



# Watertight Motors FPW Series

## Additional Information

- Technical Reference.....F-1
- General Information.....G-1

## Watertight Induction Motors

# FPW Series

The **FPW** Series motors are watertight, dust-resistant geared induction motors which conform to the IEC standard IP67. They can be used where they are periodically splashed or washed with water. These watertight induction motors are available in 25 W, 40 W, 60 W and 90 W models, and are ideal for devices whose movement is in one direction.



**FPW** Series

### ■ Features

#### ● Special Construction for Dust-resistant Performance and Watertight

The construction provides dependable resistance against dust and water by using a specially constructed cable outlet, oil seals on the output shaft, an O-ring in the case/gearhead junction and no external screws. A special coating and a stainless steel (SUS303 type) shaft provides better anti-corrosion protection against water. The paint is also water repellent.

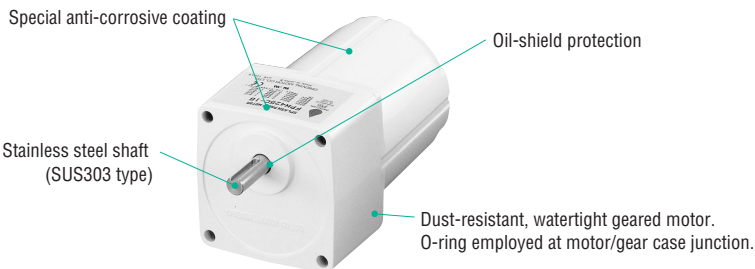
\* Not available for use under high pressure jets of water or immersion of water

IP67: The letters "IP" stand for "Ingress Protection" and are followed by two numerical digits which indicate degrees of protection against solid objects and moisture. Specified with IEC529 and IEC60034-5. **FPW** series IP67 protection are UL recognized (UL File No.E166348).

#### ● Superb anti-corrosion properties

High corrosion resistance is achieved through a special paint coating and a stainless steel shaft.

#### ● Designed and Constructed for Dust and Water-Resistance



#### ● Conforms to Safety Standards and Global Power Supply Voltages

The **FPW** series is recognized by UL/CSA standards and conforms to EN standards. CE marking is used in accordance with the low voltage directive.

Also, our wide range of products includes those that meet Asian power supply voltages as well as major European countries.

Single-phase type: 110 VAC 60 Hz, 115 VAC 60 Hz  
220 VAC 60 Hz, 230 VAC 50 Hz/60 Hz  
Three-phase type: 220 VAC 60 Hz, 230 VAC 60 Hz

### ■ Safety Standards and CE Marking

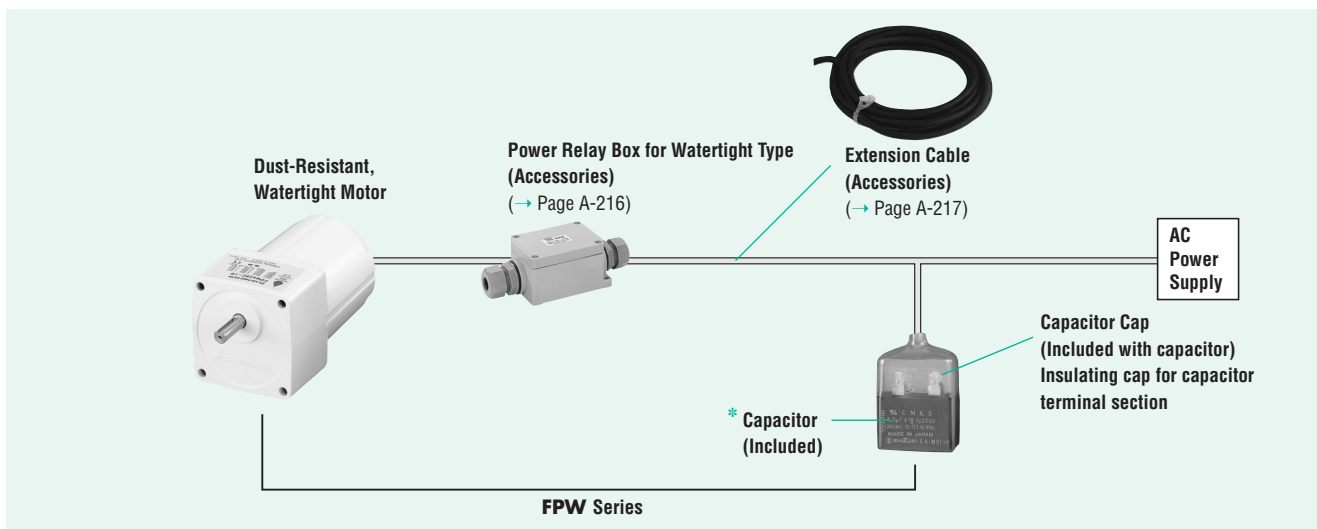
Standards	Certification Body	Standards File No.	CE Marking
UL2111	UL	E64197	Low Voltage Directives
CSA C22.2 No.100			
CSA C22.2 No.77			
EN60034-1	EN/IEC Standards		
EN60034-5			
IEC60034-11			

