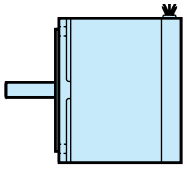
Axidyne® Microstepping Systems

Products discontinued August 01, 2006:
SSC Multi-Axis Controller,
Stepper Motors & Control Products,
Brushed DC Motors & Control Products
Contact Tol-O-Matic for repair parts



MICROSTEPPING

- *MRS MICROSTEPPING MOTORS*
- *MSD MICROSTEPPING DRIVE*
- *MSS CONTROLLER/DRIVE*
- *SSC CONTROLLER*
- *JS JOYSTICK INTERFACE*
- *SIT HAND-HELD INTERFACE*
- *PIT PANEL MOUNT INTERFACE*

Axidyne® Microstepping
OVERVIEW

APPLICATION BENEFITS

- Lowest cost for precise positioning
- Highest resolution [up to 50,800 steps- rev] without feedback device
- Good for speeds less than 2,000 rpm
- Good for torque requirements less than 35 in-lbs. (3.95 N-m)
- Smoothness better than full or half step, but not as good as servos
- Good for short, repetitive moves
- Maintenance free

MOTOR

MRS- Stepper Motors

- High torque to inertia ratio
- Long life bearings, high temperature insulation and exceptional thermal dissipation
- NEMA 17, 23 and 34 mounting

DRIVE

MSD - Microstepping Drive

- Step, direction, amplifier enable inputs, fault output, optically isolated
- 16 switch selectable microstepping resolutions
- Idle current reduction (50% switch selectable)

CONTROLLER/DRIVE

MSS - Controller/Drive

- Combines basic single axis controller and drive
- Software uses intuitive icons for setup & programming
- Software selectable: resolutions, motor current
- Two dedicated, optically isolated limit switch inputs, Four general purpose, opto-isolated inputs, CW and CCW jog inputs
- Drive fault output, 3 general purpose, optically isolated outputs

CONTROLLER

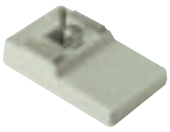
SSC Controller:

- 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

PIT - Panel mount interface

- Keypad, LCD display for use with MSS



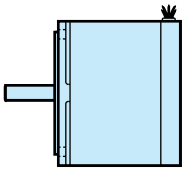
JS - Joystick

- Use with SSC joystick teach mode

SIT - Hand-held interface

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

Host compatible PC



MICROSTEPPING

Overview

Products discontinued August 01, 2006:
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Axidyne® MRS Microstepping Motors

FEATURES AND SPECIFICATIONS

COMPATIBILITY:
SYSTEM: STEPPER
MOTORS: MRS
DRIVE: MSD, MSS
CONTROLLER: SSC, MSS
INTERFACE: PIT, JS, SIT

The MRS series motors provide the best cost/performance value available in stepper motors. Available with NEMA 17, 23 and 34 mounting, the MRS series stepper motors can be driven from one common microstepping drive (MSD) or controller/drive (MSS).

MRS MOTOR FEATURES

- Long life bearings
- High temperature insulation
- Exceptional thermal dissipation properties
- NEMA 17,23 and 34 mounting
- High torque to inertia ratio

MRS MOTOR SPECIFICATIONS

MODEL	Holding Torque* 2 Phases ON		Rated Current/Phase**	Drive Settings*** Max Current/Phase	Phase Resistance	Phase Inductance§	Thermal Resistance§§	Rotor Inertia		Weight	
	oz-in (±10%)	N-m	Amps (dc)	Amps (peak)	Ohms ±10%	mH	°C/Watt	lb-in²	kg-m² x 10^{-6}	lbs	kgs
MRS171	35	0.24	1.0	1.4	4.6	8.9	NA	0.011	3.10	0.66	0.29
MRS231	109	0.77	1.5	2.2	2.61	10.3	5.5	0.041	12.07	1.5	0.68
MRS232	203	1.43	2.5	3.6	1.22	6.2	4.5	0.087	25.42	2.5	1.13
MRS341	337	2.37	5.4	5.5	0.29	2.5	3.9	0.201	58.71	3.2	1.45
MRS342	627	4.43	5.6	5.5	0.39	3.7	2.7	0.411	120.17	5.3	2.40
MRS343	995	7.03	7.9	5.5	0.26	3.1	2.0	0.604	176.68	7.6	3.45

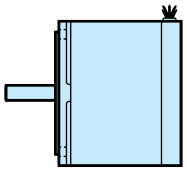
** With rated current applied. Windings at 130°C and motor unmounted and in still air at 40°C (without heat sink).*

*** Windings at 130°C and motor in still air at 40°C (without heat sink). Operation of these motors above rated current may cause demagnetization. Contact factory.*

**** When used with the MSS or MSD.*

§ Small signal inductance as measured with impedance bridge at 1kHz, 1 amp.

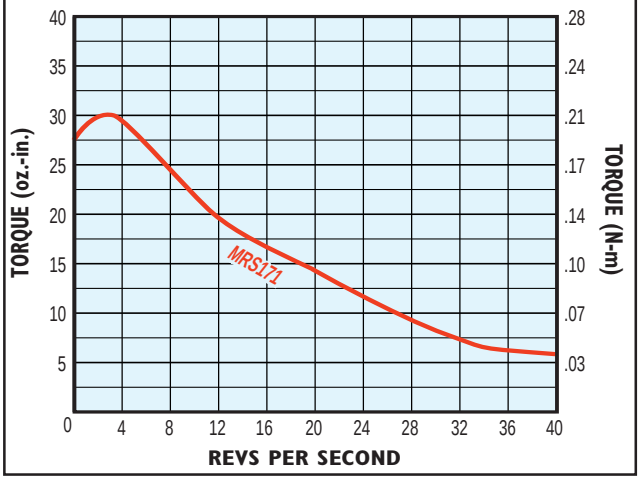
§§ Thermal resistance measured with motor hanging in still air (unmounted).



