

Moving Coil Actuators

The ability to do work and verify its accuracy at the same time

SMAC 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°
Gear or direct drive/ brush or brushless rotary



LAL-10
Stroke (mm): 10
Force (N): 2.8



LAL-15/LAR-15
Stroke (mm): 15
Force (N): 3.8



LAL-20/LAR-20
Stroke (mm): 10, 15, 25
Force (N): 8,7,4



LAL-30/LAR-30
Stroke (mm): 15, 25
Force (N): 14, 11



LAL-35/LAR-35
Stroke (mm): 50
Force (N): 10



LAL-55/LAR-55
Stroke (mm): 50, 100,150 (LAL only)
Force (N): 25, 16, 13



LAL-95/LAR-95
Stroke (mm): 15, 50
Force (N): 84, 65



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

Linear Slide Actuators:



LAS-10
Stroke (mm): 10
Force (N): 3.8



LAS-15
Stroke (mm): 15
Force (N): 3.8



LAS-20
Stroke (mm): 10, 15, 25
Force (N): 8, 7, 4



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



LAS-35
Stroke (mm): 50
Force (N): 10



LAS-55
Stroke (mm): 50,100,150
Force (N): 25, 16, 13



LAS-95
Stroke (mm): 15, 50
Force (N): 100, 60

Gripper & XY Actuators:



GRP-17
Stroke (mm): 10
Force (N): 5



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



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



LXY-10x10
Stroke (mm): 10
Force (N): 15

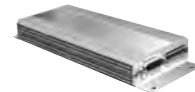


LXY-15x15
Stroke (mm): 15
Force (N): 25



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

Controllers/ Amplifiers:



LAC-25
2 axis controller



LAC-45
4 axis controller



LAC-1
single axis controller



Built-in Controller
single axis controller



LAA-5
PWM amplifier



LAD-1
pulse to servo driver



LAB-5
single brushless controller

New Products

SMAC continuously adds new models to its product range. Listed below are recent products developed to meet emerging technological demands and specific customer requests. These units are currently available but not yet considered standard models and therefore subject to change. Outline drawings are available on the SMAC website or from your local SMAC representative.



