PRECISION MOTOR- POTENTIOMETER

SAKAE Motor-Potentiometer Series are a kind of servo units consisting of a precision potentiometer of our manufacture combined with a reduction gear mechanism and a coreless D.C. motor.
Their housing is compact and strong based on our own design and there are versatile items in this series among which you can choose ones to be suitably convenient for the design of your own applications.
Precise mechanism, high reliability, extreme stability, high power for input as well as output and long life expectancy can satisfy your various requirements.
SAKAE Servo Amplifier and D.C. Power Supply in accordance with performances of motor potentiometers offer many stable electrical performances and have a compact and strong housing case as well as terminal block to make easy connections. Circuit construction is easily made with these devices and motor potentiometers.

THE NOMENCLATURE OF SAKAE MOTOR-POTENTIOMETER SERIES

S MPH 22 B 7 25HP-10 5 kΩ 0.25

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

●Model No.
MPH means motor-potentiometer.

●Diameter
22 means approximate outer diameter of the housing in metric system.
The 4 standard diameters are available: 22mm, 30mm, 35mm and 46mm.

●Code of Coupled Motor
B means the code of a coupled motor. There are 3 codes for coupled motor: **A, B & C.**

●Accuracy of Coupled Potentiometer
0.25 means independent linearity tolerance ±0.25% of the coupled potentiometer.

●Coupled Potentiometer's Model No.
25HP-10 5kΩ means a coupled potentiometer's model number and total resistance value, namely, our model 25HP-10, 5kΩ.

●Code of Coupled Reduction Gear
7 means the code a reduction gear incorporated in the housing. There are many kinds of reduction gears, of which deatails please refer to the specific tables of each models.

SELECTION GUIDE

●Motor Potentiometer

Model No.	Coupled Motor	Reduction Gear	Features
MPH22	A, B	5～11	Small sized unit for general and universal use. Panel mounting type for 1-turn and 10-turn.
MPH30	A, B	5～11	Chassis mounting type for 1-turn and 10-turn. Use only for electrical circuits. (i.e. Automatic-balancer, etc.
MPH35	C	25～32	Panel mounting type for 1-turn use. Mechanical output is big.
MPH46	C	25～32	Panel mounting type for 10-turn use. Mechanical output is big.

●Servo Amplifier

Model No.	Power Rating	Features
AP1231	±6V, ±12V, ±18V Approx. 1A, respectively	Save-energy type with Pulse Width Modulated Control.

●D.C. Power Supply

Model No.	Rated Output		Model No. of Combinable Servo Amplifier
	For Supplying Potentiometer	For Operating Servo Amplifier	
AP9201A	Approx. ±10mA	Approx. 700mA	AP1231

MODEL MPH22

●General Specifications

Model No.	Code of Coupled Motor	Code of Reduction Gear	Coupled Potentiometer			Slipping Torque	Remarks
			Kind of Element	No. of Turns	Pot. Model No.	mN• m (gf• cm)	
MPH22	A B	5～11	Wirewound	1	CP22, CP50	20 to 30 (200 to 300)	—
			Wirewound	10	22HP-10, 25HP-10	Approx. 50 (500)	Possible to mount turns-counting dials.
			Hybrid	10	22HHP-10		
			Conductive Plastic	1	FCP22E, FCP22A, FCP30A, FCP50A	20 to 30 (200 to 300)	—

Model MPH22A7FCP22E

Model MPH22B10FCP22A

Model MPH22A1022HPM-10N

●Rated Specifications of Coupled Motor

Code of Coupled Motor	Input Voltage	Max. Output	Starting Torque	Max. Efficiency	No-Load Speed
A	6V.D.C.	0.26W	0.52mN• m (5.2gf• cm)	65%	19,100 r.p.m.
B	6V.D.C.	0.43W	1.55mN• m (15.5gf• cm)	70%	10,700 r.p.m.

