

Speed Controller/Speed Control Motor ES01, ES02



ES01 and ES02 are Oriental Motor's new speed controllers designed for ultimate ease of use in functions and operations. A range of speed control motors is available for use with the new controllers.



The motor, gearhead and controller are sold separately.

Product Number Code

Speed Controller

ES 01

01: Single-Phase 100-115V
02: Single-Phase 200-230V

Speed Control Motor

4 I K 25 R GN - AW U

U: With capacitor for 110V/115V
E: With capacitor for 220V/230V

Voltage

AW: Single-Phase 110V/115V
CW: Single-Phase 220V/230V

Motor Shaft Type

GN: Pinion Shaft for use with GN-type gearhead
GU: Pinion Shaft for use with GU-type gearhead
A: Round Shaft

R: Speed Control Motor

Output Power Example 25: 25W

K: K Series

I: Induction Motor

R: Reversible Motor

Motor Frame Size

Note: The "U" and "E" at the end of the model number indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate.

Refer to page A-32 for the Product Number Code of the Gearheads.

Features

- Speed control range
90~1400r/min(50Hz) 90~1600r/min(60Hz)
- Multi-functions
Speed control function
acceleration/deceleration function that enables smooth start and stop
immediate stopping function
- Easy Wiring
For easy wiring the new design provides separate connector terminals for power-supply cables and control-signal lines.
- The IP20-compliant construction prevents the operator from touching the terminal block, thereby ensuring a high degree of safety.
- Compatible with voltages in all major countries.
- The design conforms to typical global safety standards.
- The CE Markings is used in accordance with the EMC directives and low voltage directives.

Safety Standards and CE Marking

Speed Controller

Standards	Certification Body	Standards File No.	CE Marking
UL508	UL	E91291	Low Voltage Directive EMC Directive
CSA C.22.2 No.14			
EN50178	Conform to EN Standards		
EN60950			
EN50081-2			
EN61000-6-2			

Speed Control Motor

Standards	Certification Body	Standards File No.	CE Marking
UL1004	UL	E64199 (6W) E64197 (15W~60W)	Low Voltage Directive
UL2111			
CSA C.22.2 No.100			
CSA C.22.2 No.77			
EN60950	Conform to EN Standards		
EN60034-1			
EN60034-5			
IEC60034-11			

Installation Conditions

- Overvoltage category II
- Pollution degree 2
- Speed Controller: Class II equipment
- Speed Control Motor: Class I equipment

Applicable Standards (Speed Controller)

EMI

Emission Tests	EN50081-2
Radiated Emission Test	EN55011
Conducted Emission Test	EN55011

EMS

Immunity Tests	EN61000-6-2
Radiation Field Immunity Test	IEC61000-4-3
Electrostatic Discharge Immunity Test	IEC61000-4-2
Fast Transient/Burst Immunity Test	IEC61000-4-4
Conductive Noise Immunity Test	IEC61000-4-6
Surge Immunity Test	IEC61000-4-5
Voltage Dip Immunity Test	IEC61000-4-11
Voltage Interruption Immunity Test	IEC61000-4-11

EMC

For compliance with the EMC directive, the product must be verified in the final use conditions, it located in the enclosure. Please refer to your nearest Oriental Motor office if EMC information is required.

Product Lines

Induction Motor

Single-Phase 220V/230V

Output Power W	Speed Controller	Model	
		Pinion shaft	Round shaft
6	ES02	2IK6RGN-CWE	2IK6RA-CWE
15		3IK15RGN-CWE	3IK15RA-CWE
25		4IK25RGN-CWE	4IK25RA-CWE
40		5IK40RGN-CWE	5IK40RA-CWE
60		5IK60RGU-CWE	5IK60RA-CWE

Single-Phase 110V/115V

Output Power W	Speed Controller	Model	
		Pinion shaft	Round shaft
6	ES01	2IK6RGN-AWU	2IK6RA-AWU
15		3IK15RGN-AWU	3IK15RA-AWU
25		4IK25RGN-AWU	4IK25RA-AWU
40		5IK40RGN-AWU	5IK40RA-AWU
60		5IK60RGU-AWU	5IK60RA-AWU

Gearheads

Motor Model	Gearhead Model
for 6W type	2GN3K ~ 2GN180K 2GN10XK (Decimal Gearhead)
for 15W type	3GN3K ~ 3GN180K 3GN10XK (Decimal Gearhead)
for 25W type	4GN3K ~ 4GN180K 4GN10XK (Decimal Gearhead)
for 40W type	5GN3K ~ 5GN180K 5GN10XK (Decimal Gearhead)
for 60W type	5GU3KB ~ 5GU180KB 5GU10XKB (Decimal Gearhead)

Reversible Motor

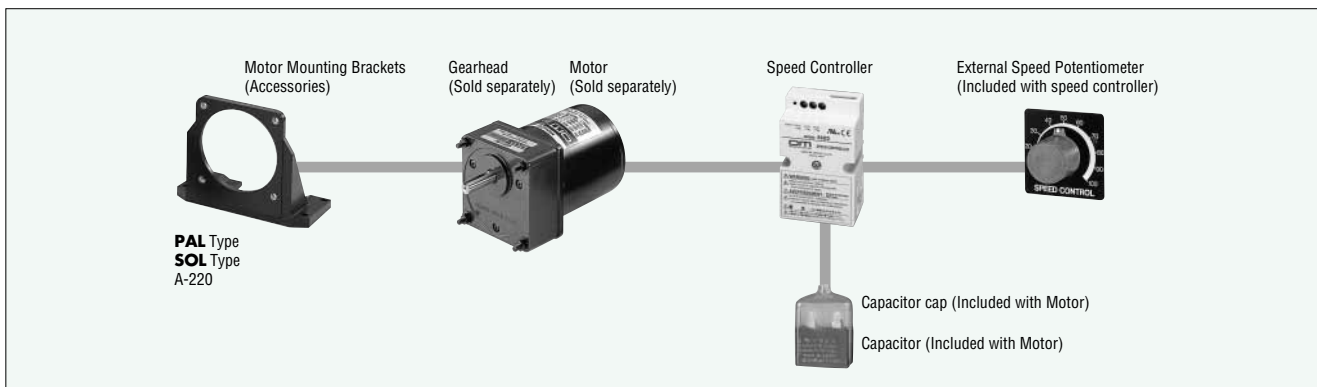
Single-Phase 220V/230V

Output Power W	Speed Controller	Model	
		Pinion shaft	Round shaft
6	ES02	2RK6RGN-CWE	2RK6RA-CWE
15		3RK15RGN-CWE	3RK15RA-CWE
25		4RK25RGN-CWE	4RK25RA-CWE
40		5RK40RGN-CWE	5RK40RA-CWE
60		5RK60RGU-CWE	5RK60RA-CWE

Single-Phase 110V/115V

Output Power W	Speed Controller	Model	
		Pinion shaft	Round shaft
6	ES01	2RK6RGN-AWU	2RK6RA-AWU
15		3RK15RGN-AWU	3RK15RA-AWU
25		4RK25RGN-AWU	4RK25RA-AWU
40		5RK40RGN-AWU	5RK40RA-AWU
60		5RK60RGU-AWU	5RK60RA-AWU

Construction



Specifications

● Induction Motors – Continuous Rating

Motor Model		Speed Controller	Maximum Output Power W	Voltage V	Frequency Hz	Variable Speed Range r/min	Permissible Torque mN·m		Starting Torque mN·m	Current A	Power Consumption W	Capacitor μF		
Pinion Shaft Type	Round Shaft Type						1200r/min	90r/min						
Ⓟ	2IK6RGN-CWE 2IK6RA-CWE	ES02	6	Single-Phase220	50	90~1400	42	32	35	0.14	28	0.6		
					60	90~1600	50	32	35	0.14	28			
					Single-Phase230	50	90~1400	46	32	40	0.14		29	
						60	90~1600	50	32	40	0.14		29	
						Single-Phase220	50	90~1400	110	38	65		0.23	43
							60	90~1600	125	38	65		0.23	46
Single-Phase230	50	90~1400	115	38	75	0.23	44							
	60	90~1600	125	38	65	0.23	47							
	Single-Phase220	50	90~1400	190	50	110	0.34	63						
		60	90~1600	190	50	110	0.34	67						
Single-Phase230	50	90~1400	200	50	120	0.34	63							
	60	90~1600	180	50	120	0.34	69							
	Single-Phase220	50	90~1400	300	75	190	0.55	96						
		60	90~1600	280	75	190	0.55	104						
Single-Phase230	50	90~1400	320	70	200	0.55	99							
	60	90~1600	260	70	200	0.55	105							
	Single-Phase220	50	90~1400	460	200	320	0.84	155						
		60	90~1600	490	215	320	0.89	175						
Single-Phase230	50	90~1400	490	170	320	0.85	158							
	60	90~1600	490	180	320	0.89	172							
	Single-Phase110	60	90~1600	50	35	40	0.28	29	2.5					
		Single-Phase115	60	90~1600	50	35	40	0.28	29	2.5				
Ⓟ	2IK6RGN-AWU 2IK6RA-AWU	ES01	6	Single-Phase110	60	90~1600	125	42	65	0.48	46	4.5		
					Single-Phase115	60	90~1600	125	42	65	0.48	46	4.5	
Ⓟ	3IK15RGN-AWU 3IK15RA-AWU	ES01	15	Single-Phase110	60	90~1600	185	50	120	0.75	58	6.5		
					Single-Phase115	60	90~1600	185	50	120	0.75	69	6.5	
Ⓟ	4IK25RGN-AWU 4IK25RA-AWU	ES01	25	Single-Phase110	60	90~1600	225	67	180	1.1	107	9		
					Single-Phase115	60	90~1600	225	67	200	1.1	107	9	
Ⓟ	5IK40RGN-AWU 5IK40RA-AWU	ES01	40	Single-Phase110	60	90~1600	225	67	200	1.1	107	9		
					Single-Phase115	60	90~1600	225	67	200	1.1	107	9	
Ⓟ	5IK60RGU-AWU 5IK60RA-AWU	ES01	60	Single-Phase110	60	90~1600	490	210	320	2	180	18		
					Single-Phase115	60	90~1600	490	210	320	2	180	18	

