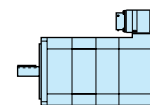


Axi dyne® Brushless Servo System



BRUSHLESS

- MRV BRUSHLESS SERVO MOTORS
- AXIOM® DV SERVO DRIVE
- AXIOM® PV SERVO CONTROLLER/DRIVE
- SSC CONTROLLER
- JS JOYSTICK INTERFACE
- SIT HAND-HELD INTERFACE

Axi dyne® Brushless Servo System

OVERVIEW

APPLICATION BENEFITS

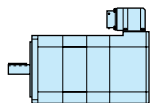
- Extremely smooth and quiet operation
- Good for high torques [up to 45 in.-lbs. (5.08 N-m) continuous, 140 in.-lbs. (15.82 N-m) peak]
- Good for high speeds, up to 6,000 RPM
- High resolution, 4,000 counts per revolution
- Provide torque control
- Good for short, repetitive moves
- Maintenance free with no moving contacts

MOTOR



MRV - Brushless Servo Motors

- Rugged, with large shafts and bearings, IP65
- Convenient MS connectors
- Common flanges (NEMA 17, 23, 34 and 56)
- Integral temperature sensor and 1000 line encoder
- Gearhead reduction available in gear ratios of 5.5:1 and 10:1 when selected with Tol-O-Matic screw-drive actuators



BRUSHLESS

Overview

DRIVE



Axiom DV - Servo Drive

- Designed to drive MRV motors
- Peak current ratings of 10A, 20A and 30A
- State-of-the-art vector commutation and current control for efficient high-bandwidth servo performance
- Simple Windows®-based software for set-up and installation

DRIVE - CONTROLLER



Axiom® PV Controller/Drive:

- Combines into one unit:
 - PLC: with real-time scan, 175 rung ladder logic
 - Motion Controller: with 1.5 axis, event triggering, motion pause and resume, point & click editor
 - Axiom drive: with all features listed above

- Includes Tol-O-Motion™ Axiom Motion Control Software and intuitive point and click sequential program and PLC ladder logic editors

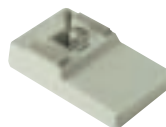
CONTROLLER



SSC Controller:

- Performs any motion task including jogging, point-to-point positioning, linear and circular interpolation, electronic gearing, camming and contouring
- Multitasking feature permits simultaneous execution of four independent applications programs
- Tol-O-Motion SSC Motion Control Software allows setup & programming with easy-to-use Windows® interface
- Up to 4 axes per unit - up to 4 units can be daisy-chained
- 4M non-volatile EEPROM memory for executing custom application programs - permits stand-alone operation
- Relative and absolute positioning with more than ± 2,000,000,000 counts per move
- Inputs: opto-isolated dedicated for home, abort, forward and reverse limits, 8 uncommitted; 7 analog inputs
- Outputs: 8 programmable

INTERFACES



JS - Joystick

- Use with SSC joystick teach mode



SIT - Hand-held interface

- 45 key - keypad, LCD display
- for use with SSC

Host compatible PC

Axi-dyne® MRV Brushless Servo Motors

FEATURES AND SPECIFICATIONS



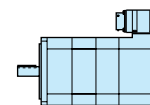
COMPATIBILITY:
SYSTEM: BRUSHLESS
MOTORS: MRV
DRIVE: AXIOM DV
AXIOM PV
CONTROLLER: SSC
AXIOM PV
INTERFACE: JS
SIT

MRV Brushless Servo Motors

Tol-O-Matic's MRV series brushless servo motors provide a wide range of rated torques and speeds for applications requiring long life under continuous, difficult environment operation. These motors are designed for maximum power density. The MRV series motor come with an internally mounted 1000 line encoder.

FEATURES

- Rugged industrial enclosures
- Large shafts and bearings for longer life with high radial and axial loads
- Dual convenient MS connectors to simplify motor termination and provide excellent noise immunity
- Common industrial mechanical flanges (NEMA 17, 23, 34, 56)
- Integral 1000 line TTL encoder with differential line driver outputs
- Ideally suited for use with Axiom DV drives (motor parameters are stored with drive) – torque/speed curves shown on the following pages reflect MRV motors with Axiom drive performance.
- Internal thermal protection
- IP65* rated (except MRV11)
**Totally protected against dust and low pressure jets of water.*



BRUSHLESS

MRV Motors

- Features
- Specifications

SPECIFICATIONS

Model	KE (1)	KT (2)	Resistance (3)		Rotor Inertia		Thermal Resistance	Cont. Stall Torque		Peak Stall Torque		Max. Speed	Inductance (4)	Weight	
	Volts/1000RPM	lb-in/amp	N-m/amp	Ohms	lb-in ²	kg-m ² x 10 ⁶	°C/W	lb-in	N-m	lb-in	N-m	RPM	mH	lbs	kgs
MRV11	6.06	0.893	0.100	2.24	0.020	5.72	—	2.50	0.28	12.50	1.41	5,000	1.63	1.16	0.53
MRV21	8.80	1.290	0.144	2.22	0.053	15.58	1.80	3.75	0.42	11.31	1.28	6,000	1.81	2.20	1.00
MRV22	14.50	2.120	0.237	2.04	0.099	28.90	1.30	7.50	0.85	22.50	2.54	6,000	2.10	3.10	1.40
MRV23	21.80	3.190	0.357	2.73	0.143	41.70	1.23	11.25	1.27	33.81	3.82	6,000	2.95	4.00	1.80
MRV24	29.00	4.250	0.476	3.36	0.193	56.33	1.16	15.63	1.77	46.88	5.30	6,000	3.81	5.00	2.30
MRV31	14.80	2.170	0.243	1.10	0.386	112.85	0.72	17.00	1.92	85.00	9.60	6,000	2.60	8.00	3.60
MRV32	22.20	3.250	0.364	0.80	0.694	203.02	0.58	30.00	3.39	150.00	16.90	6,000	2.50	11.50	5.20
MRV33	25.90	3.790	0.424	0.60	1.006	294.47	0.56	44.00	4.97	220.00	24.90	6,000	2.10	14.00	6.35
MRV51	48.90	7.150	0.801	0.54	2.531	740.75	0.72	80.00	9.04	240.00	27.10	3,000	3.06	26.00	11.80

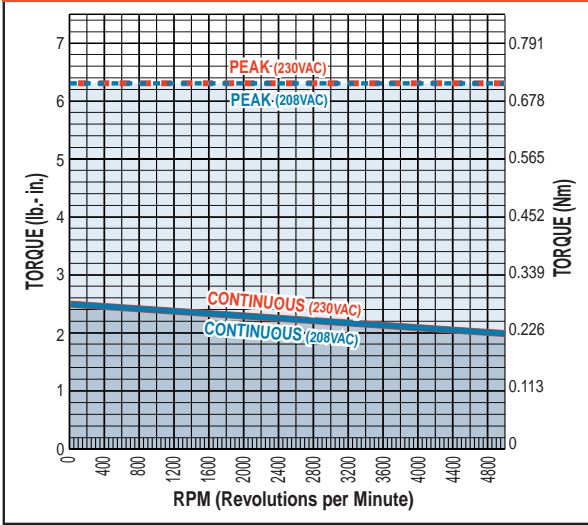
ALL RATINGS TYPICAL AND AT 77°F (25°C) UNLESS OTHERWISE NOTED. WINDING TEMPERATURE AT 257°F (125°C).

(1) L-L, RMS (±10%) (2) PER PHASE, RMS (±10%) (3) L-L DC RESISTANCE (±10%) (4) L-L (±15%)

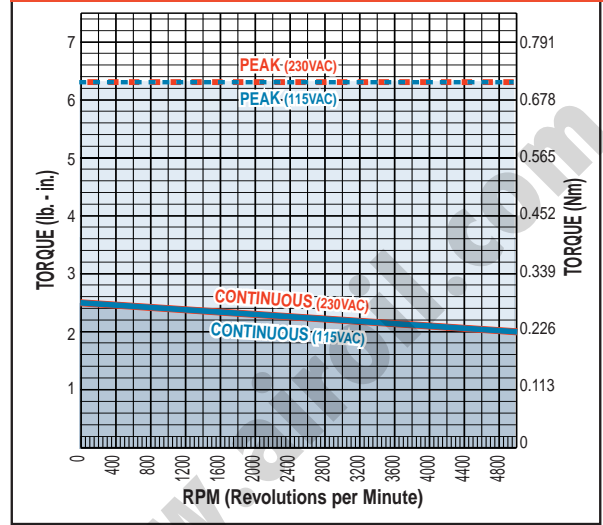
Axi-dyne[®] MRV Brushless Servo Motors

PERFORMANCE DATA WITH AXIOM[®] DV/PV DRIVES

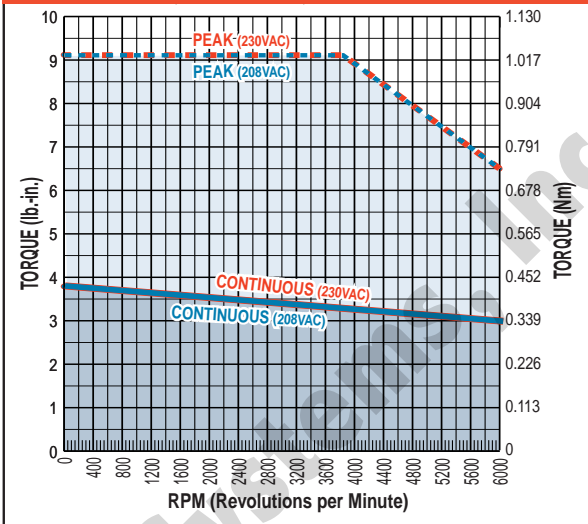
MRV11Y • DV/PV10 DRIVE • THREE-PHASE



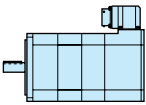
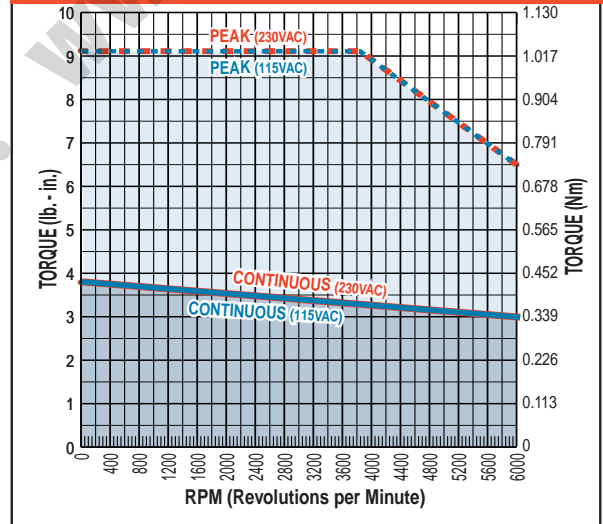
MRV11Y • DV/PV10 DRIVE • SINGLE-PHASE



