Copley Controls Corp.

Copley Motion Systems LLC

ServoTube®

APPLICATION GUIDE

Stacking, Cutting, Pick & Place

Combined Rotary and Linear Motion

Tensioner, Press Fit, Coating,

Precision Positioning,

XZ and XY Synchronised Motion ...

Programmable Speed, Acceleration, Force & Position

About Copley Controls Corporation

Copley Controls Corporation delivers high performance motion solutions to a wide range of industries including semiconductor, life sciences, automated assembly, test and measurement and packaging. Headquartered in the US with a division in England, Copley Controls has 20 years of experience in OEM partnerships. Our global commitment is backed with sales offices and local technical support in the US, Europe and Asia.

Amplifiers and Distributed Control Software

From networked servo and stepper amplifiers for distributed control to traditional torque amplifiers, Copley has the solution for your system architecture requirements. Amplifiers are available in a flexible range of packaging options in the 250W - 5kW power range. Copley software tools make distributed control system commissioning fast and simple. Advanced tuning and commutation algorithms, made possible by state-of-the-art DSP technology, maximize motor performance.

Copley also offers OEM custom solutions. Our engineering team responds quickly to enhance software, design a unique custom or package an amplifier in a subsystem. Contact a Copley application engineer today to define the right solution for you.

Linear Motors and Actuators

Copley is the inventor of the tubular linear motor setting new standards for performance and ease of mechanical integration. Patented magnetics deliver unprecedented repeatability without the need for a linear encoder - an optimal solution for high dynamic, medium precision applications. Copley also offers a full range of cost-effective motor components and modules with integrated bearings and high resolution encoders for applications that require high precision positioning.

Plug-and-play cabling makes installation fast and trouble-free. The rugged simplicity of the motor and high MTBF of the amplifier combine for the highest reliability. With over 25,000 motors shipped, Copley is a world leader in the application of linear motors.

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Contents

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LIST OF CONTENTS

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Introducing ServoTube®

A BREAKTHROUGH IN

ServoTube delivers the speed and ruggedness of pneumatics, the controllability of a ballscrew and the reliability of a linear motor at a price unprecedented in the industry.

Position control is essential to meet the ever increasing demand for flexible manufacturing. Closed-loop pneumatics are hard to control and have high audible noise. Ballscrews are speed limited and subject to wear. Belt drives are complex and need adjustment. The traditional linear motor is difficult to install and requires an expensive and fragile linear encoder.

ServoTube is a breakthrough in linear motion. The patented magnetic design delivers 12 micron repeatability and 250 micron accuracy from a non-contact, integral sensor.

Position Control Solution

Actuator

- Built-in position sensor
- Integral long-life bearing
- DIN/ISO 6431 mounting

The inherent ruggedness of the tubular motor and the availability of industry standard mounting accessories makes installation a snap.

System integration is simple with Xenus - a matched, self-tuning servo-amplifier complete with plug-and-play cabling. Xenus interfaces easily to PLCs and also features CANopen network connectivity.

LINEAR MOTION

OEM Components

- Easy mechanical integration
- No encoder required
- Mount load directly to forcer

SERVOTUBE ELEMENTS

ServoTube Thrust Rod

Sealed stainless steel tube encloses rare-earth magnets. Patented configuration ensures high density, uniform magnetic field.

ServoTube Forcer

Rugged, IP67 rated enclosure houses the motor coils and position sensing electronics. Forcer field interacts with Thrust Rod magnets for 50-105N of continuous force.

AUTOMATION FLEXIBILITY

ServoTube is available as a linear actuator and as OEM motor components.

Actuator

Moving Thrust Rod implementation for push/pull/lift applications. Mounting is compatible with pneumatic actuators and industry standard accessories. Internal bearing delivers maintenance-free, long-life performance.

Motor Components

Moving Forcer implementation for pick-and-place gantries. The load is mounted directly to the Forcer supported by a single bearing rail. The Thrust Rod is mounted at both ends, similar to a ballscrew. A large air gap reduces alignment constraints.

OPTIMAL SOLUTION

ServoTube performance surpasses traditional technologies as illustrated in the table below:

Parameter	ServoTube	Pneumatics	Belt Drive	Ballscrew
Speed	High	High	High	Low
Acceleration	High	High	High	Low
Installation	Simple	Complex	Moderate	Moderate
Reliability	High	Moderate	Moderate	Moderate
Controllability	Excellent	Poor	Good	Excellent
Ruggedness	Excellent	Excellent	Moderate	Moderate
Audible Noise	Low	High	Low	Moderate

Xenus Amplifier

ServoTube/Xenus – The Position Control Solution

WHETHER you use a PLC or PC based architecture, Xenus and ServoTube combine for an optimal solution to flexible position control.

PLC Based Control

Xenus integrates easily into PLC systems. Xenus operates as an indexer with 16 programmable indexes or as a traditional drive accepting step/direction commands and analog torque/velocity commands.

PC Based Control

With CANopen connectivity, Xenus delivers all the benefits of distributed control. Copley software tools integrate seamlessly into CoDeSys,* a rich IEC 61131-3 PLC programming environment incorporating motion function blocks, electronic gearing, camming and NC functions. Support is also provided for Labview, Visual Basic and C++ application environments.

Configuration

Copley Motion Explorer (CME 2) configuration software is powerful and intuitive. Simply select your ServoTube model number and the system comes up tuned and ready to run. Clear diagnostics make system commissioning easy. Fill in the blanks to define position, velocity and acceleration.

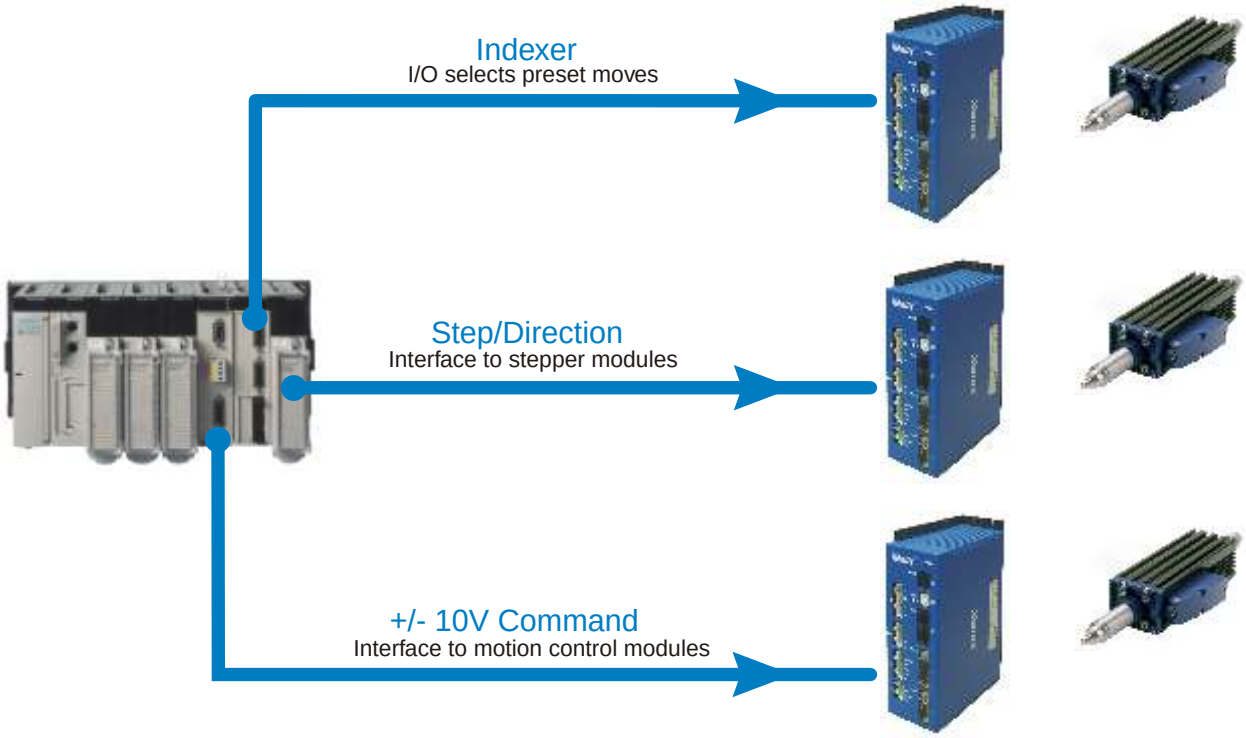
- 100-240 VAC operation (single and three-phase)
- 16 stored indexes selectable via I/O
- Home to positive stop
- CANopen connectivity
- Position, velocity and torque control
- +/-10V and PWM velocity/current command interface
- Step/Direction command interface
- Discrete I/O: 12 in, 3 out
- Dedicated brake output

Xenus Order Guide

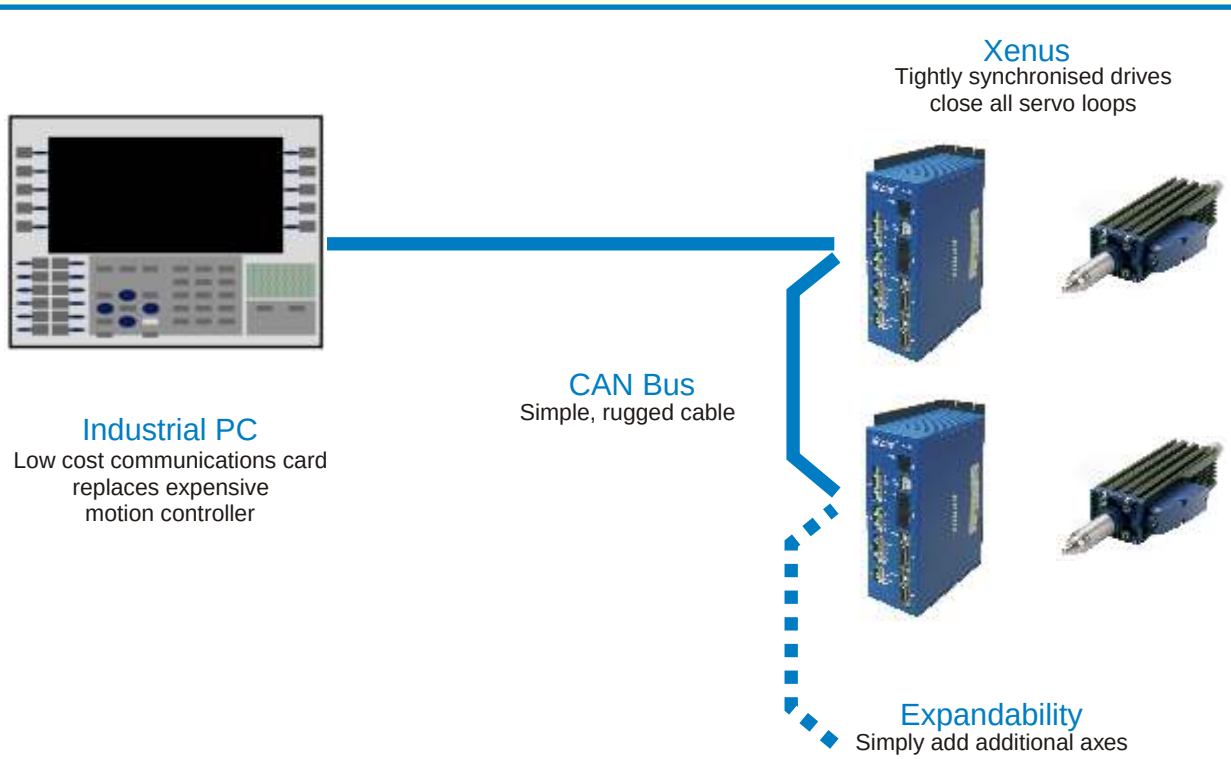
VOLTAGE VAC	CURRENT Cont	CURRENT Peak	MODEL
100 - 240	6	18	XSL-230-18
100 - 240	12	36	XSL-230-36
100 - 240	20	40	XSL-230-40

* CoDeSys is available from 3S - Smart Software Solutions www.3s-software.com

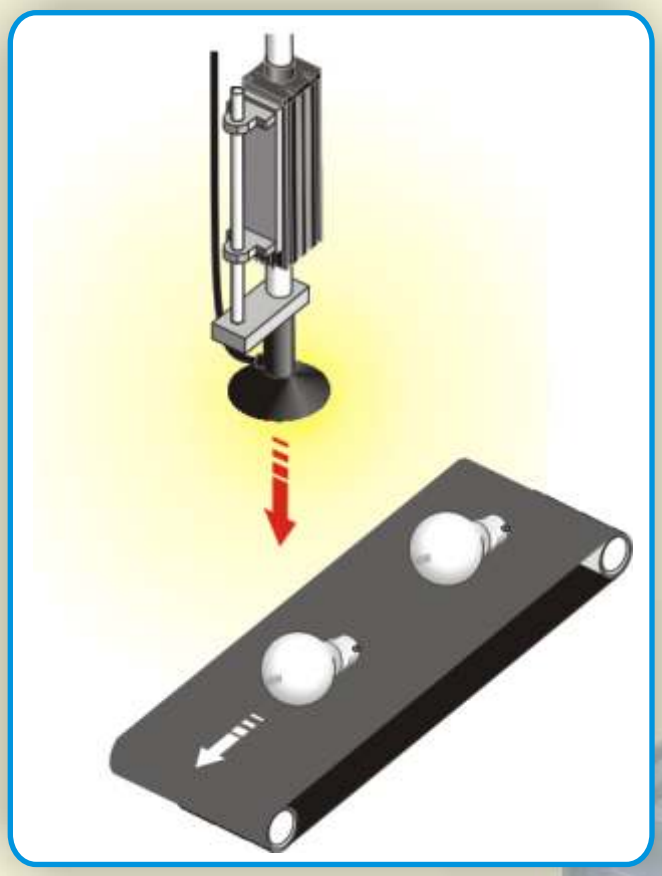
PLC Based Control



PC Based Distributed Control



Application Concepts



PICK & PLACE

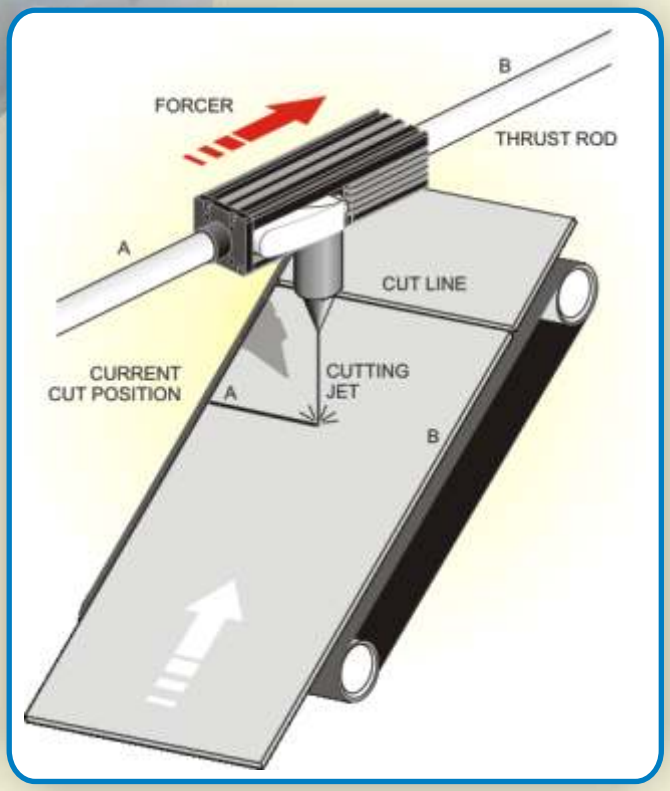
- Position control
- Velocity control

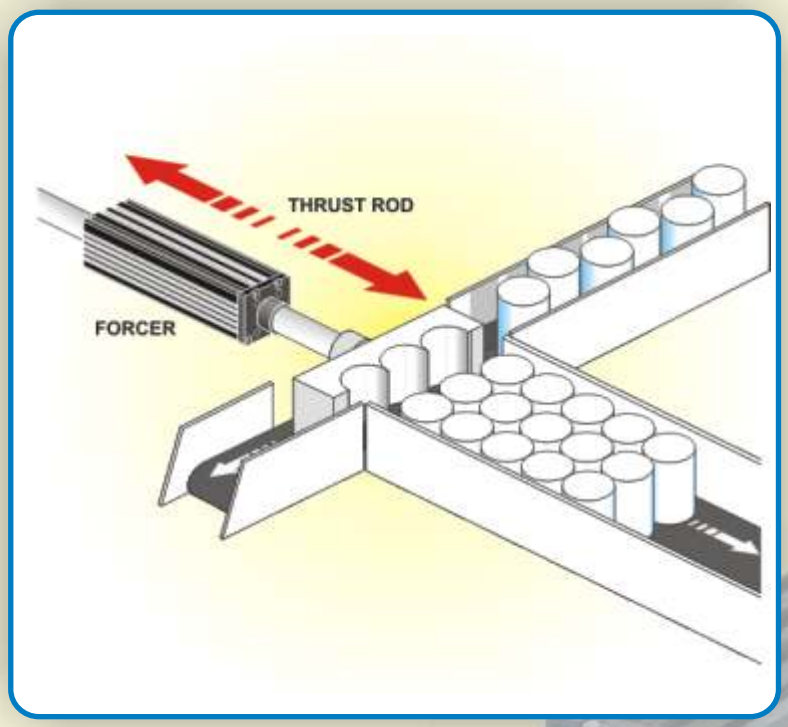
Accurate position control allows the suction cup to be precisely located over the part. Smooth acceleration and deceleration allows the part to be moved without risk of it becoming dislodged.

