

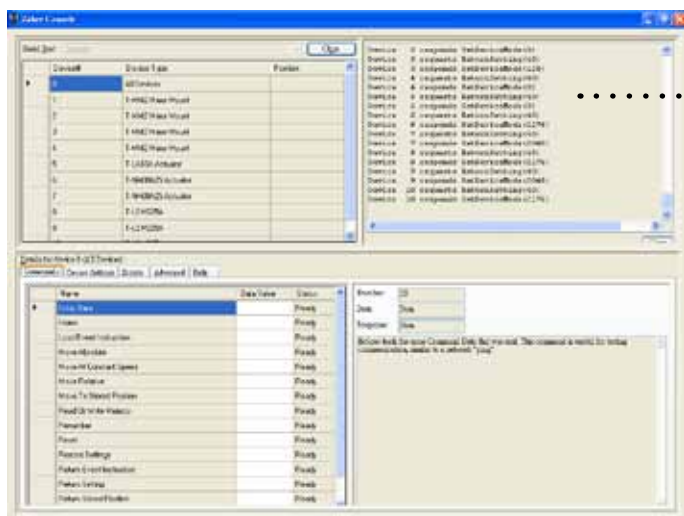
MOTORIZED STAGES

CHAPTER 6

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CHAPTER 6 MOTORIZED STAGES

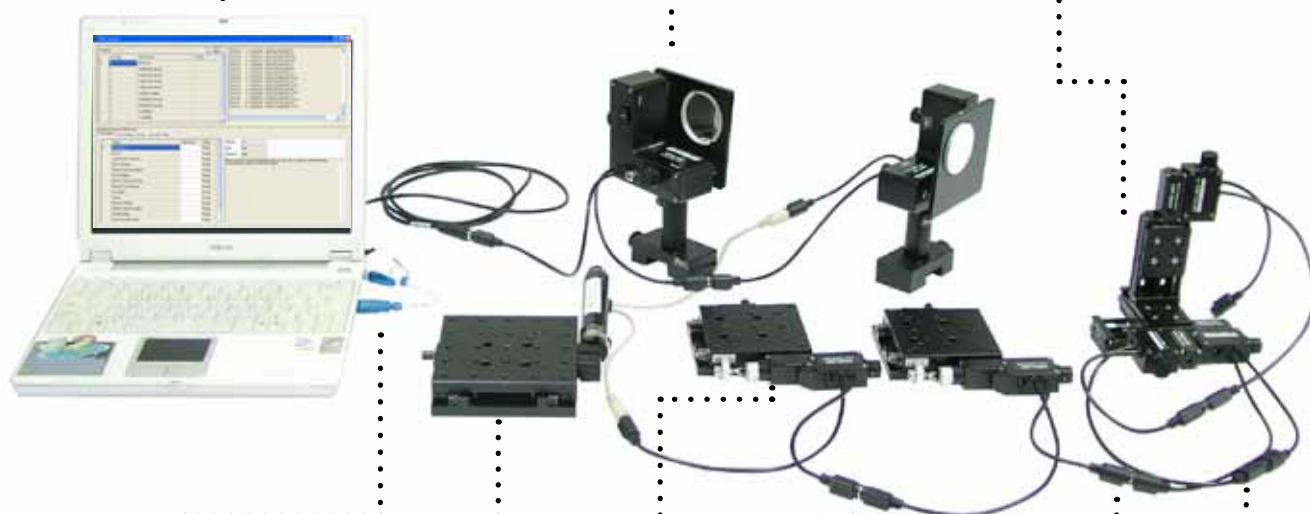
DAISY-CHAINED MECHANISM CONSTRUCTION



- More than 10 actuators are commanded simultaneously.

- Speed up to 550 mm/s and load capacity up to 20kg

- Mirror mounts, rotation stages, goniometers and translation stages are available



- Only one USB port is required

- Compact integrated motors and controllers

- Compatible with ONSET standard or OEM stages

- Multiple units can be daisy-chained without additional hardware

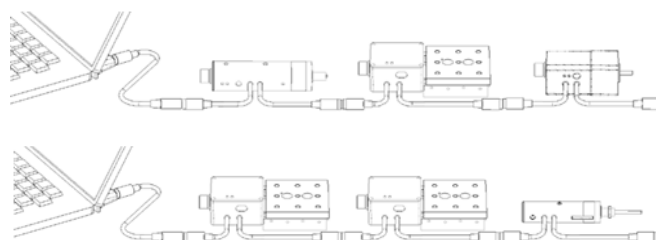
CHAPTER 6 MOTORIZED STAGES

DAISY-CHAINED MICRO LINEAR ACTUATORS



KT-NA Series Micro Linear Actuators

- 25 and 50mm travel
- Up to 8mm/s speed and up to 50N thrust
- Our most compact, precise and robust actuator
- Built-in controller; daisy chains with other T-series products
- Designed to replace standard micrometer heads on manual translation stages
- Hardened ball-tip (removable so you can use the built-in threaded tip or a flat tip)



Specification	Value	Alternate Unit
Microstep Size (Default Resolution)	0.047625 μ m	0.000002 "
Microstep Size (Finest Resolution)	0.0238125 μ m	0.000001 "
Accuracy	+/- 8 μ m	+/- 0.000315 "
Repeatability	< 1 μ m	< 0.000039 "
Backlash	< 4 μ m	< 0.000157 "
Minimum Speed	0.00022 mm/s	0.00001 "/s
Speed Resolution	0.00022 mm/s	0.00001 "/s
Maximum Speed	8 mm/s	0.315 "/s
Peak Thrust	65 N	14.6 lb
Maximum Continuous Thrust	50 N	11.2 lb
Power Supply	12-16 VDC	
Power Plug	2.1 mm center positive	
Maximum Current Draw	350 mA	
Motor Steps Per Rev	200	
Motor Type	NEMA 08	
Integrated Controller	Yes	
Controller Resolution	1/64 of a step	
Data Cable Connection	mini-DIN 6-pin	
Mechanical Drive System	Precision leadscrew	
Limit or Home Sensing	Magnetic hall sensor	
Axes of Motion	1	
Power and Com LEDs	Yes, Bi-colour	
Mounting Interface	3/8-32 nut, 3/8" shank, or M3 screws	
Vacuum Compatible	No	
Operating Temperature Range	0 to 50 degrees C	
RoHS Status	Compliant	
CE Compliant	Compliant	

Part Number	Description	Weight	Typical Lead Time
KT-NA08A25	Linear Actuator, 25mm travel, RS232 plus manual control, Kit	0.33 kg	3-5 Days
KT-NA08A25-S	Linear Actuator, 25mm travel, RS232 control, Kit	0.33 kg	3-5 Days
KT-NA08A50	Linear Actuator, 50mm travel, RS232 plus manual control, Kit	0.35 kg	3-5 Days
KT-NA08A50-S	Linear Actuator, 50mm travel, RS232 control, Kit	0.35 kg	3-5 Days



KT-LA Series Miniature Linear Actuators

- 13, 28 and 60mm travel
- Up to 4mm/s speed and up to 15N thrust
- Built-in controller; daisy chains with other T-series products
- Designed to replace standard micrometer heads on manual translation stages. (See note #2 below)



Specification	Value	Alternate Unit
Microstep Size (Default Resolution)	0.09921875 μ m	0.000004 "
Microstep Size (Finest Resolution)	0.049609375 μ m	0.000002 "
Repeatability	< 1 μ m	< 0.000039 "
Backlash	< 4 μ m	< 0.000157 "
Minimum Speed	.0009302 mm/s	0.00004 "/s
Speed Resolution	.0009302 mm/s	0.00004 "/s
Maximum Speed	4 mm/s	0.157 "/s
Power Supply	12-16 VDC	
Motor Temperature Rise	75 degrees C	
Integrated Controller	Yes	
Controller Resolution	1/64 of a step	
Data Cable Connection	Minidin 6	
Mechanical Drive System	Precision leadscrew	
Limit or Home Sensing	Magnetic home sensor	
Axes of Motion	1	
Mounting Interface	3/8-32 nut or 3/8" shank	
RoHS Status	Compliant Version Available	
CE Compliant	Compliant	

Part Number	Description	Weight
KT-LA13A	Miniature Linear Actuator, 13 mm travel, RS-232 plus manual control, Kit	0.34 kg
KT-LA13A-S	Miniature Linear Actuator, 13 mm travel, RS-232 control, Kit	0.31 kg
KT-LA13A-SV	Miniature Linear Actuator, 13 mm travel, RS-232 control, vacuum compatible, Kit	0.31 kg
KT-LA28A	Miniature Linear Actuator, 28 mm travel, RS-232 plus manual control, Kit	0.34 kg
KT-LA28A-S	Miniature Linear Actuator, 28 mm travel, RS-232 control, Kit	0.31 kg
KT-LA28A-SV	Miniature Linear Actuator, 28 mm travel, RS-232 control, vacuum compatible, Kit	0.31 kg
KT-LA60A	Miniature Linear Actuator, 60 mm travel, RS-232 plus manual control, Kit	0.35 kg
KT-LA60A-S	Miniature Linear Actuator, 60 mm travel, RS-232 control, Kit	0.34 kg
KT-LA60A-SV	Miniature Linear Actuator, 60 mm travel, RS-232 control, vacuum compatible, Kit	0.34 kg



Both KT-LA and KT-NA motorized actuators go with ONSET stages, see CHAPTER 5 !!

