![Copley Controls Corp.]
Copley Controls Corp.
Copley Motion Systems LLC

Selection Guide

Servo Drives • Stepper Drives • Control Software
Linear Motors • Linear Actuators

Copley Cont

About Copley

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. An ISO 9001:2000 company, Copley produces products of the highest quality in state-of-the-art manufacturing facilities in both the US and UK.

With over 20 years of experience in OEM partnerships, Copley's application team combines with R&D to deliver world-class, highly responsive support. Our global commitment is backed with sales offices and local technical support in the US, Europe and Asia.

Drives & Controls

From networked servo and stepper drives to traditional torque amplifiers, Copley has the solution for your system architecture. A flexible range of packaging options is available in the 100W - 5kW power range. Copley software tools make distributed control system commissioning fast and simple. Advanced tuning and commutation algorithms maximize motor performance.

rols

Custom OEM Solutions

Copley provides competitive advantage to the OEM by tailoring designs to precisely fit the application. Amplifier customization can be as simple as special I/O functions or as complex as a complete, cost-optimized multi-axis system. Motors can be incorporated into ready-to-use modules with bearing rails and limit switches.
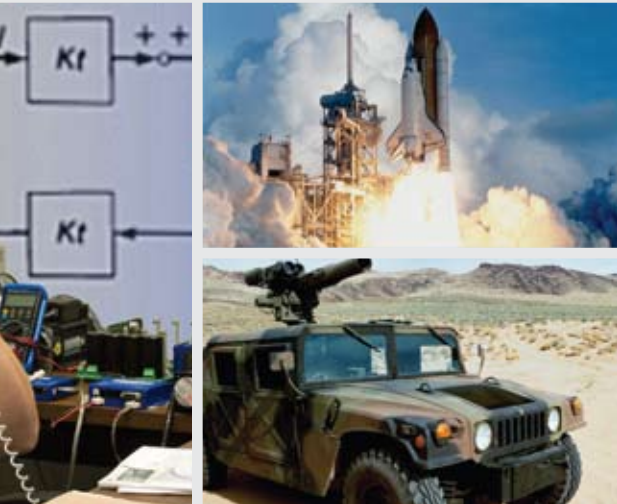
Linear Motors & Actuators

Copley Controls is the inventor of the tubular linear motor, setting new standards for performance and ease of mechanical integration. Patented magnetics and internal feedback deliver 12 micron repeatability without the need for a linear encoder. Moving-rod linear actuators with integral bearings are available as well as moving-forcer linear motors. Peak force capability is up to 1860 N.

Connectivit

Incremental Encoders

Digital incremental encoder and Halls are the standard interface on all drives with position mode capability. Xenus and Accelnet have an analog encoder option and feature a wake-and-wiggle algorithm for commutation without Halls.

Resolvers

Resolvers are the feedback of choice for rugged environments. Optional on Xenus, Copley's proprietary interface delivers 14 bit resolution up to 10,000 rpm.

Absolute Encoders

Select Copley drives are available with a range of open standard absolute encoder interfaces including EnDat 2.2, BiSS, Hiperface and SSI.

FEEDBACK

PC Based, Motion Card, PLC

A flexible range of operating modes and command interfaces enable seamless integration into both centralized and distributed control architectures. Operating modes, including advanced camming and trajectory tracking, are built-in as standard.

Copley CANopen drives have also been integrated into third party software tools including LabVIEW and CoDeSys SoftMotion for complete PC-Based multi-axis motion control solutions.

Operating Modes
- Indexer, Point-to-Point
- PVT, PT Trajectory Tracking
- Camming, Gearing
- Position: Step/Dir, ±10V
- Velocity: PWM, ±10V
- Torque: PWM, ±10V, UV

y

CANopen

CANopen is a highly cost effective implementation of distributed control. In PVT mode, the drive accepts synchronized position/velocity/time points. In profile mode the drive executes a move based on pretransmitted parameters. CANopen also accomodates velocity and torque mode.

CAN-PCI-02

CAN-IPM-01

Copley provides extensive hardware and software tools for CANopen. CAN-PCI-02 is a fully isolated dual-channel PCI card with an on-board micro controller. CAN-IPM-01 I/O Processor Module enables OEMs to design optimal system interfaces and integrate them seamlessly into a CANopen network.

EtherCAT

EtherCAT is an open, real-time Ethernet network. Fast and deterministic, EtherCAT supports a variety of network topologies including line, tree and star. Both twisted pair and fiber optic implementations are available. EtherCAT leverages standard CANopen device profiles facilitating migration to an Ethernet based system.

