

RoHS RoHS-Compliant

Unit Type Speed Control Motor and Control Unit Package

US Series

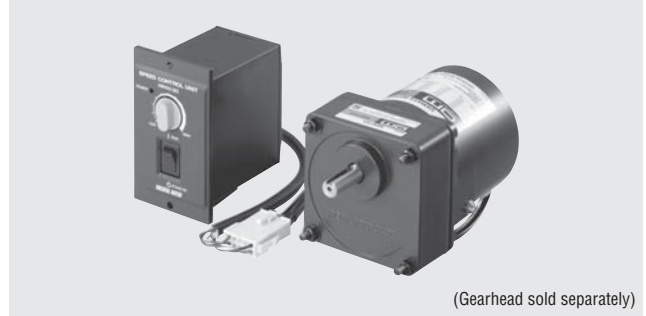
● Additional Information ●
 Technical reference → Page F-1
 Safety standards → Page G-2

The **US** Series is a panel mounted control unit and speed control motor package, which conforms to the RoHS Directive. Wiring is performed by connecting with easy-to-use connectors. This series is optimal for easy speed control applications.

- Instantaneous stop function is not equipped.



- List of safety standard approved products (Model, Standards, File No., Certification Body) → Page G-10



(Gearhead sold separately)

Features

● Easy Connection

The operation is possible just by connecting the control unit into the power supply after connecting the motor and control unit through easy-to-use connectors.

● Easy Operation

The speed can be set easily with the potentiometer on the front panel of the control unit.

● **RoHS** RoHS-Compliant

The **US** Series conforms to the RoHS Directive that prohibits the use of six chemical substances including lead and cadmium.

- Details of RoHS Directive → Page G-23

● Approved by Major Safety Standards

The **US** Series is recognized by UL and CSA, and certified under the China Compulsory Certification System (CCC System). CE Marking is used in accordance with the Low Voltage Directive and EMC Directive.

● Protective Earth Terminal on Motor (6 W~40 W)

● Variable Speed Range

50 Hz: 90 to 1400 r/min

60 Hz: 90 to 1600 r/min

Types and Features of Gearhead

● Long Life, Low Noise **GN-S** Gearhead is Available. (Applicable motors: 6 W~40 W)

The new "long life, low noise **GN-S** gearhead" achieves a long rated life of 10000 hours, twice the level of a conventional gearhead, by adopting innovative technologies and structure. Also, the gearhead is low noise designed.

- Details of long life, low noise **GN-S** gearhead → Page A-159



● Types of Gearheads

Gearhead		Applicable Motor		Rated Life (hours)	Low Noise	
Type of Gearhead	Type of Pinion	Output Power	Type of Pinion			
Parallel Shaft	RoHS Long Life, Low Noise GN-S Gearhead	GN Type Pinion Shaft	6 W~40 W	GN Type Pinion Shaft	10000	●
	RoHS GU Gearhead	GU Type Pinion Shaft	60 W, 90 W	GU Type Pinion Shaft	5000	
Right-Angle Shaft	RoHS Hollow Shaft Gearhead	GN Type Pinion Shaft	25 W, 40 W	GN Type Pinion Shaft	5000	
		GU Type Pinion Shaft	60 W, 90 W	GU Type Pinion Shaft	5000	
	RoHS Solid Shaft Gearhead	GN Type Pinion Shaft	25 W, 40 W	GN Type Pinion Shaft	5000	
		GU Type Pinion Shaft	60 W, 90 W	GU Type Pinion Shaft	5000	

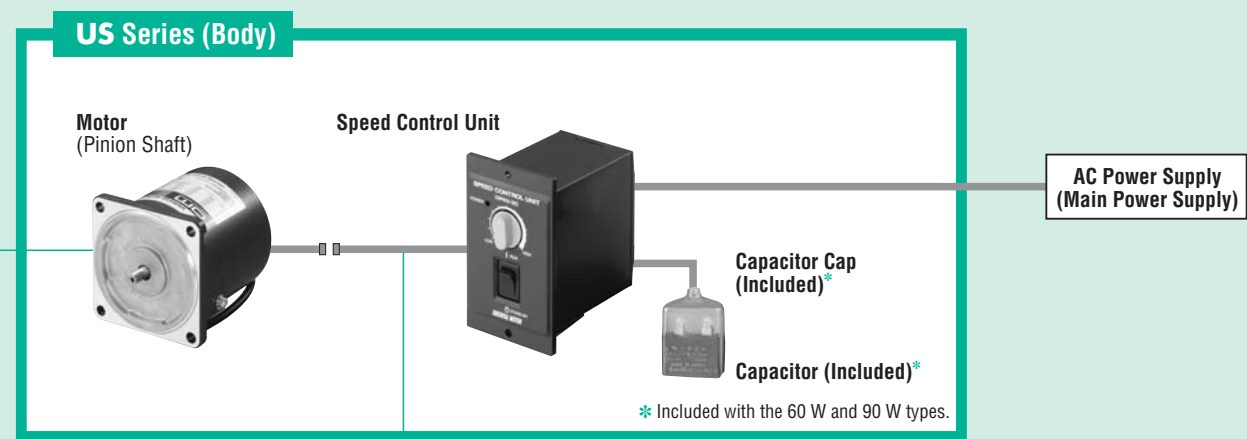
System Configuration

Gearhead (Sold separately)

Parallel Shaft Gearheads (→ Page A-159)

Right-Angle Gearheads (→ Page A-127)

Hollow Shaft Type Solid Shaft Type



Accessories (Sold separately)

① Extension Cables (→ Page A-238)

② Mounting Brackets (→ Page A-230)

③ Flexible Couplings (→ Page A-233)

No.	Product Name	Overview	Page
①	Extension Cables	Cable for extending the wiring distance between the motor and speed control unit (1 to 4 m).	A-238
②	Mounting Brackets	Dedicated mounting bracket for the motor and gearhead.	A-230
③	Flexible Couplings	Clamp type coupling that connects the motor or gearhead shaft to the driven shaft.	A-233

● Example of System Configuration

(Body) (Sold separately) (Sold separately)

US Series (Pinion Shaft)	Long Life, Low Noise Gearhead	+	Extension Cable (1 m)	Mounting Bracket	Flexible Coupling
US425-40E2	4GN25S		CC01SU05	SOL4M5	MCL301012

● Gearheads cannot be combined with round shaft type motors.

● The system configuration shown above is an example. Other combinations are available.

Product Number Code

US Series

US 5 40 - 4 0 2E 2

① ② ③ ④ ⑤ ⑥ ⑦

①	Series	US: US Series
②	Motor Frame Size	2: 60 mm 3: 70 mm 4: 80 mm 5: 90 mm
③	Output Power (W)	(Example) 40: 40 W
④	Motor Shaft Type, Type of Pinion	0: Round Shaft 4: GN Type Pinion Shaft 5: GU Type Pinion Shaft
⑤	Motor Type	0: Induction Motor
⑥	Power Supply Voltage	1U: Single-Phase 110/115 VAC 2E: Single-Phase 220/230 VAC
⑦		2: RoHS-Compliant

Gearhead

5 GN 50 S

① ② ③ ④

①	Gearhead Frame Size	2: 60 mm 3: 70 mm 4: 80 mm 5: 90 mm
②	Type of Pinion	GN: GN Type Pinion GU: GU Type Pinion
③	Gear Ratio	(Example) 50: Gear Ratio of 1:50 10X denotes the decimal gearhead of gear ratio 1:10
④	GN Type Pinion	S: Long Life, Low Noise GN-S Gearhead, RoHS-Compliant RH: Right-Angle, Hollow Shaft Gearhead, RoHS-Compliant RA: Right-Angle, Solid Shaft Gearhead, RoHS-Compliant
	GU Type Pinion	KB: GU Gearhead (Box type), RoHS-Compliant RH: Right-Angle, Hollow Shaft Gearhead, RoHS-Compliant RA: Right-Angle, Solid Shaft Gearhead, RoHS-Compliant

Product Line

US Series (RoHS)

Output Power	Power Supply Voltage	Model		Page
		Pinion Shaft Type	Round Shaft Type	
6 W	Single-Phase 110/115 VAC	US206-401U2	US206-001U2	*
	Single-Phase 220/230 VAC	US206-402E2	US206-002E2	A-167
15 W	Single-Phase 110/115 VAC	US315-401U2	US315-001U2	*
	Single-Phase 220/230 VAC	US315-402E2	US315-002E2	A-167
25 W	Single-Phase 110/115 VAC	US425-401U2	US425-001U2	*
	Single-Phase 220/230 VAC	US425-402E2	US425-002E2	A-167
40 W	Single-Phase 110/115 VAC	US540-401U2	US540-001U2	*
	Single-Phase 220/230 VAC	US540-402E2	US540-002E2	A-167
60 W	Single-Phase 110/115 VAC	US560-501U2	US560-001U2	*
	Single-Phase 220/230 VAC	US560-502E2	US560-002E2	A-167
90 W	Single-Phase 110/115 VAC	US590-501U2	US590-001U2	*
	Single-Phase 220/230 VAC	US590-502E2	US590-002E2	A-167

* For the single-phase 110/115 VAC models, please contact the nearest Oriental Motor sales office.

The following items are included in each product.

Motor, Speed Control Unit, Capacitor*, Capacitor Cap*,
Mounting Screws for Speed Control Unit, Operating Manual
* Only for 60 W and 90 W types

Parallel Shaft Gearhead (Sold separately)

◇ Long Life, Low Noise **GN-S** Gearhead (RoHS)

Applicable Motor Output Power (Pinion Shaft)	Gearhead Model	Gear Ratio
6 W	2GN□S	3~180
	2GN10XS (Decimal Gearhead)	
15 W	3GN□S	3~180
	3GN10XS (Decimal Gearhead)	
25 W	4GN□S	3~180
	4GN10XS (Decimal Gearhead)	
40 W	5GN□S	3~180
	5GN10XS (Decimal Gearhead)	

● Enter the gear ratio in the box (□) within the model name.

◇ **GU** Gearhead (RoHS)

Applicable Motor Output Power (Pinion Shaft)	Gearhead Model	Gear Ratio
60 W	5GU□KB	3~180
90 W	5GU10XKB (Decimal Gearhead)	

● Enter the gear ratio in the box (□) within the model name.

The following items are included in each product.

Gearhead, Mounting Screws, Parallel Key*, Operating Manual
* Only for the products with a key slot on the output shaft

● Right-Angle Gearhead (Sold separately)

◇ Hollow Shaft Type (RoHS)

Applicable Motor Output Power (Pinion Shaft)	Gearhead Model	Gear Ratio
25 W	4GN□RH	3~180
40 W	5GN□RH	3~180
60 W 90 W	5GU□RH	3~180

● Enter the gear ratio in the box (□) within the model name.

