STEPPING SYSTEMS

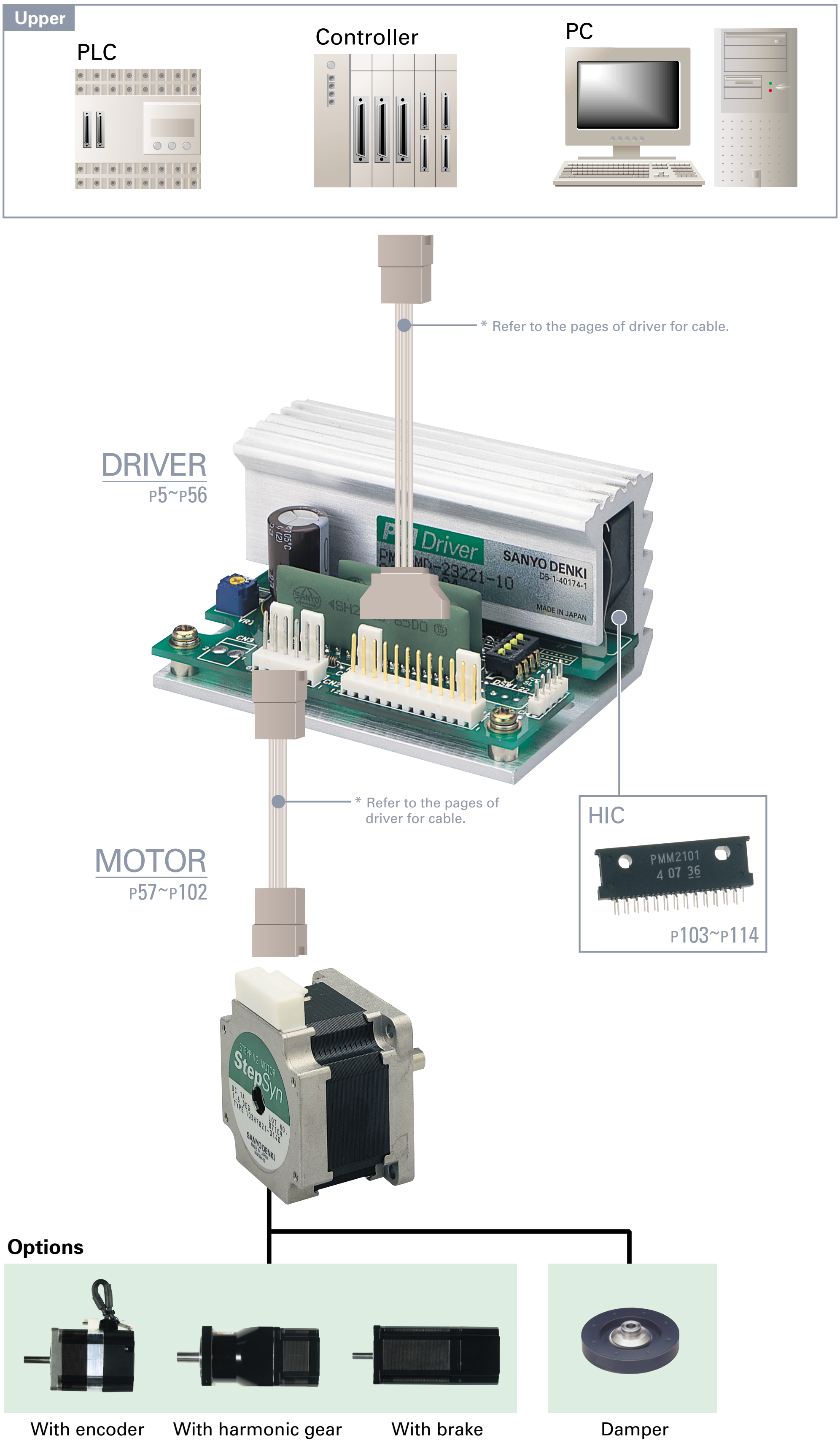
2 Phase Stepping Systems

SANYO DENKI

E

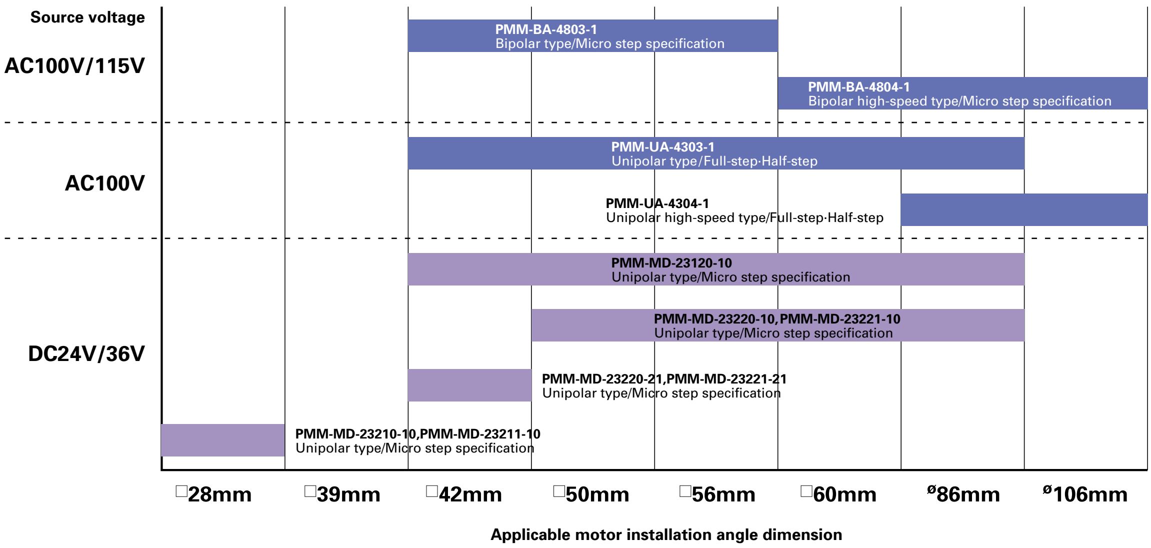
ENGLISH

■Stepping System Configuration



* For information about the options, contact our sales department.

■2-Phase Driver Area Chart



PMM-BA-4803-1

Applicable motors: □42 □50 □56

Source input
AC100/115V
Bipolar type
Micro step specification

P7~P16

PMM-BA-4804-1

Applicable motors: □60 ø86 ø106

Source input
AC100/115V
Bipolar high-speed type
Micro step specification

P7~P16

PMM-UA-4303-1

Applicable motors: □42 □50 □56 □60 ø86

Source input
AC100V
Unipolar type
Full-step/Half-step

P17~P26

PMM-UA-4304-1

Applicable motors: ø86 ø106

Source input
AC100V
Unipolar high-speed type
Full-step/Half-step

P17~P26

PMM-MD-23120-10

Applicable motors: □42 □50 □56 □60 ø86

Source input
DC24V/36V
Unipolar type
Micro step specification

P43~P56

PMM-MD-23210-10
PMM-MD-23211-10

Applicable motors: □28

Source input
DC24V/36V
Unipolar type
Micro step specification

P27~P42

PMM-MD-23220-21
PMM-MD-23221-21

Applicable motors: □42

Source input
DC24V/36V
Unipolar type
Micro step specification

P27~P42

PMM-MD-23220-10
PMM-MD-23221-10

Applicable motors: □50 □56 □60 ø86

Source input
DC24V/36V
Unipolar type
Micro step specification

P27~P42

2-phase Stepping Driver

PMM-BA-4803-1

AC100V/115V

Bipolar type

(Applicable motor rated current 1A/phase, 2A/phase)

Micro-step (200 X 1~250 divisions)

(Smooth operation and low vibration even at low speeds.)

● Applicable motor

□42 □50 □56

PMM-BA-4804-1

AC100V/115V

Bipolar high-speed type

(Applicable motor rated current 4A/phase, 6A/phase)

Micro-step (200 X 1~250 divisions)

(Smooth operation and low vibration even at low speeds.)

● Applicable motor

□60 ø86 ø106

Standard combined stepping motors

PMM-BA-4803-1

Dimensions of stepping motor	Stepping motor model number		Rated current [A/phase]	Holding torque [N-m]	Rotor inertia [x 10^{-4}kg-m^2]	Weight [kg]	Page
	Single-axis shaft	Dual-axis shaft					
□42mm	103H5205-4240 103H5208-4240 103H5209-4240 103H5210-4240	103H5205-4210 103H5208-4210 103H5209-4210 103H5210-4210	1 1 1 1	0.265 0.39 0.425 0.51	0.036 0.056 0.062 0.074	0.23 0.29 0.31 0.37	65 Page
□50mm	103H6704-5040	103H6704-5010	2	0.52	0.14	0.55	69Page
□56mm	103H7121-5040 103H7123-5040 103H7126-5040	103H7121-5010 103H7123-5010 103H7126-5010	2 2 2	0.39 0.83 1.27	0.1 0.21 0.36	0.47 0.65 0.98	73 Page

• For information about the general specifications and dimensions of each stepping motor, refer to its page.

PMM-BA-4804-1

Dimensions of stepping motor	Stepping motor model number		Rated current [A/phase]	Holding torque [N-m]	Rotor inertia [x 10^{-4}kg-m^2]	Weight [kg]	Page
	Single-axis shaft	Dual-axis shaft					
□60mm	103H7821-1740 103H7822-1740 103H7823-1740	103H7821-1710 103H7822-1710 103H7823-1710	4 4 4	0.88 1.37 2.7	0.275 0.4 0.84	0.6 0.77 1.34	79 Page
ø86mm	103H8221-5241 103H8222-5241 103H8223-5241	103H8221-5211 103H8222-5211 103H8223-5211	6 6 6	2.74 5.09 7.44	1.45 2.9 4.4	1.5 2.5 3.5	83 Page
ø106mm	103H89222-5241 103H89223-5241	103H89222-5211 103H89223-5211	6 6	13.2 19	14.6 22	7.5 10.5	89 Page

• For information about the general specifications and dimensions of each stepping motor, refer to its page.

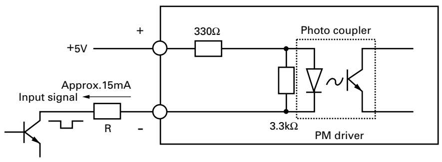
Specifications of PM Driver

Item			PMM-BA-4803-1	PMM-BA-4804-1
Basic specifications	Input source		Single phase AC 100V/115V+10, -15% 50/60Hz	
Basic specifications	Source current		3A	8A
Basic specifications	Rated current		2A/phase (Changeable to 1A/phase, refer to Page 11)	6A/phase (Changeable to 4A/phase, refer to P11)
Basic specifications / Environment	Operating ambient temperature		0~+50˚C	
Basic specifications / Environment	Conservation temperature		-20~+70˚C	
Basic specifications / Environment	Operating ambient humidity		35~85%RH (no condensation)	
Basic specifications / Environment	Conservation humidity		10~90%RH (no condensation)	
Basic specifications / Environment	Vibration resistance		4.9m/s² Frequency range 10~55Hz, Direction: along X, Y and Z axes, for 2 hours each.	
Basic specifications / Environment	Impact resistance		Considering the NDS-C-0110 standard section 3.2.2 division "C", not influenced.	
Basic specifications / Environment	Withstand voltage		Not influenced when AC1000V is applied between power input terminal and cabinet for one minute.	
Basic specifications / Environment	Insulation resistance		10MΩ or more when measured with DC500V megohmmeter between input terminal and cabinet.	
Basic specifications	Weight		2kg	4kg
Function	Protection function		Against PM driver overheat	
Function	Selection, setting function		Pulse input mode selection-- DIP switches enables selection of 1-input and 2-input mode Resolution setting-- Combination of two rotary switches enables 240 divisions ranging from 1~240 resolution Micro step selection-- External signal input (S, SEL) enables selection of the DIP switch driven micro step or the rotary switch driven micro step. Power down, power low selection-- Current value of the stepping motor can be selected when power signal is input. Automatic current down selection--- Automatic current down function can be selected. Driving current switch setting--- The rotary switch enables to set driving current of the stepping motor from rated current to 0%	
Function	LED indicator		Power supply monitor, phase origin monitor, pulse monitor, alarm monitor.	
I/O signals	Signal Name (Brevity code)	Silk-screen printing		
I/O signals	CW pulse Input signal (CW)	CW+ CW-	In the 2-input mode, inputs driving pulses to rotate in CW direction.	
I/O signals	(CK)		In the 1-input mode, inputs driving pulse train to rotate the step motor rotation. Photo coupler input method, input resistance 330Ω Input signal voltage: H = 4.0 to 5.5V, L = 0 to 0.5V Max. input frequency:100kpulse/s	
I/O signals	CCW pulse Input signal (CCW)	CCW+ CCW-	In the 2-input mode, inputs driving pulses to rotate in CCW direction.	
I/O signals	(U/D)		In the 1-input mode, inputs rotation direction signals to the stepping motor. Internal photo couplerON: CW direction. Internal photo couplerOFF: CCW direction. Photo coupler input method, input resistance 330Ω Input signal voltage: H = 4.0 to 5.5V, L = 0 to 0.5V Max. input frequency:100kpulse/s	
I/O signals	Power down input signal (PD) (PD)	PD+ PD-	Inputs PD signal to turn off the current that flows through the stepping motor. (Capable to change by the DIP switch to power low function.) PD input signal ON (Internal photo coupler ON): Power down function is enabled. PD input signal OFF (Internal photo coupler OFF): Power down function is disabled. Photo coupler input method, input resistance 330Ω, Input signal voltage: H = 4.0 to 5.5V, L = 0 to 0.5V	
I/O signals	Step angle setting selection input (S. SEL) (S.SEL)	S.SEL+ S.SEL-	Input S.SEL signal to select step angle setting method. The open position determines to be the mode 1. Internal photo coupler ON: Mode 2 method step angle setting. (Internal rotary switch setting.) Internal photo coupler OFF: Mode 1 method step angle setting. (Internal DIP switch setting.) Photo coupler input method, input resistance 330Ω Input signal voltage: H = 4.0 to 5.5V, L = 0 to 0.5V	
I/O signals	Alarm output (AL)	AL1 AL2	Outputs signal when either alarm circuit is activated in the PM driver. When this signal is generated, the stepping motor is made in the de-excited state. Relay contact output (at normal open), contact capacity: DC24V, 0.5A or less, or AC120V, 0.5A or less	

- The CW direction indicated above is the rotation direction of the stepping motor in clockwise as facing to the output shaft side (flange side). The CCW direction is the same in counter-clockwise.

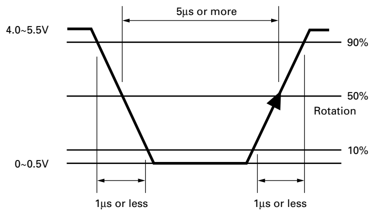
Operation, Connection, and Function

Input circuit configuration (CW, CCW) --- PMM-BA-4803-1 and PMM-BA-4804-1 in common



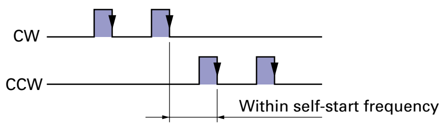
- Pulse duty 50% or less.
- When the crest value of the input signal is 5V, the external limit resistance R must be 0Ω
  When the crest value of the input signal exceeds 5V, use the external limit resistance R to limit the input current to approximately 15mA.

Input signal specifications



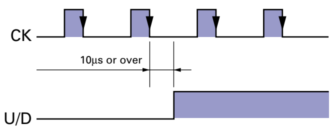
Timing of command pulse

- 2-input mode (CW, CCW)



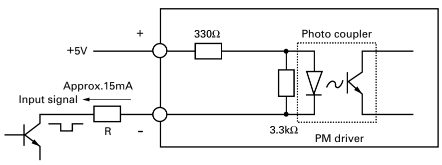
- The internal photo coupler turns ON within the ■ and, at its falling edge to OFF, the internal circuit (stepping motor) is activated.
- When applying the pulse to CW, turn OFF the CCW side internal photo coupler.
- When applying the pulse to CCW, turn OFF the CW side internal photo coupler.

- 1-input mode (CK, U/D)



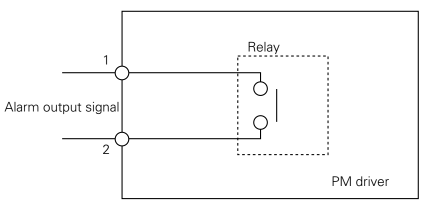
- The internal photo coupler turns ON within the ■ and, at CK side falling edge to OFF, the internal circuit (stepping motor) is activated.
- Switching of U/D input signal shall be made when CK side internal photo coupler is OFF.

Input circuit configuration (PD, S. SEL) --- PMM-BA-4803-1 and PMM-BA-4804-1 in common



- When the crest value of the input signal is 5V, the external limit resistance R must be 0Ω
  When the crest value of the input signal exceeds 5V, use the external limit resistance R to limit the input current to approximately 15mA.

Output circuit configuration (AL) --- PMM-BA-4803-1 and PMM-BA-4804-1 in common

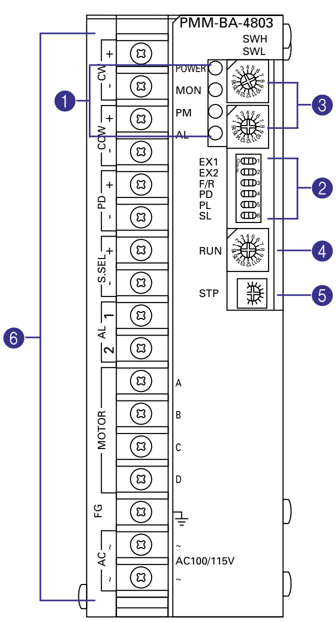


- Alarm output signal
  Contact mode: Relay contact output (Normally open)
  Contact capacity: DC24V, 0.5A or less, or AC120V, 0.5A or less

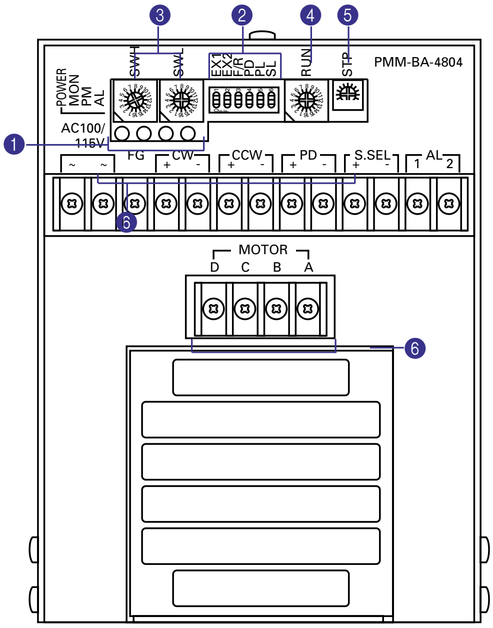
Operation, Connection, and Function

M deriver component names and function selection/setting

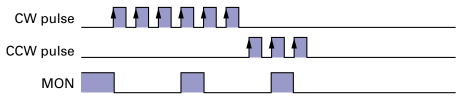
PMM-BA-4803-1



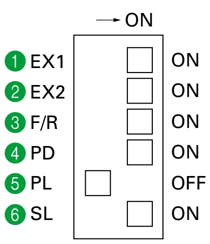
PMM-BA-4804-1



❶Monitor indication (POWER, MON, PM, AL) --- PMM-BA-4803-1 and PMM-BA-4804-1 in common

Indication	Color	State
POWER	Green	This LED illuminates when internal power supply is ON.
MON	Green	This LED illuminates when exciting magnetic phase is at the origin (when power is ON). At the 1 division (or 1.8°step) setting, illuminates once for every 4 pulses. At the 2 divisions (or 0.9°/step) setting, illuminates once for every 8 pulses. Timing of MON indicator illumination (At the 1 division)  • At ■ mark, inside photo coupler "ON" MON illuminates.
PM	Green	This LED illuminates when input pulse is applied
AL	Red	When the element temperature becomes 80˚C or higher in the PM driver, heat protective alarm circuit for the internal elements is activated and this LED illuminates. As the alarm circuit is activated, the wire-wound current is shut and the stepping motor becomes in a de-excited state. Simultaneously, the alarm output relay is closed to generate the output signal. When the element temperature falls back to 80˚C or lower, the alarm is automatically released and the current flows into the stepping motor. When the alarm is ON, turn the main power OFF before the automatic recovery system works, and take measures to reduce heat generation such as forced cooling to the PM driver enclosure

❷Function selection DIP switch pack (EX1, EX2, F/R, PD, PL, SL) --- PMM-BA-4803-1 and PMM-BA-4804-1 in common



- The factory setting is shown in the figure above.
- Turn off the power supply to the PM driver before changing DIP switch setting.

❶❷ EX1, EX2 (Step angle setting selection)

Set the step angle (mode 1)

EX1	EX2	Step Angle
OFF	ON	Basic step angle x 1/1 (1. 8°/pulse)
ON	ON	Basic step angle x 1/2 (0.9°/pulse)
ON	OFF	Basic step angle x 1/4 (0.45°/pulse)
OFF	OFF	Basic step angle x 1/5 (0.36°/pulse)

❸F/R (Pulse-input mode selection)

Select the pulse-input mode.

F/R	Pulse-input mode
ON	2-input mode (CW, CCW)
OFF	1-input mode (CK, U/D)

❹❺ PD, PL (Power-down and power-low selection)

Select stepping motor current value when power down signal is input.

PD	PL	Stepping motor winding wire current
OFF	ON	Sets current value by the stepping motor current controller (STP), when not operating. (Power down)
ON	OFF	O/A (Power Off)

- The factory setting of the current value by the current adjustment controller (STP) is at about 1/2 of stepping motor current value on operation. Adjustment by customer is not supported.

❻SL (Auto current down selection)

Select Auto current down function selection.

SL	Auto current down
ON	Enabled
OFF	Disabled

Operation, Connection, and Function

❸Step angle setting rotary switch (SWH, SWL) --- PMM-BA-4803-1 and PMM-BA-4804-1 in common

Capable to set step angle by the rotary switches SWH and SWL (mode 2).

Fundamental Formula

Step angle = n/N x Basic step angle of the stepping motor.

n: Required division number setting (capable to set by the rotary switches).
N: Basic division number (set at 240 at the factory).

- Factory setting is 0.09°/pulse (set SWH at "0", SWL at "C").
- Step angle setting by the mode 2 is effective by turning on the S.SEL input signal (internal photo coupler on).

Setting method of the rotary switch.

The rotary switches are of the hexadecimal code setting type.
(Example) To drive the stepping motor with the basic step angle of 1.8° at the rate of stepping angle of 0.36°.

0.36°= n/240 x 1.8° (n = 48 (by decimal system)

n : 48 (by decimal system) equals to 30 by hexadecimal system.
Therefore, 0.36°/pulse is obtainable by setting the rotary switch "SWH" at 3, and "SWL" 0

❹Operating-current selection switch (RUN)

Select operating current value to stepping motor.

PMM-BA-4803-1

Scale	0	1	2	3	4	5	6	7
Stepping motor current (A/Phase)	2.0	1.9	1.7	1.6	1.4	1.3	1.2	1.0
Scale	8	9	A	B	C	D	E	F
Stepping motor current (A/Phase)	0.9	0.8	0.6	0.5	0.3	0.2	0.1	0

- The factory setting is "0".
  Select setting depending on applied motors.

PMM-BA-4804-1

Scale	0	1	2	3	4	5	6	7
Stepping motor current (A/Phase)	6.0	5.7	5.1	4.8	4.2	3.9	3.6	3.0
Scale	8	9	A	B	C	D	E	F
Stepping motor current (A/Phase)	2.7	2.4	1.8	1.5	0.9	0.6	0.3	0

- The factory setting is "0".
  Select setting depending on applied motors.

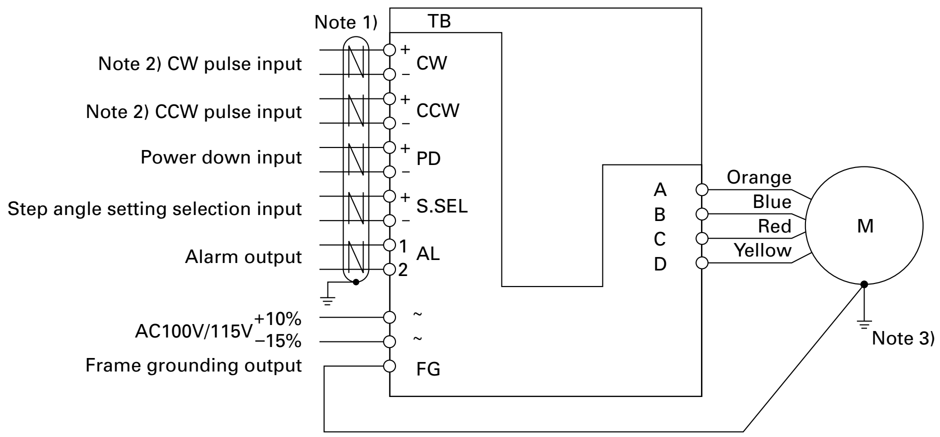
❺Current adjustment controller during halt (STP) --- PMM-BA-4803-1 and PMM-BA-4804-1 in common

Adjust current of stepping motor during halt in the range from rated current to 0% when automatic current reduction function is operating.
Factory setting is set at 50% of rated current and customers controller (STP) adjustment is not supported.

❻Terminal block (TB) --- PMM-BA-4803-1 and PMM-BA-4804-1 in common

Connects I/O signals, single phase AC power supply, and the stepping motor power cord.

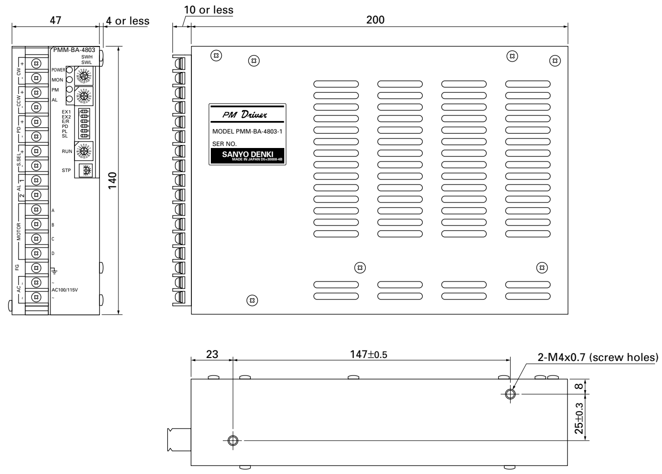
External wiring diagram --- PMM-BA-4803-1 and PMM-BA-4804-1 in commonin common



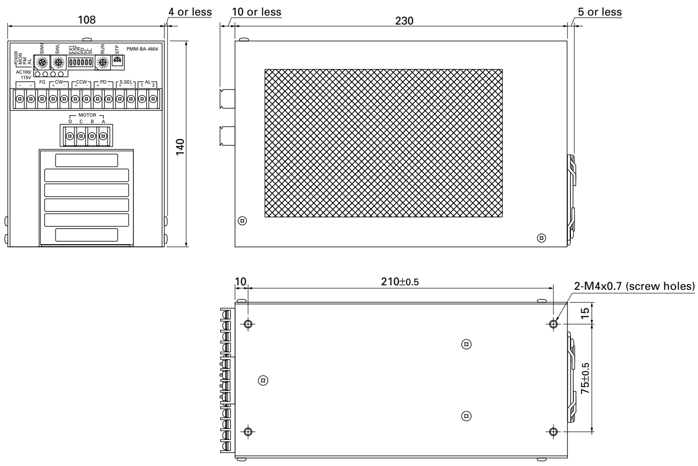
Note 1) Use twisted pair shielded cables.
Note 2) Capable to select by the function selection switch F/R for "2-input mode (CW and CCW input mode)" or"1-input mode (CK, U/D)".
Note 3) Ground the flange of the stepping motor by fastening the grounding wire together with the mounting screw. The grounding shall be made at a single point.

Dimensions (mm)

PMM-BA-4803-1

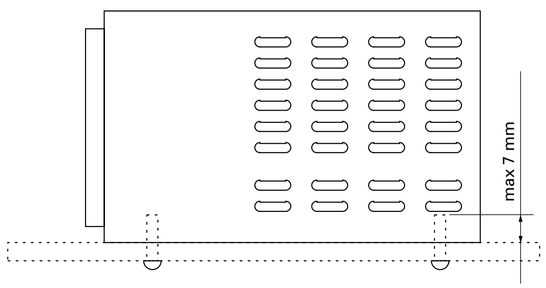


PMM-BA-4804-1

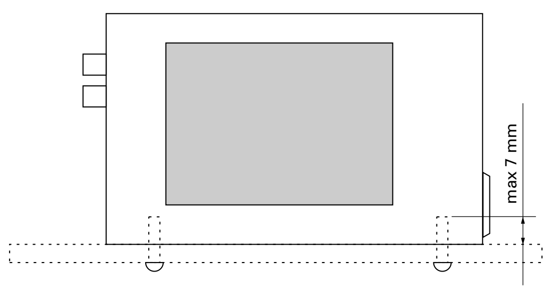


Mounting direction and mounting position

PMM-BA-4803-1



PMM-BA-4804-1



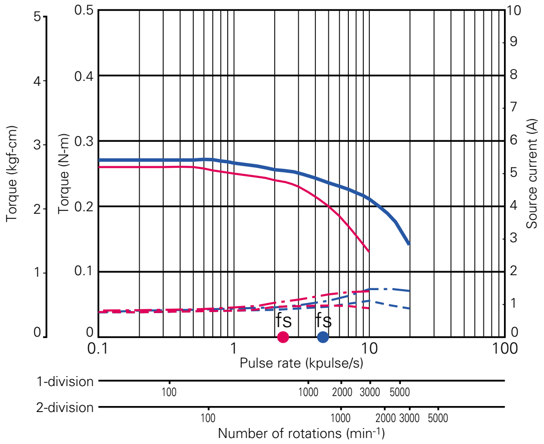
- Mount the PM driver as it stands upright.
- Use the mounting holes in the bottom of the PM driver with M4 screws as shown in the figure. (No mounting hardware is required.)
- The length of the screws projecting inward the driver enclosure shall be shorter than 7mm.

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

fs: Maximum self-start frequency when not loaded ■ 1-division is specified ■ 2-division is specified

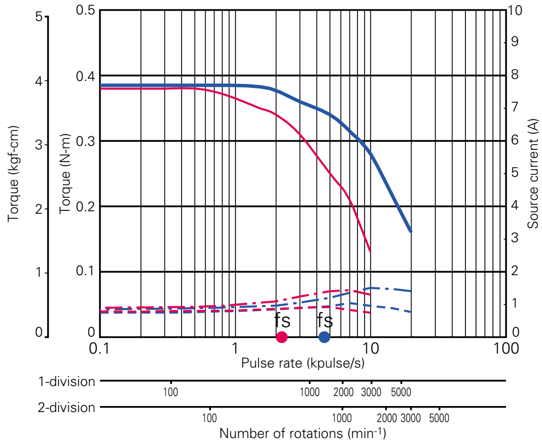
PMM-BA-4803-1

●103H5205-42□□: 100V



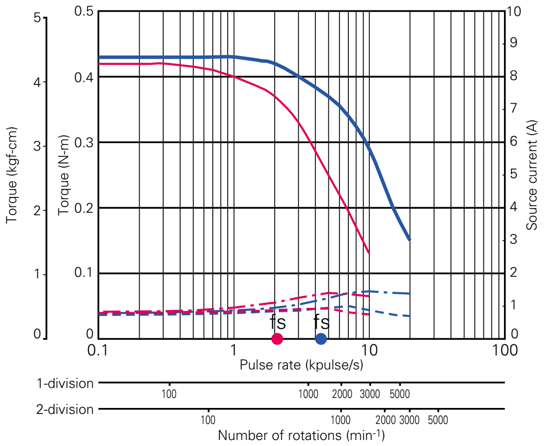
Source voltage: AC100V, Wire-wound current:1A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H5208-42□□: 100V



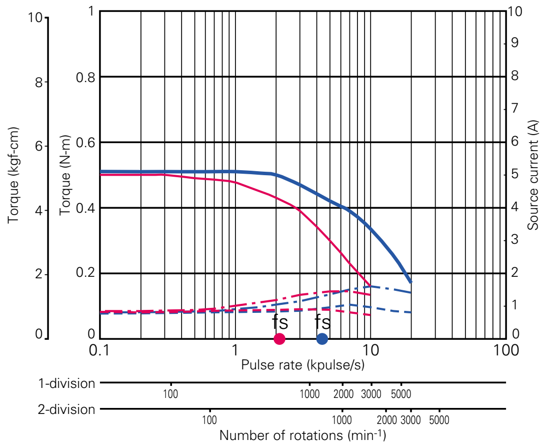
Source voltage: AC100V, Wire-wound current:1A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H5209-42□□: 100V



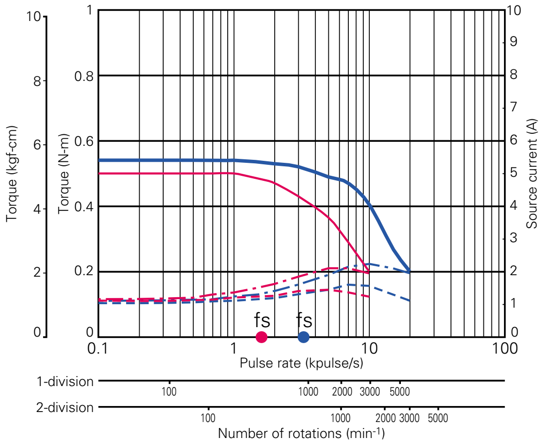
Source voltage: AC100V, Wire-wound current:1A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H5210-42□□: 100V



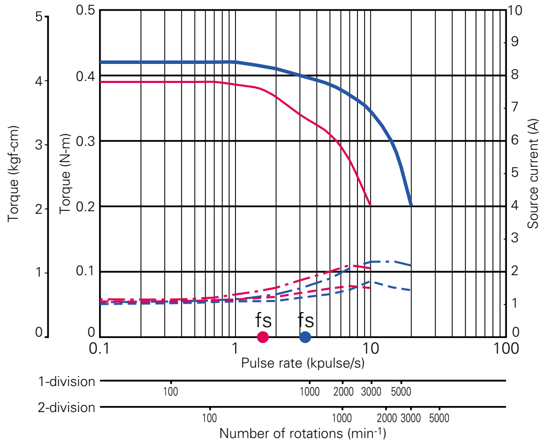
Source voltage: AC100V, Wire-wound current:1A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H6704-50□□: 100V



Source voltage: AC100V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7121-50□□: 100V



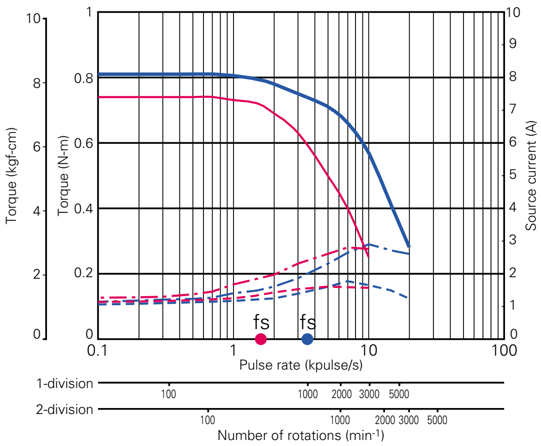
Source voltage: AC100V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

fs: Maximum self-start frequency when not loaded ■ 1-division is specified ■ 2-division is specified

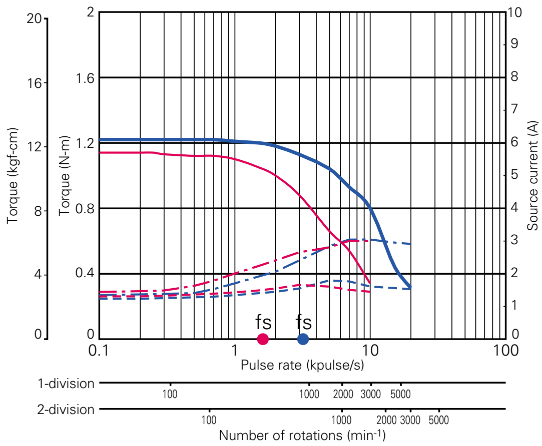
PMM-BA-4803-1

●103H7123-50□□: 100V



Source voltage: AC100V, Wire-wound current: 2A/phase
—— Getaway torque ($J_{L1}=2.6\times10^{-4}$kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

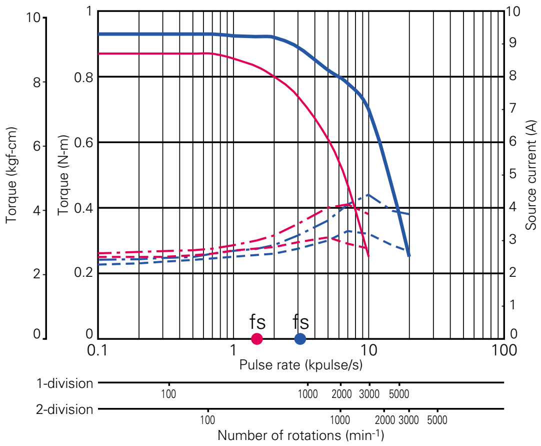
●103H7126-50□□: 100V



Source voltage: AC100V, Wire-wound current: 2A/phase
—— Getaway torque ($J_{L1}=2.6\times10^{-4}$kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

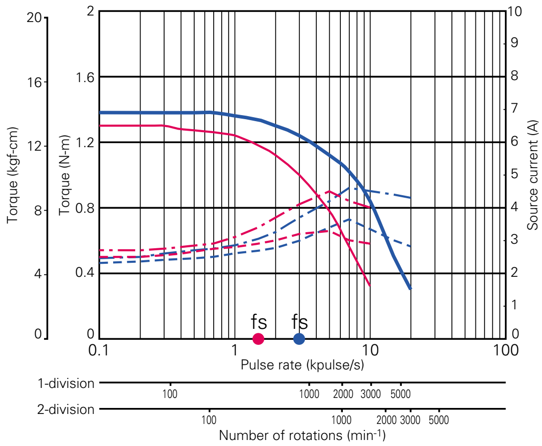
PMM-BA-4804-1

●103H7821-17□□: 100V



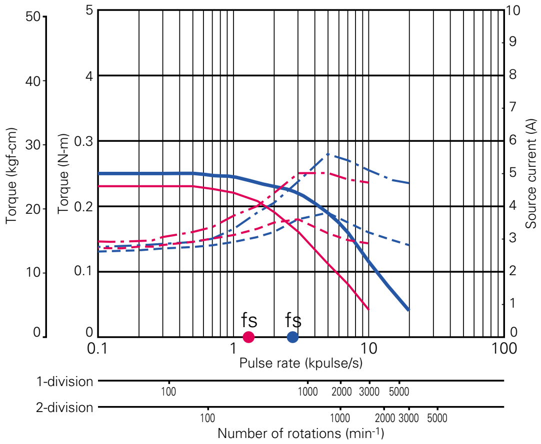
Source voltage: AC100V, Wire-wound current: 4A/phase
—— Getaway torque ($J_{L1}=2.6\times10^{-4}$kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●1103H7822-17□□: 100V



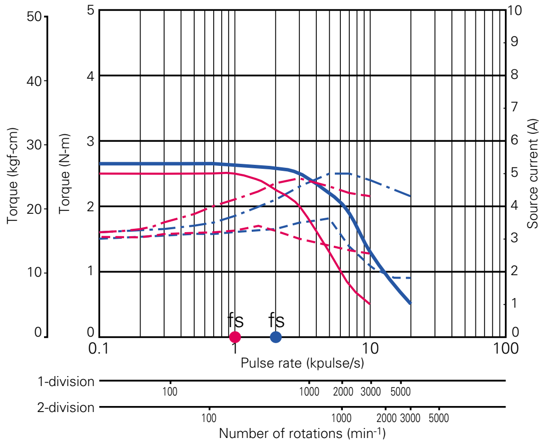
Source voltage: AC100V, Wire-wound current: 4A/phase
—— Getaway torque ($J_{L1}=2.6\times10^{-4}$kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7823-17□□: 100V



Source voltage: AC100V, Wire-wound current: 4A/phase
—— Getaway torque ($J_{L1}=15.1\times10^{-4}$kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H8221-52□□: 100V



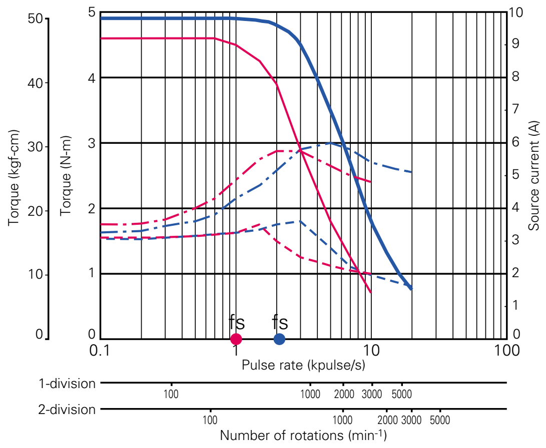
Source voltage: AC100V, Wire-wound current: 6A/phase
—— Getaway torque ($J_{L1}=15.1\times10^{-4}$kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

fs: Maximum self-start frequency when not loaded ■ 1-division is specified ■ 2-division is specified

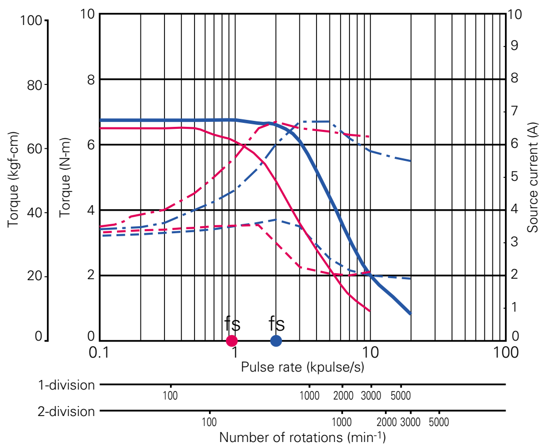
PMM-BA-4804-1

●103H8222-52□□: 100V



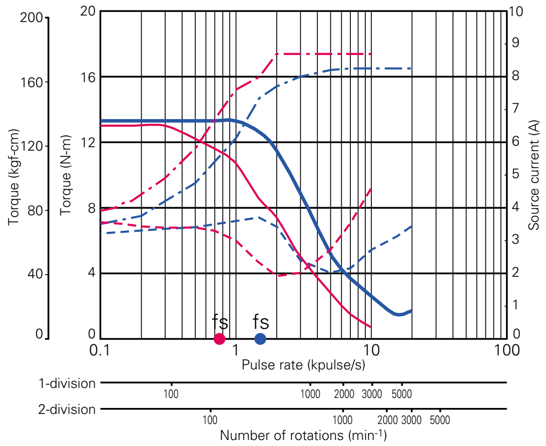
Source voltage: AC100V, Wire-wound current: 6A/phase
—— Getaway torque (J_{L1}=15.1x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H8223-52□□: 100V



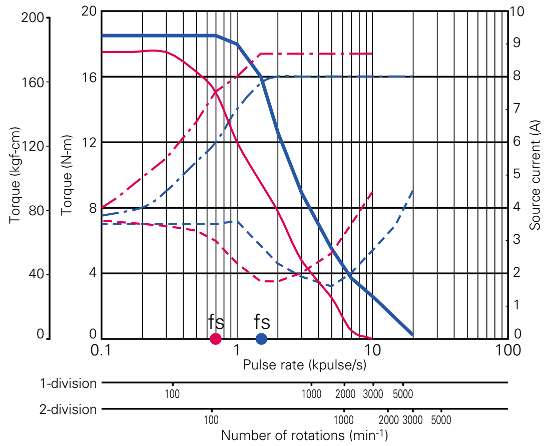
Source voltage: AC100V, Wire-wound current: 6A/phase
—— Getaway torque (J_{L1}=15.1x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H89222-52□□: 100V



Source voltage: AC100V, Wire-wound current: 6A/phase
—— Getaway torque (J_{L1}=44x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H89223-52□□: 100V



Source voltage: AC100V, Wire-wound current: 6A/phase
—— Getaway torque (J_{L1}=44x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

Options

Terminal board cover

PMM-BA-4803-1

Model No.	PM-AP-021

PMM-BA-4804-1

Model No.	PM-AP-014 PM-AP-018

2-phase Stepping Driver

PMM-UA-4303-1

AC100V

Unipolar type

(Applicable motor rated current 1.2A/phase, 2A/phase)

Full-step / Half-step

(200 x 1 division) (200 x 2 division)

● Applicable motor

□42 □50 □56 □60 ø86

PMM-UA-4304-1

AC100V

Unipolar high-speed type

(Applicable motor rated current 4A/phase)

Full-step / Half-step

(200 x 1 division) (200 x 2 division)

● Applicable motor

ø86 ø106

Standard combined stepping motors

PMM-UA-4303-1

Dimensions of Stepping Motor	Stepping motor model number		Rated current [A/phase]	Holding torque [N-m]	Rotor inertia [x 10^{-4}kg-m^2]	Weight [kg]	Page
	Single-axis shaft	Dual-axis shaft					
□42mm	103H5205-0440 103H5208-0440 103H5209-0440 103H5210-0440	103H5205-0410 103H5208-0410 103H5209-0410 103H5210-0410	1.2 1.2 1.2 1.2	0.2 0.3 0.32 0.37	0.036 0.056 0.062 0.074	0.23 0.29 0.31 0.37	65 Page
□50mm	103H6701-0440 103H6703-0440 103H6704-0440	103H6701-0410 103H6703-0410 103H6704-0410	2 2 2	0.28 0.49 0.52	0.057 0.118 0.14	0.35 0.5 0.55	69 Page
□56mm	103H7121-0440 103H7123-0440 103H7124-0440 103H7126-0440	103H7121-0410 103H7123-0410 103H7124-0410 103H7126-0410	2 2 2 2	0.39 0.83 0.98 1.27	0.1 0.21 0.245 0.36	0.47 0.65 0.8 0.98	73 Page
□60mm	103H7821-0440 103H7822-0440 103H7823-0440	103H7821-0410 103H7822-0410 103H7823-0410	2 2 2	0.78 1.17 2.1	0.275 0.4 0.84	0.6 0.77 1.34	79 Page
ø86mm	103H8221-0441 103H8222-0441 103H8223-0441	103H8221-0411 103H8222-0411 103H8223-0411	2 2 2	2.15 4.13 6.27	1.45 2.9 4.4	1.5 2.5 3.5	83 Page

• For information about the general specifications and dimensions of each stepping motor, refer to its page.

