

SMAC

Moving Coil Actuators



Product Range

linear & rotary/linear actuators:

Linear:

Resolution: 5 micron, 1 micron & 0.5 micron (consult factory for finer resolutions)

Force: Up to 250N (consult factory for higher forces)

Rotary:

Torque: .03 - 1.0 newton meter

Speed: 150 - 5000 rpm

Resolution: 0.07 - 0.007 degrees

Gear or direct drive/ brush or brushless rotary



LAL-20/LAR-20
Stroke (mm): 10, 15, 25
Force (N): 8



LAL-30/LAR-30
Stroke (mm): 15, 25
Force (N): 16, 12



LAL-55/LAR-55
Stroke (mm): 50, 100, 150 (LAL only)
Force (N): 25



LAL-90/LAR-90
Stroke (mm): 15, 50
Force (N): 100, 60



LAL-300
Stroke (mm): 50
Force (N): 250

linear slide actuators:



LAS-20
Stroke (mm): 10, 15, 25
Force (N): 8



LAS-30
Stroke (mm): 15, 25
Force (N): 16, 12



LAS-55
Stroke (mm): 50, 100, 150
Force (N): 25



LAS-90
Stroke (mm): 15, 50
Force (N): 100, 60

gripper & xy actuators:



GRP-02
Stroke (mm): 15
Force (N): 12



GRP-35
Stroke (mm): 30
Force (N): 25



GRP-50
Stroke (mm): 30
Force (N): 45



LXY-25x25
Stroke (mm): 25
Force (N): 42



LXY-60x60
Stroke (mm): 60
Force (N): 150

controllers/amplifiers:



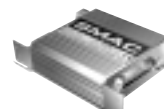
LAC-25
2 axis controller



LAC-1
single axis controller



Built-in Controller
single axis controller



LAA-5
PWM amplifier



LAD-1
pulse to servo driver

Linear and Linear/Rotary Moving Coil Actuators

two axis moving coil designed for pick, orient and place

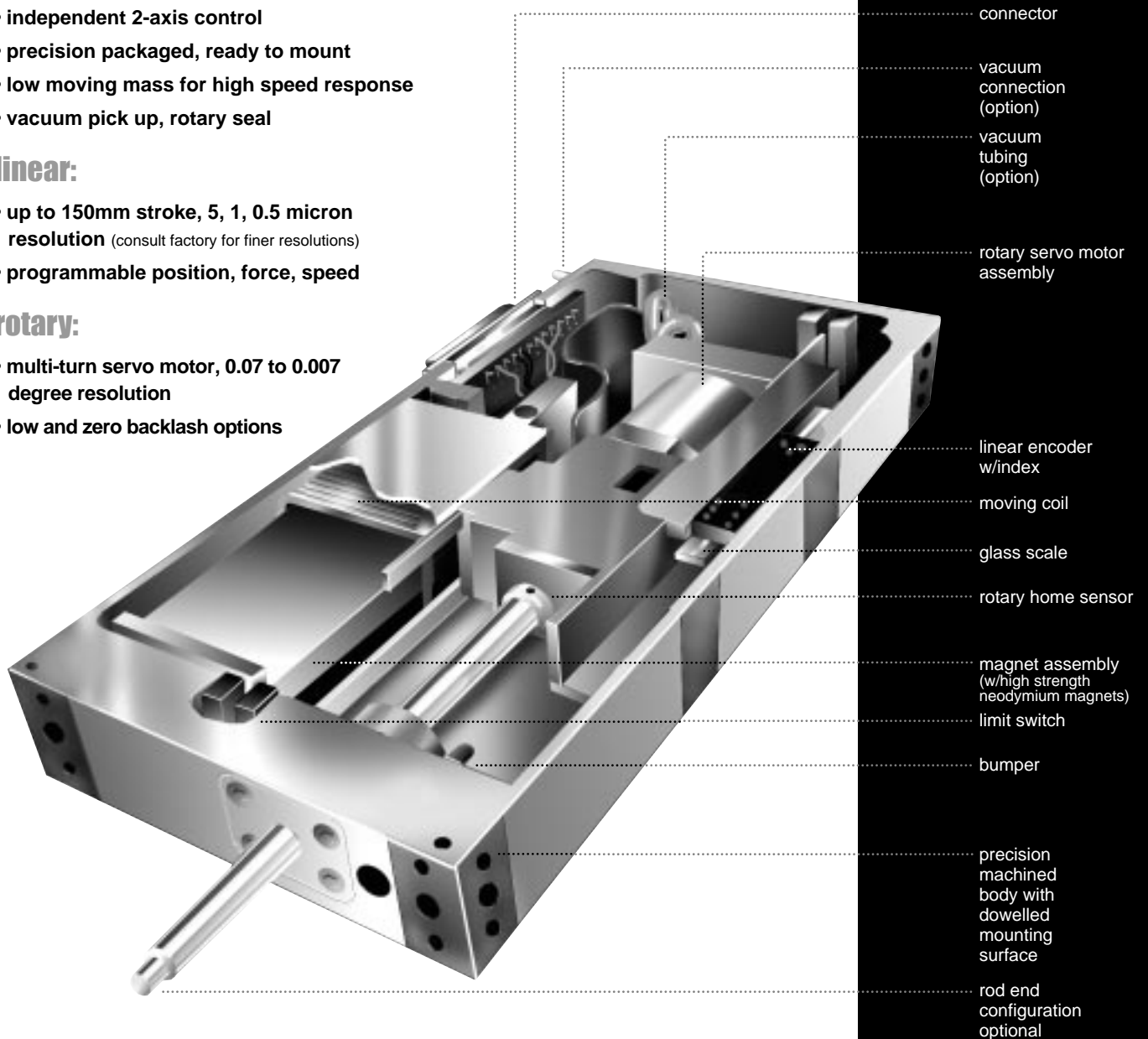
- semiconductor insertion
- circuit board assembly
- precision assembly with verification
- independent 2-axis control
- precision packaged, ready to mount
- low moving mass for high speed response
- vacuum pick up, rotary seal