CHAPTER 6 MOTORIZED STAGES

DAISY-CHAINED MINIATURE MOTORIZED STAGES



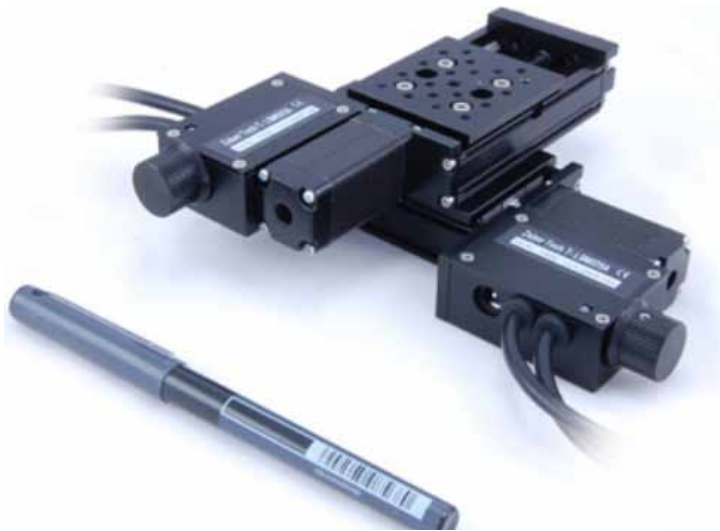
KT-LSM Series Miniature Motorized Linear Stages

- 25, 50, 100 and 200mm travel
- 10kg load capacity
- Up to 7mm/s speed and up to 40N thrust
- Our most compact motorized stage
- Built-in controller; daisy chains with other T-series products

Specification	Value	Alternate Unit
Microstep Size (Default Resolution)	0.047625 μ m	0.000002 "
Repeatability	< 1 μ m	< 0.000039 "
Backlash	< 2 μ m	< 0.000079 "
Speed Resolution	.00022 mm/s	0.00001 "/s
Maximum Speed	7 mm/s	0.276 "/s
Peak Thrust	40 N	9.0 lb
Maximum Continuous Thrust	25 N	5.6 lb
Maximum Centered Load	100 N	22.4 lb
Maximum Cantilever Load	300 N-cm	424.8 oz-in
Guide Type	Roller Bearing	
Stage Parallelism	< 25 μ m	< 0.000984 "
Power Supply	12-16 VDC	
Power Plug	2.1 mm center positive	
Maximum Current Draw	500 mA	
Linear Motion Per Motor Rev	.6096 mm	0.024 "
Motor Steps Per Rev	200	
Motor Type	NEMA 08	
Integrated Controller	Yes	
Controller Resolution	1/64 of a step	
Data Cable Connection	Minidin 6 pin M/F	
Mechanical Drive System	Precision leadscrew	
Limit or Home Sensing	Magnetic hall sensor	
Manual Control	Yes	
Axes of Motion	1	
Power and Com LEDs	Yes, Bi-Colour	
Mounting Interface	M3 threaded holes and M4 threaded center hole	
Vacuum Compatible	No	
Operating Temperature Range	0 to 50 degrees C	
RoHS Status	Compliant	
CE Compliant	Compliant	

Part Number	Description	Weight
KT-LSM025A	Motorized Stage, 25 mm travel, RS-232 plus manual control, Kit	0.59 kg
KT-LSM025A-S	Motorized Stage, 25 mm travel, RS-232 control, Kit	0.59 kg
KT-LSM050A	Motorized Stage, 50 mm travel, RS-232 plus manual control, Kit	0.60 kg
KT-LSM050A-S	Motorized Stage, 50 mm travel, RS-232 control, Kit	0.60 kg
KT-LSM100A	Motorized Stage, 100 mm travel, RS-232 plus manual control, Kit	0.63 kg
KT-LSM100A-S	Motorized Stage, 100 mm travel, RS-232 control, Kit	0.63 kg
KT-LSM200A	Motorized Stage, 200 mm travel, RS-232 plus manual control, Kit	0.70 kg
KT-LSM200A-S	Motorized Stage, 200 mm travel, RS-232 control, Kit	0.70 kg

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Part Number	Description	Weight
XY-KT-LSM025A	Motorized XY Stage, 25 x 25 mm travel, RS-232 plus manual control	0.90 kg
XY-KT-LSM050A	Motorized XY Stage, 50 x 50 mm travel, RS-232 plus manual control	0.92 kg
XY-KT-LSM100A	Motorized XY Stage, 100 x 100 mm travel, RS-232 plus manual control	0.98 kg
XY-KT-LSM200A	Motorized XY Stage, 200 x 200 mm travel, RS-232 plus manual control	1.12 kg
XYZ-KT-LSM025A	Motorized XYZ Stage, 25 x 25 x 25 mm travel, RS-232 plus manual control	1.47 kg
XYZ-KT-LSM050A	Motorized XYZ Stage, 50 x 50 x 50 mm travel, RS-232 plus manual control	1.50 kg
XYZ-KT-LSM100A	Motorized XYZ Stage, 100 x 100 x 100 mm travel, RS-232 plus manual control	1.57 kg
XYZ-KT-LSM200A	Motorized XYZ Stage, 200 x 200 x 200 mm travel, RS-232 plus manual control	1.78 kg

CHAPTER 6 MOTORIZED STAGES

HIGH LOADING DAISY-CHAINED MOTORIZED STAGES



KT-LS Series Motorized Linear Stages

- 13 and 28mm travel
- 10kg load capacity
- Up to 4mm/s speed and up to 15N thrust
- Built-in controller; daisy chains with other T-series products

Specification	Value	Alternate Unit
Microstep Size (Default Resolution)	0.09921875 μm	0.000004 "
Microstep Size (Finest Resolution)	0.049609375 μm	0.000002 "
Repeatability	< 0.4 μm	< 0.000016 "
Minimum Speed	0.0009302 mm/s	0.00004 "/s
Speed Resolution	0.0009302 mm/s	0.00004 "/s
Maximum Speed	4 mm/s	0.157 "/s
Maximum Centered Load	100 N	22.4 lb
Maximum Cantilever Load	125 N-cm	177.0 oz-in
Guide Type	Ball bearing	
Stage Parallelism	< 100 μm	< 0.003937 "
Power Supply	12-16 VDC	
Power Plug	2.1 mm center positive	
Maximum Current Draw	300 mA	
Linear Motion Per Motor Rev	0.3048 mm	0.012 "
Motor Steps Per Rev	48	
Integrated Controller	Yes	
Controller Resolution	1/64 of a step	
Data Cable Connection	Minidin 6	
Mechanical Drive System	Precision leadscrew	
Limit or Home Sensing	Magnetic home sensor	
Axes of Motion	1	
Power and Com LEDs	Yes	
Vacuum Compatible	No	
Compatible Products	T-LSR Motorized Slides, TSB Manual Translation Stages	
RoHS Status	Compliant version available	
CE Compliant	Compliant	

Part Number	Description	Weight
KT-LS13-I	Motorized Linear Stage, 13mm travel, 1/4-20 thread, RS-232 plus manual control, Kit	0.77 kg
KT-LS13-M	Motorized Linear Stage, 13mm travel, M6 thread, RS-232 plus manual control, Kit	0.77 kg
KT-LS13-SI	Motorized Linear Stage, 13mm travel, 1/4-20 thread, RS-232 control, Kit	0.77 kg
KT-LS13-SM	Motorized Linear Stage, 13mm travel, M6 thread, RS-232 control, Kit	0.77 kg
KT-LS28-I	Motorized Linear Stage, 28mm travel, 1/4-20 thread, RS-232 plus manual control, Kit	0.79 kg
KT-LS28-M	Motorized Linear Stage, 28mm travel, M6 thread, RS-232 plus manual control, Kit	0.79 kg
KT-LS28-SI	Motorized Linear Stage, 28mm travel, 1/4-20 thread, RS-232 control, Kit	0.79 kg
KT-LS28-SM	Motorized Linear Stage, 28mm travel, M6 thread, RS-232 control, Kit	0.79 kg

Part Number	Description	Weight
XY-KT-LS13-M	Motorized XY Stage, 13 x 13 mm travel, RS-232 plus manual control	1.42 kg
XY-KT-LS13-I	Motorized XY Stage, 13 x 13 mm travel, RS-232 plus manual control	1.42 kg
XY-KT-LS28-M	Motorized XY Stage, 28 x 28 mm travel, RS-232 plus manual control	1.46 kg
XY-KT-LS28-I	Motorized XY Stage, 28 x 28 mm travel, RS-232 plus manual control	1.46 kg
XYZ-KT-LS13-M	Motorized XYZ Stage, 13 x 13 x 13 mm travel, RS-232 plus manual control	1.99 kg
XYZ-KT-LS13-I	Motorized XYZ Stage, 13 x 13 x 13 mm travel, RS-232 plus manual control	1.99 kg
XYZ-KT-LS28-M	Motorized XYZ Stage, 28 x 28 x 28 mm travel, RS-232 plus manual control	2.05 kg
XYZ-KT-LS28-I	Motorized XYZ Stage, 28 x 28 x 28 mm travel, RS-232 plus manual control	2.05 kg



KT-RS Series Motorized Rotary Stages

- Worm gear driven for continuous rotation
- Repeatability down to 0.02 deg
- 20kg load capacity
- Up to 110 N-cm torque
- Built-in controller; daisy chains with other T-series products

Part Number	Description	Weight
KT-RS60	Motorized Rotary Stage, 360 degree rotation, 60 mm diameter, Integrated Controller, Kit	0.76 kg

Motorized Goniometers



A goniometer stage (sometimes called a goniometer table) is a tilting stage that rotates about a virtual axis fixed in space above the stage surface. Zaber's LMG Series motorized goniometers are stepper motor driven positioning goniometers designed to interface with our T-MCA series Stepper Motor Controller offering high resolution daisy-chainable operation. The LMG60 tilting goniometer stages pictured above are crossed roller bearing goniometers with a virtual axis of rotation 60mm above the goniometer stage surface respectively. The goniometer stage is 20mm high.

Part Number	Description	Weight
LMG60	Motorized Goniometer Stage, 60 mm radius	0.35 kg

CHAPTER 6 MOTORIZED STAGES

HIGH SPEED DAISY-CHAINED MOTORIZED STAGES



KT-LSR Series Motorized Linear Slides

- 75, 150, 300 and 450mm travel
- 20kg load capacity
- Up to 80mm/s speed and up to 100N thrust
- Built-in controller; daisy chains with other T-series products

Specification	Value	Alternate Unit
Maximum Centered Load	200 N	44.9 lb
Maximum Cantilever Load	200 N-cm	283.2 oz-in
Guide Type	Roller bearing	
Stage Parallelism	< 100 μ m	< 0.003937 "
Power Supply	12-16 VDC	
Power Plug	2.1 mm center positive	
Motor Steps Per Rev	200	
Integrated Controller	Yes	
Controller Resolution	1/64 of a step	
Data Cable Connection	Minidin 6 M/F	
Mechanical Drive System	Precision leadscrew	
Limit or Home Sensing	Magnetic home sensor	
Manual Control	Knob with center detent	
Axes of Motion	1	
Power and Com LEDs	Yes	
Mounting Interface	M6 threaded holes and 8-32 threaded holes	
Vacuum Compatible	No	
Compatible Products	T-LS Motorized Stages, TSB Manual Translation Stages	
RoHS Status	Compliant version available	
CE Compliant	Compliant	

