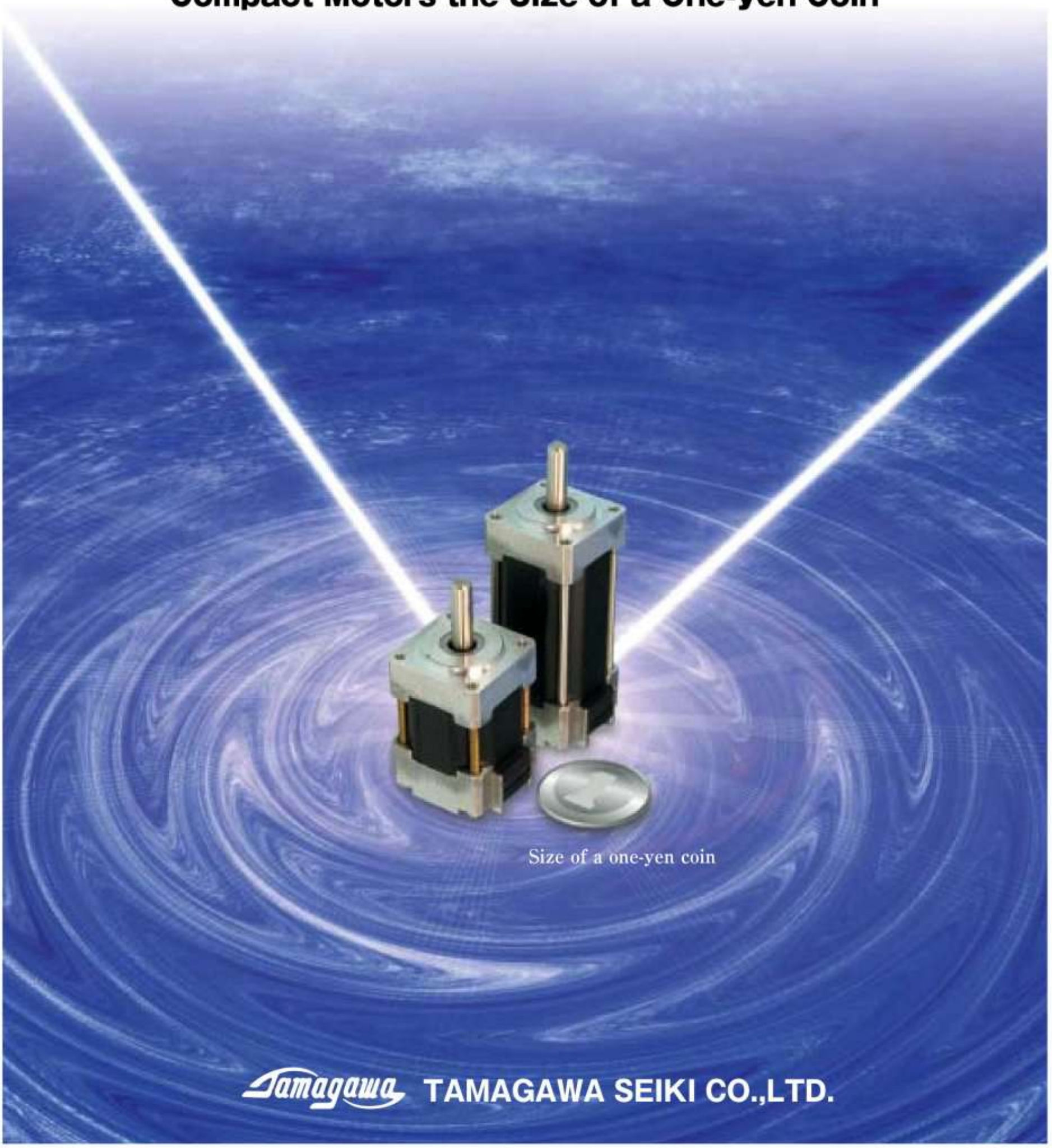
Motortronics®

Catalogu No.T12-1630

2-Phase Ultracompact／5-Phase Ultracompact