The following items are included in each product.
Gearhead, Mounting Screws, Parallel Key, Safety Cover (with screws), Gasket, Operating Manual

◇ Solid Shaft Type (RoHS)

Applicable Motor Output Power (Pinion Shaft)	Gearhead Model	Gear Ratio
25 W	4GN□RA	3~180
40 W	5GN□RA	3~180
60 W 90 W	5GU□RA	3~180

● Enter the gear ratio in the box (□) within the model name.

The following items are included in each product.
Gearhead, Mounting Screws, Parallel Key, Gasket, Operating Manual

■ Specifications (RoHS)



Model		Max. Output Power W	Voltage VAC	Frequency Hz	Variable Speed Range* r/min	Permissible Torque		Starting Torque mN-m	Current A	Power Consumption W		
Pinion Shaft Type	Round Shaft Type					1200 r/min mN-m	90 r/min mN-m					
Ⓟ US206-402E2	US206-002E2	6	Single-Phase 220	50	90~1400	44	40	38	0.13	28		
				60	90~1600	50	39	40				
				Single-Phase 230		50	90~1400	47			38	40
				60	90~1600	50	37					
Ⓟ US315-402E2	US315-002E2	15	Single-Phase 220	50	90~1400	125	35	54	0.21	40		
				60	90~1600	85		52	0.18	39		
				Single-Phase 230		50		90~1400	125	54	0.21	41
				60	90~1600	105		55	0.22	44		
Ⓟ US425-402E2	US425-002E2	25	Single-Phase 220	50	90~1400	205	40	100	0.36	68		
				60	90~1600	160		0.37				
				Single-Phase 230		50		90~1400	205		40	0.35
				60	90~1600	140		35	110		0.36	
Ⓟ US540-402E2	US540-002E2	40	Single-Phase 220	50	90~1400	300	63	140	0.53	90		
				60	90~1600	230		125	0.55	98		
				Single-Phase 230		50		90~1400	300	140	0.53	90
				60	90~1600	230		140	0.55	100		
Ⓟ US560-502E2	US560-002E2	60	Single-Phase 220	50	90~1400	490	140	240	0.85	154		
				60	90~1600	450	160	210	0.86	159		
				Single-Phase 230		50	90~1400	490	140	240	0.89	154
				60	90~1600	450	160	240	0.88	165		
Ⓟ US590-502E2	US590-002E2	90	Single-Phase 220	50	90~1400	730	230	360	1.1	200		
				60	90~1600		260	360		221		
				Single-Phase 230			50	90~1400	230	400	1.2	201
				60	90~1600		260	400		227		

*The variable speed ranges shown are under no load conditions.

● In addition to the products shown above, the products for single-phase 110/115 VAC are also available. Please contact the nearest Oriental Motor sales office.

Ⓟ: Impedance protected

Ⓟ: Contains a built-in thermal protector (automatic return type). If a motor overheats for any reason, the thermal protector is activated and the motor is stopped. When the motor temperature drops, the thermal protector closes and the motor restarts. Be sure to turn the motor off before inspecting.

General Specifications

Item	Motor	Control Unit
Insulation Resistance	100 MΩ or more when 500 VDC megger is applied between the windings and the case after rated operation under normal ambient temperature and humidity.	100 MΩ or more when 500 VDC megger is applied between all the pins and the case after rated operation under normal ambient temperature and humidity.
Dielectric Strength	Sufficient to withstand 1.5 kV at 50 Hz or 60 Hz applied between the windings and the case for 1 minute after rated operation under normal ambient temperature and humidity.	Sufficient to withstand 3.0 kV at 60 Hz applied between all the pins and the case for 1 minute after rated operation under normal ambient temperature and humidity.
Temperature Rise	Temperature rise of windings are 80°C or less measured by the resistance change method after rated operation with no load under normal ambient temperature and humidity with connecting a gearhead or equivalent heat radiation plate* to a motor.	—
Overheat Protection	US206 type has impedance protection. All others have built-in thermal protector (automatic return type). Operating temperature; open: 130±5°C, close: 82±15°C	—
Operating Environment	Ambient Temperature	0~+40°C (non-freezing)
	Ambient Humidity	85% or less (non-condensing)
	Altitude	Up to 1000 m above sea level
Insulation Class	Class B (130°C)	—
Degree of Protection	US206 , US315 , US425 and US540 types: IP20 US560 and US590 types: IP40	IP10

*Heat radiation plate (Material: Aluminum)

Motor Type (Output)	Size (mm)	Thickness (mm)
US206 type (6 W)	115×115	5
US315 type (15 W)	125×125	
US425 type (25 W)	135×135	
US540 type (40 W)	165×165	
US560 type (60 W)	200×200	
US590 type (90 W)	200×200	

Variable 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	50 Hz	466	388	280	233	186	155	112	93	77	56	46	38	28	23	18	15	14	11	9	7
	60 Hz	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	

Gearmotor – Torque Table

- Gearheads and decimal gearheads are sold separately.
- Enter the gear ratio in the box (□) within the model name.
- A colored background (□) indicates gear shaft rotation in the same direction as the motor shaft, while the others rotate in the opposite direction.
- To reduce the speed beyond the gear ratio in the table, attach a decimal gearhead of gear ratio 1/10 between the gearhead and the motor. In that case, the permissible torques are as follows.

2GN□S: 3 N·m, **3GN□S:** 5 N·m

4GN□S: 8 N·m (6 N·m when a gearhead of 1/25~1/36 is attached)

5GN□S: 10 N·m, **5GU□KB:** 20 N·m

Model Motor/ Gearhead		Gear Ratio		Unit = N·m																			
		Motor Speed r/min	3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180	
US206-402E2 /2GN□S	1200	220/230 VAC 60 Hz	0.12	0.15	0.20	0.24	0.30	0.36	0.51	0.61	0.73	0.91	1.1	1.3	1.7	2.0	2.5	3	3	3	3	3	3
		220 VAC 50 Hz	0.11	0.13	0.18	0.21	0.27	0.32	0.45	0.53	0.64	0.80	0.96	1.2	1.5	1.7	2.2	2.6	2.9	3	3	3	3
		230 VAC 50 Hz	0.11	0.14	0.19	0.23	0.29	0.34	0.48	0.57	0.69	0.86	1.0	1.2	1.6	1.9	2.3	2.8	3	3	3	3	3
	90	220 VAC 60 Hz	0.095	0.11	0.16	0.19	0.24	0.28	0.39	0.47	0.57	0.71	0.85	1.0	1.3	1.5	1.9	2.3	2.6	3	3	3	3
		230 VAC 60 Hz	0.09	0.11	0.15	0.18	0.22	0.27	0.37	0.45	0.54	0.68	0.81	0.97	1.2	1.5	1.8	2.2	2.4	2.9	3	3	3
		220 VAC 50 Hz	0.097	0.12	0.16	0.19	0.24	0.29	0.41	0.49	0.58	0.73	0.88	1.1	1.3	1.6	2.0	2.4	2.6	3	3	3	3
	1200	230 VAC 50 Hz	0.092	0.11	0.15	0.18	0.23	0.28	0.38	0.46	0.55	0.69	0.83	1.0	1.3	1.5	1.9	2.3	2.5	3	3	3	3
		220 VAC 60 Hz	0.21	0.25	0.34	0.41	0.52	0.62	0.86	1.0	1.2	1.6	1.9	2.2	2.8	3.4	4.2	5	5	5	5	5	5
		220/230 VAC 50 Hz	0.30	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	5
US315-402E2 /3GN□S	1200	230 VAC 60 Hz	0.26	0.31	0.43	0.51	0.64	0.77	1.1	1.3	1.5	1.9	2.3	2.8	3.5	4.2	5	5	5	5	5	5	5
		90	0.085	0.10	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	3.5	4.2	
		220 VAC 60 Hz	0.39	0.47	0.65	0.78	0.97	1.2	1.6	1.9	2.3	2.9	3.5	4.2	5.3	6.3	7.9	8	8	8	8	8	8
	1200	230 VAC 60 Hz	0.34	0.41	0.57	0.68	0.85	1.0	1.4	1.7	2.0	2.6	3.1	3.7	4.6	5.5	6.9	8	8	8	8	8	8
		220/230 VAC 50 Hz	0.50	0.60	0.83	1.0	1.2	1.5	2.1	2.5	3.0	3.7	4.5	5.4	6.8	8	8	8	8	8	8	8	8
		90	220 VAC 50/60 Hz 230 VAC 50 Hz	0.097	0.12	0.16	0.19	0.24	0.29	0.41	0.49	0.58	0.73	0.88	1.1	1.3	1.6	2.0	2.4	2.6	3.2	4.0	4.8
230 VAC 60 Hz	0.085		0.10	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	3.5	4.2		
US425-402E2 /4GN□S	1200	220/230 VAC 60 Hz	0.56	0.67	0.93	1.1	1.4	1.7	2.3	2.8	3.4	4.2	5.0	6.0	7.6	9.1	10	10	10	10	10	10	10
		220/230 VAC 50 Hz	0.73	0.87	1.2	1.5	1.8	2.2	3.0	3.6	4.4	5.5	6.6	7.9	9.9	10	10	10	10	10	10	10	10
		90	0.15	0.18	0.26	0.31	0.38	0.46	0.64	0.77	0.92	1.1	1.4	1.7	2.1	2.5	3.1	3.7	4.2	5.0	6.2	7.5	
US560-502E2 /5GU□KB	1200	220/230 VAC 60 Hz	1.1	1.3	1.8	2.2	2.7	3.3	4.1	4.9	5.9	7.4	8.9	10.7	14.9	17.8	19.9	20	20	20	20	20	
		220/230 VAC 50 Hz	1.2	1.4	2.0	2.4	3.0	3.6	4.5	5.4	6.4	8.1	9.7	11.6	16.2	19.4	20	20	20	20	20	20	
	90	220/230 VAC 60 Hz	0.39	0.47	0.65	0.78	0.97	1.2	1.5	1.8	2.1	2.6	3.2	3.8	5.3	6.3	7.1	8.5	9.4	11.3	14.2	17.0	
		220/230 VAC 50 Hz	0.34	0.41	0.57	0.68	0.85	1.0	1.3	1.5	1.8	2.3	2.8	3.3	4.6	5.5	6.2	7.4	8.3	9.9	12.4	14.9	
US590-502E2 /5GU□KB	90	1200	1.8	2.1	3.0	3.5	4.4	5.3	6.7	8.0	9.6	12.0	14.5	17.3	20	20	20	20	20	20	20	20	
		220/230 VAC 60 Hz	0.63	0.76	1.1	1.3	1.6	1.9	2.4	2.8	3.4	4.3	5.1	6.2	8.6	10.3	11.5	13.8	15.3	18.4	20	20	
		220/230 VAC 50 Hz	0.56	0.67	0.93	1.1	1.4	1.7	2.1	2.5	3.0	3.8	4.6	5.5	7.6	9.1	10.2	12.2	13.6	16.3	20	20	