● When the motor is approved under various standards, the model name on the nameplate is the approved model name.

● **Details of Safety Standards** → Page G-2

● **List of Safety Standard Approved Products** → Page G-14

## System Configuration

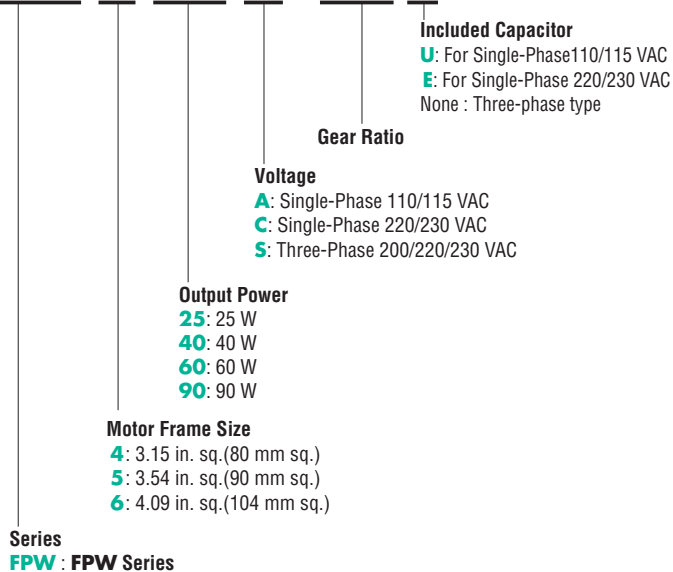


The system configuration is an example. Other combinations are available.

\* A capacitor is provided with single-phase motors. The capacitors for the motors are neither dust-resistant nor watertight.

## Product Number Code

# FPW 4 25 A - 15 U



\* The "U" and "E" at the end of the model name indicate that the unit includes a capacitor. These two letters are not inscribed on the motor nameplate. When the motor is approved under various safety standards, the model name on the nameplate is the approved model name.

## Product Line

Output Power	Power Supply Voltage	Model	Gear Ratio
1/30 HP 25 W	Single-Phase 110/115 VAC	<b>FPW425A-□U</b>	<b>3.6~180</b>
	Single-Phase 220/230 VAC	<b>FPW425C-□E</b>	<b>3.6~180</b>
	Three-Phase 200/220/230 VAC	<b>FPW425S-□</b>	<b>3.6~180</b>
1/19 HP 40 W	Single-Phase 110/115 VAC	<b>FPW540A-□U</b>	<b>3.6~180</b>
	Single-Phase 220/230 VAC	<b>FPW540C-□E</b>	<b>3.6~180</b>
	Three-Phase 200/220/230 VAC	<b>FPW540S-□</b>	<b>3.6~180</b>

Output Power	Power Supply Voltage	Model	Gear Ratio
1/12 HP 60 W	Single-Phase 110/115 VAC	<b>FPW560A-□U</b>	<b>3.6~180</b>
	Single-Phase 220/230 VAC	<b>FPW560C-□E</b>	<b>3.6~180</b>
	Three-Phase 200/220/230 VAC	<b>FPW560S-□</b>	<b>3.6~180</b>
1/8 HP 90 W	Single-Phase 110/115 VAC	<b>FPW690A-□U</b>	<b>3.6~180</b>
	Single-Phase 220/230 VAC	<b>FPW690C-□E</b>	<b>3.6~180</b>
	Three-Phase 200/220/230 VAC	<b>FPW690S-□</b>	<b>3.6~180</b>