MRV21Y • DV/PV10 DRIVE • THREE-PHASE



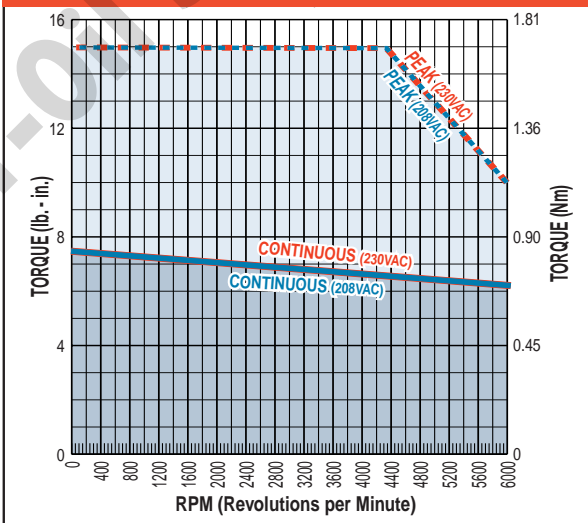
MRV21Y • DV/PV10 DRIVE • SINGLE-PHASE



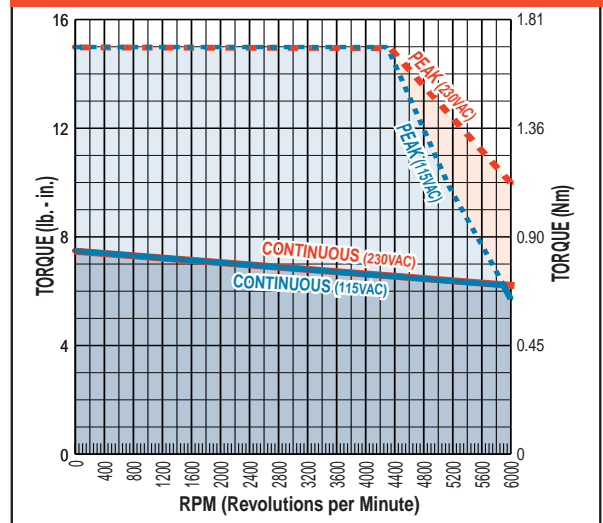
BRUSHLESS

MRV Motors
• Performance data

MRV22Y • DV/PV10 DRIVE • THREE-PHASE



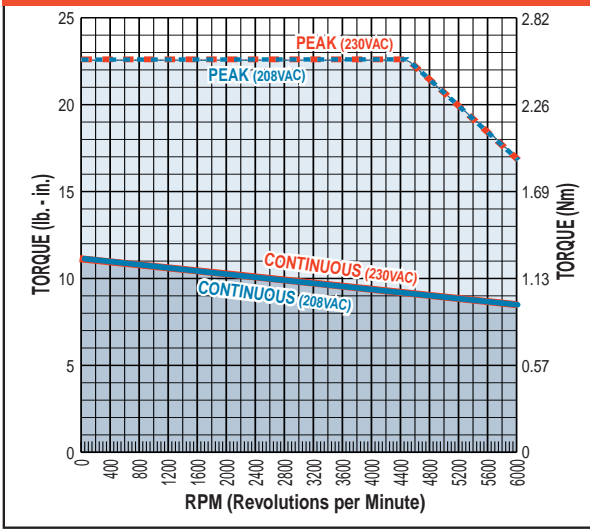
MRV22Y • DV/PV10 DRIVE • SINGLE-PHASE



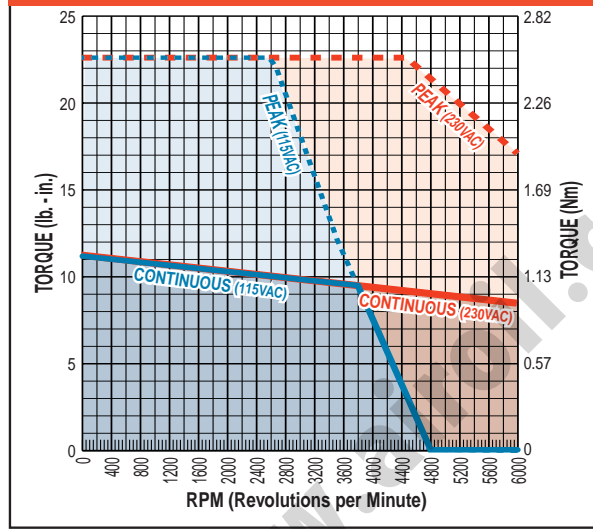
Axi-dyne® MRV Brushless Servo Motors

PERFORMANCE DATA WITH AXIOM® DVIPV DRIVES

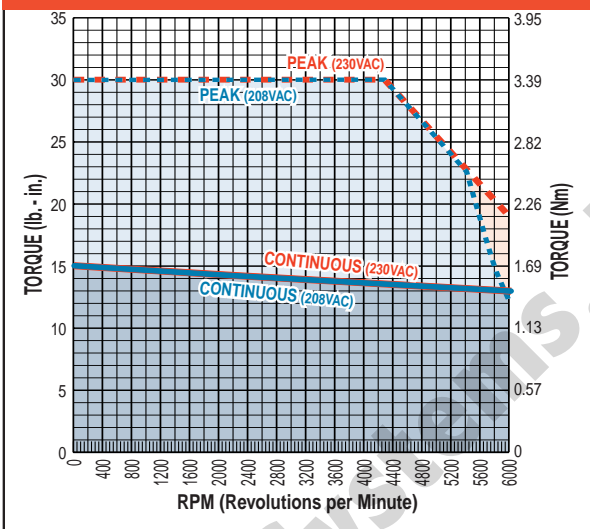
MRV23Y • DV/PV10 DRIVE • THREE-PHASE



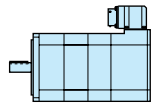
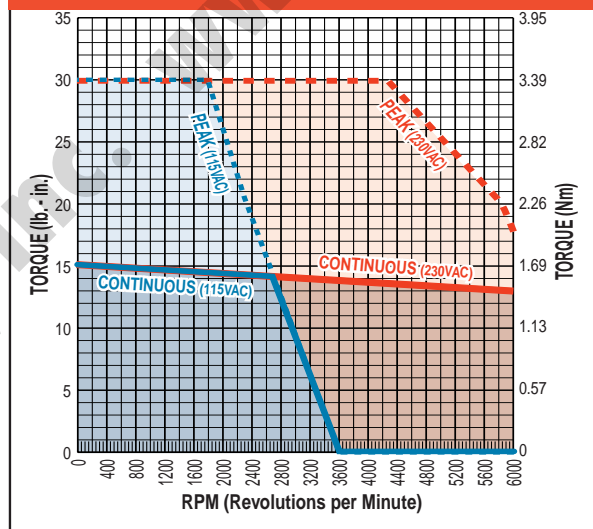
MRV23Y • DV/PV10 DRIVE • SINGLE-PHASE



MRV24Y • DV/PV10 DRIVE • THREE-PHASE



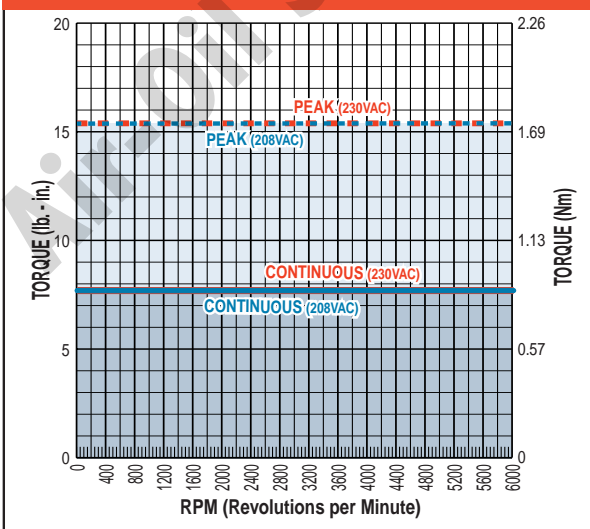
MRV24Y • DV/PV10 DRIVE • SINGLE-PHASE



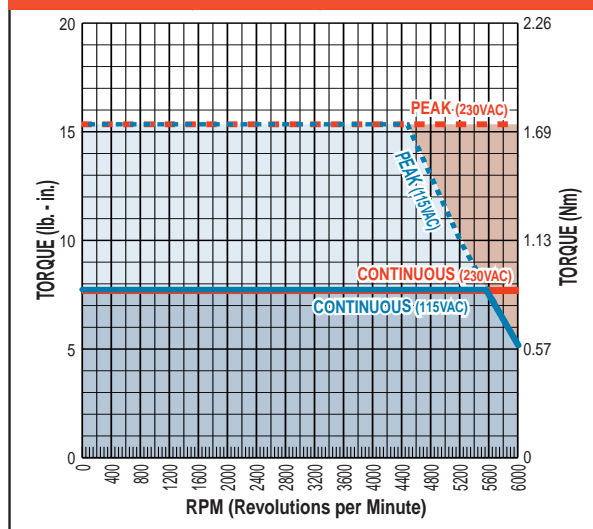
BRUSHLESS

MRV Motors
• Performance data

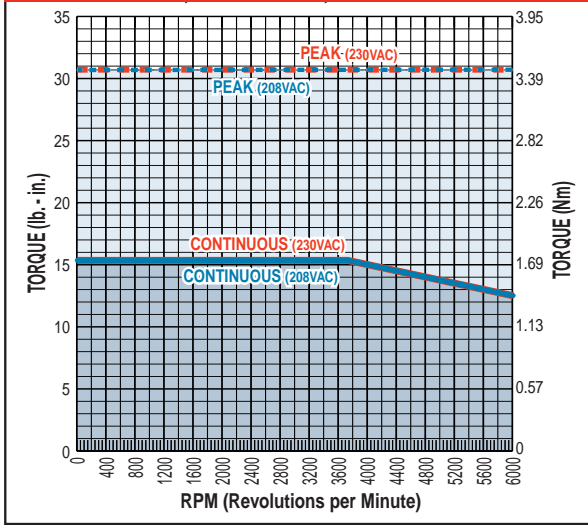
MRV31Y • DV/PV10 DRIVE • THREE-PHASE



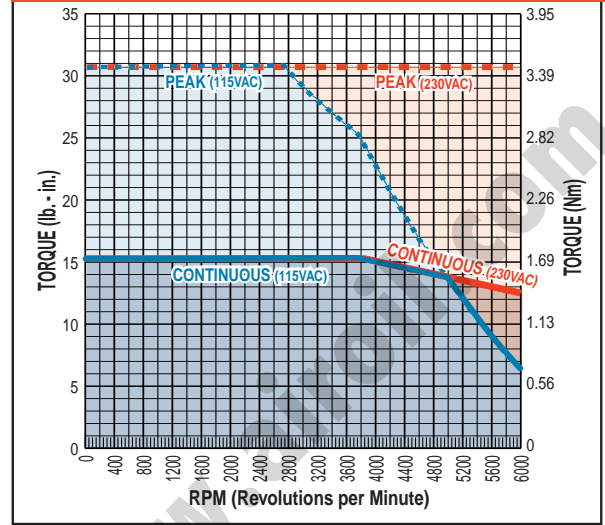
MRV31Y • DV/PV10 DRIVE • SINGLE-PHASE



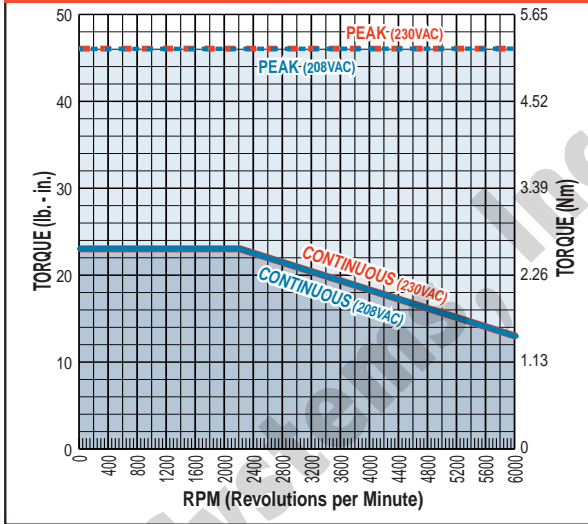
MRV31Z • DV/PV20 DRIVE • THREE-PHASE



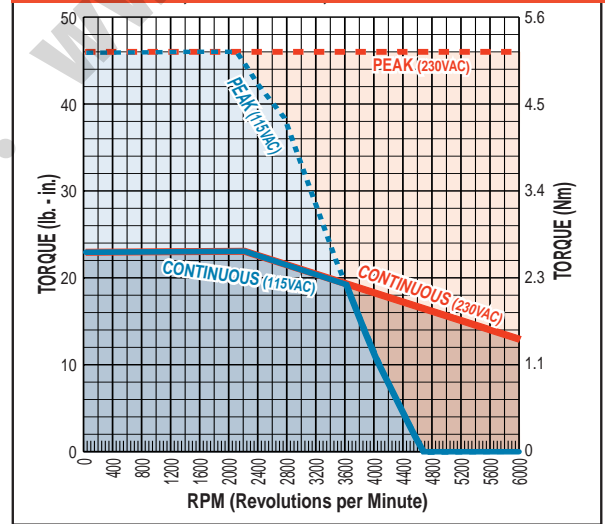
MRV31Z • DV/PV20 DRIVE • SINGLE-PHASE



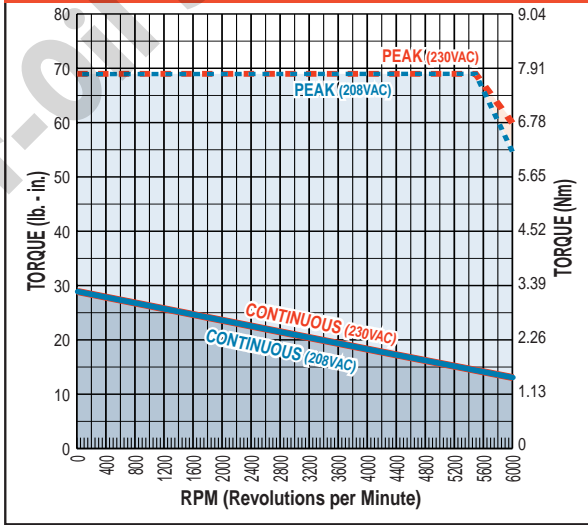
MRV32Y • DV/PV20 DRIVE • THREE-PHASE



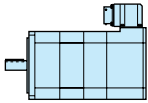
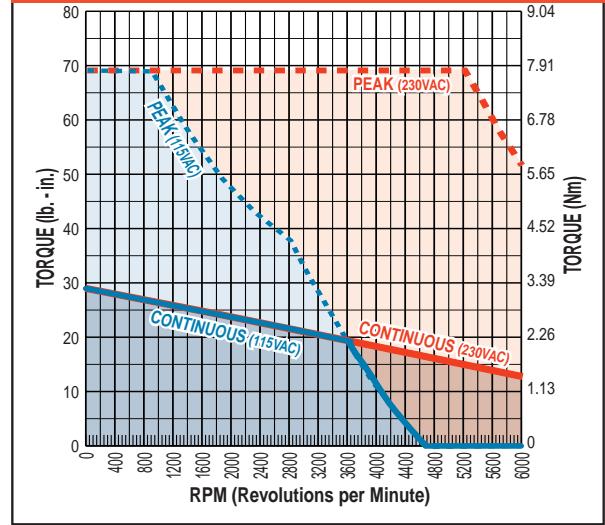
MRV32Y • DV/PV20 DRIVE • SINGLE-PHASE



