EXCELLENCE IN MOTION®

PrecisionAire™

PRODUCT CATALOG

CONTROLLED PNEUMATIC LINEAR MOTION SYSTEM

Product discontinued January 01, 2006:
PAS-PrecisionAire
Contact Tol-O-Matic for repair parts

Visit www.tolomatic.com to get the most up-to-date technical information.

TOL-O-MATIC, INC.

PATENT-PENDING

PICTURED: PAS10, KP OPTION

TABLE OF CONTENTS

FAST DELIVERY

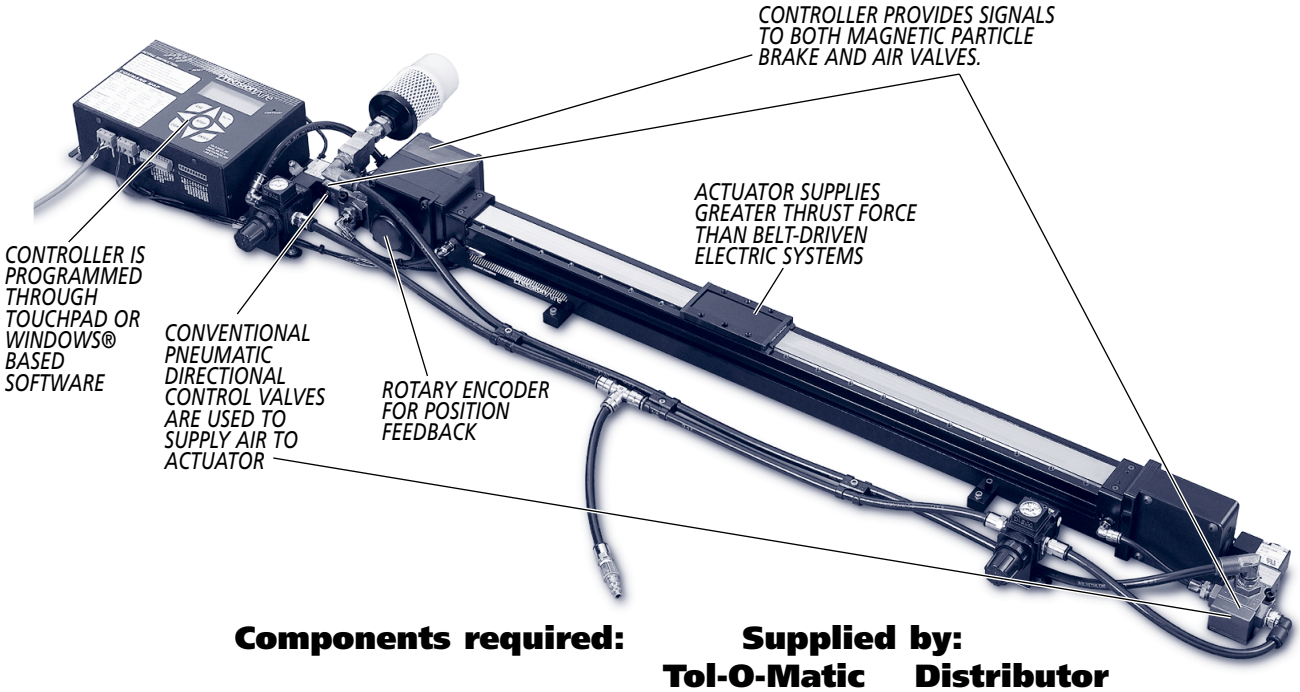
Our manufacturing speed leads the industry. Standard catalog products are ready to be shipped within 5 days. The right product, in days, not weeks – that's Tol-O-Matic's delivery promise.

HIGHEST QUALITY

ISO 9001··2000 certified quality system provides assurance that our products are built within a system to assure quality.

7.5M 1/2003 SP

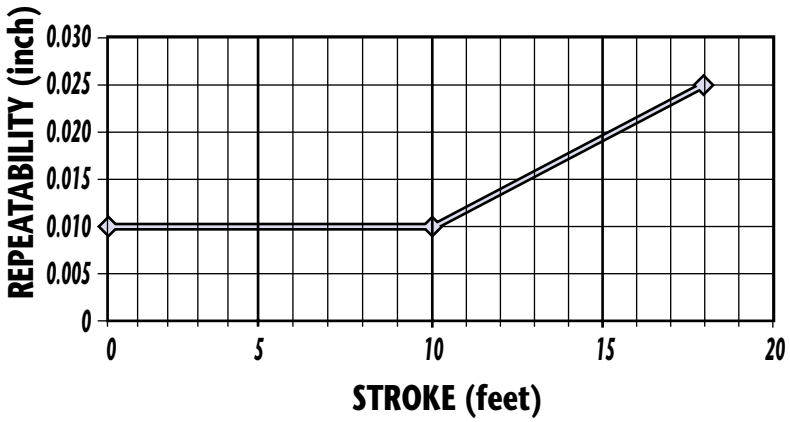
THE PRECISIONAIRE™ SYSTEM



Components required:		Supplied by: Tol-O-Matic	Distributor
Controller		X	
Programming Software		X	
Electronic Cables		X	
Actuator		X	
Pneumatic Directional Control Valves			X
Air Preparation Equipment:	Filter		X
	Regulator		X
	Plumbing		X

NOTE: A Tol-O-Matic PrecisionAire system is NOT recommended if your application requires: • No overshoot • Exact timing • Precise Velocity Control

REPEATABILITY TOLERANCES

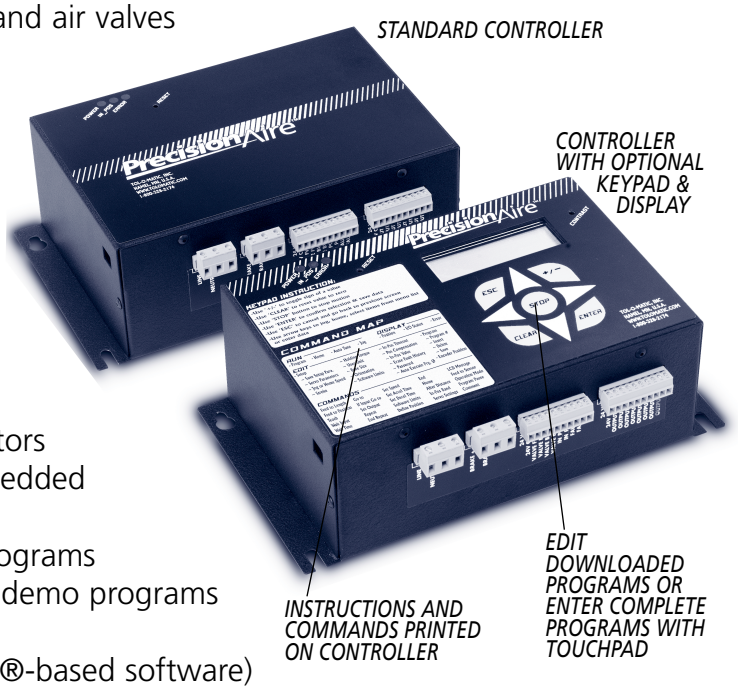


Programmability:	+/- 0.010" in 0.006" increments (encoder resolution)
Repeatability at the carrier for strokes **up to** 120"	+/- 0.010"
Repeatability at the carrier for strokes **over** 120"	Greater than +/- 0.010" [due to belt stretch, piston and bearing friction]

THE PRECISIONAIRE™ CONTROLLER

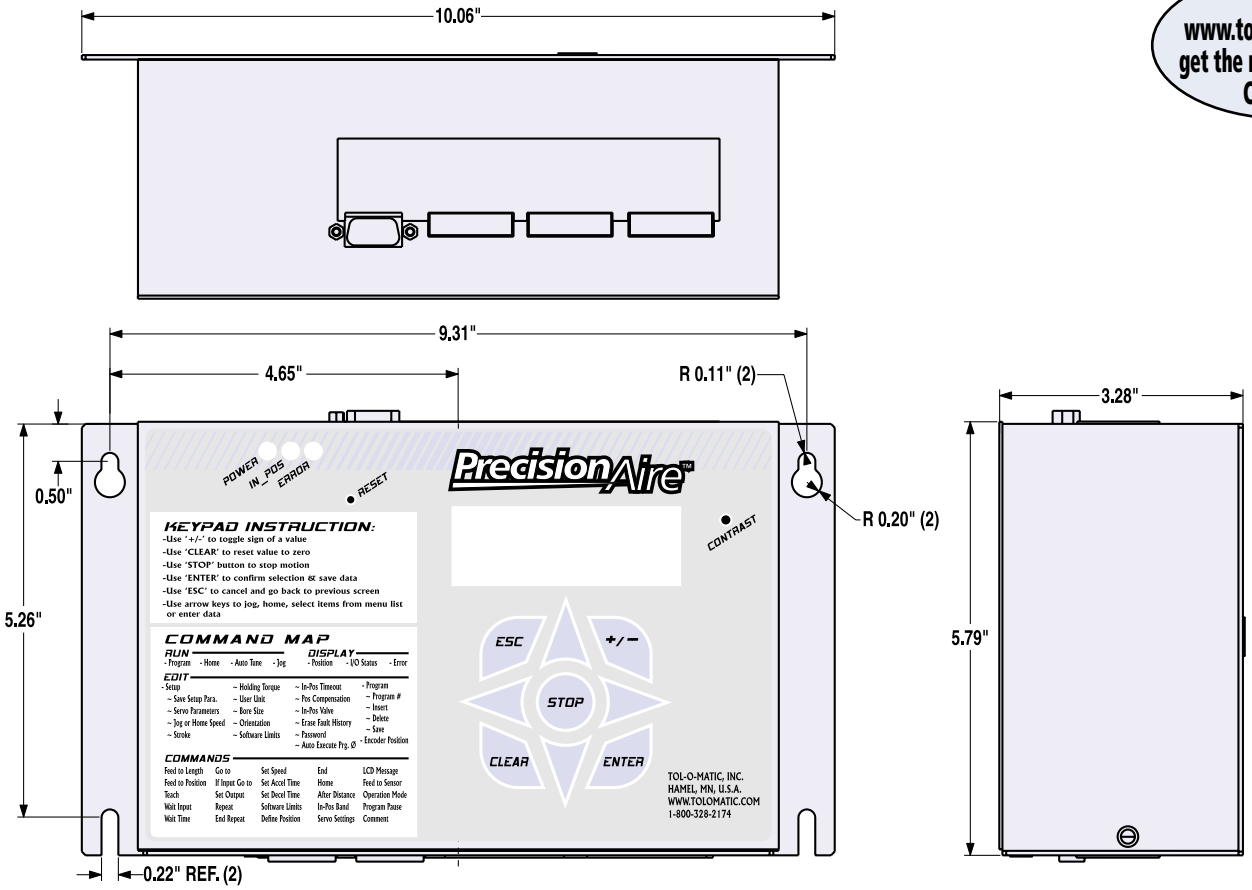
PRECISIONAIRE™ CONTROLLER FEATURES

- Provides signals to both magnetic particle brake and air valves
- Programmable position control
- Programmable users unit and holding torque
- 7 optically-isolated inputs and 4 optically-isolated outputs
- 1024 line rotary encoder for position feedback
- Tune, jog and teach functions
- Dedicated Enable input, Fault/Error and In-Position outputs
- Two 24Vdc valve outputs, 250mA max for each output
- Power ON, Fault/Error, and In-Position LED indicators
- Optional 4x20 character LCD display and an embedded keypad for easy programming
- 64K byte EEPROM for saving up to 10 motion programs (each up to 100 command lines), 3 pre-recorded demo programs (#7, #8, #9) are included
- Data collection (available with included Windows®-based software)
- Pluggable screw terminals – no breakout terminals required
- Short-circuit protection, current fault, position fault, configurable software limit protection



DIMENSIONAL DATA

Visit www.tolomatic.com to get the most up-to-date CAD files.



