STEPPING SYSTEMS

3 Phase

Stepping Systems

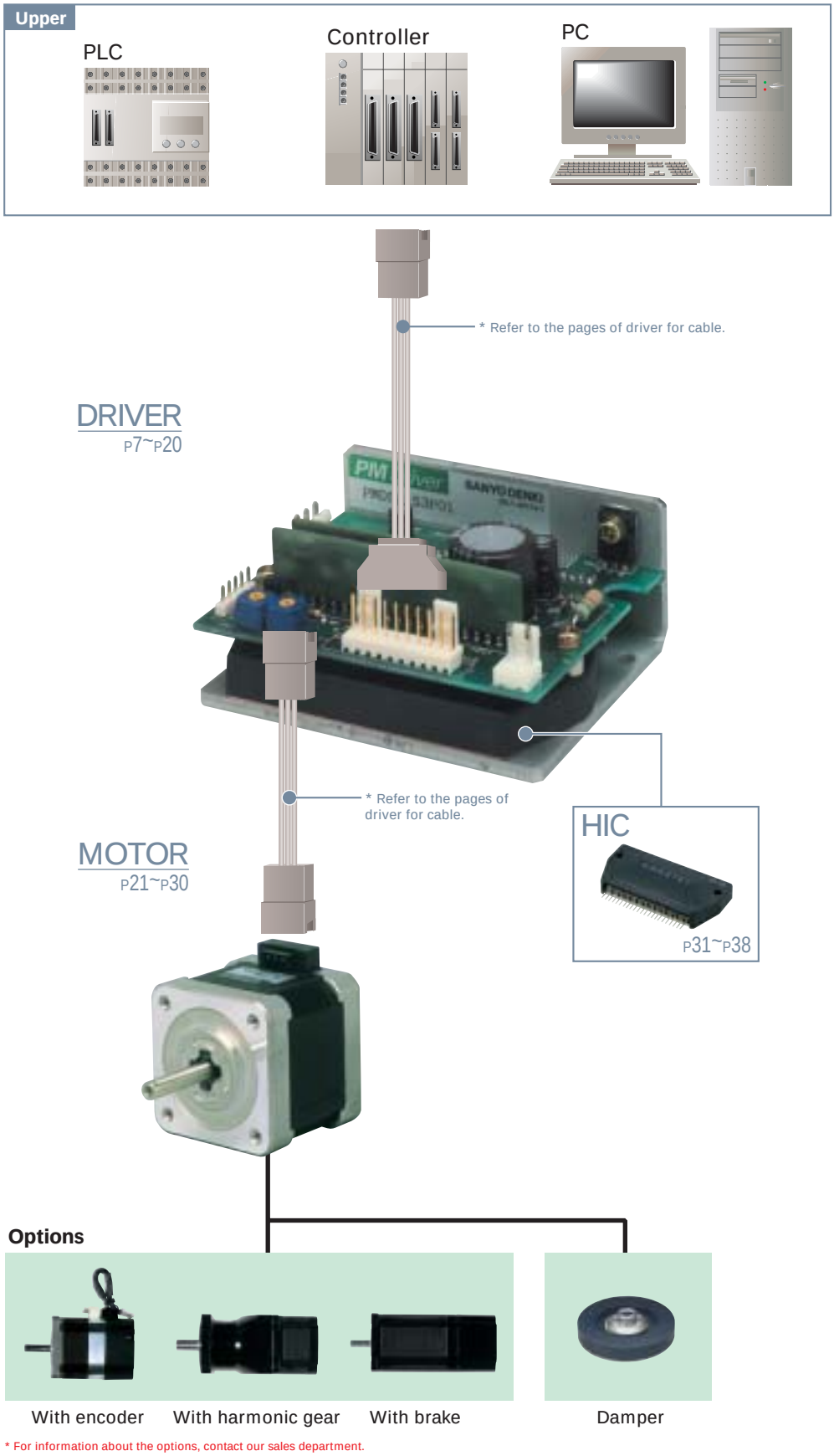
SANYO DENKI

E

ENGLISH

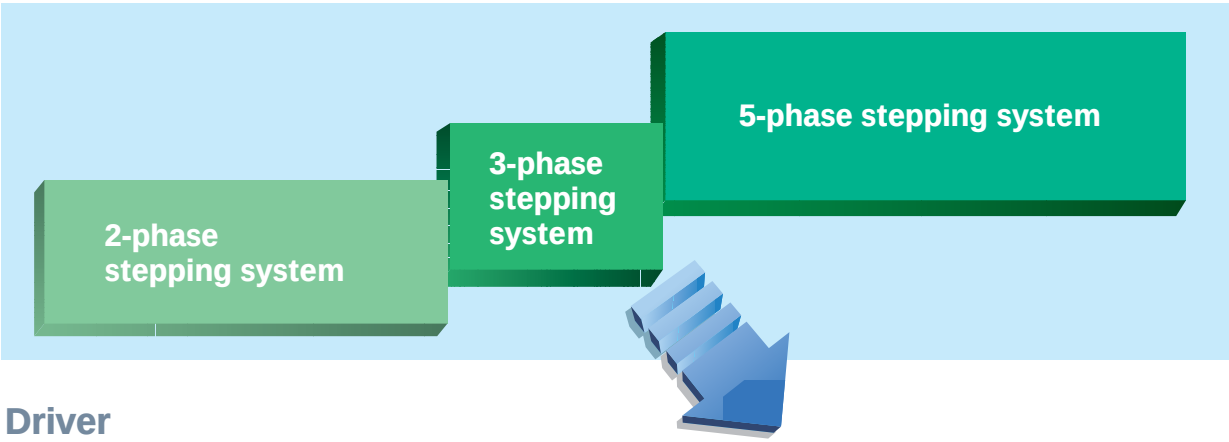
STEPPING SYSTEM
The 3-phase Stepping System

■Stepping System Configuration



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

■Ranges of Stepping Systems



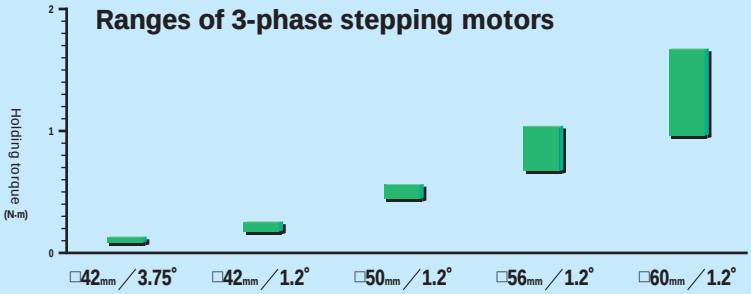
Driver

PMDSA1S3P01
PMDSA1S3C01

Applicable motors
□42 □50
□56 □60

Source input
DC24V
Star connection type
Micro step specification

P7~P20



Motor

□42mm

Applicable motors
Contact our sales department.

Step angle
3.75°
Holding torque
0.09~0.118 N·m

P23

□42mm

Applicable motors
PMDSA1S3P01 PMDSA1S3C01

Step angle
1.2°
Holding torque
0.196~0.265 N·m

P24

□50mm

Applicable motors
PMDSA1S3P01 PMDSA1S3C01

Step angle
1.2°
Holding torque
0.44~0.58 N·m

P25

□56mm

Applicable motors
PMDSA1S3P01 PMDSA1S3C01

Step angle
1.2°
Holding torque
0.69~1.1 N·m

P26

□60mm

Applicable motors
PMDSA1S3P01 PMDSA1S3C01

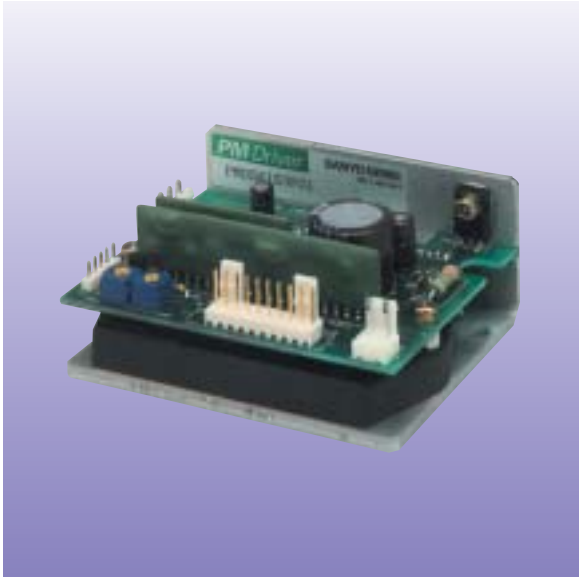
Step angle
1.2°
Holding torque
0.95~1.68 N·m

P27

Synchronous motor

Sync torque
1.8~5.2 N·m

P29~P30



3-phase stepping driver

PMDSA1S3P01 (photo coupler input method)
PMDSA1S3C01 (CMOS input method)
DC24V
Micro-Step (300×1～16分割)

● Applicable motor

□42 □50 □56 □60

Characteristics

● **Compact driver**
Reduction in size of the micro step driver for the 3-phase stepping motor with a hybrid IC developed.

● **Micro-step function available**
Smooth operation and low vibration even at low speeds.

● **2 types of interface circuit specifications**
Photo coupler input type :PMDSA1S3P01
CMOS input type :PMDSA1S3C01
You can choose the PM driver depending on your controller.

Built-in Function

● **Step angle setting function**
The DIP switchpack is provided to select the basic step angle of the stepping motor from 5 resolution: 1 to 16 divisions.

● **Both-edges operation**
Load on the upper controller can be reduced by the both-edges operation (rising edge and falling edge) of the driver pulse when the micro step is used in 1/16 division mode.

