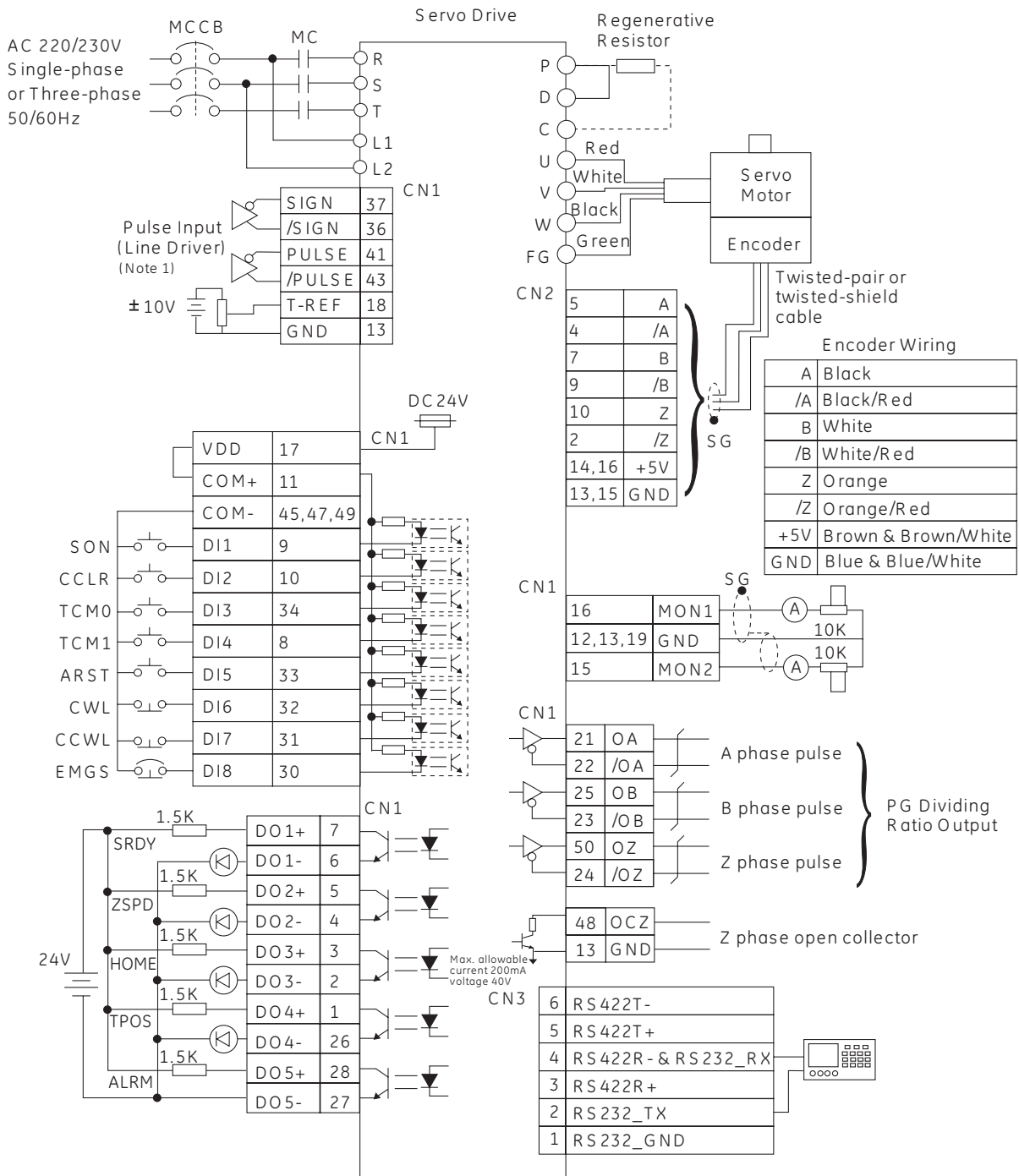


## Servo Amplifiers

### VersaMotion\*

#### Connection Diagrams

#### Position Control Mode - Pulse Follower Mode

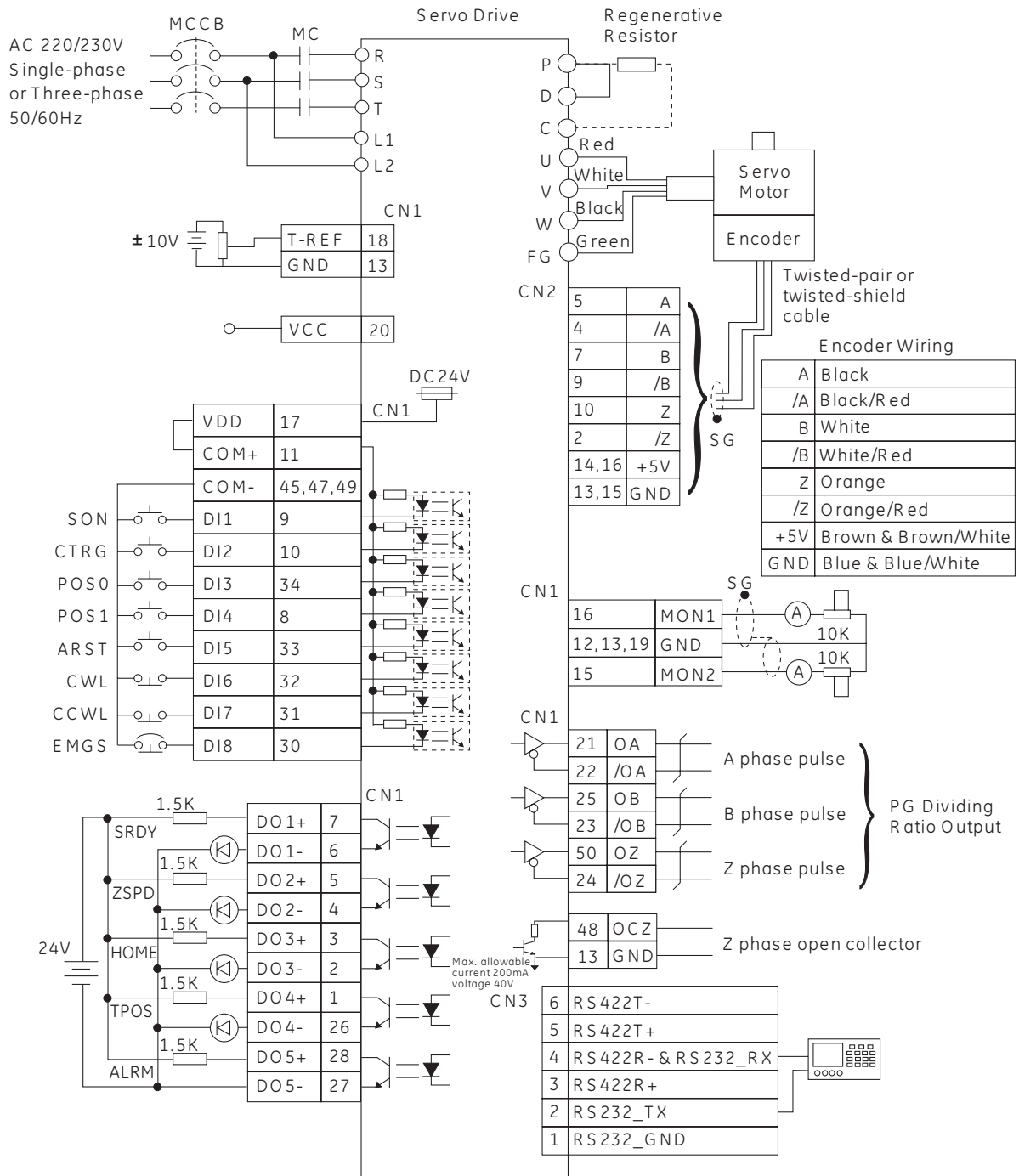


## Servo Amplifiers

### VersaMotion\*

#### Connection Diagrams

#### Position Control Mode - Stored Position Commands Mode



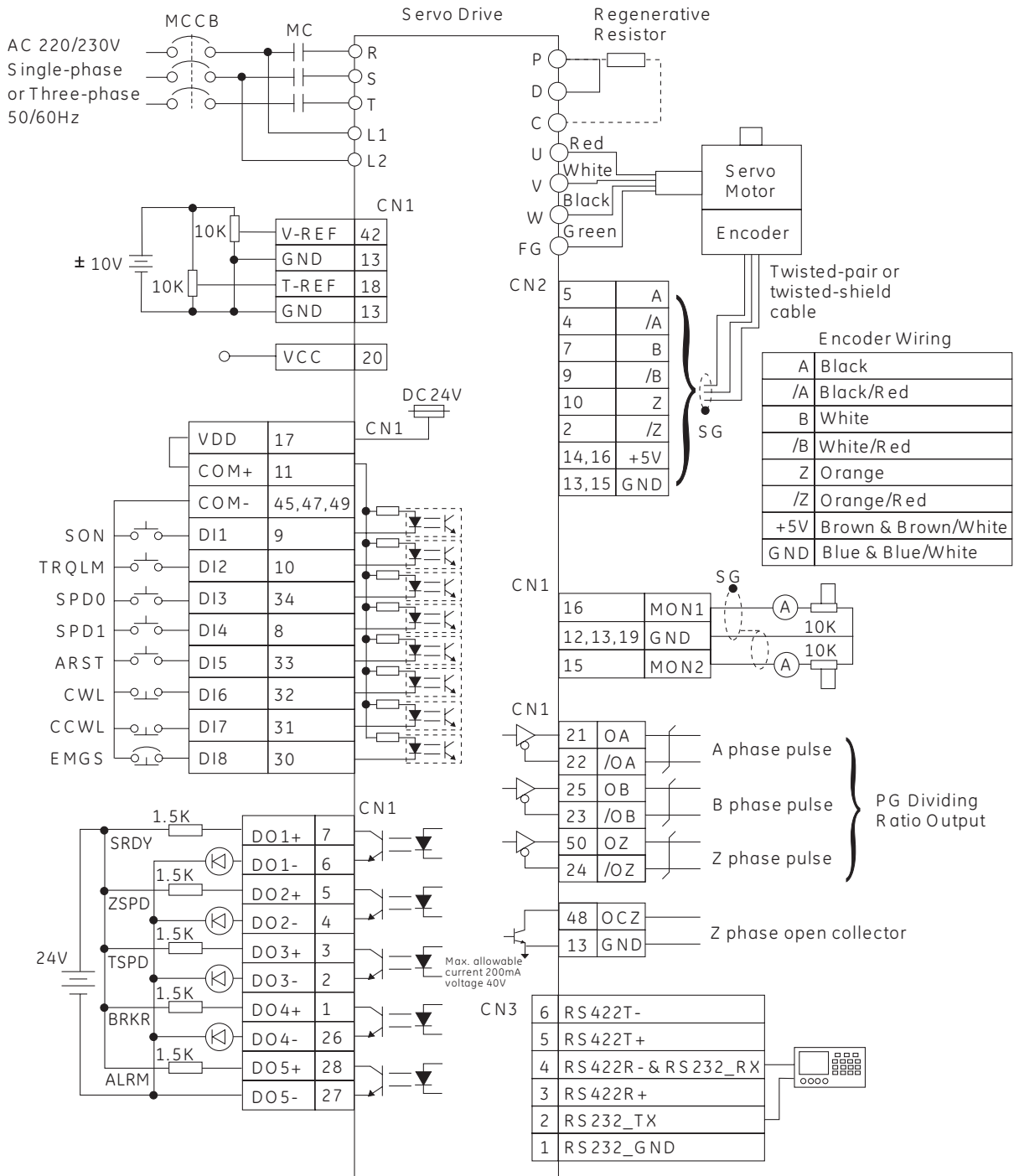


## Servo Amplifiers

### VersaMotion\*

#### Connection Diagrams

#### Speed Control Mode

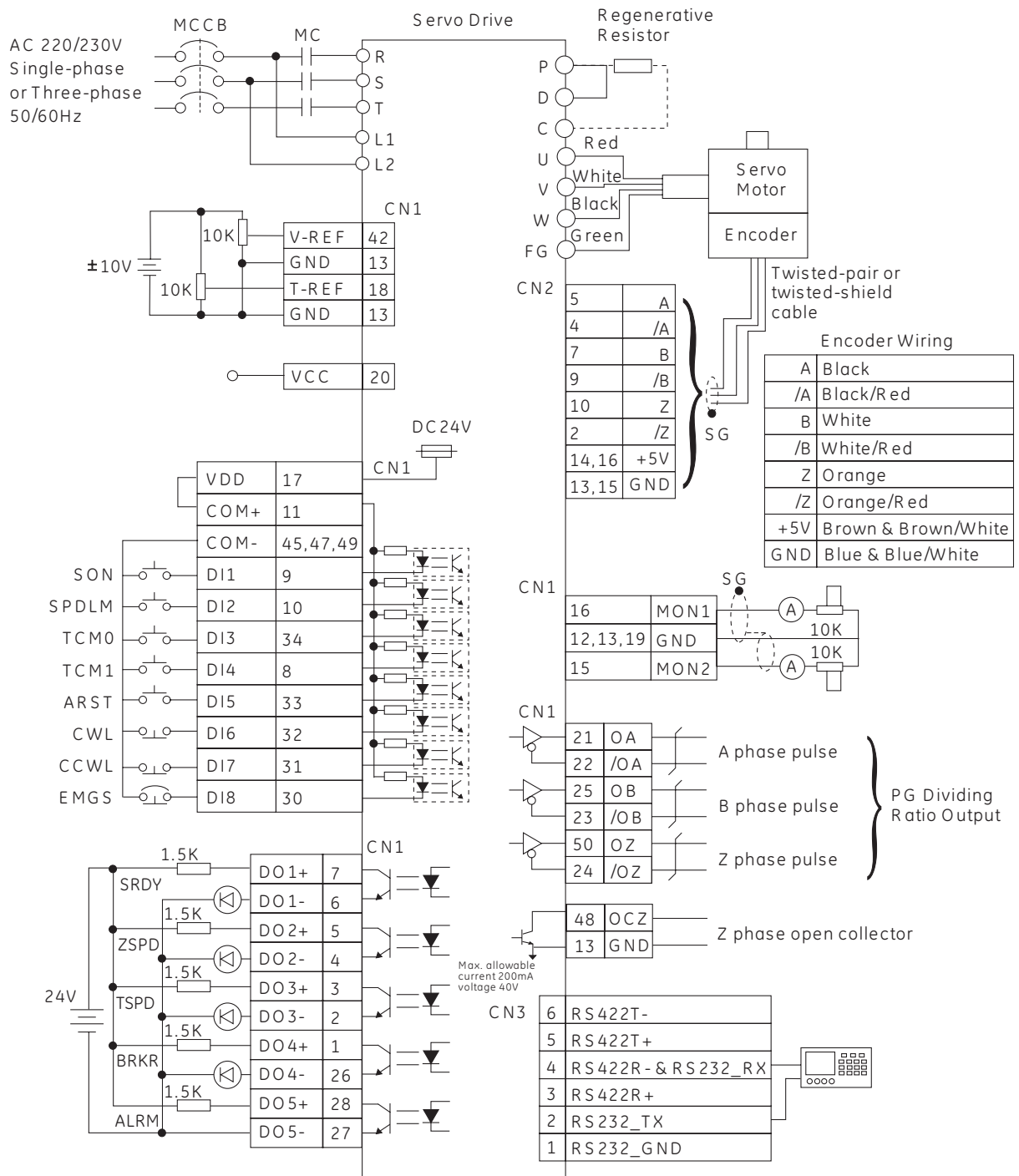


## Servo Amplifiers

### VersaMotion\*

#### Connection Diagrams

#### Torque Control Mode



## Servo Amplifiers

### VersaMotion\*

#### Ordering Information

Model	VersaMotion 100 Watt	VersaMotion 200 Watt	VersaMotion 400 Watt	VersaMotion 750 Watt
Motor Part Number	IC800VMM01LNKSE25	IC800VMM02LNKSE25	IC800VMM04LNKSE25	IC800VMM07LNKSE25
Motor/Brake Part Number	N/A	IC800VMM02LBKSE25	IC800VMM04LBKSE25	IC800VMM07LBKSE25
Amplifier Part Number	IC800VMA012	IC800VMA022	IC800VMA042	IC800VMA072

#### Cables

Power Cable	3 m	IC800VMCP030	IC800VMCP030	IC800VMCP030	IC800VMCP030
	5 m	IC800VMCP050	IC800VMCP050	IC800VMCP050	IC800VMCP050
	10 m	IC800VMCP100	IC800VMCP100	IC800VMCP100	IC800VMCP100
	20 m	IC800VMCP200	IC800VMCP200	IC800VMCP200	IC800VMCP200
Brake and Power Cable	3 m	N/A	IC800VMCB030	IC800VMCB030	IC800VMCB030
	5 m	N/A	IC800VMCB050	IC800VMCB050	IC800VMCB050
	10 m	N/A	IC800VMCB100	IC800VMCB100	IC800VMCB100
	20 m	N/A	IC800VMCB200	IC800VMCB200	IC800VMCB200
Encoder Cable	3 m	IC800VMCE030	IC800VMCE030	IC800VMCE030	IC800VMCE030
	5 m	IC800VMCE050	IC800VMCE050	IC800VMCE050	IC800VMCE050
	10 m	IC800VMCE100	IC800VMCE100	IC800VMCE100	IC800VMCE100
	20 m	IC800VMCE200	IC800VMCE200	IC800VMCE200	IC800VMCE200

#### Communications & I/O Interface Cables

Communications Cable	3 m	IC800VMCS030	IC800VMCS030	IC800VMCS030	IC800VMCS030
Flying lead I/O interface Cable	1 m	IC800VMCI010	IC800VMCI010	IC800VMCI010	IC800VMCI010
	3 m	IC800VMCI030	IC800VMCI030	IC800VMCI030	IC800VMCI030

#### Amplifier Connectors

CN1 I/O Connector <sup>(Note 1)</sup>	IC800VMACONCN1	IC800VMACONCN1	IC800VMACONCN1	IC800VMACONCN1
CN2 Encoder Connector <sup>(Note 2)</sup>	IC800VMACONCN2	IC800VMACONCN2	IC800VMACONCN2	IC800VMACONCN2
CN3 Communication Connector <sup>(Note 3)</sup>	IC800VMACONCN3	IC800VMACONCN3	IC800VMACONCN3	IC800VMACONCN3
AC Power Connector <sup>(Note 4)</sup>	IC800VMACONACP	IC800VMACONACP	IC800VMACONACP	IC800VMACONACP
Motor Power Connector <sup>(Note 4)</sup>	IC800VMACONMTRP	IC800VMACONMTRP	IC800VMACONMTRP	IC800VMACONMTRP
External Braking Resistor Connector <sup>(Note 4)</sup>	IC800VMADBR001	IC800VMADBR001	IC800VMADBR001	IC800VMADBR001

#### Motor Connectors

Power Connector (motor only)	IC800VMMCONP001	IC800VMMCONP001	IC800VMMCONP001	IC800VMMCONP001
Power Connector (motor & brake)	N/A	IC800VMMCONP002	IC800VMMCONP002	IC800VMMCONP002
Encoder Connector	IC800VMMCONE001	IC800VMMCONE001	IC800VMMCONE001	IC800VMMCONE001

#### Accessories

I/O Terminal Breakout Board and Cable <sup>(Note 5)</sup>	0.5 m	IC800VMTBC005	IC800VMTBC005	IC800VMTBC005	IC800VMTBC005
External Braking Resistor <sup>(Note 6)</sup>		IC800VMBR040	IC800VMBR040	IC800VMBR040	IC800VMBR040
40Ω, 400 Watt					
External Braking Resistor <sup>(Note 6)</sup>		IC800VMBR020	IC800VMBR020	IC800VMBR020	IC800VMBR020
20Ω, 1000 Watt					

- 1) The CN1 connector is only required when the I/O breakout terminal board (IC800VMTBC005) or flying lead I/O interface cable (IC800VMCI0x) are not used for wiring access to the amplifier I/O points.
- 2) The CN2 encoder connector is part of the separately ordered GE feedback cable. This connector is only required when user will manufacture their own motor feedback cable.
- 3) The CN3 communication connector is part of the separately ordered GE serial communication cable (IC800VMCS030). This connector is only required when user will manufacture their own communication cable.
- 4) These connectors are shipped with each VersaMotion amplifier (100W to 1 kW) and are only necessary to replace lost or damaged connector mates. Amplifiers rated 2 kW and larger have fixed wiring terminals and do not use a plug-on connector mate.
- 5) The optional breakout terminal board provides screw terminations for wiring each I/O point on the amplifier CN1 I/O connector. The flying lead I/O interface cable (IC800VMCI0x) or CN1 connector (IC800VMACONCN1) may be used.
- 6) The optional external braking resistors are used to dissipate excessive regenerated energy during fast deceleration of large loads from high speeds.

## Servo Amplifiers

### VersaMotion™

#### Ordering Information (continued)

Model	VersaMotion 1000 Watt	VersaMotion 2000 Watt	VersaMotion 3000 Watt
Motor Part Number	IC800VMM10LNKSE25 IC800VMM10MNKSE25	IC800VMM20LNKSE25 IC800VMM20MNKSE25	IC800VMM30MNKSE25
Motor/Brake Part Number	IC800VMM10LBKSE25 IC800VMM10MBKSE25	IC800VMM20LBKSE25 IC800VMM20MBKSE25	IC800VMM30MBKSE25
Amplifier Part Number	IC800VMA102	IC800VMA202	IC800VMA302

#### Cables

Power Cable	3 m	IC800VMCP1030	IC800VMCP2030	IC800VMCP3030
	5 m	IC800VMCP1050	IC800VMCP2050	IC800VMCP3050
	10 m	IC800VMCP1100	IC800VMCP2100	IC800VMCP3100
	20 m	IC800VMCP1200	IC800VMCP2200	IC800VMCP3200
Brake and Power Cable	3 m	IC800VMCB1030	IC800VMCB2030	IC800VMCB3030
	5 m	IC800VMCB1050	IC800VMCB2050	IC800VMCB3050
	10 m	IC800VMCB1100	IC800VMCB2100	IC800VMCB3100
	20 m	IC800VMCB1200	IC800VMCB2200	IC800VMCB3200
Encoder Cable	3 m	IC800VMCE1030	IC800VMCE1030	IC800VMCE1030
	5 m	IC800VMCE1050	IC800VMCE1050	IC800VMCE1050
	10 m	IC800VMCE1100	IC800VMCE1100	IC800VMCE1100
	20 m	IC800VMCE1200	IC800VMCE1200	IC800VMCE1200

#### Communications & I/O Interface Cables

Communications Cable	3 m	IC800VMCS030	IC800VMCS030	IC800VMCS030
Flying lead I/O interface Cable	1 m	IC800VMCI010	IC800VMCI010	IC800VMCI010
	3 m	IC800VMCI030	IC800VMCI030	IC800VMCI030

#### Amplifier Connectors

CN1 I/O Connector	IC800VMACONCN1	IC800VMACONCN1	IC800VMACONCN1
CN2 Encoder Connector	IC800VMACONCN2	IC800VMACONCN2	IC800VMACONCN2
CN3 Communication Connector	IC800VMACONCN3	IC800VMACONCN3	IC800VMACONCN3
AC Power Connector	IC800VMACONACP	N/A	N/A
Motor Power Connector	IC800VMACONMTRP	N/A	N/A
External Braking Resistor Connector	IC800VMADBR001	N/A	N/A

#### Motor Connectors

Power Connector (motor only)	IC800VMMCONP003	IC800VMMCONP003	IC800VMMCONP004
Power Connector (motor & brake)	IC800VMMCONP003	IC800VMMCONP003	IC800VMMCONP004
Encoder Connector	IC800VMMCONE002	IC800VMMCONE002	IC800VMMCONE002

#### Accessories

I/O Terminal Breakout Board and Cable	0.5 m	IC800VMTBC005	IC800VMTBC005	IC800VMTBC005
External Braking Resistor 40Ω, 400 Watt		IC800VMBR040	IC800VMBR040	IC800VMBR040
External Braking Resistor 20Ω, 1000 Watt		IC800VMBR020	IC800VMBR020	IC800VMBR020

## Servo Amplifiers

### $\alpha$ and $\beta i$ Series Servo Amplifiers

#### All Digital Servo Systems Offer High Performance and Reliability.

GE  $\alpha$  and  $\beta i$  Series Servo Drives, based on over five million axes installed worldwide, offer superior reliability and performance for unprecedented mean time between failure. The  $\alpha$  and  $\beta i$  Series Servos are available in a wide range of ratings for use with GE DSM300 Series motion controllers.

#### High-Performance Serial Encoders

Standard serial encoders built into the motors provide exceptional feedback resolution of 64K or 128K counts per revolution. Serial encoders support higher resolutions at high motor velocities than standard quadrature encoders and are more immune to noise. An optional battery connection provides absolute position feedback, eliminating the need to home the system after a power shutdown.

#### Reduced Tuning and Setup

There is no need for potentiometer tuning or personality modules; little tuning is required for properly sized drives. All drive parameters are stored in the controller in a standard motor database. Configuration settings are not stored in the drive, making it possible to replace drives with little set-up time. Stored drive and machine parameters are quickly transferred to repeat production machines.

#### All-Digital System

All control loops—current, velocity, and position—are closed in the GE DSM Series motion controller. High-speed microprocessors and/or digital signal processors (DSPs) in the controller provide loop update times of 250  $\mu$ s. The high response servo system can compensate for machine design limitations, yielding faster acceleration/deceleration rates and better responses to load changes.

#### All-Digital Servo Command Signals

The DSM324i and  $\beta i$  or  $\alpha i$  Series amplifiers use a high speed fiber optic command interface. The DSM302 and DSM314 use a PWM command interface between the controller and amplifier which improves efficiency by varying the on-time of the transistor switches that control motor voltage and current. With its superior noise immunity, both of these GE digital command interfaces allows for an increased signal to noise ratio for improved accuracy and performance.



Series	Motor Series	Controllers	Command Interface	Continuous Torque Range		Power Supply
				In-lb	Nm	
$\alpha$ SVU	$\alpha$	DSM302/314	PWM	53-495	6-56	Built-in
$\alpha$ HVi	$\alpha$ HVi, $\alpha$ HVis	PMM335/DSM324i	Fiber Optic	17.7-664	2-75	Separate PSM
$\beta i$	$\beta is$	PMM335/DSM324i	Fiber Optic	3.5-177	0.4-20	Built-in
$\beta$ HVi	$\beta$ HVis	PMM335/DSM324i	Fiber Optic	17.7-177	2-20	Built-in

#### Agency Approvals

UL, IEC rating and CE mark compliant

#### INFO

For application, installation, and tuning information, consult the Services website at [www.ge-ip.com](http://www.ge-ip.com).

## Servo Amplifiers

### $\beta$ i Series Servo

#### System Power Requirements

Amplifier Specification	$\beta$ i Series	$\alpha$ HVi*/ $\beta$ HVi Series
Voltage (-15%, +10%): 3-phase 1-phase (see below)	200-240VAC 220-240VAC	400-480VAC n/a
Frequency	50/60Hz	50/60 Hz
Allowable frequency fluctuation	$\pm 2$ Hz	$\pm 2$ Hz
Voltage fluctuation during acceleration/deceleration	7% or less	7% or less
Ambient Temperature Range	0-55°C	0-55°C
Humidity (non-condensing)	90%	90%
Vibration	Less than 0.5G	Less than 0.5G

\* $\alpha$ HVi series amplifiers use a separately mounted shared power supply.

The  $\beta$ i Series Servo amplifiers can be run on single phase power; however, the lifetime of the amplifier is reduced because of higher input and ripple current. An AC line filter is strongly recommended to suppress the influences of high-frequency input line noise on the drive power supply. If a power source within the

specified voltage range is not available, a transformer is required. The kVA rating of the transformer should be equal to or greater than the sum of all motor kW ratings. If an isolation-type power transformer is used, an AC line filter is not required.

GE offers the following line filters; transformers must be supplied by the user as required.

Part Number	Description	Amplifier Series
ZA81L-0001-0083#3C	5.4 kW, 3-phase AC line filter	$\beta$ i
ZA81L-0001-0101#C	10.5 kW, 3-phase AC line filter	$\beta$ i
ZA81L-0001-0168	5.4 kW, 3-phase AC line filter	$\beta$ HVi
ZA81L-0001-0169	10.5 kW, 3-phase AC line filter	$\beta$ HVi
ZA81L-0001-0163	18kW, 3-phase AC line filter	PSM-11HVi, PSM-18HVi
ZA81L-0001-0164	45kW, 3-phase AC line filter	PSM-30HVi, PSM-45HVi

#### Control Power Specification

The  $\beta$ i Series amplifiers require a 24VDC power supply for amplifier control power. This DC power supply must be supplied by the user. We recommend the GE 24VDC power supply, part number IC690PWR024. The same external DC power supply can be used to provide power to multiple amplifiers as long as the supply is rated for the

total current requirements of all of the amplifiers. The  $\alpha$  series amplifiers and  $\alpha$ HVi series power supplies require a single phase 200-230VAC central power input.



Motor Model	Max. kW Rating
$\beta$ 0.4/5000 is	0.13
$\beta$ 0.5/6000 is	0.35
$\beta$ 1/6000 is	0.5
$\beta$ 2/4000 is	0.5
$\beta$ 4/4000 is	0.75
$\beta$ 8/3000 is	1.2
$\beta$ 12/3000 is	1.8
$\beta$ 22/2000 is	2.5
$\beta$ 2/4000 HVis	0.5
$\beta$ 4/4000 HVis	0.75
$\beta$ 8/3000 HVis	1.2
$\beta$ 12/3000 HVis	1.8
$\beta$ 22/2000 HVis	2.5
$\alpha$ 2/6000HVis	1.0
$\alpha$ 4/5000HVis	1.0
$\alpha$ 8/6000HVis	2.2
$\alpha$ 12/4000HVis	2.5
$\alpha$ 22/3000HVi	4.0
$\alpha$ 22/4000HVis	4.5
$\alpha$ 30/4000HVis	5.5
$\alpha$ 40/4000HVis	5.5
$\alpha$ 50/3000HVis w/fan	14

#### Incoming DC Power for $\beta$ i Series

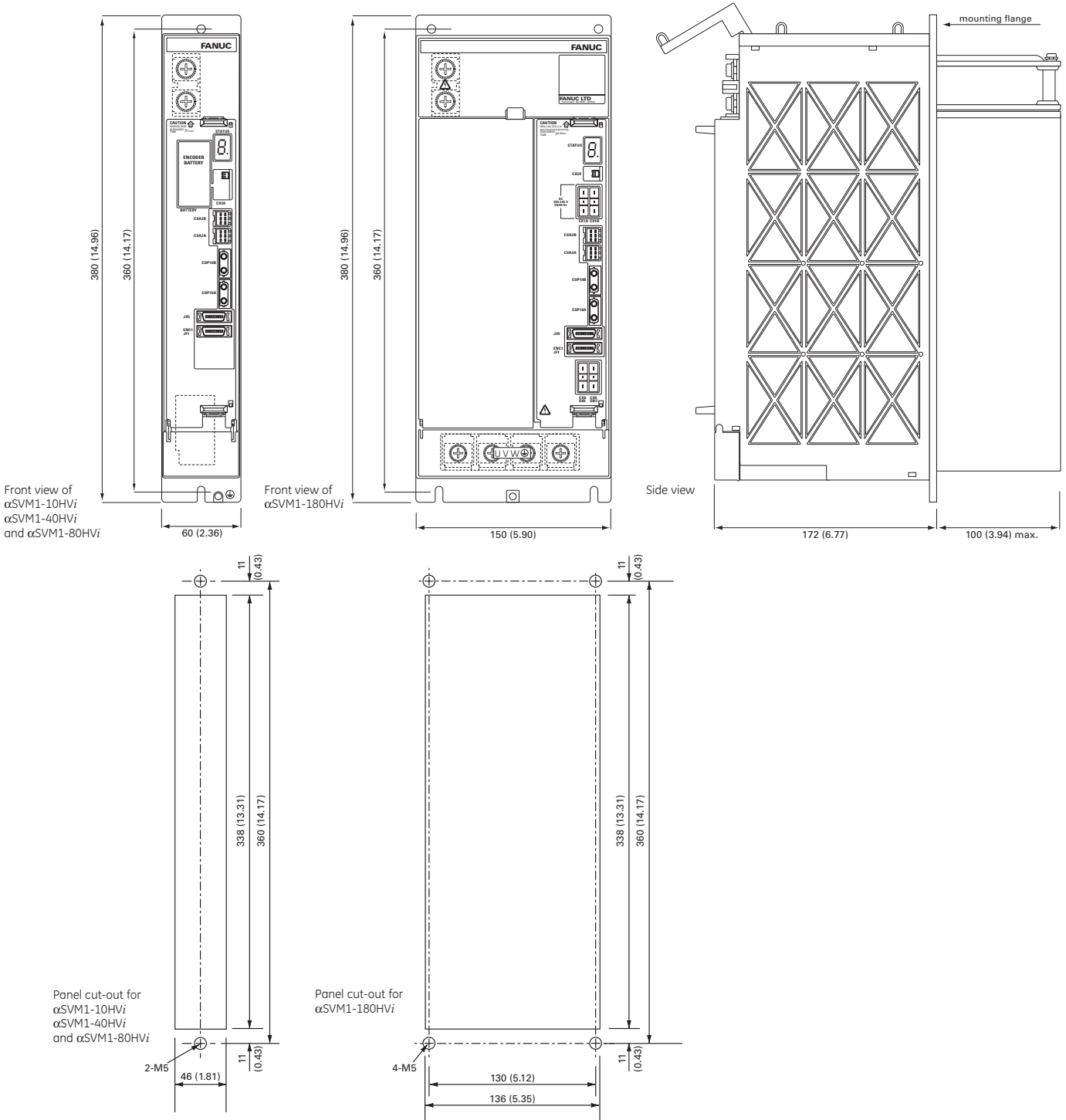
Input Voltage	24VDC ( $\pm 10\%$ )
Current Requirement (per amplifier):	
$\beta$ i Series	0.9 amps
$\beta$ HVi Series	0.9 amps

**αHVi Series Servo Amplifiers and Power Supplies**

**Dimensions**

The αHVi Series amplifiers and PSM-HVi power supplies are designed with a rear-mounted heat sink that extends through a hole in the mounting plate. This design eliminates most of the heat dissipation inside the control cabinet, reducing the temperature rise in the cabinet and the load on cabinet cooling equipment.

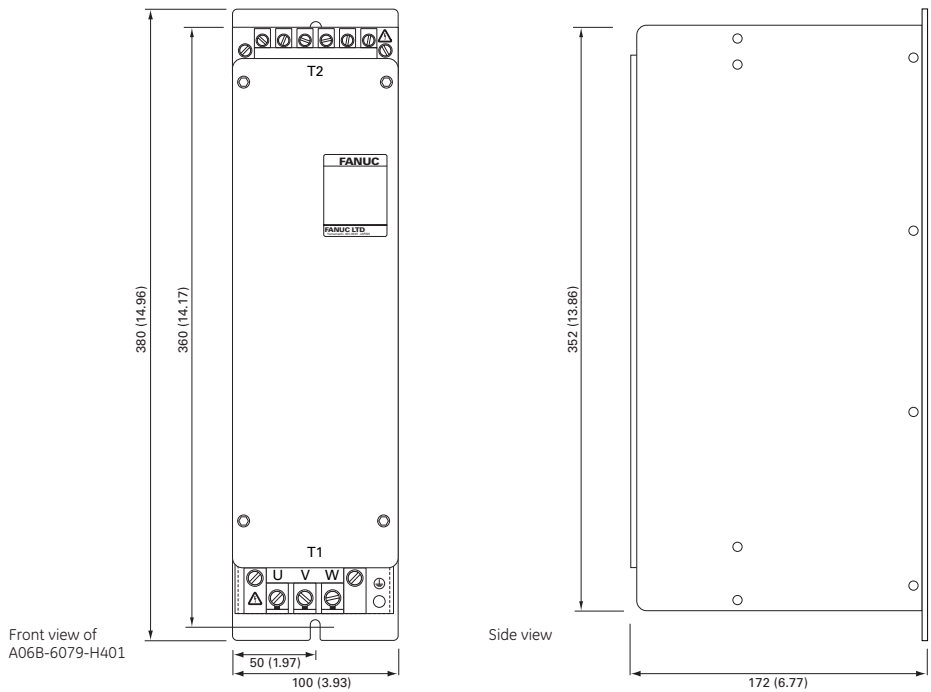
**αHVi Amplifier Dimension Drawings**



**αHVi Series Servo Amplifiers and Power Supplies**

Dimensions

Dynamic Brake Module Dimension Drawings

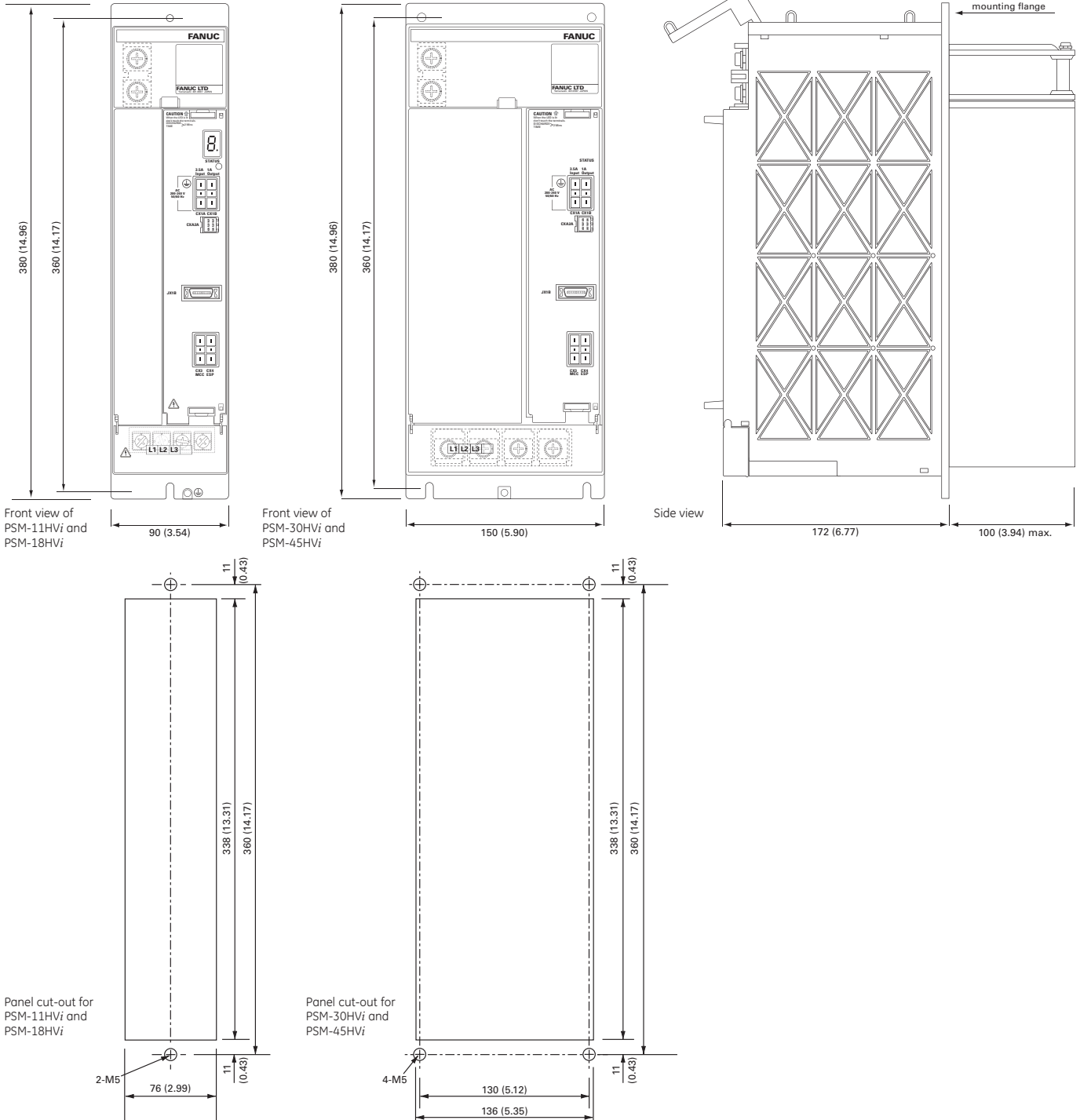




**αHVi Series Servo Amplifiers and Power Supplies**

Dimensions

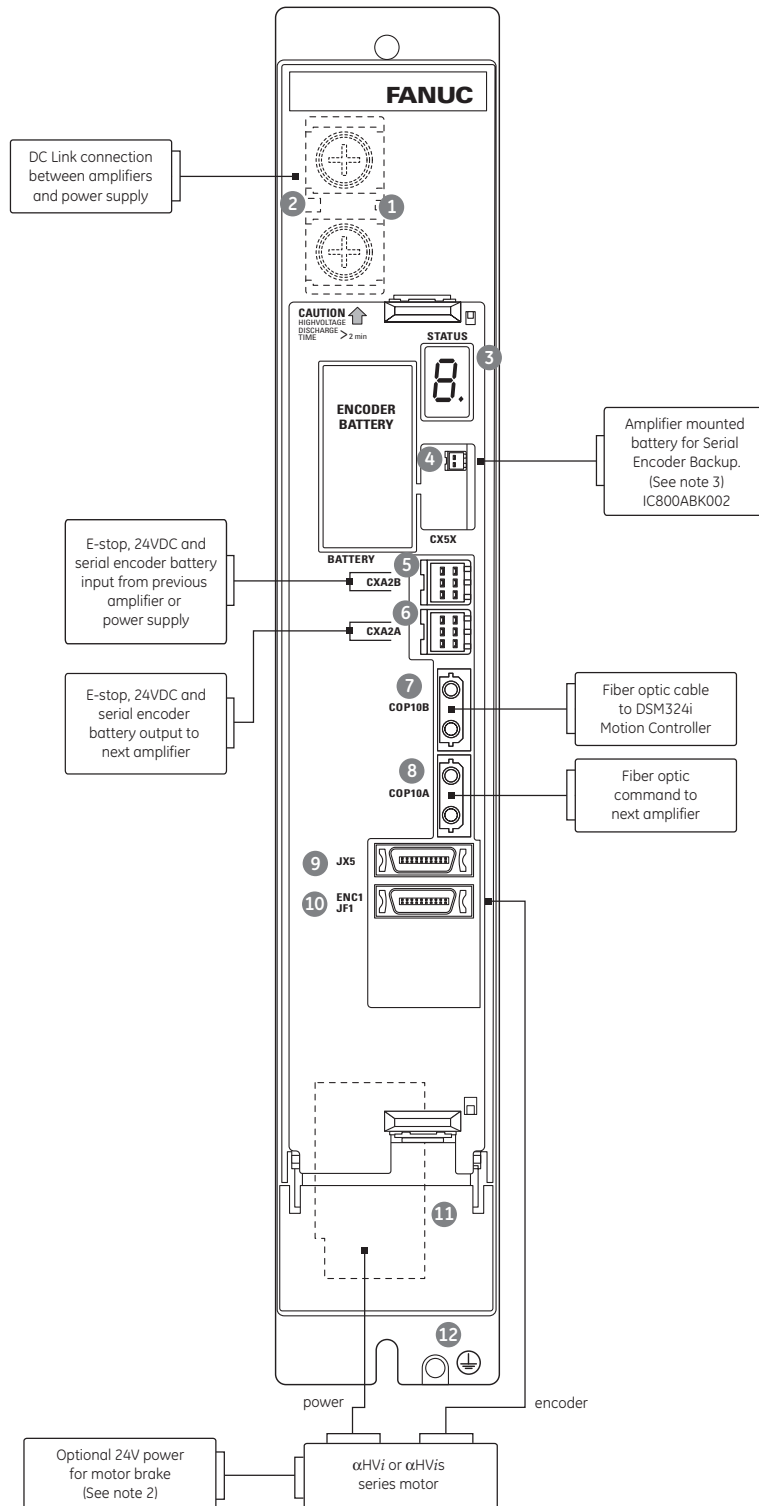
Power Supply Dimension Drawings



Servo Amplifiers

**αHV*i* Series Servo Amplifiers and Power Supplies**

**αSVM1-10HV*i*, αSVM1-40HV*i*, αSVM1-80HV*i* Connection Diagram**



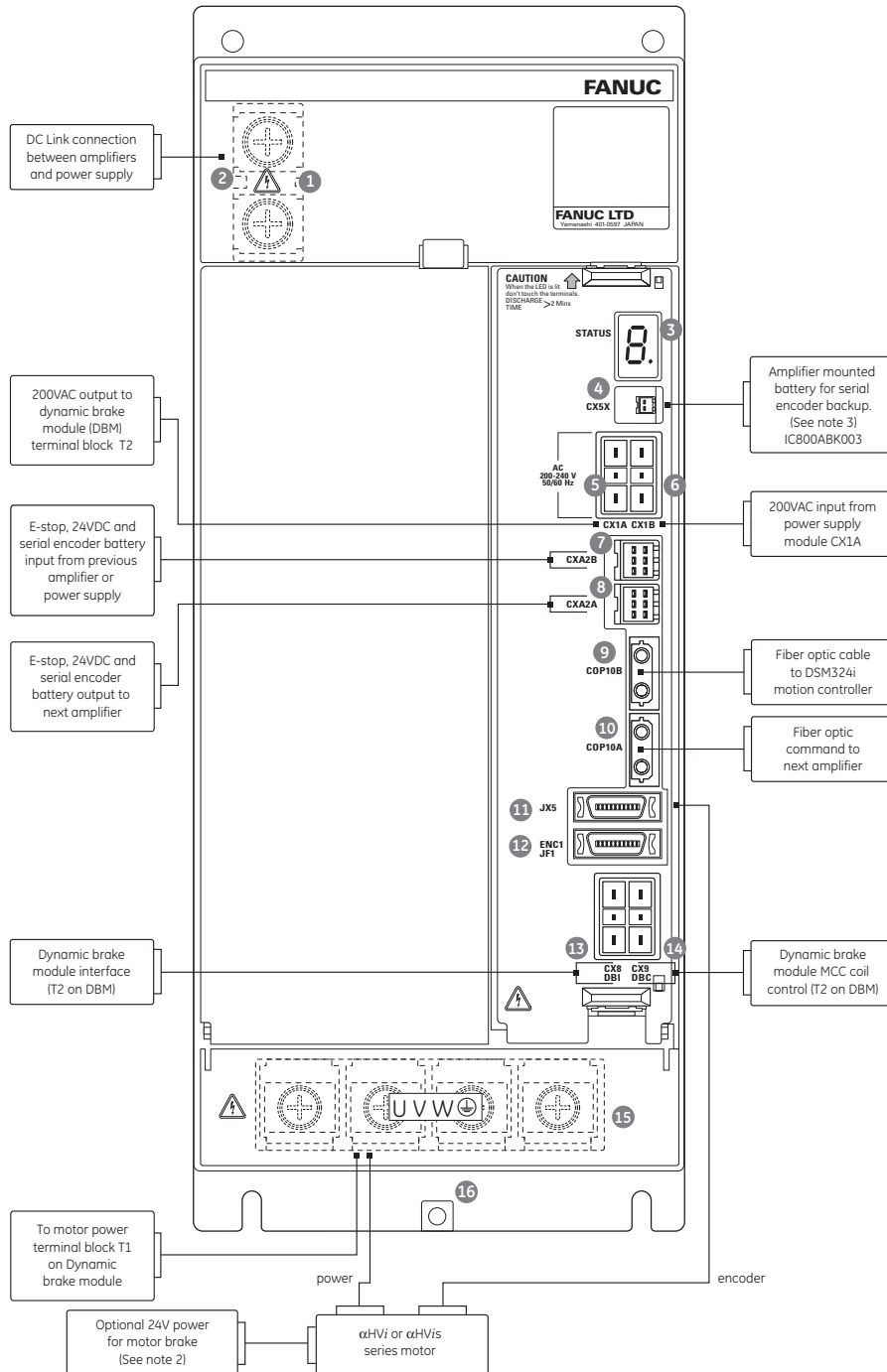
No.	Name	Remarks
1		DC link terminal block
2		DC link charge LED
3	STATUS	Status LED
4	CX5X	Absolute encoder battery input
5	CXA2B	Input connector for PSM interface
6	CXA2A	Output connector for PSM interface
7	COP10B	Fiber optic servo command input
8	COP10A	Fiber optic servo command output
9	JX5	No connection
10	ENC1/JF1	Serial encoder feedback
11	CZ2	Motor power connector
12		Tapped hole for grounding the amplifier

**Notes:**

1. Always install the circuit breakers, magnetic contactor, and AC line filter.
2. Use a regulated 24 VDC power supply for the amplifier. 24 VDC power supply for the amplifier and power supply for the motor brake cannot be shared.
3. The IC800ABK001 encoder battery pack mounts separately on the panel and can power up to 4 axes. Alternatively, the IC800ABK002 1-axis lithium battery can be snapped onto each amplifier.

αHVi Series Servo Amplifiers and Power Supplies

αSVM1-180HVi, Connection Diagram



No.	Name	Remarks
1		DC link terminal block
2		DC link charge LED
3	STATUS	Status LED
4	CX5X	Absolute encoder battery input
5	CX1A	200VAC power supply output connector
6	CX1B	200VAC power supply input connector
7	CXA2B	Input connector for PSM interface
8	CXA2A	Output connector for PSM interface
9	COP10B	Fiber optic servo command input
10	COP10A	Fiber optic servo command output
11	JX5	No connection
12	ENC1/JF1	Serial encoder feedback
13	CX8	Dynamic brake module interface connector
14	CX9	Connector for the magnetic contactor (MCC) drive coil of the dynamic brake module
15	TB2	Motor power connector
16		Tapped hole for grounding the amplifier

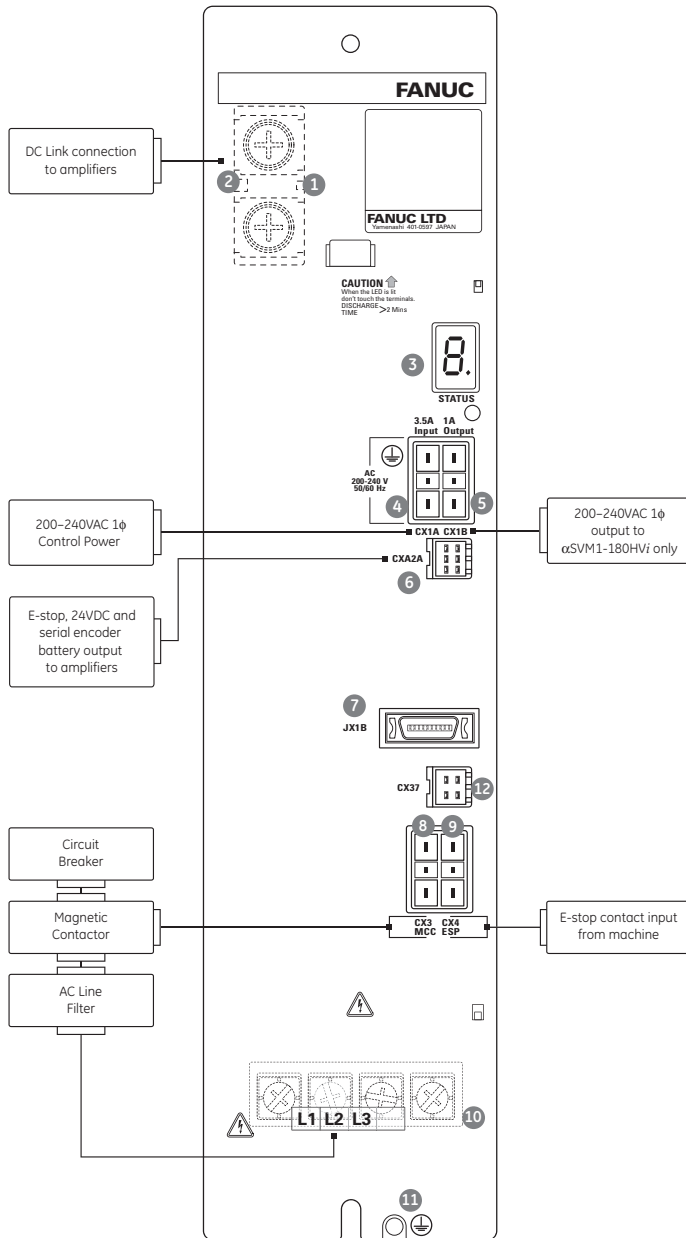
Notes:

1. Always install the circuit breakers, magnetic contactor, and AC line filter.
2. Use a regulated 24 VDC power supply for the amplifier. 24 VDC power supply for the amplifier and power supply for the motor brake cannot be shared.
3. The IC800ABK001 encoder battery pack mounts separately on the panel and can power up to 4 axes. Alternatively, the IC800ABK003 1-axis lithium battery can be snapped onto each amplifier.

