

42 mm sq. (1.65 inch sq.)

1.8° /step **RoHS**

Unipolar winding, Connector type
Bipolar winding, Lead wire type ▶ p. 62

Customizing

- Hollow Shaft modification
- Decelerator Encoder
- Brake

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

Unipolar winding, Connector type

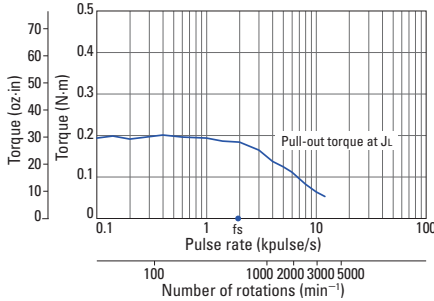
Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	Ω /phase	mH/phase	[$\times 10^{-4}$ kg·m ² (oz·in ²)]	[kg (lbs)]	mm (in)
103H5205-0440	103H5205-0410	0.2 (28.32)	1.2	2.4	2.3	0.036 (0.20)	0.23 (0.51)	33 (1.25)
103H5208-0440	103H5208-0410	0.3 (42.48)	1.2	2.9	3.4	0.056 (0.31)	0.29 (0.64)	39 (1.54)
103H5209-0440	103H5209-0410	0.32 (45.31)	1.2	3	3.9	0.062 (0.34)	0.31 (0.68)	41 (1.61)
103H5210-0440	103H5210-0410	0.37 (52.39)	1.2	3.3	3.4	0.074 (0.40)	0.37 (0.82)	48 (1.89)

Motor cable: Model No.4835710-1

Characteristics diagram

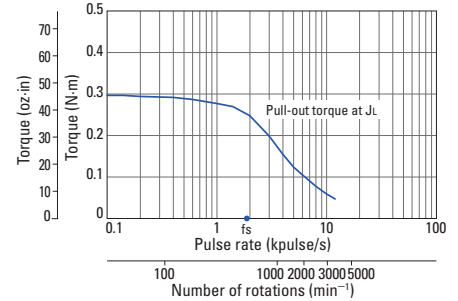
103H5205-0440
103H5205-0410

Constant current circuit
Source voltage: 24 VDC
Operating current:
1.2 A/phase, 2-phase energization (full-step)
 $J_L=[0.94 \times 10^{-4}$ kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



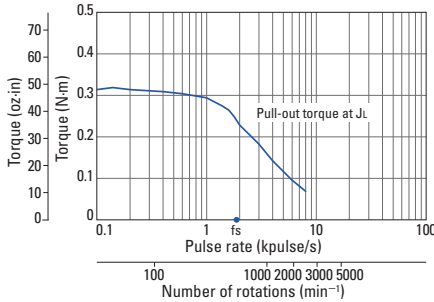
103H5208-0440
103H5208-0410

Constant current circuit
Source voltage: 24 VDC
Operating current:
1.2 A/phase, 2-phase energization (full-step)
 $J_L=[0.94 \times 10^{-4}$ kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded



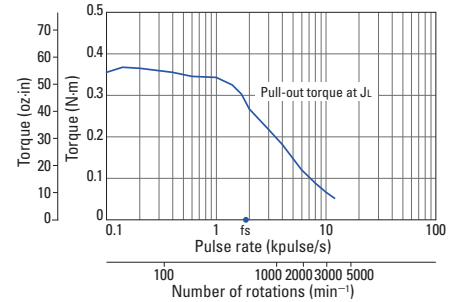
103H5209-0440
103H5209-0410

Constant current circuit
Source voltage: 24 VDC
Operating current:
1.2 A/phase, 2-phase energization (full-step)
 $J_L=[0.94 \times 10^{-4}$ kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

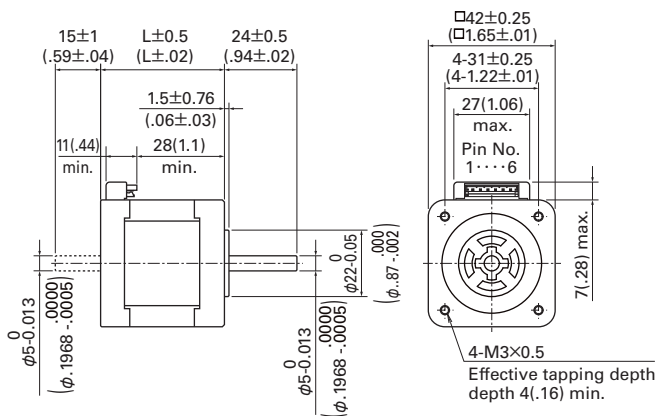


103H5210-0440
103H5210-0410

Constant current circuit
Source voltage: 24 VDC
Operating current:
1.2 A/phase, 2-phase energization (full-step)
 $J_L=[0.94 \times 10^{-4}$ kg·m² (5.14 oz·in²) use the rubber coupling]
fs: Maximum self-start frequency when not loaded