PMM-UA-4304-1

Dimensions of Stepping Motor	Stepping motor model number		Rated current [A/phase]	Holding torque [N-m]	Rotor inertia [x 10^{-4}kg-m^2]	Weight [kg]	Page
	Single-axis shaft	Dual-axis shaft					
ø86mm	103H8221-0941 103H8222-0941 103H8223-0941	103H8221-0911 103H8222-0911 103H8223-0911	4 4 4	2.15 4.13 6.27	1.45 2.9 4.4	1.5 2.5 3.5	83 Page
ø106mm	103H89222-0941 103H89223-0941	103H89222-0911 103H89223-0911	4 4	10.8 15.5	14.6 22	7.5 10.5	89 Page

• For information about the general specifications and dimensions of each stepping motor, refer to its page.

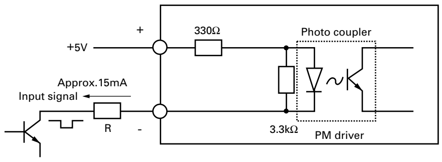
Specifications of PM Driver

<table>
<tr><th colspan="3">Item</th><th>PMM-UA-4303-1</th><th>PMM-UA-4304-1</th></tr>
<tr><td rowspan="12">Basic specifications</td><td colspan="2">Input source</td><td colspan="2">Single phase AC 100V±10% 50/60Hz±3Hz</td></tr>
<tr><td colspan="2">Source current</td><td>3A</td><td>5A</td></tr>
<tr><td colspan="2">Rated current</td><td>2A/phase (Changeable to 1.2A/phase, refer to Page 20)</td><td>4A/phase</td></tr>
<tr><td rowspan="8">Environment</td><td>Operating ambient temperature</td><td colspan="2">0~+50˚C</td></tr>
<tr><td>Conservation temperature</td><td colspan="2">-20~+70˚C</td></tr>
<tr><td>Operating ambient humidity</td><td colspan="2">35~85%RH (no condensation)</td></tr>
<tr><td>Conservation humidity</td><td colspan="2">10~90%RH (no condensation)</td></tr>
<tr><td>Vibration resistance</td><td colspan="2">4.9m/s² Frequency range 10~55Hz, Direction: along X, Y and Z axes, for 2 hours each.</td></tr>
<tr><td>Impact resistance</td><td colspan="2">Considering the NDS-C-0110 standard section 3.2.2 division “C”, not influenced.</td></tr>
<tr><td>Withstand voltage</td><td colspan="2">Not influenced when AC 1000V is applied between power input terminal and cabinet for one minute.</td></tr>
<tr><td>Insulation resistance</td><td colspan="2">110MΩ or more when measured with DC500V megohmmeter between input terminal and cabinet.</td></tr>
<tr><td colspan="2">Weight</td><td>0.6kg</td><td>3kg</td></tr>
<tr><td rowspan="3">Function</td><td colspan="2">Protection function</td><td colspan="2">Against PM driver overheat</td></tr>
<tr><td colspan="2">Selection, setting function</td><td colspan="2">Exciting mode selection– DIP switches enables selection of Full-step and Half-step mode.
Automatic current down selection-- Automatic current down function can be selected.
Driving current switch setting- DIP switch enables setting driving current of the Stepping Motor.
PMM-UA-4303-1 --- 1A/phase, 1.2A/phase, 1.5A/phase, 1.8A/phase, 2A/phase 5 selections.
PMM-UA-4304-1 --- 3.6A/phase, 4A/phase, 4.6A/phase, 5A/phase, 4 selections.</td></tr>
<tr><td colspan="2">LED indicator</td><td colspan="2">Alarm monitor.</td></tr>
<tr><td rowspan="4">I/O signals</td><td>Signal Name (Brevity code)</td><td>Silk-screen printing</td><td colspan="2"></td></tr>
<tr><td>CW pulse
Input signal (CW)</td><td>CW+
CW-</td><td colspan="2">Inputs driving pulses to rotate in CW direction.
Photo coupler input method, input resistance 330Ω Input signal voltage: H = 4.0 to 5.5V, L = 0 to 0.5V
Maximum input frequency:20kpulse/s</td></tr>
<tr><td>CCW pulse
Input signal (CCW)</td><td>CCW+
CCW-</td><td colspan="2">Input driving pulses to rotate in CCW direction.
Photo coupler input method, input resistance 330Ω Input signal voltage: H = 4.0 to 5.5V, L = 0 to 0.5V
Maximum input frequency:20kpulse/s</td></tr>
<tr><td>Alarm
output (AL)</td><td>AL1
AL2</td><td colspan="2">Outputs signal when either alarm circuit is activated in the PM driver.
When this signal is generated, the stepping motor is made in the de-excited state.
Relay contact output (at normal open), contact capacity: DC24V, 0.5A or less, or AC120V, 0.5A or less</td></tr>
</table>

- The CW direction indicated above is the rotation direction of the stepping motor in clockwise as facing to the output shaft side (flange side). The CCW direction is the same in counter-clockwise.

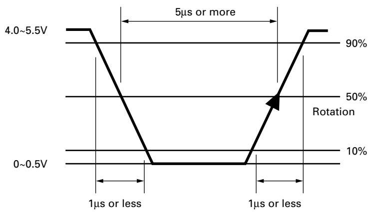
Operation, Connection, and Function

Input circuit configuration (CW, CCW) --- MM-UA-4303-1 and PMM-UA-4304-1 in common

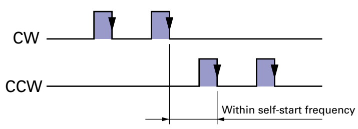


- Pulse duty 50% or less.
- When the crest value of the input signal is 5V, the external limit resistance R must be 0Ω.
  When the crest value of the input signal exceeds 5V, use the external limit resistance R to limit the input current to approximately 15mA.

Input signal specifications

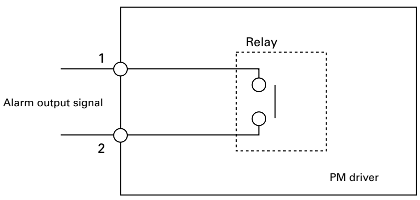


Timing of the command pulse 2-input mode (CW, CCW)



- The internal photo coupler turns ON within the ■ and, at its falling edge to OFF, the internal circuit (stepping motor) is activated.
- When applying the pulse to CW, turn OFF the CCW side internal photo coupler.
- When applying the pulse to CCW, turn OFF the CW side internal photo coupler.

Output circuit configuration (AL) --- PMM-UA-4303-1 and PMM-UA-4304-1 in common

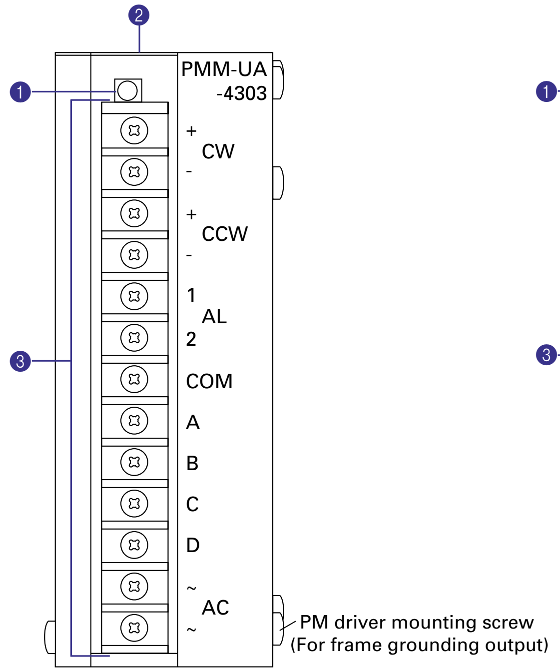


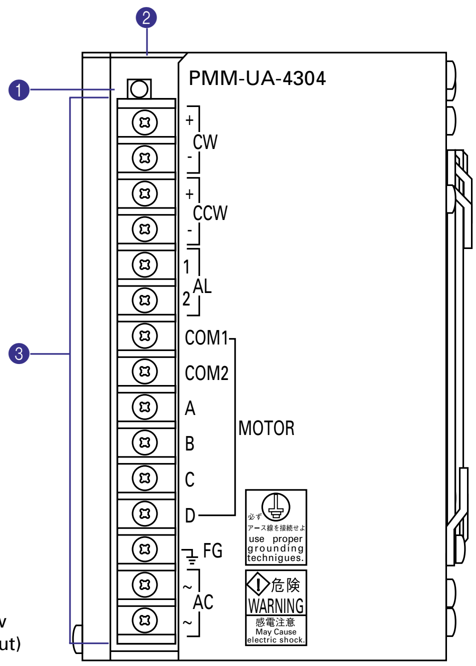
- Alarm output signal
  Contact mode: Relay contact output (Normally open)
  Contact capacity: DC24V, 0.5A or less, or AC120V, 0.5A or less

Operation, Connection, and Function

PM deriver component names

PMM-UA-4303-1 **PMM-UA-4304-1**



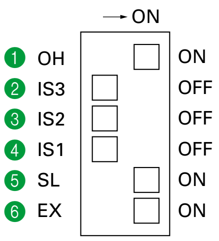


❶Monitor indication (AL) --- PMM-UA-4303-1 and PMM-BA-4304-1 in common

Indication	Color	State
AL	Red	When the element temperature becomes 80˚C or higher in the PM driver, heat protective alarm circuit for the internal elements is activated and this LED illuminates.As the alarm circuit is activated, the wire-wound current is shut and the stepping motor becomes in a de-excited state. Simultaneously, the alarm output relay is closed to generate the output signal. When the element temperature falls back to 80˚C or lower, the alarm is automatically released and the current flows into the stepping motor. When the alarm is ON, turn the main power OFF before the automatic recovery system works, and take measures to reduce heat generation such as forced cooling to the PM driver enclosure

❷Function selection DIP switch pack (OH, IS3, IS2, IS1, SL,EX)

PMM-UA-4303-1



- The factory setting is shown in the figure above.
- Turn off the power supply to the PM driver before changing DIP switch setting.

1 OH (OH selection)

This switch is not used. Do not set it to OFF.

2 3 4 IS1, IS2, IS3 (Operating current selection)

*When excited for single phase:

IS3	IS2	IS1	Wire-wound current (*)
OFF	OFF	OFF	2A/phase
ON	OFF	OFF	1.8A/phase
OFF	ON	OFF	1.5A/phase
OFF	OFF	ON	1.2A/phase
ON	OFF	ON	1.0A/phase

- The wire-wound current reduces to 80% for the 2-phase exciting.

5 SL (Auto current down selection)

Select for the automatic current reduction.

SL	Auto current down
ON	Enabled
OFF	Disabled

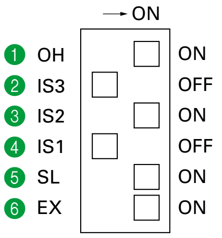
6 EX (Exciting mode selection)

Select exciting mode.

EX	Exciting mode
ON	Half step (0.9°/pulse)
OFF	Full step (1.8°/pulse)

Operation, Connection, and Function

PMM-UA-4304-1



- The factory setting is shown in the figure above.
- Turn off the power supply to the PM driver before changing DIP switch setting.

1 OH (OH selection)

This switch is not used. Do not set it to OFF.

2 3 4 IS1, IS2, IS3 (Operating current selection)

*When excited for single phase:

IS3	IS2	IS1	Wire-wound current (*)
OFF	OFF	OFF	5A/phase
ON	OFF	OFF	4.6A/phase
OFF	ON	OFF	4A/phase
OFF	OFF	ON	3.6A/phase

- The wire-wound current reduces to 80% for the 2-phase exciting.

5 SL (Auto current down selection)

Select for the automatic current reduction.

SL	Auto current down
ON	Enabled
OFF	Disabled

6 EX (Exciting mode selection)

Select exciting mode.

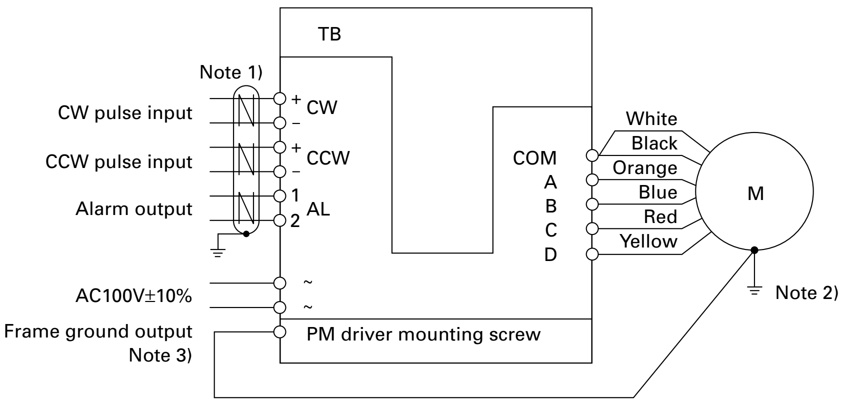
EX	Exciting mode
ON	Half step (0.9°/pulse)
OFF	Full step (1.8°/pulse)

3 Terminal block (TB) --- PMM-UA-4303-1 and PMM-BA-4304-1 in common

Connects I/O signals, single phase AC power supply, and the stepping motor power cord.

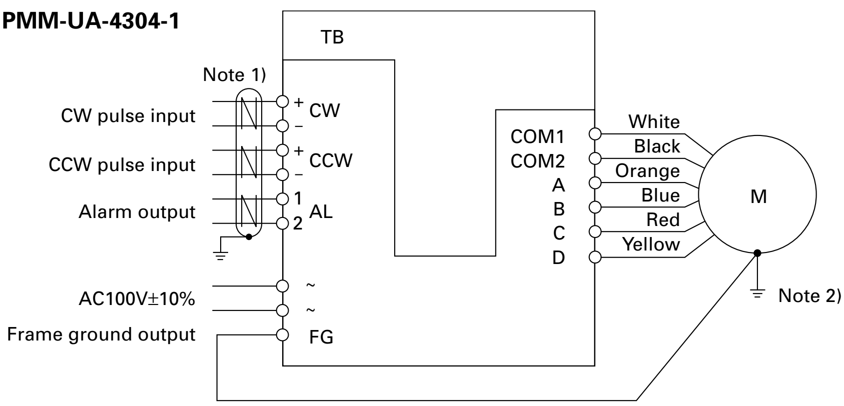
External wiring diagram

PMM-UA-4303-1



Note 1) Use twist pair shielded cables.
Note 2) Ground the flange of the stepping motor by fastening the grounding wire together with its mounting screw.
The grounding shall be made at a single point.
Note 3) Make grounding by the stepping motor mounting screw share for mounting the PM driver. The grounding shall be made at a single point.

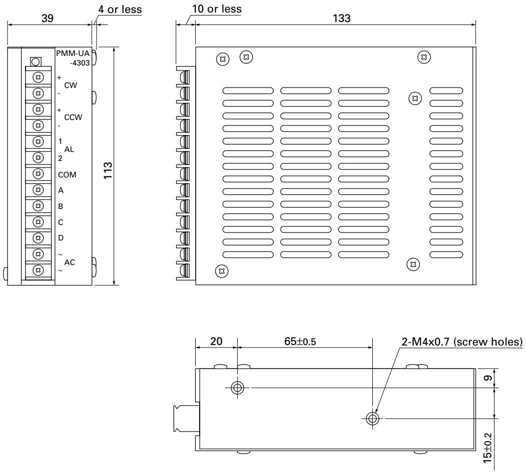
PMM-UA-4304-1



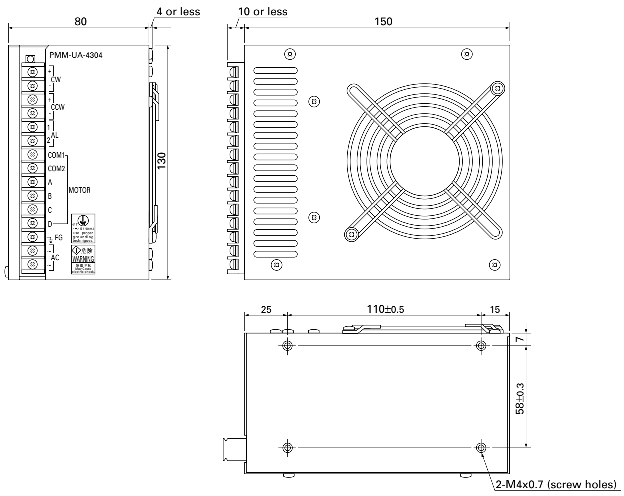
Note 1) Use twist pair shielded cables.
Note 2) Ground the flange of the stepping motor by fastening the grounding wire together with its mounting screw.
The grounding shall be made at a single point.

Dimensions (mm)

PMM-UA-4303-1

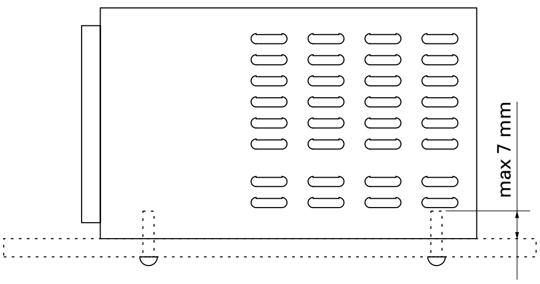


PMM-UA-4304-1

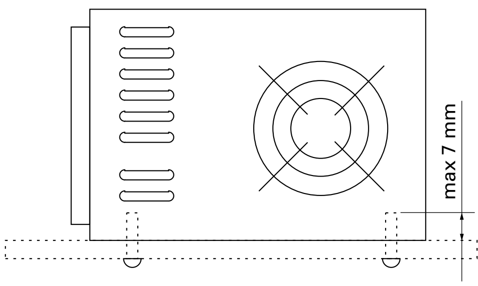


Mounting direction and mounting position

PMM-UA-4303-1



PMM-UA-4304-1



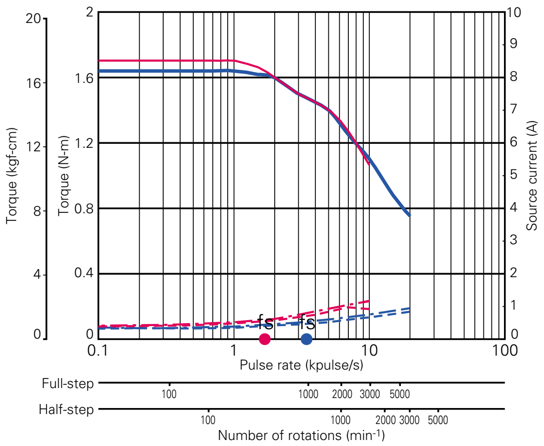
- Mount the PM driver as it stands upright.
- Use the mounting holes in the bottom of the PM driver with M4 screws as shown in the figure. (No mounting hardware is required.)
- The length of the screws projecting inward the driver enclosure shall be shorter than 7mm.

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

fs: Maximum self-start frequency when not loaded. ■ Full-step ■ Half-step

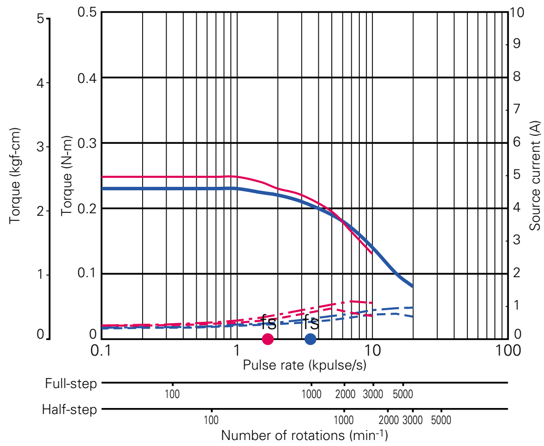
PMM-UA-4303-1

●103H5205-04□□: 100V



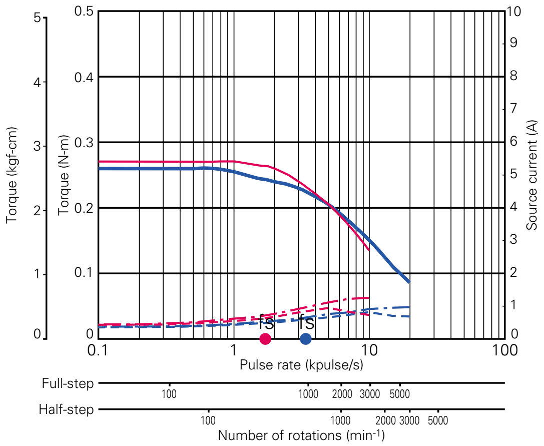
Source voltage: AC100V, Wire-wound current:1.2A/phase
—— Getaway torque ($J_{L1}=1.2\times10^{-4}$kg·m^2 Uses rubber coupling)
–·– Source current (T_L=MAX), – – – Source current (T_L=0)

●103H5208-04□□: 100V



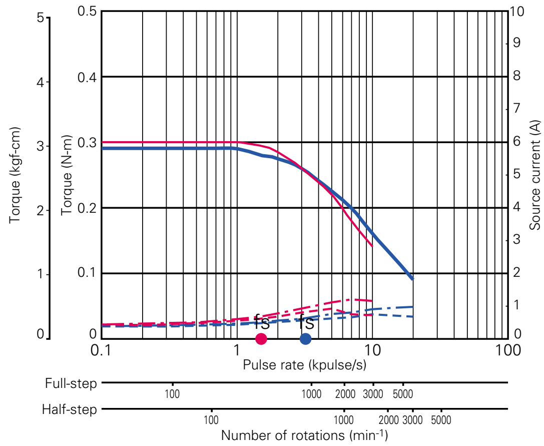
Source voltage: AC100V, Wire-wound current:1.2A/phase
—— Getaway torque ($J_{L1}=1.2\times10^{-4}$kg·m^2 Uses rubber coupling)
–·– Source current (T_L=MAX), – – – Source current (T_L=0)

●103H5209-04□□: 100V



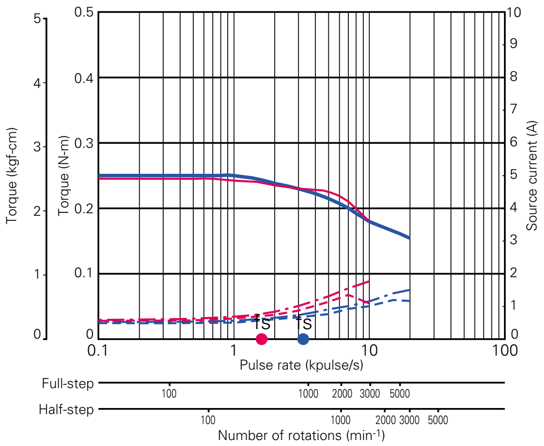
Source voltage: AC100V, Wire-wound current:1.2A/phase
—— Getaway torque ($J_{L1}=1.2\times10^{-4}$kg·m^2 Uses rubber coupling)
–·– Source current (T_L=MAX), – – – Source current (T_L=0)

●103H5210-04□□: 100V



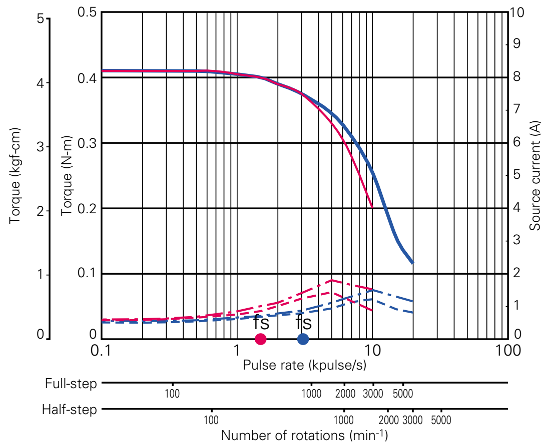
Source voltage: AC100V, Wire-wound current:1.2A/phase
—— Getaway torque ($J_{L1}=1.2\times10^{-4}$kg·m^2 Uses rubber coupling)
–·– Source current (T_L=MAX), – – – Source current (T_L=0)

●103H6701-04□□: 100V



Source voltage: AC100V, Wire-wound current: 2A/phase
—— Getaway torque ($J_{L1}=0.94\times10^{-4}$kg·m^2 Uses rubber coupling)
–·– Source current (T_L=MAX), – – – Source current (T_L=0)

●103H6703-04□□: 100V



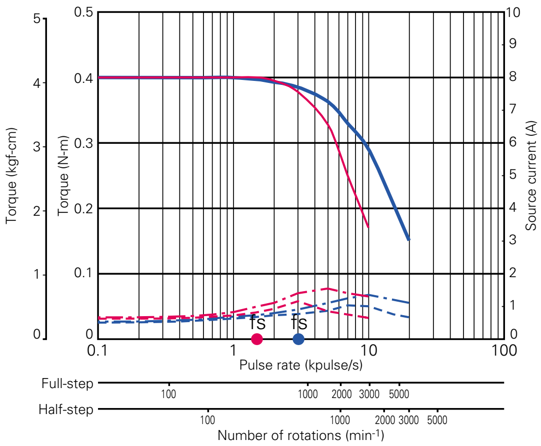
Source voltage: AC100V, Wire-wound current: 2A/phase
—— Getaway torque ($J_{L1}=0.94\times10^{-4}$kg·m^2 Uses rubber coupling)
–·– Source current (T_L=MAX), – – – Source current (T_L=0)

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

fs: Maximum self-start frequency when not loaded. ■ Full-step ■ Half-step

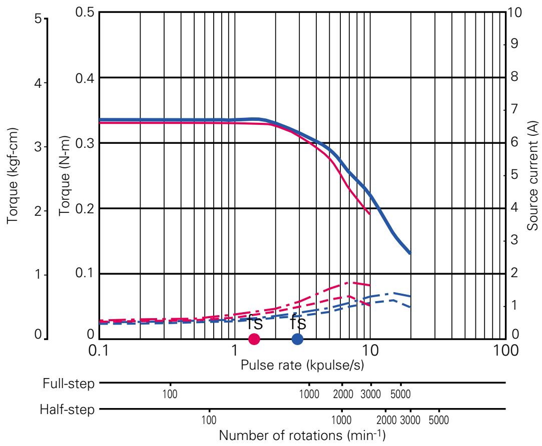
PMM-UA-4303-1

●103H6704-04□□: 100V



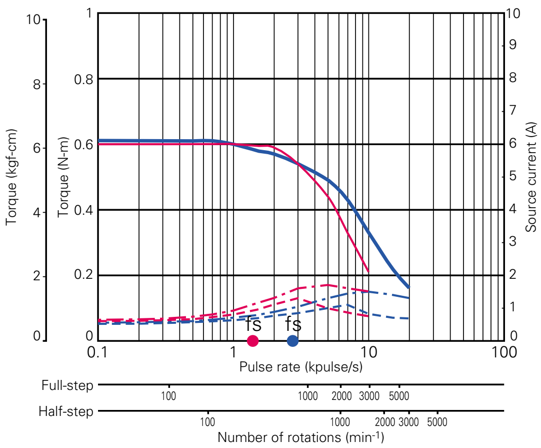
Source voltage: AC100V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10⁻⁴kg·m² Uses rubber coupling)
-·- Source current (T_L=MAX), --- Source current (T_L=0)

●103H7121-04□□: 100V



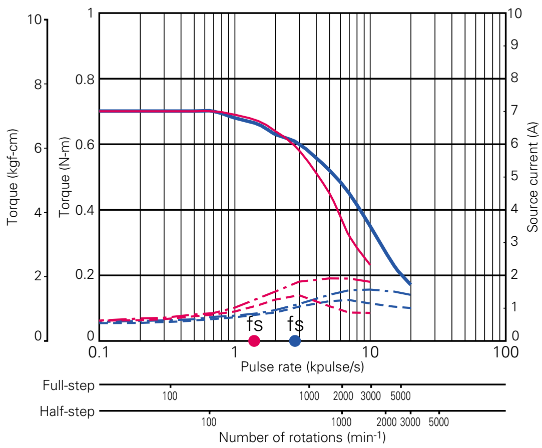
Source voltage: AC100V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10⁻⁴kg·m² Uses rubber coupling)
-·- Source current (T_L=MAX), --- Source current (T_L=0)

●103H7123-04□□: 100V



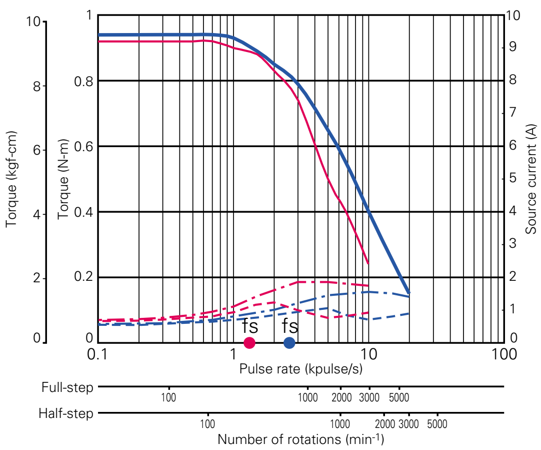
Source voltage: AC100V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=2.6x10⁻⁴kg·m² Uses rubber coupling)
-·- Source current (T_L=MAX), --- Source current (T_L=0)

●103H7124-04□□: 100V



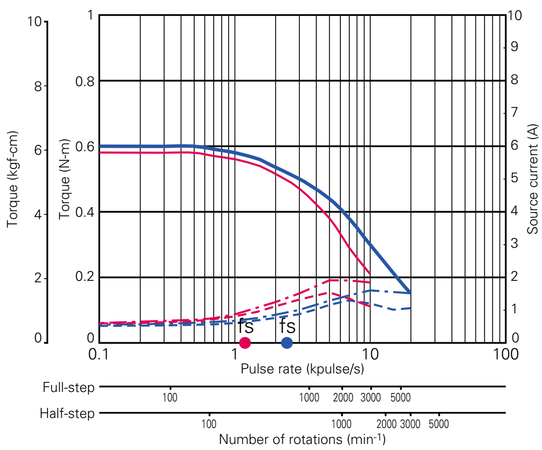
Source voltage: AC100V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10⁻⁴kg·m² Uses rubber coupling)
-·- Source current (T_L=MAX), --- Source current (T_L=0)

●103H7126-04□□: 100V



Source voltage: AC100V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10⁻⁴kg·m² Uses rubber coupling)
-·- Source current (T_L=MAX), --- Source current (T_L=0)

●103H7821-04□□: 100V



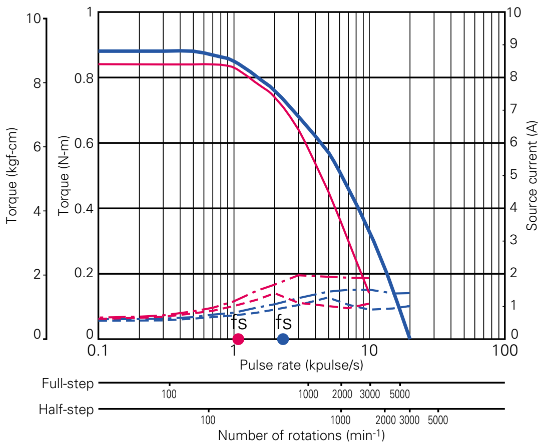
Source voltage: AC100V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10⁻⁴kg·m² Uses rubber coupling)
-·- Source current (T_L=MAX), --- Source current (T_L=0)

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

fs: Maximum self-start frequency when not loaded. ■ Full-step ■ Half-step

PMM-UA-4303-1

●103H7822-04□□: 100V

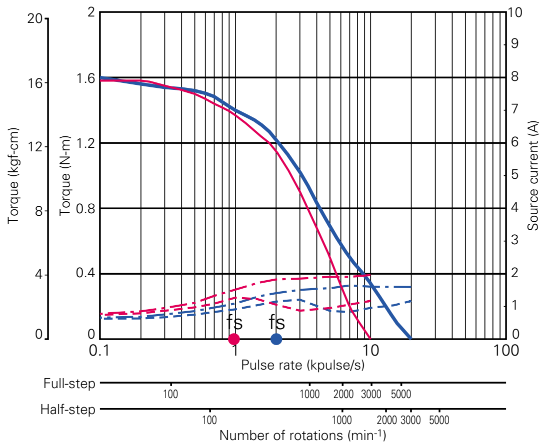


Source voltage: AC100V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=2.6x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (T_L=MAX), – – –Source current (T_L=0)

●103H7823-04□□: 100V

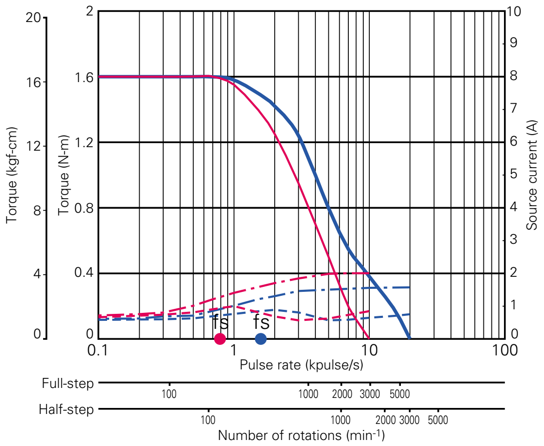


Source voltage: AC100V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=2.6x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (T_L=MAX), – – –Source current (T_L=0)

●103H8221-04□□: 100V

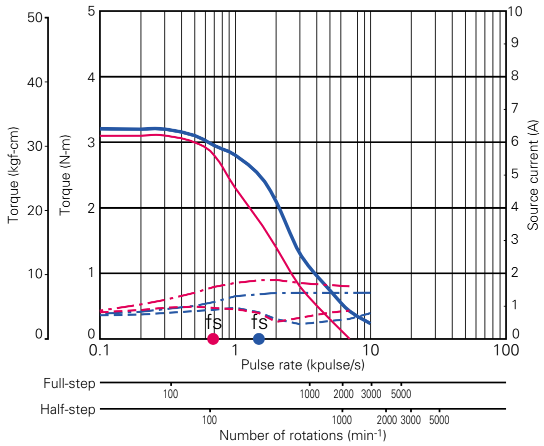


Source voltage: AC100V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=15.1x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (T_L=MAX), – – –Source current (T_L=0)

●103H8222-04□□: 100V

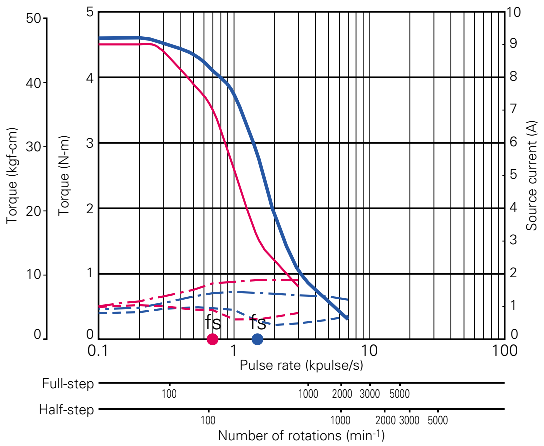


Source voltage: AC100V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=15.1x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (T_L=MAX), – – –Source current (T_L=0)

●103H8223-04□□: 100V



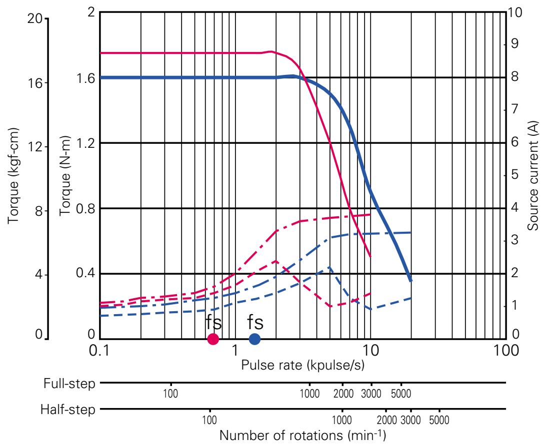
Source voltage: AC100V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=15.1x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (T_L=MAX), – – –Source current (T_L=0)

PMM-UA-4304-1

●103H8221-09□□: 100V



Source voltage: AC100V, Wire-wound current: 4A/phase

—— Getaway torque (J_{L1}=15.1x10^{-4}kg·m^2 Uses rubber coupling)

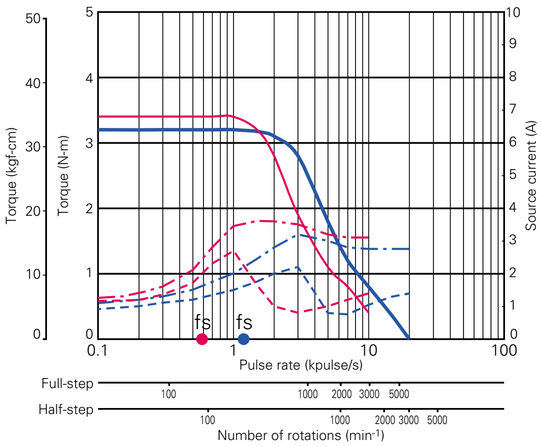
–·– Source current (T_L=MAX), – – –Source current (T_L=0)

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

fs: Maximum self-start frequency when not loaded. ■ Full-step ■ Half-step

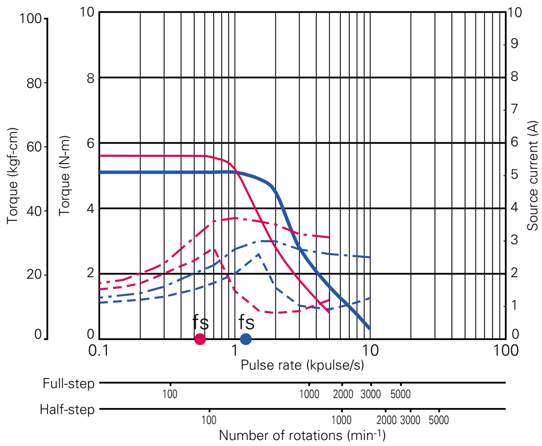
PMM-UA-4304-1

●103H8222-09□□: 100V



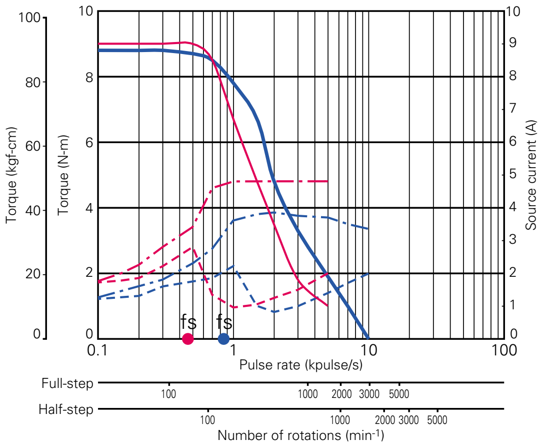
Source voltage: AC100V, Wire-wound current: 4A/phase
—— Getaway torque (J_{L1}=15.1x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (T_L=MAX), – – –Source current (T_L=0)

●103H8223-09□□: 100V



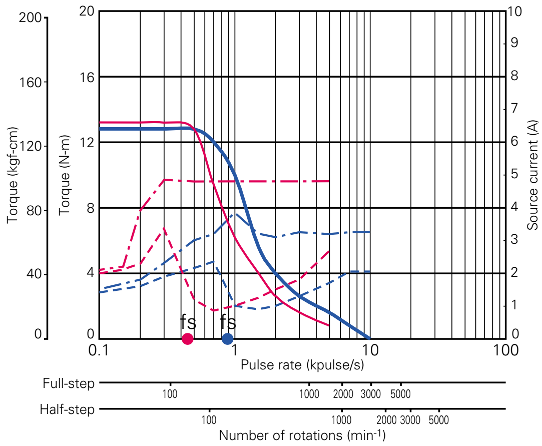
Source voltage: AC100V, Wire-wound current: 4A/phase
—— Getaway torque (J_{L1}=15.1x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (T_L=MAX), – – –Source current (T_L=0)

●103H89222-09□□: 100V



Source voltage: AC100V, Wire-wound current: 4A/phase
—— Getaway torque (J_{L1}=15.1x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (T_L=MAX), – – –Source current (T_L=0)

●103H89223-09□□: 100V



Source voltage: AC100V, Wire-wound current: 4A/phase
—— Getaway torque (J_{L1}=44x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (T_L=MAX), – – – Source current (T_L=0)

Options

● Terminal board cover

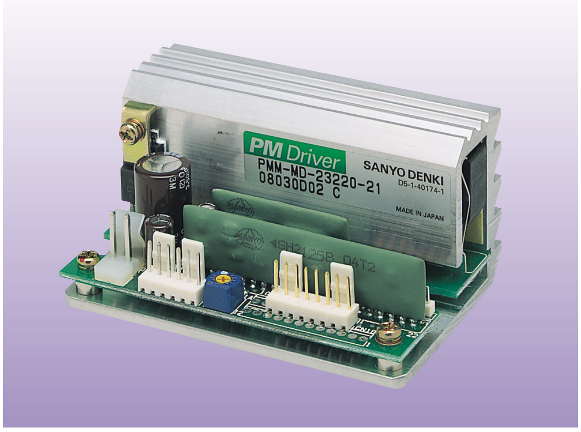
PMM-UA-4303-1

Model No.	PM-AP-018

PMM-UA-4304-1

Model No.	PM-AP-019

2-phase Stepping Driver

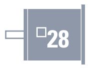


DC24V/36V
Unipolar type
(Applicable motor rated current 1.2A/phase, 2A/phase)

Micro-step (200 X 1~8 divisions)
(Smooth operation and low vibration even at low speeds.)

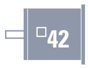
PMM-MD-23210-10 (Photo coupler input method)
PMM-MD-23211-10 (CMOS input method)

● Applicable motor



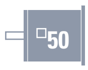
PMM-MD-23220-21 (Photo coupler input method)
PMM-MD-23221-21 (CMOS input method)

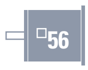
● Applicable motor

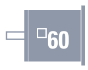


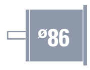
PMM-MD-23220-10 (Photo coupler input method)
PMM-MD-23221-10 (CMOS input method)

● Applicable motor









Standard combined stepping motors

PMM-MD-23210-10,PMM-MD-23211-10

Dimensions of Stepping Motor	Stepping motor model number		Rated current [A/phase]	Holding torque [N-m]	Rotor inertia [x 10^{-4}kg-m^2]	Weight [kg]	Page
	Single-axis shaft	Dual-axis shaft					
□28mm	103H3215-5240	103H3215-5210	1	0.062	0.016	0.22	63 Page

PMM-MD-23220-21,PMM-MD-23221-21

Dimensions of Stepping Motor	Stepping motor model number		Rated current [A/phase]	Holding torque [N-m]	Rotor inertia [x 10^{-4}kg-m^2]	Weight [kg]	Page
	Single-axis shaft	Dual-axis shaft					
□42mm	103H5205-0440 103H5208-0440 103H5209-0440 103H5210-0440	103H5205-0410 103H5208-0410 103H5209-0410 103H5210-0410	1.2 1.2 1.2 1.2	0.2 0.3 0.32 0.37	0.036 0.056 0.062 0.074	0.23 0.29 0.31 0.37	65 Page

PMM-MD-23220-10,PMM-MD-23221-10

Dimensions of Stepping Motor	Stepping motor model number		Rated current	Holding torque	Rotor inertia	Weight	Page
	Single-axis shaft		Dual-axis shaft	[A/phase]	[N-m]	[x 10^{-4}kg-m^2]	
□50mm	103H6701-0440 103H6703-0440 103H6704-0440	103H6701-0410 103H6703-0410 103H6704-0410	2 2 2	0.28 0.49 0.52	0.057 0.118 0.14	0.35 0.5 0.5	69 Page
□56mm	103H7121-0440 103H7123-0440 103H7124-0440 103H7126-0440	103H7121-0410 103H7123-0410 103H7124-0410 103H7126-0410	2 2 2 2	0.39 0.83 0.98 1.27	0.1 0.21 0.245 0.36	0.47 0.65 0.8 0.98	73 Page
□60mm	103H7821-0440 103H7822-0440 103H7823-0440	103H7821-0410 103H7822-0410 103H7823-0410	2 2 2	0.78 1.17 2.1	0.275 0.4 0.84	0.6 0.77 1.34	79 Page
ø86mm	103H8221-0441 103H8222-0441 103H8223-0441	103H8221-0411 103H8222-0411 103H8223-0411	2 2 2	2.15 4.13 6.27	1.45 2.9 4.4	1.5 2.5 3.5	83 Page

- For information about the general specifications and dimensions of each stepping motor, refer to its page.