Specifications of PM driver

Item			PMDSA1S3P01	PMDSA1S3C01
Basic specifications	Input source	Main power	DC24V±10%	
		Control power	–	DC5V±5%
	Source current		3A	
	Environment: Operating ambient temperature		0~+50˚C	
	Environment: Conservation temperature		–20~+70˚C	
	Environment: Operating ambient humidity		35~85%RH(no condensation)	
	Environment: Conservation humidity		10~90%RH(no condensation)	
	Environment: Vibration resistance		0.5G Tested under the following conditions, frequency range: 10 to 55Hz, direction: along the X, Y, and Z axes, for 2 hours	
	Environment: Impact resistance		Considering the NDS-C-0110 standard section 3.2.2 division "C", not influenced	
	Environment: Withstand voltage		Not influenced when AC500V is applied between power input terminal and	
	Environment: Insulation resistance		cabinet for one minute 10MΩ when measured with DC500V megohmmeter between	
	Weight		0.14kg	
Functions	Selection function		Auto current down, step angle, pulse input method (optional)	
I/O signals	Command pulse input signal		Photo coupler input method, input resistance 330Ω Input signal voltage: H = 4.0 to 5.5V L = 0 to 0.5V Maximum input frequency: 50kpulse/s	CMOS input method Input signal voltage: H = 4.0 to 5.5V L = 0 to 0.5V Maximum input frequency: 50kpulse/s
	Power down input signal		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
	Rotation monitor output signal		Open collector output by photo coupler Output signal standard, Vceo = 30V or less, Ic = 5mA or less	Open collector output by transistor Output signal standard, Vceo = 30V or less, Ic = 5mA or less

Standard combined stepping motors

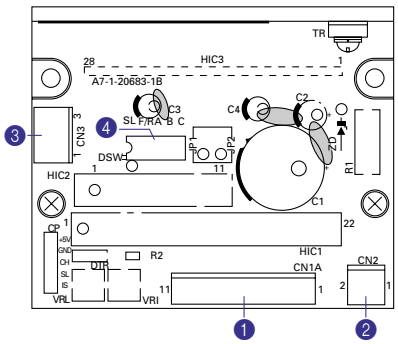
Dimensions of stepping motor	Stepping motor model number		Holding torque [N·m]	Rotor inertia [x10^{-4}kg·m^2]	Weight [kg]	Page
	Single-axis shaft	Dual-axis shaft				
□42mm	103H5332-0340 103H5333-0340	103H5332-0310 103H5333-0310	0.196 0.265	0.053 0.065	0.3 0.38	24 Page
□50mm	103H6332-0340 103H6333-0340	103H6332-0310 103H6333-0310	0.44 0.58	0.12 0.17	0.5 0.65	25 Page
□56mm	103H7332-0340 103H7333-0340	103H7332-0310 103H7333-0310	0.69 1.1	0.21 0.36	0.65 0.98	26 Page
□60mm	103H7832-0340 103H7833-0340	103H7832-0310 103H7833-0310	0.95 1.68	0.4 0.84	0.78 1.34	27 Page

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

Operation, Connection, and Function

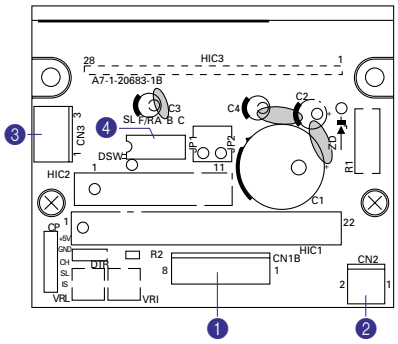
Each section name of the PM driver

PMDSA1S3P01 (photo coupler input method)



1. I/O signal connector (CN1A)
   ..... Connect the I/O signal.
2. DC source connector (CN2)
   ..... Connect the DC source.
3. Stepping motor output connector (CN3)
   ..... Connect the stepping motor drive line.
4. Function selection DIP switchpack (SL, F/R, A, B, C)
   ..... Select the function depending on your specification.

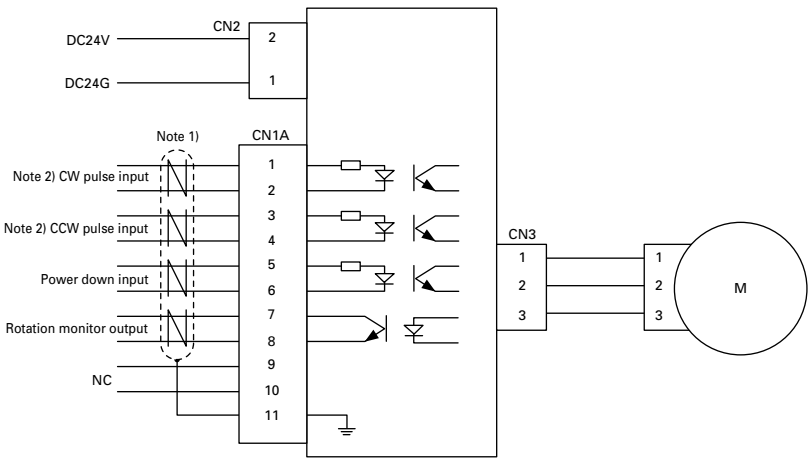
PMDSA1S3C01 (CMOS input method)



1. I/O signal connector (CN1B)
   ..... Connect the I/O signal.
2. DC source connector (CN2)
   ..... Connect the DC source.
3. Stepping motor output connector (CN3)
   ..... Connect the stepping motor drive line.
4. Function selection DIP switchpack (SL, F/R, A, B, C)
   ..... Select the function depending on your specification.

External wiring diagram

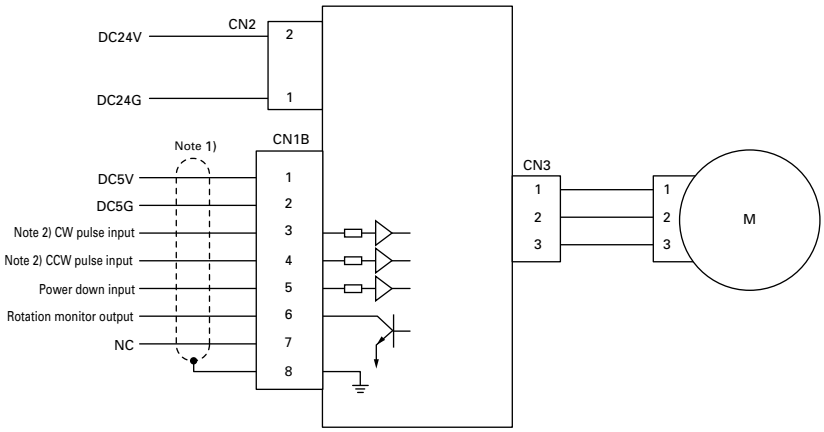
PMDSA1S3P01 (photo coupler input method)



Note 1) Use twisted pair shielded cables.
Note 2) Switching between the "2-input method (CW and CCW input method)" and the "1- input method (CK, U/D)" is an optional function. For more information, contact us.

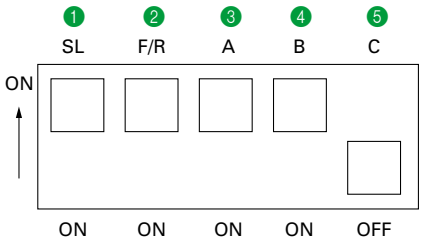
Operation, Connection, and Function

PMDSA1S3C01 (CMOS input method)



Note 1)Use twisted pair shielded cables.
Note 2)Switching between the "2-input method (CW and CCW input method)" and the "1- input method (CK, U/D)" is an optional function. For more information, contact us.

● Function selection DIP switchpack ---❹



- The factory settings are shown in the figure above.
- Before changing the settings of the function selection DIP switches, turn off the source of the PM driver.

❶SL (auto current down selection)

Select the auto current down function.

SL	Auto current down
ON	Enabled
OFF	Disabled

❷F/R selection

This switch is not used.

Do not set it to OFF.

❸・❹・❺ A, B, C (step angle setting)

Set the step angle

DIP switch			Step angle	Number of drive pulses per one period of phase current
A	B	C		
ON	ON	OFF	Basic step angle 1/1 (1.2˚/pulse)	6
ON	OFF		Basic step angle 1/2 (0.6˚/pulse)	12
OFF	ON		Basic step angle 1/4 (0.3˚/pulse)	24
OFF	OFF		Basic step angle 1/8 (0.15˚/pulse)	48
OFF	OFF	ON	Basic step angle 1/16 (0.075˚/pulse)	48

- When the DIP switch "C" = "ON" (1/16 division), the internal circuit (stepping motor) operates at the rising edge and falling edge of the drive pulse.
  If the duty ratio of the drive pulse moves out of the adjustment significantly by 50%, operation becomes unstable.

Operation, Connection, and Function

● I/O signal function ---1

Signal name (abbreviation)	Pin number (CN1)		Function
	フォトカプラ入力方式	CMOS入力方式	
Pulse input (CW)	1 2	3	Inputs the drive pulse for the rotation in the CW direction.
Pulse input (CCW)	3 4	4	Inputs the drive pulse for the rotation in the CCW direction.
Power down input (PD)	5 6	5	Inputting the PD signal turns off the current that flows through the stepping motor. Photo coupler input method: Internal photo coupler ON ···PD function enabled CMOS input method: Input of "L" level ····· PD function enabled
Rotation monitor output (MON)	MON(collector) 7 MON (collector) 8	MON(collector) 6	Turned on once for each period of the phase current. Turned on once for each 6 pulses when the division number is 1/1.

- In the table, the photo coupler input method is for the PMDSA1S3P01 and the CMOS input method is for the PMDSA1S3C01.
- The CW direction of the rotation of the stepping motor is the clockwise direction when viewing the stepping motor from the output axis side (flange side). The CCW direction is the counterclockwise direction when viewing the stepping motor from the output axis side (flange side).

● Connectors to be used

PMDSA1S3P01 (photo coupler input method)

PM driver side		Model of applicable connector	Manufacturer
Used for	Model		
I/O signals (CN1A)	5045–11AG	Applicable housing :5051–11 Applicable contact : 2759PBG	Molex Japan Co., Ltd.
DC source (CN2)	B2P–VH	Applicable connector: VHR–2N Applicable contact : SVH–21T–P1.1	JST Mfg. Co., Ltd.
Stepping motor (CN3)	B3P–VH	Applicable connector: VHR–3N Applicable contact : SVH–21T–P1.1	JST Mfg. Co., Ltd.

- Please prepare the applicable connectors yourself or order the optional connector set or connector cables.

(For information on options, refer to page 15.)

PMDSA1S3C01 (CMOS input method)

PM driver side		Model of applicable connector	Manufacturer
Used for	Model		
I/O signals (CN1B)	5045–08AG	Applicable housing:5051–08 Applicable contact: 2759PBG	Molex Japan Co., Ltd.
DC source (CN2)	B2P–VH	Applicable connector: VHR–2N Applicable contact: SVH–21T–P1.1	JST Mfg. Co., Ltd.
Stepping motor (CN3)	B3P–VH	Applicable connector: VHR–3N Applicable contact: SVH–21T–P1.1	JST Mfg. Co., Ltd.

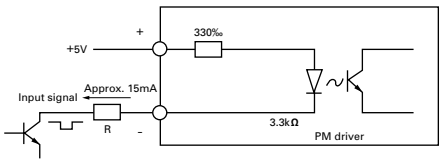
- Please prepare the applicable connectors yourself or order the optional connector set or connector cables.

(For information on options, refer to page 18.)

Operation, Connection, and Function

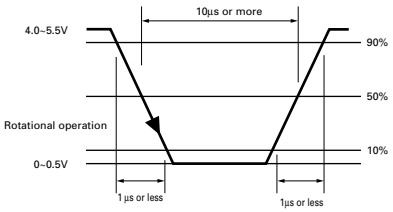
PMDSA1S3P01 (photo coupler input method)

Input circuit configuration (CW and CCW)

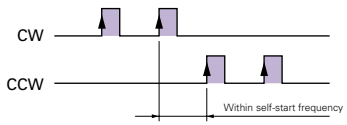


- Pulse duty: 50% or less
- When the crest value of the input signal is 5V, the external limit resistance R must be 0Ω
  When the crest value of the input signal exceeds 5V, use the external limit resistance R to limit the input current to approximately 15mA.