MRV32Z • DV/PV30 DRIVE • THREE-PHASE



MRV32Z • DV/PV30 DRIVE • SINGLE-PHASE



BRUSHLESS

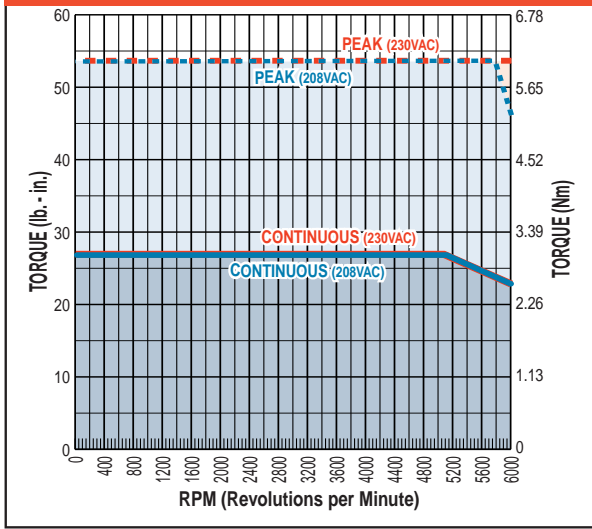
MRV Motors
• Performance data



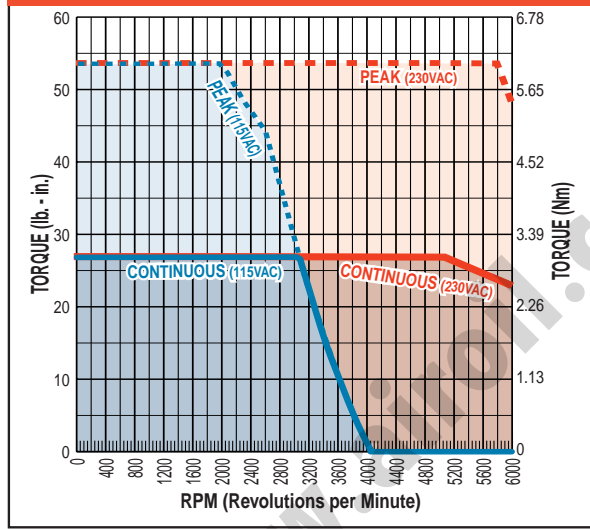
MRV Brushless Servo Motors

PERFORMANCE DATA WITH AXIOM® DVIPV DRIVES

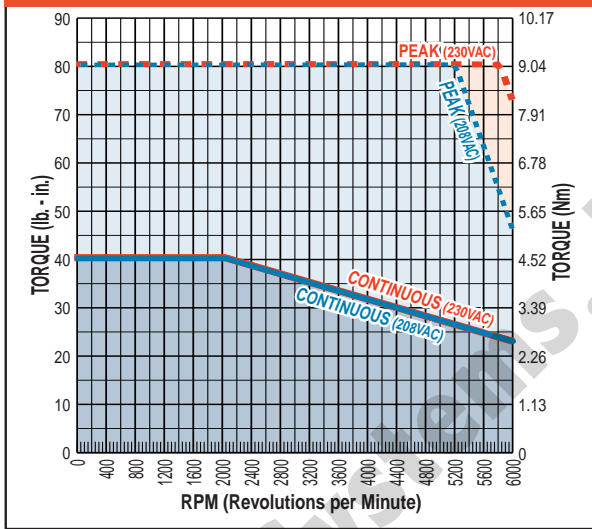
MRV33Y • DV/PV20 DRIVE • THREE-PHASE



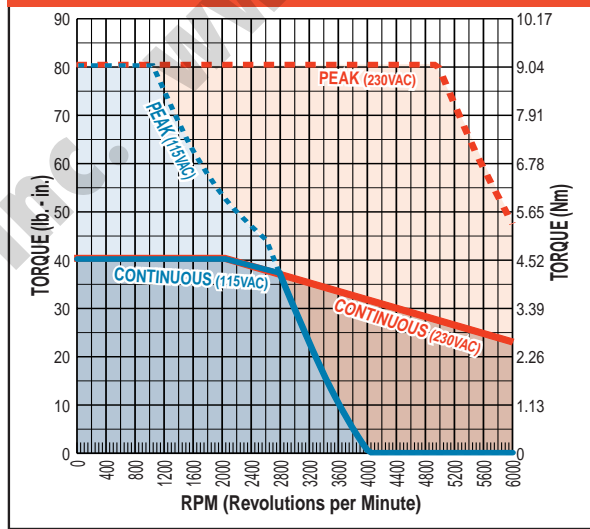
MRV33Y • DV/PV20 DRIVE • SINGLE-PHASE



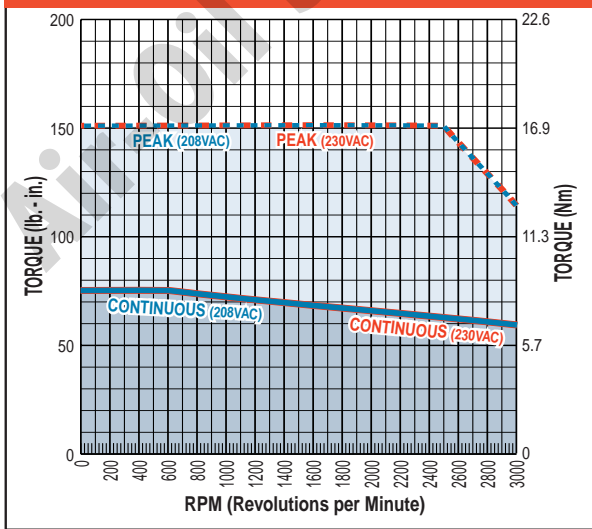
MRV33Z • DV/PV30 DRIVE • THREE-PHASE



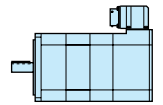
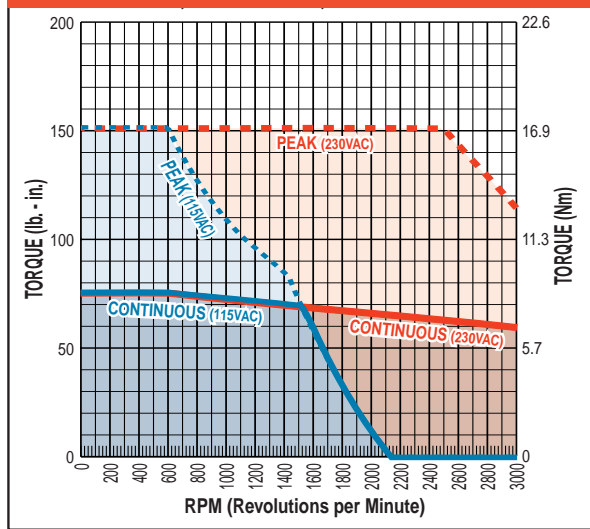
MRV33Z • DV/PV30 DRIVE • SINGLE-PHASE



MRV51Y • DV/PV30 DRIVE • THREE-PHASE



MRV51Y • DV/PV30 DRIVE • SINGLE-PHASE



BRUSHLESS

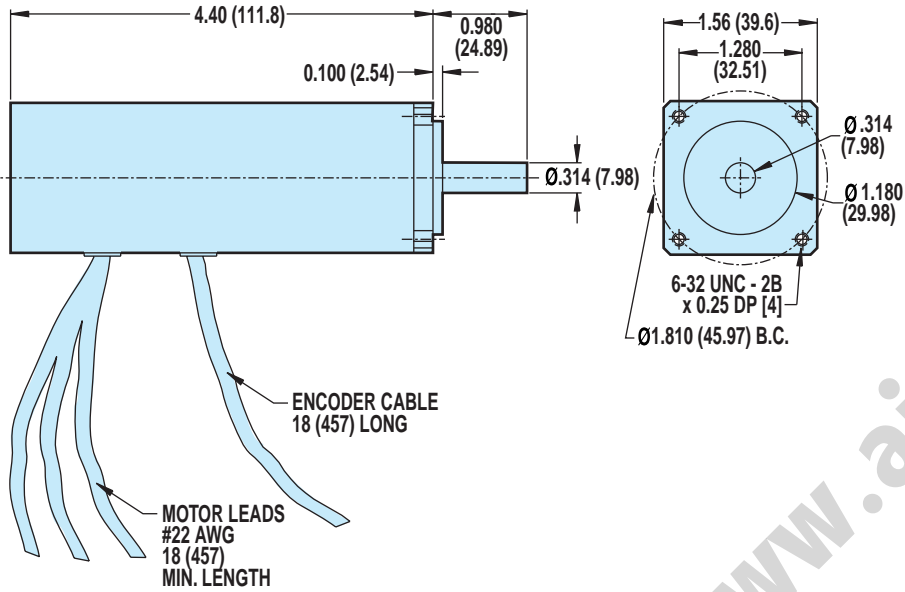
MRV Motors

- Performance data

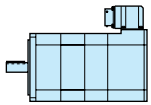
Axi-dyne® MRV Brushless Servo Motors

DIMENSIONS

MRV I I

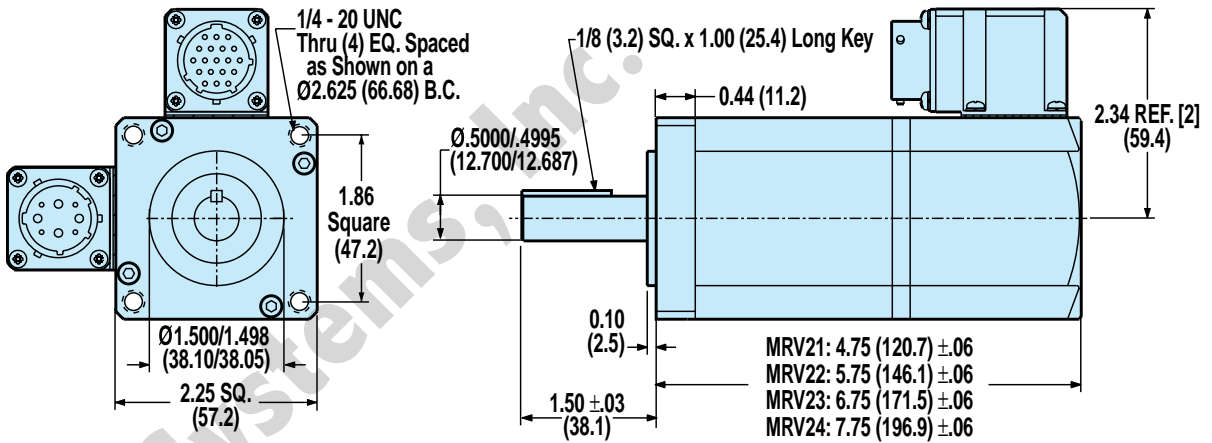


MRV21, 22, 23, 24



BRUSHLESS

MRV Motors
• Dimensions

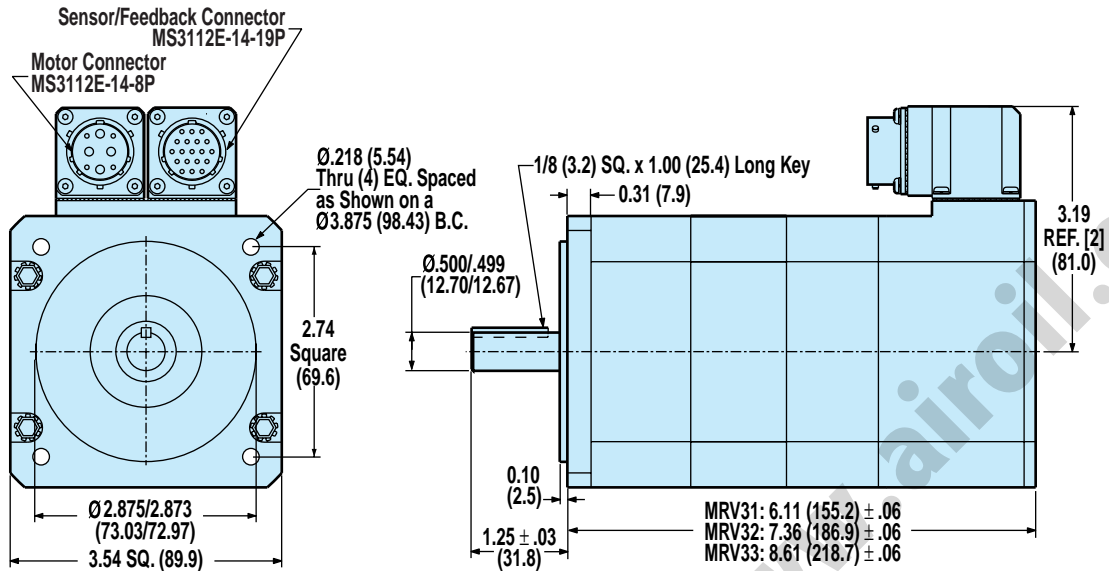


Unless otherwise noted, all dimensions shown are in inches (Dimensions in parenthesis are in millimeters)

