Stepping Motors



₽Z mm sq.

1.8°/step RoHS

Bipolar winding, Connector type

Unipolar winding, Connector type ▶p. 45

Customizing

Shaft length Shaft shape

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

Bipolar winding, Connector type

Model no.		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass	Motor length (L)
Single shaft	Dual shaft	N·m min.	A/phase	Ω/phase	mH/phase	×10 ⁻⁴ kg⋅m²	kg	mm
SF2421-10B41	SF2421-10B11	0.29	1	3.6	7	0.031	0.23	33±0.5
SF2422-10B41	SF2422-10B11	0.43	1	4.6	9.6	0.046	0.3	39±0.5
SF2423-10B41	SF2423-10B11	0.56	1	5.3	12.5	0.063	0.38	48±0.5
SF2424-10B41	SF2424-10B11	0.8	1	6.5	16	0.094	0.51	59.5±1

Characteristics diagram

SF2421-10B41 SF2421-10B11

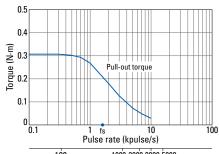
Constant current circuit Source voltage: 24 VDC Operating current: 1 A/phase, 2-phase energization (full-step) Pull-out torque: J.=0.94×10-⁴kg·m² (use the rubber coupling) fs: Maximum self-start fragespace whose part frequency when not loaded

SF2423-10B41

SF2423-10B11

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase
energization (full-step)
Pull-out torque:
J.=0.94×10-4kg·m² (use the
rubber coupling)
fs: Maximum self-start
frequency when not
loaded

loaded



1000 2000 3000 5000 100 Number of rotations (min-1)

0.7 0.6 0.5 € 0.5 ≥ 0.4 Pull-out torque Torque (1 0.2 0.1 0.1 Pulse rate (kpulse/s) 1000 2000 3000 5000

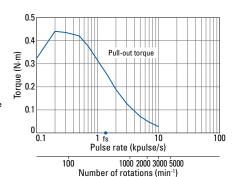
Number of rotations (min-1)

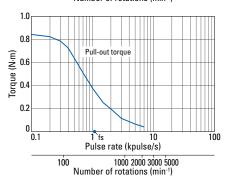
SF2422-10B41 SF2422-10B11

Constant current circuit
Source voltage: 24 VDC
Operating current:
1 A/phase, 2-phase
energization (full-step)
Pull-out torque:
J₁=0.94×10⁻⁴kg·m² (use the
rubber coupling)
fs: Maximum self-start
fraguspay whop pet frequency when not loaded

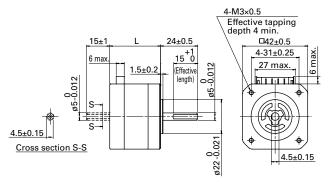
SF2424-10B41 SF2424-10B11

Constant current circuit Source voltage: 24 VDC Operating current: 1 A/phase, 2-phase energization (full-step) Pull-out torque: Ju-2.6x10-4g-m² (use the rubber coupling) fs: Maximum self-start frequency when not loaded





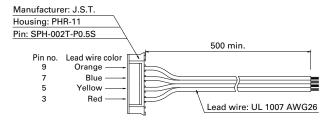
■ Dimensions (Unit: mm)



Internal wiring () connector pin number



Option (sold separately): Motor cable model no. 4835775-1



This motor cable is for model no. SF242□-10B□1.

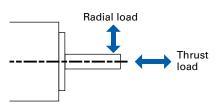
Compatible drivers

Model no.: BS1D200P10

Operating current select switch setting: A

The characteristics diagram shown above is from our experimental circuit.

Allowable Radial/Thrust Load



		Dietance	from end of	chaft: mm			
Motor size	Model no.	0	5	10	15	- Thrust load - N	
		Radial load	Radial load: N				
14 mm sq.	SH214 🗌	10	11	13	_	0.7	
28 mm sq.	SH228 🗌	42	48	56	66	3	
35 mm sq.	SH353 🗌	40	50	67	98	10	
	SF242 □	20	29	49	68	10	
42 mm sq.	SH142 🗌	22	26	33	46	10	
	SS242 🗌	10	-	_	_	4.9	
E0 mm oa	103H670 🗌	71	87	115	167	15	
50 mm sq.	SS250 🗆	8.5	-	-	_	4.9	
E6 mm on	103H712 🗌	52	65	85	123	15	
56 mm sq.	103H7128	85	105	138	200	15	
60 mm sq.	103H782 🗌	- 70	87	114	165	20	
oo iiiiii sq.	SH160 🗆	70	07	114	105	15	
86 mm sq.	SM286 ☐ SH286 ☐	167	193	229	280	60	
*86 mm	103H822 🗆	191	234	301	421	60	
°106 mm	103H8922 🗌	321	356	401	457	100	