linear:

- up to 150mm stroke, 5, 1, 0.5 micron resolution (consult factory for finer resolutions)
- programmable position, force, speed

rotary:

- multi-turn servo motor, 0.07 to 0.007 degree resolution
- low and zero backlash options

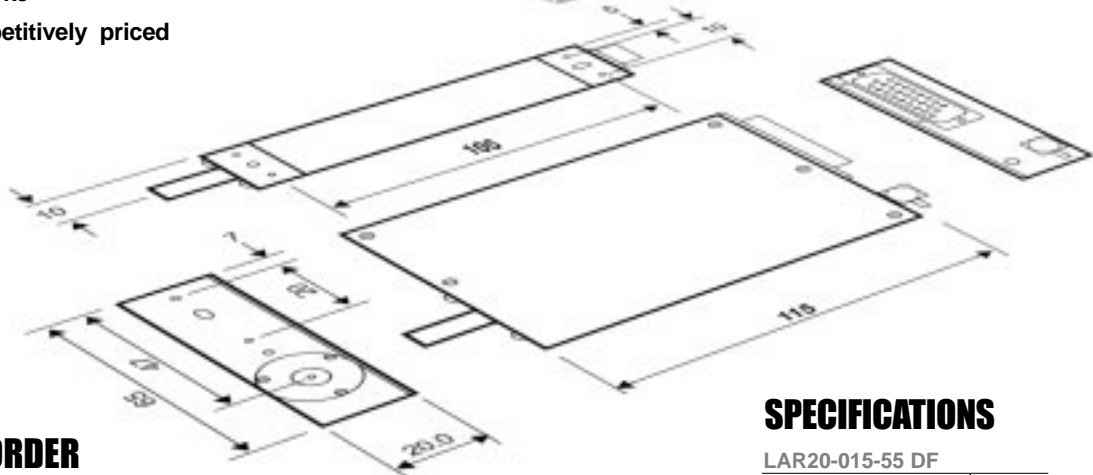


Sample Web Page

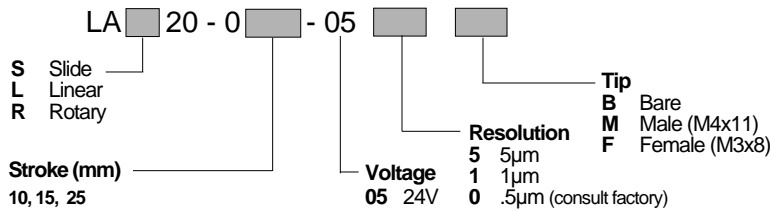
LAR20-015

FEATURES

- extremely thin, 20mm profile
- virtually burn-out proof coil
- light weight, only 280 grams
- direct drive, high resolution rotary
- 8 N peak force
- shaft threads: male M4x11/female-M3x8
- 15mm stroke
- very competitively priced