Introduction

Induction Motors

Reversible Motors

Electro-magnetic Brake Motors

Right-Angle Gearheads

Brake Pack SB50W

US AC Speed Control Motors

ES02

FE100/FE200 Inverter

Water/Right Dust-Resistant Motors

Torque Motors

Accessories

Installation

■ Gearmotor – Torque Table When Right-Angle Gearhead is Attached

A right-angle gearhead can be attached to 25 W, 40 W and 60 W types. → Page A-139

■ Permissible Overhung Load and Permissible Thrust Load

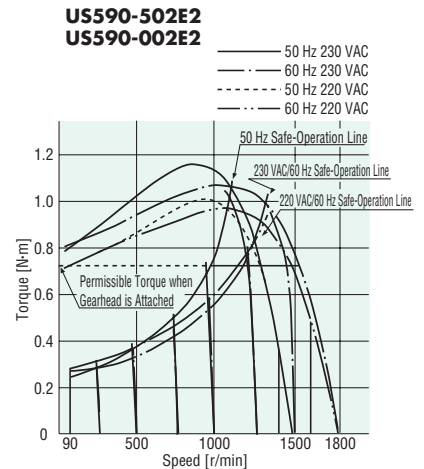
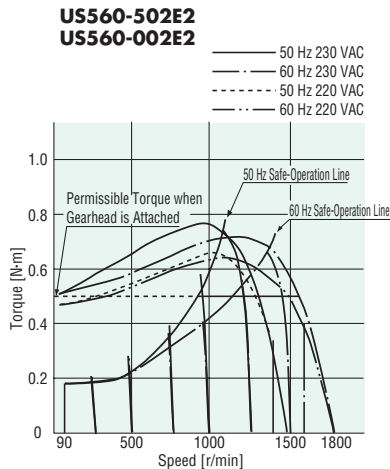
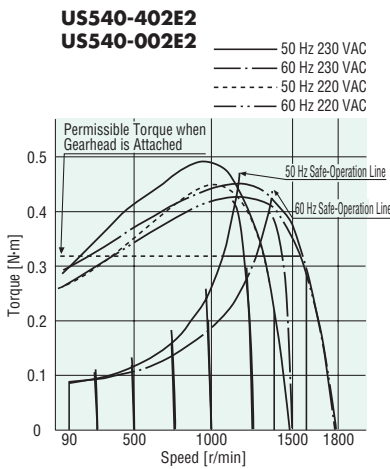
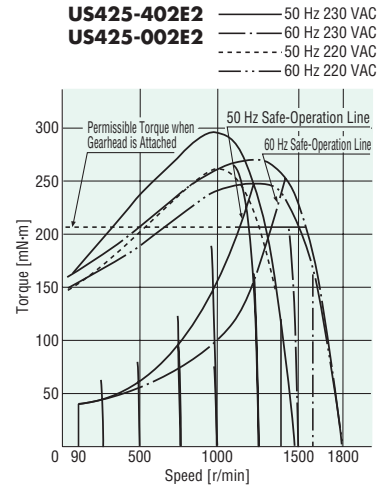
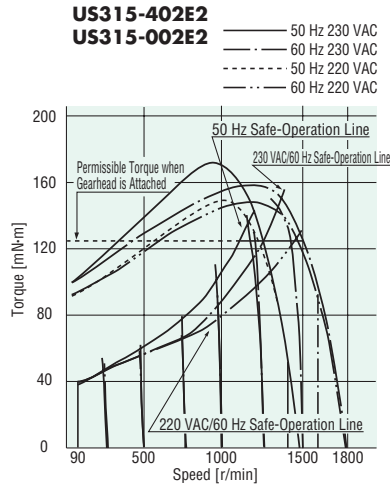
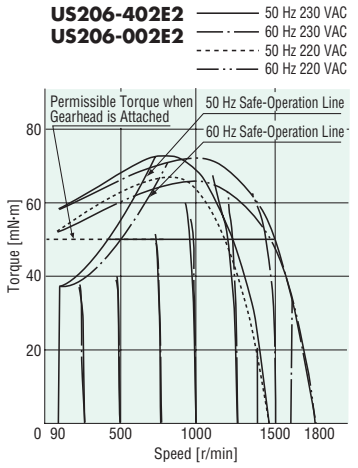
Motor (Round Shaft Type) → Page A-15

Gearhead → Page A-15

■ Permissible Load Inertia of Gearhead: J

→ Page A-16

■ Speed – Torque Characteristics



Dimensions (Unit = mm)

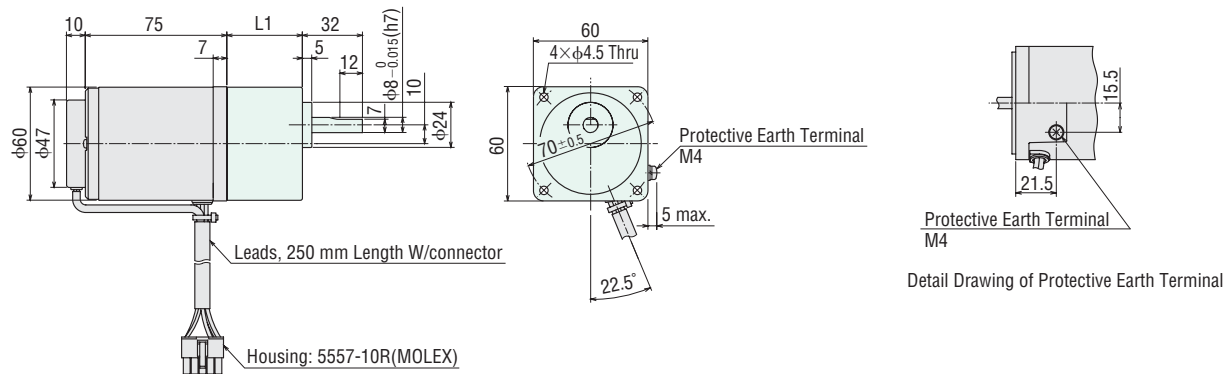
● Mounting screws are included with gearheads. Dimensions for mounting screws → Page A-246

● 6 W

◇ Motor/Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L1
US206-402E2	USM206-402W2	2GN□S	3~18	30
			25~180	40

Mass: Motor 0.8 kg
Gearhead 0.4 kg

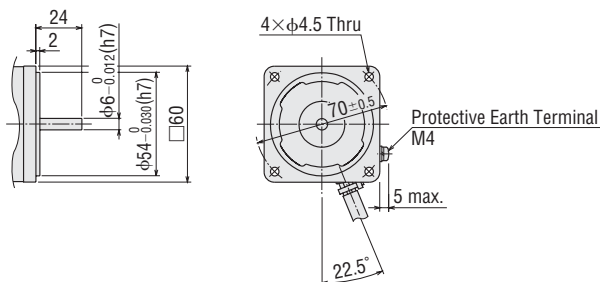


◇ Shaft Section of Round Shaft Type

The motor's dimensions (excluding the shaft section) are the same as those of the pinion shaft types.

US206-002E2

Motor: USM206-002W2
Mass: 0.8 kg

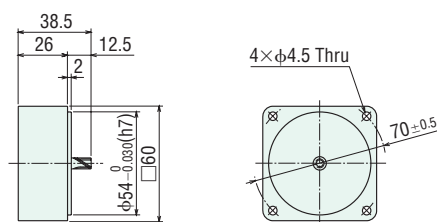


◇ Decimal Gearhead

Can be connected to **US206** pinion shaft type.

2GN10XS

Mass: 0.2 kg



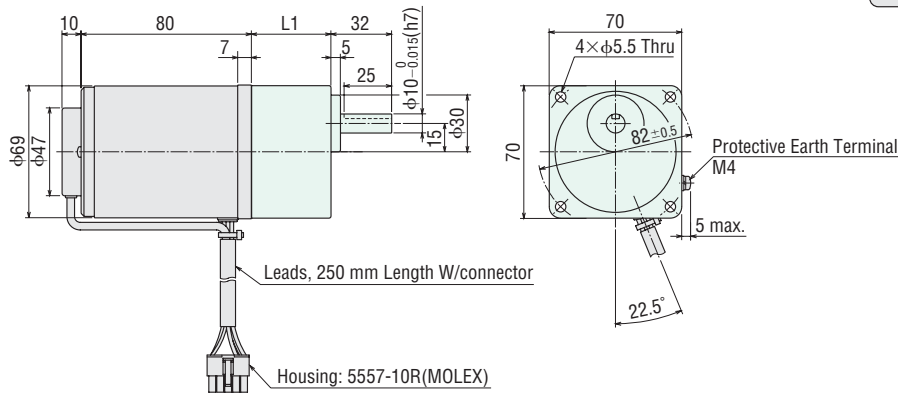
● Enter the gear ratio in the box (□) within the model name.

● 15 W

◇ Motor/Gearhead

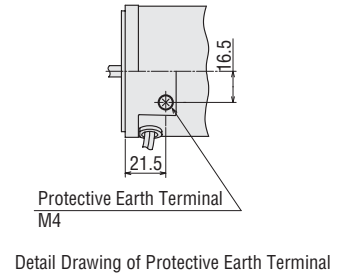
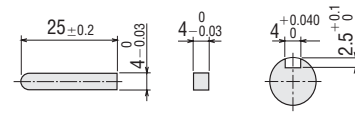
Model	Motor Model	Gearhead Model	Gear Ratio	L1
US315-402E2	USM315-402W2	3GN□S	3~18	32
			25~180	42

Mass: Motor 1.2 kg
Gearhead 0.55 kg



◇ Key and Key Slot

(The key is included with the gearhead)



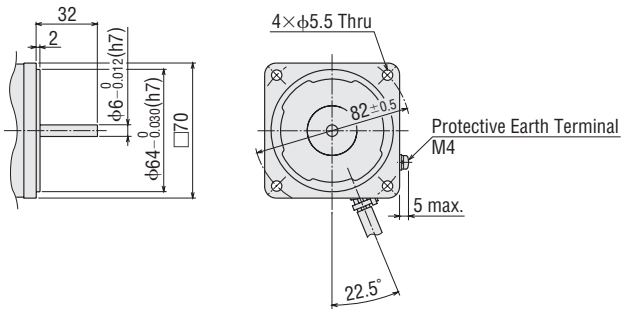
◇ Shaft Section of Round Shaft Type

The motor's dimensions (excluding the shaft section) are the same as those of the pinion shaft types.

US315-002E2

Motor: USM315-002W2

Mass: 1.2 kg

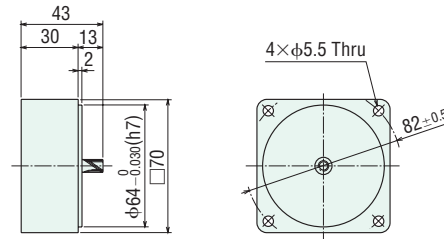


◇ Decimal Gearhead

Can be connected to **US315** pinion shaft type.

