

# Nippon Pulse Stepper Motors

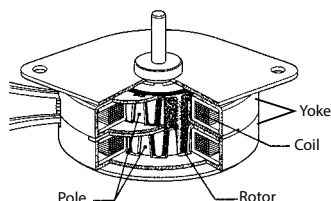
## Permanent Magnet Motors

Nippon Pulse's permanent magnet (PM) step motors (PF series tin-can steppers) have been well-established in the engineering world, and have many advantages over other kinds of stepper motors. PM motors strike the perfect balance between efficiency and affordability, as they are low-inertia, low-resolution motors that are a low-priced alternative to hybrid stepper motors in many applications.

PM step motors have a typical step angle between 3.75 and 18 degrees, and offer position resolution on the order of  $\pm 5$  percent. Its structure demonstrates ferromagnetism, with alternating north and south poles set in a straight, parallel line to the rotor shaft. The rotor is moved through the action of permanent magnets, providing increased magnetic flux intensity. This intensity results in improved torque characteristics for the PM motor, compared to variable resistance step motors.

Nippon Pulse provides high-quality PM motors to industries and professionals all over the world. Take a look at our standard PM motors over the following pages to find the one that most closely fits your needs. An application engineer can work with you to make any customizations necessary to make our PM motors a perfect fit.

## Basic Structure of 2-Phase Permanent Magnet Motor



Below are Nippon Pulse's permanent magnet stepper motors:

- **PF series** - Nippon Pulse's original PM stepper motors
- **PFC series** - PF series tin-can steppers with a fully automated coil assembly
- **PFL series (Linearstep)** - linear actuators that utilize the PF series construction
- **NFC series** - high-force, short-stroke linear actuators that utilize the PF series construction
- **PTM/PTMC series** - synchronous timing motors based on the PF series.



**PFL35T and PFC25**

## Insulation Ratings

Insulation Class	Y	A	E	B	F	H	C
Allowable Temp (°C)	90	105	120	130	155	180	>180

Note: All tin-can motors and linear steppers in this catalog are insulation Class E unless otherwise noted.

## Terminology

### Continuous Rating

Specifications are continuously applicable to the rated output.

### Dielectric Strength

The maximum voltage between the case and the coils that can be sustained for one minute without damaging the motor.

- 500Vac for one minute with operating voltage <30V
- 1000Vac for one minute with operating voltage 30-150V
- 1500Vac for one minute with operating voltage >150V

### Intermittent Rating

Specifications are applicable for a specific time length to the rated output.

### Motor Speed

Number of revolutions per minute.

### Operating Temperature Range

Ambient temperature range in which the motor can normally be driven.

### Operating Voltage Range

The voltage range in which the motor can normally be driven with Constant Voltage drive.

### Temperature Rise

The temperature of the motor rises whenever power is applied. Temperature rise is determined by applying the motor's rated voltage and measuring the increased coil resistance or the change in surface temperature of the motor.

## Abbreviations/Units

### A

SI base unit for current (ampere)

### AC

Alternating current

### CCW

Counterclockwise

### CW

Clockwise

### DC

Direct Current

### Hz

SI induced unit for frequency (cycles per second)

### K

SI base unit for temperature (Kelvin); often used for temperature rise

### PPS

Pulses per second

### RPM

Revolutions per minute

### V

SI induced unit for voltage (volts)

## RoHS Compliance

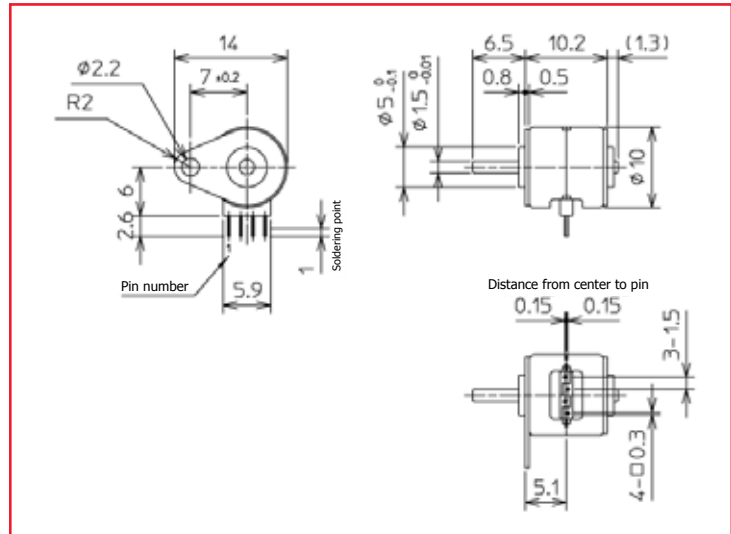
All Nippon Pulse stepper motor products are RoHS compliant.



## Tin-Can Models by Outer Diameter

OD (mm)	Tin-Can	Synchronous		Linear Stepper
		Dual Direction	Single Direction	
10	PFC10	--	--	--
20	PFCU20 PFC20T	--	--	--
25	PF(C)25 PFCU25	PTM-24P	--	PFCL25
30	PFCU30	--	--	--
35	PF35 PFC35T	PTM-24M PTM-24T	PTM-24B	PFL35T
42	PF42 PFC42H PF(C)42T	PTM-24H PTMC-24S2	PTM-12K PTM-12E	--
55	PF(C)55 PFC55H	PTM-24F	--	--

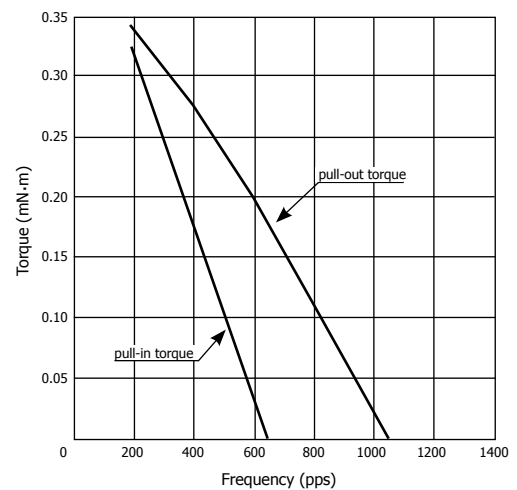




### Specifications

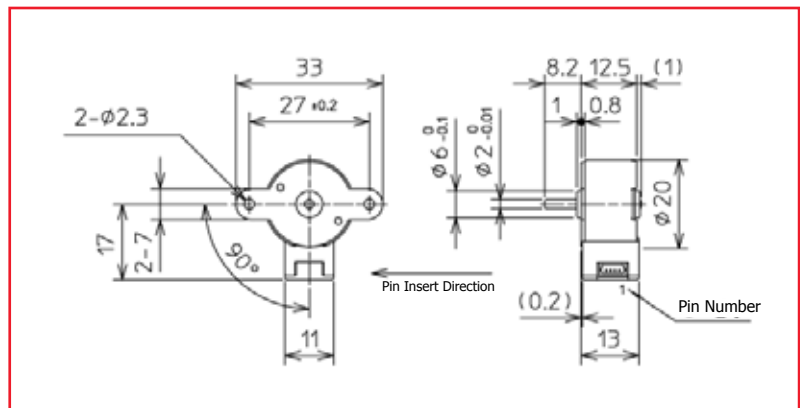
Specification	Unit	PFC10-20R6
Type of Winding		Bipolar
Excitation Mode*		Full step (2-2)
Steps/Revolution		20
Step Angle	°	18
Holding Torque	mN·m	1.0
Rated Voltage	V	2.7
Rated Current	mA/phase	135
Resistance	$\Omega / \phi$	20
Inductance	mH / $\phi$	3.2
Coil		R
Starting Pulse Rate	pps	960
Slewing Pulse Rate	pps	1600
Rotor Inertia	kg·m <sup>2</sup>	$0.03 \times 10^{-7}$
Operating Temp. Range	°C	-10 to +50
Storage Temp. Range	°C	-30 to +80
Insulation Class		E
Temperature Rise	K	70
RoHS Compliant		Yes
Weight	g	5

### Torque Curve Characteristics



Pin	Coil Phase
1	4 $\phi$ B
2	1 $\phi$ A
3	2 $\phi$ B
4	3 $\phi$ A

All tin-can motor specifications are based on full-step constant voltage operation. When the rated voltage is 5V, the terminal voltage is 4V. Do not use this product over maximum operating temperature (100°C).