20mm-Square STEP MOTORS

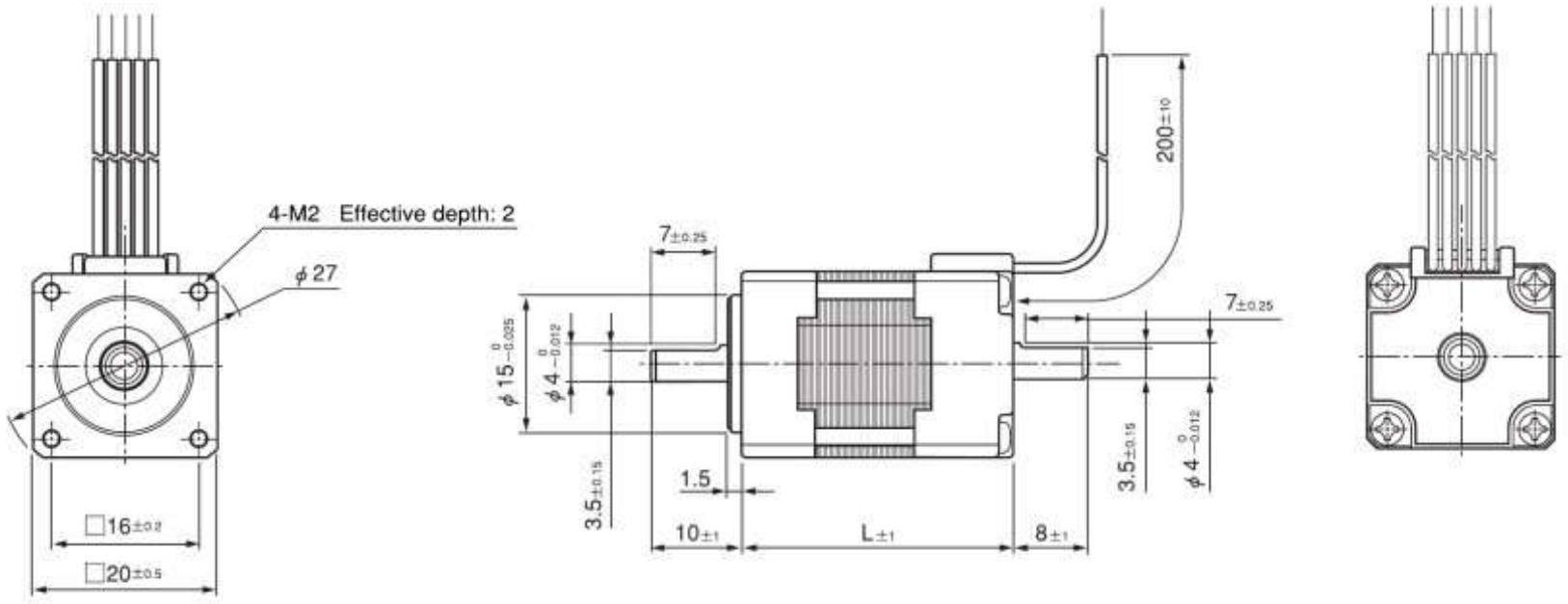
Compact Motors the Size of a One-yen Coin