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

## Specifications — Continuous Rating



Model	Output Power		Voltage VAC	Frequency Hz	Current A	Starting Torque		Rated Torque		Rated Speed r/min	Capacitor μF
	HP	W				oz-in	mN·m	oz-in	mN·m		
ⓉP FPW425A-□U	1/30	25	Single-phase 110	60	0.46	17	120	24	170	1450	6.5
			Single-phase 115	60	0.46	17	120	24	170	1450	6.5
ⓉP FPW425C-□E	1/30	25	Single-phase 220	60	0.22	17	120	24	170	1450	1.5
			Single-phase 230	50	0.24	17	120	29	205	1200	1.5
			Single-phase 230	60	0.22	17	120	24	170	1450	1.5
ⓉP FPW425S-□	1/30	25	Three-phase 200	50	0.23	34	240	26	190	1300	—
			Three-phase 200	60	0.21	22	160	22	160	1550	—
			Three-phase 220	60	0.21	22	160	22	160	1600	—
			Three-phase 230	60	0.22	22	160	22	160	1600	—
ⓉP FPW540A-□U	1/19	40	Single-phase 110	60	0.68	28	200	36	260	1500	9
			Single-phase 115	60	0.67	28	200	36	260	1500	9
ⓉP FPW540C-□E	1/19	40	Single-phase 220	60	0.35	28	200	36	260	1500	2.3
			Single-phase 230	50	0.39	28	200	42	300	1300	2.3
			Single-phase 230	60	0.34	28	200	36	260	1500	2.3
ⓉP FPW540S-□	1/19	40	Three-phase 200	50	0.32	56	400	42	300	1300	—
			Three-phase 200	60	0.30	36	260	36	260	1550	—
			Three-phase 220	60	0.30	36	260	36	260	1600	—
			Three-phase 230	60	0.31	36	260	36	260	1600	—
ⓉP FPW560A-□U	1/12	60	Single-phase 110	60	1.04	42	300	57	405	1450	12
			Single-phase 115	60	1.02	42	300	57	405	1450	12
ⓉP FPW560C-□E	1/12	60	Single-phase 220	60	0.48	42	300	57	405	1450	3
	1/14	55	Single-phase 230	50	0.51	42	300	61	430	1250	3
	1/12	60	Single-phase 230	60	0.47	42	300	57	405	1450	3
ⓉP FPW560S-□	1/12	60	Three-phase 200	50	0.48	85	600	63	450	1300	—
			Three-phase 200	60	0.43	71	500	53	380	1550	—
			Three-phase 220	60	0.44	71	500	53	380	1600	—
			Three-phase 230	60	0.45	71	500	53	380	1600	—
ⓉP FPW690A-□U	1/8	90	Single-phase 110	60	1.54	56	400	83	585	1500	18
			Single-phase 115	60	1.51	56	400	83	585	1500	18
ⓉP FPW690C-□E	1/8	90	Single-phase 220	60	0.68	56	400	85	605	1450	4
			Single-phase 230	50	0.69	56	400	99	700	1250	4
			Single-phase 230	60	0.66	56	400	85	605	1450	4
ⓉP FPW690S-□	1/8	90	Three-phase 200	50	0.54	99	700	96	680	1300	—
			Three-phase 200	60	0.51	99	700	80	570	1550	—
			Three-phase 220	60	0.50	99	700	80	570	1600	—
			Three-phase 230	60	0.49	99	700	80	570	1600	—

ⓉP : 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.

