

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



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



Standard combined stepping motors

PMM-BA-4803-1

Dimensions of stepping motor	Stepping motor model number		Rated current [A/phase]	Holding torque [N·m(oz·in)]	Rotor inertia [x 10 ⁻⁴ kg·m ² (oz·in ²)]	Mass(Weight) [kg(lbs)]	Page
	Single shaft	Double shaft					
□42mm (1.65inch)	103H5205-5240	103H5205-5210	1	0.265(37.53)	0.036(0.20)	0.23(0.51)	69 Page
	103H5208-5240	103H5208-5210	1	0.39(55.23)	0.056(0.31)	0.29(0.64)	
	103H5209-5240	103H5209-5210	1	0.425(60.18)	0.062(0.34)	0.31(0.68)	
	103H5210-5240	103H5210-5210	1	0.51(72.22)	0.074(0.40)	0.37(0.82)	
□50mm(1.97inch)	103H6704-5040	103H6704-5010	2	0.52(73.6)	0.14(0.77)	0.55(1.21)	75Page
□56mm (2.20inch)	103H7121-5040	103H7121-5010	2	0.39(55.2)	0.1(0.55)	0.47(1.04)	79 Page
	103H7123-5040	103H7123-5010	2	0.83(117.5)	0.21(1.15)	0.65(1.43)	
	103H7126-5040	103H7126-5010	2	1.27(179.8)	0.36(1.97)	0.98(2.16)	

- 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(oz·in)]	Rotor inertia [x 10 ⁻⁴ kg·m ² (oz·in ²)]	Mass(Weight) [kg(lbs)]	Page
	Single shaft	Double shaft					
□60mm (2.36inch)	103H7821-1740	103H7821-1710	4	0.88(124.6)	0.275(1.50)	0.6(1.32)	87 Page
	103H7822-1740	103H7822-1710	4	1.37(194.0)	0.4(2.19)	0.77(1.70)	
	103H7823-1740	103H7823-1710	4	2.7(382.3)	0.84(4.59)	1.34(2.95)	
φ86mm (3.39inch)	103H8221-5241	103H8221-5211	6	2.74(388.0)	1.45(7.93)	1.5(3.31)	91 Page
	103H8222-5241	103H8222-5211	6	5.09(720.8)	2.9(15.86)	2.5(5.51)	
	103H8223-5241	103H8223-5211	6	7.44(1053.6)	4.4(24.06)	3.5(7.72)	
φ106mm (2.36inch)	103H89222-5241	103H89222-5211	6	13.2(1869.2)	14.6(79.83)	7.5(16.53)	97 Page
	103H89223-5241	103H89223-5211	6	19(2690.5)	22(120.28)	10.5(23.15)	

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

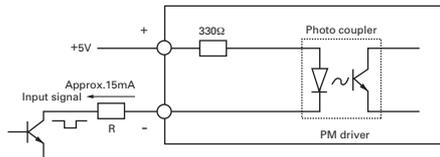
Specifications of PM Driver

Item		PMM-BA-4803-1	PMM-BA-4804-1
Basic specifications	Environment	Input source	
		Single phase AC 100V/115V+10, -15% 50/60Hz	
		Source current	3A
	Rated current	2A/phase (Changeable to 1A/phase, refer to Page 11)	
	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 AC1000V is applied between power input terminal and cabinet for one minute.		
Insulation resistance	10MΩ MIN. when measured with DC500V megohmmeter between input terminal and cabinet.		
Mass(Weight)	2kg(4.41lbs)	4kg(8.82lbs)	
Function	Protection function	Against PM driver overheat	
	Selection, setting function	Pulse input mode selection-- DIP switches enables selection of Pulse and direction 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%	
	LED indicator	Power supply monitor, phase origin monitor, pulse monitor, alarm monitor.	
I/O signals	Signal Name (Brevity code)	Silk-screen printing	
	CW pulse Input signal (CW)	CW+ CW-	In the 2-input mode, inputs driving pulses to rotate in CW direction.
	(CK)		In the Pulse and direction 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
	CCW pulse Input signal (CCW)	CCW+ CCW-	In the 2-input mode, inputs driving pulses to rotate in CCW direction. Pulse and direction
	(U/D)		In the pulse and direction 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
	Power down input signal (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
	Step angle setting selection input (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
	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 MAX. or AC120V, 0.5A MAX.