3GN10XS

Mass: 0.3 kg

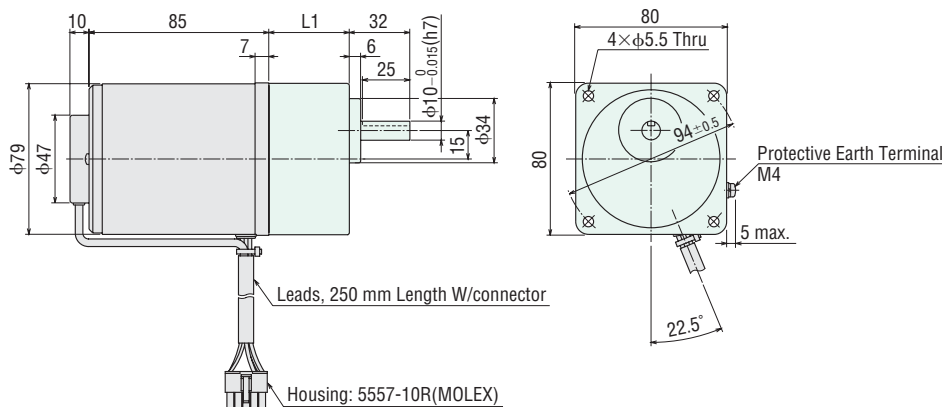


● 25 W

◇ Motor/Gearhead

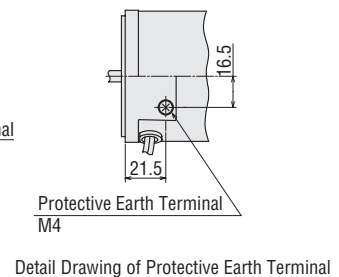
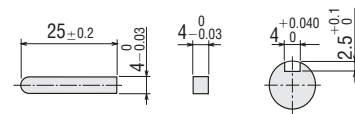
Model	Motor Model	Gearhead Model	Gear Ratio	L1
US425-402E2	USM425-402W2	4GN□S	3~18	32
			25~180	42.5

Mass: Motor 1.6 kg
Gearhead 0.65 kg



◇ Key and Key Slot

(The key is included with the gearhead)



● Enter the gear ratio in the box (□) within the model name.

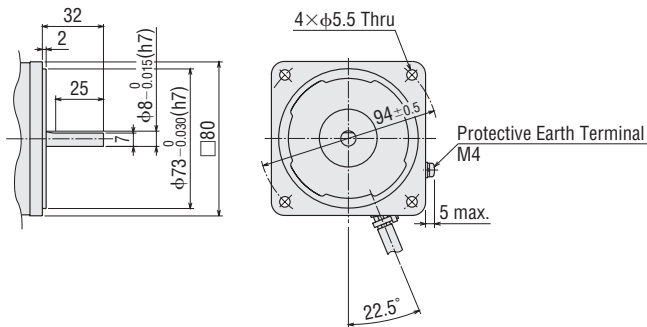
◆ Shaft Section of Round Shaft Type

The motor's dimensions (excluding the shaft section) are the same as those of the pinion shaft types.

US425-002E2

Motor: USM425-002W2

Mass: 1.6 kg

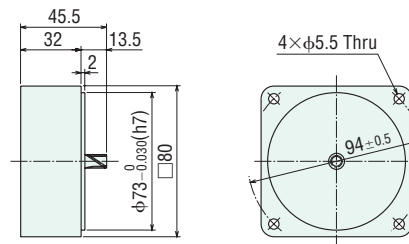


◆ Decimal Gearhead

Can be connected to **US425** pinion shaft type.

4GN10XS

Mass: 0.4 kg



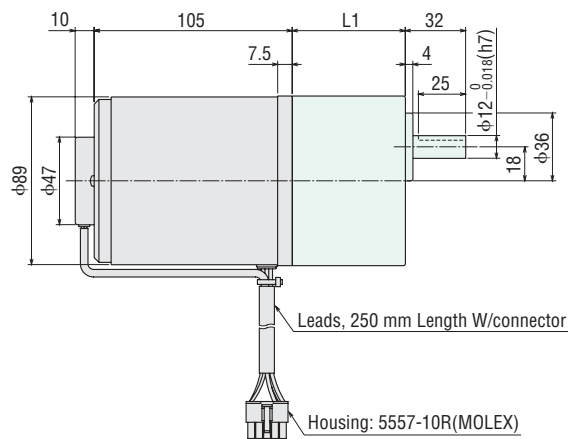
● 40 W

◆ Motor/Gearhead

Model	Motor Model	Gearhead Model	Gear Ratio	L1
US540-402E2	USM540-402W2	5GN□S	3~18	42
			25~180	60

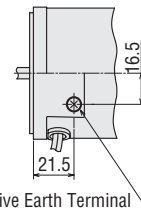
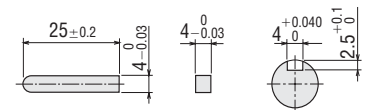
Mass: Motor 2.6 kg

Gearhead 1.5 kg



◆ Key and Key Slot

(The key is included with the gearhead)



Detail Drawing of Protective Earth Terminal

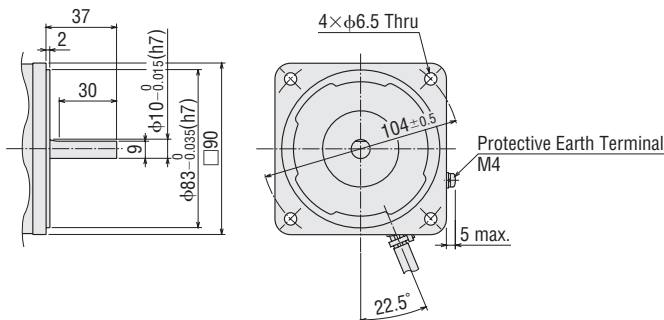
◆ Shaft Section of Round Shaft Type

The motor's dimensions (excluding the shaft section) are the same as those of the pinion shaft types.

US540-002E2

Motor: USM540-002W2

Mass: 2.6 kg

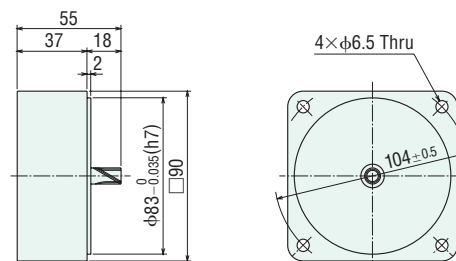


◆ Decimal Gearhead

Can be connected to **US540** pinion shaft type.

5GN10XS

Mass: 0.6 kg



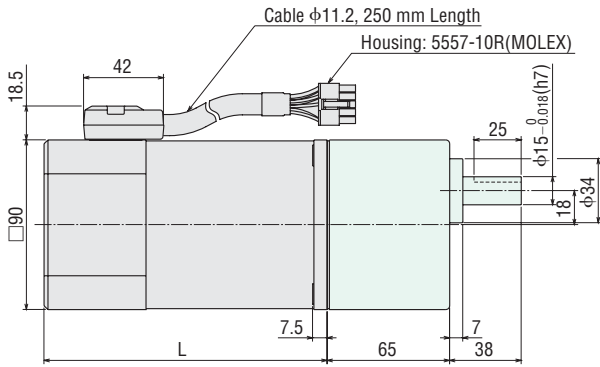
● Enter the gear ratio in the box (□) within the model name.

● 60 W

◇ Motor/Gearhead

Model	Motor Model	Gearhead Model	L
US560-502E2	USM560-502W-1	5GU□KB	150

Mass: Motor 2.8 kg
Gearhead 1.5 kg

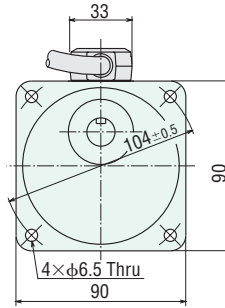


● 90 W

◇ Motor/Gearhead

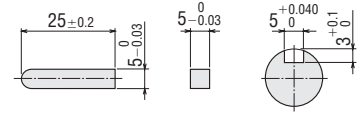
Model	Motor Model	Gearhead Model	L
US590-502E2	USM590-502W-1	5GU□KB	165

Mass: Motor 3.6 kg
Gearhead 1.5 kg



◇ Key and Key Slot

(The key is included with the gearhead)



◇ Shaft Section of Round Shaft Type

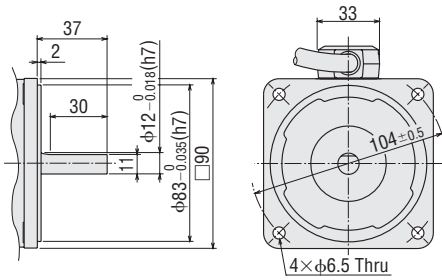
The motor's dimensions (excluding the shaft section) are the same as those of the pinion shaft types.

US560-002E2

Motor: USM560-002W-1
Mass: 2.8 kg

US590-002E2

Motor: USM590-002W-1
Mass: 3.6 kg

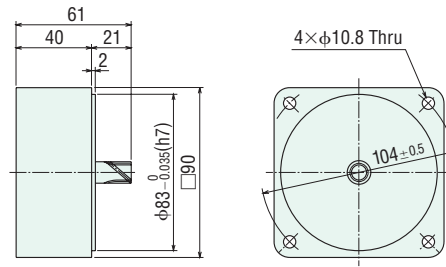


◇ Decimal Gearhead

Can be connected to **US560** or **US590** pinion shaft types.

5GU10XKB

Mass: 0.6 kg

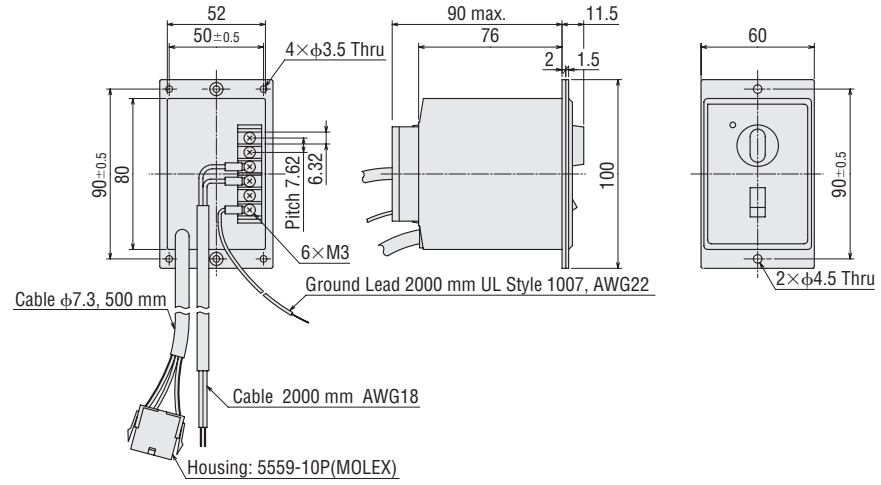


● Enter the gear ratio in the box (□) within the model name.