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PRECISIONAIRE™ CONTROLLER SPECIFICATIONS

POWER	1-IN (PAS10)	1.5 IN (PAS15)
Continuous current	1 Amp	2 Amp
Peak current (1 sec)	2 Amp	4 Amp
Input Voltage (single phase) (Voltage range is switch selectable)	95-130 Vac (190-250Vac)	
Input frequency	47-63 Hz	
SERIAL COMMUNICATION PORT		
Type	RS-232	
Settings	19200 baud, 8 data bits, none parity, 1 stop bit	
INPUTS AND OUTPUTS		
Dedicated optically isolated input	5-24Vdc, 15mA max, ENABLE Can be configured to source or sink current	
Dedicated optically isolated outputs	24Vdc max, 250mA max, 2 valve solenoid outputs 24Vdc max, 20mA max, in-position & fault outputs	
GENERAL-PURPOSE		
General-purpose optically isolated inputs	5-24Vdc, 15mA max, 7 inputs Can be configured to source or sink current	
General-purpose optically isolated outputs	5-24Vdc, 20mA max, 4 outputs Can be configured to source or sink current	
Encoder Feedback	1024 lines, Incremental, 5Vdc, differential, A/B channels	
CONNECTORS		
Serial	9 pin D-sub.	
All others	Pluggable screw terminal blocks	
ENVIRONMENTAL		
Storage temperature	-4°F to 158°F	
Operating temperature	32°F to 104°F	
Humidity	5 to 95% non-condensing	
MECHANICAL		
Dimensions	5.8" height x 10.1" wide x 3.3" deep	
Weight	8 lbs	

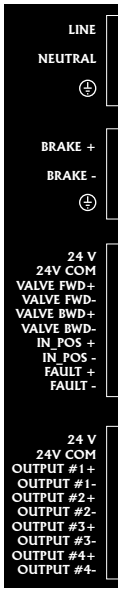
NOTE: Mating connector is provided with screw terminal access.

PRECISIONAIRE™ PROGRAMMING

Minimum System Requirements:
Microsoft Windows® 95, 98, or NT
Pentium PC, 16MB RAM
VGA with 256 color

Visit www.tolomatic.com to get Programming software.

I/O CONNECTOR ASSIGNMENTS FOR PRECISIONAIRE™ CONTROLLER:



AC POWER: PHOENIX-TYPE CONNECTORS (.300 INCH SPACING)
1 - 115/230 VAC
2 - 115/230 VAC NEUTRAL
3 - CHASSIS GND

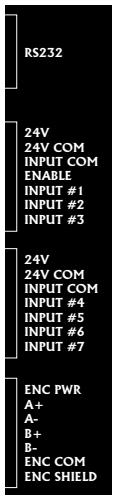
BRAKE: PHOENIX-TYPE CONNECTORS (.300 INCH SPACING)
1 - BRAKE +
2 - BRAKE -
3 - CHASSIS GND

DEDICATED OUTPUTS: PHOENIX-TYPE CONNECTORS (.150 INCH SPACING)

1 - 24 VDC	2 - 24V COM	3 - VALVE FWD +
4 - VALVE FWD -	5 - VALVE BWD +	6 - VALVE BWD -
7 - IN_POS +	8 - IN_POS -	9 - FAULT +
10 - FAULT -		

GENERAL OUTPUTS: PHOENIX-TYPE CONNECTORS (.150 INCH SPACING)

1 - 24 VDC	2 - 24V COM	3 - OUTPUT #1+
4 - OUTPUT #1-	5 - OUTPUT #2+	6 - OUTPUT #2
7 - OUTPUT #3+	8 - OUTPUT #3-	9 - OUTPUT #4+
10 - OUTPUT #4-		



RS-232: 9 PIN D-SUB

1 - RESERVED	2 - RS-232 TX.	3 - RS-232 RX.
4 - RESERVED	5 - RS-232 COMMON	6 - RESERVED
7 - RESERVED	8 - RESERVED	9 - +5V (30MA MAX)

ENABLE & GENERAL INPUTS: PHOENIX-TYPE CONNECTORS (.150 INCH SPACING)

1 - 24 VDC	2 - 24V COM	3 - INPUT COM
4 - ENABLE	5 - INPUT #1	6 - INPUT #2
7 - INPUT #3		

GENERAL INPUTS: PHOENIX-TYPE CONNECTORS (.150 INCH SPACING)

1 - 24 VDC	2 - 24V COM	3 - INPUT COM
4 - INPUT #4	5 - INPUT #5	6 - INPUT #6
7 - INPUT #7		

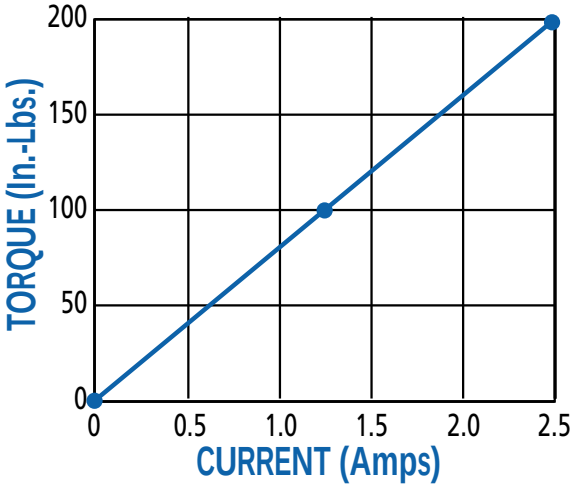
ENCODER: PHOENIX-TYPE CONNECTORS (.150 INCH SPACING)

1 - ENCODER POWER	2 - A+	3 - A-
4 - B+	5 - B-	6 - ENCODER COM
7 - SHIELD		

BRAKE SPECIFICATIONS

Torque Rating (500 RPM)	
1.25 Amp	100 in.-lbs. minimum
2.50 Amp	200 in.-lbs. minimum
Breakaway Torque	<5.0 in.-lbs.
Backlash	0 degrees
Maximum Speed	1500 RPM
Electrical Impedance 8 Ohms	325-375mH
Current (Norm./Max.)	1.25 Amp/2.5 Amp
Electrical Power Consumption	50 Watt maximum
Maximum Brake Temperature	200°F
Brake Cable	15' 20 gauge
Brake Coil Resistance	PAS10 8 ohms PAS15 4 ohms

BRAKE CHARACTERISTICS



ENCODER SPECIFICATIONS

IP Rating	IP40
Encoder Cable	15' 28 gauge

PRECISIONAIRE BEARING LUBRICATION

The bearing system for the PrecisionAire actuator is prelubricated at the factory with a high quality No. 2 lithium-soap base grease. Relubrication is recommended every 10 million linear feet using a lithium-soap base grease for optimal bearing performance. To relubricate, lift upper dust band and apply grease directly to the stationary ball ways. Applications that are exposed to moisture or dirt may require more frequent relubrication. All Tol-O-Matic actuators are prelubricated at the factory. See Parts Sheet for additional maintenance, air filtration and lubricator recommendations.

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RECOMMENDED VALVES:

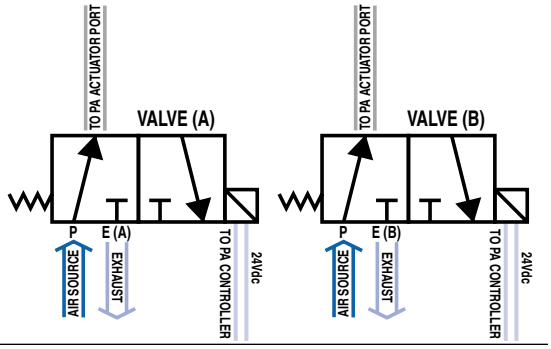
These different valve types can be used for system operation. Valve response time of less than 20 ms is required. Valves must be mounted as close to the port of the actuator as possible, using equal length of air line.

NOTE: Air pressure will greatly affect the performance of the PrecisionAire System. It is recommended to operate at an air pressure less than 10 PSI above the pressure needed to acheive desired speed or force. Operating at higher pressure can increase overshoot and affect the tuning parameters.

Optimal Performance:

2-position 3-way normally open valve

Two, 2-Position 3-Way Normally Open valves directly plumbed to the PrecisionAire actuator ports is the preferred method of valving and is recommended for vertical and long stroke applications.

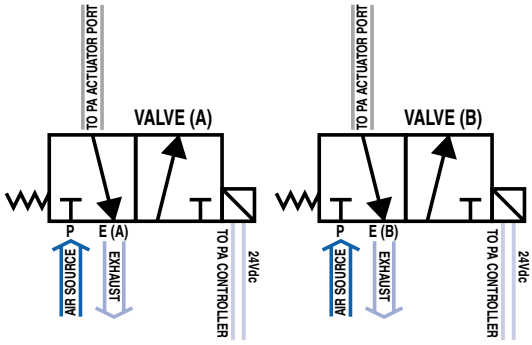


Alternate Valving:

(WILL REDUCE SYSTEM PERFORMANCE)

2-position 3-way normally closed valve

Two, 2-Position 3-Way Normally Closed valves directly plumbed to the PrecisionAire actuator port is a valving alternative.



VERTICAL APPLICATIONS

For vertical applications, a dual pressure system must be used. Two separate external pressure regulators (or valves with a sub-base mounted pressure regulator) are required to provide a dual pressure system to the actuator for optimal performance. The brake end of the PrecisionAire™ actuator must be mounted at the top.

CAUTION: Do NOT use relays or PLC outputs to control ac Pilot valves.
Valves piloted by 24Vdc coils are required for PrecisionAire™ systems.

