

# Membrane & Rubber Keypads



## Membrane Keypads

- Graphic overlay only or full switching membrane
- Metal or polydome contacts
- Tactile or non-tactile feel
- Integral SMD LEDs
- LCD windows
- ESD/RFI shielding
- Insertable legend options

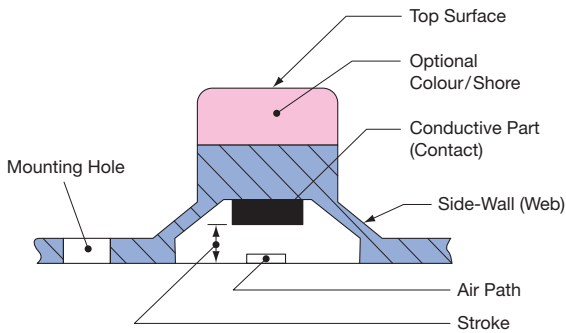
## Rubber Keypads

- Backlighting options
- Various coatings eg epoxy, polyurethane
- Harder rubber options to give 'plastic' feel
- Various travel/operating force options
- Combination with tactile switches
- Wide variation of colours and designs
- Plastic key tops available

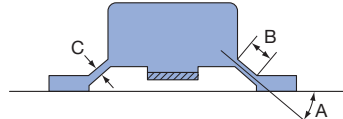


# Rubber Keypad Design

## Basic Construction Illustration

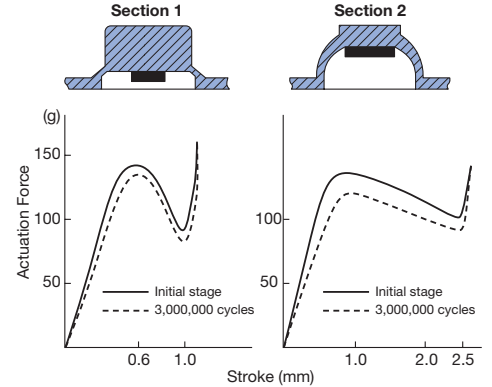


## Life Test



**Operating life depends on:**

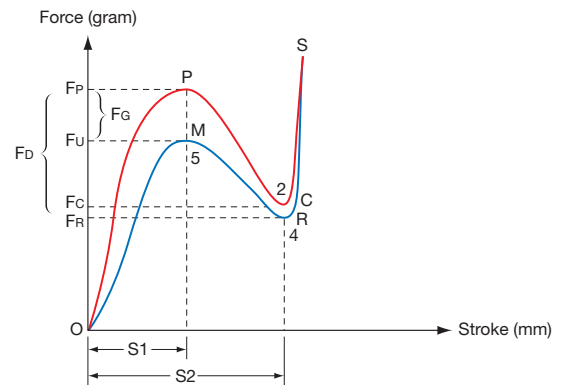
- **Soft Material** ... 50 Shore is preferred.
- **Low Stroke** ... less than 1mm.
- **Angle** (as part A illustrated above) ... 40-degree is recommended.
- **Length of side-wall** (as part B illustrated above)
- **Thickness of side-wall** (as part C illustrated above) ... determined by key structure. The thicker the web, the higher the operating force.



## Tolerance Requirement of Silicone Rubber Key

Dimensions:		Actuation Force:	
0 ~ 10mm	± 0.10mm	50 ~ 60 grams	± 15 grams
10 ~ 20mm	± 0.15mm	61 ~ 80 grams	± 20 grams
20 ~ 30mm	± 0.20mm	81 ~ 100 grams	± 25 grams
30 ~ 40mm	± 0.25mm	101 ~ 120 grams	± 30 grams
40 ~ 50mm	± 0.30mm	121 ~ 150 grams	± 35 grams
50 ~ 60mm	± 0.35mm	151 ~ 200 grams	± 40 grams
60 and above	± 0.6%	201 and above	± 25%

## Force-Stroke Curve of Rubber Keypad



Force		Location	
FP	Peak Force (Fmax)	O	Original Point
FU	Max. Return Force	P	Peak Point
FC	Contact Force	C	Contact Point
FR	Min. Return Force (Fmin)	R	Return Point
FM	Max. Return Force	M	Max. Return Point
FD	Drop Force (FD = FP - FC)		
FG	Gap Force (FG = FP - FM)		
Stroke		Travel	
S1	Peak Stroke	O-P	Peak Force (FMAX)
S2	Contact Stroke	P-C	Contact Force
		C-S	Min. Return Force (FMIN)
		S-R-M-O	Gap Force (FG = FP - FM)

## Mechanical and Electrical Properties of Silicone Rubber

Non-Conductive Silicone	
Temperature for use	-55°C ~ +250°C
Specific Gravity	1.15
Tensile Strength	90Kg/cm <sup>2</sup>
Tear Strength	13Kgf/cm
Compression Set	10% (180°C x 22hrs.)
Elongation at Break	350%
Volume Resistivity	8 x 10 <sup>14</sup> ohm cm
Contact Resistance	-
Contact Rating (DC)	-
Contact Bounce	-
Chattering	-
Insulation Breakdown	24 Kv/mm
Colour	Colouring possible
Dielectric Constant	4.2 (50Hz)
Dielectric Tangent	13% (50Hz)

Depending on the size of contacts and keyboard layout.

## Typical Key Sections and Characteristics

		Force Range 30 ~ 350 grams Stroke Range 0.5 ~ 3.0mm Cycle Life (x10 <sup>3</sup> ) 500 ~ 2000 Typical uses Telephone, Remote Control, Automotive, Radio, Toys, Calculator, etc.			Force Range 30 ~ 80 grams Stroke Range 2.0 ~ 4.0mm Cycle Life (x10 <sup>3</sup> ) 5000 ~ 20000 Typical uses Computer, Typewriter etc.
		Force Range 30 ~ 250 grams Stroke Range 0.7 ~ 2.5mm Cycle Life (x10 <sup>3</sup> ) 500 ~ 2000 Typical uses Telephone, Remote Control, Toys, Games, Calculator, etc.			Force Range 30 ~ 200 grams Stroke Range 1.0 ~ 2.5mm Cycle Life (x10 <sup>3</sup> ) 500 ~ 3000 Typical uses Telephone, Typewriter, Test Instruments, etc.
		Force Range 30 ~ 150 grams Stroke Range 0.5 ~ 3.0mm Cycle Life (x10 <sup>3</sup> ) 1000 ~ 3000 Typical uses Telephone, Remote Control, Toys, Measuring Instruments, Office Machine			Force Range 20 ~ 80 grams Stroke Range 0.2 ~ 1.0mm Cycle Life (x10 <sup>3</sup> ) 500 ~ 10000 Typical uses Typewriter, Household Appliances, Computer, etc.