MACRO

Designed for Delta Tau controllers, MACRO is Ethernet based and available in both fiber and copper physical layers. Fast and synchronized, MACRO is typically used in a centralized control architecture with position and velocity loops closed in the motion card.

NETWORKS

DeviceNet

DeviceNet is a distributed control solution typically used in PLC based systems. Drives operate as Indexers or execute moves based on pretransmitted parameters. There is no drive synchronization and DeviceNet finds its best application in point-to-point motion.

CONTROL

RS-232 ASCII

RS-232 is used for point-to-point motion in both PLC and PC based systems. Drives operate as Indexers or execute moves based on pretransmitted parameters. Multiple axes can be addressed via a transparent CANopen connection between drives.

Software To

CANopen & EtherCAT Control Software

Copley distributed control software makes system commissioning fast and simple. The development of low-level code to control a CANopen or EtherCAT network is eliminated. All network management is taken care of by a few simple commands linked into your application program.

Copley supports two development environments. Copley Motion Libraries (CML) link into a C++ application program. Copley Motion Objects (CMO) are COM objects that can be used by Visual Basic®, .NET®, LabVIEW® or any COM compliant software.
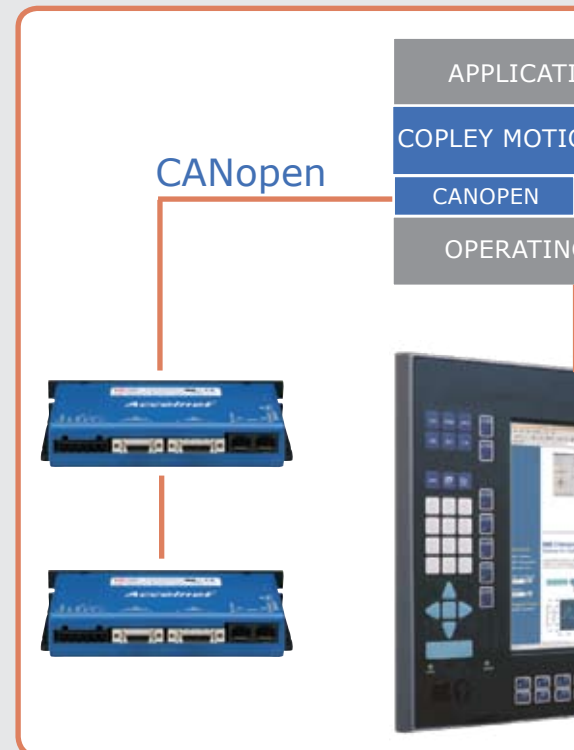
Network Management
• Configuration and startup
• Synchronization
• Node guarding
• Message generation
• Heartbeat
• Error management

Motion Control
• Path planning
• PVT generation
• Execute profiles
• PVT buffer management

General
• Set/get parameters
• Download setup files
• Drive fault handling
• I/O interfacing

CANopen

APPLICATI

COPLEY MOTIO

CANOPEN

OPERATING

Intuitive Configuration

Java based CME 2 configuration software is powerful and intuitive. Comprehensive diagnostics, auto-tuning and advanced oscilloscope tools simplify system commissioning.

Auto-phasing eliminates time consuming rewire-and-try for encoder/Halls/motor connections. CME 2 automatically compensates for crossed wires - the most common cause of startup headaches.

6

ols

Built-In Indexing

Point-and-click to define up to 32 indexes or index sequences. Index sequences can include parameter changes, dwell times and I/O control. Simply select the index/sequence and command GO.

Any parameter (e.g. move distance) can be assigned to a register for efficient adjustment by a PLC.

For more complex applications, Copley can provide custom functions. Simply install and fill in the blanks.