PEN-10
Programmable Pendant



LA 500
Hi-Force Linear

Stroke (mm): 50
Force (N): 500
Dimensions (mm): 200 x 175 x 300



GLP-5
Single Axis Gripper

Stroke (mm): 10
Force (N):
Dimensions (mm): 72 x 65 x 58



LA 55-50
Compact 55 Linear

Stroke (mm): 50
Force (N): 25
Dimensions (mm): 55 x 110 x 175



LAB-4
Low-Cost Single Axis Controller



10µm T.I.R. Option

Total indicator run-out under
10µm available on several
linear/rotary models



Linear and Linear/Rotary Moving Coil Actuators

Two Axis Moving Coil Designed for Pick, Orient and Place

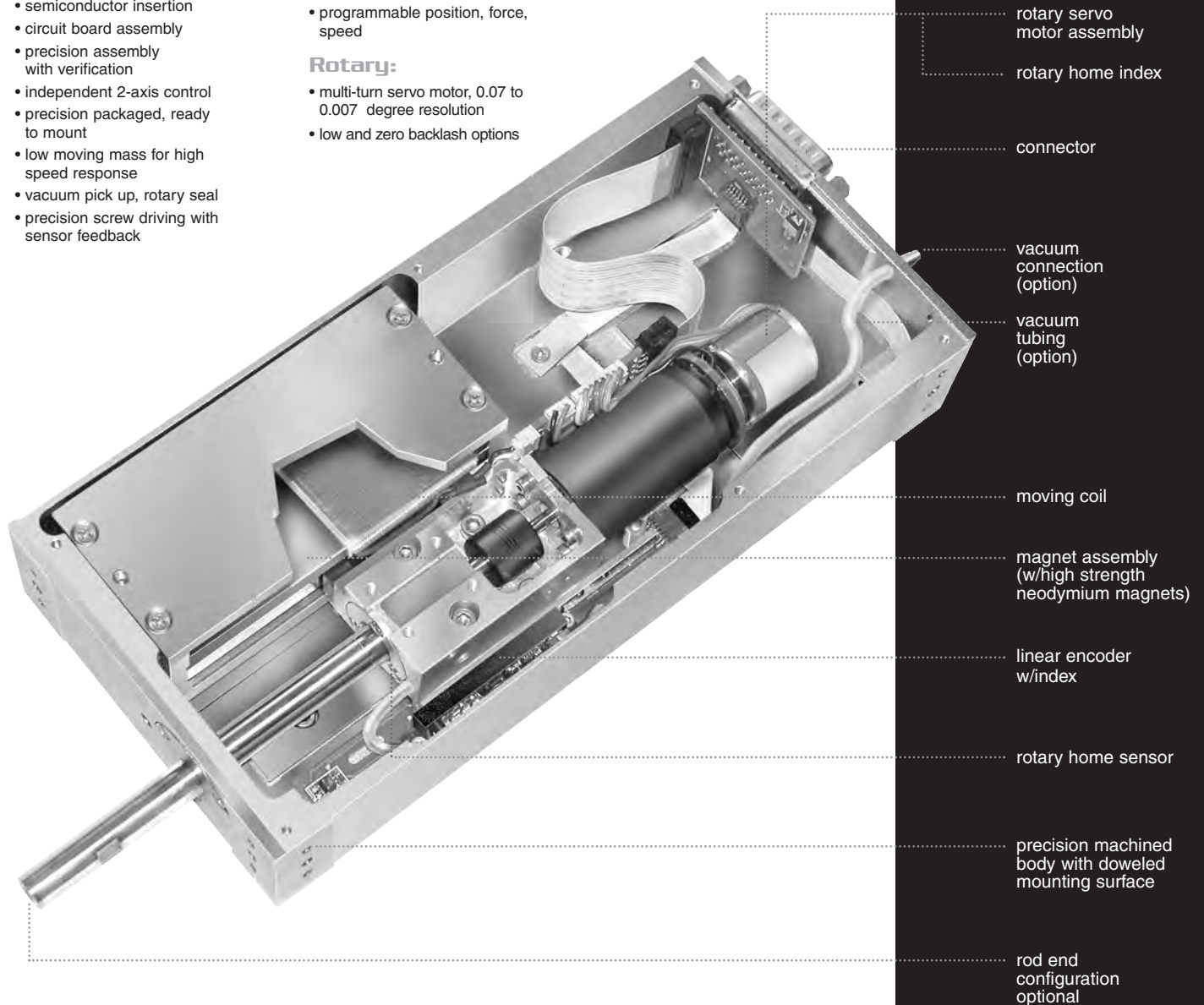
- semiconductor insertion
- circuit board assembly
- precision assembly with verification
- independent 2-axis control
- precision packaged, ready to mount
- low moving mass for high speed response
- vacuum pick up, rotary seal
- precision screw driving with sensor feedback

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



Part Numbering System for SMAC Actuators

	MODEL	SERIES	STROKE	VOLT ENCODER	SHAFT VACUUM SPRING	MOD	
	□□□□□□	-	□□□	-	□□□	-	□□□□□□
LINEAR	L A L	3 0 0	0 5 0				
LINEAR/ROTARY	L A R	3 5	0 5 0				
SLIDE	L A S	5 5	1 0 0				
X/Y TABLE	L X Y						
X/Y/Z TABLE	X Y Z						
GRIPPER	G R P						

4	= 12 volt single coil
5	= 24 volt single coil
6	= 24 volt double coil*
7	= 48 volt single coil
8	= 48 volt double coil*
0	= 0.5 μ
1	= 1.0 μ
5	= 5.0 μ (standard)
2	= 0.1 μ *
3	= 0.05 μ *
B	= BLANK
F	= FEMALE
M	= MALE
C	= CUSTOM
V	= VACUUM*
S	= SPRING*

LINEAR
LINEAR/ROTARY
SLIDE
X/Y TABLE
X/Y/Z TABLE
GRIPPER

Part Number Examples:

LAS35-050-55

LAS linear slide, 50mm stroke, 24 volt coil, 5 micron encoder

LAL300-050-85-F

LAL300 linear actuator, 50mm stroke, 48 volt double coil, 5 micron encoder, female rod end

LAR35-025-55-MVS-MOD265

LAR35 linear/rotary actuator, 25mm stroke, 24 volt coil, 5 micron encoder, male thread, vacuum spring, mod 265 specification

NOTES:

Series will not have leading zeros (e.g. LAL95)

Stroke must include zeros (e.g. 050)