HOW TO ORDER



SPECIFICATIONS

LAR20-015-55 DF

Linear Stroke	15
Coil (VDC)	24
Peak Current (A)	2
Peak Force (N)	8
Force Constant (N/A)	4.5
Continuous Force (N)	3.2
Total Weight (grams)	280
Moving Mass (grams)	60
Linear Encoder (micron)	5

Recommended Operating Conditions

Continuous Force

Peak force applied for duration shorter than 0.4 sec. in one second interval.

(force mode): 40% of peak force, continuous

Force Mode:

The specified current may be applied continuously to generate the desired force, the recommended continuous force limit should be set in the control program.

In vertical operation, the actuator rod will drop when power is cut off. A rod in the lowered position may be damaged by other moving parts in the machine. A return spring (if installed) will keep the rod raised. A safety lock-out should be installed in the machine program to confirm the rod location before another interfering component can be moved.

SMAC actuators are equipped with these safety features:

- **Limit Switches:**
indicates end-of-stroke
- **Index Line/Home Position:**
used to monitor absolute position
- **Break away shaft** (optional)

Safety Considerations

Unintentional full force may be applied continuously under the following conditions:

- missed target position
- excessive friction
- equipment malfunction, i.e. jam

If left undetected, this can cause destruction of the coil in some units. Servo program should perform these checks regularly:

- **Re-home:**
assure target position has not shifted beyond end of stroke
- **Time-outs:**
shut power down within 10 seconds of error detection
- **Following Error Limits:**
software safety
- **Check limit switches**
- **Check temperature sensor**

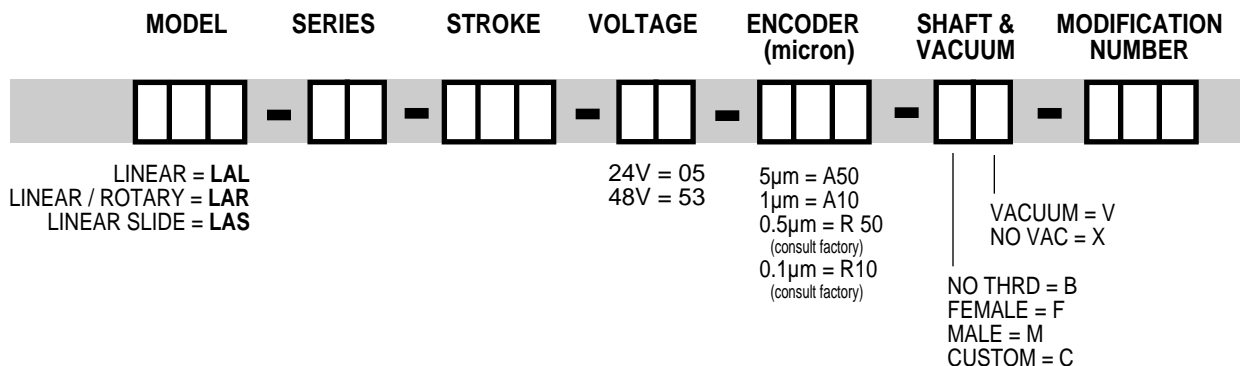


Linear & Linear/Rotary Actuators

	LAL, LAS 20	LAR 20	LAL, LAS LAR 30-15	LAL, LAS 30-25	LAR 30-25	LAR 34
Volts	24	24	24	24	24	24
Size: LxWxH	85x65x20	115x65x20	125x31x83	150x34x83	150x34x83	190x83x40
Stroke, mm	10,15,25	15	15	25	25	25
Peak Force, N	8, 5	8	16	12	12	15
Continuous Force, N	4, 2.5	4	7.6	5.7	5.7	6
Force Constant, N/A	4, 2.5	4	6.4	4.8	4.8	5
Weight, kg	.33	.41	.69	0.74	0.8	0.9
Moving Mass, kg	.06	.11	0.15 / 0.21	0.15	0.21	.25
Rod Diameter, mm	8	8	8	8	8	8
Runout, micron	50	50	50	50	50	50
Rotary	N/A	Yes	Yes	N/A	Yes	Yes
Torque, N-m		.008	0.1		0.1	.02
Gear Ratio		Direct	76		76	Direct
Resolution, degree		.025	0.07		0.07	.018 / .007
Speed, rpm		5000	150		150	5000



