

AC Servo Motor

30W~15kW Servo Motor & Drive released

- Provide a wide range of selection with various series
- **40 Flange 30W ~ 220 Flange 15kW**
- Adopted core-dividing type by using the most advanced tooling technology
- Realized high efficiency & compact size by adopting high precision winding
- Motor's life extended by the use of F-class insulation against B-class temperature rise
- Suitable for high precision control thanks to the high-precision fabricating technology & quality control
- High torque output is possible at a smaller size by adopting neodymium permanent magnet of highest-performance in its class
- Provide exclusive models with various structures & characteristics



Spinner Motor

- **Spinner Motor for semi-conductor equipment 8" & 12" developed**
- Used at Coater, Developer & Scrubber
- Realized high intermittent acceleration characteristic- higher than 100,000 rps
- Manufactured custom made-spinner motor in response to customer's demands
- Secured various diameters of hollow shaft as per customer's requirement
- Environment-resistance strengthened by adopting magnetic fluid seal
- Anti-corrosion strengthened by the special coating process on the surface



Hollow Shaft Motor

- **Provide various diameters of hollow shaft(Max.φ 50~φ130 Flange)**
- Realized a compact size by the use of high-performance permanent magnet
- Compact design by adopting an exclusive encoder
- Motor's life extended by the use of F-class insulation against B-class temperature rise
- Designing various shapes of Exclusive Motor(customized type) is provided for customer's requirement



AC Servo Drive

The Rated Specifications of Standard Servo Drive 「APD - VS Series」

- High-efficiency power transformation technologies realized by developing dedicated ASIC featuring latest control theory.
- Diversified functions added and convenience of use strengthened by the use of large-capacity flash memory.
- Precision control realized by the application of high-performance control algorithm.
- Additional services provided through various kinds of communication options.
(PC Communication, Touch Screen, High-order Network Communication)
- Loader(8 digits) is basically mounted for the convenience of use.
- Various menu function that is applied instantly after changing.

The Rated Specifications of Servo Drive with controller-embedded 「APD - VP Series」

- Products are classified by application sector and prime control functions are provided so that anyone can use the system easily.
- Linear Coordinates Position Operation Type (VP-1): Linear motion machine, X-Y table
- Rotary Coordinates Position Operation Type (VP-2): Index, Turret
- Position operation type after feeder and sensor (VP-3): Feeding machine, All sorts of feeder, conveyor, I-track
- Push-Pull position operation type (VP-4): Reseal control, Tensile control
- Program operation type (VP-5): 800 step operation
- Other private soft : Program operation, All sorts of private machine
- Tension control Operation type : Winder

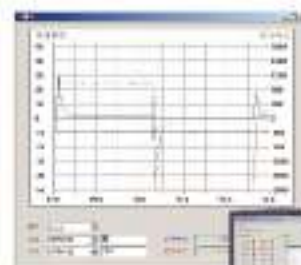


PC Loader

PC communication software also provides the graphic function in which the operation by using a computer. Reading/writing the menu data and displaying speed & torque information are all possible

Characteristics

- Display the current status information (Motor Speed, Load Rate, I/O contacts status, etc)
- Saving the menu data & download function.
- Display the motor speed & torque with a graph.
- Easy changing of mode & menu data.
- Display function of Alarm status.
- Operation handling function by using communication protocol.
- Data editing function by using communication-code.
- Auto Log operation test function.
- PC Specifications : Window 98, Window XP



Feature for Servo System

Encoder and Servo Motor Provide the Optimized Servo System for Customer needs with various Design and Characteristics

AnyPack Series Servo Motor

APM — **S** **B** **04** **A** **D** **K** **1** **G2** **3**

Flange Size	Rated Rotation Speed	Shape of Shaft	Speed Reducer (Gearbox)
A : 40 Flange B : 60 Flange C : 80 Flange D : 100 Flange E : 130 Flange F : 180 Flange G : 220 Flange	A : 3000 rpm D : 2000 rpm G : 1500 rpm M : 1000 rpm	N : Straight K : One Side Fully Grind L : L Cut D : D Cut T : Taper Shape R : Both Side Round Key H : Hollow Shaft	None : No Reducer G2 : For General Industry (Flange Mount) G3 : Precision Gearbox (Flange Mount)

