



Industrial Devices' TS Series rod-type cylinders are ideally suited for automated motion applications requiring very high load and duty cycle, precise positioning, or full torque at rest with an open loop system. The TS Series can answer a variety of motion control needs, including open or closed loop positioning, simple or very complex motion profiling, PLC or computer interfacing, and multi-operation programs.

As a replacement for troublesome hydraulic and pneumatics, TS Series systems are cleaner and easier to maintain, and are often less expensive.

These rod-type cylinders incorporate a 6 pitch (6 turns per inch) acme screw, or a 1 or 4 pitch ball bearing screw to provide a variety of speed and thrust capabilities with a maintenance free 1.8° hybrid step motor as the mechanical power source. Ball screw models are used in applications that require higher speed and duty cycles. Acme screw models generally perform best in applications with up to 60% duty cycle, and where backdrive is not acceptable. Acme screws also provide faster stopping because of their frictional damping qualities. Because they are self locking, no movement occurs when an external force is applied. The life expectancy of a ball screw is generally better than an acme screw.

Timing belt and gear reductions between the motor and the lead screw further widen the performance

range of TS Series models. Parallel motor mounted models can have many ratios, while in-line models are always direct driven, with the motor directly coupled to the screw.

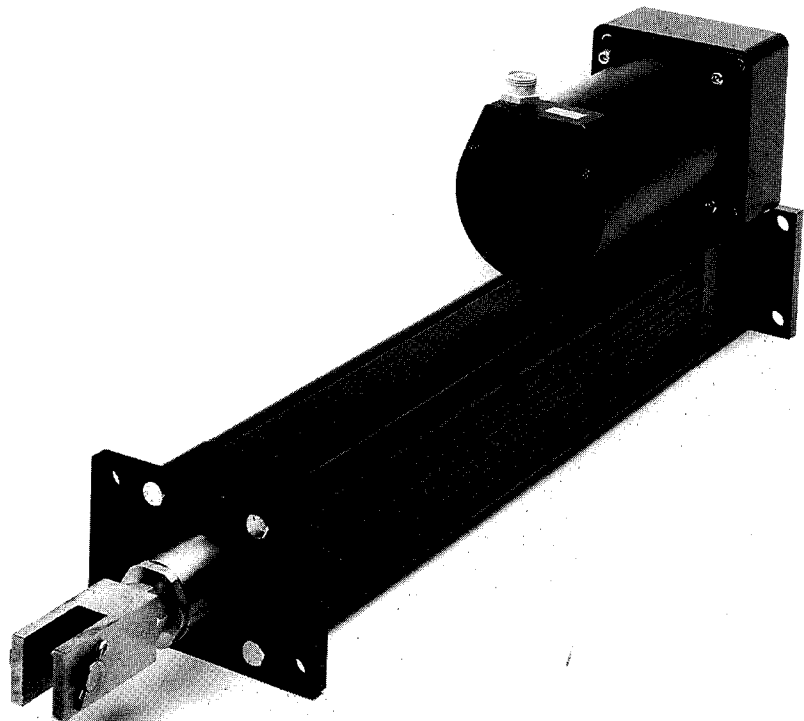
Cylinder options include a holding brake, an encoder for position feedback, and a dual rod-end bearing to increase side load capacity.

Industrial Devices will also discuss unique modifications at the customer's request.

FEATURES

- 100% duty cycle with ball screw models
- Speed to 40 inches per second
- Thrust to 2400 lbs
- Standard travel lengths to 60 inches. Custom lengths available.
- NFPA style mounting configurations provide direct replacement for hydraulic or pneumatic cylinders

- Four rod end couplings facilitate a variety of loads
- Choice of parallel or in-line models to optimize installation space.
- Hard-coat anodized external surfaces, and stainless steel thrust tube provide corrosion protection
- Acme and ball screw models for application flexibility
- High performance step motor, size 42
- Optimized for use with S5101 and S5201 controls, offering:
 - virtually unlimited programming capability
 - very high position resolution
 - repeatability to ± 0.0005 inches
 - integral control/drive/power supply package
 - see page 193