Internal Wiring and Rotation Direction

Unipolar winding

Connector type model no.: SF242

■ 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 no.					
		(3, 9)	(1)	(7)	(5)	(11)	
	1	+	-	-			
Exciting	2	+		-	-		
Exciting order	3	+			-	-	
	4	+	-			-	

Connector type model no.: 103H782 □□

Internal wire connection

() connector pin number



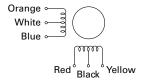
Direction of motor rotation

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

		Connecto	Connector pin no.					
		(1, 6)	(4)	(3)	(5)	(2)		
Exciting	1	+	-	-				
	2	+		-	-			
Exciting order	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		
	1	+	-	-				
Exciting	2	+		-	-			
order	3	+			-	-		
	4	+	-			-		

Bipolar winding

Connector type model no.: SF242

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.

	_	Connecto	or pin no.		
		(3)	(7)	(5)	(9)
	1	-	-	+	+
Exciting	2	+	_	-	+
Exciting order	3	+	+	-	-
	4	_	+	+	_

Connector type model no.: 103H782

Internal wire connection

() connector pin number



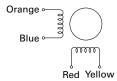
Direction of motor rotation

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

		Connecto	or pin no.		
		(3)	(2)	(4)	(1)
	1	-	-	+	+
Exciting	2	+	-	-	+
Exciting order	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 wir	e color		
		Red	Blue	Yellow	Orange
	1	-	-	+	+
Exciting	2	+	-	-	+
Exciting order	3	+	+	-	-
	4	_	+	+	-

