

# **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

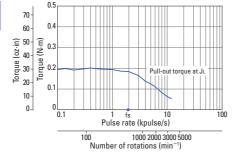
Model number		Holding torque at 2-phase energization	Rated current	Wiring resistance	Winding inductance	Rotor inertia	Mass (Weight)	Motor length (L)
Single shaft	Dual shaft	[N·m (oz·in) min.]	A/phase	$\Omega$ /phase	mH/phase	$[\times 10^{-4} \text{kg} \cdot \text{m}^2 (\text{oz} \cdot \text{in}^2)]$	[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

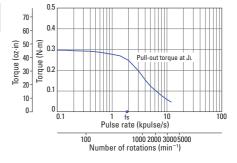
#### 103H5205-0440 103H5205-0410

Constant current circuit Source voltage: 24 VDC Operating current: 1.2 A/phase, 2-phase energization (full-step)
JL=[0.94 × 10<sup>-4</sup>kg·m² (5.14
oz·in²) use the rubber coupling] fs: Maximum self-start frequency when not loaded



#### 103H5208-0440 103H5208-0410

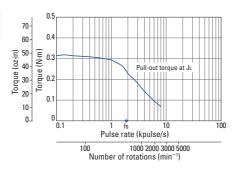
Constant current circuit Constant current circuit Source voltage: 24 VDC Operating current: 1.2 A/phase, 2-phase energization (full-step) J.=[0.94 × 10-4kg·m² (5.14 oz·in²) use the rubber coupling couplinal fs: Maximum self-start frequency when not loaded



#### 103H5209-0440 103H5209-0410

Constant current circuit Constant current circuit Source voltage: 24 VDC Operating current: 1.2 A/phase, 2-phase energization (full-step) J:=[0.94 × 10-4kg-m² (5.14 oz-in²) use the rubber coupling] fs: Maximum self-start

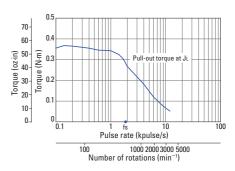
fs: Maximum self-start frequency when not



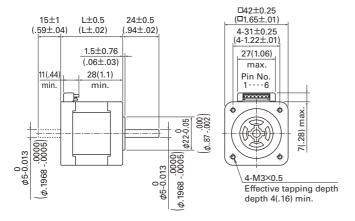
#### 103H5210-0440 103H5210-0410

Constant current circuit Source voltage: 24 VDC Operating current: 1.2 A/phase, 2-phase energization (full-step)  $J_L=[0.94 \times 10^{-4} \text{kg} \cdot \text{m}^2 (5.14)]$ oz·in²) use the rubber coupling] fs: Maximum self-start

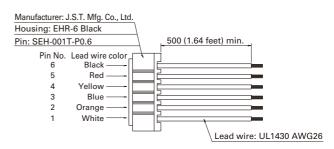
frequency when not



## **Dimensions** [Unit: mm (inch)]



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



This driver-motor cable is for motor model numbers 103H52 -04 -0.

# Internal wiring



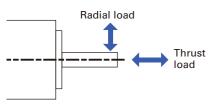
# Compatible drivers

### Model number: US1D200P10

Operating current select switch setting: 8

The characteristics diagram shown above is from our experimental circuit.

# **Allowable Radial/Thrust Load**



	Madal	Distance f	Thrust load				
Flange size	Model number	0	5	10	15	Thrust load - N (lbs)	
	Hullibel	Radial load	d : N (lbs)			- 14 (105)	
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)	
56 mm sq. (2.20 m sq.)	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)	
00 IIIII Sq. (2.30 III Sq.)	SH160 □	70 (15)	07 (13)	114 (23)	105 (37)	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)	
¢ 106 mm (¢ 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



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)			
	1	+	_	-					
Exciting order	2	+		_	_				
order	3	+			_	-			
	4	+	-			-			

Connector type Model number: 103H782

# Internal wire connection

() connector pin number



#### Direction of motor rotation

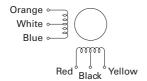
Direction of motor rotation

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)		
	1	+	-	_				
Exciting order	2	+		_	_			
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