Motor Shaft	Motor Capacity	Encoder Type (Note 1)	Excess of Oil Seal (Note 2)	Reduction ratio
S : Solid Shaft H : Hollow Shaft B : Built-in	R3 : 30W R5 : 50W 01 : 100W 02 : 200W 04 : 400W 05 : 450W 06 : 550W/600W 07 : 650W 08 : 750W/800W 09 : 850W/900W 10 : 1,000W 110 : 11,000W 150 : 15,000W	A : hc 1,024 PR15 Linear B : hc 2,000 PR15 Linear C : hc 2,048 PR15 Linear D : hc 2,500 PR15 Linear E : hc 3,000 PR15 Linear F : hc 5,000 PR15 Linear G : hc 6,000 PR15 Linear K : Abs 2,048 PR R L : Abs 4,096 PR R S : hc 2,000 PR9 Linear T : hc 2,048 PR9 Linear U : hc 2,500 PR9 Linear V : hc 3,000 PR9 Linear	None : None 1 : Oil Seal Attached 2 : Brake Attached (OC 25%) 3 : Oil Seal 4 : Brake Attached (OC 25%) 5 : Oil Seal 6 : Brake Attached (OC 25%)	3 : 1/3 10 : 1/10 ...

Note 1: For Encoder Type A, B, C, D, E, F, G, K, L, S, T, U, V, the encoder is optional. For Encoder Type A, B, C, D, E, F, G, K, L, S, T, U, V, the encoder is optional.

Note 2: For Encoder Type A, B, C, D, E, F, G, K, L, S, T, U, V, the encoder is optional. For Encoder Type A, B, C, D, E, F, G, K, L, S, T, U, V, the encoder is optional.



Configuration of Servo Drive

Provide The Optimized Control System with 32bit High-Performance DSP and Various Interface Communication for Multi-Function control parts and High Credibility and Self-Protective Function for PM Power Module

AnyPack Series Servo Drive

APD — **VS** **04** **N** **A4**

Type Classification	Drive Capacity	Encoder Type	Exclusive Code
VS : Stand and VP : Control-embedded VT : Tension Control	R5 : 50W 01 : 100W 02 : 200W 04 : 400W 05 : 500W 10 : 1,000W 15 : 1,500W 20 : 2,000W 35 : 3,500W 50 : 5,000W 75 : 7,500W 110 : 11,000W 150 : 15,000W	N : Incremental A : Absolute	VS : Exclusive Option Code VS : AS per the operating software 1 : Linear coordinates position drive 2 : Rotary coordinates position drive 3 : Feed and speed input position type 4 : Push-Pull position drive 5 : Program operation drive 9 : Customized Position Drive