- 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.

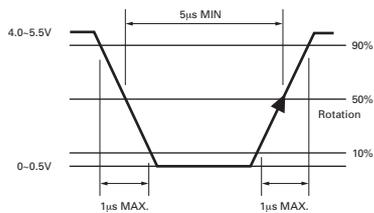
Operation, Connection, and Function

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



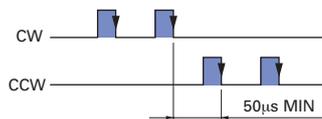
- Pulse duty 50% MAX.
- When the crest value of the input signal is 5V, the external limit resistance R must be 0Ω .
When the crest value of the input signal exceeds 5V, use the external limit resistance R to limit the input current to approximately 15mA.

Input signal specifications



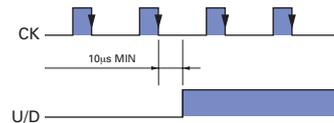
Timing of command pulse

- 2-input mode (CW, CCW)



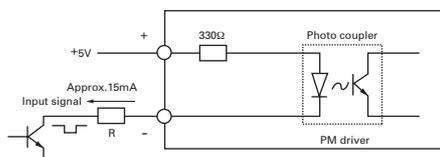
- The internal photo coupler turns ON within the ■ and, at its falling edge to OFF, the internal circuit (stepping motor) is activated.
- When applying the pulse to CW, turn OFF the CCW side internal photo coupler.
- When applying the pulse to CCW, turn OFF the CW side internal photo coupler.

- Pulse and direction mode (CK, U/D)



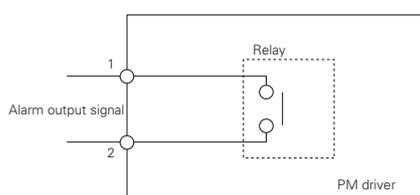
- The internal photo coupler turns ON within the ■ and, at CK side falling edge to OFF, the internal circuit (stepping motor) is activated.
- Switching of U/D input signal shall be made when CK side internal photo coupler is OFF.

● 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.

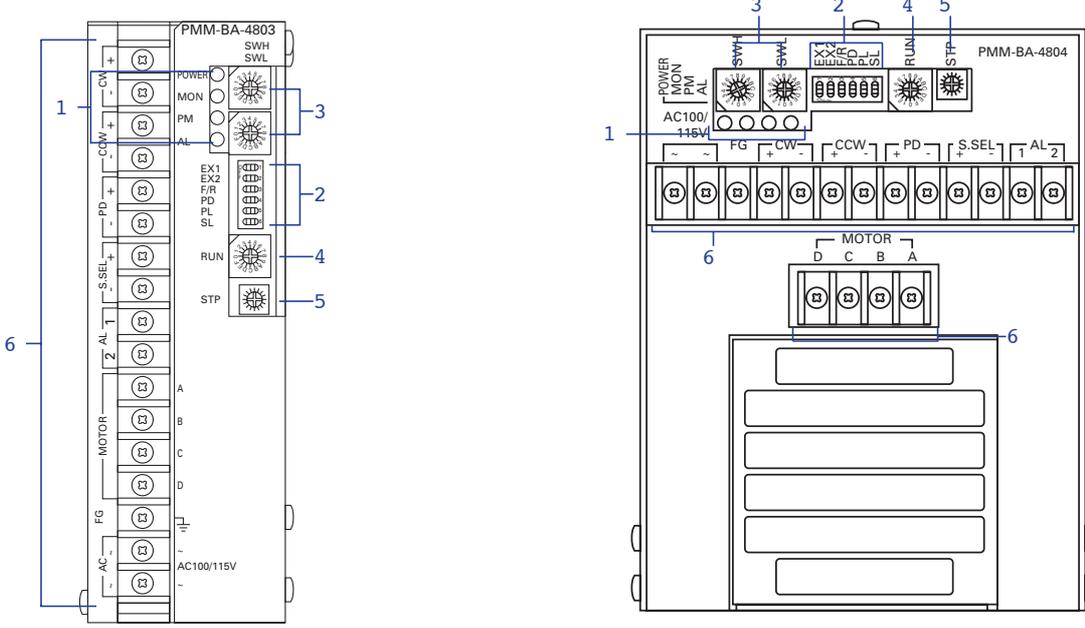
● Output circuit configuration (AL) --- PMM-BA-4803-1 and PMM-BA-4804-1 in common