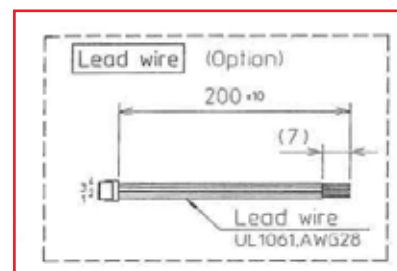
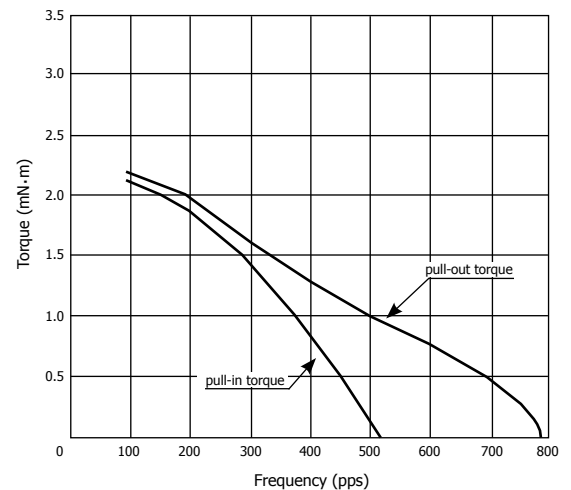


## Specifications

Specification	Unit	PFC20T-20V6
Type of Winding		Bipolar
Excitation Mode*		Full step (2-2)
Steps/Revolution		20
Step Angle	°	18
Holding Torque	mN·m	4.4
Rated Voltage	V	8.7
Rated Current	mA/phase	87
Resistance	Ω	100
Inductance	mH	35
Coil		V
Starting Pulse Rate	pps	620
Slewing Pulse Rate	pps	1080
Rotor Inertia	kg·m <sup>2</sup>	0.2 × 10 <sup>-7</sup>
Operating Temp. Range	°C	-10 to +50
Storage Temp. Range	°C	-30 to +80
Insulation Class		E
Temperature Rise	K	70
RoHS Compliant		Yes
Weight	g	24

All tin-can motor specifications are based on full-step constant voltage operation. When the rated voltage is 15V, the terminal voltage is 12V-11V. Do not use this product over maximum operating temperature (100°C).

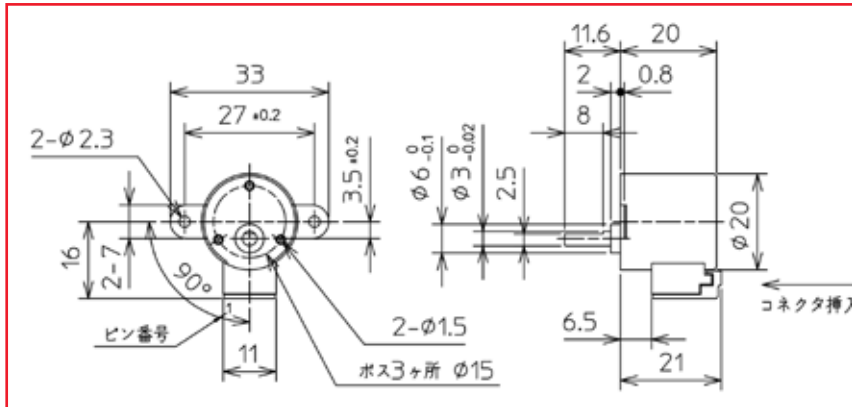
## Torque Curve Characteristics



## Connector (JST)

Applicable Housing: SHR-04V-S  
 Applicable Contact: SSH-003T-P0.2-H  
 Applicable Wire: AWG 32 to 28 (outer diameter of wire insulation: 0.4 to 0.8 mm)

Pin	Coil Phase
1	4φ B̄
2	2φ B
3	3φ Ā
4	1φ A



### Specifications

Specification	Unit	PFCU20-40_-4GM2 (1/10)		PFCU20-40_-4GM2 (1/18)	
Excitation Mode		Full-step (2-2)			
Step Angle	°	0.9		0.5	
Steps Per Revolution*		400		720	
Windings		S	V	S	V
Rated Voltage	V	11	8.7	11	8.7
Resistance <sup>1</sup>	Ω/φ	160	100	160	100
Inductance <sup>1</sup>	mH/φ	59	39	59	39
Maximum Torque	mN·m	20			
Destruction Torque	mN·m	60			
Gear Ratio/Backlash	pps	1/10		1/18	
Operating Temp. Range	°C	-10 ~ +50			
Temperature Rise*	K	70			
Weight	g	25			

All tin-can motor specifications are based on full-step constant voltage operation.

Magnet type: Neodymium

<sup>1</sup> Supply voltage 12V ±2% and at a temperature of 20°C ±5% and relative humidity 65% ±20%.

<sup>2</sup> Stated terminal voltage is with supply voltage 12V.

<sup>3</sup> Stated temperature rise is at the time of saturation.

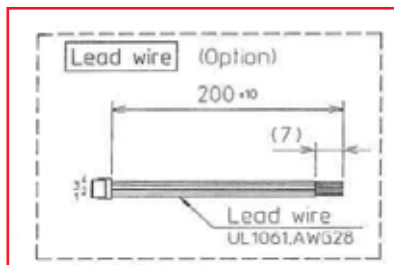
\*Under test conditions

### Connector (JST)

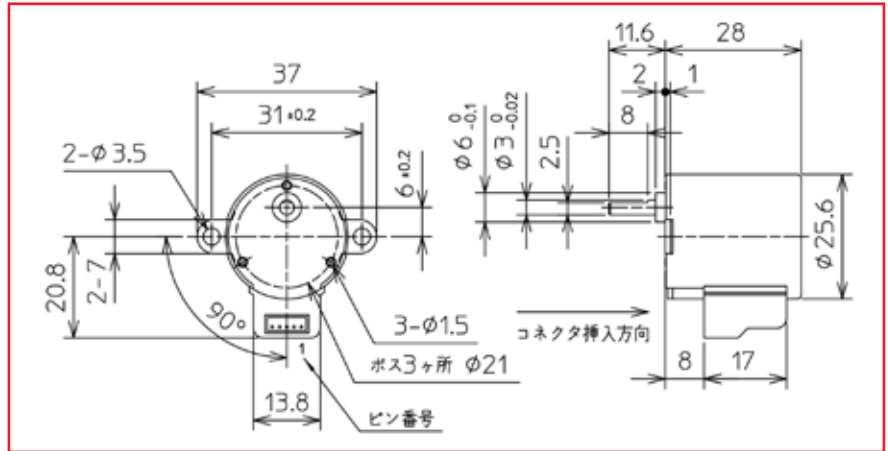
Applicable Housing: SHR-04V-S

Applicable Contact: SSH-003T-P0.2-H

Applicable Wire: AWG 32 to 28 (outer diameter of wire insulation: 0.4 to 0.8 mm)



Pin	Coil Phase
1	4φ B-
2	3φ A-
3	1φ A
4	2φ B



Specifications

Specification	Unit	PFCU25-24_-1GM (1/18)		PFCU25-24_-1GM (1/20)		PFCU25-24_-1GM (1/30)	
Excitation Mode		Full Step (2-2)					
Step Angle	°	1		0.75		0.5	
Steps Per Revolution*		360		480		720	
Winding		P	T	P	T	P	T
Rated Voltage	V	12.6	6.5	12.6	6.5	12.6	6.5
Resistance <sup>1</sup>	Ω/φ	122	32	122	32	122	32
Inductance <sup>1</sup>	mH/φ	66	16	66	16	66	16
Maximum Torque	mN·m	50					
Destruction Torque	mN·m	150					
Operating Temp. Range	°C	-10 ~ +50					
Temperature Rise*	K	70					
Weight	g	55					
Gear Ratio, Backlash		1/15		1/20		1/30	

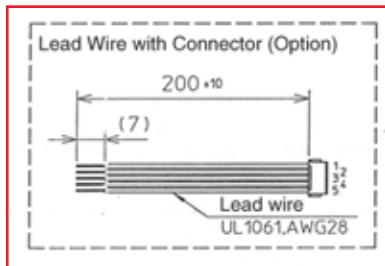
All tin-can motor specifications are based on full-step constant voltage operation, Magnet type: Anisotropic

<sup>1</sup> Supply voltage 12V ±2% and at a temperature of 20°C ±5% and relative humidity 65% ±20%.