#### Internal wire connection

( ) connector pin number, terminal block number



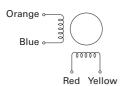
#### Direction of motor rotation

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 blo	ck number
			(3)	(2)	(4)	(1)
		1	_	-	+	+
	Exciting order	2	+	-	_	+
	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						
~		Red	Blue	Yellow	Orange			
	1	_	_	+	+			
Exciting order	2	+	_	_	+			
order	3	+	+	_	_			
	4	_	+	+	_			

# **General Specifications**

Motor model number	SH2141	SH228 □	SH353	SS242 🗆	SH142	103H52	SS250 🗌	103H67	103H712 🗆
Type	-	OTIZZO _	011333 🗆	00242	011142	1031132	00230	1031107	10311712
Operating ambient temperature	- 10°C to +	− 10°C to + 50°C							
Conversation temperature									
Operating ambient humidity			nsation)						
1 0 7		is to 95% RH (no condensation)							
Operation altitude		1 feet) max.		vol					
•					1 52 mm (10	to 70 Hz) vib	ration acceler	ration 150 m	's² (70 to 500
Vibration resistance	Hz), sweep t	time 15 min/c	cycle, 12 swe	eps in each X	, Y and Z dir	ection.	1411011 4000101	1411011 100 1111	0 (70 to 000
Impact resistance	500 m/s <sup>2</sup> of a	cceleration fo	r 11 ms with	half-sine wave	applying thr	ee times for X	, Y, and Z axe	s each, 18 tim	es in total.
Insulation class	Class B (+13	80°C)							
Withstandable voltage	minute betw	veen motor w	vinding and f	rame.		·	plied for one	@50/60 Hz appli between motor	lure with 1000 VAC ed for one minute winding and frame.
Insulation resistance		emperature a	nd humidity	, not less thai	n 100 M $\Omega$ be	tween windi	ng and frame	by 500 VDC	megger.
Protection grade	IP40								
Winding temperature rise	80 K max. (E	Based on San	iyo Denki sta	ndard)					
Static angle error	± 0.09°				± 0.054°	± 0.09°			
	0.075 mm	0.075 mm	0.075 mm	0.075 mm	0.075 mm	0.075 mm	0.075 mm (0.003 in)	0.075 mm	0.075 mm
Thrust play *1	(0.003 in) max.	(0.003 in) max.	(0.003 in) max.	(0.003 in) max.	(0.003 in) max.	(0.003 in)	max.	(0.003 in)	(0.003 in)
·····ace piay	(load: 0.35 N		(load: 5 N	(load: 4 N	(load: 5 N	(load: 5 N (1.12 lbs))	(load: 4 N	(load: 10 N (2.25 lbs))	(load: 10 N (2.25 lbs))
	(0.08 lbs))	(0.34 lbs))	(1.12 lbs))	(0.9 lbs))	(1.12 lbs))	(1.12 103//	(0.9 lbs))	(2.23 103))	(2.23 103))
Radial play *2		0.001 in) max	. (load: 5 N (	1.12 lbs))					
Shaft runout	0.025 mm (0								
Concentricity of mounting pilot relative to shaft		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)	$\phi$ 0.075 mm ( $\phi$ 0.003 in)	$\phi$ 0.075 mm ( $\phi$ 0.003 in)
Squareness of mounting		0.1 mm	0.1 mm	0.1 mm	0.1 mm	0.1 mm	0.1 mm	0.075 mm	0.075 mm
surface relative to shaft	(0.004 in)	(0.004 in)	(0.004 in)	(0.004 in)	(0.004 in)	(0.004 in)	(0.004 in)	(0.003 in)	(0.003 in)
Direction of motor mounting	Can be freely mounted vertically or horizontally								
2 John of motor mounting	Out be free	y mounteu v	ertically or n	orizontally					
Motor model number		103H78 🗆	SH286	103H8922	SM286 □	103H712 🗌 -6	6 🗆 0   103H822 CE Mode		3H8922 🗌 -63 🗌 1
		· 	1				CE Mode		
Motor model number	SH160 🗆	103H78 🗆	1			CE Model uous operation	CE Mode		
Motor model number Type	SH160 □ - - 10°C to +	103H78 □□ 50°C	1		S1 (contin	CE Model uous operation + 40°C	CE Mode		
Motor model number Type Operating ambient temperature	SH160 □ - - 10°C to + - 20°C to +	103H78 □□ 50°C 65°C	SH286 □		S1 (contin - 10°C to - 20°C to 95% max.:	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5	CE Mode on)	el CE	
Motor model number Type Operating ambient temperature Conversation temperature	SH160 □  -  - 10°C to +  - 20°C to +  20 to 90% R	103H78 □□ 50°C 65°C H (no conder	SH286   nsation)		S1 (contin - 10°C to - 20°C to 95% max.:	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5	on)	el CE	