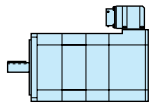
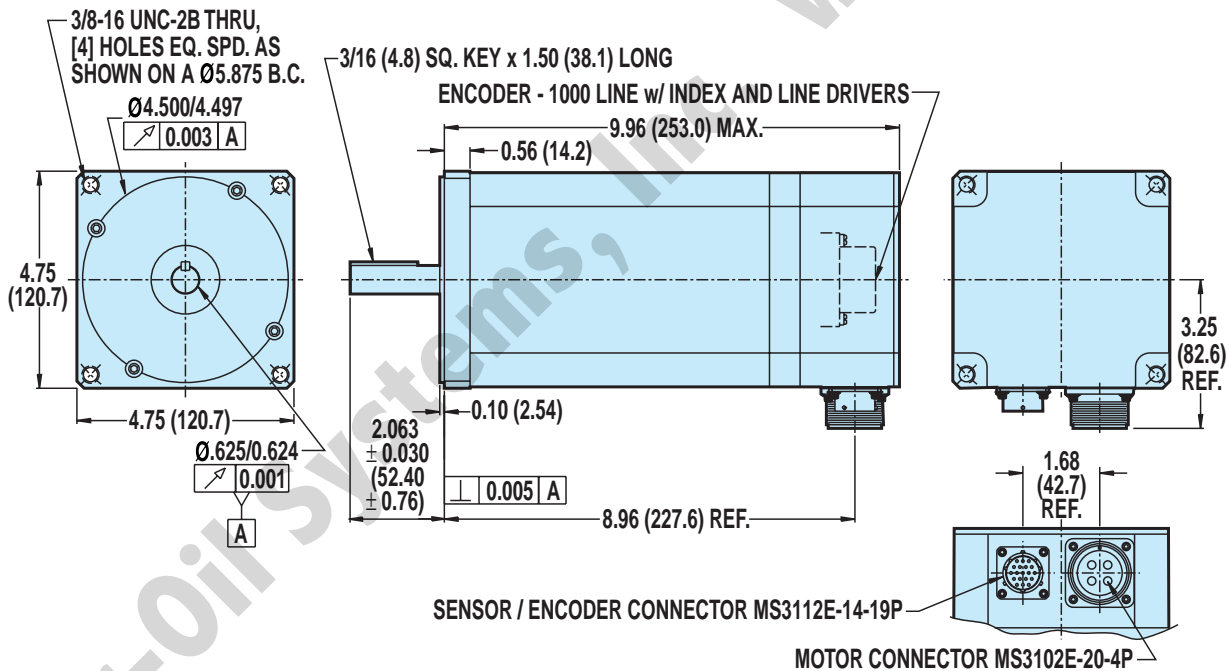
Axi-dyne® MRV Brushless Servo Motors

DIMENSIONS

MRV31, 32, 33



MRV51



BRUSHLESS

MRV Motors
• Dimensions

Axi-dyne® Gearhead Reduction

SPECIFICATIONS AND DIMENSIONS

COMPATIBILITY:
 SYSTEM: BRUSHLESS
 MOTORS: MRV
 ACTUATORS: ALL TOL-O-MATIC SCREW DRIVES

COMPATIBILITY:
 SYSTEM: STEPPER
 MOTORS: MRS
 ACTUATORS: ALL TOL-O-MATIC SCREW DRIVES

COMPATIBILITY:
 SYSTEM: BRUSHED DC
 MOTORS: MRB
 ACTUATORS: ALL TOL-O-MATIC SCREW DRIVES



For those applications requiring reduction for inertia matching or higher torque at lower speeds, Tol-O-Matic offers high efficiency, single stage, true planetary gearheads. Gear ratios of 5.5:1 and 10:1 are available and are compatible with 23- and 34-frame MRV Brushless Servo, MRS Microstepping and Brushed DC motors.

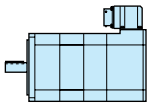
SPECIFICATIONS

Efficiency:	85%
Backlash:	less than 10 arc minutes
Max. Input Speed:	5000 RPM

⚠ * Reflected inertia is inertia at motor side of gearhead.
 § Only available on RSA64 LMI

For a complete part listing of screw-drive motor and gearhead mounting kits referencing actuator/motor/coupler compatibilities, refer to document 3600-4631 available on the Literature/Axidyne/Part Sheet section of our web site at: www.tolomatic.com.

CONFIG NO.	PART NO.	FRAME SIZE	GEAR RATIO	REFLECTED INERTIA*		INPUT SHAFT DIA. (in)	WEIGHT	
				lb-in ²	kg-m ²		lbs	kgs
GHJ20	3600-6151	23	5.5 : 1	0.0213	6.22	0.500	2.00	0.91
GHJ21	3600-6152	23	10 : 1	0.0181	5.30	0.500	1.98	0.90
GHJ30	3600-6154	34	5.5 : 1	0.1131	33.09	0.500	4.60	2.09
GHJ31	3600-6155	34	10 : 1	0.0888	25.96	0.500	4.78	2.17
GHJ32§	3600-6156	34	10 : 1	0.0888	25.96	0.500	4.81	2.18



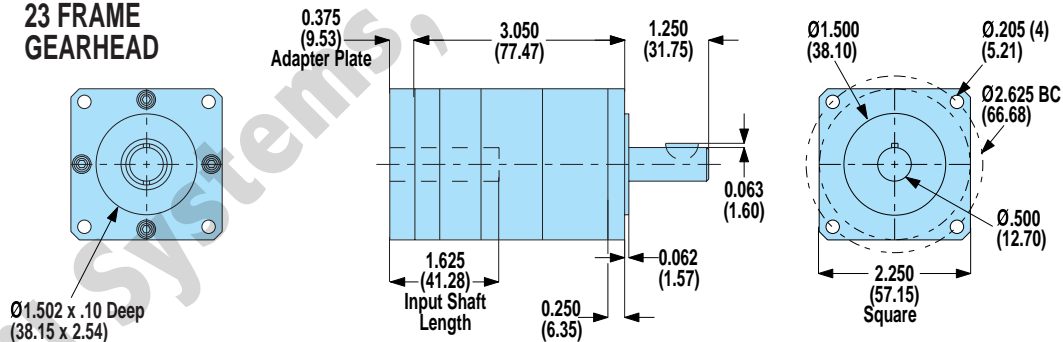
BRUSHLESS

23- AND 34-FRAME GEARHEADS

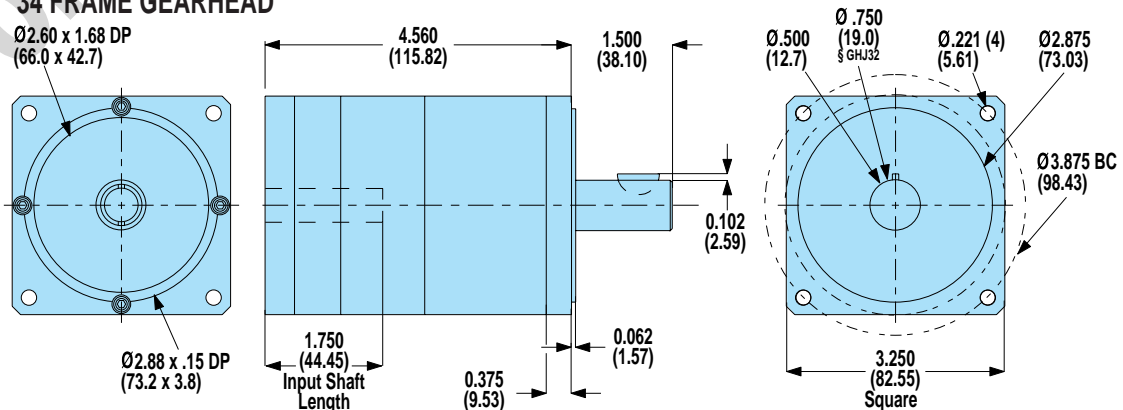
Gearhead Reduction

- Specifications
- Dimensions

23 FRAME GEARHEAD



34 FRAME GEARHEAD



Unless otherwise noted, all dimensions shown are in inches (Dimensions in parenthesis are in millimeters)

Axi dyne® AXIOM® DV Brushless Servo Drive

FEATURES

COMPATIBILITY:
SYSTEM: BRUSHLESS
MOTORS: MRV
DRIVE: AXIOM DV

CONTROLLER: SSC
INTERFACE: JS
SIT

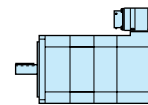


• **CONSIDER THE AXIOM PV FOR ALL OF THE FEATURES OF THE AXIOM DV, PLUS AN INTEGRAL CONTROLLER, & PLC ELIMINATING THE NEED FOR THE SSC CONTROLLER**

The Axiom series of brushless and brushed servo drives combine high-speed accuracy with user friendly set-up and diagnostics. The Axiom DV series is a state-of-the-art DSP controlled digital vector commutated drive for a full range of brushless servo motors. DV series drives are available in 10, 20 and 30 Amp peak ratings (3 sec). All come with convenient pluggable screw terminal connectors and offer fast, easy set-up and installation for use in a wide variety of applications.

AXIOM® DV DRIVE FEATURES

- Space vector commutation provides better bus voltage utilization than traditional sine drives for improved speed/torque curves
- Flux vector current control provides more accurate high bandwidth control of torque producing current for better efficiency and more torque over the full speed range than with traditional sine drives
- Drives MRV series brushless servo motors
- Autophasing eliminates the need for Hall sensors in motors
- Pluggable screw terminal connectors eliminate the need for special connectors and secondary breakout terminal strips
- 115/208-230Vac input, single or 3-phase
- Short circuit, over current and over voltage protection prevents drive damage
- 25W or 50W internal regeneration
- External regeneration connections
- Analog torque and velocity command (\pm) 10V or step and direction (CW/CCW) position control
- Feedback from differential A+B and index channel optical encoder (5V)
- Maximum line count of 500,000/motor commutation cycle
- CW/CCW travel limit inputs
- Drive enable input
- Fault, enabled, and in-position outputs
- 3A brake relay
- 3 second peak ratings



BRUSHLESS

Axiom DV Drive

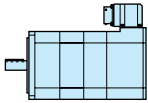
• Features

Axi dyne® AXIOM® DV Brushless Servo Drive

SPECIFICATIONS

AXIOM® DV SPECIFICATIONS

SPECIFICATIONS	Axiom™ DV and DB Series Drives		
	DV10	DV20	DV30
Power			
Continuous Current Rating:	5 Amps	10 Amps	15 Amps
Peak Current Rating (3 sec):	10 Amps	20 Amps	30 Amps
Max Input Current (single phase):	12.5 Amps	25 Amps	37.5 Amps
Input Voltage (single/3-phase):	95Vac -130Vac / 190Vac - 250Vac (voltage range is switch selectable)		
Input Frequency:	47Hz - 63Hz		
Command Sources			
Analog Torque/Velocity Input:	± 10V, 16.4K ohm impedance		
Step and Direction or Step CW/Step CCW:	1 MHz maximum, 5V differential or single ended drivers		
Serial Communication Port			
Type:	RS232		
Baud Rate:	19,200 baud		
Control Loops			
Type:	All digital		
Loop Modes:	Torque, Velocity and Position Control		
Torque Update Rate:	10KHz		
Velocity Update Rate:	5KHz		
Position Update Rate:	2.5KHz		
Inputs and Outputs			
Dedicated Optically Isolated Inputs:	5Vdc - 25Vdc, 2.7ma - 15ma ENABLE, CW LIMIT and CCW LIMIT. Can be configured to source or sink current.		
Dedicated Optically Isolated Outputs:	3 optically isolated, 25Vdc max., 50ma max. IN POSITION, ENABLED and FAULT. Can be configured to source or sink current.		
1 Dedicated Brake Relay Output:	N.O. contact, 24Vdc, 115/230Vac, 3A max.		
Motor Feedback:	Incremental encoder, 5Vdc, differential 4Mhz max., A/B/I channels 250 line min. with a 4 pole motor 125 line min. with a 2 pole motor		
Encoder Output:	Differential, 5Vdc, A/B/I channels		
Connectors			
Serial:	9 pin D-Sub.		
Control and Feedback:	15 pin D-Sub.		
Power, Motor, Brake Relay, Regen:	Screw terminal block		
All Others:	Pluggable screw terminal blocks		
Approvals	UL, CUL, CE		
Environmental			
Storage Temperature:	-40°C to 70°C		
Operating Temperature:	0°C to 50°C		
Humidity:	5% to 95%, non-condensing		
Weight:	DV10	DV20	DV30
	8 lbs	12 lbs	12 lbs
	(3.7 Kg)	(5.5 Kg)	(5.5 Kg)