## Servo Amplifiers

### αHVi Series Servo Amplifiers and Power Supplies

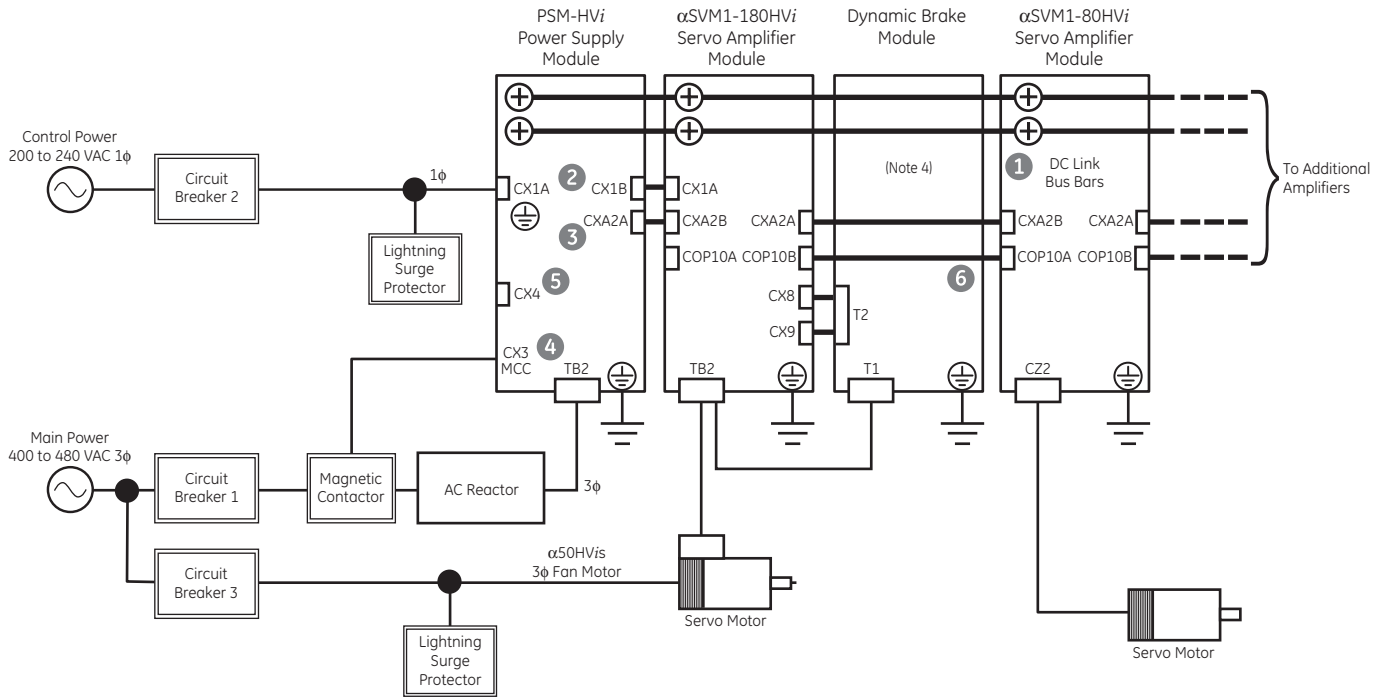
PSM-HVi Power Supply Connection Diagram



No.	Name	Remarks
1		DC link terminal block
2		DC link charge LED
3	STATUS	Status LED
4	CX1A	200VAC power supply input connector
5	CX1B	200VAC power supply output connector (used with αSVM1-180HVi only)
6	CXA2A	Output connector for PSM interface
7	JX1B	Not used
8	CX3	Connector for the main magnetic contactor (MCC) drive coil control signal
9	CX4	Connector for ESP signal
10	TB2	Terminal block for main AC power line
11		Tapped hole for grounding the power supply
12	CX37	Power failure detection output

### αHV*i* Series Servo Amplifiers and Power Supplies

#### αHV*i* System Connections



No.	Name	Remarks	Part Numbers
1	DC Link Bus Bars	30, 60 or 90 mm long bar kits available based on width of module <sup>1</sup>	60 mm kit: Z44A718031-G05 90 mm kit: Z44A718031-G03 150 mm kit: Z44A718031-G12
2	CX1A/CX1B	200VAC 1 phase control power unit <sup>2</sup>	ZA06B-6071-K203 (PSM connector kit) ZA02B-0120-K321 (2 required for αSVM1-180HV <i>i</i> only)
3	CXA2A/CXA2B	Output/input connectors for PSM interface <sup>3</sup>	ZA06B-6110-K210 (connector: 2 required) Z44C746453-001 (200 mm cable for shared encoder battery) Z44C746453-002 (200 mm cable for built-in encoder battery or no battery backup)
4	CX3	Connector for main magnetic contactor (MCC) control signal <sup>2</sup>	ZA06B-6071-K203 (PSM connector kit)
5	CX4	E-Stop signal connector <sup>2</sup>	ZA06B-6071-K203 (PSM connector kit)
6	COP10A/COP10B	Fiber optic command cable	See page 17 for cable options

#### Notes:

- Power supply and amplifier kits include appropriate length DC link bus bars.
- The power supply connector kit included with all power supply module kits includes connectors for CX1A, CX3 and CX4. Each αSVM1-180HV*i* amplifier kit includes two of the CX1A/B connectors to jumper the 200VAC single phase power from the power supply module.
- The PSM interface on connectors CXA2A/B supplies 24VDC power from the PSM power supply module to the connected amplifiers. Additionally, this interface allows shared signals such as system emergency stop and battery backup for the motor serial encoders. Connectors are included in the amplifier and power supply kits. Prefabricated cables are also available. Select the correct cable based on the battery type used to backup the motor serial encoder feedback for absolute positioning.
- Position of dynamic brake module is for reference only. Normally this module is mounted above or below the amplifiers or at the end of the module line up so that the standard DC link bus bar length is adequate to make the link connection between adjacent amplifiers.

## Servo Amplifiers

### αHV*i* Series Servo Amplifiers and Power Supplies

#### Ordering Information

The αHV*i* series amplifiers and PSM-HV*i* power supply modules can be ordered as individual components or as kits that include connectors, spare fuses, and DC link bus bars. The kits are recommended for new installations while spare parts and replacement units should use the part number for the amplifier

or power supply module. To place an order for a complete system, select the servo motor(s) that meet your application requirements, then select the amplifier kit(s), power supply kit, cables, connectors and accessories.

#### αHV*i* Amplifier Kits

Part Number	Kit Description	Qty.	Kit Contents
IC800AIHV010	10 Amp αHV <i>i</i> Series Amplifier Package	1	αSVM1-10HV <i>i</i> FSSB Amplifier (ZA06B-6127-H102)
		1	SVM Spare Control Power Fuse (ZA06B-6073-K250)
		2	CXA2A/B Connector (ZA06B-6110-K210)
		1	CZ2 Motor Power Output Connector (ZA06B-6110-K203#ZZM)
		1	Bus Bar Kit for 60 mm Module (Z44A718031-G05)
IC800AIHV040	40 Amp αHV <i>i</i> Series Amplifier Package	1	αSVM1-40HV <i>i</i> FSSB Amplifier (ZA06B-6127-H104)
		1	SVM Spare Control Power Fuse (ZA06B-6073-K250)
		2	CXA2A/B Connector (ZA06B-6110-K210)
		1	CZ2 Motor Power Output Connector (ZA06B-6110-K203#ZZM)
		1	Bus Bar Kit for 60 mm Module (Z44A718031-G05)
IC800AIHV080	80 Amp αHV <i>i</i> Series Amplifier Package	1	αSVM1-80HV <i>i</i> FSSB Amplifier (ZA06B-6127-H105)
		1	SVM Spare Control Power Fuse (ZA06B-6073-K250)
		2	CXA2A/B Connector (ZA06B-6110-K210)
		1	CZ2 Motor Power Output Connector (ZA06B-6110-K203#ZZM)
		1	Bus Bar Kit for 60 mm Module (Z44A718031-G05)
IC800AIHV180	180 Amp αHV <i>i</i> Series Amplifier Package	1	αSVM1-180HV <i>i</i> FSSB Amplifier (ZA06B-6127-H106)
		1	SVM Spare Control Power Fuse (ZA06B-6073-K250)
		2	CXA2A/B Connector (ZA06B-6110-K210)
		1	CX8/CX9 DB Module Interface Connector Kit (ZA06B-6073-K216)
		1	Bus Bar Kit for 150 mm Module (Z44A718031-G12)
		2	CX1A/B Control Power Connector Kit (ZA02B-0120-K321)

#### PSM-HV*i* Power Supply Kits

Part Number	Kit Description	Qty.	Kit Contents
IC800PSHV011	11 kW Power Supply Module Package	1	PSM-11HV <i>i</i> 11 kW HV Power Supply Module (ZA06B-6150-H011)
		1	Spare Control Power Fuse (ZA06B-6077-K250)
		1	Bus Bar Kit for 90 mm Module (Z44A718031-G03)
		1	Power Supply Connector Kit (ZA06B-6071-K203)
IC800PSHV018	18 kW Power Supply Module Package	1	PSM-18HV <i>i</i> 18 kW HV Power Supply Module (ZA06B-6150-H018)
		1	Spare Control Power Fuse (ZA06B-6077-K250)
		1	Bus Bar Kit for 90 mm Module (Z44A718031-G03)
		1	Power Supply Connector Kit (ZA06B-6071-K203)
IC800PSHV030	30 kW Power Supply Module Package	1	PSM-30HV <i>i</i> 30 kW HV Power Supply Module (ZA06B-6150-H030)
		1	Spare Control Power Fuse (ZA06B-6077-K250)
		1	Bus Bar Kit for 150 mm Module (Z44A718031-G12)
		1	Power Supply Connector Kit (ZA06B-6071-K203)
IC800PSHV045	45 kW Power Supply Module Package	1	PSM-45HV <i>i</i> 45 kW HV Power Supply Module (ZA06B-6150-H045)
		1	Spare Control Power Fuse (ZA06B-6077-K250)
		1	Bus Bar Kit for 150 mm Module (Z44A718031-G12)
		1	Power Supply Connector Kit (ZA06B-6071-K203)

The αHV*i* series amplifiers use a separately mounted shared power supply for one or more axes. These power supplies can regenerate energy back to the AC line so no regenerative resistors or modules are required.

## Servo Amplifiers

### αHV<sub>i</sub> Series Amplifier and Motor

#### Ordering Information

Motor Model	α2/6000HV <sub>i</sub>	α4/5000HV <sub>i</sub>	α8/6000HV <sub>i</sub>
Motor Part Number	ZA06B-0219-B200	ZA06B-0216-B200	ZA06B-0233-B200
Motor/Brake Part Number	ZA06B-0219-B500	ZA06B-0216-B500	ZA06B-0233-B500
Beta Amplifier Model	βSVM1-10HV <sub>i</sub>	βSVM1-10HV <sub>i</sub>	βSVM1-40HV <sub>i</sub>
Beta Amplifier Part Number	ZA06B-6131-H001	ZA06B-6131-H001	ZA06B-6131-H003
Beta Amplifier Fan Kit <sup>(Note 1)</sup>	n/a	n/a	ZA06B-6134-K002
Beta Amplifier Kit	IC800BIHV010	IC800BIHV010	IC800BIHV040
Alpha Amplifier Model	αSVM1-10HV <sub>i</sub>	αSVM1-10HV <sub>i</sub>	αSVM1-40HV <sub>i</sub>
Alpha Amplifier Part Number	ZA06B-6127-H102	ZA06B-6127-H102	ZA06B-6127-H104
Alpha Amplifier Kit	IC800AIHV010	IC800AIHV010	IC800AIHV040

Cables		α2/6000HV <sub>i</sub>	α4/5000HV <sub>i</sub>	α8/6000HV <sub>i</sub>
Power Cable	7 M	CP2I-0WPB-0070-AZ	CP2I-0WPB-0070-AZ	CP3I-0WPB-0070-AZ
	14 M	CP2I-0WPB-0140-AZ	CP2I-0WPB-0140-AZ	CP3I-0WPB-0140-AZ
Power Cable (Shielded)	7 M	CP2I-0WEB-0070-AZ	CP2I-0WEB-0070-AZ	CP3I-0WEB-0070-AZ
	14 M	CP2I-0WEB-0140-AZ	CP2I-0WEB-0140-AZ	CP3I-0WEB-0140-AZ
Feedback Cable (Right Angle)	7 M	CFDA-3WPB-0070-AZ	CFDA-3WPB-0070-AZ	CFDA-3WPB-0070-AZ
	14 M	CFDA-3WPB-0140-AZ	CFDA-3WPB-0140-AZ	CFDA-3WPB-0140-AZ
Feedback Cable (Straight)	7 M	CFDA-0WPB-0070-AZ	CFDA-0WPB-0070-AZ	CFDA-0WPB-0070-AZ
	14 M	CFDA-0WPB-0140-AZ	CFDA-0WPB-0140-AZ	CFDA-0WPB-0140-AZ
Brake Power Cable	7 M	Integrated with power cable	Integrated with power cable	CB4N-0WPM-0070-AZ
	14 M	Integrated with power cable	Integrated with power cable	CB4N-0WPM-0140-AZ
PSM Interface Cable (External Battery)	200 mm	Z44C746453-001	Z44C746453-001	Z44C746453-001
PSM Interface Cable (Built-in or No Battery)	200 mm	Z44C746453-002	Z44C746453-002	Z44C746453-002
Fiber Optic Command Cable	15 CM		ZA66L-6001-0023#L150R0	
	30 CM		ZA66L-6001-0023#L300R0	
	1 M		ZA66L-6001-0023#L1R003	
	2 M		ZA66L-6001-0023#L2R003	
	3 M		ZA66L-6001-0023#L3R003	
Fiber Optic Cable (Sheathed)	1 M		ZA66L-6001-0026#L1R003	
	3 M		ZA66L-6001-0026#L3R003	
	5 M		ZA66L-6001-0026#L5R003	
	10 M		ZA66L-6001-0026#L10R03	
	20 M		ZA66L-6001-0026#L20R03	
	30 M		ZA66L-6001-0026#L30R03	
	50 M		ZA66L-6001-0026#L50R03	
	100 M		ZA66L-6001-0026#L100R3	

Connector Kits		α2/6000HV <sub>i</sub>	α4/5000HV <sub>i</sub>	α8/6000HV <sub>i</sub>
Encoder Feedback Connector (JF1)		ZA06B-6073-K214	ZA06B-6073-K214	ZA06B-6073-K214
CXA2A/B Jumper Connector (2 Req)		ZA06B-6110-K210	ZA06B-6110-K210	ZA06B-6110-K210
CZ2 Motor Power Output Connector		ZA06B-6110-K203#ZZM	ZA06B-6110-K203#ZZM	ZA06B-6110-K203#ZZM
Motor Half Keys		Z44A730465-001	Z44A730465-016	Z44A730465-002
Motor Feedback Connector Kit	90 Deg	ZA06B-6114-K204#E	ZA06B-6114-K204#E	ZA06B-6114-K204#E
	Straight	ZA06B-6114-K204#S	ZA06B-6114-K204#S	ZA06B-6114-K204#S
Motor Power/Brake Connector Kit	90 Deg	ZA06B-6114-K220#E	ZA06B-6114-K220#E	n/a
	Straight	ZA06B-6114-K220#S	ZA06B-6114-K220#S	n/a
Motor Power Connector Kit	90 Deg	n/a	n/a	Z44A730464-G18
	Straight	n/a	n/a	Z44A730464-G17
Motor Brake Connector Kit	90 Deg	ZA06B-6114-K213#E	ZA06B-6114-K213#E	ZA06B-6114-K213#E
	Straight	ZA06B-6114-K213#S	ZA06B-6114-K213#S	ZA06B-6114-K213#S

Accessories		α2/6000HV <sub>i</sub>	α4/5000HV <sub>i</sub>	α8/6000HV <sub>i</sub>
DC Link Bus Bars		Z44A718031-G05	Z44A718031-G05	Z44A718031-G05
Spare Amplifier Control Power Fuse		ZA06B-6073-K250	ZA06B-6073-K250	ZA06B-6073-K250
Encoder Battery Back-up (Multi-Axis Panel Mounted Kit) <sup>(Note 2)</sup>		IC800ABK001	IC800ABK001	IC800ABK001
Encoder Battery Back-up (Single-Axis Built-in) <sup>(Note 2)</sup>		IC800ABK002	IC800ABK002	IC800ABK002

1) Separate user installed cooling fan is only required for the βSVM1-40HV<sub>i</sub> amplifier. This fan kit is included in the IC800BIHV040 amplifier kit but must be separately ordered when the ZA06B-6131-H003 amplifier is ordered.

2) Contents of encoder battery kits is shown on page 78

## Servo Amplifiers

### αHVi Series Amplifier and Motor

#### Ordering Information

Motor Model	α12/4000HVi	α22/3000HVi	α22/4000HVi
Motor Part Number	ZA06B-0239-B200	ZA06B-0249-B200	ZA06B-0266-B200
Motor/Brake Part Number	ZA06B-0239-B500	ZA06B-0249-B500	ZA06B-0266-B500
Beta Amplifier Model	βSVM1-40HVi	βSVM1-40HVi	n/a
Beta Amplifier Part Number	ZA06B-6131-H003	ZA06B-6131-H003	n/a
Beta Amplifier Fan Kit <sup>(Note 1)</sup>	ZA06B-6134-K002	ZA06B-6134-K002	n/a
Beta Amplifier Kit	IC800BIHV040	IC800BIHV040	n/a
Alpha Amplifier Model	αSVM1-40HVi	αSVM1-40HVi	αSVM1-80HVi
Alpha Amplifier Part Number	ZA06B-6127-H104	ZA06B-6127-H104	ZA06B-6127-H105
Alpha Amplifier Kit	IC800AIHV040	IC800AIHV040	IC800AIHV080

Cables		α12/4000HVi	α22/3000HVi	α22/4000HVi
Power Cable	7 M	CP3I-OWPB-0070-AZ	CP4I-OWPB-0070-AZ	CP4I-OWPB-0070-AZ
	14 M	CP3I-OWPB-0140-AZ	CP4I-OWPB-0140-AZ	CP4I-OWPB-0140-AZ
Power Cable (Shielded)	7 M	CP3I-OWEB-0070-AZ	CP4I-OWEB-0070-AZ	CP4I-OWEB-0070-AZ
	14 M	CP3I-OWEB-0140-AZ	CP4I-OWEB-0140-AZ	CP4I-OWEB-0140-AZ
Feedback Cable (Right Angle)	7 M	CFDA-3WPB-0070-AZ	CFDA-3WPB-0070-AZ	CFDA-3WPB-0070-AZ
	14 M	CFDA-3WPB-0140-AZ	CFDA-3WPB-0140-AZ	CFDA-3WPB-0140-AZ
Feedback Cable (Straight)	7 M	CFDA-OWPB-0070-AZ	CFDA-OWPB-0070-AZ	CFDA-OWPB-0070-AZ
	14 M	CFDA-OWPB-0140-AZ	CFDA-OWPB-0140-AZ	CFDA-OWPB-0140-AZ
Brake Power Cable	7 M	CB4N-OWPM-0070-AZ	CB4N-OWPM-0070-AZ	CB4N-OWPM-0070-AZ
	14 M	CB4N-OWPM-0140-AZ	CB4N-OWPM-0140-AZ	CB4N-OWPM-0140-AZ
PSM Interface Cable (External Battery)	200 mm	Z44C746453-001	Z44C746453-001	Z44C746453-001
PSM Interface Cable (Built-in or No Battery)	200 mm	Z44C746453-002	Z44C746453-002	Z44C746453-002
Fiber Optic Command Cable	15 CM		ZA66L-6001-0023#L150R0	
	30 CM		ZA66L-6001-0023#L300R0	
	1 M		ZA66L-6001-0023#L1R003	
	2 M		ZA66L-6001-0023#L2R003	
	3 M		ZA66L-6001-0023#L3R003	
Fiber Optic Cable (Sheathed)	1 M		ZA66L-6001-0026#L1R003	
	3 M		ZA66L-6001-0026#L3R003	
	5 M		ZA66L-6001-0026#L5R003	
	10 M		ZA66L-6001-0026#L10R03	
	20 M		ZA66L-6001-0026#L20R03	
	30 M		ZA66L-6001-0026#L30R03	
	50 M		ZA66L-6001-0026#L50R03	
	100 M		ZA66L-6001-0026#L100R3	

Connector Kits		α12/4000HVi	α22/3000HVi	α22/4000HVi
Encoder Feedback Connector (JF1)		ZA06B-6073-K214	ZA06B-6073-K214	ZA06B-6073-K214
CXA2A/B Jumper Connector (2 Req)		ZA06B-6110-K210	ZA06B-6110-K210	ZA06B-6110-K210
CZ2 Motor Power Output Connector		ZA06B-6110-K203#ZZM	ZA06B-6110-K203#ZZM	ZA06B-6110-K203#ZZM
Motor Half Keys		Z44A730465-015	Z44A730465-003	Z44A730465-003
Motor Feedback Connector Kit	90 Deg	ZA06B-6114-K204#E	ZA06B-6114-K204#E	ZA06B-6114-K204#E
	Straight	ZA06B-6114-K204#S	ZA06B-6114-K204#S	ZA06B-6114-K204#S
Motor Power Connector Kit	90 Deg	Z44A730464-G18	Z44A730464-G20	Z44A730464-G20
	Straight	Z44A730464-G17	Z44A730464-G19	Z44A730464-G19
Motor Brake Connector Kit	90 Deg	ZA06B-6114-K213#E	ZA06B-6114-K213#E	ZA06B-6114-K213#E
	Straight	ZA06B-6114-K213#S	ZA06B-6114-K213#S	ZA06B-6114-K213#S

Accessories		α12/4000HVi	α22/3000HVi	α22/4000HVi
DC Link Bus Bars		Z44A718031-G05	Z44A718031-G05	Z44A718031-G05
Spare Amplifier Control Power Fuse		ZA06B-6073-K250	ZA06B-6073-K250	ZA06B-6073-K250
Encoder Battery Back-up (Multi-Axis Panel Mounted Kit) <sup>(Note 2)</sup>		IC800ABK001	IC800ABK001	IC800ABK001
Encoder Battery Back-up (Single-Axis Built-in) <sup>(Note 2)</sup>		IC800ABK002	IC800ABK002	IC800ABK002

1) Separate user installed cooling fan is only required for the βSVM1-40HVi amplifier. This fan kit is included in the IC800BIHV040 amplifier kit but must be separately ordered when the ZA06B-6131-H003 amplifier is ordered.

2) Contents of encoder battery kits is shown on page 78



## Servo Amplifiers

### αHVi Series Amplifier and Motor

#### Ordering Information (continued)

Motor Model		α30/4000HVis	α40/4000HVis	α50/3000HVis w/ Fan
Motor Part Number		ZA06B-0269-B200	ZA06B-0273-B200	ZA06B-0276-B210
Motor/Brake Part Number		ZA06B-0269-B500	ZA06B-0273-B500	ZA06B-0276-B510
Alpha Amplifier Model		αSVM1-80HVi	αSVM1-80HVi	αSVM1-180HVi
Alpha Amplifier Part Number		ZA06B-6127-H105	ZA06B-6127-H105	ZA06B-6127-H106
Alpha Amplifier Kit		IC800AIHV080	IC800AIHV080	IC800AIHV180
Dynamic Braking Module		n/a	n/a	ZA06B-6079-H401
Cables		α30/4000HVis	α40/4000HVis	α50/3000HVis w/ Fan
Power Cable	7 M	CP4I-OWPB-0070-AZ	CP4I-OWPB-0070-AZ	CP9I-OMPb-0070-AZ
	14 M	CP4I-OWPB-0140-AZ	CP4I-OWPB-0140-AZ	CP9I-OMPb-0140-AZ
Power Cable (Shielded)	7 M	CP4I-OWEB-0070-AZ	CP4I-OWEB-0070-AZ	CP9I-OMEB-0070-AZ
	14 M	CP4I-OWEB-0140-AZ	CP4I-OWEB-0140-AZ	CP9I-OMEB-0140-AZ
Feedback Cable (Right Angle)	7 M	CFDA-3WPB-0070-AZ	CFDA-3WPB-0070-AZ	CFDA-3WPB-0070-AZ
	14 M	CFDA-3WPB-0140-AZ	CFDA-3WPB-0140-AZ	CFDA-3WPB-0140-AZ
Feedback Cable (Straight)	7 M	CFDA-OWPB-0070-AZ	CFDA-OWPB-0070-AZ	CFDA-OWPB-0070-AZ
	14 M	CFDA-OWPB-0140-AZ	CFDA-OWPB-0140-AZ	CFDA-OWPB-0140-AZ
Brake Power Cable	7 M	CB4N-OWPM-0070-AZ	CB4N-OWPM-0070-AZ	CB4N-OWPM-0070-AZ
	14 M	CB4N-OWPM-0140-AZ	CB4N-OWPM-0140-AZ	CB4N-OWPM-0140-AZ
Fan Cable	7 M	n/a	n/a	CB5N-OWPM-0070-AZ
	14 M	n/a	n/a	CB5N-OWPM-0140-AZ
PSM Interface Cable (External Battery)	200 mm	Z44C746453-001	Z44C746453-001	Z44C746453-001
PSM Interface Cable (Built-in or No Battery)	200 mm	Z44C746453-002	Z44C746453-002	Z44C746453-002
Fiber Optic Command Cable	15 CM		ZA66L-6001-0023#L150R0	
	30 CM		ZA66L-6001-0023#L300R0	
	1 M		ZA66L-6001-0023#L1R003	
	2 M		ZA66L-6001-0023#L2R003	
	3 M		ZA66L-6001-0023#L3R003	
Fiber Optic Cable (Sheathed)	1 M		ZA66L-6001-0026#L1R003	
	3 M		ZA66L-6001-0026#L3R003	
	5 M		ZA66L-6001-0026#L5R003	
	10 M		ZA66L-6001-0026#L10R03	
	20 M		ZA66L-6001-0026#L20R03	
	30 M		ZA66L-6001-0026#L30R03	
	50 M		ZA66L-6001-0026#L50R03	
	100 M		ZA66L-6001-0026#L100R3	
Connector Kits		α30/4000HVis	α40/4000HVis	α50/3000HVis w/ Fan
Encoder Feedback Connector (JF1)		ZA06B-6073-K214	ZA06B-6073-K214	ZA06B-6073-K214
CXA2A/B Jumper Connector (2 Req)		ZA06B-6110-K210	ZA06B-6110-K210	ZA06B-6110-K210
C22 Motor Power Output Connector		ZA06B-6110-K203#ZZM	ZA06B-6110-K203#ZZM	ZA06B-6110-K203#ZZM
CX8/CX9 DB Module Interface Connector Kit		n/a	n/a	ZA06B-6073-K216
CX1A/B 180HVi Amplifier Control Power		n/a	n/a	ZA02B-0120-K321
Motor Half Keys		Z44A730465-003	Z44A730465-003	n/a
Motor Feedback Connector Kit	90 Deg	ZA06B-6114-K204#E	ZA06B-6114-K204#E	ZA06B-6114-K204#E
	Straight	ZA06B-6114-K204#S	ZA06B-6114-K204#S	ZA06B-6114-K204#S
Motor Power Connector Kit	90 Deg	Z44A730464-G20	Z44A730464-G20	Z44A730464-G20
	Straight	Z44A730464-G19	Z44A730464-G19	Z44A730464-G19
Motor Brake Connector Kit	90 Deg	ZA06B-6114-K213#E	ZA06B-6114-K213#E	ZA06B-6114-K213#E
	Straight	ZA06B-6114-K213#S	ZA06B-6114-K213#S	ZA06B-6114-K213#S
Motor Fan Connector Kit	90 Deg	n/a	n/a	ZA06B-6114-K214#E
	Straight	n/a	n/a	ZA06B-6114-K214#S
Accessories		α30/4000HVis	α40/4000HVis	α50/3000HVis w/ Fan
DC Link Bus Bars		Z44A718031-G05	Z44A718031-G05	Z44A718031-G12
Spare Amplifier Control Power Fuse		ZA06B-6073-K250	ZA06B-6073-K250	ZA06B-6073-K250
Encoder Battery Back-up (Panel Mounted Kit) <sup>(Note 1)</sup>		IC800ABK001	IC800ABK001	IC800ABK001
Encoder Battery Back-up (Built-in) <sup>(Note 1)</sup>		IC800ABK002	IC800ABK002	IC800ABK003

1) Contents of encoder battery kits is shown on page 78

## Servo Amplifiers

### PSM-HV*i* Power Supply

#### Ordering Information

The  $\alpha$ HV*i* series amplifiers use a separately mounted shared power supply. A power supply module (PSM) can service multiple amplifiers in a multi-axis system. A maximum of six amplifiers

may be connected to one power supply module; however, the number of amplifier may be limited by the power supply ratings.

Model Number	PSM-11HV <i>i</i>	PSM-18HV <i>i</i>	PSM-30HV <i>i</i>	PSM-45HV <i>i</i>
Power Supply Kit	IC800PSHV011	IC800PSHV018	IC800PSHV030	IC800PSHV045
Power Supply Only	ZA06B-6150-H011	ZA06B-6150-H018	ZA06B-6150-H030	ZA06B-6150-H045
Continuous Output Rating	11	18	30	45
Peak Output Rating*	34	58	87	124
DC Link Bus Bars	Z44A718031-G03	Z44A718031-G03	Z44A718031-G12	Z44A718031-G12

#### Connectors and Cables

Connector Kit (Includes CX4 Estop, CX3 MCC and CX1A Control Power Connectors)		ZA06B-6071-K203	ZA06B-6071-K203	ZA06B-6071-K203	ZA06B-6071-K203
MCC Coil Control Output Flying Lead Cable	25 Ft	Z44C742171-001	Z44C742171-001	Z44C742171-001	Z44C742171-001
200V Control Power Input Flying Lead Cable	25 Ft	Z44C742172-001	Z44C742172-001	Z44C742172-001	Z44C742172-001
Estop Input Flying Lead Cable	10 Ft	Z44C742176-001	Z44C742176-001	Z44C742176-001	Z44C742176-001

#### Accessories

Spare Control Power Fuse		ZA06B-6077-K250	ZA06B-6077-K250	ZA06B-6077-K250	ZA06B-6077-K250
AC Line Filter		ZA81L-0001-0163	ZA81L-0001-0163	ZA81L-0001-0164	ZA81L-0001-0164
Noise Filter for PSM (required for CE)		ZA06B-6077-K155	ZA06B-6077-K156	ZA06B-6077-K156	ZA06B-6077-K157

\*Peak rating is for 0.3 seconds

#### Selecting a Power Supply

**Step 1** - Determine the total number and type of  $\alpha$ HV*i* or  $\alpha$ HV*is* series motors that will be required from the list below. If more than six axes are required divide them into groups of no more than six motors.

Motor Model	Continuous Output	Acceleration Output
$\alpha$ 22/3000HV <i>i</i>	4.0 kW	9.6 kW
$\alpha$ 22/4000HV <i>is</i>	4.5 kW	20 kW
$\alpha$ 30/4000HV <i>is</i>	5.5 kW	22 kW
$\alpha$ 40/4000HV <i>is</i>	5.5 kW	24 kW
$\alpha$ 50/3000HV <i>is</i> with fan	14 kW	39 kW

**Step 2** - Total the continuous output for all motors in a group and multiply by 0.6.

**Step 3** - Total the acceleration output for all motors in each group.

**Step 4** - Compare the continuous and acceleration output totals for each group to the continuous rating and peak rating for the power supply modules and select a PSM module to meet the following conditions:

- Motor Continuous Output Total \* 0.6 must be less than the PSM Continuous Output Rating
- Motor Acceleration Output Total must be less than the PSM Peak Output Rating

#### Example:

An application requires the following motors:

- Qty 2  $\alpha$ 22/4000HV*is*
- Qty 2  $\alpha$ 30/4000HV*is*
- Qty 1  $\alpha$ 50/3000HV*is* with fan

Since the total number of motors is less than six, assume that one PSM will be used. Therefore, the total ratings for the system are:

- Total the continuous output for all motors multiplied by 0.6 = 28 kW \* 0.6 = 16.8 kW
- Total the acceleration output for all motors = 123 kW

Select the PSM-45HV*i* module with a continuous output rating of 45 kW and peak output rating of 124 kW.

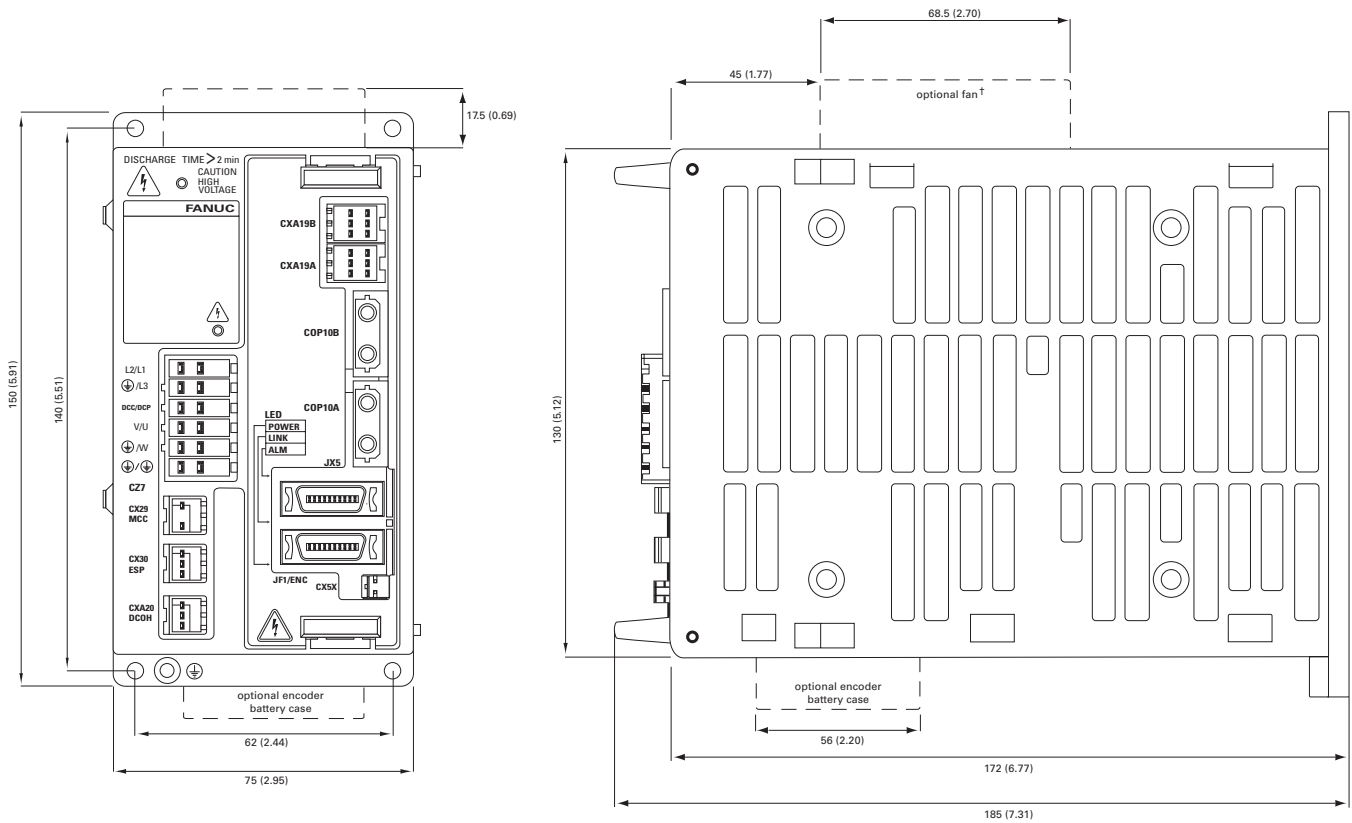
## Servo Amplifiers

### $\beta i$ Series Servo Amplifiers

#### Dimensions

The  $\beta i$  Series amplifiers are panel mounted devices with dimensions as shown. The  $\beta i$  Series amplifiers must be paired with the  $\beta is$  Series motors. When installing the amplifiers make sure to maintain the specified clearances above, below and between adjacent amplifiers to allow for proper convection cooling.

#### $\beta i$ Series Servo Amplifier Unit $\beta SVM1-20i$



Dimensions shown in mm (in).

#### $\beta i$ Series Servo Amplifiers Electrical Specifications

Model	$\beta SVM1-20i$
Rated output current (rms amps)	5.9
Current limit (Peak amps)	20
AC Power	200-240 VAC (3-phase), 220-240 VAC (1-phase) 50/60 Hz $\pm$ 2 Hz
DC Control Power	24 VDC $\pm$ 10% @ 0.9 Amp per amplifier
Max. Heat loss (watts)	66
Regenerative discharge	16J
Maintenance Clearances:	
Above and below amplifier	40 (1.57)
Beside and between amplifiers	10 (0.39)

\*These values are standard values at 20°C with a tolerance of  $\pm$ 10%. The speed-torque characteristics vary depending on the parameter setting and input voltage of the digital servo amplifiers. (The above figures show average values.) These values may be changed without prior notice.

†Separately installed cooling fan required for  $\beta 4is$  motor when a single phase AC power source is used and always with the  $\beta 8is$  motor.

## Servo Amplifiers

### $\beta$ i Series Servo Amplifiers

#### Dimensions

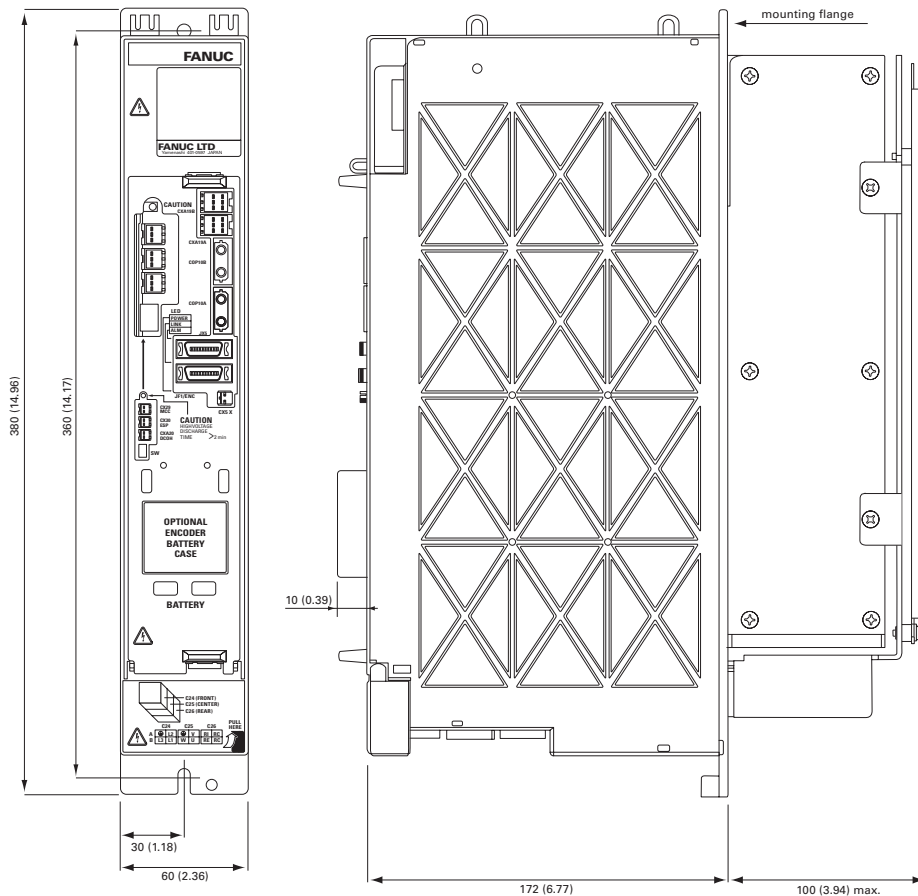
The  $\beta$ i Series amplifiers are panel mounted devices with dimensions as shown. The  $\beta$ i Series amplifiers must be paired with the  $\beta$ is Series motors. When installing the amplifiers make sure to maintain the specified clearances above, below and between adjacent amplifiers to allow for proper convection cooling.

#### $\beta$ i Series Servo Amplifier Unit

$\beta$ SVM1-40i

$\beta$ SVM1-10HV

$\beta$ SVM1-20HV



Dimensions shown in mm (in).

#### $\beta$ i Series Servo Amplifiers Electrical Specifications


Model		$\beta$ SVM1-40i	$\beta$ SVM1-10HV <i></i>	$\beta$ SVM1-20HV <i></i>
Rated output current (rms amps)		12	3.1	5.6
Current limit (Peak amps)		40	10	20
AC Power	1-phase	220-240 VAC, 50/60 Hz $\pm$ 2 Hz	n/a	n/a
	3-phase	200-240 VAC, 50/60 Hz $\pm$ 2 Hz	400-480 VAC	400-480 VAC
DC Control Power (per amplifier)		24 VDC $\pm$ 10% @ 0.9 Amp	24 VDC $\pm$ 10% @ 0.9 Amp	24 VDC $\pm$ 10% @ 0.9 Amp
Max. Heat loss (watts)		100	54	82
Regenerative discharge		50W	50W	50W
Maintenance Clearances:	Above and below amplifier	50 (1.97)	50 (1.97)	50 (1.97)
	Beside and between amplifiers	n/a	n/a	n/a

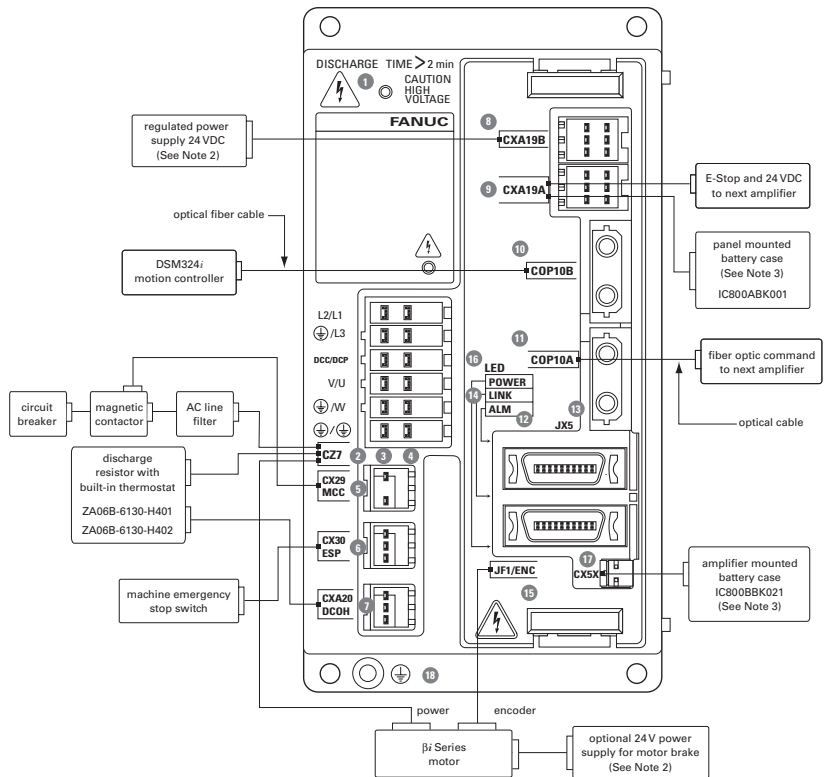
\*These values are standard values at 20°C with a tolerance of  $\pm$ 10%. The speed-torque characteristics vary depending on the parameter setting and input voltage of the digital servo amplifiers. (The above figures show average values.) These values may be changed without prior notice.

### βi Series Servo Amplifiers

#### βSVM1-20i Connection Diagram

##### Connector Location

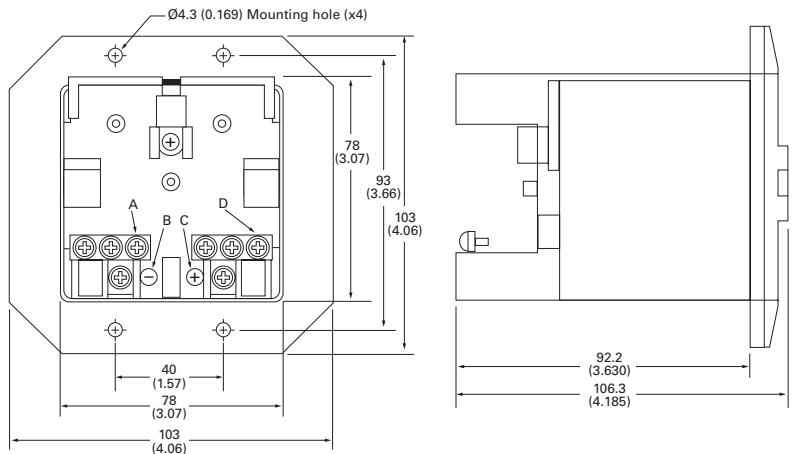
No.	Name	Remarks
1		DC link charge LED
2	CZ7-1	Main power input connector
3	CZ7-2	Discharge resistor connector
4	CZ7-3	Motor power connector
5	CX29	Connector for main power MCC control signal
6	CX30	E-Stop signal connector
7	CXA20	Regenerative resistor overtemperature switch connector
8	CXA19B	24 VDC power input
9	CXA19A	24 VDC power input
10	COP10B	Fiber optic servo command input
11	COP10A	Fiber optic servo command output
12	ALM	Servo alarm status LED
13	JX5	Reserved
14	LINK	Fiber optic link status LED
15	JF1	Serial Encoder Feedback
16	POWER	Control power status display LED
17	CX5X	Absolute encoder battery
18		Tapped hole for grounding the amplifier



##### IC800ABK001 Encoder Battery Kit Dimensions

###### Key:

- A 3-M3 negative terminals
- B Negative terminal indication
- C Positive terminal indication
- D 3-M3 positive terminals
- E 4-Ø4.3 (0.169) mounting holes



IC800ABK001 Absolute encoder battery pack

##### Notes:

- Always install the circuit breakers, magnetic contactor, and AC line filter.
- Use a regulated 24 VDC power supply for the amplifier. 24 VDC power supply for the amplifier and power supply for the motor brake cannot be shared.
- The IC800ABK001 encoder battery pack mounts separately on the panel and can power up to 4 axes. Alternatively, the IC800BBK021 1-axis lithium battery can be snapped onto each amplifier.

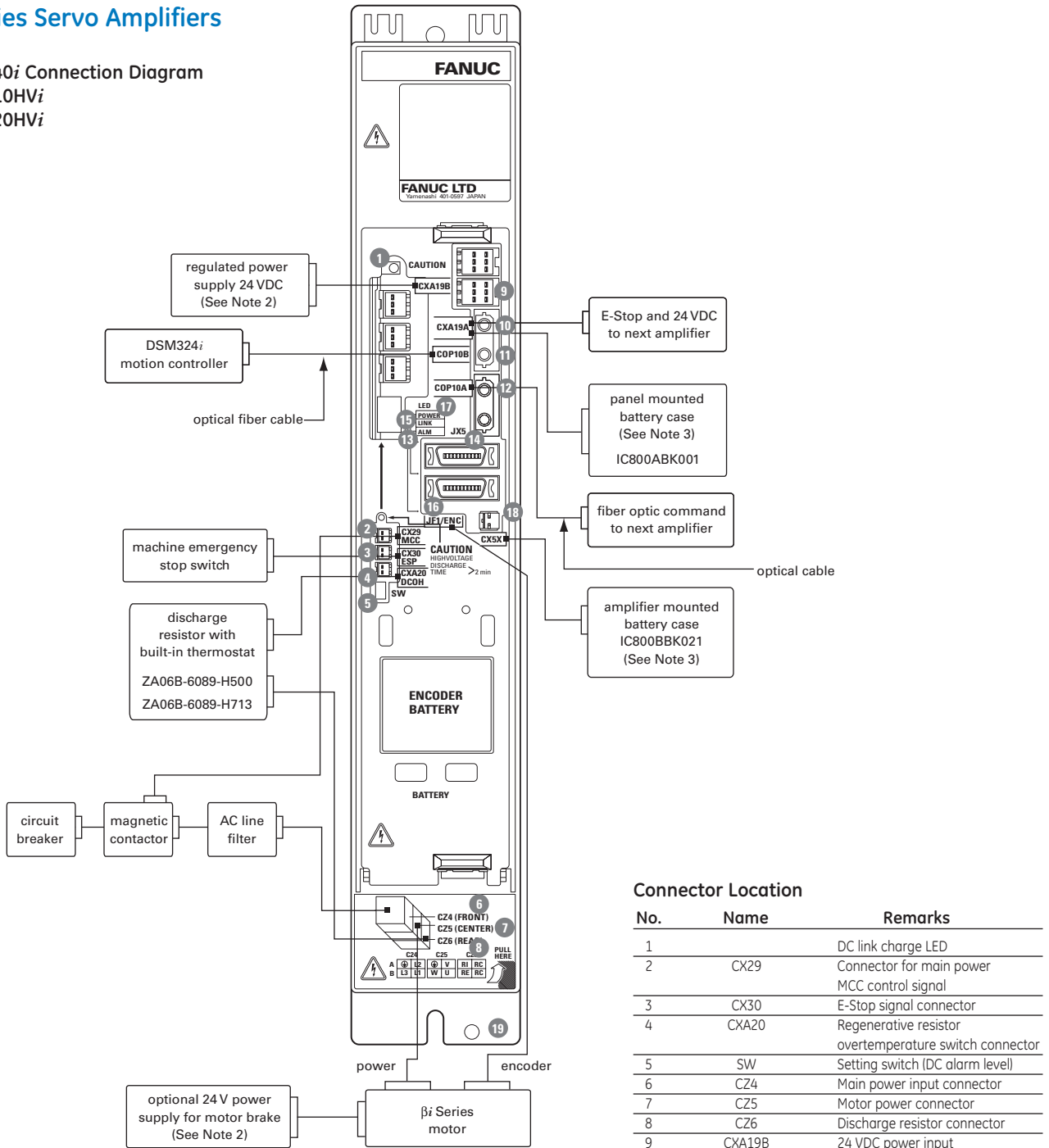
Servo Amplifiers

**βi Series Servo Amplifiers**

βSVM1-40i Connection Diagram

βSVM1-10HV*i*

βSVM1-20HV*i*



**Notes:**

1. Always install the circuit breakers, magnetic contactor, and AC line filter.
2. Use a regulated 24 VDC power supply for the amplifier. 24 VDC power supply for the amplifier and power supply for the motor brake cannot be shared.
3. The IC800ABK001 encoder battery pack mounts separately on the panel and can power up to 4 axes. Alternatively, the IC800BBK021 1-axis lithium battery can be snapped onto each amplifier.

**Connector Location**

No.	Name	Remarks
1		DC link charge LED
2	CX29	Connector for main power MCC control signal
3	CX30	E-Stop signal connector
4	CXA20	Regenerative resistor overtemperature switch connector
5	SW	Setting switch (DC alarm level)
6	CZ4	Main power input connector
7	CZ5	Motor power connector
8	CZ6	Discharge resistor connector
9	CXA19B	24 VDC power input
10	CXA19A	24 VDC power input
11	COP10B	Fiber optic servo command input
12	COP10A	Fiber optic servo command output
13	ALM	Servo alarm status LED
14	JX5	Reserved
15	LINK	Fiber optic link status LED
16	JF1	Serial Encoder Feedback
17	POWER	Control power status display LED
18	CX5X	Absolute encoder battery
19		Tapped hole for grounding the amplifier

## Servo Amplifiers

### $\beta$ i Series Servo Amplifiers

#### Ordering Information

The  $\beta$ i series amplifiers can be ordered as individual components or as kits that include connectors, regenerative discharge resistor and spare fuses. The kit is recommended for new installation while spare parts, or replacement units, should use the amplifier only model number.

To place an order for a complete servo system, select the Servo Motor that meets your application requirements, then select the amplifier kit, cables or connectors (customer built cables) and accessories.

#### $\beta$ i and $\beta$ HVi Series Servo Amplifier Kits\*

Part Number	Qty.	Kit Contents
IC800BIK020 20 Amp $\beta$ i Series Amplifier Package	1	$\beta$ SVM1-20i Amplifier (ZA06B-6130-H002)
	1	20 W Regenerative Discharge Resistor (ZA06B-6130-H401)
	1	Spare 24 VDC Fuse (ZA06B-6073-K250)
	1	CZ7 Power Connector Kit (ZA06B-6130-K200)
	2	CXA19 24 VDC Connector Kit (ZA06B-6130-K201)
	1	CXA20 Regenerative Discharge Thermostat Connector Kit (ZA06B-6130-K202)
	1	CX29 MCC Connector Kit (ZA06B-6130-K203)
	1	CX30 E-Stop Connector Kit (ZA06B-6130-K204)
	IC800BIK040 40 Amp $\beta$ i Series Amplifier Package	1
1		Spare 24 VDC Fuse (ZA06B-6073-K250)
1		CZ4 Power Connector Kit (ZA06B-6110-K200#XXS)
1		CZ5 Motor Power Connector Kit (ZA06B-6110-K202#YYs)
1		CZ6 Regenerative Discharge Resistor Connector Kit (ZA06B-6110-K201#XYM)
2		CXA19 24 VDC Connector Kit (ZA06B-6130-K201)
1		CXA20 Regenerative Resistor Thermostat Connector Kit (ZA06B-6130-K202)
1		CX29 MCC Connector Kit (ZA06B-6130-K203)
1		CX30 E-Stop Connector Kit (ZA06B-6130-K204)
IC800BIHV010 10 Amp $\beta$ HVi Series Amplifier Package	1	$\beta$ SVM1-10HVi Amplifier (ZA06B-6131-H001)
	1	Spare 24 VDC Fuse (ZA06B-6073-K250)
	1	CZ4 Power Connector Kit (ZA06B-6110-K200#XXS)
	1	CZ5 Motor Power Connector Kit (ZA06B-6110-K202#YYs)
	1	CZ6 Regenerative Discharge Resistor Connector Kit (ZA06B-6110-K201#XYM)
	2	CXA19 24 VDC Connector Kit (ZA06B-6130-K201)
	1	CXA20 Regenerative Resistor Thermostat Connector Kit (ZA06B-6130-K202)
	1	CX29 MCC Connector Kit (ZA06B-6130-K203)
	1	CX30 E-Stop Connector Kit (ZA06B-6130-K204)
IC800BIHV020 20 Amp $\beta$ HVi Series Amplifier Package	1	$\beta$ SVM1-20HVi Amplifier (ZA06B-6131-H002)
	1	Spare 24 VDC Fuse (ZA06B-6073-K250)
	1	CZ4 Power Connector Kit (ZA06B-6110-K200#XXS)
	1	CZ5 Motor Power Connector Kit (ZA06B-6110-K202#YYs)
	1	CZ6 Regenerative Discharge Resistor Connector Kit (ZA06B-6110-K201#XYM)
	2	CXA19 24 VDC Connector Kit (ZA06B-6130-K201)
	1	CXA20 Regenerative Resistor Thermostat Connector Kit (ZA06B-6130-K202)
	1	CX29 MCC Connector Kit (ZA06B-6130-K203)
	1	CX30 E-Stop Connector Kit (ZA06B-6130-K204)
IC800BIHV040 40 Amp $\beta$ HVi Series Amplifier Package	1	$\beta$ SVM1-40HVi Amplifier (ZA06B-6131-H003)
	1	Spare 24 VDC Fuse (ZA06B-6073-K250)
	1	CZ4 Power Connector Kit (ZA06B-6110-K200#XXS)
	1	CZ5 Motor Power Connector Kit (ZA06B-6110-K202#YYs)
	1	CZ6 Regenerative Discharge Resistor Connector Kit (ZA06B-6110-K201#XYM)
	2	24 VDC Connector Kit (ZA06B-6130-K201 CXA19)
	1	CXA20 Regenerative Resistor Thermostat Connector Kit (ZA06B-6130-K202)
	1	CX29 MCC Connector Kit (ZA06B-6130-K203)
	1	CX30 Estop Connector Kit (ZA06B-6130-K204)
1	Amplifier cooling fan kit (ZA06B-6134-K002)	

\*Amplifier kits provide all of the required amplifier components for complete installation; we strongly encourage kits be ordered for new systems. Separate amplifiers are available for spare or replacement units.