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

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

## General Specifications

Item	Specifications
Insulation Resistance	100 MΩ or more when 500 VDC is applied between the windings and the frame after rated motor operation under normal ambient temperature and humidity.
Dielectric Strength	Sufficient to withstand 1.5 kV at 50 Hz and 60 Hz applied between the windings and the frame for 1 minute after rated motor operation under normal ambient temperature and humidity.
Temperature Rise	144 °F (80 °C) or less measured by the resistance change method after the temperature of the coil has stabilized under normal operation at the rated voltage and frequency.
Insulation Class	Class B (266 °F [130 °C])
Overheat Protection	Built-in thermal protector (Automatic return type) Operating temperature, open : 266 °F ± 9 °F (130 °C ± 5 °C) close : 179.6 °F ± 27 °F (82 °C ± 15 °C)
Ambient Temperature Range	14 °F ~ 104 °F ( - 10 °C ~ + 40 °C), [Three-Phase 200 V : 14 °F ~ 122 °F ( - 10 °C ~ + 50 °C)] (nonfreezing)
Degree Protection	IP67

Since these are special watertight, dust-resistant, geared motors, the motor and gear sections cannot be disassembled.

The capacitors for the motors are neither dustproof nor waterproof.

## ■ Gearmotor — Torque Table

### ● Single-Phase 115 / 230 VAC 60 Hz, Three-Phase 230 VAC 60 Hz

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

Model	Speed r/min	500	300	200	120	100	60	50	30	20	15	10
	Gear Ratio	3.6	6	9	15	18	30	36	60	90	120	180
FPW425A-□U	Rated Torque	4.4 0.5	7.3 0.83	10.6 1.2	18.5 2.1	22 2.5	32 3.7	39 4.5	59 6.7	70 8	70 8	70 8
	Starting Torque	3.0 0.35	5.1 0.58	7.6 0.87	13.2 1.5	15 1.7	23 2.6	28 3.2	42 4.8	62 7.1	70 8	70 8
FPW425S-□	Rated Torque	4.1	6.9	10.6	16.8	20	30	37	55	70	70	70
	Starting Torque	0.47	0.78	1.2	1.9	2.3	3.5	4.2	6.3	8	8	8
FPW540A-□U	Rated Torque	6.7 0.76	11.5 1.3	16.8 1.9	28 3.2	33 3.8	50 5.7	60 6.8	88 10	88 10	88 10	88 10
	Starting Torque	5.1 0.58	8.5 0.97	13.2 1.5	21 2.4	25 2.9	38 4.4	46 5.3	69 7.9	88 10	88 10	88 10
FPW540S-□	Rated Torque	6.7	11.5	16.8	28	33	50	60	88	88	88	88
	Starting Torque	0.76	1.3	1.9	3.2	3.8	5.7	6.8	10	10	10	10
FPW560A-□U	Rated Torque	10.6 1.2	17.7 2.0	26 3.0	38 4.4	46 5.3	70 8.0	84 9.6	132 15	132 15	132 15	132 15
	Starting Torque	7.6 0.87	13.2 1.5	19.4 2.2	29 3.3	34 3.9	52 5.9	62 7.1	105 11.9	132 15	132 15	132 15
FPW560S-□	Rated Torque	9.7	15.9	24	37	44	66	79	132	132	132	132
	Starting Torque	1.1	1.8	2.8	4.2	5.0	7.5	9.0	15	15	15	15
FPW690A-□U	Rated Torque	15 1.7	24 2.8	38 4.3	56 6.4	68 7.7	113 12.8	136 15.4	200 23.2	260 30	260 30	260 30
	Starting Torque	10.6 1.2	16.8 1.9	25 2.9	38 4.4	46 5.3	77 8.8	92 10.5	139 15.8	210 23.8	260 30	260 30
FPW690C-□E	Rated Torque	15.9 1.8	25 2.9	38 4.4	58 6.6	69 7.9	116 13.2	140 15.9	210 24	260 30	260 30	260 30
	Starting Torque	10.6 1.2	16.8 1.9	25 2.9	38 4.4	46 5.3	77 8.8	92 10.5	139 15.8	210 23.8	260 30	260 30
FPW690S-□	Rated Torque	15	24	37	54	66	110	132	200	260	260	260
	Starting Torque	1.7	2.8	4.2	6.2	7.5	12.5	15	22.6	30	30	30

- Enter the gear ratio in the box (□) within the model name.
- The speed is calculated by dividing the motor's synchronous speed (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.