Specifications of PM Driver

Item			Photo coupler input method			CMOS input method		
			PMM-MD-23210-10	PMM-MD-23220-21	PMM-MD-23220-10	PMM-MD-23211-10	PMM-MD-23221-21	PMM-MD-23221-10
Basic specifications	Input source	Main power	DC24V/36V±10%					
		Control power	—			DC5V±5%		
	Getaway torque	Main power	2A	2A	3A	2A	2A	3A
		Control power	—			0.5A		
	Rated current		1A/phase	1.2A/phase	2A/phase	1A/phase	1.2A/phase	2A/phase
	Environment	Operating ambient temperature	0~+50˚C					
		Conservation temperature	- 20~+70˚C					
		Operating ambient humidity	35~85% RH (no condensation)					
		Conservation humidity	10~90% RH (no condensation)					
		Vibration resistance	4.9m/s² Frequency range 10~55Hz, Direction: along X,Y and Z axes, for 2 hours each.					
		Impact resistance	Considering the NDS-C-0110 standard section 3.2.2 division "C", not influenced.					
		Withstand voltage	Not influenced when AC500V is applied between power input terminal and cabinet for one minute.					
		Insulation resistance	10MΩ or more when measured with DC500V megohmmeter between input terminal and cabinet.					
	Weight		0.15kg					
Function	Selection, setting function		Pulse input mode selection– DIP switches enables selection of 1-input and 2-input mode. Resolution setting– DIP switches enables 4 divisions ranging from 1~8 resolution. Power down — External signal input enables to turn off the current that flows through the stepping motor. Automatic current down selection– Automatic current down function can be selected. Resolution selection— External signal input enables to select 1 division (Full-step) and 2 divisions (Half-step) (Resolution selection function is only for photo coupler input method type)					

I/O signals

Signal Name (Brevity code)	Pin No. (CN1) Photo coupler input method	Pin No. (CN1) CMOS input method		
CW pulse Input signal (CW)	1 2	7	In the 2-input mode, inputs driving pulses to rotate in CW direction.	
(CK)			In the 1-input mode, inputs driving pulse train to rotate the step motor rotation. Photo coupler input method, input resistance 330Ω Input signal voltage: H = 4.0 to 5.5V, L = 0 to 0.5V Maximum input frequency:20kpulse/s	CMOS input method Input signal voltage: H = 4.0 to 5.5V, L = 0 to 0.5V Maximum input frequency:20kpulse/s.
CCW pulse Input signal (CCW)	3 4	8	In the 2-input mode, inputs driving pulses to rotate in CCW direction.	
(U/D)			In the 1-input mode, inputs rotation direction signals to the stepping motor. Internal photo coupler ON (CMOS type: "H" level:) — CW direction Internal photo coupler OFF (CMOS type: "L" level)— CCW direction. Photo coupler input method, input resistance 330Ω Input signal voltage: H = 4.0 to 5.5V, L = 0 to 0.5V Maximum input frequency:20kpulse/s	CMOS input method Input signal voltage: H = 4.0 to 5.5V, L = 0 to 0.5V Maximum input frequency:20kpulse/s.
Power down input signal (PD)	5 6	9	Inputs PD signal to turn off the current that flows through the stepping motor. Internal photo coupler ON (CMOS type: "L" level input) — Power down function is enabled. Photo coupler input method, input resistance 330Ω Input signal voltage: H = 4.0 to 5.5V, L = 0 to 0.5V	CMOS input method Input signal voltage: H = 4.0 to 5.5V, L = 0 to 0.5V
Step angle selection input (S. SEL)	—	10	————————	By the input S or SEL signal, the step angle of full-step or half-step is selected. "H" level: — Half-step "L" level — Full-step CMOS input method Input signal voltage: H = 4.0 to 5.5V, L = 0 to 0.5V
Phase origin monitor output signal (MON)	7 8	11	Indicates ON when the exciting phase is at the origin position. In the full-step, outputs once for every 4 pulses. In the half-step, outputs once for every 8 pulse From the photo coupler by the open collector output (ON at the phase origin). Output specification: Vceo=30V or less, Ic=5mA or less	From the transistor by the open collector output (ON at the phase origin). Output specification: Vceo=30V or less, Ic=5mA or less

- Stepping motor rotation in the CW direction means clockwise rotation when facing the output shaft (the flange side) of the stepping motor. CCW direction means counterclockwise rotation when facing the same side.
- Set the DIP switch as follows when using the step angle selection function by signal input.

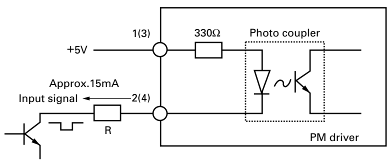
EX1	EX2	EX3
OFF	ON	ON

- When the half-step is selected by the step angle selection signal, its torque ought to be 70% of that for the full-step.

Operation, Connection, and Function

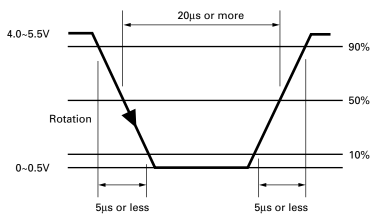
PMM-MD-23210-10(Photo coupler input method)
PMM-MD-23220-21(Photo coupler input method)
PMM-MD-23220-10(Photo coupler input method)

Input circuit configuration (CW, CCW)



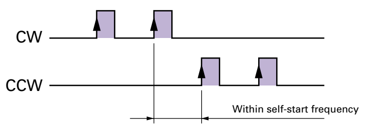
- Pulse duty 50% or less
- When the crest value of the input signal is 5V, the external limit resistance R must be 0Ω.
  When the crest value of the input signal exceeds 5V, use the external limit resistance R to limit the input current to approximately 15mA.

Input signal specifications



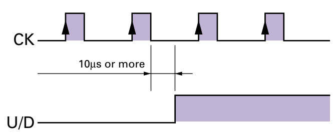
Timing of command pulse

- 2-input mode (CW, CCW)



- The internal photo coupler turns ON within the ■ and, at its rising edge to ON, the internal circuit (stepping motor) is activated.
- When applying the pulse to CW, turn OFF the CCW side internal photo coupler.
- When applying the pulse to CCW, turn OFF the CW side internal photo coupler.

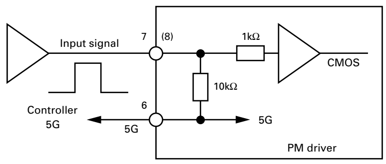
- 1-input mode (CK,U/D)



- The internal photo coupler turns ON within the ■ and, at the rising edge to ON of the CK photo coupler, the internal circuit (stepping motor) is activated.
- Switching the input signal U/D shall be performed while the internal photo coupler on the CK side is OFF.

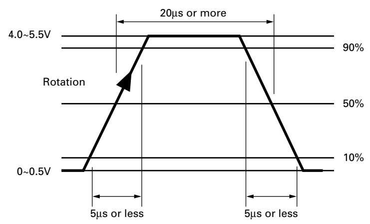
PMM-MD-23211-10(CMOS input method)
PMM-MD-23221-21(CMOS input method)
PMM-MD-23221-10(CMOS input method)

Input circuit configuration (CW, CCW)



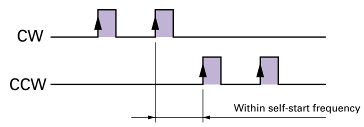
- Pulse duty 50% or less

Input signal specifications



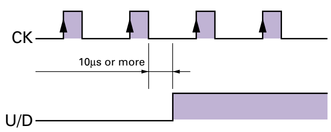
Timing of command pulse

- 2-input mode (CW, CCW)



- The “H” level is input at ■ and, at its rising edge to “H” level, the internal circuit (stepping motor) is activated.
- When applying the pulse to CW, turn OFF the CCW side internal photo coupler.
- When applying the pulse to CCW, turn OFF the CW side internal photo coupler.

- 1-input mode (CK,U/D)

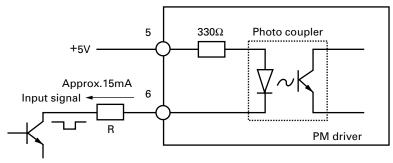


- The "H" level is input for ■ and, at its rising edge to “H” level, the internal circuit (stepping motor) is activated.
- Switching the input signal U/D should be performed while the input level on the CK side is “L”.

Operation, Connection, and Function

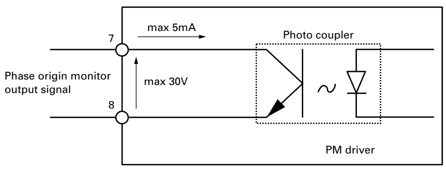
PMM-MD-23210-10(Photo coupler input method)
PMM-MD-23220-21(Photo coupler input method)
PMM-MD-23220-10(Photo coupler input method)

Input circuit configuration (PD)



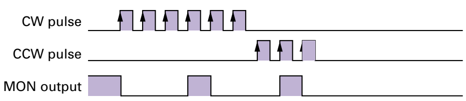
- When the crest value of the input signal is 5V, the external limit resistance R must be 0Ω.
  When the crest value of the input signal exceeds 5V, use the external limit resistance R to limit the input current to approximately 15mA.

Output circuit configuration (MON)



- Phase origin monitor output signal
  Contact mode: Open collector output of the photo coupler
  Contact capacity: DC30V 5mA or under

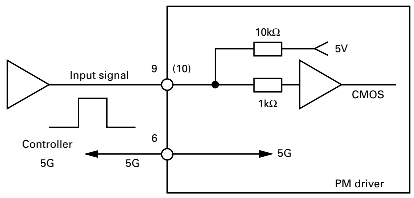
Timing of MON output (in 1-division setting)



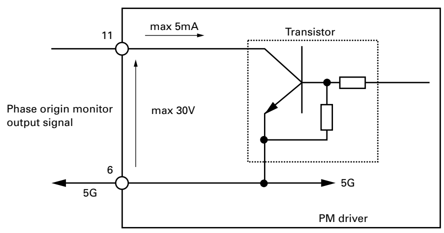
- The internal photo coupler or transistor turns ON at ■.

PMM-MD-23211-10(CMOS input method)
PMM-MD-23221-21(CMOS input method)
PMM-MD-23221-10(CMOS input method)

Input circuit configuration (PD, S, SEL)

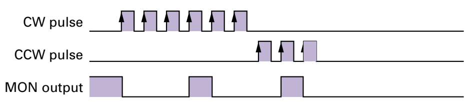


Output circuit configuration (MON)



- Phase origin monitor output signal
  Contact mode: Open collector output by the transistor
  Contact capacity: DC30V 5mA or under

Timing of MON output (in 1-division setting)

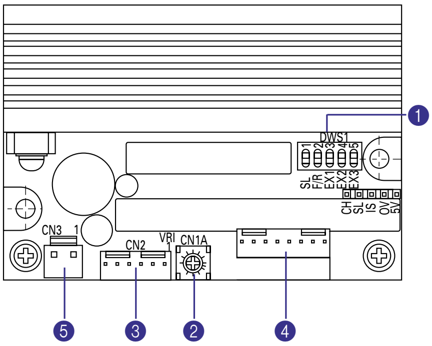


- The internal photo coupler or transistor turns ON at ■.

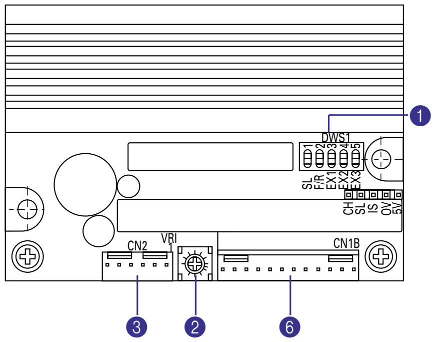
Operation, Connection, and Function

PM deriver component names

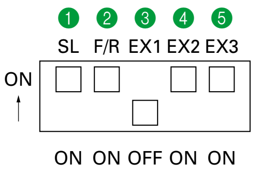
PMM-MD-23210-10(Photo coupler input method)
PMM-MD-23220-21(Photo coupler input method)
PMM-MD-23220-10(Photo coupler input method)



PMM-MD-23211-10(CMOS input method)
PMM-MD-23221-21(CMOS input method)
PMM-MD-23221-10(CMOS input method)



❶Function selection DIP switch pack --- All models in common



- The factory setting is shown in the figure above.
- Turn off the power supply to the PM driver before changing DIP switch setting.

① SL (Auto current down selection)
Select Auto current down function selection.

SL	Auto current down
ON	Enabled
OFF	Disabled

②F/R (Pulse-input method selection)
Select the pulse-input method.

F/R	Pulse-input mode
ON	2-input mode (CW, CCW)
OFF	1-input mode (CK, U/D)

③④⑤ EX1, EX2, EX3 (Step angle setting selection)
Enables selection of division numbers of basic step angles when micro step is driven.

EX1	EX2	EX3	Number of divisions
ON	ON	ON	1 (Full step)
OFF	ON	OFF	2 (Half step)
ON	OFF	OFF	4
OFF	OFF	OFF	8

❷Operating-current adjustment controller (VR1) --- All models in common

The controller is to adjust operating-current of the stepping motor.
The factory setting is at the rated current of standard combined stepping motor.

❸Connector (CN2) --- All models in common

Connects motor power line

❹Connector (CN1A) --- Photo coupler input method

Connects I/O line

❺Connector (CN3) --- Photo coupler input method

Connects DC power line

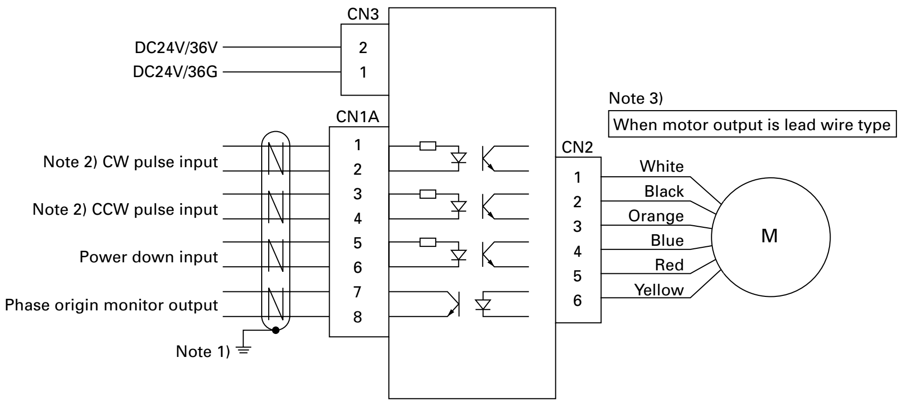
❻Connector (CN1B) --- CMOS input method

Connect I/O line and DC power line

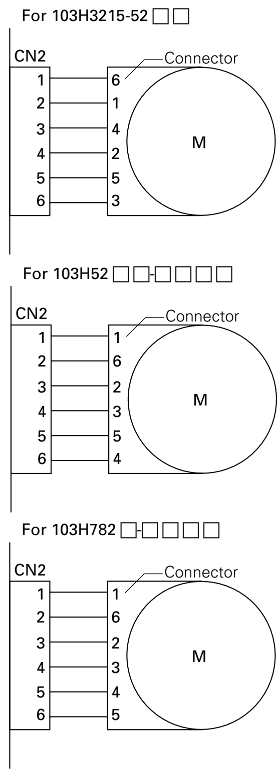
Operation, Connection, and Function

● External wiring diagram

PMM-MD-23210-10(Photo coupler input method)
PMM-MD-23220-21(Photo coupler input method)
PMM-MD-23220-10(Photo coupler input method)



Note 3)
When motor output is connector type

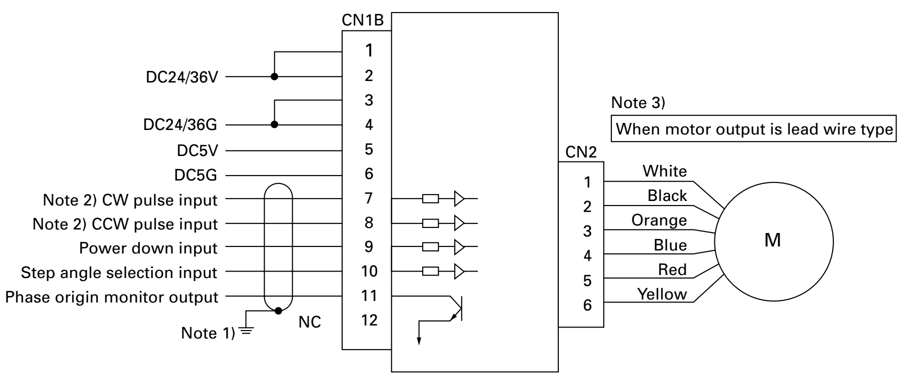


● Connectors used

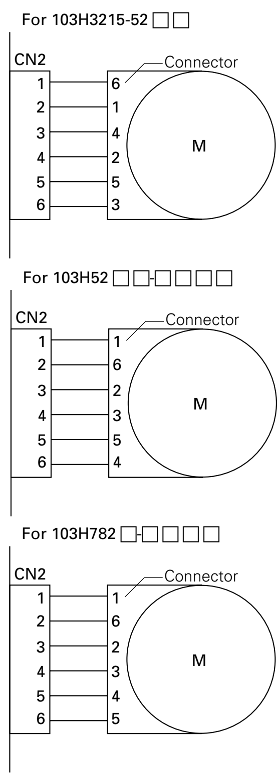
PM Diver side		Corresponding connector model number	Maker
Use	Model number		
For I/O signal (CN1A)	5045-08AG	Corresponding housing: 5051-08 Corresponding contact: 2759PBG	Molex
For stepping motor (CN2)	5045-06A	Corresponding housing: 5051-06 Corresponding contact: 5159PBT	Molex
For DC power source (CN3)	5273-02A	Corresponding housing: 5095-02 Corresponding contact: 5194PBT	Molex

• For the applicable connector, the client is requested to procure or place orders with us from the optional connector sets or the connector cables we offer. (Refer to the page 84.)

PMM-MD-23211-10(CMOS input method)
PMM-MD-23221-21(CMOS input method)
PMM-MD-23221-10(CMOS input method)



Note 3)
When motor output is connector type



● Connectors used

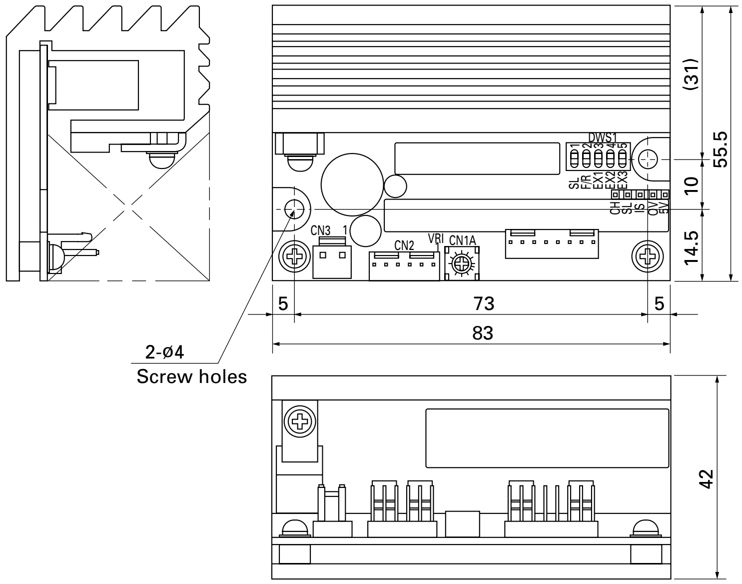
PM Diver side		Corresponding connector model number	Maker
Use	Model number		
For DC power source and I/O signals (CN1B)	5045-12AG	Corresponding housing: 5051-12 Corresponding contact: 2759PBG	Molex
For stepping motor (CN2)	5045-06A	Corresponding housing: 5051-06 Corresponding contact: 5159PBT	Molex

• For the applicable connector, the client is requested to procure or place orders with us from the optional connector sets or the connector cables we offer. (Refer to the page 84.)

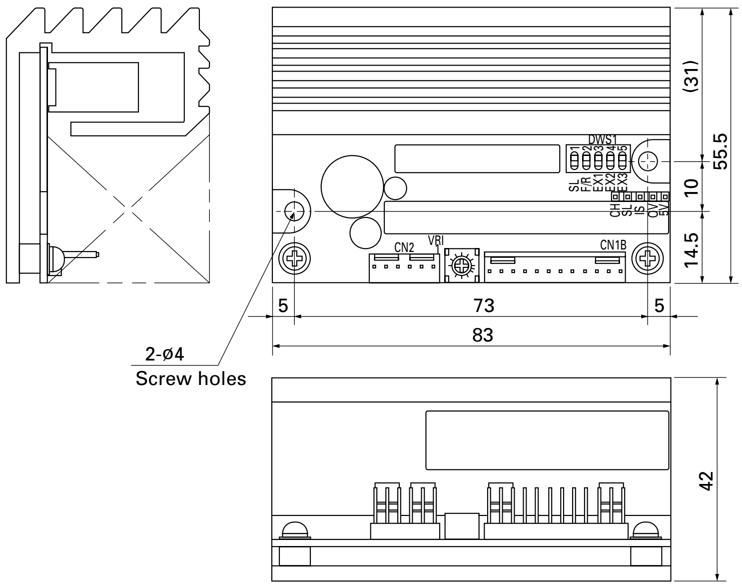
Note 1) Use twist pair shielded cables.
Note 2) Selection is possible between “2-input mode (CW, CCW)” and “1-input mode (CK, U/D)” by the function selection switch F/R.
Note 3) Motor output of stepping motor models 103H3215, 103H52□□, 103H782□ are connector type.
Motor side pin number and driver side connector(CN2) pin number is not match. So please be careful when connecting.

Dimensions (unit:mm)

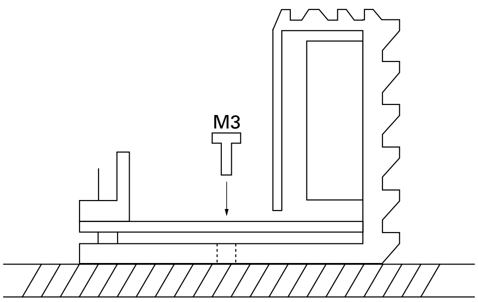
PMM-MD-23210-10(Photo coupler input method)
PMM-MD-23220-21(Photo coupler input method)
PMM-MD-23220-10(Photo coupler input method)



PMM-MD-23211-10(CMOS input method)
PMM-MD-23221-21(CMOS input method)
PMM-MD-23221-10(CMOS input method)



Mounting direction and mounting position



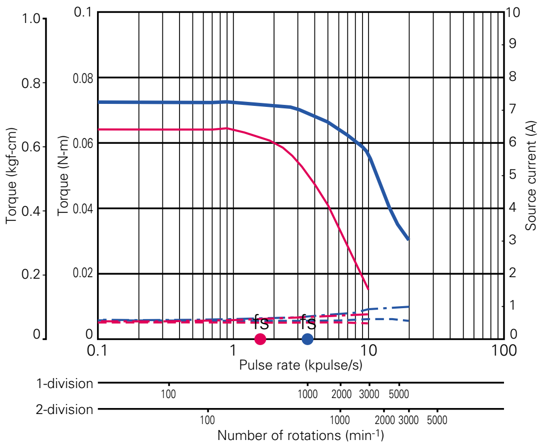
- Mount the PM driver as it stands upright.
- Use the mounting holes in the bottom of the PM driver with M4 screws as shown in the figure. (No mounting hardware is required.)
- The length of the screws projecting inward the driver enclosure shall be shorter than 7mm.

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

fs: Maximum self-start frequency when not loaded. ■ 1-division is specified ■ 2-division is specified

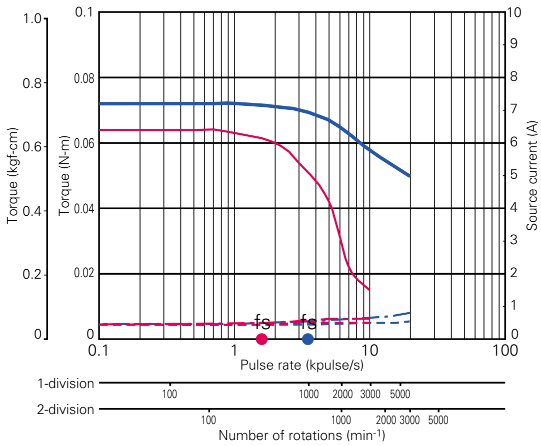
PMM-MD-23210-10 PMM-MD-23211-10

●103H3215-52□□: 24V



Source voltage: DC24V, Wire-wound current:1A/phase
—— Getaway torque (J_{L1}=0.33x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

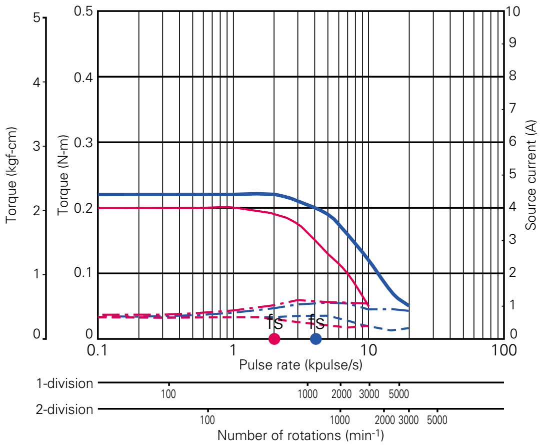
●103H3215-52□□: 36V



Source voltage: DC36V, Wire-wound current:1A/phase
—— Getaway torque (J_{L1}=0.33x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

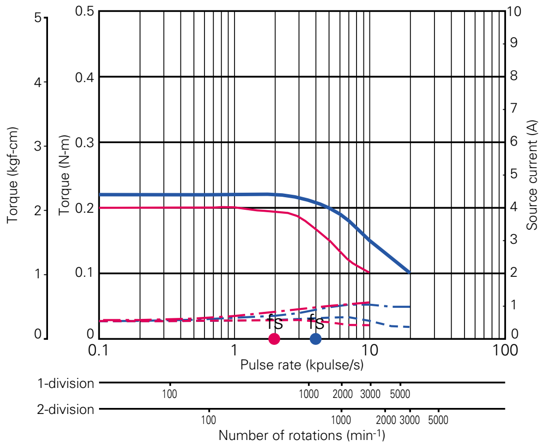
PMM-MD-23220-21 PMM-MD-23221-21

●103H5205-04□□: 24V



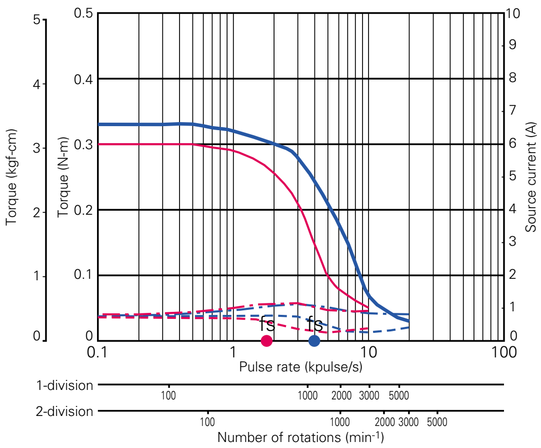
Source voltage: DC24V, Wire-wound current:1.2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H5205-04□□: 36V



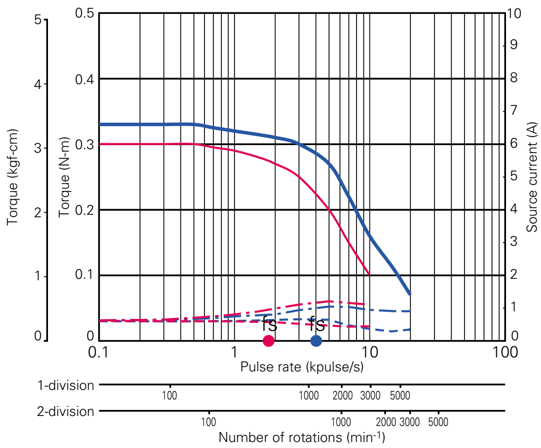
Source voltage: DC36V, Wire-wound current:1.2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H5208-04□□: 24V



Source voltage: DC24V, Wire-wound current:1.2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H5208-04□□: 36V



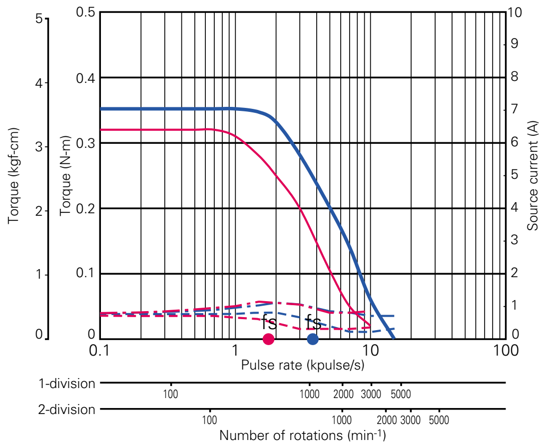
Source voltage: DC36V, Wire-wound current:1.2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

fs: Maximum self-start frequency when not loaded. ■ 1-division is specified ■ 2-division is specified

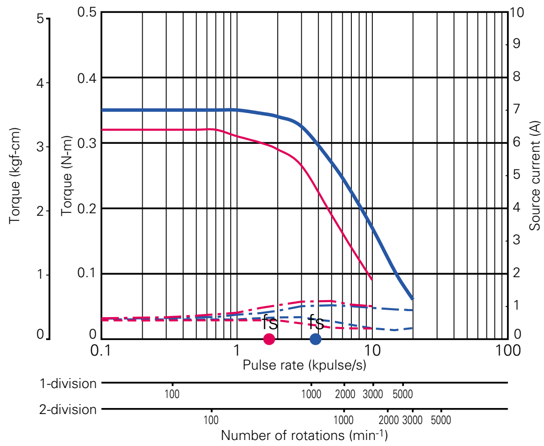
PMM-MD-23220-21 PMM-MD-23221-21

●103H5209-04□□: 24V



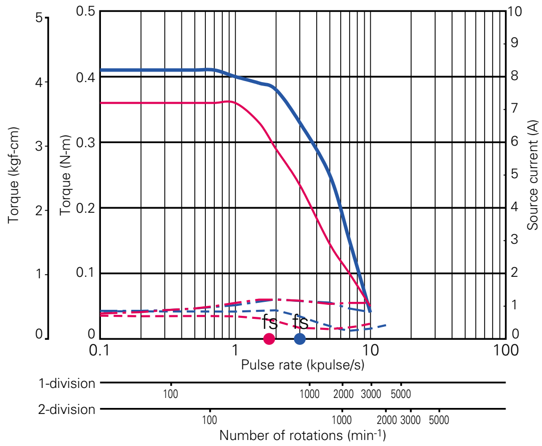
Source voltage: DC24V, Wire-wound current:1.2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H5209-04□□: 36V



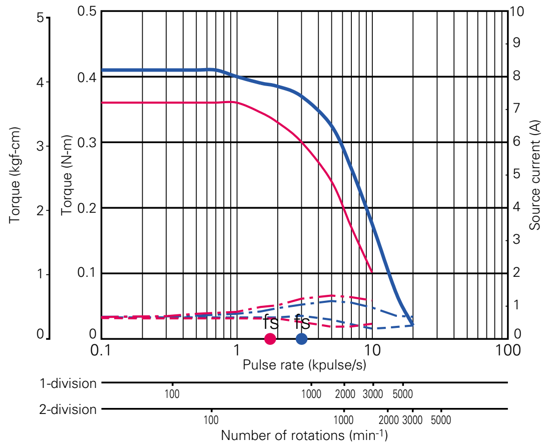
Source voltage: DC36V, Wire-wound current:1.2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H5210-04□□: 24V



Source voltage: DC24V, Wire-wound current:1.2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

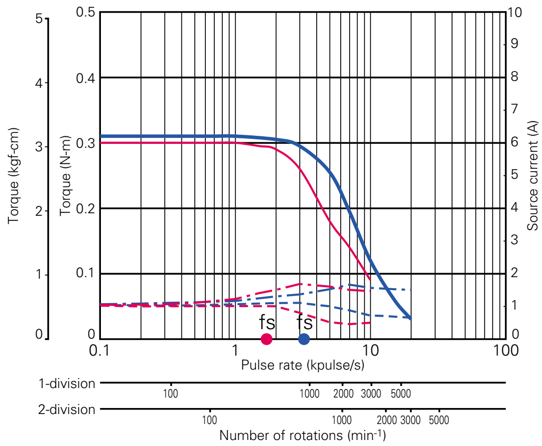
●103H5210-04□□: 36V



Source voltage: DC36V, Wire-wound current:1.2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

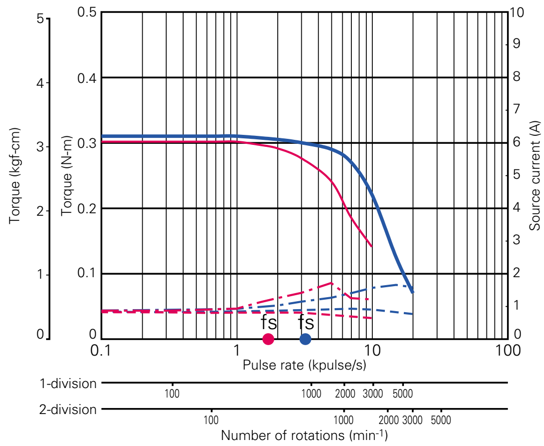
PMM-MD-23220-10 PMM-MD-23221-10

●103H6701-04□□: 24V



Source voltage: DC24V, Wire-wound current:1.2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H6701-04□□: 36V



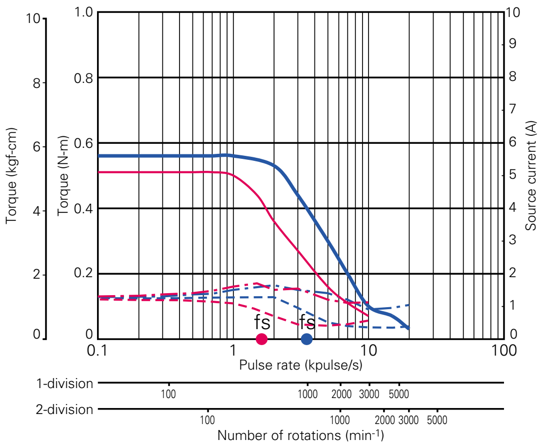
Source voltage: DC36V, Wire-wound current:1.2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

fs: Maximum self-start frequency when not loaded. ■ 1-division is specified ■ 2-division is specified

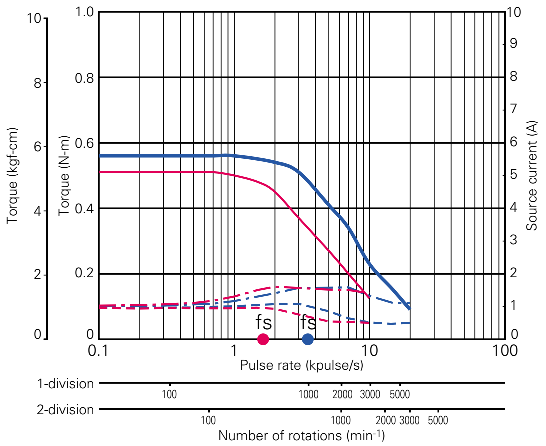
PMM-MD-23220-10 PMM-MD-23221-10

●103H6703-04□□: 24V



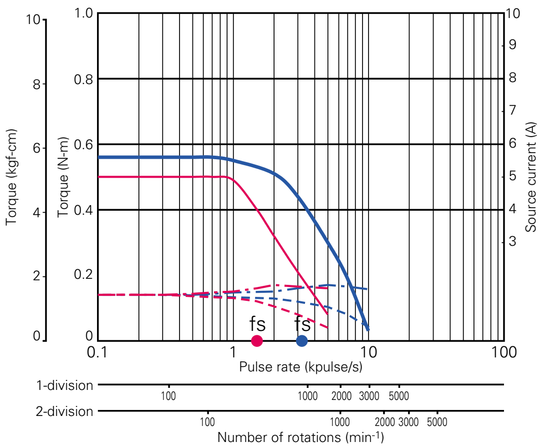
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H6703-04□□: 36V



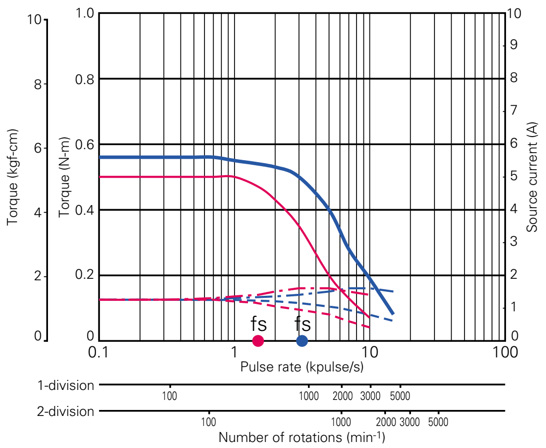
Source voltage: DC36V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H6704-04□□: 24V



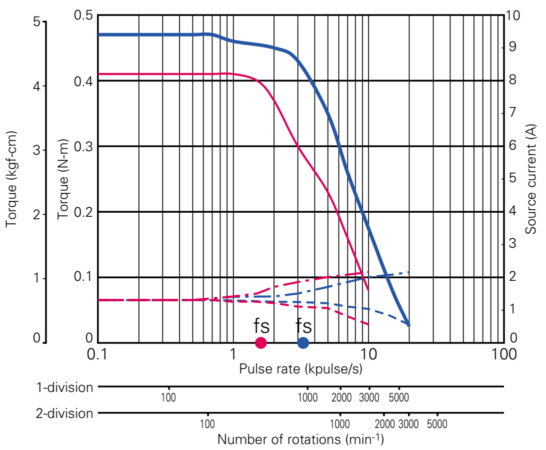
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H6704-04□□: 36V



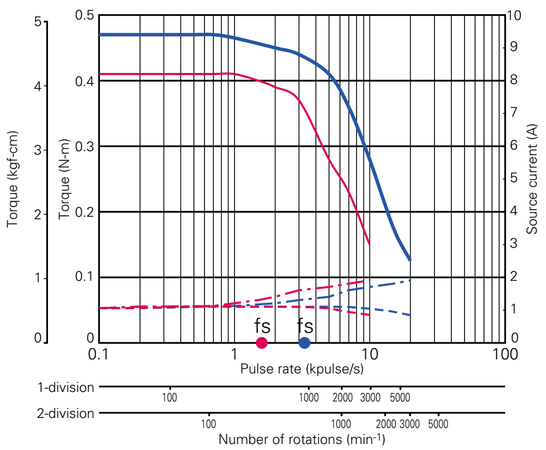
Source voltage: DC36V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7121-04□□: 24V



Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7121-04□□: 36V



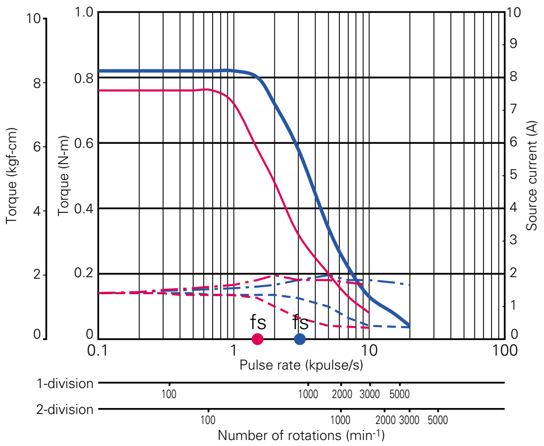
Source voltage: DC36V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

fs: Maximum self-start frequency when not loaded. ■ 1-division is specified ■ 2-division is specified

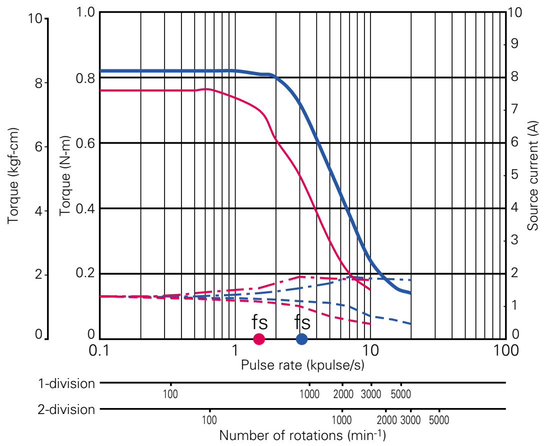
PMM-MD-23220-10 PMM-MD-23221-10

●103H7123-04□□: 24V



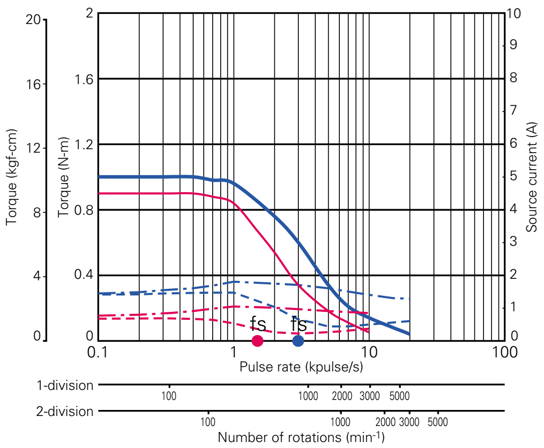
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=2.6x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7123-04□□: 36V



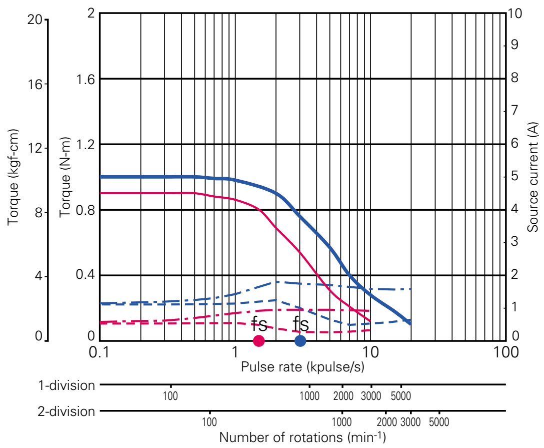
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=2.6x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7124-04□□: 24V



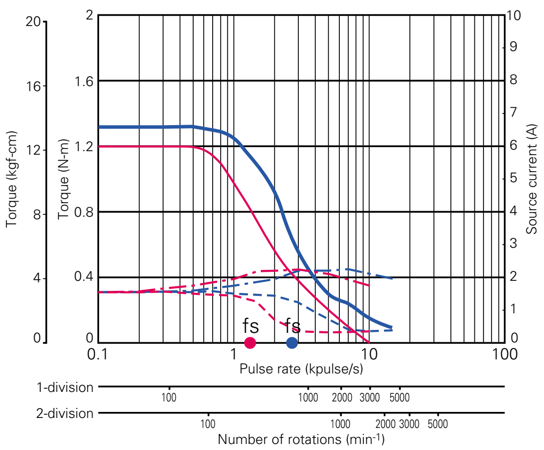
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=2.6x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7124-04□□: 36V



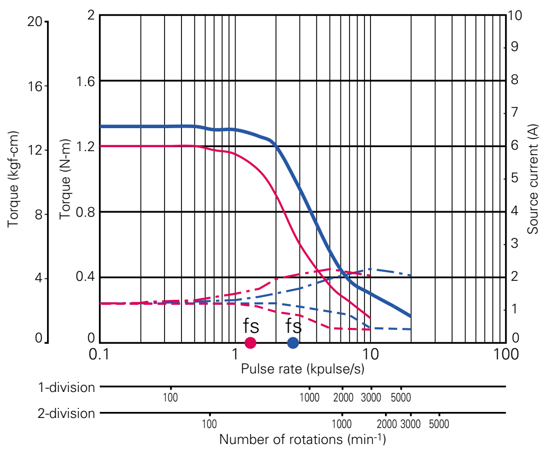
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=2.6x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7126-04□□: 24V



Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=2.6x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7126-04□□: 36V



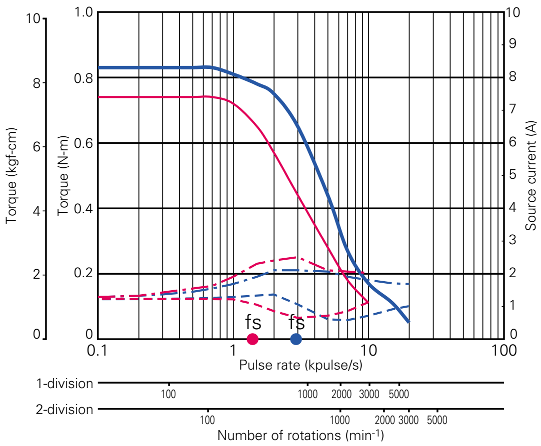
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=2.6x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

fs: Maximum self-start frequency when not loaded. ■ 1-division is specified ■ 2-division is specified

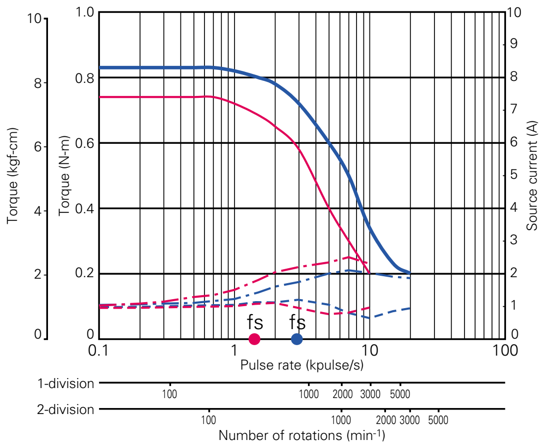
PMM-MD-23220-10 PMM-MD-23221-10

●103H7821-04□□: 24V



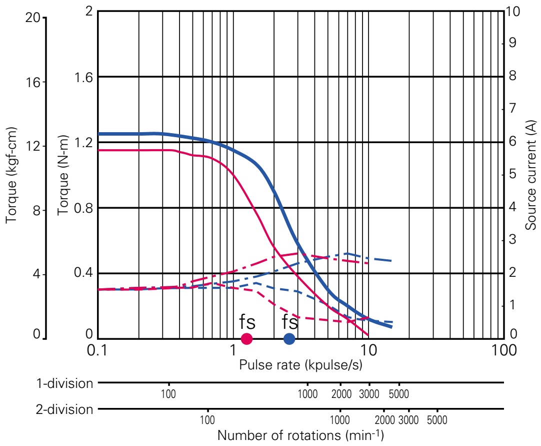
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=2.6x10-4kg·m² Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7821-04□□: 36V



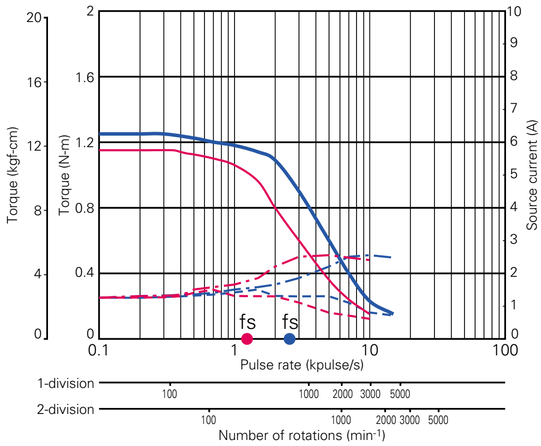
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=2.6x10-4kg·m² Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7822-04□□: 24V



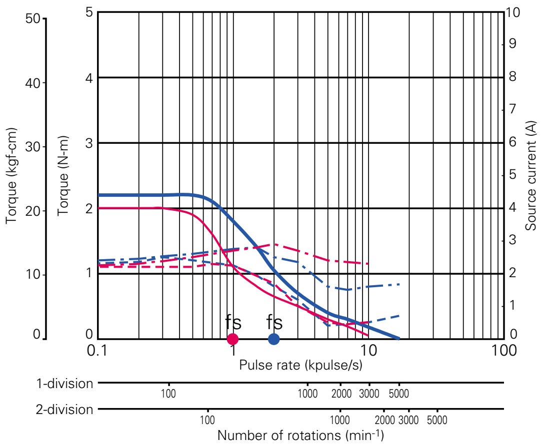
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=2.6x10-4kg·m² Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7822-04□□: 36V



