

Synchronous Motors

No Power or Load Fluctuation Effect

Synchronous motors rotate in synchronization with power frequency. Thus, if the power frequency is constant, they rotate at a constant speed (synchronized speed).

Impedance Protected

Except for some models, coils used for NPM synchronous motors provide high electric resistance, which prevents any over-current from flowing to coils. That is, coils are prevented from burning.

No Control Circuit Required

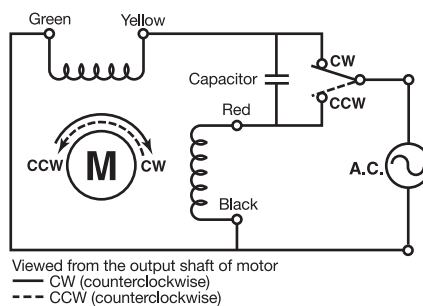
Since NPM synchronous motors are AC motors, and thus only power connection starts them rotating.

Excellent Response

Permanent magnet used for the rotor ensures excellent response at the start and stop. Power on/off starts/stops immediately.

Dual Direction Synchronous Motors

Synchronous motors which can rotate in dual direction are capacitor-based phase advancing motors. Since the rotor is rotated by shifting the phase of current by 90° with a capacitor, it is indispensable for the circuit to have a capacitor. Wiring is as follows:



Single Direction Synchronous Motors

Synchronous motors rotating in only single direction, clockwise or counterclockwise, are driven with no specific components in wiring to AC power supply. Wiring is as shown below. The leadwires have no polarity.



Dual Direction Synchronous Motors

(Capacitor-based phase advancing motors; Capacitor is indispensable)

PTM(C) - 24 F 3 4 G 1/2

① ② ③ ④ ⑤ ⑥ ⑦

① Series Designation

PTM: Flying lead joint type
PTMC: Connector joint type

② Number of Poles

12: Speed is 500 rpm with power frequency 50Hz.
Speed is 600 rpm with power frequency 60Hz.
24: Speed is 250 rpm with power frequency 50Hz.
Speed is 300 rpm with power frequency 60Hz

③ Outer Diameter (Type)

P: 25mm, M: 35mm, T: 35mm (thin), H: 12mm, S: 42mm (thin)
F: 55mm, R: 55mm (with connector)

④ Coil Specification

Blank: Standard coil (continuous rating for 24, 100 and 200 Vac)
1 to 18: Coil number for special rating

⑤ Magnet Material Type

Blank: Anisotropic ferrite magnet, 3: Isotropic ferrite magnet
4: Neodymium magnet, 5: Plastic magnet

⑥ Gear Head

Blank: No gear head, G: Gear head integrated

⑦ Gear Ratio

Typical relations between gear ratio and motor speed are as follows:

Gear ratio	rpm with 12 poles		rpm with 24 poles	
	50Hz	60Hz	50Hz	60Hz
Motor only	500	600	250	300
1/10	50	60	25	30
1/50	10	12	5	6
1/100	5	6	2.5	3

Single Direction Synchronous Motors

(Motors requiring only AC power supply; Rotating direction is limited to CW or CCW)

PTM - 24 B(G II) 100 - 50/60 - 2/2.4 CW

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

① Series Designation

PTM: Flying lead joint type

② Number of Poles

12: Speed is 500 rpm with power frequency 50Hz.
Speed is 600 rpm with power frequency 60Hz.
24: Speed is 250 rpm with power frequency 50Hz.
Speed is 300 rpm with power frequency 60Hz

③ Outer Diameter

B: 35mm, K: 42mm, E: 42mm (high output torque)

④ Gear Head

Blank: No gear head, G: Gear head integrated

⑤ Symbol used for PTM-24BGII only

Denotes BG gear type II.

⑥ Supply Voltage

24, 100, 200 Vac, etc. (selectable voltage depends on model)

⑦ Power Frequency

50, 60 or 50/60 Hz

⑧ Rotating Speed

Line frequency of 60Hz makes the motor speed 1.2 times higher than 50Hz.

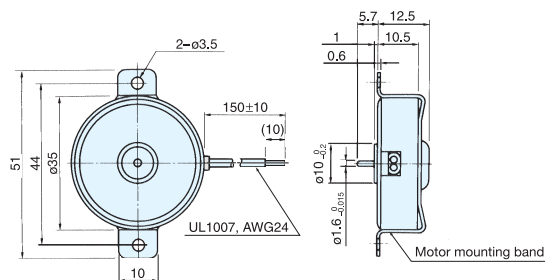
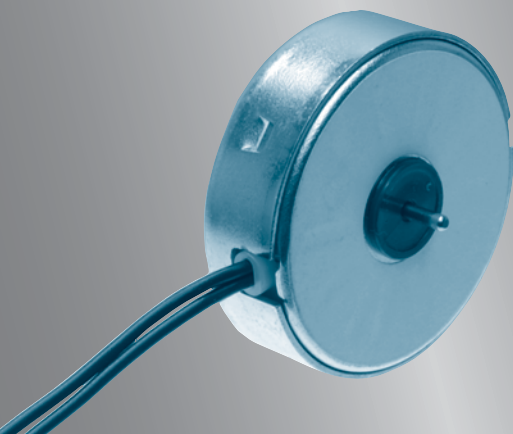
⑨ Rotating Direction

CW: Clockwise

CCW: Counterclockwise

Viewed from the output shaft of motor.

PTM-24B



Motor is fixed with an accessory mounting band.