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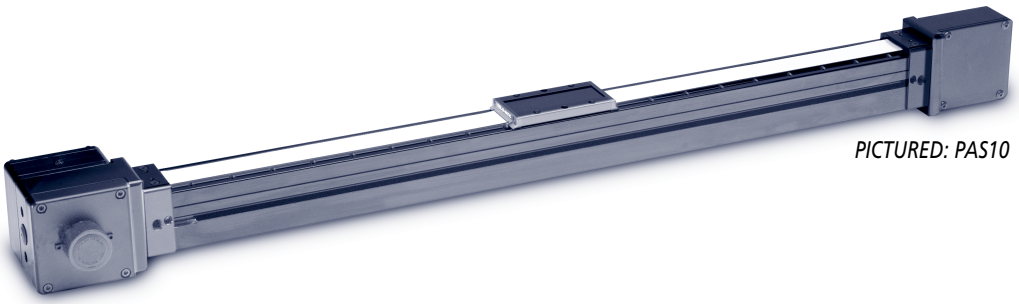


PICTURED: PAS10

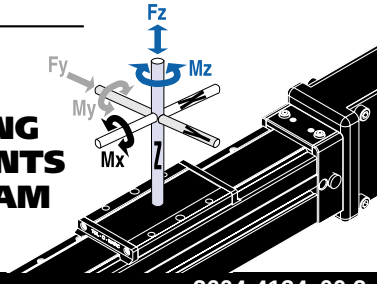
ACTUATOR SPECIFICATIONS:

	PAS10	PAS15
Base Weight (including carrier)	14.82 lbs.	23 lbs.
Weight per inch of stroke	0.308 lbs.	0.504 lbs.
Maximum Stroke Length	17' 2"	16' 11"
Maximum Speed	100"/sec.	100"/sec.
Dead Length	15.7" (pg. 8)	22.64" (pg. 9)
Maximum Load at Maximum Speed	75 lbs. @ max. speed of 100 in./sec.	150 lbs. @ max. speed of 100 in./sec.
Positional Repeatability*	± 0.010"	± 0.010"
Velocity Control	±10% of commanded	±10% of commanded
Operating Temperature	32°F to 104°F	32°F to 104°F
Recommended Belt Tension	60 lbs.	122 lbs.
Maximum Air Pressure**	100 PSI	100 PSI
Breakaway Pressure	25 PSI	20 PSI
MAXIMUM LOAD		
Fz	591 lbs.	1,454 lbs.
Fy	341 lbs.	840 lbs.
MAXIMUM BENDING MOMENTS		
Mx	250 in.-lbs.	859 in.-lbs.
My	269 in.-lbs.	1033 in.-lbs.
Mz	156 in.-lbs.	596 in.-lbs.
Pulley Pitch Dia.	1.88 in.	2.506 in.
Belt Width	0.75 in.	1.00 in.
Tube Material	Black anodized extruded aluminum	
Mounting Surface	Bottom and both sides, not top or ends	
Belt Material	High strength poly-steel	
Load Support	Carrier and ball bearing system supports load, piston and belt independent	

***NOTE: For stroke lengths greater than 120" see Repeatability Tolerance Graph, page 1**

****NOTE: Regulate air pressure to less than 10 PSI above pressure required for desired speed or force.**

BENDING MOMENTS DIAGRAM



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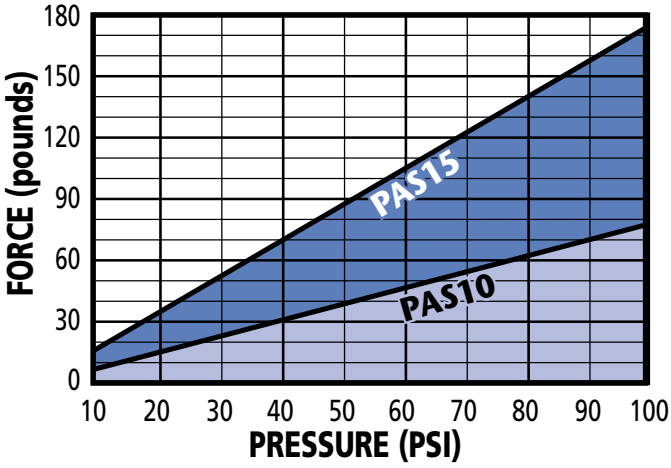
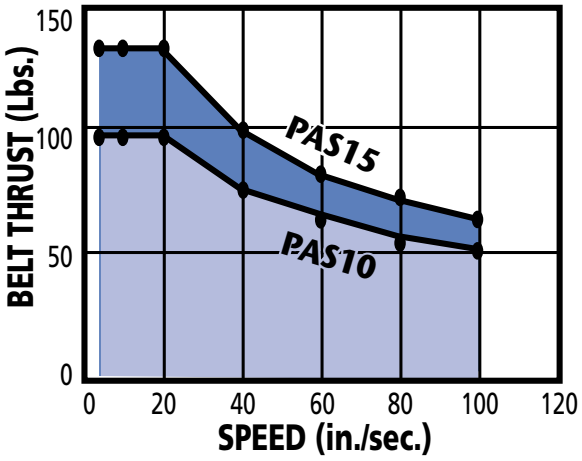
ACTUATOR PERFORMANCE

THEORETICAL FORCE vs PRESSURE

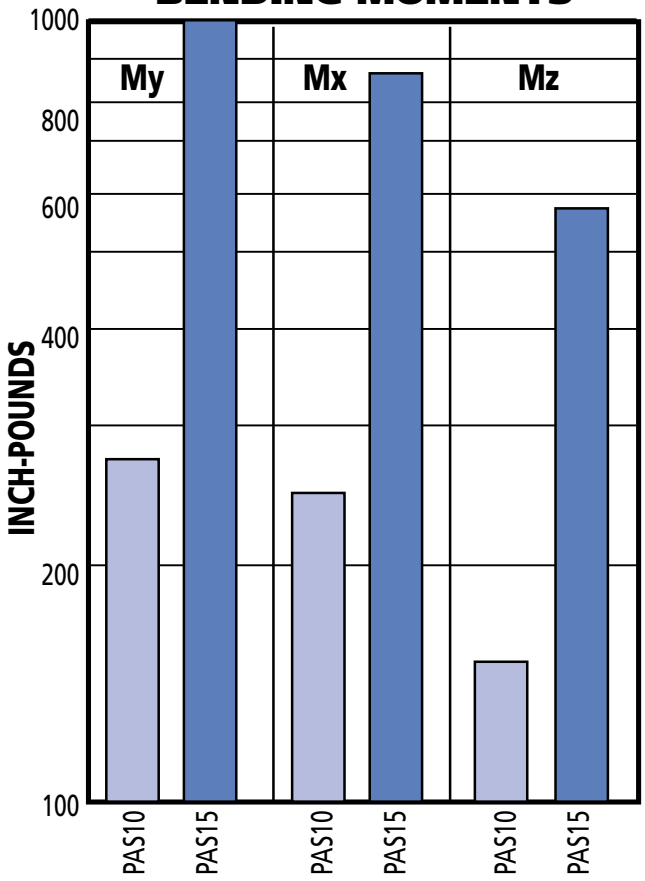


USEABLE BELT THRUST CAPACITY*

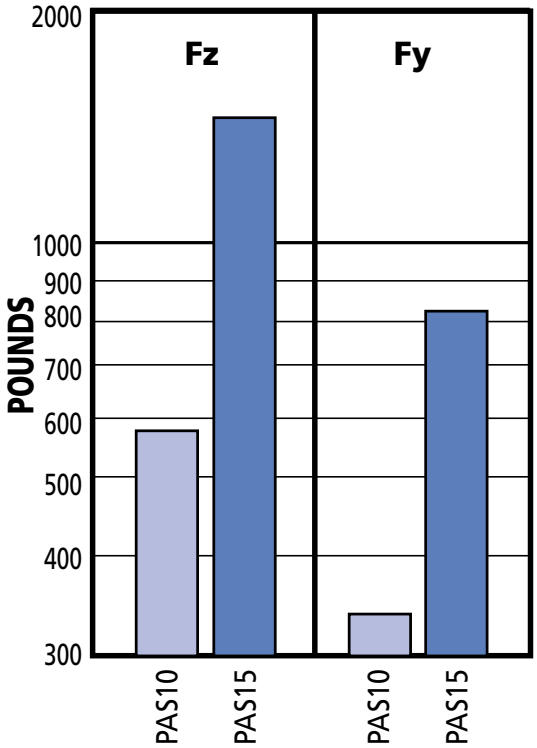


*NOTE: Belt Thrust Capacity is only a factor in deceleration, not acceleration; Use Sizing & Selection software, available at www.tolomatic.com

BENDING MOMENTS

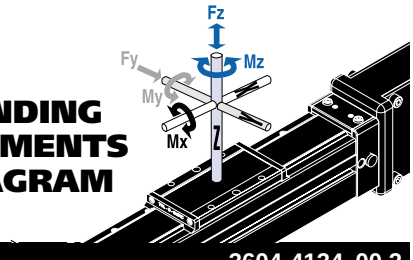


LOAD**



**NOTE: Speed and programmed position parameters will affect maximum load capacities; Use Sizing & Selection software, available at www.tolomatic.com

BENDING MOMENTS DIAGRAM



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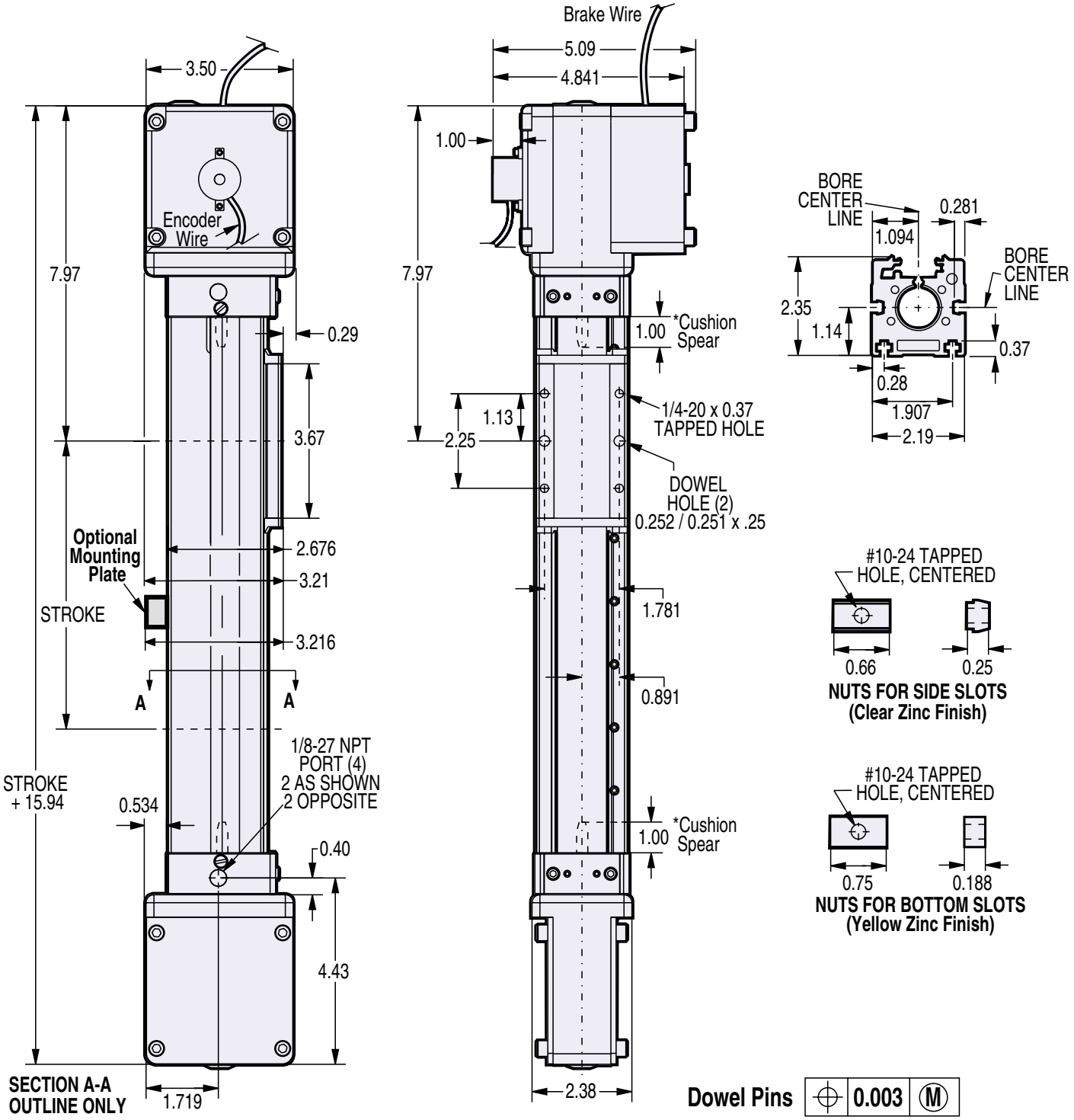
DIMENSIONAL DATA - PAS10



Dowel Pins ⌖ 0.003 Ⓜ

Dimension in inches

*NOTE: SERVO POSITIONING WITHIN CUSHION REGION IS NOT RECOMMENDED PLEASE ADD AN ADDITIONAL 2.0" TO WORKING STROKE.