### ● Single-Phase 230 VAC 50 Hz

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

Model	Speed r/min	417	250	167	100	83	50	42	25	17	12.5	8.3
	Gear Ratio	3.6	6	9	15	18	30	36	60	90	120	180
FPW425C-□E	Rated Torque	5.3 0.6	8.5 0.97	13.2 1.5	22 2.5	26 3.0	39 4.5	47 5.4	70 8	70 8	70 8	70 8
	Starting Torque	3.0 0.35	5.1 0.58	7.6 0.87	13.2 1.5	15 1.7	23 2.6	28 3.2	42 4.8	62 7.1	70 8	70 8
FPW540C-□E	Rated Torque	7.6 0.87	13.2 1.5	19.4 2.2	31 3.6	38 4.4	58 6.6	69 7.9	88 10	88 10	88 10	88 10
	Starting Torque	5.1 0.58	8.5 0.97	13.2 1.5	21 2.4	25 2.9	38 4.4	46 5.3	69 7.9	88 10	88 10	88 10
FPW560C-□E	Rated Torque	11.5 1.3	18.5 2.1	27 3.1	41 4.7	50 5.7	75 8.5	90 10.2	132 15	132 15	132 15	132 15
	Starting Torque	7.6 0.87	13.2 1.5	19.4 2.2	29 3.3	34 3.9	52 5.9	62 7.1	105 11.9	132 15	132 15	132 15
FPW690C-□E	Rated Torque	17.7 2.0	30 3.4	45 5.1	68 7.7	81 9.2	135 15.3	162 18.4	240 27.7	260 30	260 30	260 30
	Starting Torque	10.6 1.2	16.8 1.9	25 2.9	38 4.4	46 5.3	77 8.8	92 10.5	139 15.8	210 23.8	260 30	260 30

- Enter the gear ratio in the box within (□) the model name.
- The speed is calculated by dividing the motor's synchronous speed (50 Hz : 1500 r/min) by the gear ratio. The actual speed is 2~20 % less than the displayed value, depending on the size of the load.

## Permissible Overhung Load and Permissible Thrust Load

Unit = lb. (N)

Model	Gear Ratio	3.6	6	9	15	18	30	36	60	90	120	180			
FPW425 Type	Permissible Thrust Load	11.2 (50)													
	Permissible Overhung Load	22 (100)					45 (200)								
FPW540 Type	Permissible Thrust Load	22 (100)													
	Permissible Overhung Load	56 (250)					67 (300)								
FPW560 Type	Permissible Thrust Load	33 (150)													
	Permissible Overhung Load	90 (400)			101 (450)			112 (500)							
FPW690 Type	Permissible Thrust Load	45 (200)													
	Permissible Overhung Load	123 (550)				180 (800)				146 (650)				220(1000)	

- The permissible overhung load is measured at a distance from the end of the shaft  
 The upper value=0.39 inch (10 mm)  
 The lower value=0.79 inch (20 mm)

## Permissible Load Inertia J

Unit=Upper Values:oz-in<sup>2</sup>/Lower values:×10<sup>-4</sup> kg·m<sup>2</sup>

Model	Gear Ratio	3.6	6	9	15	18	30	36	60	90	120	180
FPW425 Type	Upper	22	61	137	380	550	1530	2200	4200	4200	4200	4200
	Lower	4.02	11.2	25.1	69.8	100	279	402	775	775	775	775
FPW540 Type	Upper	53	148	330	920	1330	3700	5300	10300	10300	10300	10300
	Lower	9.72	27	60.8	169	243	675	972	1875	1875	1875	1875
FPW560 Type	Upper	78	220	490	1360	1950	5400	7800	15000	15000	15000	15000
	Lower	14.3	39.6	89.1	248	356	990	1426	2750	2750	2750	2750
FPW690 Type	Upper	142	390	890	2500	3500	9800	14200	27000	27000	27000	27000
	Lower	25.9	72	162	450	648	1800	2592	5000	5000	5000	5000

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

Mounting screws are included with the motor. Dimensions for screws → Page A-126  
 Enter the gear ratio in the box (□) within the model name.