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

Operation, Connection, and Function

● PM driver component names and function selection/setting
PMM-BA-4803-1 PMM-BA-4804-1



1 Monitor 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) CW pulse CCW pulse MON • 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 MIN, 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 MAX, 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

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

1 2 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)

3 F/R (Pulse-input mode selection)
Select the pulse-input mode.

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

4 5 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)

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

SL	Auto current down
ON	Approx 50% of current rating when stopped
OFF	100% of current rating when stopped

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

4 5 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 50% of stepping motor current value on operation. Adjustment by customer is not supported.

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

SL	Auto current down
ON	Approx 50% of current rating when stopped
OFF	100% of current rating when stopped

- The temperature increase in the motor driver can be controlled by setting SL to On (approx. 50% of the rated current).
- The output torque when SL is On (approx. 50% of the rated current) is approx. 50% of the that when SL is Off (100% of the rated current).

PMM-BA-4803
PMM-BA-4804
PMM-UA-4303
PMM-UA-4304
PMM-MD-3216-10/2221-10
PMM-MD-3226-21/2221-21
PMM-MD-3226-10/2221-10
PMM-MD-23120

Operation, Connection, and Function

3 Step 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 = $n/N \times$ 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°.

$$0.36^\circ = n/240 \times 1.8^\circ \quad (n = 48 \text{ (by decimal system)})$$

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

4 Operating-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.

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

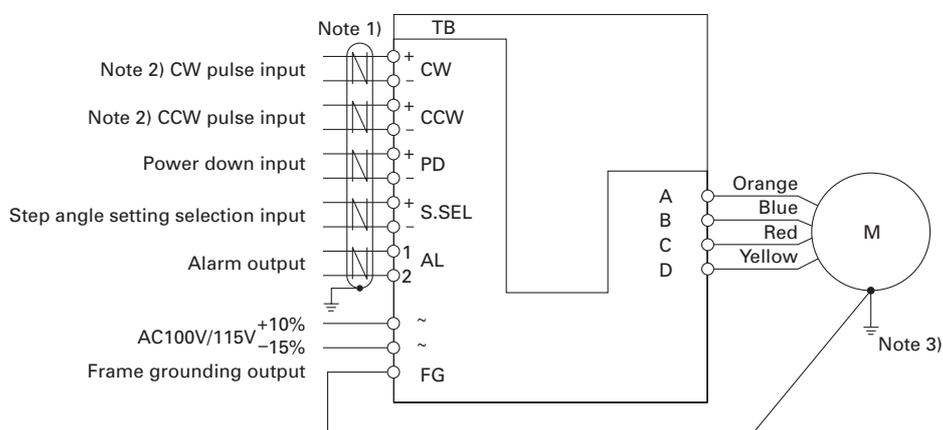
Adjust current of stepping motor during halt in the range from rated current to 0% when automatic current reduction function is operating.

Factory setting is set at 50% of rated current and customers controller (STP) adjustment is not supported.

6 Terminal 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 common



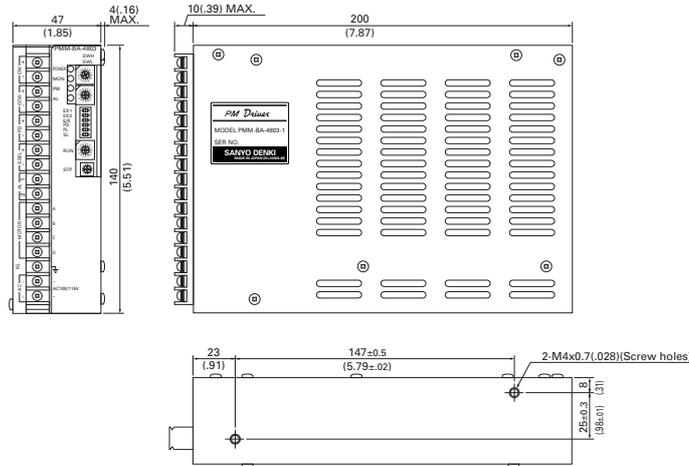
Note 1) Use twisted pair shielded cables.