BRUSHLESS

Axiom DV Drive

- Specifications

Axi dyne® Axiom® DV Brushless Servo Drive

CONNECTORS

AXIOM® DV CONNECTORS

TB1 - BRAKE/REGEN

1 - Brake	4 - External Regen
2 - Brake	5 - Internal Regen
3 - Regen Common	

TB2 - MOTOR

1 - Motor R	3 - Motor T
2 - Motor S	4 - Motor Ground

TB3 - AC POWER

1 - L3	3 - L1
2 - L2	4 - Ground

J3 - OUTPUTS

1 - In Position +	4 - Enabled Out -
2 - In Position -	5 - Fault Out +
3 - Enabled Out +	6 - Fault Out -

J4 - INPUTS

1 - CW Limit	6 - Step/Step CW +
2 - CCW Limit	7 - Step/Step CW -
3 - Limit Common	8 - Direction/Step CCW +
4 - Enable +	9 - Direction/Step CCW -
5 - Enable -	

J6 - ANALOG INPUT COMMAND

1 - Analog Common	3 - Analog -
2 - Analog +	4 - Shield

J7 - MOTOR ENCODER

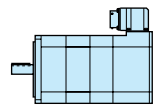
1 - Encoder +5V	6 - I+
2 - A+	7 - I-
3 - A-	8 - Common/Shield
4 - B+	9 - Motor Temp
5 - B-	

PI - BUFFERED ENCODER OUTPUT

1 - Reserved	8 - Common
2 - Reserved	9 - Encoder Out A+
3 - Reserved	10 - Encoder Out A-
4 - Reserved	11 - Encoder Out B+
5 - Reserved	12 - Encoder Out B-
6 - Reserved	13 - Encoder Out I+
7 - Reserved	14 - Encoder Out I-

P2 - COMMUNICATIONS

1 - Reserved	6 - Reserved
2 - RS-232 TX	7 - Reserved
3 - RS-232 RX	8 - Reserved
4 - Reserved	9 - +5Vdc (30ma MAX.)
5 - Common	



BRUSHLESS

Axiom DV Drive
• Connectors

Axi-dyne® Axiom® DV Brushless Servo Drive

SET-UP / CONFIGURATION

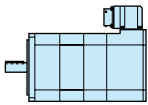
Axiom® Windows®-based PC setup software with a “control-panel” approach, makes it easy to get up and running fast. All set-up and configuration functions are performed using two main control-panel screens. Simple mouse-click commands automatically configure the control functions, eliminating layers of screens and menus. This approach also allows more relevant diagnostic information to be displayed simultaneously. All control screens include a command menu at the upper left to permit convenient selection of high-level functions and options.

A main menu is provided which allows selection of the main control panel functions, active comm port, etc. Tutorial selections are provided which emulate the main control-panel functions in an off-line manner and provide “help” text and function definitions/ descriptions so that users can actively familiarize themselves with the software without actually connecting a drive.

The software communicates with the drive using a standard RS-232 connection operating at 19,200 baud, using either comm port 1 or 2 of the PC. It can be installed and executed from any PC running Windows 95, 98, NT, 2000 or XP.

SET-UP CONFIGURATION

Drive operating mode and other options can all be selected/enabled from this screen. All set-up parameters can be uploaded and downloaded with a single click of the mouse. The parameter set can be saved to or retrieved from a disk file. Once downloaded to the drive, all parameters are stored in non-volatile EEPROM memory.



BRUSHLESS

Axiom DV Drive
• Set-up /
configuration

DRIVE MODEL # DISPLAY AND PARAMETER CONFIGURATION.

DRIVE MODE SELECTION.

DISPLAY OF TUNING AND OFFSET PARAMETERS FOR REFERENCE PURPOSES (SET IN TUNING CONTROL SCREEN).

MOTOR SELECTION AND CONFIGURATION.

CONFIGURATION/SET-UP FOR AUTO-PHASING FUNCTION INCLUDING INDEX PULSE MONITORING FOR COMMUTATION ACCURACY AND FASTER DETECTION OF FEEDBACK ERRORS.

Axi-dyne® Axiom® DV Brushless Servo Drive

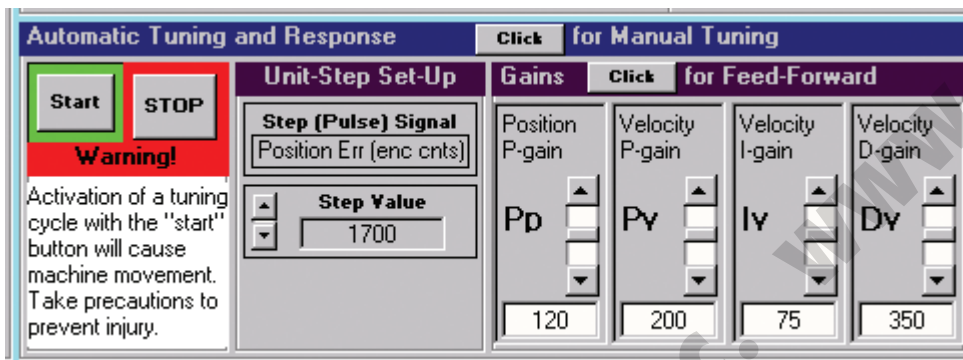
SET-UP / CONFIGURATION

TUNING AND DIAGNOSTICS

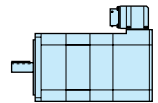
Use the 4-channel oscilloscope display for analysis of motion response when tuning and diagnosing. Scaling and format of the displayed traces can be easily modified. Values can be read directly off the traces at any point. Continuously updated bar graph displays allow important data to be viewed while motion is occurring. These displays are configured automatically based on drive operating mode they include peak detection functions and numeric displays. A status section of this control screen displays the current state of I/O and fault information.

Selecting "Drive-Tuning" from the command menu activates and displays the control functions for manual and automatic drive tuning. Use these controls to set-up and start actuation of an appropriate unit-step motion command and then enable automatic tuning parameter adjustment. Manual adjustments to tuning parameters can be easily accomplished.

The oscilloscope functions are used in conjunction with tuning, ensuring desired response goals are achieved. All tuning parameters are updated and activated immediately in the drive when modified (and also stored in EEPROM memory).



TUNING CONTROLS ALLOW USER CONFIGURABLE UNIT-STEP ACTUATION. AUTOMATIC AND MANUAL TUNING FUNCTIONS ARE PROVIDED. OPTIONAL VALUES FOR FEED FORWARD GAINS AND ANALOG OFFSETS CAN ALSO BE ENTERED.

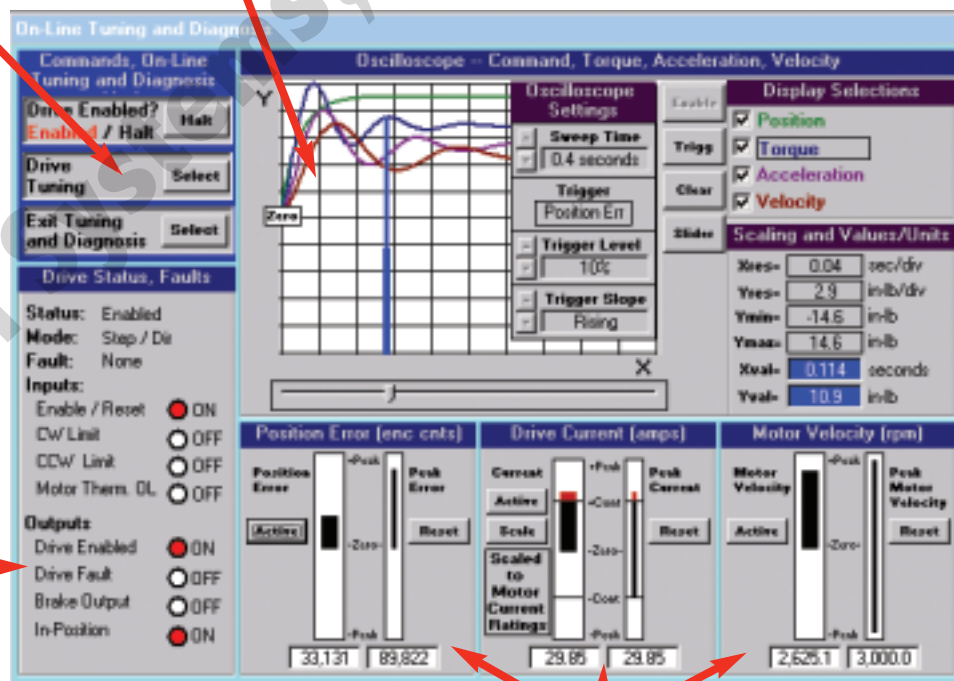


4-CHANNEL OSCILLOSCOPE DISPLAY FOR SET-UP/TUNING AND SUBSEQUENT DIAGNOSIS. FLEXIBLE DISPLAY CONFIGURATION AND SLIDING VALUE INDICATOR, MAKE ANALYSIS QUICK AND EASY. INCLUDES USER CONTROLLED TRIGGER FUNCTIONS.

BRUSHLESS

Axiom DV Drive
• Set-up / configuration

ALL SOFTWARE SCREENS INCLUDE SEPARATE MENUS OF HIGH-LEVEL FUNCTIONS IN THE UPPER LEFT CORNER TO FACILITATE QUICK TRANSITIONS BETWEEN SCREENS AND FUNCTIONS.



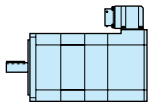
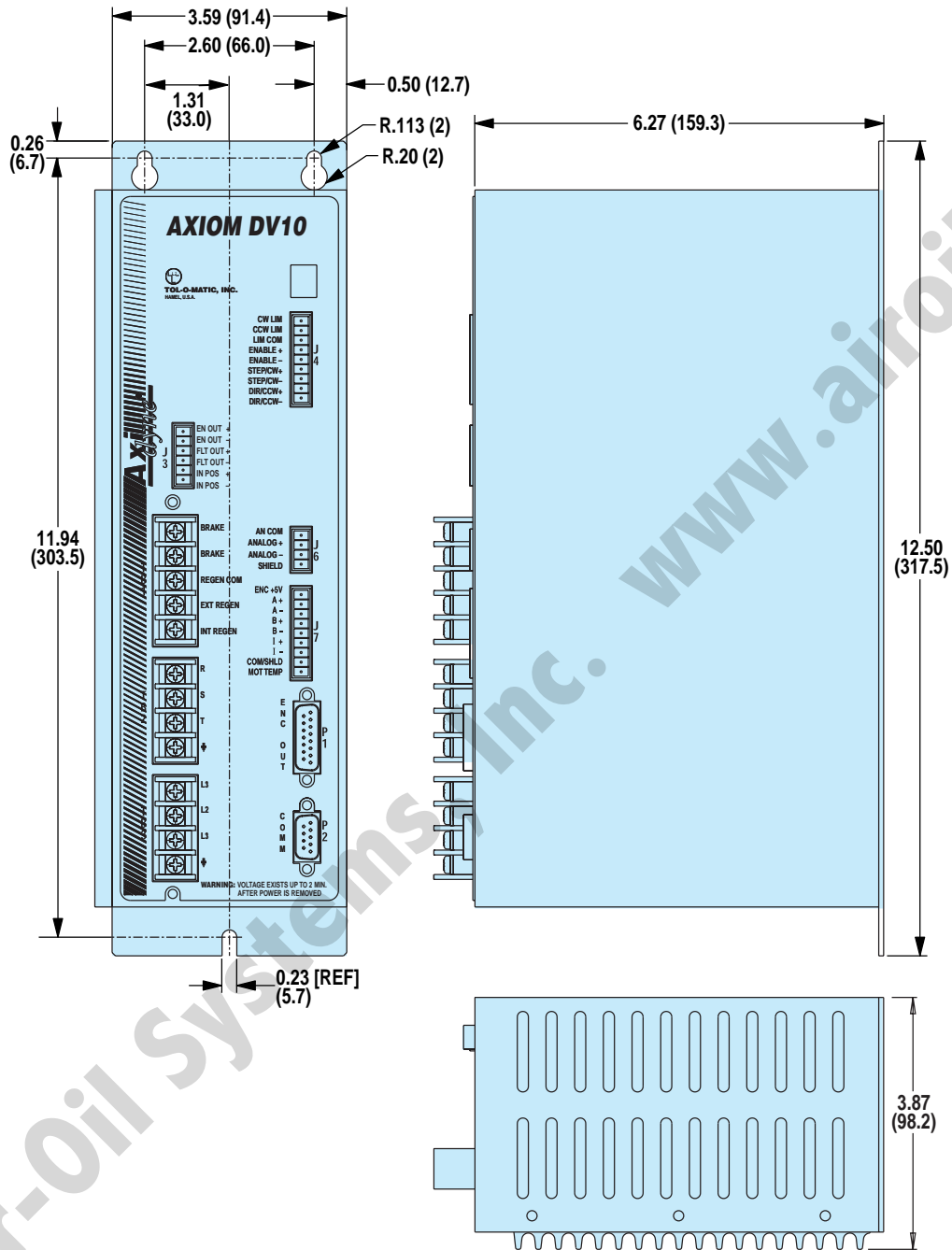
CONTINUOUS DISPLAY OF CRITICAL DRIVE STATUS INFORMATION AS WELL AS PHYSICAL STATE OF I/O.