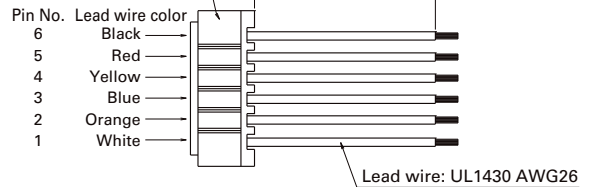


Dimensions [Unit: mm (inch)]



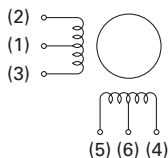
Option (sold separately): Motor cable Model number: 4835710-1

Manufacturer: J.S.T. Mfg. Co., Ltd.
Housing: EHR-6 Black
Pin: SEH-001T-P0.6



This driver-motor cable is for motor model numbers 103H52□□-04□□.

Internal wiring



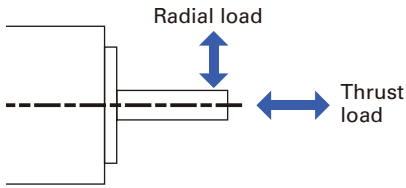
Compatible drivers

Model number: US1D200P10

Operating current select switch setting: 8

The characteristics diagram shown above is from our experimental circuit.

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)
	103H822 □					191 (43)
φ 106 mm (φ 4.17 in)	103H8922 □	321 (72)	356 (79)	401 (90)	457 (101)	100 (22.48)

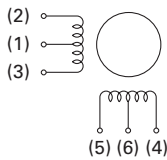
Internal Wiring and Rotation Direction

Unipolar winding

Connector type Model number: 103H52 □□

Internal wire connection

() connector pin number



Direction of motor rotation

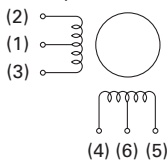
When excited by a direct current in the order shown below, the direction of rotation is clockwise as viewed from the output shaft side.

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

Connector type Model number: 103H782 □□

Internal wire connection

() connector pin number



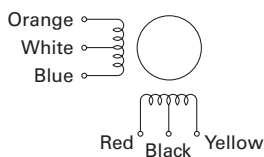
Direction of motor rotation

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

Exciting order	Connector pin number				
	(1.6)	(4)	(3)	(5)	(2)
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.

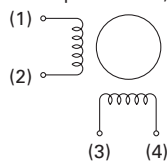
Exciting order	Lead wire color				
	White & black	Red	Blue	Yellow	Orange
1	+	-	-	-	-
2	+	-	-	-	-
3	+	-	-	-	-
4	+	-	-	-	-

Bipolar winding

Connector type

Internal wire connection

() connector pin number, terminal block number



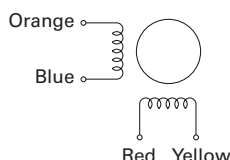
Direction of motor rotation

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

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

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

General Specifications

Motor model number	SH2141	SH228 □	SH353 □	SS242 □	SH142 □	103H52 □□	SS250 □	103H67 □□	103H712 □
Type	-								
Operating ambient temperature	- 10°C to + 50°C								
Conversation temperature	- 20°C to + 65°C								
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/s ² (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.								
Impact resistance	500 m/s ² 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°C)								
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) 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: 10 N (2.25 lbs))	0.075 mm (0.003 in) max. (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°C to + 50°C				- 10°C to + 40°C				
Conversation temperature	- 20°C to + 65°C				- 20°C to + 60°C				
Operating ambient humidity	20 to 90% RH (no condensation)				95% max.: 40°C max., 57% max.: 50°C max., 35% max.: 60°C 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/s ² (70 to 500 Hz), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.								
Impact resistance	500 m/s ² 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°C)				Class F (+155°C)	Class B (+130°C)			
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 than 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.