● Reversible Motors – 30-Minutes Rating

Motor Model		Speed Controller	Maximum Output Power W	Voltage V	Frequency Hz	Variable Speed Range r/min	Permissible Torque mN·m		Starting Torque mN·m	Current A	Power Consumption W	Capacitor μF		
Pinion Shaft Type	Round Shaft Type						1200r/min	90r/min						
Ⓟ	2RK6RGN-CWE 2RK6RA-CWE	ES02	6	Single-Phase220	50	90~1400	45	50	50	0.15	33	0.8		
					60	90~1600	50	50	45	0.16	33			
					Single-Phase230	50	90~1400	50	50	50	0.16		33	
						60	90~1600	50	50	45	0.16		33	
						Single-Phase220	50	90~1400	12	87	100		0.29	59
							60	90~1600	12	87	100		0.29	59
Single-Phase230	50	90~1400	205	115	140	0.44	88							
	60	90~1600	205	115	140	0.44	88							
	Single-Phase220	50	90~1400	205	115	155	0.44	88						
		60	90~1600	205	115	140	0.44	88						
Single-Phase230	50	90~1400	320	180	270	0.72	133							
	60	90~1600	320	170	260	0.72	133							
	Single-Phase220	50	90~1400	320	170	270	0.72	133						
		60	90~1600	320	170	260	0.72	133						
Single-Phase230	50	90~1400	490	280	42	1.0	185							
	60	90~1600	490	280	380	1.0	198							
	Single-Phase220	50	90~1400	490	280	460	1.0	188						
		60	90~1600	490	280	380	1.0	202						
Ⓟ	2RK6RGN-AWU 2RK6RA-AWU	ES01	6	Single-Phase110	60	90~1600	50	50	45	0.32	32	3.5		
					Single-Phase115	60	90~1600	50	50	45	0.32	32	3.5	
Ⓟ	3RK15RGN-AWU 3RK15RA-AWU	ES01	15	Single-Phase110	60	90~1600	125	85	100	0.6	59	6		
					Single-Phase115	60	90~1600	125	85	100	0.6	59	6	
Ⓟ	4RK25RGN-AWU 4RK25RA-AWU	ES01	25	Single-Phase110	60	90~1600	205	110	140	0.95	90	8		
					Single-Phase115	60	90~1600	205	110	140	0.95	90	8	
Ⓟ	5RK40RGN-AWU 5RK40RA-AWU	ES01	40	Single-Phase110	60	90~1600	320	155	240	1.4	138	12		
					Single-Phase115	60	90~1600	320	155	260	1.4	138	12	
Ⓟ	5RK60RGU-AWU 5RK60RA-AWU	ES01	60	Single-Phase110	60	90~1600	490	270	380	2.2	201	20		
					Single-Phase115	60	90~1600	490	270	380	2.2	201	20	

Ⓟ : These motors are impedance protected.

Ⓟ : These motors contain a built-in thermal protector. If a motor overheats for any reason, the thermal protector is opened and the motor stops. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

● The speed range is under no load conditions.

● The permissible torque and the starting torque of the reversible motors are shown in terms without the brake applied. Please keep in mind that you should select a suitable motor with enough torque, when designing the equipment.

Note : The "E" and "U" at the end of the part number indicate that the unit includes a capacitor. These two letters are not listed on the motor nameplate.

When the motor is approved under various safety standards, the nameplate is adopted.

General Specifications of Speed Controller

Model Name	ES01	ES02
Voltage	Single-Phase 100V-115V $\pm 10\%$	Single-Phase 200V-230V $\pm 10\%$
Frequency	50/60 Hz	
Operable Motor Output power	6W ~ 60W	
Speed Range	50Hz: 90~1400 r/min, 60Hz: 90~1600 r/min	
Function	Speed Control, Instantaneous Stop, Slow Start/Slow down	
Insulation Resistance	100M Ω or more when 500V DC is applied between the PE terminal and the power supply terminals, all the pins and the frame.	
Dielectric Strength	Sufficient to withstand 3.0kV at 50Hz, 60Hz applied between all the pins and the frame for 1 minute. Sufficient to withstand 1.5kV at 50Hz, 60Hz applied between the PE terminals and the power supply terminals.	
Ambient Temperature Range	0°C ~ +40°C (nonfreezing)	
Ambient Humidity	85% maximum (noncondensing)	
Degree of protection	IP20	

General Specifications of Motors

After the rated motor operation under normal ambient temperature and humidity.

Item	Specifications
Insulation Resistance	100M Ω or more when 500V DC is applied between the windings and the frame.
Dielectric Strength	Sufficient to withstand 1.5kV at 50Hz and 60Hz applied between the windings and the frame for 1 minute.
Temperature Rise	80°C or less measured by the resistance change method after rated motor operation with a gearhead or equivalent heat radiation plate connected.*
Insulation Class	Class B (130°C)
Overheating Protection Device	6W type is impedance protected. The other types contain a built-in thermal protector (automatic return type). Open: 130°C $\pm 5^\circ\text{C}$ Close: 82°C $\pm 15^\circ\text{C}$
Ambient Temperature Range	-10°C ~ +40°C (nonfreezing)
Ambient Humidity	85% maximum (noncondensing)
Degree of protection	6W, 15W, 25W, 40W type: IP20 60W type: IP40

* Equivalent head radiation plate sizes
(material : aluminum)

Unit=mm

Model	W × D × t
6W Type	115 × 115 × 5
15W Type	125 × 125 × 5
25W Type	135 × 135 × 5
40W Type	165 × 165 × 5
60W Type	200 × 200 × 5

Speed Range when Gearhead is Attached

Unit = r/min

Gear Ratio		3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
High Speed	50Hz	466	388	280	233	186	155	112	93	77	56	46	38	28	23	18	15	14	11	9	7
	60Hz	533	444	320	266	213	177	128	106	88	64	53	44	32	26	21	17	16	13	10	8.8
Low Speed		30	25	18	15	12	10	7.2	6	5	3.6	3	2.5	1.8	1.5	1.2	1	0.9	0.75	0.6	0.5

ES

■ Permissible Torque When Gearhead is Attached

The permissible torque with decimal gearhead with a gear ratio of 10 is;

2GN □ K : 3N·m **3GN** □ K : 6N·m **4GN** □ K : 8N·m (for 1/25 ~ 1/36 : 6N·m) **5GN** □ K : 10N·m **5GU** □ KB : 20N·m

Right-Angle gearheads may be connected to 25W, 40W and 60W types, Refer to page A-180 for further detail.