General Specifications

Motor model no.	SH214 🗌	SH228 🗌	SH353	SS242 🗌	SH142 🗌	SF242	SS250 🗆	103H670 🗌	103H712 🗌	
Type	_	311220	311333 🗆	33242	311142	31 242 🗆	33230	10311070	10311712	
Operating ambient temperature	-10 to +50°C	<u> </u>								
Storage temperature										
Operating ambient humidity			nsation)							
Storage humidity		to 95% RH (no condensation)								
Operation altitude		000 m max. above sea level								
Vibration resistance	Vibration fre	ibration frequency 10 to 500 Hz, total amplitude 1.52 mm (10 to 70 Hz), vibration acceleration 150 m/s² (70 to 500 z), sweep time 15 min/cycle, 12 sweeps in each X, Y and Z direction.								
Impact resistance	500 m/s ² of a	cceleration fo	r 11 ms with	half-sine wave	applying the	ree times for X	, Y, and Z axe	s each, 18 time	es in total.	
Thermal class	Class B (+13	30°C)								
Withstandable voltage		At normal temperature and humidity, no failure with 500 VAC @50/60 Hz applied for one humidity, no failure with 1000 VAC 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 to	emperature a	nd humidity	, not less thai	n 100 MΩ be	tween windir	g and frame	by 500 VDC n	negger.	
Protection grade	_									
Winding temperature rise	80 K max. (I	Based on SAI	NYO DENKI s	standard)						
Static angle error	±0.09°				±0.054°	±0.09°			±0.054°	
Thrust play *1	0.075 mm max. (load: 0.35 N)	0.075 mm max. (load: 1.5 N)	0.075 mm max. (load: 5 N)	0.075 mm max. (load: 4 N)	0.075 mm max. (load: 5 N)	0.075 mm (load: 5 N)	0.075 mm max. (load: 4 N)	0.075 mm (load: 10 N)	0.075 mm (load: 10 N)	
Radial play *2	0.025 mm m	0.025 mm max. (load: 5 N)								
Shaft runout	0.025 mm									
Concentricity of mounting pilot relative to shaft	ø0.05 mm	ø0.05 mm	ø0.075 mm	ø0.075 mm	ø0.05 mm	ø0.05 mm	ø0.075 mm	ø0.075 mm	ø0.075 mm	
Squareness of mounting surface relative to shaft	0.1 111111	0.1 mm	0.1 mm	0.1 mm	0.1 mm	0.1 mm	0.1 mm	0.075 mm	0.075 mm	
Direction of motor mounting	Can be free	ly mounted v	ertically or h	orizontally						
Motor model no.	SH160 🗆	103H782 🗆	SH286 □	103H8922	SM286 □	103H712 ☐ -6 CE Model	6 🗆 0 103H822 CE Mode		8H8922 □ -63 □ 1 Model	
Type	_				S1 (contin	uous operati	on)			
Operating ambient temperature					-10 to +40					
Storage temperature					-20 to +60					
					RH max. at 40°C or less (no condensation)					
			nsation)				5 to 95% RH (no condensation) 95% RH max. at 40°C or less, 57% RH max. at 50°C or less, 35% RH max. at 60°C or less (no condensation)			
	20 to 90% R	H (no conder			95% RH m	nax. at 40°C o			C or less,	
Operating ambient humidity	20 to 90% R 5 to 95% RH 1000 m max	H (no conder I (no condens c. above sea	sation) evel		95% RH m 35% RH m	nax. at 40°C o nax. at 60°C o	r less (no con	densation)		
Operating ambient humidity Storage humidity Operation altitude Vibration resistance	20 to 90% R 5 to 95% RH 1000 m max Vibration fre 500 Hz), swe	H (no conder I (no condens c. above sea equency 10 to eep time 15 r	evel 5 500 Hz, tota nin/cycle, 12	sweeps in ea	95% RH m 35% RH m 1.52 mm (10 ch X, Y and	nax. at 40°C on ax. at 60°C on ax. a	r less (no con	densation) ration 150 m/s	s² (70 to	
Operating ambient humidity Storage humidity Operation altitude	20 to 90% R 5 to 95% RH 1000 m max Vibration fre 500 Hz), swe	H (no conder I (no condens c. above sea equency 10 to eep time 15 r	evel 5 500 Hz, tota nin/cycle, 12	sweeps in ea	95% RH m 35% RH m 1.52 mm (10 ch X, Y and ve applying	nax. at 40°C on ax. at 60°C on ax. a	r less (no con	densation) ration 150 m/s	s² (70 to	
Operating ambient humidity Storage humidity Operation altitude Vibration resistance	20 to 90% R 5 to 95% RH 1000 m max Vibration fre 500 Hz), swe 500 m/s ² of a Class B (+13	H (no condent I (no condent I above seal equency 10 to eep time 15 nacceleration f 30°C)	eation) evel 5 500 Hz, tota nin/cycle, 12 or 11 ms with	sweeps in ean half-sine wa	95% RH m 35% RH m 1.52 mm (10 ch X, Y and ve applying Class F (+155°C)	to 70 Hz), vib Z direction. three times for Class B (+	r less (no con ration acceler or X, Y and Z a 130°C)	densation) ration 150 m/s	s² (70 to times in total	
Operating ambient humidity Storage humidity Operation altitude Vibration resistance Impact resistance	20 to 90% R 5 to 95% RH 1000 m max Vibration fre 500 Hz), swe 500 m/s² of a Class B (+13 At normal terr ure with 1000	H (no conders I (no condens c. above sea lequency 10 to eep time 15 r acceleration f	evel 5 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for one	sweeps in ean half-sine wa	95% RH m 35% RH m 1.52 mm (10 ch X, Y and ve applying Class F (+155°C) temperature	to 70 Hz), vib Z direction. three times for Class B (+	r less (no con ration acceler or X, Y and Z a	densation) ration 150 m/s exes each, 18	s² (70 to times in total	
Operating ambient humidity Storage humidity Operation altitude Vibration resistance Impact resistance Thermal class Withstandable voltage Insulation resistance	20 to 90% R 5 to 95% RH 1000 m max Vibration fre 500 Hz), swe 500 m/s² of a Class B (+13 At normal tem ure with 1000 minute betwe	H (no condense. Above sea lequency 10 to eep time 15 racceleration f 80°C) hereture and h VAC @50/60 Hz en motor winding.	evel 0 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for one	At normal applied for	95% RH m 35% RH m 1.52 mm (10 ch X, Y and ve applying Class F (+155°C) temperature one minute	to 70 Hz), vib Z direction. three times for Class B (+ and humidity between mo	r less (no con ration acceler or X, Y and Z a 130°C) /, no failure w	densation) ration 150 m/s exes each, 18 rith 1500 VAC nd frame.	s² (70 to times in total c @50/60 Hz	
Operating ambient humidity Storage humidity Operation altitude Vibration resistance Impact resistance Thermal class Withstandable voltage Insulation resistance Protection grade	20 to 90% R 5 to 95% RH 1000 m max Vibration fro 500 Hz), swe 500 m/s² of a Class B (+13 At normal tem ure with 1000 minute betwe At normal te	H (no condense. Above sea lequency 10 to eep time 15 racceleration f 80°C) In perature and h VAC @50/60 Hz en motor winding emperature and e	evel 5 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for oning and frame. nd humidity	At normal applied for, not less their	95% RH m 35% RH m 1.52 mm (10 ch X, Y and ve applying Class F (+155°C) temperature one minute	to 70 Hz), vib Z direction. three times for Class B (+ and humidity between mo	r less (no con ration acceler or X, Y and Z a 130°C) /, no failure w tor winding a	densation) ration 150 m/s exes each, 18 rith 1500 VAC nd frame.	s² (70 to times in total c @50/60 Hz	