<sup>2</sup> Stated terminal voltage is with supply voltage 12V.

<sup>3</sup> Stated temperature rise is at the time of saturation.

\*Under test conditions



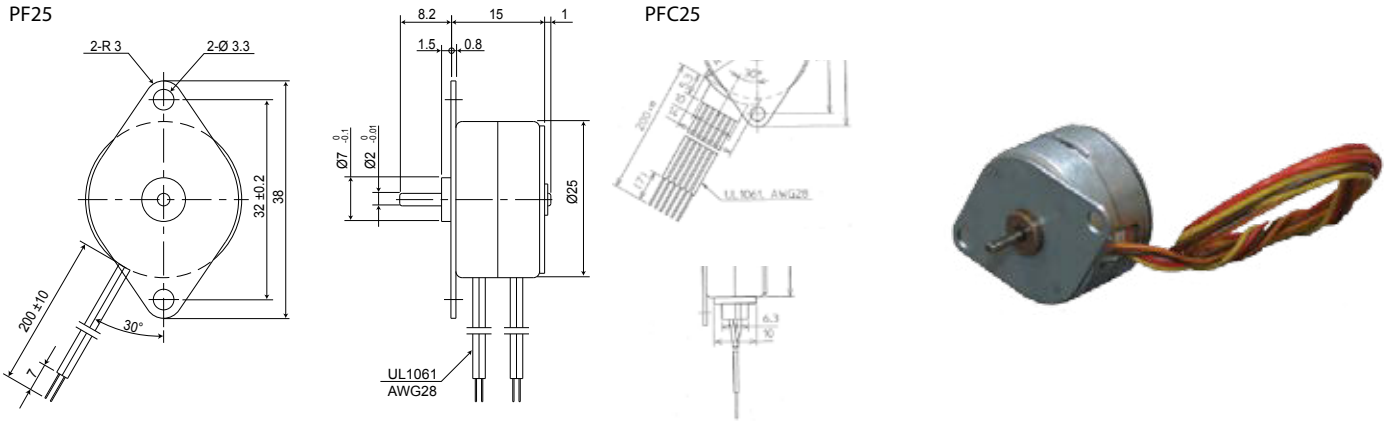
Pin	Coil Phase
1	3φ A-
2	2φ B
3	1φ A
4	4φ B-

Connector (JST)

Applicable Housing: ZHR-4

Applicable Contact: SZH-002T-P0.5

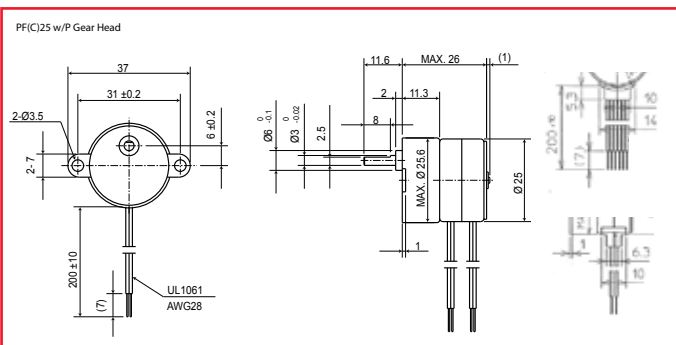
Applicable Wire: AWG 28 to 26 (outer diameter of wire insulation: 0.8 to 1.1 mm)



### Specifications

Specification	Unit	PF(C)25-24				PF(C)25-48			
Type of Winding		Unipolar		Bipolar		Unipolar		Bipolar	
Excitation Mode*		Full step (2-2)				Full step (2-2)			
Step Angle	°	15 ±5%				7.5 ±5%			
Steps Per Revolution*		24				48			
Coil		C	D	P	Q	C	D	P	Q
Rated Voltage	V	12	5	12	5	12	5	12	5
Resistance	Ω	120	16	122	15	120	16	122	15
Inductance	mH	34	4.5	66	8	37	5	81	10
Holding Torque*	mN·m	8	8	10	10	10	10	12	12
Rotor Inertia	kg·m <sup>2</sup>	1.0 x 10 <sup>-7</sup>				1.0 x 10 <sup>-7</sup>			
Starting Pulse Rate*	pps	490				790			
Slewing Pulse Rate*	pps	900							
Operating Temp. Range	°C	-10 to +50							
Temperature Rise*	K	70							
Weight	g	35							

### Dimensions of Geared Model



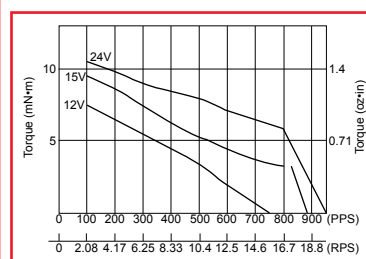
Gear Ratio	6/25	1/5	3/25	1/10	2/25	1/15	3/50	1/20
Ordinary Torque	20mN·m				50mN·m			
Destruction Torque	60mN·m				150mN·m			

Gear Ratio	1/25	1/30	1/50	1/60	1/75	2/125
Ordinary Torque	70mN·m					
Destruction Torque	210mN·m					

Gear Ratio	1/100	1/120	1/125	1/150	1/200	1/250	1/300
Ordinary Torque	100mN·m						
Destruction Torque	300mN·m						

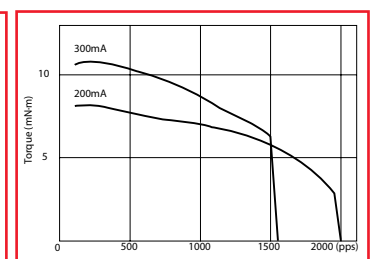
### Torque Curve (pull-out torque)\*

#### Bipolar Constant Voltage (48P1)



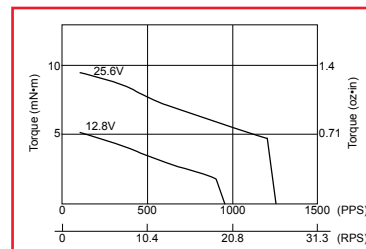
Coil Resistance: 122Ω

#### Bipolar Constant Current (48R1)



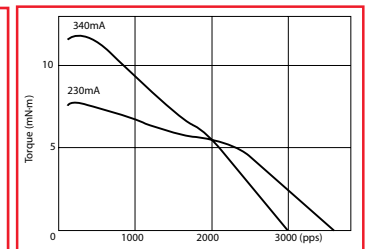
Coil Resistance: 35Ω Supply Voltage: 24V

#### Unipolar Constant Voltage (48C1)



Coil Resistance: 120Ω

#### Unipolar Constant Current (48H1)

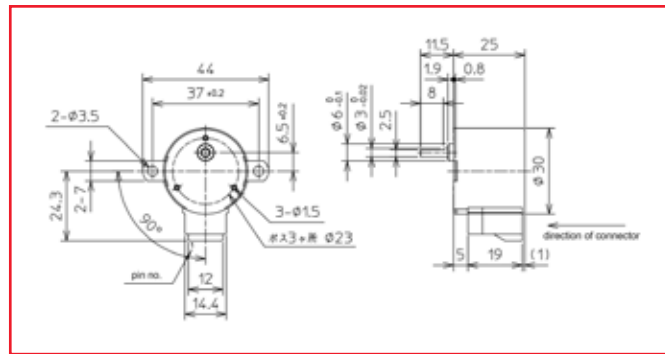


Coil Resistance: 34Ω Supply Voltage: 24V

All tin-can motor specifications are based on full-step constant voltage operation.