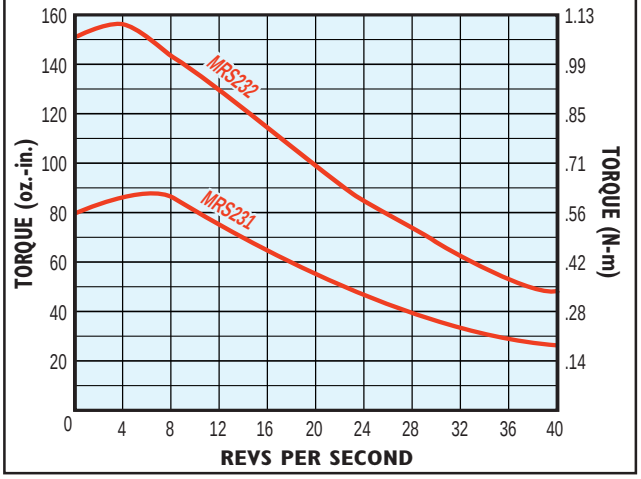
PERFORMANCE DATA

WITH MSS CONTROLLER/DRIVE OR MSD DRIVE

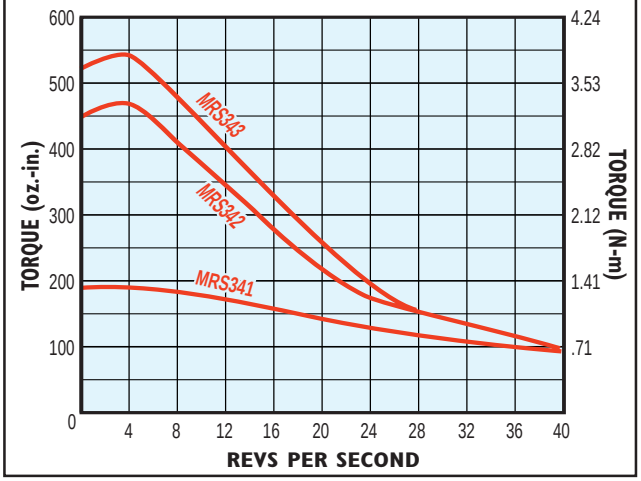
MRS171 SPEED TORQUE CURVE

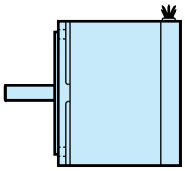


MRS231/232 SPEED TORQUE CURVE



MRS341/342/343 SPEED TORQUE CURVE





MICROSTEPPING

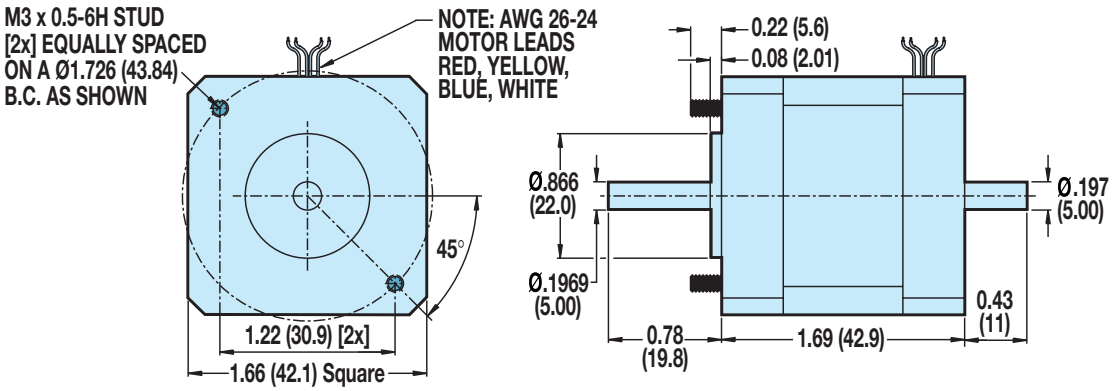
MRS Motors

- Performance data

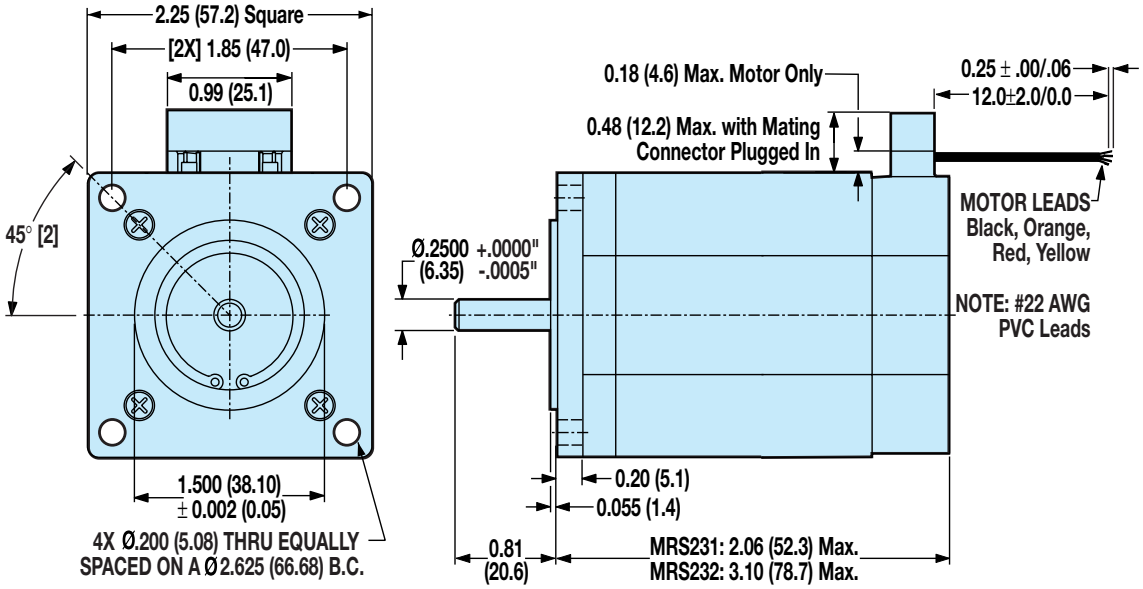
Axidyne® MRS Microstepping Motors

DIMENSIONS

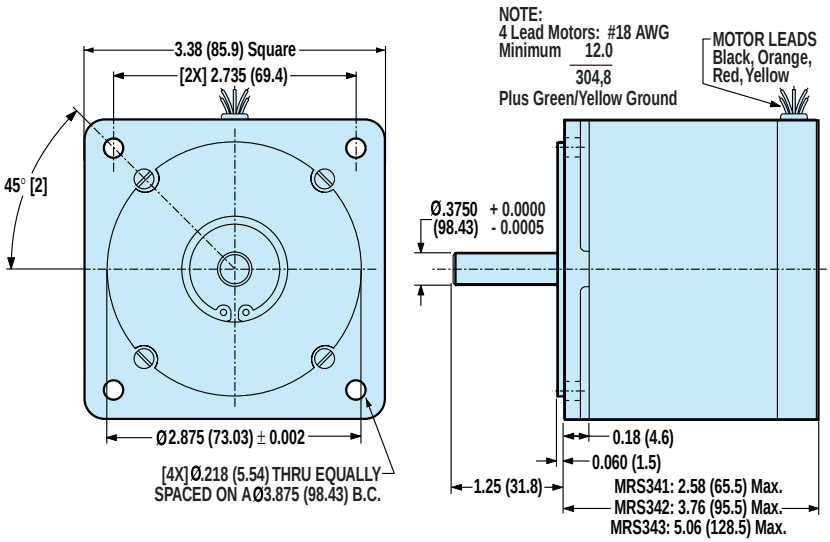
MRS171



MRS231,232



MRS341,342,343



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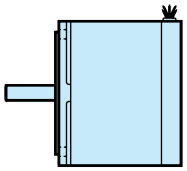


Axidyne® Gearhead Reduction

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

⚠ ** Reflected inertia is inertia at motor side of gearhead.*

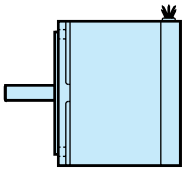
For a complete part listing of screw-drive motor and gearhead mounting kits referencing actuator/motor/coupler compatibilities, refer to document 3600-4631 available on the Literature/Axidyne/Part Sheet section of our web site at: www.tolomatic.com.

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

CONFIG NO.	PART NO.	FRAME SIZE	GEAR RATIO	REFLECTED INERTIA*		INPUT SHAFT DIA. (in)	WEIGHT	
				lb-in²	kg-m²		lbs	kgs
GHK20	3600-6150	23	5.5 :1	0.0213	6.22	0.250	1.78	0.81
GHK30	3600-6153	34	5.5 : 1	0.1131	33.09	0.375	4.68	2.12



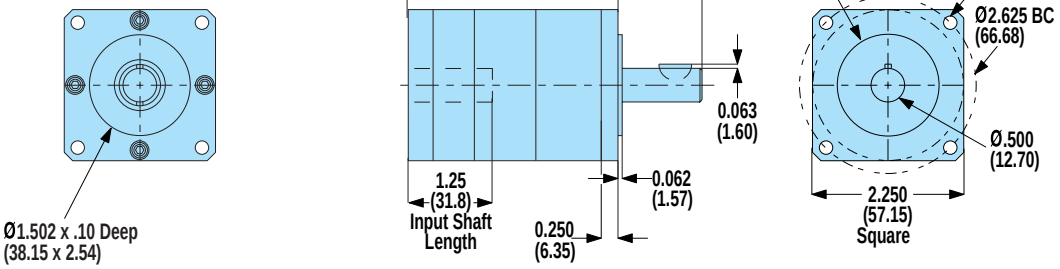
MICROSTEPPING

Gearhead Reduction

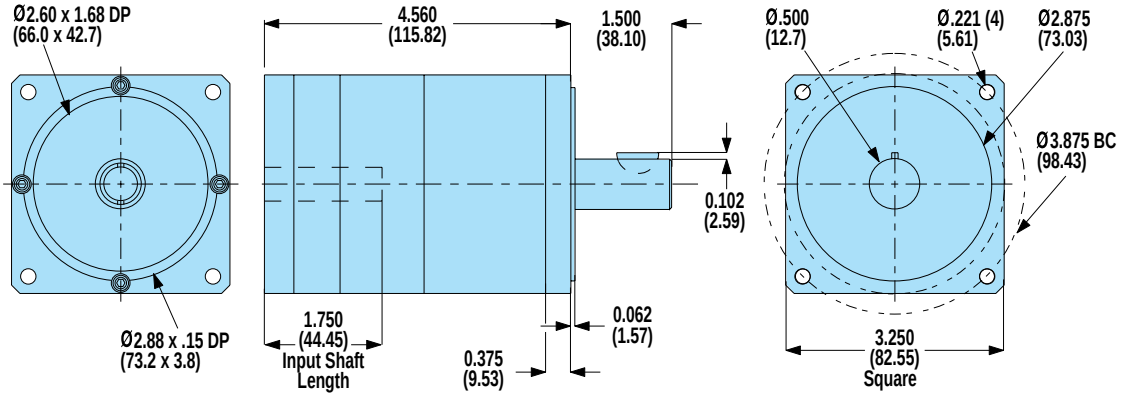
- Specifications and Dimensions

23- AND 34-FRAME GEARHEADS

23 FRAME GEARHEAD



34 FRAME GEARHEAD



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Axidyne® MSD Microstepping Drive

FEATURES

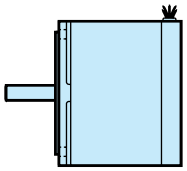
COMPATIBILITY:
SYSTEM: STEPPER
MOTORS: MRS
DRIVE: MSD
CONTROLLER: SSC
INTERFACE: JS
SIT

- CONSIDER THE MSS FOR ALL OF THE FEATURES OF THE MSD, PLUS AN INTEGRAL CONTROLLER, ELIMINATING THE NEED FOR THE SSC CONTROLLER

The MSD, a stand alone microstepping drive, is a low cost solution for use within multi-axis stepper applications. With switch-selectable current settings the MSD is the perfect drive for all of Tol-O-Matic's MRS high torque stepper motors.