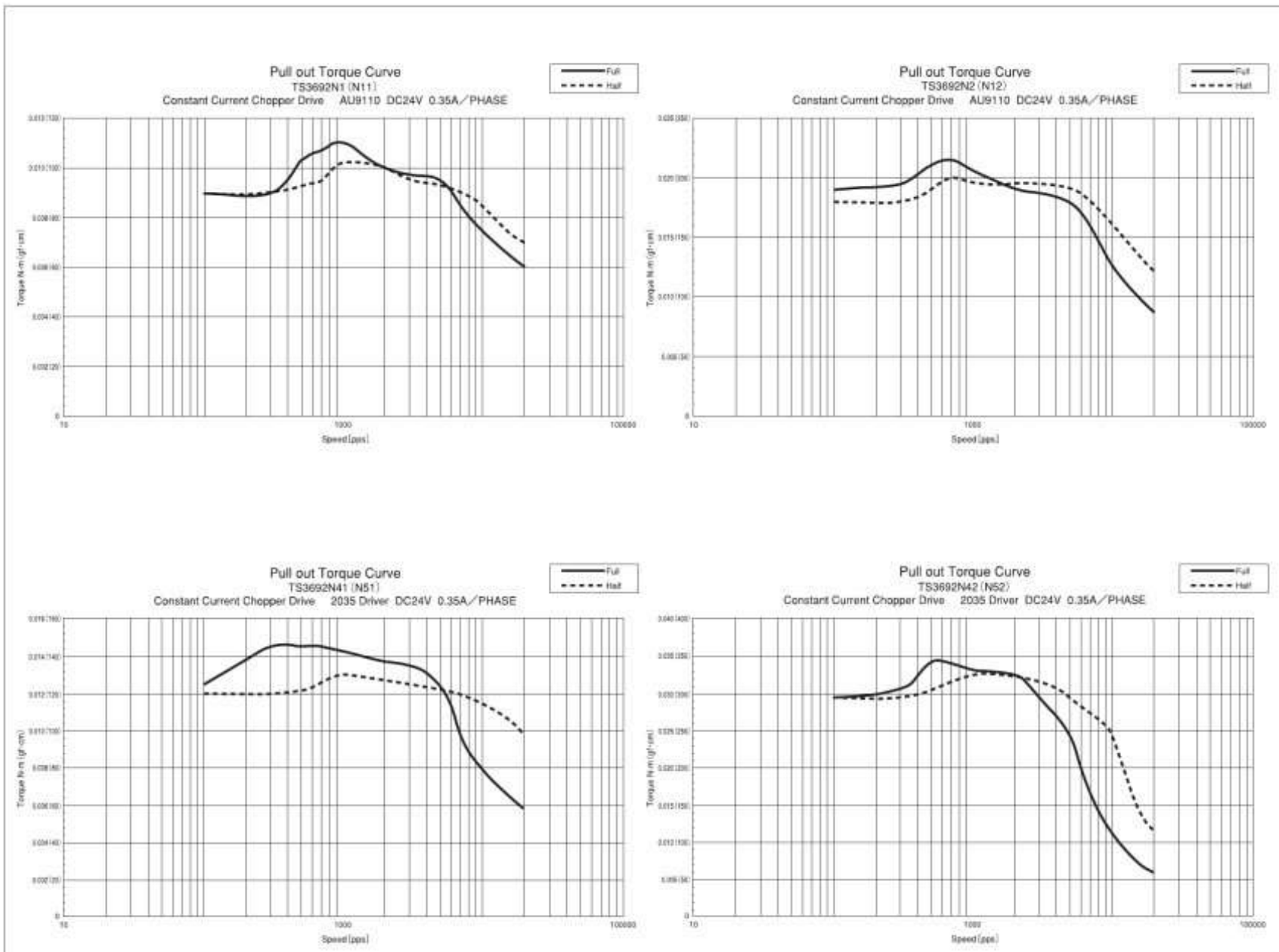
Size of a one-yen coin

Tamagawa TAMAGAWA SEIKI CO.,LTD.

OUTLINE



PULSE RATE vs. TORQUE CHARACTERISTICS（Pull-out Torque）



20mm-Square 5-Phase STEP MOTOR

Compact & Low vibration

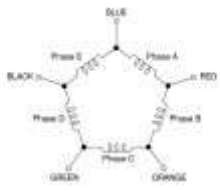
- High torque, high-speed response, compact and lightweight

Motor Type	No. of Stacks	Model Number (Single shaft)	Model Number (Dual shaft)	Step Angle (Deg.)	Rated Voltage V/Phase	Rated Current A/Phase	Winding Resistance Ω/Phase	Holding Torque N·m {kgf·cm}	Motor Length mm	Rotor Inertia g·cm²	Mass kg
5Phase	1	TS3682N1	TS3682N11	0.72	2.1	0.35	6.1	0.015 (0.13)	30	1.9	0.05
		TS3682N41	TS3682N51	0.72	1.1	0.75	1.4	0.015 (0.13)	30	1.9	0.05
	2	TS3682N2	TS3682N12	0.72	4	0.35	11.4	0.024 (0.24)	46.5	4	0.085
		TS3682N42	TS3682N52	0.72	2	0.75	2.6	0.024 (0.24)	46.5	4	0.085