Magnet type: Anisotropic

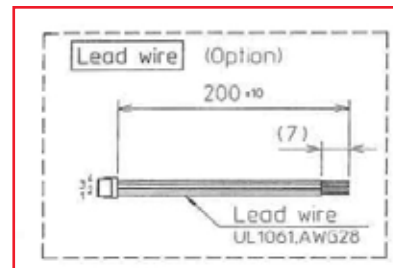
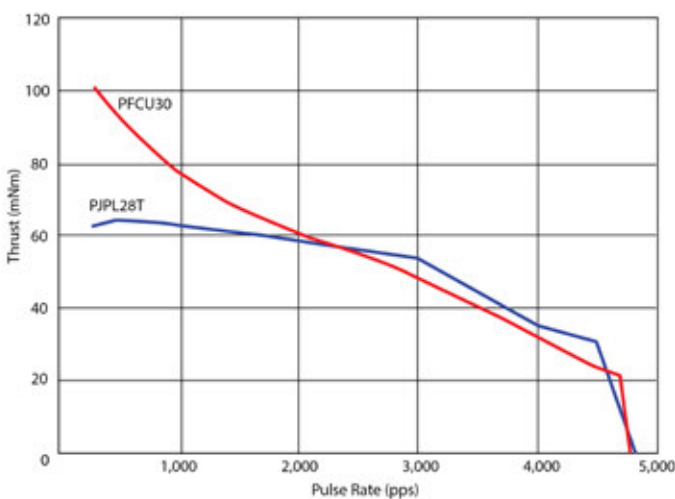
\*Torque curves are for reference only and are not guaranteed



Specifications

Specifications	Unit	PFCU30-24_-4GM (1/5)		PFCU30-24_-4GM (3/25)		PFCU30-24_-4GM (1/12)	
Type of Winding		Bipolar					
Excitation Mode*		Full step (2-2)					
Step Angle	°	3		1.8		1.25	
Steps Per Revolution*		120		200		288	
Gear Ratio		1/5		3/25		1/12	
Winding		T	V	T	V	T	V
Rated Voltage	V	9.8	6.9	9.8	6.9	9.8	6.9
Resistance	Ω / φ	60	30	60	30	60	30
Inductance	mH / φ	49	26	49	26	49	26
Ordinary Torque	mN-m	100					
Destruction Torque	mN-m	300					
Operating Temp. Range	°C	-10 ~ +50					
Storage Temp. Range	°C	-30 ~ +80					
Temperature Rise*	K	70 (at 700pps)					
Weight	g	75					

PFCU30-24\_-4GM(3/25) vs. PJP28T32E16 (Hybrid)

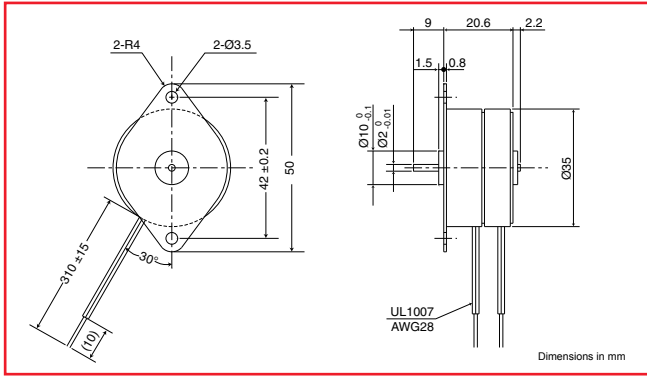


Connector

Applicable Housing: ZHR-4  
 Applicable Contact: SZH-002T-P0.5  
 Applicable Wire: AWG 28 to 26 (outer diameter of wire insulation: 0.4 to 0.8 mm)

Pin	Coil Phase
1	4φ B-
2	3φ A-
3	1φ A
4	2φ B



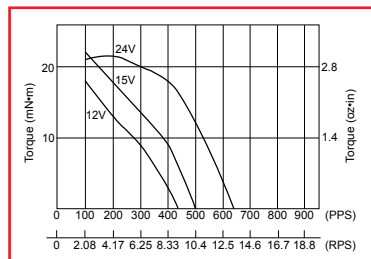


## Specifications

Specification	Unit	PF35-24				PF35-48			
		Unipolar		Bipolar		Unipolar		Bipolar	
Type of Winding		Unipolar				Bipolar			
Excitation Mode*		Full step (2-2)				Full step (2-2)			
Step Angle	°	15 ±5%				7.5 ±5%			
Steps Per Revolution*		24				48			
Coil		C	D	P	Q	C	D	P	Q
Rated Voltage	V	12	5	12	5	12	5	12	5
Resistance	Ω	90	16	100	17	90	16	100	17
Inductance	mH	37	8.7	95	14	48	8.9	124	19
Holding Torque	mN-m	15	15	19	19	20	20	25	25
Rotor Inertia	kg-m <sup>2</sup>	4.5 x 10 <sup>-7</sup>				4.5 x 10 <sup>-7</sup>			
Starting Pulse Rate*	pps	310				500			
Slewing Pulse Rate*	pps	410				530			
Operating Temp. Range	°C	-10 to +50							
Temperature Rise*	K	55							
Weight	g	80							

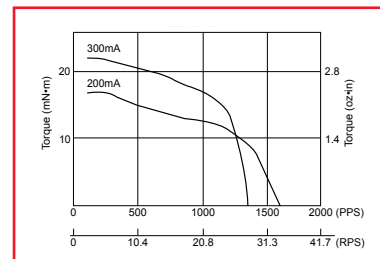
## Torque Curve (pull-out torque)\*

### Bipolar Constant Voltage (48P1)



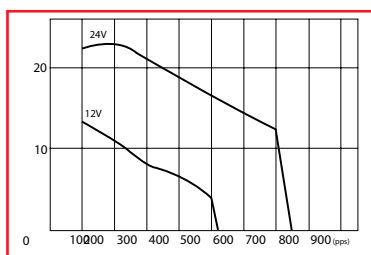
Coil Resistance: 100Ω

### Bipolar Constant Current (48181)



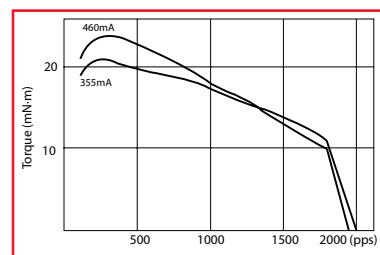
Coil Resistance: 18Ω Supply Voltage: 24V

### Unipolar Constant Voltage (48C1)



Coil Resistance: 90Ω

### Unipolar Constant Current (48071)



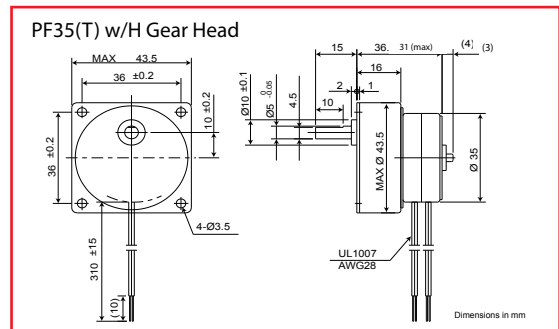
Coil Resistance: 20Ω Supply Voltage: 24V

All tin-can motor specifications are based on full-step constant voltage operation.

Magnet type: Anisotropic

\*Torque curves are for reference only and are not guaranteed

## Dimensions of Geared Model

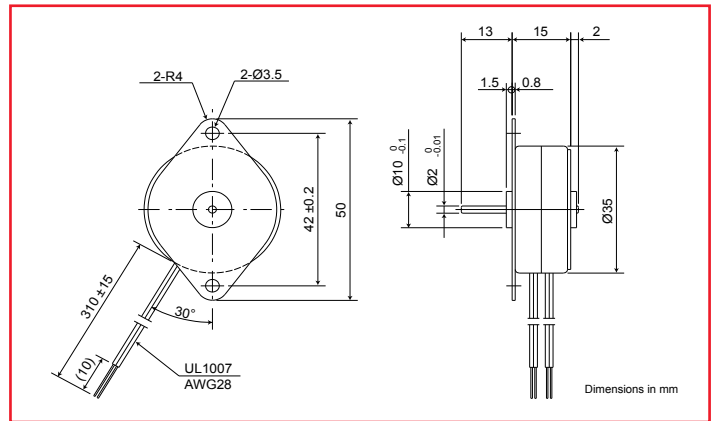
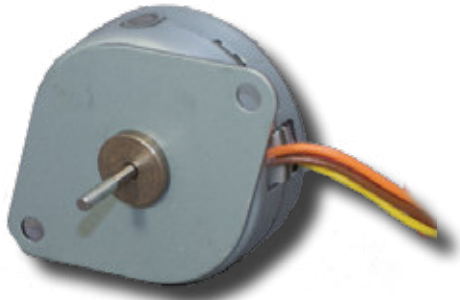