Part Number	Description	Weight
KT-LSR75A	Motorized Linear Slide, 75mm travel, RS-232 plus manual control, Kit	1.48 kg
KT-LSR75B	Motorized Linear Slide, 75mm travel, RS-232 plus manual control, Kit	1.48 kg
KT-LSR75D	Motorized Linear Slide, 75mm travel, RS-232 plus manual control, Kit	1.48 kg
KT-LSR150A	Motorized Linear Slide, 150mm travel, RS-232 plus manual control, Kit	1.68 kg
KT-LSR150B	Motorized Linear Slide, 150mm travel, RS-232 plus manual control, Kit	1.68 kg
KT-LSR150D	Motorized Linear Slide, 150mm travel, RS-232 plus manual control, Kit	1.68 kg
KT-LSR300A	Motorized Linear Slide, 300mm travel, RS-232 plus manual control, Kit	2.08 kg
KT-LSR300B	Motorized Linear Slide, 300mm travel, RS-232 plus manual control, Kit	2.08 kg
KT-LSR300D	Motorized Linear Slide, 300mm travel, RS-232 plus manual control, Kit	2.08 kg
KT-LSR450A	Motorized Linear Slide, 450mm travel, RS-232 plus manual control, Kit	2.58 kg
KT-LSR450B	Motorized Linear Slide, 450mm travel, RS-232 plus manual control, Kit	2.58 kg
KT-LSR450D	Motorized Linear Slide, 450mm travel, RS-232 plus manual control, Kit	2.58 kg
XY-KT-LSR75B	Motorized XY Stage, 75 x 75 mm travel, RS-232 plus manual control	3.02 kg
XY-KT-LSR150B	Motorized XY Stage, 150 x 150 mm travel, RS-232 plus manual control	3.42 kg
XY-KT-LSR300B	Motorized XY Stage, 300 x 300 mm travel, RS-232 plus manual control	4.22 kg
XY-KT-LSR450B	Motorized XY Stage, 450 x 450 mm travel, RS-232 plus manual control	5.22 kg
XYZ-KT-LSR75B	Motorized XYZ Stage, 75 x 75 x 75 mm travel, RS-232 plus manual control	4.30 kg
XYZ-KT-LSR150B	Motorized XYZ Stage, 150 x 150 x 150 mm travel, RS-232 plus manual control	4.90 kg
XYZ-KT-LSR300B	Motorized XYZ Stage, 300 x 300 x 300 mm travel, RS-232 plus manual control	6.10 kg
XYZ-KT-LSR450B	Motorized XYZ Stage, 450 x 450 x 450 mm travel, RS-232 plus manual control	7.60 kg

ULTRAHIGH SPEED DAISY-CHAINED MOTORIZED STAGES



KT-LSQ Series Motorized Linear Stages

- 75, 150, 300, & 450 mm travel
- 20kg load capacity
- Up to 550mm/s speed and up to 100N thrust
- Built-in controller; daisy chains with other T-series products

Specification	Value	Alternate Unit
Maximum Centered Load	200 N	44.9 lb
Maximum Cantilever Load	200 N-cm	283.2 oz-in
Guide Type	Roller bearing	
Stage Parallelism	< 100 μm	< 0.003937 "
Power Supply	12-48 VDC	
Power Plug	Molex Mini-Fit Jr. 3pin	
Maximum Current Draw	550 mA	
Motor Steps Per Rev	200	
Integrated Controller	Yes	
Controller Resolution	1/64 of a step	
Data Cable Connection	Minidin 6 M/F	
Mechanical Drive System	Precision leadscrew	
Limit or Home Sensing	Magnetic home sensor	
Manual Control	Knob with center detent	
Axes of Motion	1	
Power and Com LEDs	Yes	
Mounting Interface	M6 threaded holes and 8-32 threaded holes	
Vacuum Compatible	No	
Operating Temperature Range	0 to 50 degrees C	
RoHS Status	Compliant version available	
CE Compliant	Compliant	

Part Number	Description	Weight
KT-LSQ75A	Motorized Linear Slide, 75mm travel, RS-232 plus manual control, Kit	1.48 kg
KT-LSQ75B	Motorized Linear Slide, 75mm travel, RS-232 plus manual control, Kit	1.48 kg
KT-LSQ75D	Motorized Linear Slide, 75mm travel, RS-232 plus manual control, Kit	1.48 kg
KT-LSQ150A	Motorized Linear Slide, 150mm travel, RS-232 plus manual control, Kit	1.68 kg
KT-LSQ150B	Motorized Linear Slide, 150mm travel, RS-232 plus manual control, Kit	1.68 kg
KT-LSQ150D	Motorized Linear Slide, 150mm travel, RS-232 plus manual control, Kit	1.68 kg
KT-LSQ300A	Motorized Linear Slide, 150mm travel, RS-232 plus manual control, Kit	2.08 kg
KT-LSQ300B	Motorized Linear Slide, 150mm travel, RS-232 plus manual control, Kit	2.08 kg
KT-LSQ300D	Motorized Linear Slide, 150mm travel, RS-232 plus manual control, Kit	2.08 kg
KT-LSQ450A	Motorized Linear Slide, 450mm travel, RS-232 plus manual control, Kit	2.58 kg
KT-LSQ450B	Motorized Linear Slide, 150mm travel, RS-232 plus manual control, Kit	2.58 kg
KT-LSQ450D	Motorized Linear Slide, 450mm travel, RS-232 plus manual control, Kit	2.58 kg

CHAPTER 6 MOTORIZED STAGES

MOTORIZED MIRROR MOUNTS



KT-MM Series Motorized Mirror Mounts

- Two-axis kinematic mount with +/-5 deg range
- Repeatability down to 0.0005 deg
- Holds 2" (50mm) optic; adaptors available for smaller sized optics
- Built-in controller; daisy chains with other T-series products

Specification	Value	Alternate Unit
Microstep Size (Default Resolution)	0.000086 degrees	1.501 urad
Microstep Size (Finest Resolution)	0.000043 degrees	0.750 urad
Range	-5.27 to +5.27 degrees	
Accuracy	+/- 0.01 degrees	+/- 0.175 mrad
Repeatability	< 0.0005 degrees	< 0.009 mrad
Backlash	< 0.001 degrees	< 0.017 mrad
Minimum Speed	0.000806 deg/s	14.067 urad/s
Maximum Speed	3.44 deg/s	1 rpm
Speed Resolution	0.000806 deg/s	
Maximum Centered Load	15 N	3.4 lb
Power Supply	12-16 VDC	
Power Plug	2.1 mm center positive	
Maximum Current Draw	530 mA	
Angular Motion Per Motor Rev	0.264 degrees	
Motor Steps Per Rev	48	
Integrated Controller	Yes	
Controller Resolution	1/64 of a step	
Data Cable Connection	Minidin 6	
Mechanical Drive System	Precision leadscrew	
Limit or Home Sensing	Magnetic home sensors	
Axes of Motion	2	
Optic Mounting Interface	2" diameter optics	
Operating Temperature Range	0 to 50 degrees C	
RoHS Status	Compliant version available	

Part Number	Description	Weight
KT-MM2-I	Motorized Mirror Mount, 2 Axis, 1/4-20 thread, RS-232 plus manual control, Kit	0.83 kg
KT-MM2-IV	Motorized Mirror Mount, 2 Axis, 1/4-20 thread, RS-232, vacuum compatible, Kit	0.83 kg
KT-MM2-M	Motorized Mirror Mount, 2 Axis, M6 thread, RS-232 plus manual control, Kit	0.83 kg
KT-MM2-MV	Motorized Mirror Mount, 2 Axis, M6 thread, RS-232, vacuum compatible, Kit	0.83 kg

CONTROLLERS FOR DAISY-CHAINED MOTORIZED STAGES AND ACTUATORS



KT-MCA Series Stepper Motor Controller

Zaber's T-MCA stepper motor controller is a microstep driver offering microstepping down to 128 microsteps per step. With a typical stepper motor having 200 steps per revolution, the T-MCA stepper motor controller allows microstepping down to 25600 microsteps per revolution. The T-MCA stepper motor controller can be used to control any 2 phase stepper motor with continuous current draw up to 2.5A per phase. The T-MCA controller can be used for stepper motor control of the following products which can be purchased separately:

Stepper Linear Actuators - NA Series

Stepper Motors - NM Series

Motorized Linear stages - LML Series

Motorized Goniometers - LMG Series

T-MCA stepper motor controllers can be daisy-chained with any T-Series products to a single serial or USB port.

Specification	Value
Power Supply	12-48 VDC
Power Plug	Molex Mini-Fit Jr. 3pin
Maximum Current Draw	motor dependent mA
Controller Maximum Current	2500 mA
Motor Connection	Minidin 8 female
Integrated Controller	Yes
Controller Resolution	1/64 of a step
Data Cable Connection	Minidin 6
Manual Control	Knob with center detent
Axes of Motion	1
Power and Com LEDs	Yes
Operating Temperature Range	0 to 50 degrees C
RoHS Status	Compliant
CE Compliant	Compliant

Part Number	Description	Weight
KT-MCA	Stepper Motor Controller, 2 Phase, up to 2.5A per phase, Kit	0.75 kg



KT-JOY Series Programmable Joystick

The T-JOY3 is a programmable joystick that can control three independent axes of motion. The joystick can be daisy-chained to any T-Series motion control products, allowing for a very flexible setup. All 5 buttons of the joystick are programmable to store a location, recall a location, or a host of other functions.

The joystick can run with or without a computer attached. In stand-alone mode the joystick is a compact controller that fits easily on the lab bench. Its functionality can be expanded simply by adding a computer or laptop running Labview, Visual Basic, Microsoft Excel, or your own program. The T-JOY3 programmable joystick is the ideal controller for microscope, x-y, or x-y-z stage applications.

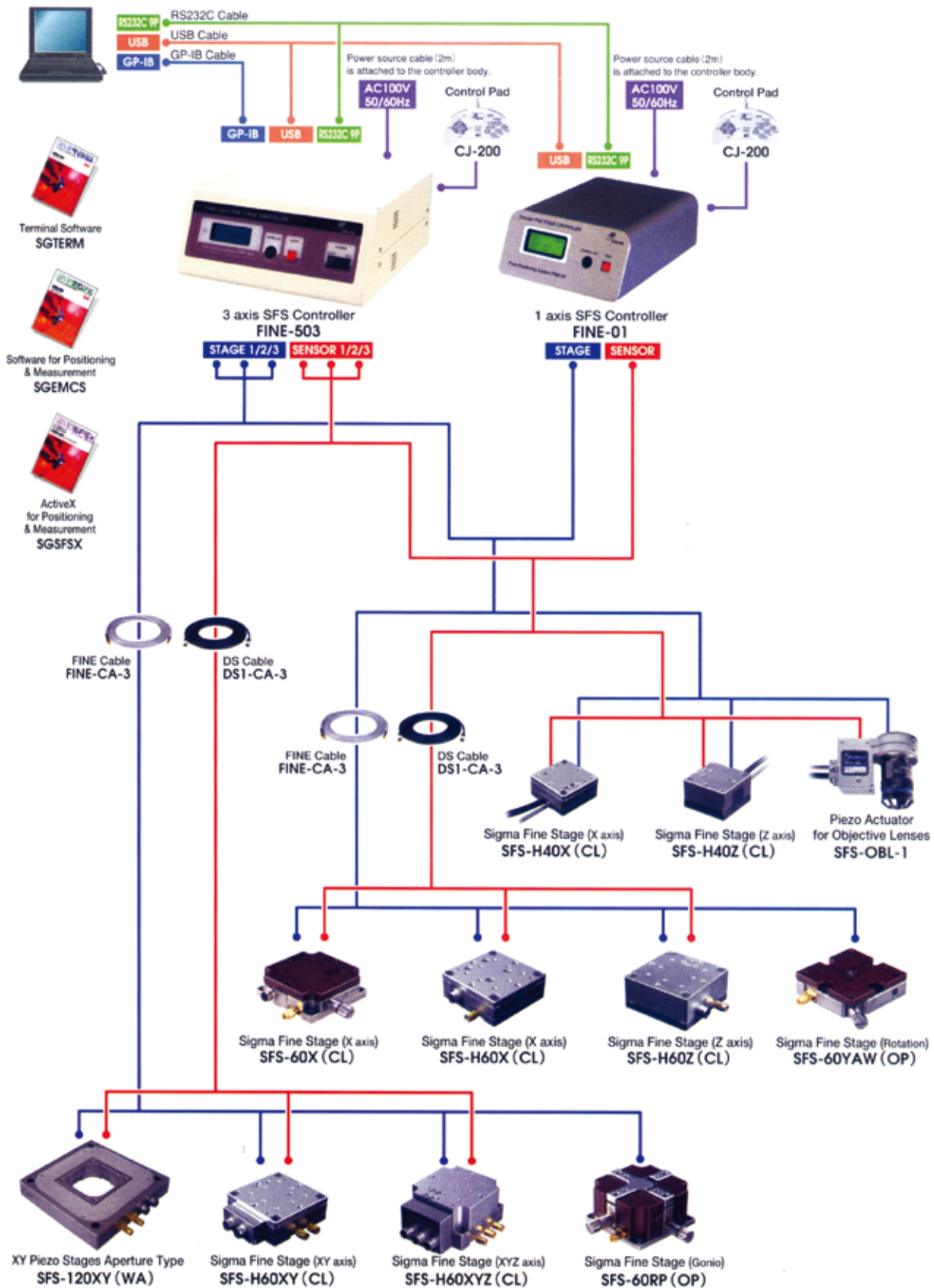
The joystick is compatible with all T-Series products, such as the T-LS Motorized Linear Slides.

