

Induction Motors

90 W (1/8 HP)

Frame Size: □ 3.54 in. (□ 90 mm)



World **K** Series
(Gearhead Sold Separately)



V Series/Combination Type
(Pre-assembled Gearmotor)



Specifications — Continuous Rating

World K Series (General Purpose)

Model			Output Power		Voltage	Frequency	Current	Starting Torque	Rated Torque		Rated Speed	Capacitor	
Upper Model Name: Pinion Shaft Type Lower Model Name(): Round Shaft Type			HP	W	VAC	Hz	A	oz-in	mN·m	oz-in	mN·m	r/min	μF
Lead Wire Type Dimension ①	Terminal Box Type Dimension ②	Conduit Box Type Dimension ③											
TP 51K90GU-AWU (51K90A-AWU)	51K90GU-AWTU (51K90A-AWTU)	51K90GU-FCH (51K90A-FCH)	Single-Phase 110		110	60	1.45					1500	20
			Single-Phase 115		115	60	1.44	63	450	83	585	1500	20
			Single-Phase 220*		220	50	0.74			103	730	1200	
TP 51K90GU-CWE (51K90A-CWE)	51K90GU-CWTE (51K90A-CWTE)	51K90GU-ECH* (51K90A-ECH)*	Single-Phase 220		220	60	0.82			85	605	1450	6
			Single-Phase 230		230	50	0.76	63	450	103	730	1200	6
			Single-Phase 230		230	60	0.81			85	605	1450	
			Three-Phase 200		200	50	0.64	120	850	96	680	1300	
			Three-Phase 200		200	60	0.59	99	700	80	570	1550	—
			Three-Phase 220		220	60	0.60	99	700	80	570	1600	
TP 51K90GU-SW (51K90A-SW)	51K90GU-SWT (51K90A-SWT)	51K90GU-SH (51K90A-SH)	Three-Phase 230		230	60	0.61	99	700	80	570	1600	

TP Contains 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 "U" and "E" at the end of the model name 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 model name on the nameplate is the approved model name. →Page G-10

Details of Safety Standard →Page G-2

* The conduit box type of the motors are not VDE approved. The conduit box type does not have a specification for Single-Phase 220 VAC 50 Hz.

V Series (Quiet Operation, High Strength, Long Life)



Model			Output Power		Voltage	Frequency	Current	Starting Torque	Rated Torque		Rated Speed	Capacitor	
Combination Type			HP	W	VAC	Hz	A	oz-in	mN·m	oz-in	mN·m	r/min	μF
Lead Wire Type Dimension ④	Terminal Box Type Dimension ⑤												
TP VH1590A-□U	VH1590AT-□U		Single-Phase 110		110	60	1.56	63	450	83	585	1500	25
			Single-Phase 115		115	60	1.55						
			Single-Phase 220		220	50	0.74			103	730	1200	
TP VH1590C-□E	VH1590CT-□E		Single-Phase 220		220	60	0.82			85	605	1450	6
			Single-Phase 230		230	50	0.76	63	450	103	730	1200	6
			Single-Phase 230		230	60	0.81			85	605	1450	
			Three-Phase 200		200	50	0.64	120	850	96	680	1300	
			Three-Phase 200		200	60	0.59	99	700	80	570	1550	—
			Three-Phase 220		220	60	0.60	99	700	80	570	1600	
TP VH1590S-□	VH1590ST-□		Three-Phase 230		230	60	0.61	99	700	80	570	1600	

TP Contains 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 "U" and "E" at the end of the model name 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 model name on the nameplate is the approved model name. →Page G-11

Details of Safety Standard →Page G-2

Models above are provided as combination type with motor and gearhead pre-assembled.

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

The values in the table are for the motor only.

