



## Moving Coil Actuators LA Series

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

# SMAC Product Overview

## Linear & Rotary / Linear Actuators



**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 35 / LAR 35**  
Stroke [mm]: 50  
Force [N]: 10



**LAL 55 / LAR 55**  
Stroke [mm]: 50, 100, 150  
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



**LAL 500**  
Stroke [mm]: 25, 50  
Force [N]: 500

## 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 20**  
Stroke [mm]: 11  
Force [N]:



**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

## Grippers



**GRP 17**  
Stroke [mm]: 10  
Force [N]: 5



**GRP 20**  
Stroke [mm]: 10  
Force [N]: 8



**GRP 35**  
Stroke [mm]: 30  
Force [N]: 25



**GRP 50**  
Stroke [mm]: 30  
Force [N]: 45

## XY Stages



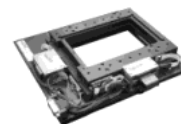
**LXY 10**  
Stroke [mm]: 10  
Force [N]: 15



**LXY 15**  
Stroke [mm]: 15  
Force [N]: 25



**LXY 25**  
Stroke [mm]: 25  
Force [N]: 42



**LXYM 15**  
Stroke [mm]: 15  
Force [N]:

## Controllers & Amplifier



**LAC-1**  
Single axis controller



**LAC-25**  
2 axis controller with built in amp



**LAC-45**  
4 axis controller with built in amp



**MAAC4-7**  
Multi axes [4] Galil based controller



**LAB-5**  
Single axis brushless controller, builtin amplifier



**Built-in Controller**



**LAA-5**  
Amplifier for 1 axis



**LAD-1**  
Smart drive for 1 axis

## Accessories



**PEN-10**  
Programmable Pendant

## 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.

# Electric Cylinder

## CA Series

The CA series of electric cylinders have been designed for the most demanding of automation tasks in mind and are the first real linear motors challenge to pneumatic devices.

They offer a long life cycle and much more precise & repeatable force control and positioning than conventional pneumatic devices. Conventional shape and mounting fit exactly where standard pneumatic cylinders are currently used. Please refer to the CA catalog for more detail.

**CAL12**

Stroke [mm]: 10  
Force [N]: 1.5  
12mm diameter



## CAL35

Stroke [mm]: 15, 25, 50  
Force [N]: 4.5 - 34  
35mm diameter



## CAL75

Stroke [mm]: 25, 50  
Force [N]: 100, 50  
75mm diameter



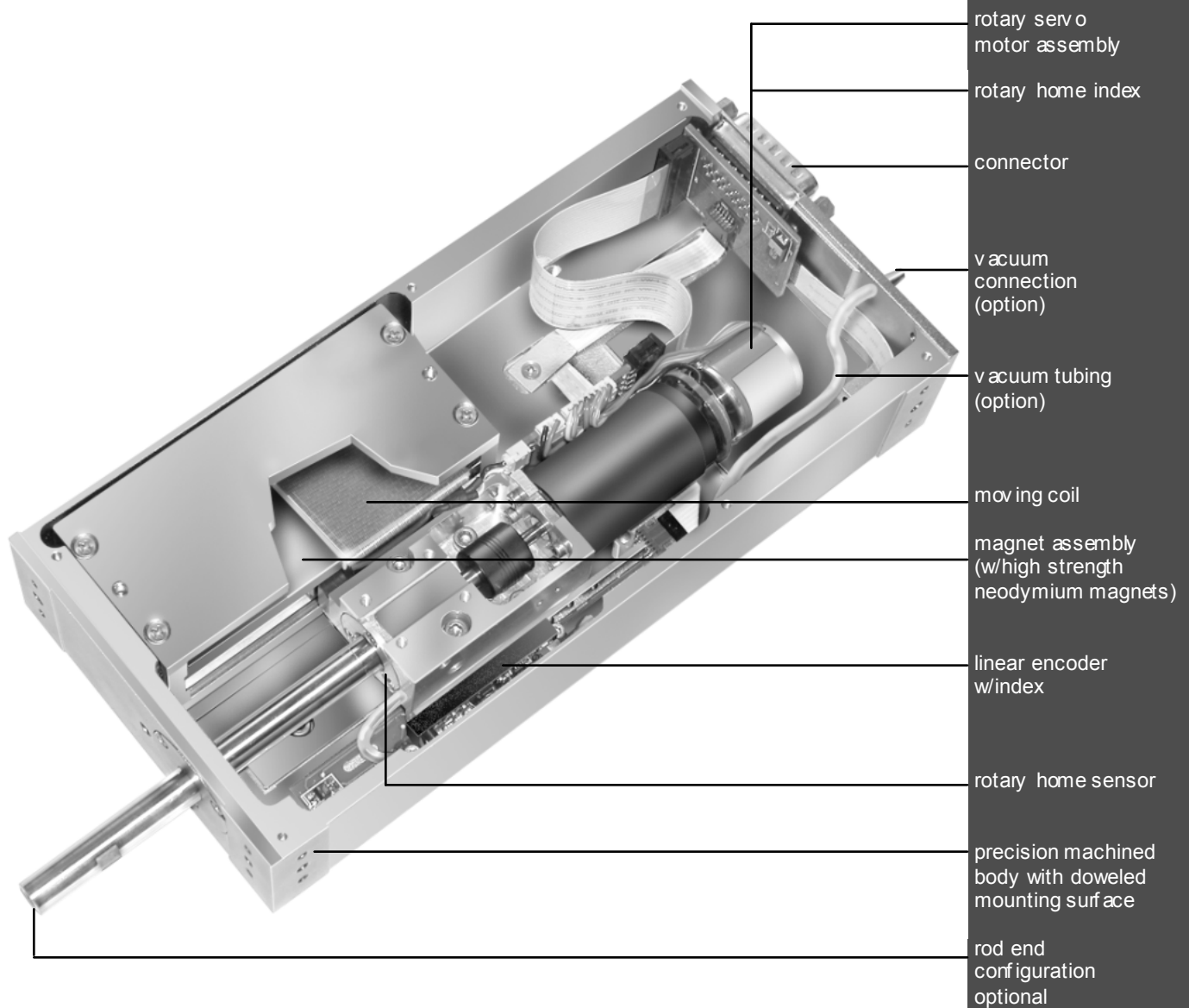
# Linear and Linear / Rotary Moving Coil Actuators

## Linear:

- Stroke up to 200mm, force up to 500N, position encoder resolution 5 $\mu$ m standard, 1, 0.5 and 0.1 $\mu$ m option for most actuators.
- Programmable force, position, acceleration and velocity.