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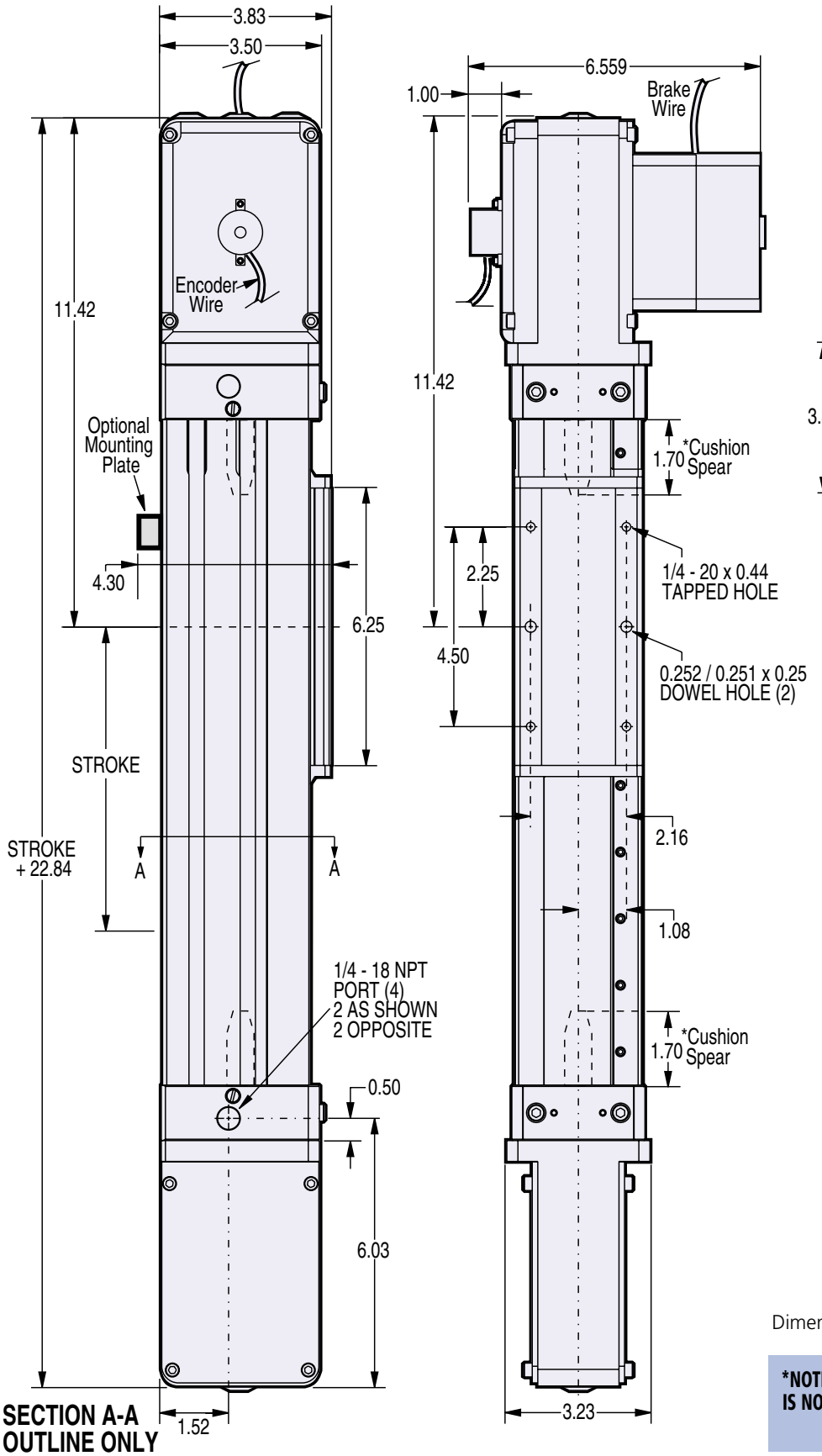
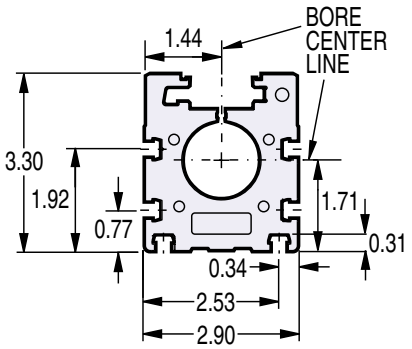
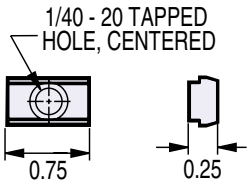
DIMENSIONAL DATA - PAS15







NUTS FOR SLOTS

Dowel Pins

⌖	0.003	Ⓜ

Dimension in inches

*NOTE: SERVO POSITIONING WITHIN CUSHION REGION IS NOT RECOMMENDED PLEASE ADD AN ADDITIONAL 3.4" TO WORKING STROKE.

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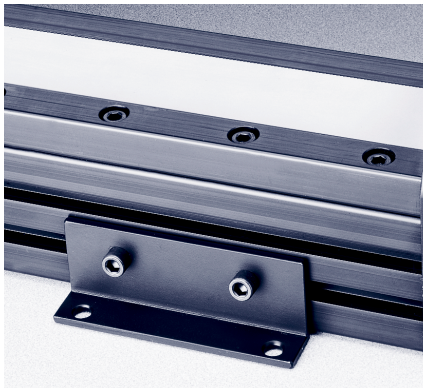
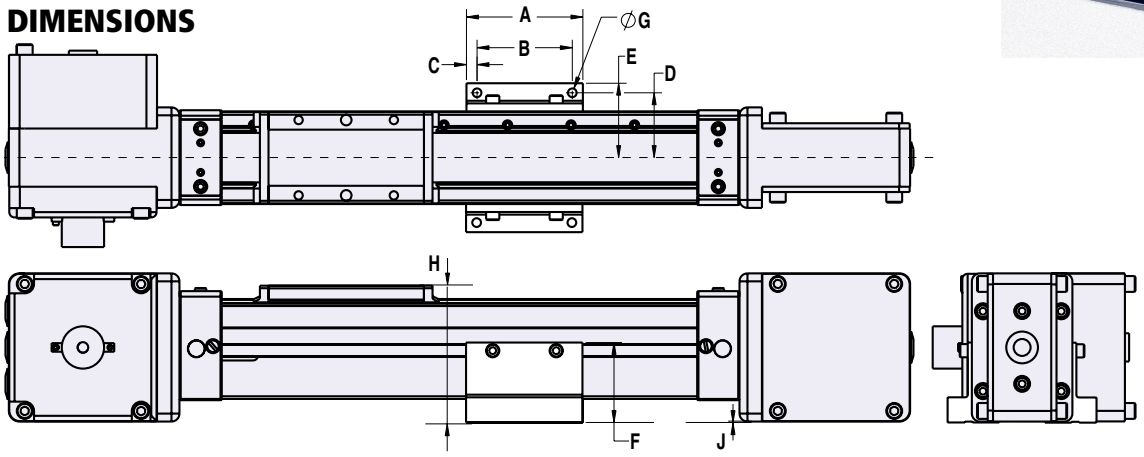
TUBE SUPPORTS

For intermediate support, Optional Tube Supports or Mounting Plates can be mounted to the PrecisionAire™ actuator. The placement and quantity of tube support brackets or mounting plates depends on the overall length of the actuator and the total weight being moved and supported. Refer to the tube support data chart below or use Tol-O-Motion Sizing & Selection software, available at www.tolomatic.com.



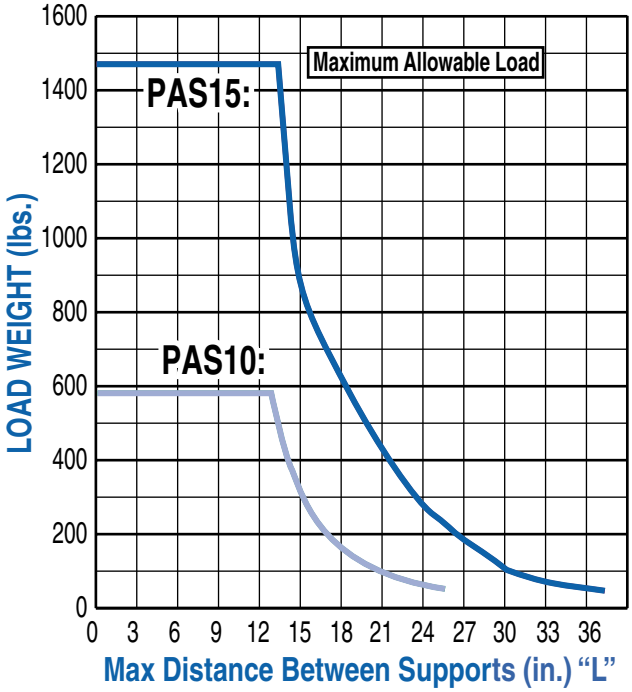
DIMENSIONS

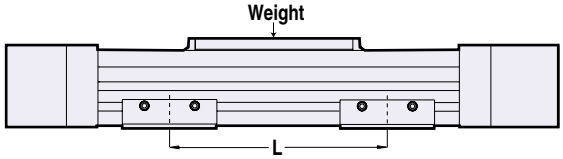


	KIT #	BORE	A	B	C	D	E	F	G	H	J
PAS10	3410-9309	1.00	2.75	2.250	0.25	1.53	1.76	1.89	0.206	3.222	0.040
PAS15	3415-9006	1.50	3.75	3.000	0.38	1.97	2.19	1.16	0.266	3.948	0.040

ABOVE DIMENSIONS IN INCHES

TUBE SUPPORT REQUIREMENTS





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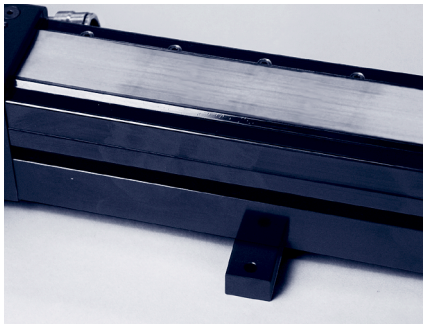
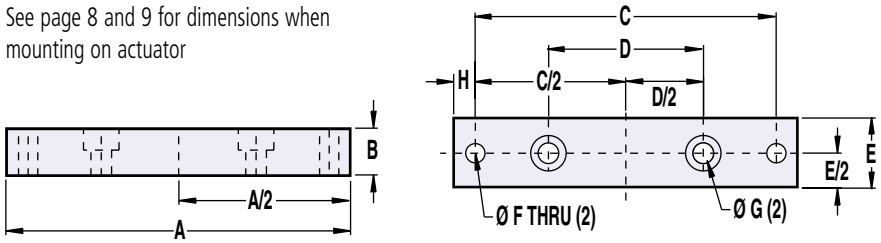
MOUNTING PLATES

Optional Mounting Plates provide clearance height for the head assemblies when mounting on a flush surface. They can be mounted directly to T-Nuts on the actuator's underside, for top mounting access. Kit includes plate, T-nuts and mounting screws.