Specifications

Particulars	Unit	PTM-24B			
Rated Voltage (AC)	V	12	24	100	200
Operating Voltage Range	%	±10			
Frequency	Hz	50/60			
Current	mA	75/70	35/32	11/10	7/6.5
Speed	rpm	250/300			
Rotating Direction		Single direction (CW or CCW)			
Torque	mN·m	0.5			
Temperature Rise	K	40			
Operating Temperature Range	°C	-10 to +50			
Dielectric Strength	V	500Vac for 1 minute		1000Vac for 1 minute	1500Vac for 1 minute
Mass	g	35			
Capacitor	μF	—			

• Electrical specifications of PTM-24AG are the same as PTM-24B.

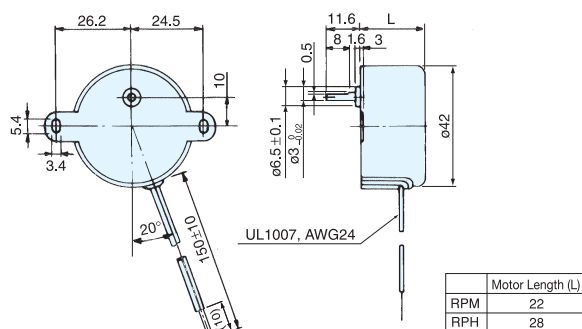
Torque Characteristics

Model	PTM-24AG		
Speed	Torque	Gear Ratio	
[RPM]	[mN·m]	50 [Hz]	60 [Hz]
1/2	80	1/500	1/600
1/3	80	1/750	1/900
1/5	80	1/1250	1/1500
1/10	80	1/2500	1/3000
1/30	80	1/7500	1/9000
1/60	80	1/15000	1/18000
1/2 [RPH]	80	1/30000	1/36000
1/24 [RPH]	80	1/360000	1/432000

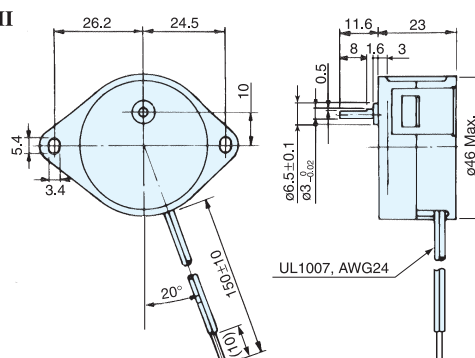
Model	PTM-24BGII		
Speed	Torque	Gear Ratio	
[RPM]	[mN·m]	50 [Hz]	60 [Hz]
20	5	2/25	1/15
10	10	1/25	1/30
5	20	1/50	1/60
4	25	2/125	1/75
3	35	3/250	1/100
2	50	1/125	1/150
1	100	1/250	1/300

Dimensions of Geared Models

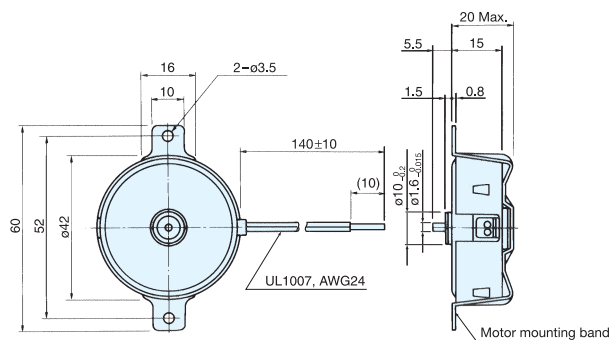
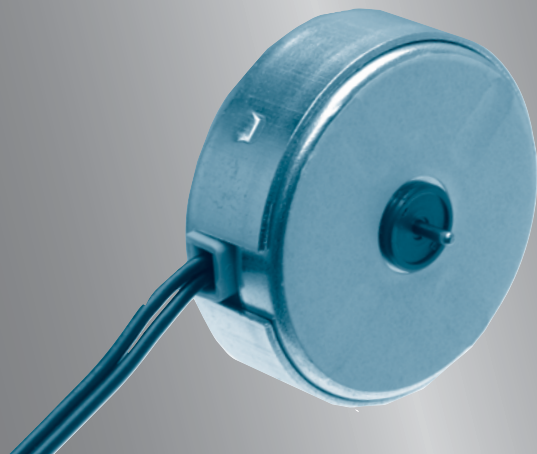
PTM-24AG



PTM-24BGII



PTM-12E



Motor is fixed with an accessory mounting band.

Specifications

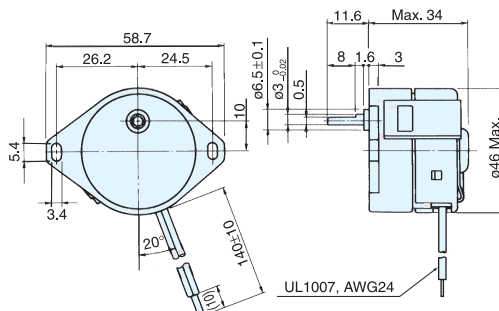
Particulars	Unit	PTM-12E			
Rated Voltage (AC)	V	12	24	100	200
Operating Voltage Range	%	±10			
Frequency	Hz	50/60			
Current	mA	160/140	88/79	20/19	10/9
Speed	rpm	500/600			
Rotating Direction		Single direction (CW or CCW)			
Torque	mN·m	1.7			
Temperature Rise	K	45			
Operating Temperature Range	°C	-10 to +50			
Dielectric Strength	V	500Vac for 1 minute		1000Vac for 1 minuts	1500Vac for 1 minute
Mass	g	95			
Capacitor	μF	—			