Note 2) Capable to select by the function selection switch F/R for "2-input mode (CW and CCW input mode)" or "Pulse and direction mode (CK, U/D)".

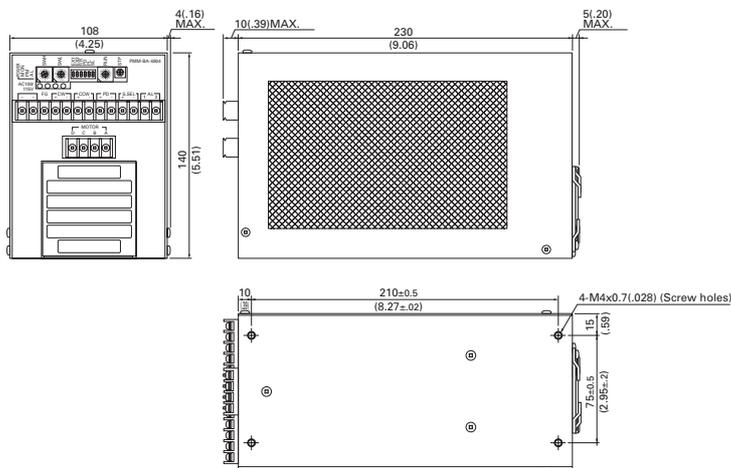
Note 3) Ground the flange of the stepping motor by fastening the grounding wire together with the mounting screw. The grounding shall be made at a single point.

Dimensions [Unit:mm(inch)]

PMM-BA-4803-1



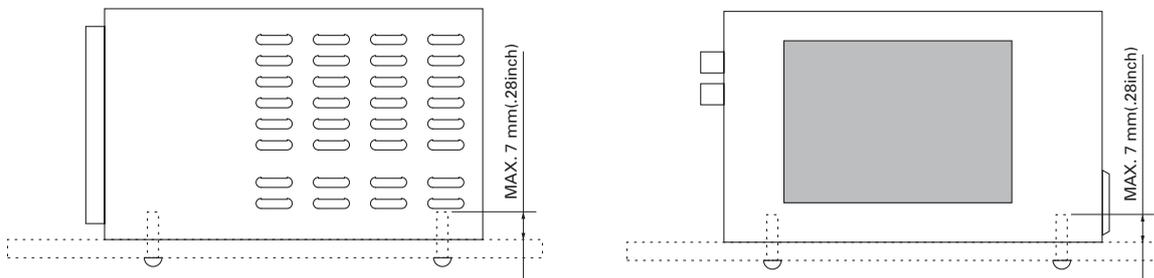
PMM-BA-4804-1



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(0.28inch).

PMM-BA-4803
PMM-BA-4804

PMM-UA-4303
PMM-UA-4304

PMM-MD-2310-10/2321-10
PMM-MD-2320-21/2321-21
PMM-MD-2320-10/2321-10

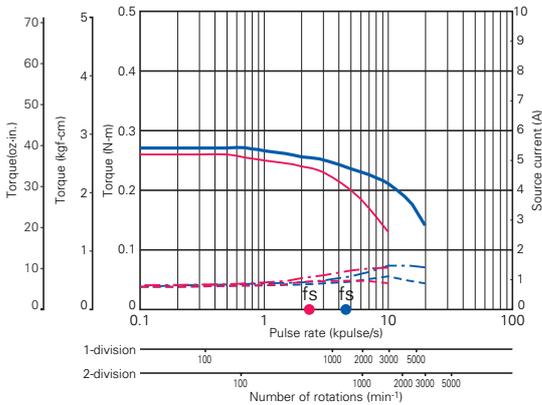
PMM-MD-23120

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

fs: No load maximum starting pulse rate ■ 1-division is specified ■ 2-division is specified