MSD FEATURES

- Motor current from 0.5 to 5.5 amps/phase (switch selectable, 51 settings)
- Built-in 80 V power supply (accepts 110 or 220 Vac power)
- MOSFET pulse width modulation switching amplifiers (3 state)
- Step, direction, amplifier enable inputs, fault output, optically isolated
- 2 MHz max input frequency
- 16 switch selectable microstepping resolutions: 200, 400, 1000, 2000, 5000, 10000, 12800, 18000, 20000, 21600, 25000, 25400, 25600, 36000, 50000, 50800,steps/rev
- Over-temperature protection
- Short circuit protection
- Surge protection
- Idle current reduction (50% switch selectable)
- Pluggable screw terminal connectors, mating connectors included
- Integral heat sink
- Digital oscillator provides smooth accel/decel ramps and precise speed control
- Oscillator Mode operates from internal pots, external pots, 0-5V dc analog signal, or analog joystick
- Two speed ranges, can be selected "on-the-fly" by a digital signal with automatic ramping between speeds
- Tach Out signal allows easy measurement of speed
- Enable input allows motor current to be shut off on command
- Built-in self test for troubleshooting
- CE compliant

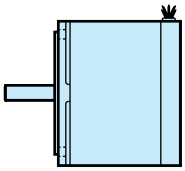


Axidyne® MSD Microstepping Drive

SPECIFICATIONS

MSD SPECIFICATIONS

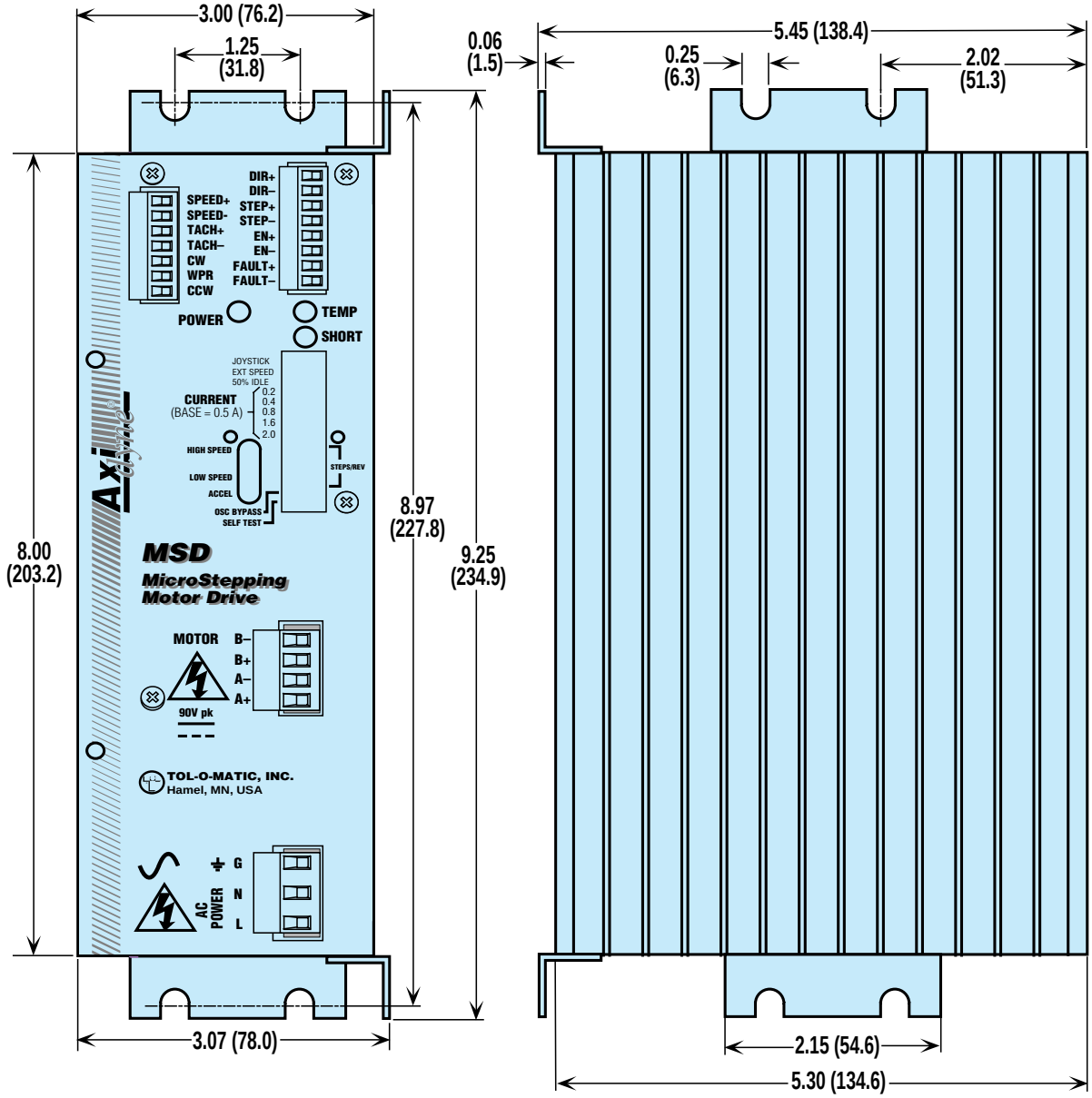
Power		
	Input Voltages (AC line):	110 or 220 Vac, 60Hz (switch selected) 400 W max
		(a 50/60Hz version can be special ordered)
	Dc Bus Voltage):	75 Vdc full load, 90 Vdc no load
Amplifiers		
	Pulse Width Modulated:	Dual, MOSFET H-bridge, 3 state at 20 kHz
	Switching:	
	Phase Peak:	0.5 - 5.5 Amps
	Output Current:	
	Output Power:	400 watts max
	Protection:	Overcurrent and over-temperature
	Automatic Idle Current	Reduces current to 50% of setting after
	Reduction:	one second (can be disabled)
Inputs		
	Step, Direction & Enable:	Optically isolated differential 5-12V logic
	Input Current:	5 mA minimum, 20 mA maximum
	Motor Steps	on falling edge of step input
	Minimum Pulse	1 µsec
	Maximum Step Rate	2 MHz
	Minimum Set Up Time:	1 µsec
	Directional Signal Minimum Hold Time:	50 µs
Fault Output		
	Photo Transistor:	Optically isolated, uncommitted (open
		collector, open emitter)
	Voltage:	30V max.
	Current:	20 mA max.
Environment		
	Max Case Temperature:	158° F (70° C)

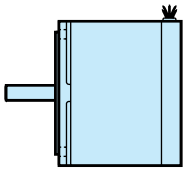


Axidyne® MSD Microstepping Drive

DIMENSIONS

MSD MICROSTEPPING DRIVE





MICROSTEPPING

MSD Drive

- Dimensions

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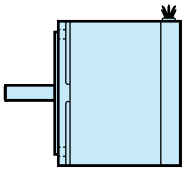
Axidyne® MSS Microstepping Contr

FEATURES / SPECIFICATIONS

Tol-O-Matic's MSS stand-alone microstepping controller/drive system is absolutely the simplest and most cost-effective way to provide single axis motion to Tol-O-Matic's stepper motor/actuator systems. The Tol-O-Motion™ MSS software allows sophisticated programming to be achieved by even the most novice user, through icons arranged in a simple, easy to follow format. Once programmed over the RS232 the PC may be removed and program interaction achieved through I/O or the PIT (Panel Mount User Interface).

COMPATIBILITY:
SYSTEM: STEPPER
MOTORS: MRS
DRIVE: MSD
MSS
CONTROLLER: MSS
INTERFACE: PIT



MSS FEATURES

- Motor Current: 0.5 to 5.5 amps/phase, (software selectable)
- Drive Voltage: 80 Vdc (from internal linear, toroidal power supply)
- Input Voltage: 115 or 230 Vac (switch selectable)
- Microstep Resolution: 13 resolutions, 2000 to 50800 steps/revolution (software selectable)
- Automatic idle current reduction: 0%, 25%, 50% or 100% (software selectable)
- Connectors: pluggable, screw terminal connectors are included.
- Two optically isolated limit switch inputs can be used as inputs, (7 - 8)
- CW and CCW jog inputs can be used as inputs, (5 - 6)
- Four general purpose, opto-isolated inputs
- Drive fault output (activated by overcurrent or over-temperature condition)
- 3 general purpose, optically isolated outputs for interfacing to other equipment
- Uses Tol-O-Motion MSS Software with absolute positioning, single-step program execution
- CE compliant

MSS SPECIFICATIONS

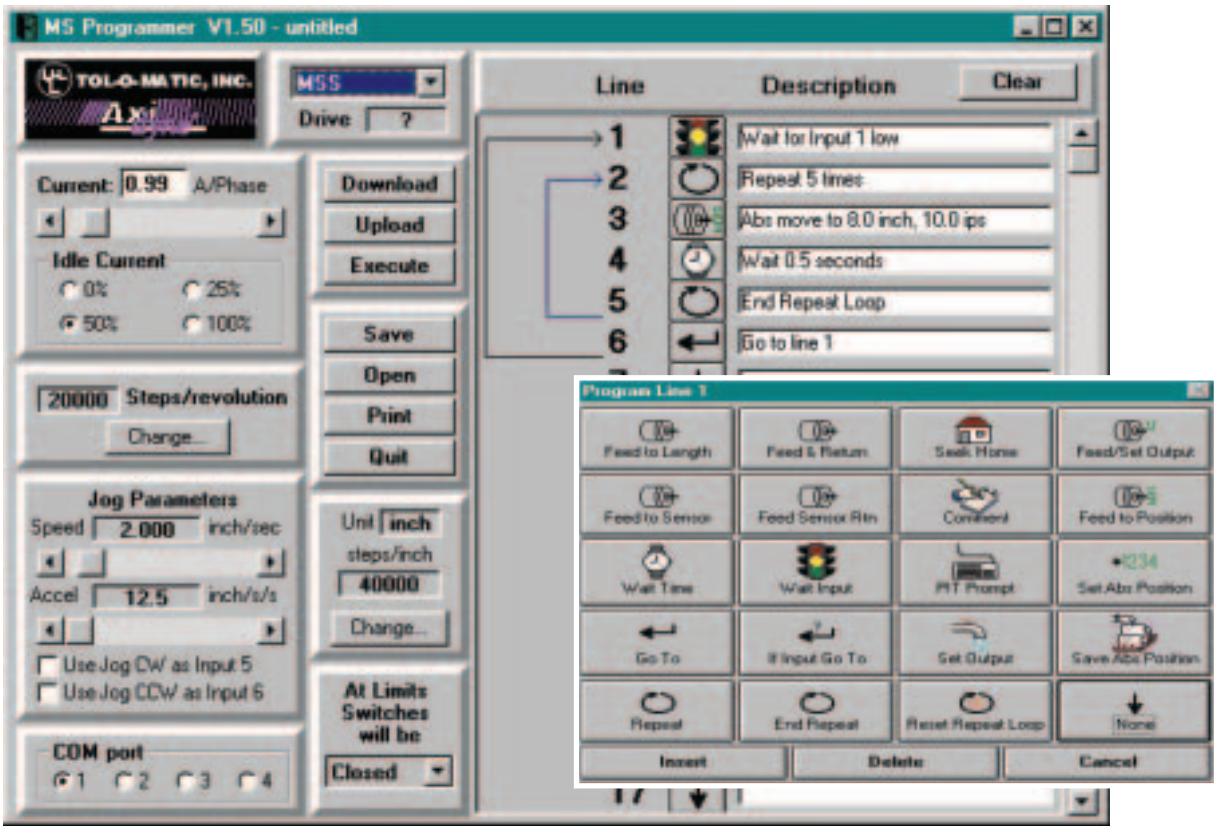
Power	
	Input Current (AC line): Varies with motor & load
	6.0A max. at 115 Vac
	Input Voltages (AC line): 115 or 230 Vac, 50-60Hz (switch selected)
	Input Fuses
	(AC line):6.3A time lag, TR5 style
	Motor Current Output: 0.5 - 5.5 A / phase peak
	Internal Bus Voltage: 80 Vdc (unregulated)
Parameter Ranges	
	Distance:1 to 16,000,000 steps
	Speed:.025 to 50 revolutions per second (in any microstep resolution)
	Acceleration:1 to 3000 rev/sec/sec (limited by accel torque)
	Deceleration:1 to 3000 rev/sec/sec (set independently from acceleration, limited by decel torque)
	Time Delays:0.1 to 25.5 seconds
	Microstep Resolution: 2000-50800 steps/rev
Inputs*	
	Input 1-4,Optically isolated, 5 - 24 Vdc, 20 mA max CW Jog, CCW Jog:2200 Ohms internal resistance
	CW Limit, can be configured for sinking (NPN)
	CCW Limit:or sourcing (PNP) signals.
Outputs*	
	Outputs 1-3:Optically isolated, 24 Vdc max, 100mA
Environment	
	Maximum Case Temp.: 167° F (75° C)
	Ambient Temp. Range: 32° to 113° F (0 to 45° C)