DIAGNOSTIC BAR GRAPH DISPLAYS OF CRITICAL SYSTEM VALUES, UPDATED CONTINUOUSLY. INCLUDES PEAK DETECTION AND NUMERIC DISPLAY.

Axi dyne® Axiom® DV Brushless Servo Drive

DIMENSIONS

AXIOM DV10



BRUSHLESS

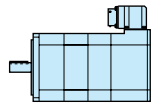
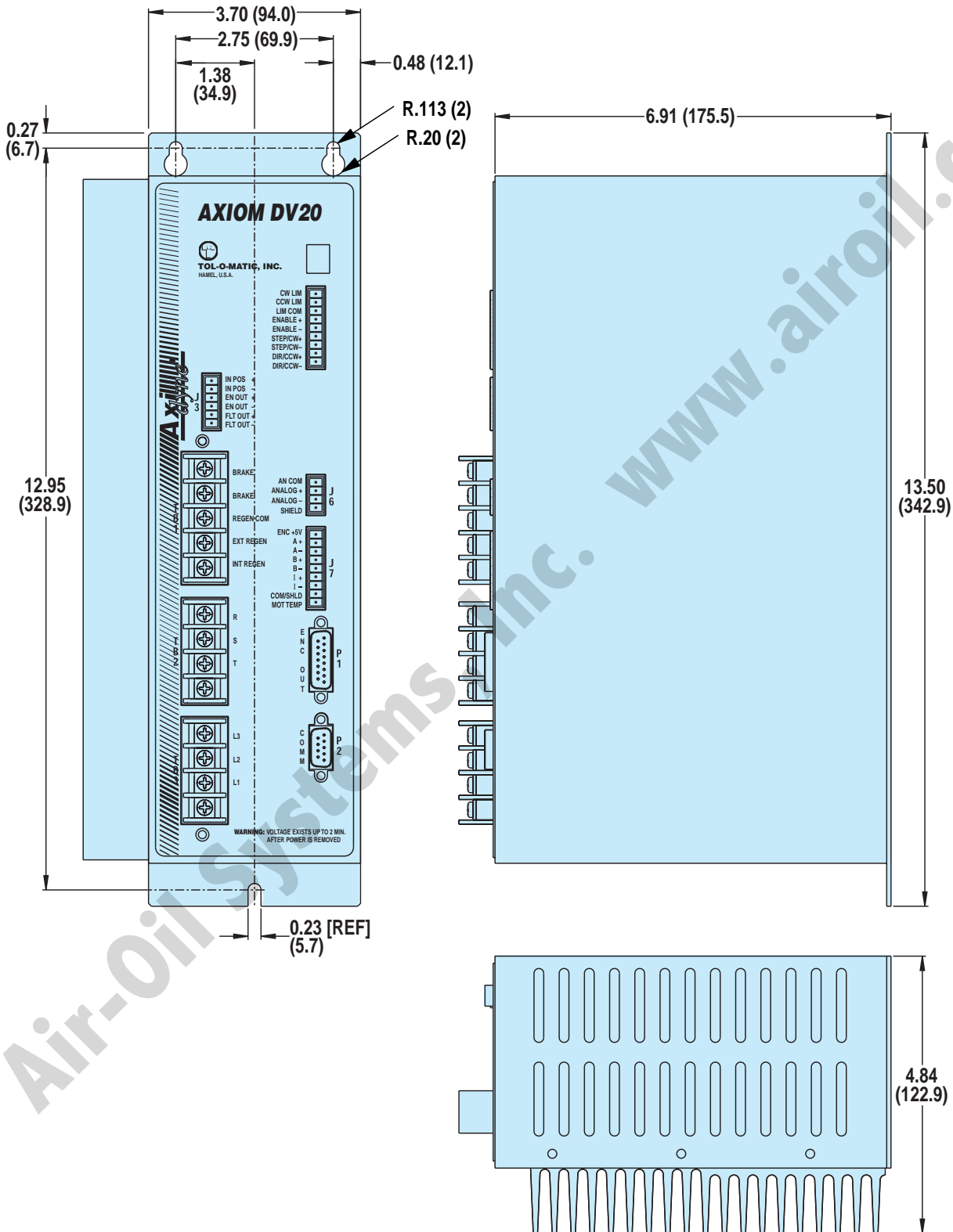
Axiom DV Drive
• Dimensions

Unless otherwise noted, all dimensions shown are in inches (Dimensions in parenthesis are in millimeters)

Axi^{dyne}® Axiom[®] DV Brushless Servo Drive

DIMENSIONS

AXIOM DV20, DV30



BRUSHLESS

Axiom DV Drive
• Dimensions

Axi dyne® Axiom® PV Servo Drive/Controller

FEATURES



The Axiom PV sequential motion controller offers intuitive yet sophisticated functionality. The integrated PLC performs real-time scans on a separate thread and communicates through software rather than physical wiring. Windows®-based software utilizes a point and click sequential program and PLC ladder logic editor, allowing programming without learning code. The Axiom PV incorporates the same vector drive technology used in our Axiom DV drive. It is price competitive with integrated motion controllers/drives that do not offer PLC capability.

COMPATIBILITY:
SYSTEM: BRUSHLESS
MOTORS: MRV
DRIVE: AXIOM PV
CONTROLLER: AXIOM PV
INTERFACE: JS
SIT

AXIOM® PV FEATURES

PLC:

- Real-time scan supervisory function continuous from power-up
- Typical scan time of 2-4 milliseconds
- Ladder logic allows 175 rungs, 4 lines deep, 5 input operations, and an output coil
- Operations include: normally-open, normally-closed, logical invert, one-shot, output coil, latch, unlatch, timers and counters
- 64 character rung descriptor downloaded and uploaded with program
- Internal bit-flags for information transfer between controller and PLC

DRIVE:

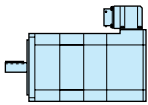
- PV series drives use space vector commutation providing better bus voltage utilization than traditional sine drives for improved speed/torque curves
- Flux vector current control provides accurate high bandwidth control of torque producing current for better efficiency and more torque over the full speed range than with traditional sine drives
- Drives MRV series brushless servo motors or can be configured for customer specified linear or rotary 3-phase brushless servo motors
- Autophasing eliminates the need for Hall sensors in motors
- Drive enable input

MOTION CONTROLLER:

- 1.5 axis (gearing to auxiliary axis)
- Commands include: absolute, incremental and velocity moves, branch to labels, subroutine calls, repeat loops, time delays, wait on conditions/inputs, output/flag control and parameter value changes including torque limit, following error, position band, follower gear ratio, and maximum velocity
- Event triggering based on intermediate positions
- Motion pause and resume
- Comment lines and labels down-loaded and uploaded with program

GENERAL:

- Modbus RTU and ASCII interface
- Pluggable screw terminal connectors eliminate the need for special connectors and secondary breakout terminal strips
- Short circuit, over current and over voltage protection prevents drive damage
- 25W or 50W internal regeneration
- External regeneration connections
- CW/CCW travel limit inputs
- Fault, enabled, and in-position outputs
- 3A brake relay
- 3 second peak ratings



BRUSHLESS

**Axiom PV
Drive/Controller**

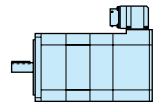
• Features

Axi dyne® Axiom® PV Servo Drive/Controller

SPECIFICATIONS

AXIOM® PV SPECIFICATIONS

SPECIFICATIONS	Axiom® PV Series Drives		
	PV10	PV20	PV30
Power			
Peak Output Current:	10 Amps	20 Amps	30 Amps
Continuous Output Current:	5 Amps	10 Amps	15 Amps
Continuous Output Power:	1.4 kW	2.8 kW	4.2 kW
Input Voltage:	95 Vac -250 Vac 1Ø; 95 Vac - 250 Vac 3Ø (voltage range is switch selectable)		
Input Frequency:	47Hz - 63Hz		
User Programming			
Language/Programming Environment:	Tol-O-Motion™ windows-based software with point and click sequential program and PLC ladder logic editors		
Firmware Field Upgradeable:	YES		
User Program Storage Capacity:	500 lines of graphic-based, high-level sequential motion and control instructions with unlimited subroutine calls.		
PLC			
Connection/Capabilities:	Internal PLC with typical real-time scan of 2-4 msec, 10-12 msec for programs of maximum capacity; 15 inputs		
Interface			
Interfaces supported:	Modbus RTU ASCII		
Inputs/Outputs			
General-Purpose Digital Inputs:	15 optically isolated 5-25 Vdc		
Inputs/Outputs:	Sinking/sourcing selectable		
General-Purpose Digital Outputs:	8 optically isolated, 5-25 Vdc, 20 mA maximum		
Communications:	Serial: RS-232, 19,200 baud rate		
Motor Feedback			
Input Modes:	Incremental with index		
Maximum Input Frequency:	4 MHz (post-quadrature)		
Commutation Startup:	Auto-phase - no Hall sensors required		
Connectors			
Auxiliary Feedback, I/O, Analog I/O:	Wire trap screw terminals		
Motor Feedback:	Wire trap screw terminals		
Serial Port:	9-pin D-sub		
Main AC, Motor Power and DC Bus:	Screw terminal block		
Approvals:	UL, CUL, CE		
Environmental			
Storage Temperature:	-40°C to 70°C (-40°F to 158°F)		
Operating Temperature:	0°C to 50°C (32°F to 126°F)		
Humidity:	5% to 95% noncondensing		
Weight	PV10	PV20	PV30
	8.5 lbs (3.85 kg)	12.5 lbs (5.66 kg)	12.5 lbs (5.66 kg)



BRUSHLESS

**Axiom PV
Drive/Controller**

• Specifications

Axi dyne[®] Axiom[®] PV Servo Drive/Controller

CONNECTORS

AXIOM[®] PV CONNECTORS

TB1 - BRAKE/REGEN

1 - Brake	2 - Brake
3 - Regen Com	4 - External Regen
5 - Internal Regen	

TB2 - MOTOR

1 - Motor R	2 - Motor S
3 - Motor T	4 - Motor Ground

TB3 - AC POWER

1 - L3	2 - L2
3 - L1	4 - Ground

J1 - Outputs

1 - Output 1 +	2 - Output 1 -
3 - Output 2 +	4 - Output 2 -
5 - Output 3 +	6 - Output 3 -

J2 - OUTPUTS

1 - +24Vdc	2 - 24Vdc Return
3 - Output 4 +	4 - Output 4 -
5 - Output 5 +	6 - Output 5 -

J3 - OUTPUTS

1 - Output 6 +	2 - Output 6 -
3 - Output 7 +	4 - Output 7 -
5 - Output 8 +	6 - Output 8 -

J4 - INPUTS

1 - +24Vdc	2 - 24Vdc Return
3 - Com 1 - 6	4 - Input 1
5 - Input 2	6 - Input 3
7 - Input 4	8 - Input 5
9 - Input 6	

J5 - INPUTS

1 - +24Vdc	2 - 24Vdc Return
3 - Com 7 - 12	4 - Input 7
5 - Input 8	6 - Input 9
7 - Input 10	8 - Input 11
9 - Input 12	

J6 - INPUTS

1 - Com 13 - 15	2 - Input 13
3 - Input 14	4 - Input 15

J7 - MOTOR ENCODER

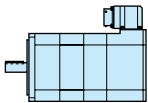
1 - Encoder +5V	2 - A +
3 - A -	4 - B +
5 - B -	6 - I +
7 - I -	8 - Com/Shld
9 - Motor Temp	

P1 - Buffered encoder out/auxiliary encoder

1 - +5V Encoder	2 - Aux Encoder A +
3 - Aux Encoder A -	4 - Aux Encoder B +
5 - Aux Encoder B -	6 - Aux Encoder I +
7 - Aux Encoder I -	8 - Encoder Common
9 - Motor Encoder Out A +	
10 - Motor Encoder Out A -	
11 - Motor Encoder Out B +	
12 - Motor Encoder Out B -	
13 - Motor Encoder Out I +	
14 - Motor Encoder Out I -	
15 - Reserved	

P2 - COMMUNICATIONS

1 - Reserved	2 - RS-232 TX
3 - RS-232 RX	4 - Reserved
5 - Common	6 - Reserved
7 - Reserved	8 - Reserved
9 - +5Vdc (30mA Max.)	



BRUSHLESS

**Axiom PV
Drive/Controller**

- Connectors

Axi^{dyne}® Axiom® PV Servo Drive/Controller

PLC / Sequential program editors

Axiom® PV set-up and configuration software has a similar look and feel to the Axiom DV software. A configuration option for motor selection and related parameters is included, along with a tuning and diagnostic mode. Help menus and control loop description information can be accessed from the main menu.

