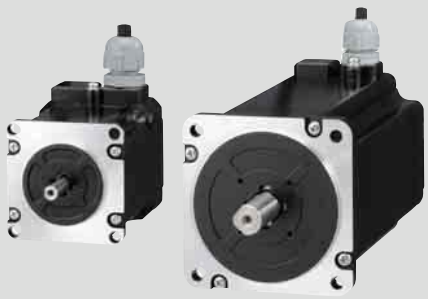
IP65 Splash and Dust Proof Stepping Motors



Cable type CE Model
CE/UL Model

Connector type CE Model

Features

- These IP65 rated motors* have superior water and dust resistance, and can be safely utilized in harsh or wet environments such as in food processing machines.
  ※ Except for the shaft and the cable end.
- The input voltage range of the motors is up to AC 250 V.
- Brake, encoder, and oil seal can be combined.

Safety standards

The CE model (Cable or Connector type) and the CE/UL model (Cable type) are available.

Specifications

	56 mm sq. (2.20 in sq.)		86 mm sq. (3.39 in sq.)	
	CE Model	CE/UL Model	CE Model	CE/UL Model
Motor model number	SP256 □ T-5 □□ 0	SP256 □ -5 □ 60	SP286 □ T-5 □□ 0	SP286 □ -5 □ 60
Type	S1 (continuous operation)			
Operating ambient temperature	− 10℃ to + 40℃			
Conversation temperature	− 20℃ to + 60℃			
Operating ambient humidity	95%MAX. : 40℃ MAX., 57%MAX. : 50℃ MAX.			
Conversation humidity	35%MAX. : 60℃ MAX. (no condensation)			
Operation altitude	1000m (3280 feet) MAX above sea level			
Vibration resistance	Vibration frequency 10 to 500 Hz, total amplitude 1.52 mm (10 to 70 Hz), vibration acceleration 147m/s² (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.			
Impact resistance	500m/s² of acceleration for 11 ms with half-sine wave applying three times for X, Y and Z axes each, 18 times in total.			
Insulation class	Class F (+155℃)			
Withstand voltage	At normal temperature and humidity, no failure with 1500 V AC @50/60 Hz applied for one minute between motor winding and frame.			
Insulation resistance	At normal temperature and humidity, not less then 100MΩ between winding and frame by DC500V megger.			
Protection grade	IP65 (Except for the shaft and the cable end)			
Winding temperature rise	100K MAX. (Based on Sanyo Denki standard)			
Static angle error	± 0.054°		± 0.09°	
Axial play	0.075 mm (0.003 in) MAX. (load: 10N (2.25 lbs))			
Radial play	0.025 mm (0.001 in) MAX. (load: 5N (1.12 lbs))			
Shaft runout	0.025 mm (0.001 in)			
Concentricity of mounting pilot relative to shaft	ϕ 0.075 mm (ϕ 0.003 in)			
Squareness of mounting surface relative to shaft	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.15 mm (0.006 in)	0.15 mm (0.006 in)

Safety standards

CE	Standard category	Standard code	
	Low-voltage directives	EN60034-1, EN60034-5	
UL	Acquired standards	Standard code	File No.
	UL	UL1004-1, UL1004-6	E179832
	UL for Canada (c-UL)		

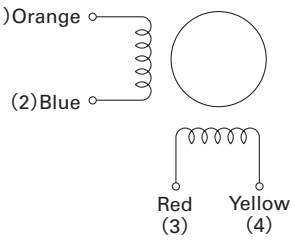
Model No. differs when the motor is equipped with a brake or oil seal.
Model No. and vibration resistence levels differ when the motor is equipped with a brake or oil seal.

Internal wiring and rotation direction

Bipolar winding

Internal wire connection

( ) : connector pin number



Direction of motor rotation

The output shaft shall rotate clockwise as seen from the shaft side, when excited by DC in the following order.