**** NOTE: External 5-24 Vdc power supply required for operation.***

Axidyne® MSS Microstepping Controller

PROGRAMMING

MSS PROGRAMMING SOFTWARE



Main Programming Screen

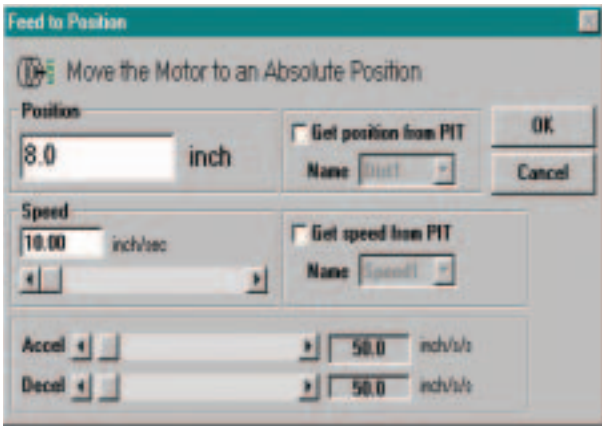
Programmable by RS232 connection to a PC running Windows 95, 98, NT, 2000 or XP. Programming software and cable included. Programming is very easy to learn and requires no previous programming experience.

Programs can be up to 100 lines long. Instructions are powerful, so 100 lines can provide the user with a sophisticated program. For example, in one program line the motor can be moved until a sensor changes state, then fed a precise distance to stop, delayed and returned to the starting point. Distances, delays, feed and return speeds, acceleration and deceleration parameters are all included in the single program instruction. The same move can take 10 program lines or more on other indexers. There are a total of 16 different instructions, including input/output, branches, loops and motion commands. These instructions can be combined to make a nearly infinite variety of programs, meeting the demands of a wide range of applications.

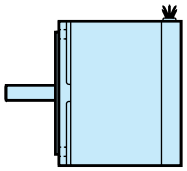
The main programming screen is shown above. On the right of the screen are the 100 program lines. In the center are command buttons and on the left are global parameters such as microstep resolution and jog. Clicking on a program step icon brings up a sequence of dialog boxes, making program selection and parameter setting easy.

Once programmed, the cable can be removed and the indexer-drive will run stand alone. Programs and parameters are stored internally in non-volatile memory. Upon power up, the drive automatically senses the connection to the Windows programming software. If no connection is detected, the program is automatically executed starting on line 1.

The MSS also allows program interaction to take place using the PIT user interface.



Dialog box for setting Feed to position



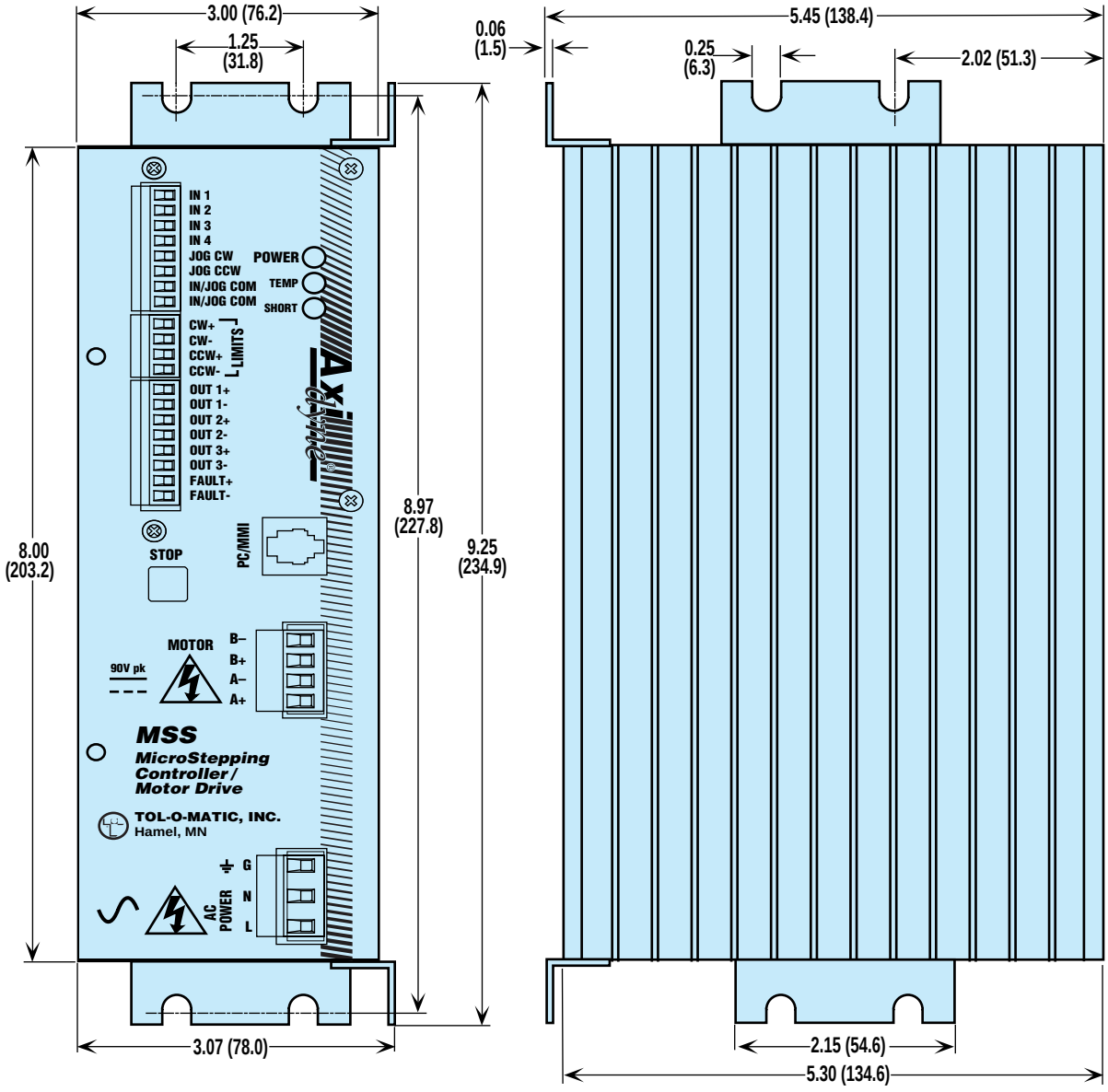
MICROSTEPPING

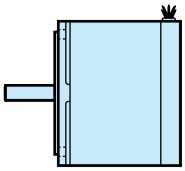
MSS Controller/Drive

- Programming

DIMENSIONS

MSS MICROSTEPPING CONTROLLER/DRIVE





MICROSTEPPING

MSS Controller/Drive

- Dimensions

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Axidyne® SSC Multi-axis Servo/Stepper C

FEATURES

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

COMPATIBILITY:
SYSTEM: STEPPER
MOTORS: MRS
DRIVE: MSD
CONTROLLER: SSC
INTERFACE: JS
SIT

COMPATIBILITY:
SYSTEM: BRUSHED DC
MOTORS: MRB
DRIVE: AXIOM DB
CONTROLLER: SSC
INTERFACE: JS
SIT

The SSC is a high-performance, state-of-the-art motion controller designed for stand-alone operation. This cost effective controller uses a 32-bit microprocessor, a sub-micron gate array, and Tol-O-Motion SSC software, to provide DSP performance without sacrificing ease of use.

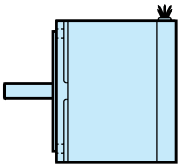
Available with up to 4 axes per unit, purchase only the number of axes required. It can simultaneously control stepper and /or servo systems.