\*\*See dimensions of battery pack on page 76

**Holding Brake:** For system designs which include a vertical axis that must hold its position when power is removed, a motor holding brake option is available. User supplied 24VDC power is required. To connect to the power, a separate brake cable is required on all motors except  $\beta$ 2is,  $\beta$ 4is,  $\beta$ 2HVis and  $\beta$ 4HVis models.

**Encoder Battery Kit:** All  $\beta$ is Series Servo motors feature a built-in serial encoder that can be used in either incremental or absolute mode. In order to utilize the absolute capability, an optional encoder battery pack must be installed. This pack allows the encoder's position information to be retained so that the machine does not need to be referenced to a home position every time power is restored to the system.

The 1-axis battery pack includes a small lithium battery and case which snaps on the amplifier unit. The 4-axis battery pack is panel mounted and uses standard D-cell batteries.

#### Battery Kits

Part Number	Qty.	Kit Contents
IC800BK021	1	Lithium Battery (ZA06B-6093-K001)
1-Axis $\beta$ i	1	Battery Holder (ZA06B-6093-K002)
Battery Kit		
IC800ABK001	4	D-Cell Alkaline Battery (ZA98L-0031-0005)
4-Axis D-Cell		
Panel Mounted	1	Panel Mounted Battery Pack (ZA06B-6050-K060)**
Battery Pack		
IC800ABK002	1	Lithium Battery (ZA06B-6114-K504)
1-Axis $\alpha$ HVi	1	Battery Holder (ZA06B-6114-K505)
Battery Kit		
IC800ABK003	1	Lithium Battery (ZA06B-6114-K504)
1-Axis $\alpha$ HVi	1	Battery Holder (ZA06B-6114-K506)
Battery Kit for $\alpha$ SVM-180HVi		
Amplifier		

## Servo Amplifiers

### βHVi Series Servo Amplifier and βHVIs Series Servo Motor

#### Ordering Information

Model Number	β2/4000HVIs	β4/4000HVIs	β8/3000HVIs	β12/3000HVIs	β22/2000HVIs
Servo Motor	ZA06B-0062-B203	ZA06B-0064-B203	ZA06B-0076-B203	ZA06B-0079-B203	ZA06B-0086-B203
Servo Motor w/ Holding Brake	ZA06B-0062-B503	ZA06B-0064-B503	ZA06B-0076-B503	ZA06B-0079-B503	ZA06B-0086-B503
Amplifier Kit	IC800BIHV010	IC800BIHV010	IC800BIHV010	IC800BIHV020	IC800BIHV020
Amplifier Only	ZA06B-6131-H001	ZA06B-6131-H001	ZA06B-6131-H001	ZA06B-6131-H002	ZA06B-6131-H002

#### Cables and Accessories Ordering Information

Model Number	β2/4000HVIs		β4/4000HVIs		β8/3000HVIs		β12/3000HVIs		β22/2000HVIs	
Power Cable	7 M	CP2I-OWPB-0070-AZ	CP2I-OWPB-0070-AZ	CP2I-OWPB-0070-AZ	CP3I-OWPB-0070-AZ	CP3I-OWPB-0070-AZ	CP3I-OWPB-0070-AZ	CP3I-OWPB-0070-AZ	CP4I-OWPB-0070-AZ	CP4I-OWPB-0070-AZ
	14 M	CP2I-OWPB-0140-AZ	CP2I-OWPB-0140-AZ	CP2I-OWPB-0140-AZ	CP3I-OWPB-0140-AZ	CP3I-OWPB-0140-AZ	CP3I-OWPB-0140-AZ	CP3I-OWPB-0140-AZ	CP4I-OWPB-0140-AZ	CP4I-OWPB-0140-AZ
Power Cable (Shielded)	7 M	CP2I-OWEB-0070-AZ	CP2I-OWEB-0070-AZ	CP2I-OWEB-0070-AZ	CP3I-OWEB-0070-AZ	CP3I-OWEB-0070-AZ	CP3I-OWEB-0070-AZ	CP3I-OWEB-0070-AZ	CP4I-OWEB-0070-AZ	CP4I-OWEB-0070-AZ
	14 M	CP2I-OWEB-0140-AZ	CP2I-OWEB-0140-AZ	CP2I-OWEB-0140-AZ	CP3I-OWEB-0140-AZ	CP3I-OWEB-0140-AZ	CP3I-OWEB-0140-AZ	CP3I-OWEB-0140-AZ	CP4I-OWEB-0140-AZ	CP4I-OWEB-0140-AZ
Feedback Cable (Right Angle Motor Connector)	7 M	CFDA-7WPB-0070-AZ	CFDA-7WPB-0070-AZ	CFDA-7WPB-0070-AZ	CFDA-7WPB-0070-AZ	CFDA-7WPB-0070-AZ	CFDA-7WPB-0070-AZ	CFDA-7WPB-0070-AZ	CFDA-7WPB-0070-AZ	CFDA-7WPB-0070-AZ
	14 M	CFDA-7WPB-0140-AZ	CFDA-7WPB-0140-AZ	CFDA-7WPB-0140-AZ	CFDA-7WPB-0140-AZ	CFDA-7WPB-0140-AZ	CFDA-7WPB-0140-AZ	CFDA-7WPB-0140-AZ	CFDA-7WPB-0140-AZ	CFDA-7WPB-0140-AZ
Feedback Cable (Straight Motor Connector)	7 M	CFDA-0WPB-0070-AZ	CFDA-0WPB-0070-AZ	CFDA-0WPB-0070-AZ	CFDA-0WPB-0070-AZ	CFDA-0WPB-0070-AZ	CFDA-0WPB-0070-AZ	CFDA-0WPB-0070-AZ	CFDA-0WPB-0070-AZ	CFDA-0WPB-0070-AZ
	14 M	CFDA-0WPB-0140-AZ	CFDA-0WPB-0140-AZ	CFDA-0WPB-0140-AZ	CFDA-0WPB-0140-AZ	CFDA-0WPB-0140-AZ	CFDA-0WPB-0140-AZ	CFDA-0WPB-0140-AZ	CFDA-0WPB-0140-AZ	CFDA-0WPB-0140-AZ
Holding Brake Power Cable	7 M	Integrated with Power Cable	Integrated with Power Cable	CB4N-OWPM-0070-AZ	CB4N-OWPM-0070-AZ	CB4N-OWPM-0070-AZ	CB4N-OWPM-0070-AZ	CB4N-OWPM-0070-AZ	CB4N-OWPM-0070-AZ	CB4N-OWPM-0070-AZ
	14 M			CB4N-OWPM-0140-AZ	CB4N-OWPM-0140-AZ	CB4N-OWPM-0140-AZ	CB4N-OWPM-0140-AZ	CB4N-OWPM-0140-AZ	CB4N-OWPM-0140-AZ	CB4N-OWPM-0140-AZ
External Regen Resistors		ZA06B-6130-H403	ZA06B-6130-H403	ZA06B-6130-H403	ZA06B-6130-H403	ZA06B-6130-H403	ZA06B-6130-H403	ZA06B-6130-H403	ZA06B-6130-H403	ZA06B-6130-H403
CZ4 Power Connector Kit		ZA06B-6110-K200#XXS	ZA06B-6110-K200#XXS	ZA06B-6110-K200#XXS	ZA06B-6110-K200#XXS	ZA06B-6110-K200#XXS	ZA06B-6110-K200#XXS	ZA06B-6110-K200#XXS	ZA06B-6110-K200#XXS	ZA06B-6110-K200#XXS
CZ5 Motor Power Connector Kit		ZA06B-6110-K202#YYS	ZA06B-6110-K202#YYS	ZA06B-6110-K202#YYS	ZA06B-6110-K202#YYS	ZA06B-6110-K202#YYS	ZA06B-6110-K202#YYS	ZA06B-6110-K202#YYS	ZA06B-6110-K202#YYS	ZA06B-6110-K202#YYS
CZ6 Regen Resistor Thermostat Connector Kit		ZA06B-6110-K201#XYM	ZA06B-6110-K201#XYM	ZA06B-6110-K201#XYM	ZA06B-6110-K201#XYM	ZA06B-6110-K201#XYM	ZA06B-6110-K201#XYM	ZA06B-6110-K201#XYM	ZA06B-6110-K201#XYM	ZA06B-6110-K201#XYM
CXA19 Connector Kit		ZA06B-6130-K201	ZA06B-6130-K201	ZA06B-6130-K201	ZA06B-6130-K201	ZA06B-6130-K201	ZA06B-6130-K201	ZA06B-6130-K201	ZA06B-6130-K201	ZA06B-6130-K201
CXA20 Regen Thermostat Connector Kit		ZA06B-6130-K202	ZA06B-6130-K202	ZA06B-6130-K202	ZA06B-6130-K202	ZA06B-6130-K202	ZA06B-6130-K202	ZA06B-6130-K202	ZA06B-6130-K202	ZA06B-6130-K202
CX29 MCC Connector Kit		ZA06B-6130-K203	ZA06B-6130-K203	ZA06B-6130-K203	ZA06B-6130-K203	ZA06B-6130-K203	ZA06B-6130-K203	ZA06B-6130-K203	ZA06B-6130-K203	ZA06B-6130-K203
CX30 Estop Input Connector Kit		ZA06B-6130-K204	ZA06B-6130-K204	ZA06B-6130-K204	ZA06B-6130-K204	ZA06B-6130-K204	ZA06B-6130-K204	ZA06B-6130-K204	ZA06B-6130-K204	ZA06B-6130-K204
Motor Feedback Connector Kit	90 Deg	ZA06B-6114-K204#E	ZA06B-6114-K204#E	ZA06B-6114-K204#E	ZA06B-6114-K204#E	ZA06B-6114-K204#E	ZA06B-6114-K204#E	ZA06B-6114-K204#E	ZA06B-6114-K204#E	ZA06B-6114-K204#E
	Straight	ZA06B-6114-K204#S	ZA06B-6114-K204#S	ZA06B-6114-K204#S	ZA06B-6114-K204#S	ZA06B-6114-K204#S	ZA06B-6114-K204#S	ZA06B-6114-K204#S	ZA06B-6114-K204#S	ZA06B-6114-K204#S
Motor Half Key <sup>(Note 2)</sup>		Z44A730465-001	Z44A730465-016	Z44A730465-002	Z44A730465-015	Z44A730465-003	Z44A730465-015	Z44A730465-003	Z44A730465-015	Z44A730465-003
Motor Power/Brake Connector Kit	90 Deg	ZA06B-6114-K220#E	ZA06B-6114-K220#E	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Straight	ZA06B-6114-K220#S	ZA06B-6114-K220#S	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Motor Power Connector Kit	90 Deg	N/A	N/A	Z44A730464-G18	Z44A730464-G18	Z44A730464-G20	Z44A730464-G18	Z44A730464-G20	Z44A730464-G18	Z44A730464-G20
	Straight	N/A	N/A	Z44A730464-G17	Z44A730464-G17	Z44A730464-G19	Z44A730464-G17	Z44A730464-G19	Z44A730464-G17	Z44A730464-G19
Motor Brake Connector Kit	90 Deg	N/A	N/A	ZA06B-6114-K213#E	ZA06B-6114-K213#E	ZA06B-6114-K213#E	ZA06B-6114-K213#E	ZA06B-6114-K213#E	ZA06B-6114-K213#E	ZA06B-6114-K213#E
	Straight	N/A	N/A	ZA06B-6114-K213#S	ZA06B-6114-K213#S	ZA06B-6114-K213#S	ZA06B-6114-K213#S	ZA06B-6114-K213#S	ZA06B-6114-K213#S	ZA06B-6114-K213#S
Spare Control Power Fuse		ZA06B-6073-K250								
Encoder Battery Kits	1 axis	IC800BBK021 <sup>(Note 1)</sup>								
	4 axis	IC800ABK001 <sup>(Note 1)</sup>								
Fiber optic Command Cable	15 cm	ZA66L-6001-0023#L150R0								
	1 M	ZA66L-6001-0023#L1R003								
	2 M	ZA66L-6001-0023#L2R003								
	3 M	ZA66L-6001-0023#L3R003								
Sheathed Fiber optic Cable	1 M	ZA66L-6001-0026#L1R003								
	5 M	ZA66L-6001-0026#L5R003								
	10 M	ZA66L-6001-0026#L10R03								
	20 M	ZA66L-6001-0026#L20R03								
	100 M	ZA66L-6001-0026#L100R3								
Feedback Connector (JF1)		ZA06B-6073-K214								
AC Line Filter	5.4 kW	ZA81L-0001-0168								
	10.5 kW	ZA81L-0001-0169								
Replacement Encoder Battery		ZA06B-6093-K001 (IC800BBK021 kit); ZA98L-0031-0005 (IC800ABK001 kit)								

1) The IC800ABPK001 panel mounted encoder battery pack requires CXA19 connector kit for user supplied cable. Uses 4 D-cell batteries. See breakdown of kit contents in the Ordering Information section.

2) Half Keys are used to fill the motor shaft Keyway when a compression type coupling is used in order to preserve the rotational balance of the motor.



## Servo Amplifiers

### βi Series Servo Amplifier and βi Series Servo Motor

#### Ordering Information

Model Number	β0.4/5000is	β0.5/6000is	β1/6000is	β2/4000is
Servo Motor	ZA06B-0114-B203	ZA06B-0115-B203	ZA06B-0116-B203	ZA06B-0061-B203
Servo Motor w/ Holding Brake	ZA06B-0114-B503	ZA06B-0115-B503	ZA06B-0116-B503	ZA06B-0061-B503
Amplifier Kit	IC800BIK020	IC800BIK020	IC800BIK020	IC800BIK020
Amplifier Only	ZA06B-6130-H002	ZA06B-6130-H002	ZA06B-6130-H002	ZA06B-6130-H002
Amplifier Fan Kit <sup>(Note 1)</sup>	N/A	N/A	N/A	N/A

#### Cables and Accessories Ordering Information

Model Number		β0.4/5000is	β0.5/6000is	β1/6000is	β2/4000is
Power Cable	7 M	CP8B-1WPB-0070-AZ	CP8B-1WPB-0070-AZ	CP8B-1WPB-0070-AZ	CP9B-0WPB-0070-AZ
	14 M	CP8B-1WPB-0140-AZ	CP8B-1WPB-0140-AZ	CP8B-1WPB-0140-AZ	CP9B-0WPB-0140-AZ
Power Cable (Shielded)	7 M	CP8B-1WEB-0070-AZ	CP8B-1WEB-0070-AZ	CP8B-1WEB-0070-AZ	CP9B-0WEB-0070-AZ
	14 M	CP8B-1WEB-0140-AZ	CP8B-1WEB-0140-AZ	CP8B-1WEB-0140-AZ	CP9B-0WEB-0140-AZ
Feedback Cable (Right Angle motor connector)	7 M	CFDA-7WPB-0070-AZ	CFDA-7WPB-0070-AZ	CFDA-7WPB-0070-AZ	CFDA-7WPB-0070-AZ
	14 M	CFDA-7WPB-0140-AZ	CFDA-7WPB-0140-AZ	CFDA-7WPB-0140-AZ	CFDA-7WPB-0140-AZ
Feedback Cable (Straight motor connector)	7 M	CFDA-0WPB-0070-AZ	CFDA-0WPB-0070-AZ	CFDA-0WPB-0070-AZ	CFDA-0WPB-0070-AZ
	14 M	CFDA-0WPB-0140-AZ	CFDA-0WPB-0140-AZ	CFDA-0WPB-0140-AZ	CFDA-0WPB-0140-AZ
Holding Brake Power Cable	7 M	CB6N-5WPM-0070-AZ	CB6N-5WPM-0070-AZ	CB6N-5WPM-0070-AZ	Integrated with Power Cable
	14 M	CB6N-5WPM-0140-AZ	CB6N-5WPM-0140-AZ	CB6N-5WPM-0140-AZ	Integrated with Power Cable
External Regen Resistors	20 W	ZA06B-6130-H401	ZA06B-6130-H401	ZA06B-6130-H401	ZA06B-6130-H401
	100 W	ZA06B-6130-H402	ZA06B-6130-H402	ZA06B-6130-H402	ZA06B-6130-H402
	200 W	N/A	N/A	N/A	N/A
	800 W	N/A	N/A	N/A	N/A
CZ7 Power Connector Kit		ZA06B-6130-K200	ZA06B-6130-K200	ZA06B-6130-K200	ZA06B-6130-K200
CZ4 Power Connector Kit		N/A	N/A	N/A	N/A
CZ5 Motor Power Connector Kit		N/A	N/A	N/A	N/A
CZ6 Regen Resistor Thermostat Connector Kit		N/A	N/A	N/A	N/A
CXA19 24 VDC Connector Kit		ZA06B-6130-K201	ZA06B-6130-K201	ZA06B-6130-K201	ZA06B-6130-K201
CXA20 Regen Thermostat Connector Kit		ZA06B-6130-K202	ZA06B-6130-K202	ZA06B-6130-K202	ZA06B-6130-K202
CX29 MCC Connector Kit		ZA06B-6130-K203	ZA06B-6130-K203	ZA06B-6130-K203	ZA06B-6130-K203
CX30 E-Stop Input Connector Kit		ZA06B-6130-K204	ZA06B-6130-K204	ZA06B-6130-K204	ZA06B-6130-K204
Motor Feedback Connector Kit	90 Deg	ZA06B-6114-K204#E	ZA06B-6114-K204#E	ZA06B-6114-K204#E	ZA06B-6114-K204#E
	Straight	ZA06B-6114-K204#S	ZA06B-6114-K204#S	ZA06B-6114-K204#S	ZA06B-6114-K204#S
Motor Half Key <sup>(Note 3)</sup>		Z44A730465-013	Z44A730465-013	Z44A730465-011	Z44A730465-001
Motor Power/Brake Connector Kit	90 Deg	N/A	N/A	N/A	ZA06B-6114-K220#E
	Straight	N/A	N/A	N/A	ZA06B-6114-K220#S
Motor Power Connector Kit	90 Deg	ZA06B-6114-K230#E	ZA06B-6114-K230#E	ZA06B-6114-K230#E	N/A
	Straight	ZA06B-6114-K230#S	ZA06B-6114-K230#S	ZA06B-6114-K230#S	N/A
Motor Brake Power Connector Kit	90 Deg	ZA06B-6114-K232#E	ZA06B-6114-K232#E	ZA06B-6114-K232#E	N/A
	Straight	ZA06B-6114-K232#S	ZA06B-6114-K232#S	ZA06B-6114-K232#S	N/A
Spare Amplifier Control Power Fuse		ZA06B-6073-K250			
Encoder Battery Kits	1 axis	IC800BBK021 <sup>(Note 2)</sup>			
	4 axis	IC800ABK001 <sup>(Note 2)</sup>			
Fiberoptic Command Cable	15 cm	ZA66L-6001-0023#L150R0			
	1 M	ZA66L-6001-0023#L1R003			
	2 M	ZA66L-6001-0023#L2R003			
	3 M	ZA66L-6001-0023#L3R003			
Fiberoptic Command Cable (sheathed)	1 M	ZA66L-6001-0026#L1R003			
	5 M	ZA66L-6001-0026#L5R003			
	10 M	ZA66L-6001-0026#L10R03			
	20 M	ZA66L-6001-0026#L20R03			
	100 M	ZA66L-6001-0026#L100R3			
Amplifier Feedback Connector (JF1)		ZA06B-6073-K214			
AC Line Filter	5.4 kW	ZA81L-0001-0083#3C			
	10.5 kW	ZA81L-0001-0101#C			
Replacement Encoder Battery		ZA06B-6093-K001 (IC800BBK021 kit); ZA98L-0031-0005 (IC800ABK001 kit)			

1) Separate user installed cooling fan is only required for the βSVM1-20i amplifier and β8/3000i motor or when single phase supply is used with the β4/4000i motor

2) The IC800ABK001 panel mounted encoder battery pack requires CXA19 connector kit for user supplied cable. Uses 4 D-cell batteries. See breakdown of kit contents in the Ordering Information section.

3) Half Keys are used to fill the motor shaft Keyway when a compression type coupling is used in order to preserve the rotational balance of the motor.

## Servo Amplifiers

### βi Series Servo Amplifier and βi Series Servo Motor

#### Ordering Information

Model Number	β4/4000is	β8/3000is	β12/3000is	β22/2000is
Servo Motor	ZA06B-0063-B203	ZA06B-0075-B203	ZA06B-0078-B203	ZA06B-0085-B203
Servo Motor w/ Holding Brake	ZA06B-0063-B503	ZA06B-0075-B503	ZA06B-0078-B503	ZA06B-0085-B503
Amplifier Kit	IC800BIK020	IC800BIK020	IC800BIK040	IC800BIK040
Amplifier Only	ZA06B-6130-H002	ZA06B-6130-H002	ZA06B-6130-H003	ZA06B-6130-H003
Amplifier Fan Kit <sup>(Note 1)</sup>	ZA06B-6134-K003	ZA06B-6134-K003	N/A	N/A

#### Cables and Accessories Ordering Information

Model Number		β4/4000is	β8/3000is	β12/3000is	β22/2000is
Power Cable	7 M	CP9B-0WPB-0070-AZ	CP3B-0WPB-0070-AZ	CP5B-0WPB-0070-AZ	CP6B-0WPB-0070-AZ
	14 M	CP9B-0WPB-0140-AZ	CP3B-0WPB-0140-AZ	CP5B-0WPB-0140-AZ	CP6B-0WPB-0140-AZ
Power Cable (Shielded)	7 M	CP9B-0WEB-0070-AZ	CP3B-0WEB-0070-AZ	CP5B-0WEB-0070-AZ	CP6B-0WEB-0070-AZ
	14 M	CP9B-0WEB-0140-AZ	CP3B-0WEB-0140-AZ	CP5B-0WEB-0140-AZ	CP6B-0WEB-0140-AZ
Feedback Cable (Right Angle motor connector)	7 M	CFDA-7WPB-0070-AZ	CFDA-7WPB-0070-AZ	CFDA-7WPB-0070-AZ	CFDA-7WPB-0070-AZ
	14 M	CFDA-7WPB-0140-AZ	CFDA-7WPB-0140-AZ	CFDA-7WPB-0140-AZ	CFDA-7WPB-0140-AZ
Feedback Cable (Straight motor connector)	7 M	CFDA-0WPB-0070-AZ	CFDA-0WPB-0070-AZ	CFDA-0WPB-0070-AZ	CFDA-0WPB-0070-AZ
	14 M	CFDA-0WPB-0140-AZ	CFDA-0WPB-0140-AZ	CFDA-0WPB-0140-AZ	CFDA-0WPB-0140-AZ
Holding Brake Power Cable	7 M	Integrated with Power Cable	CB4N-0WPM-0070-AZ	CB4N-0WPM-0070-AZ	CB4N-0WPM-0070-AZ
	14 M	Integrated with Power Cable	CB4N-0WPM-0140-AZ	CB4N-0WPM-0140-AZ	CB4N-0WPM-0140-AZ
External Regen Resistors	20 W	ZA06B-6130-H401	ZA06B-6130-H401	N/A	N/A
	100 W	ZA06B-6130-H402	ZA06B-6130-H402	N/A	N/A
	200 W	N/A	N/A	ZA06B-6089-H500	ZA06B-6089-H500
	800 W	N/A	N/A	ZA06B-6089-H713	ZA06B-6089-H713
CZ7 Power Connector Kit		ZA06B-6130-K200	ZA06B-6130-K200	N/A	N/A
CZ4 Power Connector Kit		N/A	N/A	ZA06B-6110-K200#XXS	ZA06B-6110-K200#XXS
CZ5 Motor Power Connector Kit		N/A	N/A	ZA06B-6110-K202#YYs	ZA06B-6110-K202#YYs
CZ6 Regen Resistor Thermostat Connector Kit		N/A	N/A	ZA06B-6110-K201#XYM	ZA06B-6110-K201#XYM
CXA19 24 VDC Connector Kit		ZA06B-6130-K201	ZA06B-6130-K201	ZA06B-6130-K201	ZA06B-6130-K201
CXA20 Regen Thermostat Connector Kit		ZA06B-6130-K202	ZA06B-6130-K202	ZA06B-6130-K202	ZA06B-6130-K202
CX29 MCC Connector Kit		ZA06B-6130-K203	ZA06B-6130-K203	ZA06B-6130-K203	ZA06B-6130-K203
CX30 E-Stop Input Connector Kit		ZA06B-6130-K204	ZA06B-6130-K204	ZA06B-6130-K204	ZA06B-6130-K204
Motor Feedback Connector Kit	90 Deg	ZA06B-6114-K204#E	ZA06B-6114-K204#E	ZA06B-6114-K204#E	ZA06B-6114-K204#E
	Straight	ZA06B-6114-K204#S	ZA06B-6114-K204#S	ZA06B-6114-K204#S	ZA06B-6114-K204#S
Motor Half Key <sup>(Note 3)</sup>		Z44A730465-016	Z44A730465-002	Z44A730465-015	Z44A730465-003
Motor Power/Brake Connector Kit	90 Deg	ZA06B-6114-K220#E	N/A	N/A	N/A
	Straight	ZA06B-6114-K220#S	N/A	N/A	N/A
Motor Power Connector Kit	90 Deg	N/A	Z44A730464-G18	Z44A730464-G18	Z44A730464-G20
	Straight	N/A	Z44A730464-G17	Z44A730464-G17	Z44A730464-G19
Motor Brake Power Connector Kit	90 Deg	N/A	ZA06B-6114-K213#E	ZA06B-6114-K213#E	ZA06B-6114-K213#E
	Straight	N/A	ZA06B-6114-K213#S	ZA06B-6114-K213#S	ZA06B-6114-K213#S
Spare Amplifier Control Power Fuse		ZA06B-6073-K250			
Encoder Battery Kits	1 axis	IC800BBK021 <sup>(Note 2)</sup>			
	4 axis	IC800ABK001 <sup>(Note 2)</sup>			
Fiberoptic Command Cable	15 cm	ZA66L-6001-0023#L150R0			
	1 M	ZA66L-6001-0023#L1R003			
	2 M	ZA66L-6001-0023#L2R003			
	3 M	ZA66L-6001-0023#L3R003			
Fiberoptic Command Cable (sheathed)	1 M	ZA66L-6001-0026#L1R003			
	5 M	ZA66L-6001-0026#L5R003			
	10 M	ZA66L-6001-0026#L10R03			
	20 M	ZA66L-6001-0026#L20R03			
	100 M	ZA66L-6001-0026#L100R3			
Amplifier Feedback Connector (JF1)		ZA06B-6073-K214			
AC Line Filter	5.4 kW	ZA81L-0001-0083#3C			
	10.5 kW	ZA81L-0001-0101#C			
Replacement Encoder Battery		ZA06B-6093-K001 (IC800BBK021 kit); ZA98L-0031-0005 (IC800ABK001 kit)			

1) Separate user installed cooling fan is only required for the βSVM1-20i amplifier and β8/3000is motor or when single phase supply is used with the β4/4000is motor

2) The IC800ABK001 panel mounted encoder battery pack requires CXA19 connector kit for user supplied cable. Uses 4 D-cell batteries. See breakdown of kit contents in the Ordering Information section.

3) Half Keys are used to fill the motor shaft Keyway when a compression type coupling is used in order to preserve the rotational balance of the motor.

## Servo Amplifiers

### S2K Series Servos

For systems using a DSM300 or third-party motion controller or where only speed or torque control are required, GE offers the S2K Servo Amplifiers. These brushless servos cover a wide torque range and offer high servo response to meet your most demanding application requirements. All S2K Series Amplifiers accept analog speed or torque commands in addition to pulse command input for stepper replacement systems.

#### Key Features:

- 2.7-477 in-lb (0.3-53.9 Nm) continuous stall torque range
- Auto tuning
- $\pm 10$  VDC analog torque/velocity command, pulse/direction or cw/ccw pulse command input
- 122  $\mu$ s servo loop update rate for fast servo response and improved accuracy
- UL, cUL (except IC800SSx407 models) and CE registration
- Resolver interface to MTR-Series motors
- Models available for 115, 230 and 460 VAC supply
- Electronic gearing mode with user defined ratio

#### Applications

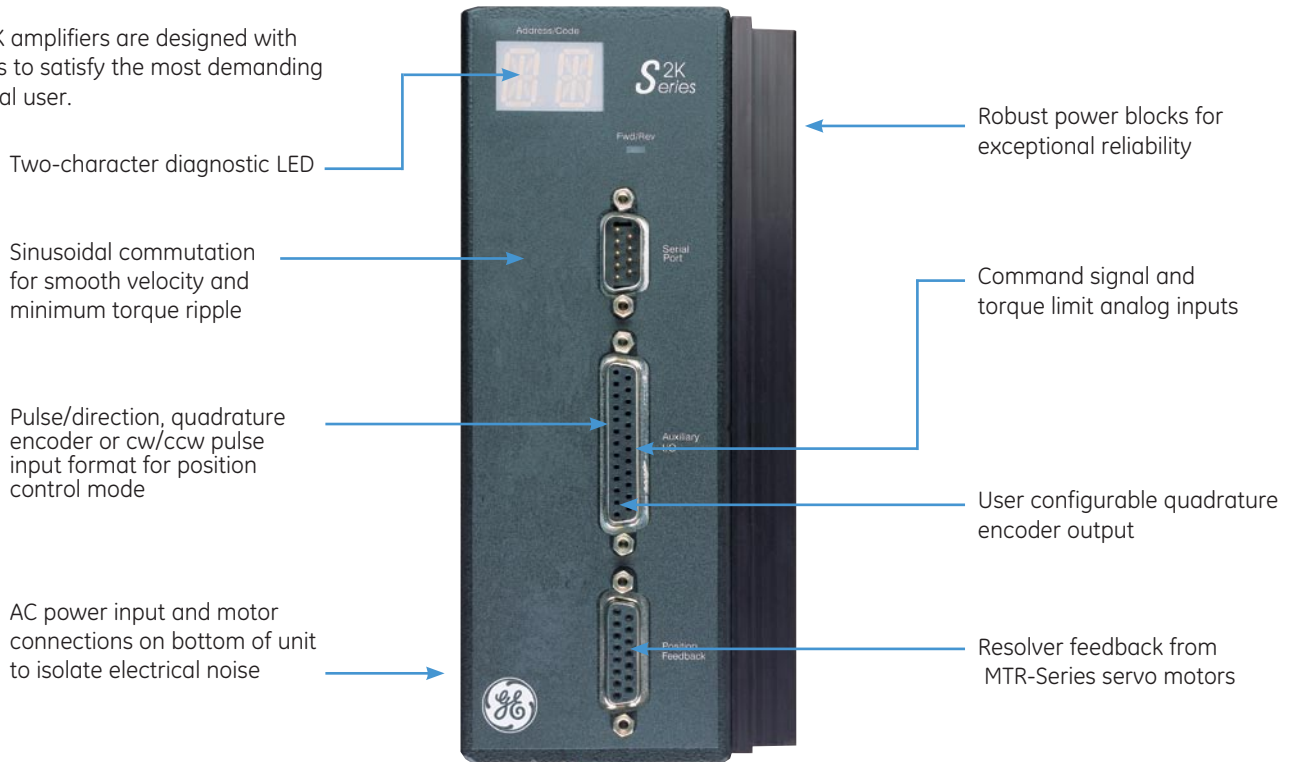
- Packaging machines
- Labeling machines
- Bag making machines
- Assembly
- Pick and place
- Flying cutoff
- Rotary tables
- Feed/cut to length
- Electronic line shafting
- Random infeed
- and many more



## Servo Amplifiers

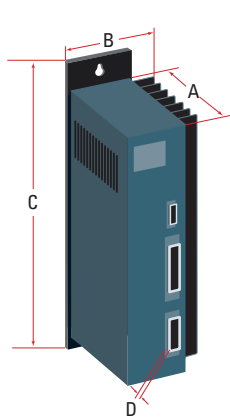
### S2K Series Servo Amplifiers

The S2K amplifiers are designed with features to satisfy the most demanding industrial user.

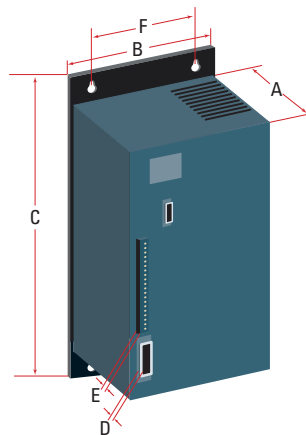


### Mechanical Dimensions

Dimension	Feature	SSD216				
		SSD104	SSD107	SSD228	SSD407	SSD420
n/a	Weight lb (kg)	3.6 (1.64)	6.5 (2.95)	13 (5.9)	6.0 (2.7)	14 (6.4)
A	Depth in (mm)	6.05 (153.7)	8.15 (207)	10.15 (258)	8.15 (207)	10.15 (258)
B	Width in (mm)	3.20 (81.3)	3.45 (87.6)	5.25 (133.4)	4.35 (110.5)	5.25 (133.4)
C	Height in (mm)	8.50 (215.9)	8.50 (215.9)	12.20 (309.9)	8.50 (215.9)	12.20 (309.9)
D	Position Feedback Connector Depth in (mm)	1.26 (32)	1.26 (32)	1.26 (32)	1.26 (32)	1.26 (32)
E	User I/O Connector Depth in (mm)	n/a	n/a	0.75 (19)	n/a	0.75 (19)
F	Center to center spacing between adjacent mounting holes	n/a	n/a	3.66 (92.96)	n/a	3.66 (92.96)



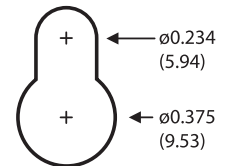
SSD104, SSD107, SSD407



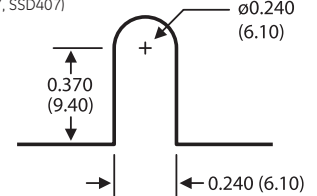
SSD216, SSD228, SSD420

### Mounting hole dimensions in (mm)

Top hole (all models)  
Bottom hole (SSD216, SSD228, SSD420)



Bottom hole (SSD104, SSD107, SSD407)



## Servo Amplifiers

### S2K Series Servo Amplifiers

#### Electrical Specifications

##### Power Specifications

Specifications	Units	SSD104	SSD107	SSD216	SSD228	SSD407	SSD420
AC Input Voltage Range	VAC	90-250, 1 or 3 phase		180-250, 3 phase		324-528, 3 phase	
AC Input Frequency Range	Hz	50-440					
PWM Frequency to Motor	kHz	16.4					
Min. Motor Inductance	mH	1 (per phase)					
Cont. Output Current	A <sub>rms</sub>	4.3	7.2	16	28	7.2	20
Peak Output Current	A <sub>rms</sub>	8.6	14.4	32	56	10.8	20
Max. Input Current 1-phase	A <sub>rms</sub>	7	15	n/a	n/a	n/a	n/a
3-phase	A <sub>rms</sub>	4	8	18	30	8	22
Max. Input Power	KVA @ Rated VAC	1.6	3.8	8.5	14.3	6.4	18
Logic Input Power	VAC	n/a	n/a	90-250 @ 0.5 A		+18-28.8 VDC @ 1.5 A	
DC Power Outputs	VDC	+5 @ 0.25 A; +12 @ 0.5 A					

##### Analog Command Inputs

Operating Range	±10 VDC
Resolution	12 Bits
Input Impedance	50 kΩ
Output Current	5 mA

##### Pulse Command/Auxiliary Encoder Input

Input Format	single-ended or differential; quadrature, pulse/direction or cw/ccw; square or sine wave
Input Voltage Range	+5 to +15 VDC
Line Count Frequency	3 MHz maximum
Pulse Frequency	12 MHz maximum with 4X multiplier

##### Differential Encoder Output\*

Output Format	differential; squarewave; quadrature, pulse/direction, cw/ccw pulse
Output Voltage	+5 VDC
Line Count Frequency	3 MHz maximum
Pulse Frequency	12 MHz maximum with 4X multiplier

##### Motor Resolver Feedback Input

Number Available	1
Resolution	4096 pulses per revolution
Maximum Speed	15,000 RPM
Type	Control Transmitter
Phase Shift	±5.0 degrees @ 5kHz
Null Voltage	< 20 mV @ 5kHz
Transformation Ratio	0.5

##### Analog Output

Operating Range	±10 VDC
Resolution	8 Bits
Input Impedance	50 kΩ
Output Current	5 mA

##### RS-232 Serial Communication

Available	1
Functions Supported	multipurpose programming port
Maximum Addressable Units	1
Communication Rate	9,600 baud
Maximum Distance of RS-232	50 feet
Flow Control	XON / XOFF

##### Environmental Specifications

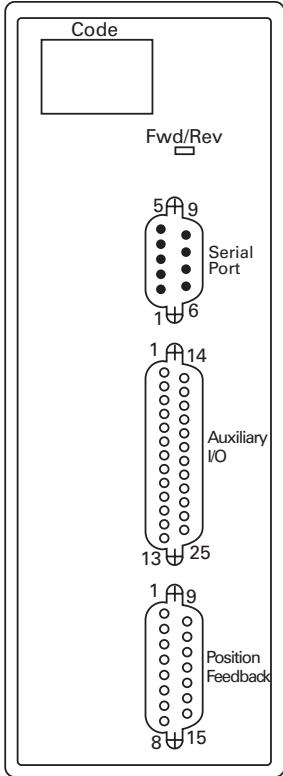
Operating Temperature, Free Air Ambient**	
SSD104, SSD105, SSD107	32 to 122°F (0 to 50°C)
SSD216, SSD228, SSD407, SSD420	32 to 104°F (0 to 40°C)
Storage and Shipping Temperature -40 to 176°F (-40 to 80°C)	
Enclosure Type	open

\*Encoder output provides a 1:1 buffer of the auxiliary encoder input. In servo systems, this output can be alternately configured as the motor position output with selectable resolution.  
 \*\*Assumes heatsink in vertical orientation.

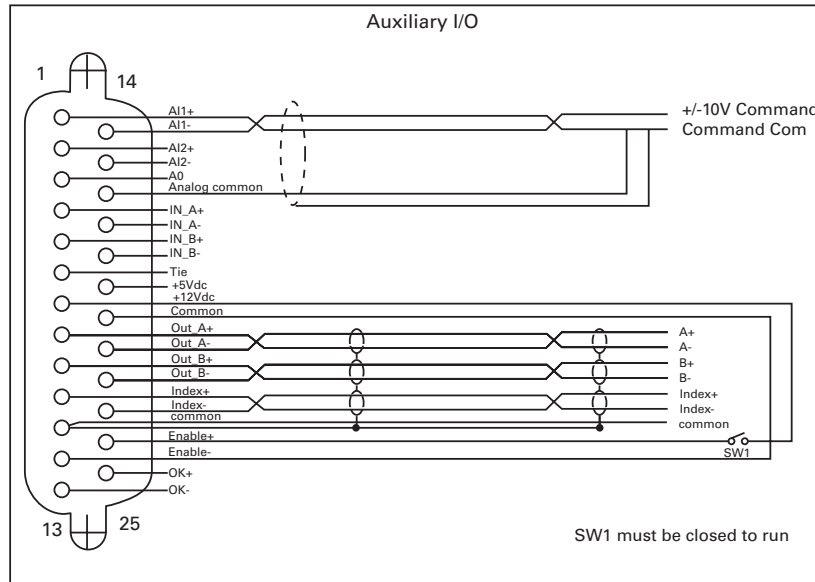
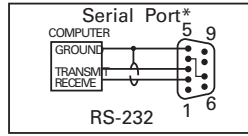
Servo Amplifiers

S2K Series Servo Amplifiers

Connection Diagrams  
S2K Model: SSD104



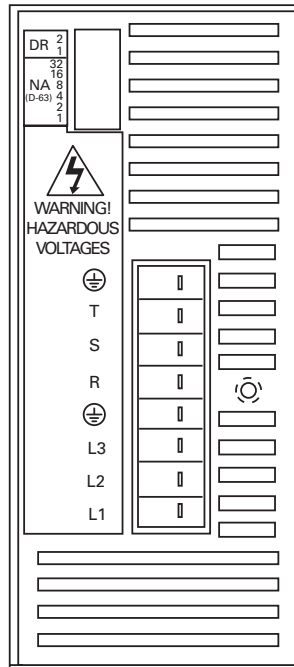
FRONT VIEW



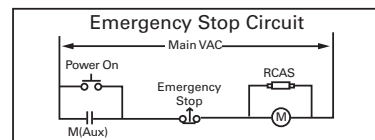
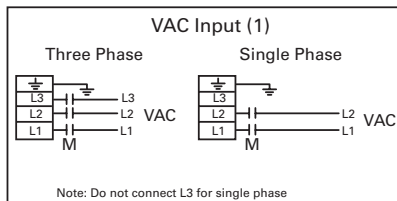
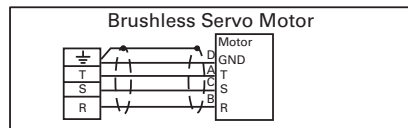
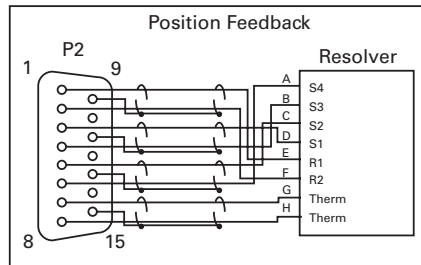
SW1 must be closed to run

**\*Note:**

The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.



BOTTOM VIEW

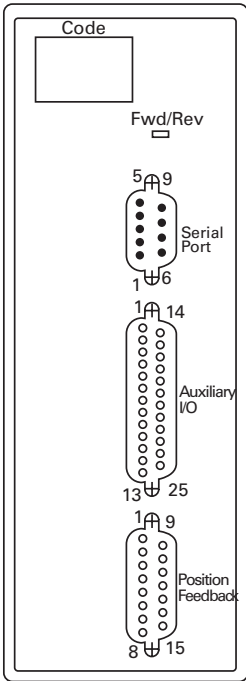


**REMARKS:**

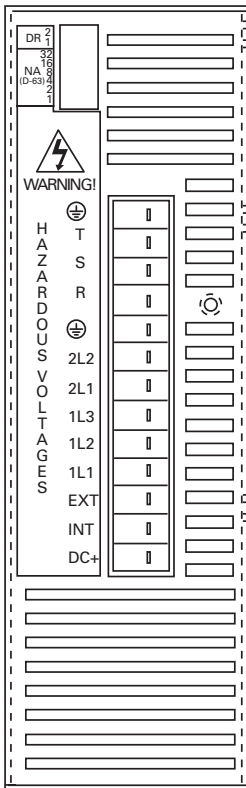
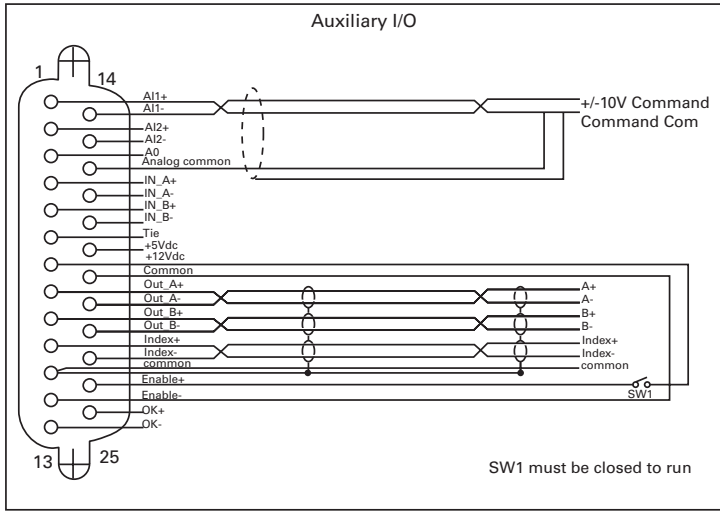
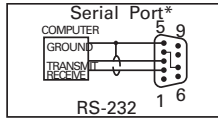
(1) Input power 90 to 250 VAC, 50-440 Hz  
1 phase @ 10 Amps, 3 phase @ 6 Amps

S2K Series Servo Amplifiers

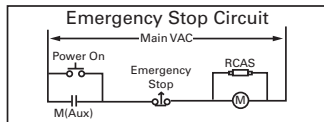
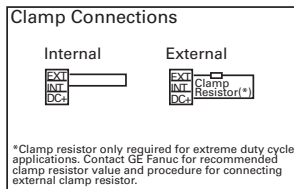
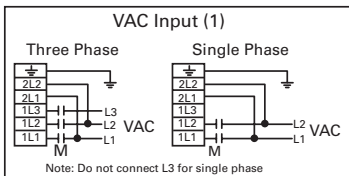
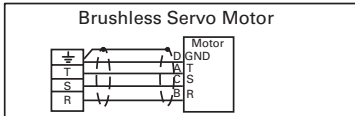
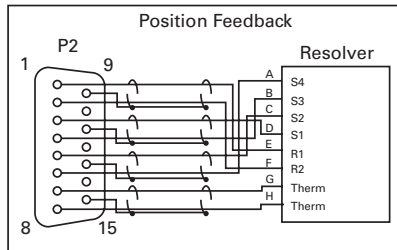
Connection Diagrams  
S2K Model: SSD107



FRONT VIEW



BOTTOM VIEW



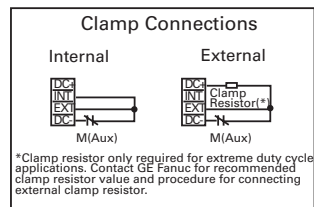
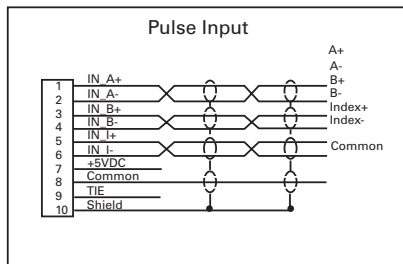
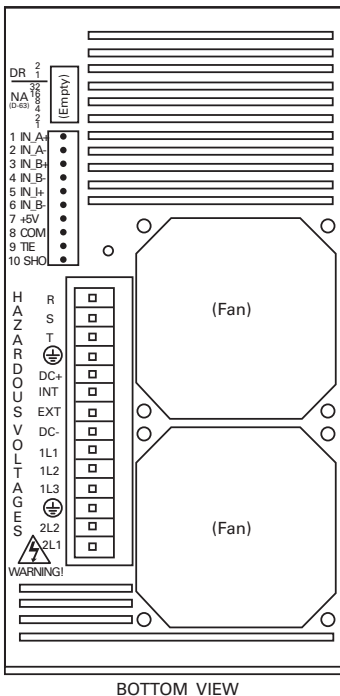
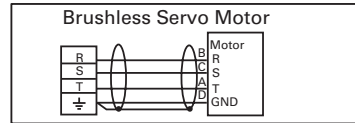
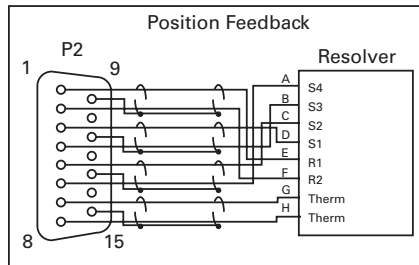
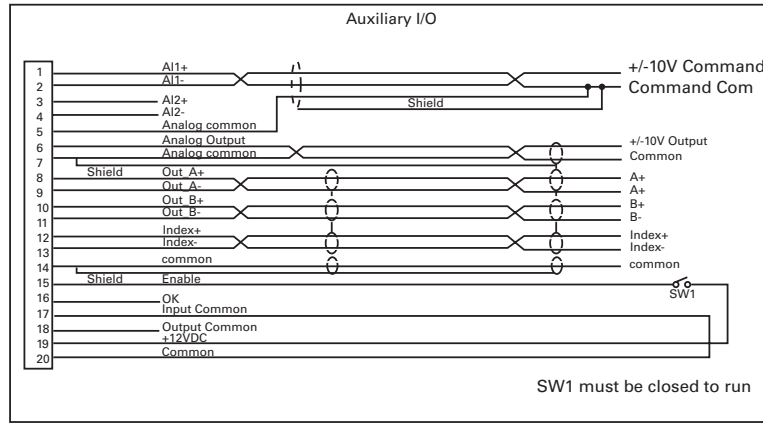
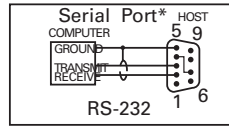
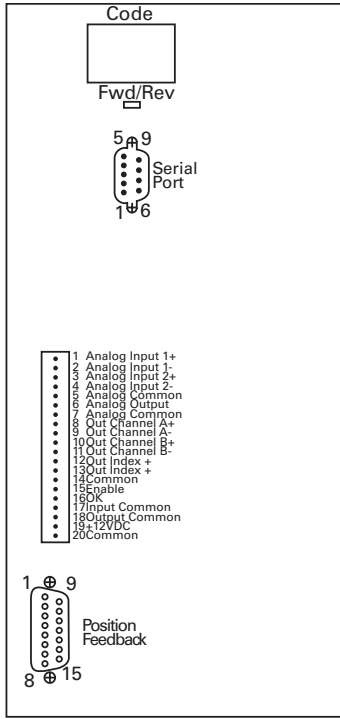
REMARKS:  
(1) Input power 90 to 250 VAC, 50-440 Hz  
1 phase @ 15 Amps, 3 phase @ 8 Amps

**\*Note:**  
The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

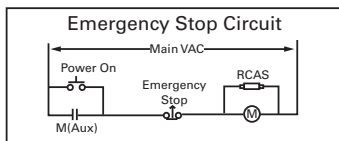
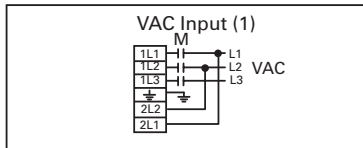
Servo Amplifiers

S2K Series Servo Amplifiers

Connection Diagrams  
S2K Model: SSD216 and SSD228



**REMARKS:**  
(1) Input power 180 to 250 VAC  
3 phase 50-440 Hz @ 18 Amps for IC800SSD216RS1A  
3 phase 50-440 Hz @ 30 Amps for IC800SSD228RS1A



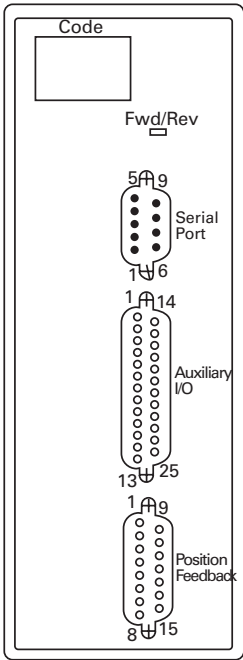
**\*Note:**  
The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.



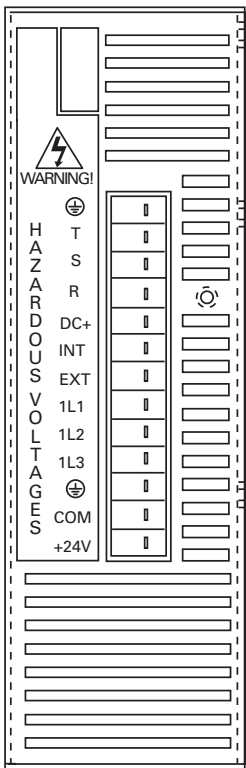
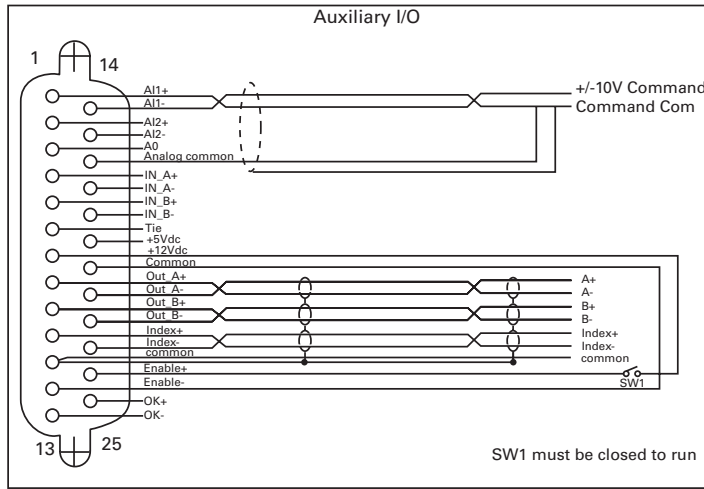
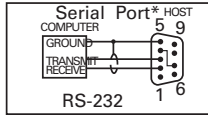
## Servo Amplifiers

### S2K Series Servo Amplifiers

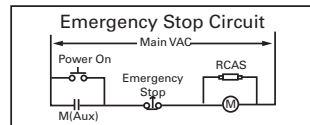
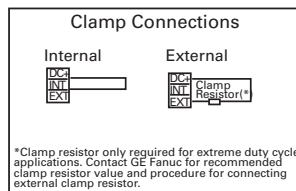
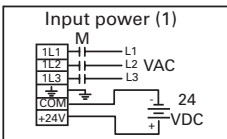
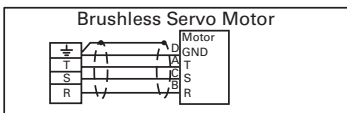
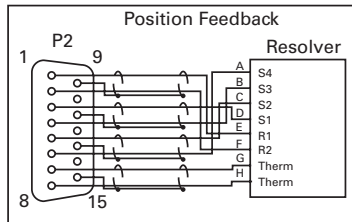
#### Connection Diagrams S2K Model: SSD407



FRONT VIEW



BOTTOM VIEW



REMARKS:  
 (1) Input motor power 324 to 528 VAC  
 3 phase 50-440 Hz @ 8 Amps  
 Input logic power 18 to 28.8 VDC @ 2 Amps

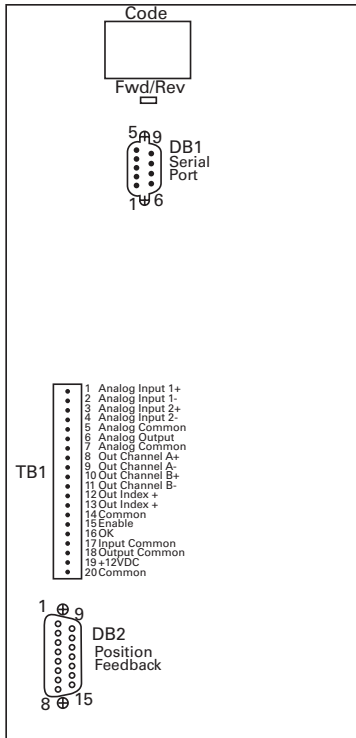
**\*Note:**

The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

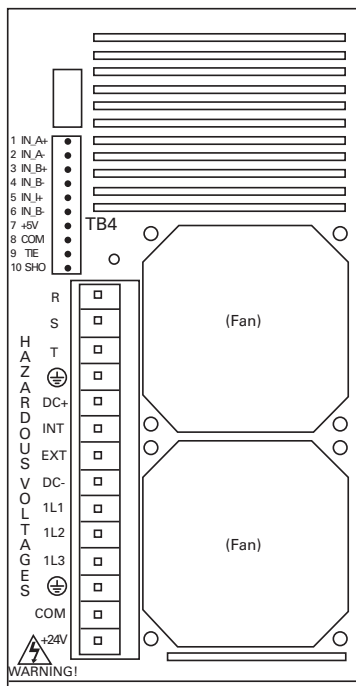
## Servo Amplifiers

### S2K Series Servo Amplifiers

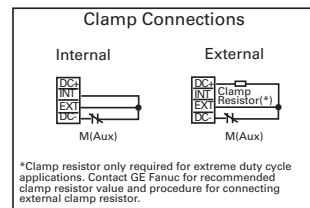
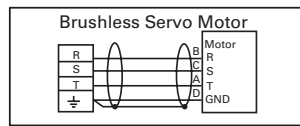
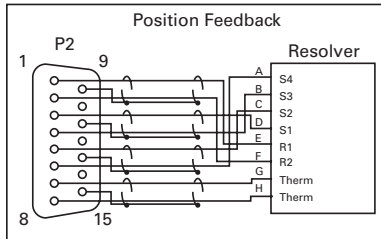
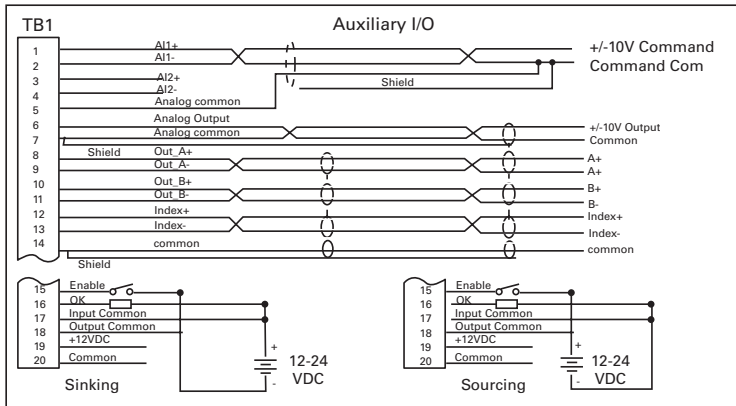
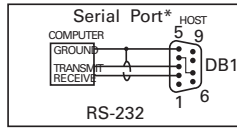
#### Connection Diagrams S2K Model: SSD420



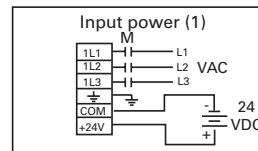
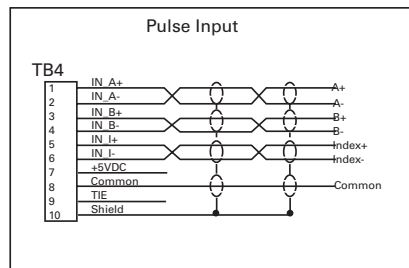
FRONT VIEW



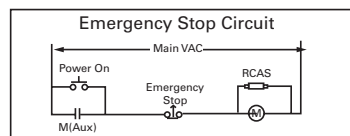
BOTTOM VIEW



\*Clamp resistor only required for extreme duty cycle applications. Contact GE Fanuc for recommended clamp resistor value and procedure for connecting external clamp resistor.