Lead wire color		Red	Blue	Yellow	Orange
Connector pin number		3	2	4	1
Exciting order	1	−	−	+	+
	2	+	−	−	+
	3	+	+	−	−
	4	−	+	+	−

56 mm sq. (2.20 inch sq.)

1.8° /step

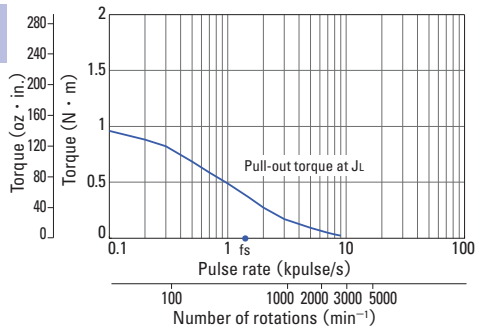
Bipolar winding

Safety standards	Model number		Holding torque at 2-phase energization	Rated current	Winding resistance	Winding inductance	Rotor inertia	Mass (Weight)
	Cable type	Connector type	[N·m (oz・in) MIN.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴ kg·m² (oz・in²)]	[kg (lbs)]
CE Model	SP2563T-5060	SP2563T-5000	1 (141.6)	1	5.7	29	0.21 (1.15)	0.9 (2)
	SP2563T-5160	SP2563T-5100	1 (141.6)	2	1.5	7.3	0.21 (1.15)	0.9 (2)
	SP2563T-5260	SP2563T-5200	1 (141.6)	3	0.7	3.4	0.21 (1.15)	0.9 (2)
	SP2566T-5060	SP2566T-5000	1.7 (240.7)	1	7.7	35.4	0.36 (1.97)	1.2 (2.65)
	SP2566T-5160	SP2566T-5100	1.7 (240.7)	2	2	9.2	0.36 (1.97)	1.2 (2.65)
	SP2566T-5260	SP2566T-5200	1.7 (240.7)	3	0.94	4.4	0.36 (1.97)	1.2 (2.65)
CE/UL Model	SP2563-5060	—	1 (141.6)	1	5.8	29	0.21 (1.15)	0.9 (2)
	SP2563-5160	—	1 (141.6)	2	1.5	7.3	0.21 (1.15)	0.9 (2)
	SP2563-5260	—	1 (141.6)	3	0.75	3.4	0.21 (1.15)	0.9 (2)
	SP2566-5060	—	1.7 (240.7)	1	7.8	35.4	0.36 (1.97)	1.2 (2.65)
	SP2566-5160	—	1.7 (240.7)	2	2	9.2	0.36 (1.97)	1.2 (2.65)
	SP2566-5260	—	1.7 (240.7)	3	1	4.4	0.36 (1.97)	1.2 (2.65)

・The Model No., rotor inertia and mass differ when the motor is equipped with brake, encoder or oil seal.

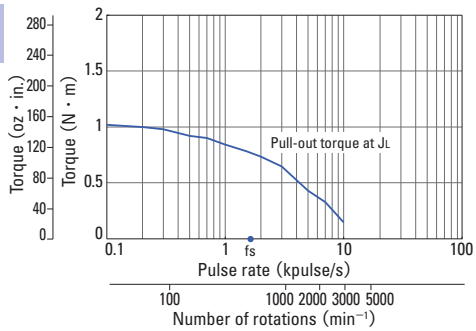
Characteristics diagram

SP2563T-50 □□
SP2563-5060



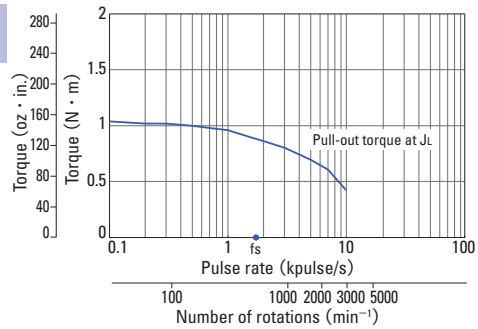
Constant current circuit
Source voltage : AC100V・operating current : 1A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg・m² (14.22 oz・in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