COORDINATED CUTTING

- Velocity control
- Coordinated movement

The forcer is aligned diagonally across the conveyor belt. Movement of the forcer is coordinated with the belt speed to ensure perfectly horizontal cutting of the material, without having to interrupt the process.





RE-POSITIONING

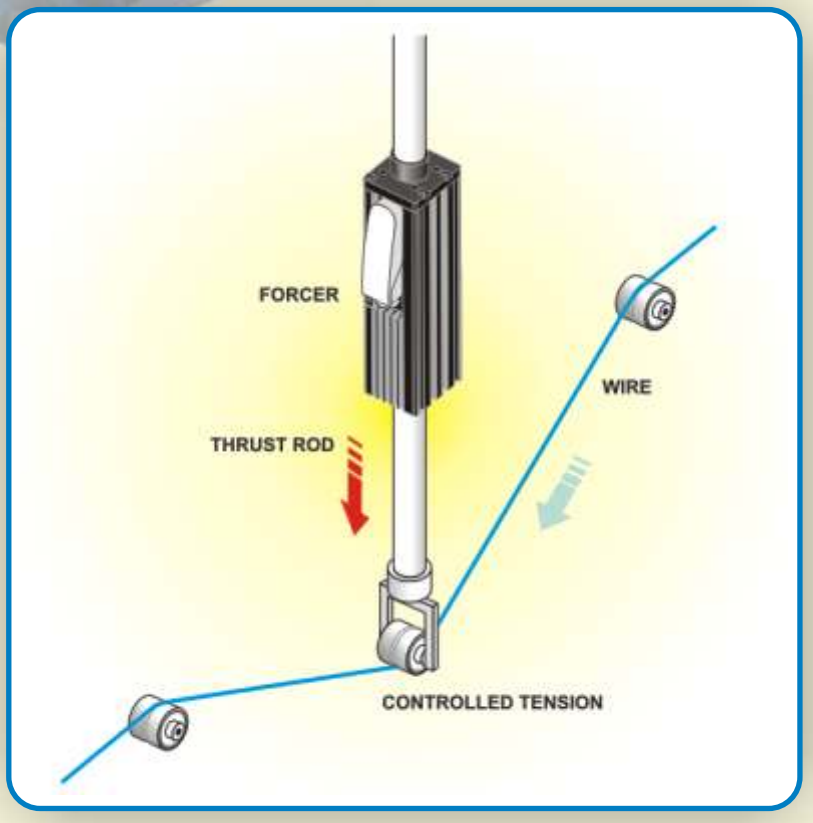
- Variable force control
- Variable position control

It is often necessary to vary the size and weight of parts being produced. This is becoming ever more true as batch sizes become smaller and smaller. The versatility of the ServoTube technology allows the position and force applied to be instantly changed in software to accommodate the needs of the different parts.

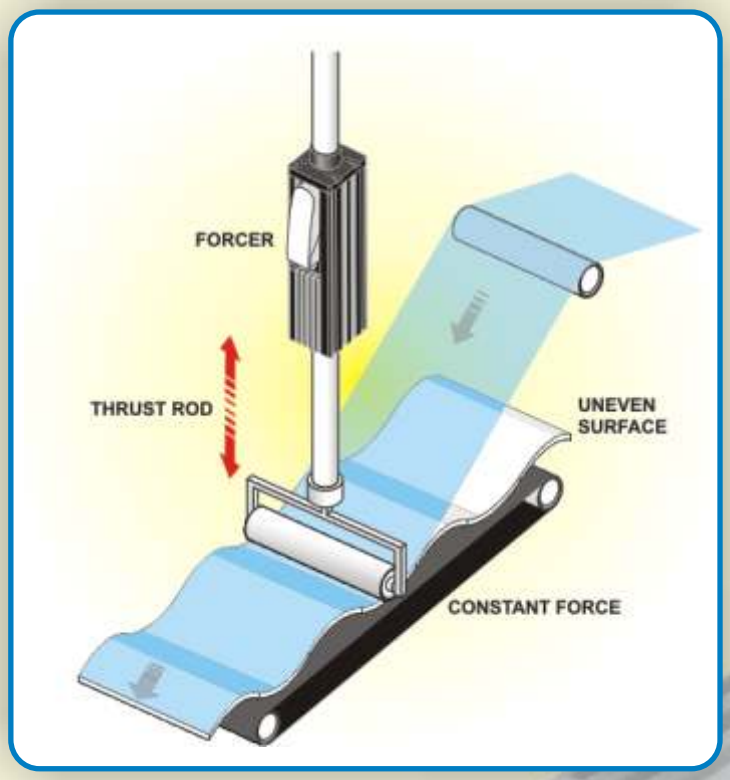
TENSIONER

- Constant force

By using constant force mode (equivalent to torque control in a rotary motor) the ServoTube can be made to act like an ideal spring, giving a constant force over its entire stroke. This allows the tension, in say a wire, to be precisely maintained even as the length of the wire (or belt) varies. This can be critical for applications such as coil winding.



Application Concepts



PRESS FIT

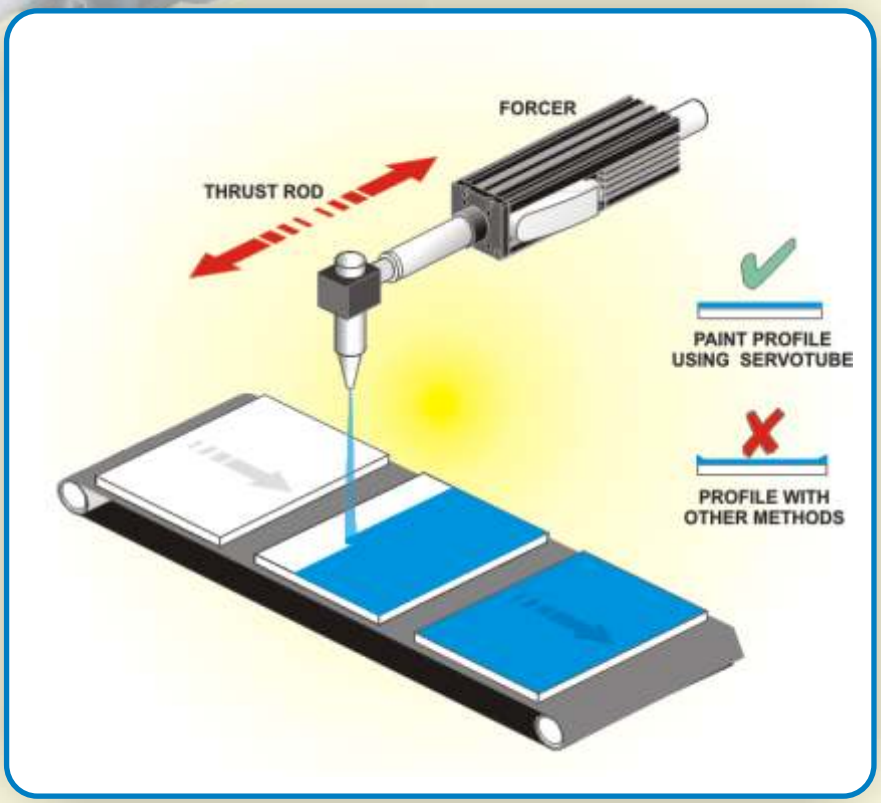
- Constant force

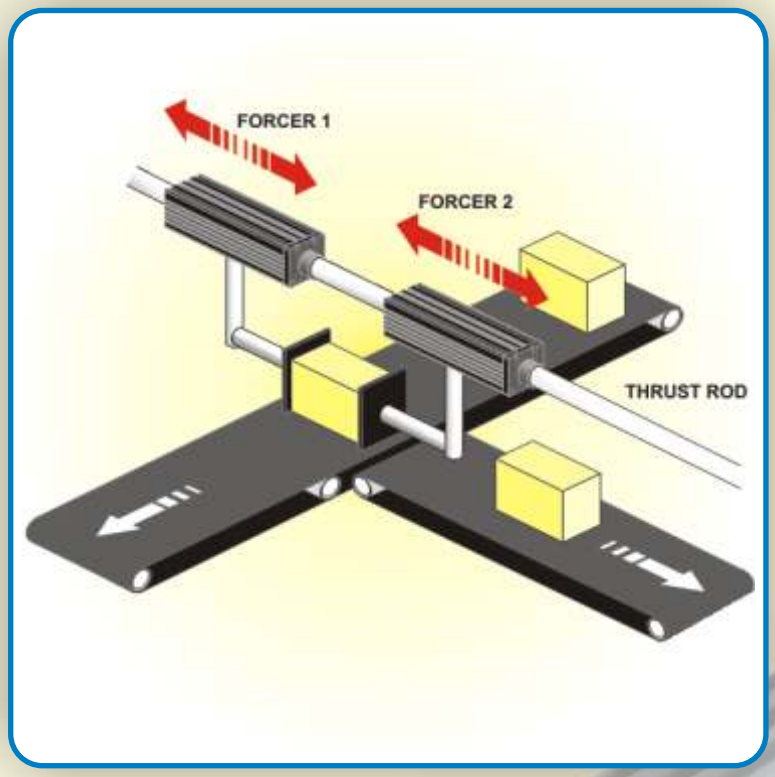
The ServoTube Actuator can be used to deliver a very consistent pressure to an uneven surface. This might be necessary when for example fitting a thin covering to a complex surface. The very low inertia and high accelerations of the actuator allows it to follow every contour of the surface while maintaining a constant pressure.

COATING APPLICATION

- Constant velocity
- High acceleration

When applying spray coatings to a surface, it is necessary to maintain very constant velocity in order to control the thickness of the coating. Very quick changes in direction are also often necessary to avoid material build-up near the edges. The 'ironless' construction of the ServoTube actuator eliminates 'cogginess', giving unprecedented smoothness of operation.





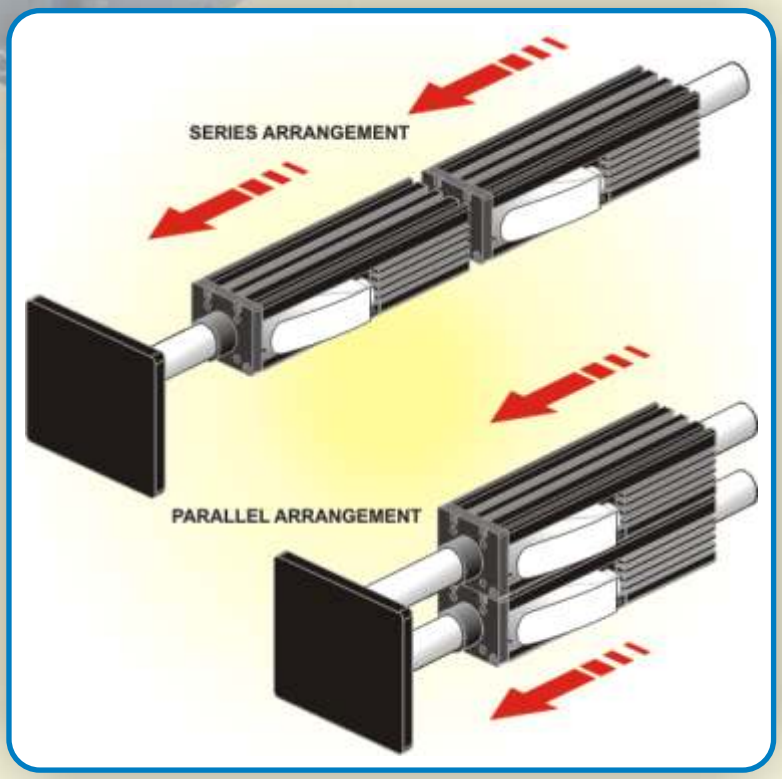
DUAL FORCER POSITIONING

- Constant force
- Position control

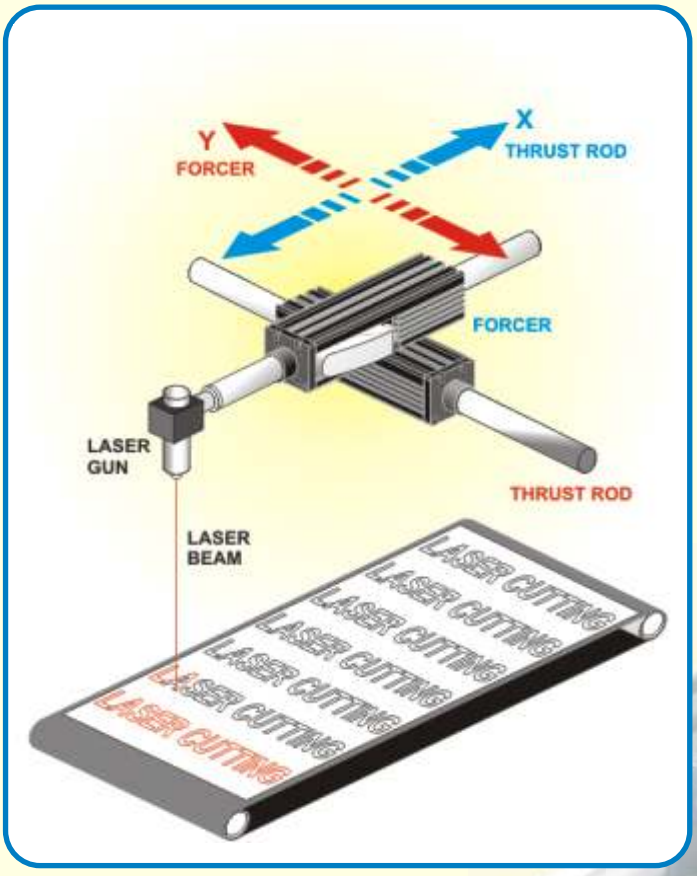
Two forcers may be combined (either on a single thrust rod or using two separate rods) in different modes to handle bulky loads. One forcer applies a constant opposing force, while the other forcer operating in position mode controls the position of the product. This technique can be used for lifting or aligning bulky items. The force used to handle the packages can be precisely controlled and varied via software for quick change over between batches.

GREATER FORCE

A number of forcers may be combined to give greater force than would be available from a single forcer. This may be achieved through the use of multiple forcers arranged in series on a single thrust rod, or in parallel using multiple rods.