●Characteristics of Reduction Gear (using coupled motor A & B)

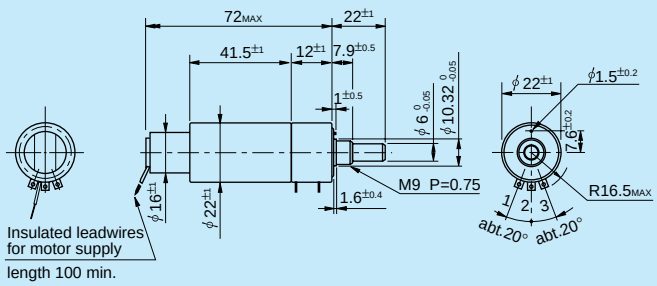
Reduction Gear	Reduction Gear Ratio	Response Time (Sec./F.S.) Approx.			
		Motor A (19,100r.p.m.)		Motor B (10,700r.p.m.)	
		1-turn pot.	10-turn pot.	1-turn pot.	10-turn pot.
5	1: 41	—	—	0.6	4.9
6	1: 76	—	—	0.7	6.2
7	1: 141	0.9	7.8	1.0	9.8
8	1: 262	1.2	11.2	1.6	15.7
9	1: 485	1.8	17.9	2.9	28.1
10	1: 900	3.2	31.2	6.0	60.0
11	1: 1,670	5.6	55.7	9.4	93.8

●Specifications of Coupled Potentiometer

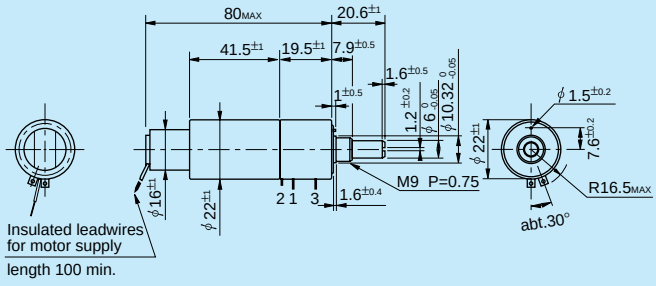
For further technical details of potentiometers, please refer to those of each potentiometer section in this catalog.

●Standard Dimensions

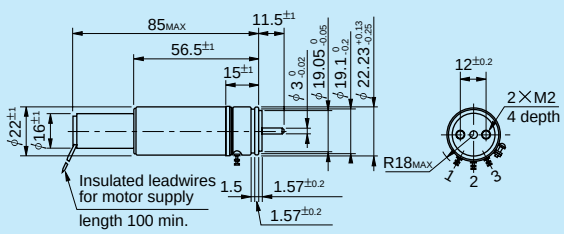
■Model MPH22A FCP22E



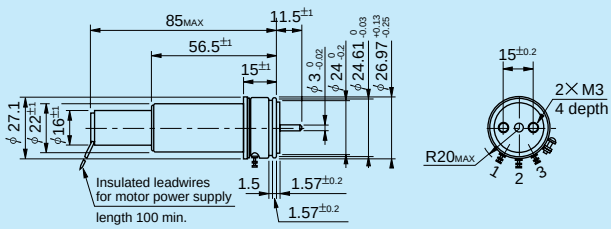
■Model MPH22A 22HPM-10N



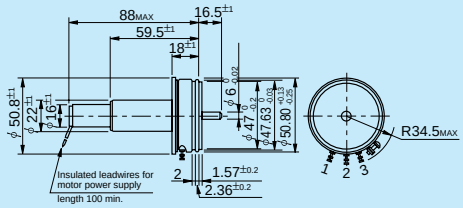
■Model MPH22B FCP22A



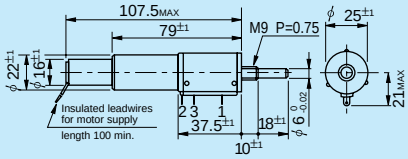
■Model MPH22B FCP30A



■Model MPH22B FCP50A



■Model MPH22B 25HP-10C



MODEL MPH30

●General Specifications

Model No.	Code of Coupled Motor	Code of Reduction Gear	Coupled Potentiometer			Slipping Torque	Remarks
			Kind of Element	No. of Turns	Pot. Model No.	mN•m (gf•cm)	
MPH30	A•B	5～11	Wirewound	1	CP22C, CP22	20 to 30 (200 to 300)	—
				10	20HP-10S, 22HP-10, 25HP-10	Approx. 50 (500)	—
			Conductive Plastic	1	FCP22AC, FCP22E, FCP22A, FCP30A	20 to 30 (200 to 300)	—
			Hybrid	10	20HHP-10S	Approx.50 (500)	—