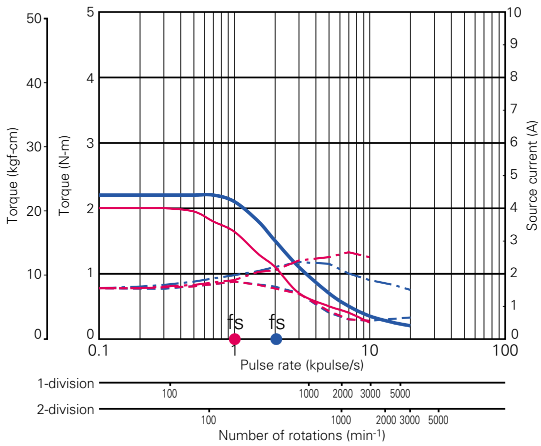
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=2.6x10-4kg·m² Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7823-04□□: 24V



Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=15.1x10-4kg·m² Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7823-04□□: 36V



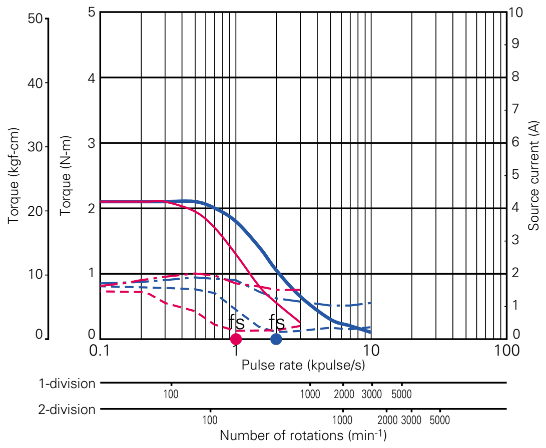
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=15.1x10-4kg·m² Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

fs: Maximum self-start frequency when not loaded. ■ 1-division is specified ■ 2-division is specified

PMM-MD-23220-10 PMM-MD-23221-10

●103H8221-04□□: 24V

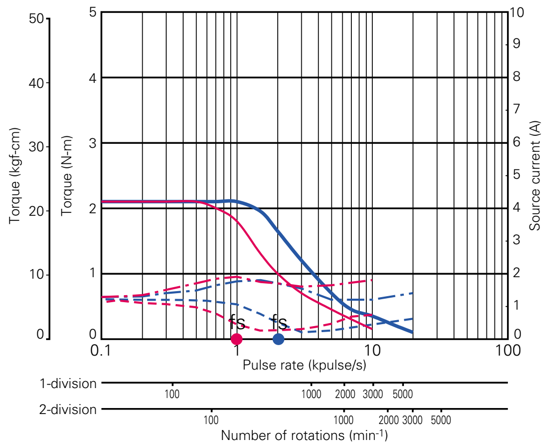


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=15.1x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H8221-04□□: 36V

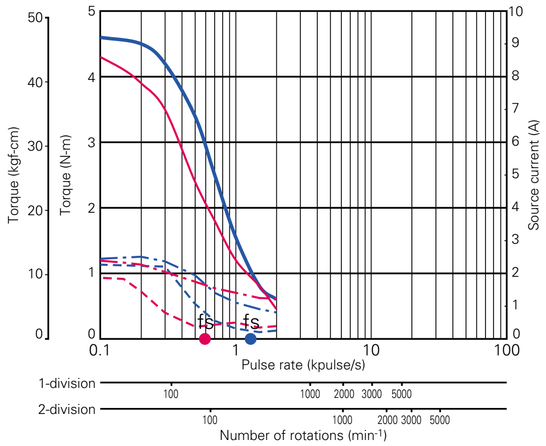


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=15.1x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H8222-04□□: 24V

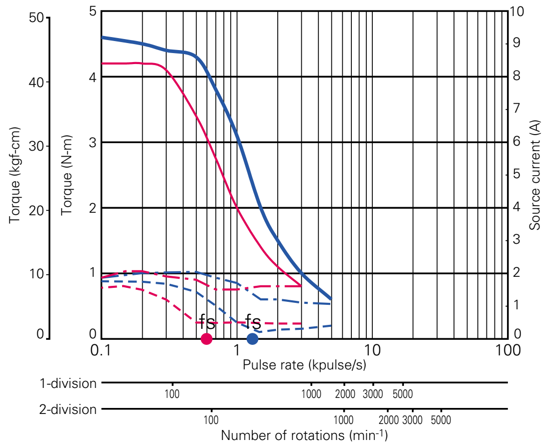


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=15.1x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H8222-04□□: 36V

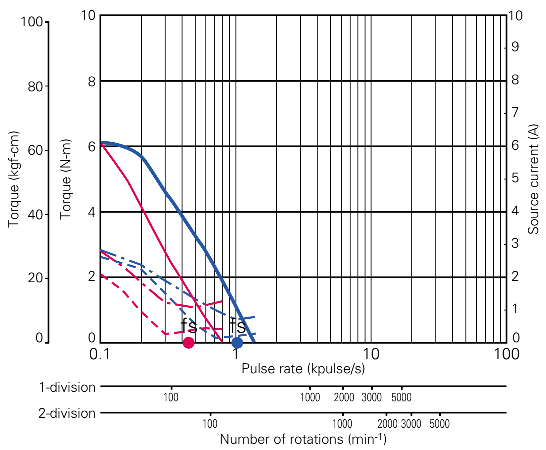


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=15.1x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H8223-04□□: 24V

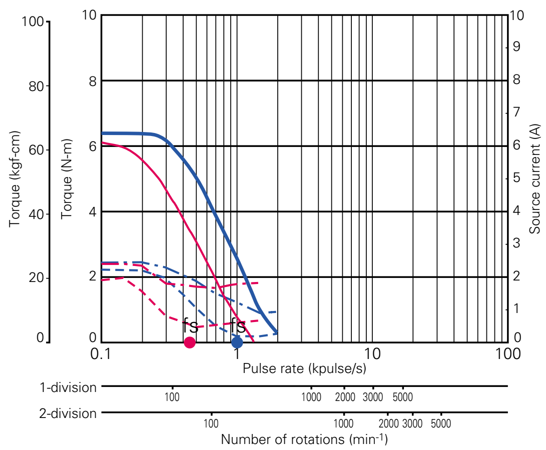


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=15.1x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H8223-04□□: 36V



Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=15.1x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

Option

Connector set

PMM-MD-23210-10 (Photo coupler input method)

Model	Used for	Contents of set	Quantity	Manufacturer	Applicable wire size	Crimp tool number
PM-AP-009	I/O signal (CN1A)	Applicable housing:5051-08	1	Molex	AWG22~28	JHTR2262A
		Applicable contact:2759PBGL	8			JHTR2262J
PM-AP-053	Stepping motor (CN2)	Applicable housing:5051-06	1	Molex	AWG24~28	JHTR2262A
		Applicable contact:5159PBTL	6			JHTR2262J
		Applicable housing:PHR-6	1	J.S.T. MFG. CO., LTD.		YRS-240
		Applicable contact:SPH-002T-P0.5S	6			
PM-AP-013	DC power supply (CN3)	Applicable housing:5195-02	1	Molex	AWG18~24	JHTR5904
		Applicable contact:5194PBTL	2			

PMM-MD-23211-10 (CMOS input method)

Model	Used for	Contents of set	Quantity	Manufacturer	Applicable wire size	Crimp tool number
PM-AP-011	Power supply I/O signal (CN1B)	Applicable housing:5051-12	1	Molex	AWG22~28	JHTR2262A
		Applicable contact:2759PBGL	12			JHTR2262J
PM-AP-053	Stepping motor (CN2)	Applicable housing:5051-06	1	Molex	AWG24~28	JHTR2262A
		Applicable contact:5159PBTL	6			JHTR2262J
		Applicable housing:PHR-6	1	J.S.T. MFG. CO.,LTD		YRS-240
		Applicable contact:SPH-002T-P0.5S	6			

PMM-MD-23220-21 (Photo coupler input method)

Model	Used for	Contents of set	Quantity	Manufacturer	Applicable wire size	Crimp tool number
PM-AP-009	I/O signal (CN1A)	Applicable housing:5051-08	1	Molex	AWG22~28	JHTR2262A
		Applicable contact:2759PBGL	8			JHTR2262J
PM-AP-054	Stepping motor (CN2)	Applicable housing:5051-06	1	Molex	AWG22~28	JHTR2262A
		Applicable contact:5159PBTL	6			JHTR2262J
		Applicable housing:EHR-6	1	J.S.T. MFG. CO., LTD.		YRS-260
		Applicable contact:SEH-001T-P0.6	6			
PM-AP-013	DC Power supply (CN3)	Applicable housing:5195-02	1	Molex	AWG18~24	JHTR5904
		Applicable contact:5194PBTL	2			

PMM-MD-23221-21 (CMOS input method)

Model	Used for	Contents of set	Quantity	Manufacturer	Applicable wire size	Crimp tool number
PM-AP-011	Power supply I/O signal (CN1B)	Applicable housing:5051-12	1	Molex	AWG22~28	JHTR2262A
		Applicable contact:2759PBGL	12			JHTR2262J
PM-AP-054	Stepping motor (CN2)	Applicable housing:5051-06	1	Molex	AWG22~28	JHTR2262A
		Applicable contact:5159PBTL	6			JHTR2262J
		Applicable housing:EHR-6	1	J.S.T. MFG. CO., LTD.		YRS-260
		Applicable contact:SEH-001T-P0.6	6			

PMM-MD-23220-10 (Photo coupler input method)

Model	Used for	Contents of set	Quantity	Manufacturer	Applicable wire size	Crimp tool number
PM-AP-009	I/O signal (CN1A)	Applicable housing:5051-08	1	Molex	AWG22~28	JHTR2262A
		Applicable contact:2759PBGL	8			JHTR2262J
PM-AP-047 H785 □ type	Stepping motor (CN2)	Applicable housing:5051-06	1	Molex	AWG22	JHTR2262A
		Applicable contact:5159PBTL	6			
		Applicable housing:VHR-6N	1	J.S.T. MFG. CO., LTD.		YC-160R
		Applicable contact:SVH-21T-P1.1	6			
PM-AP-008 Other types		Applicable housing:5051-06	1	Molex	AWG22	JHTR2262A
		Applicable contact:5159PBTL	6			
PM-AP-013	DC Power supply (CN3)	Applicable housing:5195-02	1	Molex	AWG18~24	JHTR5904
		Applicable contact:5194PBTL	2			

PMM-MD-23221-10 (CMOS input method)

Model	Used for	Contents of set	Quantity	Manufacturer	Applicable wire size	Crimp tool number
PM-AP-011	Power supply I/O signal (CN1B)	Applicable housing:5051-12	1	Molex	AWG22~28	JHTR2262A
		Applicable contact:2759PBGL	12			JHTR2262J
PM-AP-047 H785 □ type	Stepping motor (CN2)	Applicable housing:5051-06	1	Molex	AWG22	JHTR2262A
		Applicable contact:5159PBTL	6			
		Applicable housing:VHR-6N	1	J.S.T. MFG. CO., LTD.	AWG22	YC-160R
		Applicable contact:SVH-21T-P1.1	6			
PM-AP-008 Other types		Applicable housing:5051-06	1	Molex	AWG22	JHTR2262A
		Applicable contact:5159PBTL	6			

Option

Connector cable

PMM-MD-23210-10 (Photo coupler input method)
PMM-MD-23220-21 (Photo coupler input method)
PMM-MD-23220-10 (Photo coupler input method)

Model	Used for
PM-C08S0100-01	I/O signal (CN1) connector cable
PM-C02P0100-02	DC power supply (CN2) connector cable
PM-C06M0100-□□	Stepping motor (CN3) connector cable

PMM-MD-23211-10 (CMOS input method)
PMM-MD-23221-21 (CMOS input method)
PMM-MD-23221-10 (CMOS input method)

Model	Used for
PM-C12T0100-01	DC power supply, I /O signal(CN1B) connector cable
PM-C06M0100-□□	Stepping motor (CN2) connector cable

□□ ··· is 01, 03, 05 or 06. (Refer to separate table 1.)

- The connector cables consist of each interface connector with a 1m cable assembled.

Model No. of stepping motor cable (Separate Table 1)

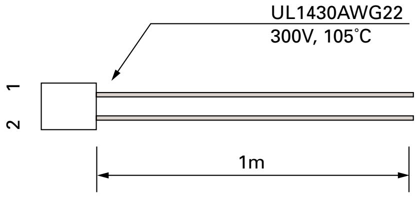
Serial No.	Stepping motor model No.
01	103H6701-04□□
	103H6703-04□□
	103H6704-53□□
	103H7121-04□□
	103H7123-04□□
	103H7124-04□□
	103H7126-04□□
	103H8221-50□□
	103H8222-50□□
	103H8223-50□□

Serial No.	Stepping motor model No.
03	103H7821-04□□
	103H7822-04□□
	103H7823-04□□
05	103H3215-52□□
06	103H5205-04□□
	103H5208-04□□
	103H5209-04□□
	103H5210-04□□

Cable 1 (Power source cable)

Driver side

Pin No.	Color
1	White
2	Black

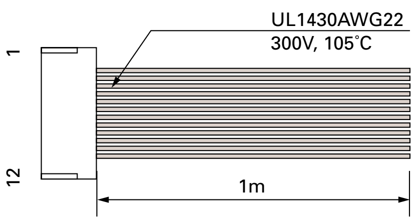


Model of cable	Length
PM-C02P0100-02	1m

Cable 2(Power source, signal cable)

Driver side

Pin No.	Color
1	White
2	
3	Black
4	
5	White
6	Black
7	Blue
8	
9	
10	
11	
12	



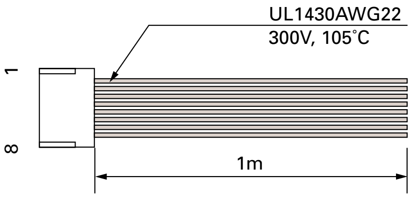
Model of cable	Length
PM-C12T0100-01	1m

Option

●Cable 3 (Signal cable)

Driver side

Pin No.	Color
1	Blue
2	
3	
4	
5	
6	
7	
8	

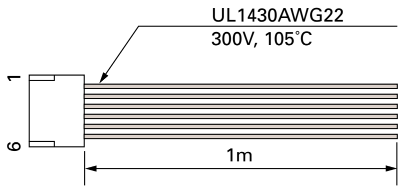


Model of cable	Length
PM-C08S0100-01	1m

●Cable 4(Stepping motor extension cable)

Driver side

Pin No.	Color
1	White
2	Black
3	Orange
4	Blue
5	Red
6	Yellow



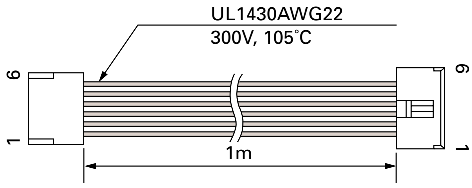
Model of cable	Length
PM-C06M0100-01	1m

Applicable stepping motor	
103H6701-04□0	103H7124-04□0
103H6703-04□0	103H7126-04□0
103H6704-04□0	103H8221-04□1
103H7121-04□0	103H8222-04□1
103H7123-04□0	103H8223-04□1

●Cable 5 (Stepping motor extension cable)

Driver side

Pin No.	Color
1	White
2	Black
3	Orange
4	Blue
5	Red
6	Yellow



Stepping motor side

Pin No.	Color
1	White
2	Orange
3	Blue
4	Red
5	Yellow
6	Black

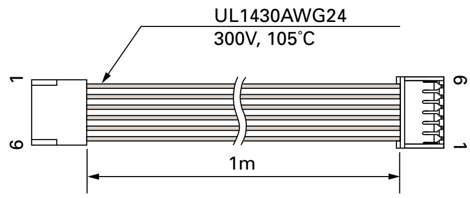
Model of cable	Length
PM-C06M0100-03	1m

Applicable stepping motor
103H7821-04□0
103H7822-04□0
103H7823-04□0

●Cable 6 (Stepping motor extension cable)

Driver side

Pin No.	Color
1	White
2	Black
3	Orange
4	Blue
5	Red
6	Yellow



Stepping motor side

Pin No.	Color
1	Black
2	Blue
3	Yellow
4	Orange
5	Red
6	White

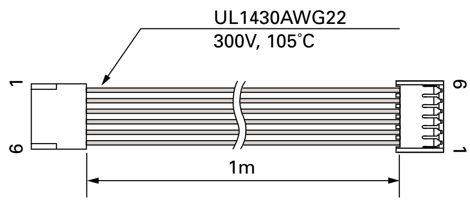
Model of cable	Length
PM-C06M0100-05	1m

Applicable stepping motor
103H3215-52□0

●Cable 7(Stepping motor extension cable)

Driver side

Pin No.	Color
1	White
2	Black
3	Orange
4	Blue
5	Red
6	Yellow



Stepping motor side

Pin No.	Color
1	White
2	Orange
3	Blue
4	Yellow
5	Red
6	Black

Model of cable	Length
PM-C06M0100-06	1m

Applicable stepping motor
103H5205-04□0
103H5208-04□0
103H5209-04□0
103H5210-04□0

2-phase Stepping Driver

PMM-MD-23120-10

DC24V/36V

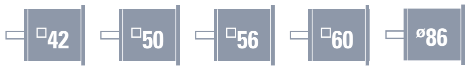
Unipolar type

(Applicable motor rated current 1.2A/phase, 2A/phase)

Micro-step (200 X 1~180 divisions)

(Smooth operation and low vibration even at low speeds.)

● Applicable motor



Standard combined stepping motors

Dimensions of Stepping Motor	Stepping motor model number		Rated current [A/phase]	Holding torque [N-m]	Rotor inertia [x 10^{-4}kg-m^2]	Weight [kg]	Page
	Single-axis shaft	Dual-axis shaft					
□42mm	103H5205-0440	103H5205-0410	1.2	0.2	0.036	0.23	65 Page
	103H5208-0440	103H5208-0410	1.2	0.3	0.056	0.29	
	103H5209-0440	103H5209-0410	1.2	0.32	0.062	0.31	
	103H5210-0440	103H5210-0410	1.2	0.37	0.074	0.37	
□50mm	103H6701-0440	103H6701-0410	2	0.28	0.057	0.35	69 Page
	103H6703-0440	103H6703-0410	2	0.49	0.118	0.5	
	103H6704-0440	103H6704-0410	2	0.52	0.14	0.5	
□56mm	103H7121-0440	103H7121-0410	2	0.39	0.1	0.47	73 Page
	103H7123-0440	103H7123-0410	2	0.83	0.21	0.65	
	103H7124-0440	103H7124-0410	2	0.98	0.245	0.8	
	103H7126-0440	103H7126-0410	2	1.27	0.36	0.98	
□60mm	103H7821-0440	103H7821-0410	2	0.78	0.275	0.6	79 Page
	103H7822-0440	103H7822-0410	2	1.17	0.4	0.77	
	103H7823-0440	103H7823-0410	2	2.1	0.84	1.34	
ø86mm	103H8221-0441	103H8221-0411	2	2.15	1.45	1.5	83 Page
	103H8222-0441	103H8222-0411	2	4.13	2.9	2.5	
	103H8223-0441	103H8223-0411	2	6.27	4.4	3.5	

• For information about the general specifications and dimensions of each stepping motor, refer to its page.

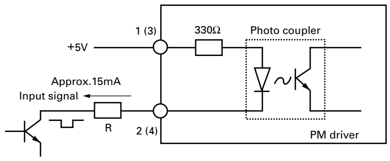
Specifications of PM Driver

Item				PMM-MD-23120-10
Basic specifications		Input source		DC24V/36V±10%
		Source current		3A
		Rated current		2A/phase (Changeable to 1.2A/phase, refer to Page 46)
	Environment	Operating ambient temperature		0~+50˚C
		Conservation temperature		-20~+70˚C
		Operating ambient humidity		35~85% RH (no condensation)
		Conservation humidity		10~90% RH (no condensation)
		Vibration resistance		$4.9m/s^2$ Frequency range 10~55Hz, Direction: along X,Y and Z axes, for 2 hours each.
		Impact resistance		Considering the NDS-C-0110 standard section 3.2.2 division "C", not influenced.
		Withstand voltage		Not influenced when AC500V is applied between power input terminal and cabinet for one minute.
		Insulation resistance		10MΩ or more when measured with DC500V megohmmeter between input terminal and cabinet.
		Weight		0.6kg
Function		Selection, setting function		Pulse input mode selection-- DIP switches enables selection of 1-input and 2-input mode Resolution setting-- Rotary switches enables 8 divisions ranging from 1~180 resolutions. Power down --- External signal input enables to turn off the current that flows through the stepping motor. Automatic current down selection-- Automatic current down function can be selected. Resolution selection--- External signal input enables to select 2 resolutions. Driving current switch setting--- The rotary switch enables to set driving current of the stepping motor from rated current to 0%.
I/O signals		Signal Name (Brevity code)	Pin No. (CN3)	
		CW pulse Input signal (CW)	1 2	In the 2-input mode, inputs driving pulses to rotate in CW direction.
		(CK)		In the 1-input mode, inputs driving pulse train to rotate the step motor rotation. Photo coupler input method, input resistance 330Ω Input signal voltage: H = 4.0 to 5.5V, L = 0 to 0.5V Maximum input frequency:20kpulse/s
		CCW pulse Input signal (CCW)	3 4	In the 2-input mode, inputs driving pulses to rotate in CCW direction.
		(U/D)		In the 1-input mode, inputs rotation direction signals to the stepping motor. Internal photo coupler ON (CMOS type: "H" level:) --- CW direction Internal photo coupler OFF (CMOS type: "L" level)--- CCW direction. Photo coupler input method, input resistance 330Ω Input signal voltage: H = 4.0 to 5.5V, L = 0 to 0.5V Maximum input frequency:20kpulse/s
		Step angle setting selection input (S. SEL)	5 6	Input S.SEL signal to select step angle selection rotary switch (S.SEL). S.SEL input signal ON (Internal photo coupler ON) --- SEL2 setting is enabled. S.SEL input signal OFF (Internal photo coupler OFF) --- SEL1 setting is enabled. Photo coupler input method, input resistance 330Ω Input signal voltage: H = 4.0 to 5.5V, L = 0 to 0.5V
		Power down input signal (PD)	7 8	Inputs PD signal to turn off the current that flows through the stepping motor. PD input signal ON (Internal photo coupler ON) --- Power down functrion is enabled. PD input signal OFF (Internal photo coupler OFF) --- Power down function is disabled. Photo coupler input method, input resistance 330Ω

• Stepping motor rotation in the CW direction means clockwise rotation when facing the output shaft (the flange side) of the stepping motor. CCW direction means counterclockwise rotation when facing the same side.

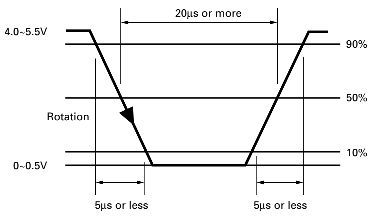
Operation, Connection, and Function

Input circuit configuration (CW, CCW)



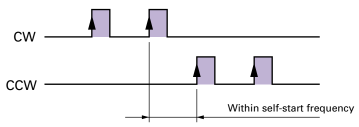
- Pulse duty 50% or less
- When the crest value of the input signal is 5V, the external limit resistance R must be 0Ω
  When the crest value of the input signal exceeds 5V, use the external limit resistance R to limit the input current to approximately 15mA.

Input signal specifications



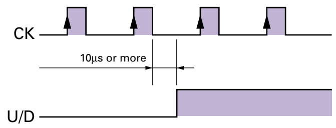
Timing of command pulse

- 2-input mode (CW, CCW)



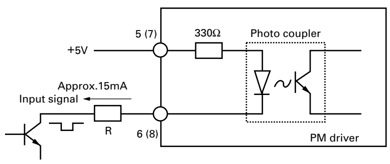
- The internal photo coupler turns ON within the ■ and, at its rising edge to ON, the internal circuit (stepping motor) is activated.
- When applying the pulse to CW, turn OFF the CCW side internal photo coupler.
- When applying the pulse to CCW, turn OFF the CW side internal photo coupler.

- 1-input mode (CK,U/D)



- The internal photo coupler turns ON within the ■ and, at the rising edge to ON of the CK photo coupler, the internal circuit (stepping motor) is activated.
- Switching the input signal U/D shall be performed while the internal photo coupler on the CK side is OFF.

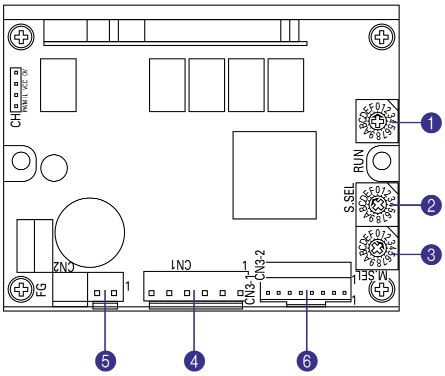
Input circuit configuration (PD, S, SEL)



- When the crest value of the input signal is 5V, the external limit resistance R must be 0Ω
  When the crest value of the input signal exceeds 5V, use the external limit resistance R to limit the input current to approximately 15mA.

Operation, Connection, and Function

PM deriver component names



❶Operation-current selection rotary switch (RUN)

Enable to select operating current value to stepping motor.

Dial	0	1	2	3	4	5	6	7
Stepping motor current (A/phase)	2.0	1.8	1.6	1.4	1.2	1.0	0.8	0.6
Dial	8	9	A	B	C	D	E	F
Stepping motor current (A/phase)	0	0	0	0	0	0	0	0

- Factory setting is "0".

❷Stepping angle selection rotary switch (S.SEL)

Enable to select standard step angle of stepping motor for 8 divisions ranging from 1~180 resolutions.

Dial		0	1	2	3	4	5	6	7
Division	SEL1	1	2	5	10	20	40	80	180
	SEL2	1	1	1	1	1	1	1	1
Dial		8	9	A	B	C	D	E	F
Division	SEL1	1	2	5	10	20	40	80	180
	SEL2	2	2	2	2	2	2	2	2

- Factory setting is "E".

❸Mode selection rotary switch (M.SEL)

Enable to select every mode

Dial		0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Pulse input	2 input	○		○		○		○		○		○		○		○	
	1 input		○		○		○		○		○		○		○		○
Automatic current down	OFF	○	○			○	○			○	○			○	○		
	ON			○	○			○	○			○	○			○	○
Low vibration method	OFF	○	○	○	○	○	○	○	○								
	ON									○	○	○	○	○	○	○	○

- Factory setting is "2".
- Enable at ○
- When low vibration is selected at 8~F, S.SEL setting is ignored and operate at low vibration mode of 1 division.

❹Connector (CN1)

Connect motor power wire.

❺Connector (CN2)

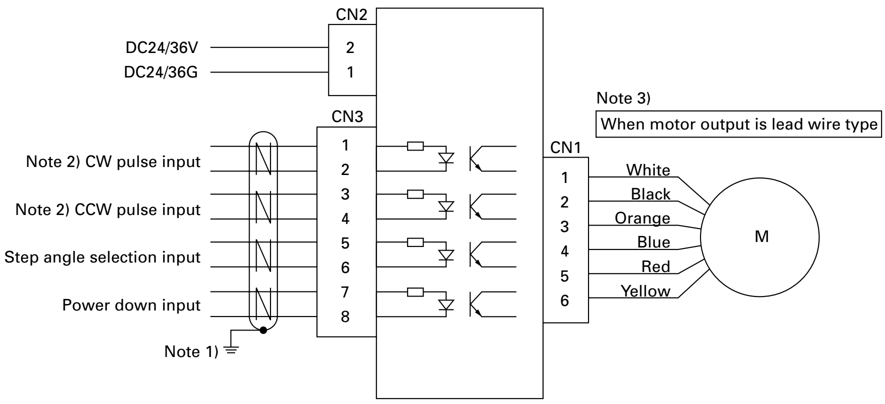
Connect DC power wire.

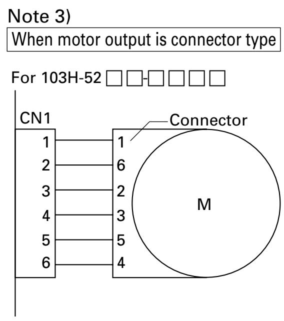
❻Connector (CN3)

Connect I/O wire.

Operation, Connection, and Function

External wiring diagram





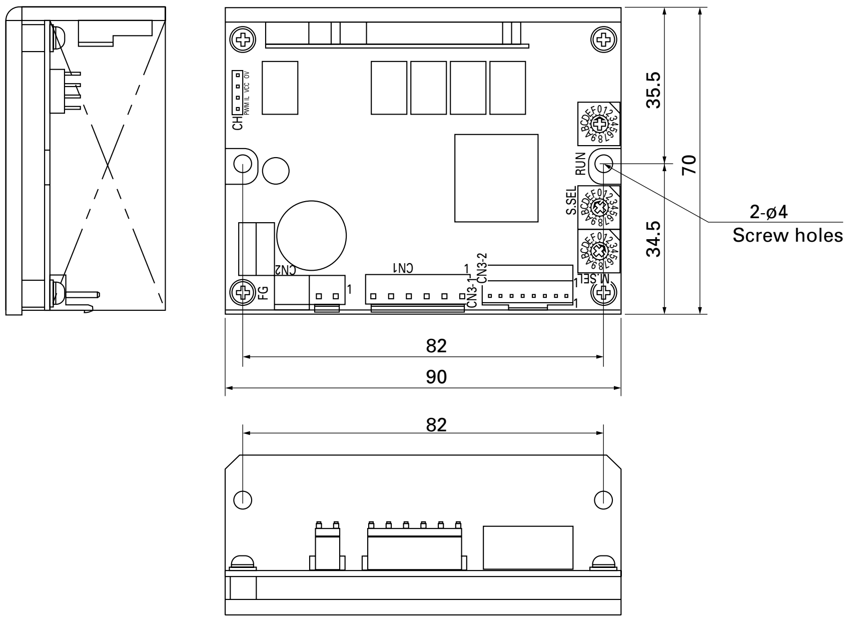
Note 1) Use twist pair shielded cables.
Note 2) Selection is possible between “2-input mode (CW pulse, CCW pulse)” and “1-input mode (CW, C/D)” by the mode selection rotary switch
Note 3) Motor output of stepping motor models 103H52 □□ is connector type. Motor side pin number and driver side connector (CN1) pin number is not match. So please be careful when connecting.

Connectors used

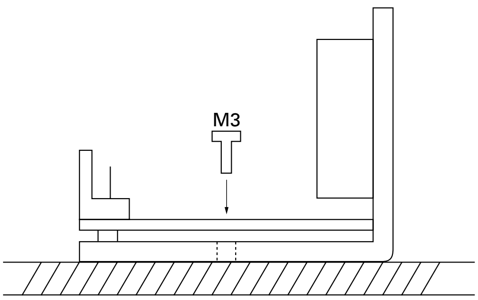
Driver side		Corresponding connector model number	Maker
Use for	Model No.		
Stepping motor (CN1)	B6P-VH	Applicable housing: VHR-6N Applicable contact: BVH-21T-P1.1	J.S.T. MFG. CO., LTD
DC Power source (CN2)	B2P-VH	Applicable housing: VHR-2N Applicable contact: BVH-21T-P1.1	J.S.T. MFG. CO., LTD
I/O signal (NC3)	IL-8P-S3 EN2-1	Applicable housing: 1L-8S-S31 Applicable contact: 1L-C2-1-10000	J.S.T. MFG. CO., LTD

• For the applicable connector, the client is requested to procure or place orders with us from the optional connector sets or the connector cables we offer (Refer to the page 55).

Dimensions (unit:mm)



Mounting direction and mounting position

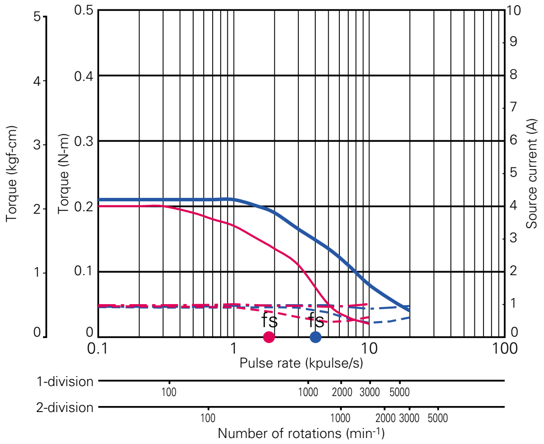


- Mount the PM driver as it stands upright.
- Use the mounting holes in the bottom of the PM driver with M4 screws as shown in the figure. (No mounting hardware is required.)
- The length of the screws projecting inward the driver enclosure shall be shorter than 7mm.

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

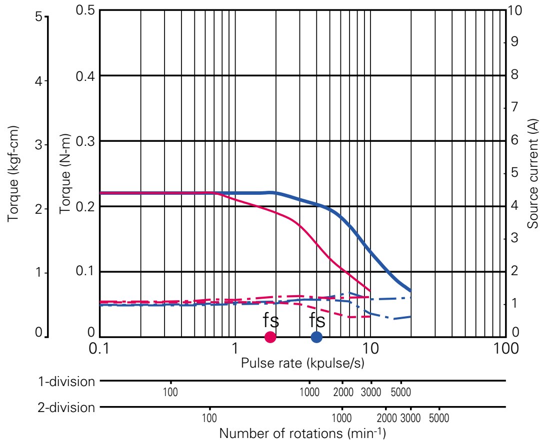
fs: Maximum self-start frequency when not loaded. ■ 1-division is specified ■ 2-division is specified

●103H5205-04□□: 24V



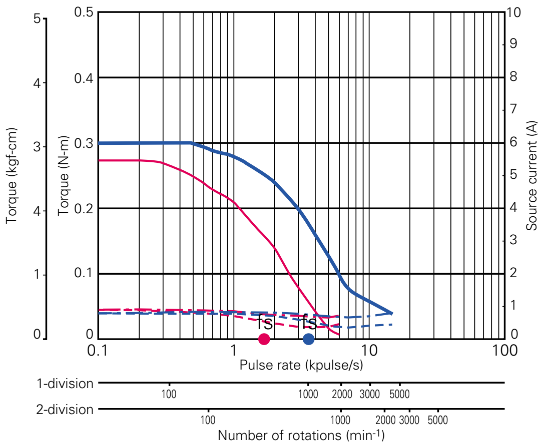
Source voltage: DC24V, Wire-wound current:1.2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H5205-04□□: 36V



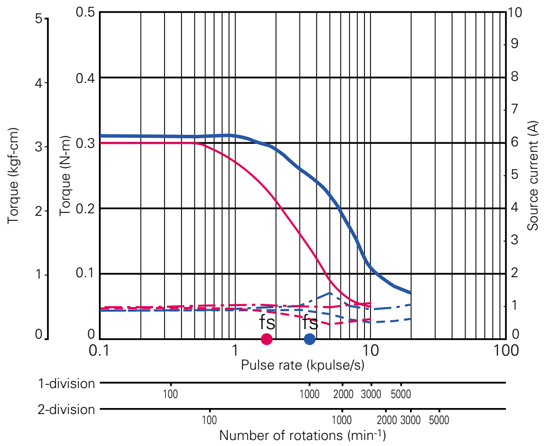
Source voltage: DC36V, Wire-wound current:1.2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H5208-04□□: 24V



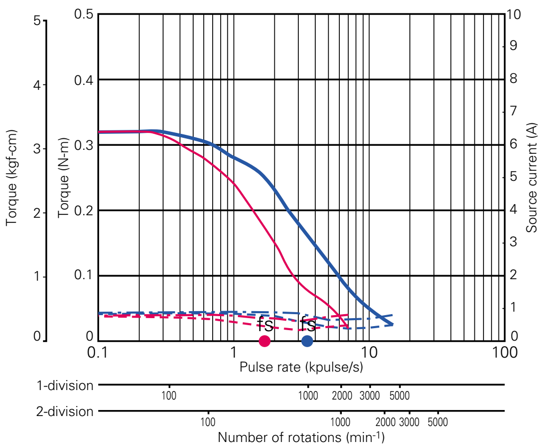
Source voltage: DC24V, Wire-wound current:1.2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H5208-04□□: 36V



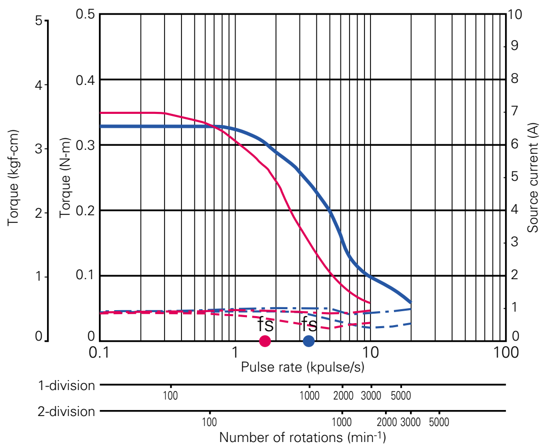
Source voltage: DC36V, Wire-wound current:1.2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H5209-04□□: 24V



Source voltage: DC24V, Wire-wound current:1.2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H5209-04□□: 36V

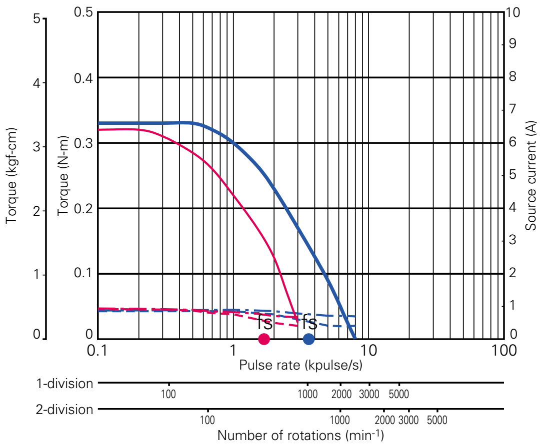


Source voltage: DC36V, Wire-wound current:1.2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

fs: Maximum self-start frequency when not loaded. ■ 1-division is specified ■ 2-division is specified

●103H5210-04□□: 24V

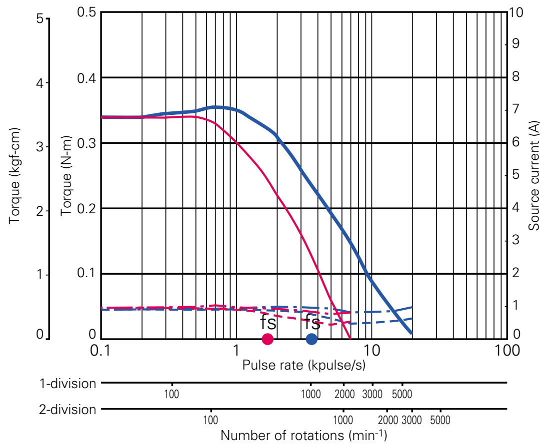


Source voltage: DC24V, Wire-wound current:1.2A/phase

—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m² Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H5210-04□□: 36V

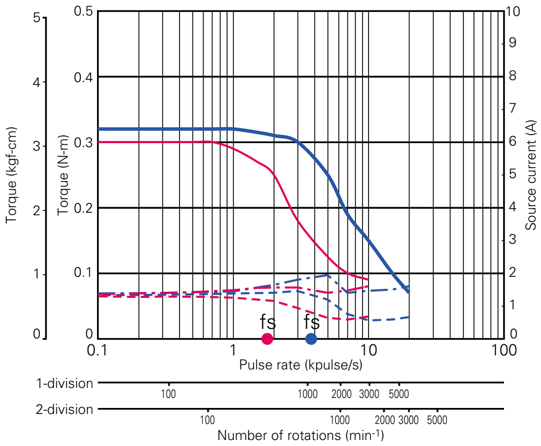


Source voltage: DC36V, Wire-wound current:1.2A/phase

—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m² Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H6701-04□□: 24V

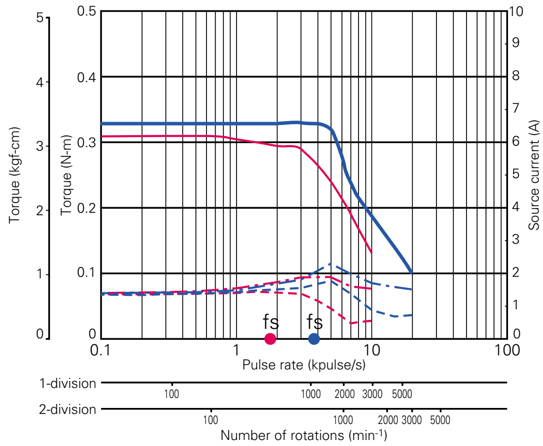


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m² Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H6701-04□□: 36V

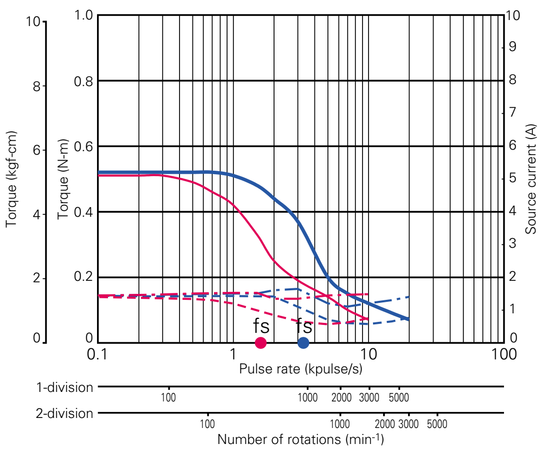


Source voltage: DC36V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m² Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H6703-04□□: 24V

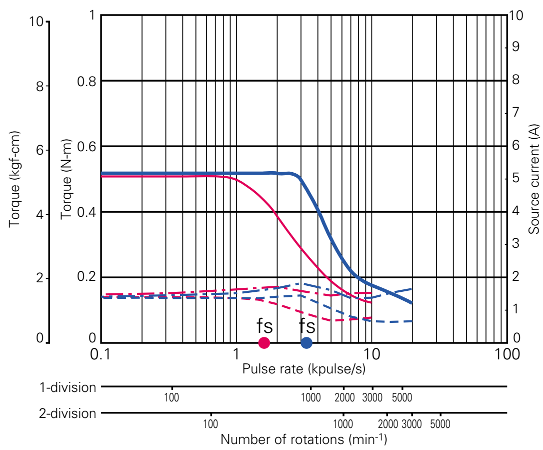


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m² Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H6703-04□□: 36V



Source voltage: DC36V, Wire-wound current: 2A/phase

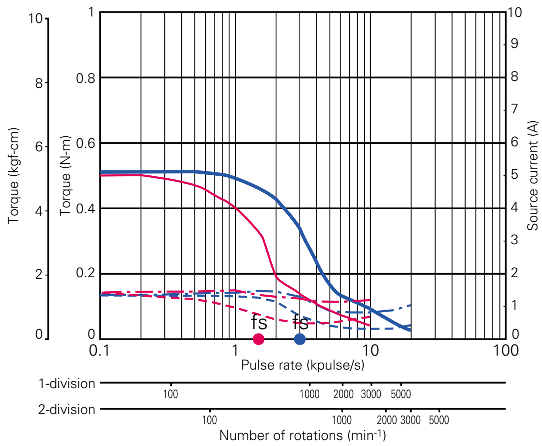
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m² Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

fs: Maximum self-start frequency when not loaded. ■ 1-division is specified ■ 2-division is specified

●103H6704-04□□: 24V

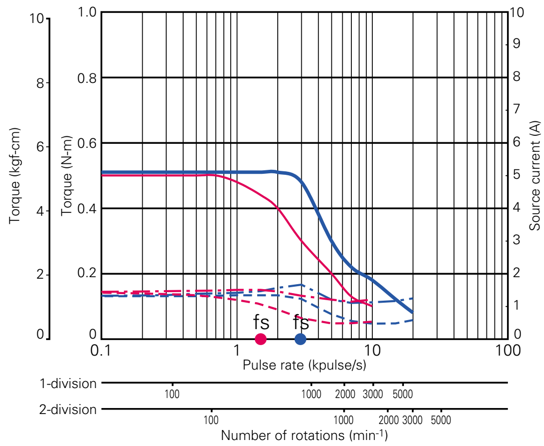


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque ($J_{L1}=0.94\times10^{-4}kg\cdot m^2$ Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H6704-04□□: 36V

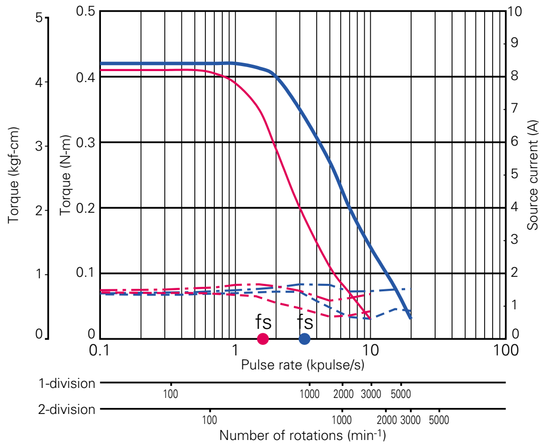


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque ($J_{L1}=0.94\times10^{-4}kg\cdot m^2$ Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7121-04□□: 24V

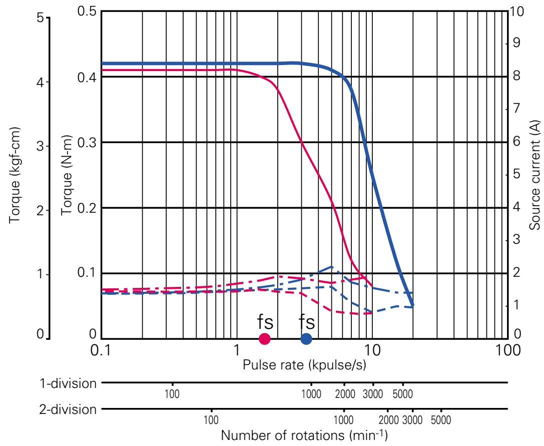


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque ($J_{L1}=0.94\times10^{-4}kg\cdot m^2$ Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7121-04□□: 36V

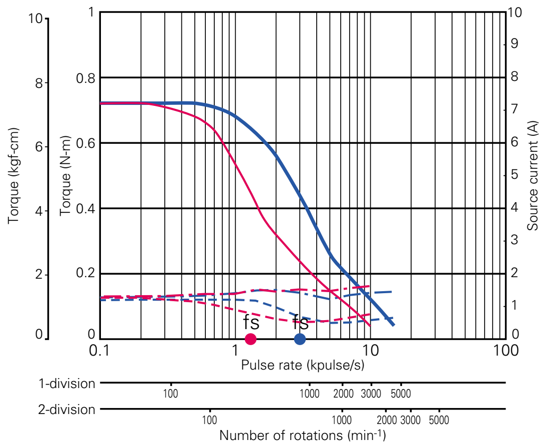


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque ($J_{L1}=0.94\times10^{-4}kg\cdot m^2$ Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7123-04□□: 24V

