LINEAR-MOTION POTENTIOMETER

(Precision Linear-motion, Wirewound, Conductive Plastic & Hybrid Element)

SAKAE Linear-motion Potentiometers are compact in size and light in weight and are capable of transforming mechanical linear movements into corresponding electrical variations. Easy to operate and handy. It is suitable for measurement of linear movements in various machinery and tools and displacements in linearly moving objects such as steering angles, numerical control tooling machines, robots, etc.

Besides, wirewound type (LP), there is another kind of resistive element in this series: Conductive Plastic (FLP-A) which features high resolution, long life expectancy and excellent high speed tracking ability. Hybrid resistive element is also available in model 9HLP. Please select the resistive element appropriately according to your applications.

THE NOMENCLATURE OF SAKAE LINEAR-MOTION POT. SERIES

S 30 FLP 100 A - ○○○○

●**Special Specifications**
S means the potentiometer with special mechanical specifications not applicable to our standard.

●**Diameter**
30 means 30mm square in cross sectional outer size of the body of the potentiometer. The 8 standard sizes are available, namely, 8mm, 9mm, 13mm, 15mm, 18mm, 30mm, 40mm and 50mm, but subject to models.

●**Type**
FLP-A means linear-motion, conductive plastic resistive element type potentiometer. According to the kinds of resistive elements incorporated, there are 3 kinds:
LP.....Wirewound resistive element type (A is not given).
FLP-A.....Conductive plastic resistive element type.
HLP.....Hybrid resistive element type.

●**4 digits branch number**
to be used for specific requirements.

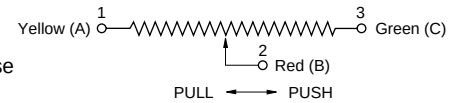
●**Characteristics**
A means a conductive plastic resistive element type. (A is not given to wirewound type and hybrid type.)

●**Stroke**
100 means effective electrical travel on the resistive element. The 15 standard strokes are available, namely, 10mm, 12mm, 15mm, 20mm, 25mm, 30mm, 50mm, 100mm, 120mm, 200mm, 300mm, 400mm, 500mm, 750mm and 1,000mm.

NOTE: The nomenclature of model 18 (F) LP series is mentioned in the next page 89 because of its complexity.

●**Terminal Connection Diagram**

Note: in case of with a connector, please use indications in the parenthesis.



SELECTION GUIDE

Kind of Element	Size (mm)	Model No.	Stroke (mm)	Features
Wirewound	20×18	**18LP**	15, 30, 50, 100	This model is a substitute model against our old model 20LP series.
	32×32	**30LP**	50, 100, 200	These types have a shaft with front and rear extension as standard version. Available with special mechanical devices such as spring return device and position-adjustable limit-switches.
	50×50	**50LP**	300, 500, 1,000	The units with 300mm and 500mm strokes have a shaft with front and near extension and the unit with 1,000mm stroke has a shaft with front extension only.
Conductive Plastic	8×7	**8FLP**	10	Low-cost and miniature size pot. with a shaft with front and rear extension. Available with spring return device incorporated as special.
	11×13	**13FLP**	12, 25 50, 100	Popular type pot. with a front extended shaft. Available with spring return device as special version.
	15×14	**15FLP**	10, 15, 20, 30	Popular type pot. with screw-mounting method.
	20×18	**18FLP-A, B, C**	15, 30, 50, 75, 100, 150	Rigid housing case and can select the shaft shapes and with connector to your applications.
	32×32	**30FLP**	100, 200, 300, 400, 500, 750, 1,000	Long-life expectancy and low-cost pot. with a front extended shaft, Various strokes are available.
	47×40	**40FLP**	200, 300, 400, 500, 750, 1,000	Dust-proof and rigid construction most suitable for various kinds of robots, machine tools, etc.
	10×20	**CFL**	200, 300, 400, 500, 1,000	Sub-assembled resistive element unit with a wiper. Low-cost and open frame housing.
Hybrid	20×9	**9HLP**	100, 120	Can use a resistive element unit with a knob slider and long-life expectancy.

THE NOMENCLATURE OF MODEL 18 (F) LP SERIES

S 18 FLP B C 100 R E I - ○○○○

Special Specifications
S means with special mechanical specifications not applicable to our standard.

Diameter
18 means 18mm square in cross sectional outer size of the housing.

Type
FLP means linear-motion, conductive plastic resistive element type potentiometer. If the resistive element is a wirewound, F is not given and only LP is indicated.

Mounting Method and Shaft Shape
- : Screw mounting, plain shaft
A : Screw mounting, plain shaft
B : Fixing nail mounting to the body, shaft with a cardan joint
C : Fixing nail mounting to the body, shaft with a ball tip

Terminal Shape
C : Connector type
W: Leadwire type
- : Lug type

Stroke
100 means effective electrical travel of 100mm on the resistive element. 15mm to 200mm are available depending on the models.