Application Table for Servo Motor and Drive

Servo Motor					Applicable drive	Encoder Used		IP grade
Rated Speed (r/min)	Maximum Speed (r/min)	Flange	Capacity (kW)	Model (APM-)	Model (APD-)	Standard Incremental	Standard Absolute	
3,000	5,000	L40	0.03	SA R3A	VSR5	-15ph type -2048 P/R	-N/A	IP 55
			0.05	SA R5A	VSR5			
			0.1	SA D1A	VSR5			
			0.1	SB D1A	VSR5			
		L80	0.2	SB D2A	VSR5	-15ph type -2,500 P/R	-13ph type -2,048 P/R -11/13bit	IP 55
			0.4	SB D4A	VSR5			
			0.4	SC D4A	VSR5			
			0.6	SC D6A	VSR5			
		L80	0.6	SC D6A	VSR5			IP 65
			1.0	SC D8A	VSR5			
			0.9	SE D9A	VSR5			
			1.5	SE D15A	VSR5			
		L130	2.2	SE D22A	VSR5	-15ph type -3,000 P/R	-13ph type -2,048 P/R -11/13bit	IP 65
			3.0	SE D30A	VSR5			
			3.0	SF D30A	VSR5			
			5.0	SF D50A	VSR5			
2,000	3,000	L80	0.3	SC D3D	VSR5	-15ph type -2,500 P/R	-13ph type -2,048 P/R -11/13bit	IP 65
			0.45	SC D45D	VSR5			
			0.55	SC D55D	VSR5			
			0.65	SC D65D	VSR5			
		L130	0.6	SE D6D	VSR5	-15ph type -3,000 P/R	-13ph type -2,048 P/R -11/13bit	IP 65
			1.1	SE D11D	VSR5			
			1.6	SE D16D	VSR5			
			2.2	SE D22D	VSR5			
		L180	2.2	SF D22D	VSR5			
			3.5	SF D35D	VSR5			
			5.5	SF D55D	VSR5			
		L220	7.5	SF D75D	VSR5			
			2.2	SG D22D	VSR5			
			3.5	SG D35D	VSR5			
			5.5	SG D55D	VSR5			
1,500	3,000	L130	7.5	SG D75D	VSR5	-15ph type -3,000 P/R	-13ph type -2,048 P/R -11/13bit	IP 65
			11.0	SG D110D	VSR5			
			0.45	SE D45G	VSR5			
			0.65	SE D65G	VSR5			
		L180	1.3	SE D13G	VSR5			
			1.7	SE D17G	VSR5			
			1.8	SF D18G	VSR5			
			2.9	SF D29G	VSR5			
		L220	4.4	SF D44G	VSR5			
			6.0	SF D60G	VSR5			
			7.5	SF D75G	VSR5			
			2.0	SG D20G	VSR5			
		L220	3.0	SG D30G	VSR5			
			4.4	SG D44G	VSR5			
			6.0	SG D60G	VSR5			
			8.5	SG D85G	VSR5			
1,000	2,000	L130	11.0	SG D110G	VSR5	-15ph type -3,000 P/R	-13ph type -2,048 P/R -11/13bit	IP 65
			15.0	SG D150G	VSR5			
			0.3	SE D3M	VSR5			
			0.6	SE D6M	VSR5			
		L180	0.9	SE D9M	VSR5			
			1.2	SE D12M	VSR5			
			1.2	SF D12M	VSR5			
			2.0	SF D20M	VSR5			
		L220	3.0	SF D30M	VSR5			
			4.4	SF D44M	VSR5			
			1.2	SG D12M	VSR5			
			2.0	SG D20M	VSR5			
			3.0	SG D30M	VSR5			
			4.4	SG D44M	VSR5			
			6.0	SG D60M	VSR5			
3,000	5,000	L60	0.1	HB D1A	VSR5	-15ph type -1,024 P/R	-N/A	IP 55
			0.2	HB D2A	VSR5			
			0.4	HB D4A	VSR5			
		L130	0.9	HE D9A	VSR5			
			1.5	HE D15A	VSR5			
			1.5	HE D15A	VSR5			



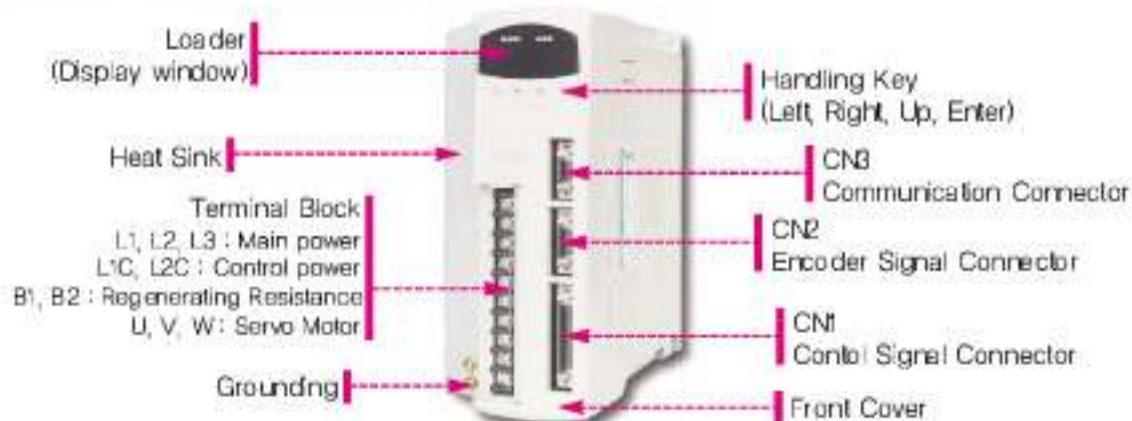
Note: IP grade of Servo Motor excludes the shaft section.