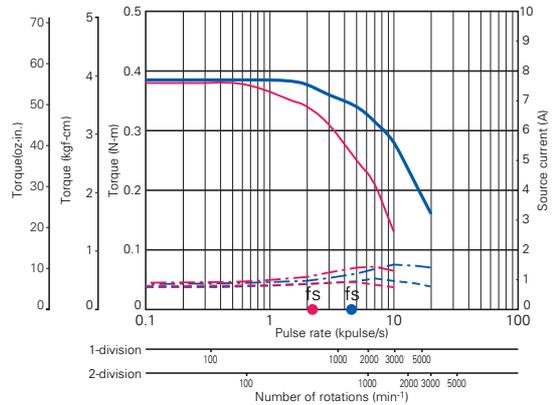
PMM-BA-4803-1

● 103H5205-52 □ □ : 100V



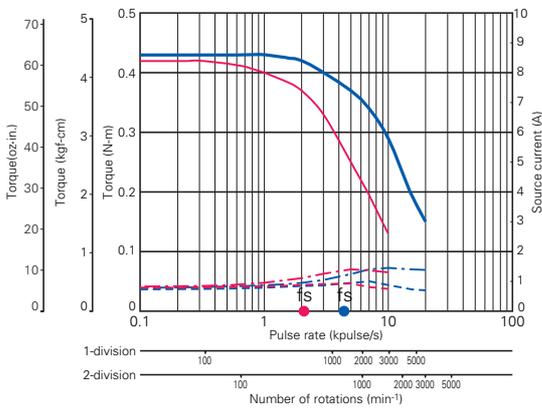
Source voltage: AC100V, Operating current: 1A/phase
 — Pull-Out torque [$JL_1=0.94 \times 10^{-4} \text{kg}\cdot\text{m}^2$ (5.14 oz-in²) Use the rubber coupling]
 - - - Source current (TL=MAX), - - - Source current (TL=0)

● 103H5208-52 □ □ : 100V



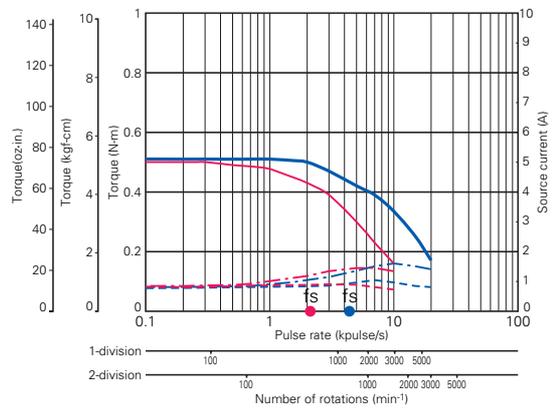
Source voltage: AC100V, Operating current: 1A/phase
 — Pull-Out torque [$JL_1=0.94 \times 10^{-4} \text{kg}\cdot\text{m}^2$ (5.14 oz-in²) Use the rubber coupling]
 - - - Source current (TL=MAX), - - - Source current (TL=0)

● 103H5209-52 □ □ : 100V



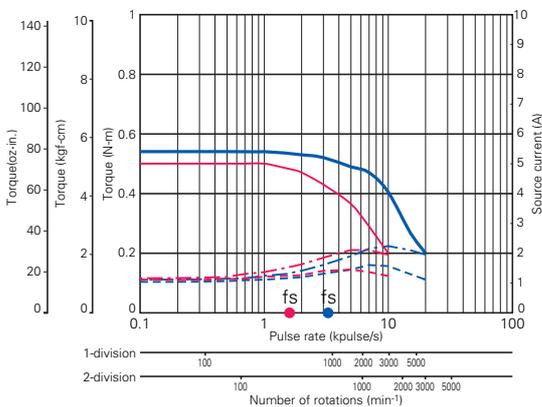
Source voltage: AC100V, Operating current: 1A/phase
 — Pull-Out torque [$JL_1=0.94 \times 10^{-4} \text{kg}\cdot\text{m}^2$ (5.14 oz-in²) Use the rubber coupling]
 - - - Source current (TL=MAX), - - - Source current (TL=0)

● 103H5210-52 □ □ : 100V



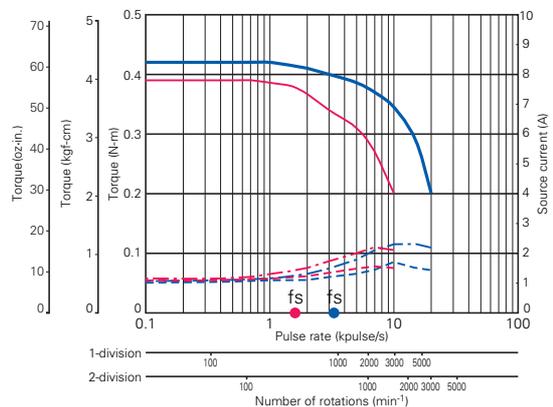
Source voltage: AC100V, Operating current: 1A/phase
 — Pull-Out torque [$JL_1=0.94 \times 10^{-4} \text{kg}\cdot\text{m}^2$ (5.14 oz-in²) Use the rubber coupling]
 - - - Source current (TL=MAX), - - - Source current (TL=0)