**REMARKS:**  
(1) Input motor power 324 to 528 VAC  
3 phase 50-440 Hz @ 8 Amps  
Input logic power 18 to 28.8 VDC @ 2 Amps



**\*Note:**

The S2K serial port includes 12 V on pin 4. A jumper must be placed from pin 4 to pin 7 to prevent possible damage to serial port on some computers. Using a GE serial communication cable is recommended.

## Servo Amplifiers

### S2K Series Servo Amplifiers

#### Ratings and Ordering Information

##### Servo Models for MTR-Series Motors (Resolver Feedback)

IC800SSD104RS1	4.3 Amp, 115/230 VAC S2K Amplifier, Resolver Feedback
IC800SSD107RS1	7.2 Amp, 115/230 VAC S2K Amplifier, Resolver Feedback
IC800SSD216RS1	16 Amp, 230 VAC S2K Amplifier, Resolver Feedback
IC800SSD228RS1	28 Amp, 230 VAC S2K Amplifier, Resolver Feedback
IC800SSD407RS1	7.2 Amp, 460 VAC S2K Amplifier, Resolver Feedback
IC800SSD420RS1	20 Amp, 460 VAC S2K Amplifier, Resolver Feedback

##### Accessories

IC800SLR001	50Ω, 100W External Regeneration Resistor Kit
IC800SLR002	100Ω, 225W External Regeneration Resistor Kit
IC800SLR003	20Ω, 300W External Regeneration Resistor Kit
IC800SLR004	15Ω, 1000W External Regeneration Resistor Kit
TRM-JAUX-03	S2K Auxiliary I/O Breakout Terminal Board, 3 ft cable
TRM-JAUX-10	S2K Auxiliary I/O Breakout Terminal Board, 10 ft cable

#### Cables

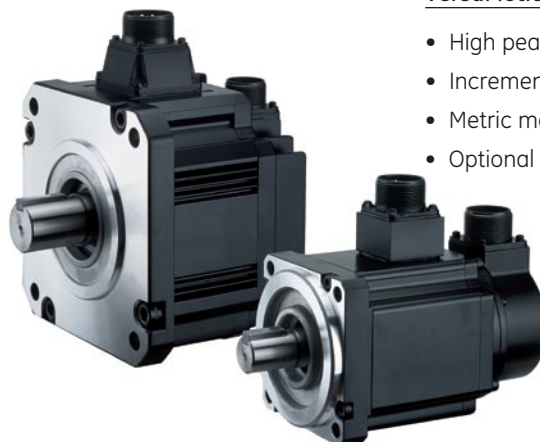
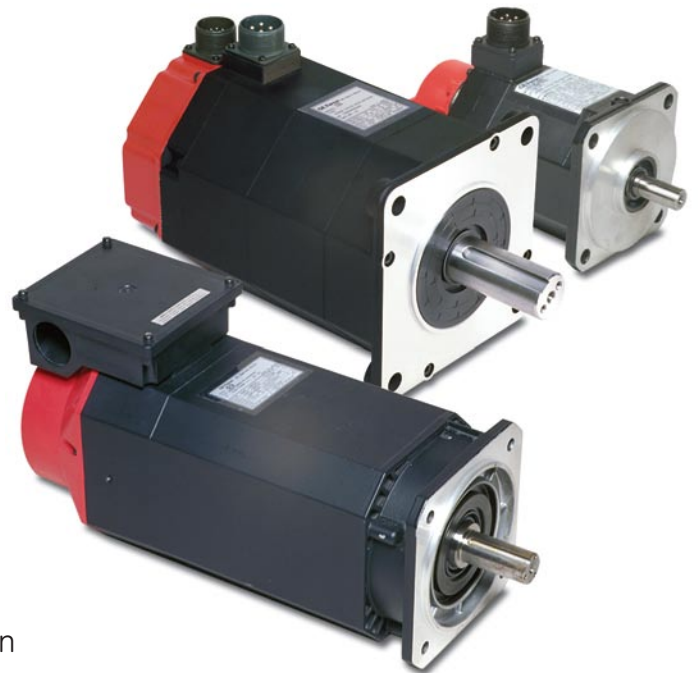
Cables in several lengths are available from GE for motor to amplifier connections and various other amplifier functions. It is strongly recommended that you use the cables available from GE as shown below. GE does not ship mating power or feedback connectors for the MTR-Series Motors with the motor. See appropriate motor section of this catalog for motor connector information.

S2K Series Cable	GE Part Number	Description
Auxiliary I/O Interface	IC800SKCIxxx IC800SKCFLYxxx	Interface Cable, S2K Auxiliary I/O to 44A726268-001 Terminal Board Assembly, 1 m or 3 m Interface Cable, S2K Auxiliary I/O connector to Flying Leads, 1 m or 3 m
Serial	IC800SKCS030	S2K Serial Communication Cable for PC (Motion Developer) Interface, 3 m
MTR-Series Motor Resolver	CBL-3T-RD-xx	Resolver Cable, S2K to MTR-3T Series Servo Motor, xx=10, 20 or 30 feet
MTR-Series Motor Power	CBL-3T-MP-xx CBL-T7-MP-xx	Power Cable, S2K to MTR-3T5x and 3T6x Servo Motor, xx=10, 20 or 30 feet Power Cable, S2K to MTR-3T1x, 3T2x and 3T4x Servo Motor, xx=10, 20 or 30 feet
MTR-Series Motor Brake	CBL-3T-MB-xx	Power/Brake Cable, S2K to MTR-3T5x and 3T6x Servo Motor with Brake, xx=10, 20 or 30 feet
	CBL-T7-MB-xx	Power/Brake Cable, S2K to MTR-3T1x, 3T2x and 3T4x Servo Motor with Brake, xx=10, 20 or 30 feet

# Servo Motors

## Servo Motor Performance for Demanding Applications

The GE Servo motors are a rugged family of brushless servo motors covering a broad torque and speed range. These motors utilize high energy rare earth magnets for superior cost/performance ratio. Low inertia design provides high acceleration rates for improved machine cycle rates. MTR-Series motors use resolver feedback and are matched for use with the S2K family of amplifiers and controllers. The  $\beta i$  Series motors use high resolution serial encoder feedback and are matched with  $\beta i$  Series amplifiers and DSM300 Series Motion Controllers. The VersaMotion Series motors use incremental encoder feedback and are matched for use with the VersaMotion Series amplifiers and DSM314 Series Motion Controllers.



### Servo Motor Features

- Models from 0.84-644 in-lb (0.095-75 Nm) continuous
- Rugged resolver feedback on MTR-Series; high resolution serial encoder feedback on  $\beta i$  Series.
- Absolute feedback available on  $\beta i$  Series with optional battery backup
  - Brushless design minimizes electromagnetic interference, carbon dust and maintenance
  - Metric servo mounting configurations
- Optional electrically released holding brakes
- Rugged TENV housing with IP55 to IP67 protection rating
- Some models include integral shaft oil seal
- Continuous torque range from 0.32 Nm to 19.1

### VersaMotion Servo Motor Features

- High peak torque of 3x continuous for fast acceleration
- Incremental encoder feedback (2500 ppr/10,000 quadrature)
- Metric mounting configuration
- Optional 24 VDC holding brake (except 100 Watt)
  - Low inertia design for high cycle rate and improved response
  - IP65 protection rating
  - Power and feedback cables available in standard lengths

## Servo Motors

### Servo Motors

#### Feature Comparison

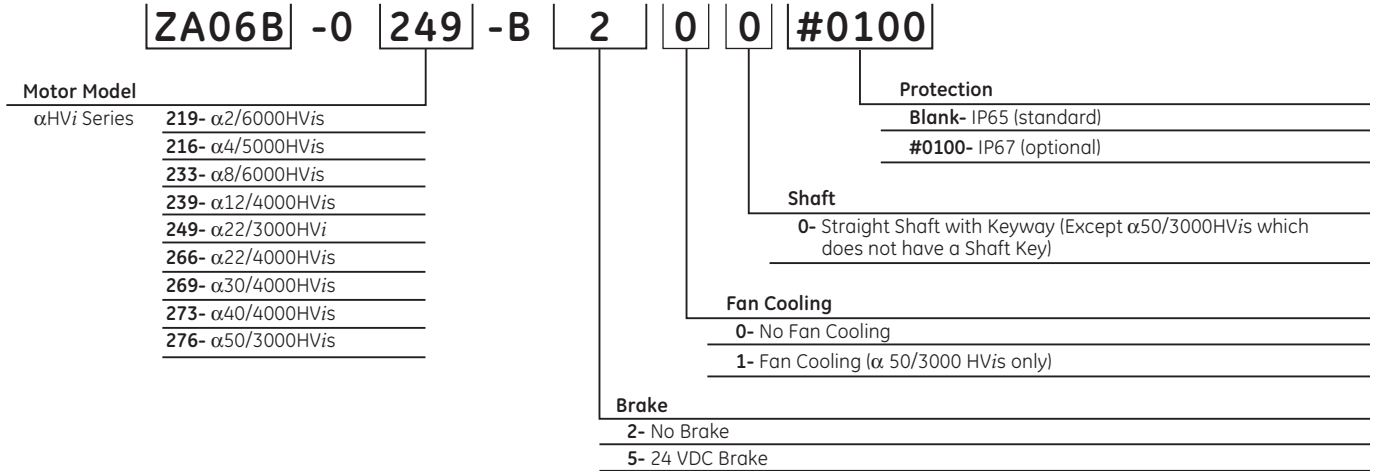
Feature	$\alpha$ HVi Series	$\beta$ i Series	$\beta$ HVi Series	VersaMotion Series	MRT-3T Series
Cont. Stall Torque Range (In-lb (Nm))	17.7-664 (2-75)	3.5-177 (0.4-20)	177-177 (2-20)	2.83-126 (0.32-14.3)	2.7-477 (0.3-53.9)
Cont. Speed Range (RPM)	2000-6000	2000-6000	2000-4000	1500 – 3000	950-9000
Max. Speed Range (RPM)	3000-6000	2000-6000	2000-4000	3000 – 5000	1300-12900
Compatible Amplifiers	$\alpha$ HVi Series	$\beta$ i Series	$\beta$ HVi Series	VersaMotion Series	S2K Series
Compatible Controllers	PMM335/DSM324i	PMM335/DSM324i	PMM335/DSM324i	DSM314	DSM/S2K
Mounting	Metric	Metric	Metric	Metric	Metric
Shaft Configuration	Straight/Keyway	Straight/Keyway	Straight/Keyway	Straight/Keyway	Straight/No Keyway
Brushless Construction	Yes	Yes	Yes	Yes	Yes
Optional Brake	24VDC	24 VDC	24 VDC	24 VDC	24 VDC
Feedback Type	Serial Encoder	Serial Encoder	Serial Encoder	Incremental Encoder	Resolver
Feedback Resolution (Counts/rev)	1 M	64 K/128 K	128 K	10,000	4096
Absolute Feedback	Yes*	Yes*	Yes*	No	No
Amplifier Line Voltage	400-480 VAC 3 $\phi$	220-240 VAC 1 $\phi$ 200-240 VAC 3 $\phi$	400-480 VAC 3 $\phi$	200-255 VAC 1 $\phi$ (100 W to 1 kW); 170-255 VAC 3 $\phi$	115 VAC 1 $\phi$ 230 VAC 1 or 3 $\phi$ 460 VAC 3 $\phi$
Shaft Seal	Standard	Standard	Standard	Standard	MTR-3T10 Series MTR-3T20 Series
Protection Rating	IP65 Standard IP67 Optional	IP65 Standard IP67 Optional	IP65 Standard IP67 Optional	IP65	IP65
Inertia	Low	Medium	Medium	Low/Medium	Medium

\*Absolute feedback requires optional encoder battery backup for  $\alpha$ HVi Series,  $\beta$ i Series, or  $\beta$ HVi Series amplifiers.

Servo Motors

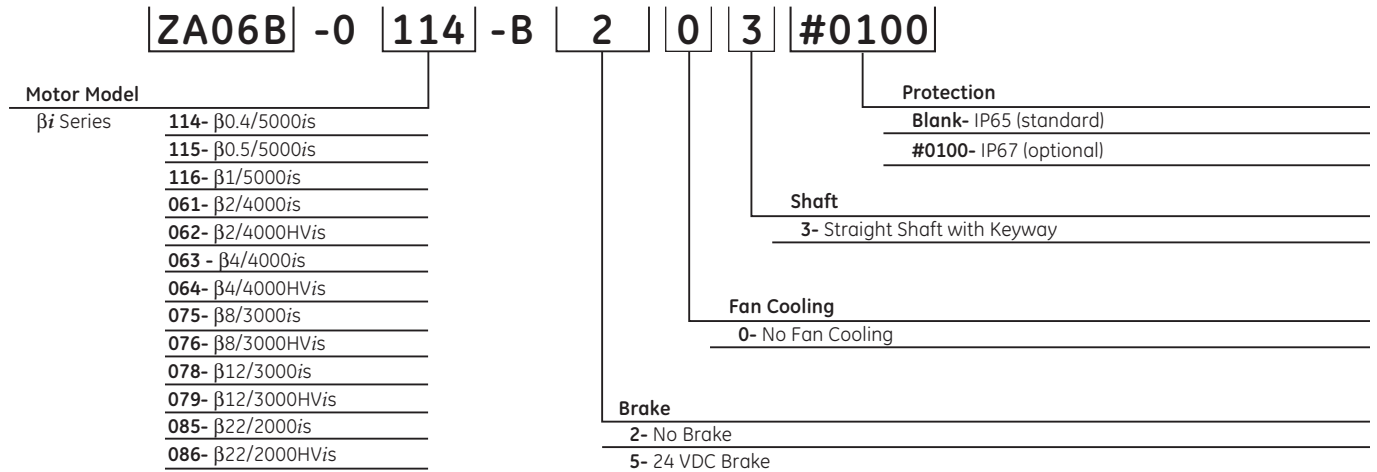
**αHVi and αHVIs Series Servo Motors**

Motor Part Numbers



**βIs and βHVIs Series Servo Motors**

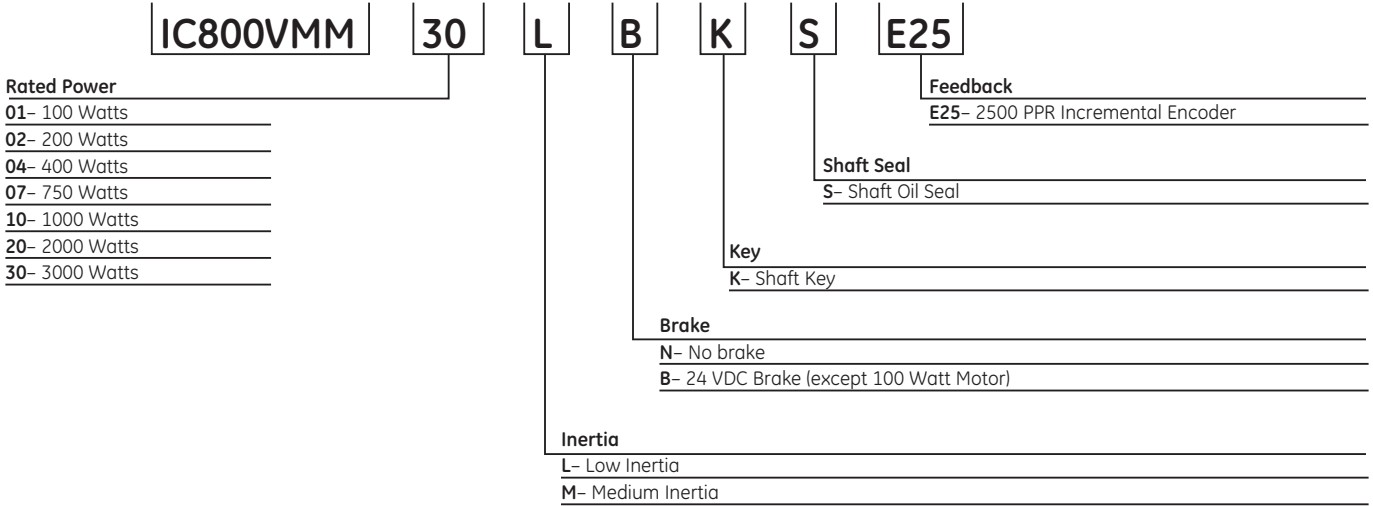
Motor Part Numbers



Servo Motors

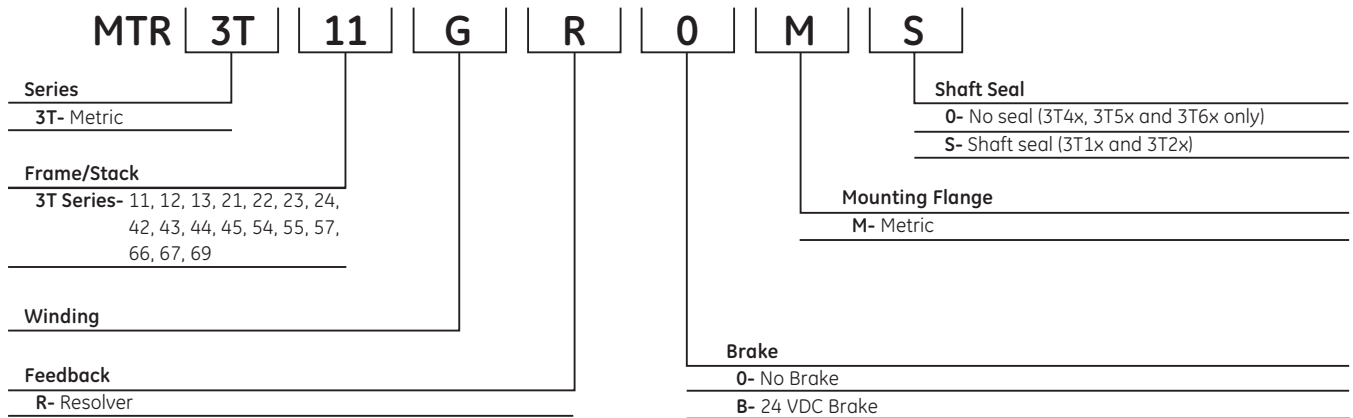
VersaMotion Series Servo Motors

Motor Part Numbers



MTR-Series Servo Motors

Motor Part Numbers



## Servo Motors

### $\alpha$ HVi and $\alpha$ HVis Series Servo Motors

#### Specifications

Motor Model	Unit	$\alpha$ 2/6000HVis	$\alpha$ 4/5000HVis	$\alpha$ 8/6000HVis	$\alpha$ 12/4000HVis	$\alpha$ 22/3000HVis
Cont Stall Torque*	Nm	2	4	8	12	22
	in-lb	17.7	35.4	70.8	106	195
Peak Torque*	Nm	6	8.8	22	46	64
	in-lb	53.1	77.9	194.7	407	566
Rotor Inertia	kgm <sup>2</sup> x 10 <sup>-4</sup>	2.91	5.15	11.7	22.8	120
	in-lb-s <sup>2</sup> x 10 <sup>-4</sup>	25.75	45.58	103.54	201.7	1062
Rated Speed	RPM	6000	4000	6000	3000	3000
No Load Speed	RPM	6000	5000	6000	4000	4000
Encoder Resolution	Counts/Rev	1,000,000	1,000,000	1,000,000	1,000,000	1,000,000
Flange Size	mm	90	90	130	130	174

#### Mechanical Data

Weight	kg	3	4.3	8	11.9	29
	lb	6.6	9.46	17.6	26.2	63.8
Axial Load Rating	kg	8	8	20	20	60
	lb	17.6	17.6	44	44	132
Radial Load Rating	kg	25	25	70	70	200
	lb	55	55	154	154	440
Mechanical Time Constant	msec	5	3	2	2	4
Thermal Time Constant	min	15	20	20	25	60
Static Friction	Nm	0.1	0.2	0.3	0.3	1.2

#### Electrical Data

Torque Constant*	Nm/A	0.99	1.32	0.89	1.8	2.41
	in-lb/A	8.76	11.68	7.87	15.9	21.33
Resistance*	ohms	5.6	2.8	0.5	0.84	0.66
Back EMF Constant*	V(rms)/krpm	35	46	31	63	84
Rated Motor Power	kW	1	1	2.2	2.5	4
	HP	1.3	1.3	3	3.4	5.4
Cont. Stall Current	A (rms)	2	3	9	6.7	9.1
Max Current	A (peak)	40	40	40	40	40
Insulation		Class F	Class F	Class F	Class F	Class F

#### Amplifier Model

$\alpha$ Amp Model Number	$\alpha$ SVM1-10HV <sub>i</sub>	$\alpha$ SVM1-10HV <sub>i</sub>	$\alpha$ SVM1-40HV <sub>i</sub>	$\alpha$ SVM1-40HV <sub>i</sub>	$\alpha$ SVM1-40HV <sub>i</sub>
$\beta$ Amp Model Number	$\beta$ SVM1-10HV <sub>i</sub>	$\beta$ SVM1-10HV <sub>i</sub>	$\beta$ SVM1-40HV <sub>i</sub>	$\beta$ SVM1-40HV <sub>i</sub>	$\beta$ SVM1-40HV <sub>i</sub>

#### Brake Data

Holding Torque	Nm	3	3	8	8	35
	in-lb	26.6	26.6	71	71	310
Inertia Adder	kgm <sup>2</sup> x 10 <sup>-4</sup>	0.2	0.2	0.7	0.7	6
	in-lb-s <sup>2</sup> x 10 <sup>-4</sup>	1.77	1.77	6.18	6.18	53
Weight Adder	kg	1	1	2.2	2.2	6
	lb	2.2	2.2	4.9	4.9	13.2
Current	A	0.9	0.9	1.1	1.1	1.2
Voltage	VDC	24	24	24	24	24
Engage Time	msec	20	20	30	30	30
Release Time	msec	60	60	160	160	160

#### Cooling Fan Data

AC Input 60 Hz	VAC	n/a	n/a	n/a	n/a	n/a
AC Input 50 Hz	VAC	n/a	n/a	n/a	n/a	n/a
Rated Current 60 Hz	A (rms)	n/a	n/a	n/a	n/a	n/a
Rated Current 50 Hz	A (rms)	n/a	n/a	n/a	n/a	n/a

#### Environmental Specifications

Humidity	80% non-condensing
Ambient Temperature	0 to 40°C
Vibration	less than 5G (operating)
Altitude	3300 feet (1000 m)

\*Data shown are nominal values at 20°C



## Servo Motors

### $\alpha$ HVi and $\alpha$ HVis Series Servo Motors

#### Specifications

Motor Model	Unit	$\alpha$ 22/4000HVis	$\alpha$ 30/4000HVis	$\alpha$ 40/4000HVis	$\alpha$ 50/3000HVis with fan
Cont Stall Torque*	Nm	22	30	40	75
	in-lb	195	266	354	664
Peak Torque*	Nm	70	100	115	215
	in-lb	620	885	1018	1903
Rotor Inertia	kgm <sup>2</sup> x 10 <sup>-4</sup>	52.7	75.9	99	145
	in-lb-s <sup>2</sup> x 10 <sup>-4</sup>	466	672	876	1283
Rated Speed	RPM	3000	3000	3000	3000
No Load Speed	RPM	4000	4000	4000	3000
Encoder Resolution	Counts/Rev	1,000,000	1,000,000	1,000,000	1,000,000
Flange Size	mm	174	174	174	174

#### Mechanical Data

Weight	kg	17	23	28	42
	lb	37.4	50.6	61.6	92.4
Axial Load Rating	kg	60	60	60	60
	lb	132	132	132	132
Radial Load Rating	kg	200	200	200	200
	lb	440	440	440	440
Mechanical Time Constant	msec	2	2	1	1
Thermal Time Constant	min	30	35	40	30
Static Friction	Nm	0.8	0.8	1.2	1.8

#### Electrical Data

Torque Constant*	Nm/A	1.42	1.9	2.2	1.9
	in-lb/A	12.57	16.82	19.47	16.82
Resistance*	ohms	0.25	0.25	0.23	0.1
Back EMF Constant*	V(rms)/krpm	50	66	77	66
Rated Motor Power	kW	4.5	5.5	5.5	14
	HP	6.0	7.4	7.4	18.8
Cont. Stall Current	A (rms)	15.5	15.9	18.1	39.6
Max Current	A (peak)	80	80	80	180
Insulation		Class F	Class F	Class F	Class F

#### Amplifier Model

$\alpha$ Amp Model Number	$\alpha$ SVM1-80HVi	$\alpha$ SVM1-80HVi	$\alpha$ SVM1-80HVi	$\alpha$ SVM1-180HVi
$\beta$ Amp Model Number	n/a	n/a	n/a	n/a

#### Brake Data

Holding Torque	Nm	35	35	35	35
	in-lb	310	310	310	310
Inertia Adder	kgm <sup>2</sup> x 10 <sup>-4</sup>	6	6	6	6
	in-lb-s <sup>2</sup> x 10 <sup>-4</sup>	53	53	53	53
Weight Adder	kg	6	6	6	6
	lb	13.2	13.2	13.2	13.2
Current	A	1.2	1.2	1.2	1.2
Voltage	VDC	24	24	24	24
Engage Time	msec	30	30	30	30
Release Time	msec	160	160	160	160

#### Cooling Fan Data

AC Input 60 Hz	VAC	n/a	n/a	n/a	170-220 1-phase
AC Input 50 Hz	VAC	n/a	n/a	n/a	170-242 1-phase
Rated Current 60 Hz	A (rms)	n/a	n/a	n/a	0.27
Rated Current 50 Hz	A (rms)	n/a	n/a	n/a	0.32

#### Environmental Specifications

Humidity	80% non-condensing
Ambient Temperature	0 to 40° C
Vibration	less than 5G (operating)
Altitude	3300 feet (1000 m)

\*Data shown are nominal values at 20° C

## Servo Motors

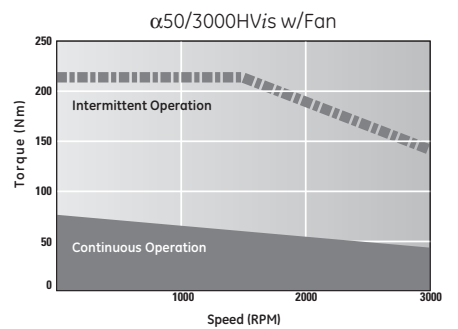
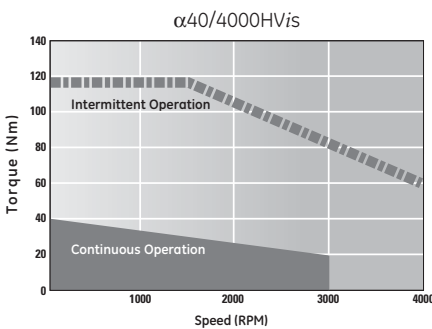
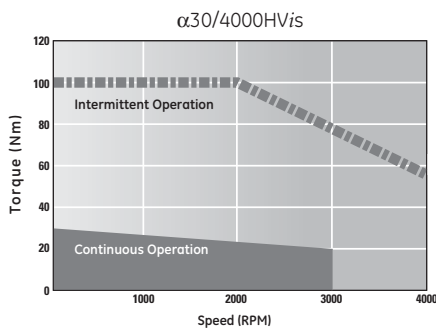
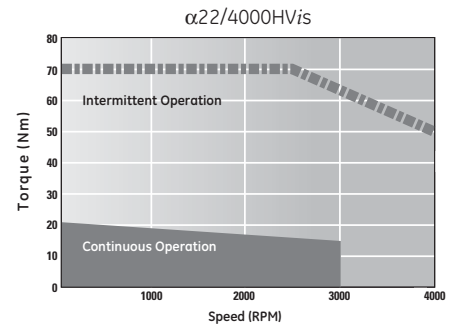
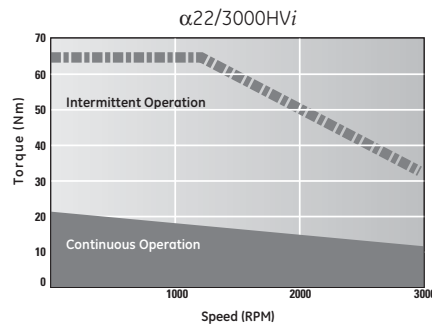
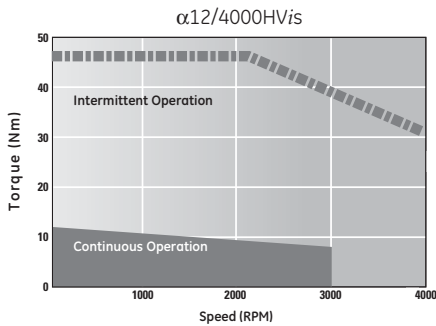
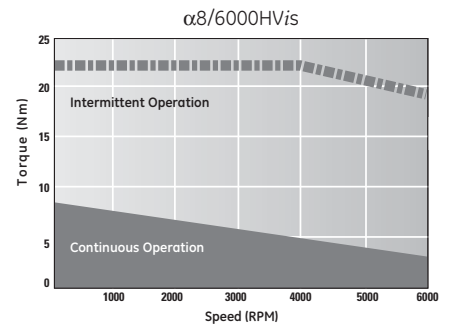
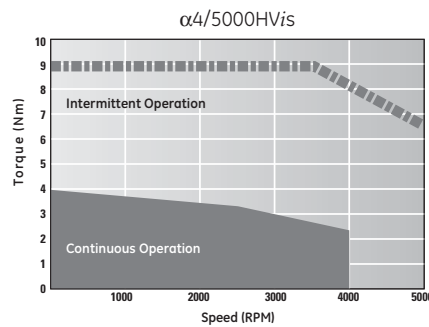
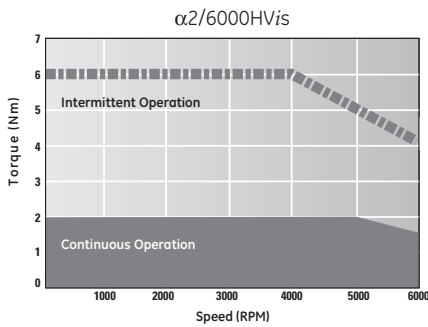
### $\alpha$ HVi and $\alpha$ HVis Series Servo Motors

#### Speed Torque Curves

The curves illustrate the relationship between motor speed and output torque. The motor can operate continuously at any combination of speed and torque within the prescribed continuous

operating zone. The limit of the continuous operating zone is determined with the motor's ambient temperature at 20°C and its drive current as a pure sine wave. Actual operation is limited by the current

of the servo drive unit. The continuous operating zone must be derated for ambient temperature above 20°C.

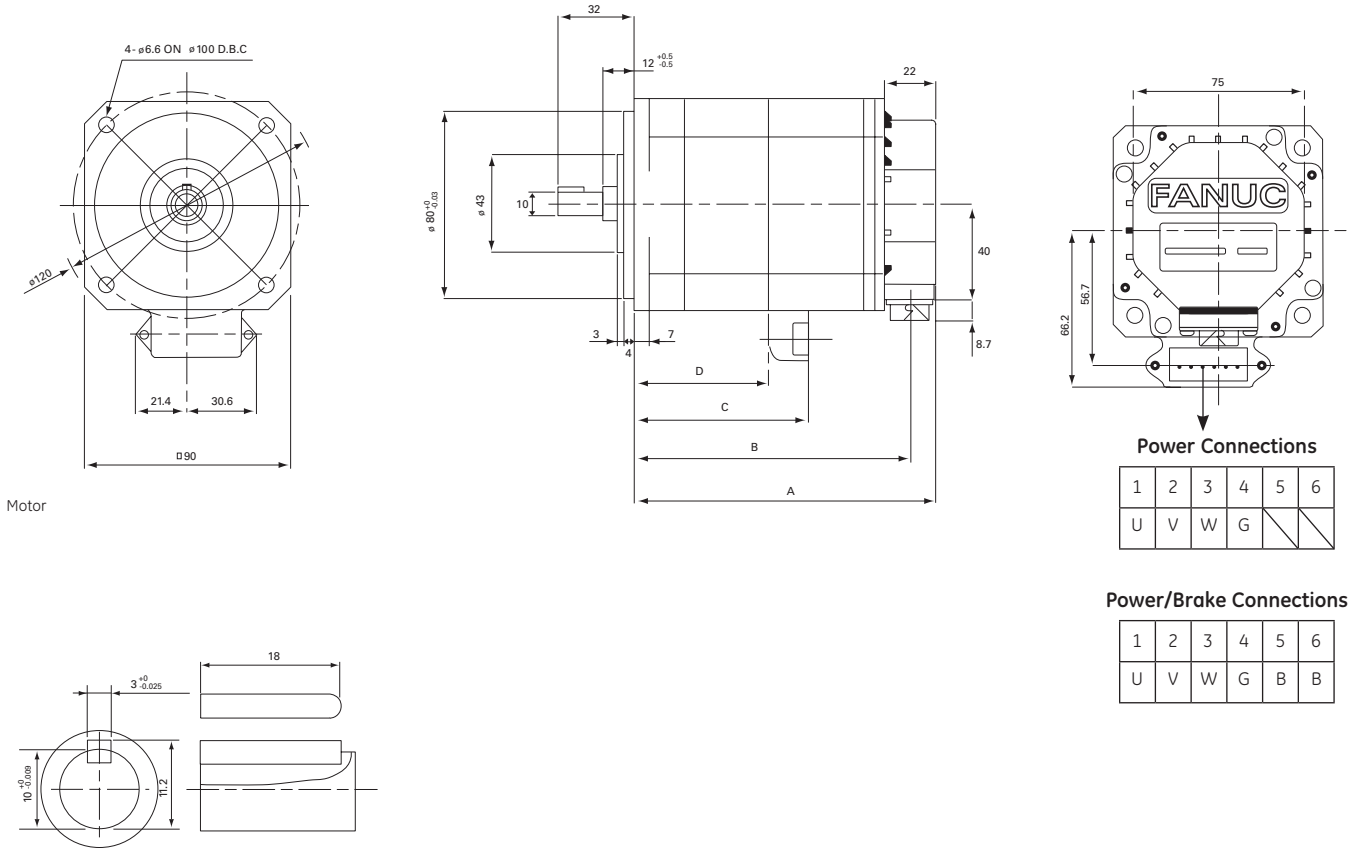


## Servo Motors

### $\alpha$ HVi Series Servo Motors

#### Dimensions

#### $\alpha$ 2/6000HVi



Motor

Shaft detail

Dimensions shown mm

Dimension	$\alpha$ 2/6000HVi
A	130
A with brake	159
B	119
B with brake	148
C	75
C with brake	75
D	59
D with brake	59

#### Notes

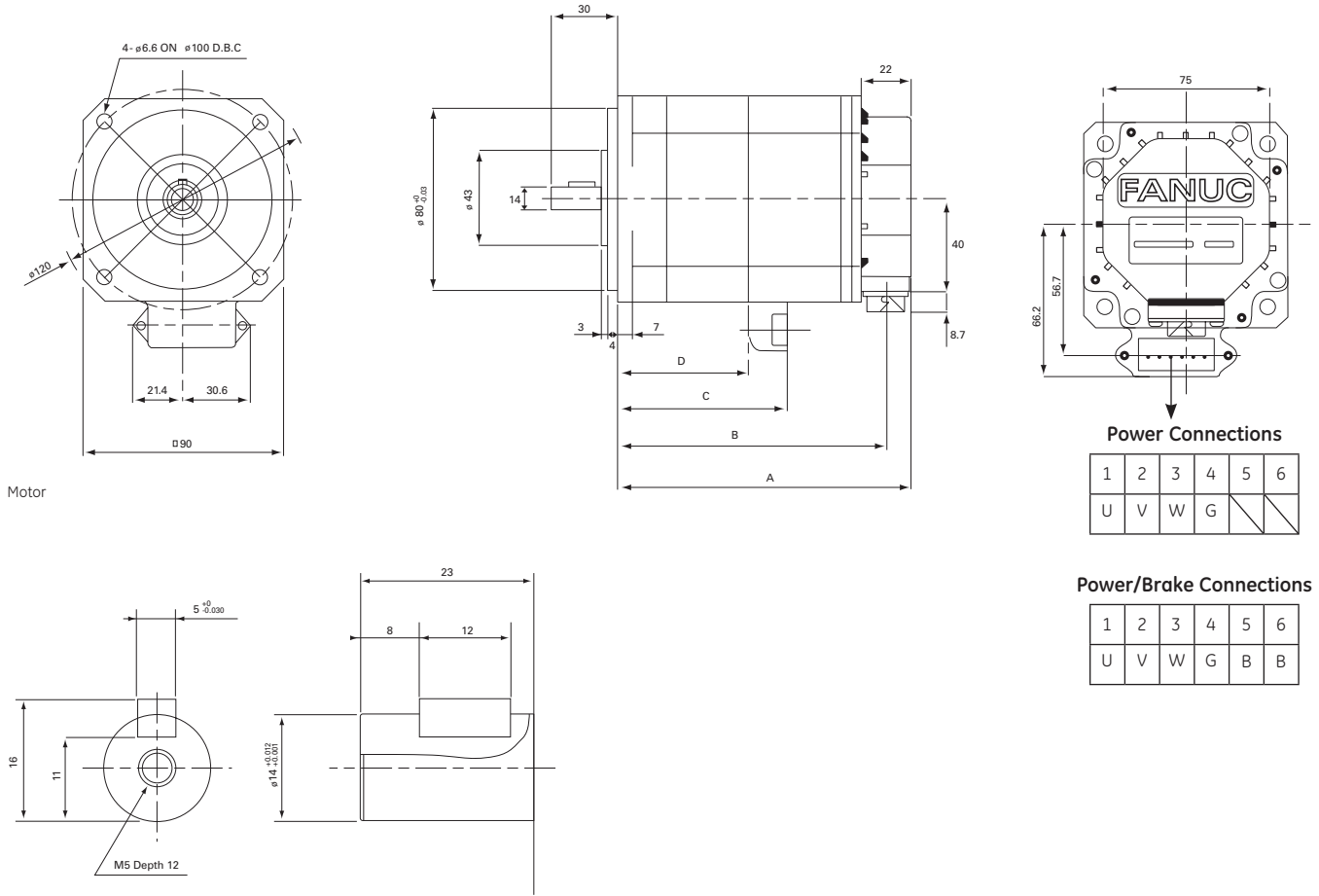
1. Shaft diameter runout = 0.02 mm max
2. Flange surface runout = 0.06 mm max
3. Maximum radial load for output shaft is 25 kgf (55 lb)

## Servo Motors

### αHV*i* Series Servo Motors

#### Dimensions

##### α4/5000HV*i*s



Motor

Shaft detail

Dimensions shown mm

Dimension	α4/5000HV <i>i</i> s
A	166
A with brake	195
B	155
B with brake	184
C	111
C with brake	111
D	95
D with brake	95

#### Notes

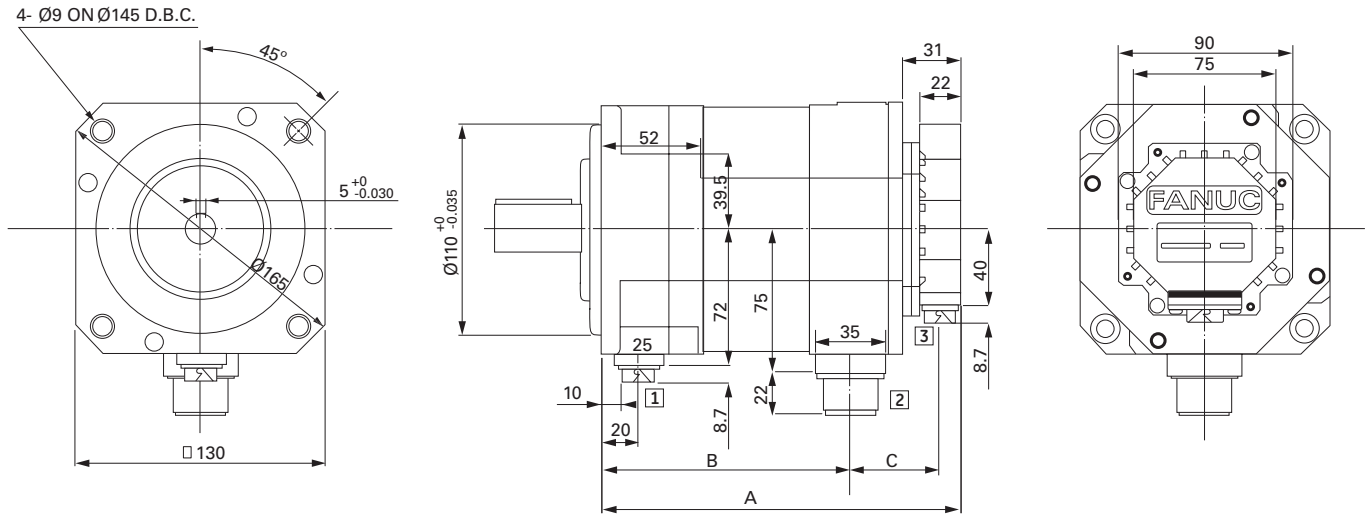
1. Shaft diameter runout = 0.02 mm max
2. Flange surface runout = 0.06 mm max
3. Maximum radial load for output shaft is 25 kgf (55 lb)

## Servo Motors

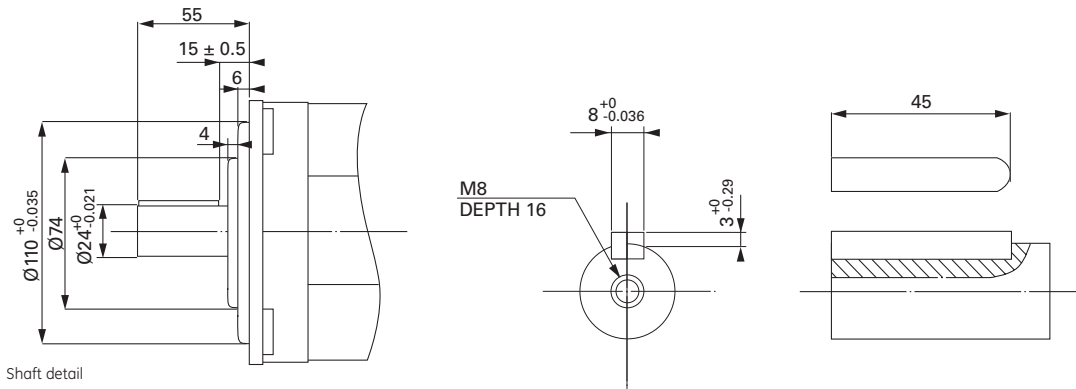
### αHV*i* Series Servo Motors

#### Dimensions

#### α8/6000HV*i*s and α12/4000HV*i*s



Motor



Shaft detail

Dimensions shown mm

Dimension	α8/6000HV <i>i</i> s	α12/4000HV <i>i</i> s
A	166	222
A with brake	191	247
B	108	164
B with brake	133	189
C	47	47
C with brake	47	47

Connector	Description
1	Brake (optional)
2	Power
3	Encoder

#### Notes

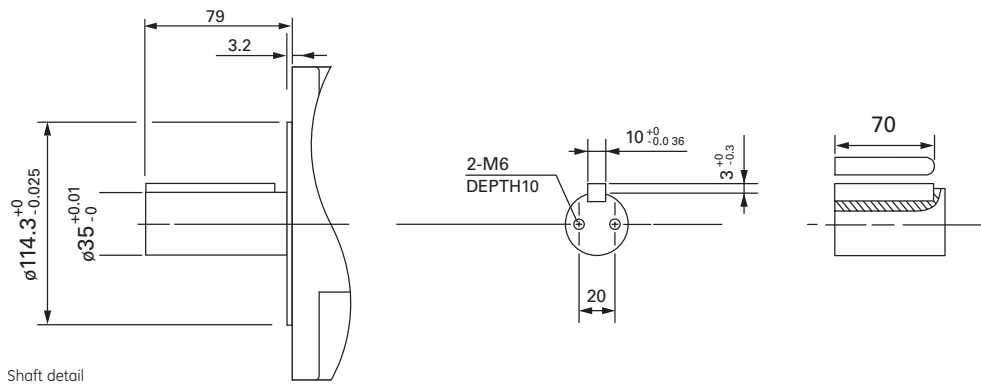
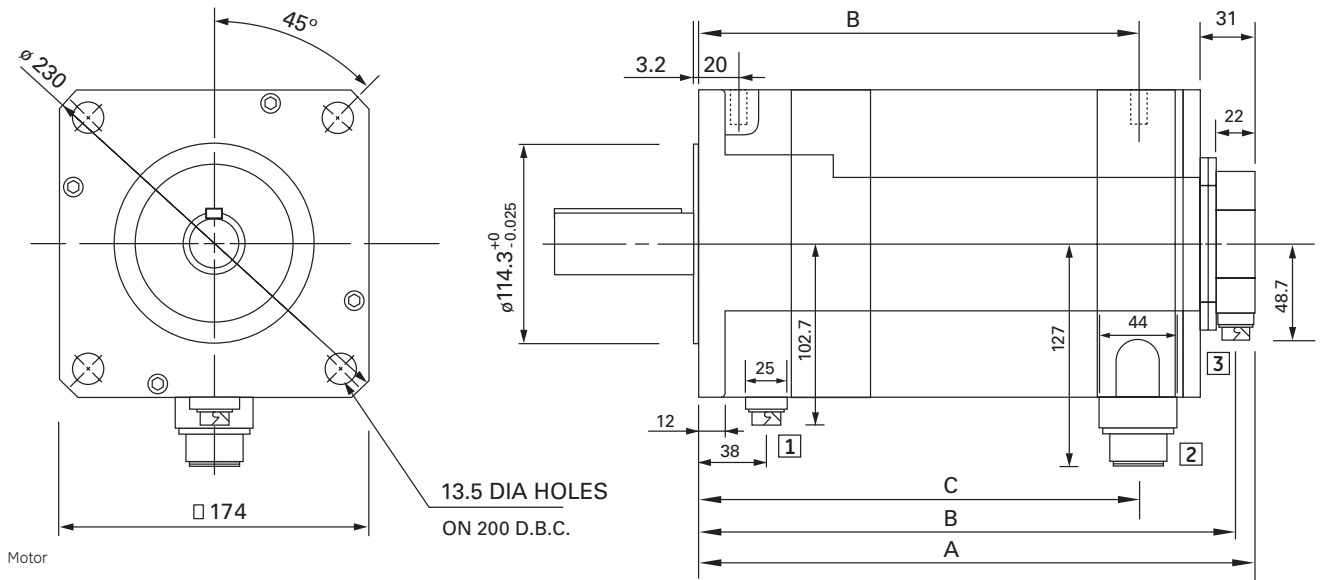
1. Shaft diameter runout = 0.02 mm max
2. Flange surface runout = 0.05 mm max
3. Maximum radial load for output shaft is 70 kgf (154 lb)

Servo Motors

**αHV*i* Series Servo Motors**

Dimensions

α22/3000HV*i*



Dimensions shown mm

Dimension	α22/3000HV <i>i</i>
A	276
A with brake	317
B	265
B with brake	306
C	215
C with brake	256

Connector	Description
1	Brake (optional)
2	Power
3	Encoder

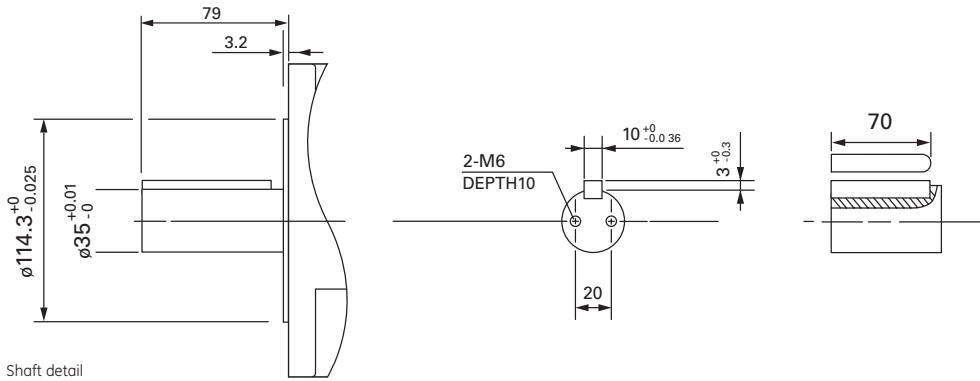
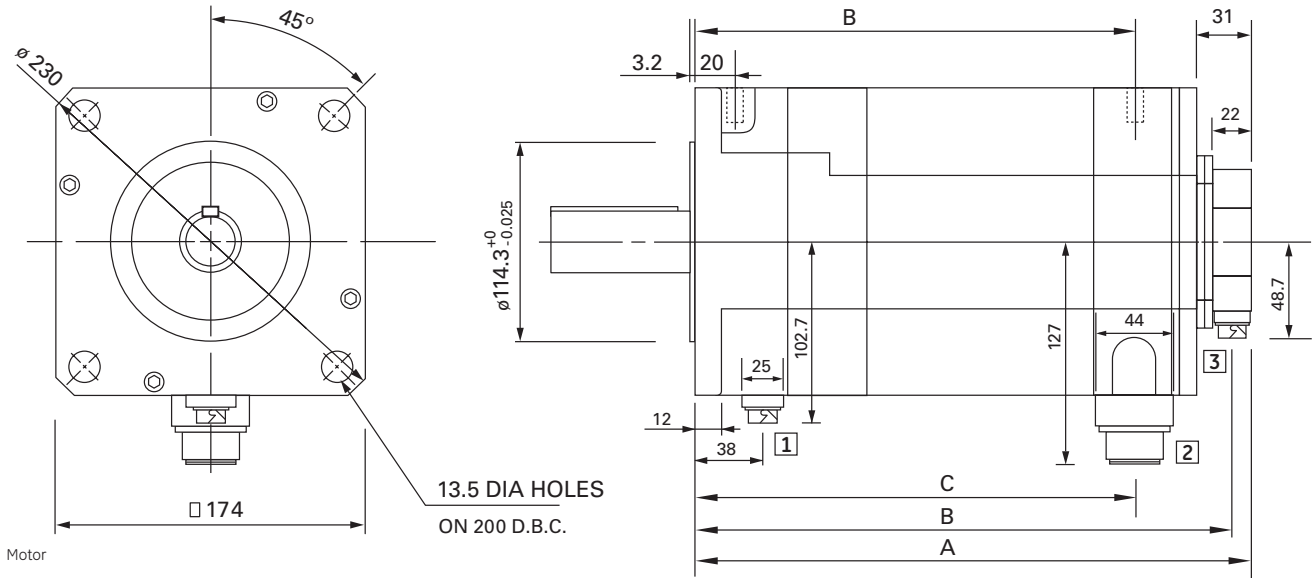
Notes

1. Shaft diameter runout = 0.03 mm max
2. Flange surface runout = 0.06 mm max
3. Maximum radial load for output shaft is 200 kgf (440 lb)

**αHV*i* Series Servo Motors**

Dimensions

α22/4000HV*i*, α30/4000HV*i*, α40/4000HV*i*



Dimensions shown mm

Dimension	α22/4000HV <i>i</i>	α30/4000HV <i>i</i>	α40/4000HV <i>i</i>
A	202	239	276
A with brake	243	280	317
B	191	228	265
B with brake	232	269	306
C	141	178	215
C with brake	182	219	256