Application Concepts



XY LASER CUTTING

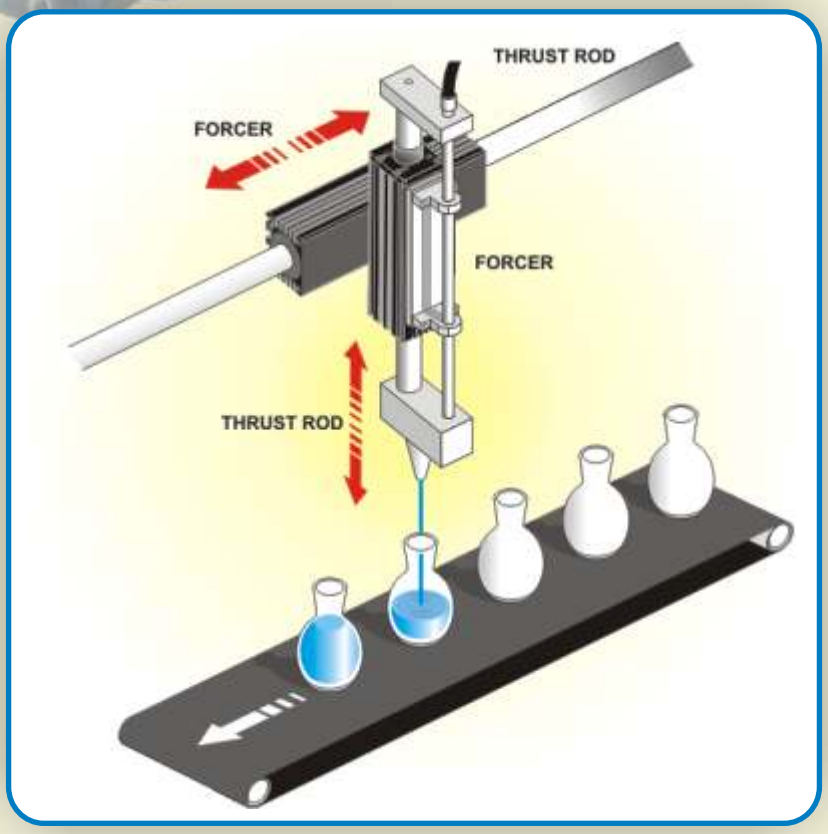
- Coordinated movement
- Position control

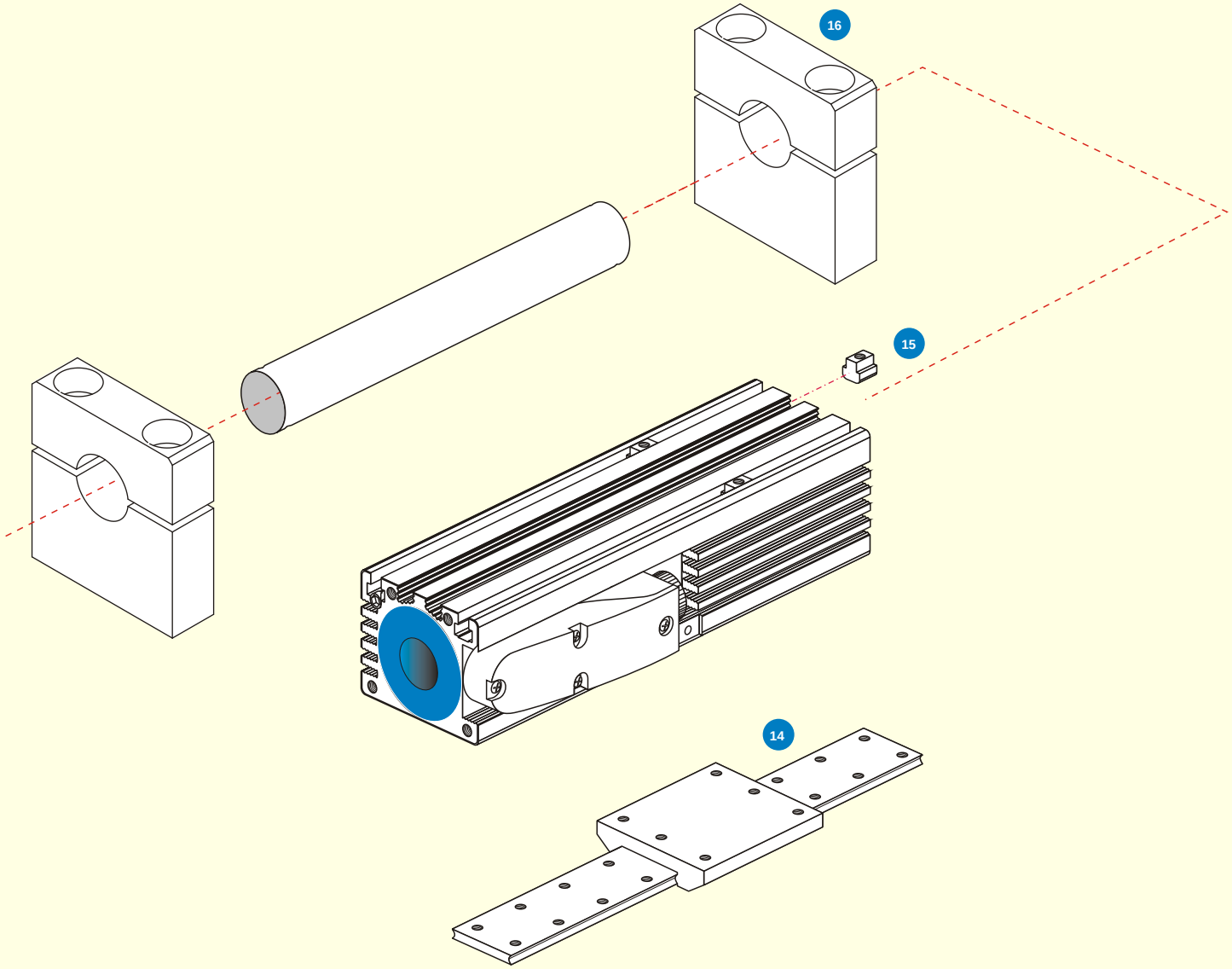
Two forcers may be combined to give interpolated X-Y positioning, for example, in laser cutting applications.

XZ BOTTLE FILLING

- Coordinated movement
- Position control

Two forcers may be combined to give X-Z actuation, for example, in bottle filling applications where high speed and close coordination between the two axes is necessary.

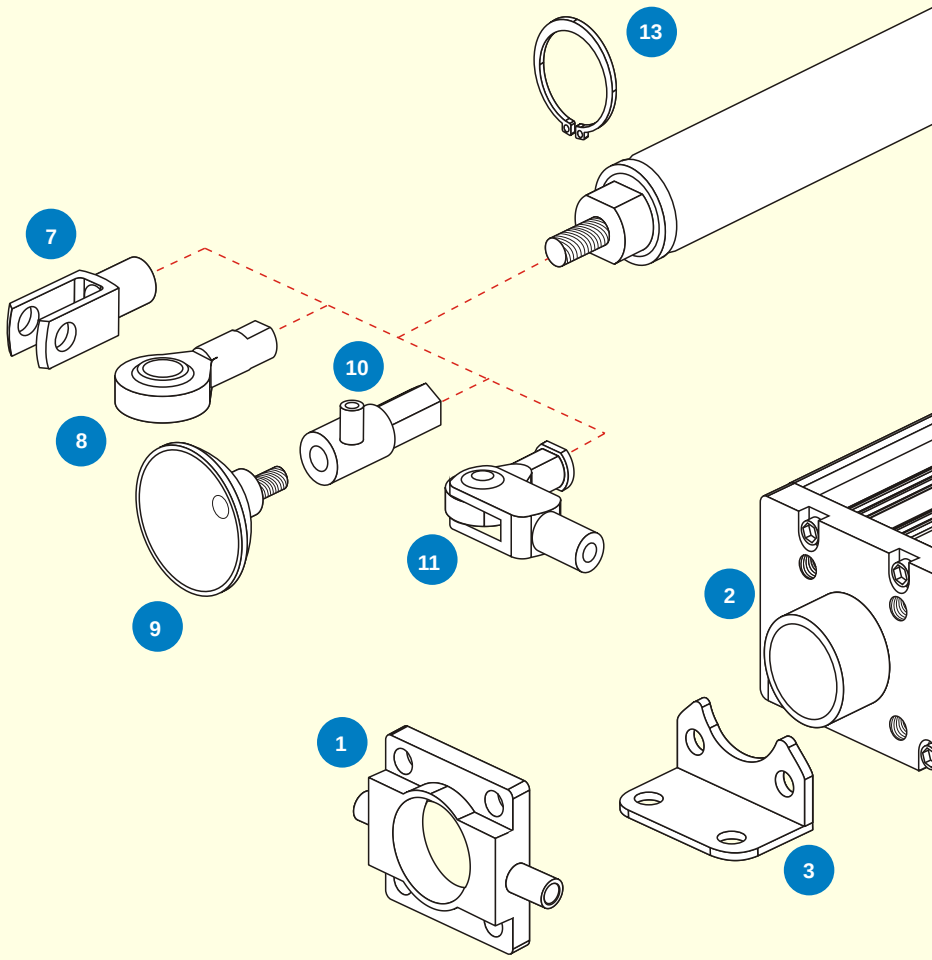




Reference	Manufacturer's Part Number	Manufacturer	Description
14	LWFF37	IKO	LINEAR BEARING
	KUVE15W	INA	LINEAR BEARING
	LAW21EL	NSK	LINEAR BEARING
	HRW21	THK	LINEAR BEARING
	SHW21	THK	LINEAR BEARING
15	044205005	CMS	M4 'T' NUT
	045205007	CMS	M5 'T' NUT
16	400885279	CMS	STB25 THRUST ROD SUPPORT

Accessories

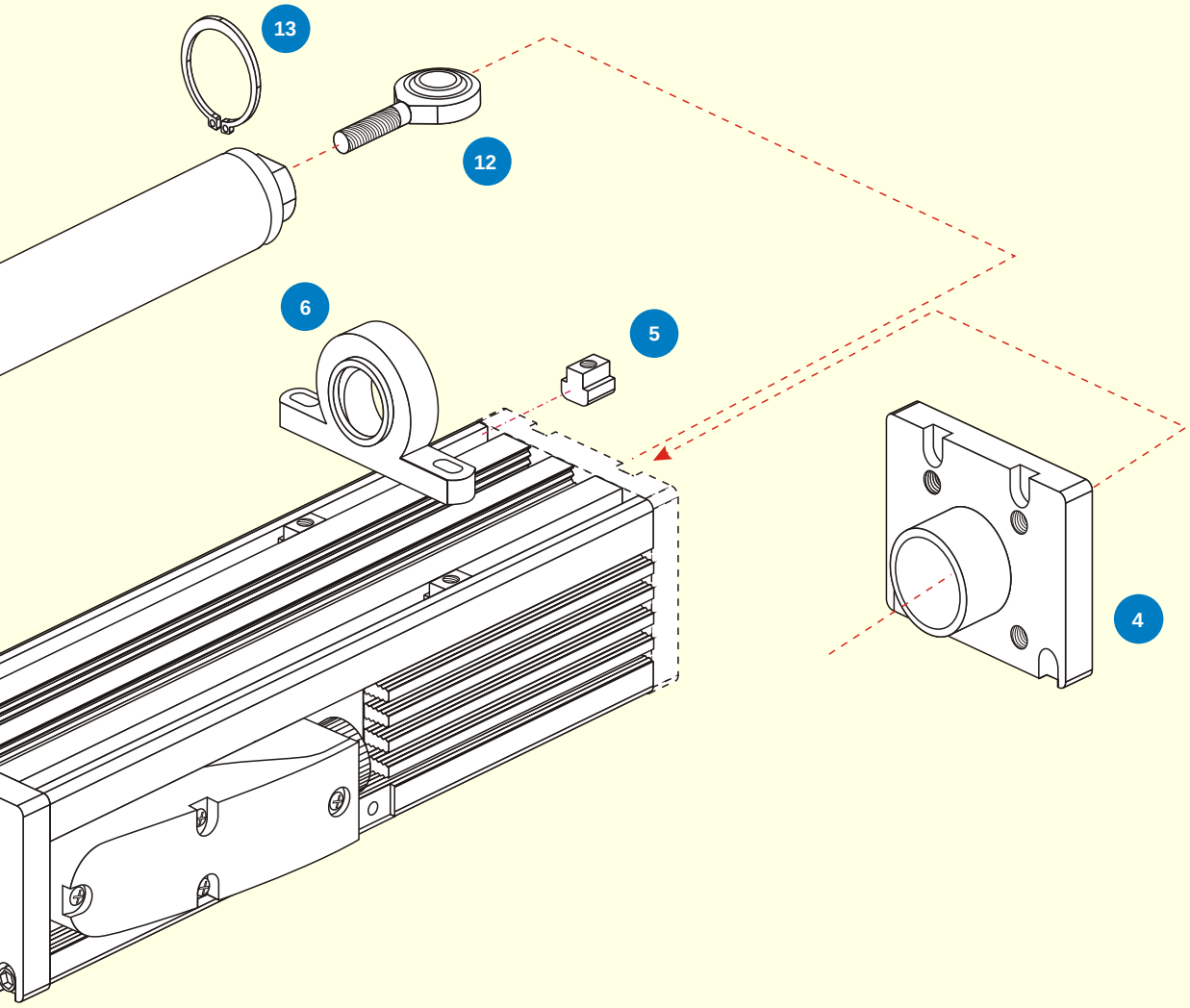
The ServoTube Actuator mounting is compatible with DIN/ISO 6431. Industry standard accessories simplify integration.



SUPPLIER CONTACT DETAILS

BSL	www.bsl.co.uk
CMS	www.copleymotion.com
FESTO	www.festo.com
IGUS	www.igus.co.uk
IKO	www.ikont.co.jp
INA	www.ina.com
NSK	www.nsk.com
THK	www.thk.com

Reference	Manufacturer's Part Number	Manufacturer	Description
1	161852	FESTO	TRUNNION FLANGE MOUNTING
2	400885261	CMS	ACTUATOR END SUPPORT
3	176937	FESTO	FOOT MOUNTING
4	400885262	CMS	ACTUATOR END PLATE
5	044205005	CMS	M4 'T' NUT
	045205007	CMS	M5 'T' NUT
6	KSTM-12	IGUS	PILLOW BLOCK BEARING
7	GERMK-08	IGUS	M8 FEMALE CLEVIS JOINT



Reference	Manufacturer's Part Number	Manufacturer	Description
8	KBRM-O8	IGUS	M8 FEMALE ROD END BEARING
	GIKER 8PW	INA	M8 FEMALE ROD END BEARING
9	HOLDER ESG	FESTO	SUCTION CUP
10	HOLDER HB	FESTO	SUCTION CUP HOLDER
11	GERMKE-08	IGUS	M8 FEMALE CLEVIS JOINT
12	KARM-08	IGUS	M8 MALE ROD END BEARING
	GAKER 8PW	INA	M8 MALE ROD END BEARING
13	D1400-23MM	BSL	23mm CIRCLIP (STEEL)
	D1400-23MMSS	BSL	23mm CIRCLIP (STAINLESS)

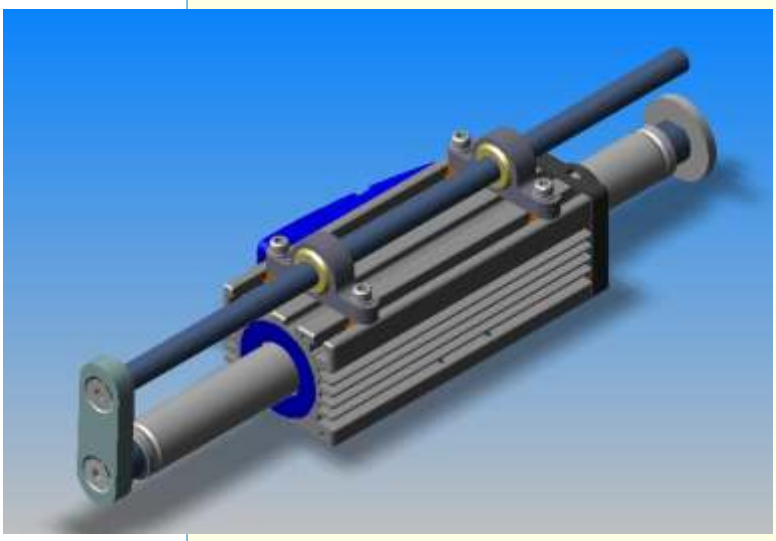
Forcer and single linear guide

A ServoTube actuator (STA) is shown in use with a single external friction bearing. This combination has many applications, both horizontal and vertical.

