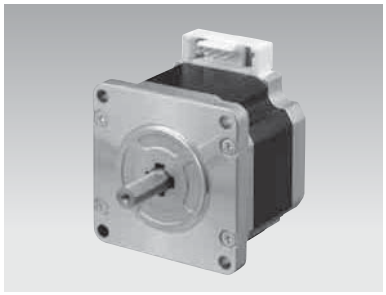


60 mm sq. (2.36 inch sq.)

1.8˚ /step RoHS

Bipolar winding, Connector type
Bipolar winding, Lead wire type
Dimensions for attaching NEMA23 are interchangeable (47.14 mm-pitch)
Unipolar winding, Connector type ▶p. 74
Unipolar winding, Lead wire type
Dimensions for attaching NEMA23 are interchangeable (47.14 mm-pitch) ▶p. 74

Customizing

Hollow | Shaft modification | Decelerator | Encoder | Brake

Varies depending on the model number and quantity. Contact us for details.

Bipolar winding, Connector type

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
103H7821-5740	**103H7821-5710**	0.88 (124.6)	2	1.27	3.3	0.275 (1.50)	0.6 (1.32)	44.8 (1.76)
103H7821-1740	**103H7821-1710**	0.88 (124.6)	4	0.35	0.8	0.275 (1.50)	0.6 (1.32)	44.8 (1.76)
103H7822-5740	**103H7822-5710**	1.37 (194.0)	2	1.55	5.5	0.4 (2.19)	0.77 (1.70)	53.8 (2.12)
103H7822-1740	**103H7822-1710**	1.37 (194.0)	4	0.43	1.38	0.4 (2.19)	0.77 (1.70)	53.8 (2.12)
103H7823-5740	**103H7823-5710**	2.7 (382.3)	2	2.4	9.5	0.84 (4.59)	1.34 (2.95)	85.8 (3.38)
103H7823-1740	**103H7823-1710**	2.7 (382.3)	4	0.65	2.4	0.84 (4.59)	1.34 (2.95)	85.8 (3.38)

Motor cable: Model No. 4837961-1

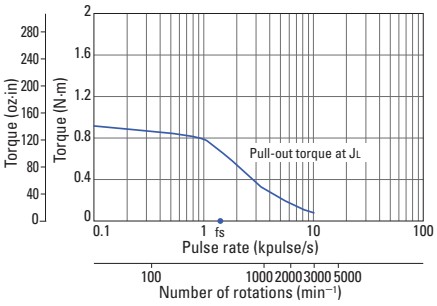
Bipolar winding, Lead wire type Dimensions for attaching NEMA23 are interchangeable (47.14 mm-pitch)

Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[×10⁻⁴kg·m² (oz·in²)]	[kg (lbs)]	mm (in)
103H7821-5760	**103H7821-5730**	0.88 (124.6)	2	1.27	3.3	0.275 (1.50)	0.6 (1.32)	43.5 (1.71)
103H7821-1760	**103H7821-1730**	0.88 (124.6)	4	0.35	0.8	0.275 (1.50)	0.6 (1.32)	43.5 (1.71)
103H7822-5760	**103H7822-5730**	1.37 (194.0)	2	1.55	5.5	0.4 (2.19)	0.77 (1.70)	52.5 (2.07)
103H7822-1760	**103H7822-1730**	1.37 (194.0)	4	0.43	1.38	0.4 (2.19)	0.77 (1.70)	52.5 (2.07)
103H7823-5760	**103H7823-5730**	2.7 (382.3)	2	2.4	9.5	0.84 (4.59)	1.34 (2.95)	84.5 (3.33)
103H7823-1760	**103H7823-1730**	2.7 (382.3)	4	0.65	2.4	0.84 (4.59)	1.34 (2.95)	84.5 (3.33)

Characteristics diagram

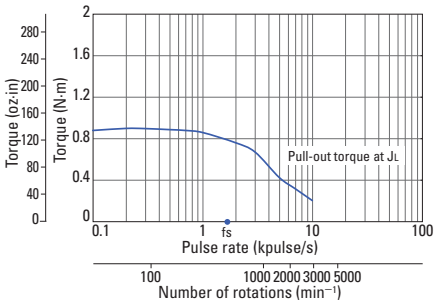
103H7821-5740
103H7821-5710
103H7821-5760
103H7821-5730

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/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