Operating ambient humidity Storage humidity Operation altitude Vibration resistance Impact resistance Thermal class Withstandable voltage Insulation resistance Protection grade Winding temperature rise	20 to 90% R 5 to 95% RH 1000 m max Vibration fro 500 Hz), swe 500 m/s² of a Class B (+13 At normal tem ure with 1000 minute betwe At normal to	H (no condense. Above sea lequency 10 to eep time 15 racceleration f 80°C) In perature and h VAC @50/60 Hz en motor winding emperature a Based on SAI	evel 5 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for oning and frame. nd humidity	At normal applied for, not less their	95% RH m 35% RH m 1.52 mm (10 ch X, Y and we applying Class F (+155°C) temperature one minute m 100 MΩ be	to 70 Hz), vib Z direction. three times for Class B (+ and humidity between most	r less (no con ration acceler or X, Y and Z a 130°C) /, no failure w tor winding a lig and frame	densation) ration 150 m/s exes each, 18 rith 1500 VAC nd frame.	s² (70 to times in total c @50/60 Hz	
Operating ambient humidity Storage humidity Operation altitude Vibration resistance Impact resistance Thermal class Withstandable voltage Insulation resistance Protection grade Winding temperature rise Static angle error	20 to 90% R 5 to 95% RH 1000 m max Vibration from 500 Hz), swe 500 m/s² of a Class B (+13 At normal terrure with 1000 minute between At normal terrure with 2000 At normal terrure with 2000 Minute between At normal terrure with 2000 4 to 2000 80 K max. (Fig. 1)	H (no condense (no	evel o 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for oning and frame. nd humidity	At normal applied for, not less their	95% RH m 35% RH m 1.52 mm (10 ch X, Y and we applying Class F (+155°C) temperature one minute m 100 MΩ be	to 70 Hz), vib Z direction. three times for Class B (+ and humidity between mo	r less (no con ration acceler or X, Y and Z a 130°C) /, no failure w tor winding a	densation) ration 150 m/s exes each, 18 rith 1500 VAC nd frame.	s² (70 to times in total c @50/60 Hz	
Operating ambient humidity Storage humidity Operation altitude Vibration resistance Impact resistance Thermal class Withstandable voltage Insulation resistance Protection grade Winding temperature rise Static angle error Thrust play *1	20 to 90% R 5 to 95% RH 1000 m max Vibration fre 500 Hz), swe 500 m/s² of a Class B (+13 At normal tem ure with 1000 minute betwe At normal te 80 K max. (I ±0.054° 0.075 mm m 0.025 mm	H (no condense (no	evel 5 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for oning and frame. nd humidity. NYO DENKI s N) 0.025 mm	At normal applied for not less then standard) 0.025 mm	95% RH m 35% RH m 1.52 mm (10 ch X, Y and ve applying Class F (+155°C) temperature one minute in 100 MΩ be IP43	to 70 Hz), vib Z direction. three times for Class B (+ and humidity between more tween windir ±0.054°	r less (no con ration acceler or X, Y and Z a 130°C) /, no failure w tor winding a g and frame ±0.09°	densation) ration 150 m/s exes each, 18 rith 1500 VAC nd frame. by 500 VDC n	s² (70 to times in total c @50/60 Hz negger.	
Operating ambient humidity Storage humidity Operation altitude Vibration resistance Impact resistance Thermal class Withstandable voltage Insulation resistance Protection grade Winding temperature rise Static angle error Thrust play *1 Radial play *2	20 to 90% R 5 to 95% RH 1000 m max Vibration fre 500 Hz), swe 500 m/s² of a Class B (+13 At normal tem ure with 1000 minute betwe At normal te 	H (no condense. A look of the condense.	evel o 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for oning and frame. nd humidity, NYO DENKI s	At normal applied for not less then standard) 0.025 mm	95% RH m 35% RH m 1.52 mm (10 ch X, Y and ve applying Class F (+155°C) temperature one minute m 100 MΩ be IP43	to 70 Hz), vib Z direction. three times for Class B (+ and humidity between more tween windir ±0.054°	r less (no con ration acceler or X, Y and Z a 130°C) /, no failure w tor winding a g and frame ±0.09°	densation) ration 150 m/s exes each, 18 rith 1500 VAC nd frame. by 500 VDC n	s² (70 to times in total ; @50/60 Hz negger.	
Operating ambient humidity Storage humidity Operation altitude Vibration resistance Impact resistance Thermal class Withstandable voltage Insulation resistance Protection grade Winding temperature rise Static angle error Thrust play *1 Radial play *2 Shaft runout Concentricity of mounting	20 to 90% R 5 to 95% RH 1000 m max Vibration fre 500 Hz), swe 500 m/s² of a Class B (+13 At normal tem ure with 1000 minute betwe At normal te 80 K max. (I ±0.054° 0.075 mm m 0.025 mm	H (no condense (no	evel 5 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for oning and frame. nd humidity. NYO DENKI s N) 0.025 mm	At normal applied for not less then standard) 0.025 mm	95% RH m 35% RH m 1.52 mm (10 ch X, Y and ve applying Class F (+155°C) temperature one minute in 100 MΩ be IP43	to 70 Hz), vib Z direction. three times for Class B (+ and humidity between more tween windir ±0.054°	r less (no con ration acceler or X, Y and Z a 130°C) /, no failure w tor winding a g and frame ±0.09°	densation) ration 150 m/s exes each, 18 rith 1500 VAC nd frame. by 500 VDC n	s² (70 to times in total c @50/60 Hz negger.	
Operating ambient humidity Storage humidity Operation altitude Vibration resistance Impact resistance Thermal class Withstandable voltage Insulation resistance Protection grade Winding temperature rise Static angle error Thrust play *1 Radial play *2 Shaft runout	20 to 90% RH 5 to 95% RH 1000 m max Vibration fre 500 Hz), swe 500 m/s² of a Class B (+13 At normal tem ure with 1000 minute betwee At normal te = 80 K max. (E ±0.054° 0.075 mm m 0.025 mm (load: 5 N) 0.025 mm ø0.075 mm	H (no condense (no	evel 5 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for oning and frame. nd humidity. NYO DENKI s N) 0.025 mm	At normal applied for not less then standard) 0.025 mm	95% RH m 35% RH m 1.52 mm (10 ch X, Y and ve applying Class F (+155°C) temperature one minute in 100 MΩ be IP43	to 70 Hz), vib Z direction. three times for Class B (+ and humidity between more tween windir ±0.054°	r less (no con ration acceler or X, Y and Z a 130°C) /, no failure w tor winding a g and frame ±0.09°	densation) ration 150 m/s exes each, 18 rith 1500 VAC nd frame. by 500 VDC n mm 0.0 5 N) (lo	s² (70 to times in total c @50/60 Hz negger.	