◇ Control Unit

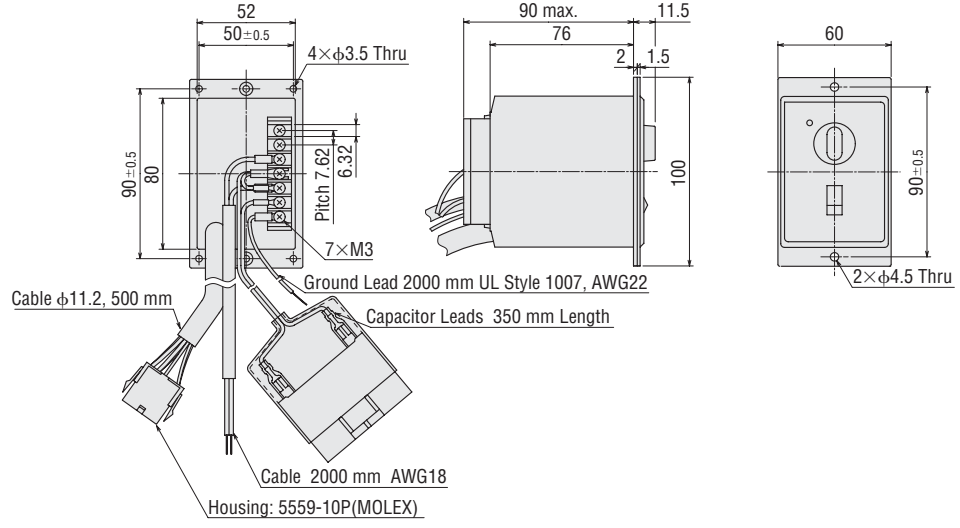
Common to **US206**, **US315**, **US425** and **US540** Types

- USP206-2E2
- USP315-2E2
- USP425-2E2
- USP540-2E2
- Mass: 0.45 kg



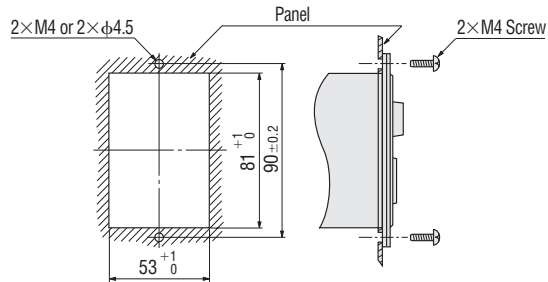
Common to **US560** and **US590** Types

- USP560-2E2
- USP590-2E2
- Mass: 0.5 kg



◇ Panel Cut-Out for Control Unit

Installation Method by Cutting a Square Hole



Introduction

Induction Motors

Reversible Motors

Electro-magnetic Brake Motors

Right-Angle Gearheads

Brake Pack SB50W

US AC Speed Control Motors

ES02

FE100/FE200 Inverter

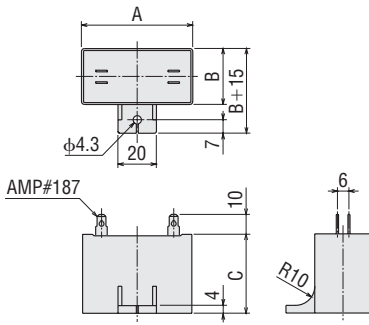
Water/Tight Dust-Resistant Motors

Torque Motors

Accessories

Installation

◇ Capacitor (Included)



◇ Capacitor Dimensions (mm)

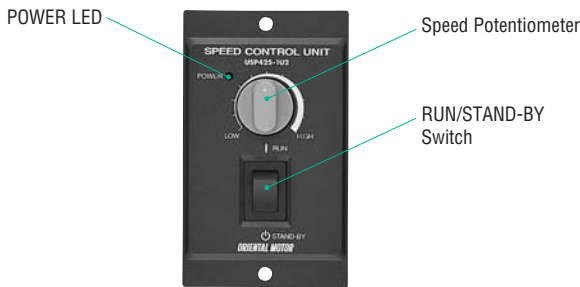
Model		Capacitor Model	A	B	C	Mass (g)
Pinion Shaft Type	Round Shaft Type					
US560-502E2	US560-002E2	CH40BFAUL	58	23.5	37	70
US590-502E2	US590-002E2	CH60BFAUL	58	29	41	85

● A capacitor cap is included with a capacitor.

■ Connection and Operation

● Names and Functions of Control Unit Parts

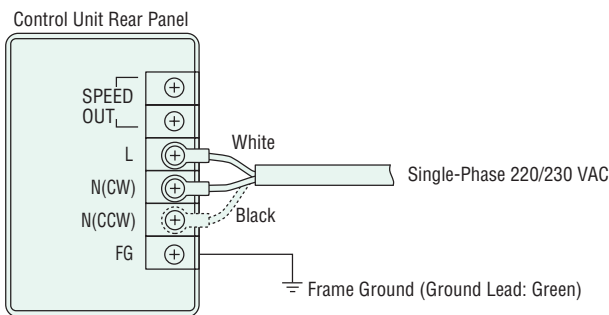
Control Unit Front Panel



● Connection Diagrams

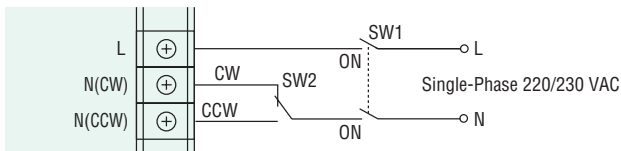
◇ US206, US315, US425 and US540 types

Continuous Rotation:



● In the diagrams above, the motor shaft rotates in the clockwise direction.
When changed to the dotted line [N (CCW)] position, the motor shaft rotates in the counterclockwise direction.

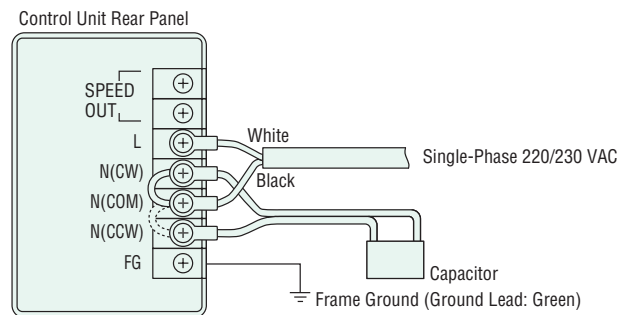
Bi-Directional Rotation:



Contact Capacity of Switch
250 VAC 5 A min. (Inductive load)

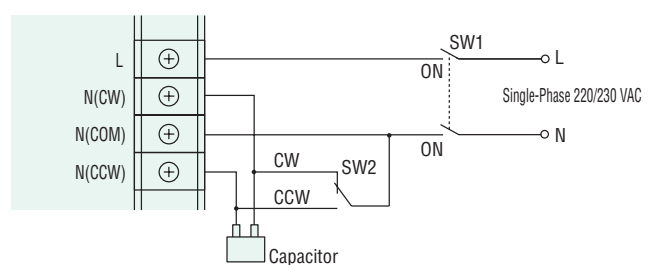
◇ US560 and US590 types

Continuous Rotation:



● In the diagrams above, the motor shaft rotates in the clockwise direction.
When changed to the dotted line [N (CCW)] position, the motor shaft rotates in the counterclockwise direction.

Bi-Directional Rotation:



Contact Capacity of Switch
250 VAC 5 A min. (Inductive load)

● How to connect a capacitor → Page A-247

● Operation Method

There is a difference in operation method between the **US206, US315, US425, US540** types and the **US560, US590** types.

◇ Rotation

Connect the motor lead wire connectors to the control unit. Then connect the power cable (2 m, AWG18) to the AC power supply. When the RUN/STAND-BY switch on the control unit is set to RUN, the motor rotates in the clockwise (CW) direction as viewed from the motor output shaft. Control units are set for clockwise rotation at shipment. The rotation direction on the gearhead output shaft may be the opposite direction of the motor shaft depending on the gear ratio.

◇ Changing Speed

When dial on the speed potentiometer located on the control unit is turned in a clockwise direction, motor speed increases; when turned in the counterclockwise direction, motor speed decreases. Motor speed can be set and adjusted over a range of 90 to 1400 r/min at 50 Hz, 90 to 1600 r/min at 60 Hz.

◇ Stopping

When the RUN/STAND-BY switch on the control unit is set to STAND-BY, the motor stops. This switch is not a power ON/OFF switch. If the motor is to be stopped for a long time, a separate power ON/OFF switch should be installed.

◇ Switching the Rotation Direction

• **US206, US315, US425 and US540** types
(Capacitor is included in the control unit.)

Uni-Directional Rotation:

When the rotation direction of motor needs to be reversed, change the terminal used for attaching the power cable, located at the rear panel of control unit, from terminal N (CW) to terminal N (CCW). The power cable connections are located at terminals L and N (CW) when shipped. This should always be done with the power OFF.

Bi-Directional Rotation:

Install an additional power switch (SW1) and CW/CCW switch (SW2) as shown on page A-176, and use these switches to change the rotation direction. Motor cannot be reversed instantaneously. Turn SW1 off and wait until the motor has come to a complete stop before switching SW2.

• **US560 and US590** types

(Connection of the included capacitor is necessary.)

Uni-Directional Rotation:

When the rotation direction of motor needs to be reversed, change the terminal used for attaching the power cable, located at the rear panel of control unit, from terminals N (CW)-N (COM) to terminals N (COM)-N (CCW). The power cable connections are located at terminals N (CW)-N (COM) when shipped. This should always be done with the power OFF.

Bi-Directional Rotation:

Install an additional power switch (SW1) and CW/CCW switch (SW2) as shown on page A-176, and use these switches to change the rotation direction. Motor cannot be reversed instantaneously. Turn SW1 off and wait until the motor has come to a complete stop before switching SW2.

■ List of Motor and Control Unit Combinations

Model name for motor and control unit combinations are shown below.

Output Power	Model	Motor Model	Control Unit Model
6 W	US206-402E2	USM206-402W2	USP206-2E2
	US206-002E2	USM206-002W2	
15 W	US315-402E2	USM315-402W2	USP315-2E2
	US315-002E2	USM315-002W2	
25 W	US425-402E2	USM425-402W2	USP425-2E2
	US425-002E2	USM425-002W2	
40 W	US540-402E2	USM540-402W2	USP540-2E2
	US540-002E2	USM540-002W2	
60 W	US560-502E2	USM560-502W-1	USP560-2E2
	US560-002E2	USM560-002W-1	
90 W	US590-502E2	USM590-502W-1	USP590-2E2
	US590-002E2	USM590-002W-1	

Standard AC Motors

Accessories

	<u>Page</u>
Motor/Gearhead Mounting Brackets.....	A-230
Flexible Couplings	A-233
External Speed Potentiometer.....	A-237
Power Relay Box for Watertight Type.....	A-237
Extension Cable for Watertight Type.....	A-238
Extension Cables.....	A-238
Connection Cables	A-239
Front Cover.....	A-239
Noise Filter	A-240
CR Circuit for Surge Suppression	A-240

Accessories

Motor/Gearhead Mounting Brackets RoHS

Dedicated mounting Brackets for attaching and securing a motor and gearhead. They are high-strength type, which can be used with high power motor and gearhead. These brackets come with tapped holes. To mount the motor and gearhead, simply fasten with the screws provided to the gearhead. To mount the motor alone, mounting screws must be purchased separately.