Gear Ratio	6/25	1/5	3/25	1/10
Ordinary Torque	200mN-m			
Destruction Torque	600mN-m			

Gear Ratio	2/25	1/15	3/50	1/20	1/25
Ordinary Torque	250mN-m				
Destruction Torque	750mN-m				

Gear Ratio	1/30	1/50	1/60	2/125	1/75
Ordinary Torque	300mN-m				
Destruction Torque	900mN-m				

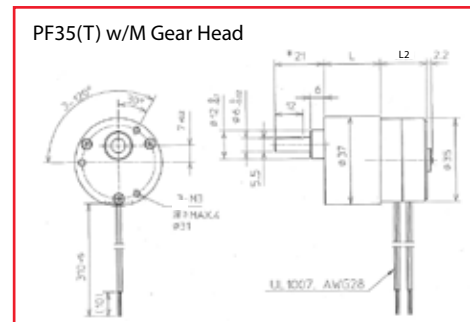
Gear Ratio	1/100	1/120	1/125	1/150	1/200	1/250	1/300
Ordinary Torque	400mN-m						
Destruction Torque	1200mN-m						



## Specifications

Specifications	Unit	PF35T-48			
Type of Winding		Unipolar		Bipolar	
Excitation Mode*		Full step (2-2)			
Step Angle	°	7.5 ± 5%			
Steps Per Revolution*		48			
Coil		C	D	R	Q
Rated Voltage	V	12	5	12	5
Resistance	Ω	70	12	72	16
Inductance	mH	30	6.5	60	6.2
Holding Torque	mN·m	18	18	27	27
Rotor Inertia	kg·m <sup>2</sup>	2.7 x 10 <sup>-7</sup>			
Starting Pulse Rate*	pps	600			
Slewing Pulse Rate*	pps	610			
Operating Temp. Range	°C	-10 to +50			
Temperature Rise*	K	70			
Weight	g	77			

## Dimensions of Geared Model



	L2
PF35	19.8
PF35T	14.2

Gear Ratio	1/5	1/6	1/10	1/12	1/15	1/18	1/25	1/30
Ordinary Torque	100mN·m			200mN·m				
Destruction Torque	300mN·m			600mN·m				

Gear Ratio	1/40	1/50	1/60	1/75	1/90	1/100	1/120
Ordinary Torque	300mN·m						
Destruction Torque	900mN·m						

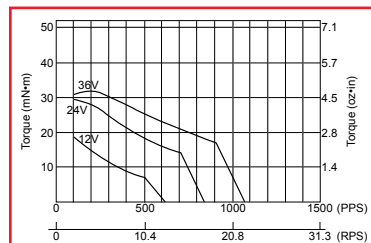
Gear Ratio	1/5	1/6	1/10	1/18	1/30	1/40	1/50	1/60	1/75	1/90	1/100	1/120	1/125	1/150	1/180	1/200	1/270	1/300
L	19.5	19.5	19.5	19.5	19.5	21.7	21.7	21.7	21.7	21.7	21.7	21.7	23.8	23.8	23.8	23.8	23.8	23.8

Gear Ratio	1/125	1/150	1/180	1/200	1/250	1/270	1/300
Ordinary Torque	600mN·m						
Destruction Torque	1800mN·m						

Available with H or M gearhead. See previous page for H gearhead drawing.

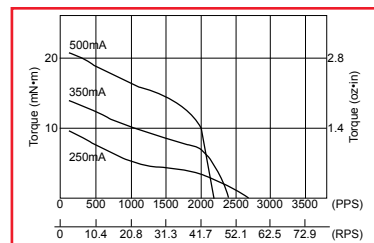
## Torque Curve (pull-out torque)\*

### Bipolar Constant Voltage (48R1)



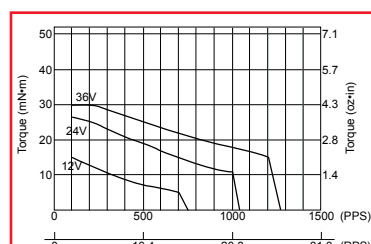
Coil Resistance: 72Ω

### Bipolar Constant Current (48Q1)



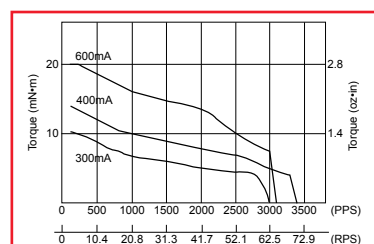
Coil Resistance: 16Ω Supply Voltage: 24V

### Unipolar Constant Voltage (48C1)



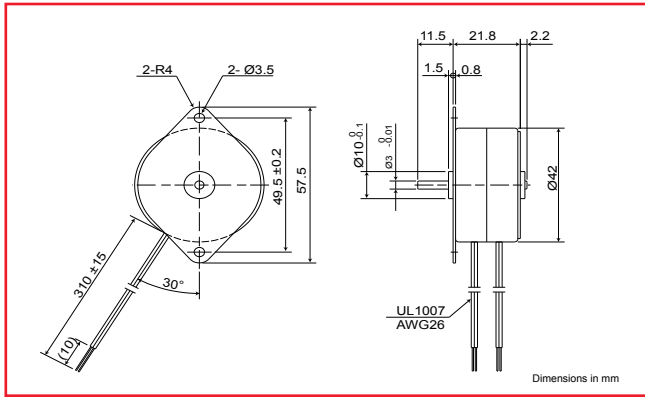
Coil Resistance: 70Ω

### Unipolar Constant Current (48D1)



Coil Resistance: 12Ω Supply Voltage: 24V

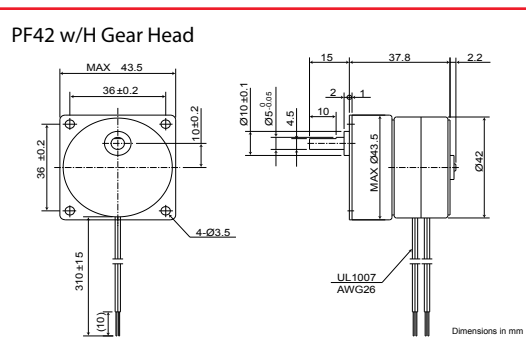
\*Torque curves are for reference only and are not guaranteed  
All specifications are based on full-step constant voltage operation.  
Magnet type: Anisotropic



## Specifications

Specification	Unit	PF42-24				PF42-48			
		Unipolar		Bipolar		Unipolar		Bipolar	
Type of Winding		Unipolar				Bipolar			
Excitation Mode*		Full step (2-2)				Full step (2-2)			
Step Angle	°	15 ± 5%				7.5 ± 5%			
Steps Per Revolution*		24				48			
Coil		C	D	P	Q	C	D	P	Q
Rated Voltage	V	12	5	12	5	12	5	12	5
Resistance	Ω	70	12	76	14	70	12	76	14
Inductance	mH	35	5.9	74	14	41	6.1	87	16
Holding Torque	mN·m	28	28	41	41	45	45	54	54
Rotor Inertia	kg·m <sup>2</sup>	16.8 x 10 <sup>-7</sup>				12.8 x 10 <sup>-7</sup>			
Starting Pulse Rate*	pps	180				310			
Slewing Pulse Rate*	pps	250				320			
Operating Temp. Range	°C	-10 to +50							
Temperature Rise*	K	55							
Weight	g	160							

## Dimensions of Geared Model



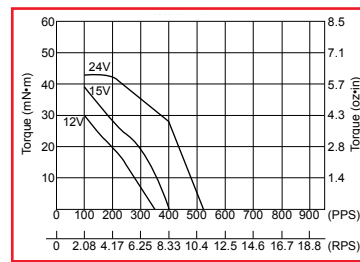
Gear Ratio	6/25	1/5	3/25	1/10	2/25	1/15	3/50	1/20	1/25
Ordinary Torque	200mN·m				250mN·m				
Destruction Torque	600mN·m				750mN·m				

Gear Ratio	1/30	1/50	1/60	2/125	1/75
Ordinary Torque	300mN·m				
Destruction Torque	900mN·m				