Torque Characteristics

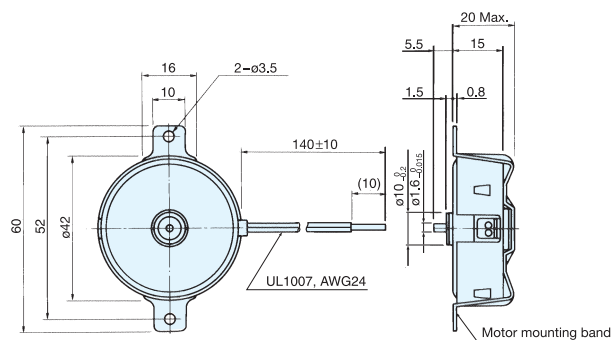
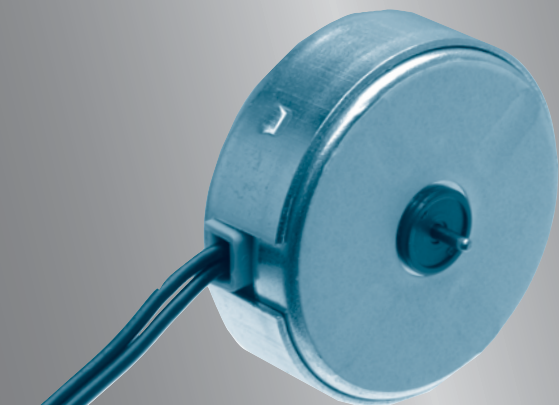
Model	PTM-12EG		
Speed	Torque	Gear Ratio	
[RPM]	[mN·m]	50 [Hz]	60 [Hz]
20	30	1/25	1/30
10	60	1/50	1/60
6	100	3/250	1/100
5	120	1/100	1/120
4	160	1/125	1/150
2	200	1/250	1/300
1	200	1/500	1/600

Dimensions of Geared Model

PTM-12EG



PTM-12K



Motor is fixed with an accessory mounting band.

Specifications

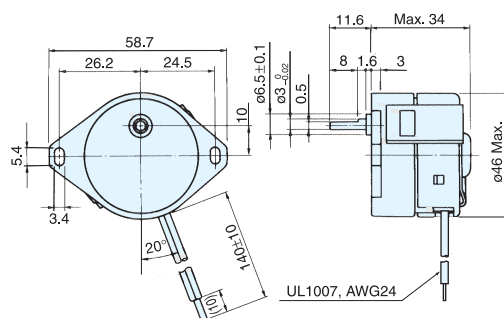
Particulars	Unit	PTM-12K			
Rated Voltage (AC)	V	12	24	100	200
Operating Voltage Range	%	±10			
Frequency	Hz	50/60			
Current	mA	160/150	110/100	18/17	7.5/7
Speed	rpm	500/600			
Rotating Direction		Single direction (CW or CCW)			
Torque	mN·m	1/0.9			
Temperature Rise	K	35			
Operating Temperature Range	°C	-10 to +50			
Dielectric Strength	V	500Vac for 1 minute		1000Vac for 1 minute	1500Vac for 1 minute
Mass	g	90			
Capacitor	μF	—			

Torque Characteristics

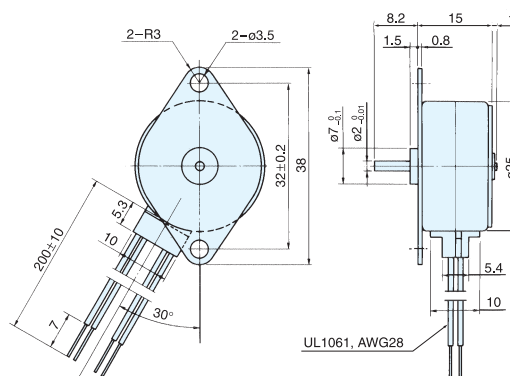
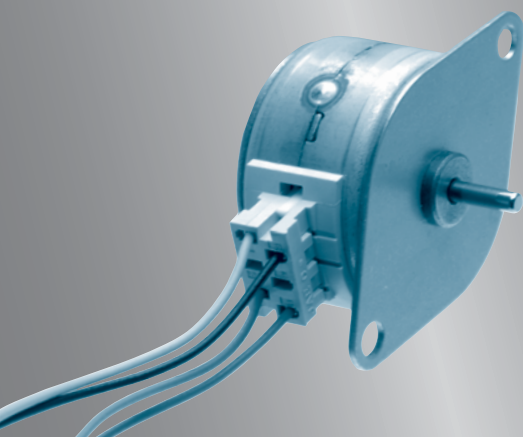
Model	PTM-12KG		
Speed	Torque	Gear Ratio	
[RPM]	[mN·m]	50 [Hz]	60 [Hz]
20	25	1/25	1/30
10	50	1/50	1/60
6	80	3/250	1/100
5	100	1/100	1/120
4	120	1/125	1/150
2	150	1/250	1/300
1	200	1/500	1/600

Dimensions of Geared Model

PTM-KG



PTMC-24P



Specifications

Particulars	Unit	PTMC-24P
Rated Voltage (AC)	V	24
Operating Voltage Range	%	± 10
Frequency	Hz	50/60
Current	mA	67/69
Speed	rpm	250/300
Rotating Direction		Dual direction (CW/CCW reversible)
Torque	mN·m	5.3/5.5
Temperature Rise	K	55
Operating Temperature Range	°C	-10 to +50
Dielectric Strength	V	500Vac for 1 minute
Mass	g	36
Capacitor	μ F	3.3