## Rotary:

- Multi-turn servo motor, torque up to 1Nm (Gearbox), velocity up to 5000 rpm, resolution up to 50000 increments per revolution.
- Programmable force, position, acceleration and velocity.



# The SMAC Advantages

- Absolute control over: force, position, acceleration and velocity.
- Direct drive actuator, therefore a very high degree of accuracy & repeatability.
- Integrated position measuring system with glass scale and optical reader head (no wear).
- Very long lifetime due to oversized linear guides.
- Indirect force measurement with the current (switch test).
- Digital and analog in/output channels.
- Ability to switch in between operations: force, position and velocity mode at any time.
- Extremely high acceleration and velocity.
- Unique "Soft-Land" function

## Programmable Features

The actuator is totally programmable for force, acceleration and velocity. It can operate in three different modes:

**Force Mode:** Force Mode is open loop, using no feed back from the encoder. The actual position is still monitored but has no effect upon the output.

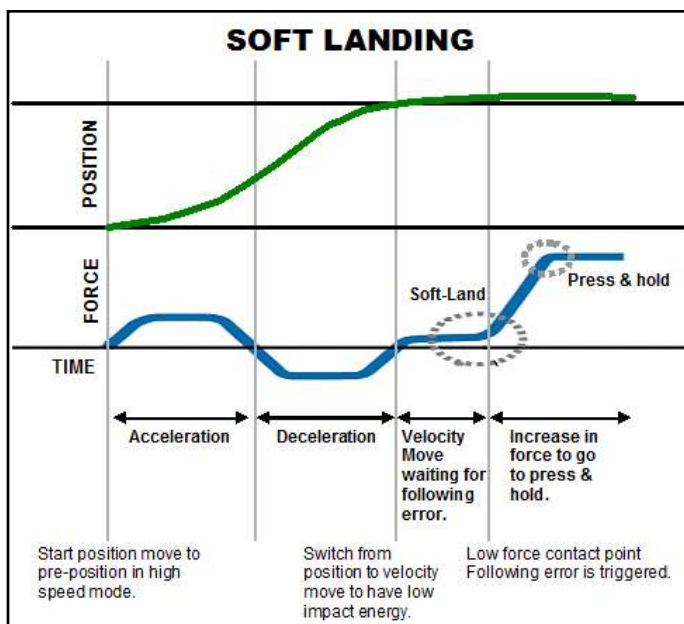
**Velocity Mode:** Velocity Mode allows the actuating rod to be moved with a given velocity, acceleration, force and direction. Typically used for a "Soft-Land" routine.

**Position Mode:** Position Mode will allow the actuating rod to be moved to various positions along the stroke using acceleration, velocity and force. It is possible to make absolute, relative and "learned position" moves.

## What is a Soft-Land?

The "**Soft-Land**" is a routine which allows the actuator rod or gripper jaw to land on the surface of component with a low programmable force. This is particularly useful wherever delicate or high value components are being handled.

The routine consists of a controlled low force approach in velocity mode, whilst the position error is constantly monitored. Once contact is made the position error builds up until a pre-programmed figure is reached - resulting in the rod maintaining position on the surface of the component.



# Moving Coil Technology (Voice Coil)

At the heart of all SMAC actuators is the moving coil, also described as a voice coil actuator. The principle is essentially the same as you will find in any permanent magnet loudspeaker. The coil is enclosed in a magnet housing, and by passing a current through the coil, a magnetic field is generated.

The amount of force generated is governed by the equation

$$F \propto N I B$$

where;

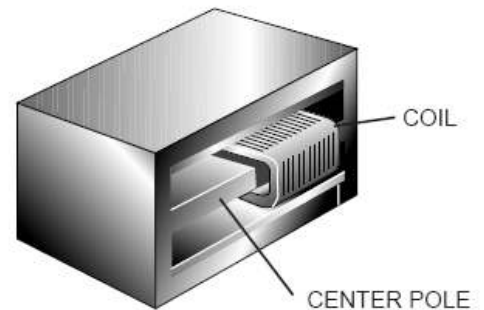
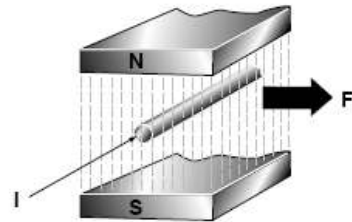
**F** is the force generated

**N** is the number of turns in the winding (Constant)

**I** is the current flowing through the winding and

**B** is the magnetic flux (Constant)

Therefore, doubling **I (current)** doubles **F (Force)**.