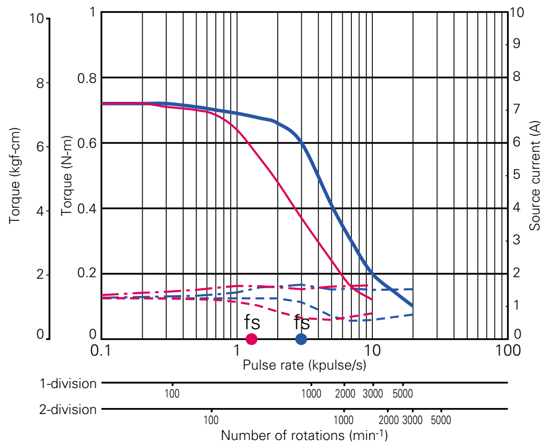


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque ($J_{L1}=0.94\times10^{-4}kg\cdot m^2$ Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7123-04□□: 36V



Source voltage: DC24V, Wire-wound current: 2A/phase

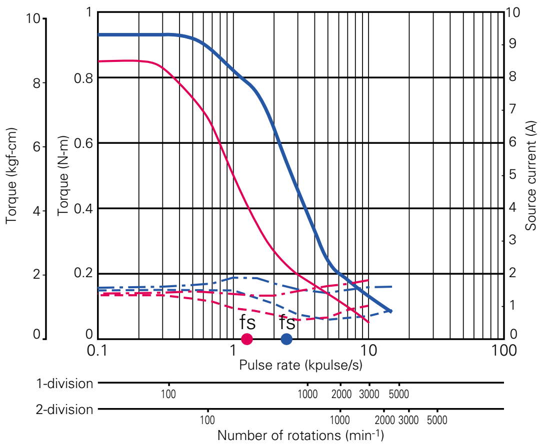
—— Getaway torque ($J_{L1}=0.94\times10^{-4}kg\cdot m^2$ Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

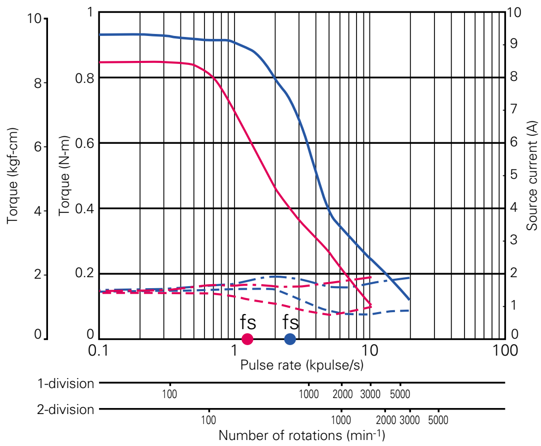
fs: Maximum self-start frequency when not loaded. ■ 1-division is specified ■ 2-division is specified

●103H7124-04□□: 24V



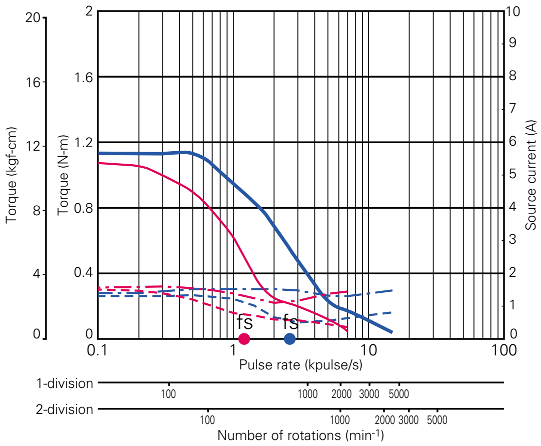
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7124-04□□: 36V



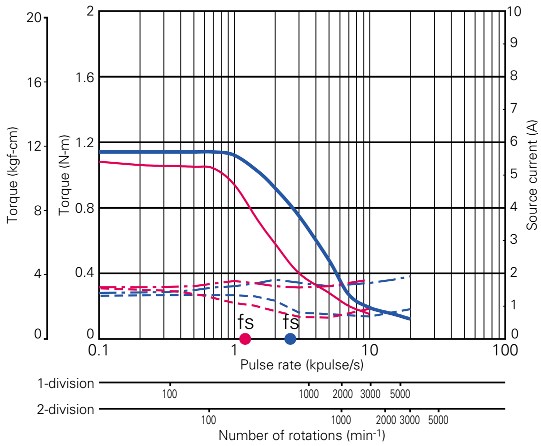
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7126-04□□: 24V



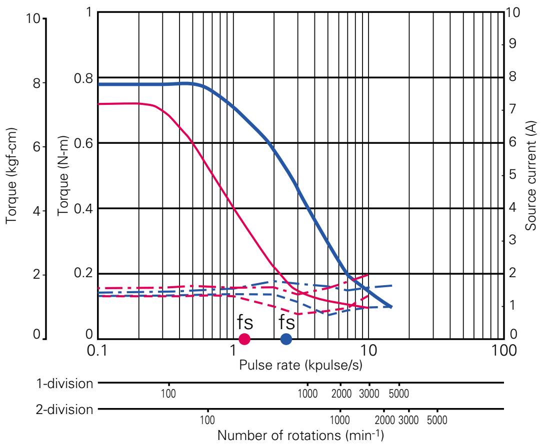
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7126-04□□: 36V



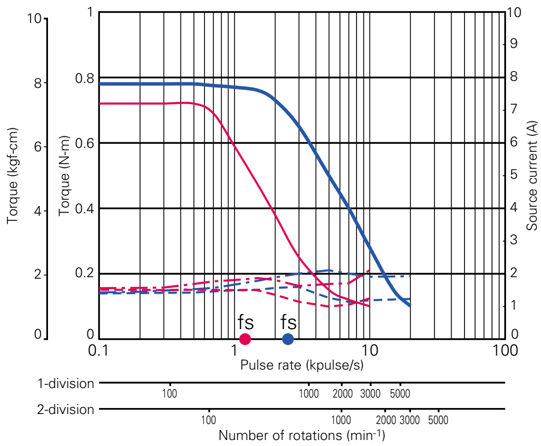
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7821-04□□: 24V



Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7821-04□□: 36V

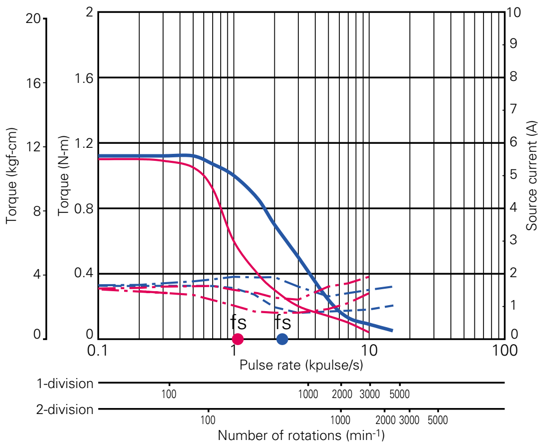


Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

fs: Maximum self-start frequency when not loaded. ■ 1-division is specified ■ 2-division is specified

●103H7822-04□□: 24V

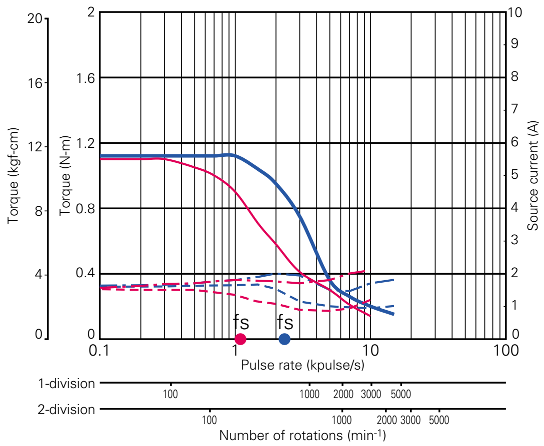


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7822-04□□: 36V

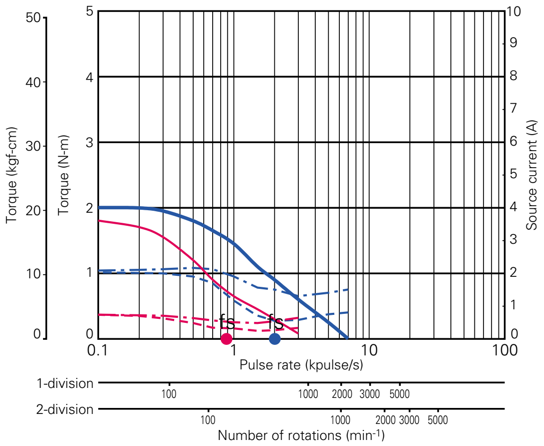


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7823-04□□: 24V

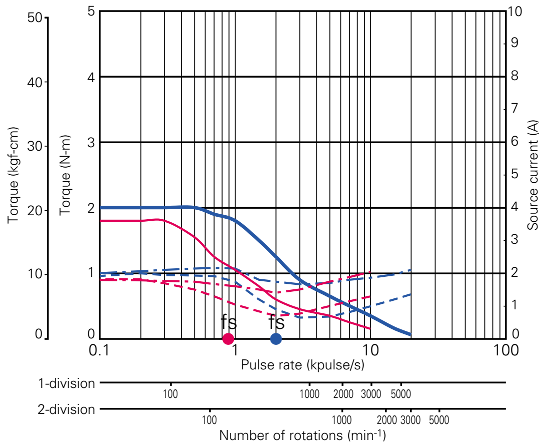


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H7823-04□□: 36V

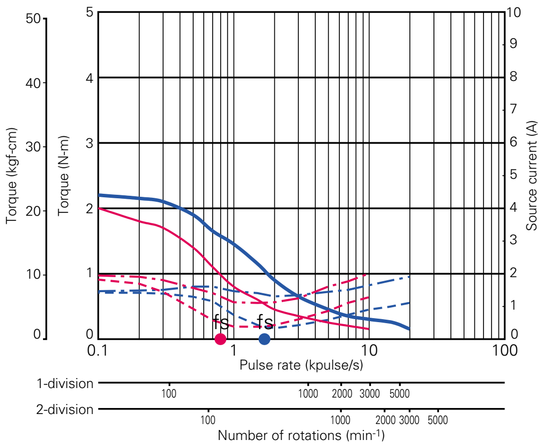


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H8221-04□□: 24V

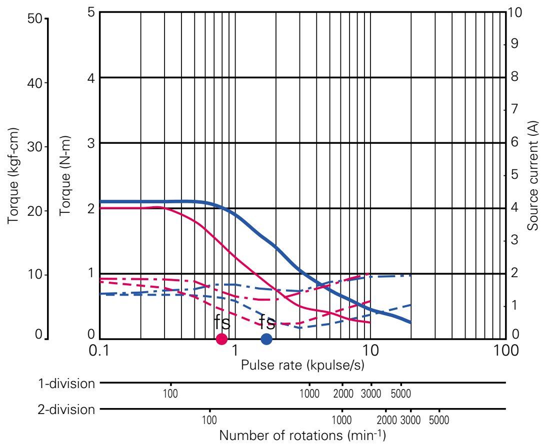


Source voltage: DC24V, Wire-wound current: 2A/phase

—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H8221-04□□: 36V



Source voltage: DC24V, Wire-wound current: 2A/phase

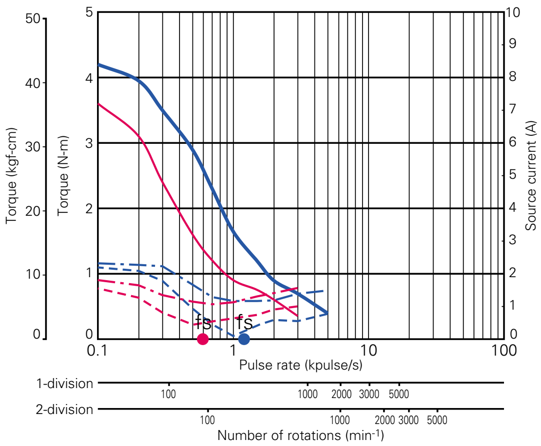
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)

–·– Source current (TL=MAX), – – – Source current (TL=0)

Pulse Rate-Torque Characteristics/Pulse Rate-Power Current Characteristics

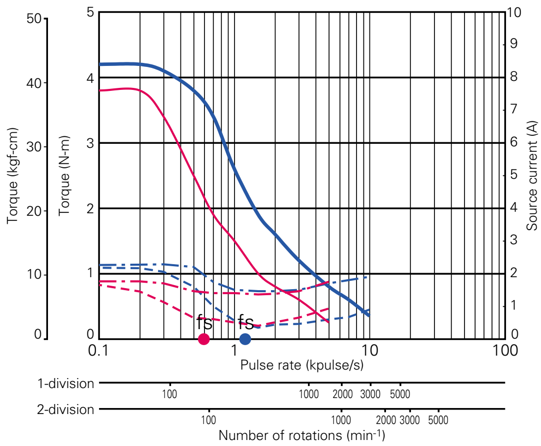
fs: Maximum self-start frequency when not loaded. ■ 1-division is specified ■ 2-division is specified

●103H8222-04□□: 24V



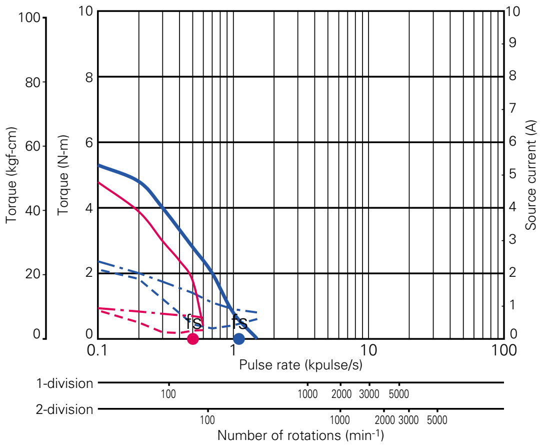
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H8222-04□□: 36V



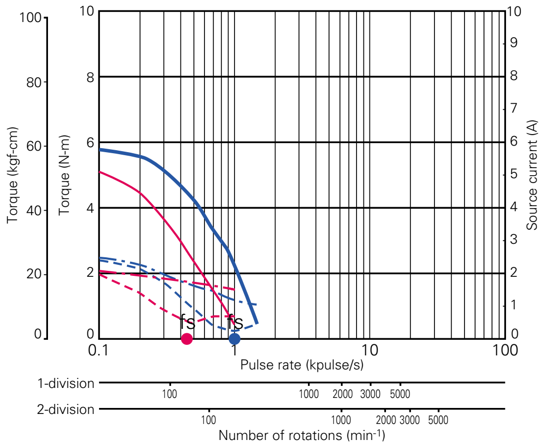
Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H8223-04□□: 24V



Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

●103H8223-04□□: 36V



Source voltage: DC24V, Wire-wound current: 2A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4}kg·m^2 Uses rubber coupling)
–·– Source current (TL=MAX), – – – Source current (TL=0)

Option

Connector set

Model	Used for	Contents of set	Quantity	Manufacturer	Applicable wire size	Crimp tool number
PM-AP-055 (H52□□ type)	Stepping motor (CN1)	Applicable housing: VHR-6N	1	J.S.T. MFG. CO.,LTD.	AWG22	YC-160R
		Applicable contact: SVH-21T-P1.1	6			
		Applicable housing: EHR-6	1			YC-260R
		Applicable contact: SEH-001T-P0.6	6			
PM-AP-048 (H782□ type)		Applicable housing: VHR-6N	1	J.S.T. MFG. CO.,LTD.	AWG22	YC-160R
		Applicable contact: SVH-21T-P1.1	6			
PM-AP-037 (Type other than above)		Applicable housing: VHR	1	J.S.T. MFG. CO.,LTD.	AWG22	YC-160R
		Applicable contact: SVH-21T-P1.1	6			
PM-AP-036	DC power supply (CN2)	Applicable housing: SVH-2N	1	J.S.T. MFG. CO.,LTD.	AWG22	YC-160R
		Applicable contact: SVH-21T-P1.1	2			
PM-AP-038	I/O signal (CN3)	Applicable housing: IL-8S-S3L-(N)	1	J.S.T. MFG. CO.,LTD.	AWG22~28	CT150-1-IL CT150-1B-IL CT150-1C-IL
		Applicable contact: IL-C2-1-0001	8			

Connector cable

Model No.	Use for
PM-C06M0100-□□	Stepping motor (CN1) connector cable
PM-C02P0100-03	DC power supply (CN2) connector cable
PM-C08S0100-02	I/O signal (CN3) connector cable

□□ ··· is 02, 04, or 07. (Refer to separate table 1.)

- The connector cable is 1-meter cable assembled with each interface connector.

Model No. of stepping motor cable (Supplement table 1)

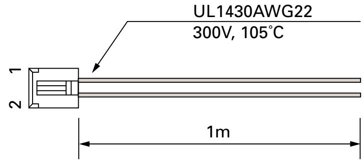
	Model of stepping motor
02	103H6701-04□□
	103H6703-04□□
	103H6704-04□□
	103H7121-04□□
	103H7123-04□□
	103H7124-04□□
	103H7126-04□□
	103H8221-04□□
	103H8222-04□□
	103H8223-04□□
04	103H7821-04□□
	103H7822-04□□
	103H7823-04□□
07	103H5205-04□□
	103H5208-04□□
	103H5209-04□□
	103H5210-04□□

Option

● Cable 1 (Power cable)

Driver side

Pin No.	Color
1	White
2	Black

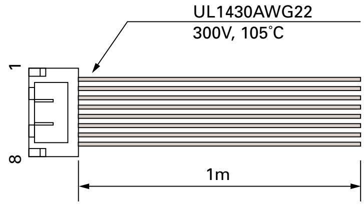


Cable model No.	Length
PM-C02P0100-03	1m

● Cable 2 (Signal cable)

Driver side

Pin No.	Color
1	Blue
2	Black
3	Blue
4	Black
5	Blue
6	Black
7	Blue
8	Black

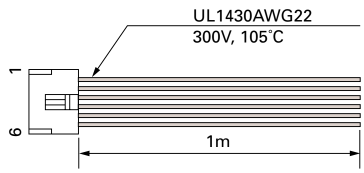


Cable model No.	Length
PM-C08S0100-02	1m

● Cable 3 (Stepping motor extension cable 1)

Driver side

Pin No.	Color
1	White
2	Black
3	Orange
4	Blue
5	Red
6	Yellow



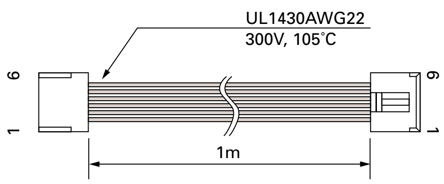
Cable model No.	Length
PM-C06M0100-02	1m

Applicable stepping motor	
103H6701-04□0	103H7124-04□0
103H6703-04□0	103H7126-04□0
103H6704-04□0	103H8221-04□1
103H7121-04□0	103H8222-04□1
103H7123-04□0	103H8223-04□1

● Cable 4 (Stepping motor extension cable 2)

Driver side

Pin No.	Color
1	White
2	Black
3	Orange
4	Blue
5	Red
6	Yellow



Stepping motor side

Pin No.	Color
1	White
2	Orange
3	Blue
4	Red
5	Yellow
6	Black

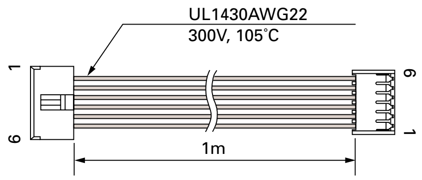
Cable model No.	Length
PM-C06M0100-04	1m

Applicable stepping motor
103H7821-04□0
103H7822-04□0
103H7823-04□0

● Cable 5 (Stepping motor extension cable 3)

Driver side

Pin No.	Color
1	White
2	Black
3	Orange
4	Blue
5	Red
6	Yellow



Stepping motor side

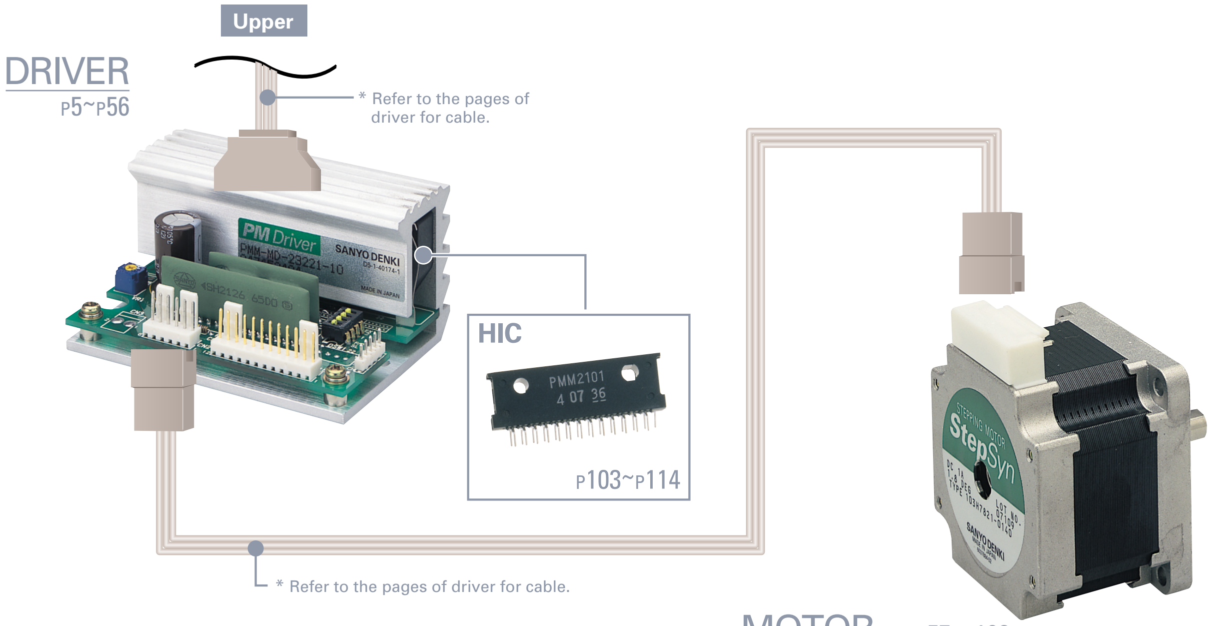
Pin No.	Color
1	White
2	Orange
3	Blue
4	Yellow
5	Red
6	Black

Cable model No.	Length
PM-C06M0100-07	1m

Applicable stepping motor
103H5205-04□0
103H5208-04□0
103H5209-04□0
103H5210-04□0

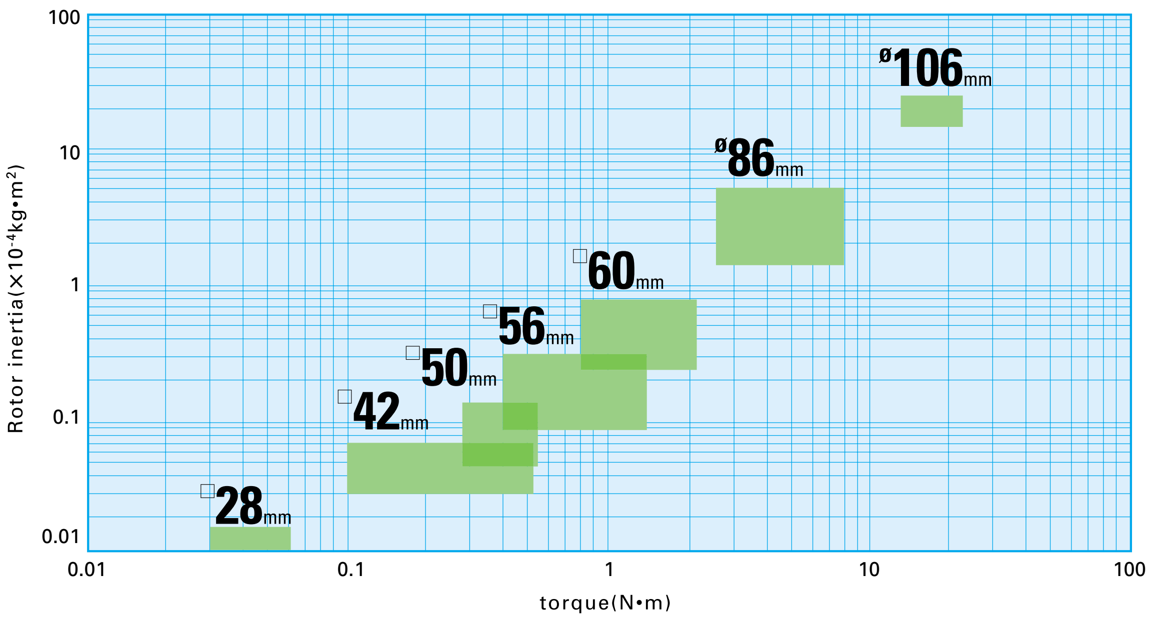
2 Phase STEPPING MOTOR
The 2-phase Stepping System

■Stepping System Configuration Chart



The 2-phase Stepping Motor
Ultra-vacuum Stepping Motor
Synchronous Motor

■2-Phase Motor Domain Chart



□39mm

Applicable drivers

Please contact our sales division.

Step angle
0.9°
Holding torque
0.032 N·m

P59

□42mm

Applicable drivers

Please contact our sales division.

Step angle
0.9°
Holding torque
0.1 N·m

P60

ø56mm

Applicable drivers

Please contact our sales division.

Step angle
0.9°
Holding torque
0.21〜0.41 N·m

P61~P62

□28mm

Applicable drivers

Please contact our sales division.

Step angle
1.8°
Holding torque
0.032〜0.062 N·m

P63~P64

□42mm

Applicable drivers

Please contact our sales division.

Step angle
1.8°
Holding torque
0.2〜0.51 N·m

P65~P68

□50mm

Applicable drivers

Please contact our sales division.

Step angle
1.8°
Holding torque
0.28〜0.53 N·m

P69~P72

□56mm

Applicable drivers

Please contact our sales division.

Step angle
1.8°
Holding torque
0.39〜1.27 N·m

P73~P78

□60mm

Applicable drivers

Please contact our sales division.

Step angle
1.8°
Holding torque
0.78〜2.1 N·m

P79~P82

ø86mm

Applicable drivers

Please contact our sales division.

Step angle
1.8°
Holding torque
2.74〜7.44 N·m

P83~P88

ø106mm

Applicable drivers

Please contact our sales division.

Step angle
1.8°
Holding torque
13.2〜19 N·m

P89~P90

□56mm

Applicable drivers

Please contact our sales division.

Step angle
1.8°
Holding torque
0.39〜1.27 N·m

P91~P92

ø86mm

Applicable drivers

Please contact our sales division.

Step angle
1.8°
Holding torque
2.75〜7.44 N·m

P93~P94

ø106mm

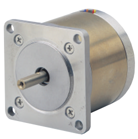
Applicable drivers

Please contact our sales division.

Step angle
1.8°
Holding torque
13.2〜19 N·m

P95~P96

Ultra-vacuum Stepping Motor



Applicable drivers

Please contact our sales division.

Step angle
1.8°
Holding torque
0.43 N·m

P99~P100

Synchronous motor

Applicable drivers

Please contact our sales division.

Getaway sync torque
0.57〜5.5 N·m

P101~P102

2-phase Stepping Motor

39mm sq.

103-4902
0.9°/step

●For information on the applicable driver, contact our sales department.

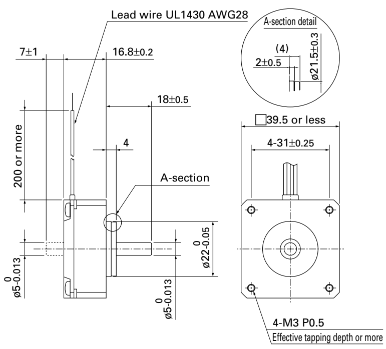
Specifications

Unipolar winding

Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	$x10^{-4}kg \cdot m^2$	kg
103-4902-0650	-0610	0.032	0.4	16.5	3.5	0.009	0.135

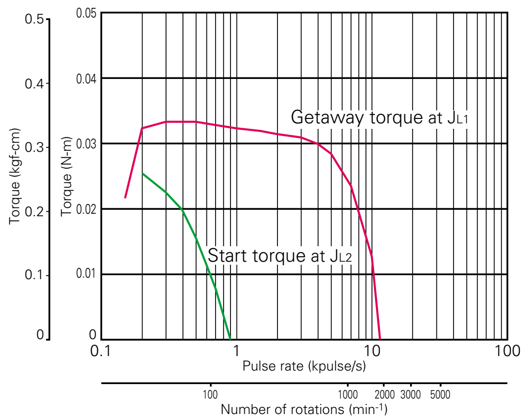
Dimensions (Unit: mm)

103-4902-0650 (Single shaft)
103-4902-0610 (Double shaft)



Pulse Rate - Torque Characteristics

●103-4902-0650



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 0.4A/phase, 2-phase energization (full-step)
$J_{L1}=0.05x10^{-4}kg \cdot m^2$ (pulley balancer method)
$J_{L2}=0.05x10^{-4}kg \cdot m^2$ (pulley balancer method)

2-phase Stepping Motor

42mm sq.

103-591
0.9°/step

●For information on the applicable driver, contact our sales department.

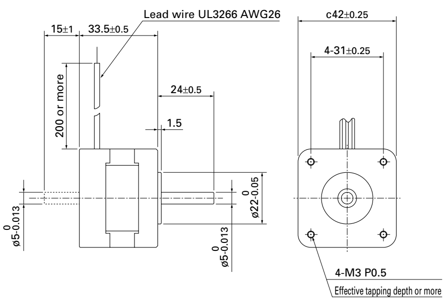
Specifications

Unipolar winding

Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	$x10^{-4}kg \cdot m^2$	kg
103-591-0241	-0210	0.1	0.85	3.3	3.7	0.03	0.2

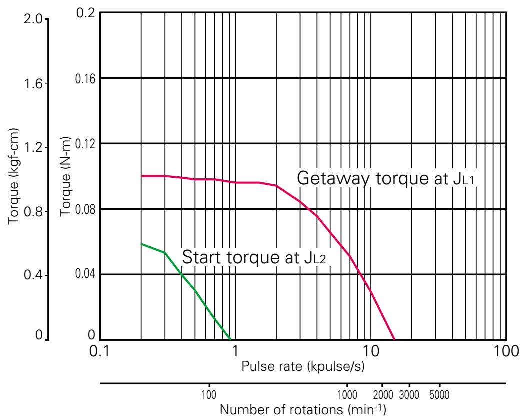
Dimensions (Unit: mm)

103-591-0241 (Single shaft)
103-591-0210 (Double shaft)



Pulse Rate - Torque Characteristics

●103-591-0241



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 0.85A/phase, 2-phase energization (full-step)
J_{L1}=0.33x10^{-4}kg·m^2 (using rubber coupling)
J_{L2}=0.18x10^{-4}kg·m^2 (using direct coupling)

2-phase Stepping Motor

56mm cir.

103-771□
0.9°/step

●For information on the applicable driver, contact our sales department.

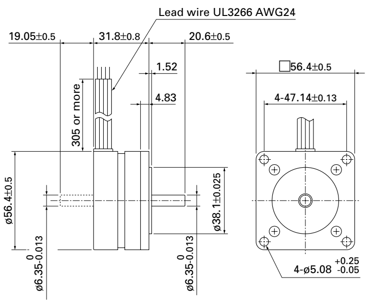
Specifications

Unipolar winding

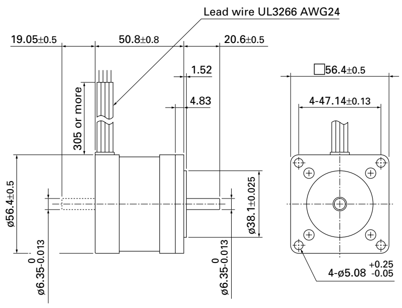
Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	x10^{-4}kg·m^2	kg
103-7711-0140	-0110	0.21	1	3.3	6.82	0.057	0.38
103-7713-0140	-0110	0.41	0.85	7.1	16.2	0.105	0.57

Dimensions (Unit: mm)

103-7711-0140 (Single shaft)
103-7711-0110 (Double shaft)

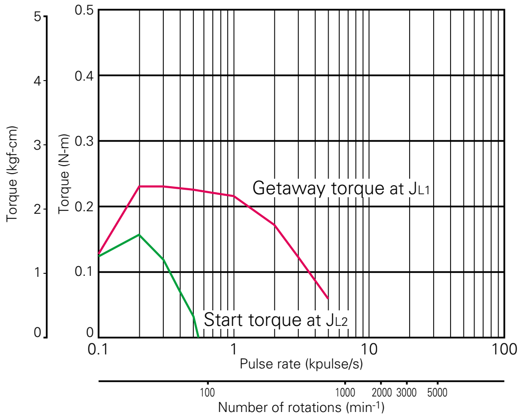


103-7713-0140 (Single shaft)
103-7713-0110 (Double shaft)



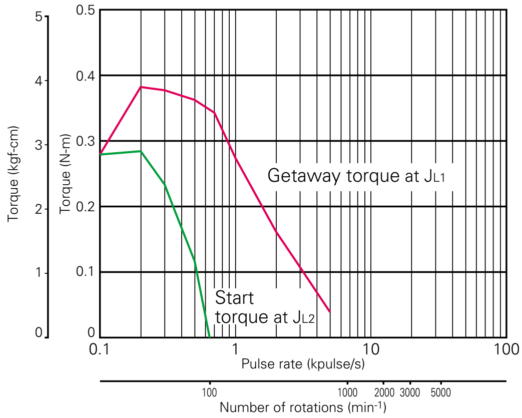
Pulse Rate - Torque Characteristics

●103-7711-0140

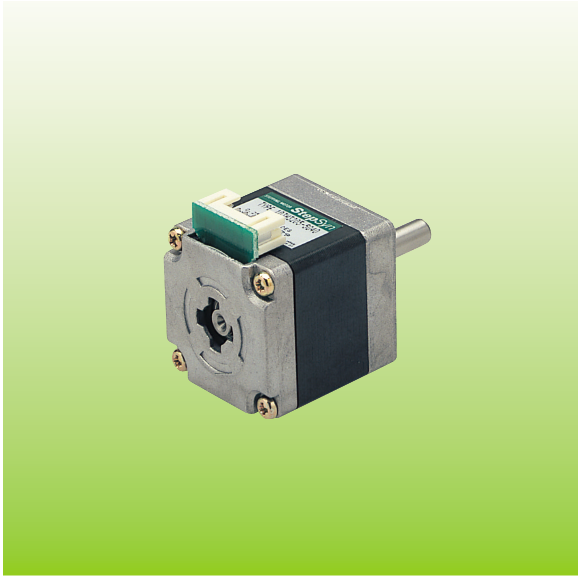


Sanyo constant current circuit
Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103-7713-0140



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 0.85A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)



2-phase Stepping Motor

28mm sq.

103-4902□□
1.8°/step

● For information on the applicable driver, contact our sales department.

Specifications

Unipolar winding · connector type

Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	x10^{-4}kg·m^2	kg
103H3205-5040	-5010	0.032	0.25	40	9.1	0.009	0.11
103H3205-5140	-5110	0.032	0.5	9.4	2.4	0.009	0.11
103H3215-5140	-5110	0.062	0.5	11	3.1	0.016	0.2
103H3215-5240	-5210	0.062	1	2.6	0.8	0.016	0.2

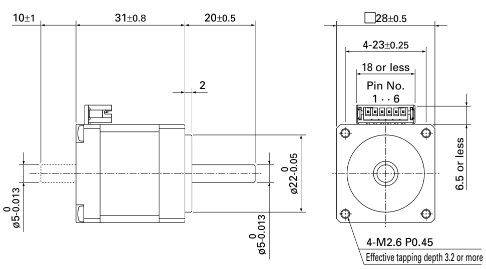
Unipolar winding · lead wire type

Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	x10^{-4}kg·m^2	kg
103H3205-5070	-5030	0.032	0.25	40	9.1	0.009	0.11
103H3205-5170	-5130	0.032	0.5	9.4	2.4	0.009	0.11
103H3215-5170	-5130	0.062	0.5	11	3.1	0.016	0.2
103H3215-5270	-5230	0.062	1	2.6	0.8	0.016	0.2

Dimensions (Unit: mm)

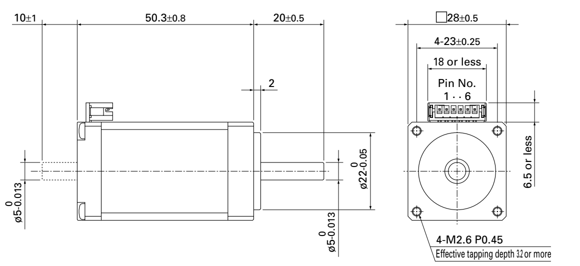
103H3205-5040/5140 (Single shaft)
103H3205-5010/5110 (Double shaft)

Applicable connector :JST Mfg.Co.,Ltd
Connector : PHR-6
Terminal : SPH-002T-P0.5S



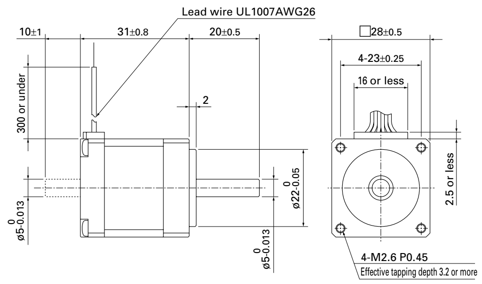
103H3215-5140/5240 (Single shaft)
103H3215-5110/5210 (Double shaft)

Applicable connector :JST Mfg.Co.,Ltd
Connector : PHR-6
Terminal : SPH-002T-P0.5S

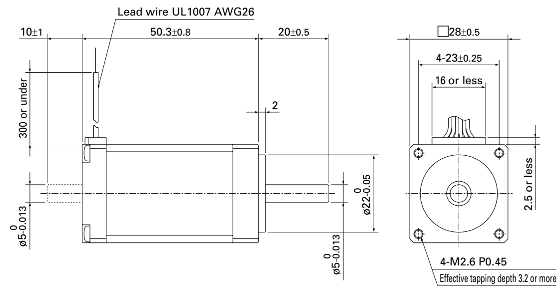


Dimensions (Unit: mm)

103H3205-5070/5170 (Single shaft)
103H3205-5030/5130 (Double shaft)

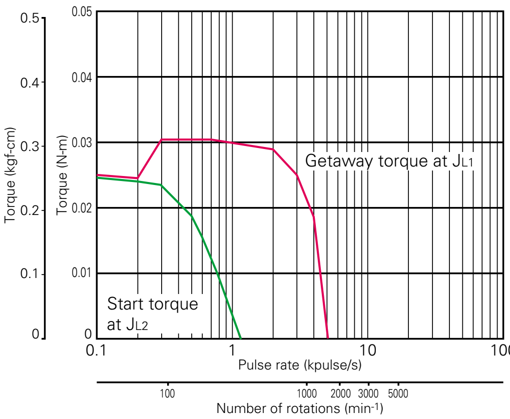


103H3215-5170/5270 (Single shaft)
103H3215-5130/5230 (Double shaft)



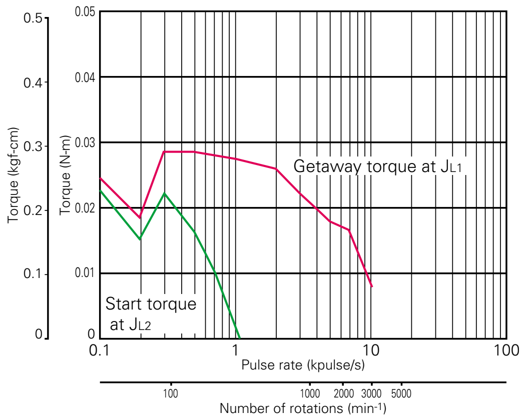
Pulse Rate - Torque Characteristics

●**103H3205-5040/103H3205-5070**



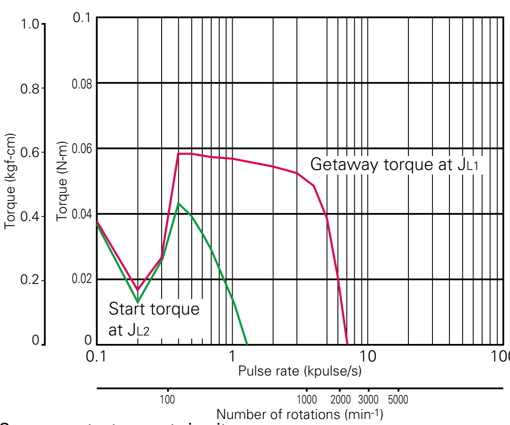
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 0.25A/phase, 2-phase energization (full-step)
J_{L1}=0.01x10^{-4}kg·m^2 (pulley balancer method)
J_{L2}=0.01x10^{-4}kg·m^2 (pulley balancer method)

●**103H3205-5140/103H3205-5170**



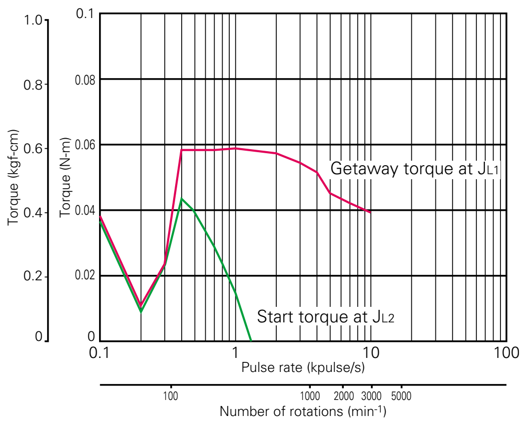
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 0.5A/phase, 2-phase energization (full-step)
J_{L1}=0.01x10^{-4}kg·m^2 (pulley balancer method)
J_{L2}=0.01x10^{-4}kg·m^2 (pulley balancer method)

●**103H3215-5140/103H3215-5170**

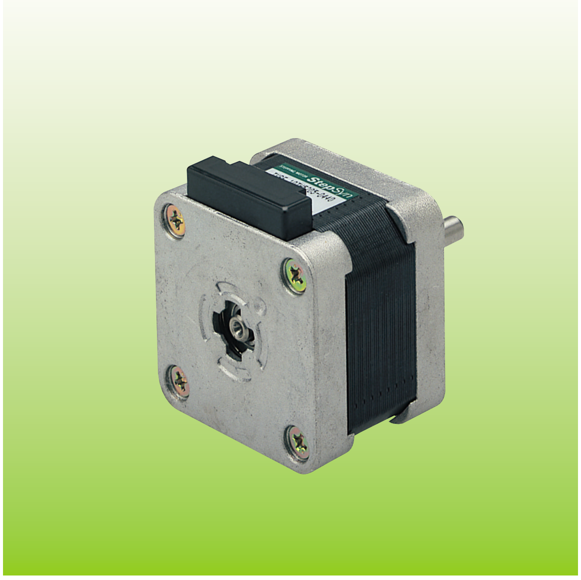


Sanyo constant current circuit
Source voltage: DC24V Wiring current: 0.5A/phase, 2-phase energization (full-step)
J_{L1}=0.01x10^{-4}kg·m^2 (pulley balancer method)
J_{L2}=0.01x10^{-4}kg·m^2 (pulley balancer method)

●**103H3215-5240/103H3215-5270**



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 1A/phase, 2-phaseenergization (full-step)
J_{L1}=0.01x10^{-4}kg·m^2 (pulley balancer method)
J_{L2}=0.01x10^{-4}kg·m^2 (pulley balancer method)



2-phase Stepping Motor

42mm sq.

103H-52□□
1.8°/step

●For information on the applicable driver, contact our sales department.