Specification	Value
Power Supply	12-16 VDC
Power Plug	2.1mm center postive
Maximum Current Draw	50 mA
Data Cable Connection	Minidin 6 M/F
Buttons	5
Axes of Motion	3
Power and Com LEDs	Yes
RoHS Status	Compliant Version Available
CE Compliant	Compliant

Part Number	Description	Weight
KT-JOY3	Programmable Joystick Controller, 3-Axis, Kit	0.55 kg

CHAPTER 6 MOTORIZED STAGES

SFS SERIES PIEZO SYSTEM DIAGRAM



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PIEZO STAGE SYSTEM

Sigma Fine (Piezo) Stages - High Stiffness Type



- SFS-H series are newly developed piezo-actuator stages which have much more high grade performance on accuracy, load capacity and speed than previous models.
- The adoption of digital sensor and piezo element help SFS to achieve 1nm theoretical resolution (open-loop control), 10nm sensor resolution (closed-loop control) and 90-100μm travel.
- Allows use of the conventional three-axis FINE-503 controller, or the single-axis FINE-01 controller for Sigma Fine (Piezo) Stage System (Piezo Stages). The controller is compatible with RS232C, USB and or GP-IB interfaces to allow easy control of positioning from a PC using measurement and control software such as SGEMCS, SGTERM, or SGSFSX applications.
- FINE controller is capable of achieving high accurate linearity below 0.5% and high speed that full stroke repeatable frequency is 10-15Hz with SFS-H60X or H40X in closed-loop control.

Travel (Fine) [μm]	Weight [kg]	Theoretical Resolution(Open) [nm]	Sensor Resolution(Close) [nm]	Linearity [%]	Straightness (Y and Z direction) [μm]	Positional Repeatability [μm]	Load Capacity Fz' [N]	Part Number
90±15%	0.28	1	10	≤0.3	1	≤0.1	10(1kgf)	SFS-H40X(CL)
100±15%	0.28	1	10	≤0.3	1	≤0.1	7(0.7kgf)	SFS-H40Z(CL)NEW
100±15%	0.4	1	10	≤0.3	1	≤0.1	20(2kgf)	SFS-H60X(CL)
100±15%	0.43	1	10	≤0.5	1	≤0.1	15(1.5kgf)	SFS-H60XY(CL)
100±15%	0.33	1	10	≤0.3	1	≤0.1	10(1kgf)	SFS-H60Z(CL)NEW
100±15%	0.63	1	10	≤0.3	1	≤0.15	10(1kgf)	SFS-H60XYZ(CL)

Sigma Fine (Piezo) Stage System



- The SFS series is a newly designed family of stages for ultra precise positioning utilizing flexures and piezo actuators. Some stages also include a digital sensor for closed loop control, achieving 20nm resolution, 90 μm of travel, and 320 μm of manual adjustment.
- Both the movement guide without any gaps adopting elastic deformation of metal and the structure that expands deformation of piezo fivefold or sixfold are used as the design of SFS, and our super precision processing technology achieves the design.

Travel (Course)	Travel (Fine)	Weight [kg]	Load Capacity Fz' [N]	Theoretical Resolution (Open)	Sensor Resolution (Close)	Positional Repeatability [μm]	Straightness (Y axis direction) [μm]	Straightness (Z axis direction) [μm]	Part Number
320±10%(μm)	90±10%(μm)	0.37	9.8(1kgf)	1(nm)	20(nm)	0.1	1	0.5	SFS-60X(CL)
57±15%(arcmin)	900±15%(arcsec)	0.31	9.8(1kgf)	0.01(arcsec)	-	-	-	-	SFS-60YAW(OP)
25±15%(arcmin)	215±15%(arcsec)	0.38	9.8(1kgf)	0.005(arcsec)	-	-	-	-	SFS-60RP(OP)

XY Piezo Stages Aperture Type



SFS-120XY(WA)

- The stage is a high precision positioning stage with 50mm x 50mm aperture.
- The stage is utilized piezo actuator as driving and digital sensor as minute displacement sensor.
- Available to control by our FINE-503. The Controller has RS232C, GPIB, USB interface.
- Easy to control by our application soft of "SGEMCS", "SGTERMS" and "SGSFSX" from PC.
- The stages are ideally suited to scanning microscopy, metrology, surface structure analysis, semiconductor test equipment, precision mask and wafer alignment, scanning interferometer, imaging (resolution enhancement), biotechnology systems.

Piezo Actuator for Objective Lenses



- Objective lens holder employing piezo actuator as driving source and digital sensors as displacement sensor.
- SFS-OBL01 is compact and highly accurate objective lens actuator for research and development use. SFS-OBL-2 possesses maintenance free and high durability features, and suitable for high-speed inspection, laser fabrication and applications related to factory automation.
- Compact, quick motion and high-resolution nano-positioning unit with less than 1nm and longer travel up to 100µm.
- Conventional FINE-01/503 controller can be used commonly with Sigma Fine Stages (SFS).
- RS-232C, GP-IB and USB PC interfaces provide easy computer controlling.
- Software "SGEMCS", "SGTERM" and "SGSFSX" are available for demands of measurement and precise positioning.
- Suitable for applications such as auto focus system, confocal microscopy, biotechnology and semiconductor test equipment.
- Attachable to Olympus, Nikon and Mitutoyo objective lenses by just alternating the adapter part.
- Please let us know the size of the using objective lens.

Screw Size [mm]	A [mm]	B [mm]	Part Number
---	---	---	SFS-OBL-1
Microscope side M20.32	M20.32 P=0.706(W0.8 x 1/36)	15	OBL-ADP-M20.32A
Objective Lens side M20.32	M20.32 P=0.706(W0.8 x 1/36)	-	OBL-ADP-M20.32B
Microscope side M25.0	M25.0 P=0.75	20	OBL-ADP-M25.0A
Objective Lens side M25.0	M25.0 P=0.75	-	OBL-ADP-M25.0B
Microscope side M26.0	M26.0 P=0.706(M26.0 x 1/36)	21	OBL-ADP-M26.0A
Objective Lens side M26.0	M26.0 P=0.706(M26.0 x 1/36)	-	OBL-ADP-M26.0B

CHAPTER 6 MOTORIZED STAGES SFS PIEZO CONTROLLERS



Control Pad

Control pad for manual operations, memory settings, program preparation, etc.



FINE-01/503 is a high accurate and high speed controller for Sigma Fine Stage with built-in piezo-element as actuator. It is possible to control SFS series have a positioning in 1nm theoretical resolution at open-loop control or in 10nm indication resolution at closed-loop control by the position data from built-in digital minute displacement sensor. Being connected to a PC via RS232C, GP-IB, USB interface (Windows XP compatible), which makes stage to move to the desired position by simple commands sent from PC and have a function in consecutively keeping (tracking) the desired position. FINE controller is a low cost, general-purpose stage controller suited to various applications such as measurement, inspection, and evaluation systems. It is also possible to improve more accurate positioning and posing suit to the system with using compensated digital sensor by download the data from PC.

*FINE-01 does not have GP-IB interface

Notes

- The product is warranted for a period of one year.
- Carefully read the Instruction Manual and Installation Manual before use.
- To prevent electromagnetic interference, we recommend grounding this product. Grounding will help ensure the reliability specifications given above.

Softwares



General Specifications

Part Number	FINE-503	FINE-01
Price (JPYen)	¥590,000	¥300,000
Number of Axis	3 axis	1 axis
External Dimension (mm)	270 W×297 D×118 H (excluding attachments)	200 W×250 D×85 H (excluding attachments)
Weight (kg)	5.3	4.0
Power Supply	AC 100 V ± 10% 50/60 Hz AC 120 V ± 10% 50/60 Hz AC 230 V ± 10% 50/60 Hz	
Power Consumption	20 VA	
Operating Temperature	10~30°C	
Storage Temperature	-20~60°C	
Ambient Humidity	20~85% RH (no condensation)	

Reliability

Noise Resistance	Electrostatic noise Should be at Level 2 of IEC 61000-4-2 under conditions of 150 pF and 300 W.
Insulation Resistance	Minimum 10 MΩ; between power supply input (AC 100 V) and FG, as determined with a 500 V Megaohm tester.
Withstand Voltage	Operations should remain normal under conditions of AC 1500 V and current limit of 15 mA for 1 minute.