SP2563T-51 □□
SP2563-5160



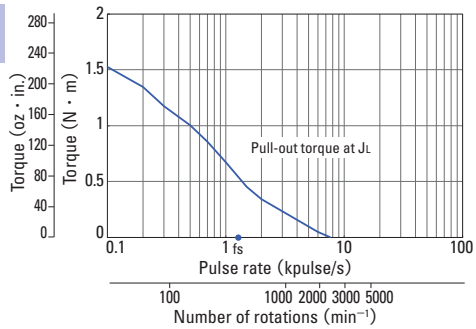
Constant current circuit
Source voltage : AC100V・operating current : 2A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg・m² (14.22 oz・in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

SP2563T-52 □□
SP2563-5260



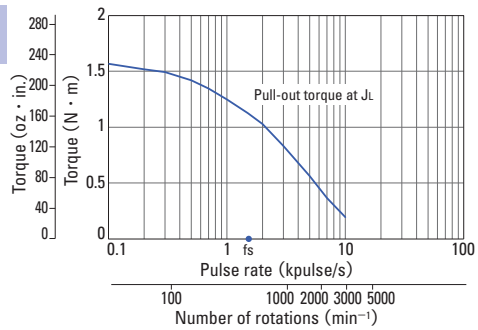
Constant current circuit
Source voltage : AC100V・operating current : 3A/phase, 2-phase energization (full-step)
J_L=[2.6 × 10⁻⁴kg・m² (14.22 oz・in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

SP2566T-50 □□
SP2566-5060



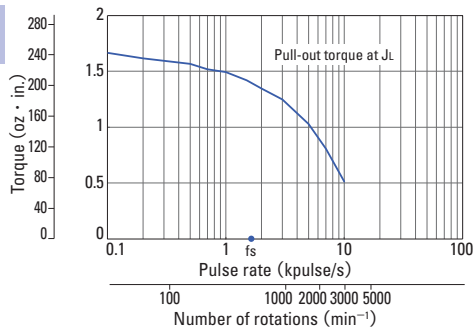
Constant current circuit
Source voltage : AC100V・operating current : 1A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10⁻⁴kg・m² (40.46 oz・in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

SP2566T-51 □□
SP2566-5160



Constant current circuit
Source voltage : AC100V・operating current : 2A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10⁻⁴kg・m² (40.46 oz・in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

SP2566T-52 □□
SP2566-5260



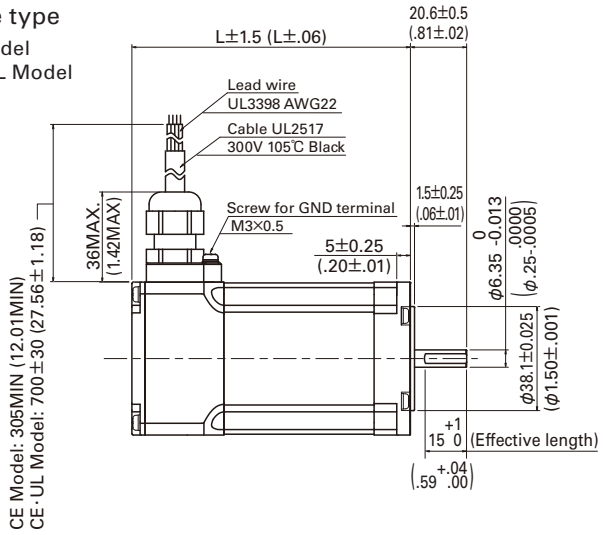
Constant current circuit
Source voltage : AC100V・operating current : 3A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10⁻⁴kg・m² (40.46 oz・in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

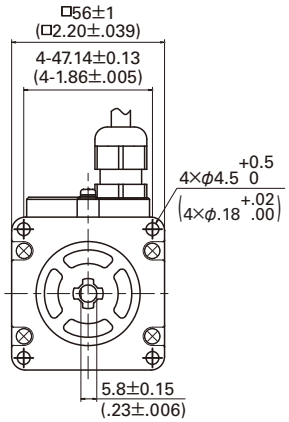
IP65 Splash and Dust Proof Stepping Motors [Unit: mm (inch)]

56 mm sq. (2.20 inch sq.)