LAL, LAS LAR 37	LAL, LAS LAR 55	LAL, LAS 90	LAR 90	LAL, LAS 90	LAR 90	LAL 150	LAL 300
24	24	48	48	48	48	48	48
210 x 28 x 92	250 x 110 x 55	90 x 90 x 95	304 x 90 x 115	147 x 90 x 95	304 x 90 x 115	160 x 70 x 95	210 x 100 x 120
50	50,100,150 / 50	15	15	50	50	15	50
8	38,25,16 / 38	100	100	60	60	150	258
4	38,25,16 / 38	40	40	24	24	60	100
3.6	24,15,10 / 24	30	30	20	20	50	86
1.1 / 1.7	3,3.8,4.5 / 3.1	2.1	3.5	3	4.7	3.5	8.8
0.22 / 0.28	.3 / .5	0.025	0.38	0.25	0.38	0.7	0.8
8	8	10	10	10	10		12
50	50	50	50	50	50	50	50
Yes	Yes	N/A	Yes	N/A	Yes	N/A	N/A
0.1	.03		1.0		1.0		
76	Direct		66		66		
0.07	.045		0.107 / 0.007		0.107 / 0.007		
150	5000				150		



X-Y Actuators & Grippers

	XY 25	XY 60	XY 100
Volts	48	48	48
Weight, Kg	4	36	40
Size: LxWxH	125 x 125 x 65	350 x 350 x 140	424 x 416 x 125

X-Axis

Stroke, mm	25	60	100
Peak Force, N	42	150	100
Continuous Force, N	17	60	40
Force Constant, N/A	14	50	33
Moving Mass, kg	0.25	1.5	2.0
Encoder Resolution, μ	5	0.5	0.5

Y-Axis

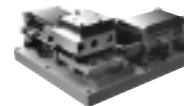
Stroke, mm	25	60	100
Peak Force, N	42	150	100
Continuous Force, N	17	60	40
Force Constant, N/A	14	50	33
Moving Mass, kg	1.25	1.5	1.5
Encoder Resolution, μ	5	0.5	0.5

	GRP 02	GRP 35	GRP 50
Volts	24	24	48
Amps, total	4	3	4
Size: LxWxH	59 x 75 x 30	93 x 110 x 38	90 x 125 x 55

Weight, kg	.75	1.5	2.5
Maximum Opening	15	30	30

Each Finger

Stroke, mm	7.5	15	15
Peak Force, N	12	25	45
Continuous Force, N	4.8	10	33
Force Constant, N/A	4	17	22.5
Moving Mass, kg	.025	0.100	0.47
Encoder Resolution, μ m	5	5	5



Model	Series	Stroke	Voltage	Encoder (micron)	Modification Number
LXY	-	-	53	-	-
				5 μ m=05	
				1 μ m=01	
				.5 μ m=00 (consult factory)	
				.1 μ m=02 (consult factory)	



Model	Series	Voltage	Encoder (micron)	Modification Number
GRP	-	-	-	-
		24V=05	5 μ m=05	
		48V=53	1 μ m=01	
			.5 μ m=00 (consult factory)	
			.1 μ m=02 (consult factory)	

Controllers / Amplifiers



LAC-25

2 axis controller,
built-in amplifier

Modes:

- Position
- Velocity or Continuous
- Force mode

Independent or coordinated 2 axis motion

4 I/P, 4 O/P, Opto-isolated general purpose I/O, 2 analog I/P, 2 analog O/P, RS-232 interface



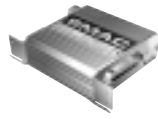
LAC-1

1 axis controller,
built-in amplifier

Modes:

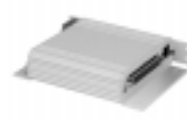
- Position
- Velocity or Continuous
- Force mode

8 I/P, 8 O/P, TTL general purpose I/O, 3 analog I/P, RS-232 interface



LAA-5

1 axis amplifier
 ± 10 Volt I/P,
3 Amp O/P



LAD-1

1 axis stepper I/P
to servo O/P
RS-232 set-up



Built in Controller

Option MOD 429
(consult factory for available actuators)