The external bearing can act to prevent rotation of the thrust rod, as well as give greater rigidity. If hollow, the rod can be used to carry cabling, etc to the work point.

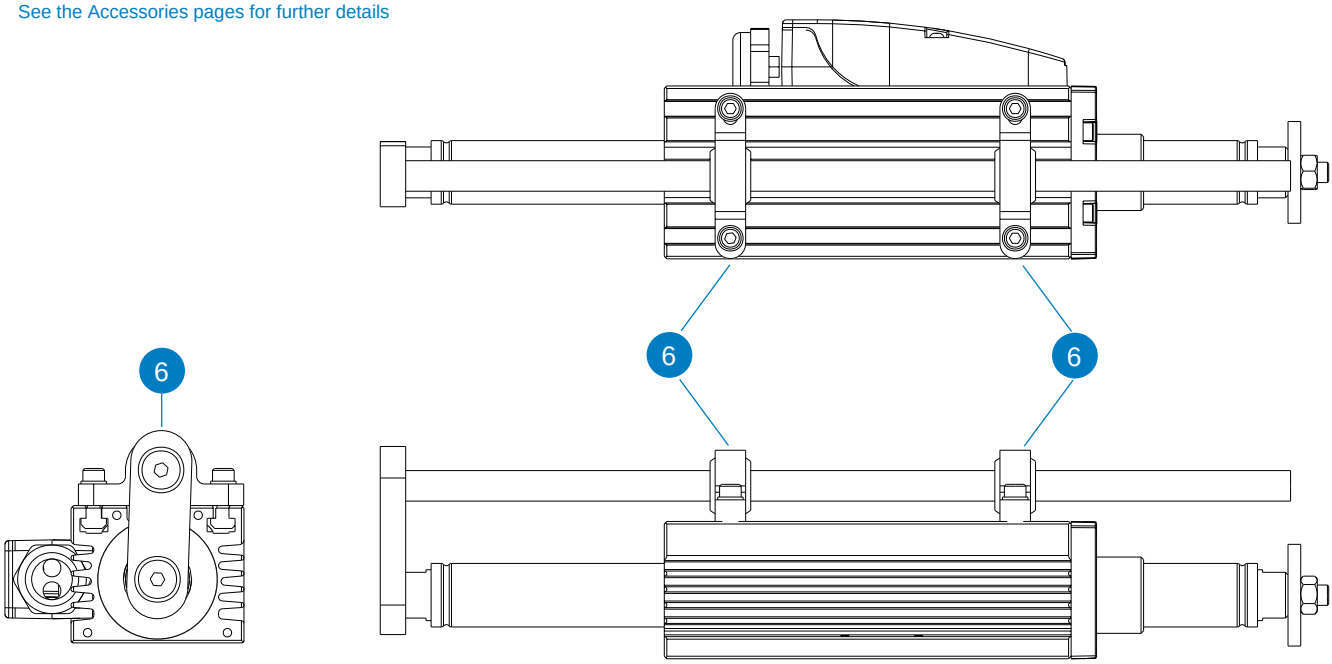
The friction bearings shown are available from third-party suppliers and bolt directly to the forcer using standard T-nuts.

This solution combines high speed actuation with complete flexibility of actuation speed and position.



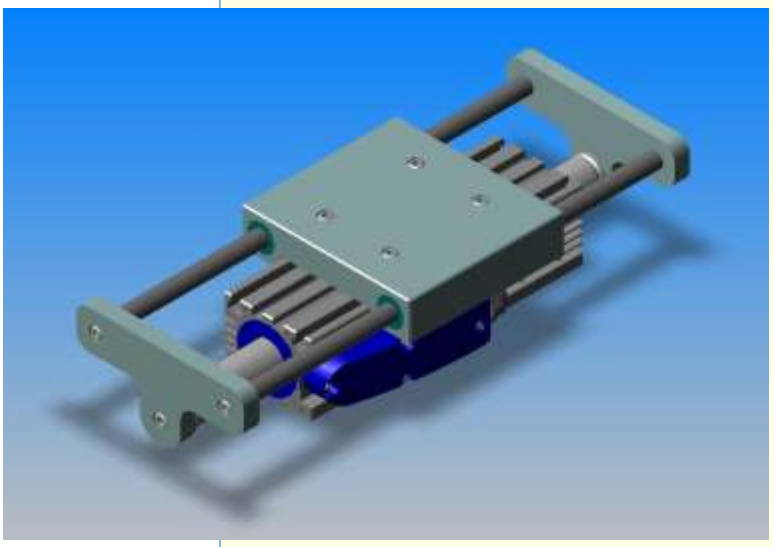
6 Pillow block bearing

See the Accessories pages for further details



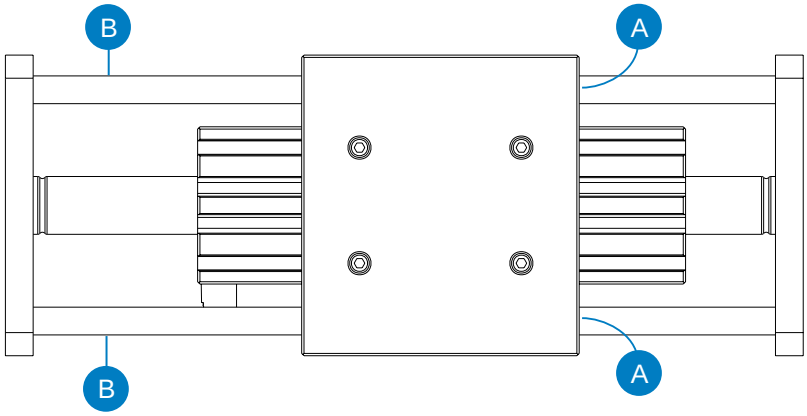
Forcer and load bearing guide

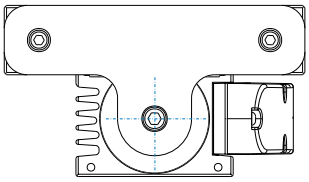
ServoTube components are shown in use with dual recirculating ball linear guides. This combination allows the motor to handle 'off axis' loads such as might be necessary in moving a large weight horizontally. The guides are precision located within the users custom mounting bracket. Use of the ServoTube component (STB) with its large air gap between forcer and thrust rod avoids potential alignment problems between the external bearings and the forcer making for easy design and manufacture.

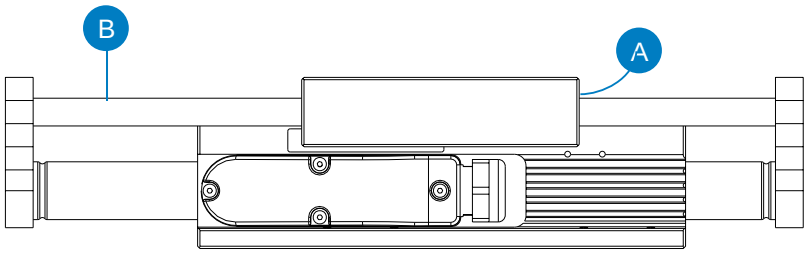


A Linear ball bearings
Part number: KS 12
INA BEARING COMPANY LTD

B Hardened & ground shaft
Part number: W 12 H6
INA BEARING COMPANY LTD







Application Designs

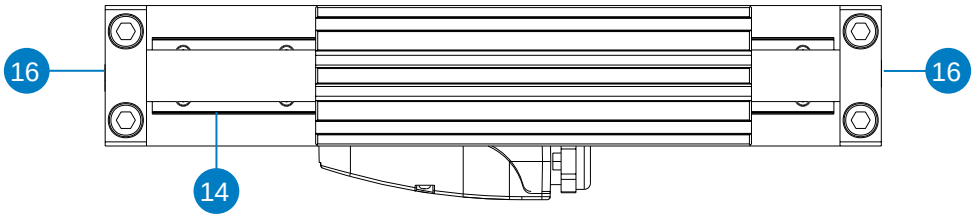
Forcer and bearing rail module

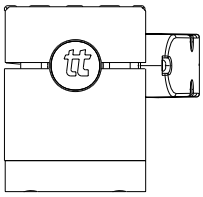
This application shows a ServoTube component (STB) in use with a precision linear guide. This combination, in which the thrust rod is usually held fixed while the forcer moves along the bearing rail, is ideally suited for heavy load bearing or more precise applications.

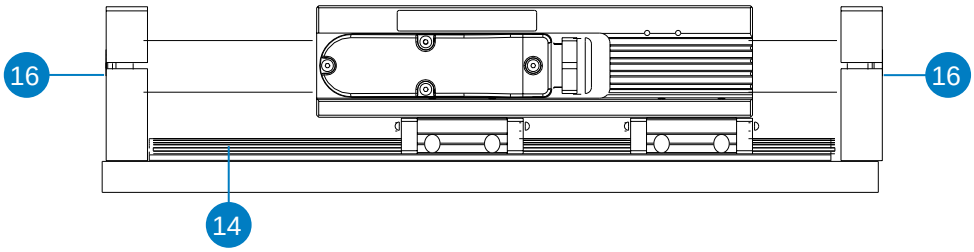
The bearing carriage (shown in the accessory section) bolts directly to standard fixing holes on the base of the forcer. Again, use of the ServoTube component with its wide air gap between forcer and thrust rod makes design and assembly extremely simple by eliminating the need for precision parts or alignment. The parts to be moved may be bolted directly to the top of the forcer.

14 Linear bearing

16 Thrust rod support





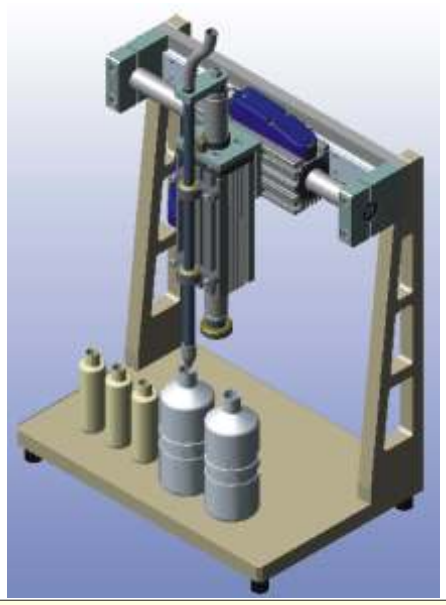


Bottle Filling Application

A ServoTube actuator and component are used to provide an elegant solution to the problem of filling bottles of varying size and shape.

A ServoTube component (STB) in moving forcer configuration as shown on page 18 provides the horizontal movement and a ServoTube actuator (STA) in moving rod configuration as shown on page 16 provides vertical adjustment.

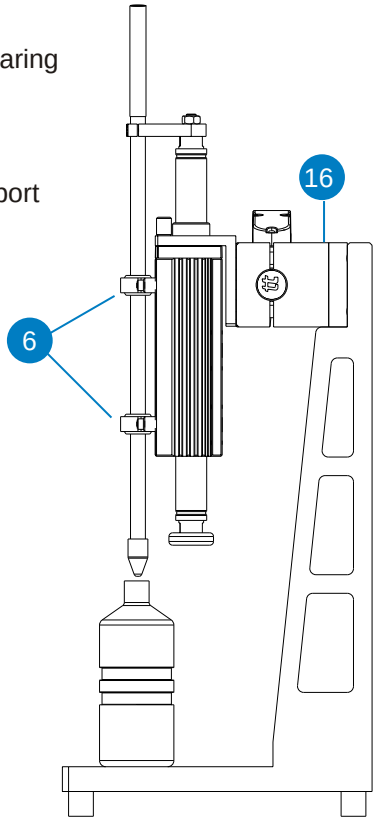
The forcer travels left to right mounted on a precision linear bearing rail. This provides a simple but very stable platform on which to mount the bottle filling equipment. Differences in bottle size or conveyor belt speed are compensated for via programmable parameters. The bottles are filled via a vertically sliding hollow tube attached to the actuator thrust rod.

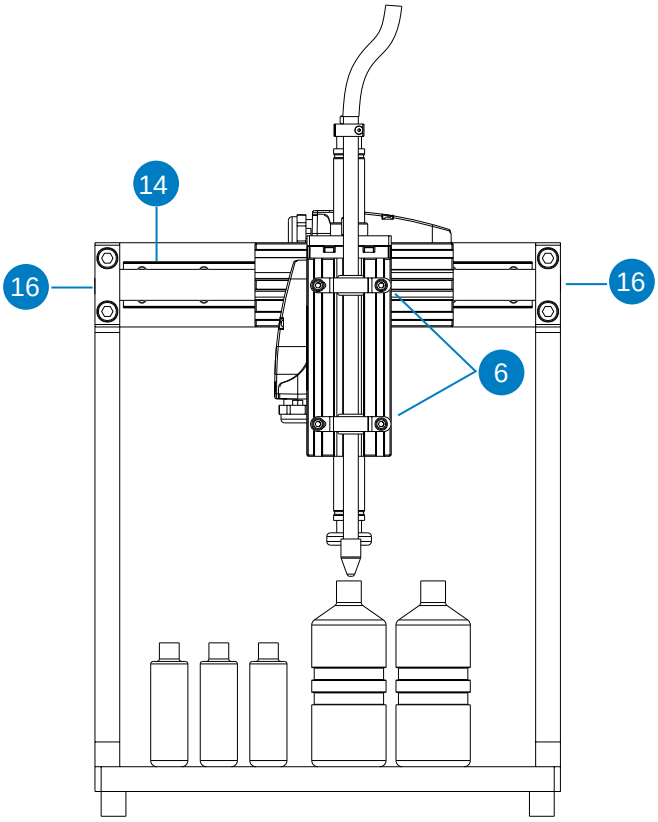


6 Pillow block bearing

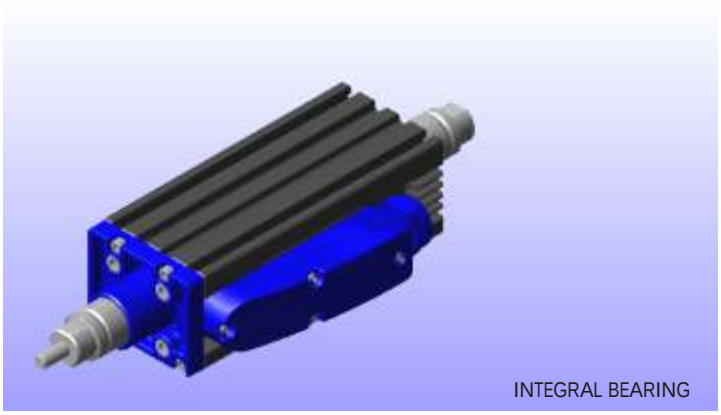
14 Linear bearing

16 Thrust rod support





STA 2504



PLEASE REFER TO PAGE 28 FOR FURTHER DETAILS

PERFORMANCE

Maximum stroke	309 mm	(12.17 in)
Peak force	312 N	(70.14 lbf)
Continuous force	42 N	(9.44 lbf)
Peak acceleration	394 m/s^2	(1292.7 ft/sec^2)
Maximum speed	5.9 m/s	(19.36 ft/sec)
Bearing life	64,000 km	(39,768 mi)