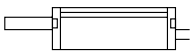
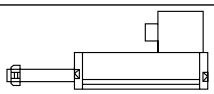
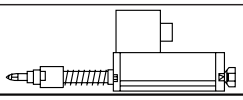
With Spring Return Device
R : With spring return device
- : Without spring return device

Shaft Extension
E : With front and rear extended shaft.
- : With front extended shaft.

Sealing
I : With simple sealing (Abt. IP54)
- : Without sealing

4 digits branch number
to be used for specific requirements.

SELECTION GUIDE

Model	Outer Shape	Kind of Resistive Element	Mounting Method and Shaft Shape	Stroke (mm)
18LP		Wirewound	Screw mounting to the body. Plain shaft.	15, 30, 50, 100
18FLPA		Conductive Plastic	Screw mounting to the body. Plain shaft.	15, 30, 50, 100
18FLPB		Conductive Plastic	Fixing nail mounting to the body. Shaft with a cardan joint.	25, 50, 75, 100, 150
18FLPC		Conductive Plastic	Fixing nail mounting to the body. Shaft with a ball tip.	25, 50

●General Performances

Kind of Element	Model No.	Stroke (mm)	Standard Total Resistance Range (Ω)	Independent Linearity Tolerance (%)	Special Specifications				
					Spring Return Device	Front and Rear Shaft Extension	Extra Taps	Simple Sealing Type	With Switch
Wirewound	**18LP**	15～100	10～20k	±2.0～±0.25	◯	◯	◯	◯	—
	30LP	50～200	50～20k	±0.7～±0.25	◯	◯	◯	◯	◯
	50LP	300～1,000	200～200k	±0.3～±0.1	◯	◯	◯	◯	◯
Conductive Plastic	**8FLP10A**	10	1k～50k	±2.0～±1.0	◯	◯	—	◯	—
	13FLP-A	12, 25, 50, 100	500～20k	±2.0～±0.3	◯	◯	—	—	—
	15FLP-A	10～30	500～10k	±2.0～±0.5	◯	◯	—	◯	—
	18FLPA	15～100	500～20k	±0.7～±0.2	◯	—	—	◯	—
	18FLPB	25～150	500～20k	±0.5～±0.05	◯	—	◯	◯	—
	18FLPC	25～50	500～10k	±0.5～±0.1	◯	◯	◯	◯	—
	30FLP-A	100～1,000	1k～500k	±0.5～±0.05	—	—	◯	◯	—
	40FLP-A	200～1,000	2k～500k	±0.5～±0.1	—	—	—	—	—
	CFL	200～1,000	2k～500k	±0.5～±0.1	—	—	—	—	—
Hybrid	**9HLP**	100, 120	1k～10k	±0.5～±0.3	—	—	—	—	—

Note: 1. For detailed performances, please refer to the general specifications of each model in this catalog.
2. ◎ means standard specifications and ◯ means special specifications available.
3. Standard total resistance values are based on 1, 2 and 5 series (i.e. 100Ω, 200Ω, 500Ω, 1kΩ, 2kΩ, 5kΩ...).

●Environmental Performances

Parameters \ Model Nos.	18LP, 30LP, 50LP	8FLP, 13FLP, 15FLP, 18FLPA, 18FLPB, 18FLPC, 30FLP, 40FLP, CFL, 9HLP
Operating Temperature Range	-30℃～+105℃	-30℃～+105℃ ※
Temperature Cycle	5 cycles under -30℃～+105℃ Total resistance value variation: below ±5% No mechanical damage	5 cycles under -30℃～+105℃ Total resistance value variation: below ±10% No mechanical damage
Exposure at Low Temperature	24 hours at -30℃ Total resistance value variation: below ±5% No mechanical damage	24 hours at -30℃ Total resistance value variation: below ±5% No mechanical damage
Exposure at High Temperature	1,000 hours at 105℃ Total resistance value variation: below ±5% No mechanical damage	1,000 hours at 105℃ Total resistance value variation: below ±10% No mechanical damage
Vibration	10Hz to 2,000Hz 147m/s² 12 hours Total resistance value variation: below ±5% No mechanical and electrical damage	10Hz to 2,000Hz 147m/s² 12 hours Total resistance value variation: below ±5% No mechanical and electrical damage
Shock	490m/s² 11ms 18 times Total resistance value variation: below ±1% No mechanical and electrical damage	490m/s² 11ms 18 times Total resistance value variation: below ±10% No mechanical and electrical damage
Moisture Resistance	40℃ 95%RH 120 hours Total resistance value variation: below ±10% Insulation resistance: over 10MΩ	40℃ 95%RH 120 hours Total resistance value variation: below ±10% Insulation resistance: over 10MΩ
Life Expectancy, Shaft Reciprocating Motions	No load at 60 c.p.m. 100,000 reciprocating motions Total resistance value variation: below ±5% against initial value Independent linearity tolerance: below 150% of specified value Noise: below 500Ω E.N.R.	No load at 120 c.p.m. 20,000,000 reciprocating motions (except 40FLP, CFL & 9HLP) 40FLP, CFL...10,000,000 reciprocating motions 9HLP...100,000 reciprocating motions Total resistance value variation: below ±10% against initial value Independent linearity tolerance: below 150% of specified value Output smoothness: below 150% of specified value