● Induction Motors

Unit = N·m

Model	Gear Ratio	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180	
2IK6RGN-CWE /2GN □ K	1200r/min	220V 50Hz	0.1	0.12	0.17	0.2	0.26	0.31	0.43	0.51	0.61	0.77	0.92	1.1	1.4	1.7	2.1	2.5	2.8	3	3	3
		230V 50Hz	0.11	0.13	0.19	0.22	0.28	0.34	0.47	0.56	0.67	0.84	1	1.2	1.5	1.8	2.3	2.7	3	3	3	3
		60Hz	0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3
	90r/min	0.078	0.093	0.13	0.16	0.19	0.23	0.32	0.39	0.47	0.58	0.7	0.84	1.1	1.3	1.6	1.9	2.1	2.5	3	3	
3IK15RGN-CWE /3GN □ K	1200r/min	220V 50Hz	0.27	0.32	0.45	0.53	0.67	0.8	1.1	1.3	1.6	2	2.4	2.9	3.6	4.4	5	5	5	5	5	5
		230V 50Hz	0.28	0.34	0.47	0.56	0.7	0.84	1.2	1.4	1.7	2.1	2.5	3	3.8	4.6	5	5	5	5	5	5
		60Hz	0.3	0.36	0.51	0.61	0.76	0.91	1.3	1.5	1.8	2.3	2.7	3.3	4.1	5	5	5	5	5	5	5
	90r/min	0.092	0.11	0.15	0.18	0.23	0.28	0.38	0.46	0.55	0.69	0.83	1	1.3	1.5	1.9	2.3	2.5	3	3.8	4.5	
4IK25RGN-CWE /4GN □ K	1200r/min	220V	0.46	0.55	0.77	0.92	1.2	1.4	1.9	2.3	2.8	3.5	4.2	5	6.3	7.5	8	8	8	8	8	8
		230V 50Hz	0.49	0.58	0.81	0.97	1.2	1.5	2	2.4	2.9	3.7	4.4	5.3	6.6	7.9	8	8	8	8	8	8
		230V 60Hz	0.44	0.52	0.73	0.87	1.1	1.3	1.8	2.2	2.6	3.3	3.9	4.7	5.9	7.1	8	8	8	8	8	8
		90r/min	0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3.3	4	5	5.9
5IK40RGN-CWE /5GN □ K	1200r/min	220V 50Hz	0.73	0.87	1.2	1.5	1.8	2.2	3	3.6	4.4	5.5	6.6	7.9	9.9	10	10	10	10	10	10	10
		220V 60Hz	0.68	0.82	1.1	1.4	1.7	2	2.8	3.4	4.1	5.1	6.1	7.4	9.2	10	10	10	10	10	10	10
		230V 50Hz	0.78	0.93	1.3	1.6	1.9	2.3	3.2	3.9	4.7	5.8	7	8.4	10	10	10	10	10	10	10	10
		230V 60Hz	0.63	0.76	1.1	1.3	1.6	1.9	2.6	3.2	3.8	4.7	5.7	6.8	8.6	10	10	10	10	10	10	10
		90r/min	0.18	0.22	0.3	0.36	0.46	0.55	0.76	0.91	1.1	1.4	1.6	2	2.5	3	3.7	4.5	5	5.9	7.4	8.9
5IK60RGU-CWE /5GU □ KB	1200r/min	50Hz	1.1	1.3	1.9	2.2	2.8	3.4	4.2	5	6	7.6	9.1	10.9	15.2	18.2	20	20	20	20	20	20
		60Hz	1.2	1.4	2	2.4	3	3.6	4.5	5.4	6.4	8.1	9.7	11.6	16.2	19.4	20	20	20	20	20	20
	90r/min	220V 50Hz	0.49	0.58	0.81	0.97	1.2	1.5	1.8	2.2	2.6	3.3	4	4.8	6.6	7.9	8.9	10.6	11.8	14.2	17.7	20
		220V 60Hz	0.52	0.63	0.87	1	1.3	1.6	2	2.4	2.8	3.5	4.3	5.1	7.1	8.5	9.5	11.4	12.7	15.2	19	20
		230V 50Hz	0.41	0.5	0.69	0.83	1	1.2	1.6	1.9	2.2	2.8	3.4	4	5.6	6.7	7.5	9	10	12	15	18.1
		230V 60Hz	0.44	0.52	0.73	0.87	1.1	1.3	1.6	2	2.4	3	3.6	4.3	5.9	7.1	8	9.6	10.6	12.7	15.9	19.1
			0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3
2IK6RGN-AWU /2GN □ K	1200r/min	0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3	
	90r/min	0.085	0.1	0.14	0.17	0.21	0.26	0.35	0.43	0.51	0.64	0.77	0.92	1.2	1.4	1.7	2.1	2.3	2.8	3	3	
3IK15RGN-AWU /3GN □ K	1200r/min	0.3	0.36	0.51	0.61	0.76	0.91	1.3	1.5	1.8	2.3	2.7	3.3	4.1	5	5	5	5	5	5	5	
	90r/min	0.1	0.12	0.17	0.2	0.26	0.31	0.43	0.51	0.61	0.77	0.92	1.1	1.4	1.7	2.1	2.5	2.8	3.3	4.2	5	
4IK25RGN-AWU /4GN □ K	1200r/min	0.45	0.54	0.75	0.9	1.1	1.3	1.9	2.2	2.7	3.4	4.1	4.9	6.1	7.3	8	8	8	8	8	8	
	90r/min	0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3.3	4	5	5.9	
5IK40RGN-AWU /5GN □ K	1200r/min	0.55	0.66	0.91	1.1	1.4	1.6	2.3	2.7	3.3	4.1	4.9	5.9	7.4	8.9	10	10	10	10	10	10	
	90r/min	0.16	0.2	0.27	0.33	0.41	0.49	0.68	0.81	0.98	1.2	1.5	1.8	2.2	2.7	3.3	4	4.4	5.3	6.6	8	
5IK60RGU-AWU /5GU □ KB	1200r/min	1.2	1.4	2	2.4	3	3.6	4.5	5.4	6.4	8.1	9.7	11.6	16.2	19.4	20	20	20	20	20	20	
	90r/min	0.51	0.61	0.85	1	1.3	1.5	1.9	2.3	2.8	3.5	4.2	5	6.9	8.3	9.3	11.2	12.4	14.9	18.6	20	

● Reversible Motors

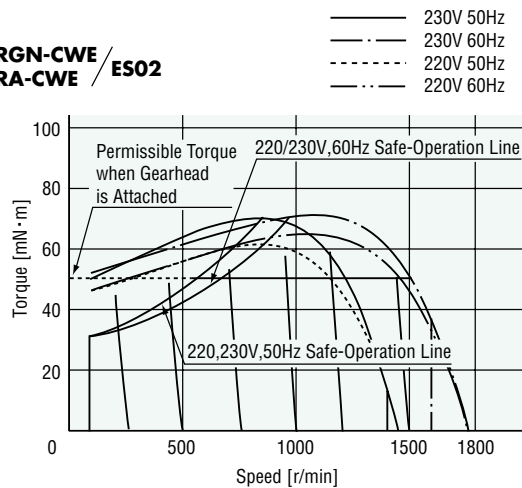
Unit = N·m

Model	Gear Ratio	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180	
2RK6RGN-CWE /2GN □ K	1200r/min	220V 50Hz	0.11	0.13	0.18	0.22	0.27	0.33	0.46	0.55	0.66	0.82	0.99	1.2	1.5	1.8	2.2	2.7	3	3	3	3
		230V 50Hz	0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3
		230V 60Hz	0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3
	90r/min	0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3	
3RK15RGN-CWE /3GN □ K	1200r/min	0.3	0.36	0.51	0.61	0.76	0.91	1.3	1.5	1.8	2.3	2.7	3.3	4.1	5	5	5	5	5	5	5	
	90r/min	0.21	0.25	0.35	0.42	0.53	0.63	0.88	1.1	1.3	1.6	1.9	2.3	2.9	3.4	4.3	5	5	5	5	5	
4RK25RGN-CWE /4GN □ K	1200r/min	0.5	0.6	0.83	1	1.2	1.5	2.1	2.5	3	3.7	4.5	5.4	6.8	8	8	8	8	8	8	8	
	90r/min	0.28	0.34	0.47	0.56	0.7	0.84	1.2	1.4	1.7	2.1	2.5	3	3.8	4.6	5.7	6.8	7.6	8	8	8	
5RK40RGN-CWE /5GN □ K	1200r/min	220V 50Hz	0.78	0.93	1.3	1.6	1.9	2.3	3.2	3.9	4.7	5.8	7	8.4	10	10	10	10	10	10	10	10
		230V 50Hz	0.44	0.52	0.73	0.87	1.1	1.3	1.8	2.2	2.6	3.3	3.9	4.7	5.9	7.1	8.9	10	10	10	10	10
		220V 60Hz	0.41	0.5	0.69	0.83	1	1.2	1.7	2.1	2.5	3.1	3.7	4.5	5.6	6.7	8.4	10	10	10	10	10
5RK60RGU-CWE /5GU □ KB	1200r/min	1.2	1.4	2	2.4	3	3.6	4.5	5.4	6.4	8.1	9.7	11.6	16.2	19.4	20	20	20	20	20	20	
	90r/min	0.68	0.82	1.1	1.4	1.7	2	2.6	3.1	3.7	4.6	5.5	6.7	9.2	11.1	12.4	14.9	16.5	19.8	20	20	
2RK6RGN-AWU /2GN □ K	1200r/min	0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3	
	90r/min	0.12	0.15	0.2	0.24	0.3	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2	2.5	3	3	3	3	3	
3RK15RGN-AWU /3GN □ K	1200r/min	0.3	0.36	0.51	0.61	0.76	0.91	1.3	1.5	1.8	2.3	2.7	3.3	4.1	5	5	5	5	5	5	5	
	90r/min	0.21	0.25	0.34	0.41	0.52	0.62	0.86	1	1.2	1.6	1.9	2.2	2.8	3.4	4.2	5	5	5	5	5	
4RK25RGN-AWU /4GN □ K	1200r/min	0.5	0.6	0.83	1	1.2	1.5	2.1	2.5	3	3.7	4.5	5.4	6.8	8	8	8	8	8	8	8	
	90r/min	0.27	0.32	0.45	0.53	0.67	0.8	1.1	1.3	1.6	2	2.4	2.9	3.6	4.4	5.4	6.5	7.3	8	8	8	
5RK40RGN-AWU /5GN □ K	1200r/min	0.78	0.93	1.3	1.6	1.9	2.3	3.2	3.9	4.7	5.8	7	8.4	10	10	10	10	10	10	10	10	
	90r/min	0.38	0.45	0.63	0.75																	