Designation of Each Part

Motor



Drive



Built-in Loader Designation and Handling key function



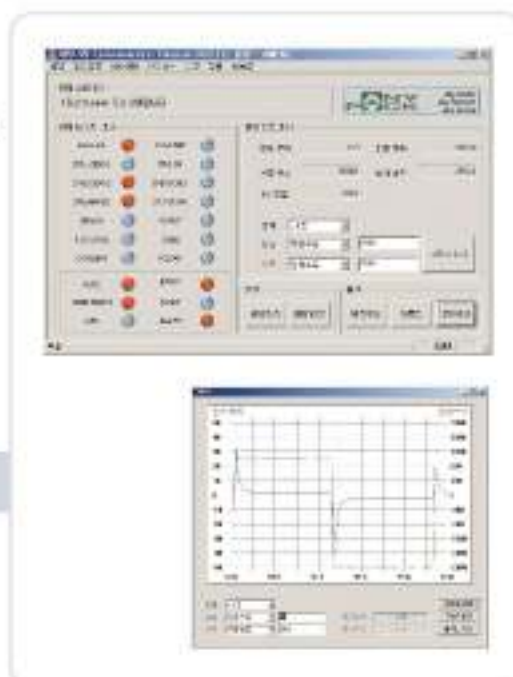
PC Loader, Handy Loader

PC communication software also provides the graphic function in which the operation by using a computer. Reading/writing the menu data and displaying speed & torque information are all possible.



PC Loader Characteristics

- Display the current status information (Motor Speed, Load Rate, I/O contacts status, etc.)
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- Display function of Alarm status.
- Operation handling function by using communication protocol.
- Data editing function by using communication-code.
- Auto Jog operation test function.
- PC Specifications : Window 98, Window XP



Note) PC Communication software can be downloaded from our web site (www.metronix.co.kr).

Main Function of Servo System

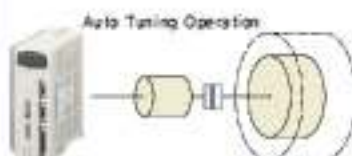
Built-In Loader Installation

Loader indicating 7 segments of 6 digits is installed for user's convenience.



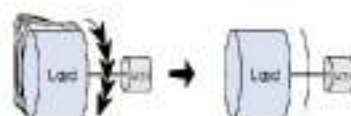
Auto Tuning Operation

Load inertia, speed gain and integral time constant are set up automatically by auto-tuning operation.



Anti-vibration during Operation

When noise is occurred by the vibration of shaft during operation, the noise can be reduced by setting the filter of speed control part.



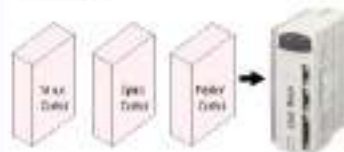
Anti-vibration at Stop

At motor's stop, it prevents the noise caused produced by vibration and the damage of machine.



Position, Speed, Torque are All in One.

With a unit, individual control and switching operation for torque, speed and position are possible.



Test Operation

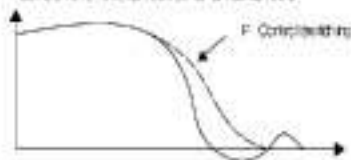
By Servo-only test operation is possible without upper controller.



(Can be achieved without connecting to Load controller)

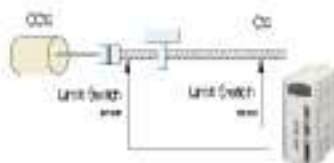
Anti-overshoot

By switching PI control and P control in order to improve the transitional characteristic at acceleration/deceleration, it is possible to control the overshoot and undershoot.



Preventing Over-trouble

If the moving part of motor outruns the movable area, it prevents the machine from damaging by stopping the rotation of motor.