Gearheads for World K Series (Sold Separately)

Parallel Shaft

Gearhead Model	Gear Ratio
5GU□KA	3~180
5GU□KHA (High Power Type)	50~180
5GU10XKB (Decimal Gearhead) [for 5GU□KA]	
5GU10XK (Decimal Gearhead) [for 5GU□KHA]	

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

Right-Angle

Type	Gearhead Model	Gear Ratio
Hollow Shaft	5GU□RH	3.6~180
Solid Shaft	5GU□RAA	3~180

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

Right-Angle Gearheads →Page A-189

■ Gearmotor — Torque Table

● World K Series (General Purpose)

The maximum permissible torque when a decimal gearhead with a gear ratio of 10:1 is:

5GU□KA: 177 lb-in (20 N·m)

5GU□KHA: 260 lb-in (30 N·m)

◆ Single-Phase 115/230 VAC 60 Hz, Three-Phase 230 VAC 60 Hz

Unit = Upper values: lb-in/Lower values: N·m

Model	Speed r/min Gear Ratio	600	500	360	300	240	200	144	120	100	72	60	50	36	30	24	20	18	15	12	10
		3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
5IK90GU-AWU 5IK90GU-AWTU 5IK90GU-FCH	5GU□KA	12.3 1.4	15 1.7	21 2.4	24 2.8	31 3.6	38 4.3	46 5.3	56 6.4	68 7.7	85 9.7	102 11.6	123 13.9	170 19.3	177 20	177 20	177 20	177 20	177 20	177 20	177 20
	5GU□KHA	—	—	—	—	—	—	—	—	—	—	—	—	170 19.3	200 23.2	220 25.9	260 30	260 30	260 30	260 30	260 30
5IK90GU-CWE 5IK90GU-CWTE 5IK90GU-ECH	5GU□KA	13.2 1.5	15.9 1.8	22 2.5	25 2.9	32 3.7	38 4.4	48 5.5	58 6.6	69 7.9	88 10.0	106 12.0	127 14.4	177 20	177 20	177 20	177 20	177 20	177 20	177 20	177 20
	5GU□KHA	—	—	—	—	—	—	—	—	—	—	—	—	177 20	210 24	230 26.8	260 30	260 30	260 30	260 30	260 30
5IK90GU-SW 5IK90GU-SWT 5IK90GU-SH	5GU□KA	12.3 1.4	15 1.7	20 2.3	24 2.8	30 3.5	37 4.2	46 5.2	54 6.2	66 7.5	83 9.4	100 11.3	119 13.5	166 18.8	177 20	177 20	177 20	177 20	177 20	177 20	177 20
	5GU□KHA	—	—	—	—	—	—	—	—	—	—	—	—	166 18.8	200 22.6	220 25.2	260 30	260 30	260 30	260 30	260 30

● KA type is standard gearhead. KHA type is high-powered gearhead.

◆ Single-Phase 230 VAC 50 Hz

Unit = Upper values: lb-in/Lower values: N·m

Model	Speed r/min Gear Ratio	500	416	300	250	200	166	120	100	83	60	50	41	30	25	20	16	15	12.5	10	8.3
		3	3.6	5	6	7.5	9	12.5	15	18	25	30	36	50	60	75	90	100	120	150	180
5IK90GU-CWE 5IK90GU-CWTE 5IK90GU-ECH	5GU□KA	15.9 1.8	18.5 2.1	26 3.0	30 3.5	38 4.4	46 5.3	59 6.7	70 8.0	84 9.6	106 12.0	128 14.5	153 17.3	177 20	177 20	177 20	177 20	177 20	177 20	177 20	177 20
	5GU□KHA	—	—	—	—	—	—	—	—	—	—	—	—	210 24.1	250 28.9	260 30	260 30	260 30	260 30	260 30	260 30

● KA type is standard gearhead. KHA type is high-powered gearhead.

● V Series (Quiet Operation, High Strength, Long Life)

◆ Single-Phase 115/230 VAC 60 Hz, Three-Phase 230 VAC 60 Hz

Unit = Upper values: lb-in/Lower values: N·m

Model	Speed r/min Gear Ratio	360	300	200	120	100	60	50	30	20	15	10
		5	6	9	15	18	30	36	60	90	120	180
VHI590A-□U VHI590AT-□U	23	28	41	69	80	133	160	260	350	350	350	
	2.6	3.2	4.7	7.9	9.1	15.1	18.1	30.2	40	40	40	
VHI590C-□E VHI590CT-□E	23	29	43	72	83	138	165	270	350	350	350	
	2.7	3.3	4.9	8.2	9.4	15.6	18.7	31.2	40	40	40	
VHI590S-□ VHI590ST-□	23	27	40	68	77	130	155	260	350	350	350	
	2.6	3.1	4.6	7.7	8.8	14.7	17.6	29.4	40	40	40	