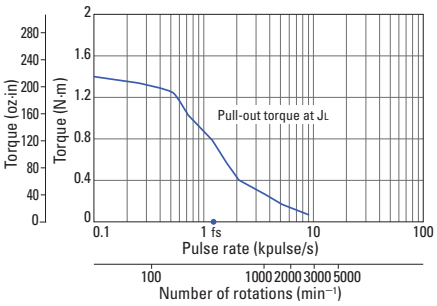
103H7821-1740
103H7821-1710
103H7821-1760
103H7821-1730

Constant current circuit
Source voltage: 24 VDC
Operating current:
4 A/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



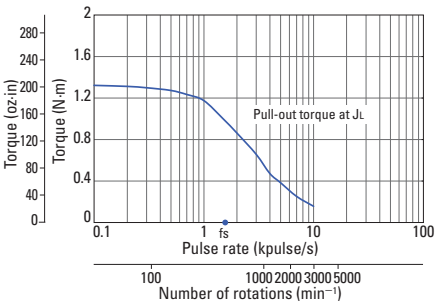
103H7822-5740
103H7822-5710
103H7822-5760
103H7822-5730

Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/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



103H7822-1740
103H7822-1710
103H7822-1760
103H7822-1730

Constant current circuit
Source voltage: 24 VDC
Operating current:
4 A/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



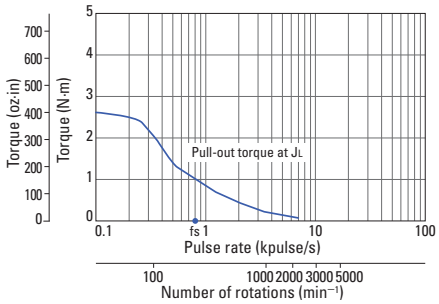
Allowable Load, Rotation Direction ▶p. 87 General Specifications ▶p. 88

Characteristics diagram

103H7823-5740
103H7823-5710

103H7823-5760
103H7823-5730

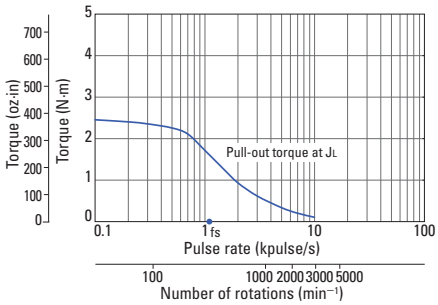
Constant current circuit
Source voltage: 24 VDC
Operating current:
2 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10^{-4}kg·m^2 (40.46 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



103H7823-1740
103H7823-1710

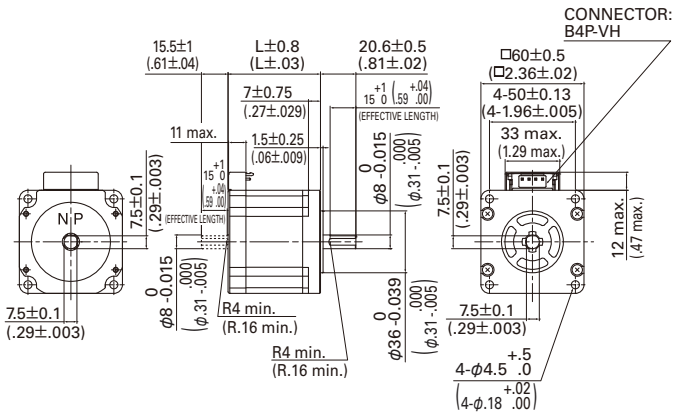
103H7823-1760
103H7823-1730

Constant current circuit
Source voltage: 24 VDC
Operating current:
4 A/phase, 2-phase energization (full-step)
J_L=[7.4 × 10^{-4}kg·m^2 (40.46 oz·in^2) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

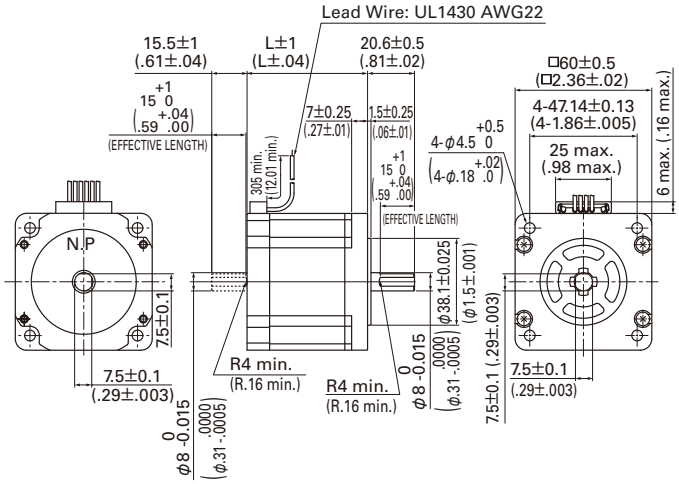


Dimensions [Unit: mm (inch)]