TS SERIES CYLINDERS

COMMON SPECIFICATIONS

Thrust Load	2400 lbs max
Speed	40 in/sec max, at no load
System Backlash	0.015 inch
Thrust Tube	
Side Load Moment	See load curves on page 257
Rotation	Does not rotate. Note: applying a rotation torque to the thrust tube may damage unit
Standard Travel Lengths	4, 6, 8, 12, 18, 24, 36, 48 and 60 inches

CONSTRUCTION MATERIALS

Bearing Housings	6601 T-6 aluminum, hard-coat anodized
Cylinder Housing	6063 T-6 aluminum, hard-coated anodized and teflon impregnated
Thrust Tube	Type 304 stainless steel, 1/4 hard, ground and polished
Wiper Seal	Polyurethane
Lead Screw	
Support Bearings	Angular contact, high thrust ball bearing
Acme Screw; drive nut	1.0 inch diameter, alloy steel screw; lubricated bronze plastic drive nut
Ball Screw; drive nut	1.0 inch diameter, hardened alloy steel screw; alloy steel, heat treated ball nut

WEIGHT (approximate, without options)

6 inch stroke unit 36 lbs, add 0.75 lbs per additional inch of stroke

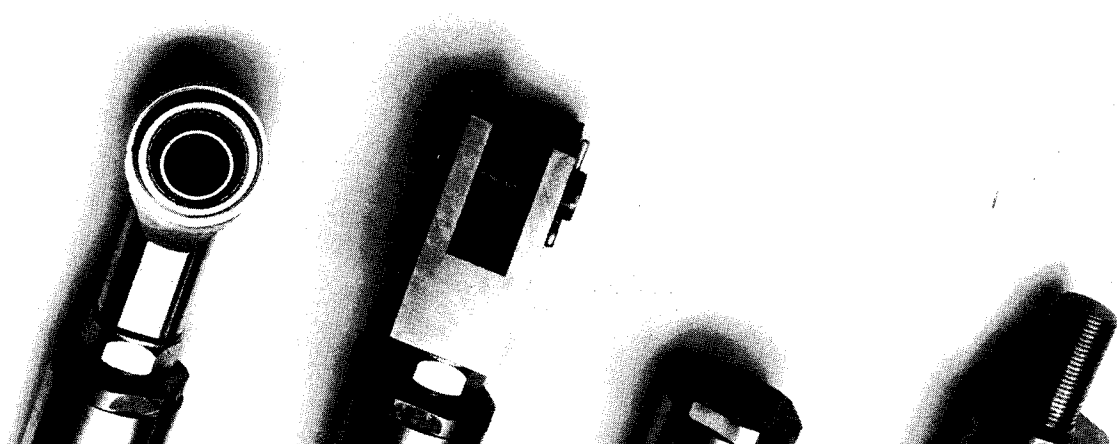
MOTOR SPECIFICATIONS

Type	1.8° permanent magnet hybrid step motor
Inductance	S4V: 9.8 mH
HIPOT breakdown	750 VAC
Static Torque	800 oz-in max
Connections	Quick disconnect: 5 contact receptacle in anodized aluminum shell, includes 12 ft cable with molded plug
Temperature	212°F (100°C) Maximum allowable motor case temperature Actual motor case temperature is ambient, duty cycle and speed dependent. Refer to speed vs. thrust performance curves for system duty ratings.

ENVIRONMENTAL OPERATION

For applications beyond standard allowable environmental conditions, see the Options and Accessories section.

Temperature Range	-20° to 140°F, -F sub-freezing option required to operate acme screw models below 32°F
Moisture	Humid, but not direct moisture contact
Contaminants	-W water resistant option allows some direct moisture contact Non-corrosive, non-abrasive



INDIVIDUAL MODEL SPECIFICATIONS—BALL SCREW MODELS

Drive Type	TS4V991B				TS4V994B					
	TS4V101B	TS4V151B	TS4V201B	TS4V501B	TS4V1001B	TS4V104B	TS4V154B	TS4V204B	TS4V504B	TS4V1004B
In-Line Timing Belt	In-Line Timing Belt	Timing Belt	Timing Belt	Helical Gear	Helical Gear	In-Line Belt	Timing Belt	Timing Belt	Helical Gear	Helical Gear
Drive Ratio (motor:screw)	1:1	1.5:1	2:1	5:1	10:1	1:1	1.5:1	2:1	5:1	10:1
Screw Pitch (rev/inch)	1	1	1	1	1	4	4	4	4	4
Load before back driving (lbs)	30	40	45	100	200	120	160	180	450	900