Order must specify full return or counterbalance spring and customer payload

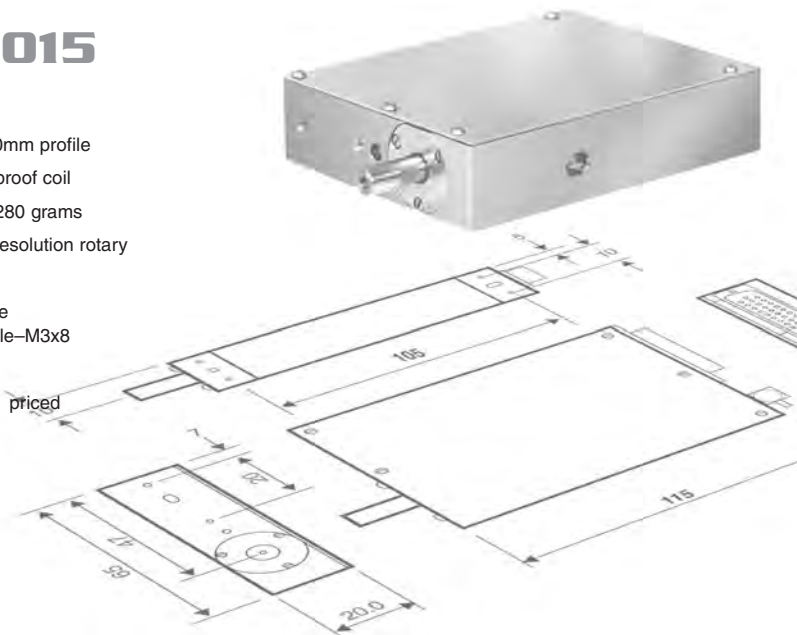
*check availability

Latest Product Information available at www.smac-mca.com

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



SPECIFICATIONS

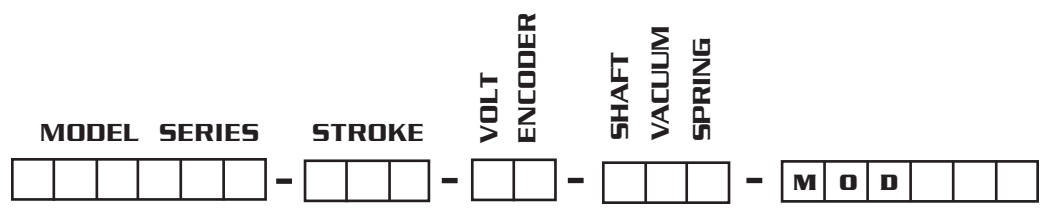
LAR20-015-55 DF

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

Linear and Linear/Rotary Actuators

	LAL, LAS 10-005	LAL-LAS 15-015	LAR 15-015	LAL,LAS 20	LAR 20	LAL, LAS LAR 30-015	LAL,LAS LAR 30-025
Volts	12	24	24	24	24	24	24
Size: LxWxH	45 x 70 x 10	120x 58 x 15	120x 58 x 15	85x65x20	115x65x20	125x83x31	150x83x34
Stroke, mm	5	15	15	10 / 15 / 25	15	15	25
Peak Force, N	3.8	3.8	5	8 / 7 / 4	7	14.5	11.3
Continuous Force, N	2.5	2.7	4	5.5 / 5 / 3	5	7.4	5.9
Force Constant, N/A	2.5	2.7	4	5.5 / 5 / 3	5	7.4	5.9
Weight, kg	.10	.23	.25	0.34	0.41	0.69	0.74 (LAR 0.8)
Moving Mass, kg	.02	.05	.07	0.07	0.09	0.15 (LAR 0.21)	0.15 (LAR 0.21)
Rod Diameter, mm	4	6	6	6	6	8	8
Runout, micron	50	50	50	50	50	50	50
Rotary	No	No	Yes	No	Yes	Yes	Yes
Torque, N-m			.0084		.008	0.1	0.1
Gear Ratio			direct		Direct drive	76:1	76:1
Rotary Encoder Counts			20,000		14K	4864	4864
Speed, rpm			5000		5000	150	150
Shaft Thread F/M,mm	NA/3	3/4	3/4	3/4	3/4	4/6	4/6

LAL, LAS 35	LAR 35	LAL, LAS 55	LAR 55	LAL, LAS 95-015	LAL, LAS 95-050	LAR 95	LAL 300
24	24	24 (48)	24 (48)	48	48	48	48
135x85x35	190 x 90 x 35	250 x 110 x 55	250 x 110 x 55	90 x 70 x 95	147 x 70 x 95	304x90x115	210x 100 x 120
50 / 100	50	50 / 100 / 150	50	15	50	15 / 50	50
10 / 6	10	25 / 16 / 13	24 (40)	84	65	84 / 65	225
7 / 2.8	7	19 / 13 / 10	17 (24)	53	42	53 / 42	100
7 / 3.5	7	19 / 13 / 10	17 (24)	53	42	53 / 42	86
1.1 / 1.7	1.4	3 / 3.8 / 4.5	3.1	2.1	3	3.5 / 4.7	8.8
0.13	0.29	0.3	0.5	0.25	0.25	0.38	0.8
8	8	10	10	10	10	10	12
50	50	50	50	50	50	50	50
No	Yes	No	Yes	No	No	Yes	No
	0.08		0.13			1	
	Direct drive		Direct drive			66:1	
	20K		2048			2048	
	5000		5000			94	
4/6	4/6	6/6	6/6	5/6	5/6	5/6	5/8