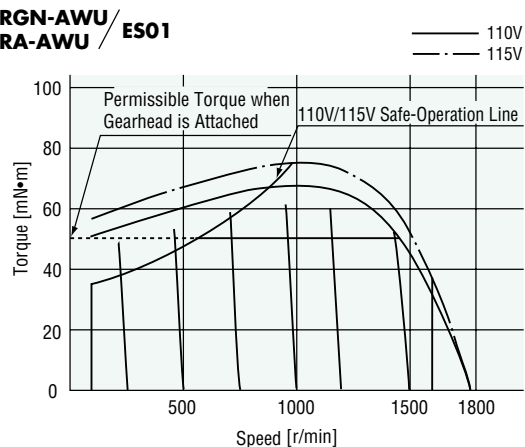
Torque-Speed Characteristics

Induction Motors

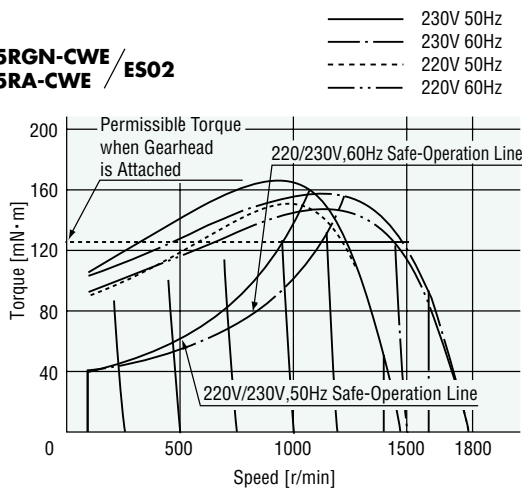
2IK6RGN-CWE / ESO2
2IK6RA-CWE / ESO2



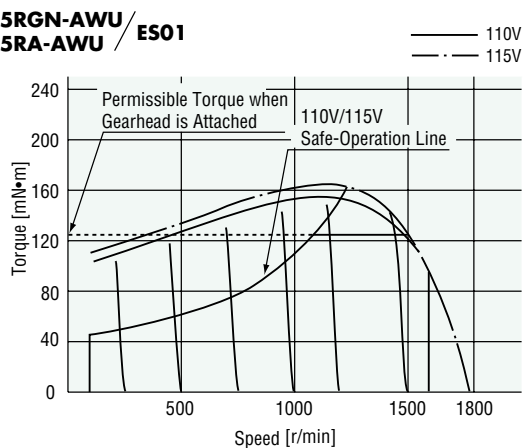
2IK6RGN-AWU / ESO1
2IK6RA-AWU / ESO1



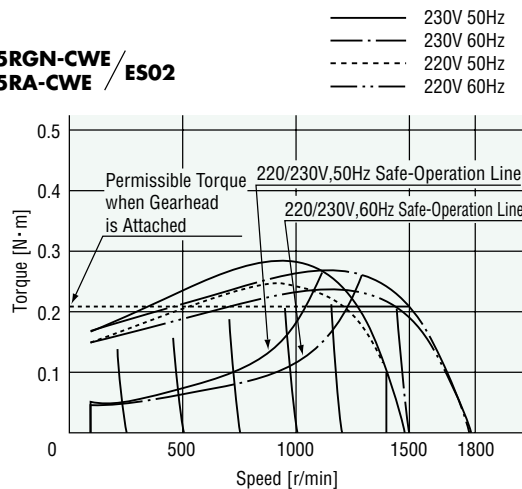
3IK15RGN-CWE / ESO2
3IK15RA-CWE / ESO2



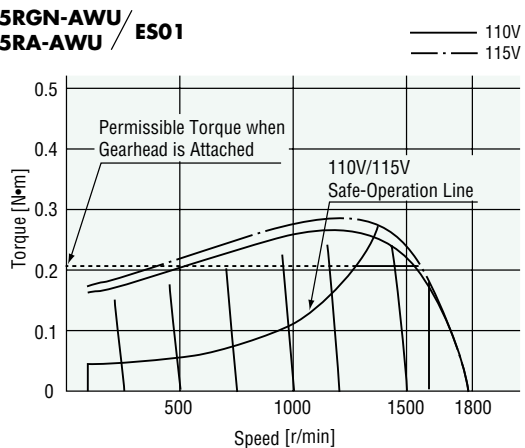
3IK15RGN-AWU / ESO1
3IK15RA-AWU / ESO1



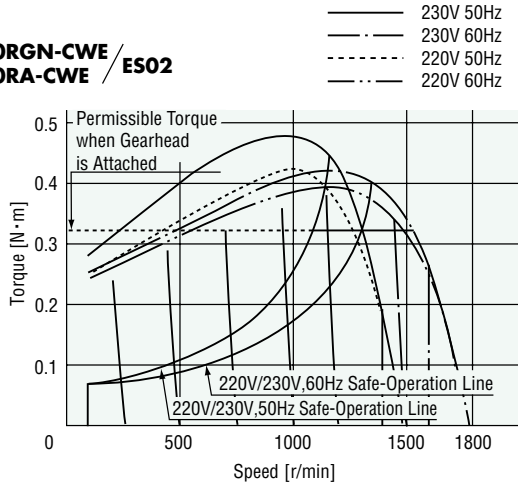
4IK25RGN-CWE / ESO2
4IK25RA-CWE / ESO2



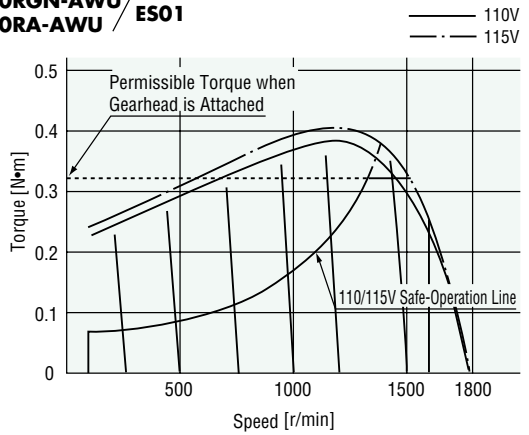
4IK25RGN-AWU / ESO1
4IK25RA-AWU / ESO1



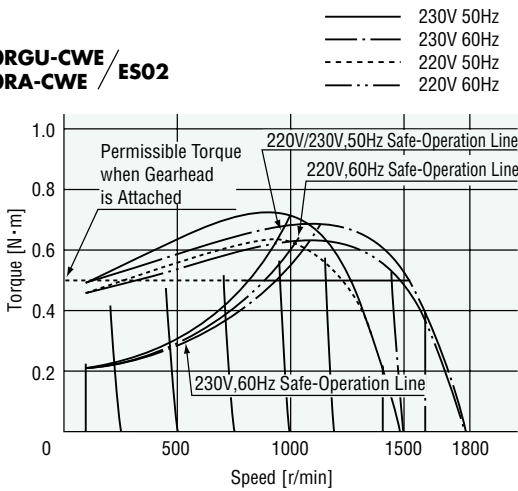
5IK40RGN-CWE / ES02
5IK40RA-CWE / ES02



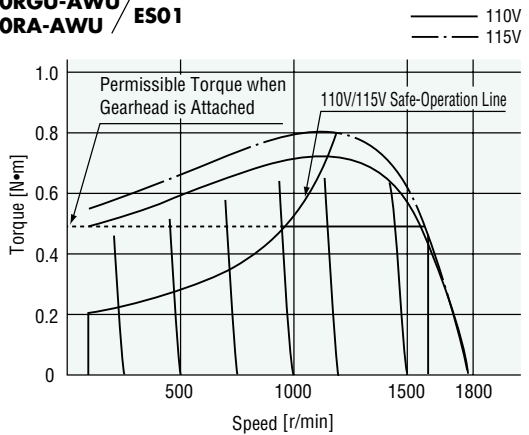
5IK40RGN-AWU / ES01
5IK40RA-AWU / ES01



5IK60RGU-CWE / ES02
5IK60RA-CWE / ES02

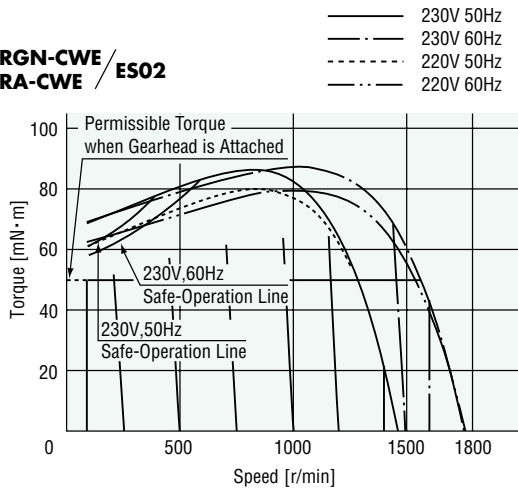


5IK60RGU-AWU / ES01
5IK60RA-AWU / ES01

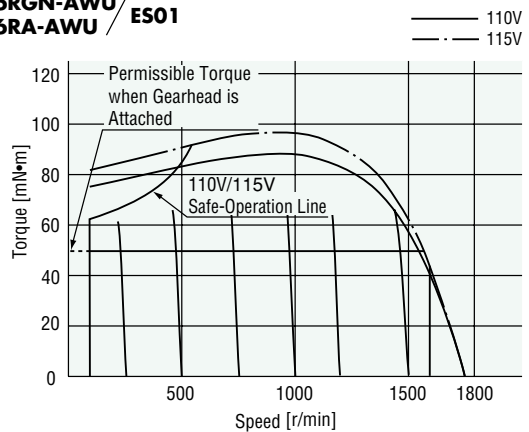


● Reversible Motors

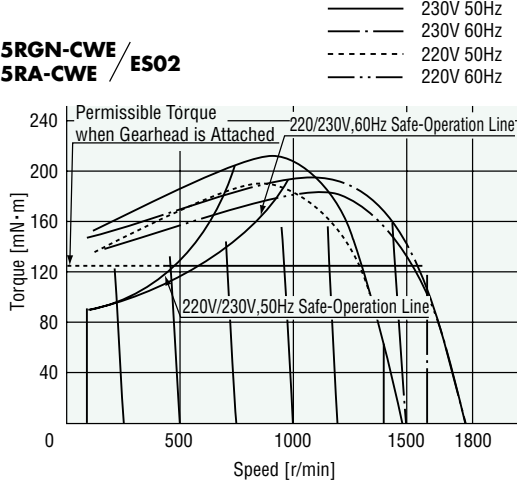
2RK6RGN-CWE / ES02
2RK6RA-CWE / ES02



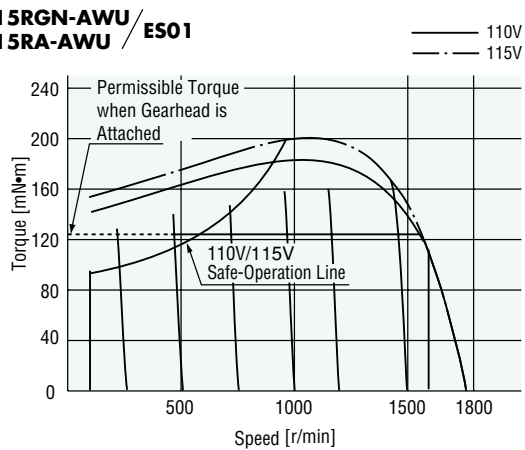
2RK6RGN-AWU / ES01
2RK6RA-AWU / ES01



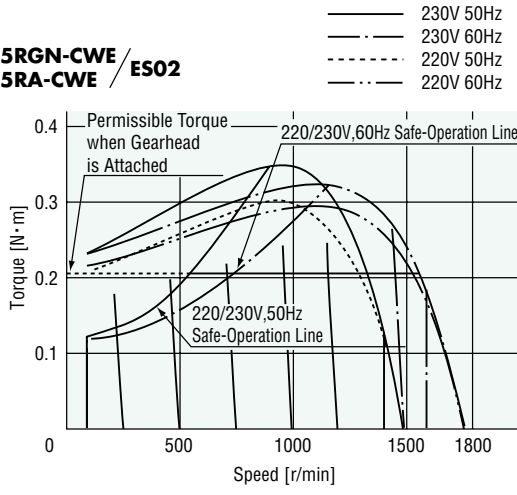
3RK15RGN-CWE / ESO2
3RK15RA-CWE / ESO2



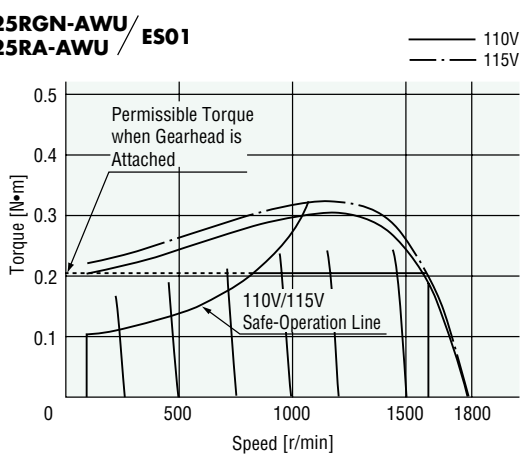
3RK15RGN-AWU / ESO1
3RK15RA-AWU / ESO1



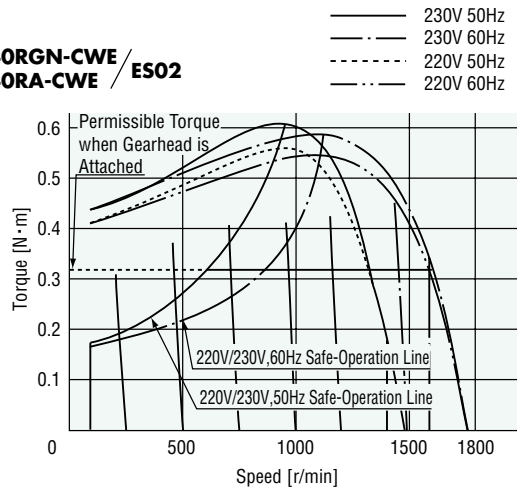
4RK25RGN-CWE / ESO2