SYSTEM PERFORMANCE USING S5101 OR S5201 CONTROL

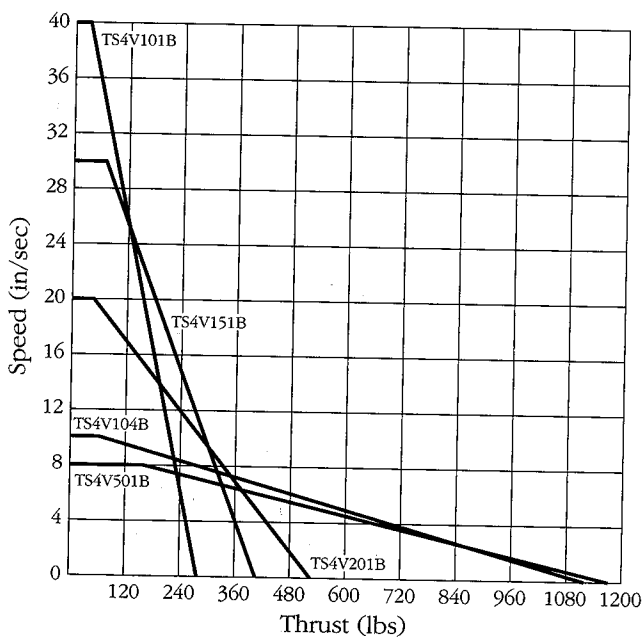
Maximum Speed (ips at no load)	Stroke										
	12-36 in	40	27	20	8	4	10	6.7	5	2	1
	48	35	27	20	8	4	9	6.7	5	2	1
	60	23	23	20	8	4	6	6	5	2	1

When applying TS cylinders with greater than 36 inch stroke, maximum speed may be limited by critical screw speed, as shown here in bold. The individual model performance curves shown on the following pages have been qualified (horizontal black lines) for critical speed limitations in 48 and 60 inch lengths.

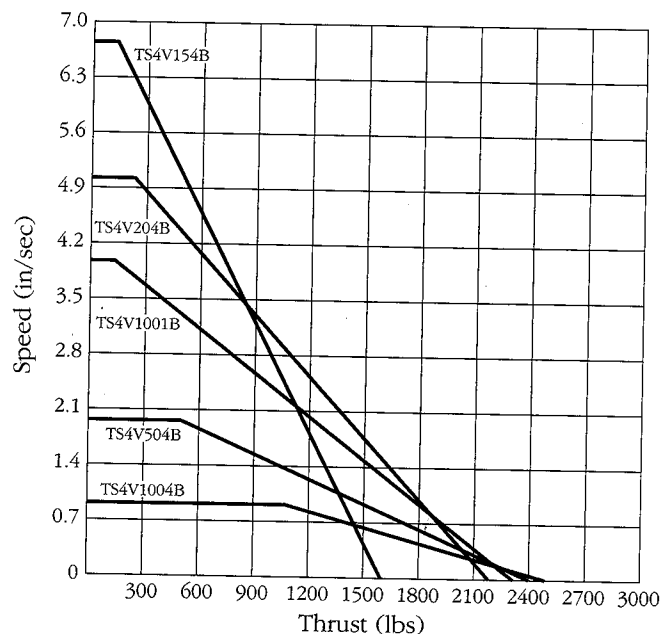
Maximum Thrust (lbs at rest)	260	400	530	1,160	2,270	1,070	1,600	2,200	2,400	2,400
Repeatability (inches)	Repeatability values achievable with S5000 controls in open-loop configuration									
	± 0.001	± 0.001	± 0.001	± 0.001	± 0.001	± 0.001	± 0.001	± 0.001	± 0.001	± 0.001

A COMPARISON OF SPEED VS. THRUST PERFORMANCE

Approximate performance using S5101 or S5201 control, see detailed curves on page 166.



HIGHER SPEED MODELS



HIGHER THRUST MODELS