- Shaft runout ——— 0.05 mm T.I.R. Max.
- Radial play ——— 0.03mm Max. at the load 4.9(4N) {0.5kgf}
- Thrust play ——— 0.075mm Max. at the load 9.8(7N) {1.0kgf}
- Insulation class ——— Class B (+130℃, except lead wires)
- Insulation resistance ——— 100MΩ Min. (at DC 500V)
- Dielectric strength ——— AC500V (1 min)
- Operating temp. range ——— −20 ~ +50℃
- Operating humidity range ——— 5%RH ~ 85%RH
- Storage temp. range ——— −40 ~ +70℃
- Permissible temp. rise ——— 80℃ Max.

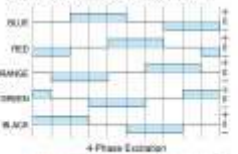
※Note: Do not allow the surface temperature of the motor case to rise above 90℃ during operation.

WIRING DIAGRAM

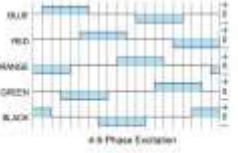


●Excitation Sequence

Excitation proceeds in the following sequence in the CW direction as viewed from the mounting end.



4-Phase Excitation



4/5 Phase Excitation

2-Phase STEP DRIVER

AU9110
for DC Power

Switch between Full-Step, Half-Step

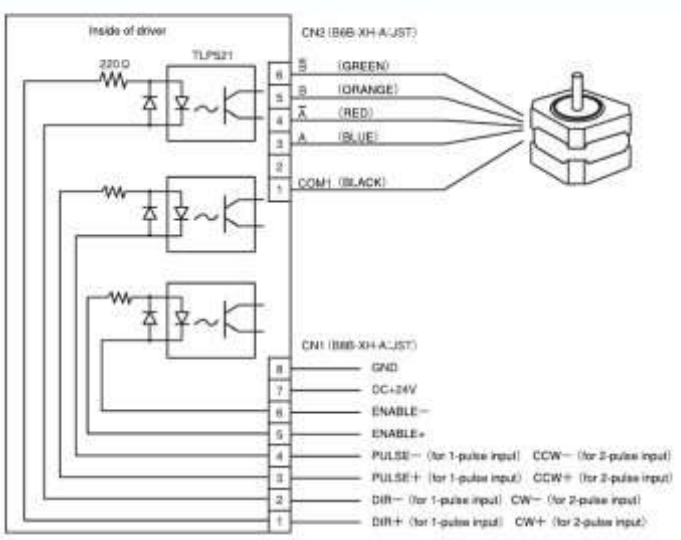
Features:

1. This step driver is geared toward motors with significantly greater torque (1.5 times greater than that of our existing models), and contributes to cost efficiency by making possible smaller, lighter-weight equipment.
2. Thanks to photo-coupler-based input, driver signals are electrically insulated, rendering them immune to power source noise.
3. Driving step angle is 1.8˚ per pulse.
   The dip switch enables changeover between full-step (1.8˚) and half-step (0.9˚) operation.
4. The automatic current-down circuit decreases the flow of redundant current to about half the normal rate when the motor is idle, mitigating temperature increases in the motor and driver. The automatic current-down circuit is turned ON/OFF via the dip switch.
5. The ENABLE function switches the motor drive OFF.
6. As for driver input signals, jumper switch changeover allows a choice between the CCW&CW pulse input mode (2-pluse input) and the pulse rotational direction input mode (1-pulse input).
7. The variable resistance feature enables the current to be set arbitrarily up to 2A/phase.
8. This step driver can be installed either vertically or horizontally.