4RK25RA-CWE / ESO2



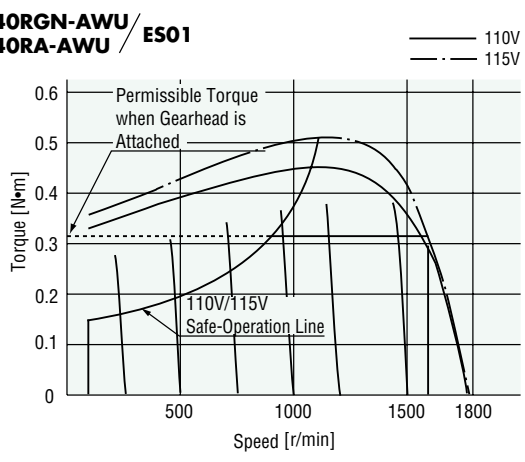
4RK25RGN-AWU / ESO1
4RK25RA-AWU / ESO1



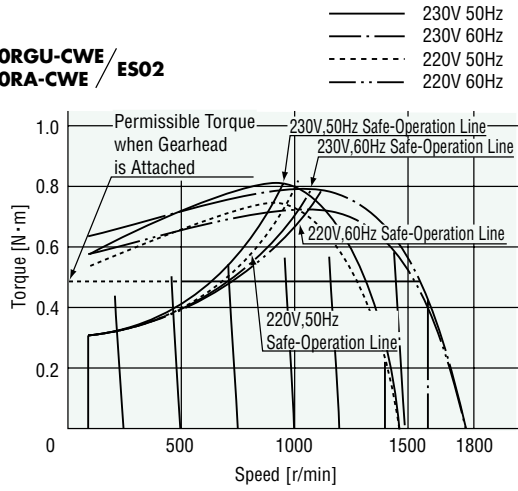
5RK40RGN-CWE / ESO2
5RK40RA-CWE / ESO2



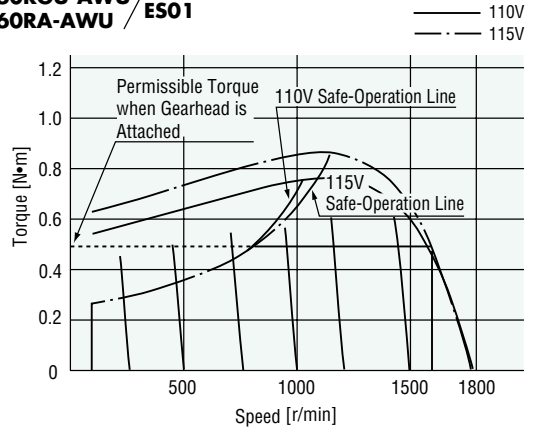
5RK40RGN-AWU / ESO1
5RK40RA-AWU / ESO1



5RK60RGU-CWE / ES02
5RK60RA-CWE / ES02



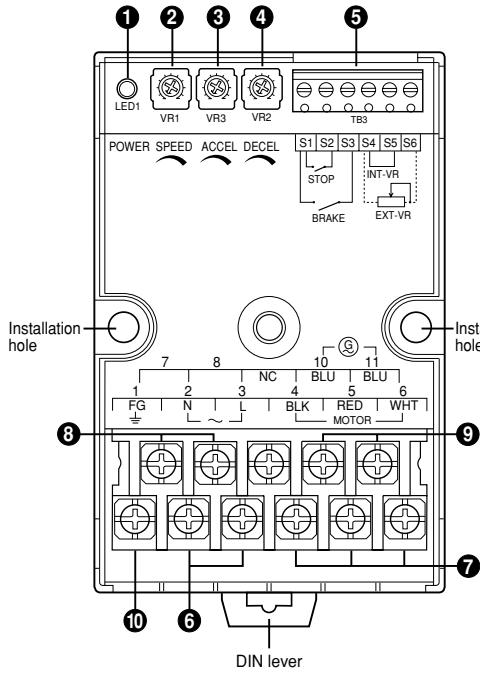
5RK60RGU-AWU / ES01
5RK60RA-AWU / ES01



Connection and operation

Names and function of parts

The illustration has the cover removed. Install the cover after connection.



- 1 POWER LED**
Turns on (green) while power is being supplied.
- 2 Internal speed potentiometer**
Set the motor's operating speed.
- 3 Acceleration time potentiometer**
Set the acceleration time for motor startup.
- 4 Deceleration time potentiometer**
Set the deceleration time for motor stop.
- 5 Control input terminal**
S1 Common terminal for running and braking
S2 Run/Stop input
Runs (OFF) or stops (ON) the motor.
S3 Run/Brake input
Runs (OFF) or brakes (ON) the motor.
S4, S5, S6 Speed potentiometer inputs
When S4 and S5 are shorted, the speed can be set using the internal speed potentiometer (INT-VR).
When S4 and S5 are open, the speed can be set using an external speed potentiometer (EXT-VR).
When using an external speed potentiometer, connect it to S4 and S6.