Designed to solve complex motion problems with superior precision, the SSC can be used for applications requiring jogging, vector positioning of multi-axis, 2-dimensional linear or circular interpolation, contouring and electronic gearing.

With the Tol-O-Motion SSC software there is no need to learn programming language. Complex motion control is made easy with an interface that streamlines the entire programming process from setup to execution.

SSC FEATURES

- High performance motion control packaged in an industrial enclosure
- Uses a 32-bit specialized microcomputer and custom, submicron gate array for highest performance and speed
- Up to 4 axes per unit — up to 8 units can be daisy-chained
- 125 µsec per axis servo update rate for high bandwidth
- Controls servo motors and/or step motors
- Sophisticated PID filter with velocity and acceleration feed forward for optimum precision
- 16 bit DAC for fine resolution control
- 256K RAM memory for holding and running active program up to 1000 lines x 80 characters
- 4M EEPROM memory for non volatile storage of custom application programs, parameters and arrays (8000 array elements x 30 arrays) — permits stand-alone operation
- Multitasking feature permits simultaneous execution of four independent applications programs
- Programmable acceleration and deceleration with profile smoothing to eliminate jerk
- Continuous vector feed of infinite number of linear and arc segments for smooth motion
- Selectable linear scale simplifies linear motion programming
- Contour mode for profiling along computer generated paths such as parabolic or spherical profiles
- Performs any motion task including jogging, point-to-point positioning, linear and circular interpolation, electronic gearing, cam and contouring
- Dedicated opto-isolated inputs for home, abort, forward and reverse limits — noise immune
- Position feedback for each axis can be from analog signal or encoder
- Auxiliary encoder inputs and dual-loop damping — ideal for backlash compensation
- Programmable event triggers for monitoring elapsed time, position, speed, and motion complete
- I/O functions, timers, and logic functions for executing PLC tasks
- 254 symbolic variables and 8000 element array space for data storage
- Internal, universal switching power supply for direct connection to AC outlet (115V or 230V)
- IDC connectors on front panel connect to DIN rail mounted screw terminal breakouts included
- Additional I/O available on request



MICROSTEPPING

SSC Multi-axis Servo/Stepper Controller

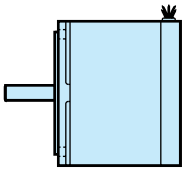
- Features

Axidyne® SSC Multi-axis Servo/Stepp

SPECIFICATIONS

SSC SPECIFICATIONS

Performance	
Servo Loop Cycle Time:	SSC 1: 250 µsec; SSC 2: 375 µsec SSC 3: 500 µsec; SSC 4: 500 µsec
Block Execution Time:	In contour mode, up to 1000 blocks (moves)/sec with full trajectory calculation
Position Accuracy:	±1 quadrature count
Velocity Accuracy:	Long-term: phase-locked, better than 0.003% Short-term: system dependent
Synchronization:	All axes in the same unit are perfectly synchronized and share the same servo cycle.
Position Capture Accuracy:	25 µsec with opto-isolation; 1 µsec if by-pass opto-isolation.
Parameter Ranges	
Position Range:	±2,147,483,647 counts/move; automatic rollover; no limit in jog or vector modes.
Velocity Range:	Up to 8,000,000 counts/sec
Acceleration/deceleration:	1,024 to 67,107,840 c/sec2
Error Limit:	±32,767 counts
Gear Ratio:	±127.9999
Filter Constants:	Kp: 0 to 1023.875 Kd: 0 to 4095.875 Ki: 0 to 2047.875
Motor Command Resolution:	16-bits or .0003 V
Step Motor Control Mode:	Full, half or microstep
Step Pulse Frequency:	2,000,000 pulse/sec
Number of Variables:	254
Array Memory Size:	8000 elements in up to 30 arrays
Program Memory Size:	1000 lines x 80 characters
Mechanical	
Dimensions:	13" high x 2.5" wide x 6.6" deep
Weight:	6 lbs.
Inputs/Outputs	
Feedback:	Two channels of A/B quadrature per axis with third channel for index. In servo mode, includes auxiliary encoder inputs for each axis. Single ended or differential. Can be configured for quadrature, pulse and direction, or from analog inputs.
General Purpose Inputs:	8 opto-isolated inputs
General Purpose Outputs:	8 TTL outputs
General Purpose Analog Inputs:	7, ±10 V; 12-bit resolution (16-bit optional)
Dedicated Inputs per Axis:	Forward and reverse limits, home.
Dedicated Outputs per Axis:	Analog motor command, pulse and direction, amplifier enable
Available Power to Drive External Devices	
+5 V 1.5 Amp	+12 V 750 mA -12 V 200 mA
Environment	
Operating Temperature:	32° to 158° F (0° to 70° C)
Communication Interface	
Selectable Baud Rate:	300, 1200, 4800, 9600, 19200, 38400. Handshake mode available.



MICROSTEPPING

SSC Multi-axis Servo/Stepper Controller

- Specifications

I/O Description (Inputs)

Encoder, A+, B+:	Position feedback from incremental encoder with two channels in quadrature. The encoder can be (±12V) or TTL. Note: Encoders that produce output in a pulse and direction format can also be used.
Encoder Index I+:	Once-per-revolution encoder pulse; used in Homing sequence or Find Index command. Minimum index pulse width is 120 nsec.
Encoder, A-, B-, I-:	Optional differential inputs from encoder; used for enhanced noise immunity.
Auxiliary Encoder:	Inputs for additional encoder; used when encoders on both the motor and the load are required.
Abort #:	Stops commanded motion instantly and also aborts application program.
Reset #:	System reset.
Forward and Reverse Limit Switch #:	When active, inhibits motion in forward or reverse direction and also causes the limit switch subroutine #LIMSWI to execute.
Home Switch #:	Input for Homing (HM) and Find Edge (FE) instructions.
Input 1 - Input 8#:	Uncommitted inputs; can be defined by the user to trigger events or interrupt program.
Latch#:	High-speed position latch to capture axis position within 25 µsec (bypass opto-isolation for .1 µsec capture). AL command arms latch. Input 1, 2, 3, 4 latches X, Y, Z, W respectively.
Analog 1 - Analog 7:	Analog inputs that can be connected to external analog signals such as force or pressure transducers. Can also be used for position feedback. 12-bit resolution ADC for ±10 V input.

I/O Description (Outputs)

Analog Motor Command:	±10 V range signal for driving servo amplifiers; 16-bit resolution or .0003 V, 3 mA.
Amp enable:	Signal to disable and enable an amplifier. Amp enable goes low when a motor-off condition occurs. For step motors, this pin provides for reduced current when low.
Step Out:	Pulses for input to a step motor driver. The pulses can be either active low or high. Upon Reset, the output will be low if the SM jumper is on, Tristate if off. The STEP OUT pin also provides the PWM signal for servo motors.
Direction:	Used with the STEP OUT signal to give direction to step motors or servo motors in the sign magnitude mode.
Error:	The signal goes low when the position error on any axis exceeds the limit specified by the error command, ER.
Output 1 - Output 8:	These 8 TTL outputs are uncommitted and can be designated by the user to toggle relays and trigger external events. The output lines are toggled by Set Bit (SB), Clear Bit (CB), Define Bit (OB), and OP instructions. Upon reset these signals will be low.

SSC CONNECTORS

SSC J2 Main; 60-Pin IDC;

1	Ground	2	5 V				
3	Error	4	Reset				
5	Switch Common	6	Forward Limit - X				
7	Reverse Limit - X	8	Home - X				
9	Forward Limit - Y	10	Reverse Limit - Y				
11	Home - Y	12	Forward Limit - Z				
13	Reverse Limit - Z	14	Home - Z				
15	Forward Limit - W	16	Reverse Limit - W				
17	Home - W	18	Output 1				
19	Input Common	20	Latch X or Input 1				
21	Latch Y or Input 2	22	Latch Z or Input 3				
23	Latch W or Input 4	24	Abort Input				
25	Motor Command X	26	Amp Enable X				
27	Motor Command Y	28	Amp Enable Y				
29	Motor Command Z	30	Amp Enable Z				
31	Motor Command W	32	Amp Enable W				
33	A+ X	34	A- X	35	B+ X	36	B- X
37	I+ X	38	I- X	39	A+ Y	40	A- Y
41	B+ Y	42	B- Y	43	I+ Y	44	I- Y
45	A+ Z	46	A- Z	47	B+ Z	48	B- Z
49	I+ Z	50	I- Z	51	A+ W	52	A- W
53	B+ W	54	B- W	55	I+ W	56	I- W
57	+12 V	58	-12 V	59	5 V	60	Ground

SSC J5 General I/O; 26-Pin IDC;

1	Analog 1	2	Analog 2
3	Analog 3	4	Analog 4
5	Analog 5	6	Analog 6
7	Analog 7	8	Ground
9	5 V	10	Output 1
11	Output 2	12	Output 3
13	Output 4	14	Output 5
15	Output 6	16	Output 7
17	Output 8	18	Input 8
19	Input 7	20	Input 6
21	Input 5	22	Input 4 (Latch W)
23	Input 3 (Latch W)	24	Input 2 (Latch W)
25	Input 1 (Latch W)	26	Input Common (Isolated 5 V)

SSC J3 Auxiliary Encoder; 20-Pin IDC;

1	Sample Clock	2	Reserved
3	B- Aux W	4	B+ Aux W
5	A- Aux W	6	A+ Aux W
7	B- Aux Z	8	B+ Aux Z
9	A- Aux Z	10	A+ Aux Z
11	B- Aux Y	12	B+ Aux Y
13	A- Aux Y	14	A+ Aux Y
15	B- Aux X	16	B+ Aux X
17	A- Aux X	18	A+ Aux X
19	5 V	20	Ground