Performance Specifications

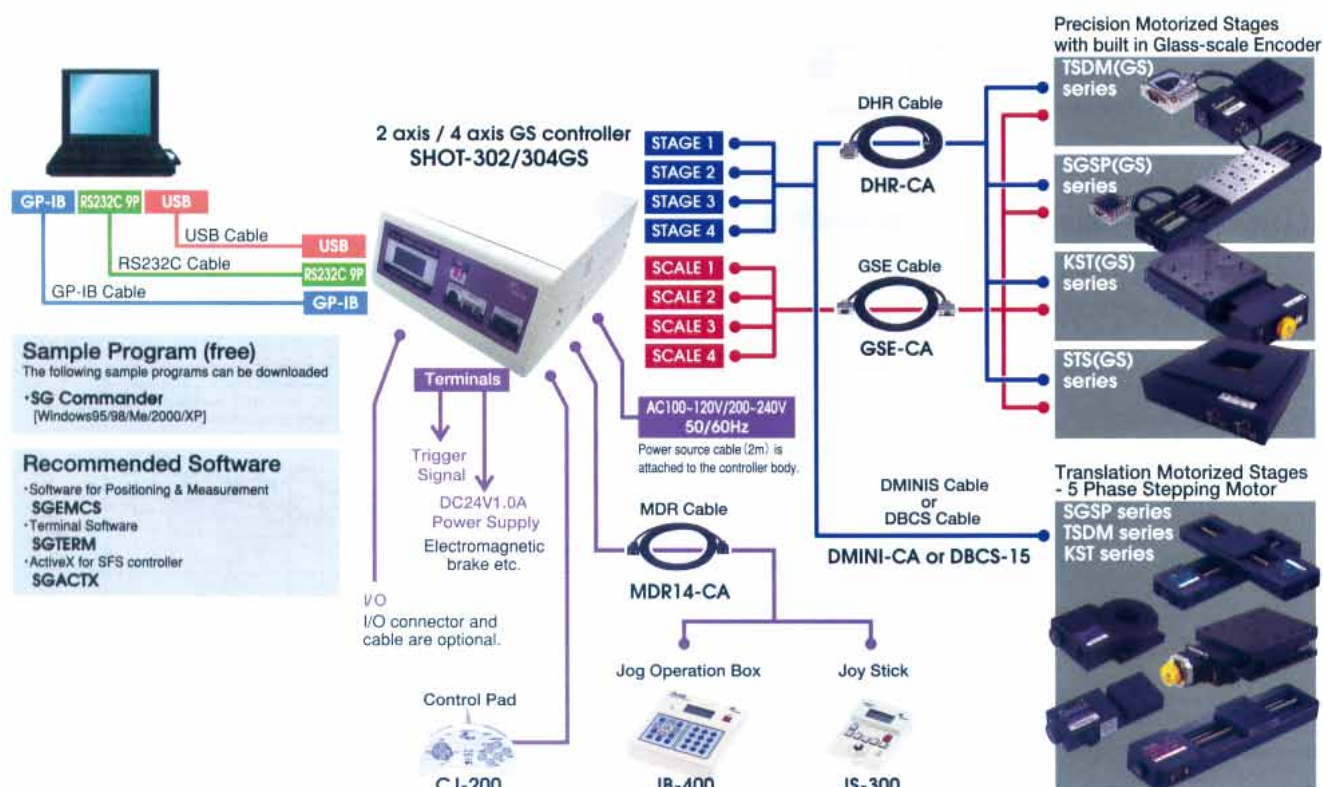
D/A Converter	18 bit
Output Vvoluta	-10 ~ 150 V (-8,000 ~ 120,000 step) 1 step = 1.25 mV
Display/Coordinate-setting Range	± 999999 step (open loop control) ± 999999 nm (close loop control)
Coordinate Display	-10000 ~ +150000 mV (open loop control/close loop control)
Control Mode	O/C (identification of open loop/close loop)
Sensor Resolution	5 nm (for close loop only)
Theoretical Limit of Resolution (open)	≤ 1 nm
External Interface	RS 232 C
	Connector Shape 9 pin female
	Baud Rate 38400, 19200, 9600, 4000
	Data Bit 8 bit
	Parity None
	Stop Bit 1 bit
	Delimiters CR, LF, CR+LF
	GP-IB
	Setting Address 1~30
	Delimiters CR, LF, CR+LF, EOI
	USB
	Not compatible with USB 2.0

Connector

RS232C	XM 3 B-0922-132 (model manufactured by Omron or equivalent product) female type
GP-IB (FINE-503)	57 L-20240-7700 D 35 (model manufactured by DDK or equivalent product)
USB	XM 7 B-442 (model manufactured by Omron or equivalent product)
PIEZO 1/2/3	HRM-305 (model manufactured by Hirose Electric Co. or equivalent product)
SCALE 1/2/3	HR 10 G-7 R-6 S (model manufactured by Hirose Electric Co.)
CONTROL PAD	TC 7668-01-201 (model manufactured by Hosiden or equivalent product)

CHAPTER 6 MOTORIZED STAGES

GS SERIES ENCODED SYSTEM DIAGRAM



PRECISION MOTORIZED STAGES WITH BUILT IN GLASS-SCALE ENCODER



- It is precision motorized stage with stepping motor, for measurement and test applications, as precision grade guide actuator was adopted.
- High-resolution and small footprint linear encoder is installed, which realizes high accuracy and reliable full closed feedback system by controlling with dedicated controller.

Table Size [mm]	Travel [mm]	Maximum Travel Speed [mm/sec]	Weight [kg]	Load Capacity Fz' [N]	Positional Accuracy [mm]	Positional Repeatability [mm]	Lost Motion [mm]	Straightness [mm]	Part Number
80 x 80	50	30	1.6	100(10kgf)	0.007	0.001	0.0005	0.01	SGSP(GS)26-50(X)
80 x 155	125	30	2.8	100(10kgf)	0.007	0.001	0.0005	0.015	SGSP(GS)26-125(X)

Precision Motorized Stages with built in Glass-scale Encoder



- High-resolution and small footprint linear encoder is installed, which realizes high accuracy and reliable full closed feedback system when controlled with the dedicated controller.
- Patented "extended contact bearing mechanism" utilizing company original precision fabrication technology, enables high accuracy and ultra smooth movement. Combining this "extended contact bearing mechanism" and high precision screws, high-performance and cost effective stage is realized.
- The guide are integrated with top and bottom table, and therefore realize thin but high rigidity stage. It is ideal stage for low optical path height experiment.

Table Size [mm]	Limit Sensor	Travel [mm]	Maximum Travel Speed [mm/sec]	Weight [kg]	Load Capacity Fz' [N]	Positional Accuracy [mm]	Positional Repeatability [mm]	Lost Motion [mm]	Straightness [mm]	Part Number
60 x 60	GF1S092HCPI	15	5	0.8	20(2kgf)	0.005	0.0005	0.0005	0.002	TSDM(GS)60-15X
80 x 80	PM-L24	20	5	1.1	30(3kgf)	0.005	0.0005	0.0005	0.002	TSDM(GS)80-20X
60 x 60	PM-F24	10	2	0.7	20(2kgf)	0.002	0.0005	0.0005	-	TSDM(GS)60-10ZF

Precision Motorized Stage with built in Glass-scale Encoder



- High-resolution and small footprint linear encoder is installed, which realizes high accuracy and reliable full closed feedback system when controlled with the dedicated controller.

The transmission hole at the center of the table is provided. It is suitable for inspection or observation use with delivered light source.

- Customized stages are available upon request.

Travel [mm]	Maximum Travel Speed [mm/sec]	Weight [kg]	Load Capacity Fz' [N]	Positional Accuracy [mm]	Positional Repeatability [mm]	Lost Motion [mm]	Part Number
±15	5	6.8	50(5kgf)	0.004	0.001	0.0005	STS(GS)100-30

CHAPTER 6 MOTORIZED STAGES

2AXIS / 4AXIS ENCODED STAGE CONTROLLERS



- SHOT-302GS and SHOT-304GS are 2 axis/4 axis stage controllers with built in glass-scale encoder. (Our standard stepping motors can be controlled by those controllers.)
- Optional products JS-300 which is operated by joystick, and JB-400 which is enable to move stages to registered point by button, can be connected.
- RS232C, GP-IB and USB interface supported. The stage can be accurately moved to the desired position by simple commands sent from the computer. It is possible to save internal data by downloads and uploads.
- Internal power supply for I/O (Input/Output) signals, trigger output signals, and DC 24V output signals makes it possible to control external input or output devices or to output trigger signals synchronized with external measuring devices.

Performance Specifications

Number of Controlling Axis		2axis : SHOT-302GS 4axis : SHOT-304GS	
Coordinate Setting Range		999999999 pulses	
Maximum Operating Pulse Rate (F)		500kpps	
Minimum Operating Pulse Rate (S)		1pps	
Acceleration/Deceleration Time (R)		0~1000ms	
Limit Sensor		Mechanical origin sensor / proximity sensor / CW (+) limit/ CCW (-) limit (Input logic is switchable by memory switch)	
Trigger Outputs		Open collector output (max. DC 24V 30 mA)	
Interfaces	RS232C	Communications Parameters	9-pin male
		Baud Rate	38400, 19200, 9600, 4000 bauds
		Data Length	8 bits
		Parity	no parity
		Stop Bit	1 bit
		Flow Control	hardware
		Delimiters	CR, LF, CR+LF
	GP-IB	Setting Address	1 ~ 30
		Delimiters	CR, LF, CR+LF, EOF
	USB2.0		Full speed mode supported
DC Outputs		DC 36V 3.2 A (non-insulated) motor driver operation DC24V 1.0A (non-insulated) external I/O power supply terminal output (such as motor brake) DC12V 0.2A (non-insulated) sensor power supply CPU logic circuitry, driver interface	
I/O	Input Signals 4	photo coupler input : internal resistance 2.2kΩ	
	Output Signals 4	open collector output : max. DC 24V 100 mA photo coupler input : internal resistance 2.2kΩ	
Control Signals	Input Signals 15	Program number - 1	
		Drive command - 1	
		Return to mechanical origin command - 2	
		Temporary stop command - 1	
		Stop - 1	
		Emergency stop command - 1	
		Forward travel command - 2	
		Reverse travel command - 2	
		Speed setting - 2	
		Alarm reset - 1	
	Selection 1, 2 axis or 3, 4 axis - 1		
	Output Signals 5	open collector output : max. DC 24V 20 mA	
		Start/stop - 1	
Return to mechanical origin/stop - 2			
BUSY - 1			
Alarm - 1			