Model MPH30A7FCP22E

Model MPH30A5SCP22C

Model MPH30A1022HP-10

●Rated Specifications of Coupled Motor

Code of Coupled Motor	Input Voltage	Max. Output	Starting Torque	Max. Efficiency	No-Load Speed
A	6V.D.C.	0.26W	0.52mN• m (5.2gf• cm)	65%	19,100 r.p.m.
B	6V.D.C.	0.43W	1.55mN• m (15.5gf• cm)	70%	10,700 r.p.m.

●Characteristics of Reduction Gear (using coupled motor A & B)

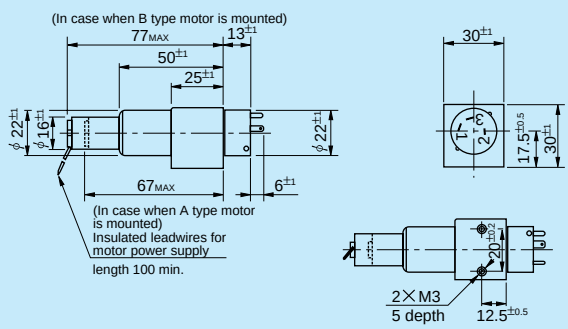
Reduction Gear	Reduction Gear Ratio	Response Time (Sec./F.S.) Approx.			
		Motor A (19,100r.p.m.)		Motor B (10,700r.p.m.)	
		1-turn pot.	10-turn pot.	1-turn pot.	10-turn pot.
5	1: 41	—	—	0.6	4.9
6	1: 76	—	—	0.7	6.2
7	1: 141	0.9	7.8	1.0	9.8
8	1: 262	1.2	11.2	1.6	15.7
9	1: 485	1.8	17.9	2.9	28.1
10	1: 900	3.2	31.2	6.0	60.0
11	1: 1,670	5.6	55.7	9.4	93.8

●Specifications of Coupled Potentiometer

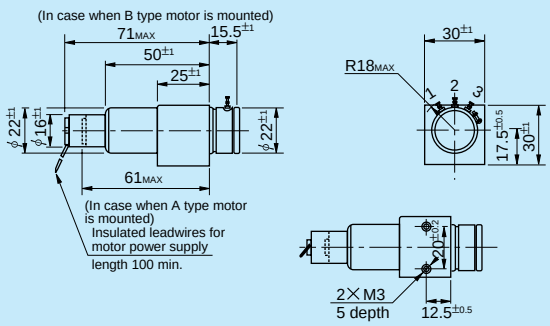
For further technical details of potentiometers, please refer to those of each potentiometer section in this catalog.