(see page 4 for ordering details)

Controllers / Amplifiers

SMAC can supply a range of single and multi axis controllers together with stand alone amplifiers and stepper driven drivers. Controllers are programmed by mnemonic type command instructions via an RS-232 interface into NVRAM. They require no supplementary software.



LAC-1

Single axis controller, built-in amplifier

Modes:

- Position
- Velocity or Continuous
- Force mode

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



LAC-25

2 axis controller, built-in amplifier

Modes:

- Position
- Velocity
- Force mode
- Gearing

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-45

4 axis controller, built-in amplifier

Modes:

- Position
- Velocity
- Force mode
- Gearing

Independent or coordinated 4 axis motion

8 I/P, 8 O/P, Opto-isolated general purpose I/O's, 6 analog I/P, 4 analog O/P, RS-232 interface



Built in Controller

Option MOD 429
(consult factory for available actuators)



LAB-5

Single axis brushless controller, built in amplifier

Modes:

- Position
- Velocity or Continuous
- Force mode

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



LAA-5

Single axis amplifier

± 10 Volt I/P,
3 Amp O/P



LAD-1

Single axis stepper I/P to servo O/P

RS-232 interface



MIOE-8/8

Expansive I/O modular, 8 I/P, 8 O/P, Opto-isolated general purpose I/O

Cables

Linear Actuator to Amplifier

Rotary/Linear Actuator to 2 LAA-5's

Linear Actuator to LAC-1

Rotary/Linear Actuator to 2 LAC-1's

Rotary/Linear Actuator to 2 LAD-1

Linear Actuator to LAD-1

2 Linear Actuators to LAC-25

Rotary/Linear Actuator to LAC-25

XY stage or Gripper to LAC-25

XY or Gripper to 2 LAA-5

GRP-17 to LAC-25

GRP-17 / LA-15 Jumper

LAH-LAD-03

LAH-RAD-03

LAH-LOD-03

LAH-RED-03

LAH-RSD-03

LAH-LSD-03

LAH-LTD-03

LAH-RTD-03

LAH-GRP-03

LAA-GRP-03

LAH-RTD26-03

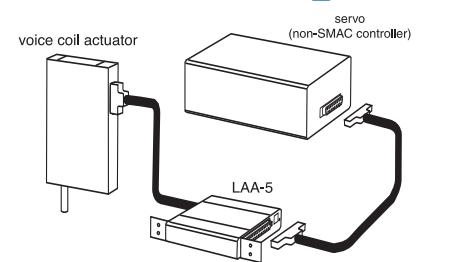
LAH-PT30-26

Length = 3 meters

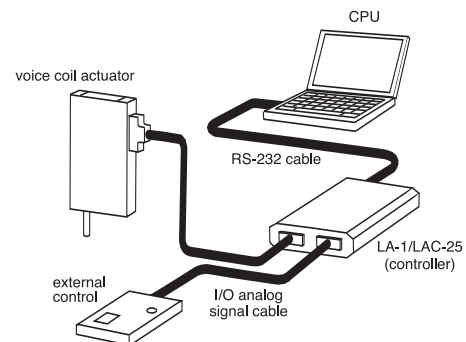
For 10, 15, 20, 35, 95 series fitted with 26 way connector add "26" to part number (e.g. LAH-LOD26-03)

Superflexible cable material, suitable for robotic applications, is available as an option.

Hardware Configuration



Hardware with SMAC Amplifier



Hardware with SMAC Controllers

Installation Guidelines

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

Individual Modifications

Many of the standard actuators listed in the following pages are compatible with both add-on options and modifications. In addition to the standard vacuum and spring option SMAC can offer the following modifications subject to approval by the factory.

Linear Guide Options

Increased rigidity and side load tolerance can be gained by using a higher specification "wide guide". Additionally in force sensitive applications we can fit a low friction guide.

Double Coil

The addition of an extra coil can enhance both force and acceleration.