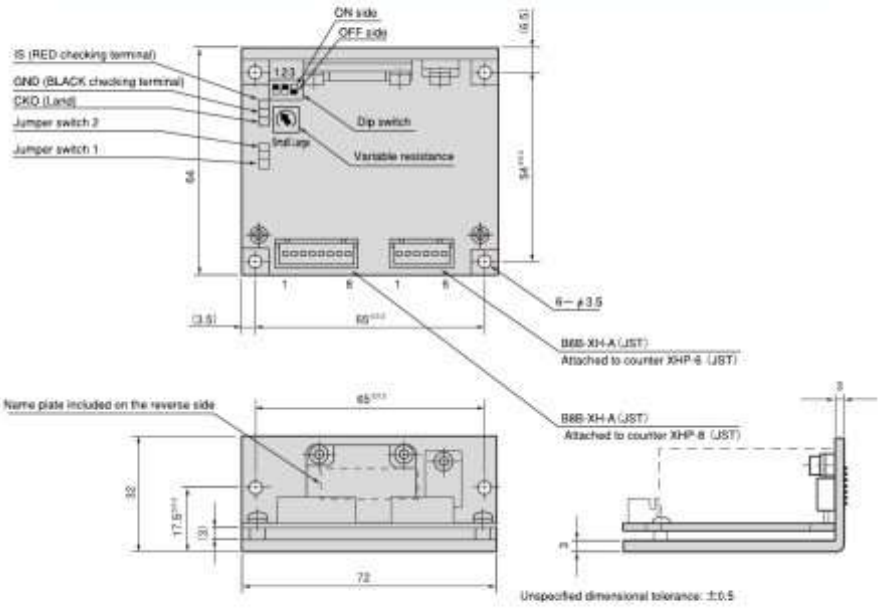
SPECIFICATIONS

Item		Description		
Power source		DC+24V±10%　3A Max. (total current consumed)		
Output power source		2A Max./use　Set by variable resistance (VR) (1A/phase ex factory)		
Excitation method (ex factory 2-phase excitation)		1-phase excitation Dip switch: 2 3 ON OFF	1-2-phase excitation Dip switch: 2 3 ON OFF	2-phase excitation Dip switch: 2 3 ON OFF
Input signal circuit		Photo-coupler TLP521 (Toshiba)　Input resistance 220Ω　Commection diagram (as below) Photo-coupler input current ranging between 10mA and 20mA		
Input signal	1-pulse input PULSE DIR	Jumper switch: 2 / 1	DIR signal's photo-coupler current and rotational direction	
			ON	CW rotation
			OFF	CCW rotation
	2-pulse input CW CCW	Jumper switch: 2 / 1	Note: Make sure that CCW input photo-coupler current is switched OFF during CW input, and CW input photo-coupler current is switched OFF during CCW input. Never simultaneously input pulse to both CW and CCW.	
	ENABLE	Motor is not energized when photo-coupler current is ON. Motor is excited when photo-coupler current is OFF.		
(ex factory 1-pluse input)		Pulse duration of 5μsec. or more; rise/fall time　of 2μsec. or less Operation starts when photo-coupler current is switched from ON to OFF.		
Output signal	CKOUT (CKO)	Land for input pulse checking　TTL output		
	Current-setting terminal (IS)	Terminal for output current checking　0.23 (V) = 1 (A/phase)		
Automatic current-down (ex factory operation setting)		In operation Dip switch: 1 ON OFF　Output current decreases to about 50% normal rate about 1 sec. after first transition of input pulse.	Not in operation Dip switch: 1 ON OFF	
Ambient temp./humidity	In operation	0～40˚C; 90% RH or lower (Note: Guard against dew condensation.)		
	In storage	−10～70˚C; 90% RH or lower (Note: Guard against dew condensation.)		
Accessories		Connector housing XHP-6 (JST) 1 piece, XHP-8 (JST) 1 piece; contact BXH-001T-P0.6 (JST) 14 pieces		