●Standard Dimensions

■Model MPH30 CP22C

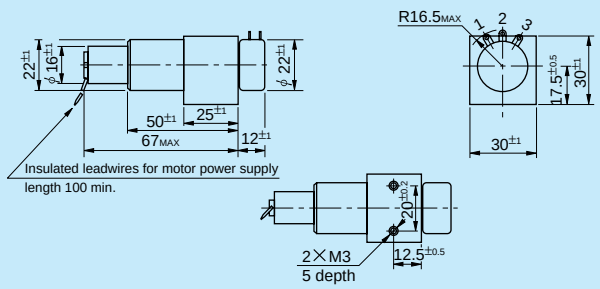


■Model MPH30 FCP22A

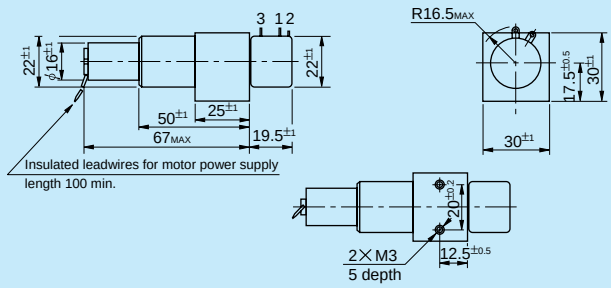


●Standard Dimensions

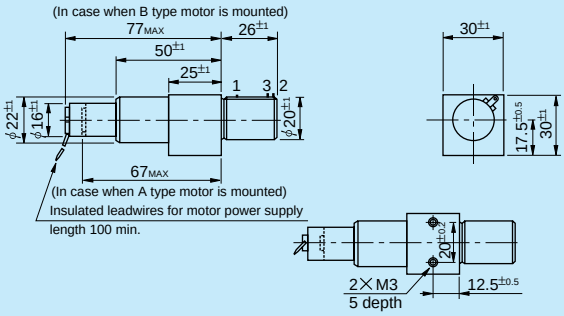
■Model MPH30A FCP22E



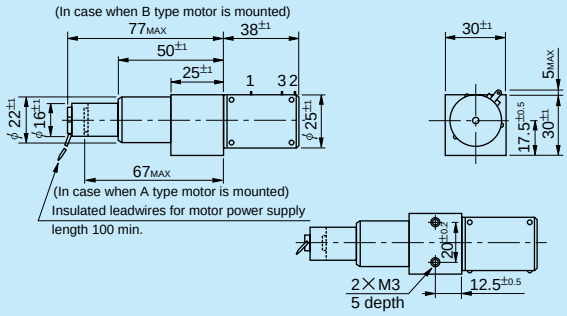
■Model MPH30A 22HPM-10N



■Model MPH30 20HP-10S



■Model MPH30 25HP-10



MODEL MPH35

●General Specifications

Model No.	Code of Coupled Motor	Code of Reduction Gear	Coupled Potentiometer			Slipping Torque	Remarks
			Kind of Element	No. of Turns	Pot. Model No.	mN• m (gf• cm)	
MPH35	C	25～32	Wirewound	1	CP50	Approx. 50 (500)	—
			Conductive Plastic	1	FCP50A		—

Model MPH35C25FCP50A

●Rated Specifications of Coupled Motor

Code of Coupled Motor	Input Voltage	Max. Output	Starting Torque	Max. Efficiency	No-Load Speed
C	6V.D.C.	3.1W	14mN• m (140gf• cm)	87%	8,350 r.p.m.

●Characteristics of Reduction Gear

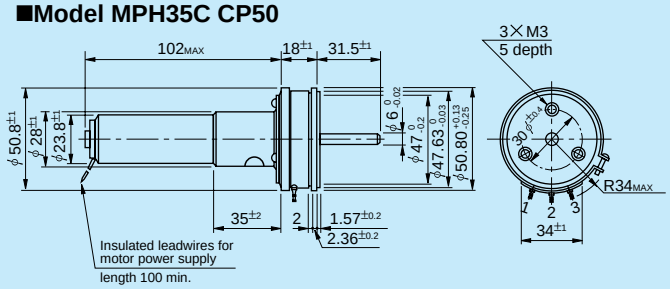
Reduction Gear	Reduction Gear Ratio	Response Time (Sec./F.S.) Approx.
		1-turn pot.
25	1: 30.7	0.3
26	1: 54.6	0.4
27	1: 97.3	0.7
28	1: 173	1.3
29	1: 308	2.2
30	1: 548	4.0
31	1: 975	7.0
32	1: 1,734	12.5

●Specifications of Coupled Potentiometer

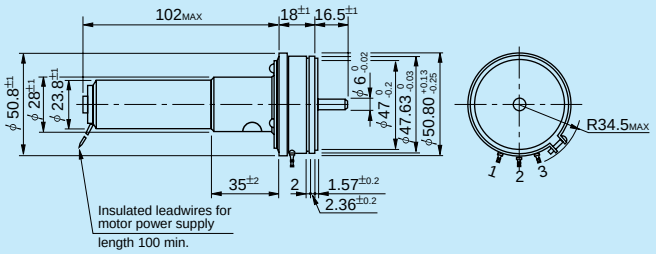
For further technical details of potentiometers, please refer to those of each potentiometer section in this catalog.