◆ Single-Phase 230 VAC 50 Hz

Unit = Upper values: lb-in/Lower values: N·m

Model	Speed r/min Gear Ratio	300	250	166	100	83	50	41	25	16	12.5	8.3
		5	6	9	15	18	30	36	60	90	120	180
VHI590C-□E VHI590CT-□E	29	34	52	87	100	166	200	330	350	350	350	
	3.3	3.9	5.9	9.9	11.3	18.8	22.6	37.7	40	40	40	

● Gearheads and decimal gearheads are sold separately. Decimal gearheads are not available for V Series.

● 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; a white background indicates rotation in the opposite direction.

● The speed is calculated by dividing the motor's synchronous speed (50 Hz: 1500 r/min, 60 Hz: 1800 r/min) by the gear ratio. The actual speed is 2~20% less than the displayed value, depending on the size of the load.

■ Gearmotor — Torque Table when Right-Angle Gearhead is Attached

Right-Angle Gearheads are available for the World K Series only.

→Page A-196

■ Permissible Overhung Load and Permissible Thrust Load

Motor (Round shaft type)→Page A-11

Gearhead→Page A-11

■ Permissible Load Inertia J for Gearhead

→Page A-12

Dimensions Scale 1/4, Unit = inch (mm)

Mounting screws are included with gearheads. Dimensions for screws → A-223

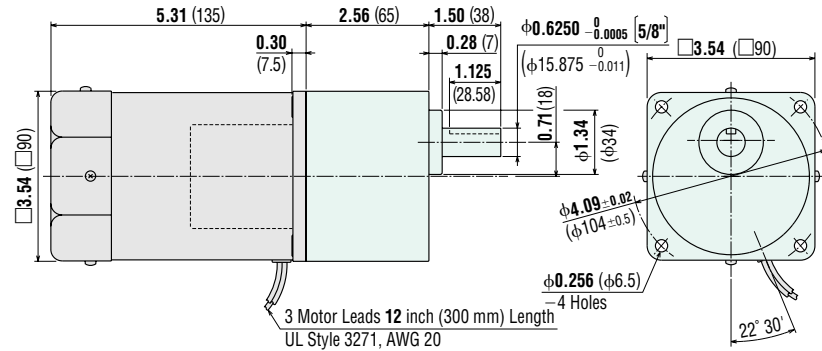
● **World K Series**

◆ **Lead Wire Type**

Motor
 51K90GU-AWU
 51K90GU-CWE
 51K90GU-SW
 Weight: 7.0 lb. (3.2 kg)

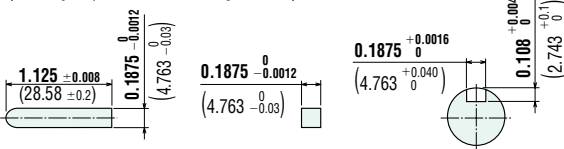
Gearhead
 5GU□KA
 Weight: 3.3 lb. (1.5 kg)

DXF A035U (5GU3KA~180KA)



● **Key and Key Slot (Scale 1/2)**

(The key is provided with the gearhead)

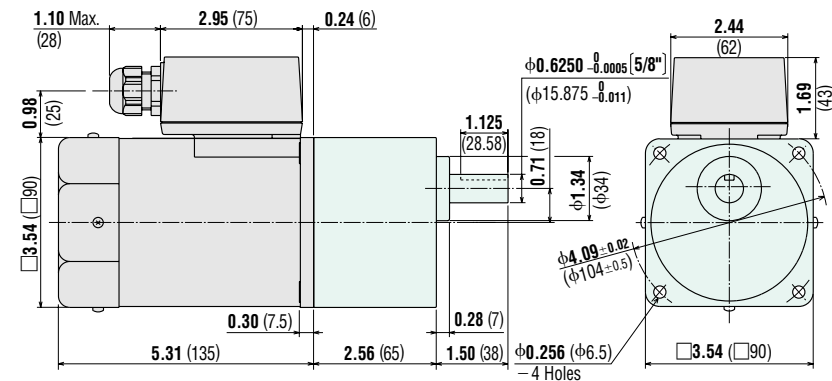


◆ **Terminal Box Type**

Motor
 51K90GU-AWTU
 51K90GU-CWTE
 51K90GU-SWT
 Weight: 7.3 lb. (3.3 kg)