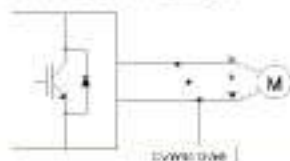
Built-in Regenerative Brake Function

Stable decelerating operation is possible by consuming the regenerative energy that is produced during motor deceleration through the regenerative circuit.



Built-in Dynamic Brake

At a sudden electricity failure or emergency stop, sudden braking operation is possible by consuming the generating energy of motor to prevent the machine from damaging.



Various Load Ratio Display Function

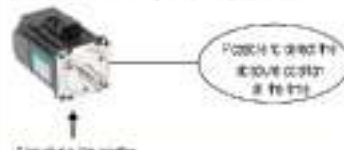
Display the current load ratio, instantaneous maximum load ratio and the average load ratio for 5 seconds during servo operation.



Load ratio display window

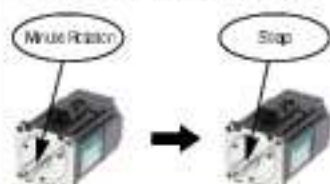
Applying an Absolute Encoder

Using an absolute encoder, the current position is always recognized even at an electricity failure, and the returning operation to the starting point is not necessary. And at power ON, the immediate operation is possible.



Zero Clamp Function

Motor might be rotated by the minute pulse voltage even at 0V of analog command voltage. The function prevents it and stops the motor.



Selecting Various Speed

Analog command and 7 internal speed commands could be selected by external contact.

	SR000	SR001	SR002
Analog speed 0	off	off	off
Internal Speed 0	off	off	on
Internal Speed 1	off	on	off
Internal Speed 2	off	on	on
Internal Speed 3	on	off	off
Internal Speed 4	on	off	on
Internal Speed 5	on	on	off
Internal Speed 6	on	on	on

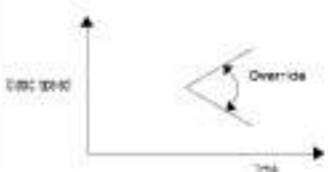
Smooth Acceleration/Deceleration Operation

Can select Linear acceleration/deceleration and S-shape acceleration/deceleration operation with 0~100 second.



Speed Override Operation

The speed by analog voltage command could be piled up on the basic setting speed.



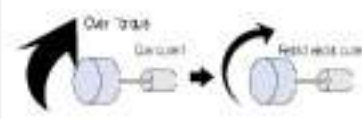
Switching Function of the Rotating Direction

Switching the rotating direction by external contact could be possible without any changing of wiring of motor or amplifier.



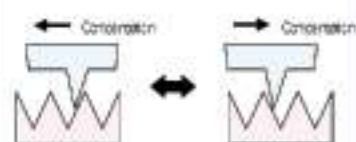
Torque Limit Function

Prevents excessive torque by control maximum electric current of motor. It prevents mechanical damage of motor.



Backlash Compensation

Compensate the repeatedly occurred position that is caused by backlash of mechanical part at forward/reverse operation.



Various Position Command Pulse

Various command pulse could be applicable.

Pulse	Pulse	Relative Mode		Absolute Mode	
		CCW	CW	CCW	CW
A. to P. pulse	yes	yes	yes	yes	yes
Forward/Reverse	yes	yes	yes	yes	yes
Zero/Speed	yes	yes	yes	yes	yes

Selecting Electronic Gear Ratio & Offset Function

Can select 4 of electronic gear ratios with the input contact. And Minute Offset can also be controlled.

	SR000	SR001
Ratio 1 (gear ratio 1)	off	off
Ratio 2 (gear ratio 2)	off	on
Ratio 3 (gear ratio 3)	on	off
Ratio 4 (gear ratio 4)	on	on

Feed-Forward Compensation

By selecting the feed-forward compensation, the position decision time can be reduced.



The Origin Point Searching Function

It is possible to stop at origin (Z) phase with a rotation of motor. It is used at combining chat of motor with machine.



Speed Limit Function at Torque's Operation

4 of speed limit setting is possible at torque control operation.