# SMAC



# Part Numbering System

	MODEL						SERIES			STROKE			VOLT		ENCODER	SHAFT	VACUUM	SPRING	MOD					
																			M	O	D			
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															
XY TABLE	L	X	Y																					
GRIPPER	G	R	P																					

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\* check availability

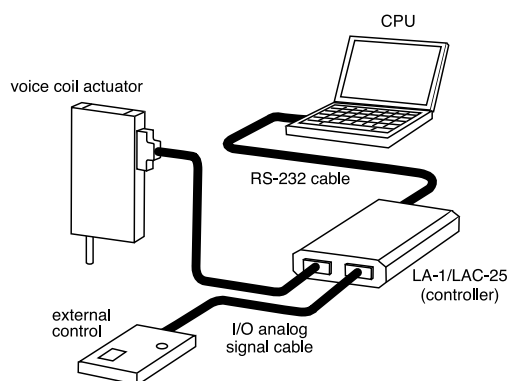
**NOTES:**

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

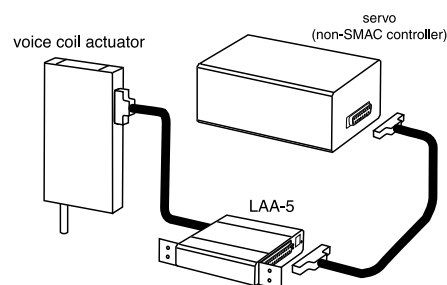
Stroke must include zeros (e.g. 050).

Spring must be specified full return or counterbalance, payload and orientation (vertical or horizontal).

## Hardware Configuration



## Hardware with SMAC Controllers



## Hardware with SMAC Amplifier

# Linear Actuators

	Voltage [DC]	Size: LxWxH [mm]	Stroke [mm]	Maximum Force [N]	Continuous Force [N]	Force Constant [N/A]	Moving Mass [kg]	Weight [kg]
LAL 10-005-5	24	45x70x10	5	3.8	2.5	2.5	0.02	0.11
LAL 15-015-5	24	120x68x15	15	5	2.7	2.7	0.05	0.23
LAL 20-010-5	24	85x65x20	10	8	5.5	5.5	0.07	0.30
LAL 20-015-5	24	65x115x20	15	7	5	5	0.07	0.34
LAL 20-015-6	24	65x115x20	15	12	11.6	5.8	0.08	0.34
LAL 20-025-5	24	85x65x20	25	5.4	3.4	3.4	0.08	0.36
LAL 35-025-6	24	135x90x35	25	31.5	24	15.5	0.19	1.06
LAL 35-025-7	48	135x90x35	25	18	10	10	0.12	0.95
LAL 35-050-5	24	135x85x35	50	10	7.5	7.5	0.13	1.12
LAL 35-100-5	24	135x85x35	100	6	2.8	3.5	0.1	1.7
LAL 55-050-5	24	250x110x55	50	25	19.5	19.5	0.31	3
LAL 55-050-7	48	250x110x55	50	40	24.5	24.5	0.31	3
LAL 55-100-5	24	250x110x55	100	16.5	13	13	0.3	3.8
LAL 55-100-7	48	250x110x55	100	25	17	17	0.3	3.8
LAL 55-150-5	24	250x110x55	150	13	10	10	0.4	4.65
LAL 55-150-7	48	250x110x55	150	19.5	12.5	12.5	0.4	4.65
LAL 95-015-7	48	90x70x95	15	84	41.5	53	0.31	2.2
LAL 95-015-8	48	147x70x95	15	195	75	60	0.5	4
LAL 95-025-8	48	180x70x95	25	162	105	52	0.58	3.75
LAL 95-050-7	48	147x70x95	50	65	41	41	0.34	2.85
LAL 300-050-8	48	210x85x120	50	235	144	78	0.8	8.8
LAL 500-025-8	48	300x140x200	25	500	200	166	1.6	26.5
LAL 500-050-8	48	300x140x200	50	500	200	100	1.6	26.5

**NOTE: SMAC requires that all units must be operated at less than 40% maximum duty cycle. Please see page 15 or user manual for further explanation on how to calculate.**

We manufacture actuators to suit our customers' requirements. Please call us if you do not find the right actuator in this list. The Linear Actuators are also available as Linear Slides (LAS series).

## Options & Modifications:

Linear encoder resolutions:	5µm standard, 1µm, 0.5µm and 0.1µm optional for most units. Consult factory for availability.
Shaft ends:	Male, Female, Blank and Custom (check with factory on availability of Custom option)
Return spring:	Prevents the shaft from dropping during vertical operation when power is cut.
Vacuum through the shaft:	For pick and place applications
Extended nose bushing:	For tighter shaft run-out and higher side load onto the shaft.
Increase of the maximum force & acceleration:	48 volt coil and double coil options are available for some units with 24 volt single coil.
Increase of the force accuracy & lifetime:	Extra long life linear guide Low friction linear guide

MODEL	SERIES	STROKE	VOLT	ENCODER	SHAFT	VACUUM	SPRING
L	A	L					



**LAL10**



**LAL15**



**LAL20**



**LAL35**



**LAL55**



**LAL95**



**LAL300**



**LAL500**



# Linear & Rotary Actuators

	Voltage [DC]	Size: LxWxH [mm]	Stroke [mm]	Maximum Force [N]	Continuous Force [N]	Force Constant [N/A]	Moving Mass [kg]	Weight [kg]	Maximum Torque* [Nm]	Rotary type	Rotary Encoder Resolution	Velocity* [rpm]
LAR15-015-5	24	120x58x15	15	3.8	2.7	2.7	0.095	0.25	0.008	direct	20K	500
LAR20-015-5	24	115x65x20	15	7	4	4	0.09	0.35	0.008	direct	20K	500
LAR31-017-5	24	140x77.25x35	17	14	10	10	0.22	0.85	0.066	direct	20K	500
LAR31-027-5	24	140x77.25x35	27	12	7	7	0.2	0.85	0.066	direct	20K	500
LAR35-025-5	24	190x90x35	25	18	12	12	0.14	0.92	0.085	direct	20K	500 - 5000
LAR35-050-5	24	190x90x35	50	10.5	7.5	7.5	0.28	1.35	0.085	direct	20K	500 - 5000
LAR55-050-5	24	250x110x55	50	25	19.5	19.5	0.31	2.8	0.2 - 2.5	direct or gear box	2000	500 - 5000
LAR55-050-7	48	250x110x55	50	40	27	27	0.31	2.8	0.95 - 2.5		2000	500 - 5000
LAR55-100-5	24	250x250x55	100	25	14	14	0.5	3.85	0.26 - 2.5		2000	500 - 5000
LAR55-100-7	48	250x250x55	100	30	15.6	18	0.5	3.85	0.2 - 2.5		2000	500 - 5000
LAR95-015-7	48	304x90x115	15	84	53	53	0.9	3.2	0.2 - 4.5		132K	75 - 5000
LAR95-050-7	48	304x90x115	50	65	41	41	0.9	4	0.2 - 4.5		132K	75 - 5000
LAR300-050-8	48	284x85x160	50	200	100	72	1	9.5	0.2 - 4.5		132K	75 - 5000

**NOTE: SMAC requires that all units must be operated at less than 40% maximum duty cycle. Please see page 15 or user manual for further explanation on how to calculate.**

We manufacture actuators to suit our customers' requirements. Please call us if you do not find the right actuator in this list.