MASS

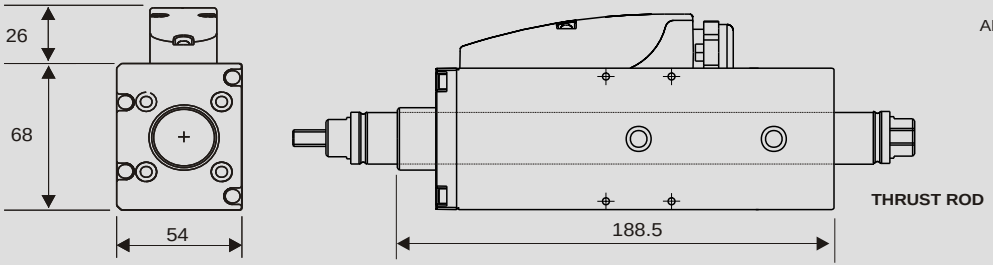
Forcer	1.25 kg	(2.76 lb)
Thrust rod	3.5 kg/m	(2.35 lb/ft)

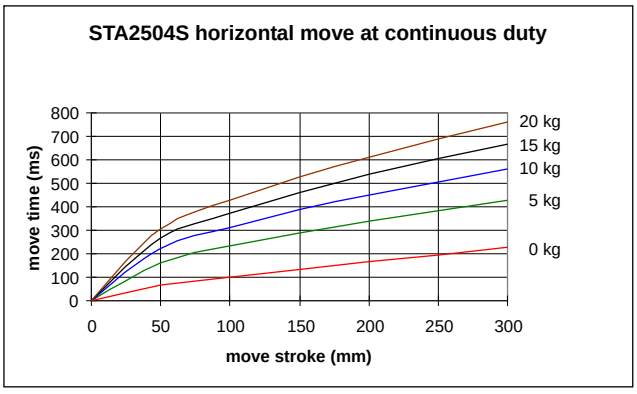
AMPLIFIER INTERFACE
Motor winding - 3 phase servo compatible
Position sensor - Industrial standard, sine / cosine 1V peak-to-peak

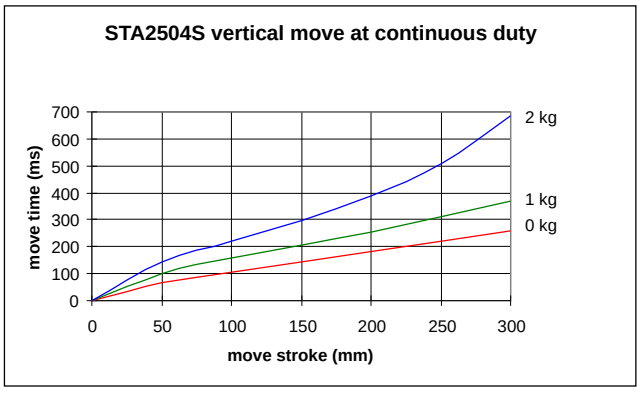
ENVIRONMENTAL RATING
IP67
CE compliant: EMC 89/336/EEC, LVD 73/23/EEC

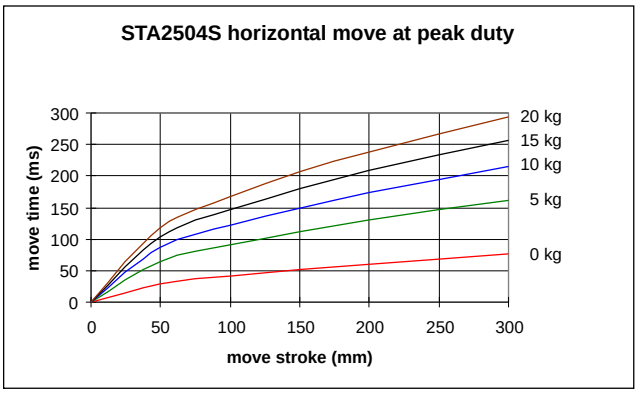
1. Peak acceleration is for 27 mm stroke actuator
2. Maximum speed is with moving rod of maximum stroke, triangular move.

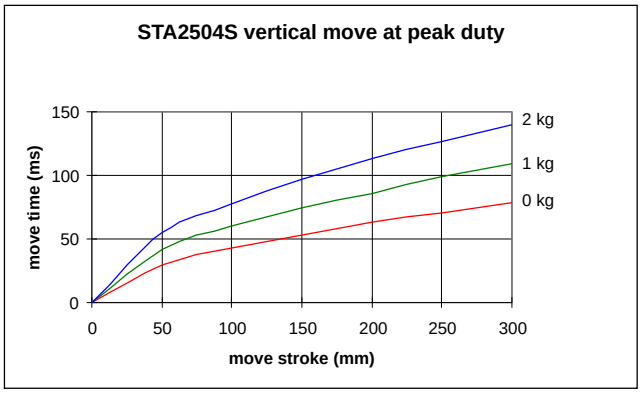
ALL DIMENSIONS IN MM





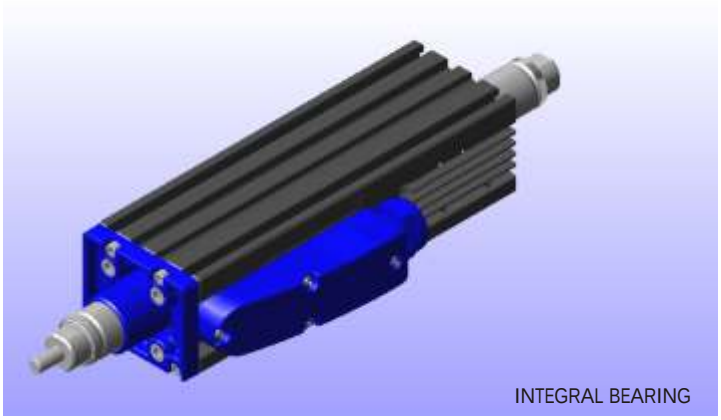






Performance figures are based on convection cooling. Higher ratings are possible with forced-air cooling (consult factory).

STA 2506



PLEASE REFER TO PAGE 28 FOR FURTHER DETAILS

PERFORMANCE		
Maximum stroke	309 mm	(12.17 in)
Peak force	468 N	(105.2 lbf)
Continuous force	59 N	(13.26 lbf)
Peak acceleration	483 m/s	(1584.6 ft/s[2)]
Maximum speed	5.3 m/s	(17.39 ft/s)
Bearing life	64,000 km	(39,768 mi)

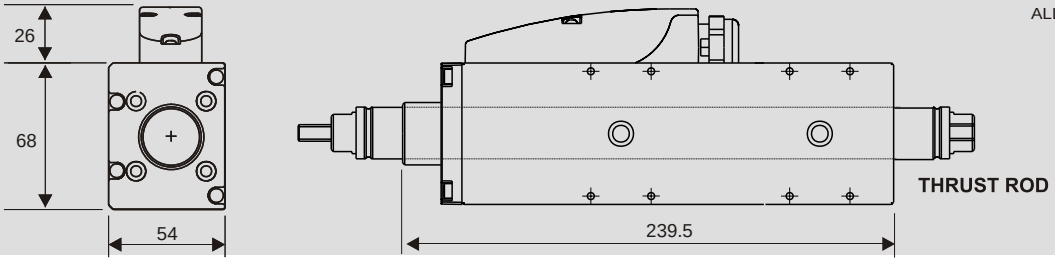
MASS		
Forcer	1.70 kg	(3.75 lb)
Thrust rod	3.5 kg/m	(2.35 lb/ft)

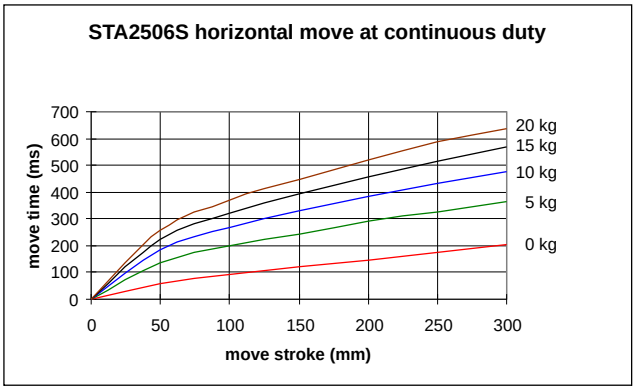
AMPLIFIER INTERFACE
Motor winding - 3 phase servo compatible
Position sensor - Industrial standard, sine / cosine 1V peak-to-peak

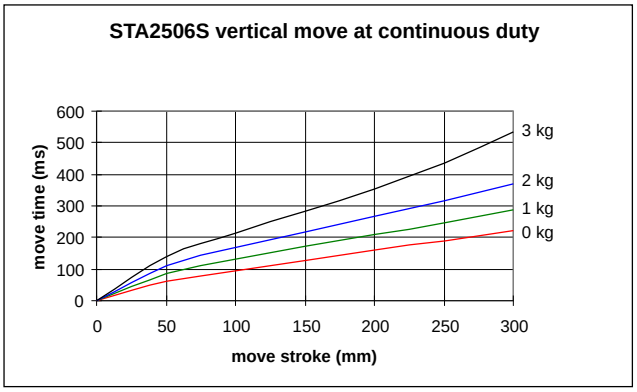
ENVIRONMENTAL RATING
IP67
CE compliant: EMC 89/336/EEC, LVD 73/23/EEC

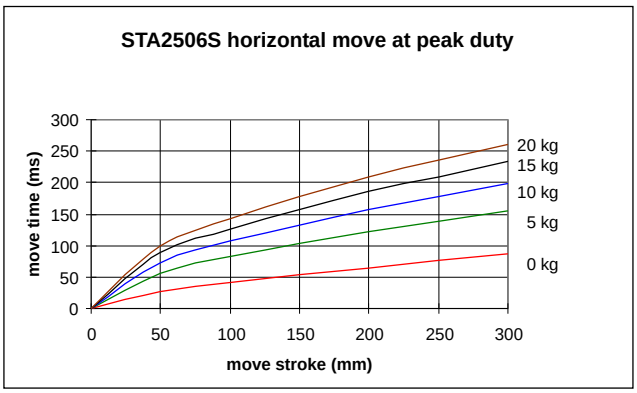
1. Peak acceleration is for 27 mm stroke actuator
2. Maximum speed is with moving rod of maximum stroke, triangular move.

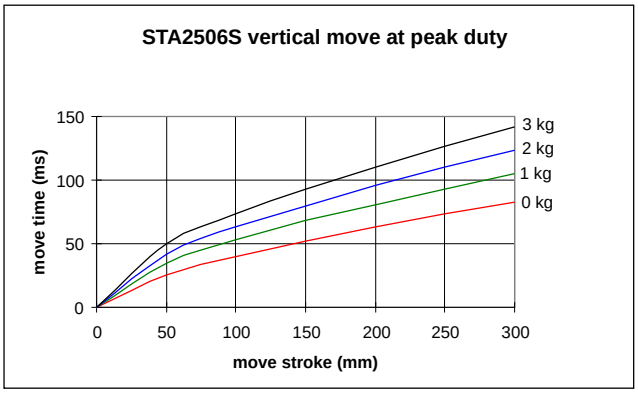
ALL DIMENSIONS IN MM





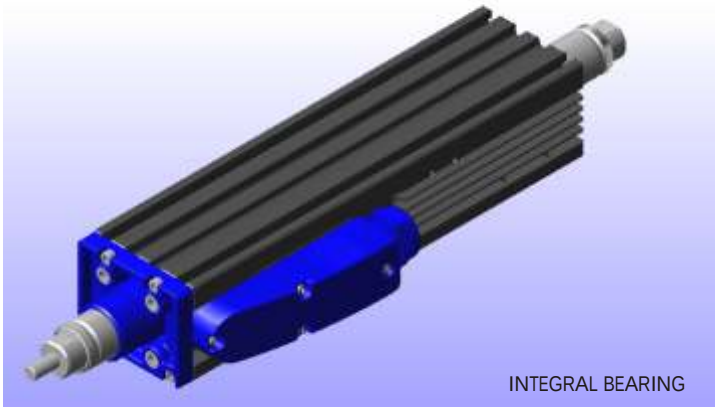






Performance figures are based on convection cooling. Higher ratings are possible with forced-air cooling (consult factory).

STA 2508



PLEASE REFER TO PAGE 28 FOR FURTHER DETAILS

PERFORMANCE		
Maximum stroke	309 mm	(12.17 in)
Peak force	624 N	(140.28 lbf)
Continuous force	75 N	(16.86 lbf)
Peak acceleration	542 m/s^2	(1778.2 ft/s^2)
Maximum speed	4.7 m/s	(15.42 ft/s)
Bearing life	64,000 km	(39,768 mi)

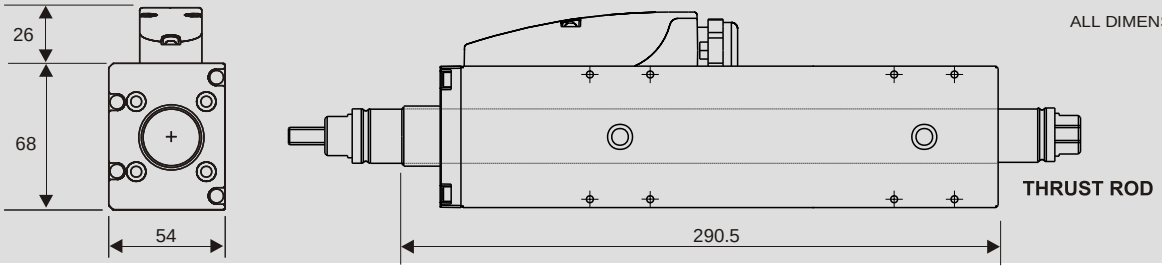
MASS		
Forcer	2.25 kg	(4.96 lb)
Thrust rod	3.5 kg/m	(2.35 lb/ft)

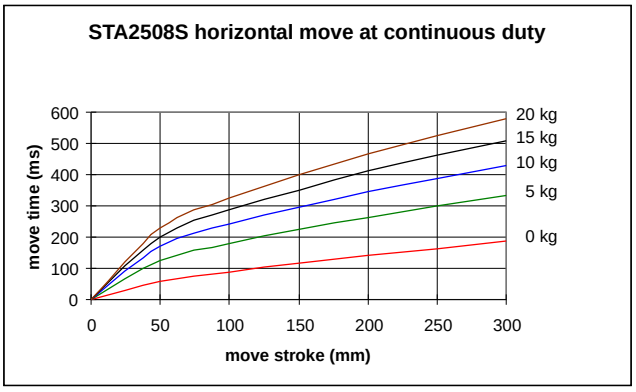
AMPLIFIER INTERFACE
Motor winding - 3 phase servo compatible
Position sensor - Industrial standard, sine / cosine 1V peak-to-peak

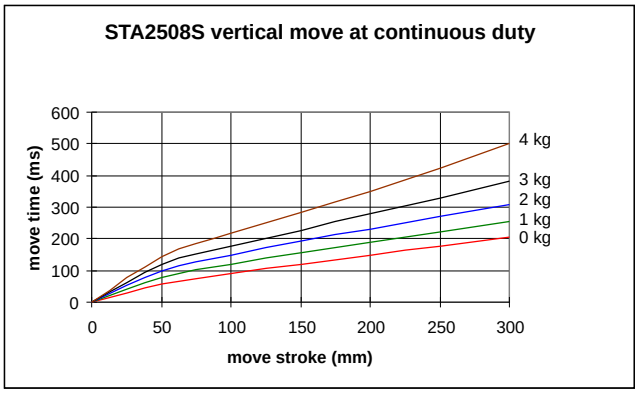
ENVIRONMENTAL RATING
IP67
CE compliant: EMC 89/336/EEC, LVD 73/23/EEC

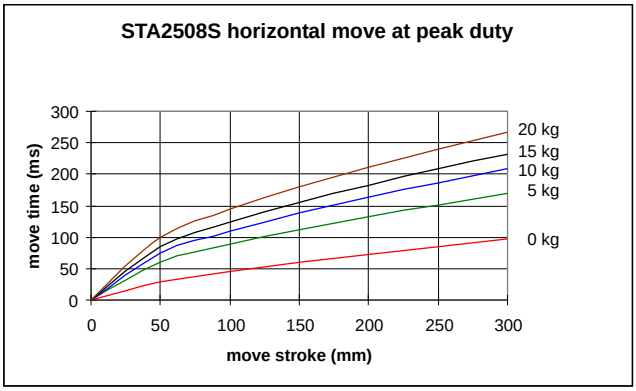
1. Peak acceleration is for 27 mm stroke actuator
2. Maximum speed is with moving rod of maximum stroke, triangular move.