Motor model number Type Operating ambient temperature Conversation temperature Operating ambient humidity	SH160 □  -  - 10°C to +  - 20°C to +  20 to 90% R  5 to 95% RH	103H78 □□ 50°C 65°C H (no conder	SH286   nsation) sation)	103H8922	S1 (contin - 10°C to - 20°C to 95% max.:	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5	CE Mode on)	el CE	
Motor model number Type Operating ambient temperature Conversation temperature Operating ambient humidity Conversation humidity Operation altitude Vibration resistance	SH160 □  -  - 10°C to +  - 20°C to +  20 to 90% R  5 to 95% RH  1000 m (328  Vibration fre 500 Hz), swe	103H78 D 50°C 65°C H (no conders (no condens to feet) max.	sH286   nsation) sation) above sea le to 500 Hz, tota nin/cycle, 12	103H8922 vel al amplitude 'sweeps in ea	S1 (contin - 10°C to - 20°C to 95% max 35% max	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5  60°C max. (n  to 70 Hz), vib Z direction.	7% max.: 50°C to condensati	el CE	(s² (70 to
Motor model number Type Operating ambient temperature Conversation temperature Operating ambient humidity Conversation humidity Operation altitude	SH160 □  -  - 10°C to +  - 20°C to +  20 to 90% R  5 to 95% RH  1000 m (328  Vibration fre 500 Hz), swe	103H78 D 50°C 65°C H (no conders (no condens to feet) max.	sH286   nsation) sation) above sea le to 500 Hz, tota nin/cycle, 12	103H8922 vel al amplitude 'sweeps in ea	S1 (contin - 10°C to - 20°C to 95% max 35% max 1.52 mm (10 ch X, Y and ove applying	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5  60°C max. (n  to 70 Hz), vib Z direction.	7% max.: 50°C to condensati	el CE	Model
Motor model number Type Operating ambient temperature Conversation temperature Operating ambient humidity Conversation humidity Operation altitude Vibration resistance	SH160 —  - 10°C to +  - 20°C to +  20 to 90% R  5 to 95% RH 1000 m (328  Vibration fre 500 Hz), swe 500 m/s² of a	103H78 D  50°C 65°C H (no condens to feet) max. Sequency 10 feet to fe	SH286   nsation) sation) above sea le o 500 Hz, tota nin/cycle, 12 or 11 ms with	vel al amplitude sweeps in ean	S1 (contin - 10°C to - 20°C to 95% max 35% max	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5  60°C max. (n  to 70 Hz), vib Z direction.	7% max.: 50°C to condensation acceler	el CE	(s² (70 to
Motor model number Type Operating ambient temperature Conversation temperature Operating ambient humidity Conversation humidity Operation altitude Vibration resistance Impact resistance	SH160 □  - 10°C to +  - 20°C to +  20 to 90% R  5 to 95% RH 1000 m (328 Vibration fre 500 Hz), swe 500 m/s² of a  Class B (+13  At normal tem ure with 1000°	103H78 D  50°C 65°C H (no condens 0 feet) max. equency 10 to each time 15 n acceleration for	sH286  sation) sation) above sea le 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail-	vel al amplitude sweeps in ean half-sine wa	S1 (contin - 10°C to - 20°C to 95% max 35% max 1.52 mm (10 ch X, Y and ive applying Class F (+155°C) temperature	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5  60°C max. (n  to 70 Hz), vib  Z direction.  three times for  Class B (+	7% max.: 50°C to condensation acceler	C max., on) ration 150 m/	s² (70 to times in total.
Motor model number Type Operating ambient temperature Conversation temperature Operating ambient humidity Conversation humidity Operation altitude Vibration resistance Impact resistance Insulation class Withstandable voltage Insulation resistance	SH160 □  - 10°C to +  - 20°C to +  20 to 90% R  5 to 95% RH 1000 m (328 Vibration fre 500 Hz), swe 500 m/s² of a  Class B (+13  At normal tem ure with 1000 minute betwee At normal tem	103H78 D  50°C 65°C H (no condens of feet) max. of feet) max. of feet) max. of feet of	sH286  sation) sation) above sea le 5 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for one	vel al amplitude sweeps in ean half-sine wa	S1 (contin - 10°C to - 20°C to 95% max. 35% max. 1.52 mm (10 ch X, Y and ve applying Class F (+155°C) temperature one minute	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5  60°C max. (n  to 70 Hz), vib  Z direction.  three times for  Class B (+  and humidity between mo	7% max.: 50°C to condensation acceler or X, Y and Z at 130°C )	C max., on) ration 150 m/ axes each, 18 with 1500 VA6 nd frame.	(s² (70 to times in total.