Cables

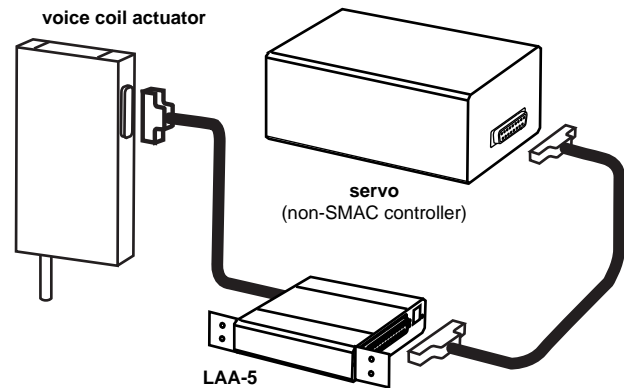
Linear Actuator to Amplifier	LAH-LAD-03
Rotary/Linear Actuator to Amplifiers	LAH-RAD-03
Linear Actuator to LAC-5	LAH-LCD-03
Rotary/Linear Actuator to 2 LAA-5s	LAH-RCD-03
Linear Actuator to LAC-1	LAC-LOD-03
Rotary/Linear Actuator to 2 LAC-1s	LAH-RED-03
2 Linear Actuators to LAC-25	LAH-LTD-03
Rotary/Linear Actuator to LAC-25	LAH-RTD-03
XY or Gripper to LAC-25	LAH-GRP-03
XY or Gripper to 2 LAA-5	LAA-GRP-03

Add 26 for LA-20's (i.e. LOD26-03)

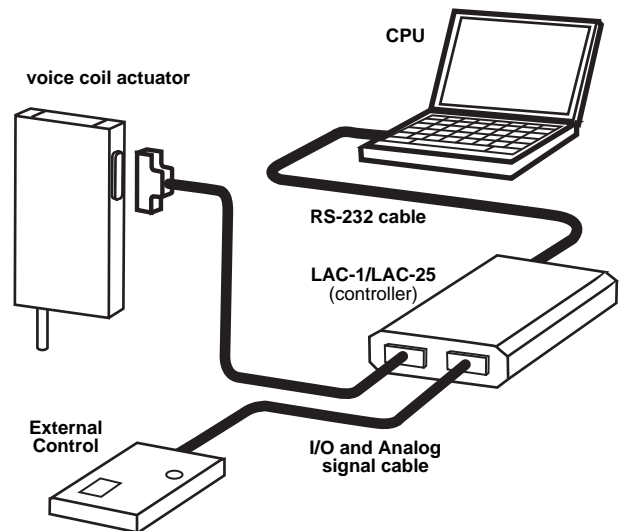
Length = 3 meters

*Super flexible cable material, suitable for robotic applications is available as an option

Hardware Configuration



Hardware with SMAC Amplifier

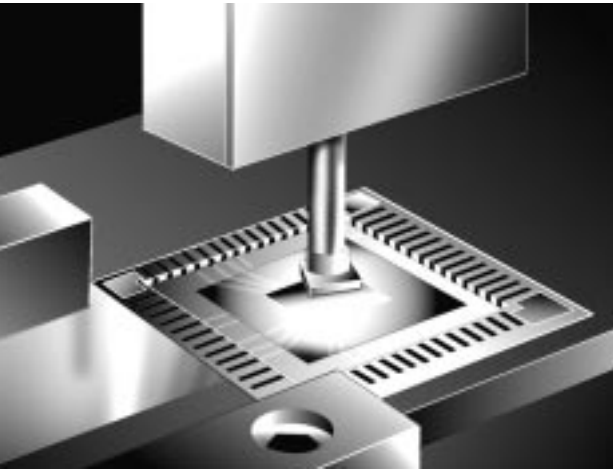


Hardware with SMAC Controllers

- Pick and place
- Switch Testing
- Component assembly
- Cellphone testing

Sample Applications

- measurement systems
- Ferrule quality testing
- Die Bonding



- Screen Printing
- Chip Mounter
- Die Bonding
- Pin Insertion
- Mechanical Assembly
- Ultrasonic Welding
- Laser Cutting
- Glass Printing
- Wire Trimming
- Components

Key Operational Details

A. PICK UP

- High speed approach
- Slow down, soft land on part (pick-off height)
- Turn on vacuum, pick up
- High speed take-off