Joy Stick
JS-300



Jog Operation Box
JB-400



Control Pad
CJ-200



Softwares



Software for
Positioning &
Measurement
SGEMCS



Terminal
Software
SGTERM

General Specifications

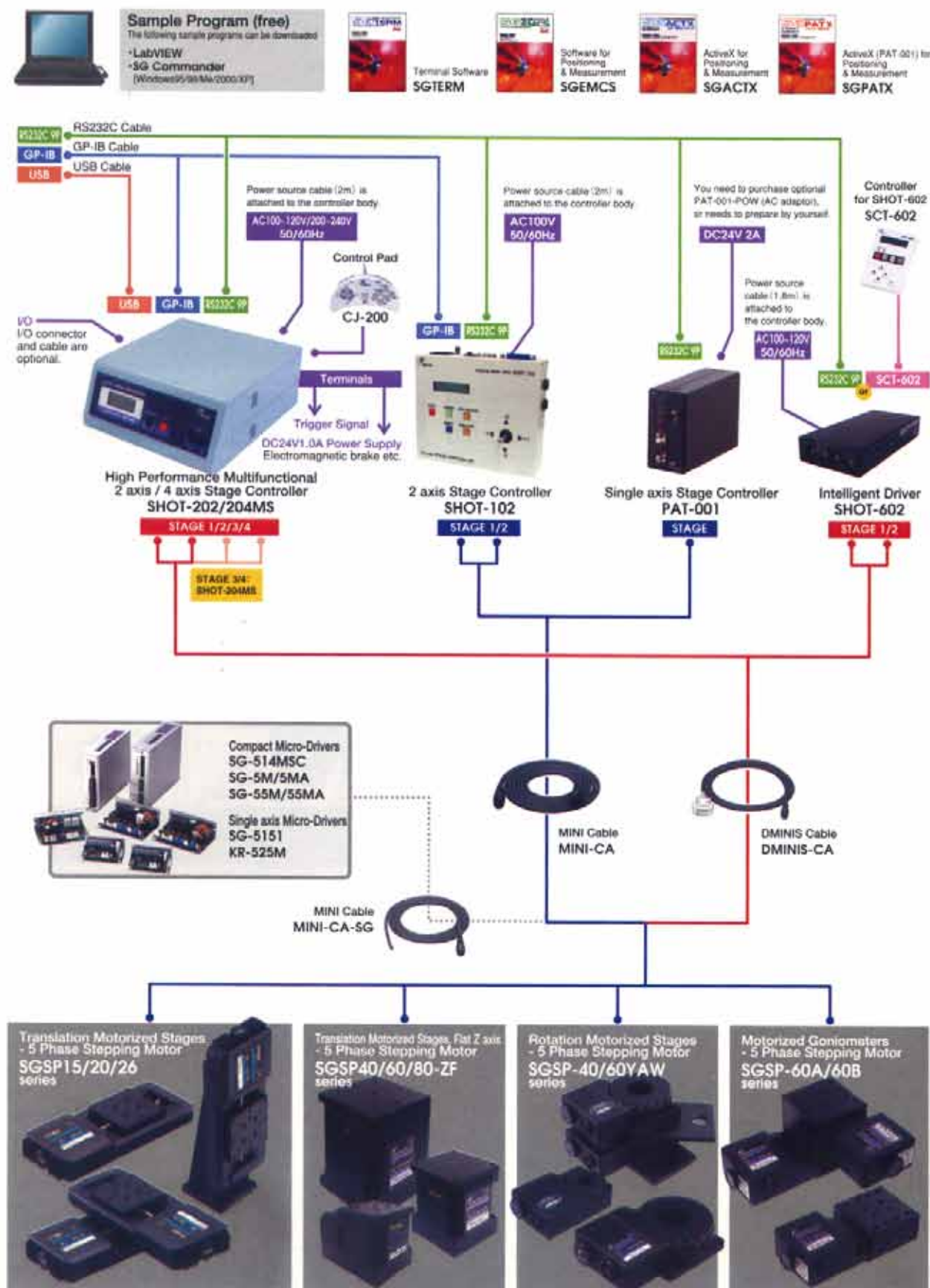
Power Supply	AC100~120V/200~240V 50/60Hz
Power Consumption	160VA : SHOT-302GS/300VA (SHOT-304GS)
Operating Temperature	5~40°C
Storage Temperature	-20~60°C
Ambient Humidity	20~80%RH (non-condensing)
External Dimension	270W×302D×118H (excluding attachments)mm
Weight	5.5kg : SHOT-302GS/6.5kg : SHOT-304GS

Driver Specifications

Drive Method	Bipolar pentagon micro-step
Drive Current (Output Current)	0.25~1.4A/phase
Current Down (Stop Current)	20%~88% of designated output current
Motor Excitation	Motor excitation set to ON/OFF via input signal
Micro-step Setting	1, 2, 4, 5, 8, 10, 20, 25, 40, 50, 80, 100, 125, 200, 250 micro-steps
Setting Switches	RUN/STOP
Fast Transient/Burst Noise	EN611000-4-4(1995) Level 2
Insulation Voltage Resistance	No abnormality when AC1500 V is applied at 60 Hz for one minute between the power supply terminal and the case at room temperature and humidity
Surge Noise	EN61000-4-5(1995) Level 2
Static Noise	EN61000-4-2(1995) +AH Level 2

CHAPTER 6 MOTORIZED STAGES

SGSP SERIES 5 PHASE STEPPING SYSTEM DIAGRAM



CHAPTER 6 MOTORIZED STAGES



Sample Program (free)

The following sample programs can be downloaded

- LabVIEW
- SG Commander
[Windows95-98/Me/2000/XP]



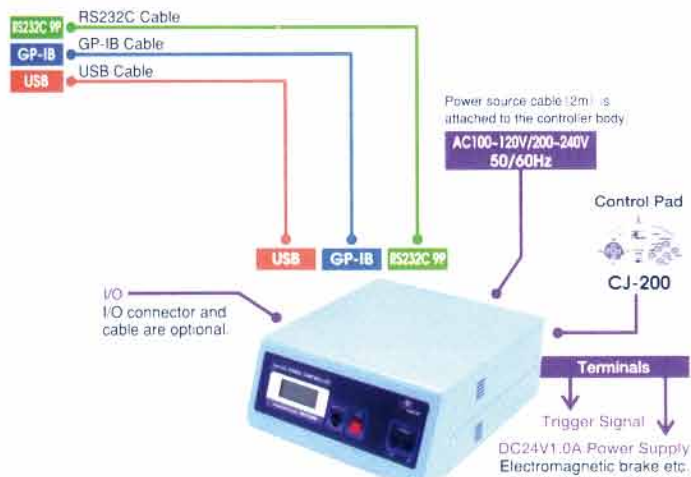
Terminal Software
SGTERM



Software for
Positioning
& Measurement
SGEMCS



ActiveX for
Positioning
& Measurement
SGACTX



High Performance Multifunctional
2 axis / 4 axis Stage Controller
SHOT-202/204MS

STAGE 1/2/3/4

**STAGE 3/4:
SHOT-204MS**



DAC Cable
DAC-SG

DBCS Cable
DBCS-15



CHAPTER 6 MOTORIZED STAGES

SGSP SERIES TRANSLATION MOTORIZED STAGES- 5 PHASE STEPPING MOTOR



- The SGSP Series of motorized stages incorporate 5 phase stepping motor and high-precision guide actuators to provide precise movement. The stages are available in range of travels lengths and load capacities to meet your demanding requirements.
- The uni-body shaped construction with integrated rail is precision honed to provide maximum stability. The construction results in a structure that resists the effects of pitch and yaw to provide the stability required for many applications.
- Sigma Koki offers a large variety of motorized positioning solutions. Our positioning stages are suitable for laboratory and OEM applications. If you would like to help in selecting the most appropriate positioning device for your application, please contact us.

Axis	Travel [mm]	Maximum Travel Speed [mm/sec]	Weight [kg]	Load Capacity Fz' [N]	Positional Accuracy [mm]	Positional Repeatability [mm]	Lost Motion [mm]	Straightness (Y axis direction) [mm]	Straightness (Z axis direction) [mm]	Part Number
X	10	15	0.5	30(3kgf)	0.01	0.005	0.005	0.005	0.005	SGSP15-10(X)
XY	10	15	1	20(2kgf)	*1	*1	*1	*1	*1	SGSP15-10(XY)
Z	10	15	1.1	5(0.5kgf)	*1	*1	*1	*1	*1	SGSP15-10(Z)
Plate	-	-	-	-	-	-	-	-	-	SG15-M4
X	20	15	0.5	50(5kgf)	0.01	0.005	0.005	0.005	0.005	SGSP20-20(X)
XY	20	15	1	40(4kgf)	*1	*1	*1	*1	*1	SGSP20-20(XY)
Z	20	15	1.1	10(1kgf)	*1	*1	*1	*1	*1	SGSP20-20(Z)
X	35	25	0.7	80(8kgf)	0.005	0.003	0.003	0.005	0.005	SGSP20-35(X)
X	85	25	1	80(8kgf)	0.007	0.003	0.003	0.005	0.005	SGSP20-85(X)
XY	35	25	1.4	70(7kgf)	*1	*1	*1	*1	*1	SGSP20-35(XY)
XY	85	25	2	70(7kgf)	*1	*1	*1	*1	*1	SGSP20-85(XY)
Z	35	25	1.5	30(3kgf)	*1	*1	*1	*1	*1	SGSP20-35(Z)
Z	85	25	1.8	30(3kgf)	*1	*1	*1	*1	*1	SGSP20-85(Z)
X	50	30	1.4	120(12kgf)	0.005	0.003	0.003	0.01	0.01	SGSP26-50(X)
X	100	30	1.7	120(12kgf)	0.01	0.003	0.003	0.01	0.01	SGSP26-100(X)
X	150	30	2	120(12kgf)	0.015	0.006	0.005	0.01	0.01	SGSP26-150(X)
X	200	30	2.5	120(12kgf)	0.015	0.006	0.005	0.015	0.015	SGSP26-200(X)
XY	50	30	2.8	100(10kgf)	*1	*1	*1	*1	*1	SGSP26-50(XY)
XY	100	30	3.4	100(10kgf)	*1	*1	*1	*1	*1	SGSP26-100(XY)
XY	150	30	4	100(10kgf)	*1	*1	*1	*1	*1	SGSP26-150(XY)
XY	200	30	5	100(10kgf)	*1	*1	*1	*1	*1	SGSP26-200(XY)
Z	50	30	2.5	40(4kgf)	*1	*1	*1	*1	*1	SGSP26-50(Z)
Z	100	30	3.1	40(4kgf)	*1	*1	*1	*1	*1	SGSP26-100(Z)
Z	150	30	3.5	40(4kgf)	*1	*1	*1	*1	*1	SGSP26-150(Z)
Z	200	30	4	40(4kgf)	*1	*1	*1	*1	*1	SGSP26-200(Z)
X	50	80	3	200(20kgf)	0.015	0.006	0.005	0.01	0.01	SGSP33-50(X)
X	100	80	3.4	200(20kgf)	0.02	0.006	0.005	0.01	0.01	SGSP33-100(X)
X	200	80	4.2	200(20kgf)	0.02	0.006	0.005	0.015	0.015	SGSP33-200(X)
XY	50	80	6	170(17kgf)	*1	*1	*1	*1	*1	SGSP33-50(XY)
XY	100	80	6.8	160(16kgf)	*1	*1	*1	*1	*1	SGSP33-100(XY)
XY	200	80	8.4	150(15kgf)	*1	*1	*1	*1	*1	SGSP33-200(XY)
Z	50	80	4.8	70(7kgf)	*1	*1	*1	*1	*1	SGSP33-50(Z)
Z	100	80	5.2	70(7kgf)	*1	*1	*1	*1	*1	SGSP33-100(Z)
Z	200	80	6	70(7kgf)	*1	*1	*1	*1	*1	SGSP33-200(Z)
X	300	120	10.8	300(30kgf)	0.025	0.006	0.005	0.015	0.015	SGSP46-300(X)
X	400	120	12.4	300(30kgf)	0.025	0.006	0.005	0.02	0.02	SGSP46-400(X)
X	500	120	14	300(30kgf)	0.025	0.006	0.005	0.02	0.02	SGSP46-500(X)
X	800	120	19	300(30kgf)	0.15	0.01	0.02	0.05	0.05	SGSP46-800(X)
XY	300	120	21.6	190(19kgf)	*1	*1	*1	*1	*1	SGSP46-300(XY)
XY	400	120	24.8	150(15kgf)	*1	*1	*1	*1	*1	SGSP46-400(XY)
XY	500	120	28	150(15kgf)	*1	*1	*1	*1	*1	SGSP46-500(XY)
Z	300	120	16.8	70(7kgf)	*1	*1	*1	*1	*1	SGSP46-300(Z)
Z	400	120	18.4	70(7kgf)	*1	*1	*1	*1	*1	SGSP46-400(Z)
Z	500	120	20	70(7kgf)	*1	*1	*1	*1	*1	SGSP46-500(Z)
X	1200	120	47.4	500(50kgf)	0.2	0.016	0.05	0.05	0.05	SGSP65-1200(X)
X	1500	120	55.5	500(50kgf)	0.28	0.016	0.05	0.055	0.055	SGSP65-1500(X)

TRANSLATION MOTORIZED STAGES, FLAT Z AXIS - 5 PHASE STEPPING MOTOR



- The SGSP-ZF Series is the motorized stage for precise elevation movements incorporating five phase stepping motor and high-precision actuators.
- The five-phase stage stepper motor enables the SGSP-ZF series stages to be lightweight and compact.
- In addition, the stages can be used with linear stages in many laboratory, measurement, inspection and OEM applications.