## Options & Modifications:

Linear encoder resolutions:	5µm standard, 1µm, 0.5µm and 0.1µm optional for most units. Consult factory for availability.
Shaft ends:	Male, Female, Blank and Custom (check with factory on availability of Custom option)
Return spring:	Prevents the shaft from dropping during vertical operation when power is cut.
Vacuum through the shaft:	For pick and place applications
Extended nose bushing:	For tighter shaft run-out and higher side load onto the shaft.
Increase of the maximum force and acceleration:	48 volt coil and double coil options are available for some units with 24 volt single coil.
Increase of torque/gear ratio:	Alternative geared motors are available for some units.
Rotary encoder resolution:	Consult factory for higher resolution.
Increase of the force accuracy and lifetime:	Extra long life linear guide Low friction linear guide

\* Torque and velocity can vary based on your specific application.



**LAR15**



**LAR20**



**LAR31**



**LAR35**



**LAR55**



**LAR95**



**LAR300**

MODEL SERIES  
L A R -

STROKE  
-

VOLT  
ENCODER  
-

SHAFT  
VACUUM  
SPRING

# Linear Slide Actuators

	Voltage [DC]	Size: LxWxH [mm]	Stroke [mm]	Maximum Force [N]	Continuous Force [N]	Force Constant [N/A]	Moving Mass [kg]	Weight [kg]
LAS 10-005-5	24	45x70x10	5	3.8	1.3	2.5	0.02	0.11
LAS 15-015-5	24	120x58x15	15	5	4	4	0.05	0.25
LAS 20-010-5	24	85x65x20	10	8	5.5	5.5	0.07	0.3
LAS 20-015-5	24	65x115x20	15	7	5	5	0.07	0.33
LAS 20W-015-6	24	75x135x20	15	10.6	4.9	4.9	0.122	0.54
LAS 20-025-5	24	85x65x20	25	5.5	3.5	2.8	0.06	0.36
LAS W20-011-5	24	85x75x23	11	8	5.5	5.5	0.07	0.3
LAS 35-025-6	24	135x90x35	25	31.5	24	15.5	0.19	1.06
LAS 35-025-7	48	150x83x34	25	18	10	10	0.15	0.95
LAS 35-050-5	24	135x85x35	50	10	5	5	0.1	1.1
LAS 35-100-5	24	135x85x35	100	6	2.8	3.5	0.1	1.7
LAS 35-100-7	48	135x85x35	100	7	6	6	0.1	1.3
LAS 55-050-5	24	250x110x55	50	25	19.5	19.5	0.3	3
LAS 55-050-7	48	250x110x55	50	40	24.5	24.5	0.31	3
LAS 55-100-5	24	250x110x55	100	16.5	13	13	0.3	3.8
LAS 55-100-7	48	250x110x55	100	35	19	19	0.31	3.8
LAS 55-150-5	24	250x110x55	150	13	10	10	0.4	4.65
LAS 55-150-7	48	250x110x55	150	25	13	13	0.31	4.58
LAS 95-015-7	48	90x70x95	15	90	60	60	0.25	2.1
LAS 95-015-8	48	147x70x95	15	195	75	60	0.5	4
LAS 95-025-8	48	180x70x95	25	162	105	52	0.5	3.78
LAS 95-050-7	48	147x70x95	50	50	34	34	0.25	3
LAS 300-050-8	48	210x85x120	50	202	144	78	0.8	8.8

**NOTE: SMAC requires that all units must be operated at less than 40% maximum duty cycle. Please see page 15 or user manual for further explanation on how to calculate.**

We manufacture actuators to suit our customers' requirements. Please call us if you do not find the right actuator in this list.

## Options & Modifications:

Linear encoder resolutions:	5µm standard, 1µm, 0.5µm and 0.1µm optional for most units. Consult factory for availability.
Shaft ends:	Male, Female, Blank and Custom (check with factory on availability of Custom option)
Return spring:	Prevents the shaft from dropping during vertical operation when power is cut.
Increase of the maximum force & acceleration:	48 volt coil and double coil options are available for some units with 24 volt single coil.
Increase of the force accuracy & lifetime:	Extra long life linear guide Low friction linear guide

MODEL	SERIES	STROKE	VOLT	ENCODER	SHAFT	VACUUM	SPRING
L	A	S					



**LAS 10**



**LAS 15**



**LAS 20**



**LAS W20**



**LAS 30**



**LAS 35**



**LAS 55**



**LAS 95**

# Grippers

	Voltage [DC]	Size: LxWxH [mm]	Stroke per Axis [mm]	Axis 1				Axis 2				Weight [kg]	Maximum Opening
				Maximum Force [N]	Continuous Force [N]	Force Constant [N/A]	Moving Mass [kg]	Maximum Force [N]	Continuous Force [N]	Force Constant [N/A]	Moving Mass [kg]		
GRP17-010-5	24	55x70x17	5	5	2	3.5	0.025	5	2	3.5	0.025	0.25	10
GRP20-010-5	24	80x90x23	5	8		5.5	0.065	8		5.5	0.065	0.5	10
GRP35-030-5	24	93x110x38	15	25	10	17	0.1	25	10	17	0.1	1.5	30
GRP50-030-7	48	90x125x55	15	45	33	22.5	0.47	45	33	22.5	0.47	2.5	30

**NOTE: SMAC requires that all units must be operated at less than 40% maximum duty cycle. Please see page 15 or user manual for further explanation on how to calculate.**

We manufacture actuators to our suit our customers' requirements. Please call us if you do not find the right actuator in this list.