Cable type

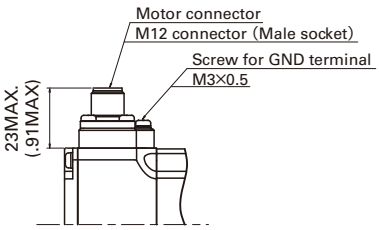
CE Model
CE・UL Model





Connector type

CE Model

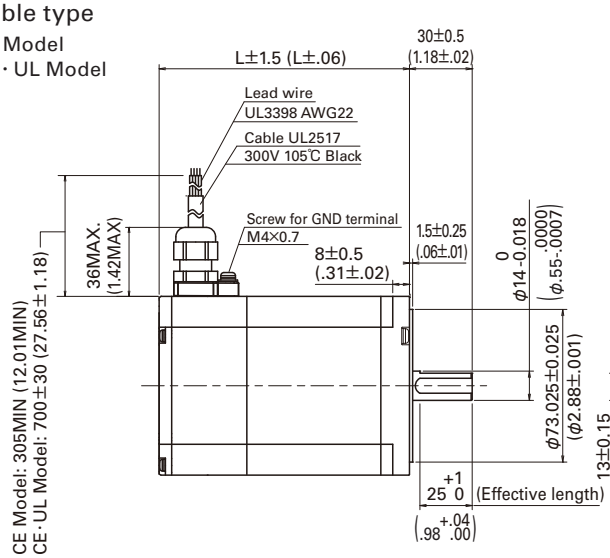


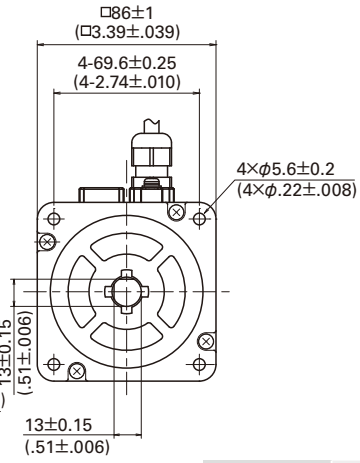
Safety standards	Model number		Motor length (L)
	Cable type	Connector type	
CE Model	SP2563T-5 □ 60	SP2563T-5 □ 00	80 (3.15)
	SP2566T-5 □ 60	SP2566T-5 □ 00	102 (4.02)
CE・UL Model	SP2563-5 □ 60	–	80 (3.15)
	SP2566-5 □ 60	–	102 (4.02)

86 mm sq. (3.39 inch sq.)