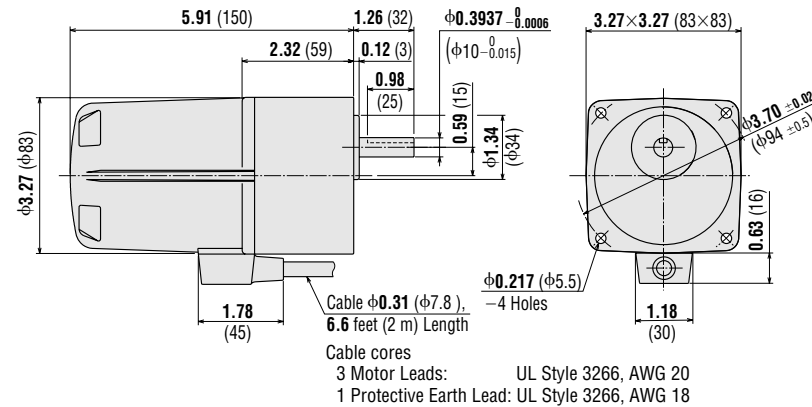
### Geared Motors

**FPW425A-□U, FPW425C-□E, FPW425S-□**

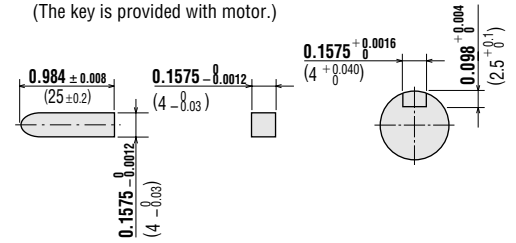
Motor: FPW425A-□, FPW425C-□, FPW425S-□

Weight: 6.6 lb. (3.0 kg)

**DXF** A226



### Key and Key Slot (Scale 1/2) (The key is provided with motor.)

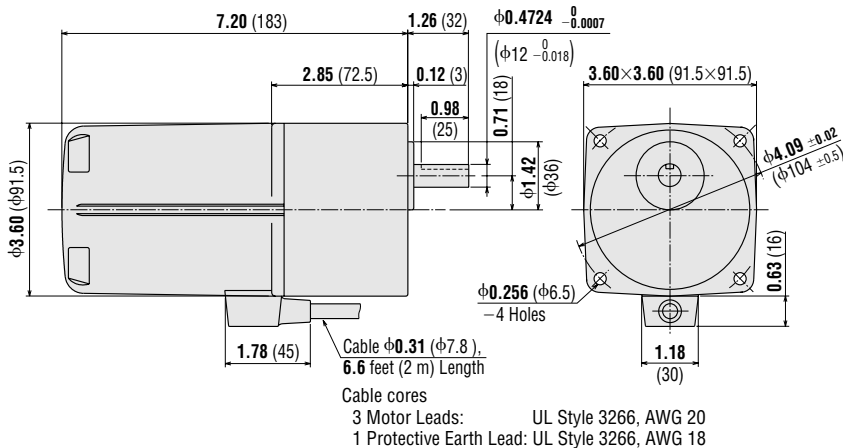


**FPW540A-□U, FPW540C-□E, FPW540S-□**

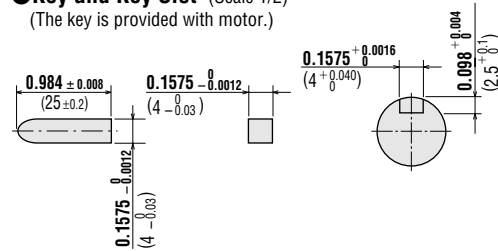
Motor: FPW540A-□, FPW540C-□, FPW540S-□

Weight: 8.8 lb. (4.0 kg)