## Options & Modifications:

Linear encoder resolutions:

GRP17 & GRP20: 1µm standard, 0.5µm and 0.1µm optional.  
GRP35 & GRP50: 5µm standard, 1µm, 0.5µm and 0.1µm optional.

Increase of the maximum force & acceleration:

48 volt coil and double coil options are available for some units with 24 volt single coil.

Increase of the force accuracy & lifetime:

Extra long life linear guide  
Low friction linear guide



**GRP17**



**GRP20**



**GRP35**



**GRP50**

**MODEL**      **SERIES**  
**G** **R** **P**   

**STROKE**

**ENCODER**  
**VOLT**   

**SPRING**  
**VACUUM**  
**SHAFT**

# XY Stages

	Voltage [DC]	Size: LxWxH [mm]	Stroke per Axis [mm]	Axis 1				Axis 2				Weight [kg]
				Maximum Force [N]	Continuous Force [N]	Force Constant [N/A]	Moving Mass [kg]	Maximum Force [N]	Continuous Force [N]	Force Constant [N/A]	Moving Mass [kg]	
LXY10-010-7	48	65x65x81	10	15	4	6	0.06	23	8	11	0.16	0.8
LXY15-015-7	48	111x112x86	15	22	11	13	0.13	25	12	12	0.22	1.65
LXY25-025-8	48	125x125x65	25	42	17	14	0.19	42	17	14	1.5	3.2
LXYM15-015	24/48	230x242.5x55	15	14.7/24.5		12.7	0.36	16.4/27.4		13	0.51	2.7

**NOTE: SMAC requires that all units must be operated at less than 40% maximum duty cycle. Please see page 15 or user manual for further explanation on how to calculate.**

We manufacture actuators to suit our customers' requirements. Please call us if you do not find the right actuator in this list.

## Options & Modifications:

Linear encoder resolutions : 5µm standard, 1µm, 0.5µm and 0.1µm optional for most units. Consult factory for availability.

Increase of the maximum force & acceleration: 48 volt coil and double coil options are available for some units with 24 volt single coil.



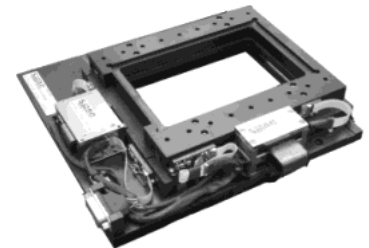
**LXY10**



**LXY15**



**LXY25**



**LXYM15**

MODEL      SERIES  
**L X Y**   

STROKE

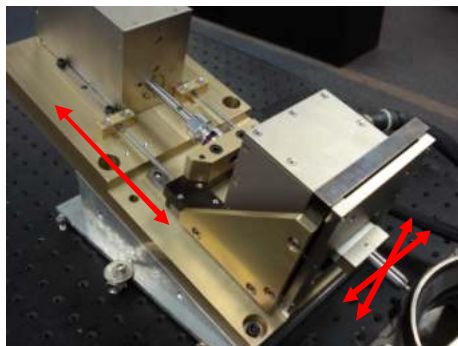
ENCODER  
VOLT   

SPRING  
VACUUM  
SHAFT

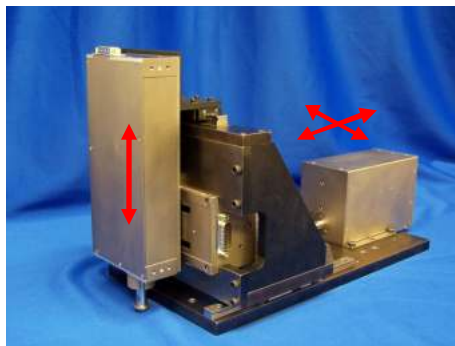
# Multi-Axis System

SMAC is pleased to introduce its range of Multi-Axis controls solutions. These systems deliver the capability to learn and follow a 3D contour or motion path, with a high degree of speed, precision, accuracy and repeatability. All combinations of SMAC actuators can be used: linear, linear/rotary, linear slide, and XY stage axis.

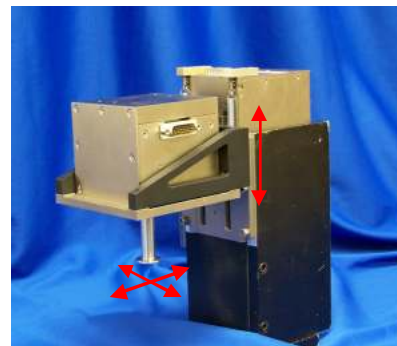
Ideal applications are measuring and testing (QC), dispensing (Bonding), machining (CNC), scoring and cutting, to name a few. SMAC Multi-Axis 3D systems are unique — they enable total programmability of speed, position and force all at the same time with an exceptional degree of accuracy and repeatability. SMAC Multi-Axis Systems offer a wide variety of solutions with a range of highly flexible control interfaces.