Gearhead
 5GU□KA
 Weight: 3.3 lb. (1.5 kg)

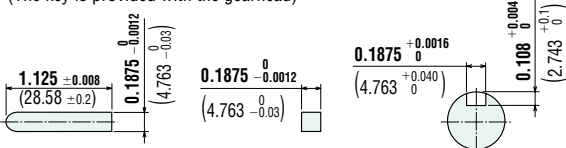
DXF A036U (5GU3KA~180KA)



- Use cable (VCTF) with a diameter of φ0.24 inch (φ6 mm)~φ0.47 inch (φ12 mm).
- Details of Terminal Box → Page A-224

● **Key and Key Slot (Scale 1/2)**

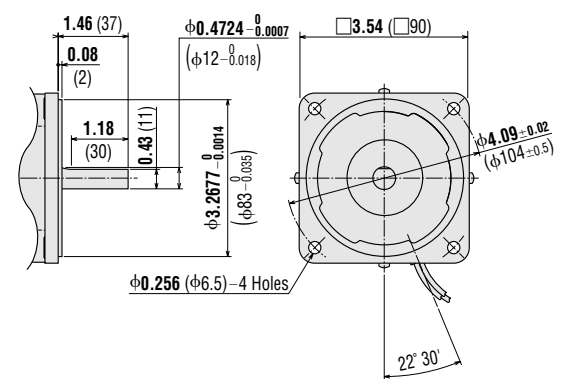
(The key is provided with the gearhead)



Round Shaft Type

51K90A-AWU
 51K90A-CWE
 51K90A-SW
 Weight: 7.0 lb. (3.2 kg)

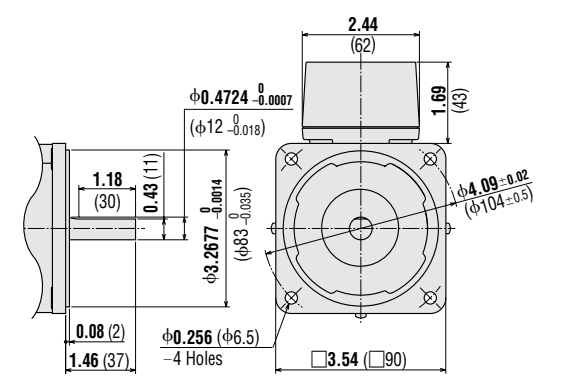
DXF A333



Round Shaft Type

51K90A-AWTU
 51K90A-CWTE
 51K90A-SWT
 Weight: 7.3 lb. (3.3 kg)