Motor model number Type Operating ambient temperature Conversation temperature Operating ambient humidity Conversation humidity Operation altitude Vibration resistance Impact resistance Insulation class Withstandable voltage Insulation resistance Protection grade	SH160 □  - 10°C to +  - 20°C to +  20 to 90% R  5 to 95% RH 1000 m (328 Vibration fre 500 Hz), swe 500 m/s² of a  Class B (+13  At normal tem ure with 1000 minute betwee At normal tes IP40	103H78 D  50°C 65°C H (no condens to feet) max. to generate 15 n acceleration for 150°C)  sperature and how AC @50/60 Hz an motor winding the winding the motor winding the winding the winding the winding the wi	sH286  sation) sation) above sea le 5 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for one ng and frame.	vel al amplitude sweeps in ea a half-sine wa applied for	S1 (contin - 10°C to - 20°C to 95% max. 35% max. 1.52 mm (10 ch X, Y and ve applying Class F (+155°C) temperature one minute	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5  60°C max. (n  to 70 Hz), vib  Z direction.  three times for  Class B (+  and humidity between mo	7% max.: 50°C to condensation acceler or X, Y and Z at 130°C )  y, no failure water winding a	C max., on) ration 150 m/ axes each, 18 with 1500 VA6 nd frame.	(s² (70 to times in total.
Motor model number Type Operating ambient temperature Conversation temperature Operating ambient humidity Conversation humidity Operation altitude Vibration resistance Impact resistance Insulation class Withstandable voltage Insulation resistance Protection grade Winding temperature rise	SH160 □  - 10°C to +  - 20°C to +  20 to 90% R  5 to 95% RH 1000 m (328 Vibration fre 500 Hz), swe 500 m/s² of a  Class B (+13  At normal tem ure with 1000 minute betwee At normal te IP40  80 K max. (E	103H78 □□  50°C  65°C  H (no condensity of feet) max. Requency 10 to each of feet) e	sH286  sation) sation) above sea le 5 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for one ng and frame.	vel al amplitude sweeps in ea a half-sine wa applied for	S1 (contin - 10°C to - 20°C to 95% max. 35% max. 1.52 mm (10 ch X, Y and ve applying Class F (+155°C) temperature one minute	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5  60°C max. (n  to 70 Hz), vib  Z direction.  three times for  Class B (+  and humidity between mo	7% max.: 50°C to condensation acceler or X, Y and Z at 130°C )  y, no failure water winding a	C max., on) ration 150 m/ axes each, 18 with 1500 VA6 nd frame.	(s² (70 to times in total.
Motor model number Type Operating ambient temperature Conversation temperature Operating ambient humidity Conversation humidity Operation altitude Vibration resistance Impact resistance Insulation class Withstandable voltage Insulation resistance Protection grade Winding temperature rise Static angle error	SH160 □  - 10°C to +  - 20°C to +  20 to 90% R  5 to 95% RH 1000 m (328 Vibration fre 500 Hz), swe 500 m/s² of a  Class B (+13  At normal tem ure with 1000 minute betwee At normal te IP40  80 K max. (E  ± 0.054°	103H78 □□  50°C  65°C  H (no condense of feet) max. Requency 10 to experime 15 no experime 15 no experime and how the feet of feet) was a feet of feet	sH286  sation) sation) sation) above sea le 5 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for one ng and frame. Ind humidity, nyo Denki sta	vel al amplitude sweeps in ea a half-sine wa  At normal applied for applied for not less their	S1 (contin - 10°C to - 20°C to 95% max. 35% max. 1.52 mm (10 ch X, Y and ve applying Class F (+155°C) temperature one minute	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5  60°C max. (n  to 70 Hz), vib  Z direction.  