Custom Nose-Bushing

Extended nose bushing with increased side load tolerance are available on many models. We can also offer scraper and wiper seals around the shaft to protect the bearings from excessive wear in harsh environments.

Custom Shafts

In addition to the standard male/female rod-ends we can also offer options such as "break-away" shafts and custom shaft diameters.

Flying Lead

In place of the standard chassis connector we can offer a flying lead option.

Rotary

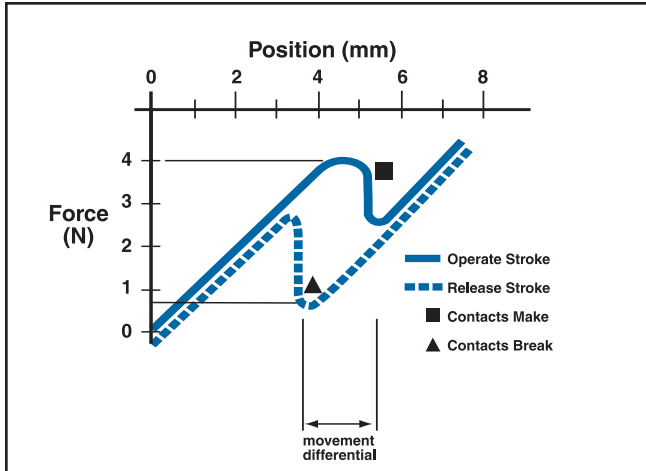
If a longer life rotary is required, then we can fit a brushless rotary motor.

Cable Options

Whenever an SMAC actuator is being manipulated on any 3rd party device such as a gantry or multi-axis robot, SMAC strongly recommends that a superflex cable is used. Cable lengths can be increased from the standard 3 meters up to a maximum of 10 meters.

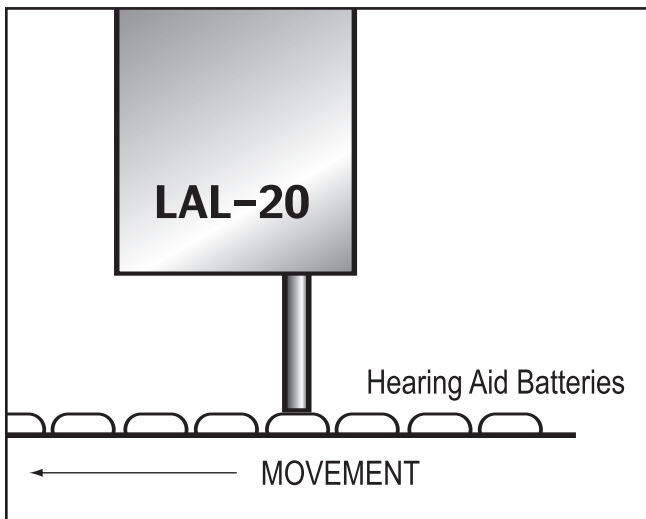
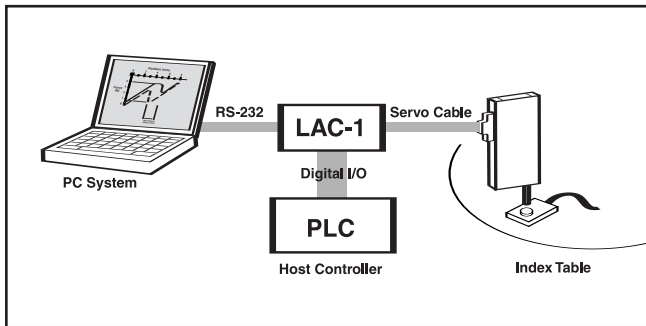
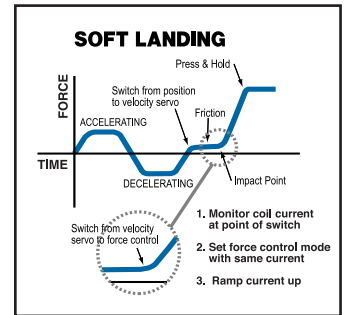
Sample Applications

Switch Testing: Hysteresis Effect



Switch Testing

- 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



Height Gauge

- Measure each part against go-no go window
- Measure each part and store part height data (transmit to PC)
- Measure each part, sort

Actuator Used: LAL20

Stroke 10, 15 or 25mm
Resolution: 5, 1 or 0.5 microns
Force: 8N
Moving mass: 50 grams

Key Operational Details:

- High speed approach, slow down, softland on part, measure part
- Measurement is compared against GO/NO GO window
- Good / Bad part signal is turned on

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**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

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.