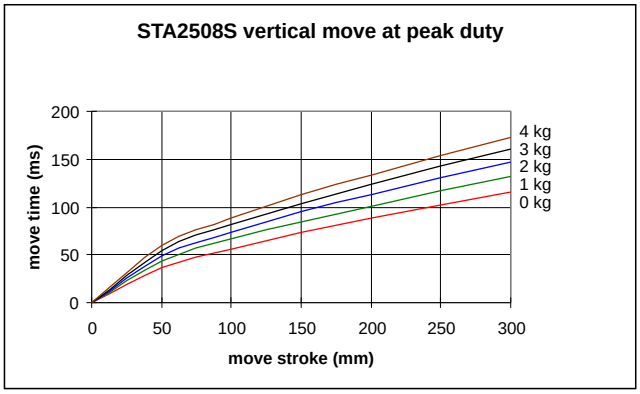
ALL DIMENSIONS IN MM





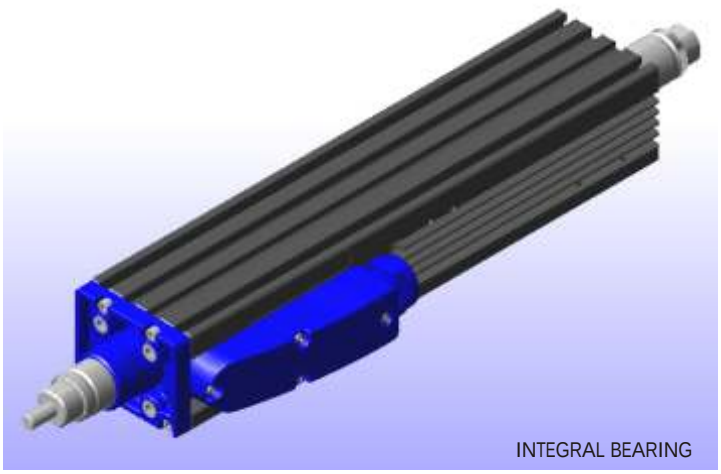






Performance figures are based on convection cooling. Higher ratings are possible with forced-air cooling (consult factory).

STA 2510



PLEASE REFER TO PAGE 28 FOR FURTHER DETAILS

PERFORMANCE		
Maximum stroke	309 mm	(12.17 in)
Peak force	780 N	(175.35 lbf)
Continuous force	90 N	(20.05 lbf)
Peak acceleration	586 m/s^2	(1922.6 ft/s^2)
Maximum speed	4.2 m/s	(13.78 ft/s)
Bearing life	64,000 km	(39,768 mi)

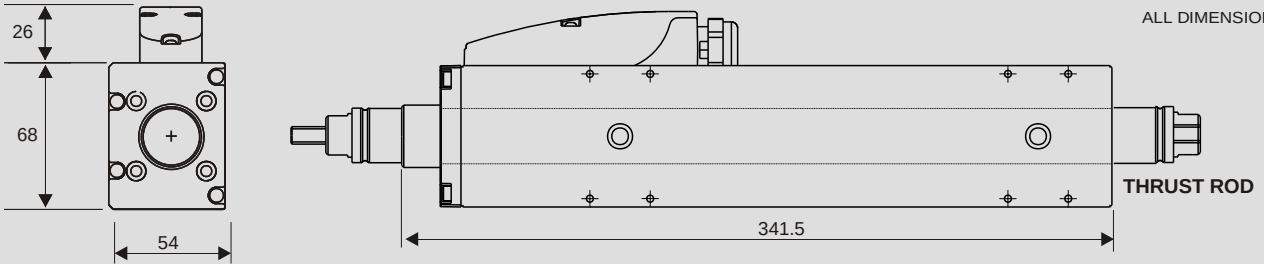
MASS		
Forcer	2.65 kg	(5.84 lb)
Thrust rod	3.5 kg/m	(2.35 lb/ft)

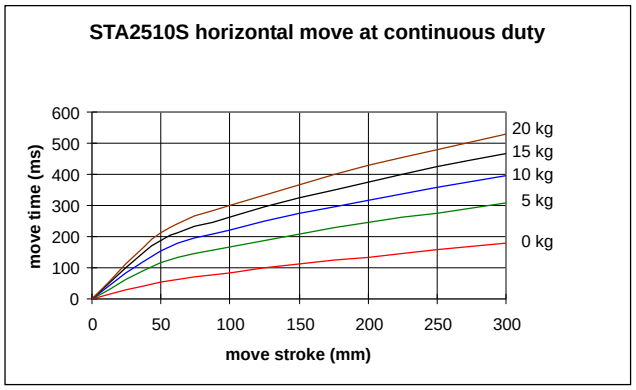
AMPLIFIER INTERFACE
Motor winding - 3 phase servo compatible
Position sensor - Industrial standard, sine / cosine 1V peak-to-peak

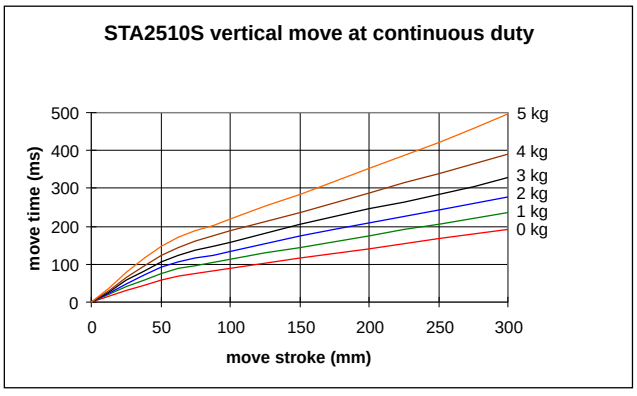
ENVIRONMENTAL RATING
IP67
CE compliant: EMC 89/336/EEC, LVD 73/23/EEC

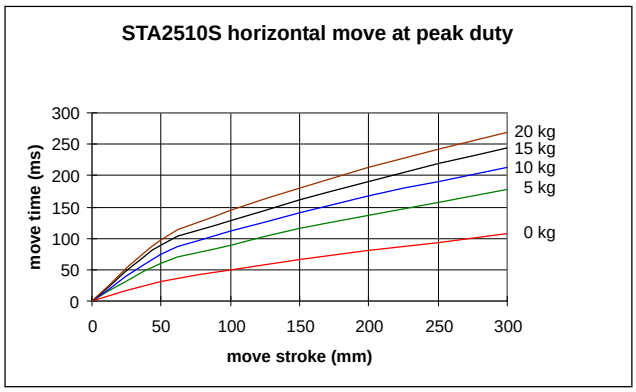
1. Peak acceleration is for 27 mm stroke actuator
2. Maximum speed is with moving rod of maximum stroke, triangular move.

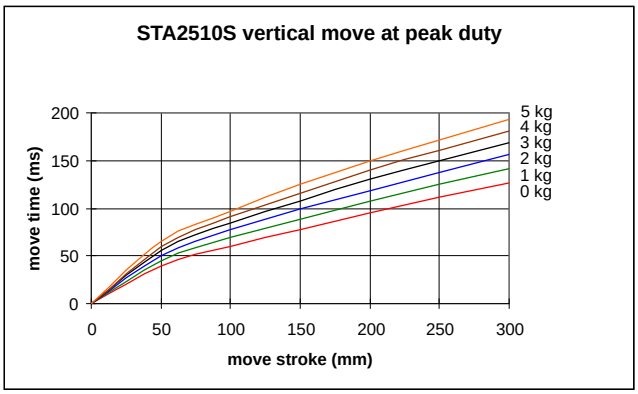
ALL DIMENSIONS IN MM





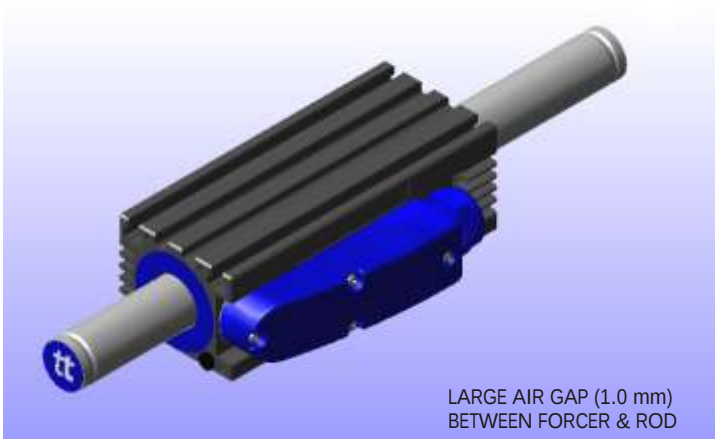






Performance figures are based on convection cooling. Higher ratings are possible with forced-air cooling (consult factory).

STB 2504



PLEASE REFER TO PAGE 29 FOR FURTHER DETAILS

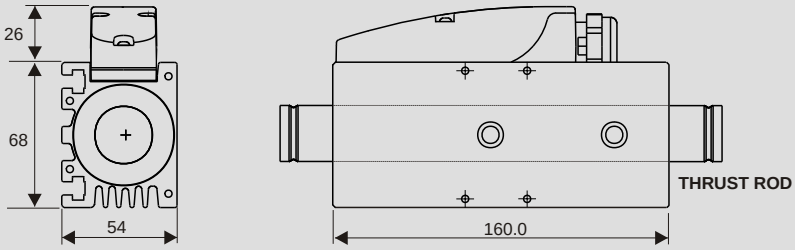
PERFORMANCE		
Maximum stroke	1180 mm	(46.46 in)
Peak force	312 N	(70.14 lbf)
Continuous force	42 N	(9.44 lbf)
Peak acceleration	223 m/s^2	(731.63 ft/s^2)[2]
Maximum speed	8.7 m/s	(28.54 ft/s)
MASS		
Forcer	1.40 kg	(3.09 lb)
Thrust rod	3.5 kg/m	(2.35 lb/ft)

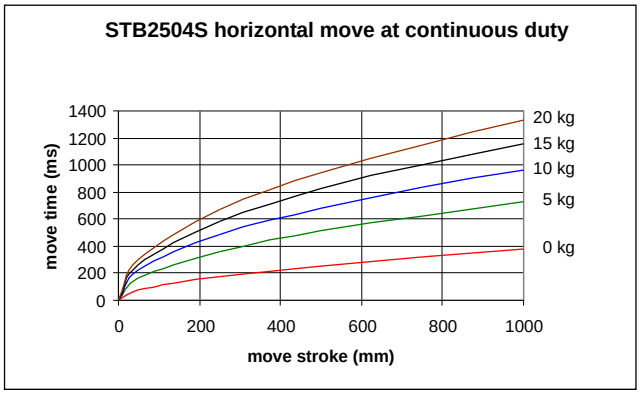
AMPLIFIER INTERFACE
Motor winding - 3 phase servo compatible
Position sensor - Industrial standard, sine / cosine 1V peak-to-peak

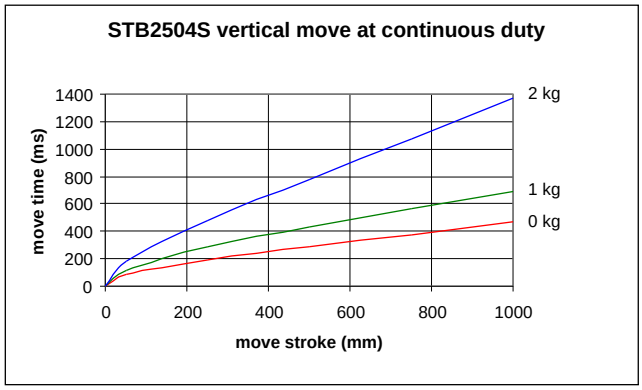
ENVIRONMENTAL RATING
IP67
CE compliant: EMC 89/336/EEC, LVD 73/23/EEC

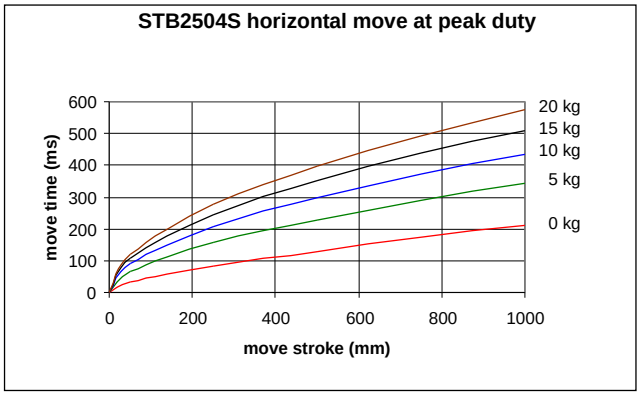
1. Peak acceleration is with moving forcer.
2. Maximum speed is with moving forcer over maximum stroke.
3. Forcer mass includes mass of recommended bearing carriage(s).

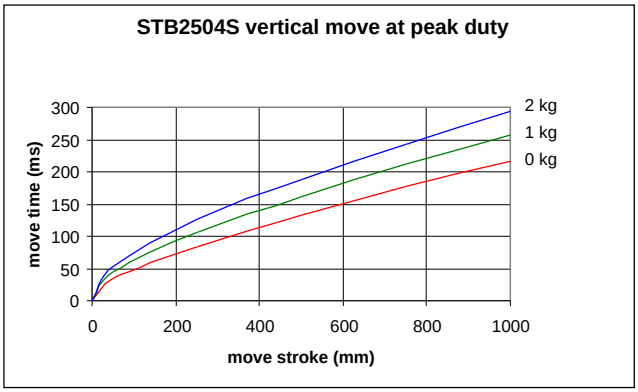
ALL DIMENSIONS IN MM





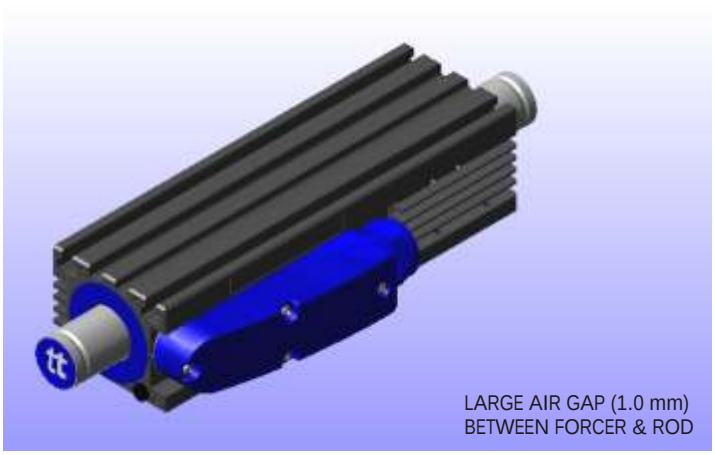






Performance figures are based on convection cooling. Higher ratings are possible with forced-air cooling (consult factory).