Specifications

Unipolar winding

Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	$\times10^{-4}$kg·m^2	kg
103H5205-0440	-0410	0.2	1.2	2.4	2.3	0.036	0.23
103H5208-0440	-0410	0.3	1.2	2.9	3.4	0.056	0.29
103H5209-0440	-0410	0.32	1.2	3	3.9	0.062	0.31
103H5210-0440	-0410	0.37	1.2	3.3	3.4	0.074	0.37

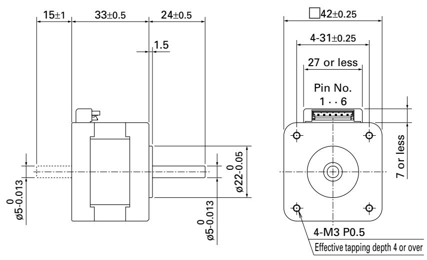
Bipolar winding

Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	$\times10^{-4}$kg·m^2	kg
103H5205-4240	-4210	0.265	1	3.4	6.5	0.036	0.23
103H5208-4240	-4210	0.39	1	4.1	9.5	0.056	0.29
103H5209-4240	-4210	0.425	1	4.4	11	0.062	0.31
103H5210-4240	-4210	0.51	1	4.8	9.5	0.074	0.37

Dimensions (Unit: mm)

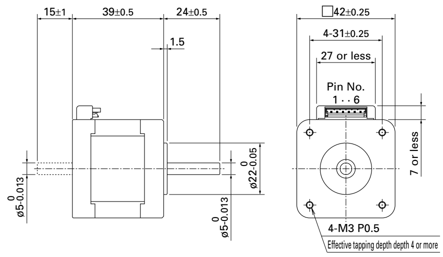
103H5205-0440/4240 (Single shaft)
103H5205-0410/4210 (Double shaft)

Applicable connector (J.S.T. MFG., CO.)
Connector: EHR-6
Terminal: SEH-001T-P0.6



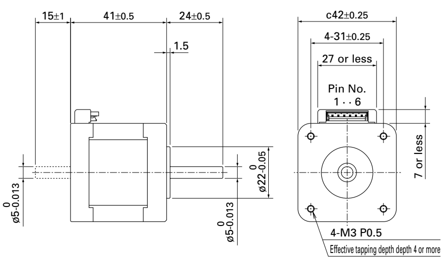
103H5208-0440/4240 (Single shaft)
103H5208-0410/4210 (Double shaft)

Applicable connector (J.S.T. MFG., CO.)
Connector: EHR-6
Terminal: SEH-001T-P0.6



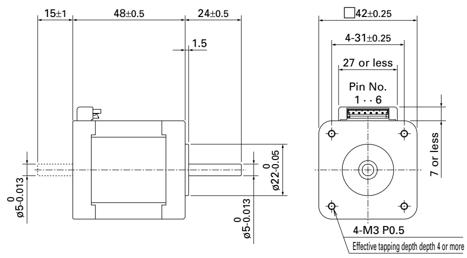
103H5209-0440/4240 (Single shaft)
103H5209-0410/4210 (Double shaft)

Applicable connector (J.S.T. MFG., CO.)
Connector: EHR-6
Terminal: SEH-001T-P0.6



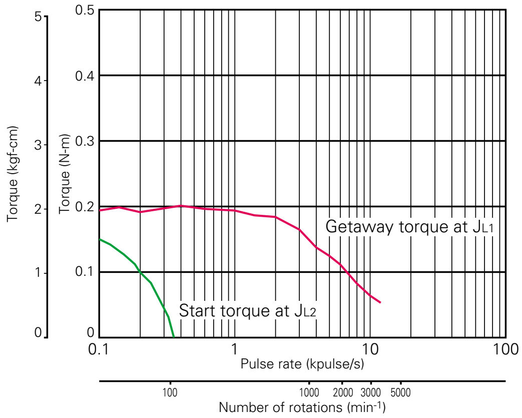
103H5210-0440/4240 (Single shaft)
103H5210-0410/4210 (Double shaft)

Applicable connector (J.S.T. MFG., CO.)
Connector: EHR-6
Terminal: SEH-001T-P0.6



Pulse Rate - Torque Characteristics

●103H5205-0440



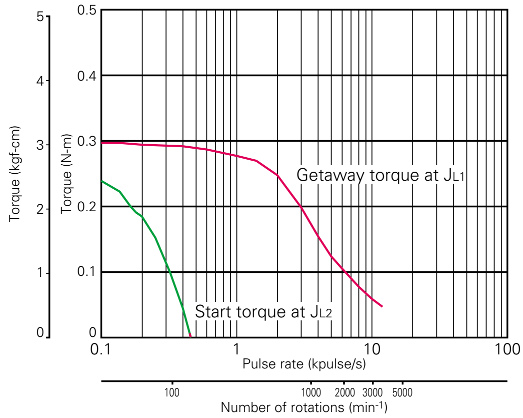
Sanyo constant current circuit

Source voltage: DC24V Wiring current: 1.2A/phase, 2-phase energization (full-step)

J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)

J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H5208-0440



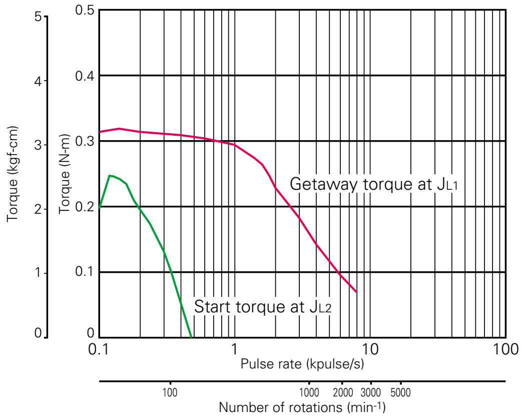
Sanyo constant current circuit

Source voltage: DC24V Wiring current: 1.2A/phase, 2-phase energization (full-step)

J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)

J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H5209-0440



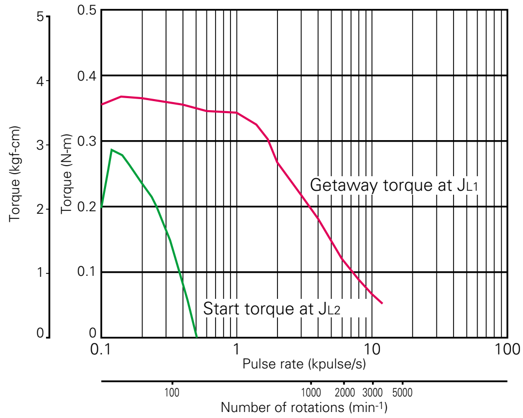
Sanyo constant current circuit

Source voltage: DC24V Wiring current: 1.2A/phase, 2-phase energization (full-step)

J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)

J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H5210-0440



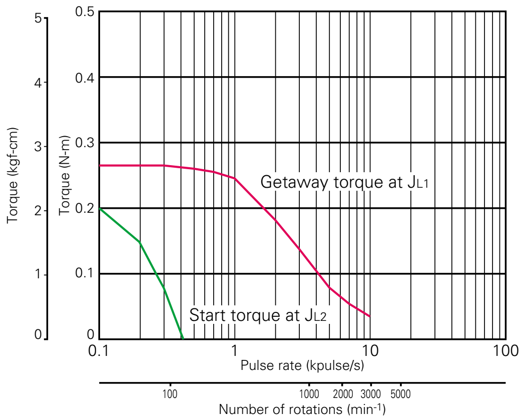
Sanyo constant current circuit

Source voltage: DC24V Wiring current: 1.2A/phase, 2-phase energization (full-step)

J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)

J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H5205-4240



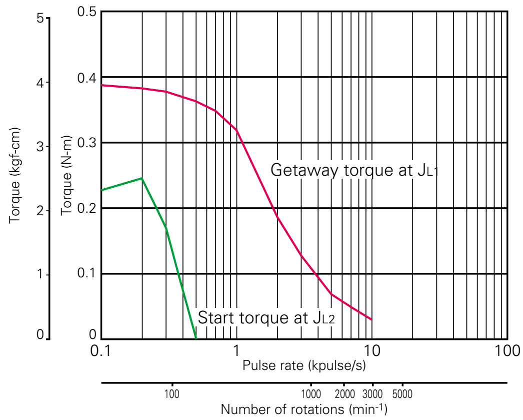
Sanyo constant current circuit

Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)

J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)

J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H5208-4240



Sanyo constant current circuit

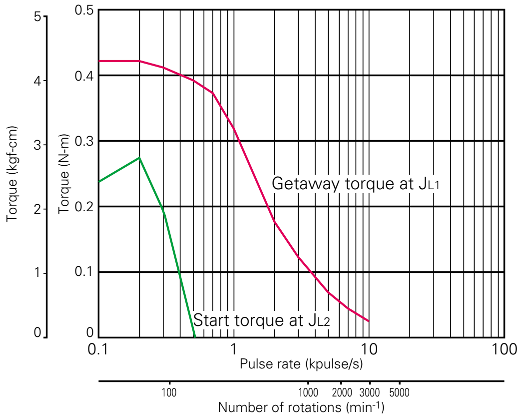
Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)

J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)

J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

Pulse Rate - Torque Characteristics

●103H5209-4240



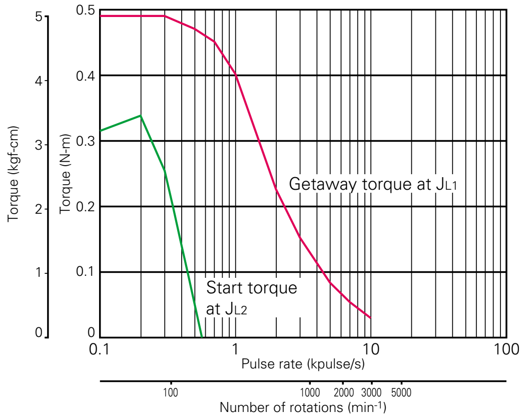
Sanyo constant current circuit

Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)

$J_{L1}=0.94\times10^{-4}$ kg·m^2 (Uses rubber coupling)

$J_{L2}=0.8\times10^{-4}$ kg·m^2 (Uses direct coupling)

●103H5210-4240



Sanyo constant current circuit

Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)

$J_{L1}=0.94\times10^{-4}$ kg·m^2 (Uses rubber coupling)

$J_{L2}=0.8\times10^{-4}$ kg·m^2 (Uses direct coupling)

2-phase Stepping Motor

50mm sq.

103H670□
1.8°/step

- For information on the applicable driver, contact our sales department.

Specifications

Unipolar winding

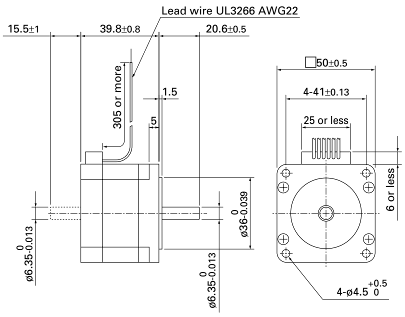
Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	$x10^{-4}kg \cdot m^2$	kg
103H6701-0140	-0110	0.28	1	4.3	6.8	0.057	0.35
103H6701-0440	-0410	0.28	2	1.1	1.6	0.057	0.35
103H6701-0740	-0710	0.28	3	0.6	0.7	0.057	0.35
103H6703-0140	-0110	0.49	1	6	13	0.118	0.5
103H6703-0440	-0410	0.49	2	1.6	3.2	0.118	0.5
103H6703-0740	-0710	0.49	3	0.83	1.4	0.118	0.5
103H6704-0140	-0110	0.53	1	6.5	16.5	0.14	0.55
103H6704-0440	-0110	0.52	2	1.7	3.8	0.14	0.55
103H6704-0740	-0710	0.53	3	0.9	1.7	0.14	0.55

Bipolar winding

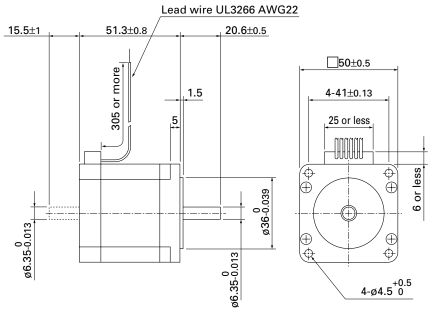
Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	$x10^{-4}kg \cdot m^2$	kg
103H6704Ål504	-5010	0.52	2	0.9	3.8	0.14	0.55

Dimensions (Unit: mm)

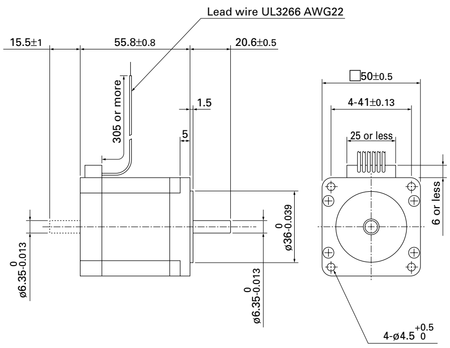
103H6701-0140/0440/0740 (Single shaft)
103H6701-0110/0410/0710 (Double shaft)



103H6703-0140/0440/0740 (Single shaft)
103H6703-0110/0410/0710 (Double shaft)

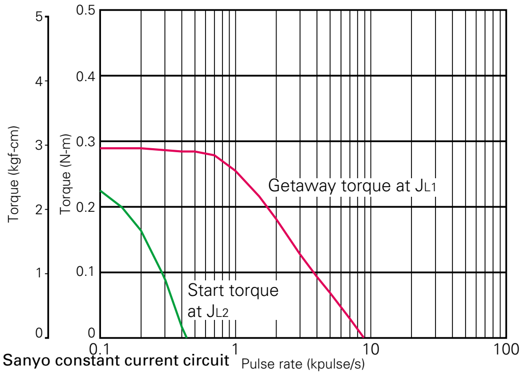


103H6704-0140/0440/0740/5040 (Single shaft)
103H6704-0110/0410/0710/5010 (Double shaft)



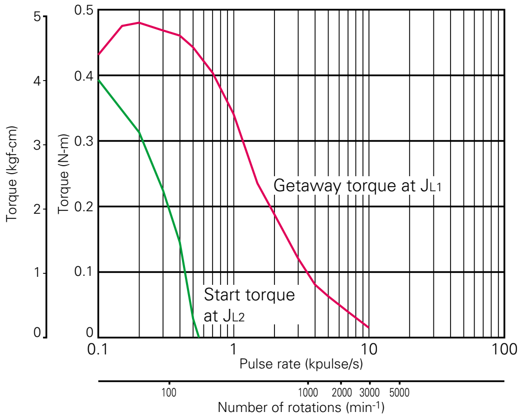
Pulse Rate - Torque Characteristics

●103H6701-0140



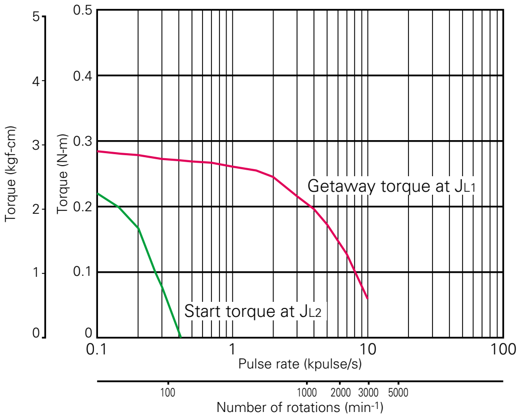
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H6703-0140



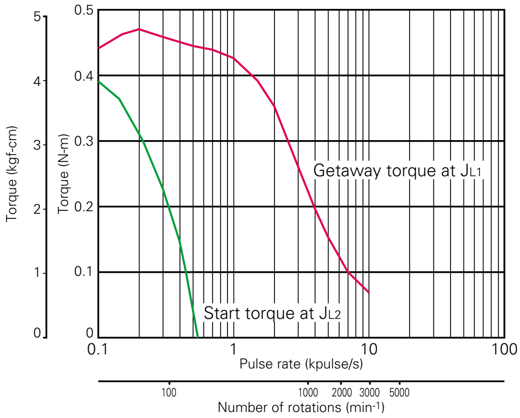
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H6701-0440



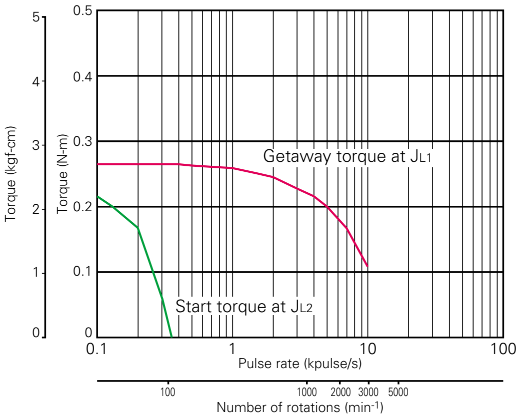
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 2A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H6703-0440



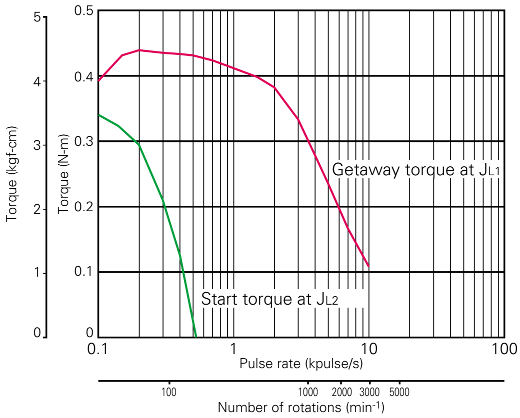
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 2A /phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H6701-0740



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 3A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

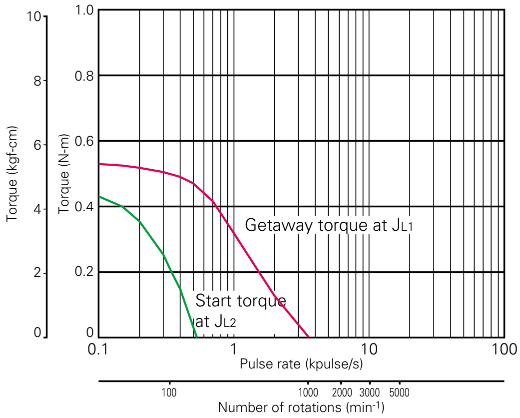
●103H6703-0740



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 3A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

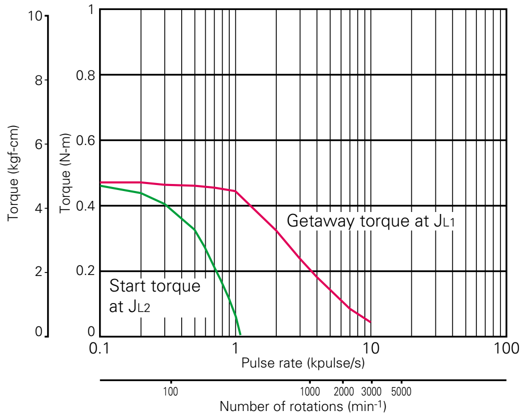
Pulse Rate - Torque Characteristics

●103H6704-0140



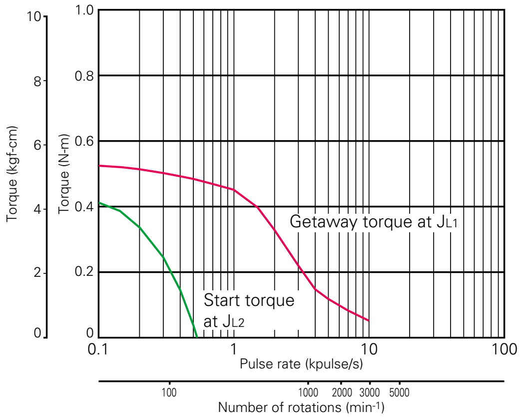
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H6704-5040



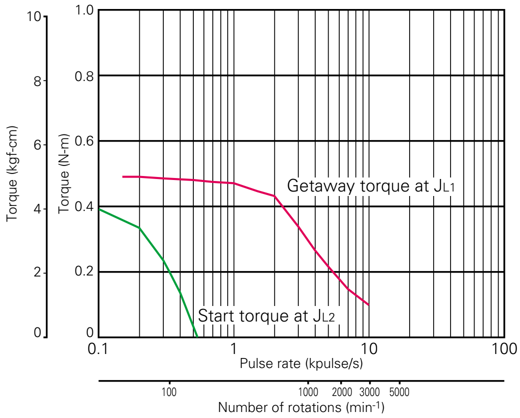
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 2A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.14x10^{-4}kg·m^2 (pulley balancer method)

●103H6704-0440



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 2A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H6704-0740



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 3A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

2-phase Stepping Motor

56mm sq. 103H712□ 1.8°/step

●For information on the applicable driver, contact our sales department.

Specifications

Unipolar winding

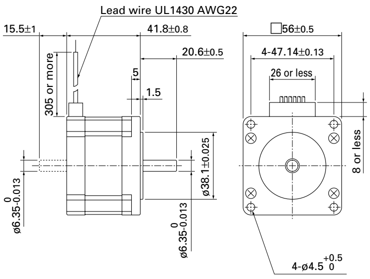
Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	x10^{-4}kg·m^2	kg
103H7121-0140	-0110	0.39	1	4.8	8	0.1	0.47
103H7121-0440	-0410	0.39	2	1.25	1.9	0.1	0.47
103H7121-0740	-0710	0.39	3	0.6	0.8	0.1	0.47
103H7123-0140	-0110	0.83	1	6.7	15	0.21	0.65
103H7123-0440	-0410	0.83	2	1.6	3.8	0.21	0.65
103H7123-0740	-0710	0.78	3	0.77	1.58	0.21	0.65
103H7124-0140	-0110	0.98	1	7	12.5	0.245	0.8
103H7124-0440	-0410	0.98	2	1.7	3.1	0.245	0.8
103H7124-0740	-0710	0.98	3	0.74	1.4	0.245	0.8
103H7126-0140	-0110	1.27	1	8.6	19	0.36	0.98
103H7126-0440	-0410	1.27	2	2	4.5	0.36	0.98
103H7126-0740	-0710	1.27	3	0.9	2.2	0.36	0.98

Bipolar winding

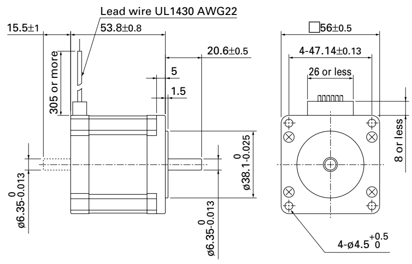
Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	x10^{-4}kg·m^2	kg
103H7121-5040	-5010	0.39	2	0.65	1.9	0.1	0.47
103H7123-5040	-5010	0.83	2	0.8	3.8	0.21	0.65
103H7126-5040	-5010	1.27	2	1.05	4.5	0.36	0.98

Dimensions (Unit: mm)

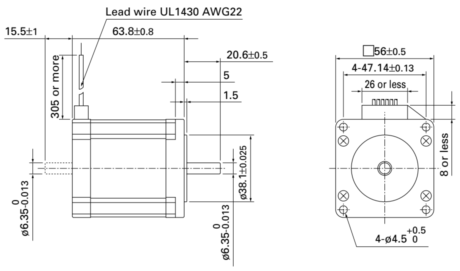
103H7121-0140/0440/0740/5040 (Single shaft)
103H7121-0110/0410/0710/5010 (Double shaft)



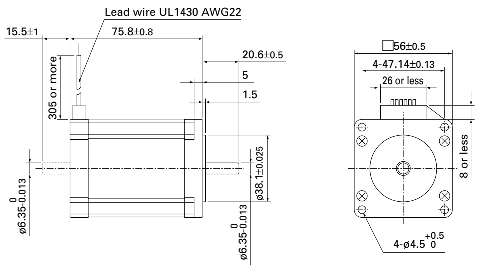
103H7123-0140/0440/0740/5040 (Single shaft)
103H7123-0110/0410/0710/5010 (Double shaft)



103H7124-0140/0440/0740 (Single shaft)
103H7124-0110/0410/0710 (Double shaft)

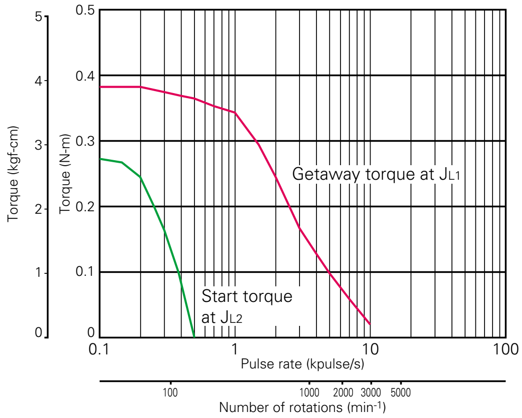


103H7126-0140/0440/0740/5040 (Single shaft)
103H7126-0110/0410/0710/5010 (Double shaft)



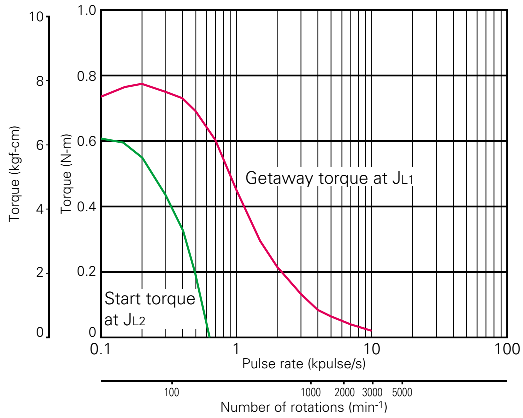
Pulse Rate - Torque Characteristics

●103H7121-0140



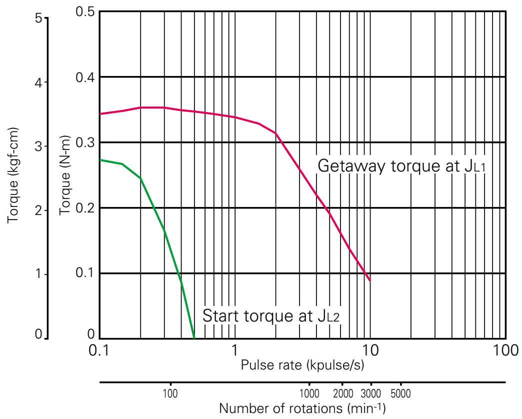
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H7123-0140



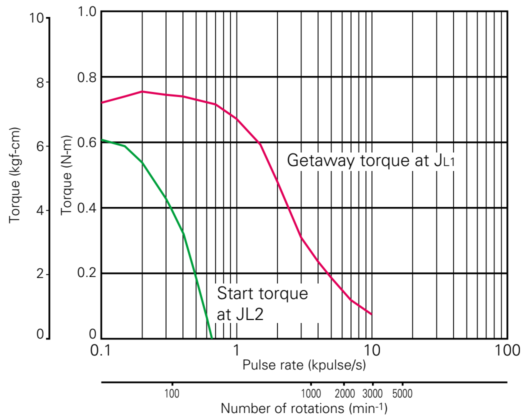
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H7121-0440



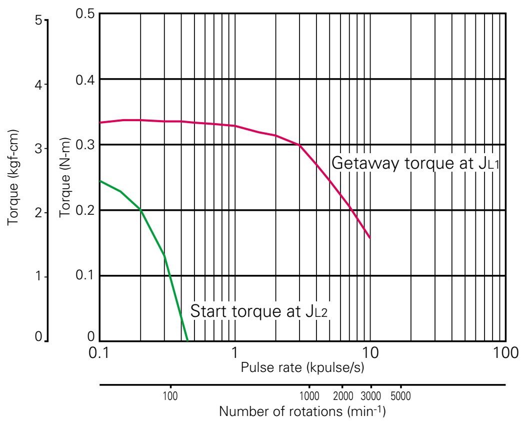
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 2A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H7123-0440



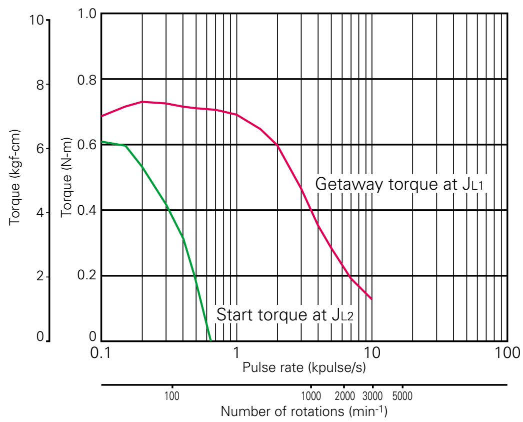
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 2A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H7121-0740



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 3A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

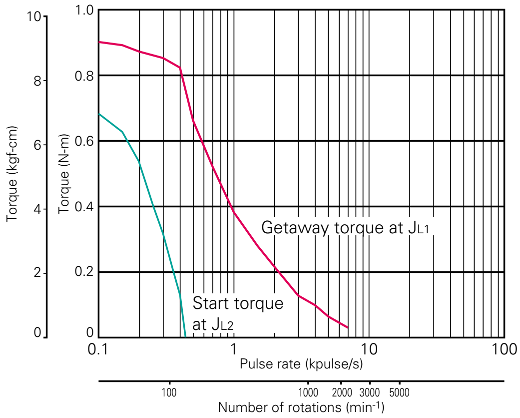
●103H7123-0740



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 3A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

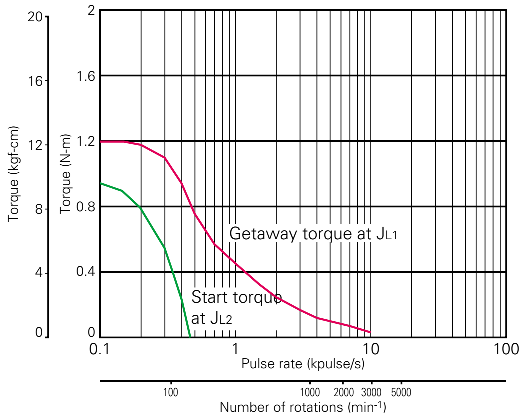
Pulse Rate - Torque Characteristics

●103H7124-0140



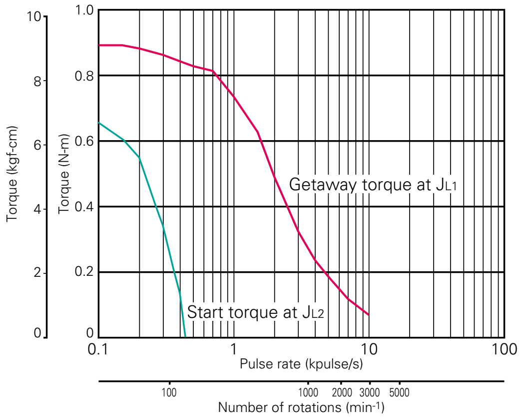
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)
J_{L1}=2.6x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=2.6x10^{-4}kg·m^2 (Uses direct coupling)

●103H7126-0140



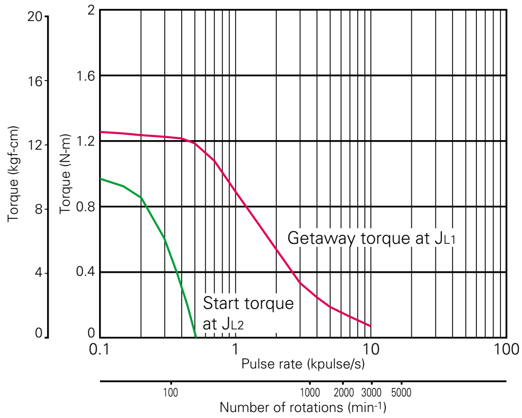
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)
J_{L1}=2.6x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=2.6x10^{-4}kg·m^2 (Uses direct coupling)

●103H7124-0440



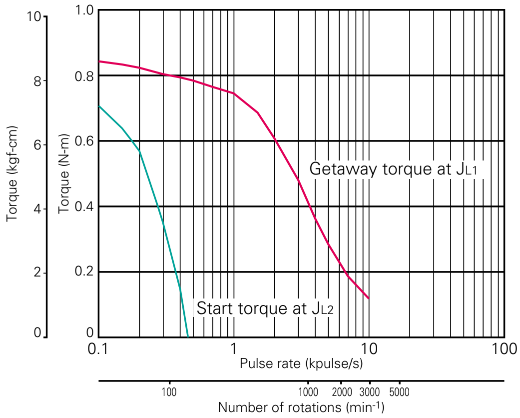
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 2A/phase, 2-phase energization (full-step)
J_{L1}=2.6x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=2.6x10^{-4}kg·m^2 (Uses direct coupling)

●103H7126-0440



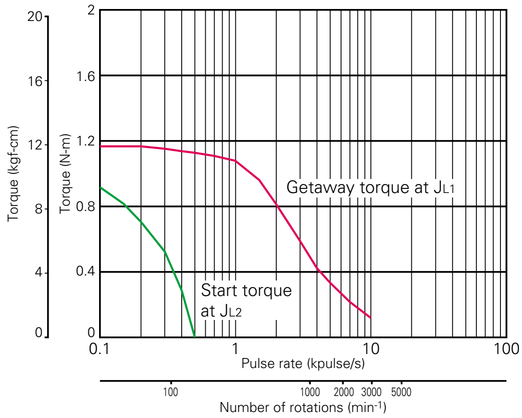
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 2A/phase, 2-phase energization (full-step)
J_{L1}=2.6x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=2.6x10^{-4}kg·m^2 (Uses direct coupling)

●103H7124-0740



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 3A/phase, 2-phase energization (full-step)
J_{L1}=2.6x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=2.6x10^{-4}kg·m^2 (Uses direct coupling)

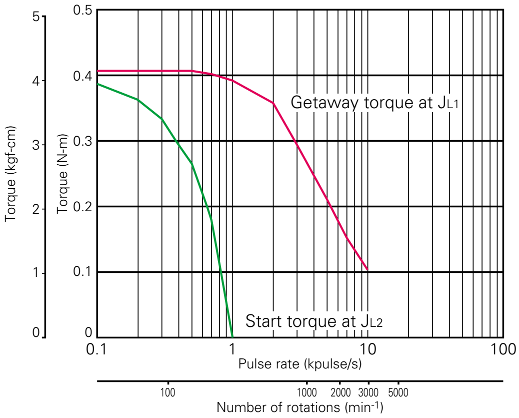
●103H7126-0740



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 3A/phase, 2-phase energization (full-step)
J_{L1}=2.6x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=2.6x10^{-4}kg·m^2 (Uses direct coupling)

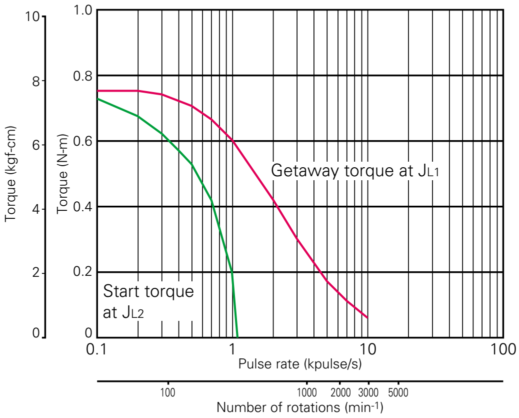
Pulse Rate - Torque Characteristics

●**103H7121-5040**



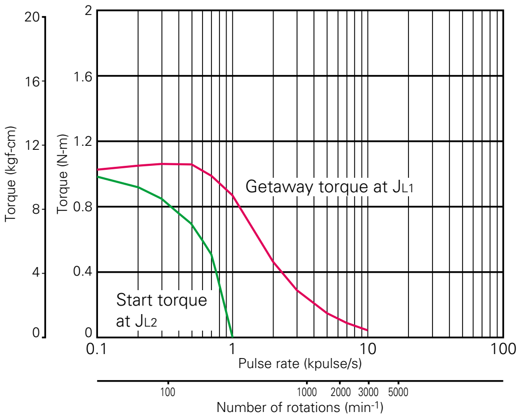
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 2A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.1x10^{-4}kg·m^2 (pulley balancer method)

●**103H7123-5040**



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 2A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.21x10^{-4}kg·m^2 (pulley balancer method)

●**103H7126-5040**



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 2A/phase, 2-phase energization (full-step)
J_{L1}=2.6x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.33x10^{-4}kg·m^2 (pulley balancer method)

2-phase Stepping Motor

60mm sq.

103H782□
1.8°/step

●For information on the applicable driver, contact our sales department.

Specifications

Unipolar winding

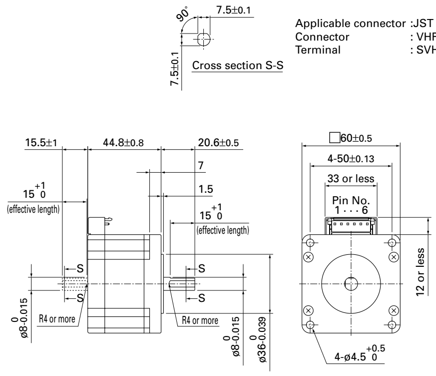
Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	x10⁻⁴kg·m²	kg
103H7821-0140	-0110	0.78	1	5.7	8.3	0.275	0.6
103H7821-0440	-0410	0.78	2	1.5	2	0.275	0.6
103H7821-0740	-0710	0.78	3	0.68	0.8	0.275	0.6
103H7822-0140	-0110	1.17	1	6.9	14	0.4	0.77
103H7822-0440	-0410	1.17	2	1.8	3.6	0.4	0.77
103H7822-0740	-0710	1.17	3	0.8	1.38	0.4	0.77
103H7823-0140	-0110	2.1	1	10	21.7	0.84	1.34
103H7823-0440	-0410	2.1	2	2.7	5.6	0.84	1.34
103H7823-0740	-0710	2.1	3	1.25	2.4	0.84	1.34

Bipolar winding

Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	x10⁻⁴kg·m²	kg
103H7821-1740	-1710	0.88	4	0.35	0.8	0.275	0.6
103H7822-1740	-1710	1.37	4	0.43	1.38	0.4	0.77
103H7823-1740	-1710	2.7	4	0.65	2.4	0.84	1.34

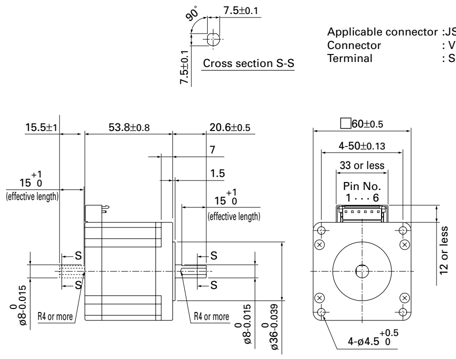
Dimensions (Unit: mm)

103H7821-0140/0440/0740/1740 (Single shaft)
103H7821-0110/0410/0710/1740 (Double shaft)



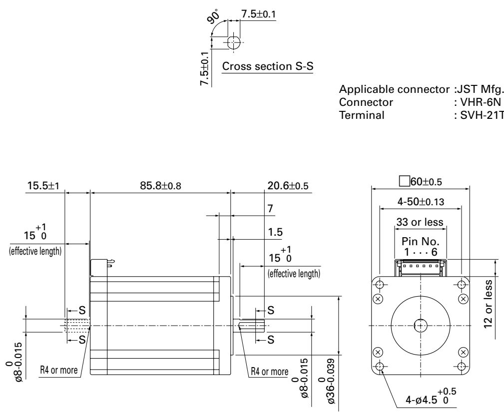
Applicable connector :JST Mfg.Co.,Ltd
Connector : VHR-6N
Terminal : SVH-21T-P1.5

103H7822-0140/0440/0740/1740 (Single shaft)
103H7822-0110/0410/0710/1710 (Double shaft)



Applicable connector :JST Mfg.Co.,Ltd
Connector : VHR-6N
Terminal : SVH-21T-P1.5

103H7823-0140/0440/0740/1740 (Single shaft)
103H7823-0110/0410/0710/1710 (Double shaft)

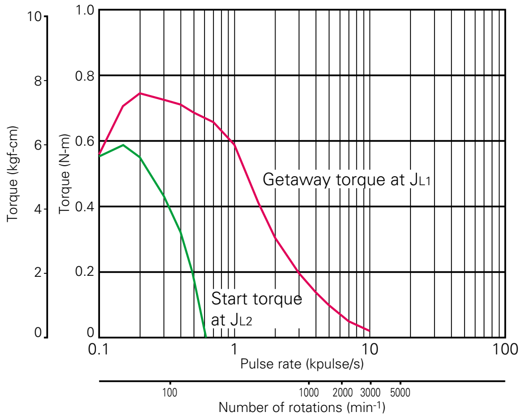


Applicable connector :JST Mfg.Co.,Ltd
Connector : VHR-6N
Terminal : SVH-21T-P1.5

□39mm(0.9°) □42mm(0.9°)
□56mm(0.9°)
□28mm(1.8°)
□42mm(1.8°)
□50mm(1.8°)
□56mm(1.8°)
□60mm(1.8°)
ø86mm(1.8°)
ø106mm(1.8°)
□56mm(CE)
ø86mm(CE)
ø106mm(CE)
Specifications of 2-phase stepping motor
In-vacuum stepping motor
2-phase synchronous motor

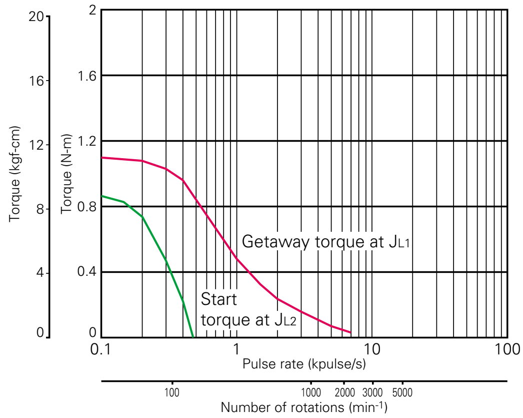
Pulse Rate - Torque Characteristics

●103H7821-0140



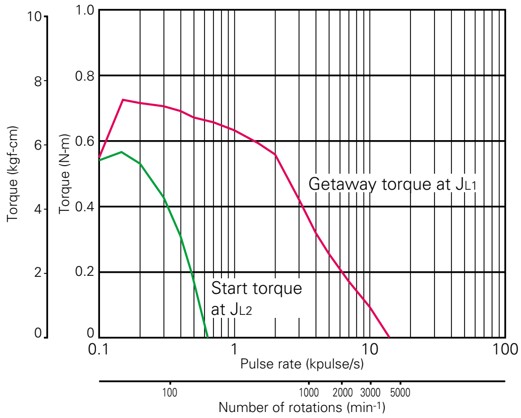
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H7822-0140



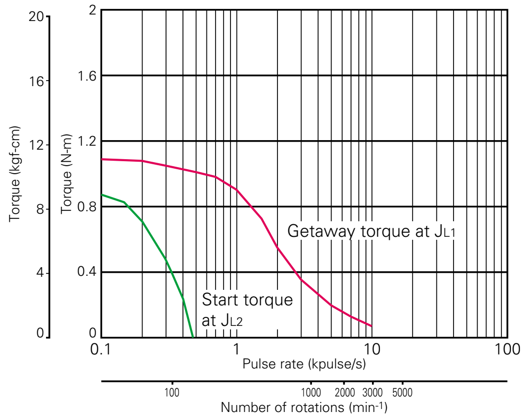
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)
J_{L1}=7.4x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=7.4x10^{-4}kg·m^2 (Uses direct coupling)

●103H7821-0440



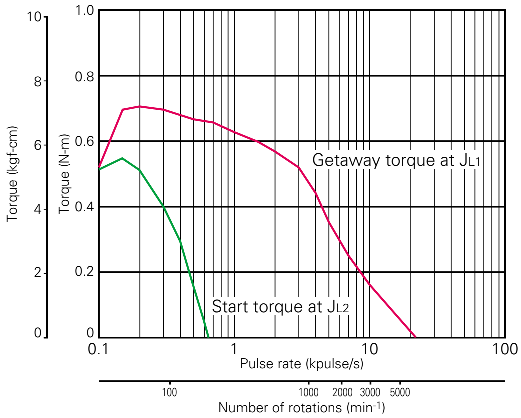
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 2A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H7822-0440



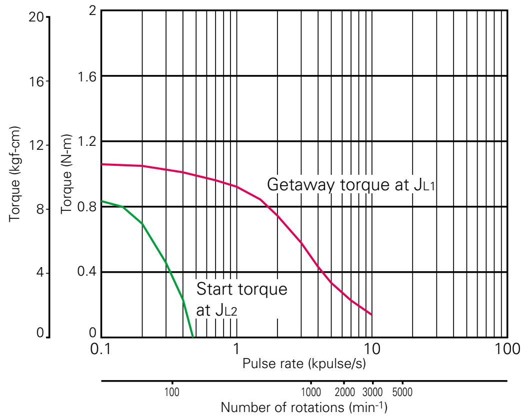
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 2A/phase, 2-phase energization (full-step)
J_{L1}=7.4x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=7.4x10^{-4}kg·m^2 (Uses direct coupling)

●103H7821-0740



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 3A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

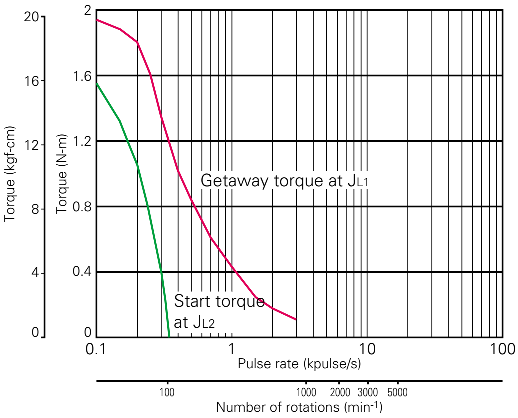
●103H7822-0740



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 3A/phase, 2-phase energization (full-step)
J_{L1}=7.4x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=7.4x10^{-4}kg·m^2 (Uses direct coupling)

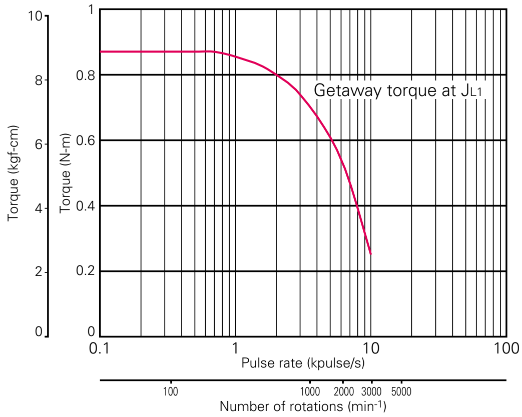
Pulse Rate - Torque Characteristics

●103H7823-0140



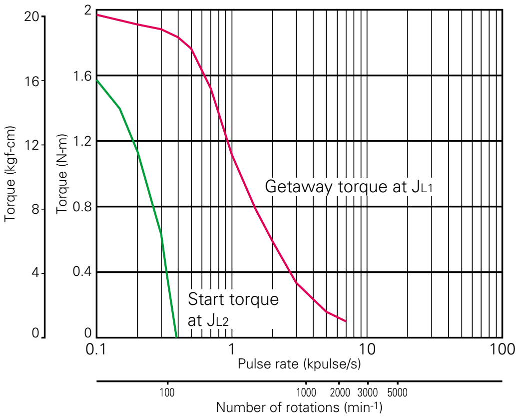
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)
J_{L1}=7.4x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=7.4x10^{-4}kg·m^2 (Uses direct coupling)

●103H7821-1740



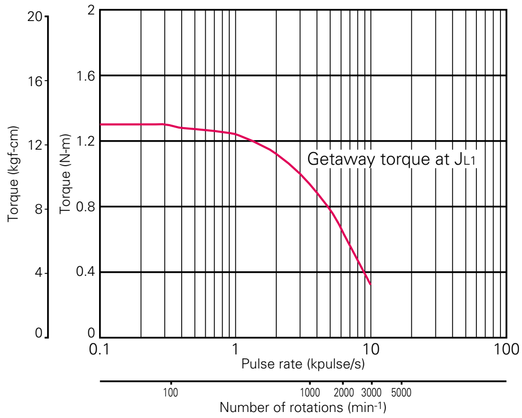
Sanyo constant current circuit
Source voltage: AC100V Wiring current: 4A/phase, 2-phase energization (full-step)
J_{L1}=2.6x10^{-4}kg·m^2 (Uses rubber coupling)

●103H7823-0440



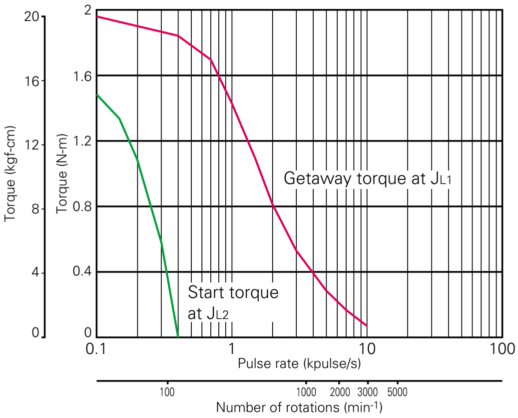
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 2A/phase, 2-phase energization (full-step)
J_{L1}=7.4x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=7.4x10^{-4}kg·m^2 (Uses direct coupling)

●103H7822-1740



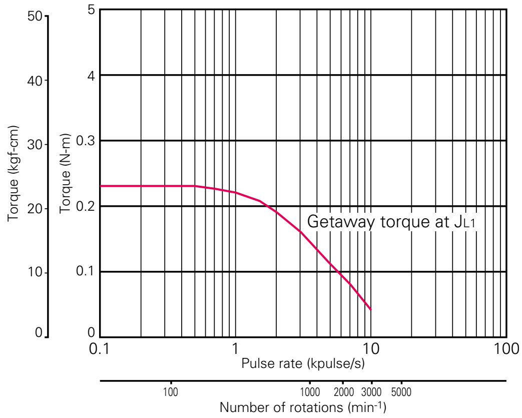
Sanyo constant current circuit
Source voltage: AC100V Wiring current: 4A/phase, 2-phase energization (full-step)
J_{L1}=2.6x10^{-4}kg·m^2 (Uses rubber coupling)

●103H7823-0740



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 3A/phase, 2-phase energization (full-step)
J_{L1}=7.4x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=7.4x10^{-4}kg·m^2 (Uses direct coupling)

●103H7823-1740



Sanyo constant current circuit
Source voltage: AC100V Wiring current: 4A/phase, 2-phase excitation (full-step)
J_{L1}=15.1x10^{-4}kg·m^2 (Uses rubber coupling)

2-phase Stepping Motor

86mm cir. 103H822□ 1.8°/step

●For information on the applicable driver, contact our sales department.