	SR000	SR001
Internal Speed 0	off	off
Internal Speed 1	off	on
Internal Speed 2	on	off
Internal Speed 3	on	on



Characteristics of Servo Motor and Torque's Characteristics

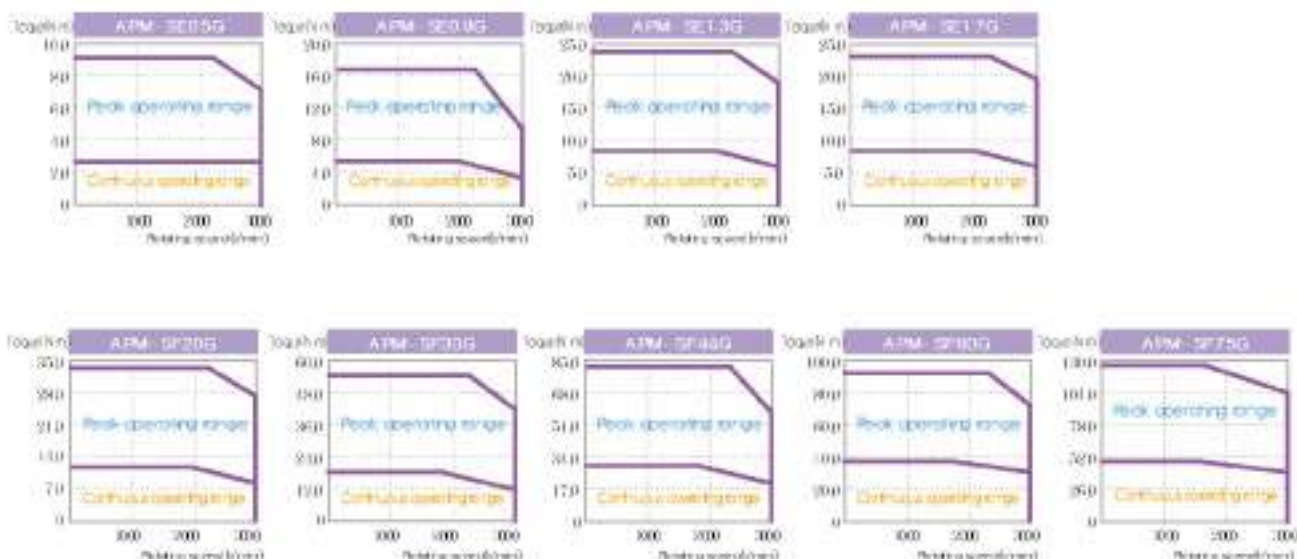
Servo Motor's Characteristics <Rated Speed 1500r/min>

Servo Motor Model (NPM-□□□□□□)	SE05G	SE09G	SE13G	SE17G	SF20G	SF30G	SF44G	SF60G	SF75G
Servo Drive Model (NPD-□□□□□□)	VS05	VS10	VS15	VS20	VS20	VS35	VS50	VS75	VS110
Flange Size (□)	□130				□180				
Rated Power [kW]	0.45	0.85	1.3	1.7	1.8	2.9	4.4	6.0	7.5
Rated Torque [N·m]	2.86	5.41	8.27	10.82	11.45	18.46	28.0	38.2	47.7
	[kgf·cm]	29.22	55.19	84.41	110.38	118.88	188.3	285.7	389.8
Max. Intrinsic torque [N·m]	8.59	16.23	24.82	32.46	34.35	55.38	84.03	95.5	128.8
	[kgf·cm]	87.66	165.57	253.23	331.14	350.64	564.9	857.1	974.9
Rated rpm [r/min]	1,500								
Max. rpm [r/min]	3,000				2,500				
Moment of inertia [kg·m ² × 10 ⁻⁴]	6.659	11.999	17.339	22.679	30.74	52.13	83.60	121.35	143.82
	[g1·cm ² × 10 ⁻⁴]	6.792	12.238	17.685	23.132	31.35	53.16	85.24	123.74
Stall torque [kgf·cm]	10 times of motor inertia				5 times of motor inertia				
Rated Power Rate [kW/S]	12.28	24.39	39.54	51.61	42.70	85.36	93.84	120.32	158.48
Speed, Pulse Transducer	Standard (Not)	Incremental 3000(P/R)							
	Option	Absolute, Manchester communication							
Specification & Features	Relative Method	Totally enclosed, Non ventilated IP65 (Excluding the shaft-through section and connectors.)							
	Rated Time	Continuous							
	Ambient Temp.	Operating Temp. : 0~40[°C] / Storage Temp. : -20~80[°C]							
	Ambient Temp.	Lower than 90[%] (Avoid condensation)							
	Atmosphere	Avoid direct sunlight, no corrosive gas, inflammable gas, oil mist, or dust							
	E/V	Elevation/Vibration 49[m/s ²] (5G)							
Weight [kg]		5.5	7.54	9.68	11.78	12.4	17.7	26.3	35.6
								39.4	