DXF A334



◆ Conduit Box Type

Motor

51K90GU-FCH

51K90GU-ECH

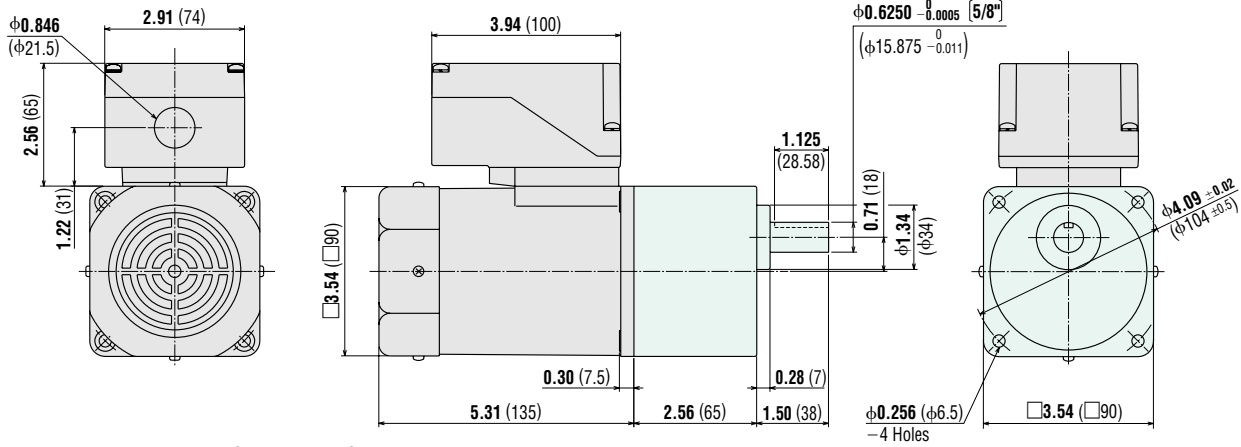
Weight: 8.1 lb. (3.7 kg)

Gearhead

5GU□KA

Weight: 3.3 lb. (1.5 kg)

DXF A806 (5GU3KA~180KA)

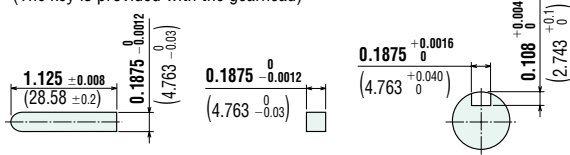


3 Motor Leads: UL Style 3266, AWG 20
1 Ground Lead: UL Style 3266, AWG 18

●Details of Terminal Box → Page A-224

●Key and Key Slot (Scale 1/2)

(The key is provided with the gearhead)



Motor

51K90GU-SH

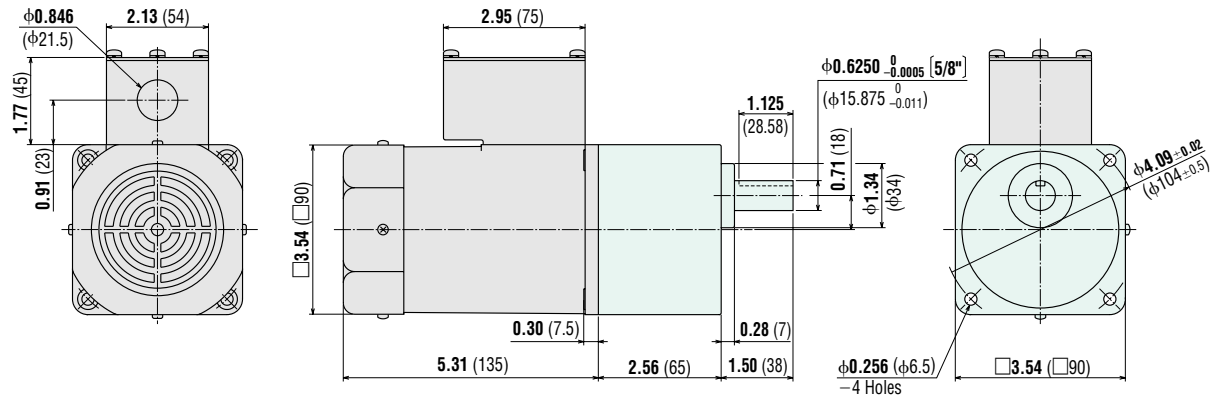
Weight: 7.3 lb. (3.3 kg)

Gearhead

5GU□KA

Weight: 3.3 lb. (1.5 kg)

DXF A807 (5GU3KA~180KA)

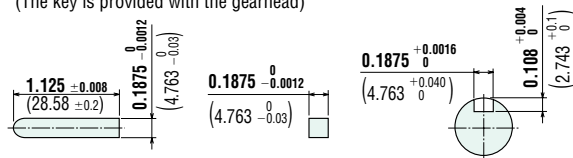


3 Motor Leads: UL Style 3266, AWG 20
1 Ground Lead: UL Style 3266, AWG 18

●Details of Terminal Box → Page A-224

●Key and Key Slot (Scale 1/2)

(The key is provided with the gearhead)