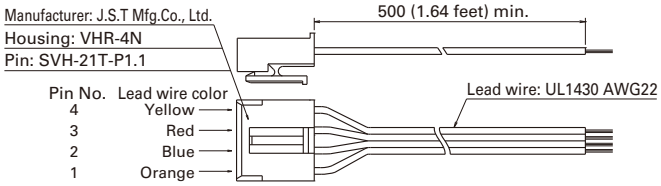
Connector type



Lead wire type



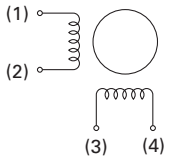
Motor cable Bipolar Model number: 4837961-1



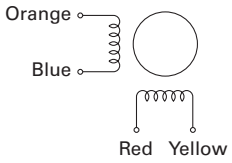
Internal wiring

Connector type

( ) connector pin number, terminal block number



Lead wire type



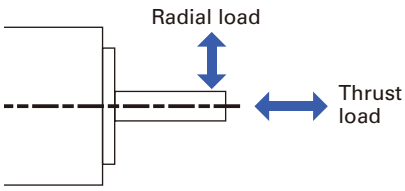
Compatible drivers

- For motor model number 103H782 □ -17 □ 0 (4 A/phase)
  Driver is not included.
  If you require assistance finding a driver, contact us for details.
- For motors not listed above (2 A/phase)
  Model number: BS1D200P10 (DC input)
  Operating current select switch setting: 0

Allowable Load, Rotation Direction ▶ p. 87 General Specifications ▶ p. 88

Data is measured under the trial conditions of SANYO DENKI. Driving torque may vary according to actual machine precision.

Allowable Radial/Thrust Load



Flange size	Model number	Distance from end of shaft : mm (in)				Thrust load N (lbs)
		0	5	10	15	
		Radial load : N (lbs)				
14 mm sq. (0.55 in sq.)	SH2141	10 (2.25)	11 (2.47)	13 (2.92)	-	0.7 (0.16)
28 mm sq. (1.10 in sq.)	SH228 □	42 (9)	48 (10)	56 (12)	66 (14)	3 (0.67)
35 mm sq. (1.38 in sq.)	SH353 □	40 (8)	50 (11)	67 (15)	98 (22)	10 (2.25)
42 mm sq. (1.65 in sq.)	103H52 □□ SH142 □	22 (4)	26 (5)	33 (7)	46 (10)	10 (2.25)
50 mm sq. (1.97 in sq.)	103H670 □	71 (15)	87 (19)	115 (25)	167 (37)	15 (3.37)
56 mm sq. (2.20 in sq.)	103H712 □	52 (11)	65 (14)	85 (19)	123 (27)	15 (3.37)
	103H7128	85 (19)	105 (23)	138 (31)	200 (44)	15 (3.37)
60 mm sq. (2.36 in sq.)	103H782 □	70 (15)	87 (19)	114 (25)	165 (37)	20 (4.50)
	SH160 □					15 (3.37)
86 mm sq. (3.39 in sq.)	SM286 □ SH286 □	167 (37)	193 (43)	229 (51)	280 (62)	60 (13.488)
86 mm sq. (3.39 in sq.)	103H822 □	191 (43)	234 (53)	301 (68)	421 (95)	60 (13.488)
ϕ106 mm (ϕ4.17 in)	103H8922 □	321 (72)	356 (79)	401 (90)	457 (101)	100 (22.48)

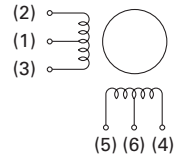
Internal Wiring and Rotation Direction

Unipolar winding

Connector type Model number: 103H52 □□

Internal wire connection

( ) connector pin number



Direction of motor rotation

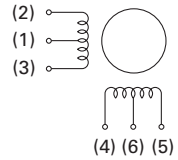
When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

		Connector pin number				
		(1.6)	(5)	(3)	(4)	(2)
Exciting order	1	+	–	–		
	2	+		–	–	
	3	+			–	–
	4	+	–			–