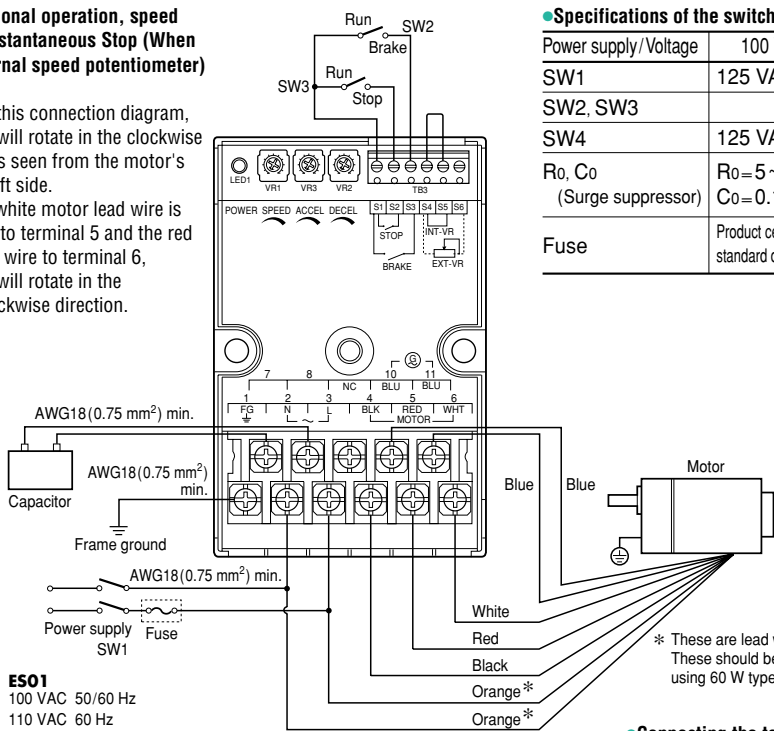
- 6 Power connection terminal (terminals 2 and 3)**
- 7 Motor connection terminal (terminals 4, 5 and 6)**
Connect the black motor lead wire to terminal 4. When the red motor lead wire is connected to terminal 5 and the white motor lead wire to terminal 6, the motor will rotate in the clockwise direction, as seen from the motor's output-shaft side. When the white motor lead wire is connected to terminal 5 and the red motor lead wire to terminal 6, the motor will rotate in the counterclockwise direction, as seen from the motor's output-shaft side.
- 8 Terminals 7 and 8**
- 9 Generator connection terminal (terminals 10 and 11)**
Connect the blue generator lead wires.
- 10 FG terminal (terminal 1)**

● Connection Diagram

Uni-directional operation, speed control, Instantaneous Stop (When using internal speed potentiometer)

In case of this connection diagram, the motor will rotate in the clockwise direction, as seen from the motor's output-shaft side.

When the white motor lead wire is connected to terminal 5 and the red motor lead wire to terminal 6, the motor will rotate in the counterclockwise direction.

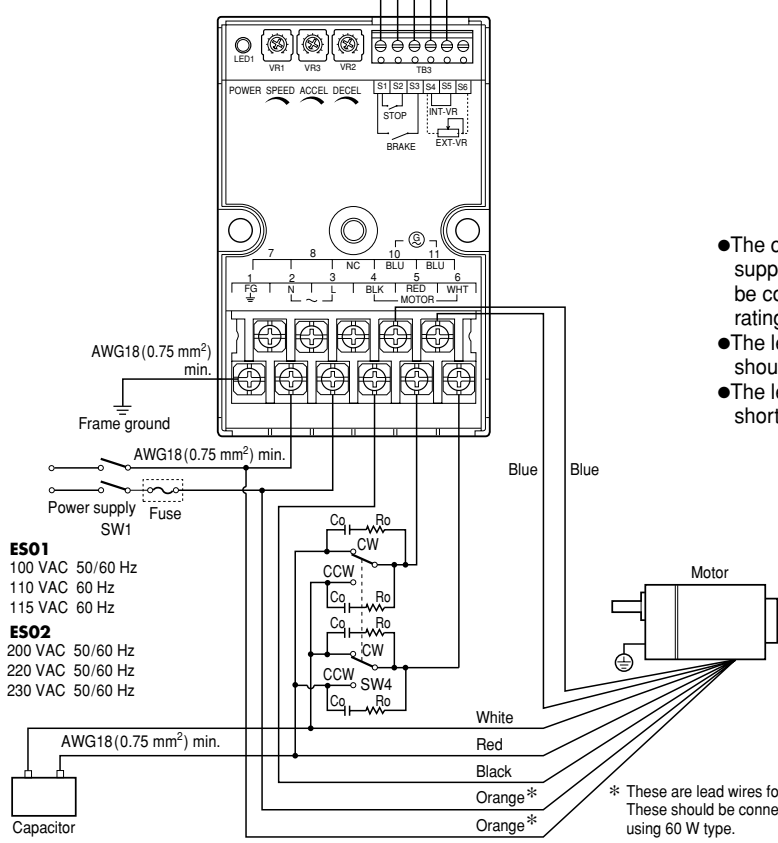


- ES01**
100 VAC 50/60 Hz
110 VAC 60 Hz
115 VAC 60 Hz
- ES02**
200 VAC 50/60 Hz
220 VAC 50/60 Hz
230 VAC 50/60 Hz

● Specifications of the switches and fuse

Power supply/Voltage	100 V/110 V/115 V (ES01)	200 V/220 V/230 V (ES02)
SW1	125 VAC 10A	250 VAC 5A
SW2, SW3	18 VDC 1mA	
SW4	125 VAC 10A	250 VAC 5A
R ₀ , C ₀ (Surge suppressor)	R ₀ =5~200 Ω C ₀ =0.1~0.2 μF, 200 WV	R ₀ =5~200 Ω C ₀ =0.1~0.2 μF, 400WV
Fuse	Product certified under the UL/CSA248-14 standard or equivalent 250 VAC 10A	Product certified under the UL/CSA248-14 standard or equivalent 250 VAC 5A

Bi-directional operation, Speed Control, Instantaneous Stop (When using internal speed potentiometer)

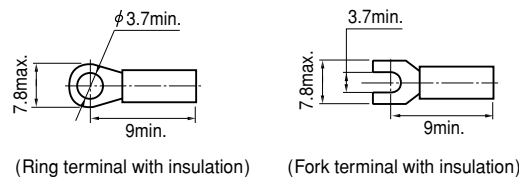


- ES01**
100 VAC 50/60 Hz
110 VAC 60 Hz
115 VAC 60 Hz
- ES02**
200 VAC 50/60 Hz
220 VAC 50/60 Hz
230 VAC 50/60 Hz

● Connecting the terminal of the motor and power supply

Terminal screw size: M3.5
Screw tightening torque: 1 N·m

Appropriate crimp terminal [Unit: mm]

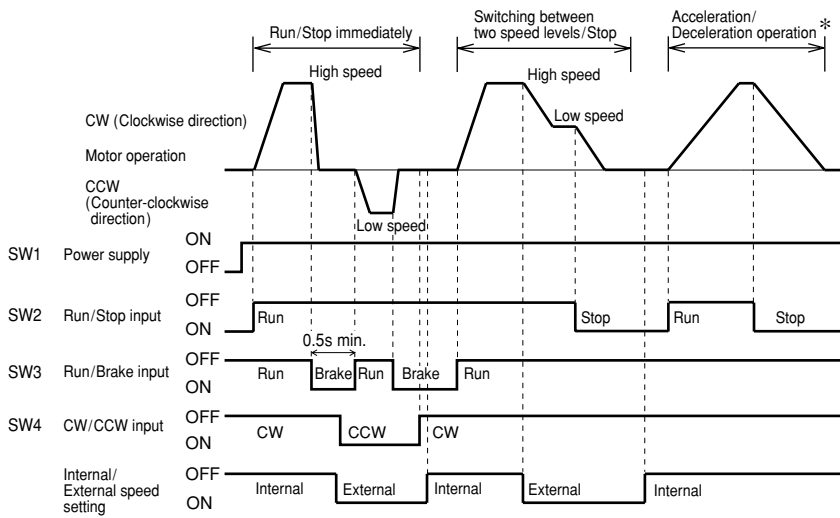


● Connecting the control input terminal

Applicable lead wire diameter: AWG28~16 (0.08~1.5 mm²)
Length of the lead wire which can be stripped: 5~7 mm
Tightening torque: 0.22~0.25 N·m
Tip thickness 0.3~0.4 mm
Tip width 2~2.5 mm

- The control input terminals are not insulated from the AC power supply. Any equipment (sequencer, relay and/or switch) that will be connected to the control input terminals must have contact ratings of 18 VDC and 1 mA min.
- The length of the cable connecting the motor and speed controller should be no more than 10 m.
- The length of the control cable should be no more than 2 m and as short as possible.

The timing chart below shows an example of switching between two speed levels when the high speed and low speed are selected via the internal and external speed potentiometers, respectively.



* Case where the acceleration and deceleration times are set longer by turning each potentiometer clockwise.