B. ORIENT

- Camera determines orientation
- Rotate

C. PLACE

- High speed approach
- Slow down, soft land on fixture
- Increase force to press & hold
- Release part
- High speed take-off

SMAC Advantages:

Z-Theta actuator in a single ready to mount package with through the rod vacuum

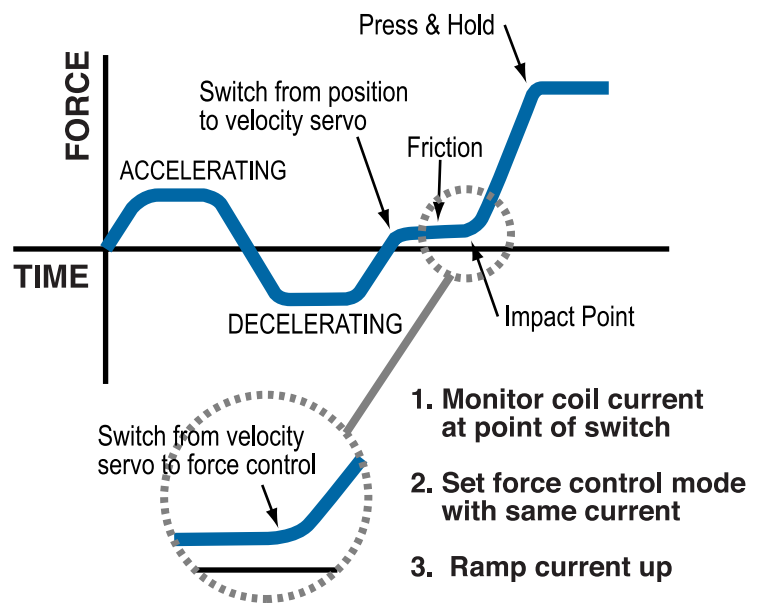
High speed, long life design for continuous operation