●Standard Dimensions

■Model MPH35C CP50



■Model MPH35C FCP50A



MODEL MPH46

●General Specifications

Model No.	Code of Coupled Motor	Code of Reduction Gear	Coupled Potentiometer			Slipping Torque	Remarks
			Kind of Element	No. of Turns	Pot. Model No.	mN• m (gf• cm)	
MPH46	C	25～32	Wirewound	10	46HD-10	Approx. 50 (500)	Possible to mount turns-counting dials.

Model MPH46C28 46HD-10

●Rated Specifications of Coupled Motor

Code of Coupled Motor	Input Voltage	Max. Output	Starting Torque	Max. Efficiency	No-Load Speed
C	6V.D.C.	3.1W	14mN• m (140gf• cm)	87%	8,350 r.p.m.

●Characteristics of Reduction Gear

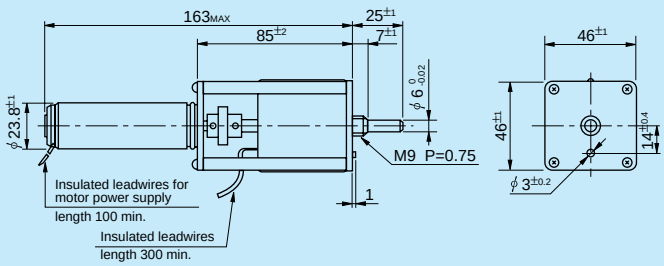
Reduction Gear	Reduction Gear Ratio	Response Time (Sec./F.S.) Approx.
		10-turn pot.
25	1: 30.7	2.3
26	1: 54.6	4.0
27	1: 97.3	7.0
28	1: 173	12.5
29	1: 308	22.2
30	1: 548	39.4
31	1: 975	70.1
32	1: 1,734	124.7

●Specifications of Coupled Potentiometer

For further technical details of potentiometers, please refer to those of each potentiometer section in this catalog.

●Standard Dimensions

■Model MPH46C 46HD-10

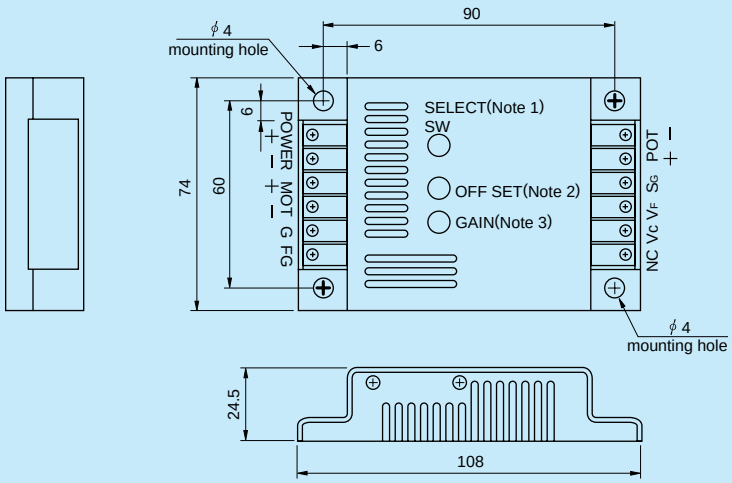


SERVO AMPLIFIER

Model AP1231

●Standard Dimensions

■Model AP1231



Note 1: SELECT SW: Setted at ±6V.
Note 2: OFF SET: Possible to adjust about ±0.5V.
Note 3: GAIN: Adjusted at about 3.