Gear Ratio	1/100	1/120	1/125	1/150	1/200	1/250	1/300
Ordinary Torque	400mN·m						
Destruction Torque	1200mN·m						

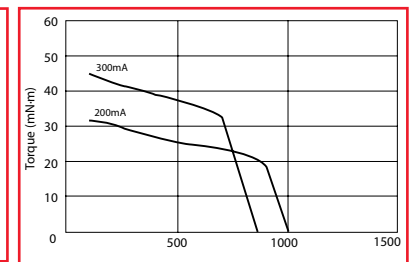
## Torque Curve (pull-out torque)\*

### Bipolar Constant Voltage (48P1)



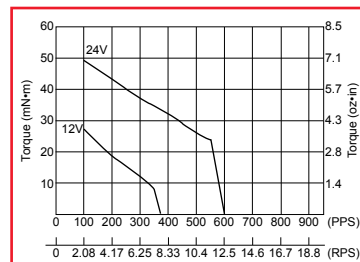
Coil Resistance: 76Ω

### Bipolar Constant Current (48Y1)



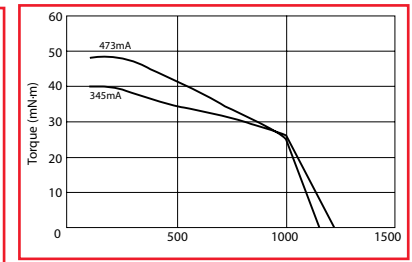
Coil Resistance: 20Ω Supply Voltage: 24V

### Unipolar Constant Voltage (48C1)



Coil Resistance: 70Ω

### Unipolar Constant Current (48I1)

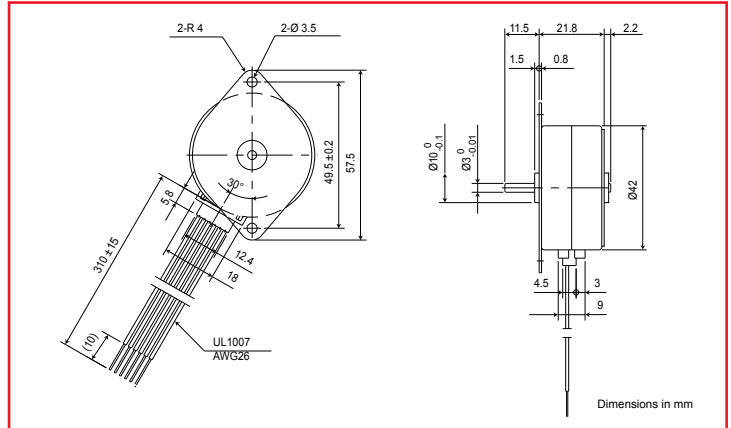
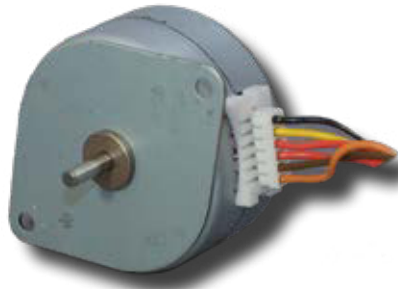


Coil Resistance: 20Ω Supply Voltage: 24V

All tin-can motor specifications are based on full-step constant voltage operation

Magnet type: Anisotropic

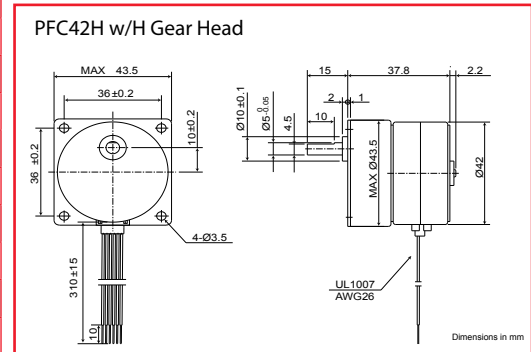
\*Torque curves are for reference only and are not guaranteed



## Specifications

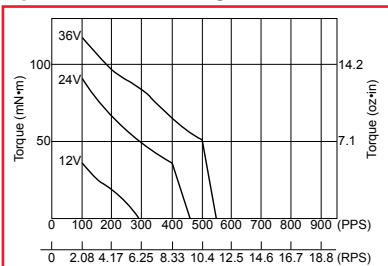
Specification	Unit	PFC42H-48			
Type of Winding		Unipolar		Bipolar	
Excitation Mode*		Full step (2-2)			
Step Angle	°	7.5 ±5%			
Steps Per Revolution*		48			
Coil		C	D	P	Q
Rated Voltage	V	12	5	12	5
Resistance	Ω	70	12	70	12
Inductance	mH	39	6.6	80	13
Holding Torque	mN·m	50	50	70	70
Rotor Inertia	kg·m <sup>2</sup>	27 x 10 <sup>-7</sup>			
Starting Pulse Rate*	pps	290			
Slewing Pulse Rate*	pps	320			
Operating Temp. Range	°C	-10 to +50			
Temperature Rise*	K	55			
Weight	g	160			

## Dimensions of Geared Model



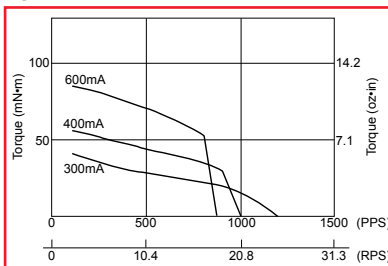
## Torque Curve (pull-out torque)\*

### Bipolar Constant Voltage (48P1)



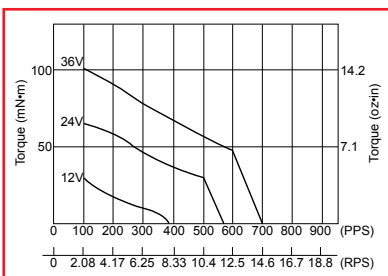
Coil Resistance: 70Ω

### Bipolar Constant Current (48Q1)



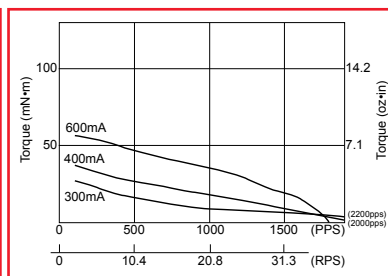
Coil Resistance: 12Ω Supply Voltage: 24V

### Unipolar Constant Voltage (48C1)



Coil Resistance: 70Ω

### Unipolar Constant Current (48D1)



Coil Resistance: 12Ω Supply Voltage: 24V

All tin-can motor specifications are based on full-step constant voltage operation.

Magnet type: Anisotropic

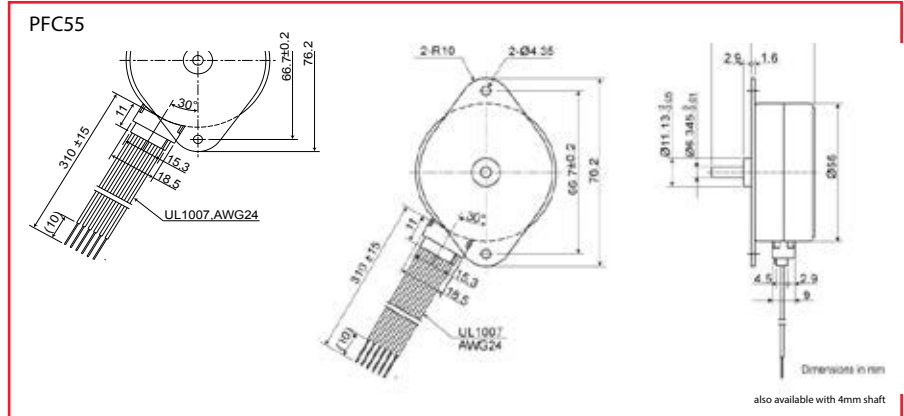
\*Torque curves are for reference only and are not guaranteed

Gear Ratio	6/25	1/5	3/25	1/10	2/25	1/15	3/50	1/20	1/25
Ordinary Torque	200mN·m				250mN·m				
Destruction Torque	600mN·m				750mN·m				

Gear Ratio	1/30	1/50	1/60	2/125	1/75
Ordinary Torque	300mN·m				
Destruction Torque	900mN·m				