Specifications

Unipolar winding

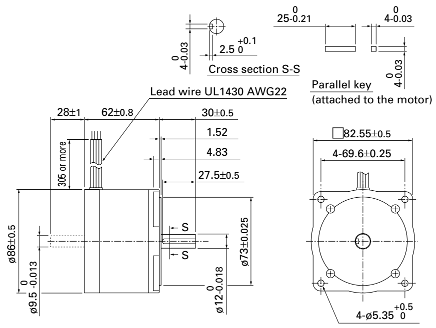
Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	x10⁻⁴kg·m²	kg
103H8221-0441	-0411	2.15	2	2.5	7.2	1.45	1.5
103H8221-0941	-0911	2.15	4	0.62	1.8	1.45	1.5
103H8222-0441	-0411	4.13	2	4.0	15	2.9	2.5
103H8222-0941	-0911	4.13	4	0.97	3.6	2.9	2.5
103H8223-0441	-0411	6.27	2	5.6	24	4.4	3.5
103H8223-0941	-0911	6.27	4	1.35	5.6	4.4	3.5

Bipolar winding

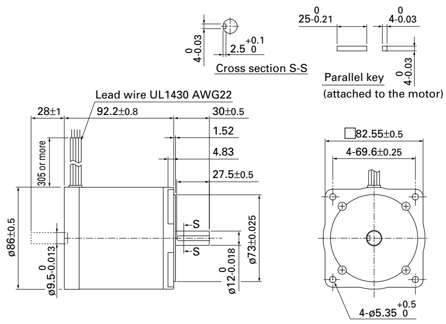
Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	x10⁻⁴kg·m²	kg
103H8221-5041	-5011	2.74	2	2.3	14	1.45	1.5
103H8221-5141	-5111	2.74	4	0.6	3.5	1.45	1.5
103H8221-5241	-5211	2.74	6	0.3	1.65	1.45	1.5
103H8222-5041	-5011	5.09	2	2.7	23	2.9	2.5
103H8222-5141	-5111	5.09	4	0.7	5.7	2.9	2.5
103H8222-5241	-5241	5.09	6	0.35	2.7	2.9	2.5
103H8223-5041	-5011	7.44	2	3.6	32.5	4.4	3.5
103H8223-5141	-5111	7.44	4	0.9	8.1	4.4	3.5
103H8223-5241	-5211	7.44	6	0.45	3.4	4.4	3.5

Dimensions (Unit: mm)

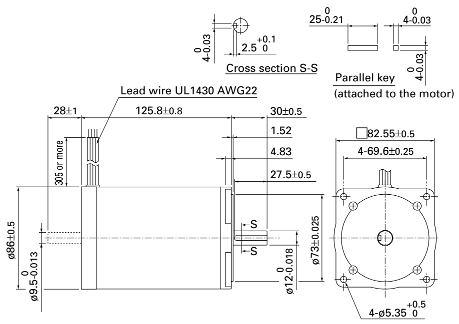
103H8221-0441/0941/5041/5141/5241 (Single shaft)
103H8221-0411/0911/5011/5111/5211 (Double shaft)



103H8222-0441/0941/5041/5141/5241 (Single shaft)
103H8222-0411/0911/5011/5111/5211 (Double shaft)

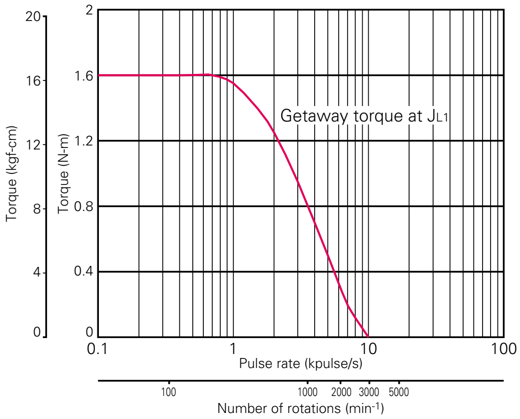


103H8223-0441/0941/5041/5141/5241 (Single shaft)
103H8223-0411/0911/5011/5111/5211 (Double shaft)



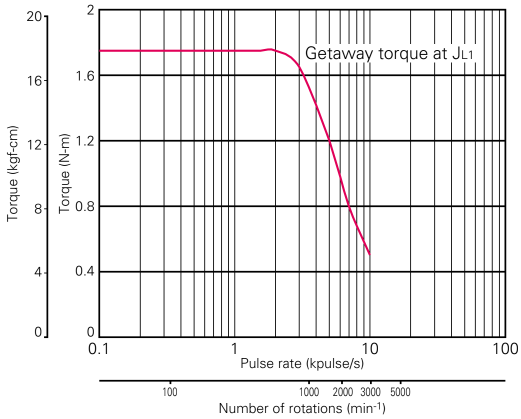
Pulse Rate - Torque Characteristics

●103H8221-0441



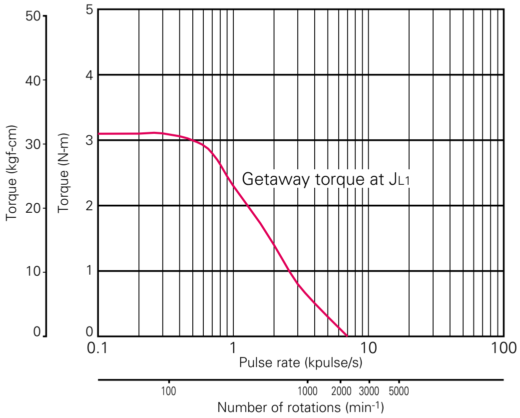
Sanyo constant current circuit
Source voltage: AC100V Wiring current: 2A/phase, 2-phase energization (full-step)
JL1=0.94x10^{-4}kg·m^2 (Uses rubber coupling)

●103H8221-0941



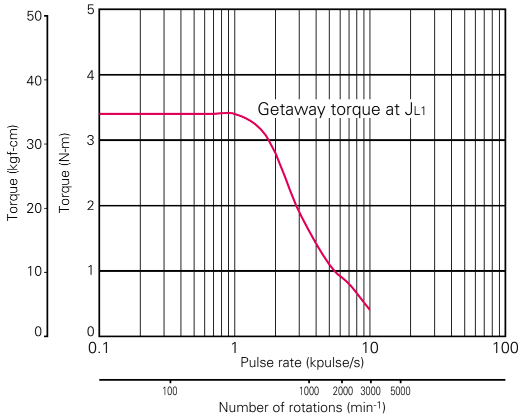
Sanyo constant current circuit
Source voltage: AC100V Wiring current: 4A/phase, 2-phase energization (full-step)
JL1=15.1x10^{-4}kg·m^2 (Uses rubber coupling)

●103H8222-0441



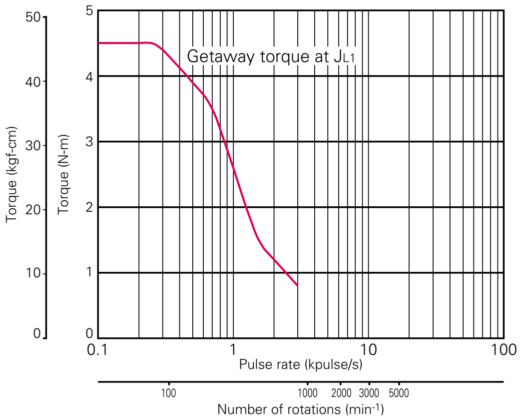
Sanyo constant current circuit
Source voltage: AC100V Wiring current: 2A/phase, 2-phase energization (full-step)
JL1=2.6x10^{-4}kg·m^2 (Uses rubber coupling)

●103H8222-0941



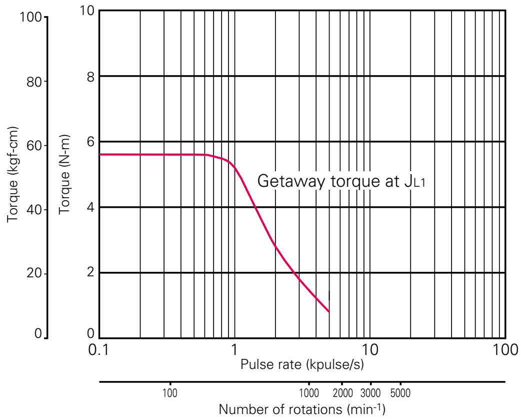
Sanyo constant current circuit
Source voltage: AC100V Wiring current: 4A/phase, 2-phase energization (full-step)
JL1=15.1x10^{-4}kg·m^2 (Uses rubber coupling)

●103H8223-0441



Sanyo constant current circuit
Source voltage: AC100V Wiring current: 2A/phase, 2-phase energization (full-step)
JL1=2.6x10^{-4}kg·m^2 (Uses rubber coupling)

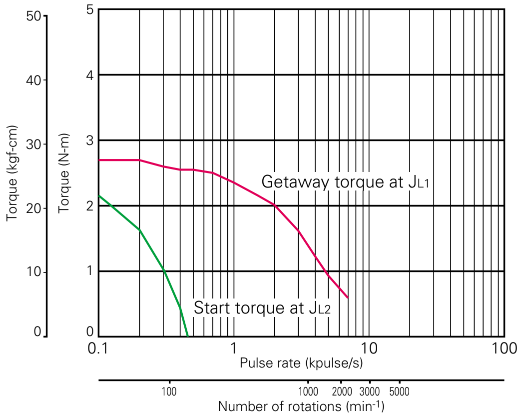
●103H8223-0941



Sanyo constant current circuit
Source voltage: AC100V Wiring current: 4A/phase, 2-phase energization (full-step)
JL1=15.1x10^{-4}kg·m^2 (Uses rubber coupling)
JL2=0.8x10^{-4}kg·m^2 (Uses rubber coupling)

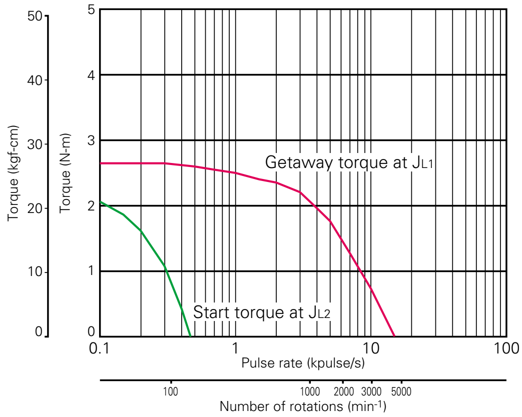
Pulse Rate - Torque Characteristics

●103H8221-5041



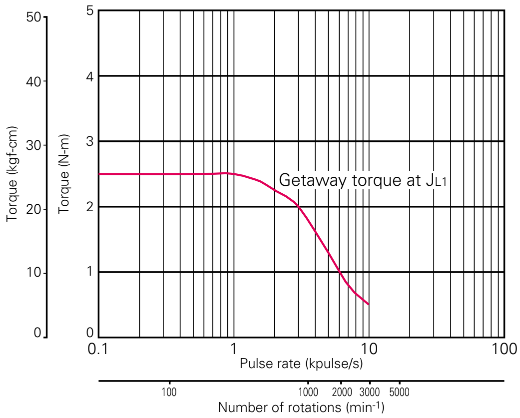
Sanyo constant current circuit
Source voltage: AC100V Wiring current: 2A/phase, 2-phase energization (full-step)
JL1=7.4x10^{-4}kg·m^2 (Uses rubber coupling)
JL2=7.4x10^{-4}kg·m^2 (Uses rubber coupling)

●103H8221-5141



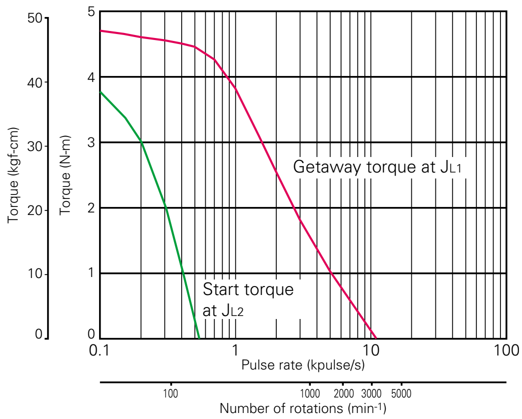
Sanyo constant current circuit
Source voltage: AC100V Wiring current: 4A/phase, 2-phase energization (full-step)
JL1=7.4x10^{-4}kg·m^2 (Uses rubber coupling)
JL2=7.4x10^{-4}kg·m^2 (Uses rubber coupling)

●103H8221-5241



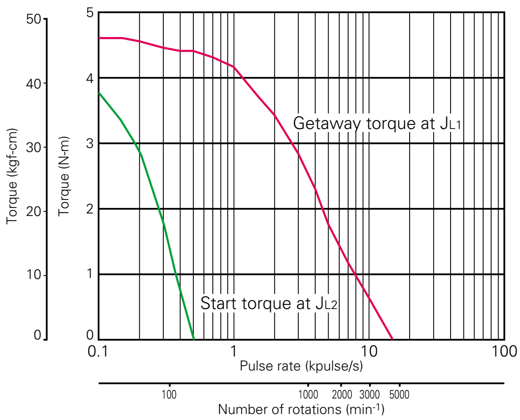
Sanyo constant current circuit
Source voltage: AC100V Wiring current: 6A/phase, 2-phase energization (full-step)
JL1=15.1x10^{-4}kg·m^2 (Uses rubber coupling)

●103H8222-5041



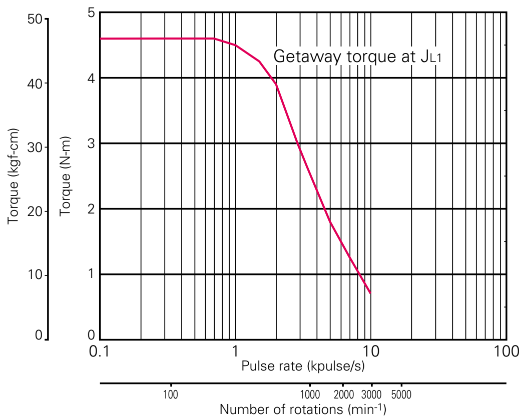
Sanyo constant current circuit
Source voltage: AC100V Wiring current: 2A/phase, 2-phase energization (full-step)
JL1=15.3x10^{-4}kg·m^2 (Uses rubber coupling)
JL2=15.3x10^{-4}kg·m^2 (Uses rubber coupling)

●103H8222-5141



Sanyo constant current circuit
Source voltage: AC100V Wiring current: 4A/phase, 2-phase energization (full-step)
JL1=15.3x10^{-4}kg·m^2 (Uses rubber coupling)
JL2=15.3x10^{-4}kg·m^2 (Uses rubber coupling)

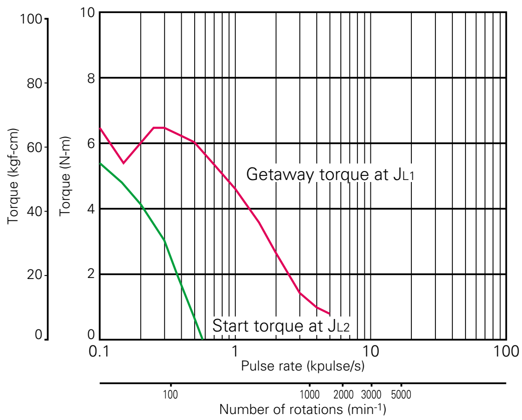
●103H8222-5241



Sanyo constant current circuit
Source voltage: AC100V Wiring current: 6A/phase, 2-phase energization (full-step)
JL1=15.1x10^{-4}kg·m^2 (Uses rubber coupling)

Pulse Rate - Torque Characteristics

●103H8223-5041



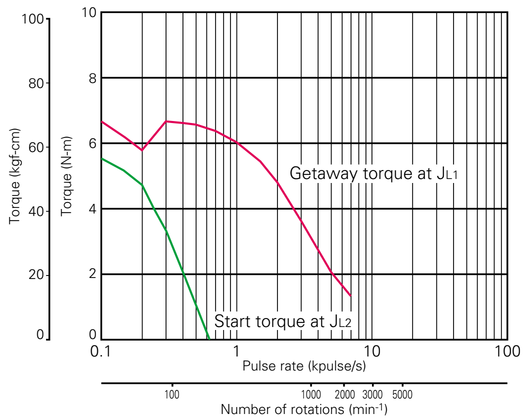
Sanyo constant current circuit

Source voltage: AC100V Wiring current: 2A/phase, 2-phase energization (full-step)

J_{L1}=15.3x10^{-4}kg·m^2 (Uses rubber coupling)

J_{L2}=15.3x10^{-4}kg·m^2 (Uses rubber coupling)

●103H8223-5141



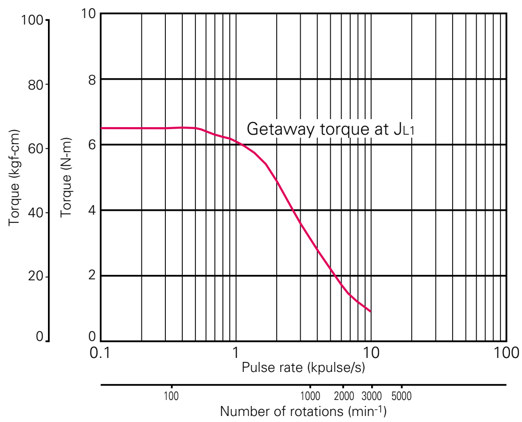
Sanyo constant current circuit

Source voltage: AC100V Wiring current: 4A/phase, 2-phase energization (full-step)

J_{L1}=15.3x10^{-4}kg·m^2 (Uses rubber coupling)

J_{L2}=15.3x10^{-4}kg·m^2 (Uses rubber coupling)

●103H8223-5241



Sanyo constant current circuit

Source voltage: AC100V Wiring current: 6A/phase, 2-phase energization (full-step)

J_{L1}=15.1x10^{-4}kg·m^2 (Uses rubber coupling)

2-phase Stepping Motor

106mm cir.

103H8922□
1.8°/step

●For information on the applicable driver, contact our sales department.

Specifications

Unipolar winding

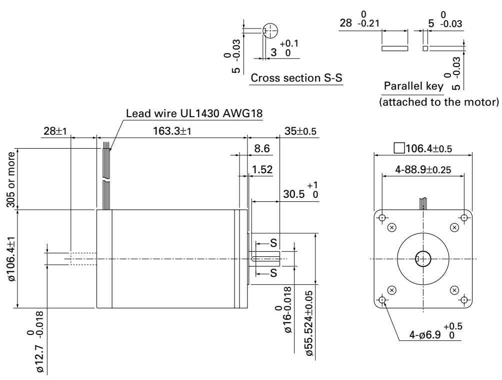
Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	$\times10^{-4}$kg·m^2	kg
103H89222-0941	-0911	10.8	4	0.98	6.3	14.6	7.5
103H89223-0941	-0911	15.5	4	1.4	9.7	22	10.5

Bipolar winding

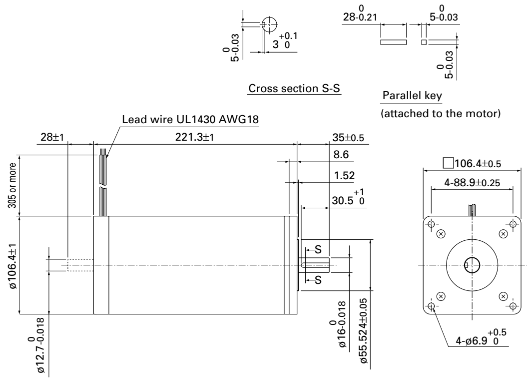
Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	$\times10^{-4}$kg·m^2	kg
103H89222-5241	-5211	13.2	6	0.45	5.4	14.6	7.5
103H89223-5241	-5211	19	6	0.63	8	22	10.5

Dimensions (Unit: mm)

103H89222-0941/5241 (Single shaft)
103H89222-0911/5211 (Double shaft)

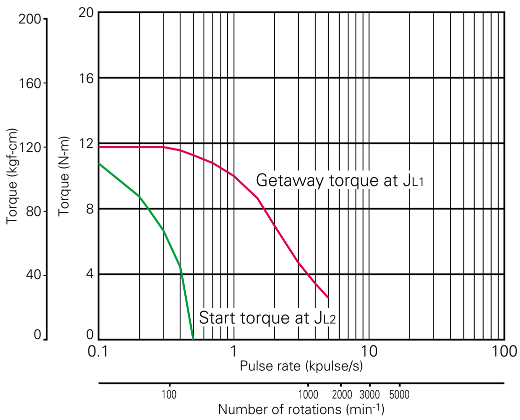


103H89223-0941/5241 (Single shaft)
103H89223-0911/5211 (Double shaft)



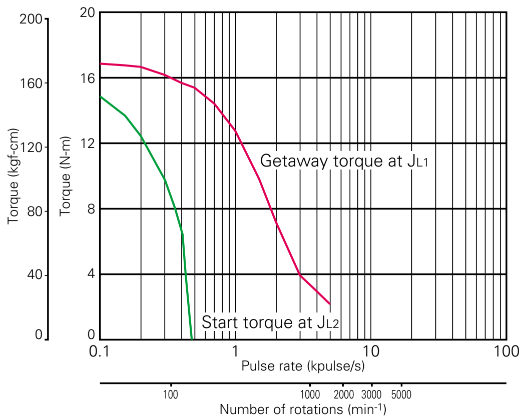
Pulse Rate - Torque Characteristics

●103H89222-5241



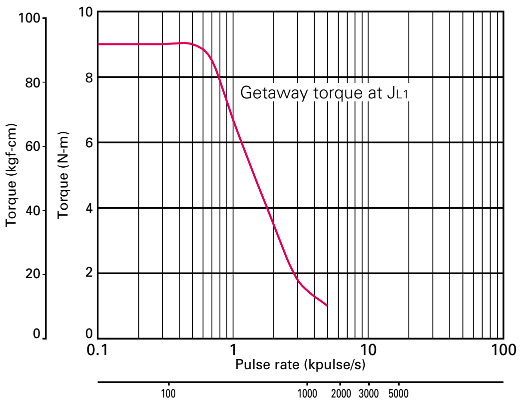
Sanyo constant current circuit
Source voltage: AC100V Wiring current: 6A/phase, 2-phase energization (full-step)
J_{L1}=43x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=43x10^{-4}kg·m^2 (Uses rubber coupling)

●103H89223-5241



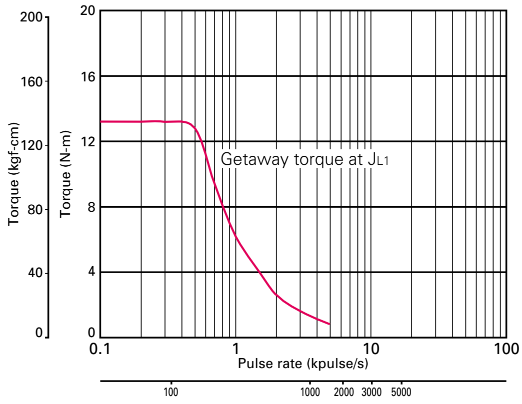
Sanyo constant current circuit
Source voltage: AC100V Wiring current: 6A/phase, 2-phase energization (full-step)
J_{L1}=43x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=43x10^{-4}kg·m^2 (Uses rubber coupling)

●103H89222-0941



Sanyo constant current circuit
Source voltage: AC100V Wiring current: 4A/phase, 2-phase energization (full-step)
J_{L1}=43x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=43x10^{-4}kg·m^2 (Uses rubber coupling)

●103H89223-0941



Sanyo constant current circuit
Source voltage: AC100V Wiring current: 4A/phase, 2-phase energization (full-step)
J_{L1}=43x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=43x10^{-4}kg·m^2 (Uses rubber coupling)

2-phase Stepping Motor

56mm sq.

103H712□
Conforming to the CE marking
1.8°/step

CE

●For information on the applicable driver, contact our sales department.

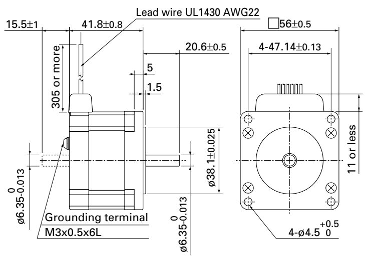
Specifications

Unipolar winding

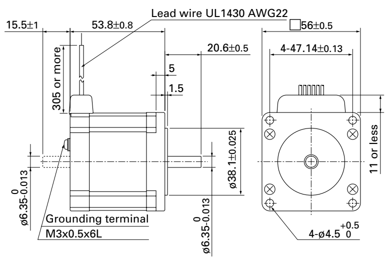
Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	$\times10^{-4}$kg·m^2	kg
103H7121-6140	-6110	0.39	1	4.8	8	0.1	0.47
103H7121-6740	-6710	0.39	3	0.6	0.8	0.1	0.47
103H7123-6140	-6110	0.83	1	6.7	15	0.21	0.65
103H7123-6740	-6710	0.78	3	0.77	1.58	0.21	0.65
103H7126-6140	-6110	1.27	1	8.6	19	0.36	0.98
103H7126-6740	-6710	1.27	3	0.9	2.2	0.36	0.98

Dimensions (Unit: mm)

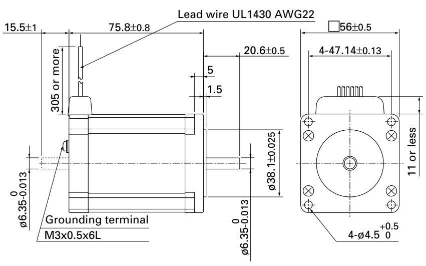
103H7121-6140/6740 (Single shaft)
103H7121-6110/6710 (Double shaft)



103H7123-6140/6740 (Single shaft)
103H7123-6110/6710 (Double shaft)

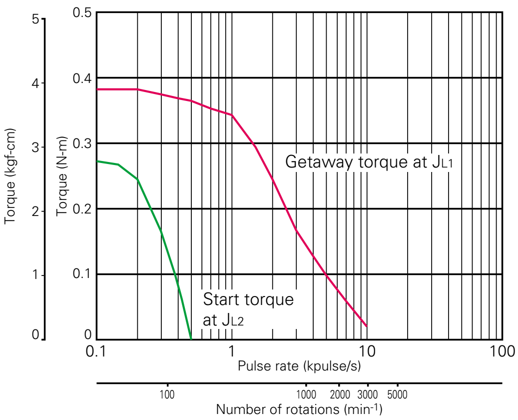


103H7126-6140/6740 (Single shaft)
103H7126-6110/6710 (Double shaft)



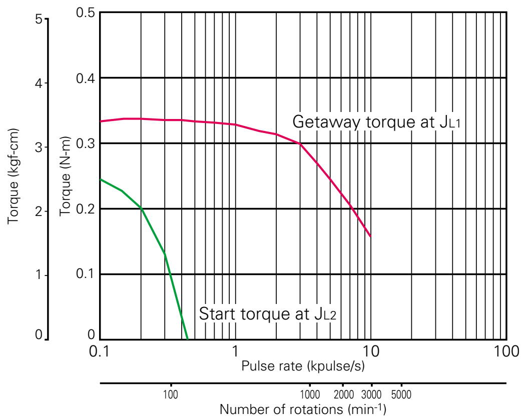
Pulse Rate - Torque Characteristics

●103H7121-6140



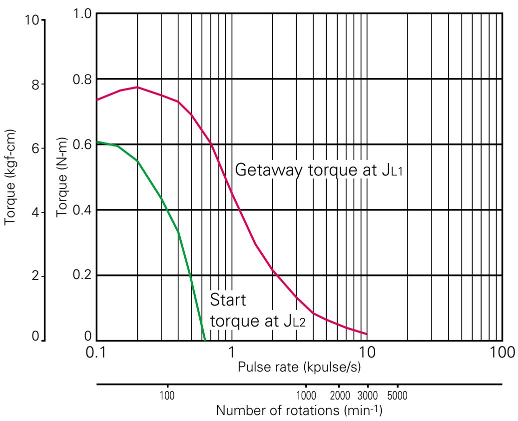
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H7121-6740



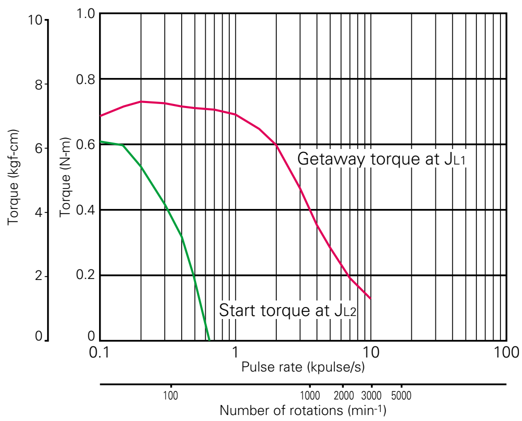
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 3A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H7123-6140



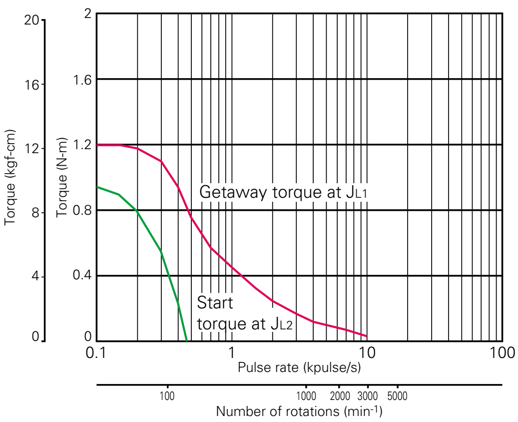
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H7123-6740



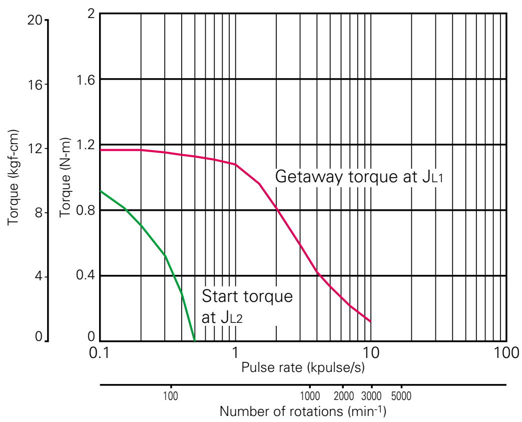
Sanyo constant current circuit
Source voltage: DC24V Wiring current: 3A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m^2 (Uses direct coupling)

●103H7126-6140



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 1A/phase, 2-phase energization (full-step)
J_{L1}=2.6x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=2.6x10^{-4}kg·m^2 (Uses direct coupling)

●103H7126-6740



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 3A/phase, 2-phase energization (full-step)
J_{L1}=2.6x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=2.6x10^{-4}kg·m^2 (Uses direct coupling)

2-phase Stepping Motor

86mm cir.

103H822□
Conforming to the CE marking
1.8°/step

CE

●For information on the applicable driver, contact our sales department.

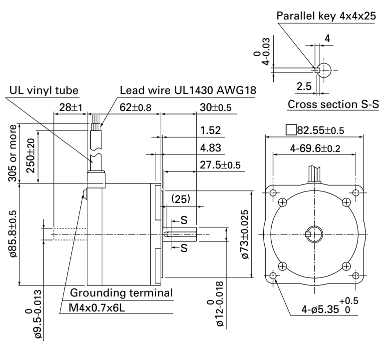
Specifications

Bipolar winding

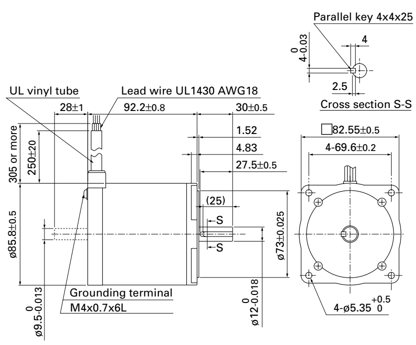
Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	$x10^{-4}kg{\cdot}m^2$	kg
103H8221-6240	-6210	2.75	6	0.3	1.65	1.45	1.5
103H8222-6340	-6310	5.09	6	0.35	2.7	2.9	2.5
103H8223-6340	-6310	7.44	6	0.45	3.4	4.4	3.5

Dimensions (Unit: mm)

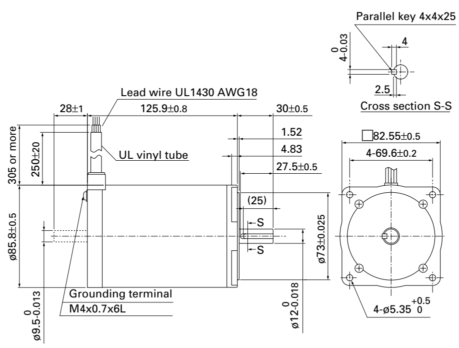
103H8221-6240 (Single shaft)
103H8221-6210 (Double shaft)



103H8222-6340 (Single shaft)
103H8222-6310 (Double shaft)

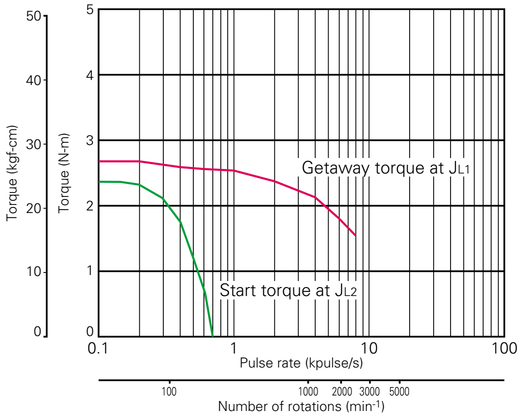


103H8223-6340 (Single shaft)
103H8223-6310 (Double shaft)



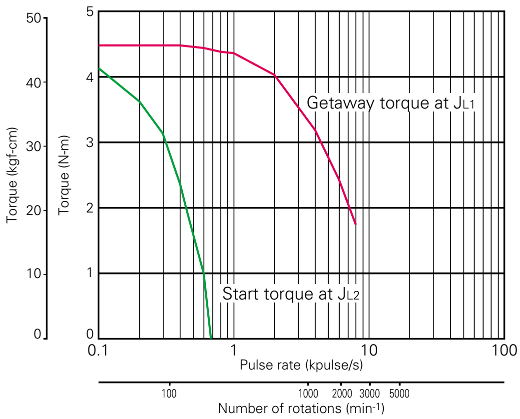
Pulse Rate - Torque Characteristics

●103H8221-6240



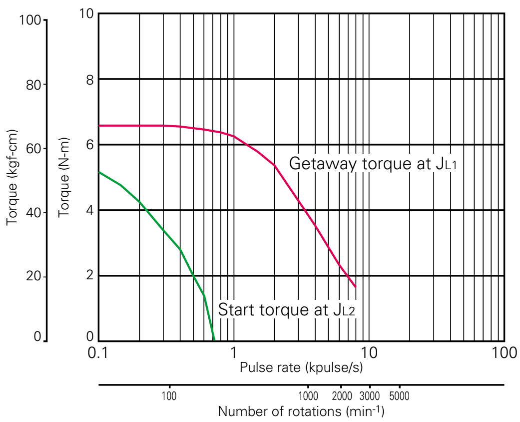
Sanyo constant current circuit
Source voltage: AC100V Wiring current: 6A/phase, 2-phase energization (full-step)
J_{L1}=7.4x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=7.4x10^{-4}kg·m^2 (Uses direct coupling)

●103H8222-6340



Sanyo constant current circuit
Source voltage: AC100V Wiring current: 6A/phase, 2-phase energization (full-step)
J_{L1}=15.3x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=7.4x10^{-4}kg·m^2 (Uses direct coupling)

●103H8223-6340



Sanyo constant current circuit
Source voltage: AC100V Wiring current: 6A/phase, 2-phase energization (full-step)
J_{L1}=43x10^{-4}kg·m^2 (Uses rubber coupling)
J_{L2}=43x10^{-4}kg·m^2 (Uses direct coupling)

2-phase Stepping Motor

106mm cir.

103H8922□
Conforming to the CE marking
1.8°/step

CE

●For information on the applicable driver, contact our sales department.

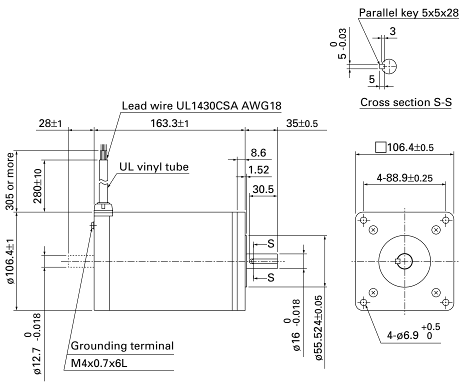
Specifications

Bipolar winding

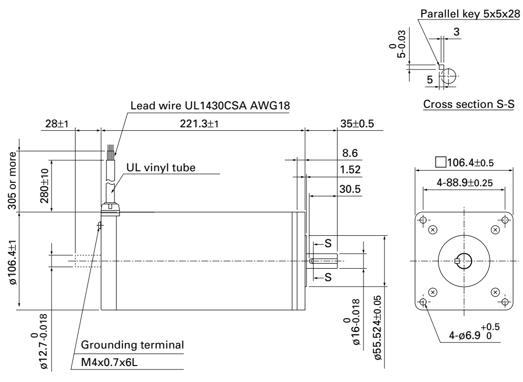
Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	$x10^{-4}kg\cdot m^2$	kg
103H89222-6341	-6311	13.2	6	0.45	5.4	14.6	7.5
103H89223-6341	-6311	19	6	0.63	8	22	10.5

Dimensions (Unit: mm)

103H89222-6341 (Single shaft)
103H89222-6311 (Double shaft)

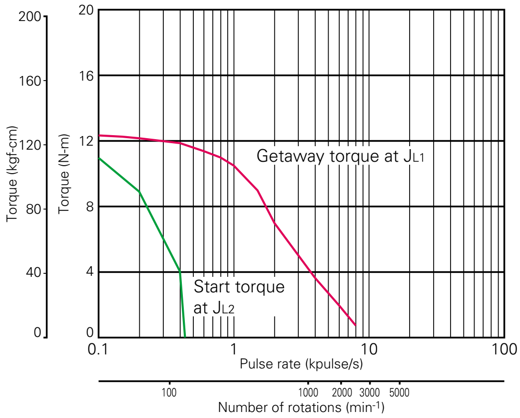


103H89223-6341 (Single shaft)
103H89223-6311 (Double shaft)



Pulse Rate - Torque Characteristics

●**103H89222-6341**



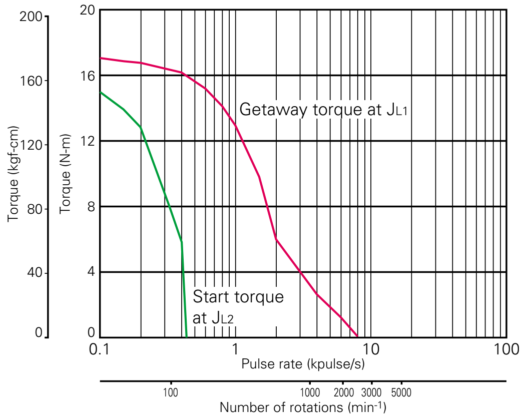
Sanyo constant current circuit

Source voltage: AC100V Wiring current: 6A/phase, 2-phase energization (full-step)

J_{L1}=44x10^{-4}kg·m^2 (Uses rubber coupling)

J_{L2}=44x10^{-4}kg·m^2 (Uses direct coupling)

●**103H89223-6341**



Sanyo constant current circuit

Source voltage: AC100V Wiring current: 6A/phase, 2-phase energization (full-step)

J_{L1}=44x10^{-4}kg·m^2 (Uses rubber coupling)

J_{L2}=44x10^{-4}kg·m^2 (Uses rubber coupling)

Specifications of 2-Phase Stepping Motor

General Specifications

	103-4902	103-591	103-771□	103H32□□	103H52□□
Insulation class	Class B (130˚C)				
Insulation resistance	100MΩ or more when measured with a DC500V megohmmeter between the motor wiring and the frame at normal temperature and humidity.				
Withstand voltage	Not influenced when applied 0.5kVA (1kVAC for the 103-771□), 50/60Hz between the motor wound-wire and the frame for 1 minute (leak current 1mA) at room temperature and humidity.				
Operating environment	Ambient temperature: -10˚C~+50˚C				
	Ambient humidity: 20~90% RH (no condensation)				
Winding temperature rise	80K or less (conditioned on the Sanyo standard)				
Standing angle error	±0.045°	±0.054°	±0.045°	±0.09°	±0.09°
Axial play	0.75mm or less (with 4.4N loaded)	0.75mm or less (with 4.4N loaded)	0.75mm or less (with 9N loaded)	0.75mm or less (with 4.4N loaded)	0.75mm or less (with 4.4N loaded)
Radial play (Note 1)	0.025mm or less (with 4.4N loaded)				
Shaft runouts	0.025mm				
Concentricity of mounting spigot relative to shaft	ø0.05mm	ø0.05mm	ø0.075mm	ø0.05mm	ø0.05mm
Perpendicularity of mounting surface relative to shaft	0.1mm	0.1mm	0.075mm	0.1mm	0.1mm
Allowable thrust load	2N	10N	15N	50N	10N
Allowable radial load(Note 1)	30N	28N	80N	34N	28N

	103H670□	103H712□	103H782□	103H822□□	103H8922□□
Insulation class	Class B (130˚C)				
Insulation resistance	100MΩ or more when measured with a DC500V megohmmeter between the motor wiring and the frame at normal temperature and humidity.				
Withstand voltage	Not influenced when applied 1kVAC, 50/60Hz between the motor wound-wire and the frame for 1 minute (leak current 1mA) at room temperature and humidity.				
Operating environment	Ambient temperature: -10˚C~+50˚C				
	Ambient humidity: 20~90% RH (no condensation)				
Winding temperature rise	80K or less (conditioned on the Sanyo standard)				
Standing angle error	±0.09°	±0.054°	±0.054°	±0.09°	±0.09°
Axial play	0.75mm or less (with 9N loaded)	0.75mm or less (with 9N loaded)	0.75mm or less (with 9N loaded)	0.75mm or less (with 9N loaded)	0.75mm or less (with 9N loaded)
Radial play (Note 1)	0.025mm or less (with 4.4N loaded)				
Shaft runouts	0.025mm				
Concentricity of mounting spigot relative to shaft	ø0.075mm	ø0.075mm	ø0.075mm	ø0.075mm	ø0.075mm
Perpendicularity of mounting surface relative to shaft	0.075mm	0.075mm	0.075mm	0.075mm	0.075mm
Allowable thrust load	15N	15N	20N	60N	100N
Allowable radial load (Note 1)	80N	75N	80N	220N	360N

Note 1: The load point is the position 1/3 from the output axis end.

General Specifications (CE Marked Models)

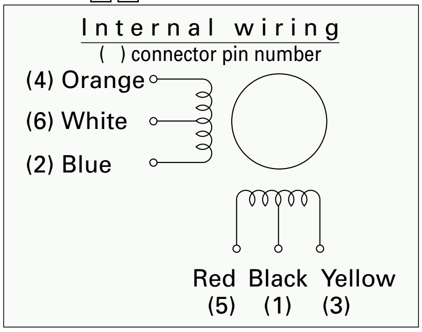
	103H712□	103H822□	103H8922□
Rated voltage	12-200VDC	12-300VDC	12-300VDC
Operation type	S1 (continuous rating)		
Device category	Class 1 device		
Operation environment	Fouling 22		
Insulation class	Class B (130˚C)		
Insulation resistance	100MΩ or more when measured with a DC500V megohmmeter between the motor wiring and the frame at normal temperature and humidity.		
Withstand voltage	Not influenced when applied 1.6kVAC (1.5kVAC for 103H712□), 50/60Hz between the motor wound-wire and the frame for 1 minute (leak current 10mA) at room temperature and humidity.		
Operating environment	Ambient temperature: -15˚C~+40˚C		
	20~95% RH (no condensation)		
Winding temperature rise	80K or less (conditioned on the Sanyo standard)		
Standing angle error	±0.054°	±0.09°	±0.09°
Axial play	0.075mm or less (with 9N loaded)		
Radial play (Note 1)	0.025mm or less (with 4.4N loaded)		
Shaft runouts	0.025mm		
Concentricity of mounting spigot relative to shaft	ø0.075mm	ø0.05mm	ø0.05mm
Perpendicularity of mounting surface relative to shaft	0.075mm	0.1mm	0.1mm
Allowable thrust load	15N	60N	100N
Allowable radial load (Note 1)	75N	220N	360N

Note 1: The load point is the position 1/3 from the output axis end.

