HELICALOHM® MULTI-TURN POTENTIOMETER

(Precision Multi-turn, Wirewound & Hybrid Element)

There are two kinds in **SAKAE** Helicalohm Potentiometers with a wirewound resistive element. One is Model HD Series which are an original device consisting of a resistive element wound helically on a drum surface and a slider of which contact is made around the resistance drum and the other is Model HP Series which are formed with a slider travelling along the interior surface of a resistive element helically wound inside a sealed pipe.
Both of them equally offer high resolution, excellent reliability and long life. **SAKAE** has expanded to the production of hybrid resistive element potentiometers and this element has now been incorporated into Model HP Series with small size.

THE NOMENCLATURE OF SAKAE HELICALOHM POT. SERIES

S 46 HD S - 10 L G - ○○○○○

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

●Diameter
46 means the approximate outer diameter of the poten-tiometer in metric system. The 8 standard diameters are available, namely, 10mm, 12mm, 20mm, 22mm, 25mm, 30mm, 46mm, and 50mm.

●Type and Internal Construction
H means helicalohm, multi-turn, linear potentiometer. There are 3 kinds of HP, HHP, and HD.
HP, HPC.....Wirewound type with resistive element helically wound inside the pipe-shaped housing.
HHP.....Hybrid type with same construction as HP type.
HD.....Wirewound type with resistive element helically wound on the drum-shaped base.

●4 or 5 digits branch number
to be used for specific requirements.

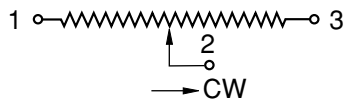
●Number of Gangs
G means 2 ganged potentiometer on the same axle. The potentiometer consists of one single section unless G is given.(e.g. G3...3 ganged, G4...4 ganged.)

●Application
L means for semi-fixed purpose. **P** means for p.c. terminals. **W** means for lug terminals at rear end. **E** means inch dimensional bushing and shaft type.

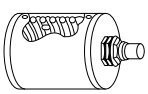
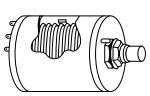
●Number of Turns
10 means 10-turn. There are 5 kinds in the number of our standard multi-turn potentiometers. They are 3, 5, 10, 15 and 20, but subject to models.

●Mounting Method
S means servomount type(in case of bushingmount type, S is deleted.)

●Terminal Connection Diagram



SELECTION GUIDE

Internal Constraction	Type	Kind of Element	Diameter (mm)	Model No.	Features
Pipe type 	HP	Wirewound	ϕ 10.5	**10HP**	World's smallest multi-turn pot. since 1965.
			ϕ 13	**12HP, 12HP-P, 12HPS, 12HPC, 12HPC-P, 12HPC-W**	Low-cost multi-turn pot. of outer dia. of 13mm. Terminals for p.c. board and rear terminals are also available.
			ϕ 20	**20HP, 20HPS**	Precision multi-turn pot. of outer dia. of 20mm. Servomount type is also available.
			ϕ 22	**22HP**	Low-cost multi-turn pot. of outer dia. of 22mm.Most popular items for general applications. Two kinds of bushing in 22HP series are available : plastic and metal.
			ϕ 25	**25HP, 25HPS**	Precision multi-turn pot. of outer dia. of 25mm. Various specials based on this item are also available.
	HHP	Hybrid	ϕ 13	**12HHP, 12HHP-P, 12HHPS**	World's smallest multi-turn precision hybrid pot. of outer dia. of 13mm. Servomount type is also available.
			ϕ 20	**20HHP, 20HHPS**	Precision multi-turn hybrid pot. of outer dia. of 20mm. Servomount type is also available.
			ϕ 22	**22HHP, 22HHPS**	Low-cost precision multi-turn hybrid pot. of outer dia. of 22mm. Servomount type is also available.
Drum type 	HD	Wirewound	ϕ 46	**46HD, 46HDS**	Traditional item being manufactured continuously over 45 years. Slide wire resistive element type which brings infinite resolution is available as standard version against the standard resistance values within 20Ω in this series, but subject to models.