Input signal specifications



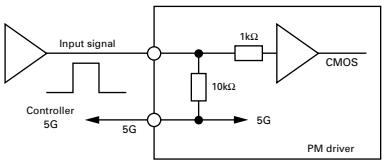
Timing of the command pulse



- The internal photo coupler turns ON within the and, when the DIP switch "C" = "OFF," the internal circuit (stepping motor) operates at the rising edge of "ON" of the photo coupler.
- 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.
- When the DIP switch "C" = "ON," the internal circuit (stepping motor) operates at the rising edge and falling edge of "ON" of the photo coupler.

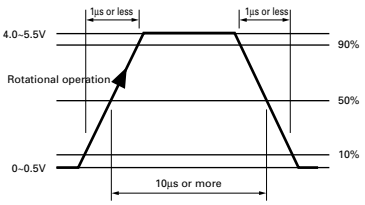
PMDSA1S3C01 (CMOS input method)

Input circuit configuration (CW and CCW)

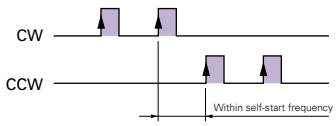


- Pulse duty: 50% or less

Input signal specifications



Timing of the command pulse

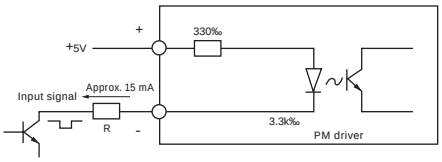


- The "H" level is inputted within the and, when the DIP switch "C" = "OFF," the internal circuit (stepping motor) operates at the rising edge of the "H" level.
- When applying the pulse to CW, set the CCW side input level to the "L" level.
- When applying the pulse to CCW, set the CW side input level to the "L" level.
- When the DIP switch "C" = "ON," the internal circuit (stepping motor) operates at the rising edge and falling edge of "ON" of the photo coupler.

Operation, Connection, and Function

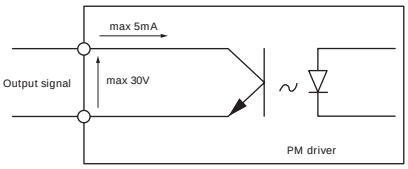
PMDSA1S3P01 (photo coupler input method)

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.

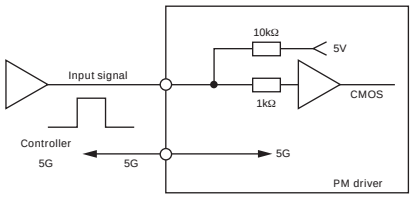
Output circuit configuration (MON)



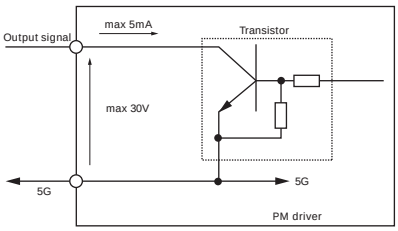
- Rotation monitor signal output signal
  Contact type: Open collector output by photo coupler
  Contact capacity: DC30V, 5mA or less

PMDSA1S3C01 (CMOS input method)

Input circuit configuration (PD)



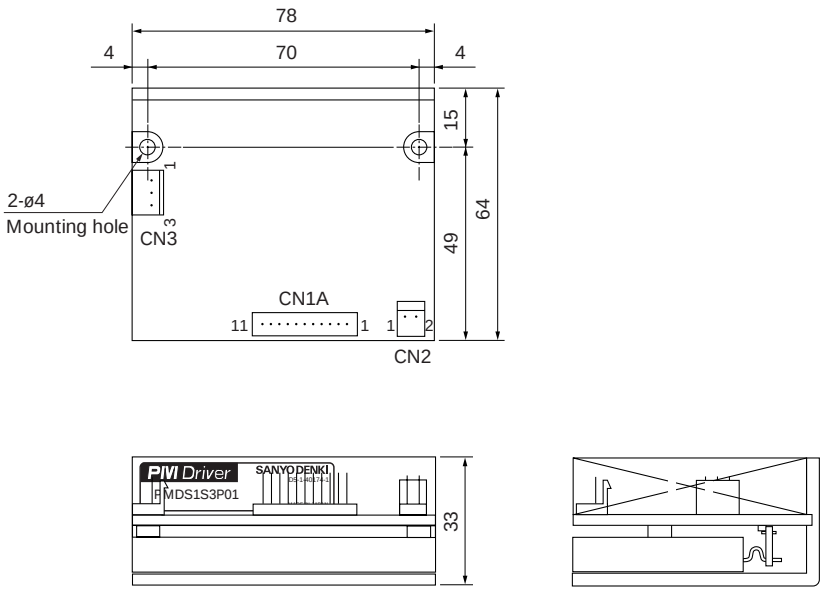
Output circuit configuration (MON)



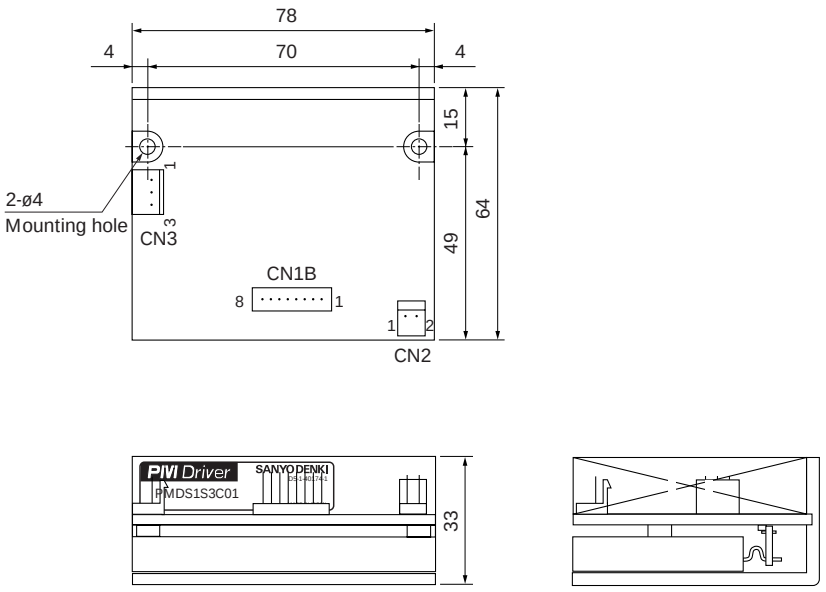
- Rotation monitor signal output signal
  Contact type: Open collector output by transistor
  Contact capacity: DC30V, 5mA or less

Dimensions (unit: mm)

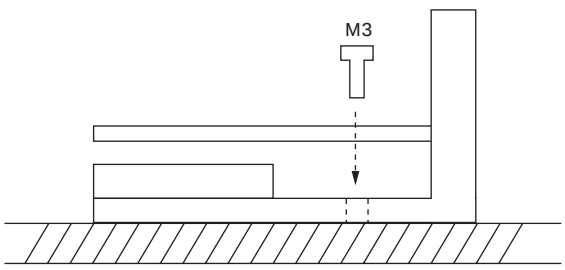
PMDSA1S3P01 (photo coupler input method)



PMDSA1S3C01 (CMOS input method)



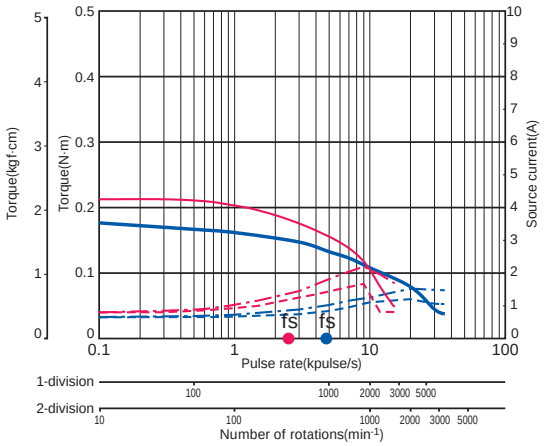
Mounting direction and mounting position



- Use the mounting holes in the bottom of the PM driver with M3 screws as shown in the figure. (No mounting hardware is required.)
- The positions of the mounting holes are shown in the outline drawing above.

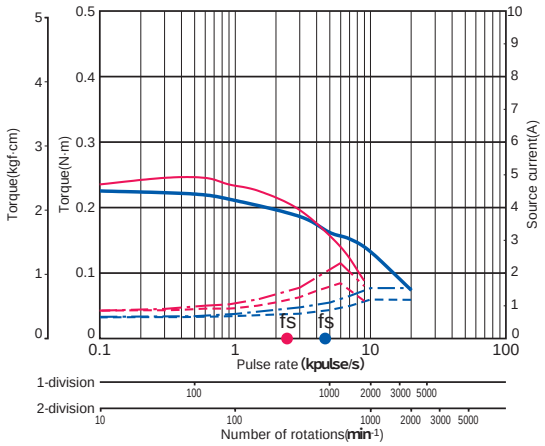
Pulse Rate-Torque Characteristics/Pulse Rate-Source Current Characteristics

●103H5332-03 □□



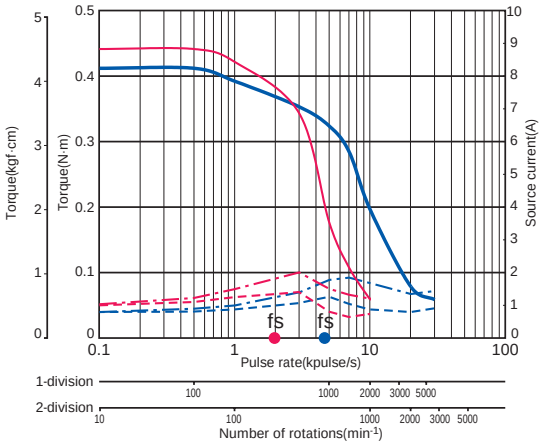
Source voltage: DC24V _ Winding current: 3A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4} kg·m^2 Uses rubber coupling)
– · – Source current (T_L=MAX) – – – Source current (T_L =0)
fs: Maximum self-start frequency when not loaded ■ 1-division is specified ■ 2-division is specified

●103H5333-03 □□



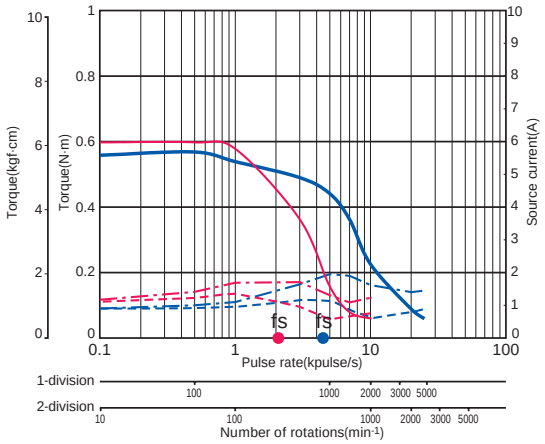
Source voltage: DC24V _ Winding current: 3A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4} kg·m^2 Uses rubber coupling)
– · – Source current (T_L=MAX) – – – Source current (T_L =0)
fs: Maximum self-start frequency when not loaded ■ 1-division is specified ■ 2-division is specified