three times for  Class B (+  and humidity between mo	7% max.: 50°C to condensation acceler or X, Y and Z at 130°C )  y, no failure water winding a	C max., on) ration 150 m/ axes each, 18 with 1500 VA6 nd frame.	(s² (70 to times in total.
Motor model number Type Operating ambient temperature Conversation temperature Operating ambient humidity Conversation humidity Operation altitude Vibration resistance Impact resistance Insulation class Withstandable voltage Insulation resistance Protection grade Winding temperature rise	SH160 □  - 10°C to +  - 20°C to +  20 to 90% R  5 to 95% RH 1000 m (328 Vibration fre 500 Hz), swe 500 m/s² of a  Class B (+13  At normal tem ure with 1000 minute betwee At normal te IP40  80 K max. (E  ± 0.054°  0.075 mm (C)	103H78 □□  50°C  65°C  H (no condension feet) max.  Equency 10 to be time 15 no acceleration feet)  Proper ture and how the time with the time	sH286  sation) sation) above sea le 5 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for one ng and frame. Ind humidity, nyo Denki sta . (load: 10 N	vel al amplitude sweeps in ea a half-sine wa  At normal applied for applied for not less their	S1 (contin - 10°C to - 20°C to 95% max. 35% max. 1.52 mm (10 ch X, Y and ve applying Class F (+155°C) temperature one minute 1 100 MΩ be IP43	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5  60°C max. (n  to 70 Hz), vib  Z direction.  three times for  Class B (+  and humidity between model	7% max.: 50°C to condensation acceler or X, Y and Z at 130°C )  y, no failure water winding a and frame	C max., on) ration 150 m/ axes each, 18 with 1500 VAC nd frame. by 500 VDC	(s² (70 to times in total.) C @50/60 Hz megger.
Motor model number Type Operating ambient temperature Conversation temperature Operating ambient humidity Conversation humidity Operation altitude Vibration resistance Impact resistance Insulation class Withstandable voltage Insulation resistance Protection grade Winding temperature rise Static angle error	SH160 □  - 10°C to +  - 20°C to +  20 to 90% R  5 to 95% RH 1000 m (328 Vibration fre 500 Hz), swe 500 m/s² of a  Class B (+13  At normal tem ure with 1000 minute betwee At normal te IP40  80 K max. (E  ± 0.054°	103H78 □□  50°C  65°C  H (no condense of feet) max. Requency 10 to experime 15 no experime 15 no experime and how the feet of feet) was a feet of feet	sH286  sation) sation) sation) above sea le 5 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for one ng and frame. Ind humidity, nyo Denki sta	vel al amplitude sweeps in ea a half-sine wa  At normal applied for applied for not less their	S1 (contin – 10°C to – 20°C to 95% max 35% max I.52 mm (10 ch X, Y and ve applying Class F (+155°C) temperature one minute in 100 MΩ be IP43	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5  60°C max. (n  to 70 Hz), vib  Z direction.  three times for  Class B (+  and humidity between mo	7% max.: 50°C to condensation acceler or X, Y and Z at 130°C )  y, no failure water winding a	c max., on)  ration 150 m/ exes each, 18  with 1500 VAI nd frame.  by 500 VDC  mm 0. in) (0 5 N (lo	(s² (70 to times in total.