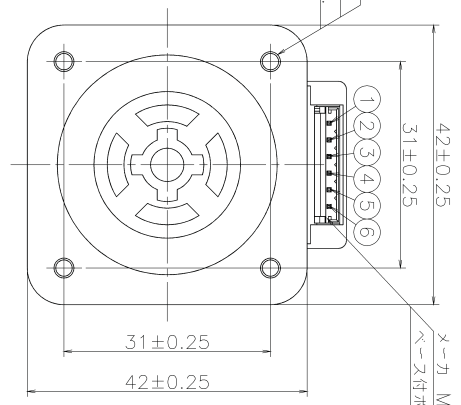
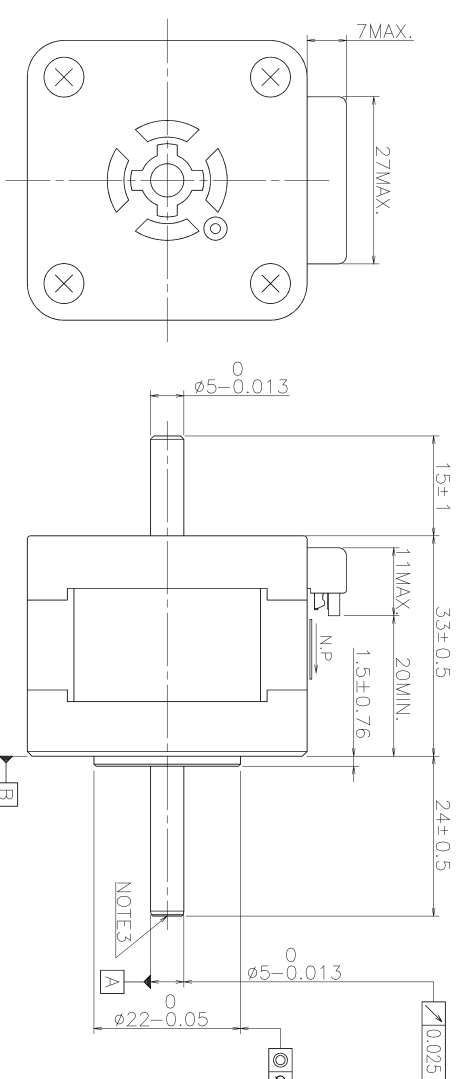
Safety standards

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



メーカー MANUFACTURER: JST
 ヘッドボースト SHROUDED HEADER P/N: B6B-EH-K

ピン配列 PIN ARRANGEMENT

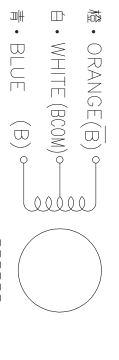
ピン番号	相	山洋標準色
1	BCOM	白・WHITE
2	B	橙・ORANGE
3	B	青・BLUE
4	A	黄・YELLOW
5	A	赤・RED
6	ACOM	黒・BLACK

定格特性 RATED CHARACTERISTICS

相数	2
PHASES	2
基本ステップ角度	1.8°
STEP ANGLE	1.8°
定格電圧	2.88 V(DC)
VOLTS	2.88 V(DC)
定格電流	1.2 A/PHASE
AMPS	1.2 A/PHASE
巻線抵抗	2.4 Ω±10% at 25°C
D.C. RESISTANCE	2.4 Ω±10% at 25°C
巻線インダクタンス	2.3 mH±20% at 1 kHz, 1 V(rms)
COIL INDUCTANCE	2.3 mH±20% at 1 kHz, 1 V(rms)
ホールデイングトルク	0.2 N・m MIN. at I=1.2 A/phase 2PHASE EXCITATION
HOLDING TORQUE	0.2 N・m MIN. at I=1.2 A/phase 2PHASE EXCITATION
脱出力トルク	0.15 N・m MIN. at 1000 pulse/s
NOTE 1. PULL OUT TORQUE	0.15 N・m MIN. at 1000 pulse/s

負荷イナーシャ
 INERTIAL LOAD $0.94 \times 10^{-4} \text{ kg} \cdot \text{m}^2$
 (ラバーカップインナーシヤ含む)
 (INERTIA OF RUBBER COUPLING IS INCLUDED)

内部結線・CONNECTION



- 注1. 山洋ドライバ PPM-MD-23221回路による。(2相励磁)E=24 V[DC]I=1.2 A/相。(平均値)
 NOTE. BY SANYO DRIVER PPM-MD-23221 CIRCUIT.
 (2 PHASE EXCITATION), E=24 V[DC], I=1.2 A/PHASE. (AVERAGE VALUE)
 2. 温度上昇は、モータを100×100×2t SPCC板熱橋に取付け、2相励磁I=1.2 A/相一定にて励磁し、抵抗法により測定。
 MOUNT A MOTOR ON 100×100×2t SPCC HEAT SINK AND ENERGIZE A COIL AT 2 PHASE EXCITATION, I=1.2 A/PHASE CONSTANT.
 MEASURED BY THE RESISTANCE METHOD.
 3. シャフトセンター穴の有無は、山洋電気株式会社任意とする。
 CENTER HOLE ON THE SHAFT END IS NOT ALWAYS MADE.
 4. 適合コネクタは、添付品ではありません。
 A MATING CONNECTOR IS NOT ATTACHED.

回転方向・DIRECTION OF ROTATION

下記の順に連続励磁した場合、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	相	PHASE
1	ACOM/BCOM	A B Ā B̄
2	+	+
3	+	+
4	+	+



RED BLACK YELLOW
 赤 黒 黄
 (A) (ACOM) (A)

品番	製造年月	製造所
E E0072993	09-01-17	山洋電気株式会社
D E0029697	09-10-12	山洋電気株式会社
C E0023258	09-01-25	山洋電気株式会社
B E0021293	08-11-06	山洋電気株式会社
A NEW DESIGN	08-09-18	山洋電気株式会社