●103H6332-03 □□



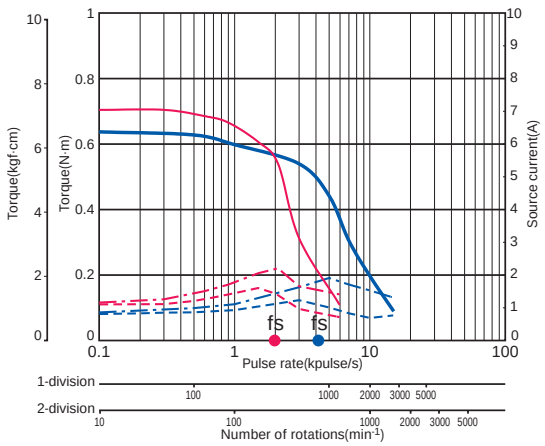
Source voltage: DC24V _ Winding current: 3A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4} kg·m^2 Uses rubber coupling)
– · – Source current (T_L=MAX) – – – Source current (T_L =0)
fs: Maximum self-start frequency when not loaded ■ 1-division is specified ■ 2-division is specified

●103H6333-03 □□



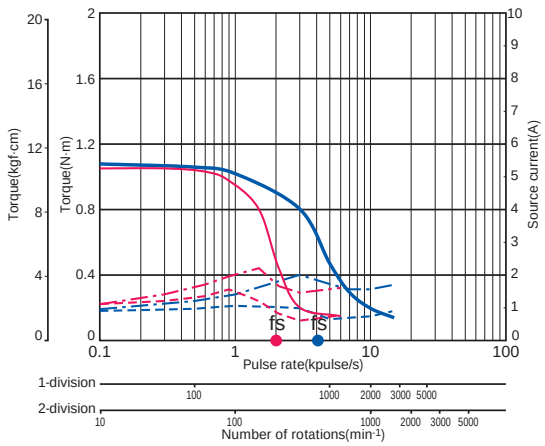
Source voltage: DC24V _ Winding current: 3A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4} kg·m^2 Uses rubber coupling)
– · – Source current (T_L=MAX) – – – Source current (T_L =0)
fs: Maximum self-start frequency when not loaded ■ 1-division is specified ■ 2-division is specified

●103H7332-03 □□



Source voltage: DC24V _ Winding current: 3A/phase
—— Getaway torque (J_{L1}=0.94x10^{-4} kg·m^2 Uses rubber coupling)
– · – Source current (T_L=MAX) – – – Source current (T_L =0)
fs: Maximum self-start frequency when not loaded ■ 1-division is specified ■ 2-division is specified

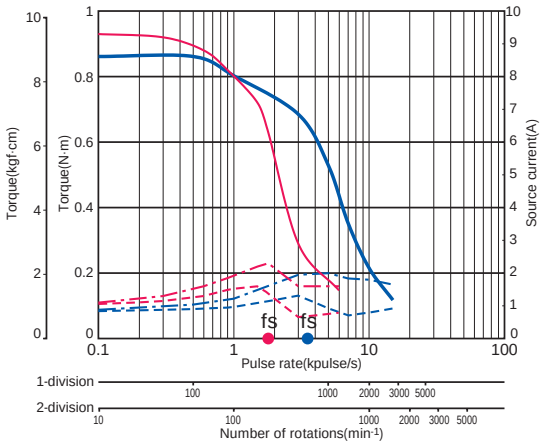
●103H7333-03 □□



Source voltage: DC24V _ Winding current: 3A/phase
—— Getaway torque (J_{L1}=2.6x10^{-4} kg·m^2 Uses rubber coupling)
– · – Source current (T_L=MAX) – – – Source current (T_L =0)
fs: Maximum self-start frequency when not loaded ■ 1-division is specified ■ 2-division is specified

Pulse Rate-Torque Characteristics/Pulse Rate-Source Current Characteristics

●103H7832-03 □□



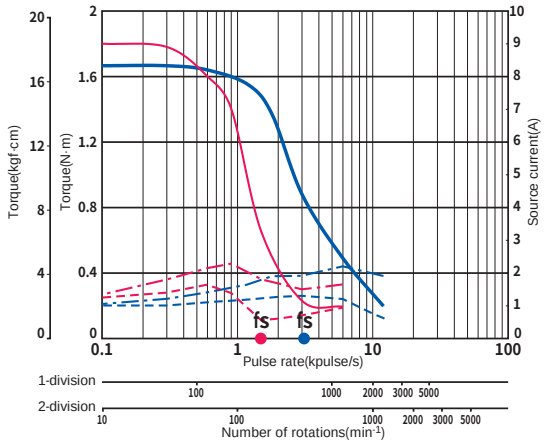
Source voltage: DC24V _ Winding current: 3A/phase

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

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

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

●103H7833-03 □□



Source voltage: DC24V _ Winding current: 3A/phase

—— Getaway torque (J_{L1}=7.4x10^{-4} kg·m^2 Uses rubber coupling)

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

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

Options

PMDSA1S3P01 (photo coupler input method)

Connector sets

Model	Used for	Contents of set	Quantity	Manufacturer	Applicable wire size	Crimp tool number
PM–AP–039	I/O signals (CN1A)	Applicable housing: 5051–11	1	Molex Japan Co., Ltd.	AWG22 to 28	JHTR2262A
		Applicable contact: 2759PBG	11			JHTR2262J
PM–AP–036	DC source (CN2)	Applicable housing:VHR–2N	1	J.S.T Mfg. Co., Ltd.	AWG18 to 22	YC–160R
		Applicable contact: SVH–21T–P1.1	2			
PM–AP–041 (H533* type)	Stepping motor (CN3)	Applicable housing:VHR–3N	1	J.S.T Mfg. Co., Ltd.	AWG22	YC–160R
		Applicable contact: SVH–21T–P1.1	3			
		Applicable housing:EHR–3–N–NATURAL	1			YC–260R
		Applicable contact: SEH–001T–P0.6	3			
PM–AP–040 (other types)		Applicable housing:VHR–3N	2	J.S.T Mfg. Co., Ltd.	AWG18 to 22	YC–160R
		Applicable contact: SVH–21T–P1.1	6			

Connector cables

Model	Used for
PM–C11S0100–01	Connector cable for I/O signals (CN1A)
PM–C02P0100–01	Connector cable for DC source (CN2)
PM–C03M0100–□□	Connector cable for stepping motor (CN3)

□□ ··· is 01 or 02. (Refer to separate table 1.)

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

Stepping moter cable model numbers (supple ment table 1)

	Model of stepping motor
01	103H6332–03□□
	103H6333–03□□
	103H7332–03□□
	103H7333–03□□
	103H7832–03□□
	103H7833–03□□
02	103H5332–03□□
	103H5333–03□□

Options

PMDSA1S3C01 (CMOS input method)

Connector sets

Model	Used for	Contents of set	Quantity	Manufacturer	Applicable wire size	Crimp tool number
PM–AP–009	I/O signals (CN1B)	Applicable housing: 5051–08	1	Molex Japan Co., Ltd.	AWG22~28	JHTR2262A
		Applicable contact: 2759PBG	8			JHTR2262J
PM–AP–036	DC source (CN2)	Applicable housing: VHR–2N	1	J.S.T Mfg.Co., Ltd.	AWG18~22	YC–160R
		Applicable contact: SVH–21T–P1.1	2			
PM–AP–041 (H533* type)	Stepping motor (CN3)	Applicable housing: VHR–3N	1	J.S.T Mfg.Co., Ltd.	AWG22	YC–160R
		Applicable contact: SVH–21T–P1.1	3			
		Applicable housing: EHR–3–N–NATURAL	1			YC–260R
		Applicable contact: SEH–001T–P0.6	3			
PM–AP–040 (other types)		Applicable housing: VHR–3N	2	J.S.T Mfg.Co., Ltd.	AWG18~22	YC–160R
		Applicable contact: SVH–21T–P1.1	6			

Connector cables

Model	Used for
PM–C08S0100–01	Connector cable for I/O signals (CN1B)
PM–C02P0100–01	Connector cable for DC source (CN2)
PM–C03M0100–□□	Connector cable for stepping motor (CN3)

□□ ··· is 01 or 02. (Refer to separate table 1.)

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

Stepping moter cable model numbers (supple ment table 1)

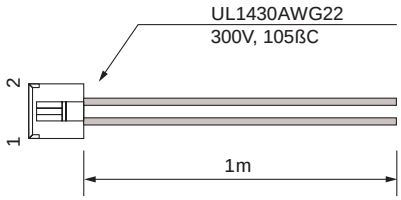
	Model of stepping motor
01	103H6332–03cc
	103H6333–03cc
	103H7332–03cc
	103H7333–03cc
	103H7832–03cc
	103H7833–03cc
02	103H5332–03cc
	103H5333–03cc

Options

●Cable 1 (power source cable)

Driver side

Pin number	Color
1	Black
2	White

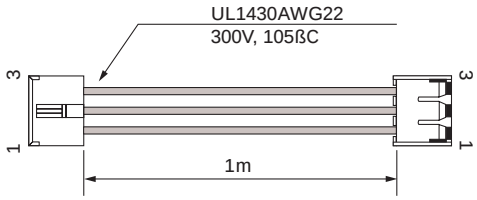


Model of cable	Length (L1)
PM-C02P0100-01	1m

●Cable 2 (stepping motor extension cable 1)

Driver side

Pin number	Color
1	Red
2	White
3	Black



Stepping motor side

Pin number	Color
1	Red
2	White
3	Black

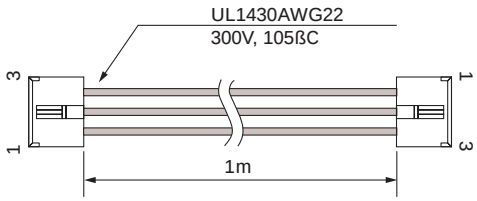
Model of cable	Length (L2)
PM-C03M0100-02	1m

Applicable stepping motor
103H5332-03□0
103H5333-03□0

●Cable 3 (stepping motor extension cable 2)

Driver side

Pin number	Color
1	Red
2	White
3	Black



Stepping motor side

Pin number	Color
1	Red
2	White
3	Black

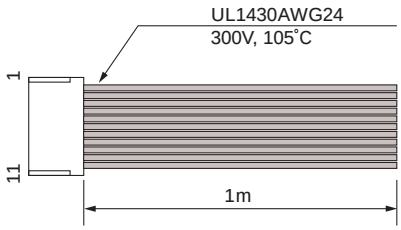
Model of cable	Length (L3)
PM-C03M0100-01	1m

Applicable stepping motor
103H6332-03□0
103H6333-03□0
103H7332-03□0
103H7333-03□0
103H7832-03□0
103H7833-03□0

●Cable 4 (I/O signal cable)

Driver side

Pin number	Color
1	Blue
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	

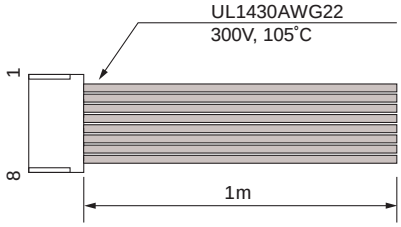


Model of cable	Length (L4)
PM-C11S0100-01	1m

●Cable 5 (source/I/O signal cable)