Copley also provides a flexible OEM programming environment. Copley Virtual Machine assembler and powerful debugger enable the development of fast, compact control programs.
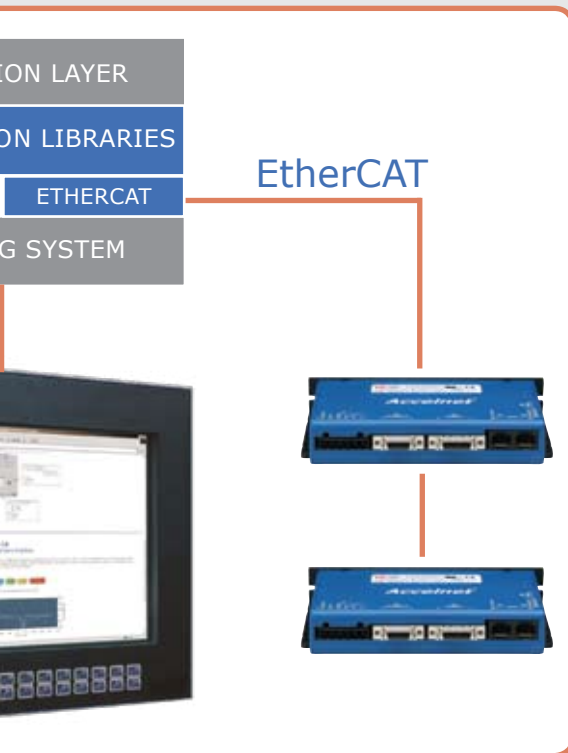
Absolute Move	Wait Move Done
Relative Move	Set Output
Velocity Move	Wait Time
Force Move	Wait Input
Home	Set Parameter

ON LAYER

ON LIBRARIES

ETHERCAT

G SYSTEM

EtherCAT

Cam Tables

Camming is an effective way to produce repetitive motion synchronized to an external device. A pre-defined cam-table of slave positions is typically cycled through by a master encoder connected to the drive. The drive performs linear interpolation between points to minimize cam-table size.

Digital Driv

Installation Flexibility

Copley offers a complete range of digital drives for brushless, brush and stepper motors. High power density panel-mount and PCB-mount packaging options provide installation flexibility. Both AC and DC powered versions are available.

AC Powered

Feature	Xenus	Accelnet
Motor	Brushless/Brush	Brushless/Brush
Input Power	100-240 VAC	20-180 VDC
Continuous Current	1-20 A	1-12 A
Feedback*	E, R, S	E, S, A
Ruggedized Version	•	•
CANopen, DeviceNet	•	•
EtherCAT, MACRO		•
Indexer	•	•
Camming	•	•
Gearing	•	•
Step/Direction	•	•
PWM velocity/current	•	•
±10V velocity/current	•	•

* E=Incremental Encoder, R=Resolver, S=Analog Encoder,

Technology Edge

Field Oriented Control
- Optimal orientation of magnetic fields
- Motors run faster and cooler

Servo & PWM Performance
- High bandwidth nested loops
- Biquad filter enables notch or low pass flters
- High efficiency dynamic PWM
- Edge filter accessories for low emissions

Stepper Technology
- Advanced current control for higher torque
- Very low audible noise
- Pecision microstepping with reduced resonance
- Servo mode for closed loop control
- Detent torque compensation

es

Custom Drive Designs

A broad spectrum of technology expertise enables Copley to respond rapidly and cost-effectively to OEM needs. Custom capabilities include:

- Optimized Packaging: connectors and form factor
- Power Ratings: custom current and voltage
- Multi-Axis: rack systems and 2-4 axis packages
- Java Beans: custom indexer functions
- Feedback: special encoders
- Enhanced Firmware: custom compensation filters

Stepnet	Accelus	Junus
Stepper	Brushless/Brush	Brush
VAC, VDC	20-180 VDC	20-180 VDC
2-5 A	3-12 A	5-10 A
E	E	V
•		
•		
•		
•	•	
•	•	
•	•	•
•	•	•

A=Absolute Encoder, V=Back-EMF

DC Powered

Ruggedized Drives

The R-Series incorporates ruggedized versions of Xenus and Accelnet. Designed to endure temperature extremes, high humidity, vibration and shock, the R-Series finds application in COTS military, nautical, aviation, oil refining and vehicle based systems.

Ambient Temp.	-40ºC to 70ºC
Thermal Shock	-40ºC to 70ºC in 1 minute
Relative Humidity	95% non-condensing at 60ºC
Vibration	5 Hz to 500 Hz, up to 3.85 $g$rms
Altitude	-400 m to 5,000 m
Shock	40 g peak acceleration

Xenus

BRUSHLESS • BRUSH

Panel	VAC	Ic	Ip
XTL-230-18	100 - 240	6	18
XTL-230-36	100 - 240	12	36
XTL-230-40	100 - 240	20	40

Resolver: append -R
Analog encoder: append -S

Micro Panel	VAC	Ic	Ip
XSJ-230-02	100 - 240	1	2
XSJ-230-06	100 - 240	3	6
XSJ-230-10	100 - 240	5	10