Connector type Model number: 103H782 □□

Internal wire connection

( ) connector pin number



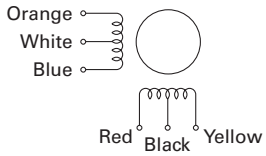
Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

		Connector pin number				
		(1.6)	(4)	(3)	(5)	(2)
Exciting order	1	+	–	–		
	2	+		–	–	
	3	+			–	–
	4	+	–			–

Lead wire type

Internal wire connection



Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

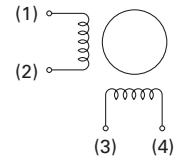
		Lead wire color				
		White & black	Red	Blue	Yellow	Orange
Exciting order	1	+	–	–		
	2	+		–	–	
	3	+			–	–
	4	+	–			–

Bipolar winding

Connector type

Internal wire connection

( ) connector pin number, terminal block number



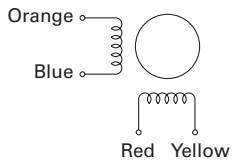
Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

		Connector pin number, terminal block number			
		(3)	(2)	(4)	(1)
Exciting order	1	–	–	+	+
	2	+	–	–	+
	3	+	+	–	–
	4	–	+	+	–

Lead wire type

Internal wire connection



Direction of motor rotation

When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

		Lead wire color			
		Red	Blue	Yellow	Orange
Exciting order	1	–	–	+	+
	2	+	–	–	+
	3	+	+	–	–
	4	–	+	+	–

General Specifications

Motor model number	SH2141	SH228 □	SH353 □	SS242 □	SH142 □	103H52 □□	SS250 □	103H67 □□	103H712 □
Type	—								
Operating ambient temperature	− 10℃ to + 50℃								
Conversation temperature	− 20℃ to + 65℃								
Operating ambient humidity	20 to 90% RH (no condensation)								
Conversation humidity	5 to 95% RH (no condensation)								
Operation altitude	1000 m (3281 feet) max. above sea level								
Vibration resistance	Vibration frequency 10 to 500 Hz, total amplitude 1.52 mm (10 to 70 Hz), vibration acceleration 150 m/s² (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.								
Impact resistance	500 m/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 B (+130℃)								
Withstandable voltage	At normal temperature and humidity, no failure with 500 VAC @50/60 Hz applied for one minute between motor winding and frame.							At normal temperature and humidity, no failure with 1000 VAC @50/60 Hz applied for one minute between motor winding and frame.	
Insulation resistance	At normal temperature and humidity, not less than 100 MΩ between winding and frame by 500 VDC megger.								
Protection grade	IP40								
Winding temperature rise	80 K max. (Based on Sanyo Denki standard)								
Static angle error	± 0.09˚				± 0.054˚	± 0.09˚			
Thrust play *1	0.075 mm (0.003 in) max. (load: 0.35 N (0.08 lbs))	0.075 mm (0.003 in) max. (load: 1.5 N (0.34 lbs))	0.075 mm (0.003 in) max. (load: 5 N (1.12 lbs))	0.075 mm (0.003 in) max. (load: 4 N (0.9 lbs))	0.075 mm (0.003 in) max. (load: 5 N (1.12 lbs))	0.075 mm (0.003 in) (load: 5 N (1.12 lbs))	0.075 mm (0.003 in) max. (load: 4 N (0.9 lbs))	0.075 mm (0.003 in) (load: 10 N (2.25 lbs))	0.075 mm (0.003 in) (load: 10 N (2.25 lbs))
Radial play *2	0.025 mm (0.001 in) max. (load: 5 N (1.12 lbs))								
Shaft runout	0.025 mm (0.001 in)								
Concentricity of mounting pilot relative to shaft	ϕ 0.05 mm (ϕ 0.002 in)	ϕ 0.05 mm (ϕ 0.002 in)	ϕ 0.075 mm (ϕ 0.003 in)	ϕ 0.075 mm (ϕ 0.003 in)	ϕ 0.05 mm (ϕ 0.002 in)	ϕ 0.05 mm (ϕ 0.002 in)	ϕ 0.075 mm (ϕ 0.003 in)	ϕ 0.075 mm (ϕ 0.003 in)	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)	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.1 mm (0.004 in)	0.075 mm (0.003 in)	0.075 mm (0.003 in)
Direction of motor mounting	Can be freely mounted vertically or horizontally								