● 103H6704-50 □ □ : 100V



Source voltage: AC100V, Operating current: 2A/phase
 — Pull-Out torque [$JL_1=0.94 \times 10^{-4} \text{kg}\cdot\text{m}^2$ (5.14 oz-in²) Use the rubber coupling]
 - - - Source current (TL=MAX), - - - Source current (TL=0)

● 103H7121-50 □ □ : 100V



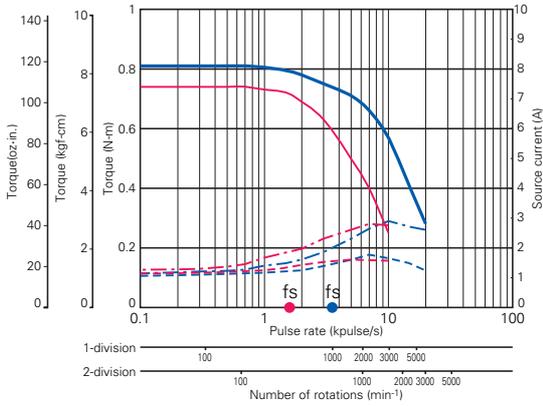
Source voltage: AC100V, Operating current: 2A/phase
 — Pull-Out torque [$JL_1=0.94 \times 10^{-4} \text{kg}\cdot\text{m}^2$ (5.14 oz-in²) Use the rubber coupling]
 - - - Source current (TL=MAX), - - - Source current (TL=0)

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

fs: No load maximum starting pulse rate ■ 1-division is specified ■ 2-division is specified

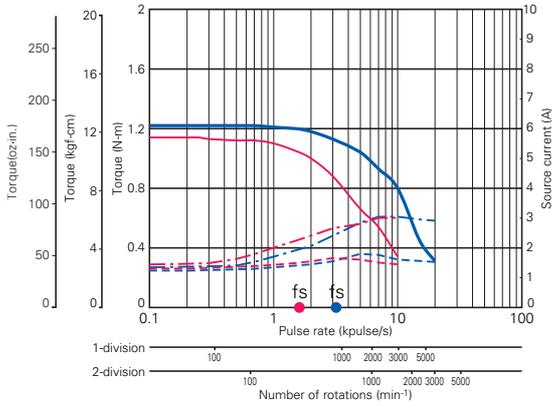
PMM-BA-4803-1

● 103H7123-50 □□ : 100V



Source voltage: AC100V, Operating current : 2A/phase
 — Pull-Out torque [$J_{L1}=2.6 \times 10^{-4} \text{kg}\cdot\text{m}^2$ (14.22 oz-in²) Use the rubber coupling]
 - - - Source current (TL=MAX), - - - Source current (TL=0)

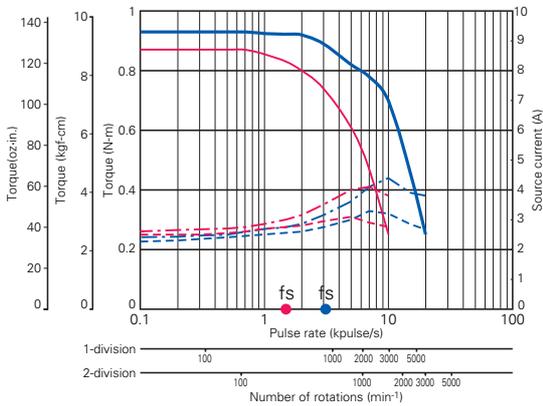
● 103H7126-50 □□ : 100V



Source voltage: AC100V, Operating current : 2A/phase
 — Pull-Out torque [$J_{L1}=2.6 \times 10^{-4} \text{kg}\cdot\text{m}^2$ (14.22 oz-in²) Use the rubber coupling]
 - - - Source current (TL=MAX), - - - Source current (TL=0)