Note) Standard Encoder specification is 5VTL Line Driver.

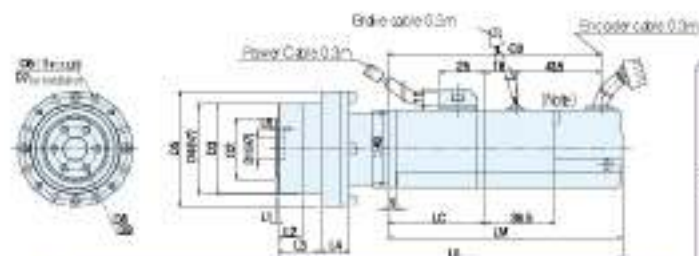
Rotation Speed-Torque's Characteristics



P-CK AC Servo Motor

Precision Gearhead Servo Motor Dimension

APM-SAR3A, APM-SAR5A, APM-SA01A



Note: 1) Use DC 24V for Brake power supply.
2) Back emf: * indicates less than 600mV, ** indicates less than 100mV.
3) Average input rotation of Gearhead: * indicates 3000rpm, ** indicates 4000rpm.
4) Horizontal type less than 300 can be supplied.
5) The dimension in () is for brake attached type.

Plug Specification



Plug Specification
12007-1
(Made by AMP)

Pin No.	Color	Phase
1	Red	U
2	White	V
3	Black	W
4	Green	Ground

(Connector Pin for Power)



Plug Specification
12005-1
(Made by AMP)

Pin No.	Color	Phase
1	Red	BK+
2	White	BK-

(Brake connector Pin)



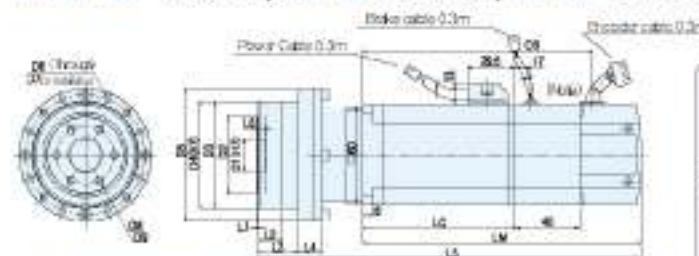
Plug Specification : 12010-1
(Made by AMP)

Pin No.	Phase	Pin No.	Phase	Pin No.	Phase
1	A	6	Z	11	W
2	A	7	U	12	W
3	B	8	U	13	+5V
4	B	9	V	14	0V
5	Z	10	V	15	SHIELD

(Encoder connector Pin)