Connector	Description
1	Brake (optional)
2	Power
3	Encoder

Notes

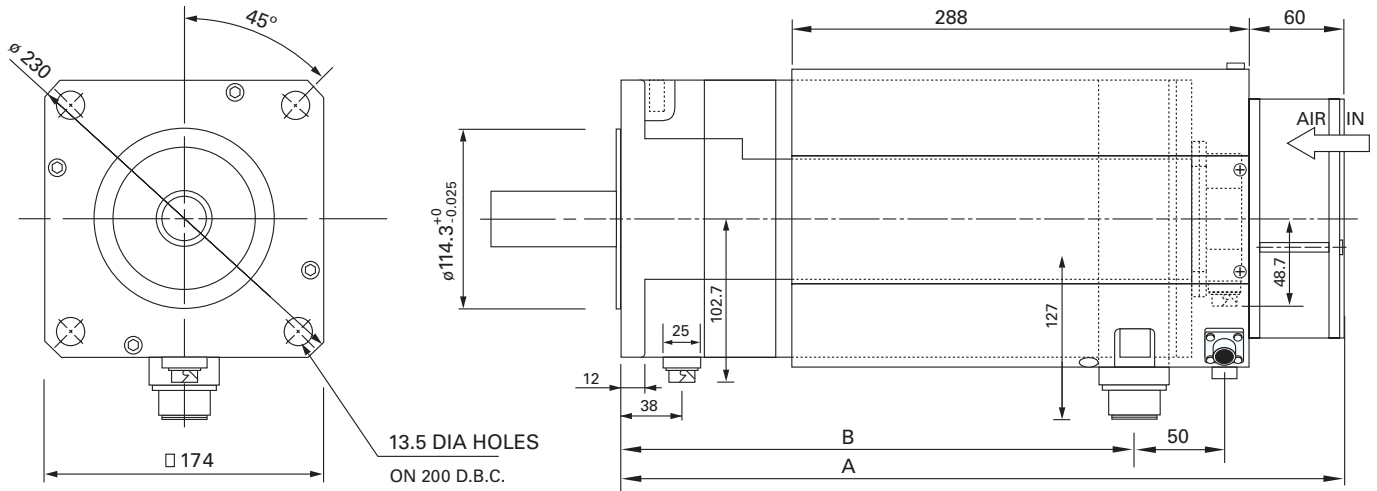
1. Shaft diameter runout = 0.03 mm max
2. Flange surface runout = 0.06 mm max
3. Maximum radial load for output shaft is 200 kgf (440 lb)

Servo Motors

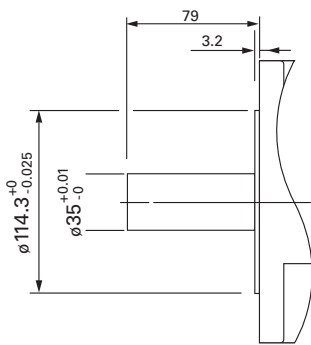
**αHV*i* Series Servo Motors**

Dimensions

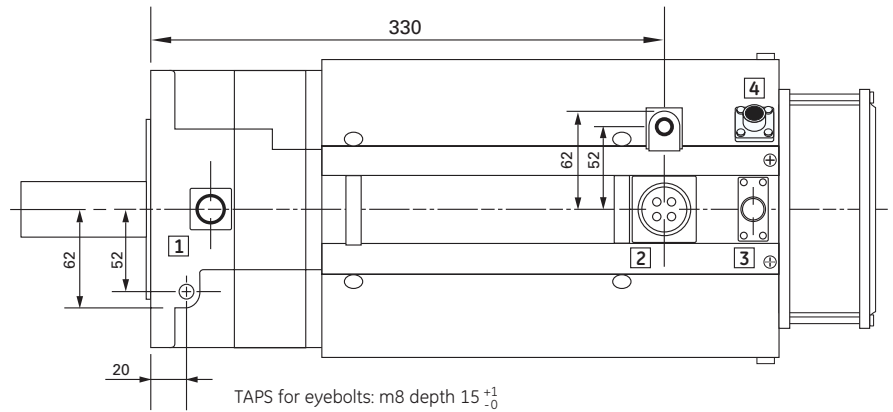
α50/3000HV*i*s with Fan



Motor



Shaft detail



Dimensions shown mm

Dimensions shown mm

Dimension	α50/3000HV <i>i</i> s with Fan
A	416
A with brake	457
B	289
B with brake	330

Connector	Description
1	Brake (optional)
2	Power
3	Encoder
4	Fan

Notes

1. Shaft diameter runout = 0.03 mm max
2. Flange surface runout = 0.06 mm max
3. Maximum radial load for output shaft is 200 kgf (440 lb)

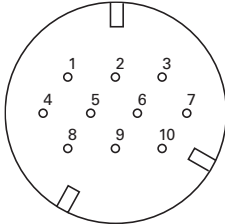


## Servo Motors

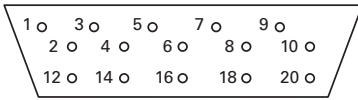
### $\alpha$ HVi and $\alpha$ HVis Series Servo Motors

#### Connections

##### Serial Encoder Connections



All  $\alpha$ HVi and  $\alpha$ HVis Motors



$\alpha$ HVi Amplifier (JF1)

Description	$\alpha$ HVi and $\alpha$ HVis Motors	$\alpha$ HVi Series Amplifier JF1 Connector
N/C	2	1
N/C	1	2
RD	6	5
RD	5	6
+5 VDC	8, 9	9, 20
0 VDC	7, 10	12, 14
+6 VA (battery)	4	7
Frame Ground	3	16
Cable Shield	3	16

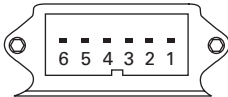
GE Mating Motor Connector:

ZA06B-6114-K204#E (90 degree)  
ZA06B-6114-K204#S (Straight)

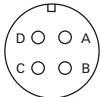
Amplifier Mating Connector (JF1):

ZA06B-6073-K214

##### Power and Brake Connections



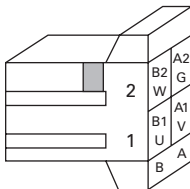
$\alpha$ 2/6000HVis and  $\alpha$ 4/5000HVis Motor Power/Brake



All other  $\alpha$ HVi and  $\alpha$ HVis Motor Power



All other  $\alpha$ HVi and  $\alpha$ HVis Brake



$\alpha$ SVM1-10HVi,  $\alpha$ SVM1-40HVi and  $\alpha$ SVM1-80HVi Amplifier (CZ2)

Description	$\alpha$ 2HVis and $\alpha$ 4HVis Motor Connector	All other $\alpha$ HVi and $\alpha$ HVis Motor Connector	$\alpha$ SVM1-10HVi/40HVi/80HVi CZ2 Connector	$\alpha$ SVM1-180HVi Amplifier TB2 Connector
Phase U	1	A	B1	U
Phase V	2	B	A1	V
Phase W	3	C	B2	W
Earth (case)	4	D	A2	PE
Brake VDC	5	n/a	n/a	n/a
Brake VDC	6	n/a	n/a	n/a

GE Mating Motor Connector:

ZA06B-6114-K220#E (90 degree) ( $\alpha$ 2HVis and  $\alpha$ 4HVis)  
ZA06B-6114-K220#S (Straight) ( $\alpha$ 2HVis and  $\alpha$ 4HVis)  
Z44A730464-G20 (90 degree) ( $\alpha$ HVi and  $\alpha$ HVis)  
Z44A730464-G19 (Straight) ( $\alpha$ HVi and  $\alpha$ HVis)  
Z44A730464-G18 (90 degree) ( $\alpha$ 12/4000HVis)  
Z44A730464-G17 (Straight) ( $\alpha$ 12/4000HVis)

Amplifier Mating Connector (CZ2):

ZA06B-6110-K203#Z2N

##### Description $\alpha$ 8HVis, $\alpha$ 12HVis, $\alpha$ 22HVi, $\alpha$ 22HVis, $\alpha$ 30HVis, $\alpha$ 40HVis, $\alpha$ 50HVis Motor Brake Connector

Brake VDC	1
Brake VDC	2
Earth (case)	4

GE Mating Motor Connector:

ZA06B-6114-K213#E (90 degree)  
ZA06B-6114-K213#S (Straight)

24 VDC Brake power connections are not polarized.

## Servo Motors

### $\alpha$ HVi and $\alpha$ HVis Series Servo Motor

#### Ordering Information

Model Number	Description
ZA06B-0216-B200	$\alpha$ 4/5000HVis Servo Motor
ZA06B-0216-B500	$\alpha$ 4/5000HVis Servo Motor with Brake
ZA06B-0219-B200	$\alpha$ 2/6000HVis Servo Motor
ZA06B-0219-B500	$\alpha$ 2/6000HVis Servo Motor with Brake
ZA06B-0233-B200	$\alpha$ 8/6000HVis Servo Motor
ZA06B-0233-B500	$\alpha$ 8/6000HVis Servo Motor with Brake
ZA06B-0239-B200	$\alpha$ 12/4000HVis Servo Motor
ZA06B-0239-B200#0100	$\alpha$ 12/4000HVis Servo Motor, IP67 Protection
ZA06B-0239-B500	$\alpha$ 12/4000HVis Servo Motor with Brake
ZA06B-0239-B500#0100	$\alpha$ 12/4000HVis Servo Motor with Brake, IP67 Protection
ZA06B-0249-B200	$\alpha$ 22/3000HVi Servo Motor
ZA06B-0249-B200#0100	$\alpha$ 22/3000HVi Servo Motor, IP67 Protection
ZA06B-0249-B500	$\alpha$ 22/3000HVi Servo Motor with Brake
ZA06B-0249-B500#0100	$\alpha$ 22/3000HVi Servo Motor with Brake, IP67 Protection
ZA06B-0266-B200	$\alpha$ 22/4000HVis Servo Motor
ZA06B-0266-B200#0100	$\alpha$ 22/4000HVis Servo Motor, IP67 Protection
ZA06B-0266-B500	$\alpha$ 22/4000HVis Servo Motor with Brake
ZA06B-0266-B500#0100	$\alpha$ 22/4000HVis Servo Motor with Brake, IP67 Protection
ZA06B-0269-B200	$\alpha$ 30/4000HVis Servo Motor
ZA06B-0269-B200#0100	$\alpha$ 30/4000HVis Servo Motor, IP67 Protection
ZA06B-0269-B500	$\alpha$ 30/4000HVis Servo Motor with Brake
ZA06B-0269-B500#0100	$\alpha$ 30/4000HVis Servo Motor with Brake, IP67 Protection
ZA06B-0273-B200	$\alpha$ 40/4000HVis Servo Motor
ZA06B-0273-B200#0100	$\alpha$ 40/4000HVis Servo Motor, IP67 Protection
ZA06B-0273-B500	$\alpha$ 40/4000HVis Servo Motor with Brake
ZA06B-0273-B500#0100	$\alpha$ 40/4000HVis Servo Motor with Brake, IP67 Protection
ZA06B-0276-B210	$\alpha$ 50/3000HVis Servo Motor with Fan
ZA06B-0276-B210#0100	$\alpha$ 50/3000HVis Servo Motor with Fan, IP67 Protection
ZA06B-0276-B510	$\alpha$ 50/3000HVis Servo Motor with Fan and Brake
ZA06B-0276-B510#0100	$\alpha$ 50/3000HVis Servo Motor with Fan and Brake, IP67 Protection

#### Motor Cables

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See applicable amplifier section for information about the proper cables to use with each motor.

## Servo Motors

### βis Series Servo Motors

#### Specifications

Motor Model	Unit	β0.4/5000is	β0.5/6000is	β1/6000is	β2/4000is	β4/4000is	β8/3000is	β12/3000is	β22/2000is
Cont Stall Torque*	in-lb (Nm)	3.5 (0.4)	5.8 (0.65)	10.6 (1.2)	17.7 (2)	31 (3.5)	62 (7)	97.4 (11)	177 (20)
Peak Torque*	in-lb (Nm)	8.9 (1)	22.1 (2.5)	44.3 (5)	62 (7)	88.5 (10)	132.8 (15)	239 (27)	398.3 (45)
Rotor Inertia	in-lb-s <sup>2</sup> × 10 <sup>-4</sup> (kg-m <sup>2</sup> × 10 <sup>-4</sup> )	0.885 (0.1)	1.593 (0.18)	3.009 (0.34)	25.76 (2.91)	45.58 (5.15)	103.55 (11.7)	201.80 (22.8)	466.43 (52.7)
Rated Speed	RPM	4000	6000	6000	4000	3000	2000	2000	2000
No Load Speed	RPM	5000	6000	6000	4000	4000	3000	3000	2000
Encoder Resolution	Counts/Rev	65,536	65,536	65,536	131,072	131,072	131,072	131,072	131,072
Flange Size	mm	60	60	60	90	90	130	130	174

#### Mechanical Data

Weight	lb (kg)	1.76 (0.8)	2.2 (1)	3.3 (1.5)	6.16 (2.8)	9.46 (4.3)	16.28 (7.4)	26.18 (11.9)	37.4 (17)
Axial Load Rating	lb (kg)	11 (5)	11 (5)	11 (5)	17.6 (8)	17.6 (8)	44 (20)	44 (20)	132 (60)
Radial Load Rating	lb (kg)	44 (20)	44 (20)	44 (20)	55 (25)	55 (25)	154 (70)	154 (70)	440 (200)
Mechanical Time Constant	msec	1	0.9	0.7	4	3	3	2	2
Thermal Time Constant	min	8	10	15	15	20	20	25	30
Static Friction	Nm	0.04	0.04	0.04	0.1	0.2	0.3	0.4	0.8

#### Electrical Data

Torque Constant*	in-lb/A (Nm/A)	0.99 (0.11)	1.97 (0.22)	3.98 (0.45)	5.49 (0.62)	6.64 (0.75)	10.27 (1.16)	9.56 (1.08)	15.66 (1.77)
Resistance*	ohms	0.55	0.85	1.5	1.6	0.94	1	0.39	0.44
Back EMF*	V <sub>rms</sub> /krpm	4	7.7	15.4	21	26	41	38	62
Rated Motor Power*	HP (kW)	0.17 (0.13)	0.47 (0.35)	0.67 (0.5)	0.67 (0.5)	1 (0.75)	1.6 (1.2)	2.4 (1.8)	3.4 (2.5)
Cont. Stall Current	A (rms)	3.6	2.9	2.7	3.3	4.7	6	10.2	11.3
Max Current	A <sub>peak</sub>	20	20	20	20	20	20	40	40
Insulation		Class F	Class F	Class F	Class F	Class F	Class F	Class F	Class F

#### Amplifier Model

Amp Model Number	βSVM1-20i	βSVM1-20i	βSVM1-20i	βSVM1-20i	βSVM1-20i	βSVM1-20i	βSVM1-40i	βSVM1-40i
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#### Brake Data

Holding Torque	in-lb (Nm)	5.8 (0.65)	5.8 (0.65)	10.6 (1.2)	26.6 (3)	26.6 (3)	70.8 (8)	70.8 (8)	309.8 (35)
Inertia Adder	in-lb-s <sup>2</sup> × 10 <sup>-4</sup> (kg-m <sup>2</sup> × 10 <sup>-4</sup> )	0.797 (0.09)	0.797 (0.09)	0.797 (0.09)	1.770 (0.2)	1.770 (0.2)	6.195 (0.7)	6.195 (0.7)	53.100 (6)
Weight Adder	lb (kg)	0.88 (0.4)	0.88 (0.4)	0.88 (0.4)	2.2 (1)	2.2 (1)	4.84 (2.2)	4.84 (2.2)	13.2 (6)
Current	A	0.5	0.5	0.5	0.9	0.9	1.1	1.1	1.2
Voltage	VDC	24	24	24	24	24	24	24	24
Engage time	msec	20	20	20	10	10	30	30	30
Release time	msec	40	40	40	60	60	160	160	160

\*Data shown are nominal values at 20°C

#### Environmental Specifications

Humidity	80% non-condensing
Ambient Temperature	0 to 40°C
Vibration	less than 5G (operating)
Altitude	3300 feet (1000 m)

# Motion Solutions

## Servo Motors

### βHVis Series Servo Motors

#### Specifications

Motor Model	Unit	β2/4000HVis	β4/4000HVis	β8/3000HVis	β12/3000HVis	β22/2000HVis
Cont Stall Torque*	Nm	2	3.5	7	11	20
	in-lb	17.7	31	62	97.4	177
Peak Torque*	Nm	7	10	15	27	45
	in-lb	62	88.5	132.8	239	398.3
Rotor Inertia	kgm <sup>2</sup> x 10 <sup>-4</sup>	2.91	5.15	11.7	22.8	52.7
	in-lb-s <sup>2</sup> x 10 <sup>-4</sup>	25.76	45.58	103.55	201.80	466.43
Rated Speed	RPM	4000	3000	2000	2000	2000
No Load Speed	RPM	4000	4000	3000	3000	2000
Encoder Resolution	Counts/Rev	131,072	131,072	131,072	131,072	131,072
Flange Size	mm	90	90	130	130	174

#### Mechanical Data

Weight	kg	2.8	4.3	7.4	11.9	17
	lb	6.16	9.46	16.28	26.18	37.4
Axial Load Rating	kg	8	8	20	20	60
	lb	17.6	17.6	44	44	132
Radial Load Rating	kg	25	25	70	70	200
	lb	55	55	154	154	440
Mechanical Time Constant	msec	4	3	3	2	2
Thermal Time Constant	min	15	20	20	25	30
Static Friction	Nm	0.1	0.2	0.3	0.4	0.8

#### Electrical Data

Torque Constant *	Nm/A	1.23	1.5	2.32	2.16	3.5
	in-lb/A	10.89	13.28	20.53	19.12	30.98
Resistance*	ohms	6.6	4	3.9	1.6	1.8
Back EMF Constant*	V(rms)/krpm	43	53	81	76	120
Rated Motor Power*	kW	0.5	0.75	1.2	1.8	2.5
	HP	0.67	1	1.6	2.4	3.4
Cont. Stall Current	A (rms)	1.6	2.3	3	5.1	5.6
Max Current	A (peak)	10	10	10	20	20
Insulation	Class F	Class F	Class F	Class F	Class F	Class F

#### Amplifier Model

Amp Model Number	βSVM1-10HVi	βSVM1-10HVi	βSVM1-10HVi	βSVM1-20HVi	βSVM1-20HVi
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#### Brake Data

Holding Torque	in-lb	26.6	26.6	70.8	70.8	309.8
	Nm	3	3	8	8	35
Inertia Adder	kgm <sup>2</sup> x 10 <sup>-4</sup>	0.2	0.2	0.7	0.7	6
	in-lb-s <sup>2</sup> x 10 <sup>-4</sup>	1.770	1.770	6.195	6.195	53.100
Weight Adder	lb	2.2	2.2	4.84	4.84	13.2
	kg	1	1	2.2	2.2	6
Current	A	0.9	0.9	1.1	1.1	1.2
Voltage	VDC	24	24	24	24	24
Engage time	msec	10	10	30	30	30
Release time	msec	60	60	160	160	160

\*Data shown are nominal values at 20°C

#### Environmental Specifications

Humidity	80% non-condensing
Ambient Temperature	0 to 40° C
Vibration	less than 5G (operating)
Altitude	3300 feet (1000 m)

## Servo Motors

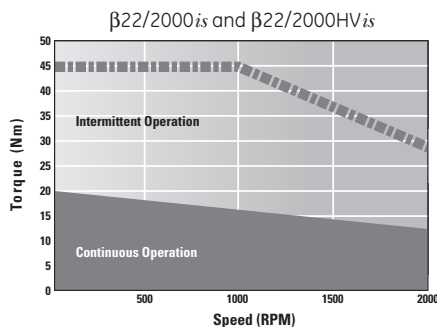
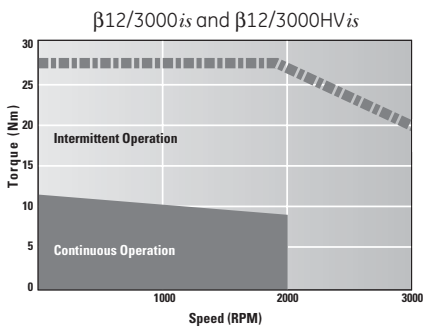
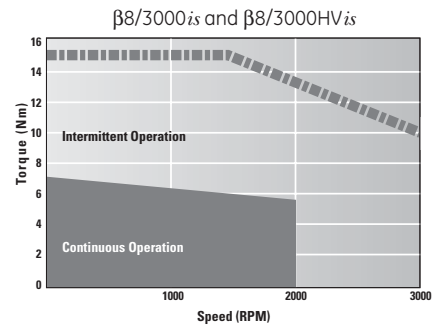
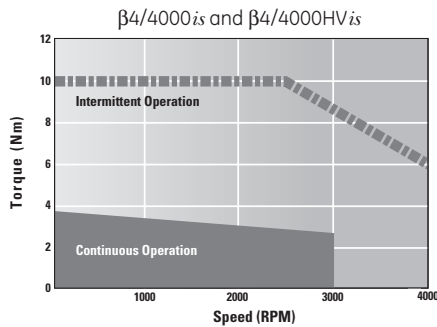
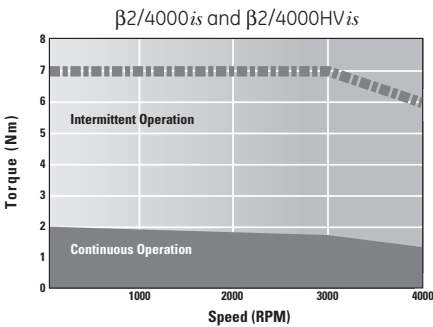
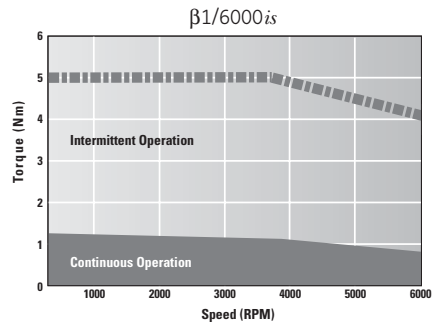
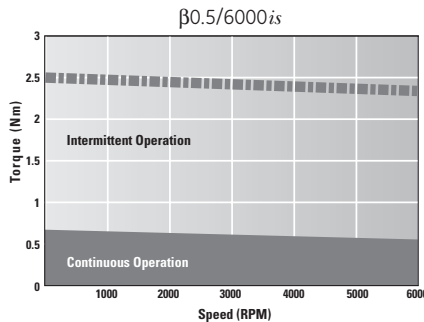
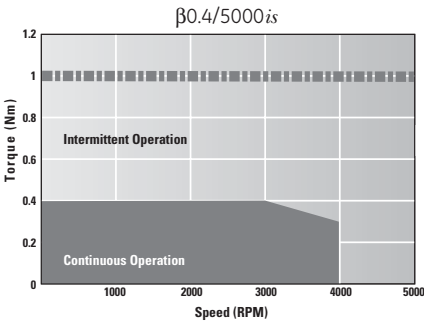
### $\beta$ is and $\beta$ HV is Series Servo Motors

#### Speed Torque Curves

The curves illustrate the relationship between motor speed and output torque. The motor can operate continuously at any combination of speed and torque within the prescribed continuous

operating zone. The limit of the continuous operating zone is determined with the motor's ambient temperature at 20°C and its drive current as a pure sine wave. Actual operation is limited by the current

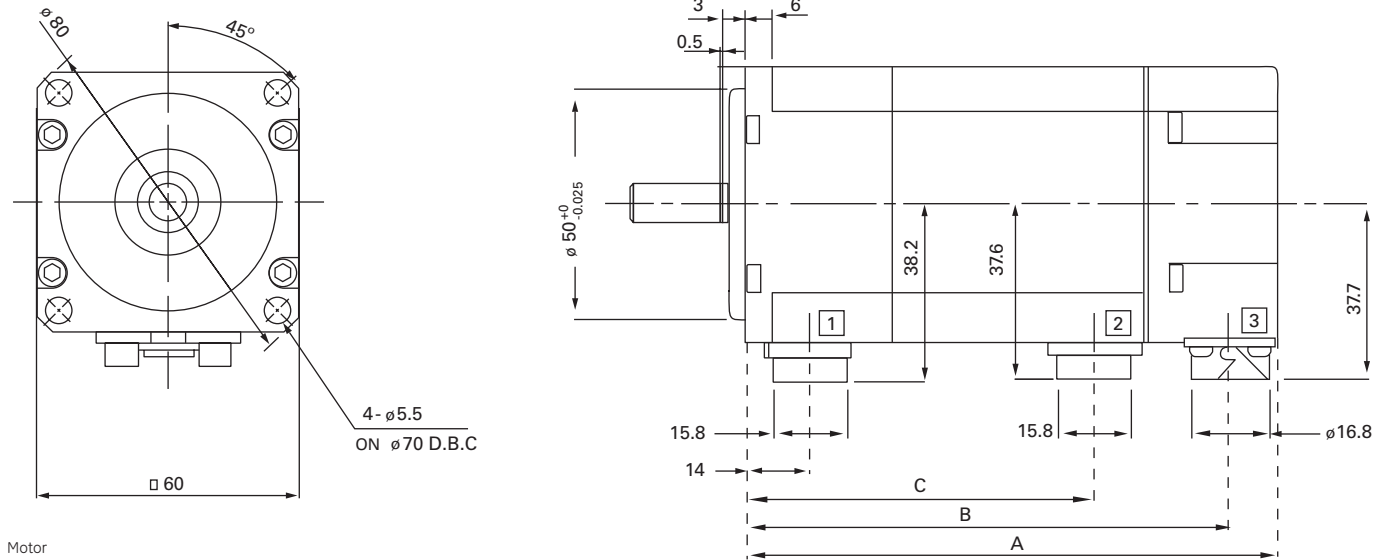
of the servo drive unit. The continuous operating zone must be derated for ambient temperature above 20°C.



### βis Series Servo Motors

#### Dimensions

β0.4/5000is, β0.5/6000is, β1/6000is



Motor

Shaft detail

Dimensions shown mm

Dimension	β0.4/5000is	β0.5/6000is	β1/6000is
A	75	89.5	118.5
A with brake	101.5	116	145
A1	∅9 <sup>+0.009</sup>	∅9 <sup>+0.009</sup>	∅14 <sup>+0.011</sup>
A2	1.2 <sup>+0.1</sup>	1.2 <sup>+0.1</sup>	2 <sup>+0.1</sup>
A3	3 <sup>+0.025</sup>	3 <sup>+0.025</sup>	5 <sup>+0.33</sup>
A4	M3 Depth 6	M3 Depth 6	M4 Depth 10
A5	25	25	30
B	65	79.5	108.5
B with brake	91.5	106	135
C	34.5	49	78
C with brake	61	75.5	104.5

Connector	Description
1	Brake (optional)
2	Power
3	Encoder

#### Notes

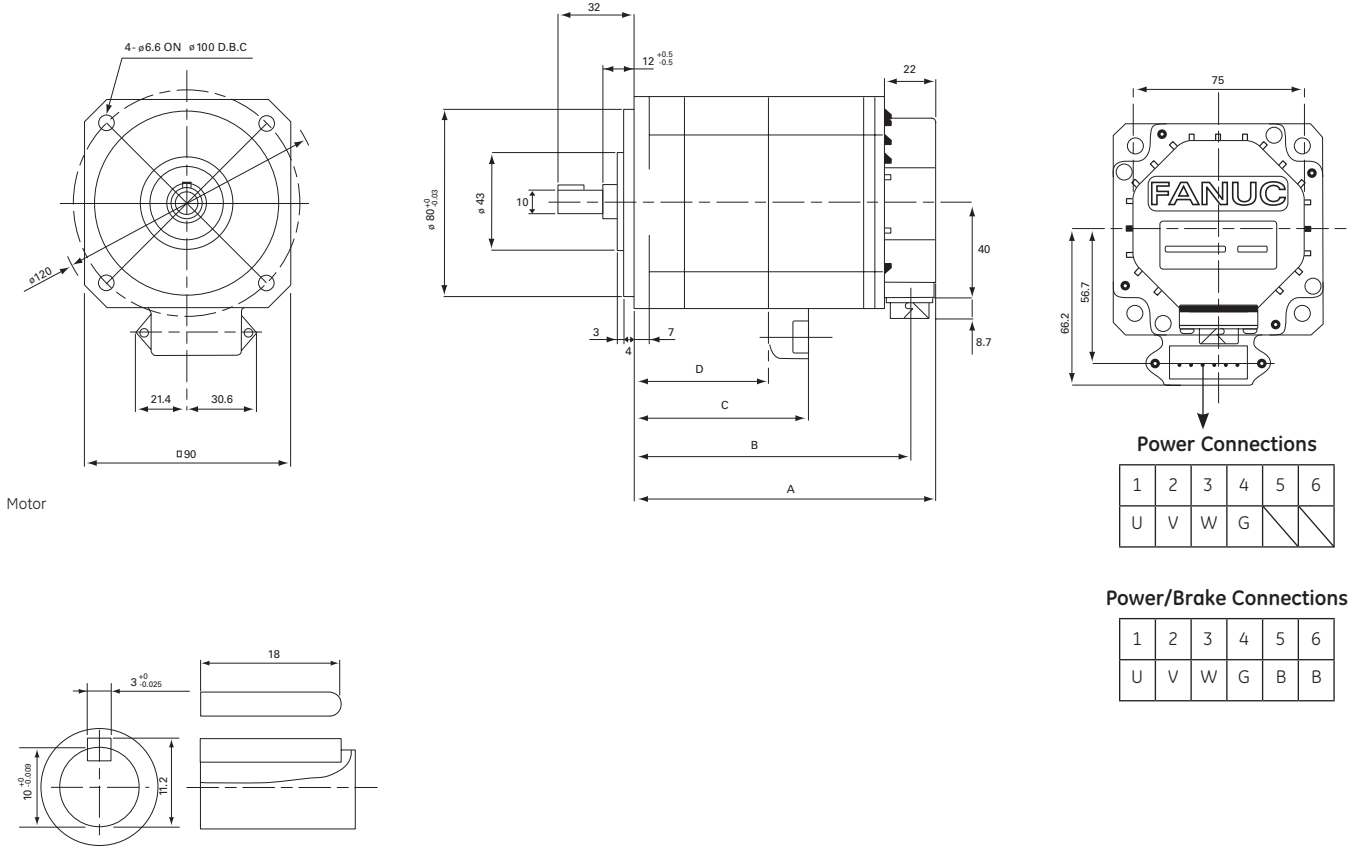
1. Shaft diameter runout = 0.02 mm max
2. Flange surface runout = 0.06 mm max
3. Maximum radial load for output shaft is 20 kgf (44 lb)

## Servo Motors

### βis Series Servo Motors

#### Dimensions

#### β2/4000is, β2/4000HVis



Motor

Shaft detail

Dimensions shown mm

Dimension	β2/4000is
	β2/4000HVis
A	130
A with brake	159
B	119
B with brake	148
C	75
C with brake	75
D	59
D with brake	59

#### Notes

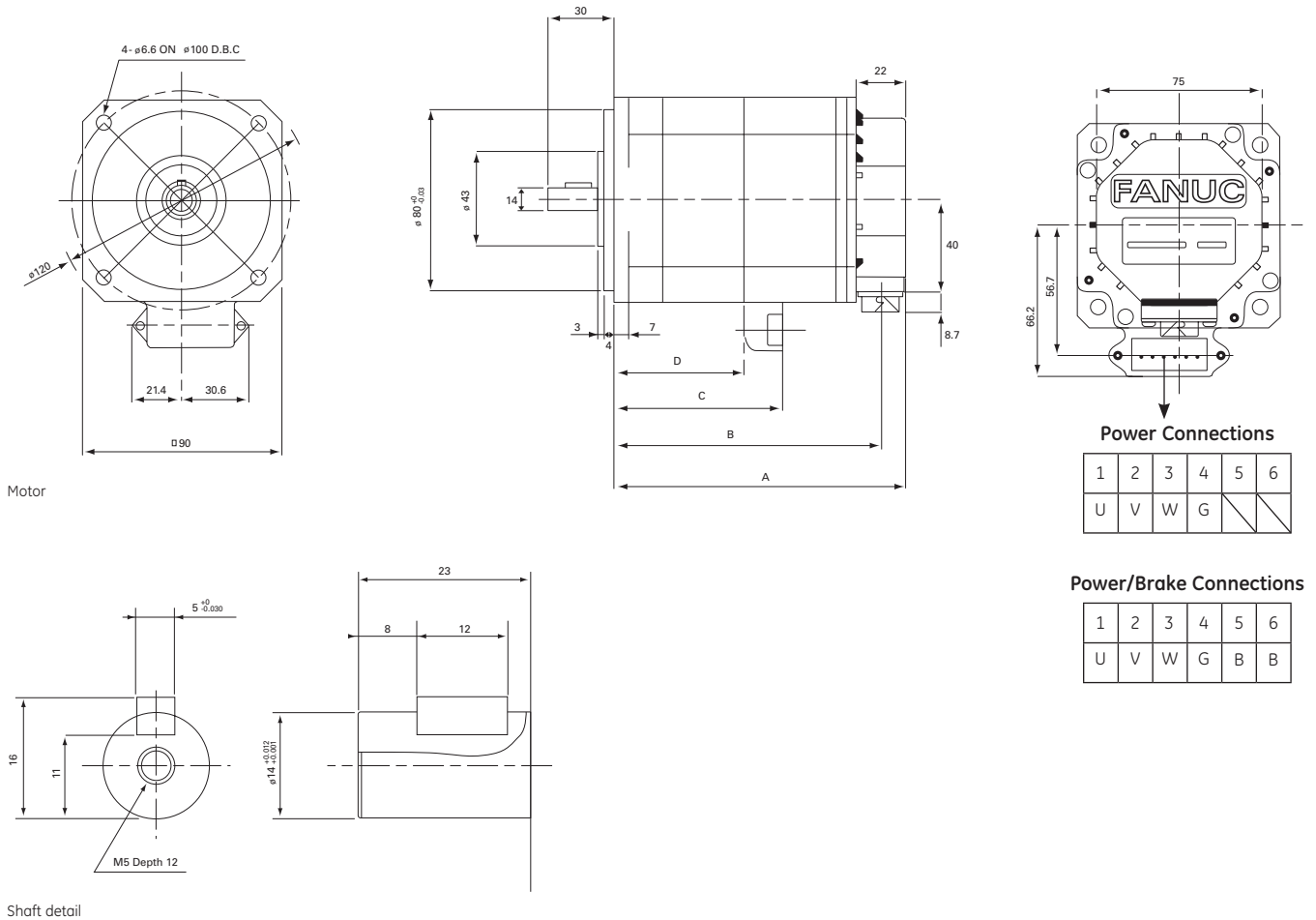
1. Shaft diameter runout = 0.02 mm max
2. Flange surface runout = 0.06 mm max
3. Maximum radial load for output shaft is 25 kgf (55 lb)

## Servo Motors

### βis Series Servo Motors

#### Dimensions

#### β4/4000is, β4/4000HVis



Dimensions shown mm

Dimension	β4/4000is
	β4/4000HVis
A	166
A with brake	195
B	155
B with brake	184
C	111
C with brake	111
D	95
D with brake	95

#### Notes

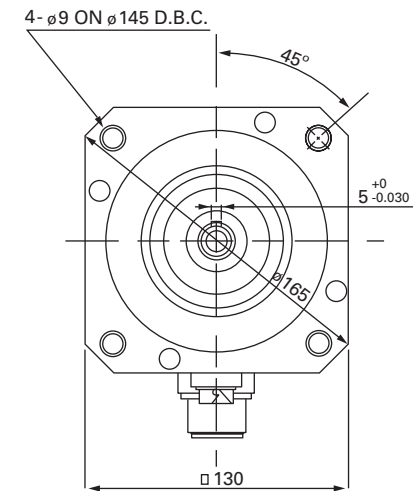
1. Shaft diameter runout = 0.02 mm max
2. Flange surface runout = 0.06 mm max
3. Maximum radial load for output shaft is 25 kgf (55 lb)



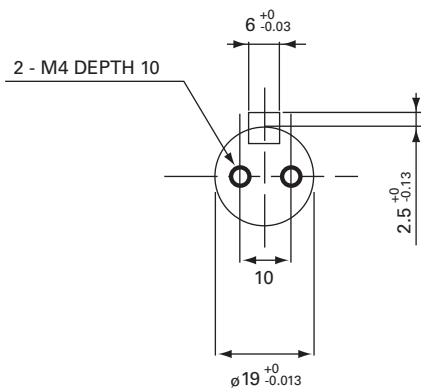
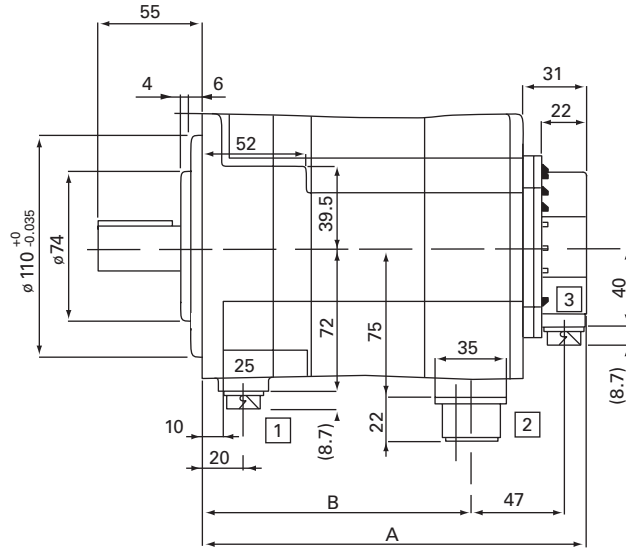
**βis Series Servo Motors**

**Dimensions**

β8/3000is, β8/3000HVis,  
β12/3000is, β12/3000HVis

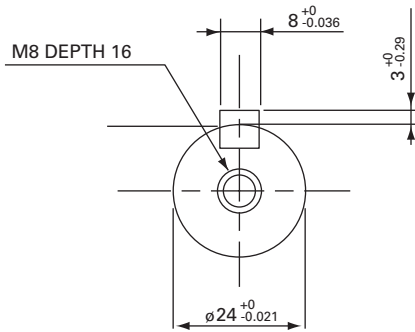


Motor



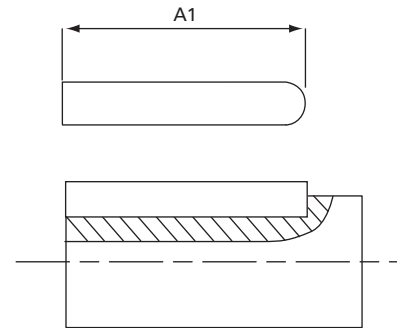
Shaft detail

β8/3000is  
β8/3000HVis



β12/3000is  
β12/3000HVis

Dimensions shown mm



Dimension	β8/3000is	β12/3000is
	β8/3000HVis	β12/3000HVis
A	166	222
A with brake	191	247
A1	36	45
B	108	164
B with brake	133	189

Connector	Description
1	Brake (optional)
2	Power
3	Encoder

**Notes**

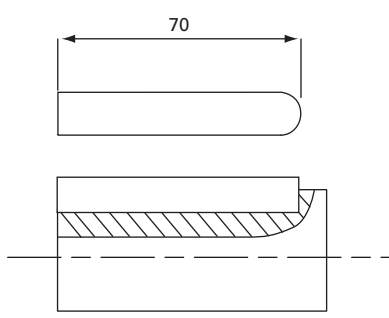
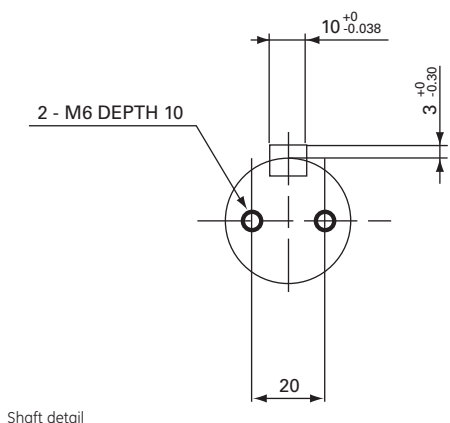
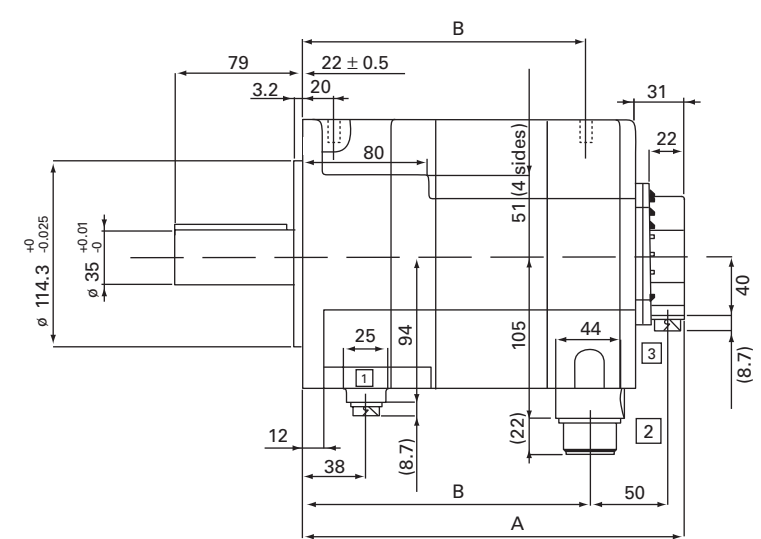
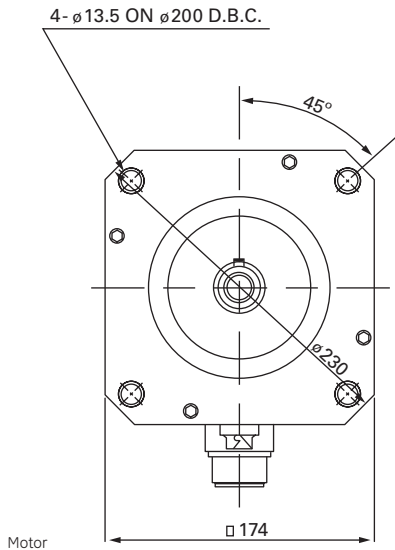
1. Shaft diameter runout = 0.02 mm max
2. Flange surface runout = 0.05 mm max
3. Maximum radial load for output shaft is 70 kgf (154 lb)

## Servo Motors

### βis Servo Series Motors

#### Dimensions

β22/2000is, β22/2000HVis



Dimensions shown mm

Dimension	β22/2000is	β22/2000HVis
A	202	
A with brake	243	
B	141	
B with brake	182	

Connector	Description
1	Brake (optional)
2	Power
3	Encoder

#### Notes

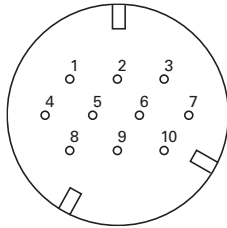
1. Shaft diameter runout = 0.03 mm max
2. Flange surface runout = 0.06 mm max
3. Maximum radial load for output shaft is 200 kgf (440 lb)

## Servo Motors

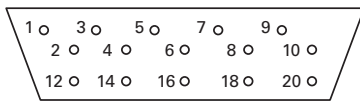
### $\beta$ is and $\beta$ HVis Series Servo Motors

#### Connections

##### Serial Encoder Connections



All  $\beta$ is and  $\beta$ HVis Motors

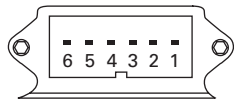


$\beta$ i and  $\beta$ HVis Amplifier (JF1)

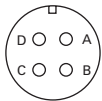
Description	$\beta$ is and $\beta$ HVis Motors	$\beta$ i Series Amplifier JF1 Connector
N/C	2	1
N/C	1	2
RD	6	5
$\overline{\text{RD}}$	5	6
+5 VDC	8, 9	9, 20
0 VDC	7, 10	12, 14
+6 VA (battery)	4	7
Frame Ground	3	16
Cable Shield	3	16

GE Mating Motor Connector:  
 ZA06B-6114-K204#E (90 degree)  
 ZA06B-6114-K204#S (Straight)

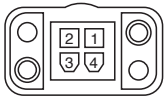
##### Power and Brake Connections



$\beta$ 2is and  $\beta$ 4is Motor Power/Brake  
 $\beta$ 2HVis and  $\beta$ 4HVis Motor Power/Brake



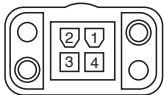
$\beta$ 8is,  $\beta$ 12is and  $\beta$ 22is Motor Power  
 $\beta$ 8HVis,  $\beta$ 12HVis and  $\beta$ 22HVis Motor Power



$\beta$ 0.4is,  $\beta$ 0.5is and  $\beta$ 1is Motor Power



$\beta$ 8is,  $\beta$ 12is and  $\beta$ 22is Brake  
 $\beta$ 8HVis,  $\beta$ 12HVis and  $\beta$ 22HVis Brake



$\beta$ 0.4is,  $\beta$ 0.5is and  $\beta$ 1is Brake

Description	$\beta$ 0.4is, $\beta$ 0.5is & $\beta$ 1is Motor Connector	$\beta$ 2is & $\beta$ 4is $\beta$ 2HVis & $\beta$ 4HVis Motor Connector	$\beta$ 8is, $\beta$ 12is, & $\beta$ 22is $\beta$ 8HVis, $\beta$ 12HVis, & $\beta$ 22HVis Motor Connector	$\beta$ i -Series Amplifier CZ7/CZ5 Connector
Phase U	1	1	A	U
Phase V	2	2	B	V
Phase W	3	3	C	W
Earth (case)	4	4	D	PE
Brake VDC	n/a	5	n/a	n/a
Brake VDC	n/a	6	n/a	n/a

GE Mating Motor Connector:  
 ZA06B-6114-K220#E (90 degree) ( $\beta$ 2is,  $\beta$ 4is,  $\beta$ 2HVis,  $\beta$ 4HVis)  
 ZA06B-6114-K220#S (Straight) ( $\beta$ 2is,  $\beta$ 4is,  $\beta$ 2HVis,  $\beta$ 4HVis)  
 Z44A730464-G18 (90 degree) ( $\beta$ 8is,  $\beta$ 12is,  $\beta$ 8HVis,  $\beta$ 12HVis)  
 Z44A730464-G17 (Straight) ( $\beta$ 2is,  $\beta$ 4is,  $\beta$ 2HVis,  $\beta$ 4HVis)  
 ZA06B-6114-K230#E ( $\beta$ 0.4is,  $\beta$ 0.5is,  $\beta$ 1is)  
 Z44A730464-G20 (90 degree) ( $\beta$ 22is,  $\beta$ 22HVis)  
 Z44A730464-G19 (Straight) ( $\beta$ 22is,  $\beta$ 22HVis)

Amplifier Mating Connector:  
 ZA06B-6130-K200 ( $\beta$ 0.4 to  $\beta$ 8is)  
 ZA06B-6110-K202#VYS ( $\beta$ 12is,  $\beta$ 22is, All  $\beta$ HVis)

Description	$\beta$ 0.4is, $\beta$ 0.5is & $\beta$ 1is Motor Brake Connector	$\beta$ 8is, $\beta$ 12is, & $\beta$ 22is $\beta$ 8HVis, $\beta$ 12HVis, & $\beta$ 22HVis Motor Brake Connector
Brake VDC	1	1
Brake VDC	2	2
Earth (case)	4	4

GE Mating Motor Connector:  
 ZA06B-6114-K213#E (90 degree) ( $\beta$ 8is,  $\beta$ 12is,  $\beta$ 22is,  $\beta$ 8HVis,  $\beta$ 12HVis,  $\beta$ 22HVis)  
 ZA06B-6114-K213#S (Straight) ( $\beta$ 8is,  $\beta$ 12is,  $\beta$ 22is,  $\beta$ 8HVis,  $\beta$ 12HVis,  $\beta$ 22HVis)  
 ZA06B-6114-K232#E ( $\beta$ 0.4is,  $\beta$ 0.5is,  $\beta$ 1is)

24 VDC Brake power connections are not polarized.

## Servo Motors

### $\beta$ is Series Servo Motors

#### Ordering Information

Model Number	Description
ZA06B-0114-B203	$\beta$ 0.4/5000is Servo Motor
ZA06B-0114-B203#0100	$\beta$ 0.4/5000is Servo Motor, IP67 Protection
ZA06B-0114-B503	$\beta$ 0.4/5000is Servo Motor with Brake
ZA06B-0114-B503#0100	$\beta$ 0.4/5000is Servo Motor with Brake, IP67 Protection
ZA06B-0115-B203	$\beta$ 0.5/6000is Servo Motor
ZA06B-0115-B203#0100	$\beta$ 0.5/6000is Servo Motor, IP67 Protection
ZA06B-0115-B503	$\beta$ 0.5/6000is Servo Motor with Brake
ZA06B-0115-B503#0100	$\beta$ 0.5/6000is Servo Motor with Brake, IP67 Protection
ZA06B-0116-B203	$\beta$ 1/6000is Servo Motor
ZA06B-0116-B203#0100	$\beta$ 1/6000is Servo Motor, IP67 Protection
ZA06B-0116-B503	$\beta$ 1/6000is Servo Motor with Brake
ZA06B-0116-B503#0100	$\beta$ 1/6000is Servo Motor with Brake, IP67 Protection
ZA06B-0061-B203	$\beta$ 2/4000is Servo Motor
ZA06B-0061-B203#0100	$\beta$ 2/4000is Servo Motor, IP67 Protection
ZA06B-0061-B503	$\beta$ 2/4000is Servo Motor with Brake
ZA06B-0061-B503#0100	$\beta$ 2/4000is Servo Motor with Brake, IP67 Protection
ZA06B-0063-B203	$\beta$ 4/4000is Servo Motor
ZA06B-0063-B203#0100	$\beta$ 4/4000is Servo Motor, IP67 Protection
ZA06B-0063-B503	$\beta$ 4/4000is Servo Motor with Brake
ZA06B-0063-B503#0100	$\beta$ 4/4000is Servo Motor with Brake, IP67 Protection
ZA06B-0075-B203	$\beta$ 8/3000is Servo Motor
ZA06B-0075-B203#0100	$\beta$ 8/3000is Servo Motor, IP67 Protection
ZA06B-0075-B503	$\beta$ 8/3000is Servo Motor with Brake
ZA06B-0075-B503#0100	$\beta$ 8/3000is Servo Motor with Brake, IP67 Protection
ZA06B-0078-B203	$\beta$ 12/3000is Servo Motor
ZA06B-0078-B203#0100	$\beta$ 12/3000is Servo Motor, IP67 Protection
ZA06B-0078-B503	$\beta$ 12/3000is Servo Motor with Brake
ZA06B-0078-B503#0100	$\beta$ 12/3000is Servo Motor with Brake, IP67 Protection
ZA06B-0085-B203	$\beta$ 22/2000is Servo Motor
ZA06B-0085-B203#0100	$\beta$ 22/2000is Servo Motor, IP67 Protection
ZA06B-0085-B503	$\beta$ 22/2000is Servo Motor with Brake
ZA06B-0085-B503#0100	$\beta$ 22/2000is Servo Motor with Brake, IP67 Protection

### $\beta$ HVis Series Servo Motors

#### Ordering Information

Model Number	Description
ZA06B-0062-B203	$\beta$ 2/4000HVis Servo Motor
ZA06B-0062-B203#0100	$\beta$ 2/4000HVis Servo Motor, IP67 Protection
ZA06B-0062-B503	$\beta$ 2/4000HVis Servo Motor with Brake
ZA06B-0062-B503#0100	$\beta$ 2/4000HVis Servo Motor with Brake, IP67 Protection
ZA06B-0064-B203	$\beta$ 4/4000HVis Servo Motor
ZA06B-0064-B203#0100	$\beta$ 4/4000HVis Servo Motor, IP67 Protection
ZA06B-0064-B503	$\beta$ 4/4000HVis Servo Motor with Brake
ZA06B-0064-B503#0100	$\beta$ 4/4000HVis Servo Motor with Brake, IP67 Protection
ZA06B-0076-B203	$\beta$ 8/3000HVis Servo Motor
ZA06B-0076-B203#0100	$\beta$ 8/3000HVis Servo Motor, IP67 Protection
ZA06B-0076-B503	$\beta$ 8/3000HVis Servo Motor with Brake
ZA06B-0076-B503#0100	$\beta$ 8/3000HVis Servo Motor with Brake, IP67 Protection
ZA06B-0079-B203	$\beta$ 12/3000HVis Servo Motor
ZA06B-0079-B203#0100	$\beta$ 12/3000HVis Servo Motor, IP67 Protection
ZA06B-0079-B503	$\beta$ 12/3000HVis Servo Motor with Brake
ZA06B-0079-B503#0100	$\beta$ 12/3000HVis Servo Motor with Brake, IP67 Protection
ZA06B-0086-B203	$\beta$ 22/2000HVis Servo Motor
ZA06B-0086-B203#0100	$\beta$ 22/2000HVis Servo Motor, IP67 Protection
ZA06B-0086-B503	$\beta$ 22/2000HVis Servo Motor with Brake
ZA06B-0086-B503#0100	$\beta$ 22/2000HVis Servo Motor with Brake, IP67 Protection

#### Motor Cables

See applicable amplifier section for information about the proper cables to use with each motor.