Resolver: append -R
Analog encoder: append -S

Control Modes
• Indexer, Point-to-Point, PVT
• Camming, Gearing, Position, Velocity, Torque

Command Interface
• CANopen/DeviceNet
• ASCII and discrete I/O
• Stepper commands
• ±10V position/velocity/torque command
• PWM velocity/torque command
• Master encoder [Gearing/Camming]

Communications
• CANopen/DeviceNet
• RS-232

Accessories
• External regen resistors
• External edge filter

Feedback
• Digital quad A/B encoder
• Aux. encoder / encoder out
• Analog sin/cos encoder [Panel, Micro Panel option]
• Resolver [Panel, Micro Panel option]
• Digital Halls

I/O - Digital
• 11-14 inputs, 4 outputs

Regen
• Panel: external resistor dissipation
• Micro Panel: internal dissipation

Dimensions: mm [in]
• Panel: 191 x 140 x 64 [7.5 x 5.5 x 2.5]
• Micro Panel: 126 x 90 x 53 [5.0 x 3.5 x 2.1]

Accelnet

BRUSHLESS • BRUSH

Panel	VDC	Ic	Ip
ADP-055-18	20 - 55	6	18
ADP-090-09	20 - 90	3	9
ADP-090-18	20 - 90	6	18
ADP-090-36	20 - 90	12	36
ADP-180-09	20 - 180	3	9
ADP-180-18	20 - 180	6	18

Analog encoder: append -S

Micro Panel	VDC	Ic	Ip
ACJ-055-09	20 - 55	3	9
ACJ-055-18	20 - 55	6	18
ACJ-090-03	20 - 90	1	3
ACJ-090-09	20 - 90	3	9
ACJ-090-12	20 - 90	6	12

Analog encoder: append -S

Module	VDC	Ic	Ip
ACM-055-18	20 - 55	6	18
ACM-090-09	20 - 90	3	9
ACM-180-09	20 - 180	3	9
ACM-180-18	20 - 180	6	18
ACM-180-20	20 - 180	10	20

Micro Module	VDC	Ic	Ip
ACK-055-06	20 - 55	3	6
ACK-090-04	20 - 90	2	4

Control Modes
• Indexer, Point-to-Point, PVT
• Camming, Gearing, Position, Velocity, Torque

Command Interface
• CANopen/DeviceNet
• EtherCAT [Panel option]
• MACRO [Panel option]
• ASCII and discrete I/O
• Stepper commands
• ±10V position/velocity/torque command
• PWM velocity/torque command
• Master encoder [Gearing/Camming]

Communications
• CANopen/DeviceNet
• EtherCAT & MACRO [Panel option]
• RS-232

Feedback
• Digital quad A/B encoder
• Aux. encoder/encoder out [Panel, Micro Panel]
• Analog sin/cos encoder [Panel, Micro Panel option]
• Digital Halls
• EnDat 2.2, Hiperface, BISS, SSI, Yaskawa & Panasonic encoders [EtherCAT, MACRO drives]

I/O - Digital
• 8-12 inputs, 2-4 outputs

Dimensions: mm [in]
• Panel: 168 x 99 x 31 [6.6 x 3.9 x 1.2]
• EtherCAT, MACRO: 196 x 99 x 31 [7.7 x 3.9 x 1.2]
• Micro Panel: 97 x 64 x 33 [3.8 x 2.5 x 1.3]
• Module: 102 x 69 x 25 [4.0 x 2.7 x 1.0]
• Micro Module: 64 x 41 x 16 [2.5 x 1.6 x 0.6]

Stepnet

STEPPER

Stepnet AC	VAC	Ic	Ip
STX-115-07	115	5	7
STX-230-07	240	5	7

Panel	VDC	Ic	Ip
STP-075-07	20 - 75	5	7

Module	VDC	Ic	Ip
STM-075-07	20 - 75	5	7

Micro Module	VDC	Ic	Ip
STL-055-04	20 - 55	3	4.5
STL-075-03	20 - 75	2	3

Control Modes
• Indexer, Point-to-Point, PVT
• Camming, Gearing
• Position, Velocity, Torque [Servo Mode]
• Position (Microstepping)

Command Interface
• CANopen/DeviceNet
• ASCII and discrete I/O
• Stepper commands
• ±10V position/velocity/torque command
  [Stepnet AC, Module]
• PWM velocity/torque command
• Master encoder [Gearing/Camming]