LX15 & LAL95



LAL35, LAL95 & LAS95

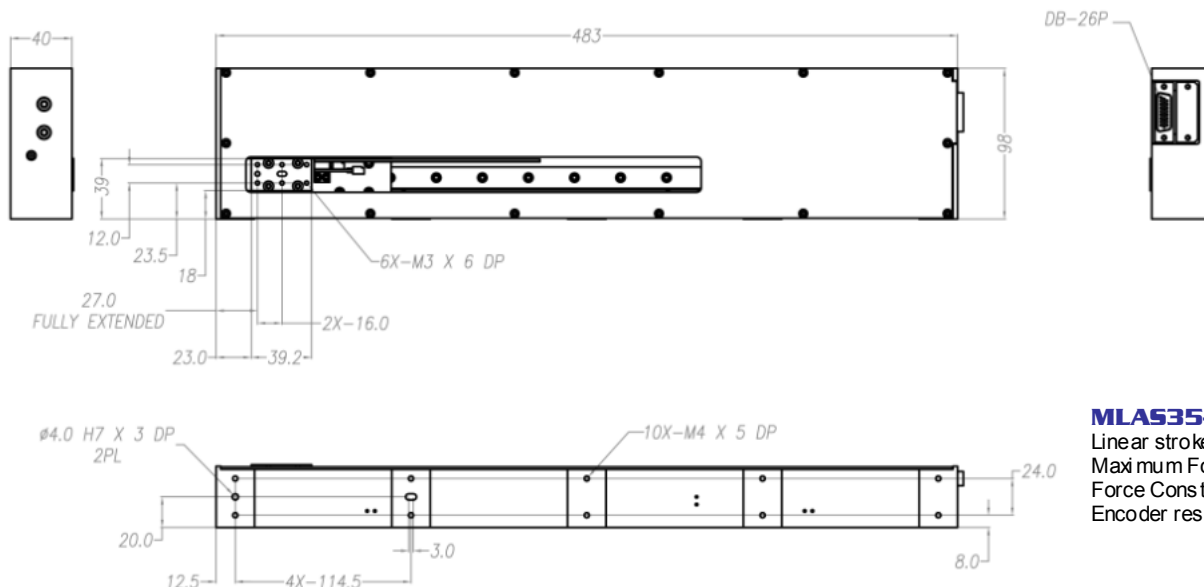


LX15 & LAS95

# Multipole Actuators

These actuators are equipped with several coils and magnets. This allows us to increase the stroke up to 600mm and increases the acceleration up to 10G. The typical application for such an actuator is the transport of a smaller actuator. Normally multipoles are used in pick & place applications to reach very short cycle times.

Please contact our technical office for further information on multipole actuators.



## ML535-250

Linear stroke [mm]: 250  
Maximum Force [N]: 60  
Force Constant [N/A]: 11  
Encoder resolution [µm]: 5

# Controllers / Amplifiers

SMAC can supply a range of single and multi axis controllers together with stand alone amplifiers and stepper driven driver. 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

### Mode:

- Position
- Velocity or Continuous
- Force

8 I/P, 8 O/P TTL general purpose I/O's, RS232 Interface, 3 analog I/P



## LAC-25

2 axis controller, built-in amplifier

### Modes:

- Position
- Velocity
- Force
- Gearing

Independent or coordinated 2 axis motion, 4 I/P, 4 O/P, Opto-isolated general purpose I/O's, 2 analog I/P, 2 analog O/P, RS232 Interface



## LAC-45

4 axis controller, built-in amplifier

### Mode:

- Position
- Velocity
- Force
- 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, RS232 Interface



## MAAC4-7

4 axis controller brushed/brushless, integrated high end amplifier, advanced math capability, circular interpolation, teach path function, additional controllers can be added to work together on systems requiring more than 4 axes.

Ethernet Interface, RS-232 Interface, 8 TTL I/O's



## LAA-5

Single axis amplifier  
+/- 10 Volt I/P, 3 Amp O/P



## LAD-1

Smart Driver for single axis stepper I/P to servo O/P  
RS232 Interface



## MIOE-8/8

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



## LAB-5

Single axis brushless controller, built-in amplifier

### Mode:

- Position
- Velocity or Continuous
- Force

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

## Cables

Actuator	Controller / Amplifier / Smart Driver			
	LAC-1	LAC-25	LAA-5	LAD-1
LAL10 (*1)	LAH-L0D26-03		LAH-LAD26-03	LAH-LSD26-03
LAL15 (*1)	LAH-L0D26-03		LAH-LAD26-03	LAH-LSD26-03
LAL20	LAH-L0D26-03		LAH-LAD26-03	LAH-LSD26-03
LAL35	LAH-L0D26-03		LAH-LAD26-03	LAH-LSD26-03
LAL55	LAH-L0D-03		LAH-LAD-03	LAH-LSD-03
LAL95	LAH-L0D26-03		LAH-LAD26-03	LAH-LSD26-03
LAL300	LAH-L0D-03		LAH-LAD-03	LAH-LSD-03
LAL500	LAH-L0D-03		LAH-LAD-03	LAH-LSD-03
LAR15		LAH-RTD26-03	LAH-RAD26-03	LAH-RSD26-03
LAR20		LAH-RTD26-03	LAH-RAD26-03	LAH-RSD26-03
LAR35		LAH-RTD26-03	LAH-RAD26-03	LAH-RSD26-03
LAR55		LAH-RTD-03	LAH-RAD-03	LAH-RSD-03
LAR95		LAH-RTD-03	LAH-RAD-03	LAH-RSD-03
LAR300		LAH-RTD-03	LAH-RAD-03	LAH-RSD-03
2 x LAL10		LAH-LTD26-03		
2 x LAL15		LAH-LTD26-03		
2 x LAL20		LAH-LTD26-03		
2 x LAL35		LAH-LTD26-03		
2 x LAL55		LAH-LTD-03		
2 x LAL95		LAH-LTD26-03		
2 x LAL300		LAH-LTD-03		
2 x LAL500		LAH-LTD-03		
GRP17		LAH-RTD26-03	LAH-RAD-03	
GRP20		LAH-RTD26-03	LAH-RAD-03	
GRP35		LAH-RTD26-03	LAH-RAD-03	
GRP50 (*2)		LAH-RTD26-03	LAH-RAD-03	
LXY10		LAH-GRP-03	LAA-GRP-03	
LXY15		LAH-GRP-03	LAA-GRP-03	
LXY25		LAH-GRP-03	LAA-GRP-03	
LXYM15		LAH-GRP-03	LAA-GRP-03	



## Built-in Controller

Consult factory for available actuator

All cables except flying lead are 3m standard, optional lengths from minimum 1m up to maximum 10m.