SSC J4 Driver; 20-Pin IDC;

1	Motor Command X	2	Amp Enable X
3	PWM X/Step X	4	Sign X/Dir X
5		6	Motor Command Y
7	Amp Enable Y	8	PWM Y/Step Y
9	Sign Y/Dir Y	10	
11	Motor Command Z	12	Amp Enable Z
13	PWM Z/Step Z	14	Sign Z/Dir Z
15	5 V	16	Motor Command W
17	Amp Enable W	18	PWM W/Step W
19	Sign W/Dir W	20	Ground

AC Power INputs; 4-PIN Detachable Screw Type:

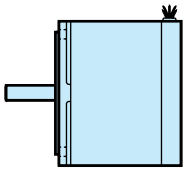
Hot	Connects to 110 or 220 AC
NC	No Connect
Neutral	Return for AC
Earth	Chassis input

RS232 - Main Port; 9-PIN:

1	CTS - output	2	Transmit data
3	Receive data	4	RTS - input
5	Ground	6	CTS - output
7	RTS - input	8	CTS - output
9	5 V		

RS232 - Auxiliary Port; 9-PIN:

1	CTS - input	2	Receive data -
3	Transmit data	4	RTS - output
5	Ground	6	CTS - input
7	RTS - output	8	CTS - input
9	5 V		



MICROSTEPPING

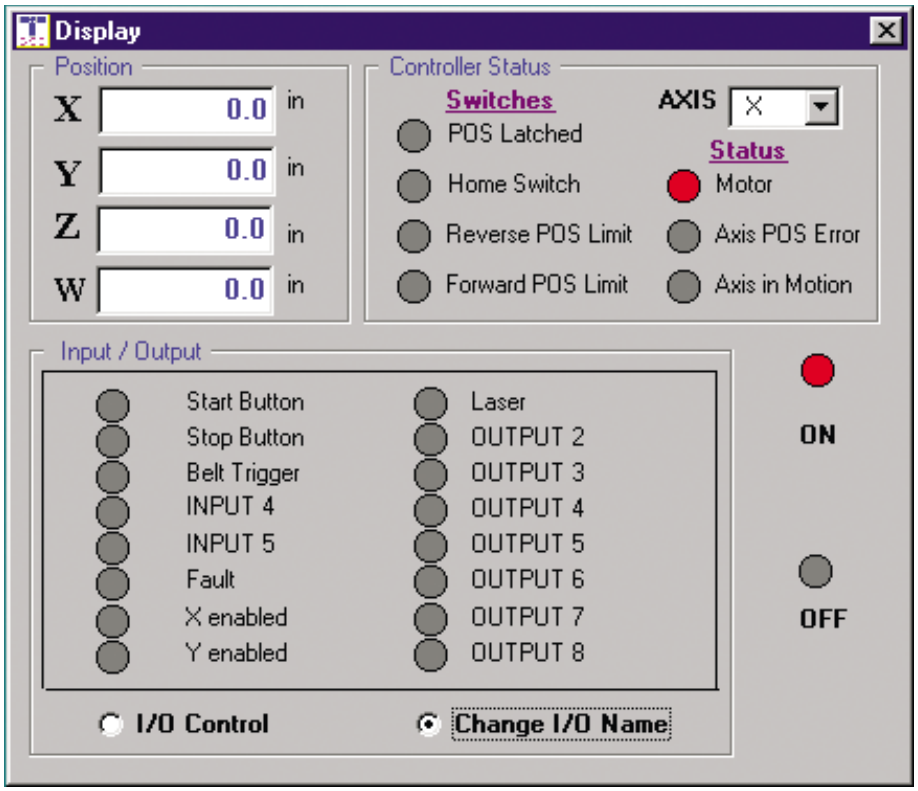
SSC Multi-axis Servo/Stepper Controller

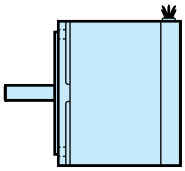
- Connectors

SSC PROGRAMMING SOFTWARE

Programming is accomplished through RS232 connection to a PC running Windows 95, 98, NT, 2000 or XP. Visual Basic panels guide the user through the complete setup process including communications and axis configuration. The user can then use other program options including Display, Jog, Teach, Programmer, Tune and Data Acquisition.

Display
The Display panel (shown above) allows the user to identify axis locations and status faults, limits, and I/O.



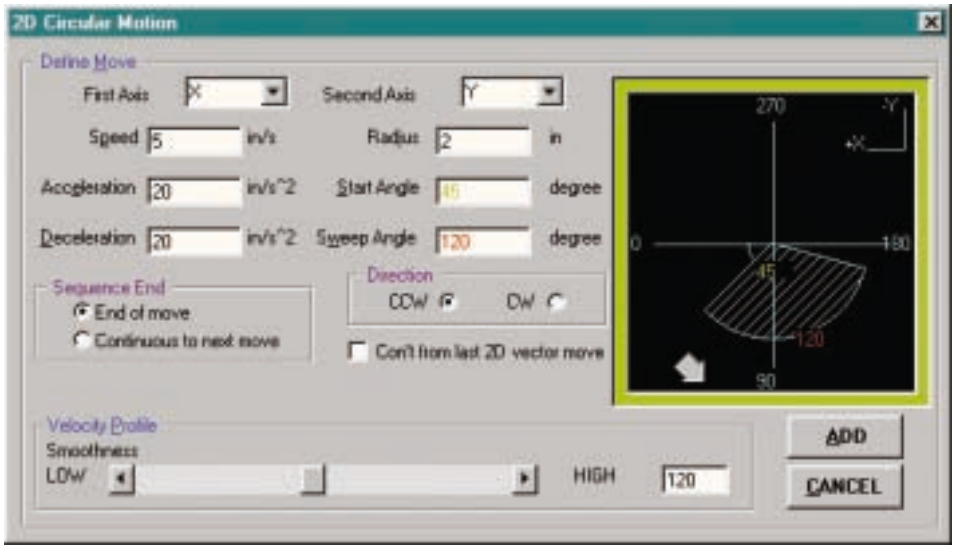


MICROSTEPPING

SSC Multi-axis Servo/Stepper Controller

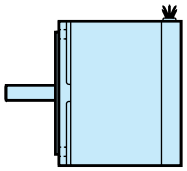
- Programming

Jog
The Jog panels allow the user to easily setup independent motion or coordinated motion.



CIRCULAR MOTION

The added feature of 2-dimensional circular programming, assists you in selecting start and sweep angles.



MICROSTEPPING

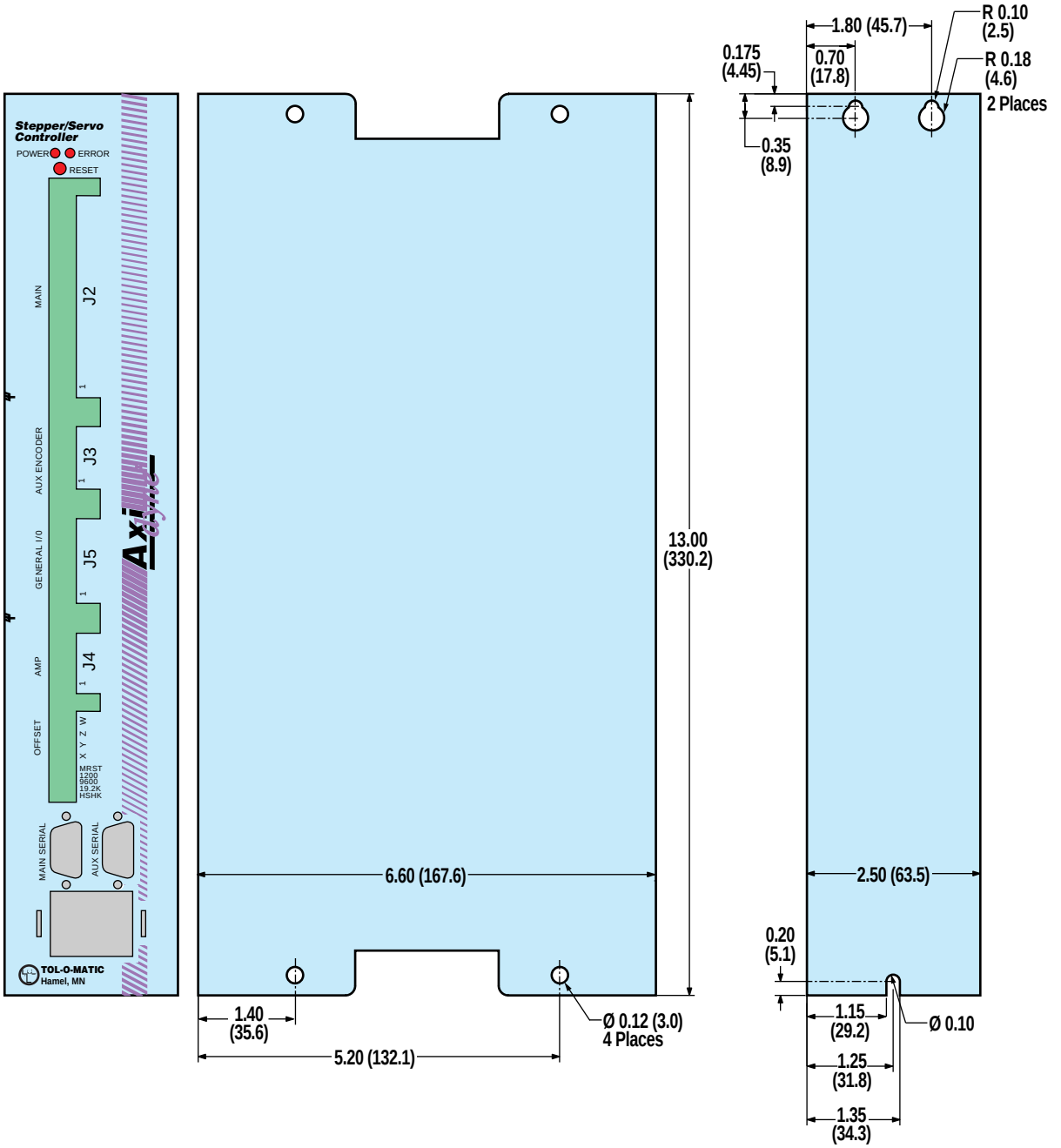
SSC Multi-axis Servo/Stepper Controller

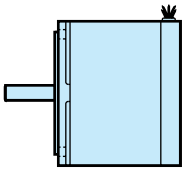
- Programming

Axidyne® SSC Multi-axis Servo/Stepp

DIMENSIONS

SSC (MULTI-AXIS SERVO/STEPPER CONTROLLER)





