Membrane & Rubber Keypads

Membrane Keypads

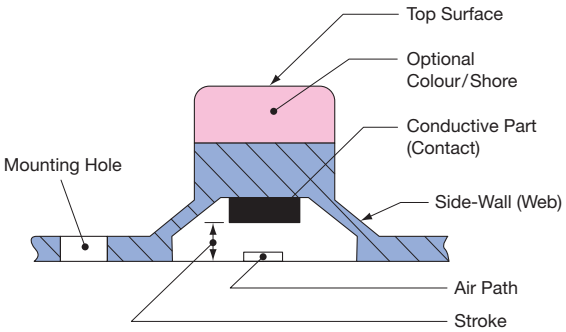
- Graphic overlay only or full switching membrane
- Metal or polydome contacts
- Tactile or non-tactile feel
- Integral SMD LEDS
- LCD windows
- ESD/RFI shielding
- Insertable legend options

Rubber Keypads

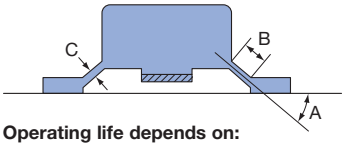
- Backlighting options
- Various coatings eg epoxy, polyurethane
- Harder rubber options to give ‘plastic’ feel
- Various travel/operating force options
- Combination with tactile switches
- Wide variation of colours and designs
- Plastic key tops available

Rubber Keypad Design

Basic Construction Illustration

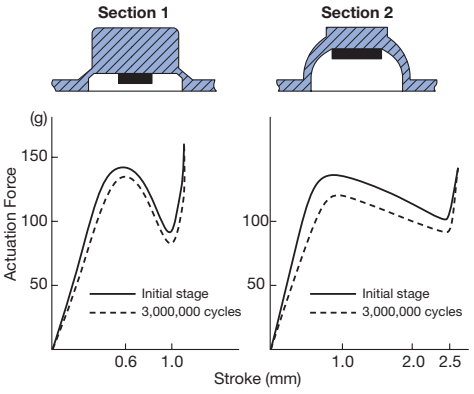


Life Test



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

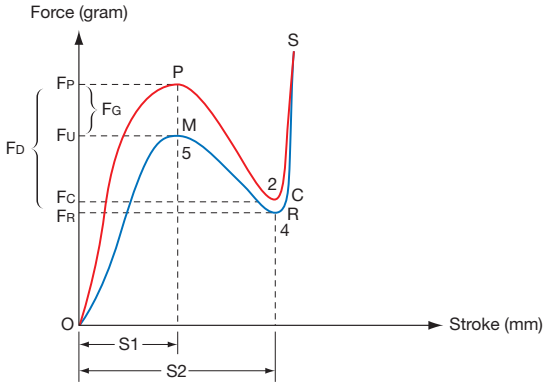
Dimensions:		Actuation Force:	
0 ~ 10mm	± 0.10mm	50 ~ 60 grams	± 15 grams
10 ~ 20mm	± 0.15mm	61 ~ 80 grams	± 20 grams
20 ~ 30mm	± 0.20mm	81 ~ 100 grams	± 25 grams
30 ~ 40mm	± 0.25mm	101 ~ 120 grams	± 30 grams
40 ~ 50mm	± 0.30mm	121 ~ 150 grams	± 35 grams
50 ~ 60mm	± 0.35mm	151 ~ 200 grams	± 40 grams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

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^2
Tear Strength	13Kgf/cm
Compression Set	10% (180°C x 22hrs.)
Elongation at Break	350%
Volume Resistivity	8 x 10^{14} 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.

Force-Stroke Curve of Rubber Keypad



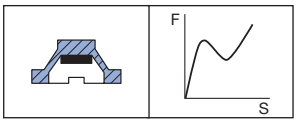
Force	
FP	Peak Force (Fmax)
FU	Max. Return Force
FC	Contact Force
FR	Min. Return Force (Fmin)
FM	Max. Return Force
FD	Drop Force (FD = FP – FC)
FG	Gap Force (FG = FP – FM)

Stroke	
S1	Peak Stroke
S2	Contact Stroke

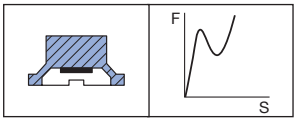
Location	
O	Original Point
P	Peak Point
C	Contact Point
R	Return Point
M	Max. Return Point

Travel	
O-P	Peak Force (FMAX)
P-C	Contact Force
C-S	Min. Return Force (FMIN)
S-R-M-O	Gap Force (FG = FP – FM)

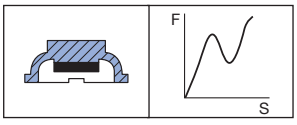
Typical Key Sections and Characteristics



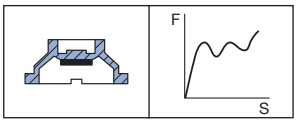
Force Range	30 ~ 350 grams
Stroke Range	0.5 ~ 3.0mm
Cycle Life (x10^3)	500 ~ 2000
Typical uses	Telephone, Remote Control, Automotive, Radio, Toys, Calculator, etc



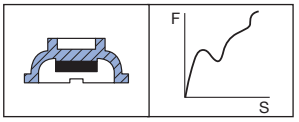
Force Range	30 ~ 250 grams
Stroke Range	0.7 ~ 2.5mm
Cycle Life (x10^3)	500 ~ 2000
Typical uses	Telephone, Remote Control, Toys, Games, Calculator, etc



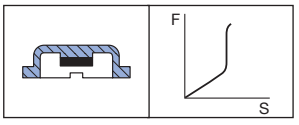
Force Range	30 ~ 150 grams
Stroke Range	0.5 ~ 3.0mm
Cycle Life (x10^3)	1000 ~ 3000
Typical uses	Telephone, Remote Control, Toys, Measuring Instruments, Office Machine



Force Range	30 ~ 80 grams
Stroke Range	2.0 ~ 4.0mm
Cycle Life (x10^3)	5000 ~ 20000
Typical uses	Computer, Typewriter etc.



Force Range	30 ~ 200 grams
Stroke Range	1.0 ~ 2.5mm
Cycle Life (x10^3)	500 ~ 3000
Typical uses	Telephone, Typewriter, Test Instruments, etc.



Force Range	20 ~ 80 grams
Stroke Range	0.2 ~ 1.0mm
Cycle Life (x10^3)	500 ~ 10000
Typical uses	Typewriter, Household Appliances, Computer, etc.

The above information and specifications are for reference only.