Please note that these mounting brackets cannot be used with the following products:

- Right-angle gearheads (**RH** type, **RA** type)
- Right-angle shaft type (**BH** Series)
- Watertight, dust-resistant motors
- Hollow shaft flat gearhead (**GFS2G**□**FR**, **GFS4G**□**FR**, **GFS5G**□**FR**)
- **GFS6G**□



■ For Motor Frame Size: □ 42 mm

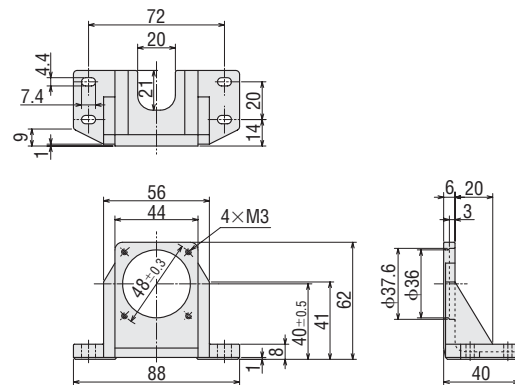
● Model: **SOLOM3**

Mass: 85 g Material: Aluminum alloy

◇ Applicable Products

BLH Series Round shaft type
Frame size 42 mm motor

● Dimensions (Unit = mm)



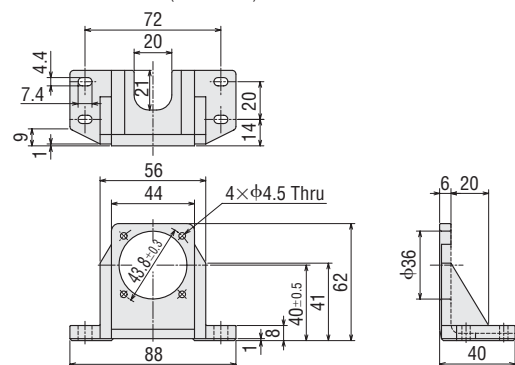
● Model: **SOLOB**

Mass: 85 g Material: Aluminum alloy

◇ Applicable Products

BLH Series Geared motor

● Dimensions (Unit = mm)



■ For Motor Frame Size: □60 mm

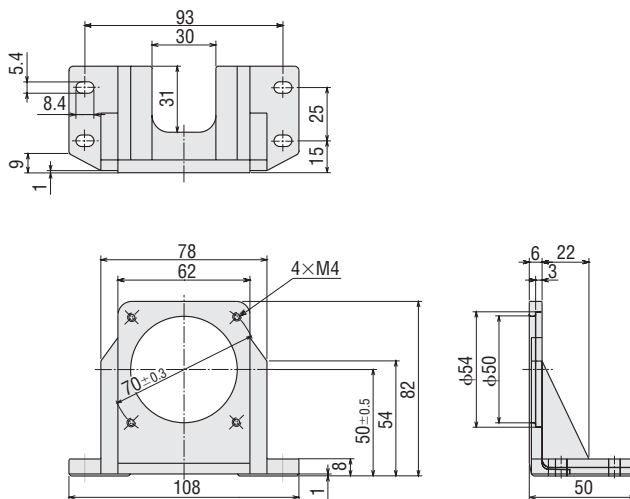
● Model: **SOL2M4**

Mass: 135 g Material: Aluminum alloy

◇ Applicable Products

- 2GN gearhead
- GFS2G gearhead
- Frame size 60 mm motor

● Dimensions (Unit = mm)



■ For Motor Frame Size: □70 mm

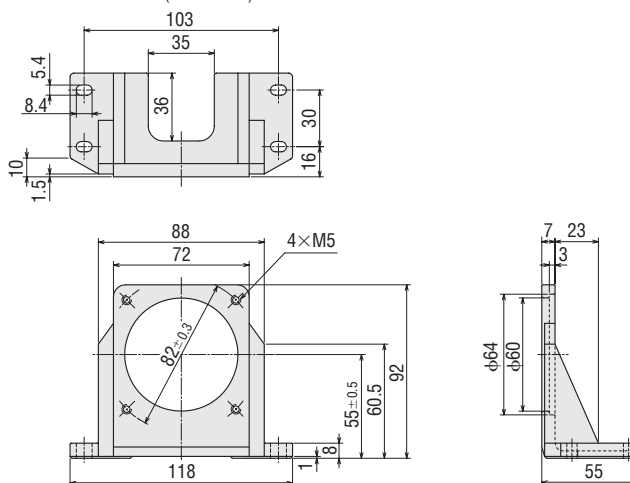
● Model: **SOL3M5**

Mass: 175 g Material: Aluminum alloy

◇ Applicable Products

- 3GN gearhead
- Frame size 70 mm motor

● Dimensions (Unit = mm)



■ For Motor Frame Size: □80 mm

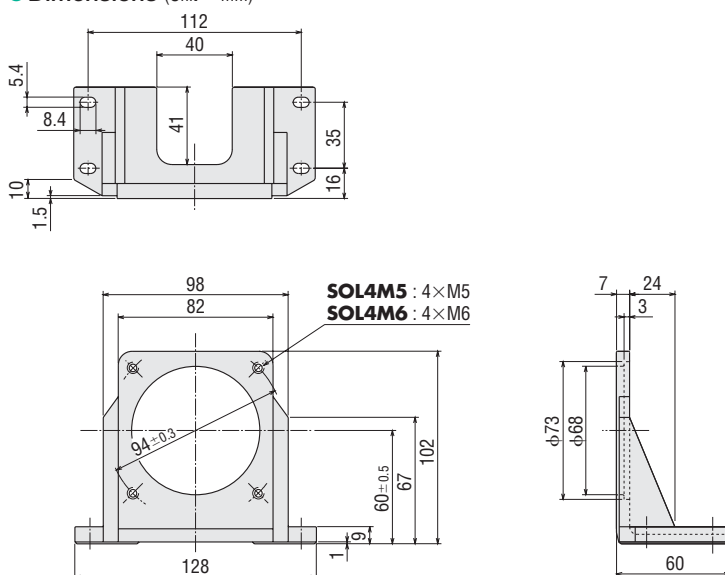
● Model: **SOL4M5, SOL4M6**

Mass: 210 g Material: Aluminum alloy

◇ Applicable Products

- **SOL4M5**
- 4GN gearhead
- For standard AC motors with a frame size 80 mm
- **SOL4M6**
- GFS4G gearhead
- For brushless DC motors with a frame size 80 mm

● Dimensions (Unit = mm)



For Motor Frame Size: 90 mm

Model: SOL5M6, SOL5M8

Mass: 270 g Material: Aluminum alloy

◇ Applicable Products

● **SOL5M6**

5GN gearhead

5GE gearhead

5GU□**KB** gearhead

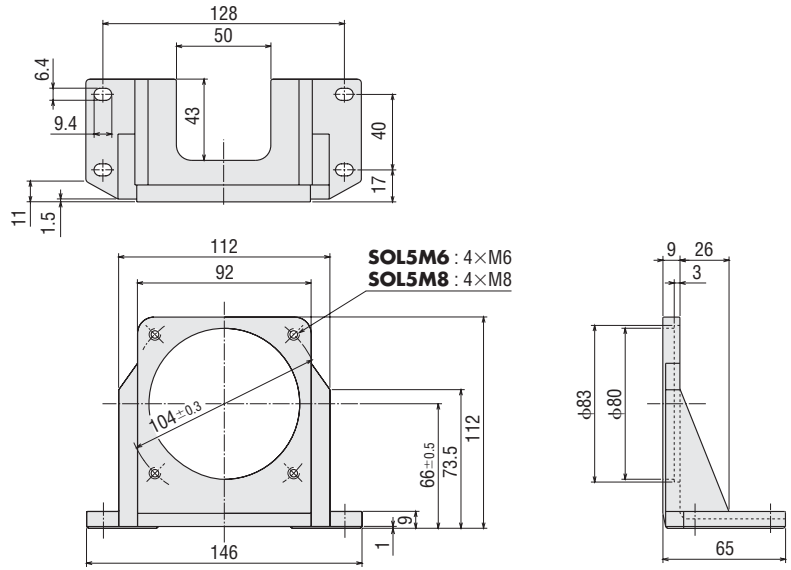
For standard AC motors with a frame size 90 mm

● **SOL5M8**

GFS5G gearhead

For brushless DC motors with a frame size 90 mm

● Dimensions (Unit = mm)



For Motor Frame Size: 104 mm

Model: SOL6M8

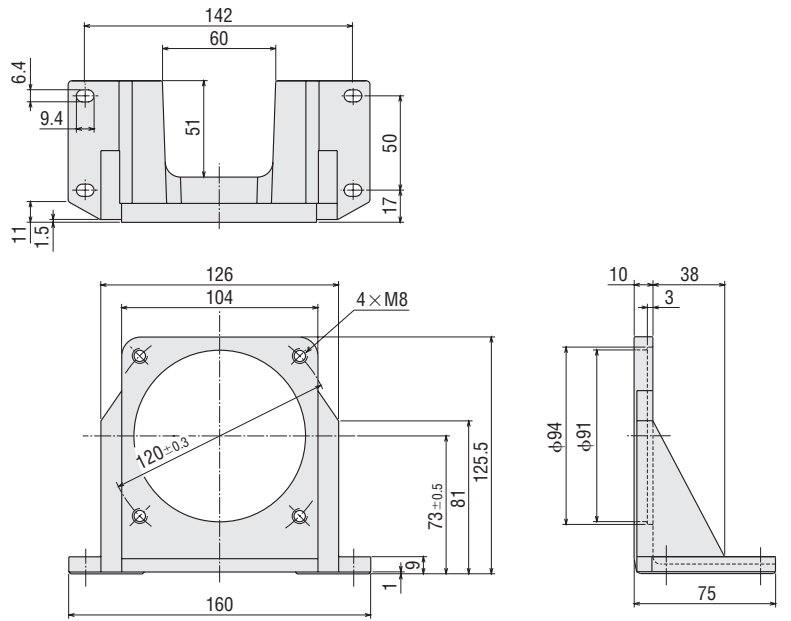
Mass: 380 g Material: Aluminum alloy

◇ Applicable Products

BH Series

BLF Series Round shaft type

● Dimensions (Unit = mm)



Flexible Couplings RoHS

These products are clamp type couplings to connect motor or gearhead shaft to the shaft of the equipment to be connected. Once the motor or gearhead are determined, the coupling can be selected.