## Servo Motors

### VersaMotion Servo Motors

#### Specifications

Specifications	IC800VMM01L	IC800VMM02L	IC800VMM04L	IC800VMM07L
Product Name	VersaMotion 100 Watt	VersaMotion 200 Watt	VersaMotion 400 Watt	VersaMotion 750 Watt
Rated Output (kW)	0.1	0.2	0.4	0.75
Rated Torque (Nm)	0.32	0.64	1.27	2.39
Maximum Torque (Nm)	0.96	1.92	3.82	7.16
Rated Speed (RPM)	3000	3000	3000	3000
Maximum Speed (RPM)	5000	5000	5000	5000
Rated Current (Amps)	0.9	1.55	2.6	5.1
Maximum Current (Amps)	2.7	4.65	7.8	15.3
Rotor Moment of Inertia (Kg.m <sup>2</sup> x 10 <sup>-4</sup> )	0.037	0.177	0.277	1.13
Mechanical Time Constant (msec)	0.75	0.8	0.53	0.63
Torque Constant - KT (Nm/A)	0.36	0.41	0.49	0.47
Voltage Constant - KE (mV/rpm)	13.6	16	17.4	17.2
Armature Resistance (Ohm)	9.3	2.79	1.55	0.42
Armature Inductance (mH)	24	10.84	6.84	3.53
Electrical Time Constant (msec)	2.58	3.89	4.43	8.37
Maximum Radial Shaft Load (Newton)	78.4	196	196	245
Maximum Thrust Shaft Load (Newton)	39.2	68	68	98
Amplifier Model	IC800VMA012	IC800VMA022	IC800VMA042	IC800VMA072

#### Motor Technical Data

Insulation Class	Class B
Insulation Resistance	>100M ohm, 500 VDC
Insulation Strength	1500 VAC, 50Hz, 60 seconds
Vibration Grade (um)	15
Brake Power (VDC)	24
Vibration	2.5G
IP Rating	IP65 (except shaft and connector)

#### Environmental Specifications

Relative Humidity	20~90%RH (non condensing)
Operating Temperature	0 to 40°C
Storage Temperature	-10 to 80°C

# Motion Solutions

## Servo Motors

### VersaMotion Servo Motors

#### Specifications (continued)

Specifications	IC800VMM10L	IC800VMM10M	IC800VMM20L	IC800VMM20M	IC800VMM30M
Product Name	VersaMotion 1000 Watt	VersaMotion 1000 Watt	VersaMotion 2000 Watt	VersaMotion 2000 Watt	VersaMotion 3000 Watt
Rated Output (kW)	1.0	1.0	2.0	2.0	3.0
Rated Torque (Nm)	3.18	4.77	6.37	9.55	14.32
Maximum Torque (Nm)	9.54	14.32	19.11	28.66	42.96
Rated Speed (RPM)	3000	2000	3000	2000	2000
Maximum Speed (RPM)	5000	3000	5000	3000	3000
Rated Current (Amps)	7.3	5.6	11.3	11.0	16.1
Maximum Current (Amps)	21.9	24.9	33.9	33.0	48.3
Rotor Moment of Inertia (Kg.m <sup>2</sup> x 10 <sup>-4</sup> )	2.65	9.14	4.45	15.88	55
Mechanical Time Constant (msec)	0.74	1.64	0.66	1.05	1.06
Torque Constant - KT (Nm/A)	0.44	0.85	0.53	0.87	0.89
Voltage Constant - KE (mV/rpm)	16.8	31.9	19.2	31.8	32
Armature Resistance (Ohm)	0.20	0.465	0.14	0.174	0.052
Armature Inductance (mH)	2.0	5.99	1.53	2.76	1.38
Electrical Time Constant (msec)	10.26	12.88	10.63	15.86	26.39
Maximum Radial Shaft Load (Newton)	490	490	490	490	1470
Maximum Thrust Shaft Load (Newton)	98	98	98	98	490
Amplifier Model	IC800VMA102	IC800VMA102	IC800VMA202	IC800VMA202	IC800VMA302

#### Motor Technical Data

Insulation Class	Class B
Insulation Resistance	>100M ohm, 500 VDC
Insulation Strength	1500 VAC, 50Hz, 60 seconds
Vibration Grade (um)	15
Brake Power (VDC)	24
Vibration	2.5G
IP Rating	IP65 (except shaft and connector)

#### Environmental Specifications

Relative Humidity	20~90%RH (non condensing)
Operating Temperature	0 to 40°C
Storage Temperature	-10 to 80°C

## Servo Motors

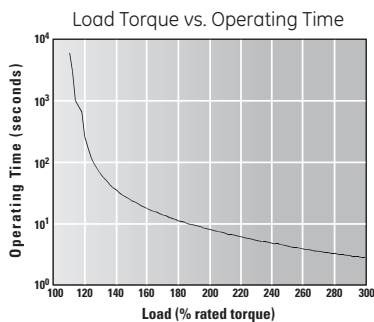
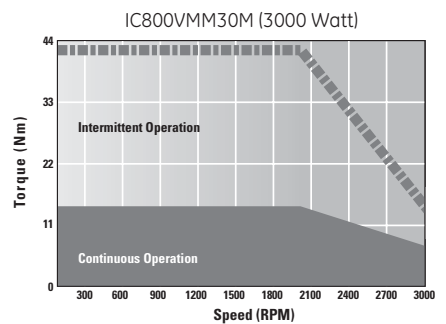
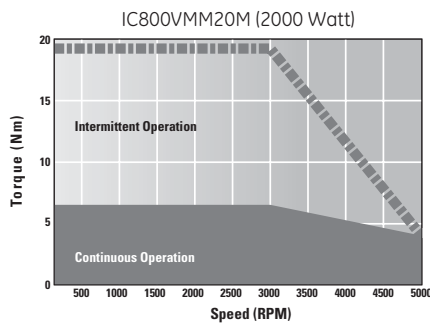
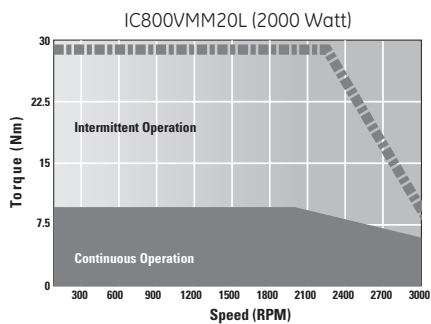
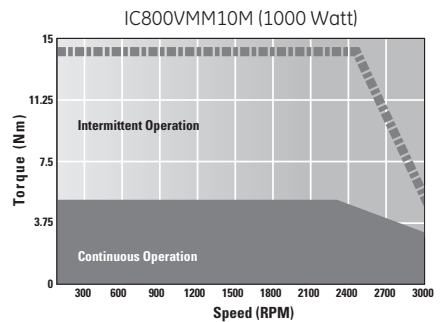
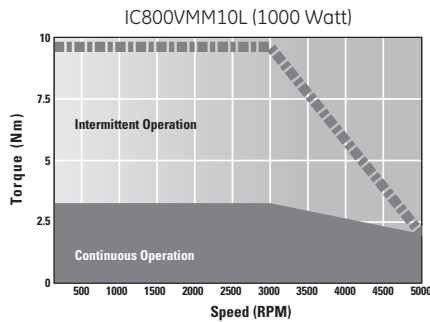
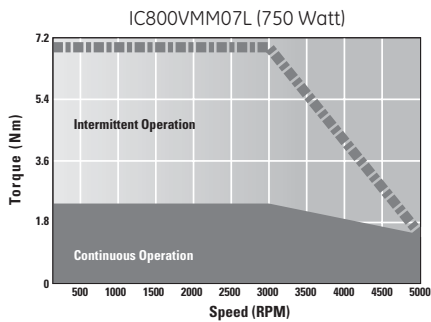
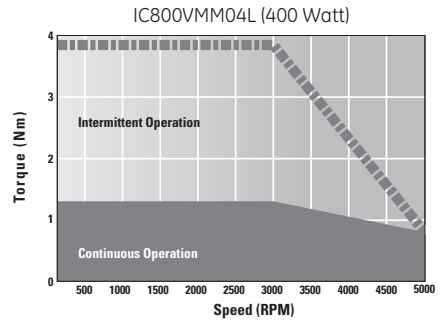
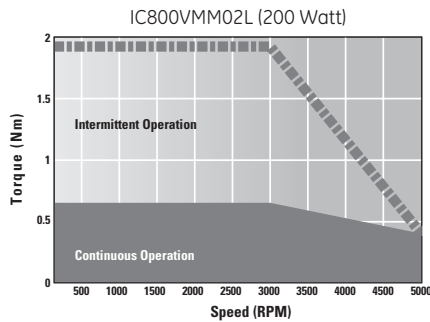
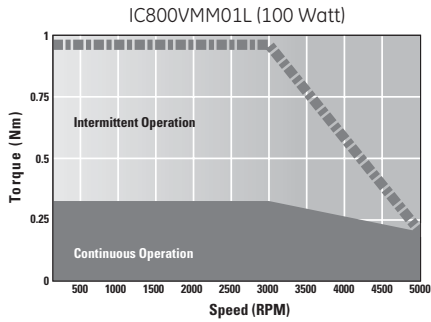
### VersaMotion Servo Motors

#### Speed Torque Curves

The curves illustrate the relationship between motor speed and output torque. The motor can operate continuously at any combination of speed and torque within the prescribed continuous

operating zone. The limit of the continuous operating zone is determined with the motor's ambient temperature at 20°C and its drive current as a pure sine wave. Actual operation is limited by the current

of the servo drive unit. The continuous operating zone must be derated for ambient temperature above 20°C.



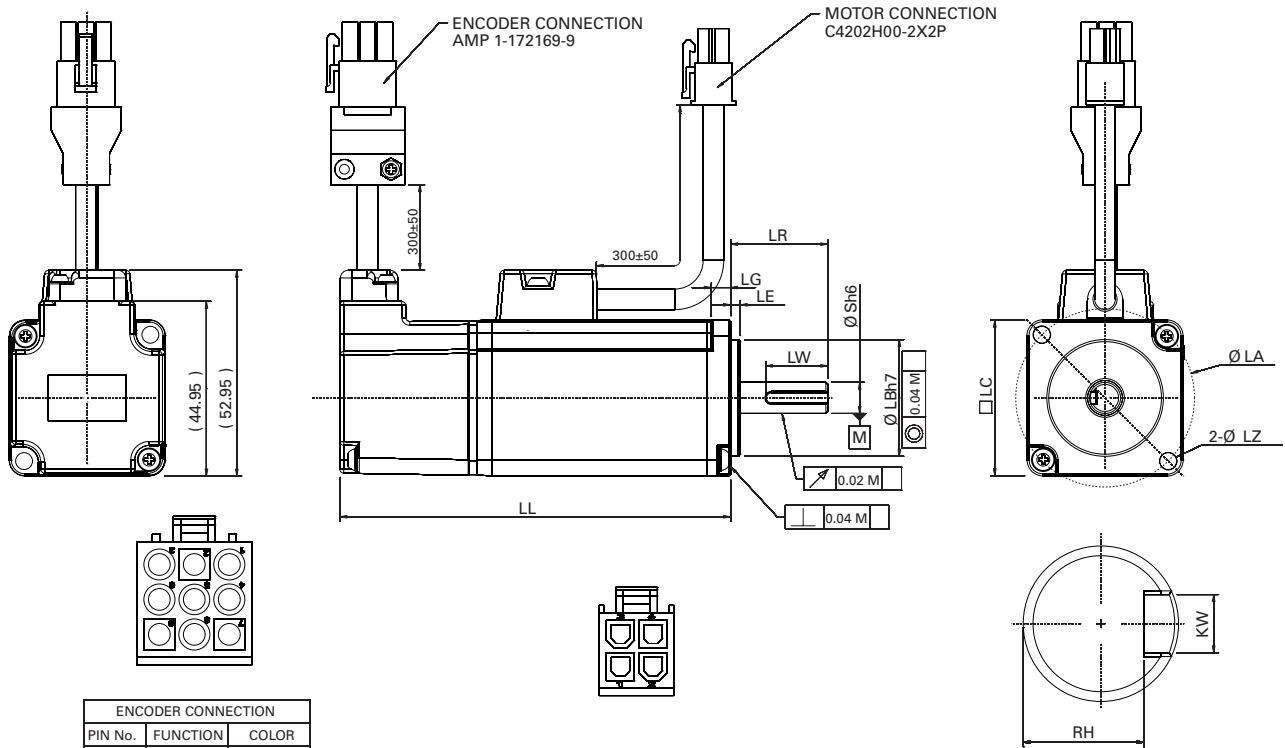
Load	Operating Time
120%	263.8 s
140%	35.2 s
160%	17.6 s
180%	11.2 s
200%	8 s
220%	6.1 s
240%	4.8 s
260%	3.9 s
280%	3.3 s
300%	2.8 s

## Servo Motors

### VersaMotion Servo Motors

#### Dimensions

#### IC800VMM01L



ENCODER CONNECTION		
PIN No.	FUNCTION	COLOR
1	A	BLK
2	B	WHT
3	Z	ORG
4	$\bar{A}$	BLK/RED
5	$\bar{B}$	WHT/RED
6	$\bar{Z}$	ORG/RED
7	DC+5V	BRN
8	GND	BLU
9	SHIELD	SHIELD

MOTOR CONNECTION		
PIN No.	FUNCTION	COLOR
1	U	RED
2	V	WHT
3	W	BLK
4	C.G.	GRN/YEL

SHAFT END DETAILS

Dimensions shown mm

Dimension	IC800VMM01L□
LC	40
LZ	4.5
LA	46
S	8
LB	30
LL	100.6
LL with brake	N/A (no brake available on 100 Watt model at this time)
LR	25
LE	2.5
LG	5
LW	16
RH	6.2
KW	3

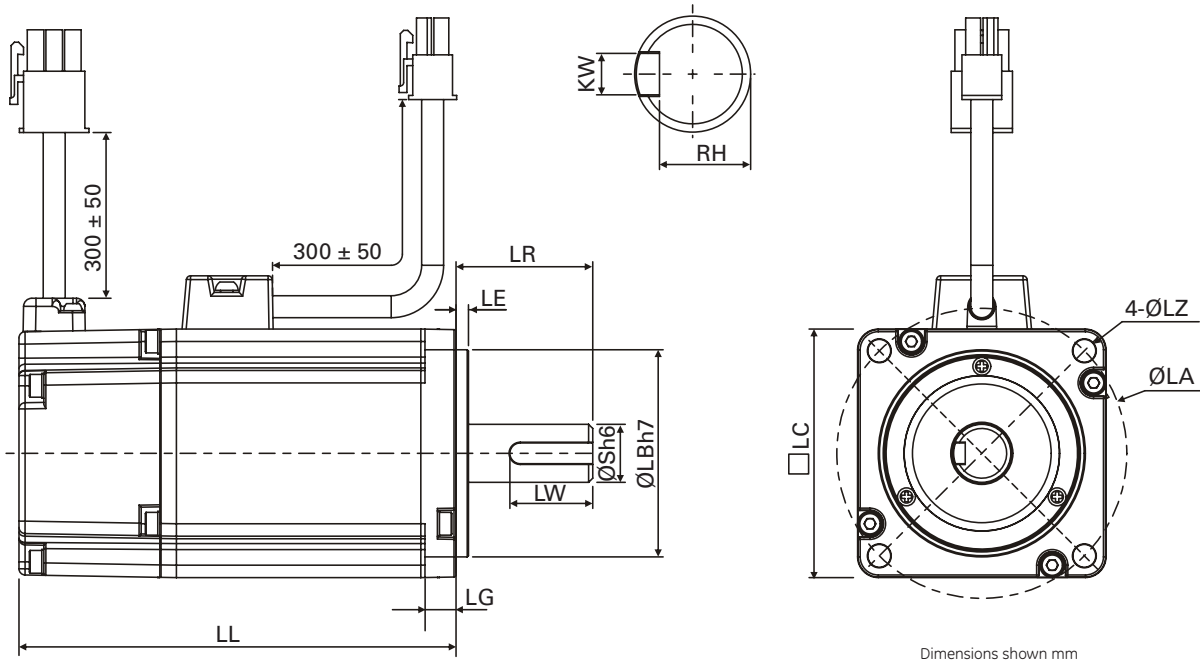
The boxes (□) at the ends of the model names are for shaft type or options (keyway, brake and oilseal)



VersaMotion Servo Motors

Dimensions

IC800VMM02L, IC800VMM04L, IC800VMM07L



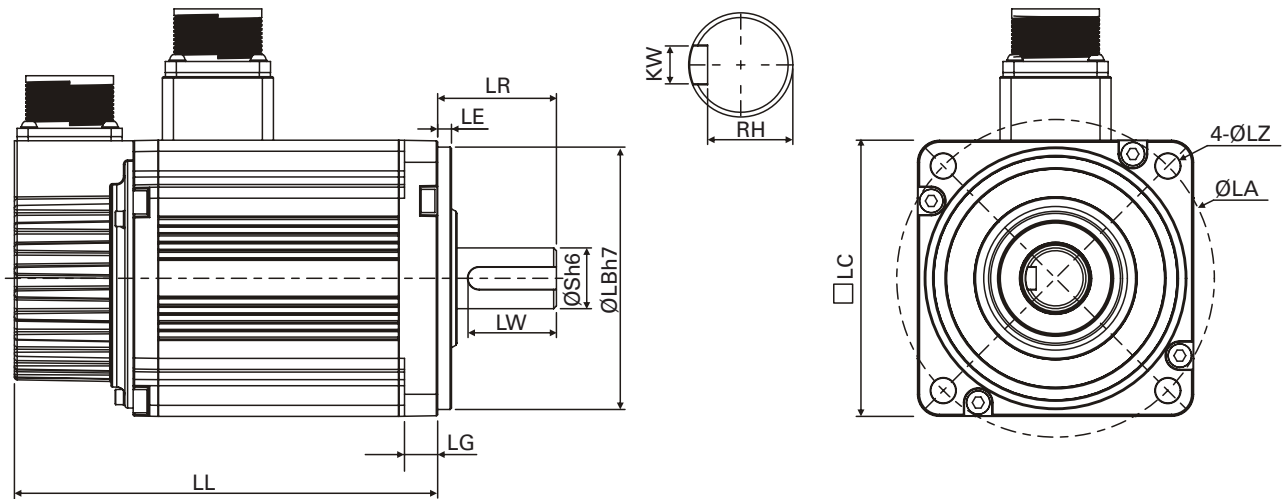
Dimension	IC800VMM02L□	IC800VMM04L□	IC800VMM07L□
LC	60	60	80
LZ	5.5	5.5	6.6
LA	70	70	90
S	14	14	19
LB	50	50	70
LL	105.5	130.7	138.3
LL with brake	141.6	166.8	178
LR	30	30	35
LE	3	3	3
LG	7.5	7.5	8
LW	20	20	25
RH	11	11	15.5
KW	5	5	6

The boxes (□) at the ends of the model names are for shaft type or options (keyway, brake and oilseal)

VersaMotion Servo Motors

Dimensions

IC800VMM10L, IC800VMM10M, IC800VMM20L, IC800VMM20M, IC800VMM30M



Dimensions shown mm

Dimension	IC800VMM10L □	IC800VMM10M □	IC800VMM20L □	IC800VMM20M □	IC800VMM30M □
LC	100	130	100	130	180
LZ	9	4	9	4	13.5
LA	115	145	115	145	200
S	22	22	22	22	35
LB	95	110	95	110	114.3
LL	153.5	147.5	199	187.5	202.1
LL with brake	192.5	183.5	226	216	235
LR	45	55	45	55	79
LE	5	6	5	6	4
LG	12	11.5	12	11.5	20
LW	32	36	32	36	63
RH	18	18	18	18	30
KW	8	8	8	8	10

The boxes (□) at the ends of the model names are for shaft type or options (keyway, brake and oilseal)

## Servo Motors

### VersaMotion Servo Motors

#### Ordering Information

##### Part Number

Motor Only	Description	Amplifier
IC800VMM01LNKSE25	100 Watt VersaMotion Servo Motor	IC800VMA012
IC800VMM02LNKSE25	200 Watt VersaMotion Servo Motor	IC800VMA022
IC800VMM02LBKSE25	200 Watt VersaMotion Servo Motor with Brake	IC800VMA022
IC800VMM04LNKSE25	400 Watt VersaMotion Servo Motor	IC800VMA042
IC800VMM04LBKSE25	400 Watt VersaMotion Servo Motor with Brake	IC800VMA042
IC800VMM07LNKSE25	750 Watt VersaMotion Servo Motor	IC800VMA072
IC800VMM07LBKSE25	750 Watt VersaMotion Servo Motor with Brake	IC800VMA072
IC800VMM10LNKSE25	1000 Watt VersaMotion Servo Motor	IC800VMA102
IC800VMM10MNKSE25	1000 Watt VersaMotion Servo Motor	IC800VMA102
IC800VMM10LBKSE25	1000 Watt VersaMotion Servo Motor with Brake	IC800VMA102
IC800VMM10MBKSE25	1000 Watt VersaMotion Servo Motor with Brake	IC800VMA102
IC800VMM20LNKSE25	2000 Watt VersaMotion Servo Motor	IC800VMA202
IC800VMM20MNKSE25	2000 Watt VersaMotion Servo Motor	IC800VMA202
IC800VMM20LBKSE25	2000 Watt VersaMotion Servo Motor with Brake	IC800VMA202
IC800VMM20MBKSE25	2000 Watt VersaMotion Servo Motor with Brake	IC800VMA202
IC800VMM30MNKSE25	3000 Watt VersaMotion Servo Motor	IC800VMA302
IC800VMM30MBKSE25	3000 Watt VersaMotion Servo Motor with Brake	IC800VMA302

#### Motor Cables

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See applicable amplifier section for information about the proper cables to use with each motor.

# Motion Solutions

## Servo Motors

### MTR-3T Series Servo Motors

#### Specifications

Specifications	Units	3T11-G	3T12-G	3T13-G	3T21-G	3T22-G	3T23-G	3T24-H	3T42-H	3T43-H	3T43-J	3T44-J
Continuous Stall Torque <sup>1</sup>	in-lb (Nm)	2.7 (0.30)	5.3 (0.6)	8 (0.9)	5.3 (0.60)	11.5 (1.3)	17.7 (2.0)	23.0 (2.6)	36.3 (4.1)	50.4 (5.7)	54.0 (6.1)	72 (8.13)
Peak Torque <sup>3</sup>	in-lb (Nm)	9.3 (1.05)	20.8 (2.35)	24.6 (2.78)	19.9 (2.25)	35.5 (4.01)	53.5 (6.05)	58.2 (6.58)	105.8 (11.9)	100 (11.3)	106.7 (12.06)	143.6 (16.23)
Rated Speed:												
@120 VAC input	RPM	3,500	4,250	4,500	3,025	2,325	1,800	1,500	1,475	925	1,500	1,050
@240 VAC input		7,000	8,500	9,000	6,050	4,650	3,600	3,000	2,950	1,850	3,000	2,100
@480 VAC input		n/a	n/a	n/a	n/a	n/a	n/a	n/a	5,900	n/a	6,800	5,100
No-load Speed:												
@120 VAC input	RPM	6,450	5,400	5,300	4,625	3,550	2,350	2,175	2,000	1,300	2,025	1,500
@240 VAC input		12,900	10,800	10,600	9,250	7,100	4,700	4,350	4,000	2,600	4,050	3,000
@480 VAC input		n/a	n/a	n/a	n/a	n/a	n/a	n/a	7,900	n/a	8,100	6,000
Feedback	4096 counts/rev resolver (control transmitter; 0.5 transformation ratio)											
Weight	lb (kg)	2.6 (1.2)	3.3 (1.5)	4.2 (1.9)	3.7 (1.7)	5.0 (2.3)	6.4 (2.9)	7.7 (3.5)	136 (6.2)	16.7 (7.6)	16.7 (7.6)	20 (9.0)
Rotor Inertia	in-lb-s <sup>2</sup> x 10 <sup>-4</sup> (kg-m <sup>2</sup> x 10 <sup>-4</sup> )	1.02 (0.12)	1.64 (0.19)	2.26 (0.26)	1.9 (0.22)	3.4 (0.38)	4.9 (0.55)	6.4 (0.72)	32 (3.6)	46 (5.2)	46 (5.2)	60 (6.8)
Shaft Thrust Load <sup>2</sup>	lb (kg)	n/a	n/a	n/a	17 (7.7)	17 (7.7)	17 (7.7)	17 (7.7)	41.5 (18.9)	41.5 (18.9)	41.5 (18.9)	41.5 (18.9)
Shaft Radial Load <sup>2</sup>	lb (kg)	n/a	n/a	n/a	62 (28.1)	62 (28.1)	62 (28.1)	62 (28.1)	157 (71.5)	157 (71.5)	157 (71.5)	157 (71.5)
Torque Constant	in-lb/A <sub>(rms)</sub> (Nm/A <sub>(rms)</sub> )	2.4 (0.27)	2.9 (0.32)	2.9 (0.32)	3.3 (0.37)	4.3 (0.49)	6.5 (0.74)	7.0 (0.79)	7.7 (0.87)	11.9 (1.34)	7.5 (0.85)	10.2 (1.15)
Resistance (phase)	Ohms	16.3	6.8	3.9	8.8	4.81	6.1	4.6	3.2	3.9	1.54	1.8
Inductance (phase)	mH	7.1	4.3	2.7	10.5	7.4	10.6	8.9	8.9	13.0	5.3	7.1
Electrical Time Constant	ms	0.43	0.63	0.69	1.19	1.54	1.73	1.93	2.78	3.33	3.44	3.94
Continuous Current	A <sub>(rms)</sub>	0.96	1.88	2.73	1.72	2.65	2.7	3.3	4.7	4.6	7.2	7.2

<sup>1</sup>Torque shown is available up to an ambient temperature of 25°C with motor mounted to a 10' x 10' x 0.25' aluminum heat sink. For higher ambient temperature the continuous Torque must be derated by multiplying by the following factor (155-t)/130 where t=ambient motor temperature in degrees C (40°C max.).

<sup>2</sup>Shaft loads are based on L10 bearing life at 3000 rpm and assume force is applied to center of shaft.

<sup>3</sup>Peak torque ratings are limited by the specific amplifier or controller shown in the MTR-Series motor ordering information based on the amplifier's peak current limitations.

#### Optional Brake Data

Inertia Adder	in-lb-s <sup>2</sup> x 10 <sup>-4</sup> (kg-m <sup>2</sup> x 10 <sup>-4</sup> )	1.1 (0.12)	1.1 (0.12)	1.1 (0.12)	1.1 (0.12)	1.1 (0.12)	1.1 (0.12)	1.1 (0.12)	9.7 (1.1)	9.7 (1.1)	9.7 (1.1)	9.7 (1.1)
Weight Adder	lb (kg)	0.4 (0.2)	0.4 (0.2)	0.4 (0.2)	0.4 (0.2)	0.4 (0.2)	0.4 (0.2)	0.4 (0.2)	1.3 (0.6)	1.3 (0.6)	1.3 (0.6)	1.3 (0.6)
Voltage	VDC ± 10%	24	24	24	24	24	24	24	24	24	24	24
Current	A	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.66	0.66	0.66	0.66
Engage Time	ms	25	25	25	25	25	25	25	20	20	20	20
Release Time	ms	25	25	25	25	25	25	25	30	30	30	30
Torque	in-lb (Nm)	10.6 (1.2)	10.6 (1.2)	10.6 (1.2)	10.6 (1.2)	10.6 (1.2)	10.6 (1.2)	10.6 (1.2)	88.5 (10)	88.5 (10)	88.5 (10)	88.5 (10)

#### Environmental Specifications

Relative Humidity	98% non-condensing
Ambient Temperature	-20 to 40°C operating
Storage Temperature	-30 to 150°C

## Servo Motors

### MTR-3T Series Servo Motors

#### Specifications (continued)

Specifications	Units	3T45-H	3T54-H	3T55-H	3T57-H	3T66-H	3T67-G	3T69-G
Continuous Stall Torque <sup>1</sup>	in-lb (Nm)	90.3 (10.2)	120 (13.5)	151 (17)	195 (22)	318 (36)	372 (42)	477 (53.9)
Continuous Torque w/ 480 V, 20A S2K	in-lb (Nm)	n/a	119.3 (13.48)	150.3 (16.98)	n/a	307 (34.69)	358.5 (40.5)	463 (52.3)
Peak Torque <sup>3</sup>	in-lb (Nm)	181 (20.45)	304.9 (34.45)	383.9 (43.38)	488.8 (55.2)	772.5 (87.3)	902 (102)	1165 (132)
Peak Torque w/ 480V, 20A S2K	in-lb (Nm)	n/a	339 (38.3)	426 (48.1)	n/a	462 (52.2)	540 (61)	699 (78.9)
Rated Speed:								
@120 VAC input	RPM	825	n/a	n/a	n/a	n/a	n/a	n/a
@240 VAC input		1,650	2,100	1,650	2,450	1,450	1,250	950
@480 VAC input		4,000	4,300	3,400	n/a	3,150	2,700	2,100
No-load Speed:								
@120 VAC input	RPM	1,175	n/a	n/a	n/a	n/a	n/a	n/a
@240 VAC input		2,350	2,700	2,150	3,050	2,000	1,700	1,300
@480 VAC input		4,750	5,450	4,300	n/a	3,950	3,400	2,650
Feedback	4096 counts/rev resolver (control transmitter; 0.5 transformation ratio)							
Weight	lb (kg)	22.9 (10.4)	28.6 (13)	33 (15)	41.9 (19)	79.3 (36)	92.5 (42)	119 (54)
Rotor Inertia	in-lb-s <sup>2</sup> x 10 <sup>-4</sup> (kg-m <sup>2</sup> x 10 <sup>-4</sup> )	74 (8.4)	220 (24.9)	271 (30.6)	373 (42.1)	833 (94)	965 (109)	1230 (139)
Shaft Thrust Load <sup>2</sup>	lb (kg)	41.5 (18.9)	31.5 (18.9)	31.5 (18.9)	31.5 (18.9)	48.3 (21.9)	48.3 (21.9)	48.3 (21.9)
Shaft Radial Load <sup>2</sup>	lb (kg)	157 (71.5)	115 (52.3)	115 (52.3)	115 (52.3)	200 (45)	200 (45)	200 (45)
Torque Constant	in-lb/A <sub>(rms)</sub> (Nm/A <sub>(rms)</sub> )	12.9 (1.46)	11.3 (1.27)	14.2 (1.6)	10 (1.13)	15.4 (1.74)	18 (2.04)	23.3 (2.63)
Resistance (phase)	Ohms	2.1	0.8	0.9	0.3	0.32	0.35	0.41
Inductance (phase)	mH	8.7	7.1	8.8	3.1	6.5	7.7	10
Electrical Time Constant	ms	4.1	8.9	9.8	10.3	20.3	22	24.4
Continuous Current	A <sub>(rms)</sub>	7.1	10.6	10.6	19.5	20.7	20.7	20.6

<sup>1</sup>Torque shown is available up to an ambient temperature of 25°C with motor mounted to a 10' x 10' x 0.25' aluminum heat sink. For higher ambient temperature the continuous Torque must be derated by multiplying by the following factor (155-t)/130 where t=ambient motor temperature in degrees C (40°C max.).

<sup>2</sup>Shaft loads are based on L10 bearing life at 3000 rpm and assume force is applied to center of shaft.

<sup>3</sup>Peak torque ratings are limited by the specific amplifier or controller shown in the MTR-Series motor ordering information based on the amplifier's peak current limitations.

#### Optional Brake Data

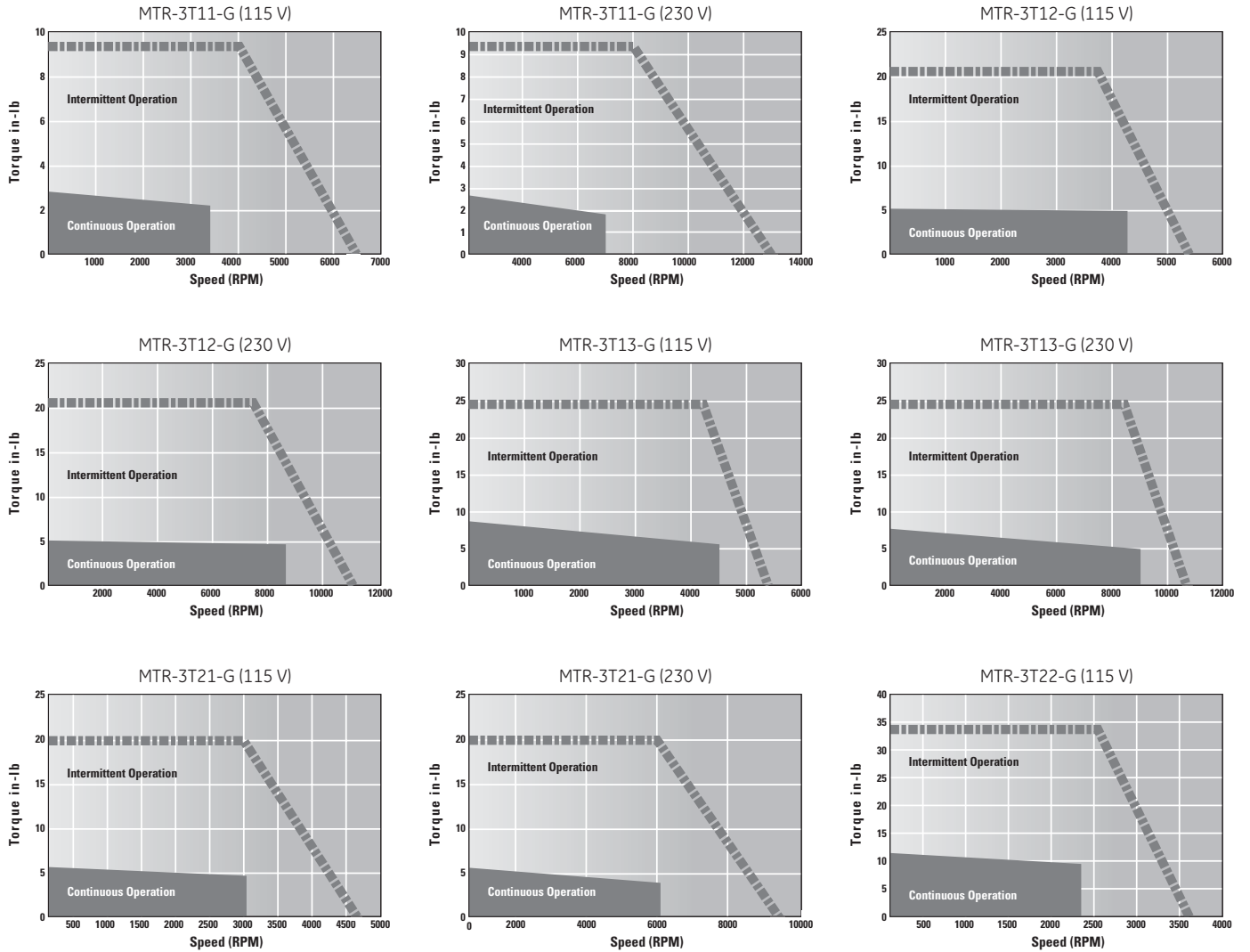
Inertia Adder	in-lb-s <sup>2</sup> x 10 <sup>-4</sup> (kg-m <sup>2</sup> x 10 <sup>-4</sup> )	9.7 (1.1)	31.9 (3.6)	31.9 (3.6)	31.9 (3.6)	84.1 (9.5)	84.1 (9.5)	84.1 (9.5)
Weight Adder	lb (kg)	1.3 (0.6)	3.3 (1.5)	3.3 (1.5)	3.3 (1.5)	4.8 (2.2)	4.8 (2.2)	4.8 (2.2)
Voltage	VDC ± 10%	24	24	24	24	24	24	24
Current	A	0.48	0.41	0.41	0.41	0.73	0.73	0.73
Engage Time	ms	20	25	25	25	25	25	25
Release Time	ms	30	50	50	50	75	75	75
Torque	in-lb (Nm)	88.5 (10)	159 (16)	159 (16)	159 (16)	354 (40)	354 (40)	354 (40)

#### Environmental Specifications

Humidity	98% non-condensing
Ambient Temperature	-20 to 40°C operating
Storage Temperature	-30 to 150°C

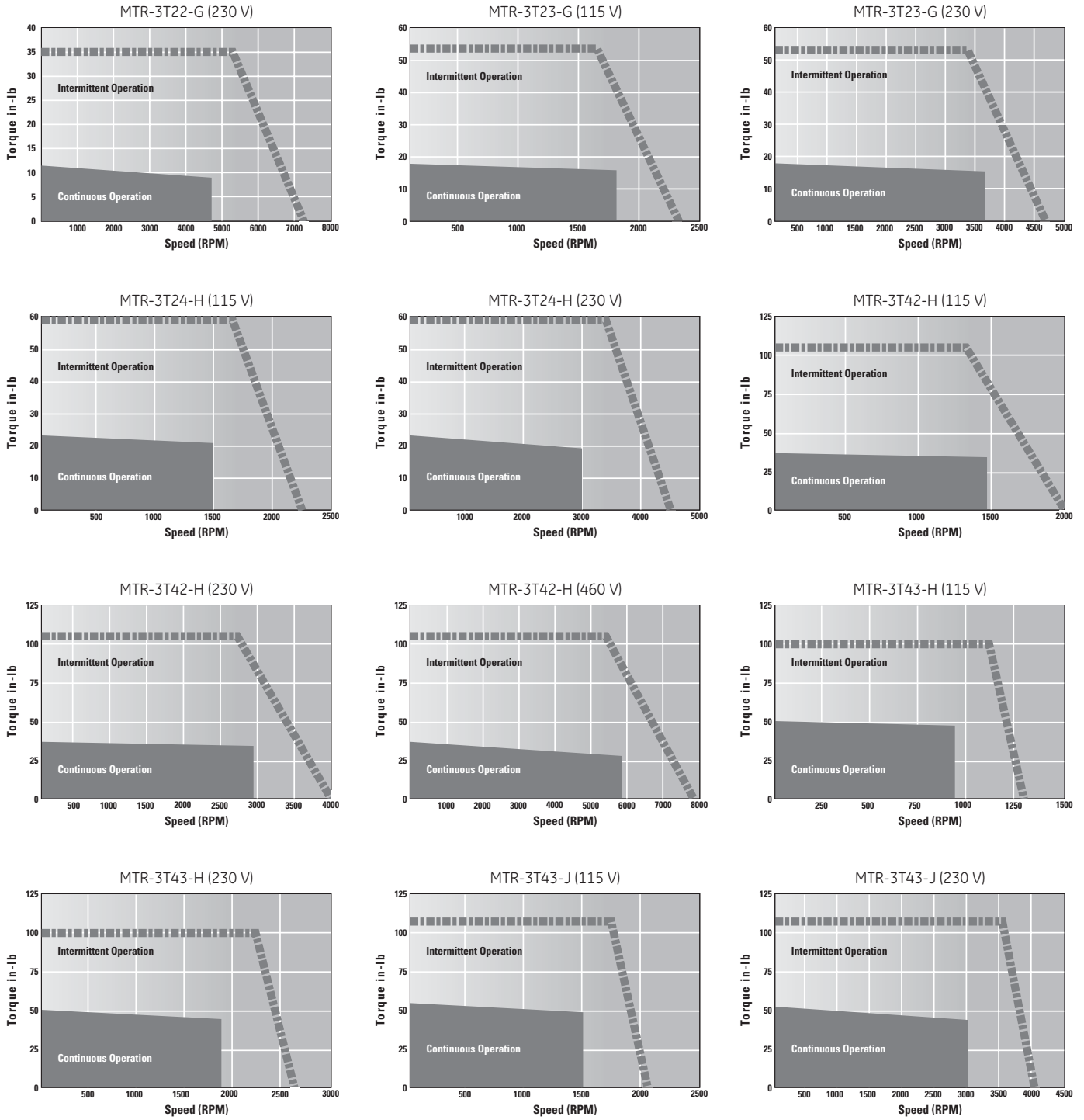
MTR-3T Series Servo Motors

Speed Torque Curves



### MTR-3T Series Servo Motors

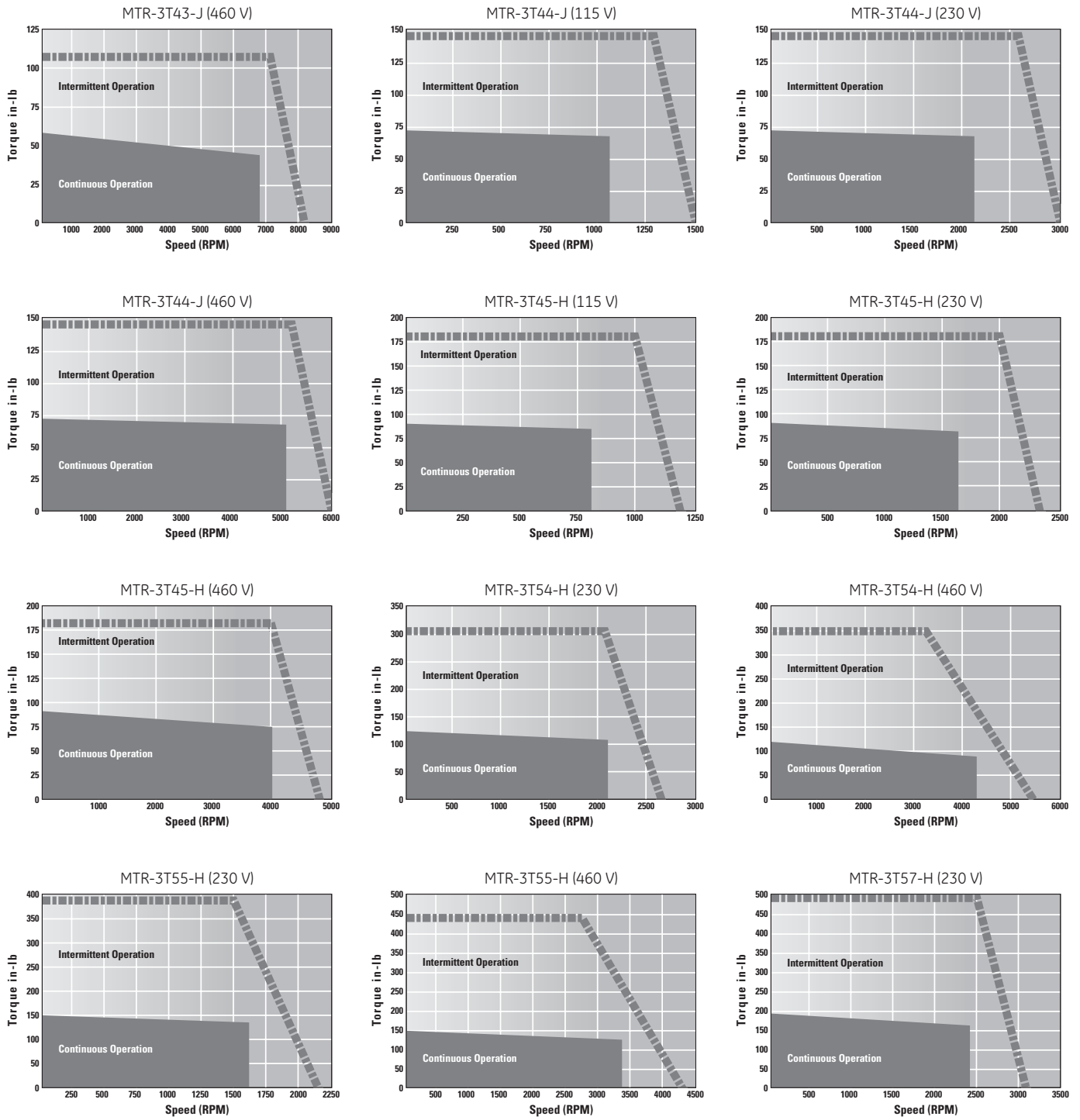
#### Speed Torque Curves (continued)



## Servo Motors

### MTR-3T Series Servo Motors

#### Speed Torque Curves (continued)

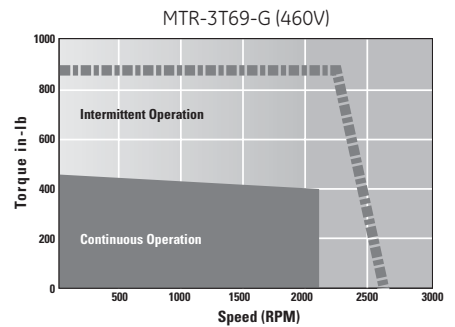
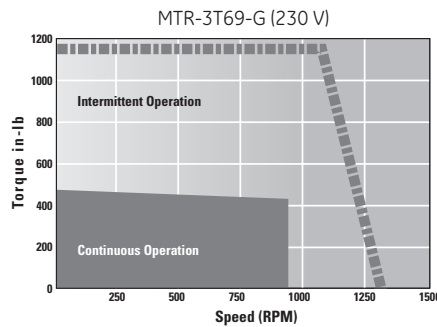
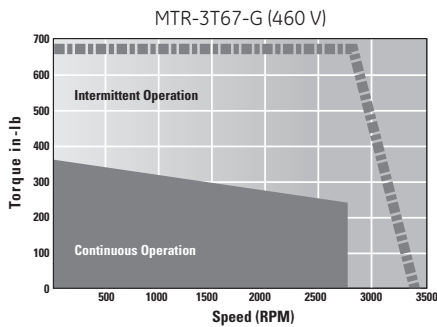
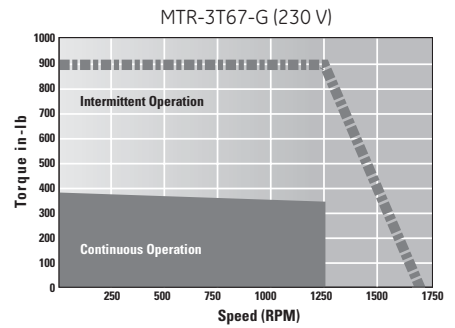
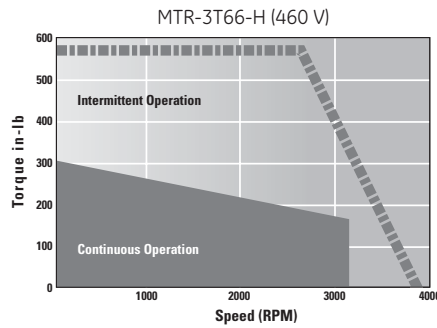
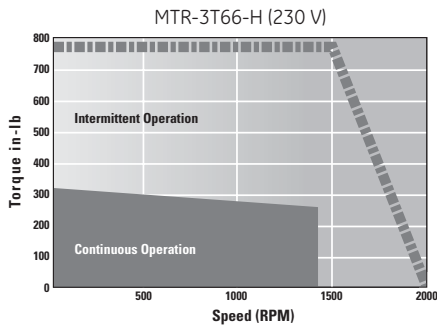




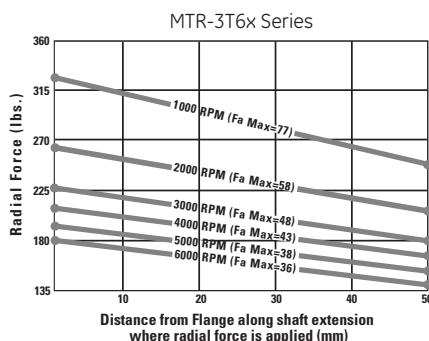
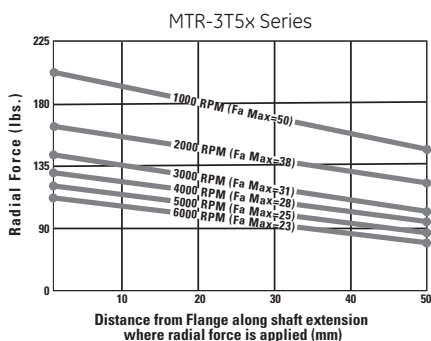
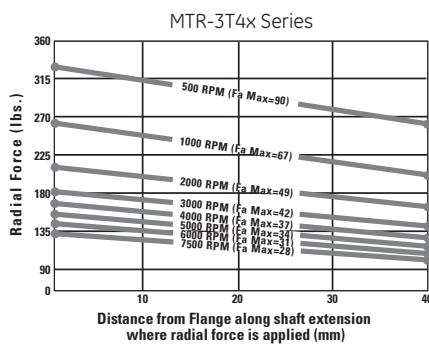
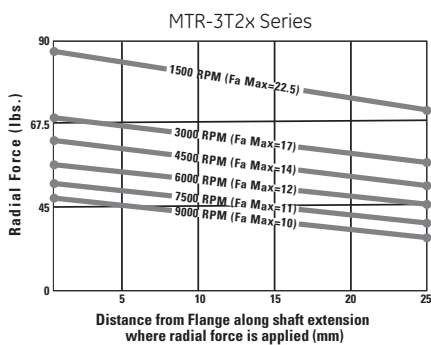
Servo Motors

MTR-3T Series Servo Motors

Speed Torque Curves (continued)



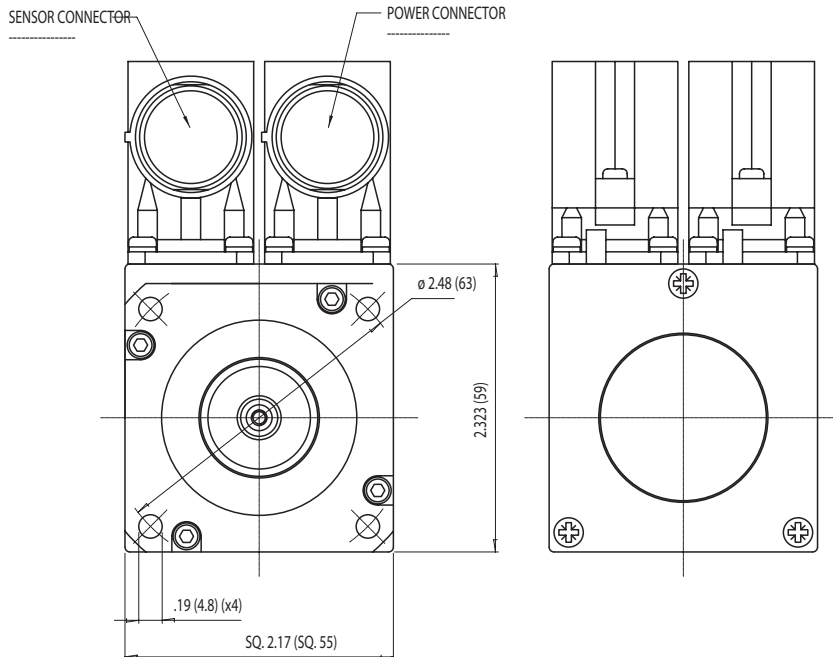
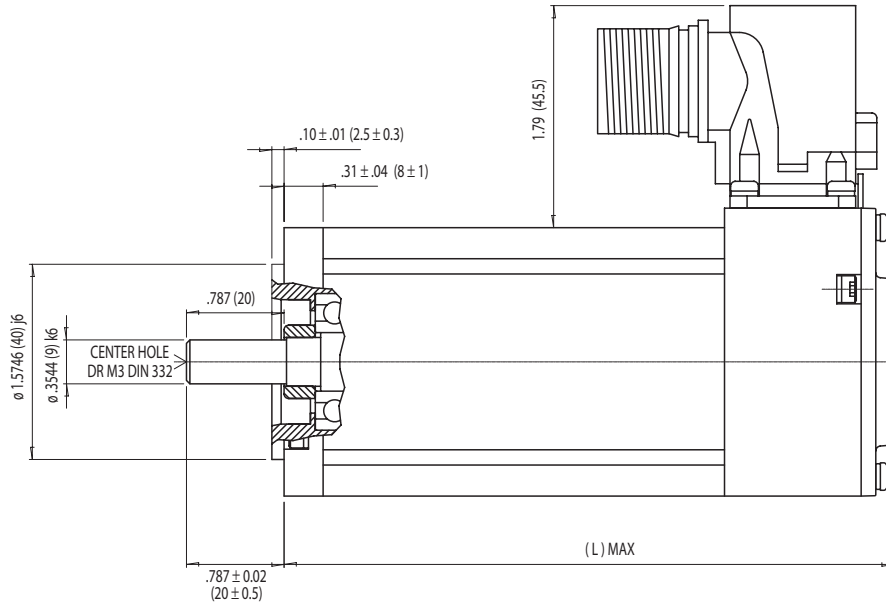
Bearing Fatigue Life ( $L_{10}$ )



The  $L_{10}$  20,000 hour rating means that 10% of the bearings will fail in 20,000 hours of operation if within the parameters specified on the curve. Median bearing life is between 4 to 5 times the  $L_{10}$  bearing fatigue life. The bearing fatigue life is an industry standard lifetime measurement and is a good indicator of motor MTBF.