DIMENSIONS

See page 8 and 9 for dimensions when mounting on actuator

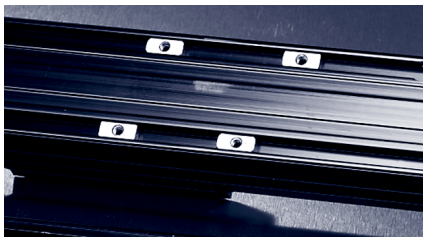


	BORE	KIT #	A	B	C	D	E	F	G	H
PAS10	1.00	3410-9312	3.52	0.54	3.060	1.656	0.750	0.206	Ø .221 Thru. C Bore Ø .38 x 0.22 Dp.	0.23
PAS15	1.50	3415-9056	4.380	0.50	3.942	2.188	0.750	0.266	Ø .281 Thru. C Bore Ø .44 x 0.22 Dp.	0.22

DIMENSIONS IN INCHES

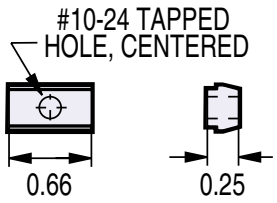
T-NUTS

All PrecisionAire™ actuators are provided with T-Nuts for use in the T-slots running the length of the bottom of the cylinder. Four T-Nuts for the first 24 inches of stroke are standard. Two nuts are provided for each additional 20 inches of stroke.

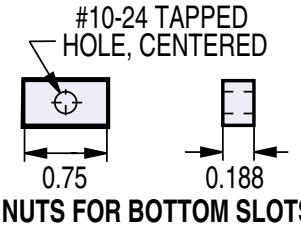


DIMENSIONS

PAS10

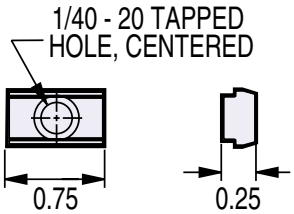


NUTS FOR SIDE SLOTS
(Clear Zinc Finish)



NUTS FOR BOTTOM SLOTS
(Yellow Zinc Finish)

PAS15



NUTS FOR SLOTS

Dimension in inches

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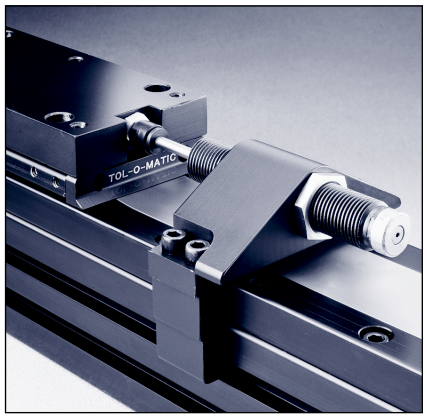
SHOCK ABSORBERS

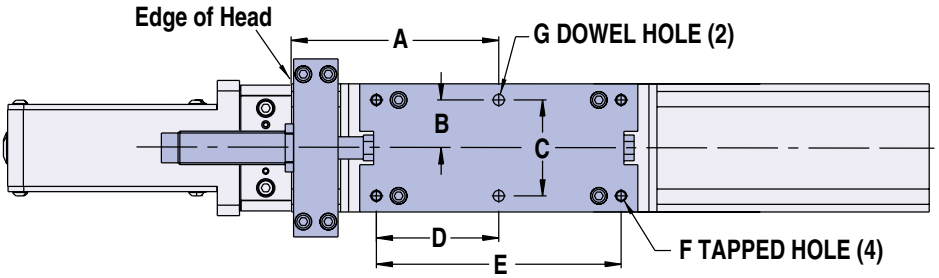
- Adjustable to any point along actuator
- Minimizes hardware damage if software defaults are overridden
- Installed on home (non-brake) end of actuator as default location
- Requires shock stop plate (see dimensions below)
- Life expectancy 1-2 million cycles

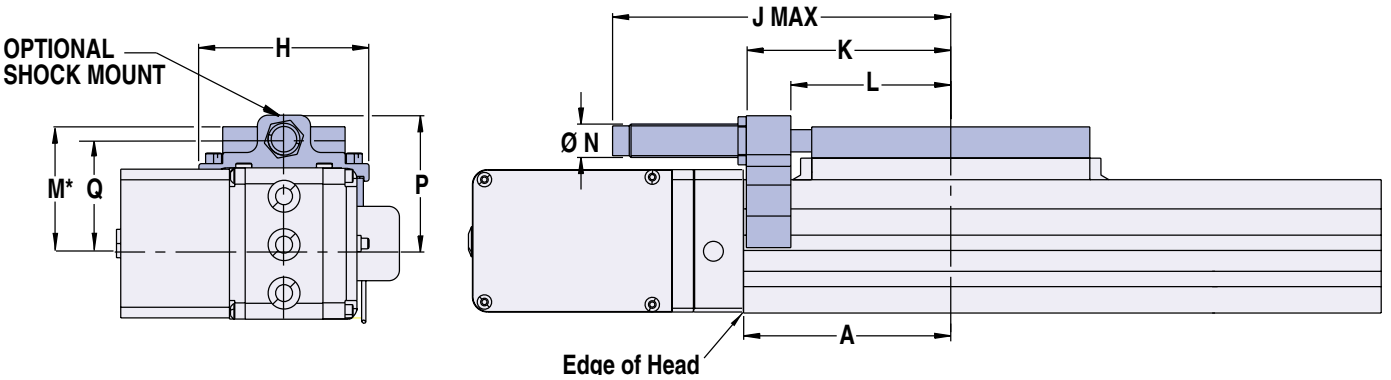
Required for applications that exceed these load values:
PAS10 > 60 lbs.
PAS15 > 150 lbs.



SHOCK ABSORBER ON PAS15

DIMENSIONS





DIMENSIONS - ADJUSTABLE STYLE SHOCK

MODEL	BORE	A	B	C	D	E	F	G**	H	J	K	L	M	N	P	Q
PAS10	1.0	2.94	.890	1.781	1.562	3.125	1/4-20 x .50DP	.252-.251 x .25	3.09	5.47	2.91	2.22	2.223	.50	2.46	1.964
PAS15	1.5	4.66	1.078	2.156	2.750	5.500	1/4-20 x .50DP	.252-.251 x .25	4.00	7.60	4.59	3.59	2.812	ø.75	3.06	2.495

DIMENSIONS IN INCHES

**DOWEL PINS ⌖ .003 Ⓜ

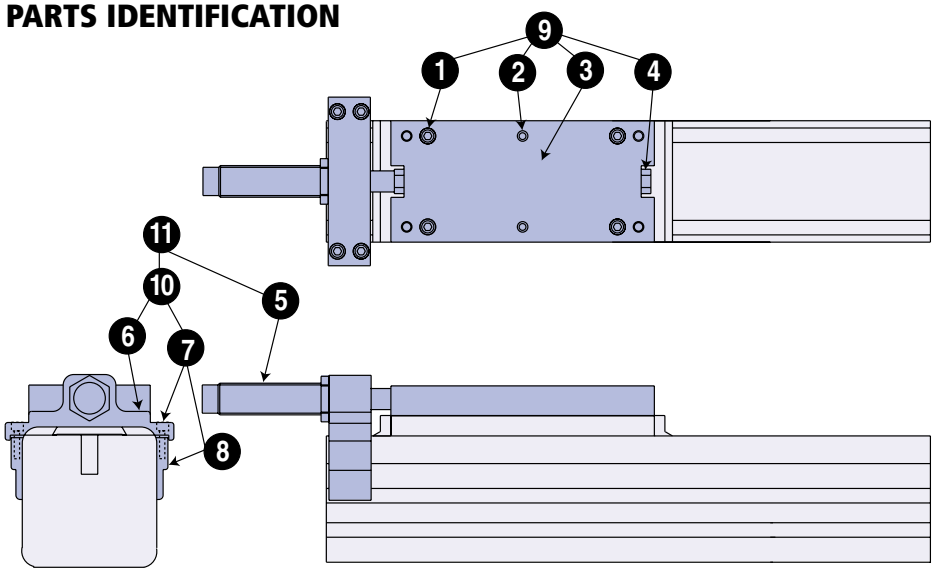
***NOTE: Shock Stop Plate will increase carrier height (M)**

Visit www.tolomatic.com to get the most up-to-date CAD files.

Product discontinued January 01, 2006:
PAS-PrecisionAire
Contact Tol-O-Matic for repair parts

SHOCK ABSORBERS

PARTS IDENTIFICATION



[1]NOTE: Shock Mount Kits are available with mounting hardware and heavy duty shock or with mounting hardware only.

Shock Stop Plate Kits are sold separately.

One Shock Stop Plate Kit is required per cylinder.

For field retrofitting PAS actuators with shock absorbers, please see below or page 17 for field retrofit packages and part numbers.

PARTS LISTING

		PAS10	PAS15
❶	Cap Screw	1004-1064	1004-1064
❷	Dowel Pin	0610-1044	0610-1044
❸	Shock Plate	3410-1039	3415-1039
❹	Impact Bolt	3410-1041	3415-1057
❺	Heavy Duty Shock	2406-1062	0912-1068
❻	Shock Mount	3410-1037	3415-1037
❼	Cap Screw	0910-1314	1004-1064
❽	Clamp Hook	3410-1038	3415-1038
❾	Shock Stop Plate Kit	3410-9004	3415-9004
❿	Shock Mount Kit w/o Shock	3410-9003	3415-9003
⓫	[2] Shock Mount kit w/HD Shock	3410-9013	3415-9013

[2]NOTE: Includes all mounting hardware for 1 shock.

NOTE: No extra stroke is required with shock absorbers.

NOTE: Internal cushions are standard -
Servo positioning within cushion region is not recommended.
Cushion area - PAS10: 1.0", PAS15: 1.7" on each end.

PRECISIONAIRE™ OPTIONS

SWITCHES

Commonly used for end-of-stroke signalling to programmable controllers, these switches are activated by the PrecisionAire's internal magnet.

If necessary to remove factory installed switches, be sure to reinstall on the same of side of actuator with scored face of switch toward internal magnet.

Switches contain reverse polarity protection. Switch cable is **unshielded** for switches that DO NOT incorporate the quick-disconnect feature. Switches with quick-disconnect coupler feature have **shielded** cable from the female quick-disconnect coupler to the flying leads. Shield should be terminated at flying lead end.

**QUICK-DISCONNECT COUPLERS SPEED INSTALLATION*

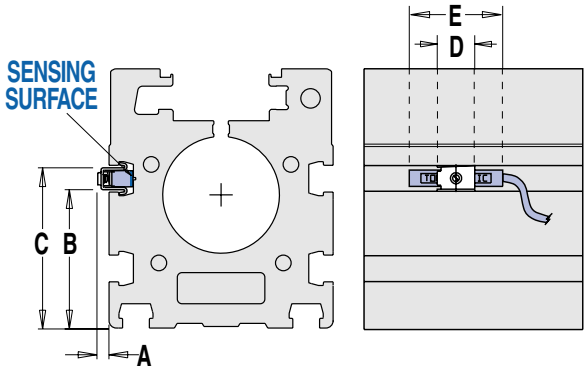
DC REED SWITCHES

These are mechanical switches designed for signalling position to devices such as programmable logic controllers.

DC HALL-EFFECT SWITCHES

Available in either sinking type (NPN), or sourcing type (PNP). They are designed to signal devices such as programmable controllers, dc loads, and TTL or CMOS circuits.

DIMENSIONAL DATA



Model	A	B	C	D	E
PAS10	0.194	0.822	0.906	0.500	1.250
PAS15	0.160	1.428	1.721	0.500	1.250

DIMENSIONS IN INCHES

***NOTE: 197" (5m) length, quick-disconnect coupler is positioned 6" from the sensor**

NOTE: The scored face of the switch indicates the sensing surface and must face toward the magnet.

NOTE: The notched groove in the actuator indicates the side with the magnet. Contact Tol-O-Matic if switches are required on both sides of actuator.