Cable type

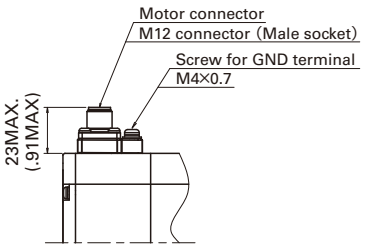
CE Model
CE・UL Model





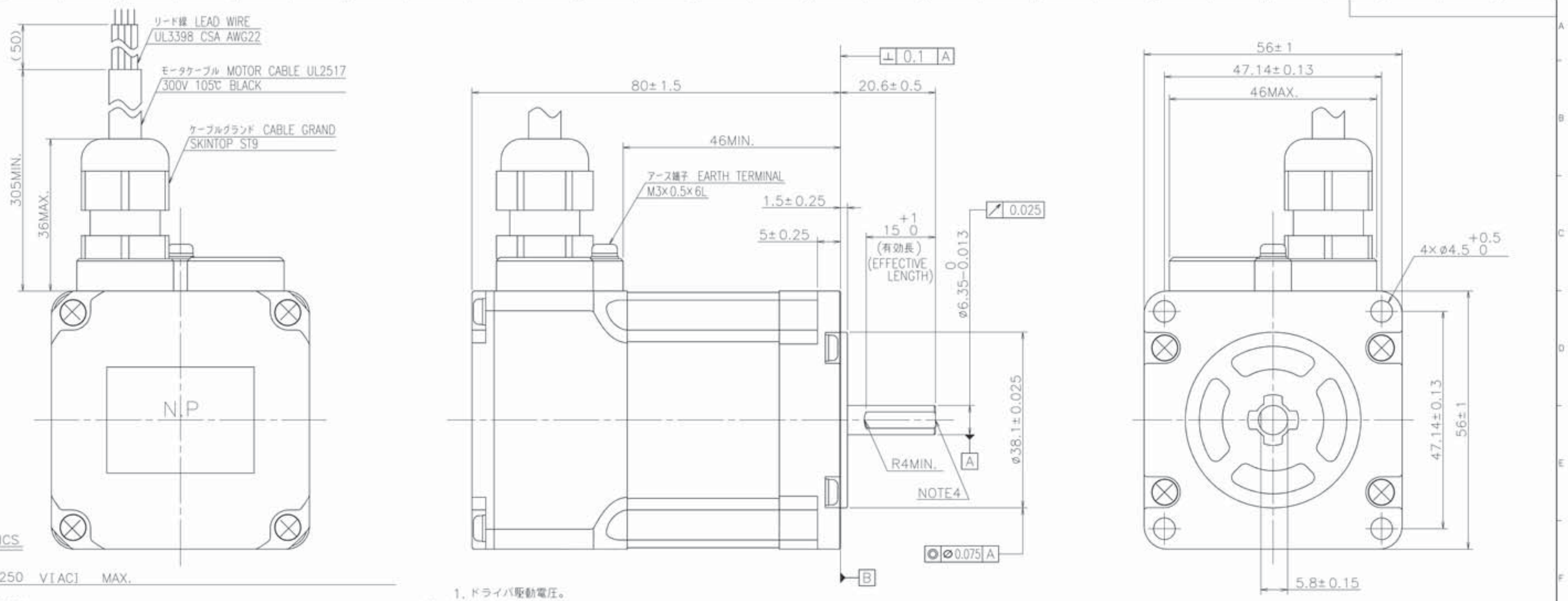
Connector type

CE Model



Safety standards	Model number		Motor length (L)
	Cable type	Connector type	
CE Model	SP2862T-5 □ 60	SP2862T-5 □ 00	120 (4.72)
	SP2863T-5 □ 60	SP2863T-5 □ 00	150 (5.91)
CE・UL Model	SP2862-5 □ 60	–	120 (4.72)
	SP2863-5 □ 60	–	150 (5.91)