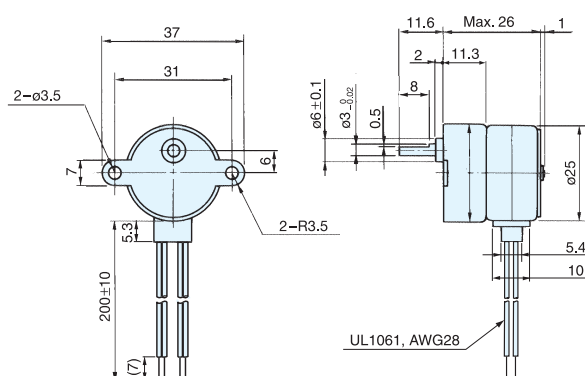
Torque Characteristics

Model	PTMC-24PG			
Speed	Torque [mN·m]		Gear Ratio	
[RPM]	50 [Hz]	60 [Hz]	50 [Hz]	60 [Hz]
60	14	17	6/25	1/5
30	20*	20*	3/25	1/10
20	33	42	2/25	1/15
10	54	67	1/25	1/30
5	70*	70*	1/50	1/60
4	70*	70*	2/125	1/75
3	—	100*	—	1/100
2	100*	100*	1/125	1/150
1	100*	100*	1/250	1/300

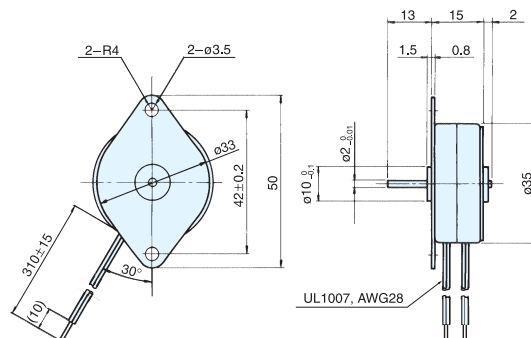
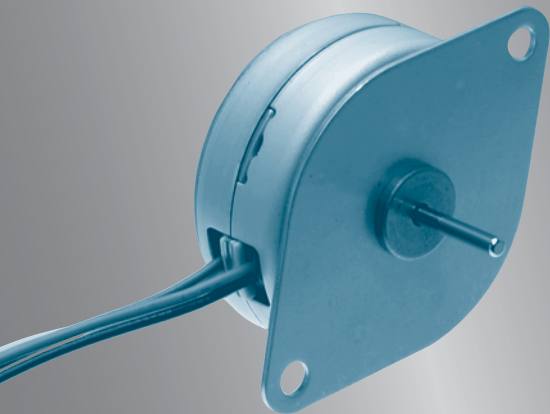
* Asterisked values are values regulated by normal gear strength. Do not apply any load exceeding the normal gear strength.

Dimensions of Geared Model

PTMC-24PG



PTM-24T



Specifications

Particulars	Unit	PTM-24T
Rated Voltage (AC)	V	24
Operating Voltage Range	%	±10
Frequency	Hz	50/60
Current	mA	68/70
Speed	rpm	250/300
Rotating Direction		Dual direction (CW/CCW reversible)
Torque	mN·m	9/9.5
Temperature Rise	K	55
Operating Temperature Range	°C	-10 to +50
Dielectric Strength	V	500Vac for 1 minute
Mass	g	77
Capacitor	μF	3.3

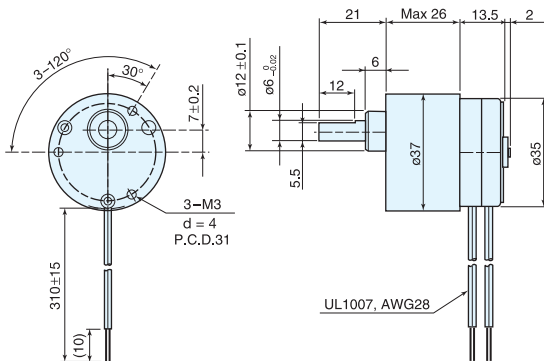
Torque Characteristics

Model	PTM-24TG			
Speed	Torque [mN·m]		Gear Ratio	
[RPM]	50 [Hz]	60 [Hz]	50 [Hz]	60 [Hz]
60	—	30	—	1/5
30	—	60	—	1/10
20	—	72	—	1/15
10	115	145	1/25	1/30
5	180	230	1/50	1/60
4	—	290	—	1/75
3	—	300*	—	1/100
2	365	465	1/125	1/150
1	—	600*	—	1/300

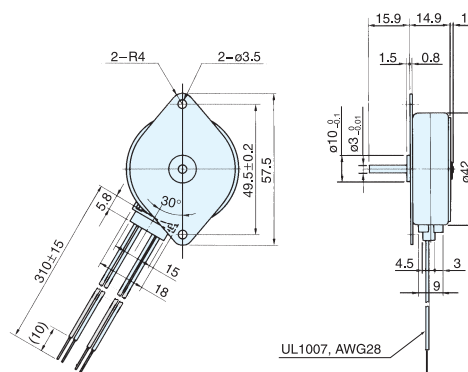
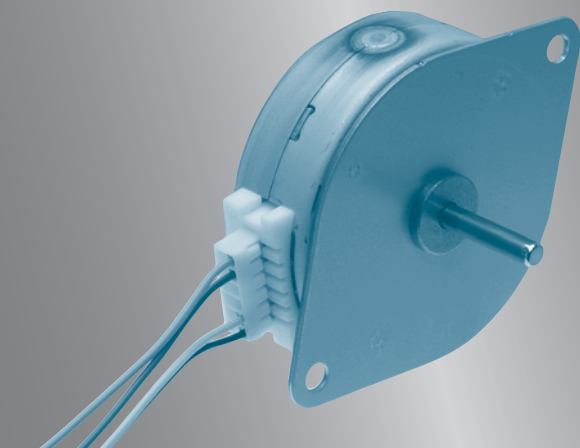
* Asterisked values are values regulated by normal gear strength. Do not apply any load exceeding the normal gear strength.