Table Size [mm]	Motor	Lead Screw [mm]	Travel [mm]	Maximum Travel Speed [mm/sec]	Travel per Pulse(Full/ Half Step) [μm]	Weight [kg]	Load Capacity Fz' [N]	Positional Repeatability [mm]	Lost Motion [mm]	Part Number
40 x 40	PK513PB-C9 (0.35A/Phase)	ø5(1mm Lead)	5	2	1/0.5	0.35	20(2kgf)	0.010	0.005	SGSP40-5ZF
60 x 60	C9863-90215P (0.75A/Phase)	ø6(1mm Lead)	5	4	2/1	0.6	40(4kgf)	0.010	0.005	SGSP60-5ZF
60 x 60	C9863-90215P (0.75A/Phase)	ø6(1mm Lead)	10	4	2/1	0.6	40(4kgf)	0.010	0.005	SGSP60-10ZF
80 x 80	PMM33BH-MG20 (0.75A/Phase)	ø8(2mm Lead)	20	2	0.2/0.1	1.6	150(15kgf)	0.010	0.005	SGSP80-20ZF

Rotation Motorized Stages - 5 Phase Stepping Motor



- SGSP series rotation stages are designed with a continuous 360° motion.
- Compact and high accuracy, these rotation stages are available in five models ranging from 40mm footprint to 160 mm footprint diameter platform.
- Adapter plates, top plates and interface plates are available in standard inch or metric hole patterns.

Type	Table Size [mm]	Maximum Travel Speed [°/s]	Weight [kg]	Load Capacity Fz' [N]	Positional Repeatability [°]	Lost Motion [°]	Wobble [mm]	Part Number
Small	ø40	30	0.35	20(2kgf)	0.02	0.05	0.02	SGSP-40YAW
Small	ø60	30	0.45	30(3kgf)	0.02	0.05	0.02	SGSP-60YAW-0B
Small	ø60	30	1	30(3kg)	0.02	0.05	0.02	SGSP-60YAW-W-0B
Large	ø80	30	1.1	100(10kgf)	0.02	0.05	0.02	SGSP-80YAW
Large	ø120	30	2	200(20kgf)	0.02	0.05	0.02	SGSP-120YAW
Large	ø160	30	2.5	200(20kgf)	0.02	0.05	0.02	SGSP-160YAW
Large	ø120	30	5.5	200(20kgf)	0.02	0.05	0.02	SGSP-120YAW-W

MOTORIZED POLARIZER HOLDERS WITH GLAN THOMPSON PRISM



- Rotation Motorized Optic Holder that is attached to some polarizing elements with Rotation Motorized Stage.



Rroduct Name	Weight [kg]	Maximum Travel Speed [°/s]	Optics Usage	Positional Repeatability [°]	Lost Motion [°]	Wobble [mm]	Part Number
Rotation Motorized Polarizer Holder with Glan Thom	0.5	30	GTPC-08-20AN	0.02	0.05	0.02	SGSP-60-GTPC-0B
Adapter for SGSP-60-GTPC	-	-	-	-	-	-	SGSP-60-GHD
Rotation Motorized Polarizer Holder with Quarts Wa	0.5	30	WPQ-6700-4M	0.02	0.05	0.02	SGSP-60-WPQ-0B
Adapter for SGSP-60-WPQ	-	-	-	-	-	-	SGSP-60-WHD

Rotation Motorized Stages with Optics - 5 Phase Stepping Motor



- Motorized ND filter Holder for adjusting photon that is attached to Valiable ND filters with Rotation Motorized Stage.
- It adjusts phpton by rotation angles of filters

Rroduct Name	Weight [kg]	Maximum Travel Speed [°/s]	Optics Usage	Positional Repeatability [°]	Lost Motion [°]	Wobble [mm]	Part Number
Rotation Motorized ND Filter Holder	0.5	30	VND-100	0.02	0.05	0.02	SGSP-60-ND-0B
Rotation Motorized ND Filter Holder	0.5	30	VND-100U	0.02	0.05	0.02	SGSP-60-NDU-0B

MOTORIZED GONIOMETERS - 5 PHASE STEPPING MOTOR



- This stage uses crossed roller method which is more durable to friction than the conventional V groove ball bearing.
- This offers superior stiffness use than the previous products.
- Rotation center for each axis is coincided.

Adjustable Range [°]	Max Speed [°/s]	Weight [kg]	Load Capacity Fz'(Horizontally) [N]	Positional Repeatability [°]	Lost Motion [°]	Rotation Center Height [mm]	Part Number
±7	6	0.65	24.5(2.5kgf)	0.004	0.02	75	SGSP-60A75
±5	6	0.55	24.5(2.5kgf)	0.004	0.02	100	SGSP-60A100
±4	6	0.65	24.5(2.5kgf)	0.004	0.02	130	SGSP-60A130
α±5 β±7	6	1.1	19.1(1.9kgf)	*1	*1	75	SGSP-60B75
α±4 β±5	6	1.2	19.1(1.9kgf)	*1	*1	100	SGSP-60B100

CHAPTER 6 MOTORIZED STAGES

2 AXIS INTELLIGENT DRIVER FOR 5 PHASE STEPPING MOTOS



- Consisting of a stage controller and driver, the Intelligent Driver permits simple, accurate positioning of two motorized stages by commands sent from a PC via an SHOT-602 interface. By adding a DIP switch, the return to origin method and limit sensor logic method can be altered expanding the applications for motorized stages even further.

Notes

- Pin 1 connector for use with the SCT-602 has an electrical output of 24V. Under no circumstances should it be connected to a personal computer via an RS232C cable.
- Although the driver has protection circuitry, there is danger of damage. Be sure to disconnect either the RS232C or SCT-602.
* If RS232C and SCT-602 are connected at the same time, neither of them will function.

Sample programs

The following sample programs can be downloaded
SG Commander(for WINDOWS95/98/Me/2000/XP)
LabVIEW

Softwares



Software for
Positioning &
Measurement
SGEMCS



ActiveX for
Positioning &
Measurement
SGACTX



Terminal
Software
SGTERM

Performance Specifications

Number of Controlling Axis	2 axis
Coordinate Setting Range	± 16777214 pulses
Minimum Operating Pulse Rate	1 pps
Maximum Operating Pulse Rate	20 kpps
Acceleration/Deceleration Time	0~1000 ms (straight line)
Limit Sensor	Origin (ORG) sensor limit sensor (LS+, LS-) Origin proximity (NEAR) sensor
Sensor Logic	Normal closed/ Normal open (Switchable using No. 4 DIP switch)
Zero Point Detection	Limit sensor (MINI) method/ Sigma (Mark) method (Switchable using No.3 DIP switch)
Return to Origin Axis	Axis 1/ Axis 2 (Switchable using No.5 DIP switch)
Interfaces	RS 232 C (Dsub 9 pin female) Baud rate : 19200, 9600, 4800, 2400 bauds (Switchable using No.1, No.2 DIP switches) Data length : 8 bits Parity : no parity Stop bit : 1 bit Delimiter : CR+LF SCT-602 (Dsub 9 pin male) SCT-602 dedicated interface. Caution : Pin 1 has electrical output of 24 V.

General Specifications

Power Supply	AC100 V 50/60Hz 50VA
Operating Temperature	5~40°C
Ambient Humidity	20~85% RH (non-condensing)
External Dimension	236 W x 114 D x 42 H mm (excluding attachments)
Weight	1.6 kg

Driver Specifications

Motor	5 Phase Stepping Motors
Drive Method	Half-step
Drive Current (RUN)	0.17A/phase~0.85A/phase
Stop Current (STOP)	0.09A/phase~0.69A/phase
Current Down	Automatic
Motor Free	By command (C)

CHAPTER 6 MOTORIZED STAGES

2 AXIS STAGE CONTROLLERS FOR 5 PHASE STEPPING MOTOS



- SHOT-102 is a 2-axis stage controller designed to deliver high performance in a compact, low-cost, package. The controller has two internal drivers and offers both automatic controls using PC and manual operation using a built in joystick.

Notes

- The product is warranted for a period of one year.