Driver side

Pin number	Color
1	Blue
2	
3	
4	
5	
6	
7	
8	



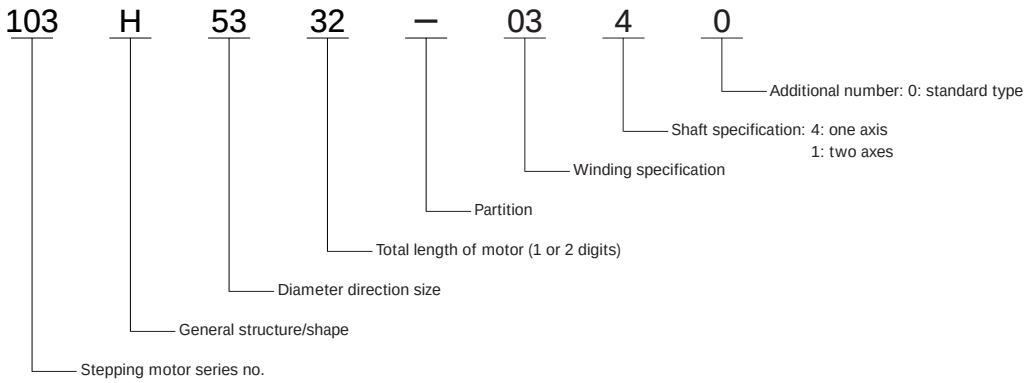
Model of cable	Length (L5)
PM-C08S0100-01	1m

StepSyn 3

3-phase stepping system

Specifications of 3-phase stepping motor

Explanation of motor model



General specifications

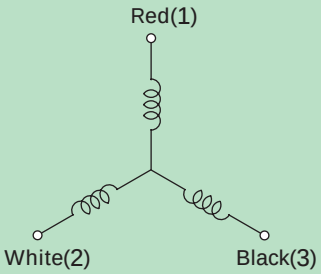
	103-530□	103H533□	103H633□	103H733□	103H783□
Insulation class	B species(130˚C)				
Insulation resistance	100MΩ or more when measured with a DC500V megohmmeter between the motor wiring and the frame at normal temperature and humidity.				
Withstand voltage	Not influenced when 50/60 Hz, AC1000V (AC500V for 103-530□ and 103H533□) is applied between the motor wiring and the frame for one minute at normal temperature and humidity (leak current: 1mA).				
Operating environment	Ambient temperature: -10 to +50_C				
	Ambient humidity: 20 to +90% (no condensation)				
Winding temperature rise	80 K or less (Conditions depend on Sanyo standard.)				
Standing angle error	±0.1875˚	±0.06˚	±0.06˚	±0.06˚	±0.06˚
Axial play	0.075 mm or less (load: 9N)	0.075 mm or less (load: 9N)	0.075 mm or less (load: 9N)	0.075 mm or less (load: 9N)	0.075 mm or less (load: 9N)
Radial play	0.025 mm or less (load: 4.4N)	0.025 mm or less (load: 4.4N)	0.025 mm or less (load: 4.4N)	0.025 mm or less (load: 4.4N)	0.025 mm or less (load: 4.4N)
Shaft runout	0.025mm				
Concentricity of mounting spigot relative to shaft	ø0.05mm	ø0.05mm	ø0.075mm	ø0.075mm	ø0.075mm
Perpendicularity of mounting surface relative to shaft	0.1mm	0.1mm	0.075mm	0.075mm	0.075mm
Allowable thrust load	10N	10N	15N	15N	20N
Allowable radial load (note)	35N	35N	80N	75N	80N

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

Internal connection and rotational direction

Internal connection

( ) Connector pin number



Direction of motor rotate

When DC-energized in the order below, the rotational direction must be counterclockwise viewed from the output axis side.

Type		Color of lead		
		Red (1)	White (2)	Black (3)
Energization order	1	+	–	
	2	+		–
	3		+	–
	4	–	+	
	5	–		+
	6		–	+

3-phase stepping motor

42mm sq. 103-530□
3.75˚/step PM rotor type

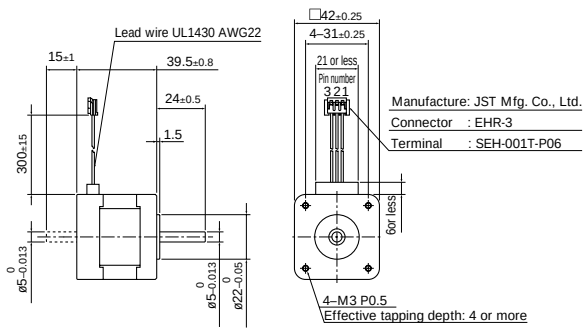
●For information on the applicable driver, contact our sales department.

Specifications

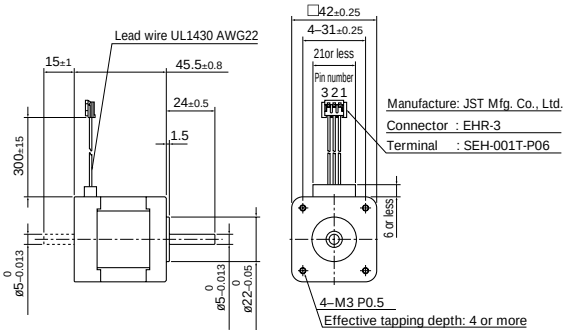
Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weight
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	x10^{-4}kg·m^2	kg
103-5308-0240	-0210	0.09	1.8	1.7	2.4	0.035	0.3
103-5309-0340	-0310	0.118	2.4	1.4	1.53	0.05	0.38

Dimensions (unit: mm)

103-5308-0240 (Single shaft)
103-5308-0210 (Double shaft)

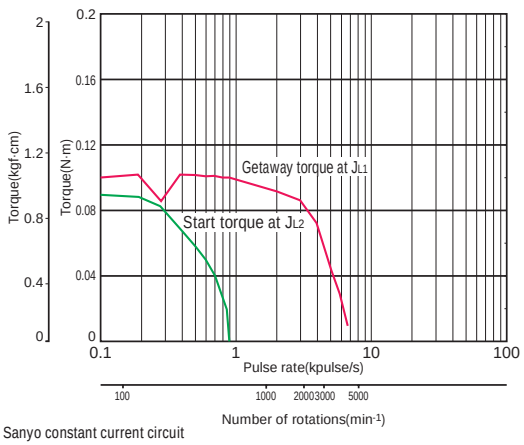


103-5309-0340 (Single shaft)
103-5309-0310 (Double shaft)



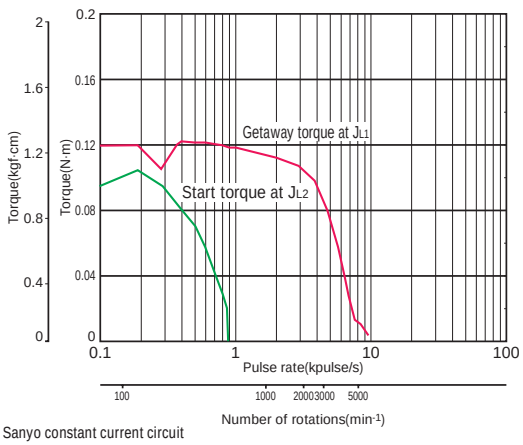
Pulse Rate-Torque Characteristics

●103-5308-0240



Sanyo constant current circuit
Source voltage: DC24V·Winding current: 1.8A/phase, 2-phase energization (full step)
J_{L1}=0.161x10^{-4}kg·m^2(Uses rubber bellow.)
J_{L2}=0.01x10^{-4}kg·m^2(Pulley balancer method)

●103-5309-0340



Sanyo constant current circuit
Source voltage: DC24V·Winding current: 2.4A/phase, 2-phase energization (full step)
J_{L1}=0.161x10^{-4}kg·m^2(Uses rubber bellow.)
J_{L2}=0.01x10^{-4}kg·m^2(Pulley balancer method)

3-phase stepping motor

42mm sq.

103H533□
1.2˚/step HB type

●Applicable driver

Photo coupler input　CMOS input

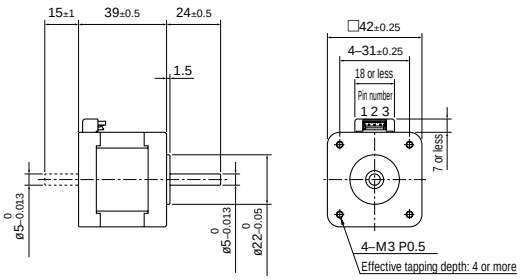
Specifications

Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weight
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	x10^{-4}kg·m^2	kg
103H5332-0340	-0310	0.196	3	0.84	0.5	0.053	0.3
103H5333-0340	-0310	0.265	3	0.94	0.5	0.065	0.38

Dimensions(unit: mm)

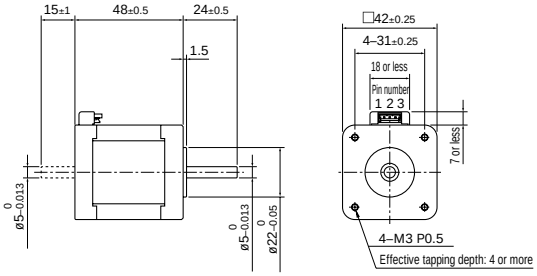
103H5332-0340 (Single shaft)
103H5332-0310 (Double shaft)

Applicable connector: JST Mfg. Co., Ltd.
Connector : EHR-3
Terminal : SEH-001T-P06



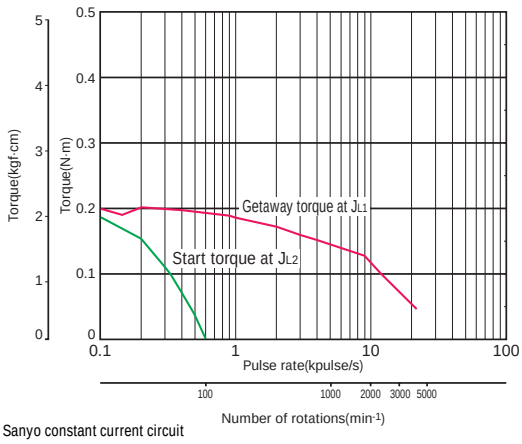
103H5333-0340 (Single shaft)
103H5333-0310 (Double shaft)

Applicable connector: JST Mfg. Co., Ltd.
Connector : EHR-3
Terminal : SEH-001T-P06



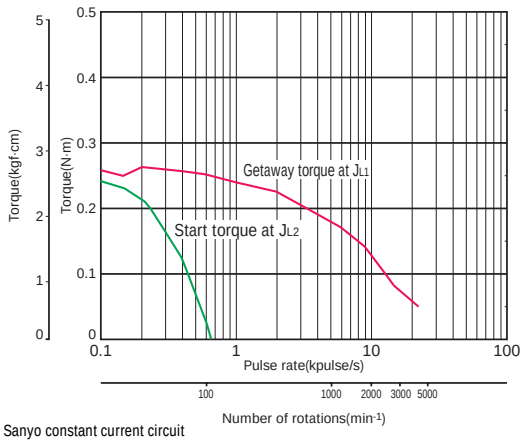
Pulse Rate-Torque Characteristics

●**103H5332-0340**



Sanyo constant current circuit
Source voltage: DC24V·Winding 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.)