**DXF** A227



**Key and Key Slot** (Scale 1/2)  
 (The key is provided with motor.)

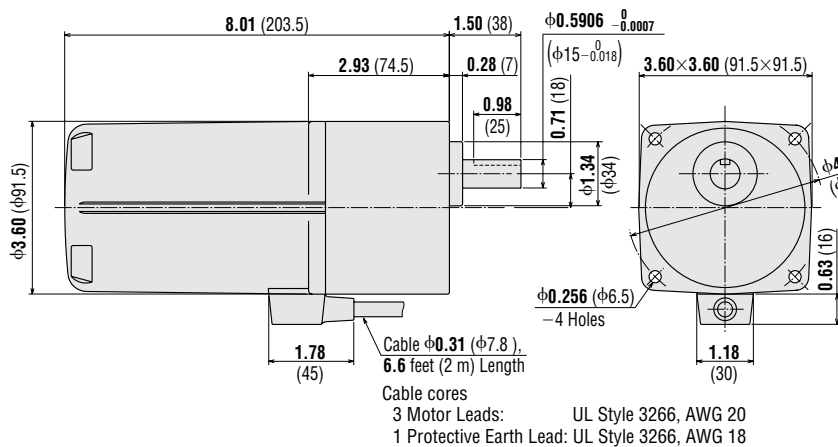


**FPW560A-□U, FPW560C-□E, FPW560S-□**

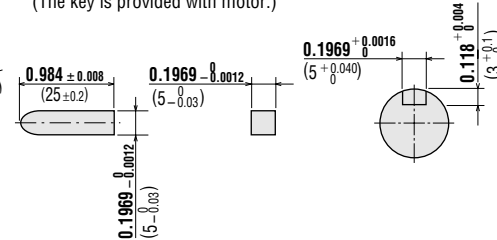
Motor: FPW560A-□, FPW560C-□, FPW560S-□

Weight: 11 lb. (5.0 kg)

**DXF** A228



**Key and Key Slot** (Scale 1/2)  
 (The key is provided with motor.)

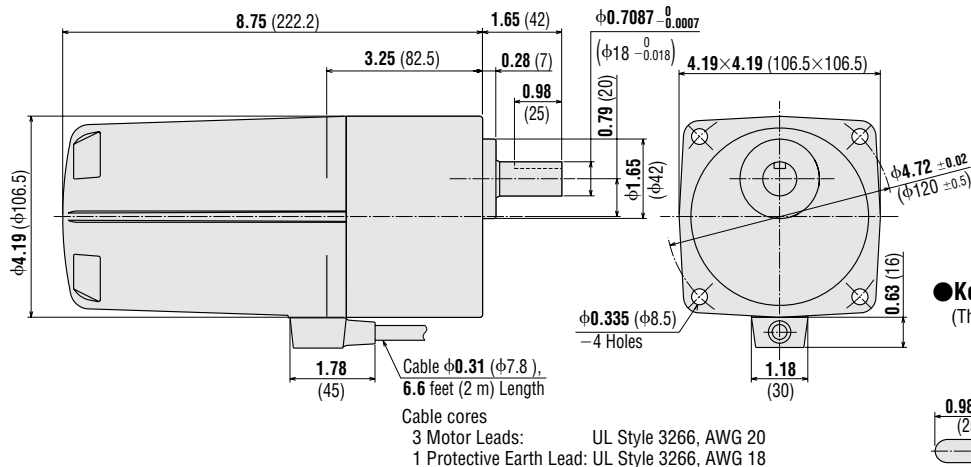


**FPW690A-□U, FPW690C-□E, FPW690S-□**

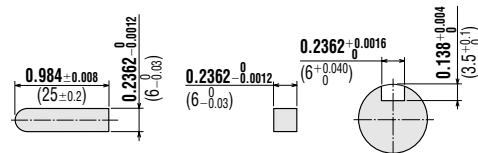
Motor: FPW690A-□, FPW690C-□, FPW690S-□

Weight: 16.5 lb. (7.5 kg)

**DXF** A256

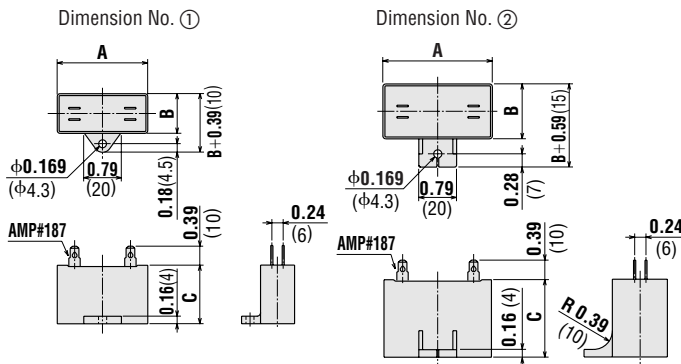


**Key and Key Slot** (Scale 1/2)  
 (The key is provided with motor.)





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



● **Capacitor Dimensions**

Unit=inch (mm)