Internal Wiring and Rotation Direction

Unipolar wiring

●103H32□□

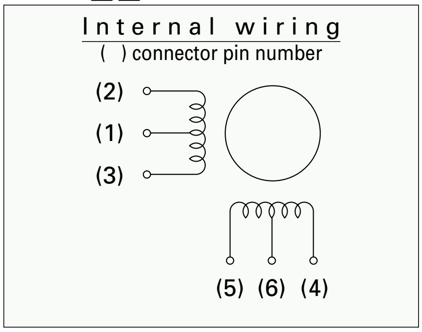


Direction of motor rotate

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

		Lead wire color, connector type pin number				
Lead wire		White & black	Red	Blue	Yellow	Orange
Connector		(6.1)	(5)	(2)	(3)	(4)
Exciting order	1	+	−	−		
	2	+		−	−	
	3	+			−	−
	4	+	−			−

●103H52□□

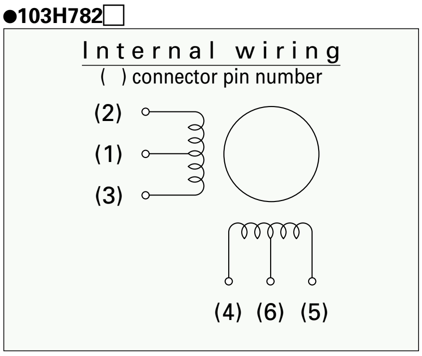


Direction of motor rotate

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

		Connector type pin number				
		(6.1)	(5)	(3)	(4)	(2)
Exciting order	1	+	−	−		
	2	+		−	−	
	3	+			−	−
	4	+	−			−

●103H782□

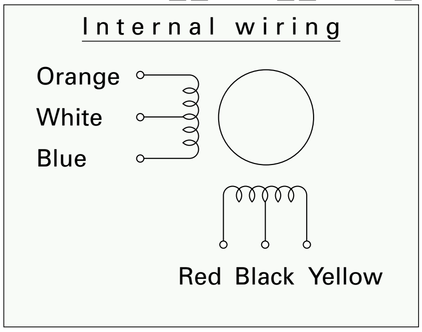


Direction of motor rotate

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

		Connector type pin number				
		(6.1)	(4)	(3)	(5)	(2)
Exciting order	1	+	−	−		
	2	+		−	−	
	3	+			−	−
	4	+	−			−

●Other than 103H32□□,103H52□□,103H782□

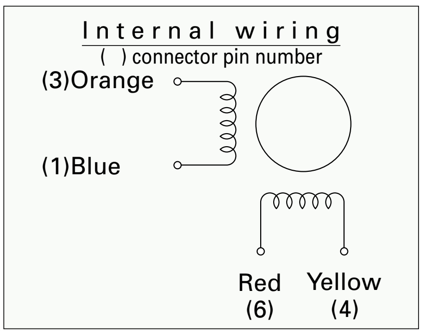


Direction of motor rotate

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

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

Bipolar wiring



Direction of motor rotate

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

		Lead wire color, connector type pin number			
Lead wire		Red	Blue	Yellow	Orange
Connector		(6)	(1)	(4)	(3)
Exciting order	1	−	−	+	+
	2	+	−	−	+
	3	+	+	−	−
	4	−	+	+	−

2-Phase Stepping Motor for Vacuum Environment

1. What Is Stepping Motor for Vacuum Environment

We have developed the stepping motor for use under a vacuum environment in response to the demand for the actuator that can operate without a vacuum introducer.
The stepping motor for a vacuum environment secures the highly accurate operation in speed control and position control by the open-loop control system, the features realized with the general stepping motor.

2. Characteristics

- Enables use in a vacuum environment of ultrahigh degree (10^{-8}Pa).
- Enables baking at the temperature 200˚C.
- A line of the product models is available to be selected for various uses.

3. Range of Uses

The stepping motors for vacuum environment are utilized in the devices of the following fields.

- Industrial robots on satellites (Space industry)
- Semiconductor production systems
- Scanning electron microscopes
- Large scale experiment facilities (Particle accelerator, radial light analyzer)

etc.

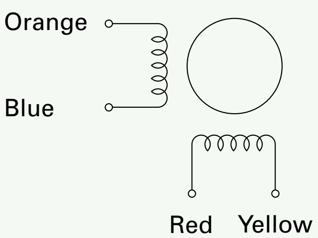
General Specifications

	103-770-12V1
Insulation class	Class C (200˚C)
Insulation resistance	100MΩ or more when measured with a DC500V megohmmeter between the motor wiring and the frame at normal temperature and humidity.
Withstand voltage	Not influenced when applied 1kVAC, 50/60Hz between the motor wound-wire and the frame for 1 minute (leak current 1mA) at room temperature and humidity.
Ambient pressure	10^{-8}Pa (reference value)
Standing angle error	±0.09˚
Axial play	0.075mm or less (with 9N loaded)
Radial play (Note 1)	0.025mm or less (with 4.4N loaded)
Shaft runouts	0.025mm
Concentricity of mounting spigot relative to shaft	ø0.075mm
Perpendicularity of mounting surface relative to shaft	0.075mm
Allowable thrust load	15N
Allowable radial load (Note 1)	80N

Note 1: The load point is the position 1/3 from the output axis end.

●103-770-70V1

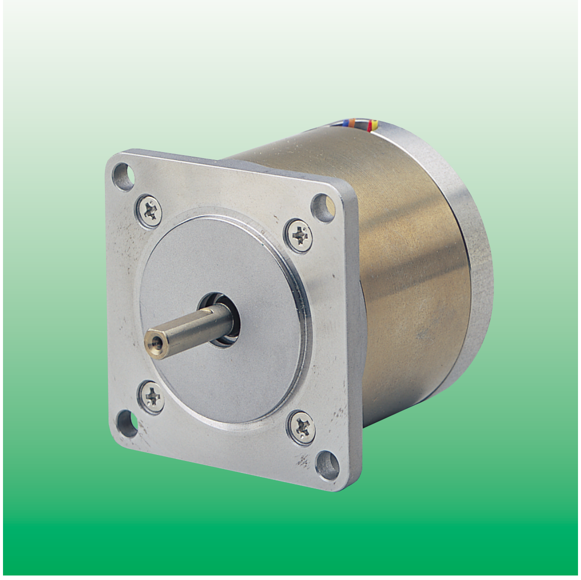
Internal wiring



Direction of motor rotate

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

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



The Stepping Motor for Ultra-vacuum Environment

Ambient pressure 10^{-8}Pa
(reference value)

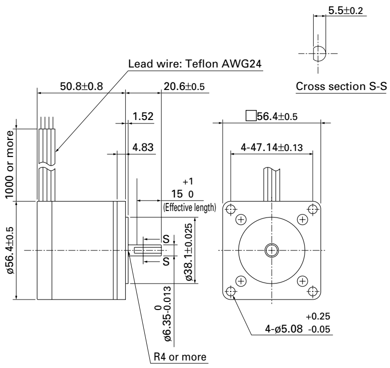
●For information on the applicable driver, contact our sales department.

Specifications

Model	Basic step angle	Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weigh
		N.m or more	A/phase	Ω/phase	mH/phase	$\times 10^{-4}$kg·m²	kg
103-770-12V1	1.8°	0.43	2.2	0.73	2.12	0.105	0.8

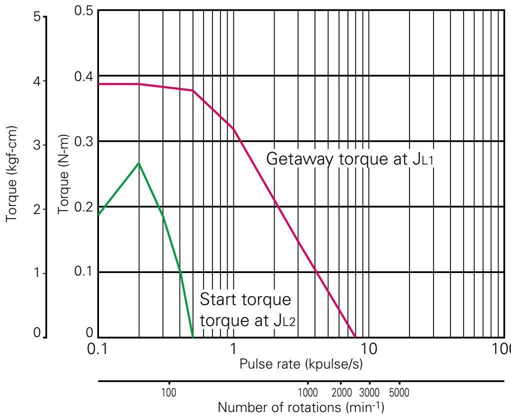
Dimensions (Unit: mm)

●103-770-12V1



Frequency - Torque Characteristics

●103-770-12V1



Sanyo constant current circuit
Source voltage: DC24V Wiring current: 2A/phase, 2-phase energization (full-step)
J_{L1}=0.94x10^{-4}kg·m² (Uses rubber coupling)
J_{L2}=0.8x10^{-4}kg·m² (Uses direct coupling)

2-Phase Synchronous Motor

Principle

●The stepping motor is transformed into a synchronous motor by replacing the wound-wire for the AC power specification.

●A synchronous motor rotates at a constant speed in proportion to the AC power frequency of which current is applied directly to the wound-wire, while a stepping motor rotates in accordance with the switched phase by the driving circuit.

●The 2-phase synchronous motor is driven by the phase shifter (condenser and resistor) used on the supplied single phase current.

Characteristics

- A constant rotation speed is maintained without slip within the load range to the motor torque.
- Enables ultra-low speed rotation and high torque.
- Enables cost saving as it operates on the commercial power supply and therefore the driving circuit is not required.

Range of Uses

- Widely used in various fields such as conveyer drives, printers, ultimate freezers, and general industrial devices.

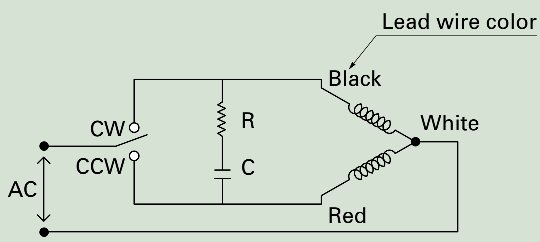
General Specifications

	03H7093-0140	103H823□	103H8923□	103-830-0140
Insulation class	Class B (130˚C)			
Insulation resistance	100MΩ or more when measured with a DC500V megohmmeter between the motor wiring and the frame at normal temperature and humidity.			
Withstand voltage	Not influenced when applied 1kVAC, 50/60Hz between the motor wound-wire and the frame for 1 minute (leak current 1mA) at room temperature and humidity.			
Operating environment	Ambient temperature: -10˚C~+60˚C			
	Ambient humidity: 20~95% RH (no condensation)			
Winding temperature rise	80K or less (conditioned on the Sanyo standard)			
Axial play	0.075mm or less (with 9N loaded)			
Radial play (Note 1)	0.025mm or less (with 4.4N loaded)			
Shaft runouts	0.025mm			
Concentricity of mounting spigot relative to shaft	ø0.075mm	ø0.075mm	ø0.075mm	ø0.075mm
Perpendicularity of mounting surface relative to shaft	0.075mm	0.075mm	0.075mm	0.075mm
Allowable thrust load	15N	60N	100N	60N
Allowable radial load (Note 1)	75N	220N	360N	130N

Note 1: The load point is the position 1/3 from the output axis end.

Internal wiring and rotation direction

Internal wiring



Direction of motor rotate

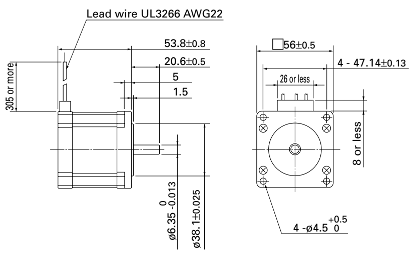
The output shaft shall rotate clockwise as seen from the shaft side, when the switch is selected CW at the internal wiring indicated left.

Specifications

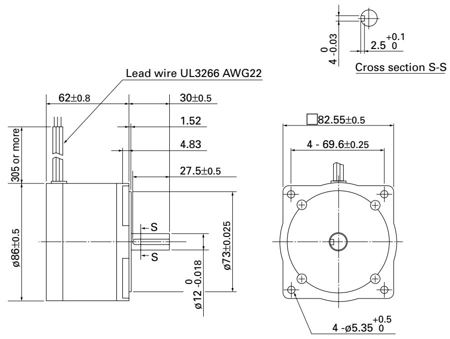
Model	Synchronous pull-out torque	Rated voltage	Rated current	Phase shifter			Number of rotation (min⁻¹)		Weight
				Condenser (μF)		Resister (Ω)			
	N.m or more	VAC	A	50Hz	60Hz		50Hz	60Hz	kg
103H7093-0140	0.57	100	0.15	1.7	1.7	–	60	72	0.65
103H8231-0140	1.6	100	0.5	6.75	5	180	60	72	1.5
103H8232-0240	3	220	0.5	2.4	1.8	500	60	72	2.5
103H89235-0140	2.6	120	0.4	–	–	–	60	72	5
103H89236-0140	5.5	120	0.9	–	–	–	60	72	7.5
103-830-0140	0.54	120	0.33	3.75	3.75	300	166	200	2.5

Dimensions (Unit: mm)

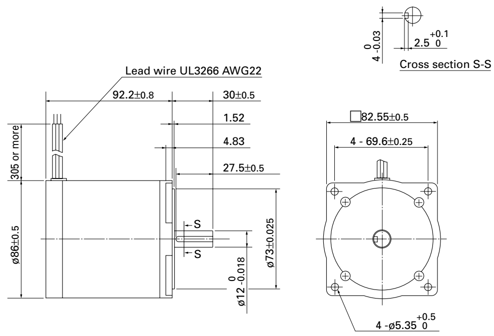
103H7093-0140



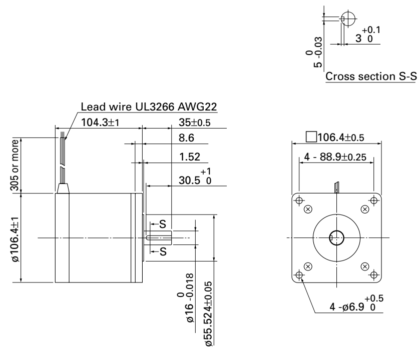
103H8231-0140



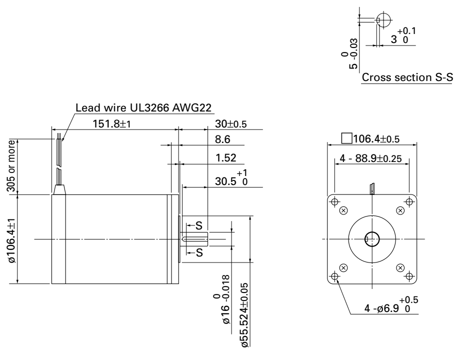
103H8232-0240



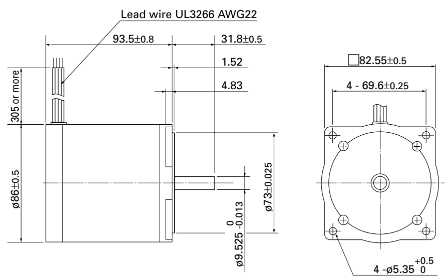
103H89235-0140

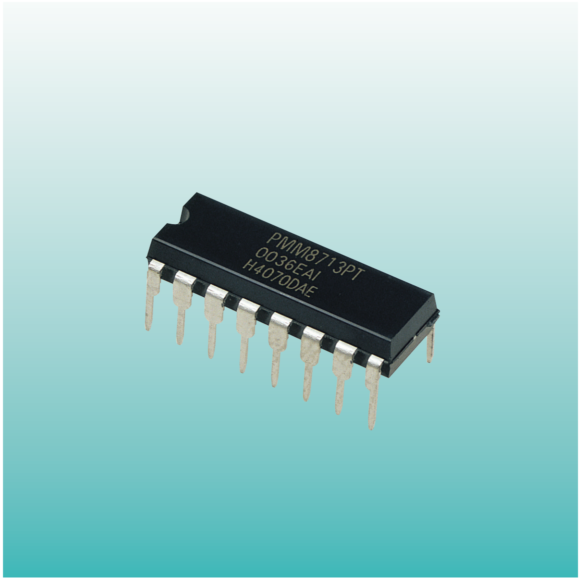


103H89236-0140



103-830-0140





Universal Controller IC for the 2-Phase Stepping Motor Drive

PMM8713PT

Outline

The universal controller "PMM8713PT" is the gate array IC (HIC) to control the 2-phase stepping motor drive.
This product has been developed for the purpose to further simplify 2-phase stepping motor use, as combined only with switching elements or power hybrid ICs to configure a 2-phase stepping motor driver.

Characteristics

- Universal controller : The following 3 types of energization mode can be selected by switching at the energization mode switching terminal
  1EX / 1-2EX / 2EX
- Source voltage : Vcc=4.5~5.5V
- High output current : 24mA min (sink, source)
- High noise margin : Schmitt trigger circuit is incorporated for the all input terminals.
- 2 types of pulse input : 2 input mode (CW, CCW input mode)
  1 input mode (CK, U/D input mode)
- Excited status verification monitor : Outputs the monitor signal of the controller status.

Maximum Rating (Ta=25˚C)

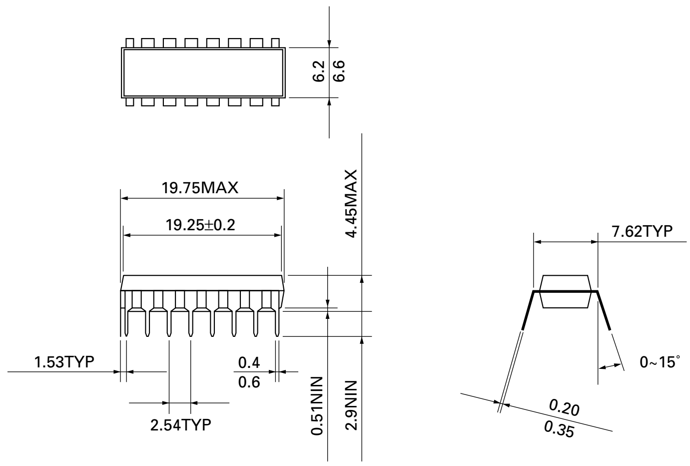
Item		Symbol	Rating	Unit
Source voltage		V_{CC}	–0.3~7	V
Output current øn	"H" level	I_{OH} ø	–35	mA
	"L" level	I_{OL} ø	35	
Output current Co,EM	"H" level	I_{OH}		µA
	"L" level	I_{OL}		
Input voltage		V_{IN}	–0.3~V_{CC}+0.3	V
Input current		I_{IN}	±10	mA
Operating current		T_{opr}	–20~85	˚C
Conservation temperature			T_{stg}	–40~125 ˚C

Recommended Operating Conditions (Ta=20~85˚C)

Item		Symbol	Rating			Unit
			Min.	Standard	Max.	
Source voltage		V_{CC}	4.5	–	5.5	V
Output current øn	"H" level	I_{OH} ø	–24	–	–	mA
	"L" level	I_{OL} ø	24	–	–	
Output current Co,EM,Zo	"H" level	I_{OH}	–2	–	–	mA
	"L" level	I_{OL}	2	–	–	
Input voltage		V_{IN}	0	–	V_{CC}	V

Dimensions (Unit: mm)

Pin No.	Name	Function
1.	C_U	Input pulse UP clock input
2.	C_D	Input pulse DOWN clock input
3.	C_K	Input pulse clock input
4.	U/D	Rotation direction conversion
5.	E_A	energization mode switching input
6.	E_B	energization mode switching input
7.	$ø_C$	energization mode switching input
8.	V_{SS}	GND
9.	R	Reset input
10.	ø4	ø4 output
11.	ø3	ø3 output
12.	ø2	ø2 output
13.	ø1	ø1 output
14.	E_M	energization monitor output
15.	C_O	Input pulse monitor output
16.	V_{CC}	4.5~5.5V



Electrical Characteristics

Direct current characteristics (Ta=-20~85˚C)

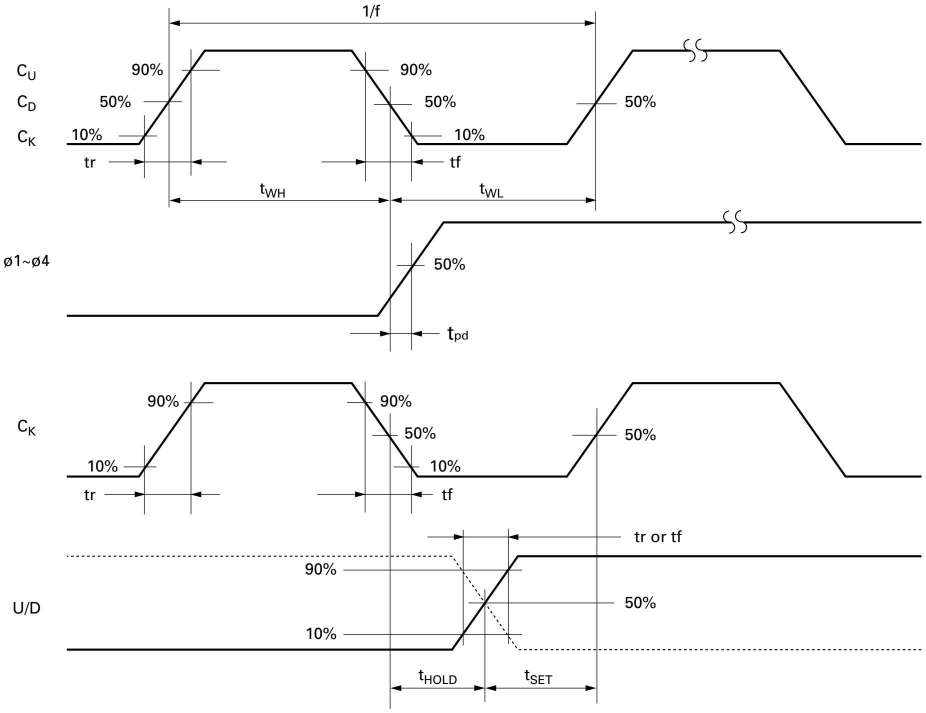
Item		Symbol	Vcc [V]	Condition	Standard value Min.	Standard value Standard	Standard value Max.	Unit
Input voltage	"H" level	V_{IH}	5	——	3.5	–	–	V
	"L" level	V_{IL}	5	——	–	–	1.5	
Output voltage	"H" level	V_{OH}	5	V_H = 5V V_L = 0V I_{OH} = 0	4.9	–	–	V
	"L" level	V_{OL}	5	V_H = 5V V_L = 0V I_{OH} = 0	–	–	0.1	
Output current ø1~ø4	"H" level	I_{OH}	5	V_H = 5V V_L = 0V V_{OUT} = 2.4V	–24	–	–	mA
	"L" level	I_{OL}	5	V_H = 5V V_L = 0V V_{OUT} = 0.4V	24	–	–	
Output current C_O,E_M	"H" level	I_{OH}	5	V_H = 5V V_L = 0V V_{OUT} = 2.4V	–2	–	–	mA
	"L" level	I_{OL}	5	V_H = 5V V_L = 0V V_{OUT} = 0.4V	2	–	–	
Input current		I	5	——	–	10	–	μA
Static current consumption		I_{CC}	5	V_H = 5V V_L = 0V	–	1	–	mA

Switching characteristics (Ta=20~85˚C)

Item	Symbol	Vcc [V]a	Condition	Standard value Min.	Standard value Standard	Standard value Max.	Unit
Max. clock frequency	f_{MAX}	5	tr=tf=20ns,CL=50pF	1	–	–	MHz
Min. width of clock pulse	t_{WL},t_{WH}	5	tr=tf=20ns,CL=50pF	–	–	500	ns
Min. width of reset pulse	t_{WR}	5	tr=tf=20ns,CL=50pF	–	–	1000	ns
Time delay (from clock input to ø output)	t_{pd}	5	tr=tf=20ns,CL=50pF	–	–	2000	ns
Set time	t_{SET}	5	tr=tf=20ns,CL=50pF	0	–	–	ns
Holding time	t_{HOLD}	5	tr=tf=20ns,CL=50pF	250	–	–	ns

Electrical Characteristics

Measured waveforms on switching time scale



Function Table

Input modes and rotation direction

Input mode	Input				Rotation direction
	CU	CD	CK	U/D	
2 input mode	↓	L	L	L	CW
(CW,CCW)	L	↓	L	L	CCW
1 input mode	L	L	↓	H	CW
(CK, U/D)	L	L	↓	L	CCW

Energization modes

Excitation mode	Input			
	$\overline{R}$	EA	EB	øC
1 EX	H	H	L	H
1–2EX	H	H	H	H
2 EX	H	L	L	H

Energization Sequence

1EX

Phase \ Pulse	0 (Reset)	1	2	3	4
ø1	1	0	0	0	1
ø2	0	1	0	0	0
ø3	0	0	1	0	0
ø4	0	0	0	1	0
EM	0	0	0	0	0
UP	→				
DOWN	←				

2EX

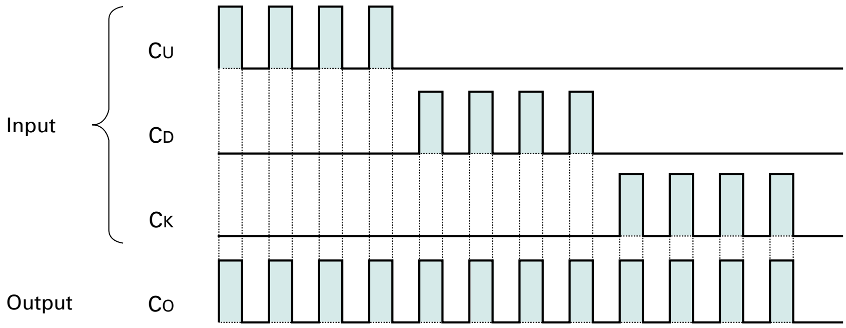
Phase \ Pulse	0 (Reset)	1	2	3	4
ø1	1	1	0	0	1
ø2	0	1	1	0	0
ø3	0	0	1	1	0
ø4	1	0	0	1	1
EM	1	1	1	1	1
UP	→				
DOWN	←				

1–2EX

Phase \ Pulse	0 (Reset)	1	2	3	4	5	6	7	8
ø1	1	1	1	0	0	0	0	0	1
ø2	0	0	1	1	1	0	0	0	0
ø3	0	0	0	0	1	1	1	0	0
ø4	1	0	0	0	0	0	1	1	1
EM	1	0	1	0	1	0	1	0	1
UP	→								
DOWN	←								

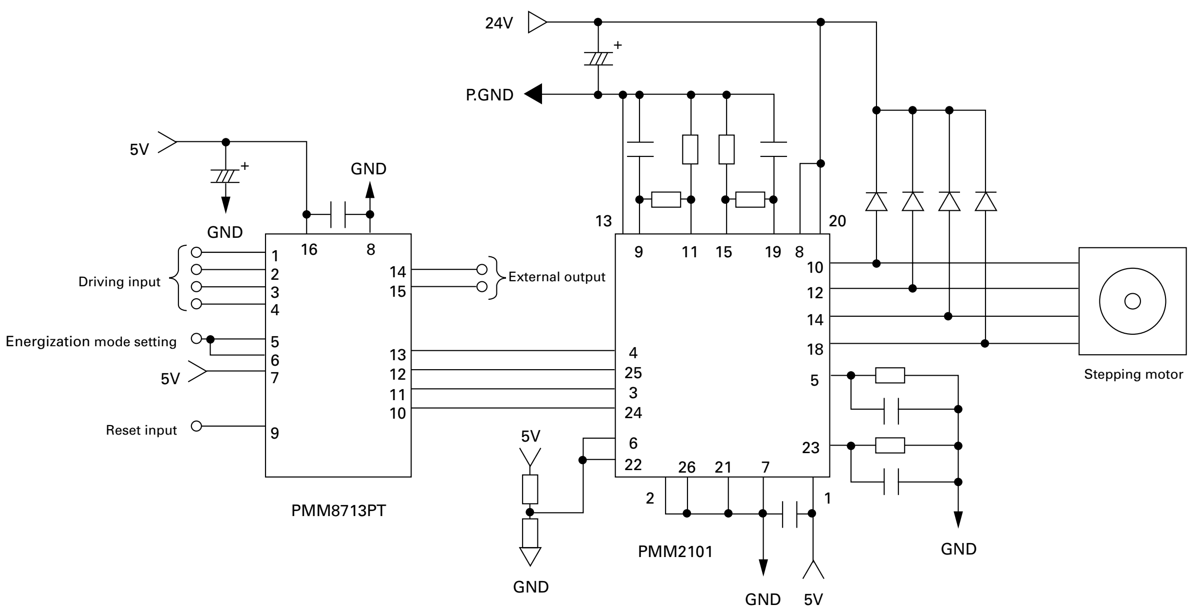
- Reset after changing the energization mode.

Input Pulse Monitor



Example of Application Circuit (Bipolar wiring motor)

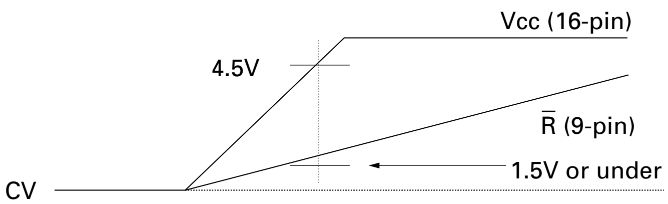
● Combined with the power hybrid IC



Energization mode setting

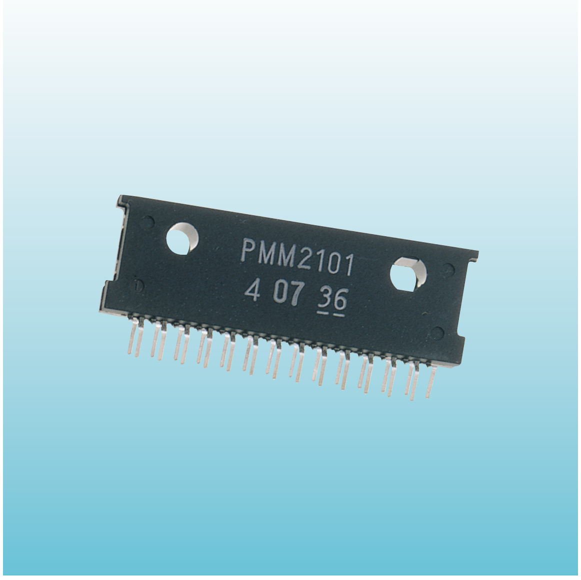
Pin No.	Terminal symbol	Input level	Motor operation
5,6	EA,EB	H	1–2EX
		L	2EX

● The normal initial reset may not be performed during unstable VCC after turning the power ON. For reliable resetting, hold the R terminal (9-pin) at the "L" level till the VCC becomes stable.



● Power hybrid IC: Refer to page 146 for the PMM2101 specifications.

● Refer to the PMM8713PT Operation Manual for other application circuit examples.



HIC for 2-Phase Stepping Motor

PMM2101

Full Step / Half Step

Outline

The stepping motor driver IC “PMM2101” is a monolithic-type power hybrid driver IC (HIC) packaging the circuits for 2-phase stepping motor driving.
This product is developed for the purpose to further simplify 2-phase stepping motor use, as combined only with the universal controller “PMM8713PT” for stepping motor driving, or the step sequence circuit, to configure a 2-phase stepping motor driver.

Characteristics

- Enables high speed and high torque operation by using bipolar constant current switching method.
- Enables compact driving circuit configuration with few of externally attached parts.
- The overheat protection circuit is incorporated to assist the safety design.

Maximum Rating (Tc=25˚C)

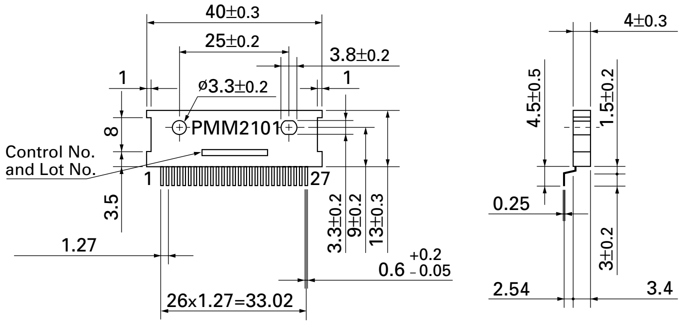
Item	Symbol	Rated value	Unit
Source voltage –1	V_{CC1}	8~60	V
Source voltage –2	V_{CC2}	0~7	V
Output current	I_O	1.4	A
Allowable loss	P_T	35 (Tc=25˚C)	W
Thermal resistance	θ_{jc}	3.57	˚C/W
	θ_{ja}	25	˚C/W
Junction temperature	T_{jmax}	150	˚C
Conservation temperature	T_{stg}	–40~150	˚C

Recommended Operating Conditions

Item	Symbol	Rated value	Unit
Source voltage –1	V_{CC1}	100~50	V
Source voltage –2	V_{CC2}	4.75~5.25	V
Output current	I_O	1.0	A
Oscillator frequency	F_C	20~27	kHz
Operation temperature	Ta	–25~85	˚C

Dimensions (Unit: mm)

Pin No.	Name	Function
1.	V_{CC2}	Power terminal for controller section
2.	ENA A	Enable input terminal
3.	ø1	Arm drive input
4.	ø2	Arm drive input
5.	CR A	One shot time constant setting terminal
6.	V_{ref} A	Motor current setting terminal
7.	LG A	GND
8.	V_{CC1} A	Motor driver power terminal
9.	VsA	Motor current detection terminal
10.	M1	Motor output
11.	R_S A	Detection resistor connecting terminal
12.	M2	Motor output
13.	PG	P.GND
14.	M3	Motor output
15.	R_S B	Detection resistor connecting terminal
16.	NC	–
17.	NC	–
18.	M4	Motor output
19.	Vs B	Motor current detection terminal
20.	V_{CC1} B	Motor driver power terminal
21.	LG B	GND
22.	V_{ref} B	Motor current setting terminal
23.	CR B	One shot time constant setting terminal
24.	ø3	Arm drive input
25.	ø4	Arm drive input
26.	ENA B	Enable terminal
27.	AL	Overheat alarm output terminal



● Operational truth value table

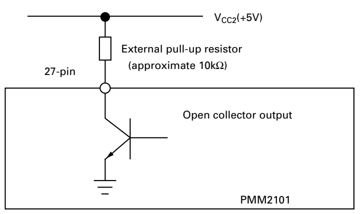
ENA A (ENA B)	ø1 (ø3)	ø2 (ø4)	M1 (M3)	M2 (M4)
L	L	L	OFF	OFF
L	L	H	L	H
L	H	L	H	L
L	H	H	OFF	OFF
H	–	–	OFF	OFF

Electrical Characteristics (Ta=25˚C)

Item	Symbol	Condition	Rating			Unit
			Min.	Standard	Max.	
"H" level input voltage	V_{IH}	V_{CC2}=5V	2.7	–	VCC2	V
"L" level input voltage	V_{IL}	V_{CC2}=5V	0	–	1.0	V
"H" level input current	I_{IH}	V_{CC2}=5V,V_I=5V	–	–	10	μA
"L" level input current	I_{IL}	V_{CC2}=5V,V_I=0V	–	–	–50	μA
Reference voltage (V_{ref}) input current	I_{ref}	V_{CC2}=5V,V_{ref}=0V	–	–	–10	μA
Current detection (V_S) input current	I_S	V_{CC2}=5V,V_S=0V	–	–	–10	μA
Forward direction voltage of FET diod	V_F	I_F=1A	–	1.3	1.5	V
High output saturating voltage	$V_{ce\ (sat)H}$	I_C=1A	–	1.0	1.4	V
Low output saturating voltage	$V_{ce\ (sat)L}$	I_C=1A	–	1.0	1.3	V
Output leak current	I_R	V_{CC1}=60V,V_{OUT}=0V	–	–	10	μA
		V_{OUT}=60V,V_{RS}=0V	–	–	10	μA
Power current to controller section	I_{CC2}	V_{CC2}=5V(during circuit operation)	–	–	75	mA
Alarm terminal current	I_{alm}	V_{CC2}=5V,V_{alm}=0.5V	–	–	2	mA
Overheat alarm operating temperature	–	–	–	125	–	˚C
Overheat protection stop temperature	–	–	–	150	–	˚C

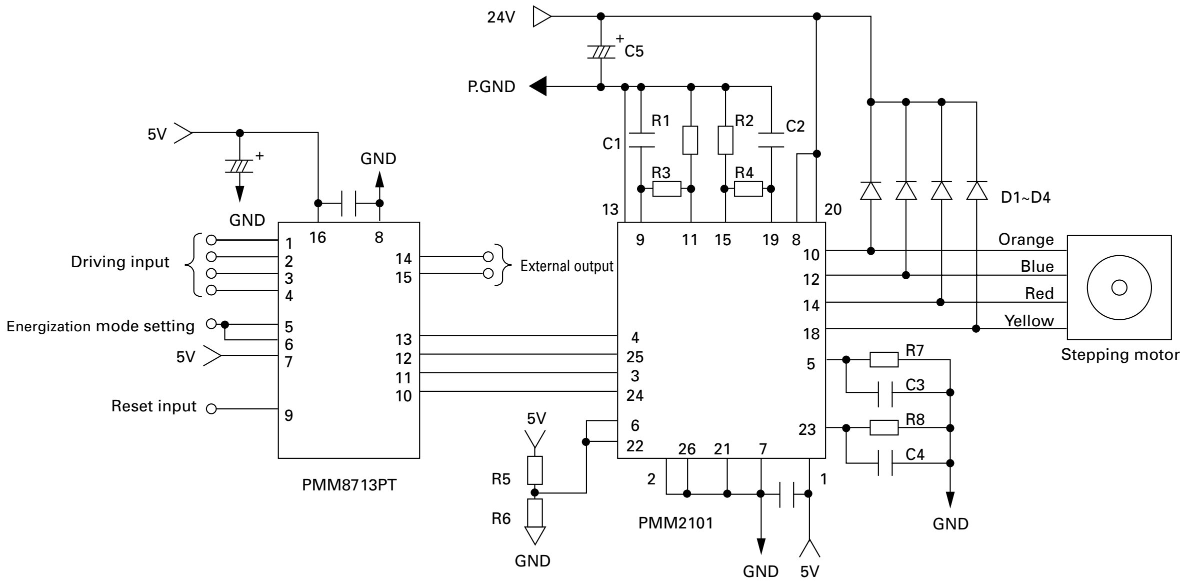
Overheat Alarm Output

The overheat protection circuit outputs an alarm signal at +125˚C at the internal junction in the IC, and activates (motor excitation OFF) at +150˚C.



- Transistor ON during alarming
  Vce (ON): 0.5V or under
  Ialm: 2mA or under
- The alarming signal output and overheat protection circuit recover automatically when the temperature lowers.

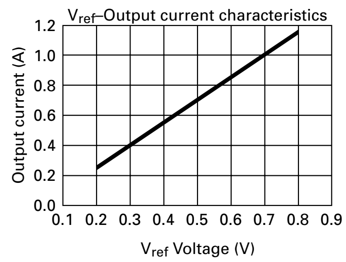
Example of Application Circuit



- Refer to page 103 for the PMM8713PT specifications.
- Recommended circuit constants for PMM2101

Applicable	Constant	Applicable	Constant
R1,R2	5W 0.68Ω	C1,C2	1000pF
R3,R4	1/4W 3.9kΩ	C3,C4	3300pF
R7,R8	1/4W 15kΩ	C5	330μF

- Determine on the R5 and R6 constants referring to the Vref-output current characteristics.
- Determine on D1~D4.
  Peak reverse voltage≧100V
  Output current≧1A
  Reverse recovery time≦100ns



HIC for 2-Phase Stepping Motor

PMM2301

Micro Step

Outline

The Stepping motor driver IC "PMM2301" is a power hybrid IC (HIC) packaging the integrated excitation mode generation circuits and related switching elements for 2-phase stepping motor driving.
This product is developed for the purpose to further simplify 2-phase stepping motor use, as combined only with a few peripheral parts to configure a 2-phase stepping motor driver.

Characteristics

- Sine wave driven micro-step driver.
- The current detection resistor is incorporated.
- MOSFET is used for the power driving circuit to reduce heating.
- Totally packaged to reduce parts for the peripheral circuit.
- Enables selection from the 5 various excitation modes by the external bit signal.

Maximum Rating (Tc=25˚C)

Item	Symbol	Condition	Rated value	Unit
Source voltage –1	$V_{CC1\ max}$	V_{CC2}=0V	52	V
Source voltage –2	$V_{CC2\ max}$	with no signal	7	V
Input voltage	$V_{in\ max}$	Logic input terminal	7	V
Phase current	$I_{OH\ max}$	0.5sec,1pulse,V_{CC1} applied	4	A
Operating temperature on PCB	$T_{C\ max}$	–	105	˚C
Junction temperature	$T_{j\ max}$	–	150	˚C
Conservation temperature	T_{stg}	–	–40~125	˚C

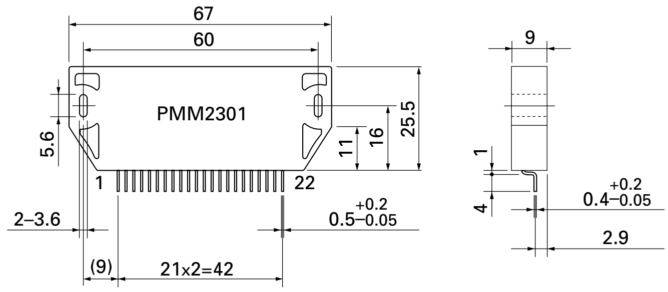
Recommended Operating Conditions (Ta=25˚C)

Item	Symbol	Condition	Rated value	Unit
Source voltage –1	V_{CC1}	with signal	10~45	V
Source voltage –2	V_{CC2}	with signal	5.0±5%	V
Input voltage	V_{IH}	–	0~V_{CC2}	V
Phase current	I_{OH}	Duty 50%	3	A
Clock frequency	Clock	–	DC~50	kHz
Withstand voltage of phase driver	V_{DSS}	–	100	V

Dimensions (Unit: mm)

Pin No.	Terminal name
1.	B
2.	B
3.	P.GND A
4.	P.GND B
5.	A
6.	A
7.	V_{CC2}
8.	V_{ref}
9.	Mode 1
10.	Mode 2
11.	Mode 3

Pin No.	Terminal name
12.	V_{CC2}
13.	V_{CC2}
14.	Clock
15.	CW/CCW
16.	Reset
17.	Return
18.	Enable
19.	M_{OI}
20.	M_{O1}
21.	M_{O2}
22.	GND



Each Terminal Function

Terminal name	Function	Functioning condition				
V_{ref}	Motor current setting input	–				
Clock	Motor driving pulse input	Mode 3="H"level: Operates at rising edge Mode 3="L"level: Operates at rising and falling edges				
CW/CCW	Motor rotation direction setting input	"H" level= CW rotation "L" level= CCW rotation				
Reset	System reset	Reset="L"				
Return	Forced return to phase origin	Forced shift to the origin of the present energization phase with Return="H".				
Enable	Power OFF input	Enable="L"				
M_{OI}	Phase origin monitor output	"L" level output at the phase origin.				
M_{O1},M_{O2}	Monitor output on phase energization status	Outputs level signal on the present phase energization status.				
		Phase coordinate	A phase	B phase	$\bar{A}$ phase	$\bar{B}$ phase
		M_{O1}	H	L	L	H
		M_{O2}	L	H	L	H

Energization Mode Table

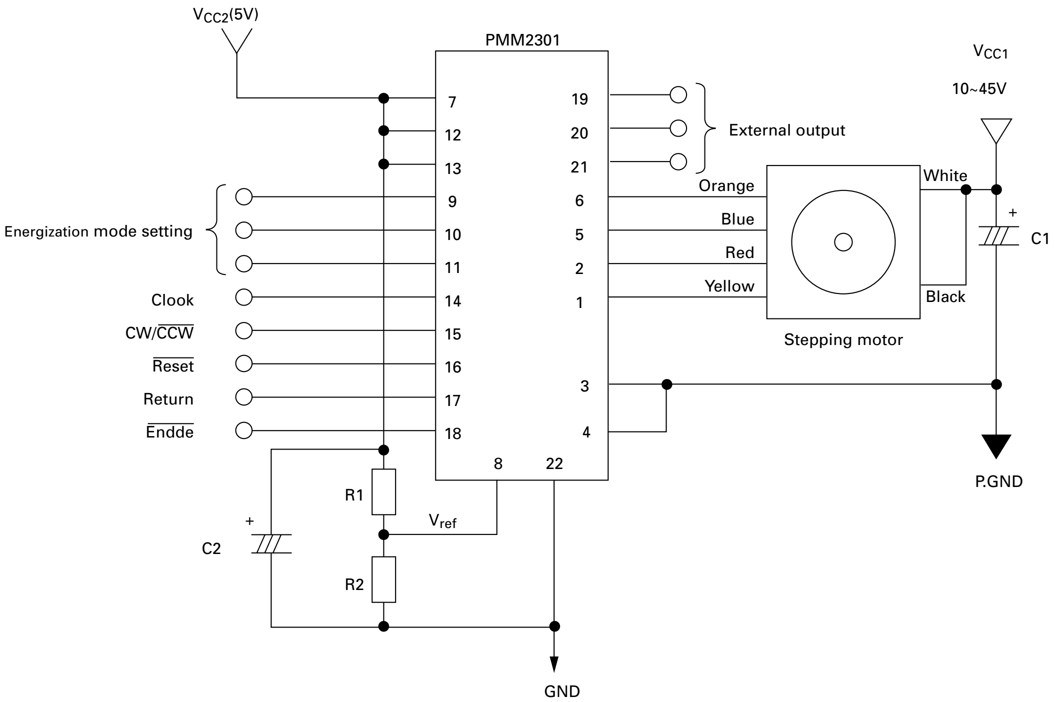
Input condition			Energization mode	1 step angle (degree)	Number of basic angle division
Mode 1	Mode 2	Mode 3			
L	L	H	2EX	1.8	1/1
H	L	H	1–2EX	0.9	1/2
L	H	H	W1–2EX	0.45	1/4
H	H	H	2W1–2EX	0.225	1/8
H	H	L	4W1–2EX	0.1125	1/16

- Conditioned on the Mode 3=L, one pulse operation is performed at every rising and falling edge of the clock pulse. Accordingly, the operation becomes unstable if the driving pulse duty ratio deviates from 50%.

Electrical Characteristics (Tc=25°C, Vcc1=24V, Vcc2=5V)

Item	Symbol	Condition	Rating			Unit
			Min.	Standard	Max.	
V_{CC2} Power current	I_{CCO}	Enable="L"	–	4.5	15	mA
Effective output current	$I_{o\ ave}$	Each phase R/L=3.5Ω/3.8mH Vref=0.6V	0.45	0.50	0.55	A
Forward direction voltage of FET diode	V_{df}	I_f=1A	–	1.2	1.8	V
Output saturating voltage	V_{sat}	RL=7.5Ω (I≒3.0A)	–	1.4	2.6	V
"H" level input voltage	V_{IH}	9~11,14~18 pins	4.0	–	–	V
"L" level input voltage	V_{IL}	9~11,14~18 pins	–	–	1.0	V
Input current	I_{IL}	9~11,14~18 pins=GND level Pull-up resistor 20kΩ	125	250	510	μA
V_{ref} input voltage	V_r	8-pin	0	–	V_{CC2}/2	V
V_{ref} input curren	I_r	8-pin	–	1	–	μA
"H" level output voltage M_{OI},M_{O1},M_{O2}	V_{OH}	19~21 pins I=3mA I=–3mA	2.4	–	–	V
"L" level output voltage M_{OI},M_{O1},M_{O2}	V_{OL}	19~21 pins I=3mA I=3mA	–	–	0.4	V
PWM frequency	Fc	–	37	47	57	kH

Example of Application Circuit



● Recommended circuit constants

C1	C2
100μF OR OVER	10μF

- Determine on the R1 and R2 constants based on the Vref voltage calculated from the following formula.
  Vref(V)=Motor current adjusted value (A/phase) x 0.6