STB 2506



PLEASE REFER TO PAGE 29 FOR FURTHER DETAILS

PERFORMANCE		
Maximum stroke	1129 mm	(44.45 in)
Peak force	468 N	(105.2 lbf)
Continuous force	59 N	(13.26 lbf)
Peak acceleration	223 m/s^2	(731.63 ft/s^2)[2]
Maximum speed	6.5 m/s	(21.33 ft/s)

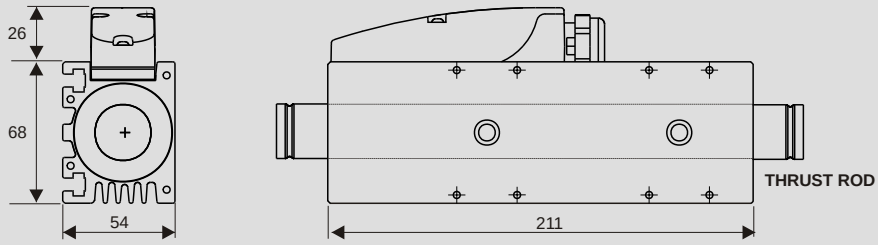
MASS		
Forcer	2.10 kg	(4.63 lb)
Thrust rod	3.5 kg/m	(2.35 lb/ft)

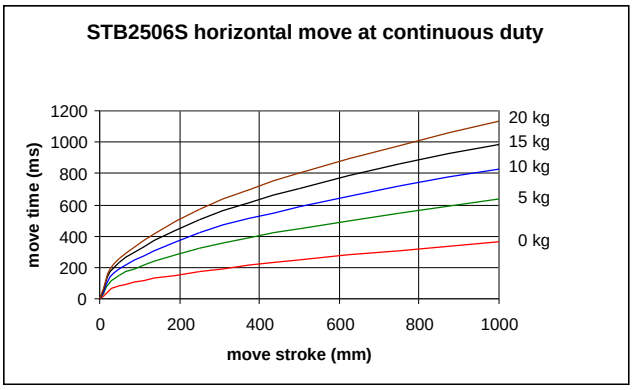
AMPLIFIER INTERFACE
Motor winding - 3 phase servo compatible
Position sensor - Industrial standard, sine / cosine 1V peak-to-peak

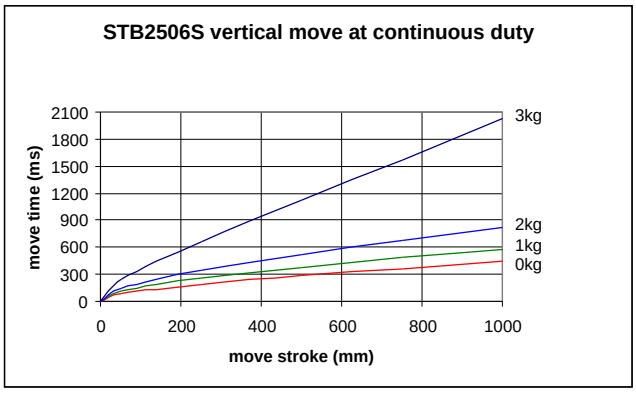
ENVIRONMENTAL RATING
IP67
CE compliant: EMC 89/336/EEC, LVD 73/23/EEC

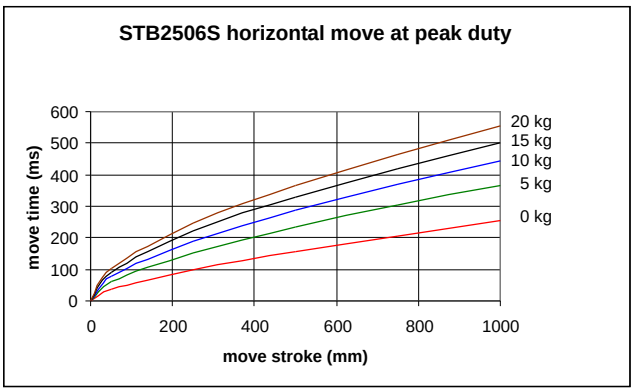
1. Peak acceleration is with moving forcer.
2. Maximum speed is with moving forcer over maximum stroke.
3. Forcer mass includes mass of recommended bearing carriage(s).

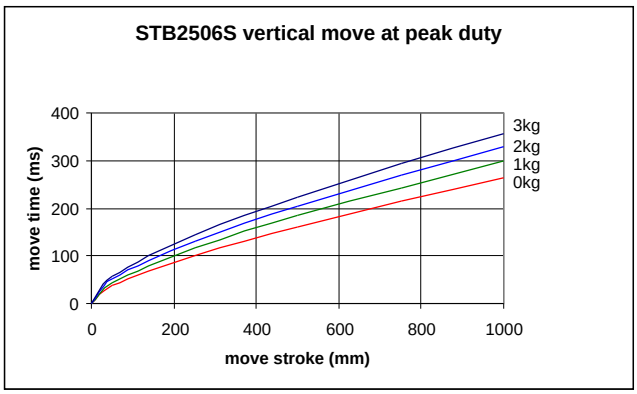
ALL DIMENSIONS IN MM





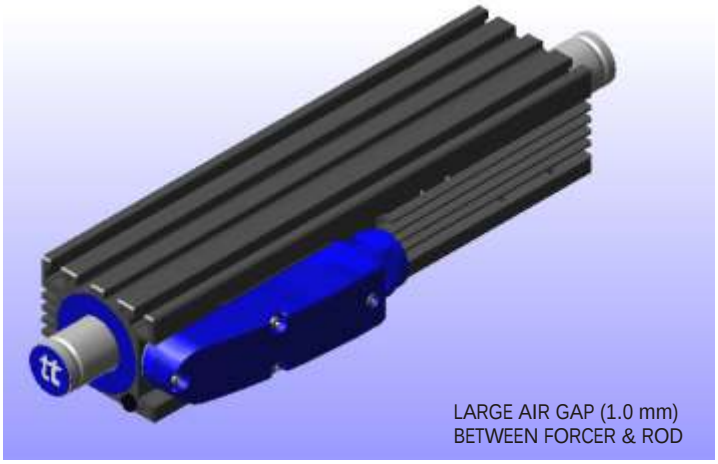






Performance figures are based on convection cooling. Higher ratings are possible with forced-air cooling (consult factory).

STB 2508



PLEASE REFER TO PAGE 29 FOR FURTHER DETAILS

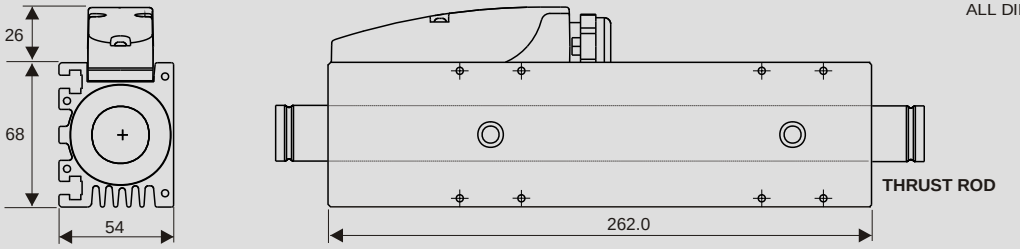
PERFORMANCE		
Maximum stroke	1078 mm	(42.44 in)
Peak force	624 N	(140.28 lbf)
Continuous force	75 N	(16.86 lbf)
Peak acceleration	235 m/s^2	(771.00 ft/s^2)
Maximum speed	5.4 m/s	(17.72 ft/s)
MASS		
Forcer	2.65 kg	(5.84 lb)
Thrust rod	3.5 kg/m	(2.35 lb/ft)

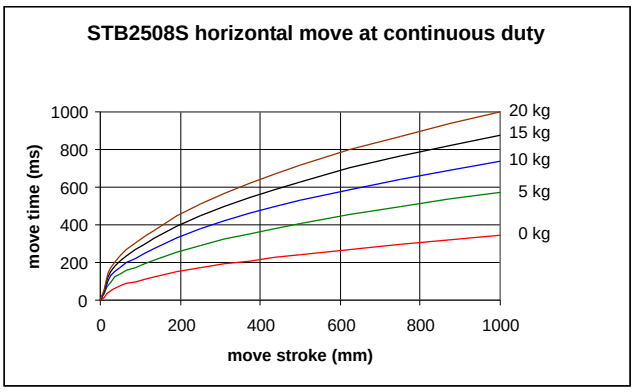
AMPLIFIER INTERFACE
Motor winding - 3 phase servo compatible
Position sensor - Industrial standard, sine / cosine 1V peak-to-peak

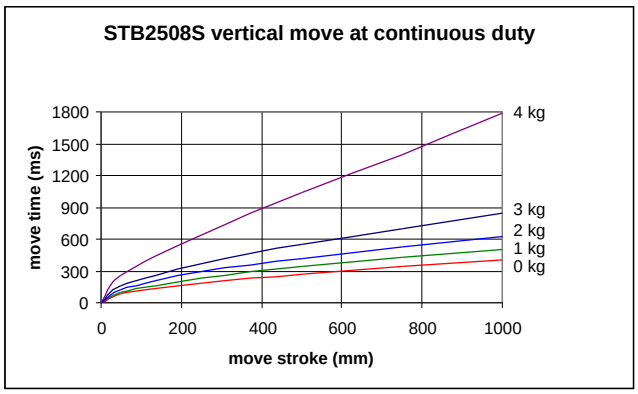
ENVIRONMENTAL RATING
IP67
CE compliant: EMC 89/336/EEC, LVD 73/23/EEC

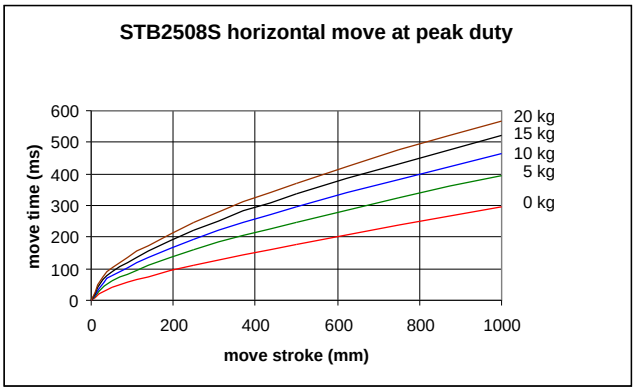
1. Peak acceleration is with moving forcer.
2. Maximum speed is with moving forcer over maximum stroke.
3. Forcer mass includes mass of recommended bearing carriage(s).

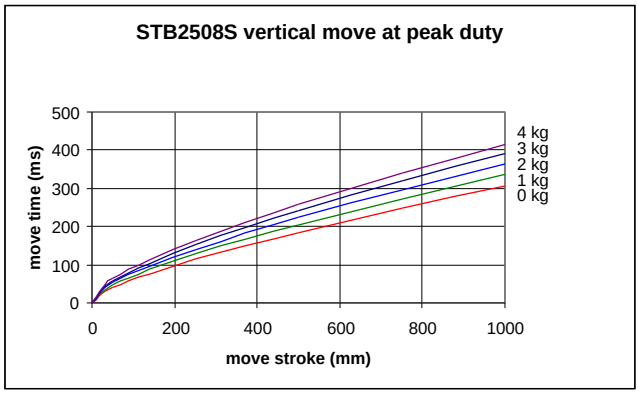
ALL DIMENSIONS IN MM





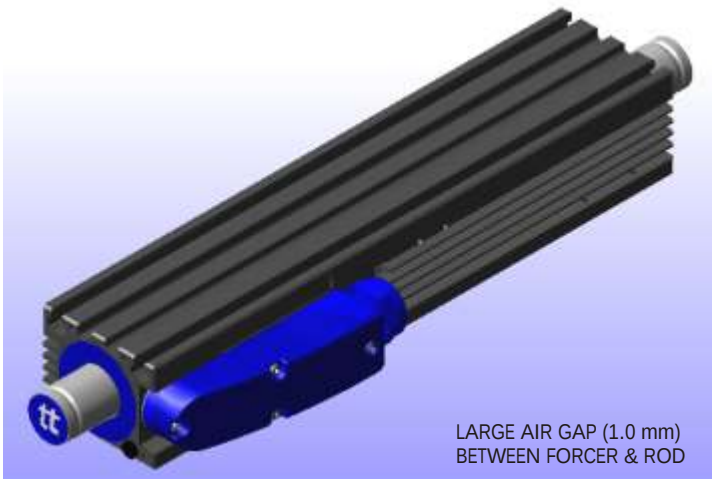






Performance figures are based on convection cooling. Higher ratings are possible with forced-air cooling (consult factory).

STB 2510



PLEASE REFER TO PAGE 29 FOR FURTHER DETAILS

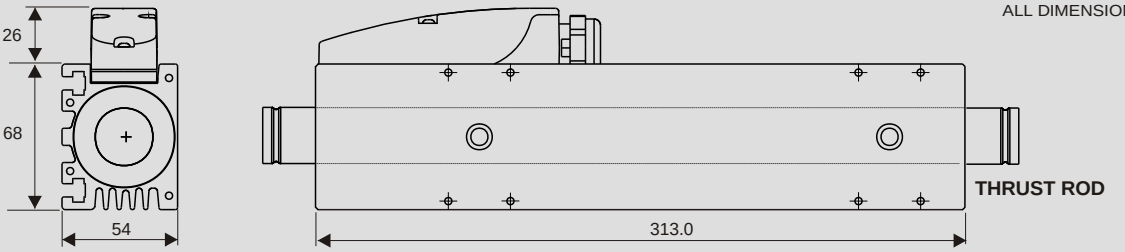
PERFORMANCE		
Maximum stroke	1027 mm	(40.43 in)
Peak force	780 N	(175.35 lbf)
Continuous force	90 N	(20.05 lbf)
Peak acceleration	256 m/s^2	(839.9 ft/s^2)
Maximum speed	4.6 m/s	(15.09 ft/sec)
MASS		
Forcer	3.05 kg	(6.72 lb)
Thrust rod	3.5 kg/m	(2.35 lb/ft)

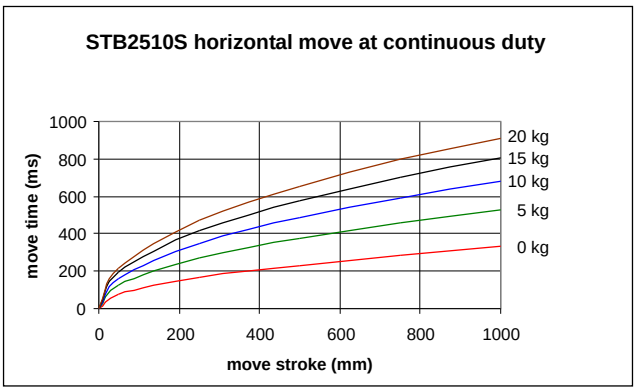
AMPLIFIER INTERFACE
Motor winding - 3 phase servo compatible
Position sensor - Industrial standard, sine / cosine 1V peak-to-peak

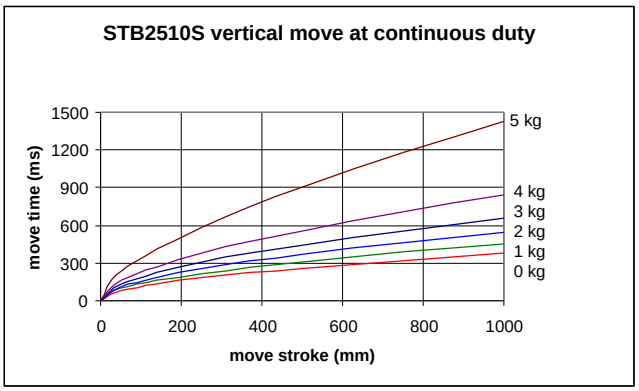
ENVIRONMENTAL RATING
IP67
CE compliant: EMC 89/336/EEC, LVD 73/23/EEC

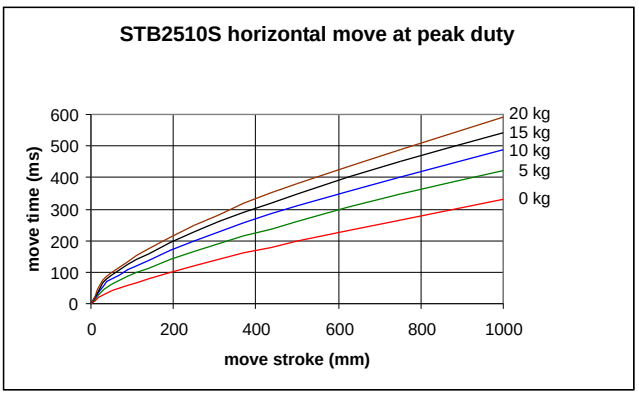
1. Peak acceleration is with moving forcer.
2. Maximum speed is with moving forcer over maximum stroke.
3. Forcer mass includes mass of recommended bearing carriage(s).