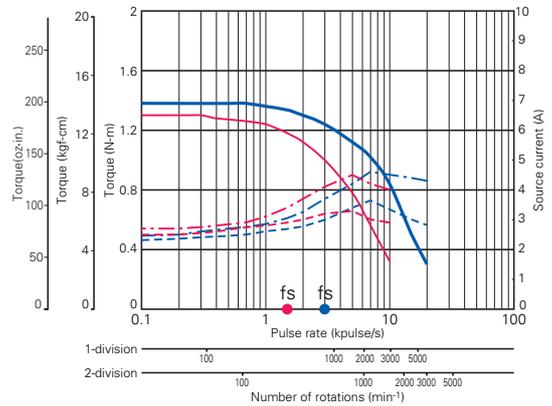
PMM-BA-4804-1

● 103H7821-17 □□ : 100V



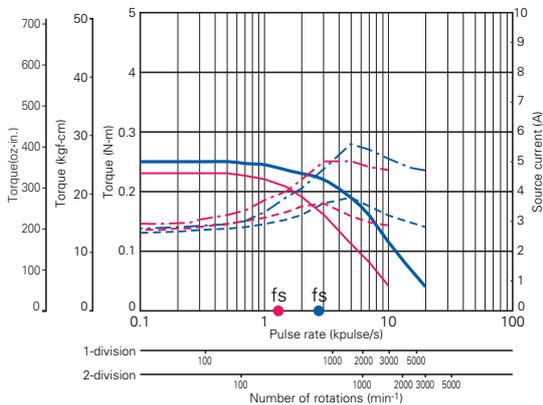
Source voltage: AC100V, Operating current : 4A/phase
 — Pull-Out torque [$J_{L1}=2.6 \times 10^{-4} \text{kg}\cdot\text{m}^2$ (14.22 oz-in²) Use the rubber coupling]
 - - - Source current (TL=MAX), - - - Source current (TL=0)

● 103H7822-17 □□ : 100V



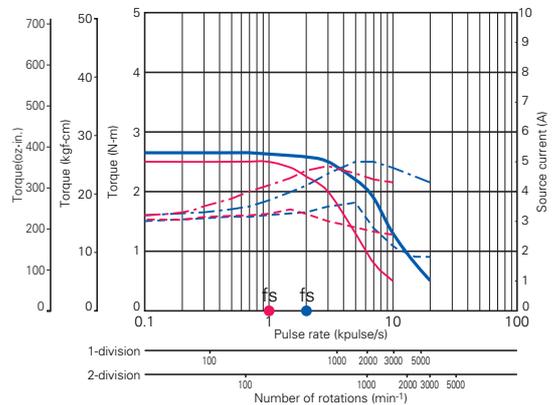
Source voltage: AC100V, Operating current : 4A/phase
 — Pull-Out torque [$J_{L1}=2.6 \times 10^{-4} \text{kg}\cdot\text{m}^2$ (14.22 oz-in²) Use the rubber coupling]
 - - - Source current (TL=MAX), - - - Source current (TL=0)

● 103H7823-17 □□ : 100V



Source voltage: AC100V, Operating current : 4A/phase
 — Pull-Out torque [$J_{L1}=15.3 \times 10^{-4} \text{kg}\cdot\text{m}^2$ (83.65 oz-in²) Use the rubber coupling]
 - - - Source current (TL=MAX), - - - Source current (TL=0)

● 103H8221-52 □□ : 100V



Source voltage: AC100V, Operating current : 6A/phase
 — Pull-Out torque [$J_{L1}=15.3 \times 10^{-4} \text{kg}\cdot\text{m}^2$ (83.65 oz-in²) Uses rubber coupling]
 - - - Source current (TL=MAX), - - - Source current (TL=0)

PMM-BA-4803
PMM-BA-4804

PMM-UA-4303
PMM-UA-4304

PMM-MD-3320-10/2321-10
PMM-MD-3320-21/2321-21
PMM-MD-3320-10/2321-10

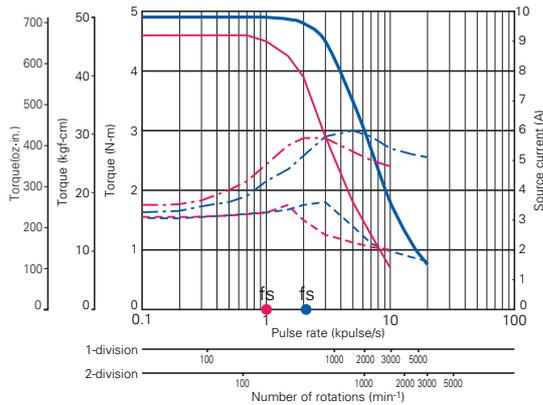
PMM-MD-23120

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

fs: No load maximum starting pulse rate ■ 1-division is specified ■ 2-division is specified