Model	Reduction Ratio	External Dimension																		Weight (kg)
		D1	D2	D3	D4	D5	D6	D7 _{total}	D8	D9 _{total}	L1	L2	L3	L4	L5	L6	LM	LC	CB	
SAR3A	*4/5/7	12	32	46.8	47	60	8-φ3.5	54	6-M4x6	22.5	1	12.5	22.5	15	133.09.5	4.5	75.5112	42.5	65.510.2	0.820.17
	**15.4/25/41	13	40	55.8	56	70	8-φ3.5	63	6-M5x6	30	5	14.5	22.5	31	164.5198	4	75.5112	42.5	65.510.2	1.421.77
	46/53.9/8 86/106.6/13.2	13	40	55.8	56	70	8-φ3.5	63	6-M5x6	30	5	14.5	22.5	31	164.5198	4	75.5112	42.5	65.510.2	1.421.77
SAR5A	*4/5/7	12	32	46.8	47	60	8-φ3.5	54	6-M4x6	22.5	1	12.5	22.5	15	140.76.9	4.5	82.5119	49.5	72.5109	0.881.23
	**15.4/25/41	13	40	55.8	56	70	8-φ3.5	63	6-M5x6	30	5	14.5	22.5	31	169.5209	4	82.5119	49.5	72.5109	1.481.83
	46/53.9/8 86/106.6/13.2	13	40	55.8	56	70	8-φ3.5	63	6-M5x6	30	5	14.5	22.5	31	169.5209	4	82.5119	49.5	72.5109	1.481.83
SAR1A	*4/5/7	12	32	46.8	47	60	8-φ3.5	54	6-M4x6	22.5	1	12.5	22.5	15	157.093.9	4.5	96.5126	66.5	89.5126	1.0135
	**15.4/25/41	13	40	55.8	56	70	8-φ3.5	63	6-M5x6	30	5	14.5	22.5	31	186.5229	4	96.5126	66.5	89.5126	1.6136
	46/53.9/8 86/106.6/13.2	13	40	55.8	56	70	8-φ3.5	63	6-M5x6	30	5	14.5	22.5	31	186.5229	4	96.5126	66.5	89.5126	1.6136

APM-SB01A, APM-SB02A, APM-SB04A



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2) Back emf: * indicates less than 600mV, ** indicates less than 100mV.
3) Average input rotation of Gearhead: * indicates 3000rpm, ** indicates 4000rpm.
4) Horizontal type less than 300 can be supplied.
5) The dimension in () is for brake attached type.

Plug Specification



Plug Specification
12007-1
(Made by AMP)

Pin No.	Color	Phase
1	Red	U
2	White	V
3	Black	W
4	Green	Ground

(Connector Pin for Power)



Plug Specification
12005-1
(Made by AMP)

Pin No.	Color	Phase
1	Red	BK+
2	White	BK-

(Brake connector Pin)



Plug Specification : 12010-1
(Made by AMP)

Pin No.	Phase	Pin No.	Phase	Pin No.	Phase
1	A	6	Z	11	W
2	A	7	U	12	W
3	B	8	U	13	+5V
4	B	9	V	14	0V
5	Z	10	V	15	SHIELD

(Encoder connector Pin)

Model	Reduction Ratio	External Dimension																		Weight (kg)
		D1	D2	D3	D4	D5	D6	D7total	D8	D9total	L1	L2	L3	L4	L5	L6	LM	LC	CB	
SB01A	*5/10	20	48	65.8	66	82	8-φ4.5	54	6-M5x6	36	1	14.5	24.5	15	177.097	4.5	92.030	52	59.508.9	2.032.6
	**31.36/48	20	55	74.5	75	90	8-φ4.5	65	6-M5x6	43	4	13	23	34.5	190.200	7	92.030	52	59.508.9	2.933.5
	61.71/76.6/85 90/123	20	55	74.5	75	90	8-φ4.5	65	6-M5x6	43	4	13	23	34.5	190.200	7	92.030	52	59.508.9	2.933.5
SB02A	*5/10	12	32	46.8	47	60	8-φ3.5	54	6-M4x6	22.5	1	12.5	22.5	15	144.5210	4.5	106.045	66	73.5108.5	2.282.8
	**31.36/48/61	20	55	74.5	75	90	8-φ4.5	65	6-M5x6	43	4	13	23	34.5	204.244	7	106.045	66	73.5108.5	3.183.75
	48/61	20	55	74.5	75	90	8-φ4.5	65	6-M5x6	43	4	13	23	34.5	204.244	7	106.045	66	73.5108.5	3.183.75
SB04A	*5/10	12	32	46.8	47	60	8-φ3.5	54	6-M4x6	22.5	1	12.5	22.5	15	162.5238	4.5	134.721	96	101.5041.5	2.763.36
	**29/39/39/43	27	63	87.5	88	107	8-φ5.5	98	6-M5x6	50	3.5	19.5	29.5	33.5	237.270	9	134.721	96	101.5041.5	4.685.25
	39/43	27	63	87.5	88	107	8-φ5.5	98	6-M5x6	50	3.5	19.5	29.5	33.5	237.270	9	134.721	96	101.5041.5	4.685.25