Dimensions of Geared Model

PTM-24TG



PTMC-24S2



Specifications

Particulars	Unit	PTMC-24S2
Rated Voltage (AC)	V	24
Operating Voltage Range	%	±10
Frequency	Hz	50/60
Current	mA	110/115
Speed	rpm	250/300
Rotating Direction		Dual direction (CW/CCW reversible)
Torque	mN·m	20.5/19.5
Temperature Rise	K	70
Operating Temperature Range	°C	-10 to +50
Dielectric Strength	V	500Vac for 1 minute
Mass	g	105
Capacitor	μF	5.6

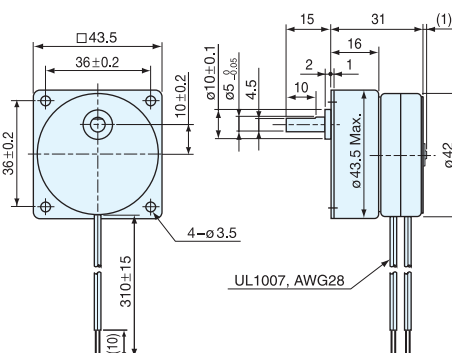
Torque Characteristics

Model	PTMC-24SG			
Speed	Torque [mN·m]		Gear Ratio	
[RPM]	50 [Hz]	60 [Hz]	50 [Hz]	60 [Hz]
60	49	55	6/25	1/5
30	98	110	3/25	1/10
20	115	135	2/25	1/15
10	235	220	1/25	1/30
5	300*	300*	1/50	1/60
4	300*	300*	2/125	1/75
3	—	400*	—	1/100
2	400*	400*	1/125	1/150
1	400*	400*	1/250	1/300

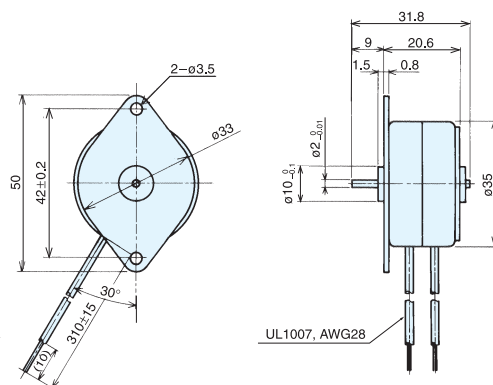
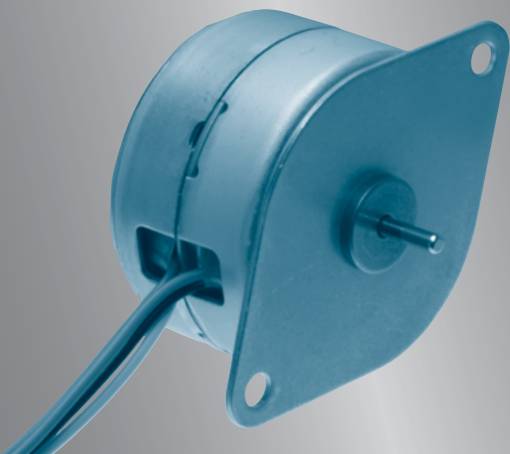
* Asterisked values are values regulated by normal gear strength. Do not apply any load exceeding the normal gear strength.

Dimensions of Geared Model

PTMC-24SG



PTM-12M8



Specifications

Particulars	Unit	PTM-12M8
Rated Voltage (AC)	V	100
Operating Voltage Range	%	±10
Frequency	Hz	50/60
Current	mA	32/35
Speed	rpm	500/600
Rotating Direction		Dual direction (CW/CCW reversible)
Torque	mN·m	9.3/8.8
Temperature Rise	K	60
Operating Temperature Range	°C	-10to +50
Dielectric Strength	V	1000Vac for 1 minute
Mass	g	80
Capacitor	µF	0.39

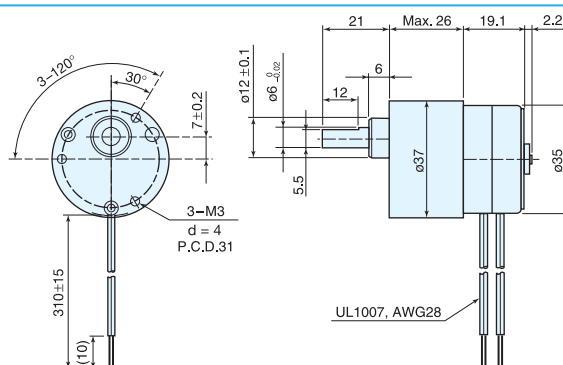
Torque Characteristics

Model	PTM-12MG			
Speed	Torque [mN·m]		Gear Ratio	
[RPM]	50 [Hz]	60 [Hz]	50 [Hz]	60 [Hz]
120	—	28	—	1/5
60	—	56	—	1/10
40	—	67	—	1/15
20	115	135	1/25	1/30
10	190	215	1/50	1/60
8	—	270	—	1/75
6	—	300*	—	1/100
4	380	430	1/125	1/150
2	—	600*	—	1/300
1	600*	600*	1/500	1/600

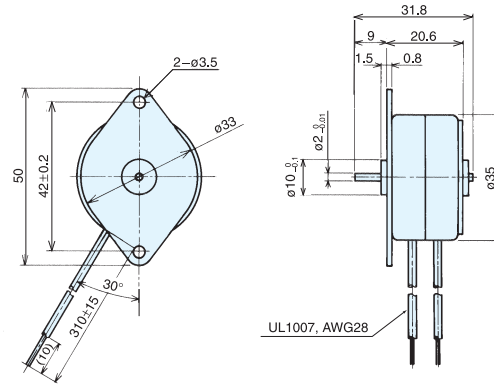
* Asterisked values are values regulated by normal gear strength. Do no apply any load exceeding the normal gear strength.