● Run/Brake, Stop

Setting SW2/SW3 to “Run” (OFF) causes the motor to rotate at the speed set via the speed potentiometer.

Setting SW3 to “Brake” (ON) during operation causes the motor to stop immediately.

Setting SW2 to “Stop” (ON) during operation causes the motor to coast to a stop.

The braking function (current through the

motor) is only active for approximately 0.4 seconds after the Run/Brake input is turned ON. It is important to wait 0.5 seconds, or greater, prior to switching back to Run. Otherwise, damage to the speed controller may result.

Run/Stop input	Run/Brake input	Motor operation
OFF	OFF	Runs
OFF	ON	Stops immediately
ON	OFF	Coasts to a stop

● Switching the direction of rotation

SW4 is used to switch the motor’s direction of rotation.

When SW4 is set to CW, the motor rotates in the clockwise direction, as seen from the motor’s output-shaft side.

When SW4 is set to CCW, the motor rotates in the counterclockwise direction, as seen from the motor’s output-shaft side.

The rotating direction of the gear output shaft is opposite that of the motor shaft, depends on the gear ratio.

- Instant switching between forward and reverse operations is possible with a reversible motor. Connect a surge suppressor between the relay contacts. Oriental Motor also provides an optional **EPCR1201-2** CR circuit for surge suppression.
- For bi-directional operation of an induction motor, switch the rotating direction after the motor has come to a complete stop.

● Repeated operation/braking cycle

When running/braking of the motor is repeated in short cycles, the rise in motor temperature will increase and the continuous-operation time will be limited.

Use the following values as a guideline:

Motor output	Repetition cycle
6~40 W	2 seconds min. (Running 1 second, stopping 1 second)
60 W	4 seconds min. (Running 2 seconds, stopping 2 seconds)

● Braking current

When the motor is commanded to stop immediately, the following braking current will flow. Provide an appropriate power supply by referring to these values.

Motor output	Braking current (Peak value) [A]	
	Single-phase 100 V/110 V/115 V	Single-phase 200 V/220 V/230 V
6 W	1.5	1.0
15 W	3.5	2.0
25 W	5.5	3.0
40 W	8.5	6.0
60 W	15.5	8.0

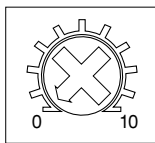
● **Methods of Speed setting**

The following two methods of setting speed can be used.

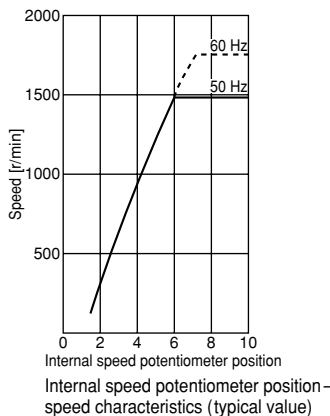
① **Internal speed potentiometer.**

The setting range is from 90 to 1400 r/min at 50 Hz or 90 to 1600 r/min at 60 Hz. Short the speed potentiometer input terminals S4 and S5.

Turning the potentiometer clockwise will set a faster speed. The factory setting is 0 r/min.



Internal speed potentiometer

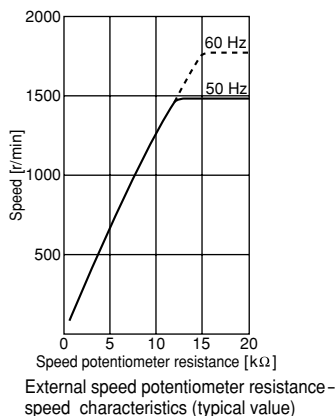
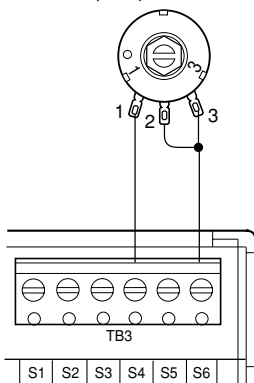


② **External Speed Potentiometer (provided).**

Open the speed potentiometer input terminals S4 and S5. Before connecting, turn the dial on the external speed potentiometer counterclockwise to set the speed to 0 r/min.

Turning the dial clockwise will set a faster speed.

External speed potentiometer
20 kΩ 1/4 W
with a linear resistance vs.
angle curve



NOTE

- Do not operate multiple speed controllers with a single external speed potentiometer. Doing so may damage the speed controllers.

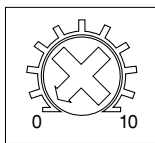
● **Acceleration and Deceleration Operation**

① **Acceleration**

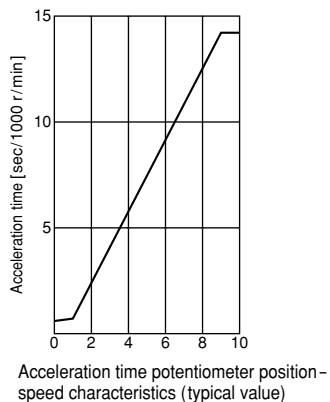
The acceleration function is actuated at start or when the speed is switched to the higher setting in a two-level speed control.

Turning the acceleration time potentiometer clockwise will increase the set time.

The factory setting is 0 (no acceleration).



Acceleration time potentiometer

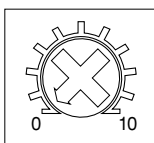


② **Deceleration**

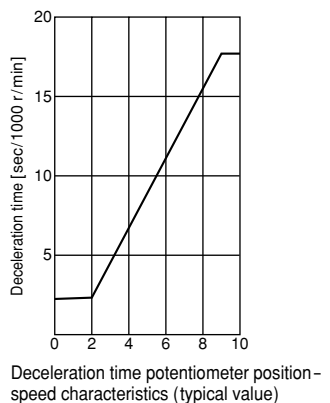
The deceleration function is actuated at natural stop or when the speed is switched to the lower setting in a two-level speed control.

Turning the deceleration time potentiometer clockwise will increase the set time.

The factory setting is 0 (no deceleration).



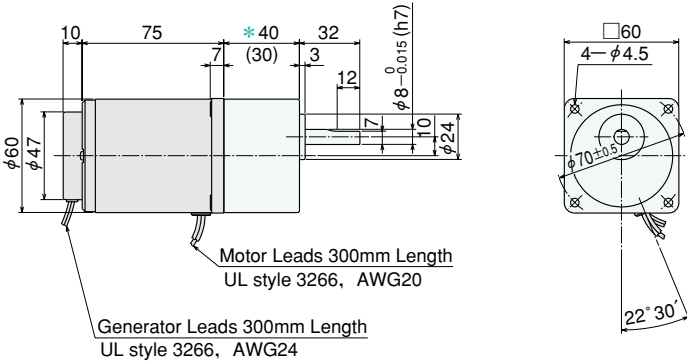
Deceleration time potentiometer



Dimensions (Scale 1/4, Unit=mm)

Motor

2IK6RGN-CWE, AWU / Gearhead
2RK6RGN-CWE, AWU / **2GN□K** (sold separately)
 Mass : 0.8kg Mass : 0.4kg

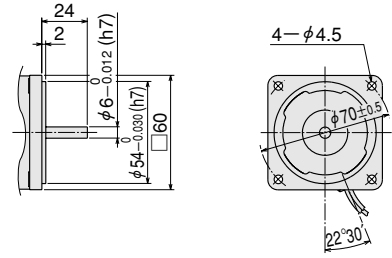


Asterisk (*) indicates the dimensions of **2GN25K ~ 180K**.
 the figure in the parenthesis indicates the dimensions of **2GN3K ~ 18K**.

Round shaft Type

Motor

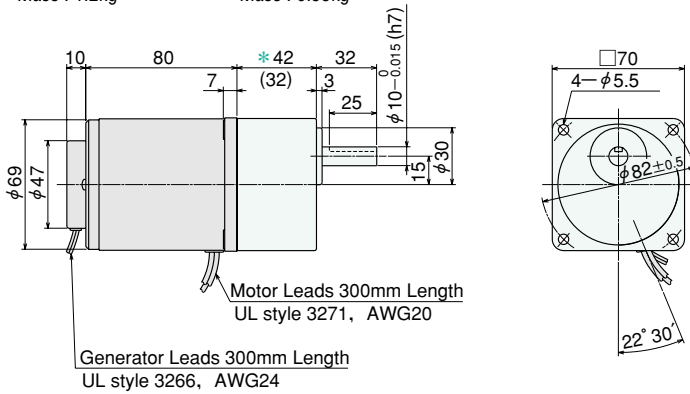
2IK6RA-CWE, AWU
2RK6RA-CWE, AWU
 Mass : 0.8kg



- Induction Motors
- Reversible Motors
- Electromagnetic Brake Motors
- FBL II
- Brushless Motor and Driver
- AXU
- AXH
- HL
- HL
- MSS · W
- ES
- US
- Gearheads
- Linear Heads
- Water Tight Motors FPW
- Accessories

Motor

3IK15RGN-CWE, AWU / Gearhead
3RK15RGN-CWE, AWU / **3GN□K** (sold separately)
 Mass : 1.2kg Mass : 0.55kg

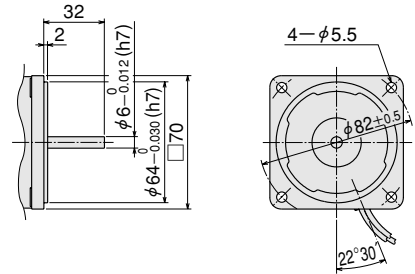


Asterisk (*) indicates the dimensions of **3GN25K ~ 180K**.
 the figure in the parenthesis indicates the dimensions of **3GN3K ~ 18K**.