Sample programs

The following sample programs can be downloaded
SG Commander(for WINDOWS95/98/Me/2000/XP)
LabVIEW

Softwares



Software for
Positioning &
Measurement
SGEMCS



ActiveX for
Positioning &
Measurement
SGACTX



Terminal
Software
SGTERM

Performance Specifications

Number of Controlling Axis	2 axis
Maximum Display Range	8 digits×2 lines
Coordinate Setting Range	±16777124 pulses
Minimum Operating Pulse Rate	1 pps
Maximum Operating Pulse Rate	20 kpps
Limit Sensor	Normal closed-loop
Acceleration/Deceleration Time	0~5000 ms
Mechanical Origin Detection	Limit sensor method
DC Outputs	Built-in power source for photo sensor Integrated hot sensor power source Voltage DC 24 V/5 V (100 Ω series resistance) 2 axis independent, switchable Rated current 20 mA (24 V), 50 mA (5 V)
Operating Modes	Host/manual
Interfaces	RS 232 C interfaces (9-pin female) Communications parameters Baud rate : 38400,19200,9600,4800 bauds Data length : 8 bit Parity : no parity Stop bit : 1 bit Flow control : Hardware RTS/CTS GP-IB
Delimiters	CR,LF,CR+LF,EOI EOI with GP-IB interface only

Driver Specifications

Motor	5 Phase Stepping Motors (5 leads)
Drive Method	Half-step, Full-step
Drive Current (RUN)	0.17~0.85 A / phase
Stop Current (STOP)	0.09~0.69 A / phase
Current Down	Auto
Motor Free	By command

General Specifications

Power Supply	AC 100~120V 50/60 Hz 50 VA
Operating Temperature	5~40°C
Ambient Humidity	20~85% RH (non-condensing)
External Dimensions	200 W×172 D×52 H mm (excluding attachments)
Weight	2.0 kg

List of Commands

	Command	Keyboard Command	Description
Drive Commands	Return to Mechanical Origin	H :	detect mechanical origin
	Relative Displacement Pulse Rate Setting	M :	Set axis of movement, direction, pulse rate
	Jog Motion Command	J :	Operate at minimum speed (S)
	Absolute Displacement Pulse Rate Setting	A :	Set movement to absolute coordinates
Setting Commands	Drive Command	G :	Start operation
	Electrical (Logic) Origin Setting	R :	Set current position as electrical (logic) origin
	Speed Setting	D :	Set F, S and R
	Stop	L :	Stop or decelerate and stop
	Emergency Stop	L : E	Emergency stop under any conditions
Confirmation Commands	Motor Free	C :	Excitation ON/OFF
	Status 1	Q :	Signal current position
	Status 2	! :	Signal B (BUSY), R (READY)
	Internal Information	? :	Confirm internal information

CHAPTER 6 MOTORIZED STAGES

2 AXIS / 4AXIS STAGE CONTROLLERS FOR 5 PHASE STEPPING MOTOR



- RS232C, GP-IB and USB interface supported. The stage can be accurately moved to the desired position by simple commands sent from the PC. It is possible to save internal data by downloads and uploads.
- Internal power supply for I/O (Input / Output) signals, trigger output signals, and DC 24V output signals makes it possible to control external input or output devices or to output trigger signals synchronized with external measuring devices.

Notes

- The product is warranted for a period of one year.

Sample programs

The following sample programs can be downloaded

SG Commander(for WINDOWS95/98/Me/2000/XP)
LabVIEW

Softwares



Software for
Positioning &
Measurement
SGEMCS



ActiveX for
Positioning &
Measurement
SGACTX



Terminal
Software
SGTERM

Control Pad

Control pad for manual
operations, memory settings,
program preparation, etc.



CJ-200

Performance Specifications

Number of Controlling Axis		2 axis (SHOT-202) / 4 axis (SHOT-204 MS)	
Coordinate Setting Range		999999999 pulses	
Maximum Operating Pulse Rate (F)		500 kpps	
Minimum Operating Pulse Rate (S)		1 pps	
Acceleration/Deceleration Time (R)		0~1000 ms	
Limit Sensor		Mechanical origin sensor / proximity sensor / CW (+) limit/ CCW (-) limit (Input logic is switchable by memory switch)	
Trigger Outputs		Open collector output (max. DC 24 V 30 mA)	
Interfaces	RS 232 C	Communications Parameters	9-pin male
		Baud Rate	38400,19200,9600,4800 bauds
		Data Length	8 bits
		Parity	no parity
		Stop Bit	1 bit
		Flow Control	hardware
		Delimiters	CR, LF, CR+LF
	GP-IB	Setting Address	1~30
		Delimiters	CR,LF,CR+LF,EOL
	USB	Full speed mode supported	
DC Outputs	DC36V3.2A (non-insulated) motor driver operation		
	DC24V1.0A (non-insulated) external I/O power supply terminal output (such as motor brake)		
	DC12V 0.2A (non-insulated) sensor power supply		
	CPU logic circuitry, driver interface		
I/O	Input Signals 4	photo coupler input : internal resistance 2.2 kΩ	
	Output Signals 4	open collector output : max. DC24V100mA	
Control Signals	Input Signals 14	photo coupler input : internal resistance 2.2 kΩ	
		Program number - 1	
		Drive command - 1	
		Return to mechanical origin command - 2	
		Temporary stop command - 1	
		Emergency stop command - 1	
		Forward travel command - 2	
		Reverse travel command - 2	
		Speed setting - 2	
	Output Signals 5	Alarm reset - 1	
Selection 1,2 axis or 3,4 axis - 1			
open collector output : max. DC24V20mA			
Start/stop - 1		Return to mechanical origin/stop - 2	
BUSY - 1			
ALARM - 1			
Insulation Resistance		Greater than 100 MΩ when measured between the power supply terminal and the case at DC 500 V megohms at room temperature and humidity	
Insulation Voltage Resistance		No abnormality when AC 1500 V is applied at 60 Hz for one minute between the power supply terminal and the case at room temperature and humidity	
Power supply Line Noise		Normal operation under conditions of 800 V 1 micron S in common mode and normal mode	
Static Noise		Normal operation under conditions of 200 pF, 1 kΩ 10 kV	

General Specifications

Power Supply	AC100~120V / 200~240V 50/60Hz
Power Consumption	160VA(SHOT-202) 300VA(SHOT-204MS)
Operating Temperature	5~40°C
Storage Temperature	-20~60°C
Ambient Humidity	20~80% RH (non-condensing)
External Dimension	270 W×297 D×118 Hmm (excluding attachments)
Weight	5.5 kg(SHOT-202) 6.5 kg(SHOT-204MS)

Driver Specifications

Drive Method	Bipolar pentagon micro-step
Drive Current (Output Current)	0.25 A~1.4 A / phase
Current Down (Stop Current)	27%~90% of designated output current
Motor Excitation	Motor excitation set to ON/OFF via input signal
Micro-step Setting	1, 2, 4, 5, 8, 10, 20, 25, 40, 50, 80, 100, 125, 200, 250 micro-steps (Switchable between M 1 with the micro-step setting switch)
Setting Switches	RUN, STOP

CHAPTER 6 MOTORIZED STAGES

CONTROLLERS FOR SHOT-602



- SCT-602 control pad is a dedicated device for controlling the SHOT-602. The control pad makes it possible to create a program with up to 100 lines for each of four channels (400 lines total). By using the teaching mode of the SCT-602 program steps can be saved. The control pad is able to control axes coordinates, travel speed, wait time and number of time to run program steps.

Points

- This is a dedicated device for controlling the Intelligent Driver.
- Permits driver control suited to specific purpose by saving coordinates of two axis, travel speed, wait time, and the number of repeat passes as individual steps, 100 steps for each of four channels (total of 400 steps).

Notes

- Pin 1 connector for use with the SCT-602 has an electrical output of 24V. Under no circumstances should it be connected to a personal computer via an RS232C cable.
- Although the driver has protection circuitry, there is danger of damage. Be sure to disconnect either the RS232C or SCT-602.
* If RS232C and SCT-602 are connected at the same time, neither of them will function.
- It is impossible for controller : SCT-602 for SHOT-602 to operate old product of Intelligent driver : CGS-602.

Performance Specifications

Number of Control Axis	2 axis
Operating Modes	MANUAL (M) / TEACHING (T) / RUN (R) / EDIT (E) / SET UP (SET UP)
Coordinate Setting Range	-99999999~+99999999 pulses Input range will be changed by the resolution/per unit
Coordinate Indication Range	-16777214~+16777214 pulses Input range will be changed by the resolution/per unit
Speed Setting	10 step 2 axis switching (switchable according to parameters)
Minimum Operating Pulse Rate (S)	50~20000 pps
Maximum Operating Pulse Rate (F)	50~20000 pps
Acceleration/Deceleration Time (R)	0~1000 mS
Coordinate Setting Unit	[pps] [μ m] [$^{\circ}$]
Data Storage	100 step x 4 channels
Parameter in STEP Mode	Wait Time 0~25.5 sec / 0.1 sec per unit Repeatable Number 0~255 [times]
Excursion Pattern in RUN Mode	ALL : All step excursion at specified channel STEP : 1 step excursion at specified channel
Origin Positioning Direction	Switchable to +direction / -direction
Return to Origin Axis	Available X axis / Available Y axis / Available both axes to be switched

General Specifications

Power Supply	DC+24 V Supplied from the intelligent driver (SHOT-602).
Operating Temperature	5~40°C
Ambient Humidity	20%~80% RH (non-condensing)
External Dimensions	94 W x 30 H x 140 Dmm
Weight	560 g (incl. cable)
Display	LCD 16 character x 2 lines
Connectable Cable	Attached exclusive use cable (Detachable)

CHAPTER 6 MOTORIZED STAGES

SINGLE AXIS STAGE CONTROLLERS



- PAT-001 is a economical model of single axis controller. Also good space factor and light weight compare with others.
- When the PAT-001 is connected to a personal computer using the RS232C interface, the stage can be accurately moved to the desired position by simple commands sent from the PC.
- Since the I/O (input and output) signal, the signal for JOG operation, and the signal for an emergency stop are built in, the synchronization with external device is possible.

Notes

- The product is warranted for a period of one year.
- The power supply of PAT-001 is +24V 2A. You need to purchase optional PAT-001-POW (AC adaptor), or need to prepare by yourself.

Sample programs

The following sample programs can be downloaded
SG Commander(for WINDOWS95/98/Me/2000/XP)

Softwares



Software for
Positioning &
Measurement
SGEMCS



ActiveX for
Positioning &
Measurement
SGPATX



Terminal
Software
SGTERM

Performance Specifications

Number of Controlling Axes	1 axis
Coordinate Indication Range	0~16777215 pulses
Minimum Driving Speed	100 pps (Programmable in 100 pps.)
Maximum Driving Speed	20000 pps (Programmable in 100 pps.)
Acceleration/Deceleration Time	0~1000 ms
Limit Sensor Input	Maximum 2
Interfaces	RS 232 C interfaces (9-pin female) Communications parameters Baud rate : 38400, 19200, 9600, 4800 bauds Data length : 8 bit Parity : none Stop bit : 1 bit Flow control : Enable (via RS-CS)/Disable switchable
I/O	Input Signals 4 +24 [V] capable photo coupler isolated input
	Output Signals 4 +24 [V] capable open collector photo coupler output (open collector)
Control Signals	Input Signals 3 E-Stop Input : 1 JOG move : 2

General Specifications

Power Supply	DC+24V 2A (supply from screw type terminal)
Operating Temperature	5~40°C
External Dimensions	47 W×125 D×90 Hmm (excluding attachments)
Weight	0.4 kg

Driver Specifications

Motor	5 Phase Stepping Motors (5 leads)
Drive Method	Half-step, full-step
Drive Current (RUN)	0.1~0.8 A / phase
Stop Current (STOP)	0.1~0.8 A / phase
Current Down	Auto

CHAPTER 6 **FIBER POSITIONERS**

MOTORIZED STAGES

MBT612/M Single Mode Fiber Launch w/Quick Release Clamp

MBT613/M Single Mode Fiber Launch with FC Connectorized Fiber Holder



MBT610/M Single Mode Fiber Launch w/Variable V-Groove Clamp



MBT611/M Multi-Mode Fiber Launch w/Fast Release Fiber Mount

MBT614/M Single Mode Fiber Launch with GRIN Lens Holder



MBT621/M Polarization Maintaining Fiber Launch w/ Rotator



**MDT630A
COMPLETE SYSTEM
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**APB302/M PiezoBlock™ & MDT693
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