Feedback
• Digital quad A/B encoder [Servo Mode]

Communications
• CANopen/DeviceNet
• RS-232

I/O - Digital
• 12 inputs, 4 outputs

Dimensions: mm [in]
• Stepnet AC: 146 x 119 x 55 [5.7 x 4.7 x 2.2]
• Panel: 138 x 78 x 39 [5.4 x 3.1 x 1.5]
• Module: 102 x 69 x 25 [4.0 x 2.7 x 1.0]
• Micro Module: 64 x 41 x 16 [2.5 x 1.6 x 0.6]

Accelus
BRUSHLESS • BRUSH

Panel	VDC	Ic	Ip
ASP-055-18	20 - 55	6	18
ASP-090-09	20 - 90	3	9
ASP-090-18	20 - 90	6	18
ASP-090-36	20 - 90	12	36
ASP-180-09	20 - 180	3	9
ASP-180-18	20 - 180	6	18

Card	VDC	Ic	Ip
ASC-055-18	20 - 55	6	18
ASC-090-09	20 - 90	3	9

Control Modes
• Gearing, Position, Velocity, Torque

Command Interface
• Stepper commands
• ±10V position/velocity/torque command
• PWM velocity/torque command
• Master encoder [Gearing]

Communications
• RS-232

Feedback
• Digital quad A/B encoder
• Digital Halls

I/O - Digital
• 6 inputs, 2 outputs

Dimensions: mm [in]
• Panel: 168 x 99 x 31 [6.6 x 3.9 x 1.2]
• Card: 153 x 89 x 31 [6.0 x 3.5 x 1.2]

Junus
BRUSH • VOICE COIL

Model	VDC	Ic	Ip
JSP-090-10	20 - 90	5	10
JSP-090-20	20 - 90	10	20
JSP-180-10	20 - 180	5	10
JSP-180-20	20 - 180	10	20

Control Modes
• Velocity, Torque

Command Interface
• ±10V velocity/torque command
• PWM velocity/torque command

Communications
• RS-232

Feedback
• Back-EMF (velocity mode)

I/O - Digital
• 5 inputs, 1 output

Dimensions: mm [in]
• 130 x 82 x 31 [5.1 x 3.2 x 1.2]

Analog Amp

Copley offers a complete range of analog amplifiers for brushless, brush and voice coil motors. 7 Series sinusoidal amplifiers accept externally commutated UV current commands.

5 Series trapezoidal amplifiers commutate from Halls. 4 Series brush/voice coil amplifiers accept tachometer feedback for velocity mode operation.

Amplifier Technology
• Excellent linearity
• High PWM switching frequency
• Temperature drift compensation
• Zero deadband
• Internal edge filter option

Protection
• Output short circuit
• Current limiting: continuous, peak, time
• Overtemperature
• Overvoltage shutdown
• Undervoltage shutdown

Sinusoidal Brushless Amplifiers

Model	VAC	Ic	Ip
7225AC	100 - 120	10	20
7425AC	100 - 240	10	20

Control Mode: Torque
Command Interface: UV
Dimensions: 191 x 176 x 69 [7.5 x 6.9 x 2.7]

Model	VDC	Ic	Ip
7225X1	24 - 180	10	25
7225X2	24 - 180	10	25

Control Mode: Torque
Command Interface: UV
Dimensions X1: 186 x 112 x 39 [7.3 x 4.4 x 1.5]
Dimensions X2: 249 x 125 x 46 [7.3 x 4.9 x 1.8]

lifiers

Trapezoidal Brushless Amplifiers

Model	VAC	Ic	Ip
5224AC	100 - 120	10	20
5234AC	100 - 120	15	30
5424AC	100 - 240	10	20
5434AC	100 - 240	15	30

Control Mode: Torque
Command Interface: ±10V
Dimensions: 191 x 176 x 69 [7.5 x 6.9 x 2.7]

Model	VDC	Ic	Ip
503	18 - 55	5	10

Control Mode: Torque
Command Interface: ±10V
Dimensions: 120 x 84 x 33 [4.7 x 3.3 x 1.3]

Brush & Voice Coil Amplifiers

Model	VDC	Ic	Ip
412CE	24 - 90	10	20
413CE	24 - 90	15	30
421CE	24 - 180	5	10
422CE	24 - 180	10	20

Control Modes: Velocity, Torque
Command Interface: ±10V
Dimensions: 130 x 84 x 36 [5.1 x 3.3 x 1.4]

Model	VDC	Ic	Ip
4122Z	24 - 90	10	20
4212Z	24 - 125	6	12

Control Mode: Torque
Command Interface: ±10V
Dimensions: 110 x 77 x 26 [4.3 x 3.0 x 1.0]

ServoTube

Copley linear motors and actuators set a new standard for performance and simplicity in linear motion delivering fast, quiet, clean actuation at low cost. ServoTube achieves up to 12 micron repeatability from a built-in sensor. A linear encoder is not required.