Motor model number Type Operating ambient temperature Conversation temperature Operating ambient humidity Conversation humidity Operation altitude Vibration resistance Impact resistance Insulation class Withstandable voltage Insulation resistance Protection grade Winding temperature rise Static angle error Thrust play *1	SH160 □  - 10°C to +  - 20°C to +  20 to 90% R  5 to 95% RH  1000 m (328  Vibration fre- 500 Hz), swe- 500 m/s² of a  Class B (+13  At normal tem ure with 1000 minute between At normal tem 1P40  80 K max. (E  ± 0.054°  0.075 mm (0.001 in) (load: 5 N	103H78 \  \to	sH286  sation) sation) sation) sation) above sea le to 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for one ng and frame. and humidity, nyo Denki sta  (load: 10 N 0.025 mm (0.001 in) (load: 5 N	vel al amplitude r sweeps in ea a half-sine wa  At normal applied for not less ther  (2.25 lbs))  0.025 mm (0.001 in) (load: 10 N	S1 (contin – 10°C to – 20°C to 95% max. 35% max. 35% max. 4.52 mm (10 ch X, Y and ve applying Class F (+155°C ) temperature one minute in 100 MΩ be IP43	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5  60°C max. (n  to 70 Hz), vib  Z direction.  three times for  Class B (+  and humidity between model  tween windin  0.025 mm (0.001 in) (load: 5 N	7% max.: 50°C to condensation acceler to X, Y and Z at 130°C )  y, no failure water winding a to may and frame  0.025 to (0.001 (10ad):	c max., on)  ration 150 m/ exes each, 18  with 1500 VAI nd frame.  by 500 VDC  mm 0. in) (0 5 N (lo	Section 10 Model  (Section 10 Model)  (Section 10 Model)
Motor model number Type Operating ambient temperature Conversation temperature Operating ambient humidity Conversation humidity Operation altitude Vibration resistance Impact resistance Insulation class Withstandable voltage Insulation resistance Protection grade Winding temperature rise Static angle error Thrust play *1  Radial play *2  Shaft runout Concentricity of mounting pilot relative to shaft	SH160 □  - 10°C to + - 20°C to + 20 to 90% R 5 to 95% RH 1000 m (328 Vibration fre 500 Hz), swe 500 m/s² of a Class B (+13 At normal tem ure with 1000 minute betwee At normal te IP40 80 K max. (E ± 0.054° 0.075 mm (0 0.025 mm (0.001 in) (load: 5 N (1.12 lbs)) 0.025 mm (0 0.025 mm (0 0.025 mm (0 0.025 mm (0 0.0075 mm (0 0.0075 mm (0 0.0075 mm (0	103H78 \  \to	sH286  sation) sation) sation) above sea le to 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for one ng and frame. Ind humidity, nyo Denki sta  (load: 10 N 0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	vel al amplitude r sweeps in ea a half-sine wa  At normal applied for not less ther  (2.25 lbs))  0.025 mm (0.001 in) (load: 10 N	S1 (contin – 10°C to – 20°C to 95% max. 35% max. 35% max. 4.52 mm (10 ch X, Y and ve applying Class F (+155°C ) temperature one minute in 100 MΩ be IP43	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5  60°C max. (n  to 70 Hz), vib  Z direction.  three times for  Class B (+  and humidity between model  tween windin  0.025 mm (0.001 in) (load: 5 N	7% max.: 50°C to condensation acceler to X, Y and Z at 130°C )  y, no failure water winding a to may and frame  0.025 to (0.001 (10ad):	c max., on)  ration 150 m/ exes each, 18  with 1500 VAI nd frame.  by 500 VDC  mm 0. in) (0 5 N (lo	Section 2015 mm (2001 in) pad: 10 N
Motor model number Type Operating ambient temperature Conversation temperature Operating ambient humidity Conversation humidity Operation altitude Vibration resistance Impact resistance Insulation class Withstandable voltage Insulation resistance Protection grade Winding temperature rise Static angle error Thrust play *1  Radial play *2  Shaft runout Concentricity of mounting pilot relative to shaft Squareness of mounting	SH160 □  - 10°C to + - 20°C to + 20 to 90% R 5 to 95% RH 1000 m (328 Vibration fre 500 Hz), swe 500 m/s² of a Class B (+13 At normal ten ure with 1000 minute betwee At normal te IP40 80 K max. (E ± 0.054° 0.075 mm (0.001 in) (load: 5 N (1.12 lbs)) 0.025 mm (0.0075 mm (0.007	103H78 