MTR-3T10 Series Servo Motor

Dimensions



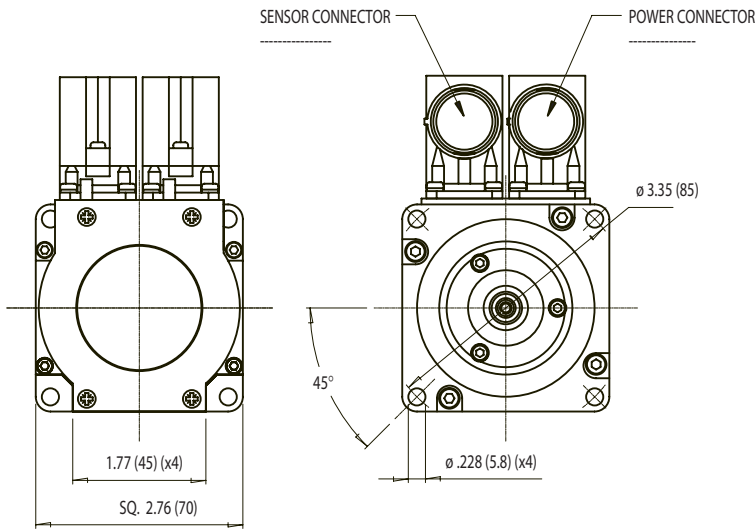
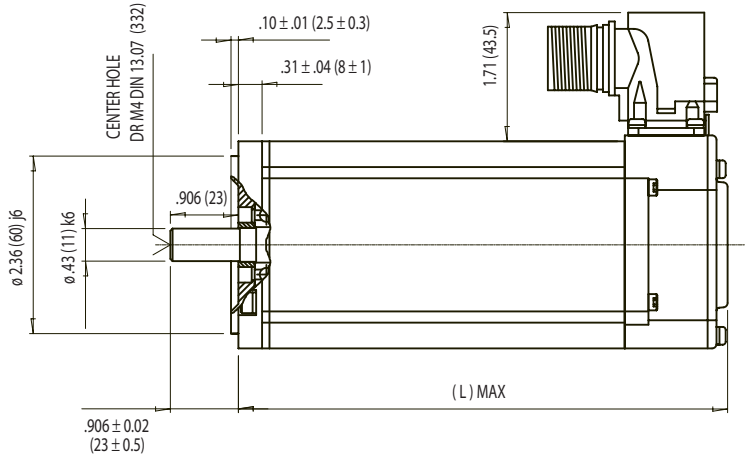
Model	L Max	Weight
3T11	4.921 (125)	2.6 (1.2)
3T12	5.906 (150)	3.3 (1.5)
3T13	6.890 (175)	4.2 (1.9)

Brake Option: Add 1" (25 mm) to L; Add 0.4 lbs (0.2 kg) to Weight

Dimensions are shown in inches (mm), weight in pounds (kg)

MTR-3T20 Series Servo Motor

Dimensions

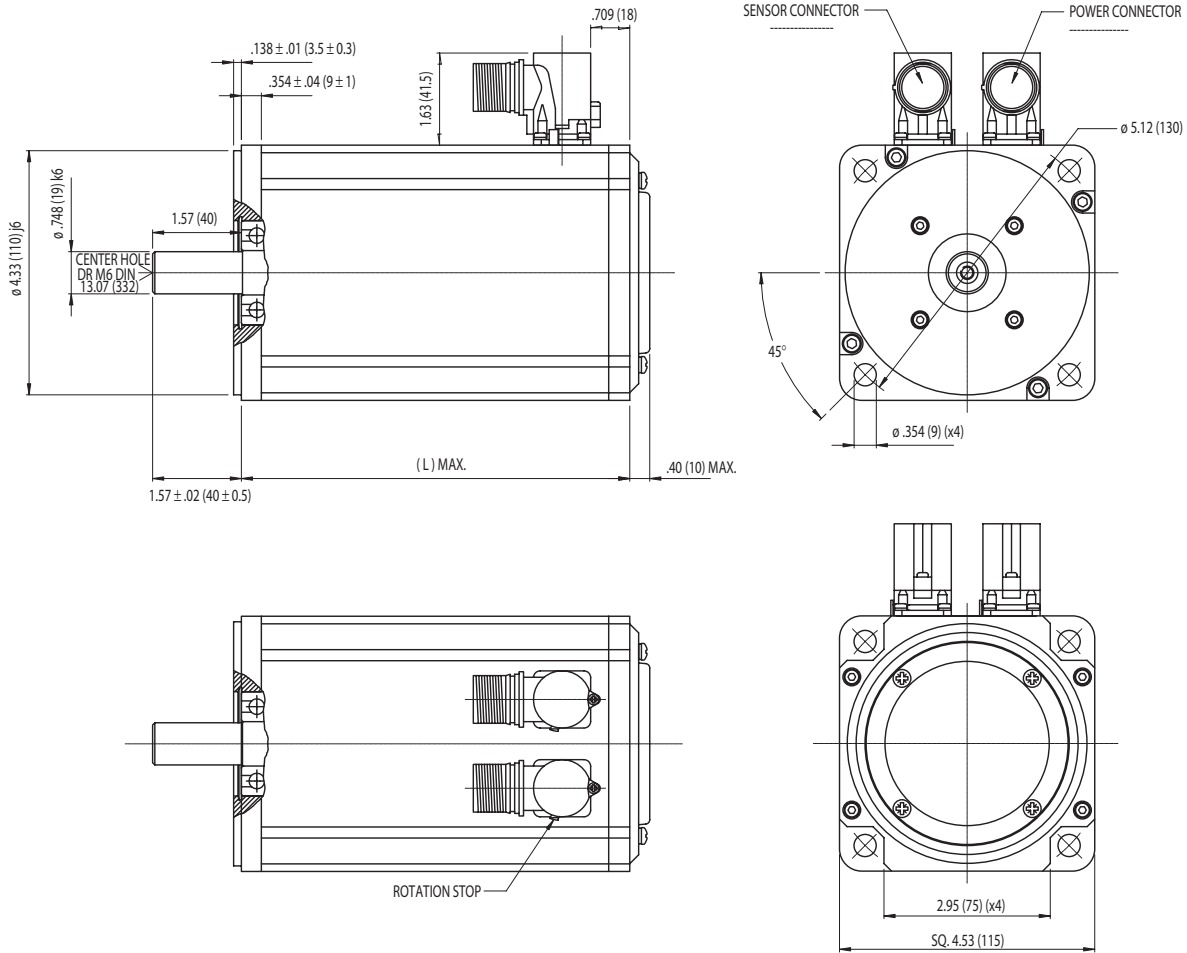


Model	L Max	Weight
3T21	5.63 (143)	3.7 (1.7)
3T22	6.61 (168)	5.0 (2.3)
3T23	7.59 (193)	6.4 (2.9)
3T24	8.58 (218)	7.7 (3.5)

Brake Option: Add 0.4 lbs (0.2 kg) to Weight  
 Dimensions are shown in inches (mm), weight in pounds (kg)

MTR-3T40 Series Servo Motor

Dimensions

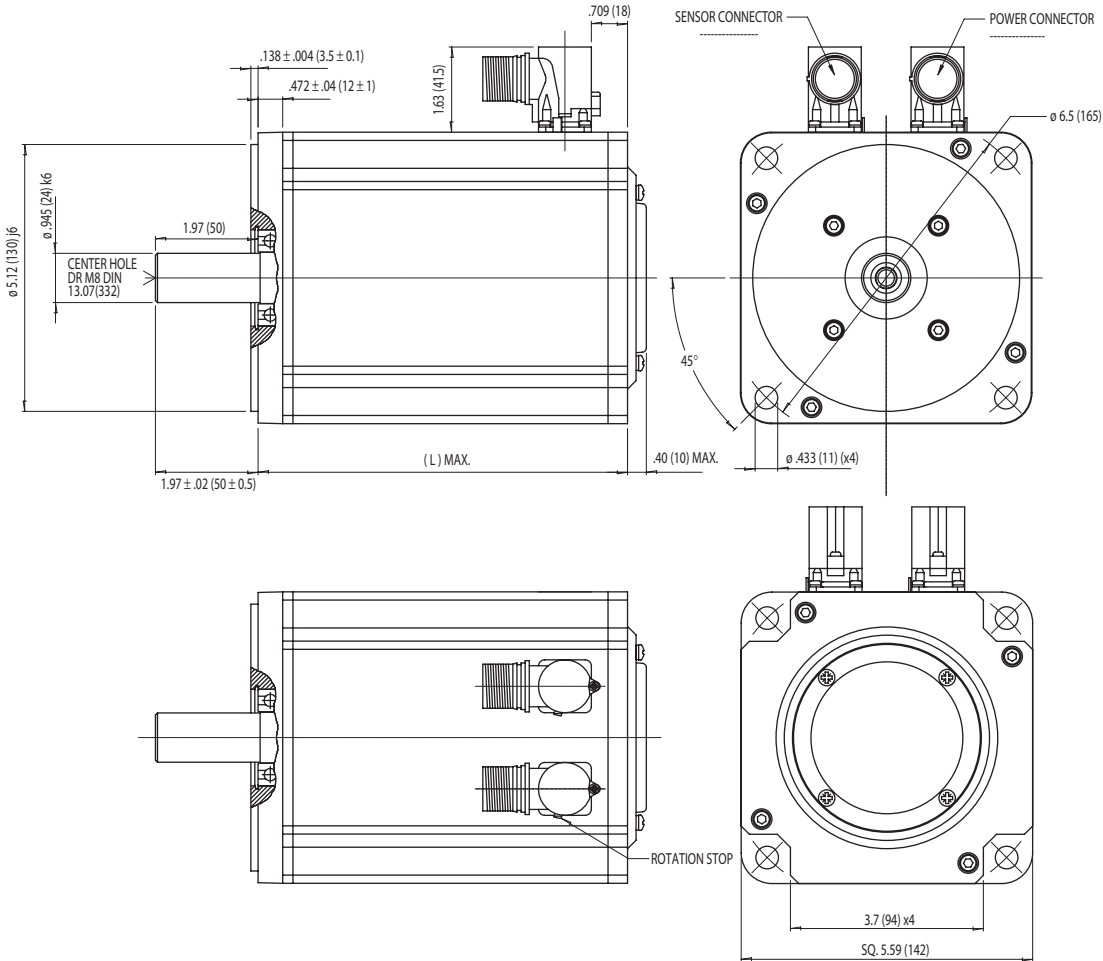


Model	L Max	Weight
3T42	7.28 (185)	13.6 (6.2)
3T43	8.27 (210)	16.7 (7.6)
3T44	9.25 (235)	20.0 (9.0)
3T45	10.24 (260)	22.9 (10.4)

Brake Option: Add 1.3 lbs (0.6 kg) to Weight  
 Dimensions are shown in inches (mm), weight in pounds (kg)

MTR-3T50 Series Servo Motor

Dimensions



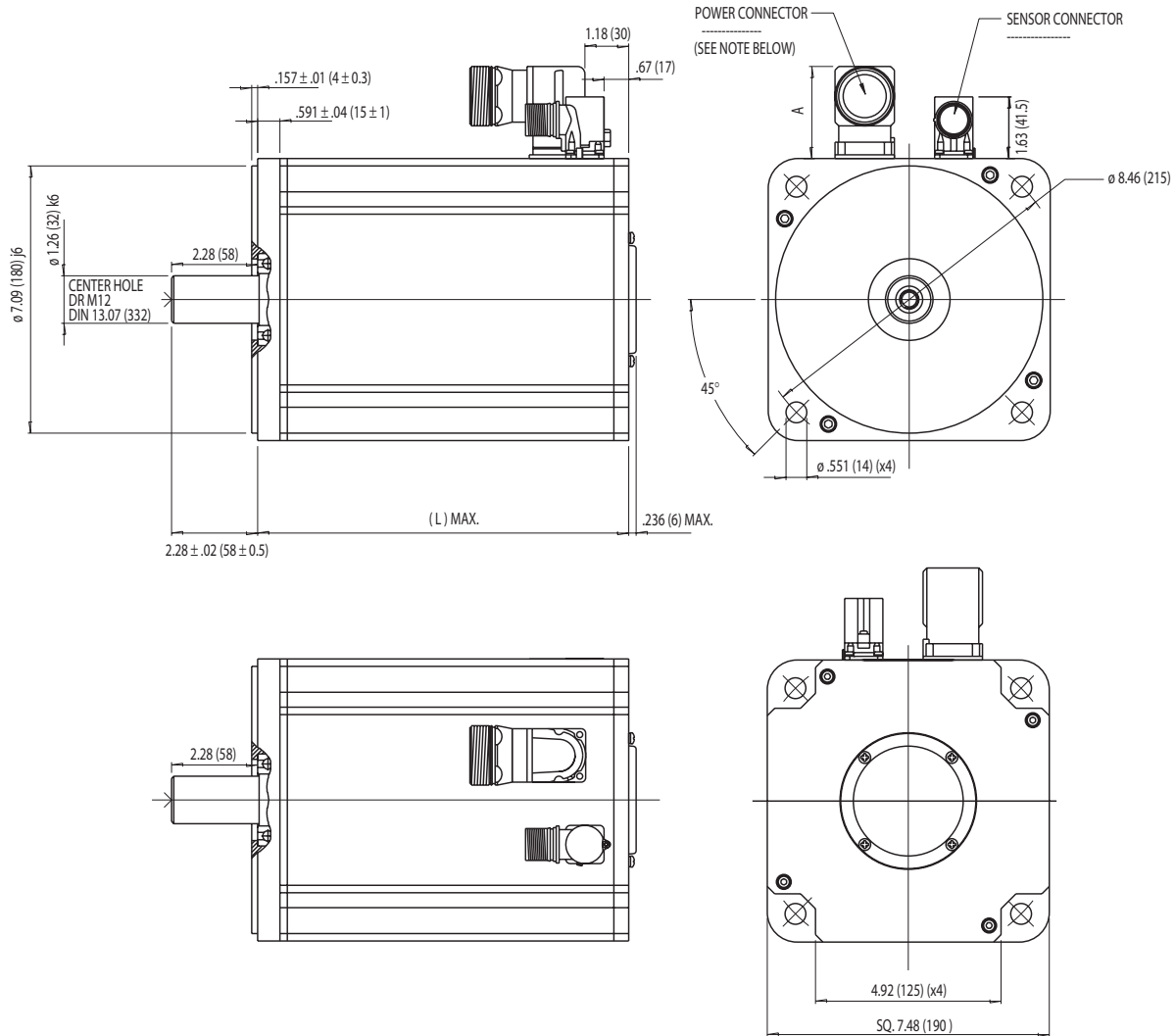
Model	L Max	Weight
3T54	9.06 (230)	28.6 (13.0)
3T55	10.04 (255)	33.0 (15.0)
3T57	12.01 (305)	41.9 (19.0)

Brake Option: Add 3.3 lbs (1.5 kg) to Weight  
 Dimensions are shown in inches (mm), weight in pounds (kg)

Servo Motors

MTR-3T60 Series Servo Motor

Dimensions



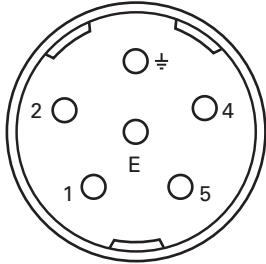
Model	L Max	Weight
3T66	12.60 (320)	79.3 (36.0)
3T67	13.58 (345)	92.5 (42.0)
3T69	15.55 (395)	119 (54.0)

Brake Option: Add 4.8 lbs (2.2 kg) to Weight  
 Dimensions are shown in inches (mm), weight in pounds (kg)

## Servo Motors

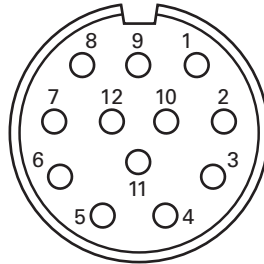
### MTR-3T Series

#### Servo Motor Connections



Power and Brake

Pin	Function
1	Phase T
2	Phase S
⏏	Ground (Frame)
4	Optional Brake -
5	Phase R
E	Optional Brake +



Resolver

Pin	Function
1	S1 (+sine)
2	S3 (-sine)
3	S4 (-cosine)
4	S2 (+cosine)
5	R1 (Excitation)
6	R2 (Excitation RTN)
7	Thermistor
8	Thermistor

## Servo Motors

### MTR-Series Servo Motors

#### Ordering Information

#### Amplifier/Controller

##### Part Number\*

Motor Only	Motor with Brake	Description	S2K Amplifier	S2K Controller
MTR-3T11-G-R-0-M-S	MTR-3T11-G-R-B-M-S	2.3 in-lb, 230V, IP65, Metric, Seal	IC800SSD104RS1	IC800SSI104RS1
MTR-3T12-G-R-0-M-S	MTR-3T12-G-R-B-M-S	5.3 in-lb, 230V, IP65, Metric, Seal		IC800SSI104RD2
MTR-3T13-G-R-0-M-S	MTR-3T13-G-R-B-M-S	8 in-lb, 230V, IP65, Metric, Seal		IC800SSI104RP2
MTR-3T21-G-R-0-M-S	MTR-3T21-G-R-B-M-S	5.6 in-lb, 230V, IP65, Metric, Seal		
MTR-3T22-G-R-0-M-S	MTR-3T22-G-R-B-M-S	11.5 in-lb, 230V, IP65, Metric, Seal		
MTR-3T23-G-R-0-M-S	MTR-3T23-G-R-B-M-S	17.7 in-lb, 230V, IP65, Metric, Seal		
MTR-3T24-H-R-0-M-S	MTR-3T24-H-R-B-M-S	23 in-lb, 230V, IP65, Metric, Seal		
MTR-3T42-H-R-0-M-0	MTR-3T42-H-R-B-M-0	33 in-lb, 230V, IP65, Metric		
MTR-3T43-H-R-0-M-0	MTR-3T43-H-R-B-M-0	54 in-lb, 230V, IP65, Metric		
MTR-3T42-H-R-0-M-0	MTR-3T42-H-R-B-M-0	33 in-lb, 230V, IP65, Metric	IC800SSD107RS1	IC800SSI107RS1
MTR-3T43-J-R-0-M-0	MTR-3T43-J-R-B-M-0	54 in-lb, 230V, IP65, Metric		IC800SSI107RD2
MTR-3T44-J-R-0-M-0	MTR-3T44-J-R-B-M-0	72 in-lb, 230V, IP65, Metric		IC800SSI107RP2
MTR-3T45-H-R-0-M-0	MTR-3T45-H-R-B-M-0	90 in-lb, 230V, IP65, Metric		
MTR-3T54-H-R-0-M-0	MTR-3T54-H-R-B-M-0	120 in-lb, 230V, IP65, Metric	IC800SSD216RS1	IC800SSI216RD2
MTR-3T55-H-R-0-M-0	MTR-3T55-H-R-B-M-0	151 in-lb, 230V, IP65, Metric		IC800SSI216RP2
MTR-3T57-H-R-0-M-0	MTR-3T57-H-R-B-M-0	195 in-lb, 230V, IP65, Metric	IC800SSD228RS1	IC800SSI228RP2
MTR-3T66-H-R-0-M-0	MTR-3T66-H-R-B-M-0	319 in-lb, 230V, IP65, Metric		IC800SSI228RD2
MTR-3T67-G-R-0-M-0	MTR-3T67-G-R-B-M-0	372 in-lb, 230V, IP65, Metric		
MTR-3T69-G-R-0-M-0	MTR-3T69-G-R-B-M-0	478 in-lb, 230V, IP65, Metric		
MTR-3T42-H-R-0-M-0	MTR-3T42-H-R-B-M-0	33 in-lb, 460V, IP65, Metric	IC800SSD407RS1	IC800SSI407RS1
MTR-3T43-J-R-0-M-0	MTR-3T43-J-R-B-M-0	54 in-lb, 460V, IP65, Metric		IC800SSI407RD2
MTR-3T44-J-R-0-M-0	MTR-3T44-J-R-B-M-0	72 in-lb, 460V, IP65, Metric		IC800SSI407RP2
MTR-3T45-H-R-0-M-0	MTR-3T45-H-R-B-M-0	90 in-lb, 460V, IP65, Metric		
MTR-3T54-H-R-0-M-0	MTR-3T54-H-R-B-M-0	120 in-lb, 460V, IP65, Metric	IC800SSD420RS1	IC800SSI420RD2
MTR-3T55-H-R-0-M-0	MTR-3T55-H-R-B-M-0	151 in-lb, 460V, IP65, Metric		IC800SSI420RP2
MTR-3T66-H-R-0-M-0	MTR-3T66-H-R-B-M-0	318 in-lb, 460V, IP65, Metric		
MTR-3T67-G-R-0-M-0	MTR-3T67-G-R-B-M-0	372 in-lb, 460V, IP65, Metric		
MTR-3T69-G-R-0-M-0	MTR-3T69-G-R-B-M-0	478 in-lb, 460V, IP65, Metric		

\*Motors can possibly be used with larger amplifiers/controllers in order to increase the system peak torque capability. Contact GE for assistance.

#### Connector Mates

Motor Series	Function	Applicable Model	Part Number	Source
MTR-3T Series	Motor Power	All	21000526	GE
	Resolver	All	21000525	GE

#### Motor Cables

See applicable amplifier section for information about the proper cables to use with each motor.





# Stepping Amplifiers and Motors

GE Intelligent Platforms MTR-Series Stepping solutions provide an economical open loop alternative when the performance of a servo is not required. Stepping motors systems are easy to set up, do not require the tuning that is typical with servo motors and provide cost effective solutions for a variety of automation applications.



The Power Cube offers full or half step selection in a very compact package while the S2K Stepping Motor Controller provides microstepping for applications requiring improved smoothness and resolution. When matched with the MTR-Series stepping motors these solutions provide unparalleled performance in the field of stepping motor technology and are ideal for demanding automation applications.

communications in a single compact package. The Stepping Motor Cube is available in pulse command input formats or with an integral DeviceNet communications interface. Providing multi-axis networked motion solutions has never been easier. Besides saving valuable panel space the Stepping Motor Cube also reduces system wiring and integration costs.

The unique Stepping Motor Cube provides the space-saving advantage of integrating a stepping amplifier, control, motor and

- NEMA 23 and 34 motor mountings mate easily to off the shelf gearheads
- Power Cube requires DC power only - excellent for battery based applications!
- 50,000 Microsteps when used with the S2K Series provides enhanced resolution and accuracy
- Stepping motor holding torque range from 61–3074 oz-in (0.43–21.7 Nm)

## APPLICATIONS

- Packaging
- Test equipment
- Automatic fixturing
- Material handling
- Index table
- Feed-to-length
- Light assembly
- Semiconductor
- Electronic manufacturing
- and many more

# Power Cube Stepping Amplifiers

## Stepper Performance in a Space-Saving Package

The Power Cube Stepping Motor-Drive Package provides a cost-effective solution for typical OEM stepping motor applications in a rugged and easy to install package.

The Power Cube is ideal for high volume applications such as packaging, test equipment, automatic fixturing and material handling. The Power Cube drive accepts pulse and direction inputs from an external pulse source such as the GE Operator Control Station (OCS) stepping control module. Unlike many low-cost stepping motor drives, the Power Cube is a high performance bipolar chopper design. This drive design maintains constant current in a wide range of

operating conditions and provides better high-speed performance than other similar drive designs.

Optional high performance MTR-Series stepping motors are matched to the drive characteristics to provide optimum performance. Like all other GE motor products, these motors provide maximum power in a minimum frame size. They also incorporate exceptional heat dissipation capability.



## Features

- Low cost stepping drive and motor for OEM applications
- High performance bipolar chopper translator rated at 4 Amps continuous
- Accepts power supply input voltages from 12-48 VDC
- Rugged design for demanding applications
- Full and half-step user configurable modes
- On-board potentiometer or remote inputs can be used for control

Like all GE products, the Power Cube incorporates key design features to provide the flexibility, performance and serviceability demanded by industrial users. These features include:

- Completely packaged drive unit with heat sink
- Optically isolated inputs for noise immunity
- Overtemperature, overcurrent and overvoltage protection
- Quick disconnect terminals for ease of installation and replacement
- Optional MTR-Series motors and cables simplify system integration

## Stepping Amplifiers

### Power Cube

#### Features

#### Specifications

##### Pulse and Direction Inputs

Input Format	+4 VDC pulse/direction; +24 VDC pulse/direction differential, optically isolated
Input Voltage Range	3.5-4.2 VDC for +4 V input; 12-30 VDC for +24 V input
Maximum Input Pulse Rate	50 kHz
Minimum Pulse Width	5 microseconds

##### Digital Inputs and Outputs

Dedicated Inputs	Enable, power save
Dedicated Outputs	OK, Stall
Operating Range	4-24 VDC, 30 VDC Maximum
Interface Format	optically isolated, source/sink user configurable
Maximum Off Input Voltage	1 VDC
Minimum On Input Voltage	4 VDC
Input Load	1k Ohms
Maximum On Output Resistance	35 Ohms
Maximum Load Output Current	100 mA
Maximum Off Output Leakage Current	200 nA

##### Step Size Selection

A	B	Step Size
open	open	Full Stepping (200 steps/rev)
open	short	Half Stepping (400 steps/rev)
short	open	Microstepping (1,000 steps/rev)

short = Connect to Step Size Common

##### DC Input Power Requirements

Drive	24 VDC $\pm$ 20% @ 3.1 Amps max. <sup>1</sup> 48 VDC $\pm$ 10% @ 3.1 Amps max. <sup>1</sup>
Oversvoltage Threshold	54 VDC $\pm$ 2 VDC
Undersvoltage Threshold	18 VDC $\pm$ 2 VDC

##### Output Power

Voltage range	17 to 38 Vrms 2 phase
Frequency	0-8 kHz fundamental (16.4 kHz PWM)
Current 2	4 A rms per phase

##### Environmental Specifications

Operating Temperature, Free Air Ambient	0 to 50° C @ 3 Amps 1 to 45° C @ 4 Amps
Storage and Shipping Temperature	-40 to 80° C
Enclosure Type	Encapsulated

##### Motor Compatibility and Configuration

Stepping Motor	DIP Switch Location				Connection	Amps RMS at 100% Current	Amps RMS at 60% current	Stall Velocity Threshold RPS
	1	2	4	PRG				
MTR-1216	Off	Off	Off	Off	Parallel	2.5	1.5	9
MTR-1220	On	Off	Off	Off	Series	2.5	1.5	4
MTR-1221	Off	On	Off	Off	Parallel	3.5	2.1	4
MTR-1235	On	On	Off	Off	Series	3.0	1.8	3
MTR-1231	Off	Off	On	Off	Parallel	3.1	1.9	3
MTR-1331-J	On	Off	On	Off	Series	4.0	2.4	4
MTR-1N31-I	Off	On	On	Off	Series	4.0	2.4	4
Reserved	On	On	On	Off	TBD	TBD	TBD	TBD

<sup>1</sup> DC input power has undervoltage and oversvoltage detection.

<sup>2</sup> The outputs are provided with internal overload protection.

#### ORDERING INFORMATION

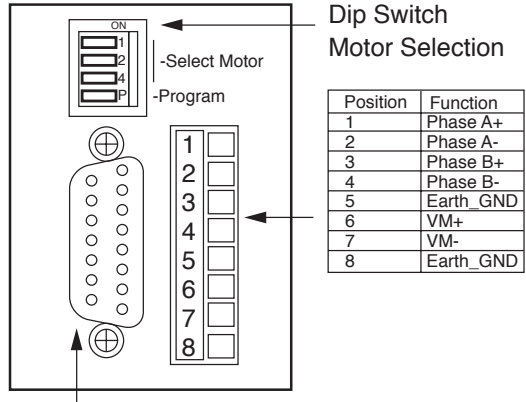
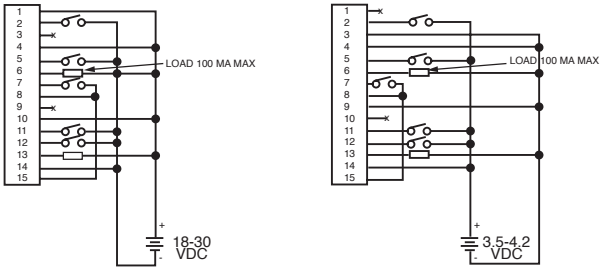
Power Cube	IC800PCUB00300
DIN Rail Mounting Plate	IC800PCUBDINMTG
DB15 to Screw Terminal Adapter	IC800CUBDB15ADP

## Stepping Amplifiers

### Power Cube

#### Connections

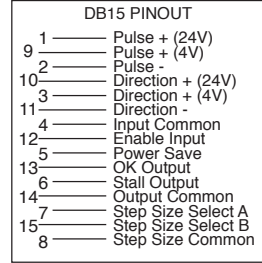
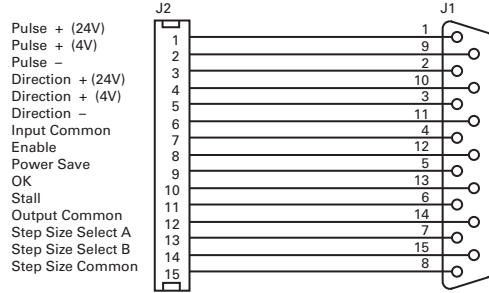
##### Discrete Inputs and Outputs



Position	Function
1	Phase A+
2	Phase A-
3	Phase B+
4	Phase B-
5	Earth_GND
6	VM+
7	VM-
8	Earth_GND

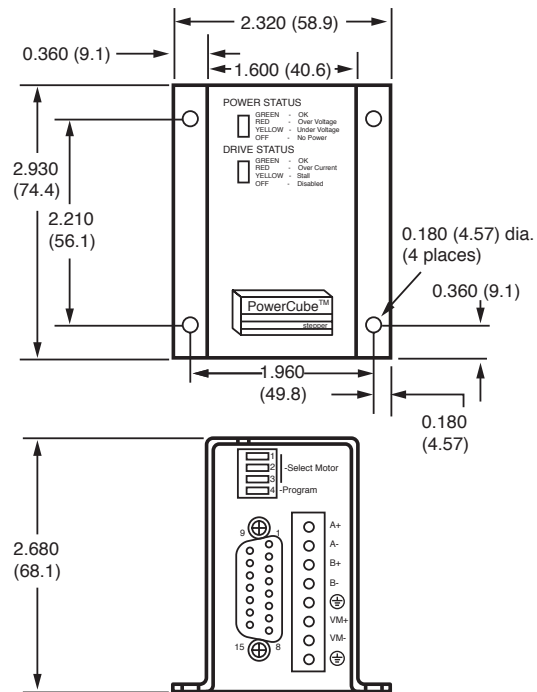
##### IC800CUBDB15ADP

##### Optional DB15 to Screw Terminal Adapter



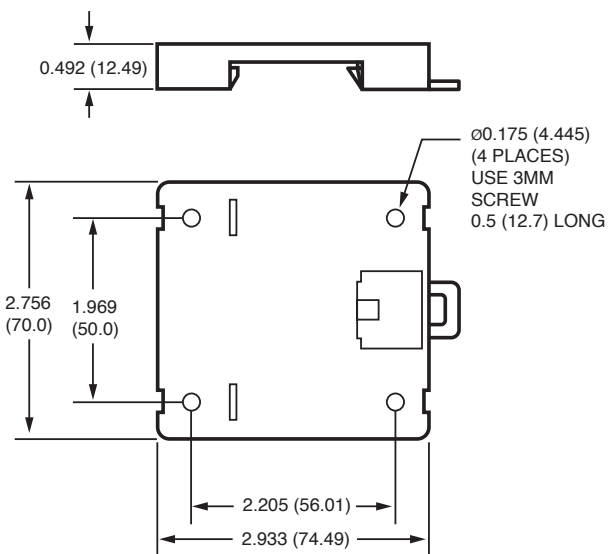
#### Mechanical Specifications

Dimensions in inches (mm)



Weight = 12 oz. (0.34kg)

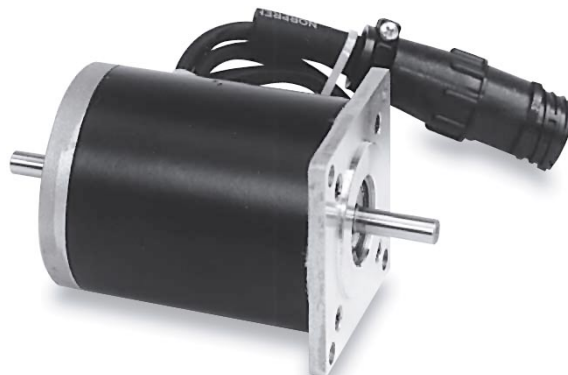
##### IC800PCUBDINMTG Optional DIN Rail Mount Plate



# MTR-Series Stepping Motors

## High Performance at an Economical Price

The GE MTR-Series Stepping Motors provide unparalleled performance in the field of stepping motor technology and are ideal for the demanding automation applications requiring precision positioning and/or velocity control. Higher speed capability and compact size provide performance capabilities not previously attainable.



### Features

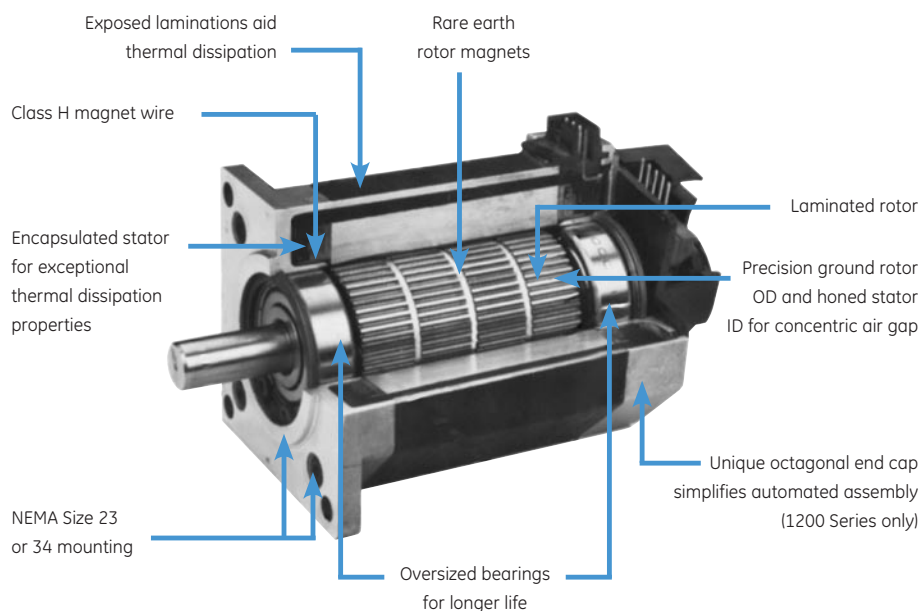
- Low inertia design for improved machine cycle rates
- Fully connectorized for easy installation
- Long life oversized bearings and high temperature insulation for superior reliability
- Exposed laminations for improved heat dissipation
- Economical design without sacrificing performance
- Brushless design minimizes maintenance
- Optional 500 ppr Encoder

Stepping motors provide a low cost alternative for automation applications requiring high torque without the high speed provided by servo motors. In addition, steppers can operate open loop, which means they do not require the cost of the motor position feedback device necessary with servo systems.

Stepping motors are easy to set up and do not require the tuning that is typical with servo motors and provide solutions for a variety of automation applications when used with GE motion control products. The Power Cube is user-configurable for half-stepping when applications require improved smoothness and resolution. For further performance enhancement, the S2K Stepping Motor Controller implements microstepping technology for 50,000 steps per revolution.

MTR-Series high torque stepping motors incorporate many design features to enhance reliability and performance. High energy product rare earth magnets provide high torque-to-inertia ratios for

exceptional machine cycle rates. Rare earth magnet inserts in the stator increase torque production resulting in maximum power in the minimum motor size.



## Stepping Motors

### MTR-Series

#### Features

#### Specifications for Stepping Motors used with Power Cube Amplifier

Specification	Units	MTR-1216-D	MTR-1220-D	MTR-1221-D	MTR-1231-D	MTR-1235-D	MTR-1331-J-D	MTR-1N31-I-D
Holding Torque <sup>1</sup>	oz-in (Nm)	61 (0.43)	116 (0.82)	124 (0.87)	236 (1.68)	185 (1.31)	327 (2.31)	605 (4.27)
Inertia	oz-in-sec <sup>2</sup> (kg-m <sup>2</sup> x 10 <sup>-3</sup> )	0.0010 (0.007)	0.0015 (0.011)	0.0017 (0.012)	0.0036 (0.025)	0.0170 (0.012)	0.0202 (0.014)	0.0202 (0.014)
Winding	Parallel/Series	Parallel	Series	Parallel	Parallel	Series	Series	Series
Rated Current/Phase	Amps	2.5	2.7	1.8	1.6	3.4	4.2	4.3
Phase Resistance <sup>2</sup>	Ohms	0.84	0.76	2.12	3.12	0.68	0.52	0.72
Phase Inductance	mH	2.3	2.5	8.0	12.4	2.4	4.4	5.8
Detent Torque	oz-in (Nm)	2.5 (0.018)	4.8 (0.034)	9.4 (0.066)	17 (0.12)	4.6 (0.32)	22 (0.16)	18 (0.13)
Number of Phases	n/a	2	2	2	2	2	2	2
Number of Poles	n/a	50	50	50	50	50	50	50
Full Steps per Revolution	Steps	200	200	200	200	200	200	200
Full Step Angle	Degrees	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Weight	lb (kg)	1.0 (0.45)	1.2 (0.55)	1.5 (0.68)	2.5 (1.13)	2.1 (0.95)	3.2 (1.45)	5.0 (2.27)
Encoder Option	500 ppr, Incremental, Dual Channel Quadrature with Index, +5V ±10%, 100KHZ max freq., TTL Compatible							

#### Specifications for Stepping Motors used with S2K Series

Specification	Units	MTR-1221-D	MTR-1231-D	MTR-1324-D	MTR-1337-D	MTR-1350-A	MTR-1350-D	MTR-1N31-I-D	MTR-1N32-I-D	MTR-1N41-G-A
Holding Torque <sup>1</sup>	oz-in (Nm)	144 (1.02)	238 (1.68)	335 (2.37)	675 (4.77)	630 (4.45)	995 (7.02)	650 (4.59)	1200 (8.47)	1905 (13.45)
Inertia	oz-in-sec <sup>2</sup> (kg-m <sup>2</sup> x 10 <sup>-3</sup> )	0.0017 (0.012)	0.0036 (0.025)	0.0083 (0.059)	0.0170 (0.12)	0.0250 (0.176)	0.0250 (0.176)	0.0202 (0.14)	0.038 (0.27)	0.0783 (0.55)
Rated Current/Phase	Amps	1.8	1.6	2.7	4.1	7.9	4.0	4.3	4.1	5.0
Phase Resistance <sup>2</sup>	Ohms	2.12	3.12	1.12	0.74	0.26	1.02	0.72	1.03	0.58
Phase Inductance	mH	8.0	12.4	10.0	8.9	3.1	12.6	5.8	10.3	7.8
Detent Torque	oz-in (Nm)	9.4 (0.066)	17 (0.12)	22 (0.16)	42 (0.3)	64 (0.45)	64 (0.45)	18 (0.13)	36 (0.25)	65 (0.46)
Number of Phases	n/a	2	2	2	2	2	2	2	2	2
Number of Poles	n/a	50	50	50	50	50	50	50	50	50
Full Steps per Revolution	Steps	200	200	200	200	200	200	200	200	200
Full Step Angle	Degrees	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Weight	lb (kg)	1.5 (0.68)	2.5 (1.13)	3.2 (1.45)	5.3 (2.41)	7.6 (3.45)	7.6 (3.45)	5.0 (2.27)	8.4 (3.81)	11 (4.98)
Encoder Option	500 ppr, Incremental, Dual Channel Quadrature with Index, +5V ±10%, 100KHZ max freq., TTL Compatible									

All ratings typical at 25°C unless otherwise noted.

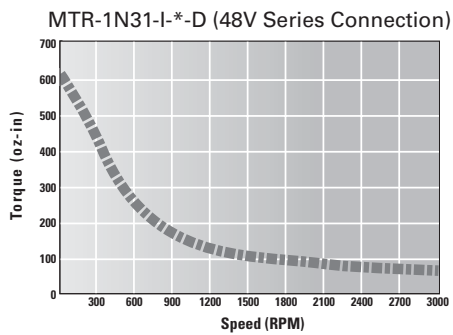
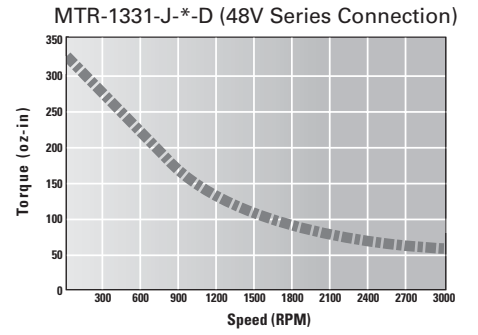
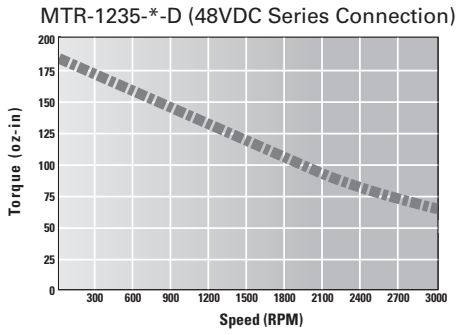
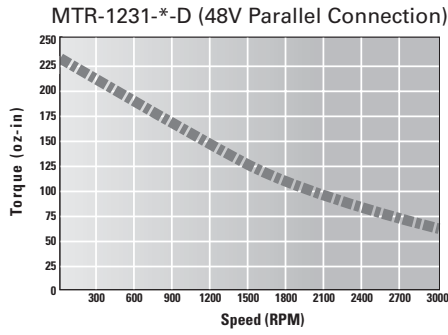
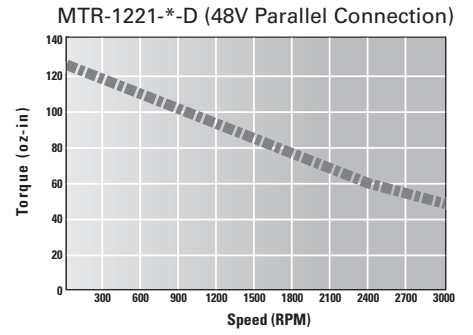
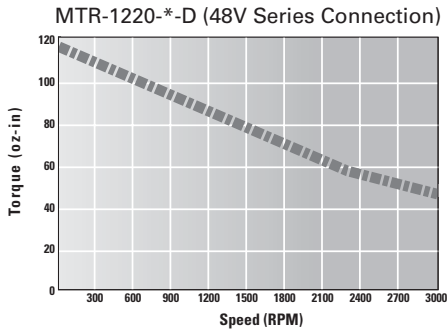
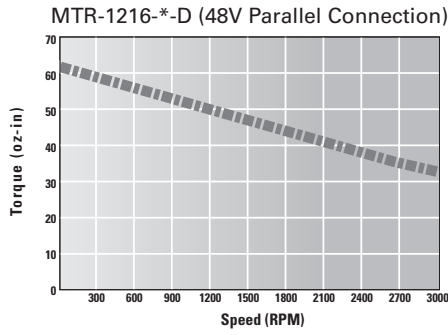
<sup>1</sup> Holding torque specified for motor winding temperature at 130°C and motor unmounted in still air at 40°C

<sup>2</sup> Phase resistance with winding at 130°C and motor in still air at 40°C

## Stepping Motors

### MTR-Series

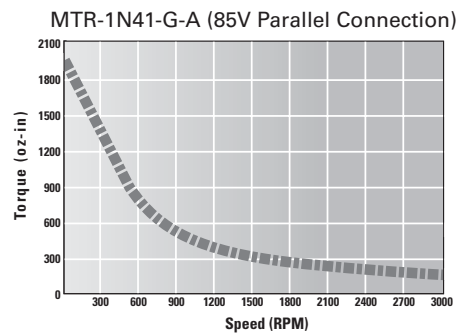
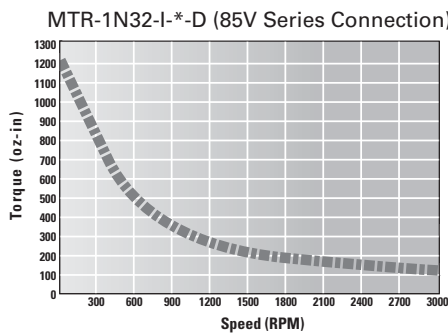
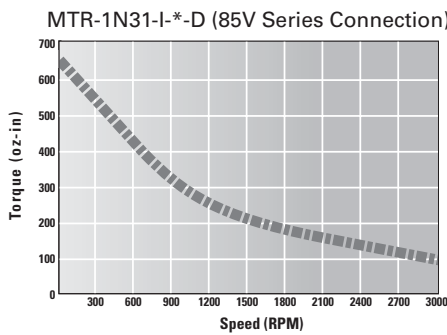
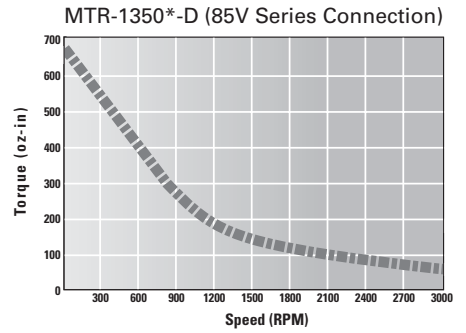
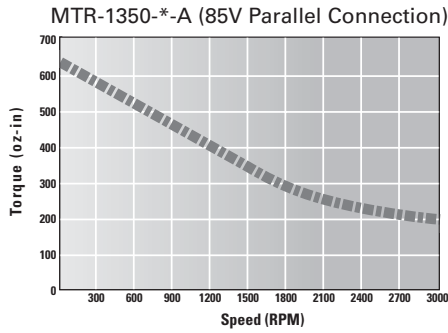
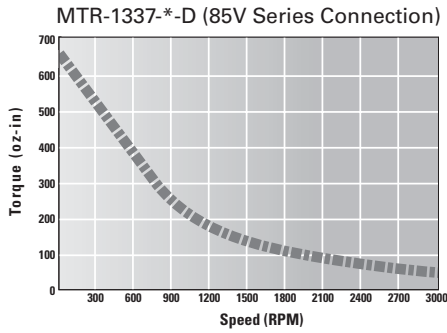
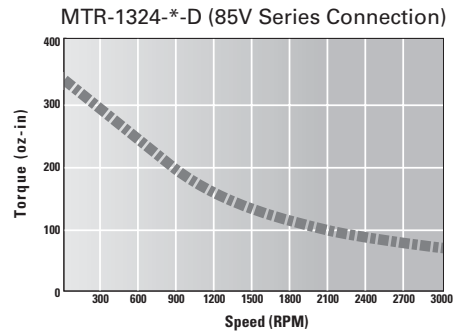
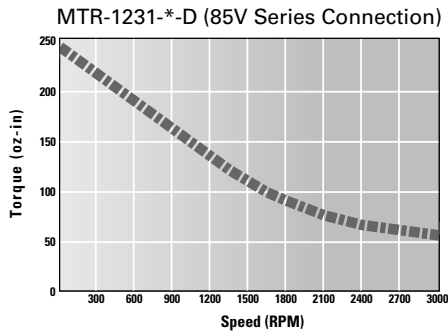
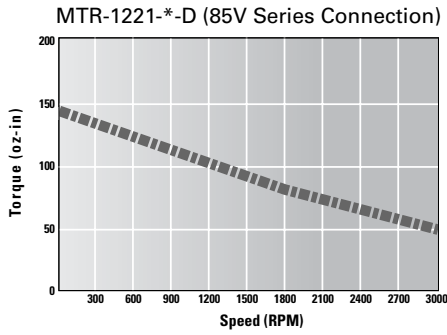
#### Speed Torque Curves for Power Cube Amplifier





MTR-Series

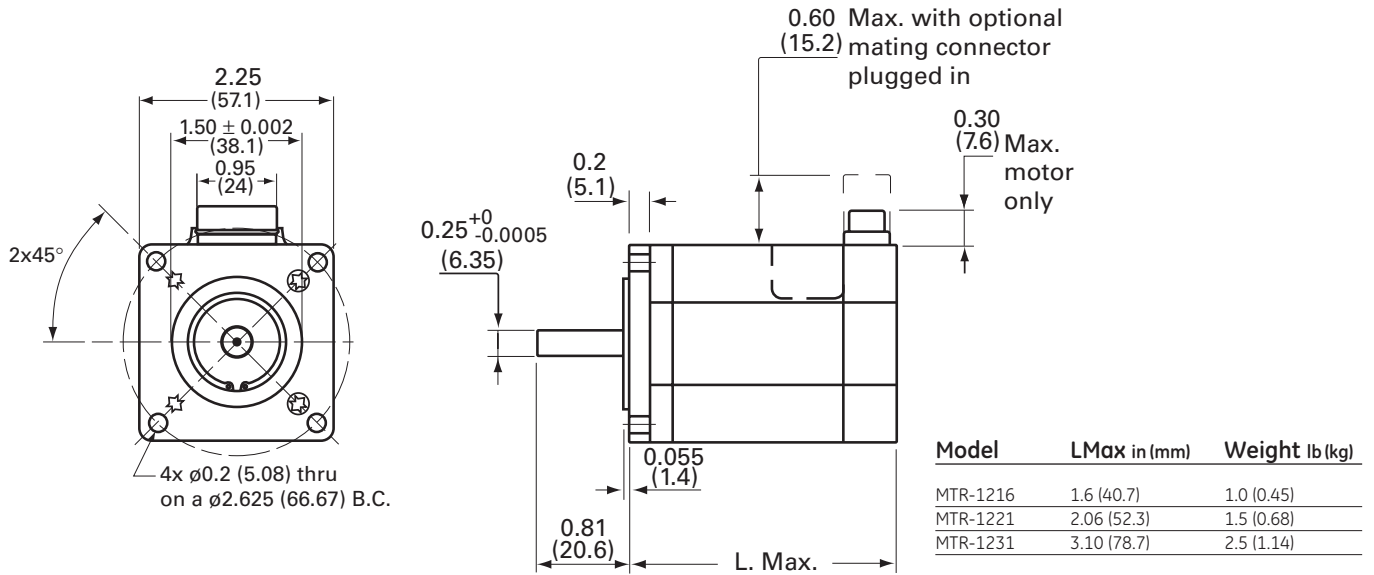
Speed Torque Curves for S2K Amplifier/Controllers



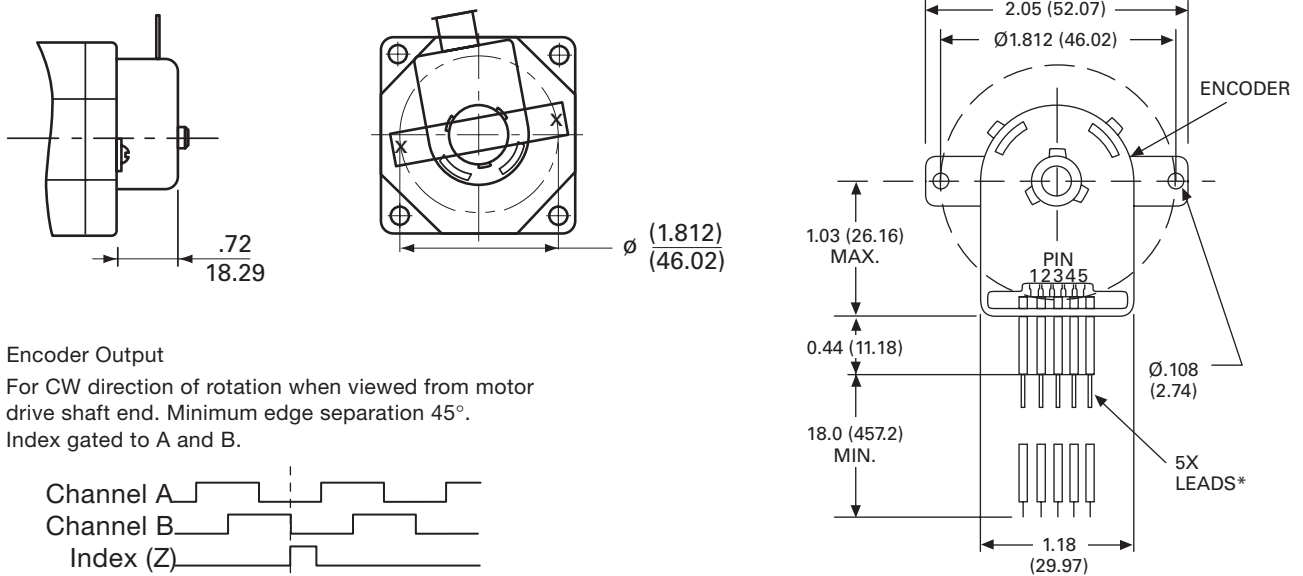
## Stepping Motors

### MTR-Series

#### MTR-1216, 1221 & 1231 Stepping Motor Dimensions NEMA 23 Flange

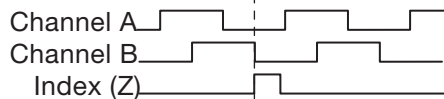


#### Encoder Option



#### Encoder Output

For CW direction of rotation when viewed from motor drive shaft end. Minimum edge separation 45°. Index gated to A and B.



Pin	Function
1	Ground
2	Z
3	A
4	+5V
5	B

\*Leads are terminated with 18 inch (457mm) long Agilent Technologies HEDS-8903 connector/cable. Encoder terminals are 0.025 inch square pins on 0.100 inch centers.