Features

- Couplings come with shaft holes and have standardized combinations for different diameter shaft holes.
- Characteristics are the same for clockwise and counterclockwise rotation.
- Oil-resistant and electrically insulated
- Aluminum alloy construction
- The driven shaft is not damaged, since shafts are joined by clamping.
- Easy installation due to a separated hub and sleeve design

Selecting a Flexible Coupling

Once you decide on a motor or gearhead and the shaft diameter of the equipment to be connected, you can select the proper flexible coupling to use. **MCL** couplings are available in external diameter that provide the strength required for the torque of motor or gearhead.

Example **MCL 30 10 12**

Inner Diameter d1 Inner Diameter d2

- For uniform load, when the gearhead is **4GN□S** (shaft outer diameter of $\phi 10$ mm) and the shaft diameter of the equipment to be connected is $\phi 12$ mm, use **MCL301012**.
- For impact-applied use, when the gearhead is **4GN□S** (shaft outer diameter of $\phi 10$ mm) and the shaft diameter of the equipment to be connected is $\phi 12$ mm, use **MCL401012**.

Product Number Code

MCL 40 12 15

- ① ② ③ ④

①	Flexible Coupling	
②	Outer Diameter of Coupling	20: $\phi 20$ mm ~ 65: $\phi 65$ mm
③	Inner Diameter d1 (Small Inner Diameter)	05: $\phi 5$ mm ~ 25: $\phi 25$ mm
④	Inner Diameter d2 (Large Inner Diameter)	05: $\phi 5$ mm ~ 25: $\phi 25$ mm

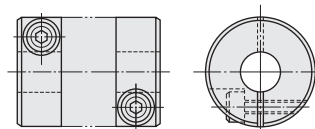
● Details of applicable products → Page A-234

Mounting on a Shaft

The **MCL** couplings are clamp type for mounting the flexible coupling to the shaft.

Clamp Type

Clamp type couplings use the binding force of the screw to compress the axis hole diameter and thereby fasten the coupling to the shaft. This does not damage the shaft and is easy to mount and remove. The following table shows the screw tightening torque. And, the use of a torque wrench is recommended for tightening.



Type	*MCL20	MCL30	MCL40	MCL55	MCL65
Tightening torque [N·m]	1	2.5	12	25	50
Tightening torque of key press screw [N·m]	0.7	1.7	1.7	1.7	4

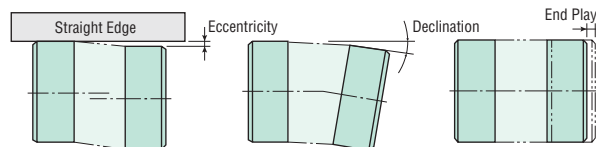
* The screws for holding shaft flat are used for **MCL20** Type.

Alignment Adjustment

Flexible couplings tolerate misalignment of the axis center and transfer rotation angle and torque, but produce vibration when the permissible value for misalignment is exceeded. This can dramatically shorten the life of coupling. Be sure to adjust the alignment.

Misalignment of the axis center includes eccentricity (parallel error of both centers), declination (angle error of both centers) and end play (shaft movement in the axial direction). To keep misalignment within the permissible value, always check and adjust the alignment.

To increase the life of the coupling, we recommend keeping misalignment to below 1/3 of the permissible value.



Notes:

- Misalignment or excessive torque beyond the permissible values will deform the coupling and shorten its life.
- If you hear a strange metallic noise from the coupling while operating, stop the motor immediately and check for misalignment, shaft interference, loose screws or the like.
- When the load fluctuates substantially, paint adhesive over the screws or switch to a larger coupling diameter. This helps to prevent coupling screws from coming loose.
- When using couplings that have no key slot, as on the **MCL20**, **MCL30**, etc., fasten clamping screws before fastening set screws.
- Only use the screws specified by Oriental Motor. Other screws may damage the couplings.
- Do not bring fingers or hands into contact with an operating coupling as injury may result. Always use protective covers to prevent accidents. Also, install safety systems that stop motor rotation as soon as the protective cover is opened.
- Always be sure the power is off during installation. Should the drive unit accidentally start running, injury can occur by being drawn into the device. Always check that main power supply of the device is off before installation.

■ Applicable Products

Couplings are also available for round shaft motors if a shaft diameter matches.

□: For uniform load □: For impact load □: Common use of uniform load and impact load

Gearhead Model		Gearhead Output Shaft Outer Diameter mm	Applicable Shaft Diameter to be Connected mm											Coupling Type	Nominal Torque N-m	Mass g	Outer Diameter mm	Length mm			
Uniform Load	Impact Load		φ5	φ6	φ8	φ10	φ12	φ14	φ15	φ16	φ18	φ20	φ22						φ25		
2GN□S		φ8															MCL20	5	19	φ20	29
	2GN□S	φ8																			
3GN□S 4GN□S 4GN□RA GFS2G□	3GN□S GFS2G□	φ10															MCL30	12.5	66	φ30	43.5
5GN□S 5GN□RA		φ12																			
	4GN□S 4GN□RA	φ10																			
	5GN□S 5GN□RA	φ12																			
5GE□S 5GU□KB 5GE□RA 5GU□RA GFS4G□		φ15															MCL40	25	150	φ40	64
	5GE□S 5GU□KB 5GE□RA 5GU□RA GFS4G□	φ15																			
GFS5G□ BH6G2-□	GFS5G□	φ18																			
	BH6G2-□	φ18																			
BH6G2-□RA GFS6G□	BH6G2-□RA GFS6G□	φ22															MCL65	160	570	φ65	87.5

● The load in this table are of common use. Check the specifications values of each coupling for details.

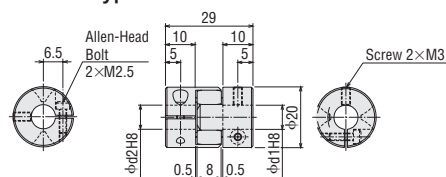
Specifications

Model	Dimension				Nominal Torque [N·m]	Mass [g]	Moment of Inertia J ($\times 10^{-4}$ kg·m ²)	Permissible Eccentricity [mm]	Permissible Declination [°]	End Play [mm]
	Outer Diameter [mm]	Length [mm]	Shaft Hole Diameter d1 [mm]	Shaft Hole Diameter d2 [mm]						
MCL200505 MCL200506 MCL200508 MCL200606 MCL200608 MCL200808	φ20	29	5	5	5.0	19	0.01	0.15	1.0	+0.8 0
5			6							
5			8							
6			6							
6			8							
8			8							
MCL300808 MCL300810 MCL300812 MCL301010 MCL301012 MCL301212	φ30	43.5	8	8	12.5	66	0.083	0.2	1.0	+1.0 0
8			10							
8			12							
10			10							
10			12							
12			12							
MCL401010 MCL401012 MCL401014 MCL401015 MCL401016 MCL401212 MCL401214 MCL401215 MCL401216 MCL401414 MCL401415 MCL401416 MCL401515 MCL401516 MCL401616	φ40	64	10	10	25.0	150	0.36	0.2	1.0	+1.2 0
10			12							
10			14							
10			15							
10			16							
12			12							
12			14							
12			15							
12			16							
14			14							
14			15							
14			16							
15			15							
15			16							
16			16							
MCL551515 MCL551516 MCL551518 MCL551520 MCL551525 MCL551616 MCL551618 MCL551620 MCL551625 MCL551818 MCL551820 MCL551825			φ55	76						
15	16									
15	18									
15	20									
15	25									
16	16									
16	18									
16	20									
16	25									
18	18									
18	20									
18	25									
MCL651515 MCL651516 MCL651518 MCL651520 MCL651525 MCL651616 MCL651618 MCL651620 MCL651625 MCL651818 MCL651820 MCL651825 MCL652022 MCL652222 MCL652225	φ65	87.5	15	15	160	570	3.7	0.2	1.0	+1.5 0
15			16							
15			18							
15			20							
15			25							
16			16							
16			18							
16			20							
16			25							
18			18							
18			20							
18			25							
20			22							
22			22							
22			25							

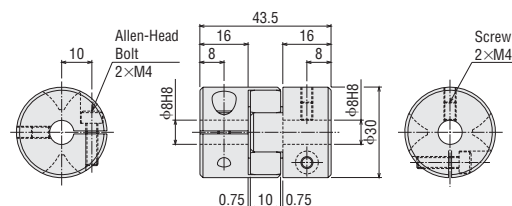
● The specifications above are the values when combined with Oriental Motor's motor or gearhead.

Dimensions (Unit = mm)

MCL20 type



MCL300808



Introduction

Induction Motors

Reversible Motors

Electro-magnetic Brake Motors

Right-Angle Gearheads

Brake Pack SB50W

US AC Speed Control Motors

ES02

FE100/FE200 Inverter

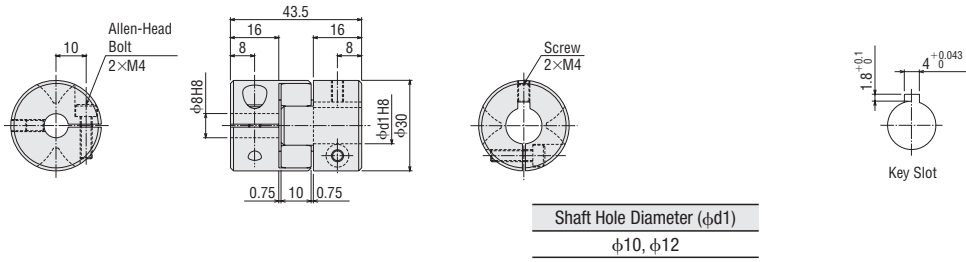
Water/High-Dust-Resistant Motors

Torque Motors

Accessories

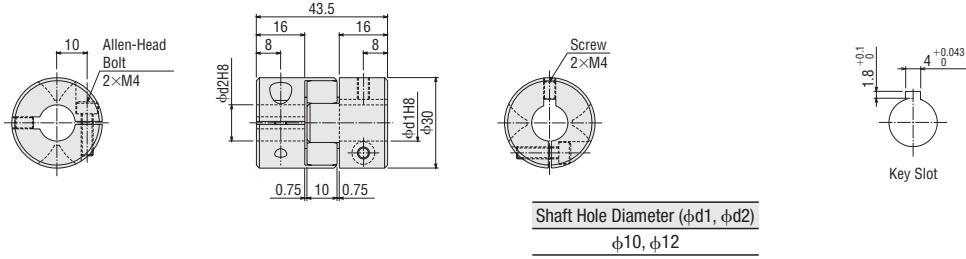
Installation

MCL300810
MCL300812



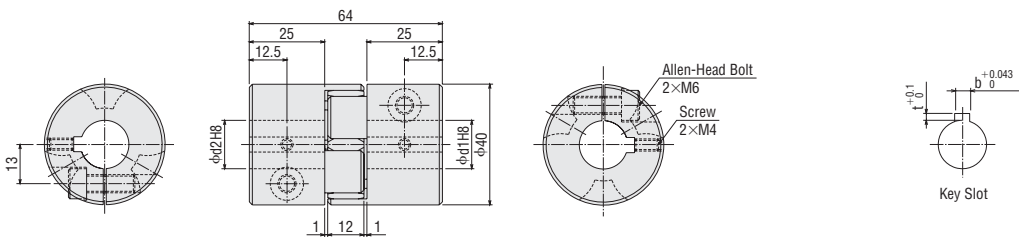
Shaft Hole Diameter ($\phi d1$)
 $\phi 10, \phi 12$