MICROSTEPPING

SSC Multi-axis Servo/Stepper Controller

- Dimensions

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

Axidyne® PIT – Panel Mount User Interf

SPECIFICATIONS AND DIMENSIONS

COMPATIBILITY:
SYSTEM: STEPPER
MOTORS: MRS
DRIVE: MSS
CONTROLLER: MSS
INTERFACE: PIT

COMPATIBILITY:
SYSTEM: BRUSHED DC
MOTORS: MRB
DRIVE: AXIOM DB
CONTROLLER: MSC
INTERFACE: PIT

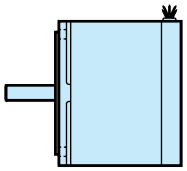
User interaction with the MSS is simple with the PIT panel mount user interface. The Tol-O-Motion MS software allows visual setup of the panel to status the user on a particular action taking place, or to prompt the user to make a decision or provide information such as move distance, move speed, repeat count.

FEATURES

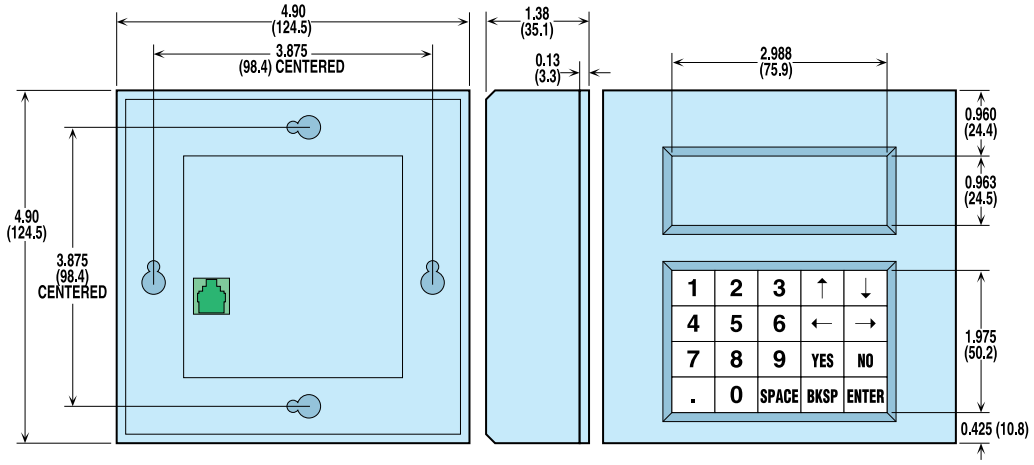
- Flush or surface mounting
- Four line by 20 character LCD display
- RS232 communication to MSS controllers
- Uses RS232 cable supplied with MSS controllers

CABLES

Motor cable and encoder cable are included when ordering MSS controllers (see page G-23)



PIT (PANEL MOUNT USER INTERFACE) DIMENSIONS



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

Axidyne® JS – Joystick User Interface

SPECIFICATIONS AND DIMENSIONS

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

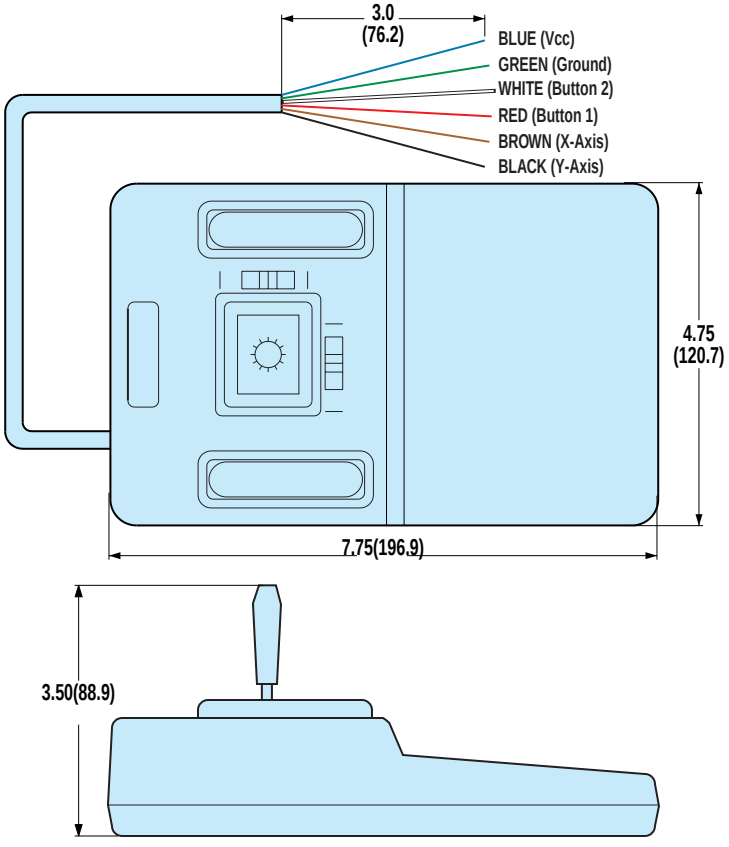
COMPATIBILITY:
SYSTEM: STEPPER
MOTORS: MRS
DRIVE: MSD
CONTROLLER: SSC
INTERFACE: JS SIT

COMPATIBILITY:
SYSTEM: BRUSHED DC
MOTORS: MRB
DRIVE: AXIOM DB
CONTROLLER: SSC
INTERFACE: JS SIT

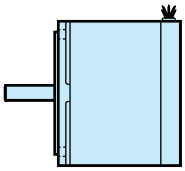
For simple setup of the SSC controller the JS joystick provides 2-axis manipulation. Used with the Joystick Teach mode of the Tol-O-Motion SSC software, moves can be made with velocity control, and then stored using a separate button integrated into the joystick housing.

SPECIFICATIONS	JS Joystick
Joystick Travel	27° from design center in all directions
Mechanical Life Cycle	5 million (minimum)
Trim Movement (Optional)	±7° (total trim 14°) for each axis
Main Ball Pivot	Precision ground stainless steel
Stick Shaft	3/16" brass plated
Potentiometers	Set at center of resistance
Potentiometer Calibration	Thumb tab provides up to 114° of potentiometer calibration
Return to Center Repeatability	±1%
Deflection Force	0.14 lbs. at 27° at 2-7/8" from pivot point
Switches	2 elongated push-button switches
Cable	Integrated 7' (2.1m) cable with strain relief

JS (JOYSTICK) DIMENSIONS



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



MICROSTEPPING

Js Joystic User Interface

- Specifications
- Dimensions

Axidyne® SIT – Hand-held User interface

FEATURES, SPECIFICATIONS AND DIMENSIONS

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

COMPATIBILITY:
SYSTEM: STEPPER
MOTORS: MRS
DRIVE: MSD
CONTROLLER: SSC
INTERFACE: JS
SIT

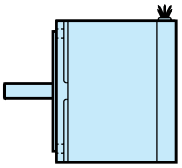
COMPATIBILITY:
SYSTEM: BRUSHED DC
MOTORS: MRB
DRIVE: AXIOM DB
CONTROLLER: SSC
INTERFACE: JS
SIT

For user interaction with the SSC 1-4 axis multi-function controllers the SIT hand held user interface provides flexibility and setup simplicity. The Tol-O-Motion SS software (included with the SSC 1-4 controllers) has a setup page for use with the SIT to allow the controller to status the user, or to prompt the user for information, eliminating the need for a PC following setup.