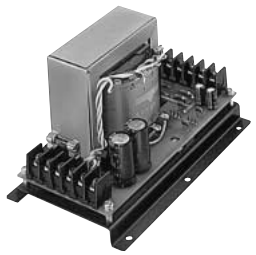
●General Specifications

Specifications \ Model			AP1231
Voltage Amplification Factor			0.2～20
Output	Voltage	Motor (Change-over)	±6, ±12, ±18V Approx.1A, respectively
	Current	Supply for pot.	10V.D.C. max. 15mA.
Input Impedance			Over 1MΩ
Temperature Drift (Reffered to input)			Below 1mV/℃
Max. Input Voltage			±10V
Operating Temperature Range			0℃～40℃
Current Consumption at no load			Approx. 50mA
Working Power Supply Voltage			24V.D.C.±10%
Mass			Approx. 160g

●Terminal Explanation

Terminal	Function
Power +	⊕Input terminal for working power supply 24V.D.C.
Power -	⊖Input terminal for working power supply GND
MOT +	Connected to the D.C. Motor
MOT -	Connected to the D.C. Motor
G	GND (Common with power ⊖)
FG	For housing earth (Independence)
POT -	Terminal for pot. supply (GND)
POT +	Terminal for pot. supply (+10V)
SG	GND for signal (Common with pot. ⊖)
VF	Feedback input terminal from pot.
VC	Command input terminal
NC	Idle terminal

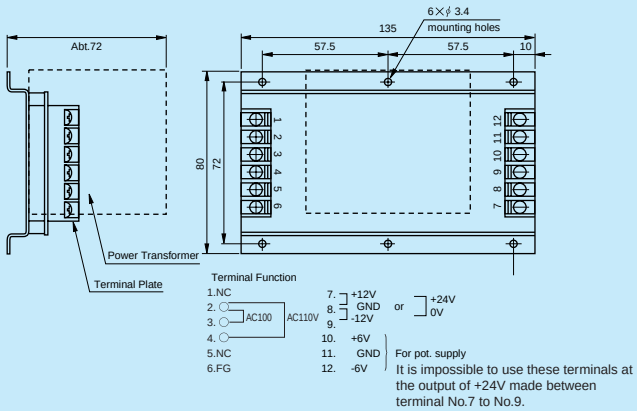
D.C. POWER SUPPLY



Model AP9201A

●Standard Dimensions

■Model AP9201A



Note: Terminal No.8 can not connect when +24V is applied.

●General Specifications

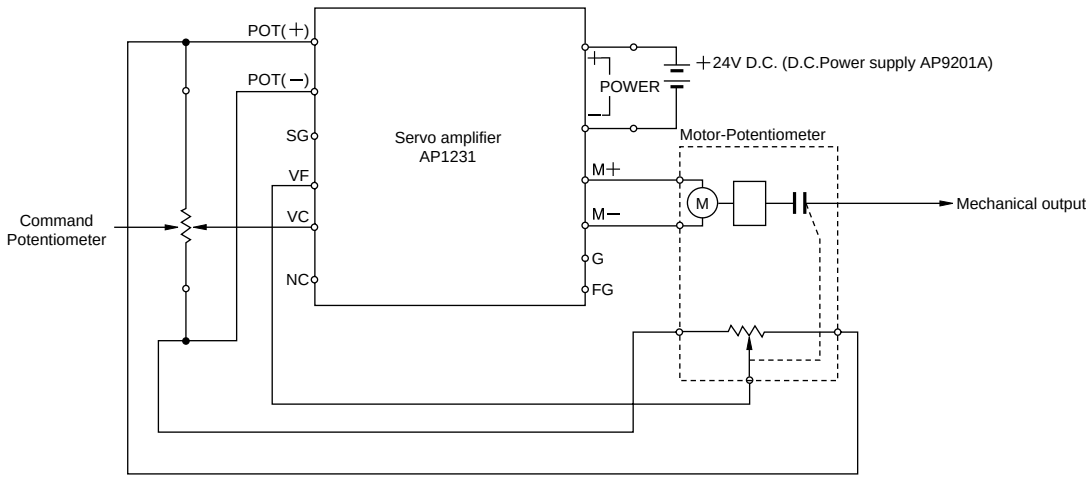
Specifications / Model		AP9201A
Input Voltage Note (1)		100V.A.C. ±10%
For Operating Servo Amplifier	**Output Voltage**	Approx.±12V or +24V
	Output Current	Approx.700mA
For Supplying Potentiometer Note (2)	**Output Voltage**	Approx.±6V
	Output Current	Approx.±10mA
Operating Temperature Range		0℃ ~ 70℃
Mass		Approx. 1kg