Dimensions of Geared Model

PTM-12MG



PTM-24M



Specifications

Particulars	Unit	PTM-24M	
Rated Voltage (AC)	V	24	100
Operating Voltage Range	%	±10	
Frequency	Hz	50/60	
Current	mA	62/63	16/17
Speed	rpm	250/300	
Rotating Direction		Dual direction (CW/CCW reversible)	
Torque	mN·m	12/12.5	
Temperature Rise	K	55	
Operating Temperature Range	°C	-10 to +50	
Dielectric Strength	V	500Vac for 1 minute	1000Vac for 1 minute
Mass	g	80	
Capacitor	µF	3.9	0.23

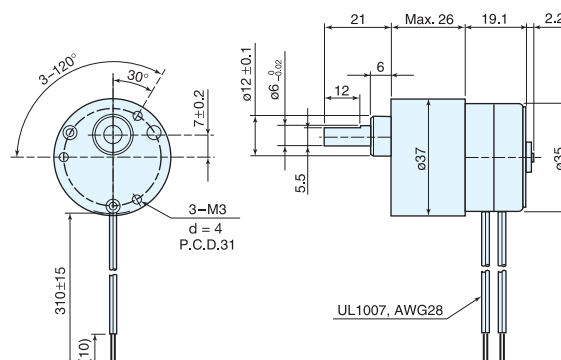
Torque Characteristics

Model	PTMC-24MG			
	Torque [mN·m]		Gear Ratio	
	50 [Hz]	60 [Hz]	50 [Hz]	60 [Hz]
[RPM]				
60	—	40	—	1/5
30	—	80	—	1/10
20	—	96	—	1/15
10	150	190	1/25	1/30
5	245	300*	1/50	1/60
4	—	300*	—	1/75
3	—	300*	—	1/100
2	400	600*	1/125	1/150
1	—	600*	—	1/300

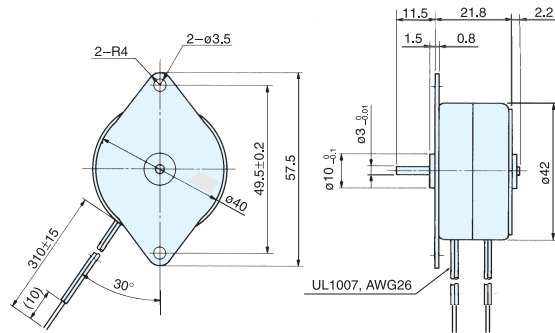
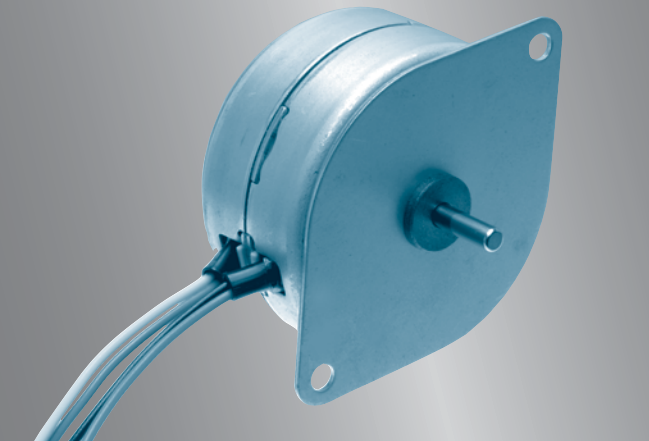
* Asterisked values are values regulated by normal gear strength. Do not apply any load exceeding the normal gear strength.

Dimensions of Geared Model

PTM-24MG



PTM-12H8



Specifications

Particulars	Unit	PTM-12H8
Rated Voltage (AC)	V	100
Operating Voltage Range	%	±10
Frequency	Hz	50/60
Current	mA	37/41
Speed	rpm	500/600
Rotating Direction		Dual direction (CW/CCW reversible)
Torque	mN·m	18.5/17
Temperature Rise	K	70
Operating Temperature Range	°C	-10 to +50
Dielectric Strength	V	1000Vac for 1 minute
Mass	g	160
Capacitor	μF	0.47

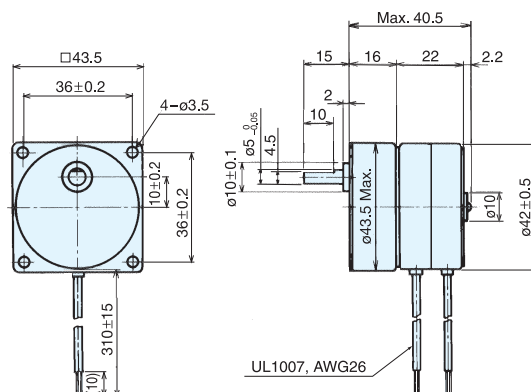
Torque Characteristics

Model	PTM-12HG			
Speed	Torque [mN·m]		Gear Ratio	
[RPM]	50 [Hz]	60 [Hz]	50 [Hz]	60 [Hz]
120	49	53	6/25	1/5
60	98	105	3/25	1/10
40	115	130	2/25	1/15
20	235	205	1/25	1/30
10	300*	300*	1/50	1/60
8	300*	300*	2/125	1/75
6	—	400*	3/250	1/100
4	400*	400*	1/125	1/150
2	400*	400*	1/250	1/300