CAUTION: DO NOT OVER TIGHTEN SWITCH HARDWARE WHEN INSTALLING!

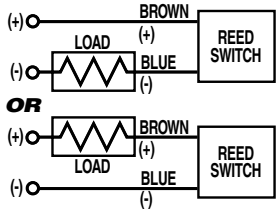
Product discontinued January 01, 2006:
PAS-PrecisionAire
Contact Tol-O-Matic for repair parts

SWITCHES

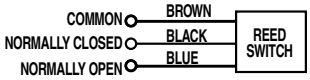
DC REED SWITCH PERFORMANCE DATA

SPECIFICATIONS		
RESISTANCE	0.1 Ω INITIAL (MAXIMUM)	
RELEASE TIME	1.0 MSEC. MAXIMUM	
OPERATING TEMP.	-40° F (-40 C) TO 158° F (70° C)	
CABLE MINIMUM BEND RADIUS	**5M CABLE WITH PVC JACKET:** 0.630" STATIC, DYNAMIC NOT RECOMMENDED **5M QUICK-DISCONNECT STYLE CABLE WITH PVC JACKET:** 0.630" STATIC, 1.260" DYNAMIC	
LIFE EXPECTANCY	UP TO 200,000,000 CYCLES (DEPENDING ON LOAD CURRENT, DUTY CYCLE AND ENVIRONMENTAL CONDITIONS)	
	FORM A	**FORM C**
CONTACTS	SINGLE-POLE, SINGLE-THROW, NORMALLY-OPEN	SINGLE-POLE, DOUBLE-THROW, NORMALLY-OPEN / NORMALLY-CLOSED
CONTACT RATING	10 WATTS, MAXIMUM CURRENT 500MA (NOT TO EXCEED 10VA) (REFER TO TEMPERATURE VS. CURRENT AND VOLTAGE DERATING CHARTS.)	3 WATTS, MAXIMUM CURRENT 250MA (NOT TO EXCEED 3VA) (REFER TO TEMPERATURE VS. CURRENT AND VOLTAGE DERATING CHARTS.)
VOLTAGE DROP	2.6V TYPICAL @ 100MA	NA
INPUT VOLTAGE	200VDC MAXIMUM	120VDC MAXIMUM
OPERATING TIME	0.6 MSEC. MAXIMUM (INCLUDING BOUNCE)	0.7 MSEC. MAXIMUM (INCLUDING BOUNCE)
INDICATOR	RED LED LIT WHEN 4MA MIN. (AT 24V) FLOWS THROUGH CONTACTS	NONE

REED SWITCH, FORM A WIRING DIAGRAM



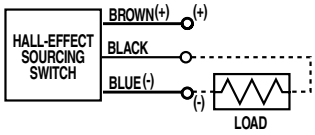
REED SWITCH, FORM C WIRING DIAGRAM



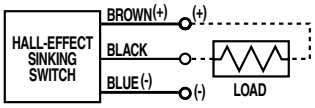
DC HALL-EFFECT SOURCING AND SINKING SWITCH PERFORMANCE DATA

SPECIFICATIONS	
INPUT VOLTAGE	5 TO 25VDC
OUTPUT	OPEN COLLECTOR TRANSISTOR SWITCH
OUTPUT RATING	25VDC, 200MA DC
ON TRIP POINT	150 GAUSS MAXIMUM
OFF TRIP POINT	40 GAUSS MINIMUM
OPERATING TEMP.	0° F (-18 C) TO 150° F (66° C)
OPERATING SPEED	<10 MICRO SEC..
INDICATOR	RED LED LIT WHEN SENSOR IS ACTIVATED
CABLE MINIMUM BEND RADIUS	**5M CABLE WITH PVC JACKET:** 0.630" STATIC, DYNAMIC NOT RECOMMENDED **5M QUICK-DISCONNECT STYLE CABLE WITH PVC JACKET:** 0.630" STATIC, 1.260" DYNAMIC

HALL-EFFECT SOURCING SWITCH WIRING DIAGRAM



HALL-EFFECT SINKING SWITCH WIRING DIAGRAM



PRECISIONAIRE™ ORDERING

The example below describes a 1" bore PrecisionAire™ system. Stroke length is 83-1/8". Options desired include 6 Mounting Plates, Keypad & LCD Display for the Controller, RS232 Cable and 3 Hall-effect Sinking Switches, with 5 meter quick-disconnect leads.

Boxes represent the number of fields available for each section and not all of them will be used in every application. Omit empty boxes when you construct your configurator number (placeholders are not required).
For the example, the order string would appear as follows: **PAS10SK83.125MP6KPCRZKM3**

OPTIONS

PAS|10|SK83.125|MP6|___|KP|CRZ|___|___|KM3

MODEL TYPE - pg. 6
- **PAS** = PrecisionAire™ System

BORE SIZE - pg. 6
- **10** = 1.00 inch
- **15** = 1.50 inch

STROKE LENGTH*
- **SK_ _ _** = (Enter desired stroke length in decimal inches)

MOUNTING PLATES - pg. 11
- **MP_** = Mounting Plates (Enter desired number of Mounting Plates)

TUBE SUPPORTS - pg. 10
- **TS_** = Tube Supports (Enter desired number of Tube Supports)

CONTROLLER WITH KEYPAD & LCD DISPLAY - pg. 2
- **KP** = Enter if Controller with Keypad & LCD Display is desired

RS232 CABLE
- **CRZ** = Enter if RS232 cable is desired (used to download programs from computer to PrecisionAire™ Controller)

T-NUT OPTION - pg. 11
- **TN_** = T-Nuts (Enter desired number of T-Nuts) minimum of 4 nuts included

SHOCK ABSORBER OPTION** - pg. 12
- **AH** = AH Standard Shock, Heavy Duty
- **AD** = AD Standard Shock, Hardware Only

SWITCHES - pg. 14
- **RM** = Reed Switch (Form A) with 5-meter lead, Quick Disconnect Coupler (Q-D), and quantity desired
- **RT** = Reed Switch (Form A) with 5-meter lead, and quantity desired
- **BM** = Reed Switch (Form C) with 5-meter lead, Q-D, and quantity desired
- **BT** = Reed Switch (Form C) with 5-meter lead, and quantity desired
- **KM** = Hall-effect Sinking Switch with 5-meter lead, Q-D, and quantity desired
- **KT** = Hall-effect Sinking Switch with 5-meter lead, and quantity desired
- **TM** = Hall-effect Sourcing Switch with 5-meter lead, Q-D, and quantity desired
- **TT** = Hall-effect Sourcing Switch with 5-meter lead, and quantity desired

***NOTE: SERVO POSITIONING WITHIN CUSHION REGION IS NOT RECOMMENDED PLEASE ADD AN ADDITIONAL 2.0" (PAS10) • 3.4" (PAS15) TO WORKING STROKE.**

****NOTE: SHOCK ABSORBER OPTION WILL INCREASE OVERALL HEIGHT OF ACTUATOR SEE PAGE 12**

PRECISIONAIRE™ FIELD RETROFIT ORD

CODE	DESCRIPTION	PAS10	PAS15
MP	Mounting Plates	3410-9312	3415-9056
TS	Tube Supports	3410-9309	3415-9006
AD	Shock Absorber Kit, Hardware Only	3410-9003	3415-9003
AH	Shock Absorber Kit, Heavy Duty	3410-9013	3415-9013
	Shock Stop Plate Kit	3410-9004	3415-9004
KP	Controller with Keypad & LCD Display	3604-9604	3604-9606
	Controller without Keypad & LCD Display	3604-9605	3604-9607
PAS10	Replacement 1" bore Actuator	3410-0301	—
PAS15	Replacement 1-1/2" bore Actuator	—	3415-0301
CRZ	RS232 Cable	3600-1172	3600-1172
TN	T-Nuts Side Slots	3410-1013	3415-1013
TN	T-Nuts Bottom Slots	3410-1775	3415-1013
	Switch Hardware Only	3410-9999	3415-9999

Replacement belt is ordered by part number and stroke length:
PAS10 Belt Part #3410-1744 PAS15 Belt Part #3415-1744

NOTE: BECAUSE OF THE SPECIAL ASSEMBLY PROCEDURES REQUIRED FOR THE PRECISIONAIRE ACTUATOR MANY PARTS CANNOT BE FIELD INSTALLED WITHOUT PROPER ASSEMBLY FIXTURES. SEE PARTS SHEET FOR COMPLETE REPAIR INFORMATION.

DESCRIPTION	PART NUMBER	Switch Kit (Hardware & switch) CODE	DESCRIPTION
Switch Only, Reed, Form C, 5m	3600-9084	BT	Form C, 5m lead
Switch Only, Reed, Form C, Male Conn.	3600-9085	BM	Form C, 5m QD lead
Switch Only, Reed, Form A, 5m	3600-9082	RT	Form A, 5m lead
Switch Only, Reed, Form A, Male Conn.	3600-9083	RM	Form A, 5m QD lead
Switch Only, Hall-effect, Sinking, 5m	3600-9090	KT	Hall-effect, Sinking switch, 5m lead
Switch Only, Hall-effect, Sinking, Male Conn.	3600-9091	KM	Hall-effect, Sinking switch, 5m QD lead
Switch Only, Hall-effect, Sourcing, 5m	3600-9088	TT	Hall-effect, Sourcing switch, 5m lead
Switch Only, Hall-effect, Sourcing, Male Conn.	3600-9089	TM	Hall-effect, Sourcing switch, 5m QD lead
Connector (Female) 5 meter lead	2503-1025		

TO ORDER FIELD RETROFIT SWITCH AND HARDWARE KITS FOR PRECISIONAIRE™ ACTUATORS:

S W | P A S | 1 0 | K M

OPTION - SWITCH - FIELD RETROFIT
SW = Switch

MODEL TYPE
PAS = PrecisionAire™ System

SWITCHES
_ _ = Type of switch needed

BORE SIZE
10 = 1.00 inch bore
15 = 1.50 inch bore

The example above describes field retrofit ordering of a Hall-effect Sinking Switch, quick-disconnect, 5 meter lead, including all mounting hardware for the 1" bore PrecisionAire™.

Configurator code as follows: **SWPAS10KM**

Product discontinued January 01, 2006:
PAS-PrecisionAire
Contact Tol-O-Matic for repair parts

APPLICATION DATA WORKSHEET

Distributor

Name

Distributor Name

Date Time

Phone: Fax:

Customer

Name Title

Company Name

Address

City State Zip

Date Time

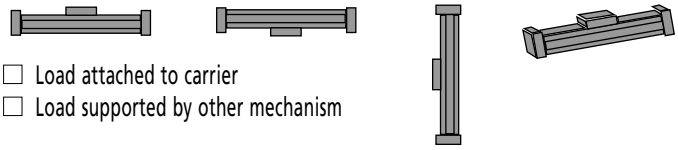
Phone: Fax:

Define Application

Stroke Length (in inches)

MOUNTING ORIENTATION / LOAD ORIENTATION*
*To insure maximum brake life it is recommended that the actuator be mounted in such a way as to keep the brake/encoder shaft parallel to the ground.