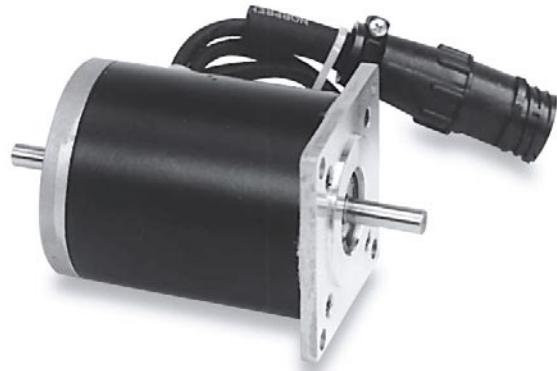
Stepping Motors

MTR-Series

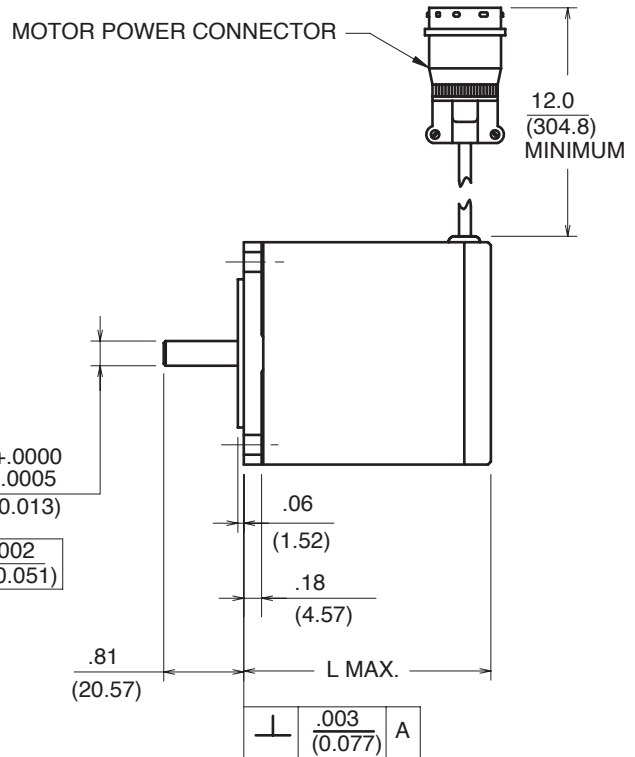
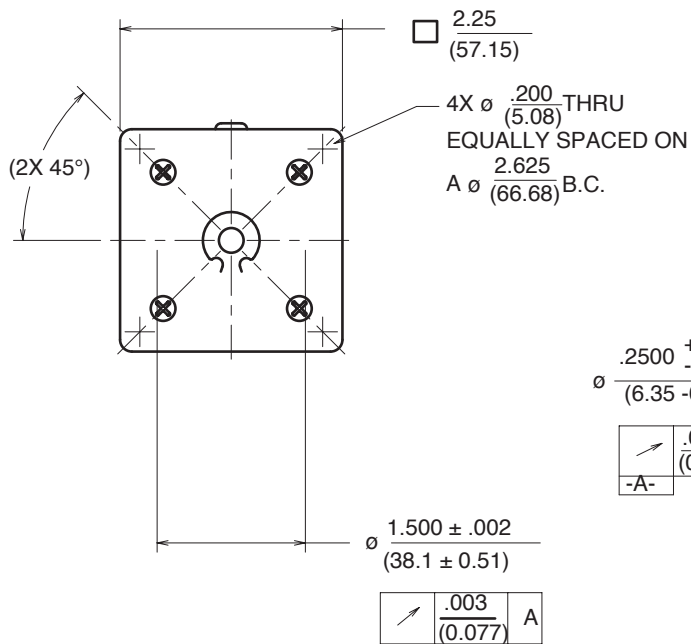
MTR-1220 and 1235 Series Stepping Motor Dimensions  
NEMA 23 Flange - Standard Construction

Model	LMax in (mm)	Weight lb (kg)
MTR-1220	2.06 (52.3)	1.2 (0.55)
MTR-1235	3.06 (77.7)	2.1 (0.95)

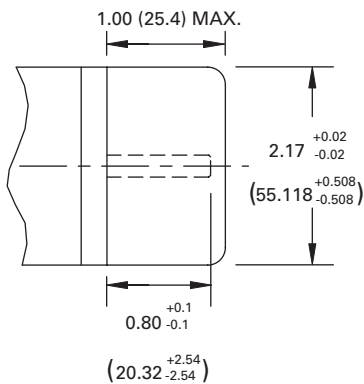
Metric dimensions shown beneath



Encoder Option



Encoder Option

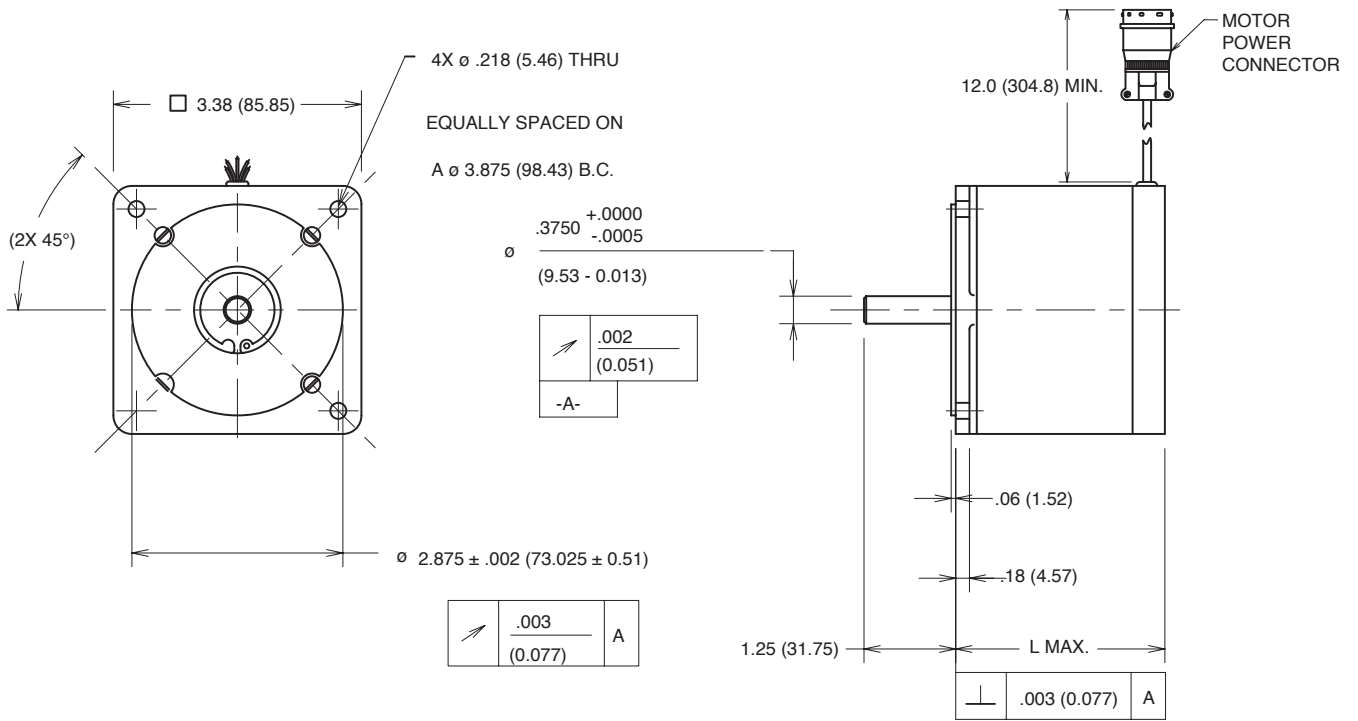


Stepping Motors

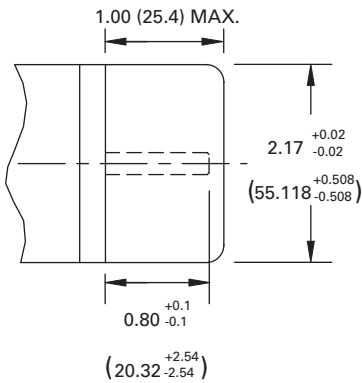
MTR-Series

MTR-1300 Series Stepping Motor Dimensions  
NEMA 34 flange - Standard Construction

Model	LMax in (mm)	Weight lb (kg)
MTR-1324	2.58 (65.5)	3.2 (1.45)
MTR-1337	3.76 (95.5)	5.3 (2.4)
MTR-1350	5.06 (128.5)	7.6 (3.45)



Encoder Option

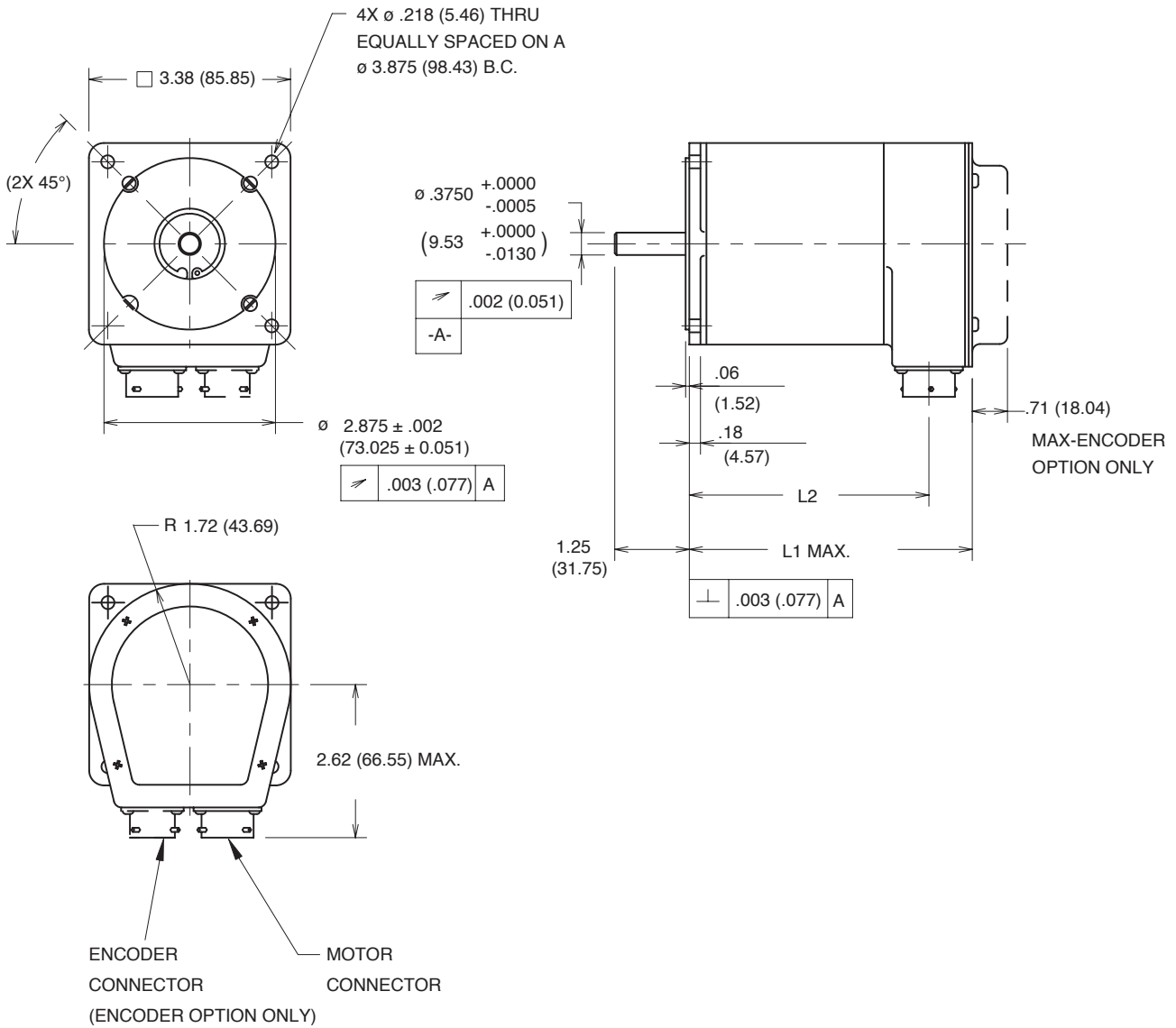


Stepping Motors

MTR-Series

MTR-1300 Series Stepping Motor Dimensions  
NEMA 34 flange - Splashproof Construction

Model	L1 Max. in (mm)	L2 in (mm)	Weight lb (kg)
MTR-1324	3.6 (91.4)	2.87 (72.9)	3.2 (1.45)
MTR-1337	4.77 (121.2)	4.02 (102.1)	5.3 (2.4)
MTR-1350	6.05 (153.7)	5.30 (134.6)	7.6 (3.45)

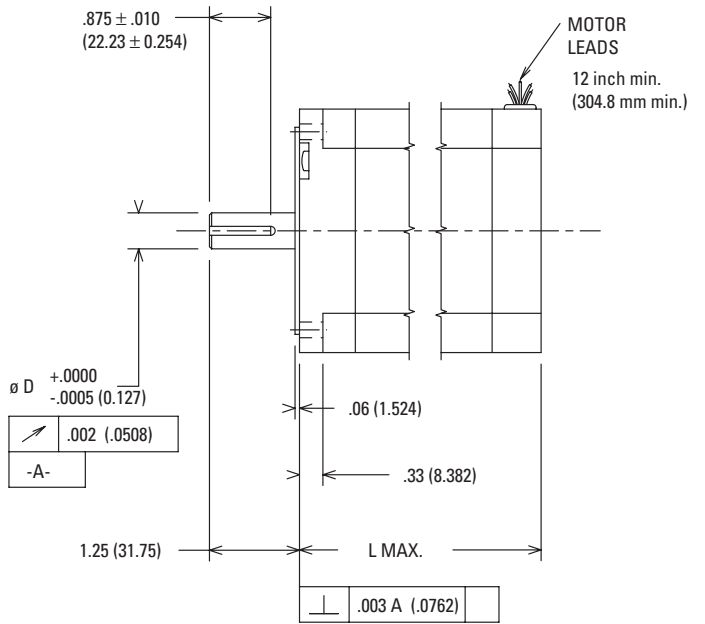
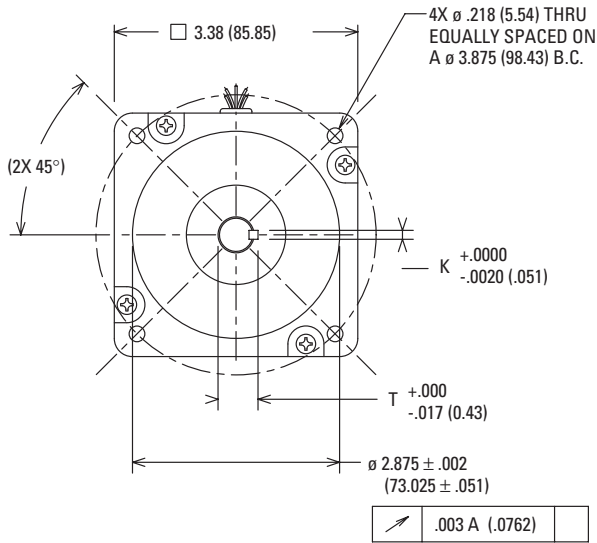


Stepping Motors

MTR-Series

MTR-1N3x Series Stepping Motor Dimensions

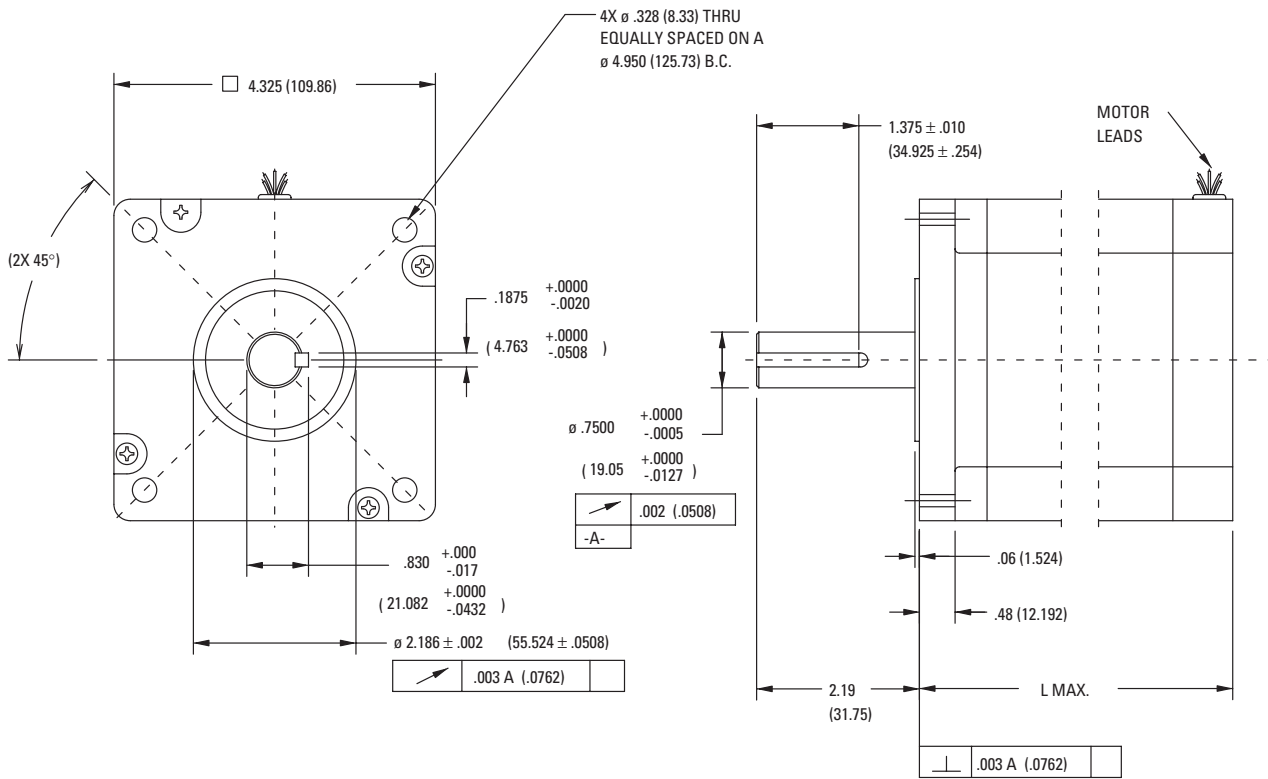
Model	D in (mm)	K	T	L Max.	Weight lb (Kg)
MTR-1N31	.5000 (12.7)	.1250 (3.81)	.555 (14.097)	3.13 (79.50)	5.0 (2.27)
MTR-1N32	.5000 (12.7)	.1250 (3.81)	.555 (14.097)	4.65 (118.11)	8.4 (3.81)



MTR-Series

MTR-1N4x Series Stepping Motor Dimensions

Model	LMax in (mm)	Weight lb (kg)
MTR-1N41	3.89 (98.81)	11 (4.98)



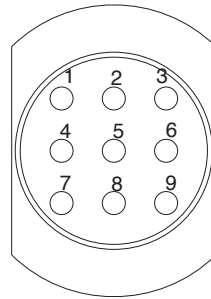
## Stepping Motors

### MTR Series

#### Connections

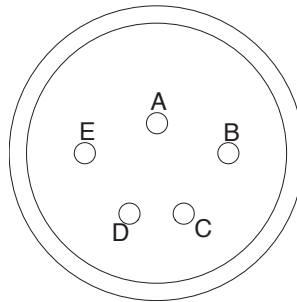
##### Motor Power

Standard Construction: MTR-1220, MTR-1235, MTR-1300 and MTR-1N Series



Pin	Function
1	A+
2	n/c
3	A-
4	n/c
5	Ground
6	n/c
7	B+
8	n/c
9	B-

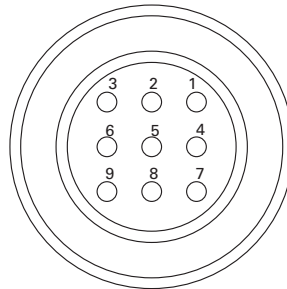
Splashproof Construction: MTR-1300



Pin	Function
A	A+
B	A-
C	B+
D	B-
E	Ground

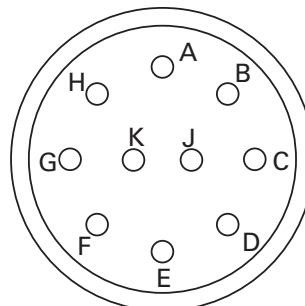
#### Encoder (500 line)

Standard Construction: MTR-1220, MTR-1235, MTR-1300 and MTR-1N Series



Pin	Function
1	Channel A+
2	Channel A-
3	Channel B+
4	Channel B-
5	+5 VDC
6	Ground
7	Index +
8	Index -
9	n/c

Splashproof Construction: MTR-1300



Pin	Function
A	Channel A+
B	Channel A-
C	Channel B+
D	Channel B-
E	Index +
F	Index -
G	+5 VDC
H	Ground
J	n/c
K	n/c

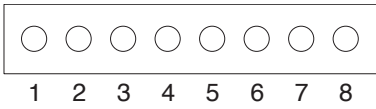


## Stepping Motors

### MTR Series

#### Connections

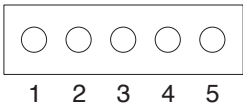
##### Motor Power MTR-1216, MTR-1221 and MTR-1231



Pin	Parallel Connection For PowerCube Amplifier	Series Connection For S2K Controller
1	A-	A-
2	A-	Jumper to pin 5
3	B-	B-
4	B-	Jumper to pin 7
5	A+	Jumper to pin 2
6	A+	A+
7	B+	Jumper to pin 4
8	B+	B+

#### Encoder (500 line)

##### MTR-1216, MTR-1221 and MTR-1231



Pin	Function
1	Ground
2	Z
3	A
4	+5V
5	B

## Stepping Motors

### Stepping Motor Systems

#### Cable Resistance and the Performance

The cable used to connect a stepping motor driver to the motor itself is a critical system component. A poor cable choice can rob an otherwise well-designed system of torque and power and seriously degrade system reliability. Among the many cable issues that must be considered, such as flexibility and environmental factors, the system

designer must choose a cable with the proper electrical resistance for the application. This is especially important in stepping motor systems. Let's review the effects of cable resistance in stepping motor systems and learn how to select the proper resistance for your application.

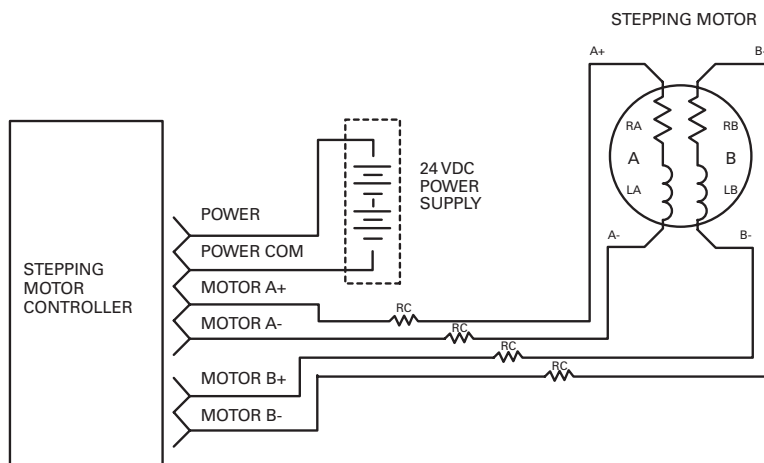
#### Cable Resistance Limits the Voltage Available to the Motor

Every cable exhibits electrical capacitance, inductance, and resistance, all of which can degrade the performance of a stepping motor system. In most cases, the effect of the capacitance and inductance are small compared to the inductance and capacitance of the motor, and thus have a relatively small effect on the system performance. It is the cable resistance that has the most effect on motor performance.

Unlike servo motor systems that provide motor current on a demand basis, stepping motor systems are designed to supply a constant current to the motor. This current multiplied by the cable resistance results in a voltage drop that subtracts directly from the voltage available to run the motor. The effect is to lower the maximum speed at which the motor can run and the maximum torque the motor can produce.

#### An Example Case

Suppose we have a stepping motor wired as shown in the figure below.



The controller is connected to a motor through 100 ft of a cable with four #20 AWG conductors. The motor is designed to operate at 5 amps per phase. Number 20 AWG copper wire has a resistance of about 10 ohms per 1000ft . There is 200ft of this wire in series with each motor phase (100 ft in series with each of the two phase leads) for a total resistance of 2 ohms per phase. Using Ohm's law, we can calculate the voltage drop due to the cable resistance:

$$I_{\text{cable}} = I_{\text{motor}} = 5 \text{ amps}$$

$$R_{\text{cable}} = (10 / 1000 \text{ ohms per foot}) * 200 \text{ ft} = 2 \text{ ohms}$$

$$V_{\text{cable}} = I_{\text{cable}} * R_{\text{cable}} = (5 \text{ amps} * 2 \text{ ohms}) = 10 \text{ volts}$$

This voltage drop reduces the voltage available at the motor from the original 24 to just 14 volts and will cause the motor torque to drop at lower speeds. The most noticeable loss of torque occurs when the motor is near the maximum power point.

## Stepping Motors

### Stepping Motor Systems

#### Cable Resistance Consumes Power

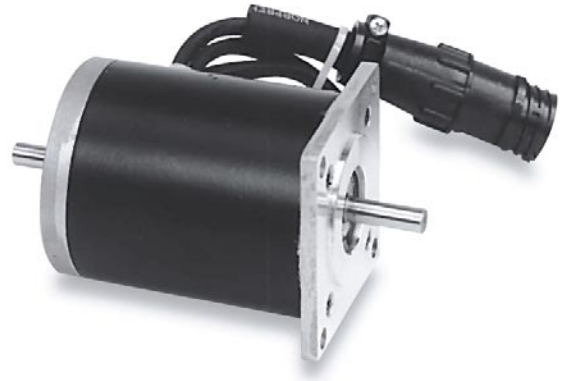
A second effect of cable resistance is to consume power from the drive and its power supply. Continuing with the example case, the total power loss in the cable is:

$$P_{\text{cable}} = I_{\text{cable}}^2 \times R_{\text{cable}}$$

$$P_{\text{cable}} = 5 \text{ amps}^2 \times 2 \text{ ohms}$$

$$P_{\text{cable}} = 50 \text{ watts per phase}$$

$$= 100 \text{ watts total cable loss}$$



If the peak motor requirement is also 100 watts, the power supply capacity must be nearly doubled to allow for the cable loss. This not only increases the cost of the system components, it will shorten the mean time between failures due to increased operating temperatures.

#### For the Best System Performance, Choose a Low Resistance Cable

A low resistance cable enhances the performance and reliability of most stepping motor systems. A rule of thumb that serves well in many applications is to keep the cable resistance less than or equal to the motor phase resistance. This ensures that the voltage drop across the cable and the cable power dissipation are

similar to the voltage drop and the dissipation in the motor while it is at rest. Since the stepping motor drive selected will usually have output voltage and power ratings several times greater than the motor static losses, such a cable will provide the best performance in most systems.

#### Stepping Motor Connector Mates

Motor Series	Function	Part Number	Source
MTR-1216, 1221,1231 Series	Motor Power	640620-8 housing	AMP
		643075-8 cover	AMP
MTR-1220, 1235	Motor Power	206708-1 receptacle	AMP
		66101-4 contact (Qty 9)	AMP
		206966-1 clamp	AMP
		206708-1 receptacle	AMP
MTR-1300 & MTR-1N Series	Motor Power	66101-4 contact (Qty 9)	AMP
		206966-1 clamp	AMP
		206705-2 receptacle	AMP
	Encoder	66099-4 contact (Qty 9)	AMP
		206966-1 clamp	AMP
		21000399	GE
MTR-1300 Series (Splashproof Motors)	Motor Power	21000399	GE
	Encoder	MS3116F12-10S	Bendix

## Stepping Motors

### MTR-Series Stepping Motors

#### Cable and Amplifier Compatibility Ordering Information

Part Number	Description	PowerCube Amplifier			S2K Stepping Controller	
		I/O Cable	Power Cable	Encoder Cable	Power Cable	Encoder Cable
MTR-1216-E-D-E-0	61 oz-in, NEMA 23, Encoder*	IC800PCUBCxxS	CBL-12-MP	CBL-1C-ET	n/a	CBL-1C-ET
MTR-1216-N-D-E-0	61 oz-in, NEMA 23*	IC800PCUBCxxS	CBL-12-MP	n/a	n/a	n/a
MTR-1220-E-D-E-0	116 oz-in, NEMA 23, Encoder	IC800PCUBCxxS	CBL-13-MP	CBL-1C-ET	n/a	n/a
MTR-1220-N-D-E-0	116 oz-in, NEMA 23	IC800PCUBCxxS	CBL-13-MP	n/a	n/a	n/a
MTR-1221-E-D-E-0	144 oz-in, NEMA 23, Encoder (124 oz-in with PowerCube)*	IC800PCUBCxxS	CBL-12-MP	CBL-1C-ET	CBL-12-MPS	CBL-1C-ET
MTR-1221-N-D-E-0	144 oz-in, NEMA 23 (124 oz-in with PowerCube)*	IC800PCUBCxxS	CBL-12-MP	n/a	CBL-12-MPS	n/a
MTR-1231-E-D-E-0	230 oz-in, NEMA 23, Encoder*	IC800PCUBCxxS	CBL-12-MP	CBL-1C-ET	CBL-12-MPS	CBL-1C-ET
MTR-1231-N-D-E-0	230 oz-in, NEMA 23*	IC800PCUBCxxS	CBL-12-MP	n/a	CBL-12-MPS	n/a
MTR-1235-E-D-E-0	185 oz-in, NEMA 23, Encoder	IC800PCUBCxxS	CBL-13-MP	CBL-13-ET	n/a	n/a
MTR-1235-N-D-E-0	185 oz-in, NEMA 23	IC800PCUBCxxS	CBL-13-MP	n/a	n/a	n/a
MTR-1324-E-D-E-0	335 oz-in, NEMA 34, Encoder	n/a	n/a	n/a	CBL-13-MP	CBL-13-ET
MTR-1324-E-D-E-S	335 oz-in, NEMA 34, Encoder, Splashproof	n/a	n/a	n/a	CBL-14-MP	CBL-14-ET
MTR-1324-N-D-E-0	335 oz-in, NEMA 34	n/a	n/a	n/a	CBL-13-MP	n/a
MTR-1324-N-D-E-S	335 oz-in, NEMA 34, Splashproof	n/a	n/a	n/a	CBL-14-MP	n/a
MTR-1331-J-E-D-E-0	327 oz-in, NEMA 34, Encoder	IC800PCUBCxxS	CBL-13-MP	CBL-13-ET	n/a	n/a
MTR-1331-J-E-D-E-S	327 oz-in, NEMA 34, Encoder, Splashproof	IC800PCUBCxxS	CBL-14-MP	CBL-14-ET	n/a	n/a
MTR-1331-J-N-D-E-0	327 oz-in, NEMA 34	IC800PCUBCxxS	CBL-13-MP	CBL-13-ET	n/a	n/a
MTR-1331-J-N-D-E-S	327 oz-in, NEMA 34, Splashproof	IC800PCUBCxxS	CBL-14-MP	CBL-14-ET	n/a	n/a
MTR-1337-E-D-E-0	675 oz-in, NEMA 34, Encoder	n/a	n/a	n/a	CBL-13-MP	CBL-13-ET
MTR-1337-E-D-E-S	675 oz-in, NEMA 34 Encoder, Splashproof	n/a	n/a	n/a	CBL-14-MP	CBL-14-ET
MTR-1337-N-D-E-0	675 oz-in, NEMA 34	n/a	n/a	n/a	CBL-13-MP	n/a
MTR-1337-N-D-E-S	675 oz-in, NEMA 34, Splashproof	n/a	n/a	n/a	CBL-14-MP	n/a
MTR-1350-E-A-E-0	630 oz-in, NEMA 34, Encoder	n/a	n/a	n/a	CBL-13-MP	CBL-13-ET
MTR-1350-E-A-E-S	630 oz-in, NEMA 34, Encoder, Splashproof	n/a	n/a	n/a	CBL-14-MP	CBL-14-ET
MTR-1350-E-D-E-0	995 oz-in, NEMA 34, Encoder	n/a	n/a	n/a	CBL-13-MP	CBL-13-ET
MTR-1350-E-D-E-S	995 oz-in, NEMA 34, Encoder, Splashproof	n/a	n/a	n/a	CBL-14-MP	CBL-14-ET
MTR-1350-N-A-E-0	630 oz-in, NEMA 34	n/a	n/a	n/a	CBL-13-MP	n/a
MTR-1350-N-A-E-S	630 oz-in, NEMA 34, Splashproof	n/a	n/a	n/a	CBL-14-MP	n/a
MTR-1350-N-D-E-0	995 oz-in, NEMA 34	n/a	n/a	n/a	CBL-13-MP	n/a
MTR-1350-N-D-E-S	995 oz-in, NEMA 34, Splashproof	n/a	n/a	n/a	CBL-14-MP	n/a
MTR-1N31-I-N-D-S-0	650 oz-in, NEMA 34, (605 oz-in with PowerCube)	IC800PCUBCxxS	CBL-13-MP	n/a	CBL-13-MP	n/a
MTR-1N32-I-N-D-S-0	1200 oz-in, NEMA 34	n/a	n/a	n/a	CBL-13-MP	n/a
MTR-1N41-G-N-A-E-0	1905 oz-in, NEMA 42	n/a	n/a	n/a	CBL-13-MP	n/a

#### Cable Ordering Information

	Part Number	Description
Stepping Motor Power Cables	CBL-12-MP-xx*	Power Cable, MTR-1216, 1221 & 1231 Stepping Motor to PowerCube, xx = 10, 20 or 30 feet
	CBL-12-MPS-xx*	Power Cable, MTR-1216, 1221 & 1231 Stepping Motor to S2K, xx = 10, 20 or 30 feet
	CBL-13-MP-xx	Power Cable, MTR-1235, 1300 & 1N Series Stepping Motors, xx = 10, 20 or 30 feet
	CBL-14-MP-xx	Power Cable, MTR-1235, 1300 & 1N Series Splashproof Stepping Motors, xx = 10, 20 or 30 feet
Encoder Cables	CBL-1C-ET-xx	Encoder Cable, MTR-1216, 1221 & 1231 Stepping Motors, xx = 10, 20 or 30 feet
	CBL-13-ET-xx**	Encoder Cable, Flying Lead to MTR-1235, 1300 & 1N Series Stepping Motors, xx = 10, 20 or 30 feet
	CBL-14-ET-xx**	Encoder Cable, Flying Lead to MTR-1235, 1300 & 1N Series Splashproof Stepping Motors, xx = 10, 20 or 30 feet
Power Cube I/O Cables	IC800PCUBC02S0x0	Interface Cable, PowerCube Amplifier DB-15 I/O Connector to Flying Leads, 200 Steps/Rev, x = 3 or 5 m
	IC800PCUBC04S0x0	Interface Cable, PowerCube Amplifier DB-15 I/O Connector to Flying Leads, 400 Steps/Rev, x = 3 or 5 m
	IC800PCUBC10S0x0	Interface Cable, PowerCube Amplifier DB-15 I/O Connector to Flying Leads, 1000 Steps/Rev, x = 3 or 5 m

\*MTR1216, 1221 an 1231 motor winding connection type (series or parallel) is determined by the motor power cable not by the winding designation (A or D) in the motor part number.

\*\*Requires TRM-JAUX-xx break out board for encoder feedback to S2K stepping motor controller.

# Stepping Motor Cube

## Stepping Motor Cube: Complete, Integrated Stepping Motor and Drive

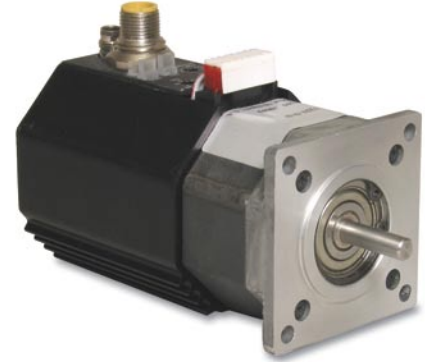
Designers of industrial stepping motor applications continually demand more features, fewer system components and less wiring. GE raises the bar with its high-performance Stepping Motor Cube, integrating motor, drive and control communications in a single package.

### Specifications

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Designed to perform in industrial environments, the Stepping Motor Cube features:

- Full or half-step modes
- 50 kHz max pulse frequency
- 2  $\mu$ s minimum pulse width



### Features

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- Integral drive with 3-Amp, 24-48 VDC power input
- NEMA 23 stepping motor
- Three models available with torque ratings from 50 to 175 oz-in
- Optional 500 ppr Encoder on pulse command models

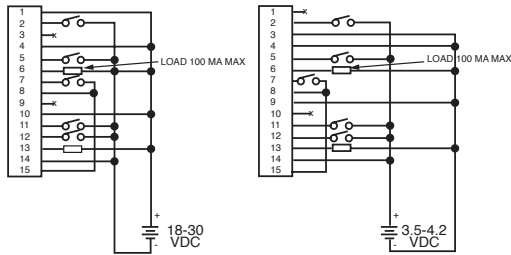
The latest addition to GE's offering of leading-edge, integrated motion control products, the Stepping Motor Cube fits easily into systems where panel space is limited.

## Stepping Motors

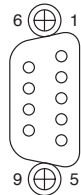
### Stepping Motor Cube

#### Connection Information

##### Discrete Inputs and Outputs



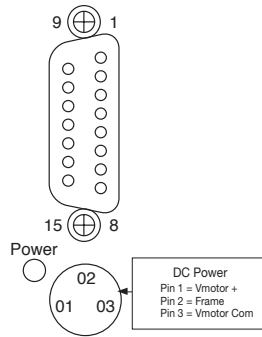
##### Encoder Output Option



DB9 Pinout	Pin	Function
1	Channel A+	
2	Channel B+	
3	Index +	
4	+ 5V	
5	Gnd	
6	Channel A-	
7	Channel B-	
8	Index -	
9	Gnd	

##### DB-15 Connector\*

Pin	Function
1	Pulse + (24V)
2	Pulse -
3	Direction + (4V)
4	Input Common
5	Power Save
6	Stall Output
7	Step Size Select A
8	Step Size Common
9	Pulse + (4V)
10	Direction + (24V)
11	Direction-
12	Enable Input
13	OK Output
14	Output Common
15	Step Size Select B



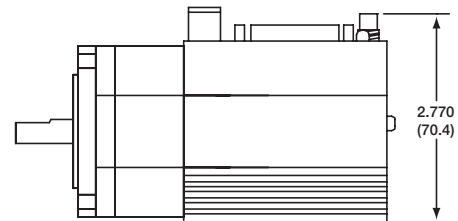
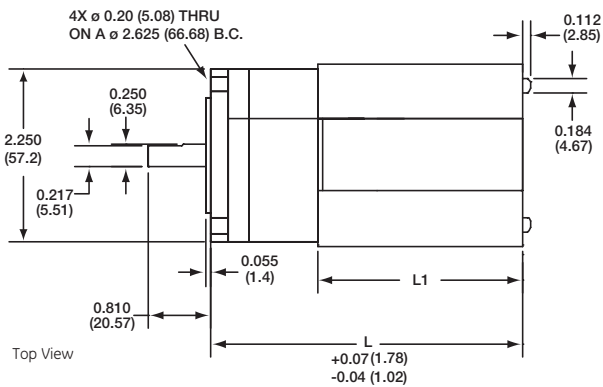
##### Step Size Selection

A	B	Step Size
open	open	Full Stepping (200 steps/rev)
open	short	Half Stepping (400 steps/rev)
short	open	Microstepping (1,000 steps/rev)

short = Connect to Step Size Common

\* Optional DB-15 to screw terminal adaptor (IC800CUBDB15ADP) is available

#### Mechanical Dimensions in (mm)



Side View-Pulse Command Configuration

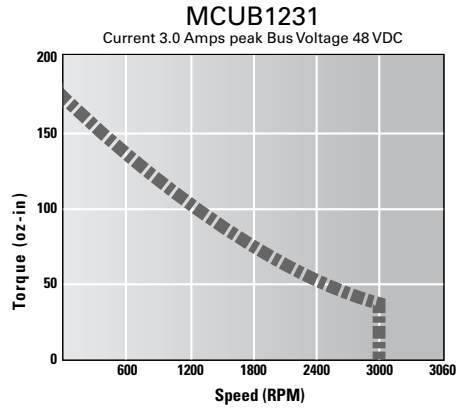
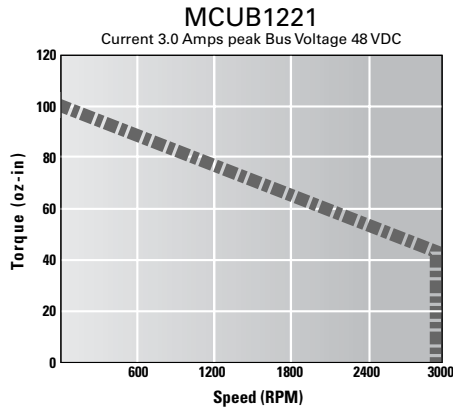
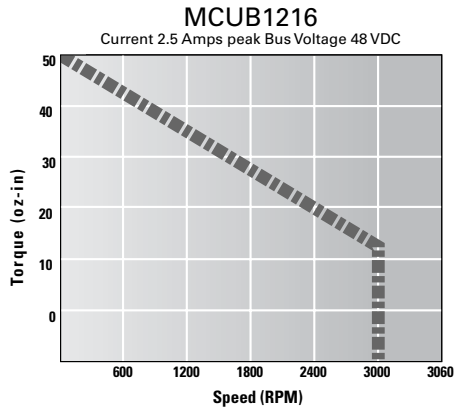
Model	LMax in (mm)	L1 in (mm)	Weight lb (kg)
IC800MCUB12160XN	3.7 (93.9)	2.7 (68.6)	1.6 (0.73)
IC800MCUB12210XN	4.2 (106.7)	2.7 (68.6)	2.1 (0.95)
IC800MCUB12310XN	5.2 (132.1)	2.7 (68.6)	3.1 (1.41)
IC800MCUB12160XE	4.5 (114.3)	3.5 (88.9)	1.8 (0.82)
IC800MCUB12210XE	5.0 (127.0)	3.5 (88.9)	2.3 (1.1)
IC800MCUB12310XE	6.0 (152.4)	3.5 (88.9)	3.3 (1.5)

## Stepping Motors

### Stepping Motor Cube

#### Performance Curves

The performance curves show rated torque available for 48 VDC and full stepping mode. Torque must be reduced by 30% for half-stepping mode. Lower bus voltages will also decrease the available speed and torque.



#### MotorCube Ordering Information

Part Number	Description
IC800MCUB12160XE	50 oz-in Stepping Motor Cube, Pulse/Direction Interface with 500 line Encoder
IC800MCUB12160XN	50 oz-in Stepping Motor Cube, Pulse/Direction Interface
IC800MCUB12210XE	100 oz-in Stepping Motor Cube, Pulse/Direction Interface with 500 line Encoder
IC800MCUB12210XN	100 oz-in Stepping Motor Cube, Pulse/Direction Interface
IC800MCUB12310XE	175 oz-in Stepping Motor Cube, Pulse/Direction Interface with 500 line Encoder
IC800MCUB12310XN	175 oz-in Stepping Motor Cube, Pulse/Direction Interface

Consult the factory for an application-specific Stepping Motor Cube sizing or for more information on how GE can improve the performance of your stepping motor control systems.

#### Cable Ordering Information

	Part Number	Description
Stepping MotorCube Power Cables	IC800MCC23P050	Power Cable, MotorCube Stepping Motor to Flying Lead, 5 m
	IC800MCC23P100	Power Cable, MotorCube Stepping Motor to Flying Lead, 10 m
Encoder Cables	CBL-12-ED-03M-RA	Encoder Cable, Stepping MotorCube DB-9 Right Angle Connector to Flying Lead, 3 m
Stepping MotorCube I/O Cables	IC800PCUBC0250x0	Interface Cable, MotorCube DB-15 I/O Connector to Flying Leads, 200 Steps/Rev, x = 3 or 5 m
	IC800PCUBC0450x0	Interface Cable, MotorCube DB-15 I/O Connector to Flying Leads, 400 Steps/Rev, x = 3 or 5 m
	IC800PCUBC1050x0	Interface Cable, MotorCube DB-15 I/O Connector to Flying Leads, 1000 Steps/Rev, x = 3 or 5 m

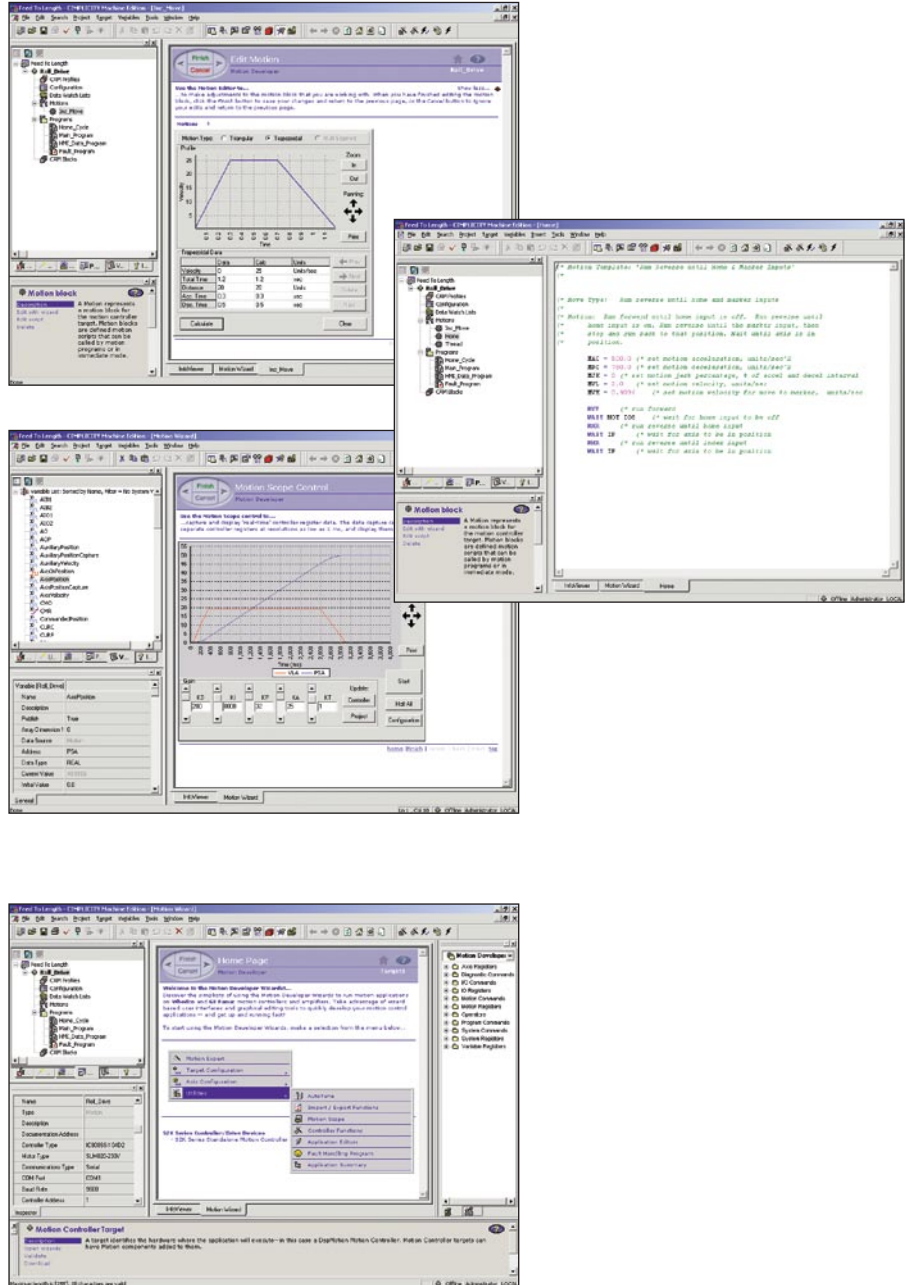
#### Accessory Ordering Information

	Part Number	Description
Screw Terminal Adapter	IC800CUBDB15ADP	Plug on Adapter Converts DB15 Connections to Screw Terminals

# Development Software

## Motion Developer

S2K Series controllers are configured using the Motion Developer software. This easy-to-use interface provides the user with a range of programming methods appropriate for both the beginner and the more advanced programmer. Motion Developer is also a member of the GE Intelligent Platforms Proficy Machine Edition environment which can include factory automation software applications like View and Control. Thus, a complete machine control solution is further simplified with one programming environment.



## Ordering Information

Motion Developer with 15 months GlobalCare Complete	BC646MODEV
5-pack Motion Developer with 15 months GlobalCare Complete	BC646MODEV05PK
10-pack Motion Developer with 15 months GlobalCare Complete	BC646MODEV10PK
1 year GlobalCare Complete Renewal	SA648MODEV



## Motion Software

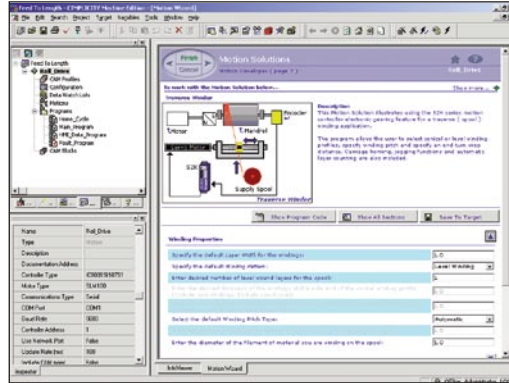
### Development Software

#### New Application Wizard

Application Wizards provide step-by-step instructions to guide the first-time user through controller configuration and simple motion programming.

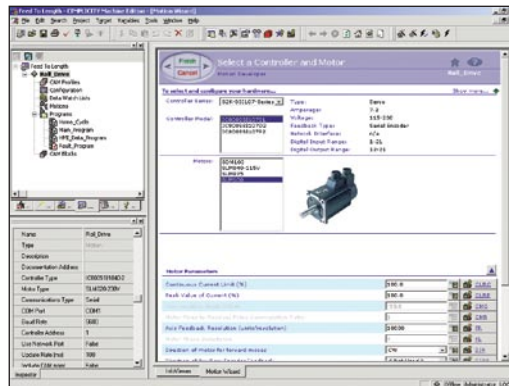
The Motion Solutions templates aid the user in rapid development of common applications such as flying cutoff, rotary knife and traverse (spool) winder.

Each Motion Developer "project" stores all of the configuration, motion and program information for a complete multi-axis system. Projects can be reused or modified at any time.



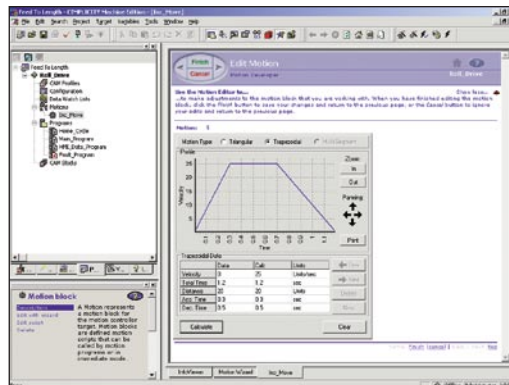
#### Configuration Wizard

Setting up your system is simplified with drop-down motor/drive lists complete with pictures. Complete controller configurations, including communication parameters, user unit scaling, master encoder configuration, position rollover, I/O configuration and electronic gearing are configured using a simple question and answer format. The S2K "autotune" function provides a novice user with a way to get optimum performance without having in-depth knowledge of tuning parameters.



#### Motion Wizard

Adding new motion blocks is as easy as selecting the move type from the available list and filling in the blanks. Incremental moves can be created using the Motion Calculator. Advanced users can customize motion blocks using the text editor. Up to 100 motion blocks can be created and called by any of the four programs. Once created, these motion blocks can be saved in the Toolchest library (drawer) under a user-specified name for re-use in future projects.

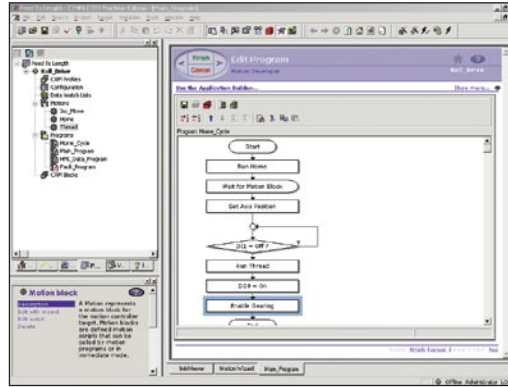


## Motion Software

### Development Software

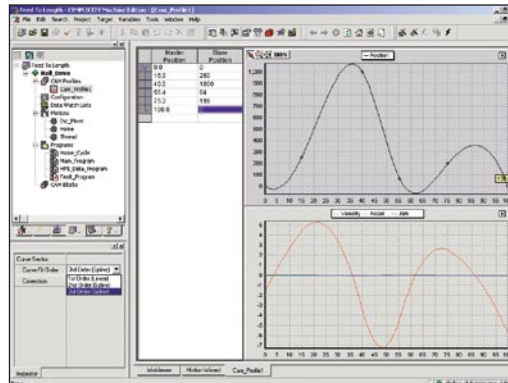
#### Graphical Motion Editor

The graphical motion Program Editor allows programs to be developed using a flow chart format. New commands can be inserted from the menus or drag-and-dropped from the Toolchest. Double clicking a program block allows block parameters to be changed. Program flow control is easy to create by making or breaking connections. Selecting a decision block highlights the conditional program path for easy visualization.



#### CAM Editor

Motion Developer provides a graphical CAM Profile Editor for developing electronic CAM Profiles. Data points can be imported/exported in CSV file format, manually entered into the data table or by inserting and dragging points on the graph. CAM Profiles can be subdivided into sectors with each sector supporting individual first, second or third order curve fitting. Multiple profiles can be stored in a project.



#### On-line Menu

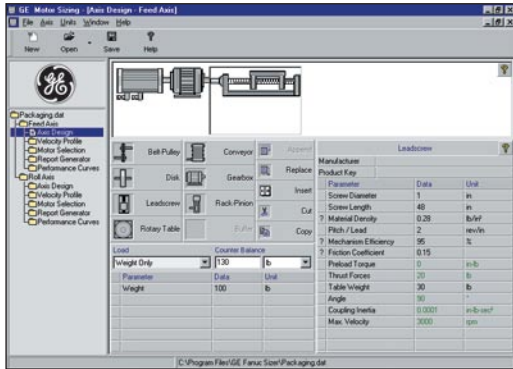
Motion Developer also includes tools to aid in quick start-up and debugging. The Controller Functions screen provides the user with a convenient way to start/stop motion blocks or programs, jog the axis motor, view or reset system status and faults and open the Data Watch window or the terminal window for immediate mode communications with the selected controller.

Variable Name	Address	Value
AxisVelocity	15136	15136
AxisPosition	15136	15136
AxisPositionCapture	15136	15136
AxisPosition	15136	15136

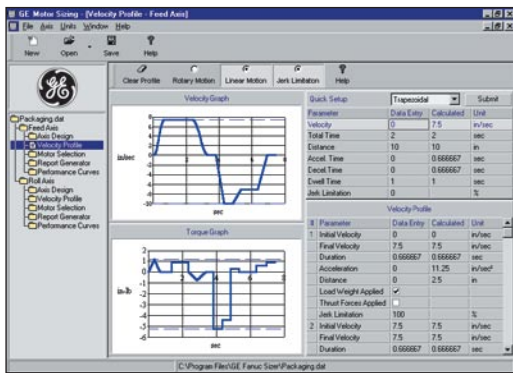
The Data Watch and Motion Scope functions allow the user to view an “o’scope-style” trend chart for selected variables. The Data Watch window allows you to monitor and change both system and user variables in real time.

### Servo Motor Sizing Software

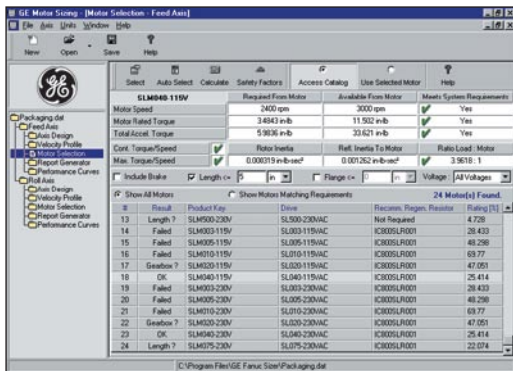
The GE Sizer is a powerful motor selection program to assist in the selection of GE servo solutions for a broad range of user defined applications. GE Sizer is one of the most advanced motor selection programs available, providing users the flexibility to quickly define and analyze many possible system configurations in order to determine the optimum solution. Advanced features include:



The Axis Design screen (above) is first used to define the system mechanics using graphical icons with fill-in-the-blank data tables.



The Velocity Profile screen (below) is then used to define the motion profile for each axis and supports the following features:



- Graphical design of system mechanics and motion profiles
- Multiple axes can be analyzed and saved in one file with user defined axes names
- Flexible user defined units of measure
- Inclined loads in increments of 1 degree with user defined counterbalancing
- Graphical display of selected motor torque/speed curve with superimposed loading
- Comprehensive on-line and printed report can be exported to an MS-Word template that can be customized by the user

- Quick Set-up for simple triangular or trapezoidal velocity profiles or a free form tool to define complex, multi-speed profiles
- Jerk limited or linear acceleration may be defined for each accel/decel segment
- Thrust load and application load may be defined for each motion segment allowing complex machine cycles to be quickly analyzed
- Enter or view profile data in either linear or rotary units
- Toggle jerk limiting on/off with convenient toolbar button to quickly assess impact on required peak motor torque

The Motor Selection screen (right) is used to search the database of GE motors for the optimum solution. The selection screen includes:

- Automatic selection and ranking of viable GE servo motor solutions
- User defined safety factors for torque load margin, load/motor inertia ratio, etc.
- Regeneration resistor calculations automatically recommend GE resistor kit part number
- User defined motor selection criteria includes voltage, motor length and diameter, brake, inertia ratio and torque safety margin

The GE Sizer software can make short work of choosing and documenting the best GE motor solution for your motion applications. The intuitive graphical interface makes it easy to use for a novice without sacrificing the flexibility or features demanded by more experienced users.

# Motion Solutions

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# Motion Solutions

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