●**103H5333-0340**



Sanyo constant current circuit
Source voltage: DC24V·Winding 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.)

3-phase stepping motor

50mm sq. 103H633□
1.2˚/step HB type

●Applicable driver

PMDSA1S3P01 Photo coupler input
PMDSA1S3C01 CMOS input

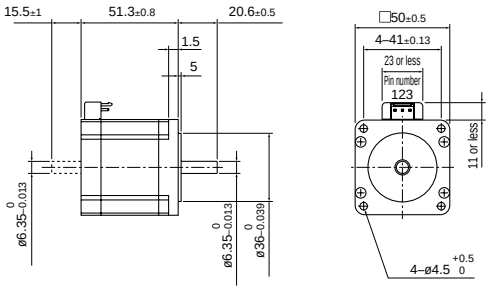
Specifications

Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weight
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	x10^{-4}kg·m^2	kg
103H6332-0340	-0310	0.44	3	1.3	1.6	0.12	0.5
103H6333-0340	-0310	0.58	3	1.6	1.6	0.17	0.65

Dimensions (unit: mm)

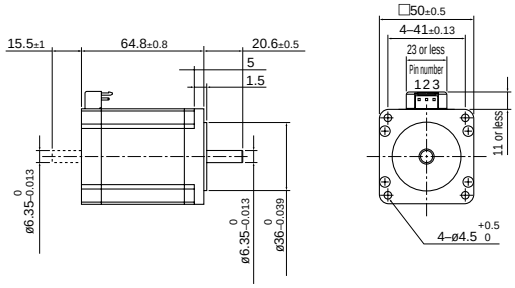
103H6332-0340 (Single shaft)
103H6332-0310 (Double shaft)

Applicable connector : JST Mfg. Co., Ltd.
Connector : VHR-3N
Terminal : SVH-21T-P1.1



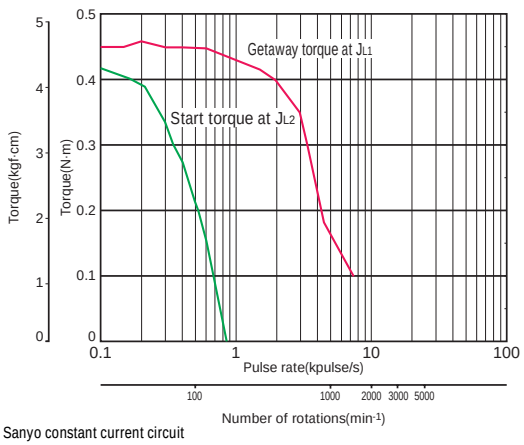
103H6333-0340 (Single shaft)
103H6333-0310 (Double shaft)

Applicable connector : JST Mfg. Co., Ltd.
Connector : VHR-3N
Terminal : SVH-21T-P1.1



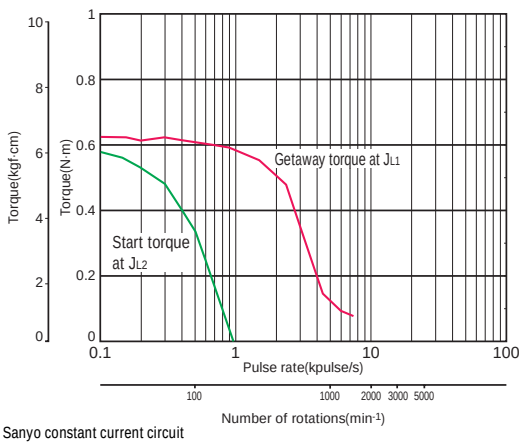
Pulse Rate-Torque Characteristics

●**103H6332-0340**



Sanyo constant current circuit
Source voltage: DC24V·Winding 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.)

●**103H6333-0340**



Sanyo constant current circuit
Source voltage: DC24V·Winding 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.)

3-phase stepping motor

56mm sq.

103H733□
1.2˚/step HB type

●Applicable driver

PMDSA1S3P01 Photo coupler input

PMDSA1S3C01 CMOS input

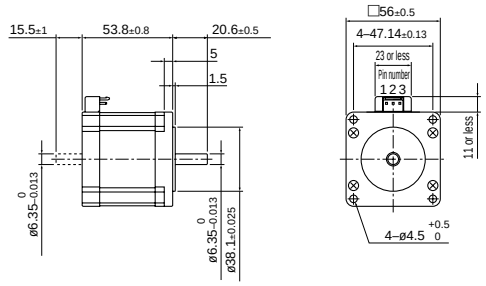
Specifications

Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weight
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	x10^{-4}kg·m^2	kg
103H7332-0340	-0310	0.69	3	1.4	1.8	0.21	0.65
103H7333-0340	-0310	1.1	3	1.7	2.4	0.36	0.98

Dimensions (unit: mm)

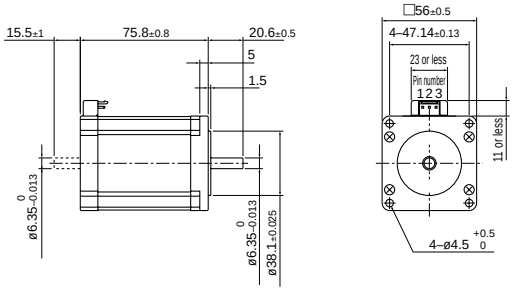
103H7332-0340 (Single shaft)
103H7332-0310 (Double shaft)

Applicable connector: JST Mfg. Co., Ltd.
Connector : VHR-3N
Terminal : SVH-21T-P1.1



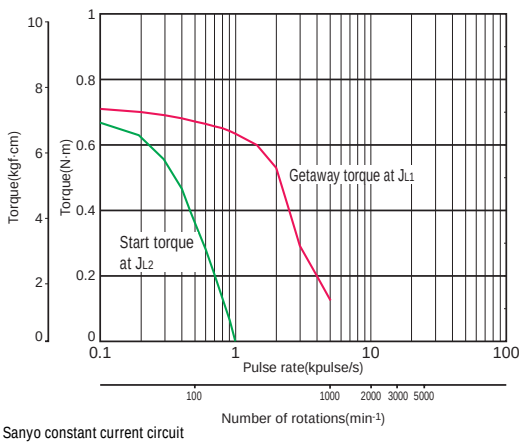
103H7333-0340 (Single shaft)
103H7333-0310 (Double shaft)

Applicable connector: JST Mfg. Co., Ltd.
Connector : VHR-3N
Termina : SVH-21T-P1.1



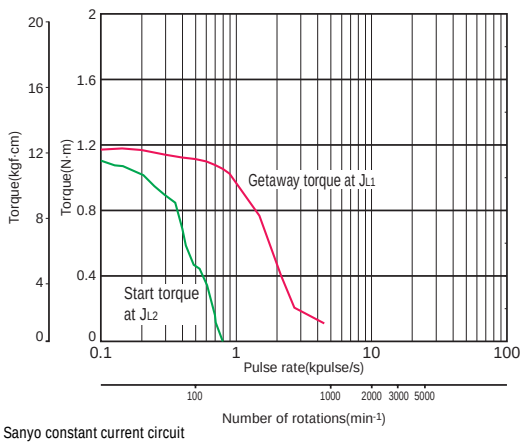
Pulse Rate-Torque Characteristics

●**103H7332-0340**



Sanyo constant current circuit
Source voltage: DC24V·Winding 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.)

●**103H7333-0340**



Sanyo constant current circuit
Source voltage: DC24V·Winding 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.)

3-phase stepping motor

60mm sq. 103H783□
1.2˚/step HB type

●Applicable driver

PMDSA1S3P01 Photo coupler input
PMDSA1S3C01 CMOS input

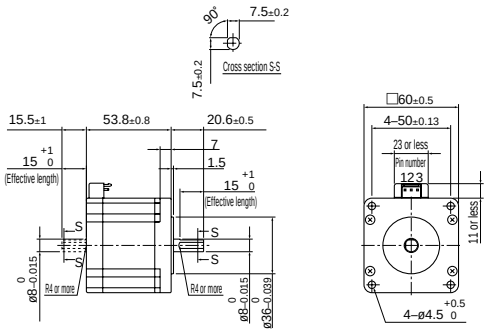
Specifications

Model		Holding torque at 2-phase energization	Rated current	Wiring resistance	Wiring inductance	Rotor inertia	Weight
One shaft	Two shafts	N.m or more	A/phase	Ω/phase	mH/phase	x10^{-4}kg·m^2	kg
103H7832-0340	-0310	0.95	3	1.5	1.8	0.4	0.78
103H7833-0340	-0310	1.68	3	2	3.2	0.84	1.34

Dimensions (unit: mm)

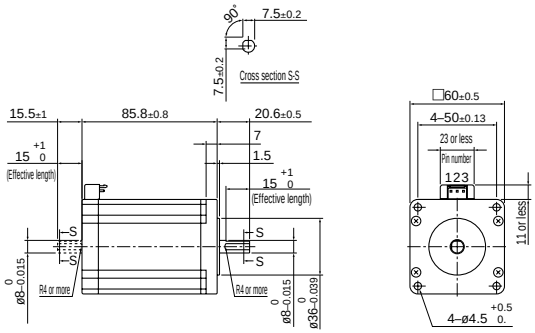
103H7832-0340 (Single shaft)
103H7832-0310 (Double shaft)

Applicable connector: JST Mfg. Co., Ltd.
Connector : VHR-3N
Terminal : SVH-21T-P1.1



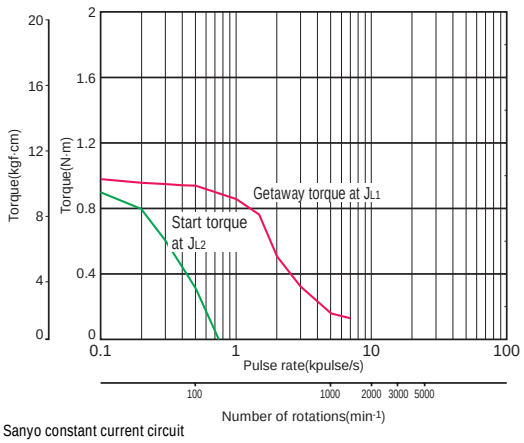
103H7833-0340 (Single shaft)
103H7833-0310 (Double shaft)

Applicable connector: JST Mfg. Co., Ltd.
Connector : VHR-3N
Terminal : SVH-21T-P1.1



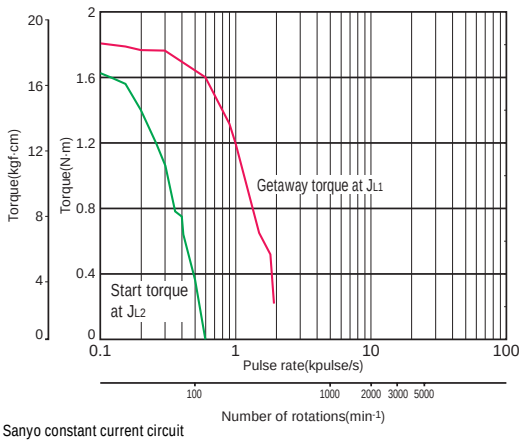
Pulse Rate-Torque Characteristics

●1103H7832-0340



Sanyo constant current circuit
Source voltage: DC24V·Winding 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.)