Model	Capacitor Model	A	B	C	Weight oz. (g)	No.
FPW425A-□U	CH65CFAUL	1.50 (38)	0.83 (21)	1.22 (31)	1.23 (35)	①
FPW425C-□E	CH15BFAUL	1.50 (38)	0.83 (21)	1.22 (31)	1.23 (35)	①
FPW540A-□U	CH90CFAUL	1.89 (48)	0.83 (21)	1.22 (31)	1.41 (40)	①
FPW540C-□E	CH23BFAUL	1.89 (48)	0.83 (21)	1.22 (31)	1.41 (40)	①
FPW560A-□U	CH120CFAUL	2.28 (58)	0.83 (21)	1.22 (31)	1.76 (50)	①
FPW560C-□E	CH30BFAUL	2.28 (58)	0.83 (21)	1.22 (31)	1.76 (50)	①
FPW690A-□U	CH180CFAUL	2.28 (58)	0.93 (23.5)	1.46 (37)	2.47 (70)	②
FPW690C-□E	CH40BFAUL	2.28 (58)	0.93 (23.5)	1.46 (37)	2.47 (70)	②

● 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.

● **Screws (Included)**  
(Material: Stainless Steel)



	ℓ	Screw Size
FPW425 Type	3.15 inch (80 mm)	M5 P0.8
FPW540 Type	3.54 inch (90 mm)	M6 P1.0
FPW560 Type	3.54 inch (90 mm)	M6 P1.0
FPW690 Type	3.94 inch (100 mm)	M8 P1.25

4 washers and 4 hexagonal nuts are provided with the screws.

■ **Connection and Operation**

	Single-Phase 110/115 VAC, Single-Phase 220/230 VAC		Three-Phase 200/220/230 VAC	
25 W	Gear Ratio <b>3.6~18</b>	Gear Ratio <b>30~36</b>	Gear Ratio <b>3.6~18</b>	Gear Ratio <b>30~36</b>
40 W	Gear Ratio <b>60~180</b>		Gear Ratio <b>60~180</b>	
60 W	Gear Ratio <b>3.6~9</b>	Gear Ratio <b>15~18</b>	Gear Ratio <b>3.6~9</b>	Gear Ratio <b>15~18</b>
	Gear Ratio <b>30~60</b>	Gear Ratio <b>90~180</b>	Gear Ratio <b>30~60</b>	Gear Ratio <b>90~180</b>
90 W	Gear Ratio <b>3.6~9</b>	Gear Ratio <b>15~36</b>	Gear Ratio <b>3.6~9</b>	Gear Ratio <b>15~36</b>
	Gear Ratio <b>60~180</b>		Gear Ratio <b>60~180</b>	

- Direction of rotation shown is for the motor shaft rotation as seen from the motor shaft side. "CW" represents clockwise direction, while "CCW" represents counterclockwise direction.
- The connection method varies with the output power or the gear ratio.
- For added safety, it is advisable to use a ground fault interrupt circuit in situations where the motor is likely to get wet during operation.
- Changing the direction of rotation
  - Single-Phase Motor Clockwise: To rotate the motor in a clockwise (CW) direction, flip SW to CW.
  - Counterclockwise: To rotate the motor in a counterclockwise (CCW) direction, flip SW to CCW.
  - Three-Phase Motor To rotate the motor in a counterclockwise direction, change any two connections between U, V and W.
- Change the direction of a 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.
- **How to connect a capacitor** → Page A-225

**Wiring precautions**

The terminals of the cable are not waterproofed. Be sure not to splash water on the cable terminal, otherwise water could seep inside the motor through the lead wire or the fabric covering, resulting in damage to the motor.