Programmable profile to handle delicate parts

Apply appropriate bonding force to effect reliable bond

- 2-Axis Robot
- Labeling Machine

SOFT LANDING



- Ultrasonic Welding

- Medical Assembly

- Laser Cutting

- Glass Cutting

- Switch Testing

- Stacking of Components

- Automated Assembly

- High Resolution

- Pick, Place, Press

- High Speed Pick Tubes

- Pick, Place, Press

- Wafer Transport

- High Speed Wafer Upgrade

- Lens Polishing

- Sandblasting Surgical Needles

- Precision Elevators

- Dynamic Balancing

- TV Tube Inspection

- Switch Testing: Hysteresis Effect

- Height Gage

- Lead Inspection Machine

- Grease Dispensing

- Glue Dispensing

- Color Dispensing

- XY

- Wafer Scrubbing Actuator

- Flip Chip Mounter

- Tuning of Delicate Capacitors

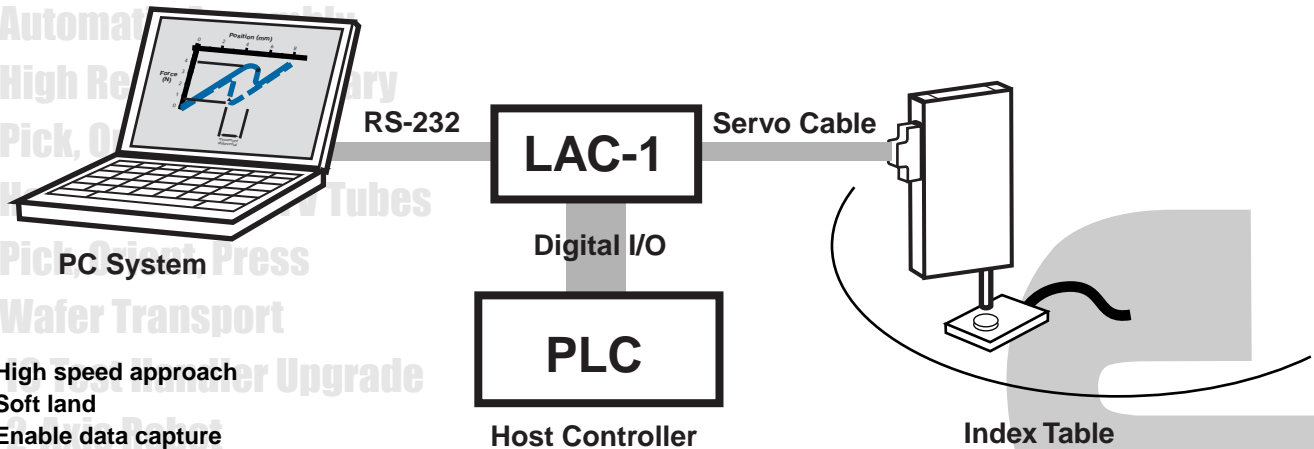
- Tension Control

- Screw Adjusting

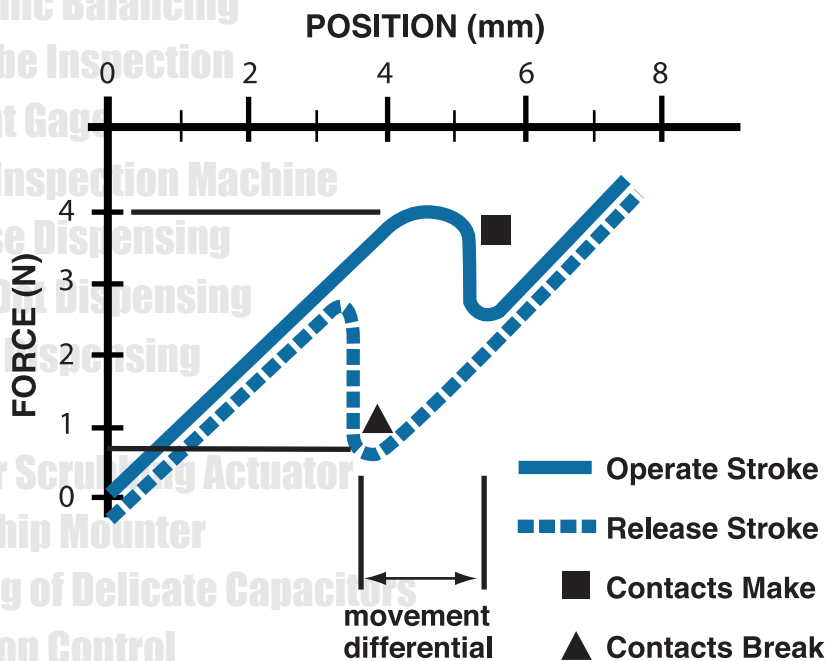
- Internal Diameter Check

- Rod Eccentricity Inspection

- Hperdermic Syringe Pull Test



- High speed approach
- Soft land
- Enable data capture
- Increment position / measure force
- Monitor contact positions
- Decrement position / measure force
- End test dump data to PC



U.S. and world wide patents issued & applied for. SMAC improves its product line on a continuing basis. Specifications and mechanical dimensions are subject to change without notice. Please consult factory before proceeding with your design.

The SMAC 12 Month Product Guarantee

SMAC Corporation designs and manufactures advanced electric actuators. All SMAC actuators are quality products specifically designed and built for long service. Therefore, all actuators appearing in this catalog are guaranteed for a period of twelve months from the original date of shipment from our factory.

This Guarantee is limited to the one-time replacement or rebuilding of any actuator which should fail to operate properly. Actuators must be returned transportation prepaid and received at our factory within the Guarantee period. They will be returned to the customer at the expense of SMAC.

No claims for labor, material, time, damage or transportation are allowable. Actuators damaged as a result of abnormal customer application are excluded from this Guarantee. The Guarantee does not apply to loss or damage caused by fire, theft, riot, explosion, labor dispute, act of God or other causes beyond the control of SMAC. SMAC shall in no event be liable for remote, special or consequential damages, under the SMAC Guarantee or under any implied warranty.

The above Guarantee is our manner of extending the engineering and service resources of the SMAC organization to assure our customers long and continued satisfaction.

The SMAC Rebuild Program

Actuators no longer covered by the SMAC Guarantee can be rebuilt under the SMAC Rebuild program. Our continued research and development program extends the life of our actuators making them even more reliable under adverse operating conditions. Actuators returned under this program are completely disassembled, inspected and rebuilt to current operating standards wherever possible, tested and returned within a few days for a reasonable charge (typically 35% of standard list price). All rebuilt actuators carry for 90 days from date of shipment from our factory the same Guarantee as provided for new actuators.

SMAC products have been tested and found to be fully compliant with EN 50082-2 & EN 55011 Group 1, Class A



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