Gear Ratio	1/100	1/120	1/125	1/150	1/200	1/250	1/300
Ordinary Torque	400mN·m						
Destruction Torque	1200mN·m						

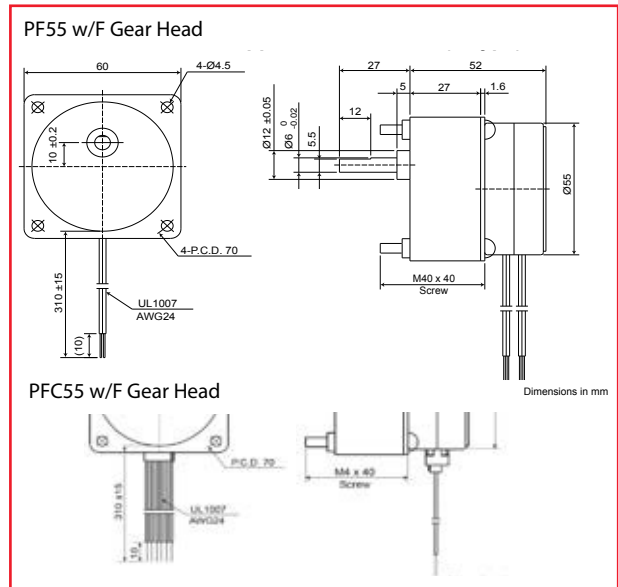




## Specifications

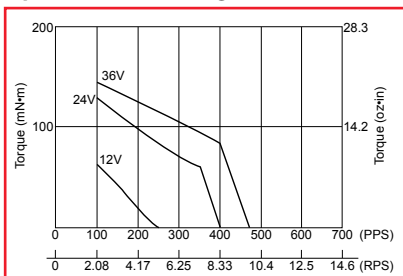
Specification	Unit	PFC55-48			
Type of Winding		Unipolar		Bipolar	
Excitation Mode*		Full step (2-2)			
Step Angle	°	7.5 ±5%			
Steps Per Revolution*		48			
Coil		C	D	P	Q
Rated Voltage	V	12	5	12	5
Resistance	Ω	36	5	40	6.75
Inductance	mH	37	4.6	84	12
Holding Torque	mN·m	120	120	150	150
Rotor Inertia	kg·m <sup>2</sup>	40 x 10 <sup>-7</sup>			
Starting Pulse Rate*	pps	280			
Slewing Pulse Rate*	pps	300			
Operating Temp. Range	°C	-10 to +50			
Temperature Rise*	K	55			
Weight	g	300			

## Dimensions of Geared Model

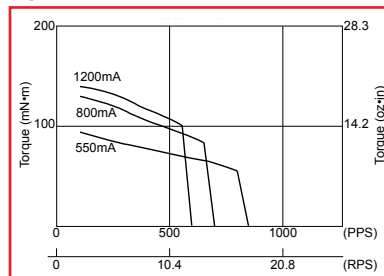


## Torque Curve (pull-out torque)\*

### Bipolar Constant Voltage (48P1)



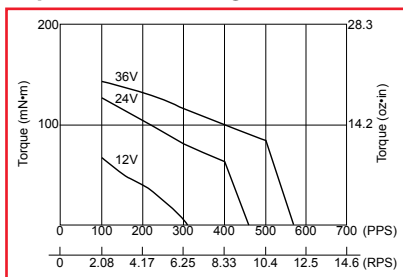
### Bipolar Constant Current (48Q1)



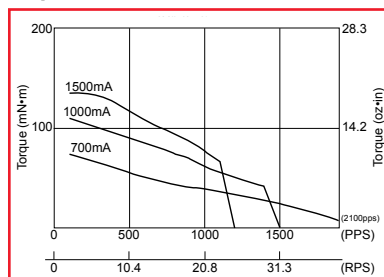
Gear Ratio	6/25	1/5	3/25	1/10	2/25	1/15	3/50	1/20
Ordinary Torque	400mN·m							
Destruction Torque	1200mN·m							

Gear Ratio	1/25	1/30	1/50	1/60
Ordinary Torque	700mN·m			
Destruction Torque	2100mN·m			

### Unipolar Constant Voltage (48C1)



### Unipolar Constant Current (48D1)

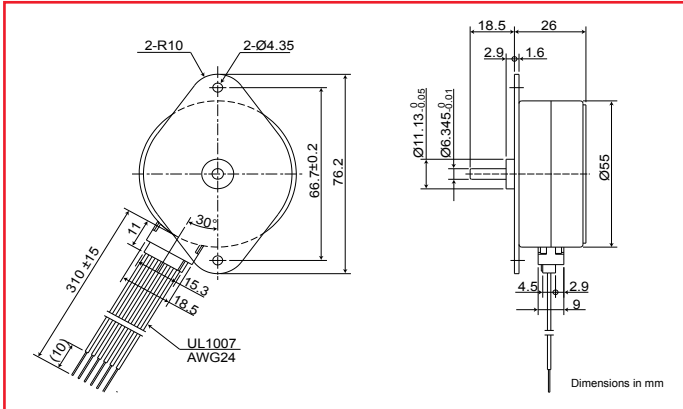


Gear Ratio	2/125	1/75	3/250	1/100	1/125	1/150	1/250	1/300
Ordinary Torque	1000mN·m							
Destruction Torque	3000mN·m							

All tin-can motor specifications are based on full-step constant voltage operation

Magnet type: Anisotropic

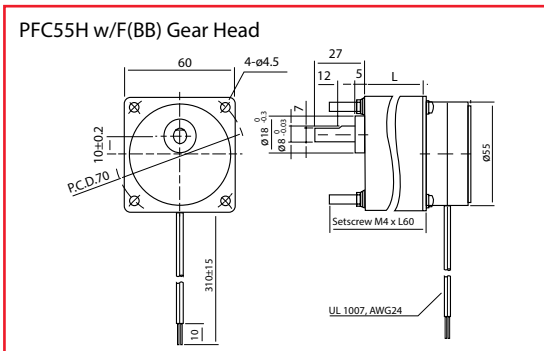
\*Torque curves are for reference only and are not guaranteed



## Specifications

Specification	Unit	PFC55H-48			
Type of Winding		Unipolar		Bipolar	
Excitation Mode*		Full step (2-2)			
Step Angle	°	7.5 ±5%			
Steps Per Revolution*		48			
Coil		C	D	P	Q
Rated Voltage	V	12	5	12	5
Resistance	Ω	36	5	36	5
Inductance	mH	30	4.4	65	9.3
Holding Torque	mN·m	150	150	180	180
Rotor Inertia	kg·m <sup>2</sup>	97 x 10 <sup>-7</sup>			
Starting Pulse Rate*	pps	210			
Slewing Pulse Rate*	pps	230			
Operating Temp. Range	°C	-10 to +50			
Temperature Rise*	°C	55			
Weight	g	300			

## Dimensions of Geared Model



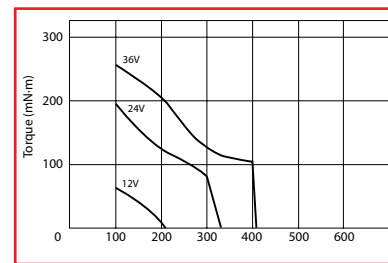
Gear Ratio	1/3	1/5	2/15	1/10	2/25	1/15	1/20
Ordinary Torque	400mN·m			500mN·m		600mN·m	800mN·m
Destruction Torque	1200mN·m			1500mN·m		1800mN·m	2400mN·m

Gear Ratio	1/25	1/30	1/50	1/60	Reduction Ratio	L
Ordinary Torque	900mN·m	1100mN·m	1600mN·m		1/3 to 1/15	32
Destruction Torque	2700mN·m	3300mN·m	4800mN·m		1/20 to 1/180	42

Gear Ratio	1/75	1/100	1/125	1/150	1/180
Ordinary Torque			2500mN·m		
Destruction Torque			7500mN·m		

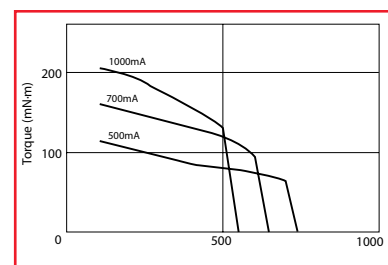
See page 16 for PFC55H with F gearhead ratios