The Axiom PV also includes a point and click sequential program and PLC ladder logic editor. Instructions include incremental and absolute motion commands, branching (conditional and unconditional), subroutine calls, repeat loops, I/O control, time delays, etc. Use the PLC editor to enter and edit PLC programs, which run using an independent scan. The PLC program accesses all 15 inputs and 8 outputs of the Axiom PV, including general purpose and dedicated internal flags.

Both of these editors utilize easy icon/text driven selections, making the creation of motion profiles a snap (no code memorization required).

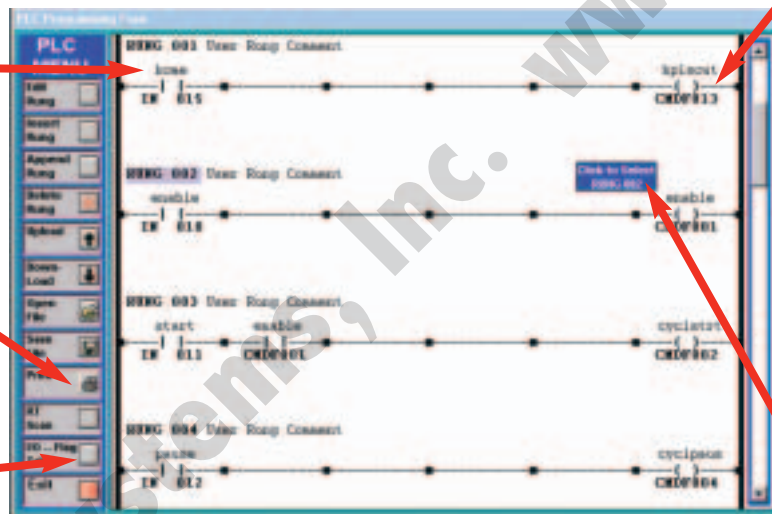
AXIOM® PV PLC EDITOR

The PLC Editor main menu allows user access to all editing functions along with a 175 rung ladder display. Rungs can be inserted at any point in the program and are easily edited by simply double-clicking with the mouse and selecting the desired functions from subsequent menus. The PLC program's real-time scan is continuous upon power-up and ranges from 2-4 milliseconds for a typical application, with 10-12 milliseconds for a maximum-length program.

ALL USER COMMENTS ARE STORED WITH THE PLC PROGRAM WHEN DOWNLOADED TO THE AXIOM PV.

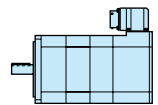
COMPLETE LADDER LISTING ALONG WITH I/O FLAGS CAN BE PRINTED OUT FOR REFERENCE.

REAL-TIME SCAN FUNCTION CONNECTS TO AXIOM PV AND MONITORS LOGICAL STATE OF ALL I/O AND FLAGS IN PLC PROGRAM.



UP TO 500 LINES OF GRAPHIC-BASED, HIGH-LEVEL SEQUENTIAL MOTION AND CONTROL INSTRUCTIONS, WITH UNLIMITED SUBROUTINE CALLS. EACH RUNG CAN BE 4 LINES DEEP AND 5 INPUT OPERATIONS IN WIDTH, PLUS THE OUTPUT COIL.

UP TO 64 CHARACTERS DESCRIPTION FOR EACH RUNG FUNCTION AND 8 CHARACTERS FOR OPERAND COMMENTS.

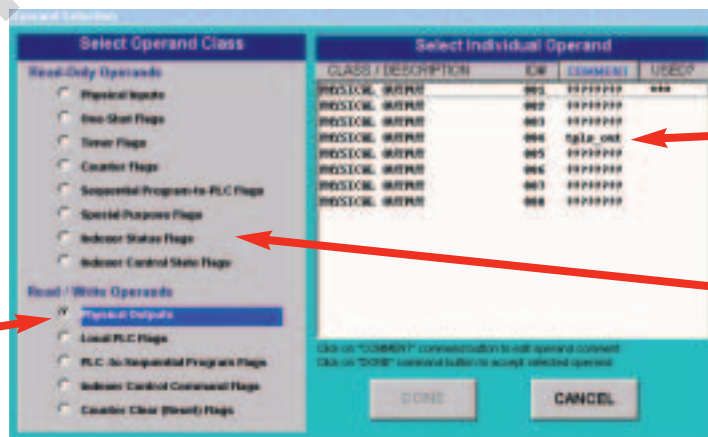


BRUSHLESS

Axiom PV Drive/Controller

- PLC / sequential program editors

OPERANDS ARE EASILY SELECTED WITH USER COMMENTS AND "IN-USE" DESIGNATION DISPLAYS.



OPERANDS ARE EASILY SELECTED WITH USER COMMENTS AND "IN-USE" DESIGNATION DISPLAYS.

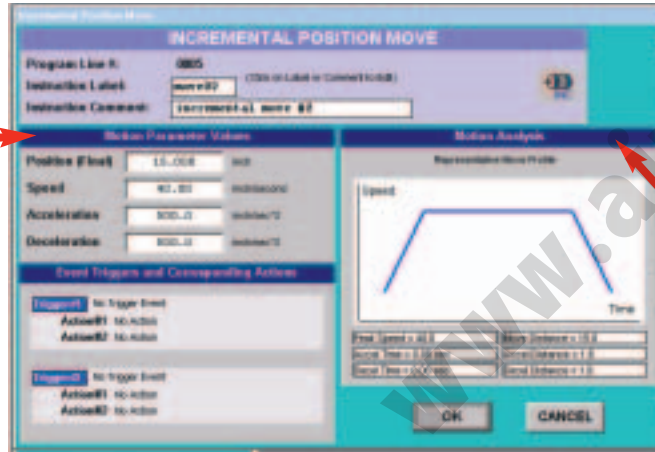
OPERATIONS SUPPORTED INCLUDE: NORMALLY-OPEN, NORMALLY-CLOSED, LOGICAL INVERT, ONE-SHOT, OUTPUT COIL, LATCH, UNLATCH, TIMERS, AND COUNTERS.

Axi-dyne® Axiom® PV Servo Drive/Controller

PLC / Sequential program editors

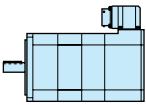
AXIOM® PV SEQUENTIAL PROGRAM EDITOR

The Sequential Editor main menu provides easy access to all essential program and display functions. Using a series of menus, the program guides the user through instruction selection. The Incremental Position Move window allows two separate trigger moves to be defined based on incremental position reached, physical input transition or flag from the PLC. Two actions can be commanded for each trigger event including torque limit or velocity change, output control or flag passing to PLC. This functionality allows an almost limitless combination of functions associated with a single move, while the PLC facilitates real-time control.



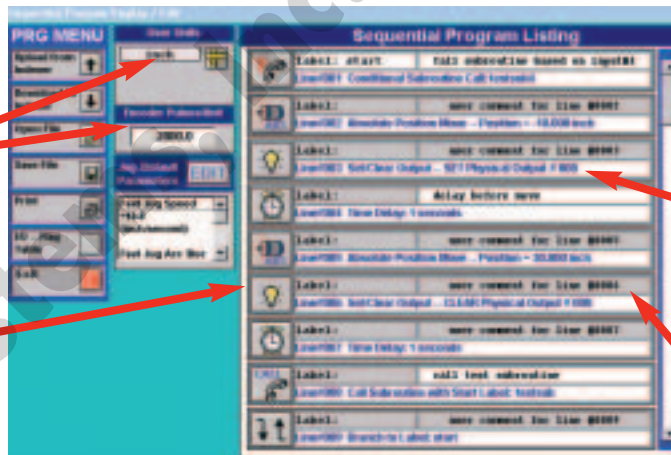
ENTERED MOTION PARAMETERS INSTANTLY UPDATE MOTION PROFILE TO SHOW MOVE TRAJECTORY

ENTERED MOTION PARAMETERS INSTANTLY UPDATE MOTION PROFILE TO SHOW MOVE TRAJECTORY



BRUSHLESS

Axiom PV Drive/Controller
 • PLC / sequential program editors

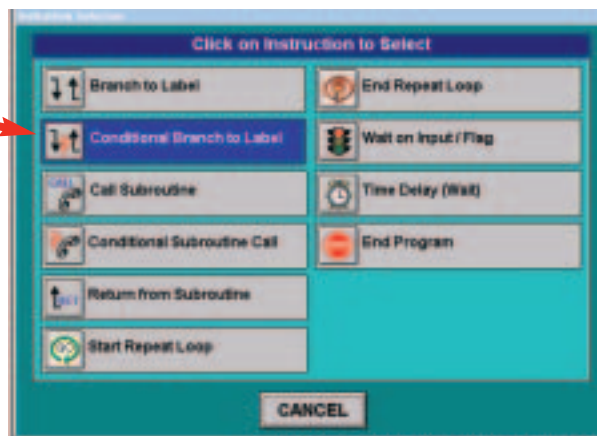


DECIMAL PRECISION USER UNITS AND TWO JOG SPEEDS.

CLICK DESIRED AREA OF DISPLAY TO EDIT

ALL USER COMMENTS AND LABELS ARE STORED WITH THE PROGRAM WHEN DOWNLOADED TO THE AXIOM PV.

EACH INSTRUCTION INCLUDES AN 8 CHARACTER LABEL USED FOR BRANCHING, SUBROUTINE CALL DESTINATIONS AND A 32 CHARACTER USER COMMENT.

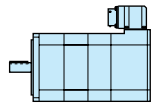
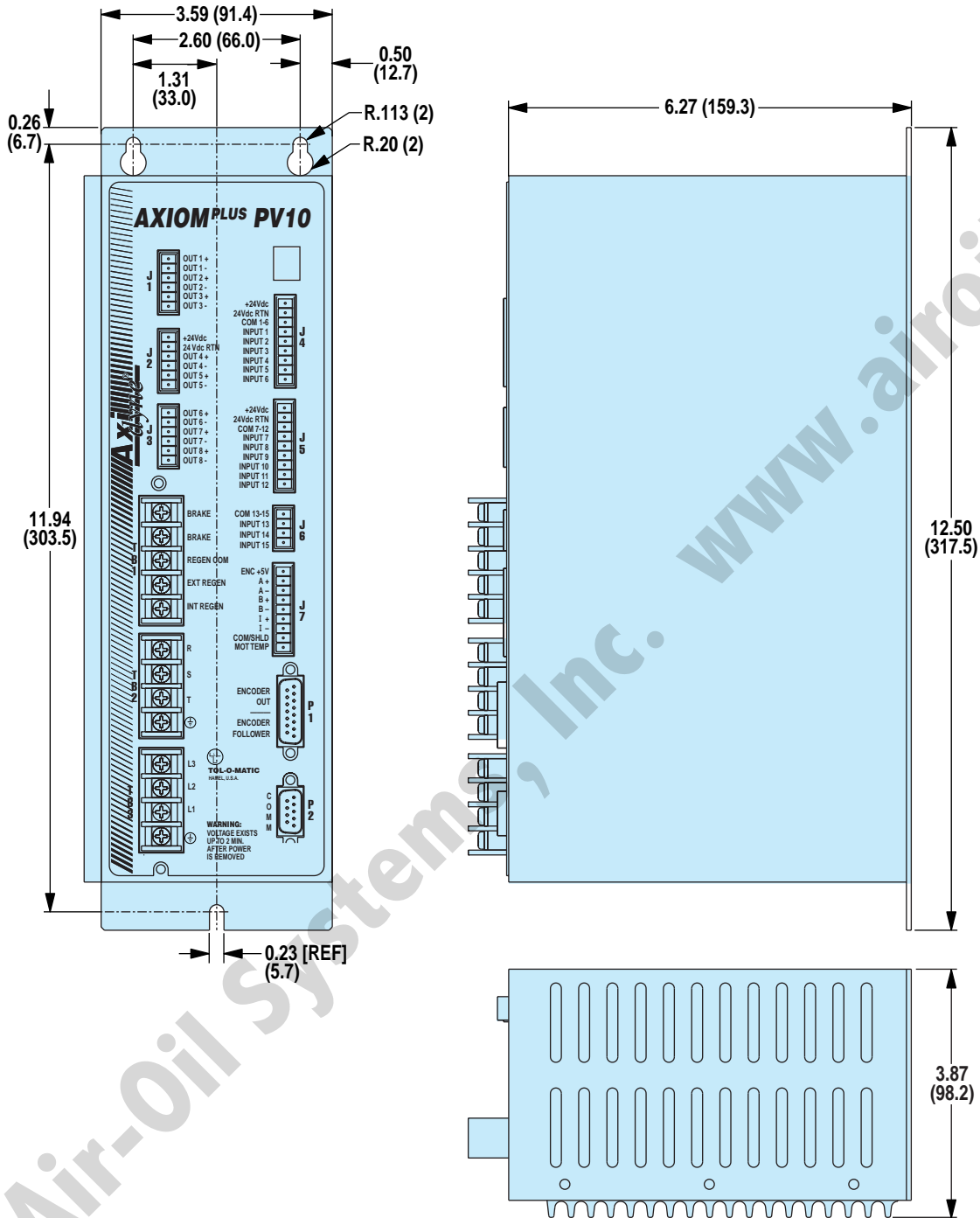


SERIES OF INSTRUCTION MENUS MAKE EASY SELECTION OF PROGRAM CONTROL, MOTION COMMANDS, ETC.