●1103H7833-0340



Sanyo constant current circuit
Source voltage: DC24V·Winding 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.)

Specifications of 3-phase synchronous motor

General specifications

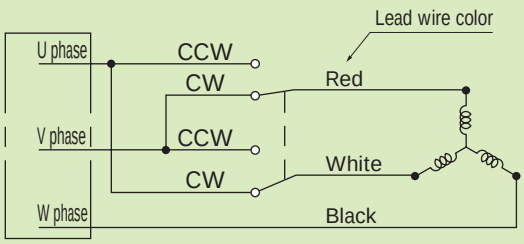
	103H833□	103H8933□
Insulation class	B species(130˚C)	
Insulation resistance	AC1000V or more when measured with a DC500V megohmmeter between the motor wiring and the frame at normal temperature and humidity.	
Withstand voltage	Not influenced when 50/60 Hz, AC1000V is applied between the motor wiring and the frame for one minute at normal temperature and humidity (leak current: 1 mA for 103H833□ and 10 ma for 103H8933□).	
Operating environment	Ambient temperature: -10 to +50_C	
	Ambient humidity: 20 to +90% (no condensation)	
Winding temperature rise	80 K or less (Conditions depend on Sanyo standard.)	
Axial play	0.075 mm or less (load: 9N)	
Radial play (note 1)	0.025 mm or less (load: 4.4N)	
Shaft runout	0.025mm	
Concentricity of mounting spigot relative to shaft	ø0.075mm	ø0.075 mm
Perpendicularity of mounting surface relative to shaft	0.075mm	0.075 mm
Allowable thrust load	60N	100N
Allowable radial load (note 1)	220N	360N

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

Internal wiring and rotational direction

Applicable model: 103H833□

Internal wiring

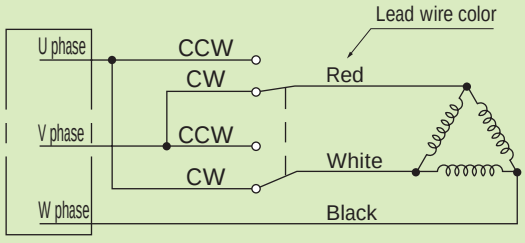


Direction of motor rotate

When the switch is set to CW with the wiring shown left, the rotational direction must be clockwise viewed from the output axis side.
When set to CCW, it must be counterclockwise.

Applicable model: 103H8933□

Internal wiring



Direction of motor rotate

Rotational direction
When the switch is set to CW with the wiring shown left, the rotational direction must be clockwise viewed from the output axis side.
When set to CCW, it must be counterclockwise.

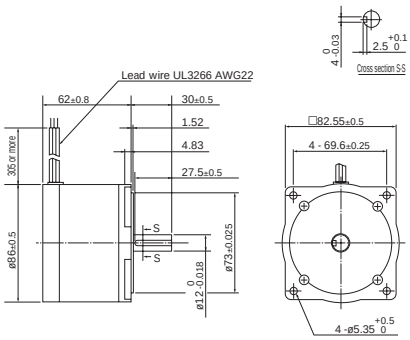
3-phase stepping motor

Specifications

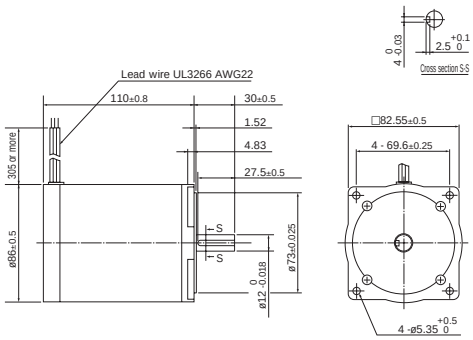
Model	Synch getaway torque	Rated voltage	Rated current	Number of rotations(min^{-1})		Weight
	N.m or more	VAC	A or less	50Hz	60Hz	kg
103H8331-0240	1.7	200	0.3	60	72	1.5
103H8332-0240	3.3	200	0.3	60	72	2.5
103H89335-0240	3.5	200	0.4	60	72	5
103H89336-0240	5.2	200	0.5	60	72	7.5

Dimensions(unit: mm)

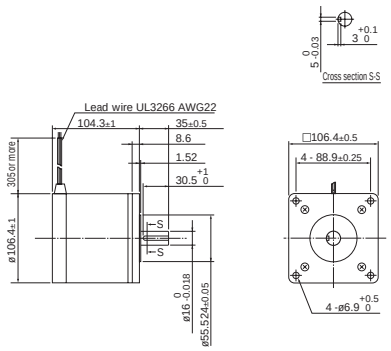
103H8331-0240



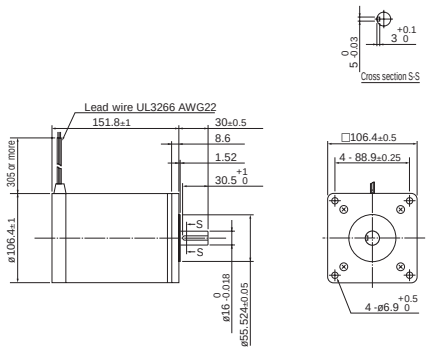
103H8332-0240



103H89335-0240



103H89336-0240



3-Phase Stepping Motor Drive IC for Universal Controller

PMM3101

Micro step

Outline

The PMM3101 IC for stepping motor drive is a power hybrid IC (HIC) that consists of an energization mode generation circuit and a switching device to drive 3-phase stepping motors in a single package. It has been developed to facilitate the use of 3-phase stepping motors more easily so that you can easily configure a micro step drive device only with this HIC and a few peripheral parts.

Features

- Micro step sine wave drive driver
- Built-in current detection resistor
- Adopting MOSFET as the power drive device to reduce heat generation
- All-in-one package reducing the number of parts of the peripheral circuit
- 4 energization modes available with an external bit signal

Maximum ratings (TC=25˚C)

Item	Symbol	Condition	Rating	Unit
Source voltage–1	$V_{CC1\ max}$	V_{CC2}=0V	37	V
Source voltage–2	$V_{CC2\ max}$	Without signal	7	V
Input voltage	$V_{in\ max}$	Logic input terminal	7	V
Phase current	$I_{O\ max}$	V_{CC2}=5V,Clock≧ 100Hz	2	A
Board temperature during operation	$T_{C\ max}$	———	+105	˚C
Joint temperature	$T_{j\ max}$	———	+150	˚C
Conservation temperature	T_{stg}	———	–40~+125	˚C

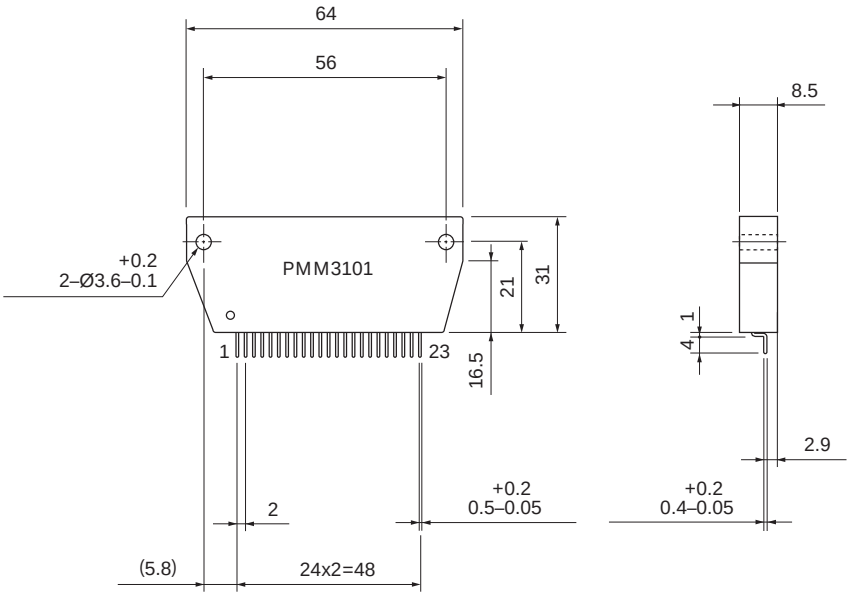
Recommended operating conditions (Ta=15˚C)

Item	Symbol	Condition	Rating	Unit
Source voltage–1	V_{CC1}	With signal	16~30	V
Source voltage–2	V_{CC2}	Without signal	5.0±5%	V
Input voltage	V_{IH}	———	0~V_{CC2}	V
Phase current–1	I_{O1}	Without heat sink	1.0	A
Phase current–2	I_{O2}	T_C=105˚C, Clock≧100Hz	1.5	A
Clock frequency	Clock	Pin 10 input frequency (rising time Tr and falling time Tf: 16É s or less)	DC~120	kHz
Phase driver withstand voltage	V_{DSS}	I_D=10mA(T_C=25˚C)	60	V

External Figures (unit: mm)

Pin connection

Pin No.	Name
1.	V_{CC1B}
2.	V_{CC1C}
3.	UO
4.	WO
5.	VO
6.	Vz
7.	V_{CC1A}
8.	GND2
9.	V_{ref}
10.	Clock
11.	Mode A
12.	Mode B
13.	Hold
14.	CW/CCW
15.	Enable
16.	Reset
17.	GND1
18.	V_{CC2}
19.	UI
20.	VI
21.	WI
22.	P.GND A



Electrical characteristics (TC=25°C, VCC1=24V, VCC2=5V)

Item	Symbol	Condition	Rating			Unit
			Min	Standard	Max	
V_{CC2} source current	I_{CCO}	Enable="L"	–	6.1	12	mA
Effective output current	I_{oe}	Each phase R/L = 2Ω/6mH, 2W2-3 phase energization	0.32	0.37	0.42	A_{rms}
FET diode forward voltage	V_{df}	If=1A(RL=23Ω)	–	1.0	1.6	V
Output saturation voltage	V_{sat}	RL=23Ω	–	0.45	0.56	V
Output leak current	I_{OL}	RL=23Ω	–	–	0.1	mA
"H" level input voltage	V_{IH}	Pins 10 to 16	4.0	–	–	V
"L" level input voltage	V_{IL}	Pins 10 to 16	–	–	1.0	V
Input current	I_{IL}	Pins 10 to 16 = GND level Pull-up resistance: 20kΩ	115	250	550	µA
V_{ref} input voltage	V_{rH}	Pin 9	0	–	$V_{CC2}/2$	V
V_{ref} input current	I_r	Pin 9 = 2.5V Internal resistance: 4.0kΩ	440	625	810	µA
PWM frequency	Fc	–	23	31	39	kHz