Motor model number	SH160 □	103H78 □□	SH286 □	103H8922 □	SM286 □	103H712 □ -6 □□ 0 CE Model	103H822 □ -6 □□ 0 CE Model	103H8922 □ -63 □ 1 CE Model
Type	—				S1 (continuous operation)			
Operating ambient temperature	− 10℃ to + 50℃				− 10℃ to + 40℃			
Conversation temperature	− 20℃ to + 65℃				− 20℃ to + 60℃			
Operating ambient humidity	20 to 90% RH (no condensation)				95% max.: 40℃ max., 57% max.: 50℃ max., 35% max.: 60℃ max. (no condensation)			
Conversation humidity	5 to 95% RH (no condensation)							
Operation altitude	1000 m (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 150 m/s² (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.							
Impact resistance	500 m/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 B (+130℃)				Class F (+155℃)	Class B (+130℃)		
Withstandable voltage	At normal temperature and humidity, no failure with 1000 VAC @50/60 Hz applied for one minute between motor winding and frame.			At normal temperature and humidity, no failure with 1500 VAC @50/60 Hz applied for one minute between motor winding and frame.				
Insulation resistance	At normal temperature and humidity, not less then 100 MΩ between winding and frame by 500 VDC megger.							
Protection grade	IP40				IP43			
Winding temperature rise	80 K max. (Based on Sanyo Denki standard)							
Static angle error	± 0.054˚	± 0.09˚						
Thrust play *1	0.075 mm (0.003 in) max. (load: 10 N (2.25 lbs))							
Radial play *2	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 10 N (2.25 lbs))	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	0.025 mm (0.001 in) (load: 10 N (2.25 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)	0.075 mm (0.003 in)	0.15 mm (0.006 in)	0.1 mm (0.004 in)	0.15 mm (0.006 in)	0.075 mm (0.003 in)	0.1 mm (0.004 in)	0.1 mm (0.004 in)
Direction of motor mounting	Can be freely mounted vertically or horizontally							

*1 Thrust play: Shaft displacement under axial load.
*2 Radial play: Shaft displacement under radial load applied 1/3rd of the length from the end of the shaft.

Safety standards

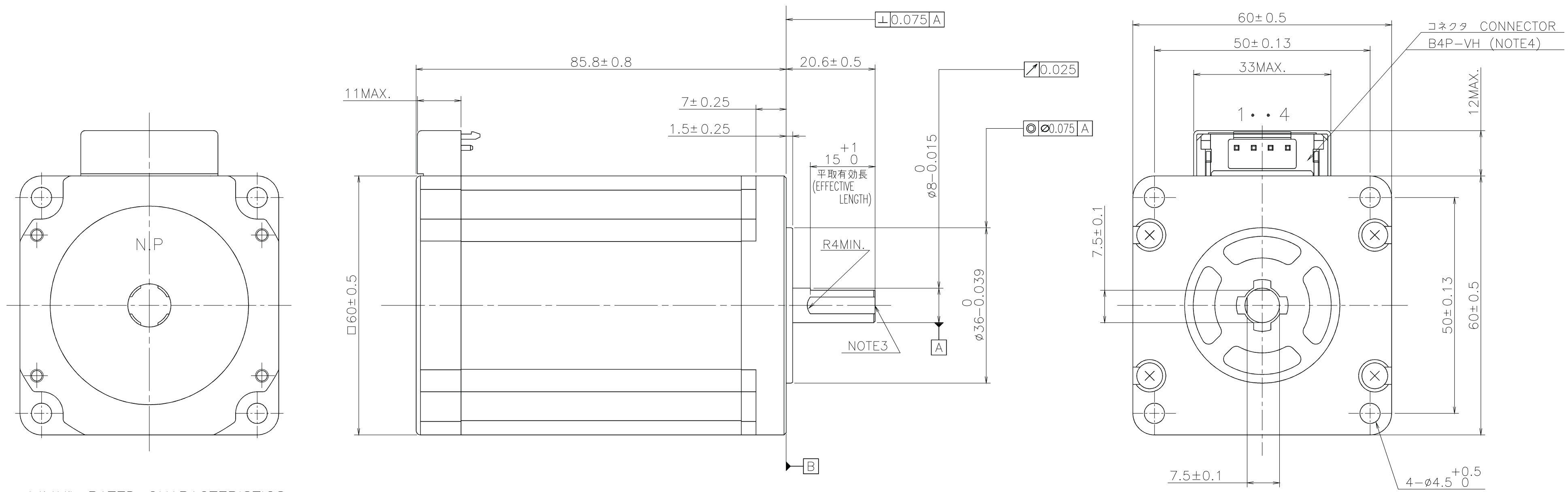
Model Number: SM286 □ CE/UL marked models