☐ Horizontal Up ☐ Horizontal Down ☐ Vertical ☐ Other



☐ Load attached to carrier
☐ Load supported by other mechanism

System Info

PRECISIONAIRE IS A POSITIONING SYSTEM, NOT A MOTION CONTROL SYSTEM

Available Pressure at Application =

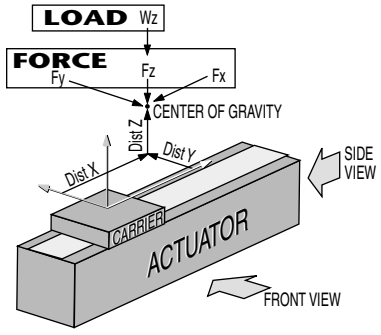
☐ POUNDS PER SQUARE INCH ☐ BARS

SERVOING TO POSITION:

Can application tolerate over shoot? ☐ Yes ☐ No

Is tight control of cylinder speed critical for your application? ☐ Yes ☐ No

Horizontal Mounting



Precision

Repeatability in or mm

Absolute Repeatability in or mm

Resolution in or mm

HOLD POSITION?
☐ After Move ☐ During Power Loss

Life Required

1. Number of Operating Cycles
(Complete Extend / Retract Motion)

per minute per hour

per day per week

Min. Maintenance Interval

LOAD WEIGHT - CENTER OF GRAVITY

☐ INCHES ☐ MM

	To Brake	From Brake ☐ SAME
Dist X=		
Dist Y=		
Dist Z=		
Wz =		

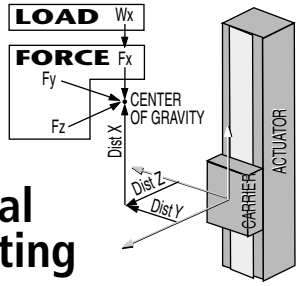
☐ POUNDS ☐ KILOGRAMS

FORCE LOAD

☐ INCHES ☐ MM

	To Brake	From Brake ☐ SAME
Dist X=		
Dist Y=		
Dist Z=		
☐ POUNDS ☐ KILOGRAMS		
Fx=		
Fy=		
Fz=		

Vertical Mounting



LOAD WEIGHT - CENTER OF GRAVITY

☐ INCHES ☐ MM

	Up Move	Down Move ☐ SAME
Dist X=		
Dist Y=		
Dist Z=		
Wz =		

☐ POUNDS ☐ KILOGRAMS

FORCE LOAD

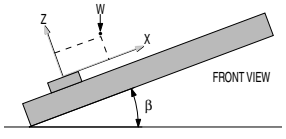
☐ INCHES ☐ MM

	Up Move	Down Move ☐ SAME
Dist X=		
Dist Y=		
Dist Z=		
☐ POUNDS ☐ KILOGRAMS		
Fx=		
Fy=		
Fz=		

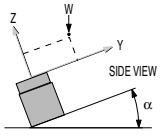
Incline or Custom Mounting*

*To insure maximum brake life it is recommended that the actuator be mounted in such a way as to keep the brake/encoder shaft parallel to the ground.

(Use Horizontal Mounting chart for force and load weight data)



Angle β



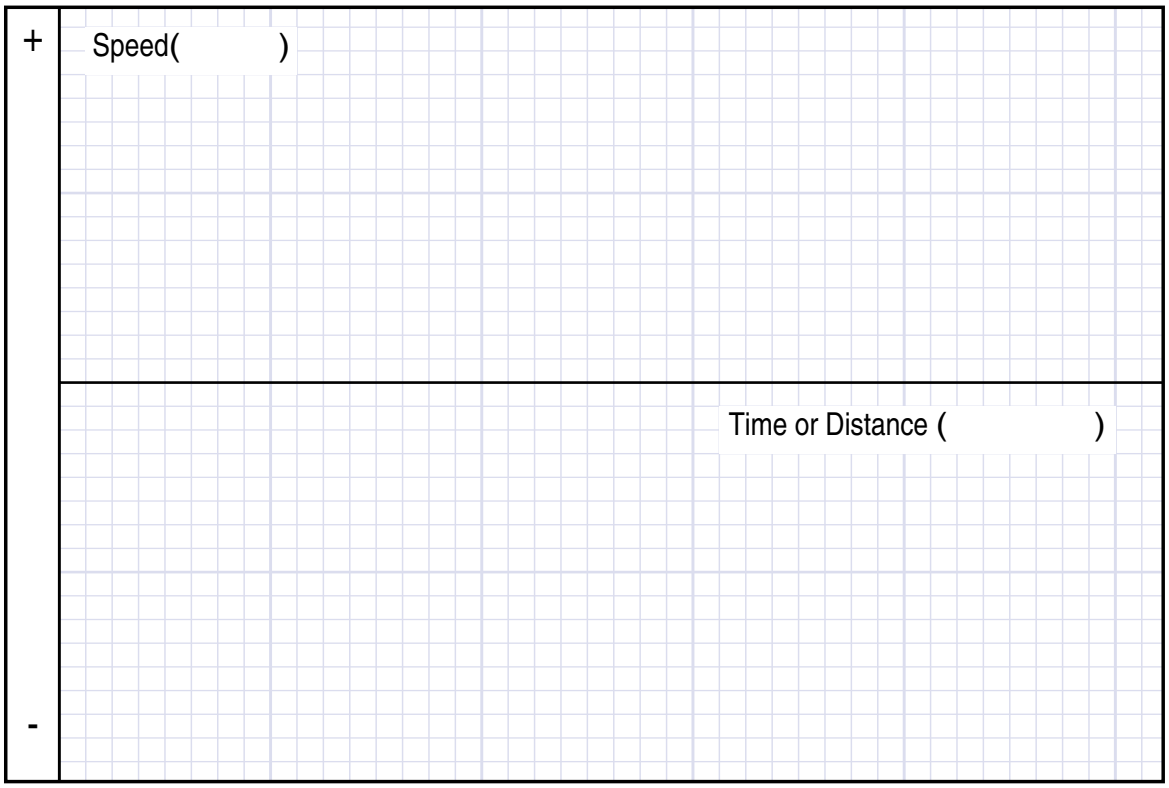
Angle α

FAX TO TOL-O-MATIC, INC. 763-478-8080

APPLICATION DATA WORKSHEET

Motion Profile

Graph your most demanding cycle, include accel/decel, velocity and dwell times. You may also want to indicate load variations and I/O changes during the cycle. Label axes with proper scale and units.



Move Profile

MOTION PROFILE

Move Distance _____ in or mm

Move Time _____ sec

Max. Speed _____ in/sec or mm/sec

Dwell Time After Move _____

TIME FOR POSITIONING:

Can the application allow for positioning time at each move? ☐ Yes ☐ No

ORIENTATION AND WEIGHT	PAS10	PAS15
Horizontal, Light Load < 40 lb.	Up to 1 Second	
Horizontal, Heavy Load > 40 lb.	Up to 2 Seconds	
Horizontal, Light Load < 80 lb.		Up to 1 Second
Horizontal, Heavy Load > 80 lb.		Up to 2 Seconds
Vertical, Light Load < 20 lb.	Up to 1 Second	
Vertical, Heavy Load > 20 lb.	Up to 2 Seconds	
Vertical, Light Load < 40 lb.		Up to 1 Second
Vertical, Heavy Load > 40 lb.		Up to 2 Seconds

Will any application moves be less than 5" per second? ☐ Yes ☐ No

Can application tolerate time variances (up to 2 sec.) in cycle time? ☐ Yes ☐ No

Input I/O

LIST DESCRIPTION (Sensors, Switches) and SIGNAL CHARACTERISTICS (TTL, Analog)

Output I/O

LIST DESCRIPTION (Sensors, Switches) and SIGNAL CHARACTERISTICS (TTL, Analog)

Actuator

SERIES

☐ 10 (1" Bore) ☐ 15 (1-1/2"Bore)

Interface

CONTROLLER

☐ Without Keypad and LCD
☐ WITH Keypad and LCD

☐ STAND ALONE
HOST: ☐ Computer
☐ PLC
☐ Other:

Operating Environment

TEMPERATURE

☐ FAHRENHEIT ☐ CELSIUS

TYPE OF PARTICLES IN AIR

OTHER

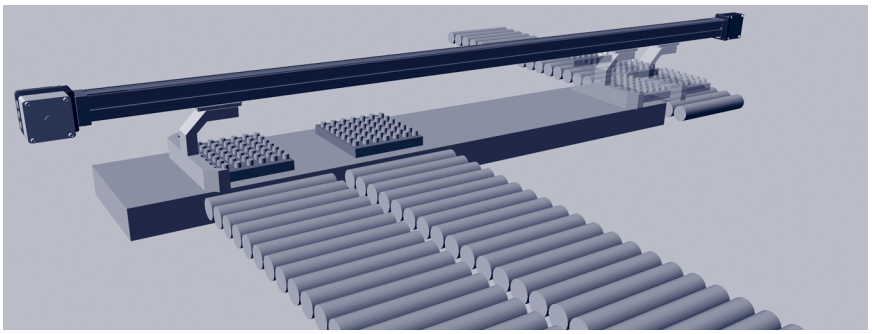
Hazardous Factors or Contributing Factors

FAX TO TOL-O-MATIC, INC. 763-478-8080

Recommended applications:

- Welding
- Dispensing
- Pick and Place
- Assembly
- Stencil
- Packaging
- Sorting
- Cut to length
- Part transfer

CONVEYOR TRANSFER



Application Description:

A manufacturer of ammunition needs to move plates loaded with primers from a double width conveyor to a single width conveyor. The actuator will need to stop at partial stroke and allow the first plate to begin down the conveyor before loading the second plate.

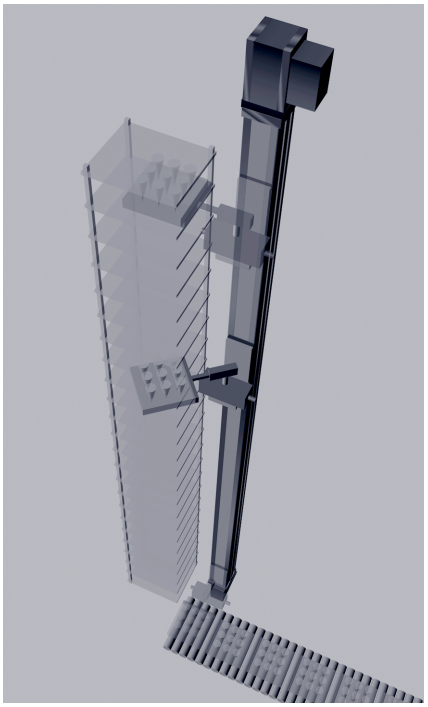
Application Requirements:

Repeatability:	0.1"
Duty cycle:	250 cycles per shift (115 seconds per cycle)
Load:	6 to 8 pounds per plate, pushing 2 plates per cycle
Available air pressure:	50 PSI
Stroke length:	32 to 40 inches

Tol-O-Matic Solution:

This application uses a PrecisionAire™ PAS10 actuator with a keypad controller. Program was set up on a laptop computer and downloaded to the controller allowing the users in the plant to make adjustments for differing plate sizes.

STORAGE SYSTEM



Application Description:

A pharmaceutical research and development facility is developing a cold storage racking system for moving trays of test product through different life stages. Trays are held in a rack 8 feet high with 24 positions. They need a device that will vertically transfer a tray insertion mechanism at high speed.

Application Requirements:

Repeatability:	+/- 0.2"
System Speed:	40 inches/second
Thrust:	100 lbs.
Available Air Pressure:	100 PSI
Stroke Length:	96 inches
User Interface:	Programming Ease
Position Control:	Programmable

Tol-O-Matic Solution:

This application requires high speed, high thrust, along with safety considerations. A PAS15 was selected because a screw-drive could not achieve the speed required and a belt drive would present some safety issues in a vertical application. The PAS controller's integral programming interface meant a technician could easily change the program for different products without the need of a computer.