Superflex available: suitable for robotic applications, is available as an option.

\*1 Requires LAH-PT30-25 (Jumper to 25 pin cable) or LAH-PT30-26 (Jumper to 26 pin cable) as supplement.

\*2 Old type of GRP50 requires LAH-GRP26-03 cable.



# Installation Guideline

## Duty cycle

All units must be operated at less than 40% maximum duty cycle. This can be calculated as follows:

$\% \text{ of max force applied} \times \% \text{ of cycle time it is applied} = \% \text{ duty cycle}$

For example:

- 100% force x 40% of cycle time = 40% duty cycle.
- 60% force x 50% of cycle time = 30% duty cycle.
- 40% force x 100% of cycle time = 40% duty cycle.

Recommendations from SMAC are that this duty cycle must not be exceeded over a one second time period.

NOTE: Failure to observe this duty cycle recommendation will usually result in the actuator sustaining damage through overloading. Overloading will overheat the coil and may cause it to deform and touch on the magnet housing.

## 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

## Mounting

If the actuator is mounted vertically, the shaft drops down when the actuator is powerless. It is possible that other moving parts of the machine may damage the actuator at this position.

A return spring would hold the actuator in an upper position when it is powerless.

A safety function in your machine should check at which position the actuator currently is before other components may move into the working area of the actuator.

# 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.

## 10µm T.I.R.

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



## Rotary

Increase of torque/gear ratio can be gained by using alternative geared motors or direct drives motors.

Higher rotary encoder resolutions are optional. Please consult factory for availability.

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

## Flying Lead

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

## 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.

## 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 catalogue 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 labour, 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

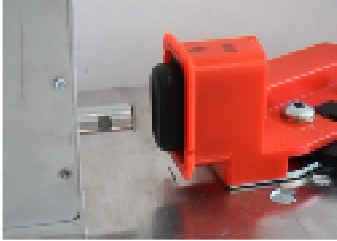
Actuators no longer covered by the SMAC Guarantee can be rebuilt under the SMAC Rebuild program. Our continued research and development program extends the life of our actuators making them even more reliable under adverse operating conditions. Actuators returned under this program are completely disassembled, 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.

# Sample Applications

## Effort Test



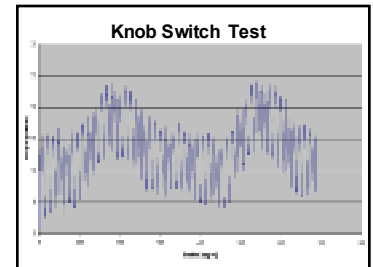
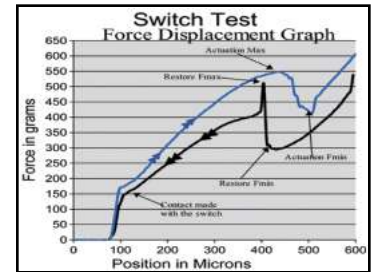
### Application Examples

- Automotive switch test
- Cell phone keypads, membrane keypads
- Touch screens
- Valves, sensors and relays
- PC Keyboards, ATM keypads
- Springs, door latches, etc...

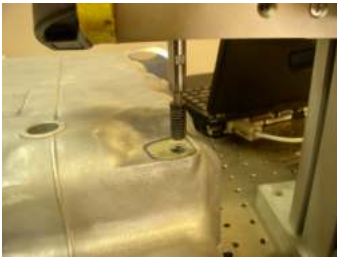


### The SMAC Advantage

- Verify hysteresis and switch differential
- Accurately simulates human movement profiles
- Combined force and position measurement
- High speed life testing
- 1,000,000 cycles in 8 hours
- QA reporting functions to verify 100% test



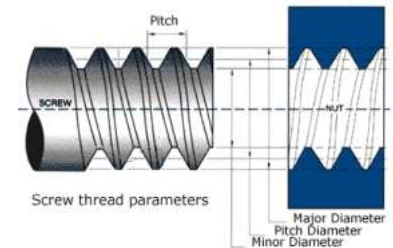
## 100% Automated Thread Check



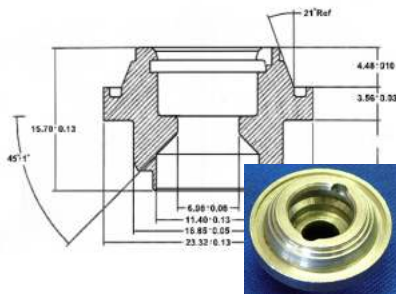
### Verification of:

- Oversize / undersize thread
- Number of threads
- Cross thread
- Thread depth
- No thread or mis-located thread
- Pitch measurement
- Shallow / blocked hole

Increase of torque/gear ratio or higher rotary encoder resolutions are available.