CE (TÜV)	Standard category		Applicable standard
	Low-voltage directives		EN60034-1, EN60034-5
UL	Acquired standards	Applicable standard	File No.
	UL	UL1004-1, UL1004-6	E179832
	UL for Canada	CSA C22.2 No.100	

Model Number: 103H712 □ -6 □□ 0, 103H822 □ -6 □□ 0, 103H8922 □ -63 □ 1 CE marked model

CE (TÜV)	Standard category	Applicable standard
	Low-voltage directives	EN60034-1, EN60034-5

RoHS

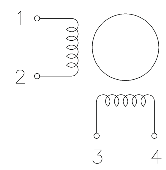


定格特性 RATED CHARACTERISTICS

	相数 PHASES	2	
	基本ステップ角度 STEP ANGLE	1.8	°
	定格電圧 VOLTS	5	V(DC)
	定格電流 AMPS	2	A/phase
	巻線抵抗 D.C RESISTANCE	2.4	Ω±10% at 25℃
	巻線インダクタンス COIL INDUCTANCE	9.5	mH±20% at 1 kHz, 1 V(rms)
	ホールディングトルク HOLDING TORQUE	2.7	N・m MIN. at I=2 A/phase 2EX.
注1. NOTE 1.	脱出トルク PULL OUT TORQUE	1.76	N・m MIN. at 200 pulse/s 負荷イナーシャ INERTIAL LOAD 7.4×10^{-4} kg・m^2 (ラバーカップリングイナーシャ含む) (INERTIA OF RUBBER COUPLING IS INCLUDED.)
注1. NOTE 1.	最大自起動周波数 MAX. STARTING RATE	550	pulse/s MIN. at NO LOAD
注1. NOTE 1.	最大連続応答周波数 MAX. SLEWING RATE	600	pulse/s MIN. at NO LOAD
	静止角度誤差 POSITIONAL ACCURACY	±0.054	°(0.108° SPREAD MAX.) 2EX.
注2. NOTE 2.	温度上昇値 COIL TEMPERATURE RISE	80	K MAX.
	ロータイナーシャ ROTOR INERTIA	0.84×10^{-4}	kg・m^2 NOMINAL
	絶縁階級 INSULATION CLASS	B	
	許容スラスト荷重 ALLOWABLE THRUST LOAD	20	N
	許容ラジアル荷重 ALLOWABLE RADIAL LOAD	71	N 軸先端荷重 LOAD TO SHAFT END.

注1. ドライバ：BS1D200P10 E=24V[DC] I=2A/相 2相励磁
NOTE) DRIVER: BS1D200P10 E=24V[DC] I=2A/PHASE 2Ex.
2.160X160X6t アルミ放熱板に取付け、2相励磁I=2 A/相を連続通電し、抵抗法により測定。
MOUNTED A MOTOR ON 160X160X6t ALUMINUM HEAT SINK AND CONTINUOUSLY ENERGIZED THE COIL AT 2 phase, I=2 A/phase CONSTANT. MEASURED BY THE CHANGE OF RESISTANCE METHOD.
3.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.
4.適合ハウジング及びコンタクト（例）：VHR-4N,SVH-21T-P1.1（日本圧着端子）
MATING HOUSING AND CONTACT.(e.g.) VHR-4N, SVH-21T-P1.1(JST)
5.適合ハウジング及びコンタクトはユーザー様でご用意してください。
PLEASE SUPPLY MATING HOUSING AND CONTACTS BY THE USER-SELF.

内部結線・CONNECTION
（ピン番号）(PIN NO.)



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 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 STEP	コネクタピン番号 CONNECTOR PIN NO. 3	2	4	1
1	⊖	⊖	⊕	⊕
2	⊕	⊖	⊖	⊕
3	⊕	⊕	⊖	⊖
4	⊖	⊕	⊕	⊖

承認 APPROVED BY	N. Miyajima 06-08-31	名称 TITLE	STEPPING MOTOR ステッピングモータ
審査 CHECKED BY	Y. Miura 06-08-31	単位 UNIT	mm
設計 DESIGNED BY	K.NAKATAKE 06-08-28	尺度 SCALE	
図番 DWG NO.	103H7823-5740	REV.	A
A	新規作成	中武	06-08-28
記号	記事 DESCRIPTION		日付 DATE

山洋電気株式会社 SANYO DENKI CO.,LTD.

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