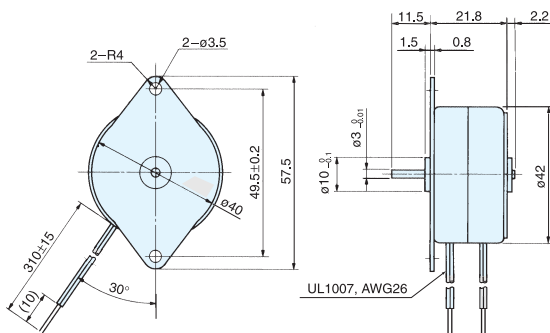
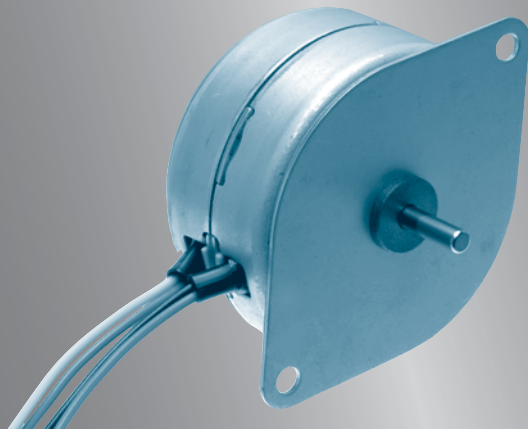
* Asterisked values are values regulated by normal gear strength. Do no apply any load exceeding the normal gear strength.

Dimensions of Geared Model

PTM-12HG



PTM-24H



Specifications

Particulars	Unit	PTM-24H	
Rated Voltage (AC)	V	24	100
Operating Voltage Range	%	±10	
Frequency	Hz	50/60	
Current	mA	99/118	22/24
Speed	rpm	250/300	
Rotating Direction		Dual direction (CW/CCW reversible)	
Torque	mN·m	22/21.5	
Temperature Rise	K	55	
Operating Temperature Range	°C	-10 to +50	
Dielectric Strength	V	500Vac for 1 minute	1000Vac for 1 minute
Mass	g	160	
Capacitor	μF	5.6	0.27

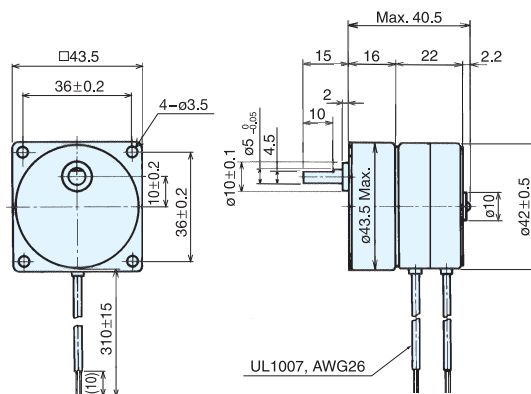
Torque Characteristics

Model	PTM-24HG			
	Torque [mN·m]		Gear Ratio	
Speed				
[RPM]	50 [Hz]	60 [Hz]	50 [Hz]	60 [Hz]
60	58	68	6/25	1/5
30	115	135	3/25	1/10
20	140	165	2/25	1/15
10	250*	260	1/25	1/30
5	300*	300*	1/50	1/60
4	300*	300*	2/125	1/75
3	—	400*	—	1/100
2	400*	400*	1/125	1/150
1	400*	400*	1/250	1/300

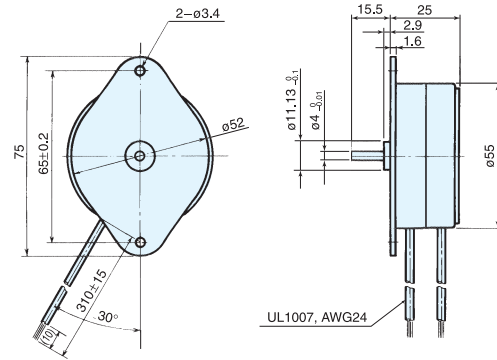
* Asterisked values are values regulated by normal gear strength. Do not apply any load exceeding the normal gear strength.

Dimensions of Geared Model

PTM-24HG



PTM-24F



Specifications

Particulars	Unit	PTM-24F		
Rated Voltage (AC)	V	24	100	200
Operating Voltage Range	%	±10		
Frequency	Hz	50/60		
Current	mA	62/63	35/45	30/25
Speed	rpm	250/300		
Rotating Direction		Dual direction (CW/CCW reversible)		
Torque	mN·m	35/30		
Temperature Rise	K	55		
Operating Temperature Range	°C	-10 to +50		
Dielectric Strength	V	500Vac for 1 minute	1000Vac for 1 minute	1500Vac for 1 minute
Mass	g	300		
Capacitor	μF	3.9	0.47	0.11