D  50°C 65°C H (no condens to the condens to feet) max. The condens to feet to	SH286   sation) sation) above sea le o 500 Hz, tota nin/cycle, 12 or 11 ms with umidity, no fail applied for one ng and frame. Ind humidity, nyo Denki sta  (load: 10 N 0.025 mm (0.001 in) (load: 5 N (1.12 lbs))  0.15 mm	vel al amplitude sweeps in each half-sine was applied for not less then (2.25 lbs))  0.025 mm (0.001 in) (load: 10 N (2.25 lbs))	S1 (contin – 10°C to – 20°C to 95% max. 35% max. 35% max. 35% max. 1.52 mm (10 ch X, Y and ve applying Class F (+155°C) temperature one minute in 100 MΩ be IP43    0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5  60°C max. (note of the content of the co	CE Mode on)  7% max.: 50°C to condensation acceler or X, Y and Z at 130°C )  y, no failure water winding a ng and frame  0.025 to (0.001 (load: (1.12 li))	el CE  C max., on)  ration 150 m/ exes each, 18  vith 1500 VA/ nd frame. by 500 VDC  mm 0. in) (0 5 N (10 bs)) (2	(s² (70 to times in total.) C @50/60 Hz megger.  025 mm. 001 in) 0ad: 10 N25 lbs))
Motor model number Type Operating ambient temperature Conversation temperature Operating ambient humidity Conversation humidity Operation altitude Vibration resistance Impact resistance Insulation class Withstandable voltage Insulation resistance Protection grade Winding temperature rise Static angle error Thrust play *1  Radial play *2  Shaft runout Concentricity of mounting pilot relative to shaft	SH160 □  - 10°C to + - 20°C to + 20 to 90% R 5 to 95% RH 1000 m (328 Vibration fre 500 Hz), swe 500 m/s² of a Class B (+13  At normal tem ure with 1000 minute betwee At normal te IP40 80 K max. (E ± 0.054° 0.075 mm (0.001 in) (load: 5 N (1.12 lbs)) 0.025 mm (0.005 mm (0.0075 mm (0.0075 mm) (0.0075 mm) (0.0075 mm) (0.0075 mm) (0.0075 mm) (0.0075 mm)	103H78 D  50°C 65°C H (no condens of the condens of feet) max. of feet) max. of feet of the condens of feet of fe	sH286  sation) sation) sation) above sea le o 500 Hz, tota nin/cycle, 12 or 11 ms with  umidity, no fail applied for one ng and frame. ind humidity, nyo Denki sta  . (load: 10 N 0.025 mm (0.001 in) (load: 5 N (1.12 lbs))  0.15 mm (0.006 in)	vel al amplitude sweeps in each half-sine was applied for not less their ndard)  (2.25 lbs))  (2.25 lbs))  (0.001 in) (10ad: 10 N (2.25 lbs))  0.1 mm (0.004 in)	S1 (contin – 10°C to – 20°C to 95% max. 35% max. 35% max. 35% max. 35% max. 35% max. 4.52 mm (10 ch X, Y and ve applying Class F (+155°C) temperature one minute in 100 MΩ be IP43  0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	CE Model  uous operation  + 40°C  + 60°C  40°C max., 5  60°C max. (n  to 70 Hz), vib  Z direction.  three times for  Class B (+  and humidity between windin  etween windin  0.025 mm (0.001 in) (load: 5 N (1.12 lbs))	7% max.: 50°C to condensation acceler or X, Y and Z at 130°C )  y, no failure water winding a and frame    0.025   (0.001   (load: (1.12   l))	el CE  C max., on)  ration 150 m/ exes each, 18  vith 1500 VA/ nd frame. by 500 VDC  mm 0. in) (0 5 N (10 bs)) (2	(s² (70 to times in total.) C @50/60 Hz megger.  025 mm .001 in) bad: 10 N .25 lbs))

# ■ Safety standards

Vlodel Number: SM286	CE/UL marked models
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MIDGELIA	louer Number. SWI200 - SE/OF market models								
CE	Standard category		Applicable standard						
(TÜV)	Low-voltage directive	es .	EN60034-1, EN60034-5						
	Acquired standards	Applicable standard	File No.						
UL	UL	UL1004-1, UL1004-6	E179832						
	UL for Canada	CSA C22.2 No.100	E179032						
Model No	Model Number: 103H712								
CE	Standard category		Applicable standard						
(TÜV)	Low-voltage directive	es	EN60034-1, EN60034-5						

<sup>\*1</sup> 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.