Axi^{dyne}® Axiom® PV Servo Drive/Controller

DIMENSIONS

AXIOM PV10



BRUSHLESS

Axiom PV Drive/Controller

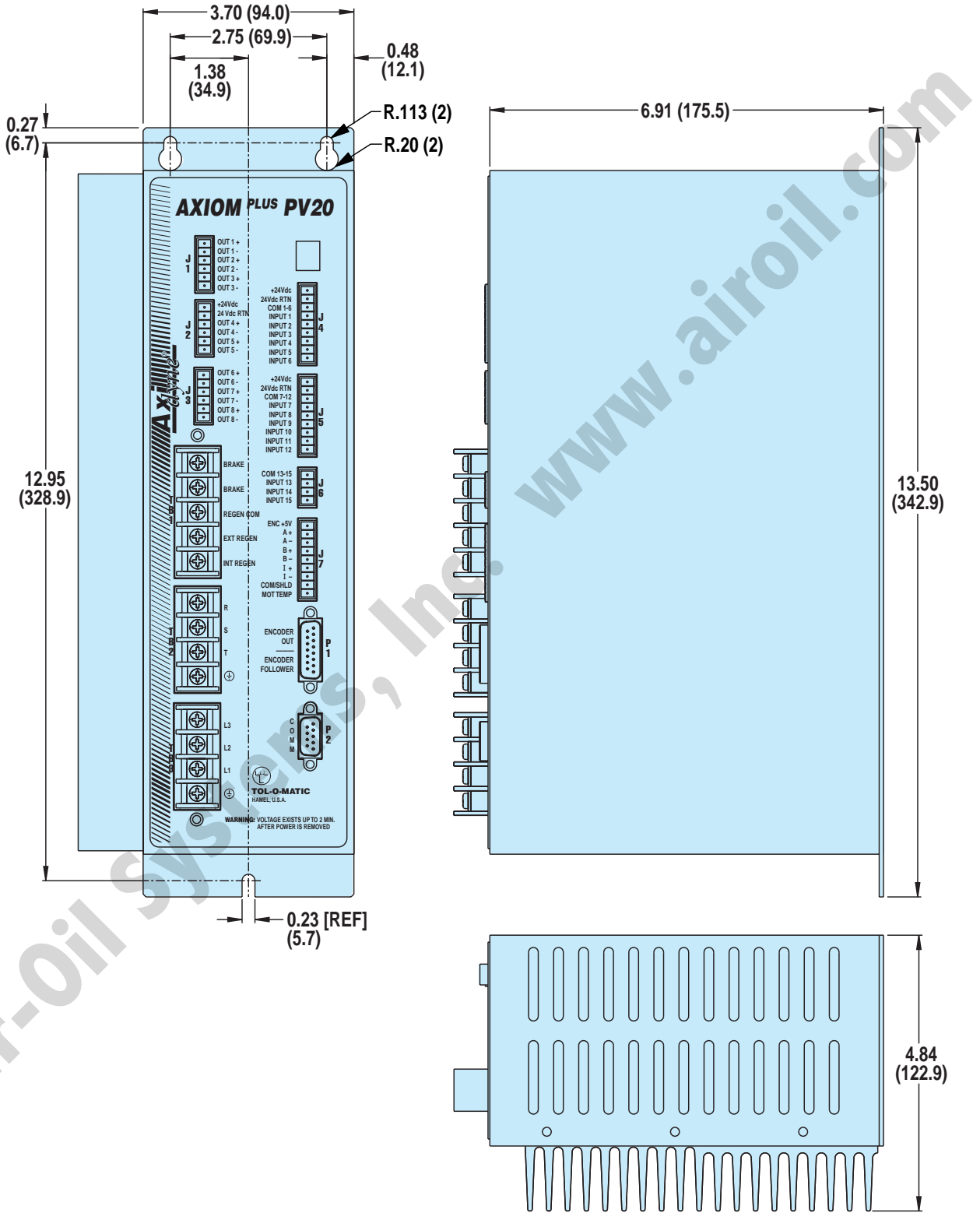
- Dimensions

Unless otherwise noted, all dimensions shown are in inches (Dimensions in parenthesis are in millimeters)

Axi^{dyne}® Axiom® PV Servo Drive/Controller

DIMENSIONS


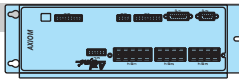
AXIOM PV20, PV30



Axi-dyne® Brushless Servo System

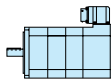
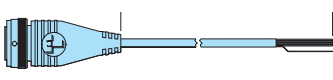
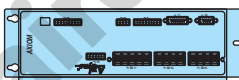
CABLES

MRV MOTORS TO AXIOM DV DRIVE & AXIOM PV DRIVE/CONTROLLER

MRV11  TO: **AXIOM DV10, AXIOM PV10** 

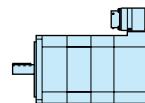
Config Code	Replacement Part Number	Included with Drive	Type	Cable Length	Motor Size	CONNECTORS AT Motor Axiom DV/PV 10		Axiom DV/PV Size
-	-	YES	Power	18 in	All	Flying leads	Screw terminal	10
-	-	YES	Encoder	18 in	All	Flying leads	Screw terminal	10

MRV21, MRV22, MRV23, MRV24
MRV31, MRV32, MRV33, MRV51 TO: **AXIOM DV10, AXIOM DV20, AXIOM DV30
AXIOM PV10, AXIOM PV20, AXIOM PV30**

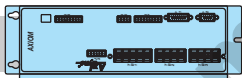

  CR6 OR CR15 

Config Code	Replacement Part Number	Included with Drive	Type	Cable Length	Motor Size	CONNECTORS AT Motor Axiom DV/PV 10		Axiom DV/PV Size
CR6	3604-1190	Optional	Power	6m	21 to 24	MS	Screw terminal	10
CR15	3604-1191	Optional	Power	15m	21 to 24	MS	Screw terminal	10
CR6	3604-1192	Optional	Power	6m	31 to 33	MS	Screw terminal	20
CR15	3604-1193	Optional	Power	15m	31 to 33	MS	Screw terminal	20
CR6	3604-1194	Optional	Power	6m	31 to 33	MS	Screw terminal	30
CR15	3604-1195	Optional	Power	15m	31 to 33	MS	Screw terminal	30
CR6	3604-1196	Optional	Encoder	6m	All	MS	Screw terminal	All
CR15	3604-1197	Optional	Encoder	15m	All	MS	Screw terminal	All

MS = Military Style, IP65



CONTROLLER TO IBM COMPATIBLE PC

AXIOM PV10, AXIOM PV20 or AXIOM PV30  TO: **PC** 

Config Code	Replacement Part Number	Type	Cable Length	Drive	CONNECTORS AT PC	PC Size
CRZ	3600-1172	Comm	2m	AxiomPV	DB9	All

BRUSHLESS

Cables

Axi-dyne® Brushless Servo System

ORDERING

MOTOR STYLE, SIZE AND GEARHEAD REDUCTION

MRV 31Y GHJ30

MOTOR TYPE

MRV Brushless Servo Motor

MOTOR SIZE / DRIVE SIZE

MODEL	FRAME SIZE	STACK SIZE	DRIVE SIZE
11Y	17	1	Axiom DV10
21Y	23	1	Axiom DV10
22Y	23	2	Axiom DV10
23Y	23	3	Axiom DV10
24Y	23	4	Axiom DV10
31Y	34	1	Axiom DV10
31Z	34	1	Axiom DV20
32Y	34	2	Axiom DV20
32Z	34	2	Axiom DV30
33Y	34	3	Axiom DV20
33Z	34	3	Axiom DV30
51Y	56	1	Axiom DV30

Once motor type and frame size is selected, the appropriate adapter and couplers required are automatically chosen.

NO DRIVE OPTION

X Replace Y or Z with X if motor/drive is NOT required (do not put 'Y' or 'Z' in string)

NO MOTOR OPTION

XY* Motor(s) supplied by customer, Tol-O-Matic to mount using standard hardware and couplers

XJ* Motor(s) supplied and mounted by customer, Tol-O-Matic to furnish standard hardware and couplers

* NOTE: For XY and XJ options, a full end-face and shaft dimensional drawing must accompany the order for the actuator. Customer motors must be directly interchangeable with Tol-O-Matic motors.

CONTROLLER CABLES & CONNECTIONS

PV CR15 CRZ

CONTROLLER OR DRIVE COMBINATION

SINGLE AXIS APPLICATIONS

PV Axiom® Plus Controller/Drive
(Drive size is determined by 'Y' or 'Z' in motor code)

GEARHEAD REDUCTIONS

(In-line or Direct-Drive mounting configurations only)

MODEL	INPUT DIA.	MOTOR SIZE	REDUCTION RATIO
GHJ20	1/2-inch	23	5.5
GHJ21	1/2-inch	23	10
GHJ30	1/2-inch	34	5.5
GHJ31	1/2-inch	34	10

TO ORDER ACTUATORS

 B3S/M3S SERIES (SEE PAGE C-27)

 B3B/M3B SERIES (SEE PAGE C-47)

 TKS SERIES (SEE PAGE C-79)

 TKB SERIES (SEE PAGE C-102)

 BCS/MCS SERIES (SEE PAGE C-124)

 SLS/MLS SERIES (SEE PAGE C-134)

 RSA/RSM SERIES (SEE PAGE D-52)

 GSA/GSM SERIES (SEE PAGE E-36)

CABLES

FOR AXIOM DV OR AXIOM PV MUST SPECIFY ENCODER, POWER CABLE LENGTH

CR6 6-meter encoder cable, power cable

CR15 15-meter encoder cable, power cable

▲ MRV11 motor has flying leads, special cables are not required.

▲ If ordering with AXIOM drive, controller encoder cables are included for each axis.

Indicate if breakout terminal and ribbon cables are needed.

BON No breakout terminals

BOY*** With breakout terminals

***BOY option includes:

• 60-pin/18" (457mm) ribbon cable & 60-pin breakout

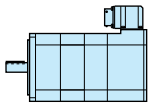
• 26-pin/18" (457mm) ribbon cable & 26-pin breakout

• 20-pin/18" (457mm) ribbon cable & 20-pin breakout
• 20-pin/18" (457mm) ribbon cable & 20-pin breakout

▲ Not all codes listed are compatible with all options.

Use the Tol-O-Motion™ Sizing Software to determine available options and accessories based on your application requirements.

User manuals and software CD-ROM is included with any controller or drive ordered. Manuals and software are also available for download at www.tolomatic.com



BRUSHLESS

System Ordering

Axi-dyne® Brushless Servo System

FIELD RETROFIT ORDERING

*AXIOM PV CONTROLLER / DRIVE

Config. Code	Includes	Part #
PV10	Controller/Drive (order cables below)	3604-0008
PV20	Controller/Drive (order cables below)	3604-0009
PV30	Controller/Drive (order cables below)	3604-0010

*Includes user manual and software CD-ROM

*AXIOM DV DRIVE

Config. Code	Includes	Part #
DV10	Drive only (order cables below)	3604-0000
DV20	Drive only (order cables below)	3604-0001
DV30	Drive only (order cables below)	3604-0002
DB20 cables are included as motor flying leads		3604-0003

*Includes user manual and software CD-ROM

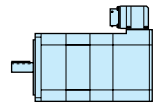
MRV BRUSHLESS SERVO MOTORS

Config. Code	Part #
MRV11**	3600-6239
MRV21	3600-6240
MRV22	3600-6241
MRV23	3600-6242
MRV24	3600-6243
MRV31	3600-6244
MRV32	3600-6245
MRV33	3600-6246
MRV51	3600-6247

** For RSA Rod Screw Actuators only

CABLES

Config Code	Item	Part #
CRZ	RS232 Cable	3600-1172
CR6 (DV10)	6m Motor Cable	3604-1190
CR6 (DV10)	6m Encoder Cable	3604-1196
CR15 (DV10)	15m Motor Cable	3604-1191
CR15 (DV10)	15m Encoder Cable	3604-1197
CR6 (DV20)	6m Motor Cable	3604-1192
CR6 (DV20)	6m Encoder Cable	3604-1196
CR15 (DV20)	15m Motor Cable	3604-1193
CR15 (DV20)	15m Encoder Cable	3604-1197
CR6 (DV30)	6m Motor Cable	3604-1194
CR6 (DV30 & MRV51)	6m Motor Cable	3604-1202
CR6 (DV30)	6m Encoder Cable	3604-1196
CR15 (DV30)	15m Motor Cable	3604-1195
CR15 (DV30 & MRV51)	15m Motor Cable	3604-1203
CR15 (DV30)	15m Encoder Cable	3604-1197



BRUSHLESS

**Field Retrofit
Ordering**