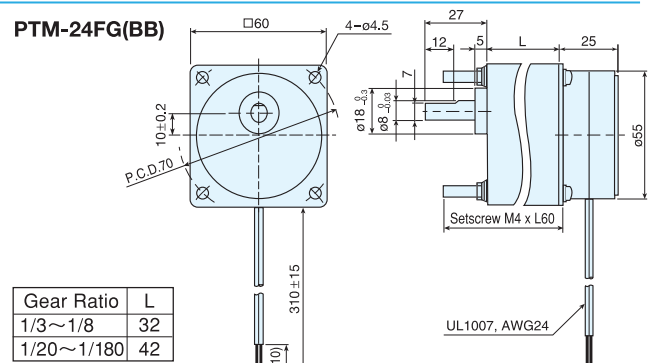
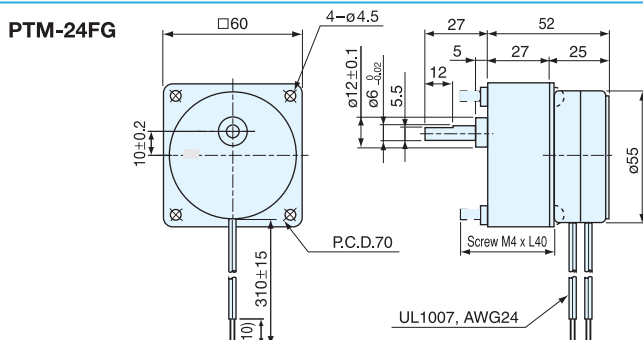
Torque Characteristics

Model	PTM-24FG			
Speed	Torque [mN·m]		Gear Ratio	
[RPM]	50 [Hz]	60 [Hz]	50 [Hz]	60 [Hz]
60	93	95	6/25	1/5
30	185	190	3/25	1/10
20	280	285	2/25	1/15
10	445	460	1/25	1/30
5	700*	700*	1/50	1/60
4	895	920	2/125	1/75
3	1000*	1000*	3/250	1/100
2	1000*	1000*	1/125	1/150
1	1000*	1000*	1/250	1/300

* Asterisked values are values regulated by normal gear strength. Do not apply any load exceeding the normal gear strength.

Model	PTM-24FG (BB)			
Speed	Torque [mN·m]		Gear Ratio	
[RPM]	50 [Hz]	60 [Hz]	50 [Hz]	60 [Hz]
60	—	96	—	1/5
30	—	190	—	1/10
20	280	285	2/25	1/15
10	445	460	1/25	1/30
5	895	920	1/50	1/60
4	—	970	—	1/75
3	1150	1200	3/250	1/100
2	1750	1800	1/125	1/150
1	—	—	—	—

Dimensions of Geared Model



Gear Ratio	L
1/3~1/8	32
1/20~1/180	42

Geared Synchronous Motors

Gear Ratio, Rotating Speed and Rated Torque

Speed	Torque [mN·m]	Gear Ratio	
[RPM]	AG Series	50 [Hz]	60 [Hz]
1/2	80	1/500	1/600
1/3	80	1/750	1/900
1/5	80	1/1250	1/1500
1/10	80	1/2500	1/3000
1/30	80	1/7500	1/9000
1/60	80	1/15000	1/18000
1/2 [RPH]	80	1/30000	1/36000
1/24 [RPH]	80	1/360000	1/432000

Speed	Torque [mN·m]	Gear Ratio	
[RPM]	BGII Series	50 [Hz]	60 [Hz]
20	5	2/25	1/15
10	10	1/25	1/30
5	20	1/50	1/60
4	25	2/125	1/75
3	35	3/250	1/100
2	50	1/125	1/150
1	100	1/250	1/300

Note: Motor length of PTM-24AG is 22mm for RPM rating and 28mm for RPH rating.

Speed	Torque [mN·m]	Torque [mN·m]	Gear Ratio	
[RPM]	EG Series	KG Series	50 [Hz]	60 [Hz]
20	30	25	1/25	1/30
10	60	50	1/50	1/60
6	100	80	3/250	1/100
5	120	100	1/100	1/120
4	160	120	1/125	1/150
2	200	150	1/250	1/300
1	200	200	1/500	1/600

Speed	Torque [mN·m]									Gear Ratio	
[RPM]	PTMC-24PG	PTM-24TG	PTM-12M8G	PTM-24MG	PTMC-24SG	PTM-12H8G	PTM-24HG	PTM-24FG	PTM-24FG(BB)	50 [Hz]	60 [Hz]
120	—	—	28	—	—	49	—	—	—	6/25	1/5
60	14	30	—	40	49	—	58	93	96	6/25	1/5
60	—	—	56	—	—	98	—	—	—	3/25	1/10
30	20	60	—	80	98	—	115	185	190	3/25	1/10
40	—	—	67	—	—	115	—	—	—	2/25	1/15
20	33	72	—	96	115	—	140	280	280	2/25	1/15
20	—	—	115	—	—	235	—	—	—	1/25	1/30
10	54	115	—	150	235	—	250	445	445	1/25	1/30
10	—	—	190	—	—	300	—	—	—	1/50	1/60
5	70	180	—	245	300	—	300	700	895	1/50	1/60
8	—	—	270	—	—	300	—	—	—	2/125	1/75
4	70	290	—	300	300	—	300	700	920	2/125	1/75
6	—	—	300	—	—	400	—	—	—	3/250	1/100
3	100	300	—	300	400	—	400	1000	1150	3/250	1/100
4	—	—	380	—	—	400	—	—	—	1/125	1/150
2	100	365	—	490	400	—	400	1000	1750	1/125	1/150
2	—	—	600	—	—	400	—	—	—	1/250	1/300
1	100	600	—	600	400	—	400	1000	—	1/250	1/300
1	—	—	600	—	—	—	—	—	—	1/500	1/600

Note: Some rotating speeds are not available depending on line frequency.
For details, refer to pages of individual models.