RoHS



定格特性・RATED CHARACTERISTICS

Note	Item	Value	Unit / Condition
注1. NOTE1.	駆動電圧 POWER INPUT	250	V[AC] MAX.
	最大許容トルク MAXIMUM PERMISSIBLE TORQUE	0.85	N・m
	最大回転数 MAXIMUM SPEED	3000	min^{-1} (10,000 pulse/s at 2 PHASE EXCITATION)
	相数 PHASES	2	REFER TO FIG.1
	基本ステップ角度 FUNDAMENTAL STEP ANGLE	1.8	°
	定格電圧 RATED VOLTAGE	3	V[DC]
	定格電流 RATED CURRENT	2	A/PHASE
	巻線抵抗 WINDING RESISTANCE	1.5	Ω±10% at 25 ℃
	巻線インダクタンス WINDING INDUCTANCE	7.3	mH±20% at 1 kHz 1 V[rms]
	ホールディングトルク HOLDING TORQUE	1.0	N・m MIN. at I=2 A/PHASE 2相励磁 2 PHASE EXCITATION
注2. NOTE2.	脱出トルク PULL-OUT TORQUE	0.8	N・m MIN. at 200 pulse/s 負荷イナーシャ INERTIAL LOAD 2.6×10^{-4} kg・m² (ラバーカップリングイナーシャを含む) (INERTIA OF RUBBER COUPLING IS INCLUDED.)
注2. NOTE2.	最大自起動周波数 MAXIMUM STARTING PULSE RATE	1400	pulse/s MIN. 無負荷時 at NO LOAD
注2. NOTE2.	最大連続応答周波数 MAXIMUM SLEWING PULSE RATE	2600	pulse/s MIN. 無負荷時 at NO LOAD
	静止角度誤差 POSITIONAL ACCURACY	±0.054	° (0.108 ° SPREAD MAX.) 2相励磁 2 PHASE EXCITATION
注3. NOTE3.	温度上昇値 TEMPERATURE RISE	80	K MAX.
	ロータイナーシャ ROTOR INERTIA	0.21×10^{-4}	kg・m² NOMINAL
	絶縁階級 INSULATION CLASS	F	
	質量 MASS	0.9	Kg
	許容スラスト荷重 ALLOWABLE THRUST LOAD	15	N
	許容ラジアル荷重 ALLOWABLE RADIAL LOAD	52	N 軸先端荷重 LOAD TO SHAFT END.
注5. NOTE5.	保護等級 IP RATING	IP65	EN60034-5 (但し、シャフト貫通部は除く) (EXCEPT FOR THE GAP BETWEEN THE SHAFT AND THE FLANGE)

Note)
1. ドライバ駆動電圧。
DRIVER INPUT VOLTAGE.
注2. 山洋標準2相駆動回路による。E=100 V[AC], I=2 A/相(設定値)
SANYO STANDARD 2PHASE EXCITATION DRIVE CIRCUIT WAS USED. E=100 V[AC], I=2 A/PHASE (SET VALUE)
3. 温度上昇は、モータを160×160×6t アルミ放熱板に取付け、2相励磁I=2 A/相を連続通電し、抵抗法にて測定した時の値。
MOUNT A MOTOR ON 160X160X6t ALUMINUM HEAT SINK AND CONTINUOUSLY ENERGIZE A COIL AT 2 PHASE EXCITATION, I=2 A/PHASE.
4. シャフトセンター穴の有無及び形状は、製造上の都合により任意とする。
CENTER HOLE ON THE SHAFT END IS NOT ALWAYS MADE.
5. IP65はEN60034-5の試験条件により、水に対して保証するものです。
IP65 IS FOR WATER PROTECTION ACCORDING TO THE TEST CONDITION OF EN60034-5.

モータ内部結線
FIG.1 MOTOR CONNECTION

回転方向・DIRECTION OF ROTATION

下記の順に直流励磁した場合、回転方向は面B側より見て時計方向回転のこと。
WHEN A MOTOR IS SEQUENCED AS SHOWN IN THE TABLE BELOW, THE SHAFT ROTATION MUST BE CLOCKWISE WHEN YOU SEE FROM SURFACE "B" SIDE.

励磁順序 ENERGIZE ORDER	赤 RED	青 BLUE	黄 YELLOW	橙 ORANGE
1	⊖	⊖	⊕	⊕
2	⊕	⊖	⊖	⊕
3	⊕	⊕	⊖	⊖
4	⊖	⊕	⊕	⊖

(リード線色 LEADS COLOR)

A	NEW DESIGN	11-06-28
記号	記事 DESCRIPTION	日付 DATE
単位 UNIT	mm	
承認 APPROVED BY	Y.MIURA	11-08-…
審査 CHECKED BY	I.TAKEDA	…-04
作成 DESIGNED BY	…HIOIRI	11-06-28
名称 TITLE	STEPPING MOTOR ステッピングモータ	
図番 DWG NO.	SP2563-5160	REV. A

山洋電気株式会社 SANYO DENKI CO.,LTD.

REFERENCE ONLY

A1G-F1 00815316