TERMS AND CONDITIONS OF SALE

1. **ORDER ACCEPTANCE**. All orders or services are subject to acceptance in Minnesota by the written approval of an authorized official of Tol-O-Matic, Inc.. Any such order shall be subject to these Terms and Conditions of Sale, and acceptance shall be conditioned on Purchaser's assent to such conditions. Purchaser's assent shall be deemed given unless Purchaser shall expressly notify Tol-O-Matic, Inc. in writing to the contrary within five (5) days after receipt of acknowledgment to confirmation of an order.

2. **CANCELLATION AND CHANGES.** No order accepted by Tol-O-Matic, Inc. may be modified in any manner by Purchaser unless agreed to in writing, by an authorized official of Tol-O-Matic, Inc.. Order cancellations, including reductions to order quantities, and changes shall be governed by the following:

   a. Any standard product order scheduled for shipment within five (5) working days of purchaser's request to cancel or modify will be shipped as previously acknowledged and purchaser agrees to accept shipment and payment responsibility, in full, at the price agreed upon.

   b. "Customer Special" orders scheduled for shipment within twenty (20) working days of purchaser's request to cancel or modify will be shipped as previously acknowledged and purchaser agrees to accept shipment and payment responsibility, in full, at the price agreed upon.

   c. All work in connection with "Customer Special" orders, not covered under Paragraph b, will be stopped immediately upon notification, and purchaser agrees to reimburse Tol-O-Matic, Inc. for all work-in-process and any materials or supplies used, or for which commitments have been made by Tol-O-Matic, Inc. in connection therewith.

3. **QUOTATIONS AND PRICES.** Written quotations automatically expire 30 calendar days from the date issued unless terminated sooner by written notice. (Verbal quotations expire, unless accepted in writing, the same day.)

   All published prices and discounts are subject to change without notice. In the event of a net price change, the price of product(s) on order will be the price in effect on the date of order acknowledgment. Any addition to an outstanding order will be accepted at prices in effect when the addition is made.

4. **MINIMUM BILLING.** Orders amounting to less than $35.00 net will be billed at $35.00

5. **TAXES.** Any Manufacturer's Tax, Retailers Occupation Tax, Use Tax, Sales Tax, Excise Tax, Duty, Customer, Inspection or Testing Fee, or any other tax, fee or charge of any nature whatsoever, imposed by any government authority, on or measured by any transactions between Tol-O-Matic, Inc. and Purchaser shall be paid by the Purchaser in addition to the prices quoted or involved. In the event Tol-O-Matic, Inc. shall be required to pay any such tax, fee or charge, Purchaser shall reimburse therefore.

6. **TERMS OF PAYMENT.** Net invoice amount is due within 30 days from date of invoice subject to credit approval. A 2% per month service charge shall apply to all invoices not paid within 30 days. All clerical errors are subject to correction. Any invoice in not paid within 60 days will subject that account to an immediate shipping hold.

7. **F.O.B. POINT.** All sales are F.O.B. Tol-O-Matic, Inc.'s facility in Hamel, Minnesota, unless quoted otherwise.

8. **DELIVERY.** Delivery of product(s) by Tol-O-Matic, Inc. to a carrier shall constitute delivery to Purchaser, and regardless of freight payment, title and all risk or loss or damage in transit shall pass to Purchaser at that time.

   Should shipment be held beyond scheduled date, upon request of Purchaser, product will be billed and Purchaser agrees to accept any charges for warehousing, trucking and other expenses as may be incident to such delay.

   Great care is taken by Tol-O-Matic, Inc. in crating its product. Tol-O-Matic, Inc. cannot be held responsible for breakage after having received "In Good Order" receipts from the transporting carrier. All claims for loss and damage must be made by Purchaser to the carrier within 14 days from receipt of goods. Tol-O-Matic, Inc. will assist insofar as practical in securing satisfactory adjustment of such claims wherever possible.

   Claims for shortages or other errors must be made, in writing, within ten (10) days to Tol-O-Matic, Inc. and any additional expense of the method or route of shipment specified by Purchaser shall be borne by the Purchaser.

9. **SHIPPING SCHEDULES**. All quoted shipping schedules are approximate and will depend upon prompt receipt from Purchaser of confirming copy of Purchase Order. Dimensional drawings and specifications submitted by Tol-O-Matic, Inc. to Purchaser for approval must be returned to Tol-O-Matic, Inc. within 10 working days, with approval granted, and any exceptions noted, in order to avoid delay in manufacturing schedules.

   Orders which include penalty clauses for failure to meet shipping schedules will not be acceptable, except in those cases specifically approved in writing by the General Manager of Tol-O-Matic, Inc..

   Tol-O-Matic, Inc. shall not be liable for damage as a result of any delay due to any cause beyond Tol-O-Matic, Inc.'s reasonable control, including, without limitation, an Act of Nature; act of Purchaser; embargo, or other government act, regulation or request; fire; accident; strike; slow down; war; riot; flood; delay in transportation; and inability to obtain necessary labor, materials or manufacturing facilities. In the event of any such delay, the date of delivery shall be extended for a period equal to the time loss by reason of the delay. The acceptance of the product when delivered shall constitute a waiver of all claims for damages caused by any such delays.

10. **RETURN OF PRODUCT.** No product may be returned without first obtaining a Return Goods Authorization form and confirming memorandum from Tol-O-Matic, Inc.. Product, if accepted for credit, shall be subject to a minimum service charge of 35% of the invoice price and all transportation charges shall be prepaid by the Purchaser; however, assembled products classified as "special," such as Cable Cylinders and other products which have been modified or built as "Customer Specials," are not returnable to Tol-O-Matic, Inc..

11. **WARRANTY**. TOL-O-MATIC, INC., WARRANTS PRODUCT MANUFACTURED BY IT TO BE FREE FROM DEFECTS IN MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM DATE OF SHIPMENT BY TOL-O-MATIC, INC.. IF WITHIN SUCH PERIOD ANY SUCH PRODUCT SHALL BE PROVED TO TOL-O-MATIC, INC.'S SATISFACTION TO BE SO DEFECTIVE, SUCH PRODUCT SHALL EITHER BE REPAIRED OR REPLACED AT TOL-O-MATIC, INC.'S OPTION.

    THIS WARRANTY SHALL NOT APPLY:

    a. TO PRODUCT NOT MANUFACTURED BY TOL-O-MATIC, INC. WITH RESPECT TO PRODUCT NOT MANUFACTURED BY TOL-O-MATIC, INC.. THE WARRANTY OBLIGATIONS OF TOL-O-MATIC, INC. SHALL IN ALL RESPECTS CONFORM AND BE LIMITED TO THE WARRANTY ACTUALLY EXTENDED TO TOL-O-MATIC, INC. BY ITS SUPPLIER.
    b. TO PRODUCT WHICH SHALL HAVE BEEN REPAIRED OR ALTERED BY PARTIES OTHER THAN TOL-O-MATIC, INC. SO AS, IN TOL-O-MATIC, INC.'s JUDGMENT, TO AFFECT THE SAME ADVERSELY, OR
    c. TO PRODUCT WHICH SHALL HAVE BEEN SUBJECT TO NEGLIGENCE, ACCIDENT, OR DAMAGE BY CIRCUMSTANCES BEYOND THE CONTROL OF TOL-O-MATIC, INC. OR TO IMPROPER OPERATION MAINTENANCE OR STORAGE, OR TO OTHER THAN NORMAL USE AND SERVICE.

    THE FOREGOING WARRANTIES ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS AND IMPLIED WARRANTIES WHATSOEVER, INCLUDING BUT NOT LIMITED TO IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, TOL-O-MATIC, INC. SHALL NOT BE SUBJECT TO ANY OTHER OBLIGATIONS OR LIABILITIES WHATSOEVER WITH RESPECT TO PRODUCT MANUFACTURED OR SUPPLIED BY TOL-O-MATIC, INC. OR SERVICE RENDERED BY IT.

12. **CONSEQUENTIAL DAMAGE.** Tol-O-Matic, Inc., shall not, under any circumstances be liable for consequential damages.

13. **SERVICE CHARGES**. Should the Purchaser request the service of any erector, demonstrator or service man (except as specifically provided for and included in the price of the product) such service will be rendered at the rate outlined in the schedule of field service charges in effect at the date of request.

Products discontinued August 01, 2006:
SSC, Stepper & Brush Motors-Drives-Controllers, Vane Rotary Actuator

TOL-O-MATIC MAKES PRODUCTS FOR ANYTHING THAT MOVES!

PNEUMATIC

BC2 Band Cylinder
CATALOG NUMBER 9900-4000

PNEUMATIC

BC3 Band Cylinder
CATALOG NUMBER 9900-4000

PNEUMATIC

BC4 Band Cylinder
CATALOG NUMBER 9900-4000

PNEUMATIC

LS Linear Slide
CATALOG NUMBER 9900-4000

PNEUMATIC

MGS Mag. Coupled Slide
CATALOG NUMBER 9900-4000

PNEUMATIC

PB2 Power-Block2 Rod Cylinder Slide
CATALOG NUMBER 9900-4000

PNEUMATIC

PB Power-Block Rod Cylinder Slide
CATALOG NUMBER 9900-4000

PNEUMATIC

HB H-Block Rod Cylinder Slide
CATALOG NUMBER 9900-4000

PNEUMATIC

MG Mag. Coupled Cylinder
CATALOG NUMBER 9900-4000

PNEUMATIC / HYDRAULIC

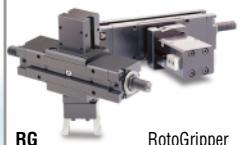
CC Cable Cylinder
CATALOG NUMBER 9900-4000

Products discontinued January 01, 2006:
Adam Clutch, GP-Gripper, HB-H Block, PAS-PrecisionAire, PB-Power Block, RA-Rotary Actuator, RG-Rotogripper

Contact Tol-O-Matic for repair parts

PNEUMATIC

Vane Rotary Actuator
CATALOG NUMBER 9900-4000

PNEUMATIC

RG RotoGripper
CATALOG NUMBER 9900-4000

POWER TRANSMISSION

Caliper Disc Brakes
CATALOG NUMBER 9900-4009

POWER TRANSMISSION

Adam & Disc Cone Clutches
CATALOG NUMBER 9900-4009

POWER TRANSMISSION

Float-A-Shaft Gear Drives
CATALOG NUMBER 9900-4009

AXIDYNE ELECTRIC

BCS Screw-Drive Linear Actuator
CATALOG NUMBER 3600-4609

AXIDYNE ELECTRIC

GSA Guided Screw Actuator
CATALOG NUMBER 3600-4609

AXIDYNE ELECTRIC

B3B Belt-Drive Linear Actuator
CATALOG NUMBER 3600-4609

AXIDYNE ELECTRIC

Controllers. Drives, Interfaces
CATALOG NUMBER 3600-4609

AXIDYNE ELECTRIC

B3S Screw-Drive Linear Actuator
CATALOG NUMBER 3600-4609

AXIDYNE ELECTRIC

RSA Rod Screw Actuator
CATALOG NUMBER 3600-4609

AXIDYNE ELECTRIC

TKS/B TruTrack Linear Actuator
CATALOG NUMBER 3600-4613

AXIDYNE ELECTRIC

MRV, MRS, MRB Motors
CATALOG NUMBER 3600-4609

AXIDYNE ELECTRIC

SLS Screw-Drive Linear Actuator
CATALOG NUMBER 3600-4609

TOL-O-MATIC
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U.S. and Canada
URL: http://www.Tolomatic.com
Email: help@Tolomatic.com

3604-4134_00.2

Product discontinued February 01, 2006:
B3B/M3B Belt Drive Actuator
>>Replaced by B3W/M3W Belt Drive Actuator
SEE brochure 3600-4148<<