MCL301010
MCL301012
MCL301212



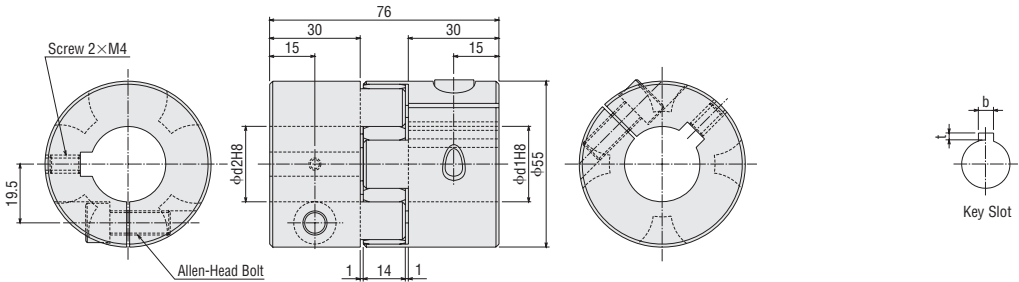
Shaft Hole Diameter ($\phi d1, \phi d2$)
 $\phi 10, \phi 12$

MCL40 type



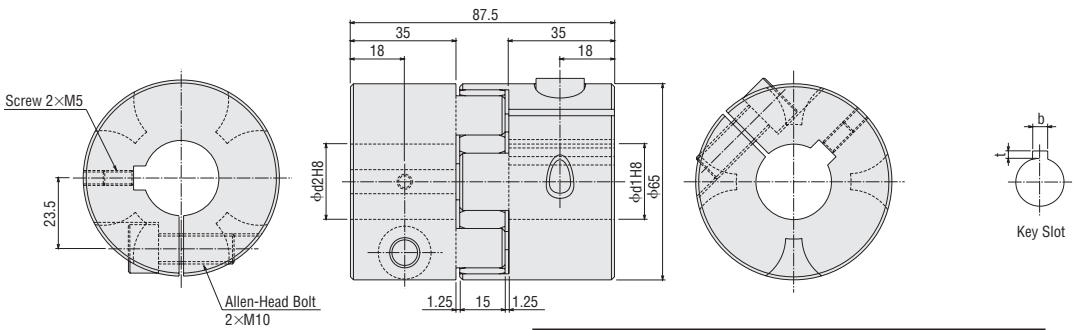
Shaft Hole Diameter ($\phi d1, \phi d2$)	Key Slot Width b	Key Slot Length t
$\phi 10, \phi 12$	4	1.8
$\phi 14, \phi 15, \phi 16$	5	2.3

MCL55 type



Shaft Hole Diameter ($\phi d1, \phi d2$)	Key Slot Width b	Key Slot Length t
$\phi 15, \phi 16$	$5^{+0.043}_0$	$2.3^{+0.1}_0$
$\phi 18, \phi 20$	$6^{+0.052}_0$	$2.8^{+0.1}_0$
$\phi 25$	$8^{+0.052}_0$	$3.3^{+0.2}_0$

MCL65 type



Shaft Hole Diameter ($\phi d1, \phi d2$)	Key Slot Width b	Key Slot Length t
$\phi 15, \phi 16$	$5^{+0.043}_0$	$2.3^{+0.1}_0$
$\phi 18, \phi 20, \phi 22$	$6^{+0.052}_0$	$2.8^{+0.1}_0$
$\phi 25$	$8^{+0.052}_0$	$3.3^{+0.2}_0$

External Speed Potentiometer RoHS

- Model: **PAVR-20KZ**
(20 k Ω 1/4 W, with a linear resistance vs. angle curve)



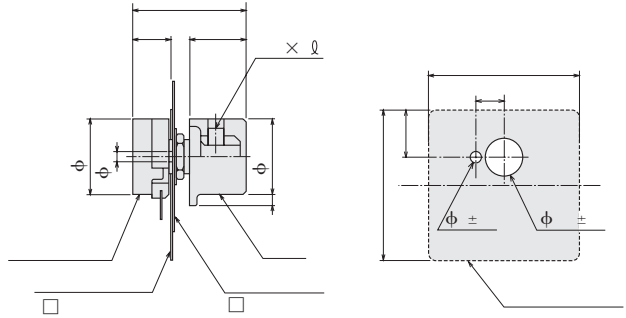
- ◇ Applicable Products
ES02
BLF Series
BLH Series

Note:



BLF **ES02**
 BLH

- Dimensions =
Mass: 20 g

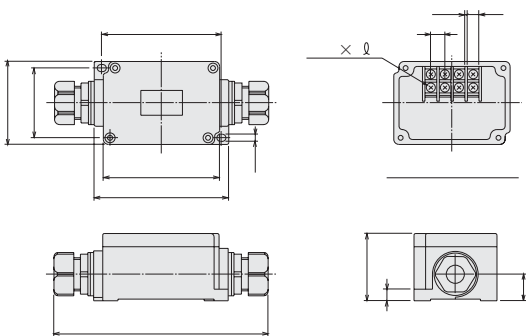


Power Relay Box for Watertight Type RoHS

- Model: **TB4-0608** (4-Terminal Type)



- Dimensions =
Mass: 150 g



- ◇ Applicable Motors
FPW Series
BH Series

Applicable cable diameter: $\phi 6.5 \sim \phi 8.5$ mm

- The power relay box conforms to IP65 only when used with an extension cable for watertight type for **FPW** Series. (Does not conform to IP65 when used with **BH** Series.)

Screws for the sealed connector and the cover of power relay box should be adjusted to the torque shown below.

Sealed connector	1.0~1.5 N·m
Cover of power relay box	0.54~0.66 N·m



Extension Cable for Watertight Type RoHS

Use with the power relay box for watertight type. An extension of 5 m and 10 m is possible.

Number of Conductors	Model	Applicable Product	Cable Length: L (m)
4 Conductors	CC05AC43P	BH Series	5
	CC10AC43P	FPW Series	10



● **Specifications**

- Conductor construction: Refer to the dimension on the right
- Finished outer diameter: $\phi 7.8$
- Outer casing: Heat-resistant vinyl chloride

Extension Cables

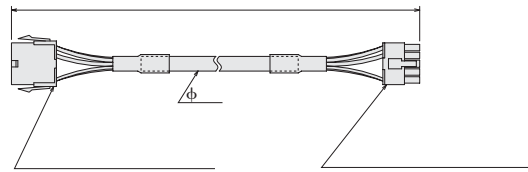
■ **Cables for US Series RoHS**

Extension cable for connecting **US** Series motor and control unit. Two types are available, depending on the motor output power. The maximum extension length is 4.75 m.

● **Applicable Motors**

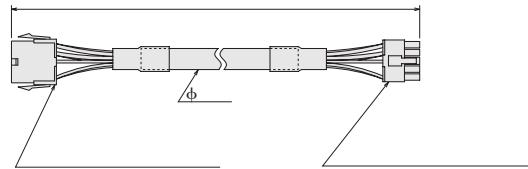
◇ **US206, US315, US425 and US540** types

Model	Cable Length: L (m)
CC01SU05	1
CC02SU05	2
CC03SU05	3
CC04SU05	4



◇ **US560 and US590** types

Model	Cable Length: L (m)
CC01SU07	1
CC02SU07	2
CC03SU07	3
CC04SU07	4



Note:

- **US**

Connection Cables RoHS

This cable is needed when connecting the motor and inverter (**FE100/FE200**) or extending their wiring length.

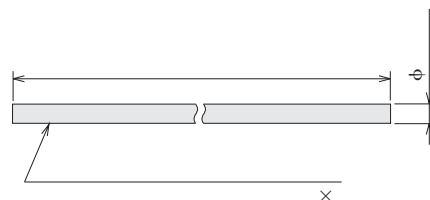
● **Applicable Products**

◇ **FE100/FE200**

Model	Cable Length: L (m)
CC01AC04	1
CC02AC04	2
CC03AC04	3
CC05AC04	5
CC10AC04	10
CC20AC04	20



● **Dimensions** =



Front Cover RoHS

A clear cover placed over the front panel of inverter **FE100/FE200**. This cover prevents accidental contact with the speed potentiometer and resulting shift in the set speed. The front cover is not waterproof.

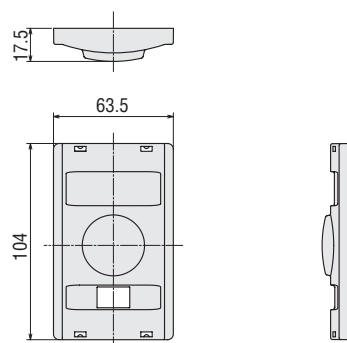
● **Model: PAFC01**

◇ **Applicable Product**
FE100/FE200



● **Dimensions** =

Mass: 10 g



Noise Filter RoHS

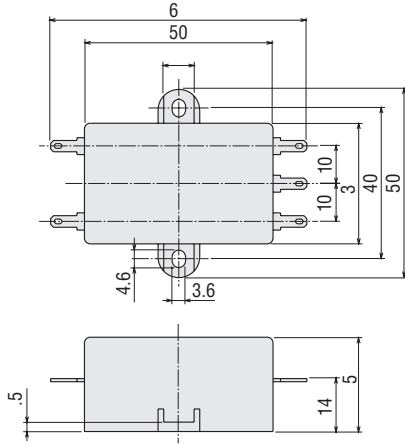
The noise filter can be used to reduce electrical noise generated by speed controller and brake pack.

● **Model: ZCB2203-11S**

250 VAC 3A

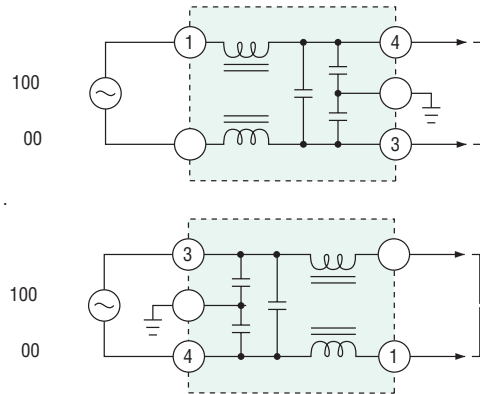
● **Dimensions** =

Mass: 55 g



● **Connecting Method**

1.



CR Circuit for Surge Suppression RoHS

This product is used to protect the contacts of the relay or switch used in the bi-directional circuit section or the instantaneous stop circuit section of a motor.

● **Model: EPCR1201-2**

250 VAC (120 Ω, 0.1 μF)

● **Dimensions** =

Mass: 5 g