■ Safety standards

Model no.: SM286 $\ \square$ CE/UL marked models

CE	Standard category		Applicable standard	
(TÜV)	Low-voltage directives		EN 60034-1, EN 60034-5	
		Applicable standard	File no.	
UL	UL	UL 1004-1, UL 1004-6	E170922	
	UL for Canada	CSA C22.2 No.100	- E179832	

Model no	.: 103H712 🗆 -6 🗆 0, 103H822 🗆 -6 🗆 0, 103H	18922 🗌 -63 🗌 1	CE marked model

	·	
CE	Standard category	Applicable standard
(TÜV)	Low-voltage directives	EN 60034-1, EN 60034-5

^{*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.

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for Stepper Motors category:

Click to view products by Sanyo Denki manufacturer:

Other Similar products are found below:

HT17-275 HT11-021 80910003 HT23-598 HT08-221 82929001 82924031 82924028 82924033 82924027 82924039 82924052 82924062 82924024 PM42S-048-HHC8 PM20L-020-HHC3 PM42L-048-HHC9 PM25L-024-HHC5 HT23-598D-ZAA 82930002 103H7121-0410 103H7123-0140 103H7126-6740 103H7823-0440 103H7126-0440 103H8223-5141 103H8222-5141 103H8223-6340 103H5210-5240 103H7126-0740 103H7126-5840 103H8221-6240 103H7126-5740 103H7822-5740 103H7823-5740 103H8222-6340 STEPPER MOTOR BIPOLAR 42X38MM 2.8V 1.7A SY20STH30-0604A SH2141-5541 STEPPER MOTOR: UNIPOLAR/BIPOLAR 57×56MM PM25S-048-HHC4 NSANYO PANCAKE STEPPER MOTOR: BIPOLAR 42× STEPPER MOTOR: UNIPOLAR/BIPOLAR 57×76MM PD28-1-1021-TMCL PD28-3-1021-TMCL PD42-1-1140-TMCL PD42-3-1141 PD57-1-1276-TMCL 103H7123-5740 82924048