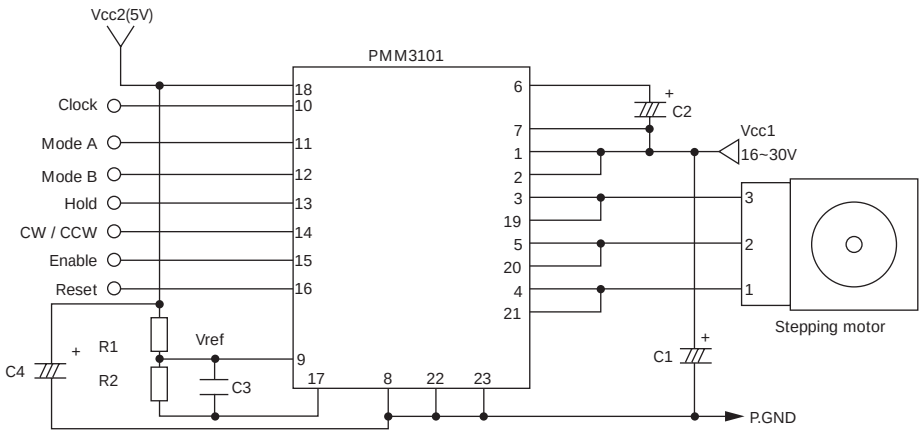
Function of each terminal

Terminal name	Function	Input condition for operation
V_{ref}	Motor current setting input	–
Clock	Pulse input for motor drive	Operates at the rising edge
Hold	Pause input	Hold = "L" level
CW/CCW	Motor rotational direction setting input	"H" level = CW rotation "L" level = CCW rotation
Enable	Power off input	Enable = "L" level
Reset	System reset	Reset = "L" level

Energization mode table

Input condition		Energization mode	1 step angle (degree)	Basic step division number
Mode A	Mode B			
L	L	2EX	1.2	1
L	H	2-3EX	0.6	2
H	L	W2-3EX	0.3	4
H	H	2W2-3EX	0.15	8

Example of Application Circuit



Recommended circuit part constants

C1	C2	C3	C4
220µF	2.2µF	0.1µF	10µF

- For the R1 and R2 constants, determine the Vref voltage according to the following equation.
  Vref (V) = motor current adjustment value (A/phase) x 1.3
  Notice that 100Ω is recommended for R2 due to the configuration of the internal circuit of the PMM3101.

- Place the GND side of the source by-pass capacitor of VCC1 (C1) as close to pins 22 and 23 as possible to reduce noise.

3-Phase Stepping Motor Drive IC for Universal Controller

PMM3501

Micro step

Outline

The PMM3501 IC for stepping motor drive is a power hybrid IC (HIC) that consists of an energization mode generation circuit and a switching device to drive 3-phase stepping motors in a single package.
It has been developed to facilitate the use of 3-phase stepping motors more easily so that you can easily configure a micro step drive device only with this HIC and a few peripheral parts.

Features

- Micro step sine wave drive driver
- Built-in current detection resistor
- Adopting MOSFET as the power drive device to reduce heat generation
- All-in-one package reducing the number of parts of the peripheral circuit
- 5 energization modes available with an external bit signal

Maximum ratings (TC=25˚C)

Item	Symbol	Condition	Rating	Unit
Source voltage–1	V_{CC1max}	V_{CC2}=0V	37	V
Source voltage–2	V_{CC2max}	Without signal	7	V
Input voltage	V_{inmax}	Logic input terminal	7	V
Phase current	I_{Omax}	V_{CC2}=5V,Clock≧100Hz	6	A
Board temperature during operation	T_{Cmax}	No condensation at low temperature	0~+105	˚C
Joint temperature	T_{jmax}	———	+150	˚C
Conservation temperature	T_{stg}	———	–40~+125	˚C

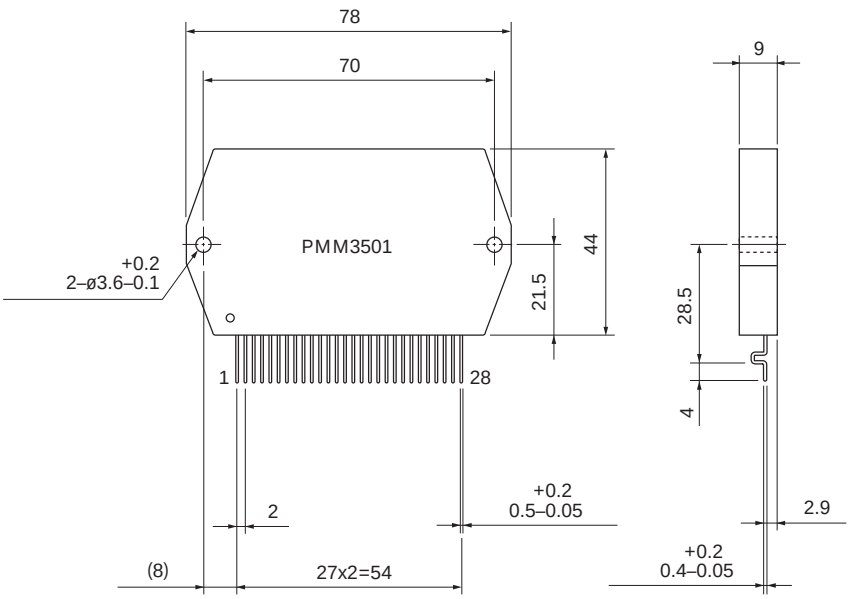
Recommended operating conditions (Ta=15˚C)

Item	Symbol	Condition	Rating	Unit
Source voltage–1	V_{CC1}	With signal	16~30	V
Source voltage–1	V_{CC2}	Without signal	5.0±5%	V
Input voltage	V_{IH}	———	0~V_{CC2}	V
Phase current–1	I_{O1}	Without heat sink	1.7	A
Phase current–2	I_{O2}	T_C=105˚C,Clock≧100Hz	4.4	A
Clock frequency	Clock	Pin 11 input frequency (pulse duty: 50%)	DC~50	kHz
Phase driver withstand voltage	V_{DSS}	I_D=10mA(T_C=25˚C)	60	V

External Figures (unit: mm)

Pin connection

Pin No.	Name
1.	V_{CC1B}
2.	V_{CC1C}
3.	–
4.	UO
5.	WO
6.	VO
7.	Vz
8.	V_{CC1A}
9.	GND2
10.	V_{ref}
11.	Clock
12.	Mode A
13.	Mode B
14.	Hold
15.	CW/CCW
16.	Enable
17.	Reset
18.	Mode C
19.	GND1
20.	MOI
21.	V_{CC2}
22.	–
23.	UI
24.	VI
25.	WI
26.	–
27.	PGNDA
28.	PGNDB



Electrical characteristics (TC=25°C, VCC1=24V, VCC2=5V)

Item	Symbol	Condition	Rating			Unit
			Min	Standard	Max	
V_{CC2} source current	I_{CCO}	Enable="L"	–	6.1	12	mA
Effective output current	I_{oe}	Each phase R/L=2Ω/6mH 2W2–3phase energization	0.92	1.03	1.14	A_{rms}
FET diode forward voltage	V_{df}	If=1A(RL=23Ω)	–	1.0	1.6	V
Output saturation voltage	V_{sat}	RL=23Ω	–	0.30	0.40	V
Output leak current	I_{OL}	RL=23Ω	–	–	0.1	mA
"H" level input voltage	V_{IH}	Pins 11 to 18	4.0	–	–	V
"L" level input voltage	V_{IL}	Pins 11 to 18	–	–	1.0	V
Input current	I_{IL}	Pins 11 to 18 = GND level Pull-up resistance:20kΩ	115	250	550	µA
V_{ref} input voltage	V_{rH}	Pin 10	0	–	V_{CC2}/2	V
V_{ref} input current	I_r	Pin 10 = 2.5 V Internal resistance:4kΩ	440	625	810	µA
"H" level MOI output voltage	V_{OH}	Pins 20 – 19 = 820kΩ	2.5	–	–	V
"L" level MOI output voltage	V_{OL}	Pins 21 – 20 = 1.6kΩ	–	–	0.4	V
PWM frequency	F_C	–	23	31	39	kHz

Function of each terminal

Function of each terminal	function	Input condition for operation
V_{ref}	Motor current setting input	–
Clock	Pulse input for motor drive	Mode C = "H": Rising edge operation Mode C = "L": Rising edge and falling edge operation
Hold	Pause input	Hold = "L" level
CW/CCW	Motor rotational direction setting input	"H" level = CW rotation "L" level = CCW rotation
Enable	Power off input	Enable = "L" level
Reset	System reset	Reset = "L" level
MOI	Rotation monitor output	"H" level output once for each phase current period

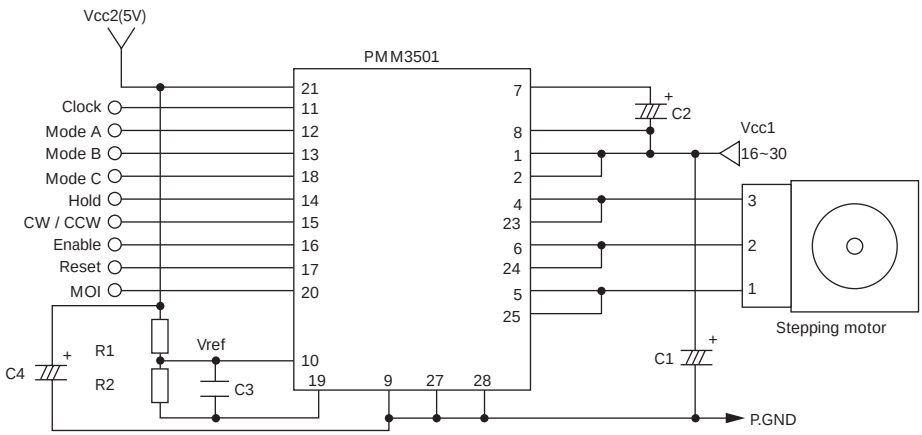
• The MOI output differs from the phase origin monitor output.

Energization mode table

Input			condition Energization mode	1 step angle (degree)	Basic step division
Mode A	Mode B	Mode C			
L	L	H	2EX	1.2	1
L	H	H	2–3EX	0.6	2
H	L	H	W2–3EX	0.3	4
H	H	H	2W2–3EX	0.15	8
H	H	L	4W2–3EX	0.075	16

• When Mode C = "L," 1 step operation is performed for each rising edge and falling edge of the Clock pulse.
If the duty ratio of the drive pulse moves out of the adjustment significantly by 50%, operation becomes unstable.

Example of Application Circuit



Recommended circuit part constants

C1	C2	C3	C4
470µF	6.8µF	0.1µF	10µF

- For the R1 and R2 constants, determine the Vref voltage according to the following equation.
  Vref (V) = motor current adjustment value (A/phase) x 0.41
  Notice that 100Ω is recommended for R2 due to the configuration of the internal circuit of the PMM3101.
- Place the GND side of the source by-pass capacitor of VCC1 (C1) as close to pins 27 and 28 as possible to reduce noise.