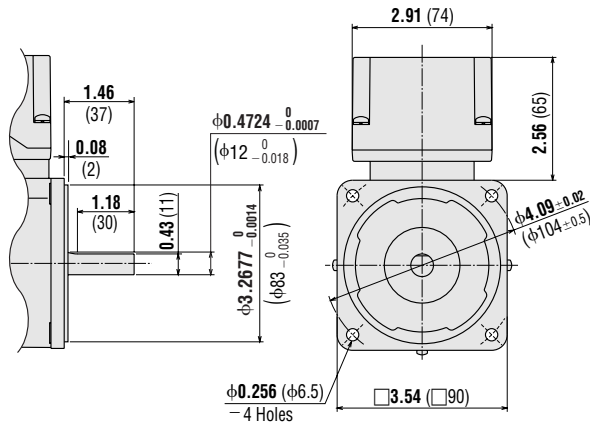


Round Shaft Type

5IK90A-FCH
5IK90A-ECH

Weight: 8.1 lb. (3.7 kg)

DXF A815



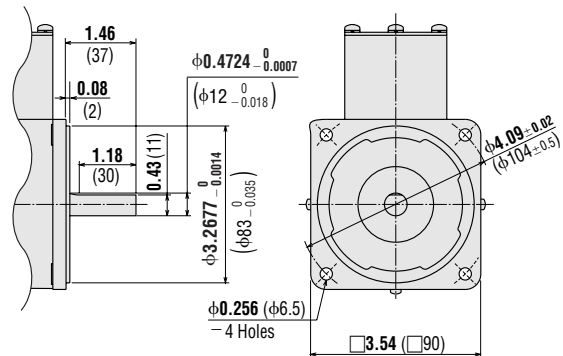
●Details of Terminal Box → Page A-224

Round Shaft Type

5IK90A-SH

Weight: 7.3 lb. (3.3 kg)

DXF A816

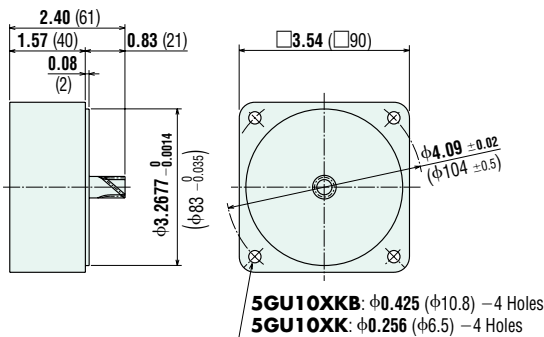


Decimal Gearheads (for World K Series)

5GU10XKB (for **5GU□KA**)
5GU10XK (for **5GU□KHA**)

Weight: 1.3 lb. (0.6 kg)

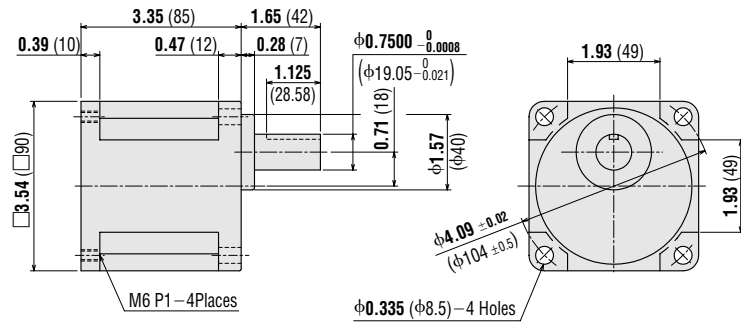
DXF A029



High-Power Type Gearhead (for World K Series)

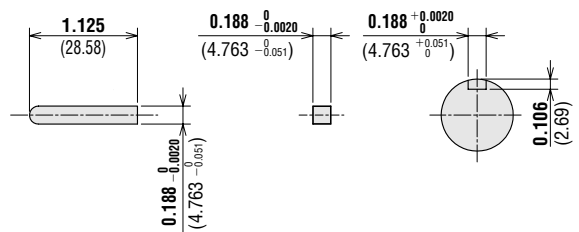
5GU□KHA Weight: 4.2 lb. (1.9 kg)