Round shaft Type

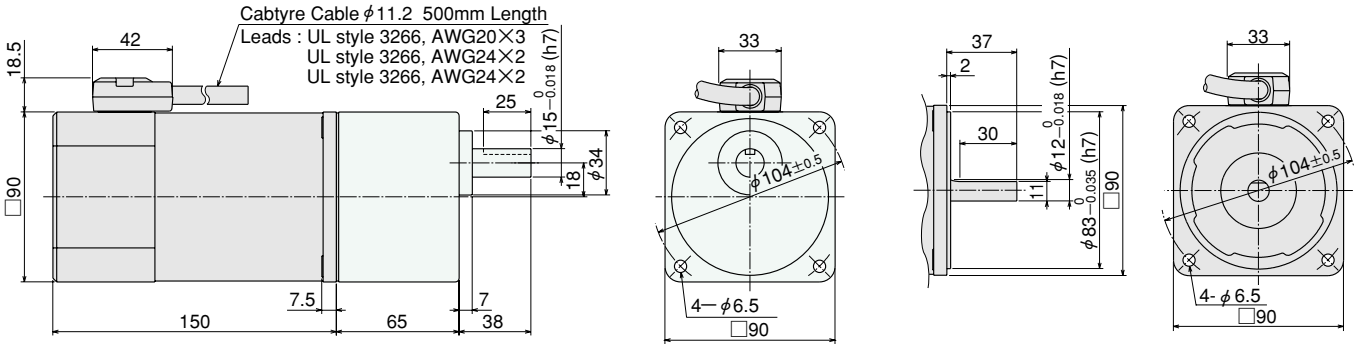
Motor

3IK15RA-CWE, AWU
3RK15RA-CWE, AWU
 Mass : 1.2kg



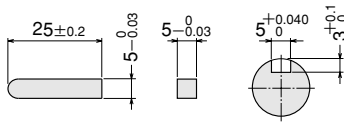
Motor
5IK60RGU-CWE, AWU / Gearhead
5RK60RGU-CWE, AWU / **5GU** □ **KB** (sold separately)
 Mass : 3.2kg Mass : 1.5kg

● **Round Shaft Type**
 Motor
5IK60RA-CWE, AWU
5RK60RA-CWE, AWU
 Mass : 3.2kg



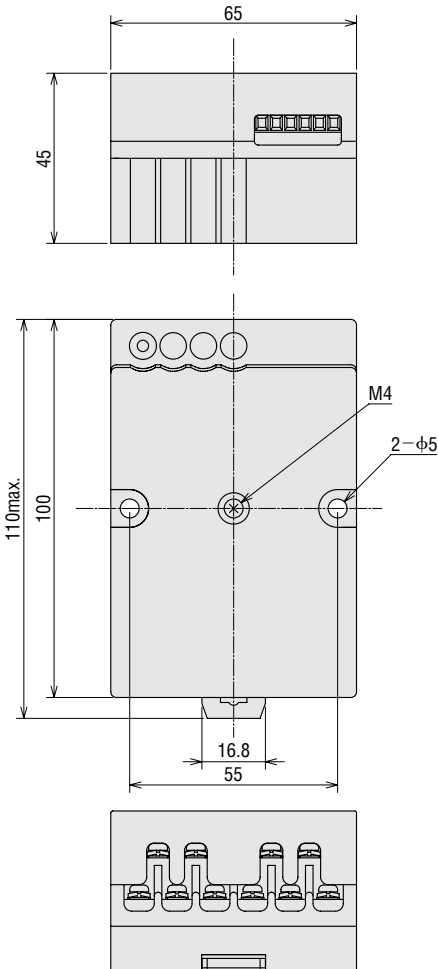
● **Key and Key Slot** (Scale 1/2)

The key is provided **5GU** □ **KB** gearhead.

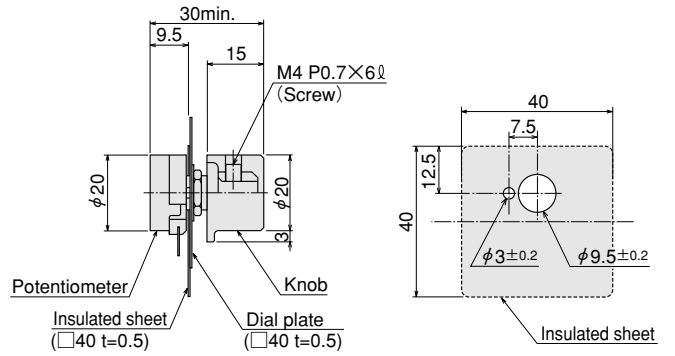


■ **Dimensions of Speed Controller** (Scale 1/2、Unit=mm)

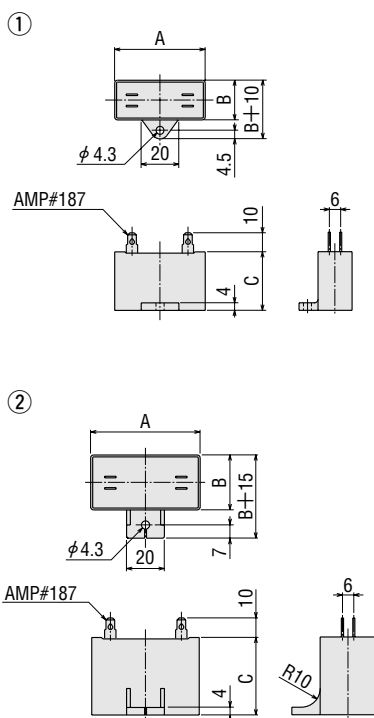
Speed Controller: **ES01**
ES02
 Mass : 0.18kg



● **External Speed Potentiometer** (Scale 1/2)



● Capacitor (included with the motor)



Dimensions (mm)

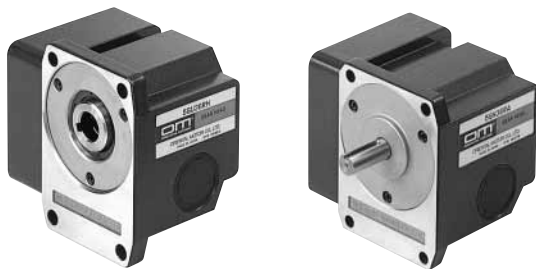
Unit Model		Capacitor Model	A	B	C	Mass Dimension	
Pinion Shaft Type	Round Shaft Type					(g)	No.
2IK6RGN-CWE	2IK6RA-CWE	CH06BFAUL	31	14.5	23.5	15	①
3IK15RGN-CWE	3IK15RA-CWE	CH10BFAUL	37	18	27	25	①
4IK25RGN-CWE	4IK25RA-CWE	CH15BFAUL	38	21	31	35	①
5IK40RGN-CWE	5IK40RA-CWE	CH23BFAUL	48	21	31	40	①
5IK60RGU-CWE	5IK60RA-CWE	CH40BFAUL	58	23.5	37	65	②
2IK6RGN-AWU	2IK6RA-AWU	CH25FAUL	31	17	27	20	①
3IK15RGN-AWU	3IK15RA-AWU	CH45FAUL	37	18	27	25	①
4IK25RGN-AWU	4IK25RA-AWU	CH65CFAUL	38	21	31	35	①
5IK40RGN-AWU	5IK40RA-AWU	CH90CFAUL	48	21	31	40	①
5IK60RGU-AWU	5IK60RA-AWU	CH180CFAUL	58	23.5	37	70	②
2RK6RGN-CWE	2RK6RA-CWE	CH08BFAUL	31	17	27	20	①
3RK15RGN-CWE	3RK15RA-CWE	CH15BFAUL	38	21	31	35	①
4RK25RGN-CWE	4RK25RA-CWE	CH20BFAUL	48	19	29	35	①
5RK40RGN-CWE	5RK40RA-CWE	CH35BFAUL	58	22	35	55	①
5RK60RGU-CWE	5RK60RA-CWE	CH50BFAUL	58	29	41	85	②
2RK6RGN-AWU	2RK6RA-AWU	CH35FAUL	31	17	27	20	①
3RK15RGN-AWU	3RK15RA-AWU	CH60CFAUL	38	21	31	40	①
4RK25RGN-AWU	4RK25RA-AWU	CH80CFAUL	48	19	29	40	①
5RK40RGN-AWU	5RK40RA-AWU	CH120CFAUL	58	21	31	50	①
5RK60RGU-AWU	5RK60RA-AWU	CH200CFAUL	58	29	41	95	②

● If you need to order a capacitor without a motor, add "-C" to the capacitor model number shown. A capacitor cap is always included with a capacitor.

■ Right-Angle Gearheads (sold separately)

The right-angle gearhead provides an output shaft at a right angle to the motor's output shaft.

Refer to page A-180 for further detail.



■ Accessories

● Motor Mounting Brackets (sold separately)

Optional die-cast aluminum mounting brackets are available. They can be used to install motors with or without gearheads.

Refer to page A-220 for further detail.