●General Performances

Kind of Element	Model No.	Standard Total Resistance Range (Ω)	Special Lower Resistance Values (Ω)	Special Higher Resistance Values (Ω)	Independent linearity Tolerance (%)	Special Specifications						
						Servo-mount Type	Front and Rear Shaft Extension	Extra Taps	Simple Sealing Type	With Limit-Switch Adaptor	Multi-ganged	Semi-fixed Setting Type
Wirewound	**10HP**	100～50k	20,50	100k	±0.25～±0.1	—	○	—	—	—	—	—
	12HP	100～100k	20,50	150k	±0.25～±0.1	○	○	—	○	—	—	○
	12HPC	100～100k	—	—	±0.25～±0.1	—	○	—	○	—	—	○
	20HP	100～50k	10,20,50	150k	±0.2 ～±0.1	○	○	○	○	○ (with adaptor)	○	○
	22HP	100～100k	—	—	±0.25～±0.1	○	○	—	○	—	○	○
	25HP	100～100k	10,20,50	200k	±0.25～±0.1	—	○	○	—	○ (with adaptor)	○	—
Hybrid	**12HHP**	2k～50k	—	100k	±0.4 ～±0.1	○	○	—	○	—	—	○
	20HHP	2k～100k	—	—	±0.25～±0.1	○	○	○	○	○ (with adaptor)	○	○
	22HHP	1k～100k	—	—	±0.25～±0.1	○	○	—	○	—	○	○
Wirewound	**46HD**	0.5～100k	—	200k	±0.3 ～±0.1	○	○	—	○	○ (Incorporated)	○	—

Note: 1. Above-mentioned data are applied for our standard 10-turn models per each series and for further technical details, please see each articles of the models in question mentioned in this catalog.

●Environmental Performances

Parameters \ Model Nos.	10HP, 12HP, 20HP, 25HP, 46HD	12HPC, 22HP	12HHP, 20HHP (22HHP)※
Operating Temperature Range	−55℃～+105℃	−55℃～+105℃	−55℃～+105℃
Temperature Cycle	5 cycles under −55℃～+105℃ Total resistance value variation: within ±5% No mechanical damage	5 cycles under −55℃～+105℃ Total resistance value variation: within ±5% No mechanical damage	5 cycles under −55℃～+105℃ Total resistance value variation: within ±5% No mechanical damage
Exposure at Low Temperature	24 hours at −55℃ Total resistance value variation: within ±5% No mechanical damage	24 hours at −55℃ Total resistance value variation: within ±5% No mechanical damage	24 hours at −55℃ Total resistance value variation: within ±5% No mechanical damage
Exposure at High Temperature	1,000 hours at 105℃ Total resistance value variation: within ±5% No mechanical damage	1,000 hours at 105℃ Total resistance value variation: within ±5% No mechanical damage	1,000 hours at 105℃ Total resistance value variation: within ±5% No mechanical damage
Vibration	10Hz to 2,000Hz 147m/s² 12 hours Total resistance value variation: within ±5% No mechanical and electrical damage	10Hz to 2,000Hz 147m/s² 12 hours Total resistance value variation: within ±5% No mechanical and electrical damage	10Hz to 2,000Hz 147m/s² 12 hours Total resistance value variation: within ±5% No mechanical and electrical damage
Shock	490m/s² 11ms 18 times Total resistance value variation: within ±1% No mechanical and electrical damage	490m/s² 11ms 18 times Total resistance value variation: within ±1% No mechanical and electrical damage	490m/s² 11ms 18 times Total resistance value variation: within ±1% No mechanical and electrical damage
Moisture Resistance	40℃ 95%RH 240 hours Total resistance value variation: within ±10% Insulation resistance: over 10MΩ	40℃ 95%RH 120 hours Total resistance value variation: within ±10% Insulation resistance: over 10MΩ	40℃ 95%RH 120 hours Total resistance value variation: within ±10% Insulation resistance: over 10MΩ
Rotational Life Expectancy (at 25℃)	No load at 40 r.p.m. 3-turn .....600,000 shaft revolutions 5-turn .....1,000,000 shaft revolutions 10-turn, 15-turn, 20-turn .....2,000,000 shaft revolutions Total resistance value variation: within ±5% against initial value Independent linearity tolerance: within 150% of specified value Noise: within 500Ω E.N.R.	No load at 40 r.p.m. 3-turn .....300,000 shaft revolutions 5-turn .....500,000 shaft revolutions 10-turn .....1,000,000 shaft revolutions Total resistance value variation: within ±5% against initial value Independent linearity tolerance: within 150% of specified value Noise: within 500Ω E.N.R.	No load at 40 r.p.m. 5-turn.....5,000,000 (2,500,000)※ shaft revolutions 10-turn.....10,000,000 (5,000,000)※ shaft revolutions Total resistance value variation: within ±5% against initial value Independent linearity tolerance: within 150% of specified value Output smoothness: 5-turn.....0.2% against input voltage 10-turn.....0.1% against input voltage

Note: 2. 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.
3. As for operating temperature range, we can not guarantee that all values of performances can satisfy within this operating temperature range. (Please see page 23 in this catalog for further details.)
4. 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.
5. Mark※ applies only for model 22HHP series.