Note: (1) Input voltage of 110V.A.C., 200V.A.C., and 220V.A.C. are available on request.
(2) Only when output for servo amplifier operating is using at ±12V is available.

Suggestions and cautions on the use of motor-potentiometers

1) Our standard input voltage for the motor is 6 V.D.C. and other input voltages such as 12 V.D.C., 24 V.D.C., and etc. are also available on request.
   As the rated voltage of motor is usually lower than that of potentiometer, when checking the insulation resistance and dielectric strength of the motor-potentiometer, please do not load with over 100 V on the unit.
2) The rotating direction of the shaft of potentiometer which drives from motor is depending on a reduction gear ratio of the reduction gear to be incorporated.
   When using, please confirm the rotating direction to avoid any inconveniences.
3) We can supply our motor-potentiometers with slipping torque of up to approx. 0.1N• m (1kgf• cm) by adjusting at our side to your request in advance. Our standard slipping torque is 50mN• m (500gf• cm), unless otherwise specified. But the load to the shaft is to be adjusted by below 1/3 of slipping torque value.
4) When rotating the motor through the amplifier, the motor-speed does not always become a linear function.

Example of Servo Amplifier, D.C.Power Supply & Motor-Potentiometer Connections

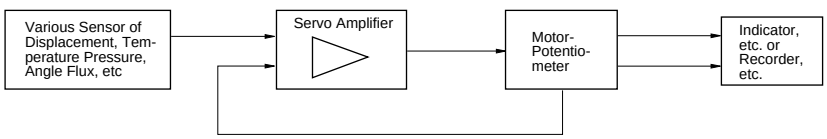


NOTE: SG terminal and POT (－) terminal are the same terminal.
G terminal and POWER (－) terminal are the same terminal.

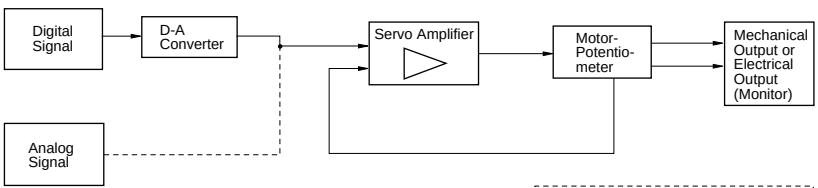
Examples of Applications

Any servo-apparatuses are readily constructed when SAKAE motor-potentiometer, servo amplifier and D.C. power supply are combined and wired.
Typical examples of applications are as follows:

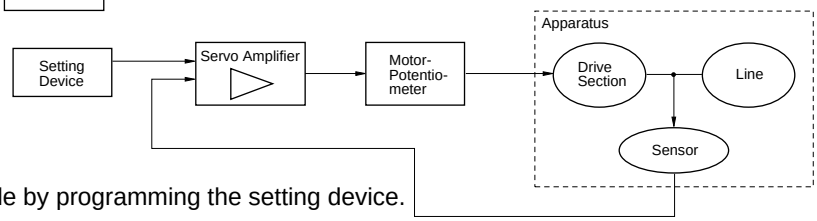
1) Indicating and recording apparatus of various sensor outputs



2) Remote control system of indicating values to be set



3) Automatic control system



Any programme settings will be possible by programming the setting device.