FEATURES:

- 45 key, alpha-numeric tactile keypad
- 4 row by 20 character LCD display
- Rugged, high impact ABS housing
- 7 foot (2.1m) RS232 cable with 9-pin "D" connector for connection to the SSC 1-4
- 5 Vdc power supplied from SSC 1-4 controller over RS232

SPECIFICATIONS	JS Joystick
Weight	8.0 oz. (.23 Kg.)
Character Set	ASCII with upper case transmit, upper and lower case receive
Case	Molded, high impact ABS with retractable hanger
Keypad	15 user-programmable function keys
Display	Transreflective LCD with 5 by 7 character font
Power Requirements	30 mA maximum, regulated, 5 Vdc ±5% (Received through RS 232 cable)
Speaker	Audible key click, bell and alert
Storage Temperature	-4° F (-20° C) to 158° F (+70° C)
Operating Temperature	32°F (0° C) to 122° F (+50° C)
Relative Humidity	10% to 90% non-condensing

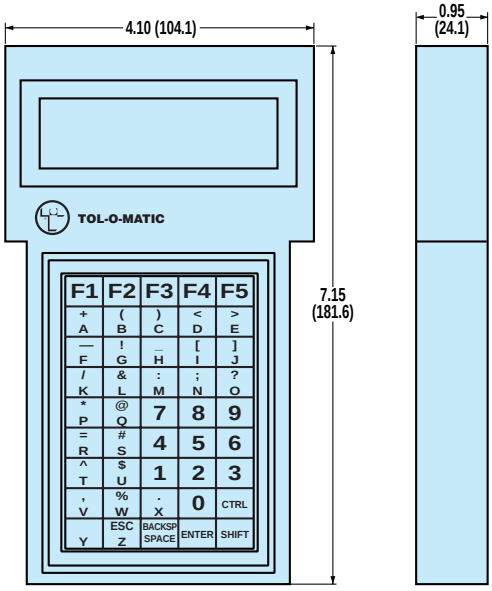


MICROSTEPPING

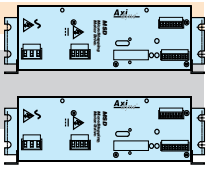
SIT Hand-held User Interface

- Features
- Specifications
- Dimensions

SIT (HAND-HELD INTERFACE)

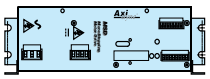
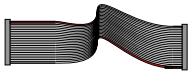
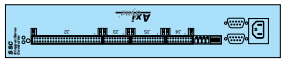


MRS MOTORS TO MSD DRIVE

MRS171, MRS231, MRS232, MRS341, MRS342, MRS343  TO: MSD or MSS 

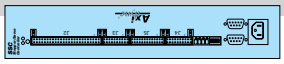
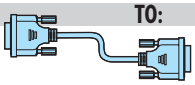
Config Code	Replacement Part Number	Included with Drive	Type	Description	Cable Length	Motor Size	CONNECTORS AT Motor	MSD-MSS	MSD MSS
–	–	Cust. supplied	Power		0.3m	All	Flying leads	Screw terminal	All

MSD DRIVE TO SSC CONTROLLER

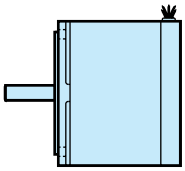
MSD  TO:  BREAKOUT BOX  RIBBON CABLE SSC 

Config Code	Replacement Part Number	Included with SSC	Type	Description	Cable Length	Drive Sizes	CONNECTORS AT Drive	SSC	SSC Size
–	3600-1347 3600-1342	YES YES	Main/Driver Signals	Ribbon Breakout	1m	All	Screw terminals	IDC	All
–	3600-1346 3600-1341	YES YES	I/O	Ribbon Breakout	1m	All	Screw terminals	IDC	All
–	3604-1345 3600-1340	YES YES	Step/Dir Signals	Ribbon Breakout	1m	All	Screw terminals	IDC	All

SSC CONTROLLER TO IBM COMPATIBLE PC

SSC  CRZ  TO: PC 

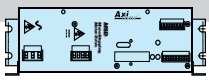
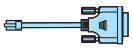
Config Code	Replacement Part Number	Included with SSC	Type	Description	Cable Length	SSC Size	CONNECTORS AT SSC	PC	PC Size
CRZ	3600-1172	Optional	Comm		1m	All	DB9	DB9	All



MICROSTEPPING

Cables

MSS DRIVE/CONTROLLER TO IBM COMPATIBLE PC

MSS  TO:  PC 

Config Code	Replacement Part Number	Included with MSS	Type	Description	Cable Length	MSS Size	CONNECTORS AT MSS	PC	PC Size
–	–	YES	Comm		2m	All	RJ11	DB9	All

Axidyne® Microstepping System

ORDERING

MOTOR STYLE, SIZE AND GEARHEAD REDUCTION | CONTROLLER | CABLES, CONNECTIONS & INTERFACE

MRS 231_ GHK20 | SSC21 | CRZ BON | JS_

MOTOR TYPE

MRS	Stepping Motor

MOTOR SIZE / DRIVE SIZE

MODEL	FRAME SIZE	STACK SIZE	DRIVE
171	17	1	MSD
231	23	1	MSD
232	23	2	MSD
341	34	1	MSD
342	34	2	MSD
343	34	3	MSD

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

NO DRIVE OPTION

X	Add X if motor drive is NOT required

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

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

GEARHEAD REDUCTIONS

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

MODEL	INPUT DIA.	MOTOR SIZE	REDUCTION RATIO
GHK20	1/4-inch	23	5.5
GHK30	3/8-inch	34	5.5

CONTROLLER/DRIVE OR CONTROLLER

SINGLE AXIS APPLICATIONS

MS	MSS Controller/Drive
SSC10	Stepper/Servo Controller, 1 axis application

MULTI AXIS APPLICATIONS

**2 Axis Application

	1st Axis	2nd Axis
SSC21	Stepper	Stepper
SSC22	Stepper	Servo

**3 Axis Application

	1st Axis	2nd Axis	3rd Axis
SSC31	Stepper	Stepper	Stepper
SSC32	Stepper	Stepper	Servo
SSC33	Stepper	Servo	Stepper
SSC34	Stepper	Servo	Servo

**4 Axis Application

	1st Axis	2nd Axis	3rd Axis	4th Axis
SSC41	Stepper	Stepper	Stepper	Stepper
SSC42	Stepper	Stepper	Stepper	Servo
SSC43	Stepper	Stepper	Servo	Stepper
SSC44	Stepper	Stepper	Servo	Servo
SSC45	Stepper	Servo	Stepper	Stepper
SSC46	Stepper	Servo	Stepper	Servo
SSC47	Stepper	Servo	Servo	Stepper
SSC48	Stepper	Servo	Servo	Servo

CABLES

For MRS motors: include 12" (0.3m) leads

For SSC Controllers

CRZ	If a 2-meter 9-pin RS232 cable is desired

⚠ ***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
- If any axis configured w/ step & direction output — 20 pin/18" (457mm) ribbon cable & 20 pin breakout

USER INTERFACE

PIT	Panel mount user interface *(for use with MSS)*
SIT	Hand-held user interface
JS	Joy Stick

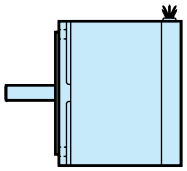
⚠ ***Not all codes listed are compatible with all options.***

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

TO ORDER ACTUATORS

- B3S/M3S SERIES (SEE PAGE C-30)
- B3B/M3B SERIES (SEE PAGE C-50)
- TKS SERIES (SEE PAGE C-81)
- TKB SERIES (SEE PAGE C-104)
- BCS/MCS SERIES (SEE PAGE C-128)
- SLS/MLS SERIES (SEE PAGE C-138)
- RSA/RSM SERIES (SEE PAGE D-53)
- GSA/GSM SERIES (SEE PAGE E-36)



Products discontinued August 01, 2006:
SSC Multi-Axis Controller,
Stepper Motors & Control Products,
Brushed DC Motors & Control Products
Contact Tol-O-Matic for repair parts

Axidyne® Microstepping System

FIELD RETROFIT ORDERING

*SSC 1-4 CONTROLLERS

Code	X-Axis	Y-Axis	Z-Axis	W-Axis	Part #
SSC10	Stepper	-	-	-	3600-0110
SSC21	Stepper	Stepper	-	-	3600-0121
SSC22	Stepper	Servo	-	-	3600-0122
SSC31	Stepper	Stepper	Stepper	-	3600-0131
SSC32	Stepper	Stepper	Servo	-	3600-0132
SSC33	Stepper	Servo	Stepper	-	3600-0133
SSC34	Stepper	Servo	Servo	-	3600-0134
SSC41	Stepper	Stepper	Stepper	Stepper	3600-0141
SSC42	Stepper	Stepper	Stepper	Servo	3600-0142
SSC43	Stepper	Stepper	Servo	Stepper	3600-0143
SSC44	Stepper	Stepper	Servo	Servo	3600-0144
SSC45	Stepper	Servo	Stepper	Stepper	3600-0145
SSC46	Stepper	Servo	Stepper	Servo	3600-0146
SSC47	Stepper	Servo	Servo	Stepper	3600-0147
SSC48	Stepper	Servo	Servo	Servo	3600-0148

NOTE: Any axis of the SSC may be changed by the insertion or removal of a jumper, see SSC manual #3600-4608
*Includes user manual and software CD-ROM

CABLES

Item	Part #
20 pin breakout	3600-1340
26 pin breakout	3600-1341
60 pin breakout	3600-1342
20 pin ribbon cable	3600-1345
26 pin ribbon cable	3600-1346
60 pin ribbon cable	3600-1347
RS232 Cable	3600-1172
SSC Encoder cable	3604-1213
RS232 - 9 Pin Adapter for MSS/MSD	3600-1186
RS232 Cable Only for MSS/MSD	3600-1187

*MSS CONTROLLER / DRIVE

Config. Code	Includes	Part #
MSS	Controller/Drive (order cables below)	3600-0038

*Includes user manual and software CD-ROM

*MSD DRIVE

Config. Code	Includes	Part #
MSD	Drive only (order cables below)	3600-0039

*Includes user manual and software CD-ROM

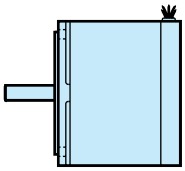
MRS STEPPING MOTORS

Config. Code	Part #
MRS171**	3600-6129
MRS231	3600-6130
MRS232	3600-6131
MRS341	3600-6132
MRS342	3600-6133
MRS343	3600-6134

** For RSA Rod Screw Actuators only

USER INTERFACES

Config. Code	Part #
PIT	3600-9607
SIT	3600-9161
JS	3600-9162



MICROSTEPPING

Field Retrofit Ordering

FIELD RETROFIT ORDERING
BRUSHLESS (SEE PAGE F-34)
BRUSHED DC (SEE PAGE H-27)