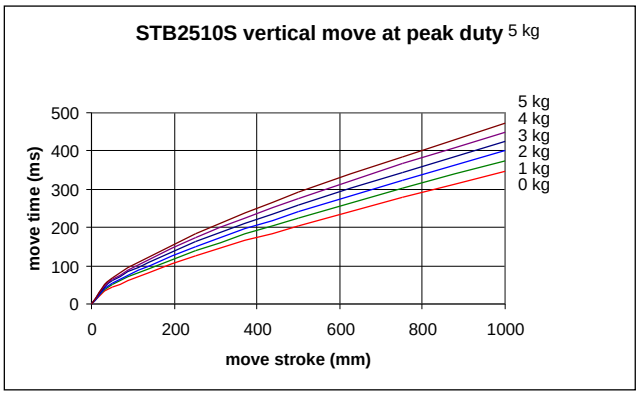
ALL DIMENSIONS IN MM









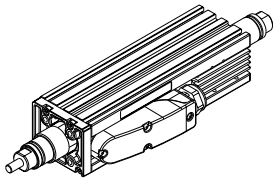


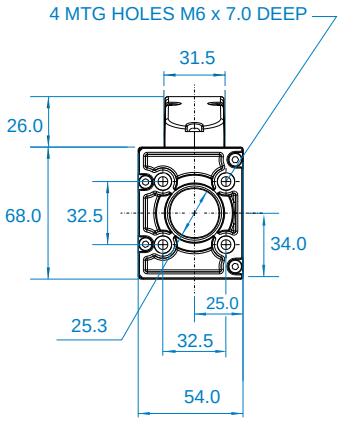
Performance figures are based on convection cooling. Higher ratings are possible with forced-air cooling (consult factory).

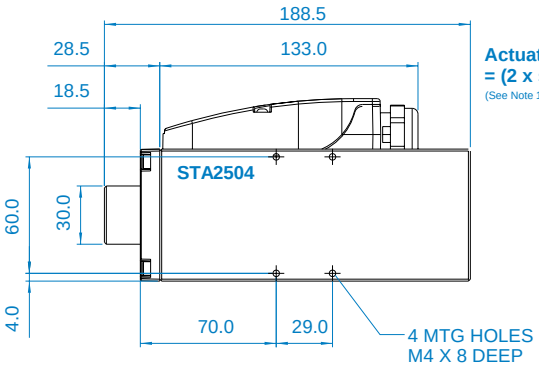
ServoTube Actuator

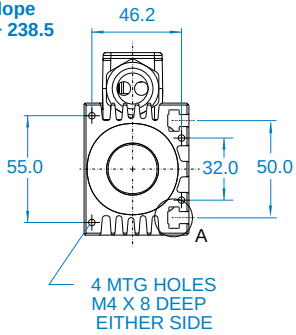
STA2504, STA2506, STA2508, STA2510

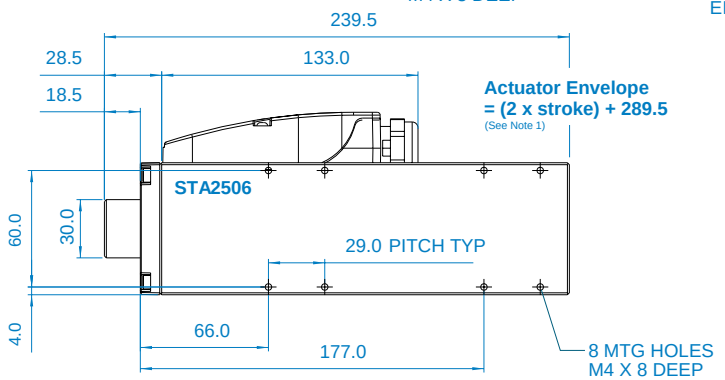
Outline details and mounting information

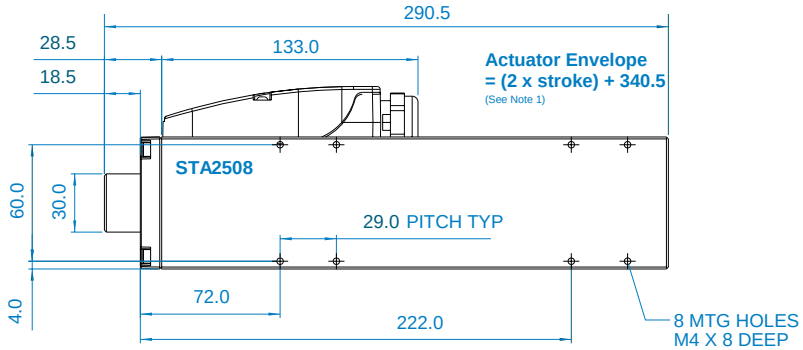


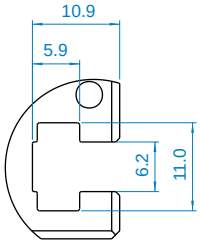


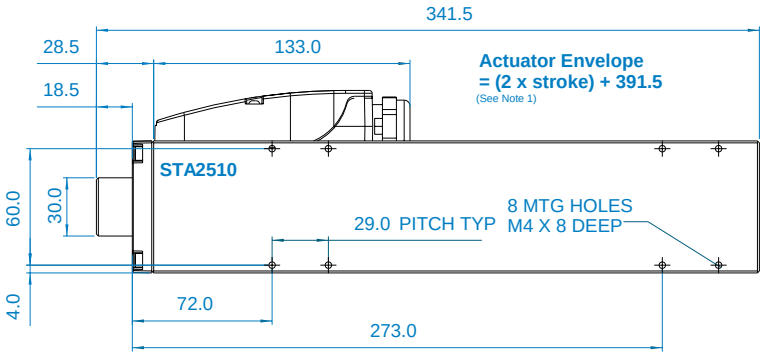


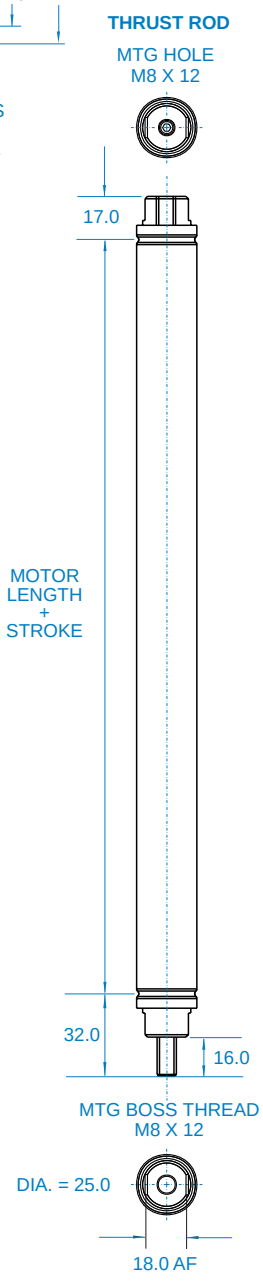












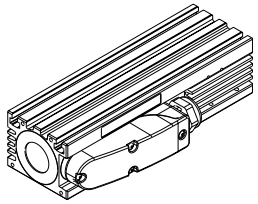
ALL DIMENSIONS IN MM

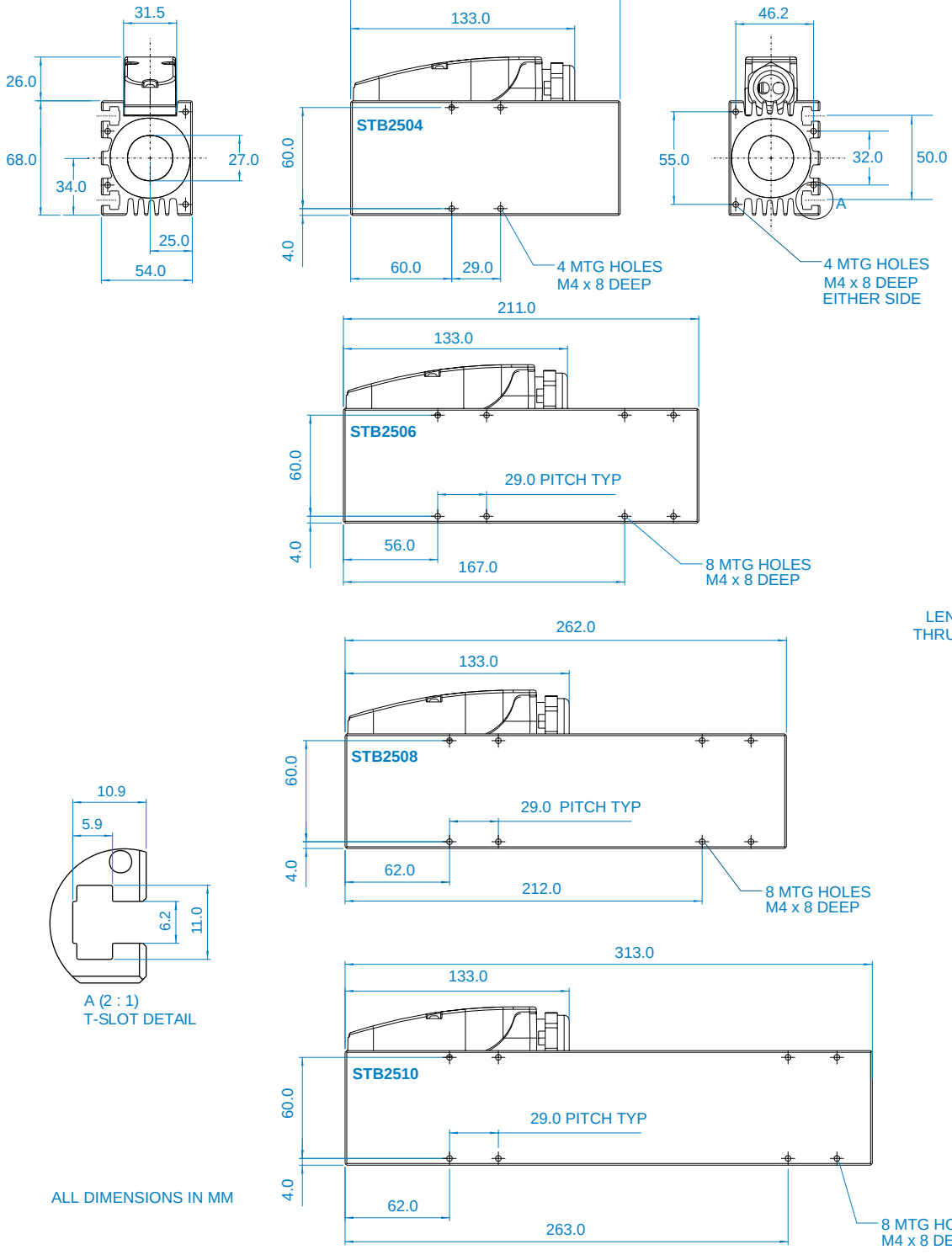
Note 1. Actuator is double acting

ServoTube Component

STB2504, STB2506, STB2508, STB2510

Outline details and mounting information





Electrical Specification

ServoTube Actuator & ServoTube Component

MOTOR TYPE	2504		2506		2508		2510		Units
Series or Parallel Winding	Series	Parallel	Series	Parallel	Series	Parallel	Series	Parallel	
Peak force @ 25°C ambient for 1 sec	312	156	468	234	624	312	780	390	N
Peak current @ 25°C ambient for 1 se	20	20	20	20	20	20	20	20	A_{pk}
With 25x25x2.5cm heatsink plate									
Continuous stall force @ 25°C ambient	51.2	51.2	69.5	69.5`	86.4	86.4	102.4	102.4	N
Continuous stall current @ 25°C ambient	2.31	4.62	2.10	4.20	1.96	3.92	1.86	3.72	A_{rms}
	3.27	6.54	2.97	5.94	2.77	5.54	2.62	5.24	A_{pk}
Without heatsink plate									
Continuous stall force @ 25°C ambient (1)	42.5	42.5	59.5	59.5	75.1	75.1	90.0	90.0	N
Continuous stall current @ 25°C ambient	1.92	3.84	1.80	3.60	1.70	3.40	1.63	3.26	A_{rms}
	2.72	5.44	2.54	5.08	2.41	4.82	2.31	4.62	A_{pk}
Force constant (sine commutation)	22.1	11.0	33.1	16.5	44.1	22.0	55.2	27.6	N/A_{rms}
	15.6	7.8	23.4	11.7	31.2	15.6	39.0	19.5	N/A_{pk}
Back EMF constant (phase to phase)	18.0	9.0	27.0	13.5	36.0	18.0	45.0	22.5	V_{pk}/m/s
Fundamental motor constant	6.47	6.47	7.92	7.92	9.13	9.13	10.24	10.24	$N/\sqrt{W}$
Eddy current loss	9.51	9.51	12.55	12.55	15.58	15.58	18.61	18.61	N/m/s
Resistance @ 25°C (phase to phase)	6.02	1.50	9.02	2.25	12.03	3.01	15.04	3.76	ohm
Resistance @ 100°C (phase to phase)	7.75	1.94	11.63	2.91	15.51	3.88	19.39	4.85	ohm
Inductance @ 1kHz (phase to phase)	3.90	0.97	5.85	1.46	7.80	1.95	9.75	2.44	mH
Electrical time constant	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	ms
Continuous working voltage	380	380	380	380	380	380	380	380	V d.c.

Note (1) Reduce continuous stall force to 89% at 40°C ambient

Thermal Specification

ServoTube Actuator & ServoTube Component

MOTOR TYPE	2504	2506	2508	2510	Units
Maximum phase temperature	100	100	100	100	°C
Thermal resistance $R_{th\ phase\ housing}$	0.41	0.27	0.20	0.16	°C/W
With 25 x 25 x 2.5 cm heatsink plate					
Power dissipation @ 25°C ambient	62.3	77.0	89.2	100.2	Watt
Thermal resistance $R_{th\ housing\text{-}ambient}$	0.79	0.69	0.64	0.59	°C/W
Without heatsink plate					
Power dissipation @ 25°C ambient	43.1	56.4	67.6	77.3	Watt
Thermal resistance $R_{th\ housing\text{-}ambient}$	1.33	1.06	0.91	0.81	°C/W
Thermal time constant	1188	1276	1377	1486	s

Order Guide

Actuator

STA25 □□□-□□□-□-□□□□

Forcer
04, 06, 08, 10

Winding
S - Series
P - Parallel

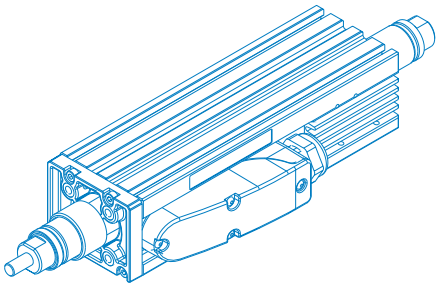
Stroke
027, 053, 078, 104, 130, 155
181, 206, 232, 258, 283, 309
Stroke in mm

Environment
S - Standard
F - Food grade

Cable Termination
X - Xenus
F - Flying leads
P - Parker

Cable Length
03 - 3 m
05 - 5 m

Cable Type
S - Non-Robotic
R - Robotic



NOTE: See page 6 for Xenus Indexer Order Guide

Components

Forcer

STB25 □□□-□-□□□□

Forcer
04, 06, 08, 10

Winding
S - Series
P - Parallel

Environment
S - Standard
F - Food grade

Cable Termination
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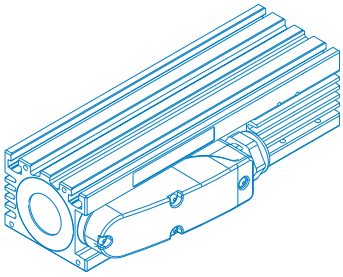

Thrust Rod

TRB25-□□□□

Thrust rod length

0226	0354	0482	0611	0739	0918	1175
0252	0380	0508	0636	0765	0970	1226
0277	0405	0534	0662	0790	1021	1278
0303	0431	0559	0688	0816	1072	1329
0329	0457	0585	0713	0867	1124	1380

Length in mm

ServoTube®
APPLICATION GUIDE

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