- Built-in position sensor
- Integral bearing (Actuator)
- IP67 rated
- Built-in heatsink
- Mount load directly to housing
- Standard 3 phase windings
- Standard sin/cos position output

Installation Flexibility

ServoTube is available as a moving-rod actuator with integral bearing and as a moving-forcer linear motor. The actuator bearing is lubricant-free and rated up to 64,000 km.

ServoTube accepts a wide range of industry-standard mounting accessories for simple drop-in pneumatic cylinder replacement. In moving-forcer applications, loads can be mounted directly to the rugged housing.
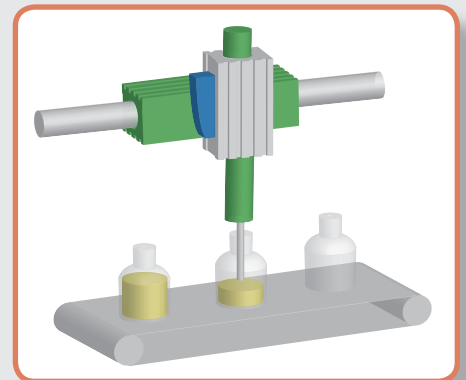
dvantage

Positioning Solution

Copley Controls delivers a complete solution for linear actuation. Position control is simple with an easy-to-use range of DC or AC powered controllers complete with cabling.

Selecting the right ServoTube or ThrustTube for your application is a snap with powerful, user-friendly design tools.

ServoTube Modules

Modules are complete, ready-to-use and provide a quick route to integrating linear motor performance into conventional machine designs. Modules are available as high-rigidity actuators as well as complete subsystems with bearing rail, limit switches and drag-chain. Linear encoders can be added for higher precision applications. Laser-welded bellows and hard-anodizing are optional.

17

ServoTube Actuator

ServoTube STA11

		1104	1108	1112	1116
Peak Force	N	46	62	69	92
Continuous Force	N	7	11.8	16.1	19.9
Maximum Velocity	m/s	5.3	5.6	5.4	4.7
Stroke	mm	14 - 232			
Forcer W x H	mm	28 x 61			
Rod Diameter	mm	11			

ServoTube STA25

		2504	2506	2508	2510
Peak Force	N	312	468	624	780
Continuous Force	N	51	70	87	104
Maximum Velocity	m/s	5.9	5.3	4.7	4.2
Stroke	mm	27 - 309			
Forcer W x H	mm	95 x 54			
Rod Diameter	mm	25			

NOTE: Optional holding brake available for STA25

ServoTube XTA38

		3804	3806	3808	3810
Peak Force	N	744	1116	1488	1860
Continuous Force	N	137	187	232	276
Maximum Velocity	m/s	4.7	3.8	3.1	2.6
Stroke	mm	33 - 318			
Forcer W x H	mm	122 x 70			
Rod Diameter	mm	38			

ServoTube Linear Motor

ServoTube STB11

		1104	1108	1112	1116
Peak Force	N	46	62	69	92
Continuous Force	N	8.6	14.5	19	23.5
Maximum Velocity	m/s	5.2	4.9	3.9	3.1
Maximum Travel *	mm	372	321	270	219
Forcer W x H	mm	28 x 61			
Rod Diameter	mm	11			

ServoTube STB25

		2504	2506	2508	2510
Peak Force	N	312	468	624	780
Continuous Force	N	51	70	87	102
Maximum Velocity	m/s	8.7	6.5	5.4	4.6
Maximum Travel *	mm	1180	1129	1078	1027
Forcer W x H	mm	95 x 54			
Rod Diameter	mm	25			

ServoTube XTB38

		3804	3806	3808	3810
Peak Force	N	744	1116	1488	1860
Continuous Force	N	137	187	232	276
Maximum Velocity	m/s	6.2	4.5	3.5	2.8
Maximum Travel *	mm	1362	1291	1219	1148
Forcer W x H	mm	122 x 70			
Rod Diameter	mm	38			

* Consult factory for longer lengths