## Torque Curve (pull-out torque)\* Bipolar Constant Voltage (48011)



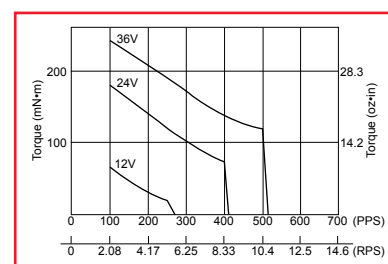
Coil Resistance: 40Ω

## Bipolar Constant Current (48S1)



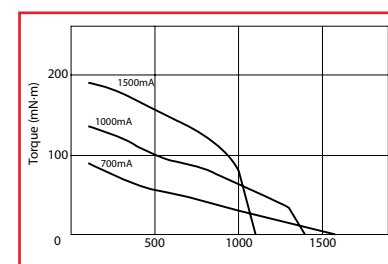
Coil Resistance: 8Ω Supply Voltage: 24V

## Unipolar Constant Voltage (48C1)



Coil Resistance: 36Ω

## Unipolar Constant Current (48D1)

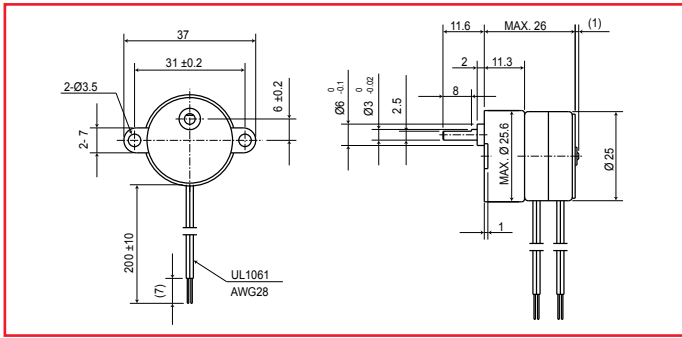


Coil Resistance: 5Ω Supply Voltage: 24V

All tin-can motor specifications are based on full-step constant voltage operation  
Magnet type: Anisotropic

\*Torque curves are for reference only and are not guaranteed

## PF25 w/P Gearhead

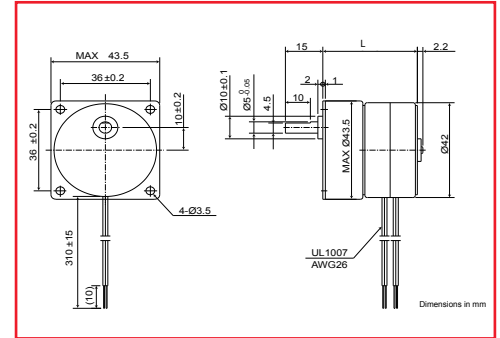


Gear Ratio	6/25	1/5	3/25	1/10	2/25	1/15	3/50	1/20
Ordinary Torque	20mN-m				50mN-m			

Gear Ratio	1/25	1/30	1/50	1/60	1/75	2/125
Ordinary Torque	70mN-m					

Gear Ratio	1/100	1/120	1/125	1/150	1/200	1/250	1/300
Ordinary Torque	100mN-m						

## PF(C)42/42H/42T w/H Gearhead



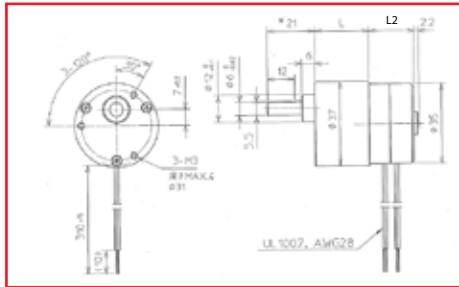
	L
PF42/ PFC42H	37.8
PF42T/ PFC42T	31

Gear Ratio	6/25	1/5	3/25	1/10	2/25	1/15	3/50	1/20	1/25
Ordinary Torque	200mN-m				250mN-m				

Gear Ratio	1/30	1/50	1/60	2/125	1/75
Ordinary Torque	300mN-m				

Gear Ratio	1/100	1/120	1/125	1/150	1/200	1/250	1/300
Ordinary Torque	400mN-m						

## PF35/35T w/M Gearhead



	L2
PF35	19.8
PF35T	14.2

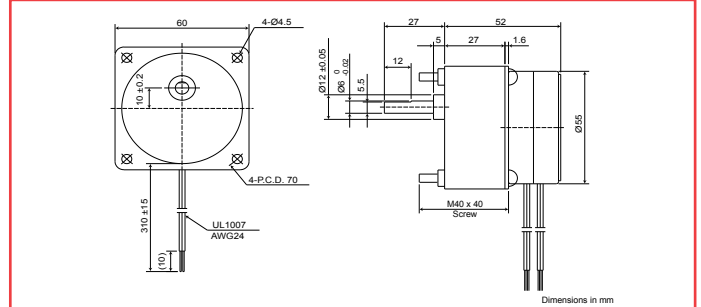
see Page 13 for L specifications

Gear Ratio	1/5	1/6	1/10	1/12	1/15	1/18	1/25	1/30
Ordinary Torque	100mN-m				200mN-m			

Gear Ratio	1/40	1/50	1/60	1/75	1/90	1/100	1/120
Ordinary Torque	300mN-m						

Gear Ratio	1/125	1/150	1/180	1/200	1/250	1/270	1/300
Ordinary Torque	600mN-m						

## PF(C)55/55H w/F Gearhead

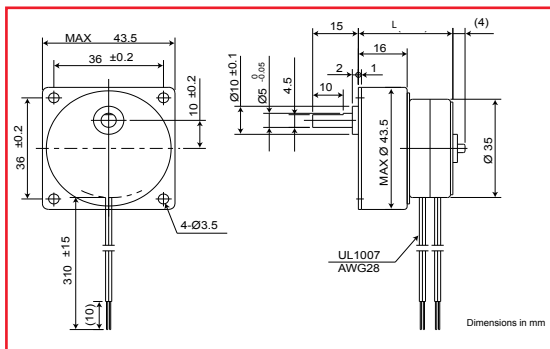


Gear Ratio	6/25	1/5	3/25	1/10	2/25	1/15	3/50	1/20
Ordinary Torque	400mN-m							

Gear Ratio	1/25	1/30	1/50	1/60
Ordinary Torque	700mN-m			

Gear Ratio	2/125	1/75	3/250	1/100	1/125	1/150	1/250	1/300
Ordinary Torque	1000mN-m							

## PF35/35T w/H Gearhead



	L
PF35	36.6
PF35T	31

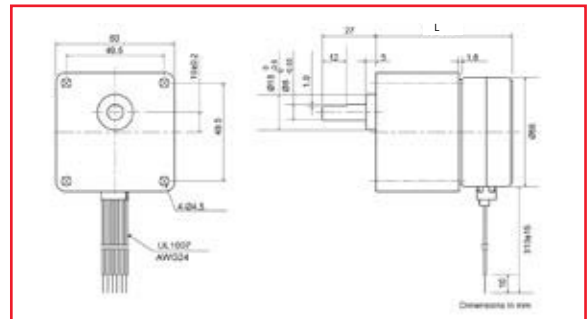
Gear Ratio	6/25	1/5	3/25	1/10	2/25	1/15	3/50	1/20	1/25
Ordinary Torque	200mN-m				250mN-m				

Gear Ratio	1/30	1/50	1/60	2/125	1/75
Ordinary Torque	300mN-m				

Gear Ratio	1/100	1/120	1/125	1/150	1/200	1/250	1/300
Ordinary Torque	400mN-m						

## PF(C)55/55H w/F(BB) Gearhead

F(BB) gearhead provides ball-bearing support for all stages, ensuring long service life



Gear Ratio	1/3	1/5	2/15	1/10	2/25	1/15	1/20
Ordinary Torque	400mN-m	500mN-m	600mN-m	800mN-m			

Gear Ratio	1/25	1/30	1/50	1/60	Reduction Ratio	L
Ordinary Torque	900mN-m	1100mN-m	1600mN-m		1/3 to 1/15	32

Gear Ratio	1/75	1/100	1/125	1/150	1/180
Ordinary Torque	2500mN-m				