Note: 4. In case of the potentiometer with special resistance values and special specifications, the above performances may change and therefore, please consult us in advance, separately.
5. As for operating temperature range. we can not guarantee that all values of performances can satisty within this operating temperature range. (Please see page 24 in this catalog for further details.)
6. The above values of performances based on each testings were measured after each testings completed, respectively, under standard conditions. As for the values during testings and other values not mentioning in the above table, please ask us separately.

※ N.B : Model 18 FLP series with spring return device and sealed version under IP54 have the operating temperature range of 0 ℃ to + 60.℃

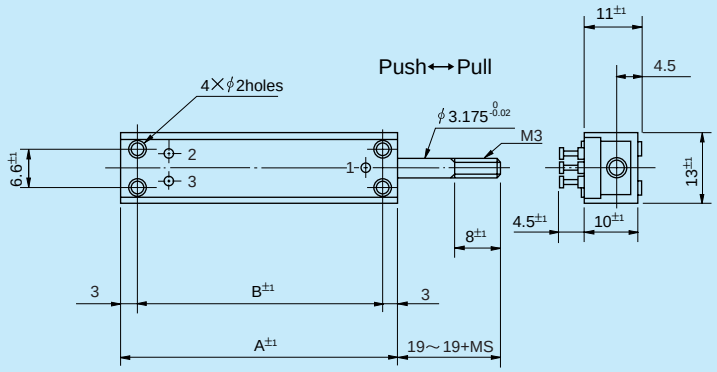
Conductive Plastic

MODEL 13FLP (with front extended shaft)

Model 13FLP25A

Model 13FLP100A

Standard Dimensions



Model No.	A	B	MS
13FLP12A	38	32	12.7 +3 0
13FLP25A	51	45	25.4 +3 0
13FLP50A	76	70	50.8 +3 0
13FLP100A	127	121	101.6 +3 0

Standard Model Nos.

13FLP12A	Stroke	12mm
13FLP25A	Stroke	25mm
13FLP50A	Stroke	50mm
13FLP100A	Stroke	100mm

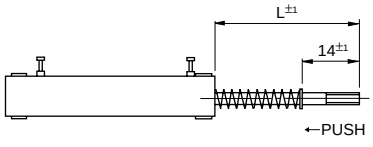
General Specifications

Model No.		13FLP12A	13FLP25A	13FLP50A	13FLP100A
Standard Resistance Values		500,1k,2k,5k,10k (Ω)	500,1k,2k,5k,10k (Ω)	1k,2k,5k,10k,20k (Ω)	1k,2k,5k,10k,20k (Ω)
Total Resistance Tolerance		±20% (M)			
Independent Linearity Tolerance	Standard Class	±2.0%	±1.5%	±1.0%	±0.7%
	Precision Class	±1.0%	±0.7%	±0.5%	±0.3%
Resolution		Essentially Infinite			
Output Smoothness		Below 0.1% against input voltage			
Contact Resistance Variation		Below 2% C.R.V.			
Power Rating		0.2W	0.4W	0.7W	1.2W
Electrical Stroke		12.7±0.5mm	25.4±0.5mm	50.8±0.5mm	101.6±0.5mm
Mechanical Stroke (MS)		12.7 +3 0 mm	25.4 +3 0 mm	50.8 +3 0 mm	101.6 +3 0 mm
Insulation Resistance		Over 1,000MΩ at 500V.D.C.			
Dielectric Strength		1 minute at 500V.A.C.			
Friction		Below 0.5N (50gf)			Below 1.0N (100gf)
Stopper Strength		Approx. 20N (2kgf)			
Resistance Temperature Coefficient		±400p.p.m./℃			
Mass		Approx. 10g	Approx. 15g	Approx. 25g	Approx. 35g

Special Specifications Available

Spring return device mounted on the shaft (Friction is referred as below table.), Special machining on the shaft, Wirewound resistive element type (13LP series).

In case of 13FLP series with spring return device, please note the following:
The spring return device is mounted on the outside shaft, of which dimensions are as the table.



Model No.	L	Friction
S13FLP12A	30～30+MS	3.5N (350gf)
S13FLP25A	35～35+MS	5 N (500gf)
S13FLP50A	40～40+MS	5 N (500gf)
S13FLP100A	50～50+MS	5 N (500gf)

Note: MS means Mechanical Stroke.