## Measuring, Bore Gauging and Groove Inspection



- Air bag components
- Fuel Injector Plug
- inside the fuel injector assembled part
- XYZ—Mini CMM
- Internal and External Diameter Gauging
- Height Gauging
- Thickness Gauging
- Multiple Point Gauging

Resolution: 5μ (0.0002 inch) to 5 nm (1.968x10<sup>-7</sup> inch)

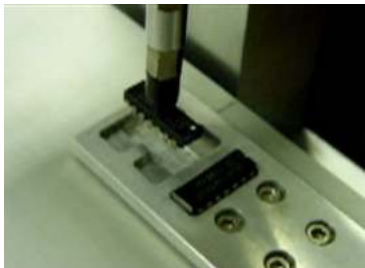


## Packaging

- Cap screw check: Cap rotates to engage slot. Detect and report no/obstructed nozzle & cap
- Labelling: Controls force and velocity to peel label from adhesive backing
- Bottle ejection: Programmable force & speed control adapt easily to different size of bottles to process.
- Parts feeding: 50,000 cycles/hour, 24/7 operation



## Pick & Place



### Problem:

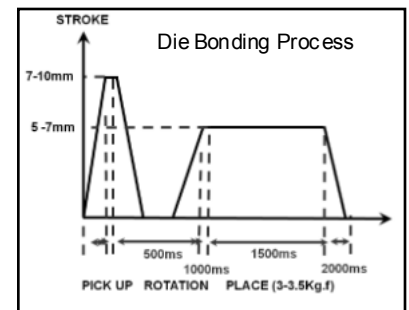
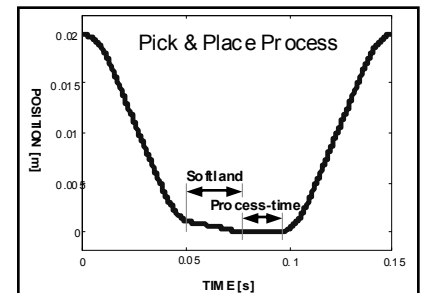
- Different pickup height's due to mechanical tolerances
- Low throughput of the machine
- Position accuracy— linear and rotary
- Constant force needed at place position

### SMAC Solution:

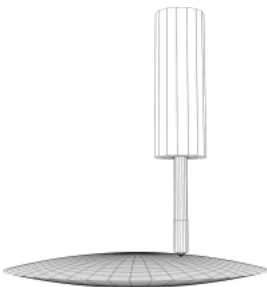
- Finding the chip surface with the Soft-Land procedure to avoid parts damages
- High speed positioning through direct drive system
- High resolution positioning with up to 0.1 micron resolution
- Up to 50000 counts/revolution - 0.007 degrees
- Precisely controlled force
- Shaft run-out 20µm standard. (>10micron option)
- Accurate repeatable positioning to +/- 2 encoder counts
- Programmable force/torque, position, velocity in all axes

### Pick & Place Application Examples

- Die bonding
- Smart Card (IC chip mounting)
- Gauging & sorting parts
- Handling small and fragile components



## Glass



### Measuring Thickness of Thin Flexible Glass

**Problem:** Accuracy of the current air cylinder, LVDT and force control system.

**Solution:** The customer used the Soft-Land feature of the SMAC LAL20 in conjunction with a load cell mounted on the rod of the SMAC actuator. The LAL20 is controlled by a dual-axis LAC25.

### Glass Grinding

**Problem:** The grinding process produces a 125µm finish with less than a 50µm variation. Damage to glass at the beginning and end of the grind cycle is caused by inadequate force control of the air cylinder driving the grind wheel. The force required is from two to four Newtons, with a 5mm stroke.

**Solution:** Customer was able to land softly on the glass panel and provide a constant force using the "force mode" of the LAL55 at both the beginning and end of the stroke.

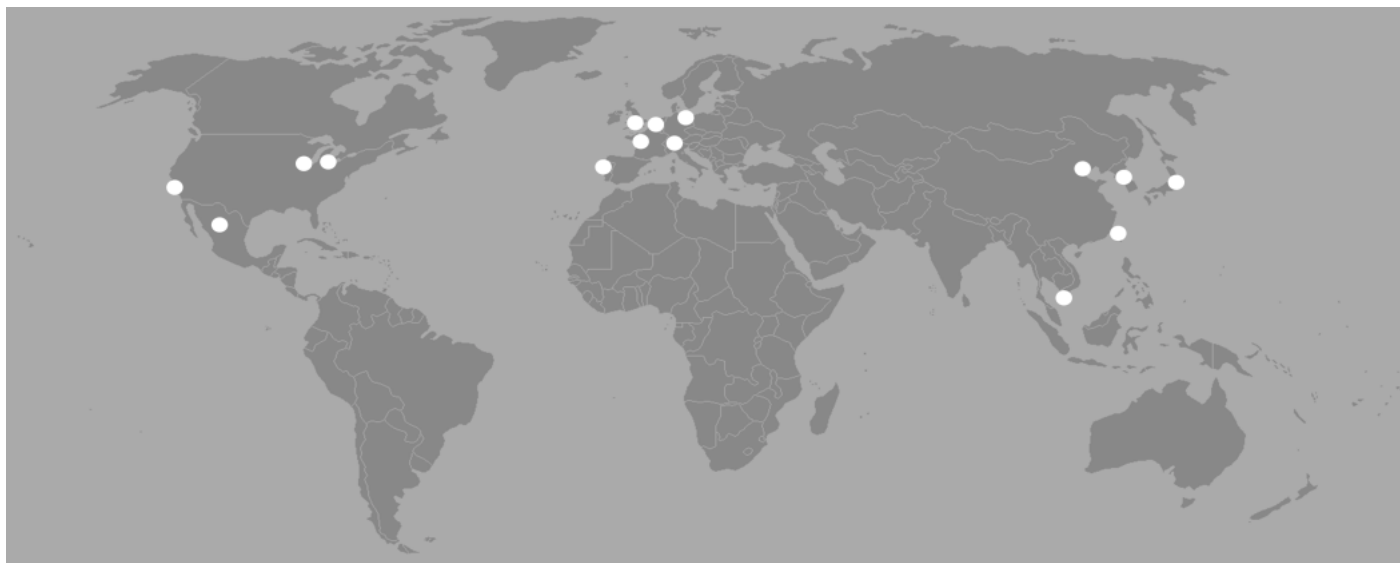
### Glass Application Examples

- Glass cutting, de-burring, positioning
- Glass scoring for solar panels and LCDs
- Chamfering and bevelling

## Medical & Bio-Science



- Push/Pull Testing of Hypodermic Needles
- Measuring cells height in two conditions, dry and saturated.
- Measuring the amount of wear on the knee replacement plate over x amount of time.



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