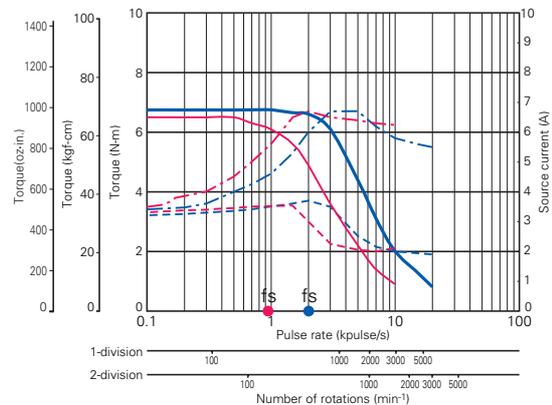
PMM-BA-4804-1

● 103H8222-52 : 100V



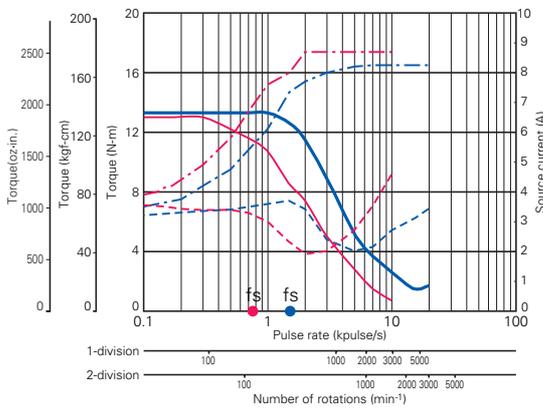
Source voltage: AC100V, Operating current : 6A/phase
 — Pull-Out torque ($JL_1=15.3 \times 10^{-4} \text{kg}\cdot\text{m}^2$ (83.65 oz-in²) Use the rubber coupling)
 - - - Source current (TL=MAX), - - - Source current (TL=0)

● 103H8223-52 : 100V



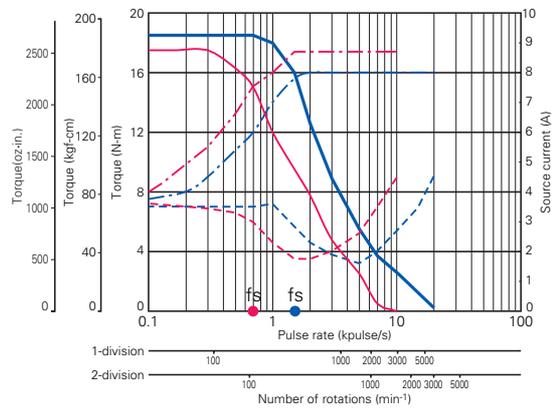
Source voltage: AC100V, Operating current : 6A/phase
 — Pull-Out torque ($JL_1=15.3 \times 10^{-4} \text{kg}\cdot\text{m}^2$ (83.65 oz-in²) Use the rubber coupling)
 - - - Source current (TL=MAX), - - - Source current (TL=0)

● 103H89222-52 : 100V



Source voltage: AC100V, Operating current : 6A/phase
 — Pull-Out torque ($JL_1=43 \times 10^{-4} \text{kg}\cdot\text{m}^2$ (235.10 oz-in²) Use the rubber coupling)
 - - - Source current (TL=MAX), - - - Source current (TL=0)

● 103H89223-52 : 100V



Source voltage: AC100V, Operating current : 6A/phase
 — Pull-Out torque ($JL_1=43 \times 10^{-4} \text{kg}\cdot\text{m}^2$ (235.10 oz-in²) Use the rubber coupling)
 - - - Source current (TL=MAX), - - - Source current (TL=0)

Options

● Terminal board cover

PMM-BA-4803-1

Model No.	PM-AP-021
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PMM-BA-4804-1

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