DXF A038U



Key and Key Slot (Scale 1/2)

(The key is provided with the gearhead)



- Introduction
- Induction Motors
- Reversible Motors
- Synchronous Motors
- Torque Motors
- Waterright Motors
- Magnetic Brake
- Clutch & Brake
- Brake Pack
- Right-Angle Gearheads
- Accessories
- Before Using a Standard AC Motor

● V Series

◆ Lead Wire Type

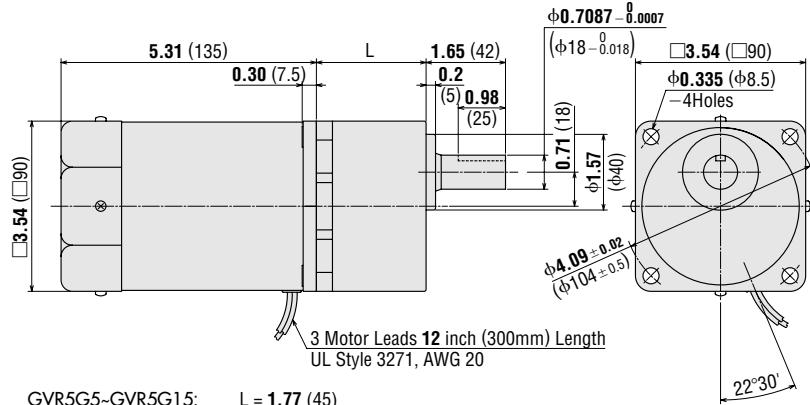
VH1590A-□U, VH1590C-□E, VH1590S-□ (Combination Type)

Weight: 10 lb. (4.7 kg) including gearhead

Motor Model: VH1590A-GVR, VH1590C-GVR, VH1590S-GVR

Gearhead Model: GVR5G□

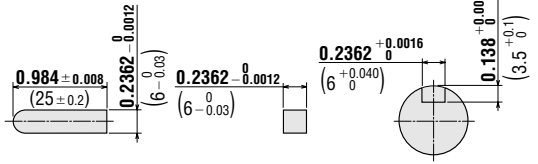
- DXF A397A (GVR5G5~15)
 A397B (GVR5G18~36)
 A397C (GVR5G60~180)



- GVR5G5-GVR5G15: L = 1.77 (45)
 GVR5G18-GVR5G36: L = 2.28 (58)
 GVR5G60-GVR5G180: L = 2.76 (70)

● Key and Key Slot (Scale 1/2)

(The key is provided with the gearhead)



◆ Terminal Box Type

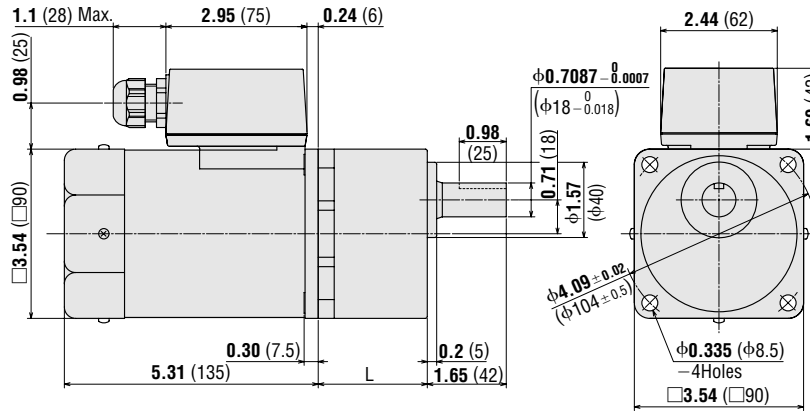
VH1590AT-□U, VH1590CT-□E, VH1590ST-□ (Combination Type)

Weight: 11 lb. (4.8 kg) including gearhead

Motor Model: VH1590AT-GVR, VH1590CT-GVR, VH1590ST-GVR

Gearhead Model: GVR5G□

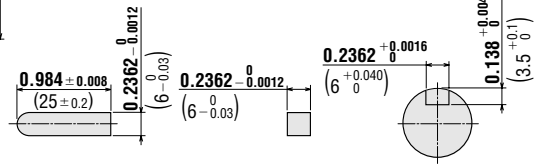
- DXF A398A (GVR5G5~15)
 A398B (GVR5G18~36)
 A398C (GVR5G60~180)



- GVR5G5-GVR5G15: L = 1.77 (45)
 GVR5G18-GVR5G36: L = 2.28 (58)
 GVR5G60-GVR5G180: L = 2.76 (70)

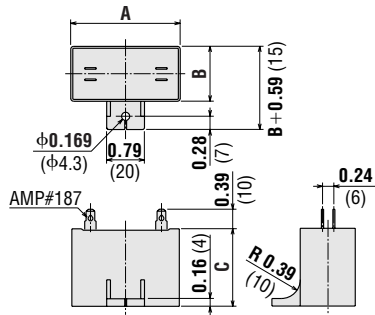
● Key and Key Slot (Scale 1/2)

(The key is provided with the gearhead)



- Use cable (VCTF) with a diameter of $\phi 0.24$ inch ($\phi 6$ mm)~ $\phi 0.47$ inch ($\phi 12$ mm).
- Details of Terminal Box → Page A-224

● **Capacitor** (included with single-phase motors)



Motor Model	Capacitor Model	Dimensions in. (mm)			Weight oz. (g)
		A	B	C	
5IK90GU-AW(T)U 5IK90A-AW(T)U	CH200CFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.4 (95)
5IK90GU-CW(T)E 5IK90A-CW(T)E VHI590C-□E VHI590CT-□E	CH60BFAUL	2.28 (58)	1.14 (29)	1.61 (41)	3.0 (85)
VHI590A-(T)U VHI590AT-□U	CH250CFAUL	2.28 (58)	1.38 (35)	1.97 (50)	4.9 (140)

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

■ **Connection Diagrams**

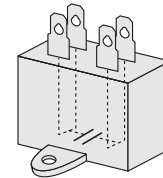
Lead Wire Type	
<p>5IK90GU-AWU 5IK90GU-CWE VHI590A-□U VHI590C-□E</p> <p>To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.</p>	<p>5IK90GU-SW VHI590S-□</p> <p>To change the rotation direction, change any two connections between U, V and W.</p>

Terminal Box Type	
<p>5IK90GU-AWTU 5IK90GU-CWTE VHI590AT-□U VHI590CT-□E</p> <p>To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.</p>	<p>5IK90GU-SWT VHI590ST-□</p> <p>To change the rotation direction, change any two connections between U, V and W.</p>

Conduit Box Type	
<p>5IK90GU-FCH 5IK90GU-ECH</p> <p>To rotate the motor in a clockwise (CW) direction, flip switch SW to CW. To rotate it in a counterclockwise (CCW) direction, flip switch SW to CCW.</p>	<p>5IK90GU-SH</p> <p>To change the rotation direction, change any two connections between U, V and W.</p>

● **Inner Connection Diagram for 4-Terminal Capacitor**

Terminals of the capacitor are connected as shown in the figure. For lead wire connection, use one lead wire per terminal.



- The direction of motor rotation is as viewed from the shaft end of the motor.
- CW represents the clockwise direction, while CCW represents the counterclockwise direction.
- Connection diagrams are also valid for the equivalent round shaft type.
- **How to connect a capacitor** → Page A-225

Note:

- Change the direction of single-phase motor rotation only after bringing the motor to a stop. If an attempt is made to change the direction of rotation while the motor is rotating, the motor may ignore the reversing command or change its direction of rotation after some delay.

■ **List of Motor and Gearhead Combinations for V Series**

Model numbers for motor and gearhead combinations are shown below.

Model	Motor Model	Gearhead Model
VHI590A-□U	VHI590A-GVR	GVR5G□
VHI590C-□E	VHI590C-GVR	
VHI590S-□	VHI590S-GVR	
VHI590AT-□U	VHI590AT-GVR	
VHI590CT-□E	VHI590CT-GVR	
VHI590ST-□	VHI590ST-GVR	

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