CONNECTION DIAGRAM



OUTLINE



QuinTep

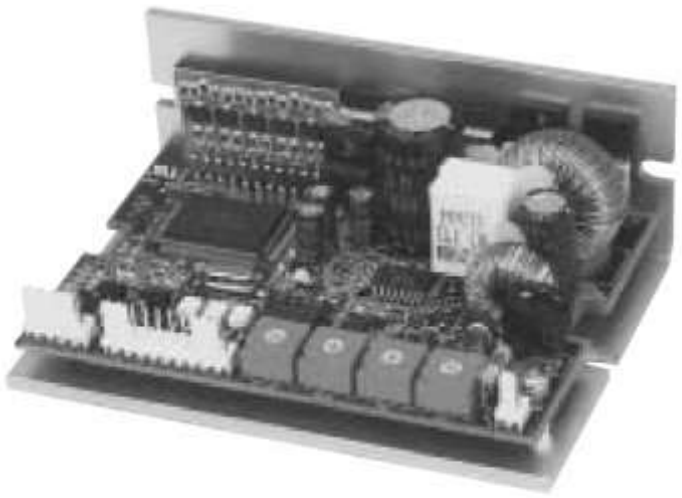
5-Phase STEP DRIVER

AU9116N1

Micro Step; for DC Power

Features:

- Input DC24V
- Output 1.4A/phase Max.
- Automatic current-down values can be set with a digital switch.
- Includes self-testing function
- Basic step angle can be split into 250 Max.



SPECIFICATIONS

Item		Description		
Power source		DC+21.6～26.4V		
Driving current (1.4A/phase ex factory)		Rated current: 1.4A/phase Setting of 0.5～1.4A/phase possible by means of digital switch [RUN].		
Driving system		Bipolar pentagon constant current driving system		
Input signal	Signal name	Explanation of functions	Input resistance	Pulse duration of 0.5μsec. or more; rise/fall time of 1μsec. or less Pulse interval of 0.5μsec. or more; pulse frequency of 500 kpps or less Pulse voltage "1": 4～8V; "0": 0.5～−8V Operation starts when photo-coupler current is switched from OFF (logic 0) to ON (logic 1). CCW rotation with CCW input of "0" in 1-clock system
	CW+ CW−	1 Clock type pulse signal input 2 Clock type input of normal rotation signal	300Ω	
	CCW+ CCW−	1 Clock type input of rotational direction instruction 2 Clock type input of reverse rotation signal	300Ω	
	H.O+ H.O−	Control signal for motor excitation OFF "1" for motor excitation OFF	390Ω	
	D.S+ D.S−	Selection signal for micro step splitting "0" to select M1, and "1" to select M2	390Ω	
Output signal	Signal name	Explanation of functions		Switched ON while excitation sequence is [0]. For motors with a step angle of 0.72°, output is made for every 7.2°. Note that output may not be possible if the step angle is changed after power has been supplied.
	Z.P+	Origin excitation output signal		
	Z.P−	Switched ON while origin is being excited		

Setting of micro step splitting (ex factory setting of M1: 5, M2: 0)

For micro step driving of one type only, set the number of splits using the digital SW M1.
For micro step driving of two types (i.e. when changing speeds for going and returning in reciprocating motion), set respective numbers of splits using the digital SW M1 and M2.

Setting No.	0	1	2	3	4	5	6	7	8	9
No. of splits	1	2	4	5	8	10	20	40	80	16
					A	B	C	D	E	F
					25	50	100	125	200	250

Note 1

When the setting of micro step splitting No. is 0.1, 1/16-split low-frequency driving takes place inside.

Setting of driving power source (ex factory setting: C)

Use the digital SW RUN to set current for the motor in motion by choosing an appropriate current from the following table.

Setting No.	0	1	2	3	4	5	6	7	8	9
Current (A)	0.50	0.58	0.66	0.75	0.81	0.88	0.96	1.03	1.13	1.18
					A	B	C	D	E	F
					1.25	1.30	1.40	1.47	1.53	1.60

Setting of automatic current-down function (ex factory setting: 5)

Use the digital SW STOP to set current for the motor when it is idle by choosing an appropriate current from the following table.
These values are percentages relative to RUN current. The current begins to decrease approx. 150ms after the final pulse input has been made.

Setting No.	0	1	2	3	4	5	6	7	8	9
%	27	31	36	40	45	50	54	58	62	66
					A	B	C	D	E	F
					70	74	78	82	84	90

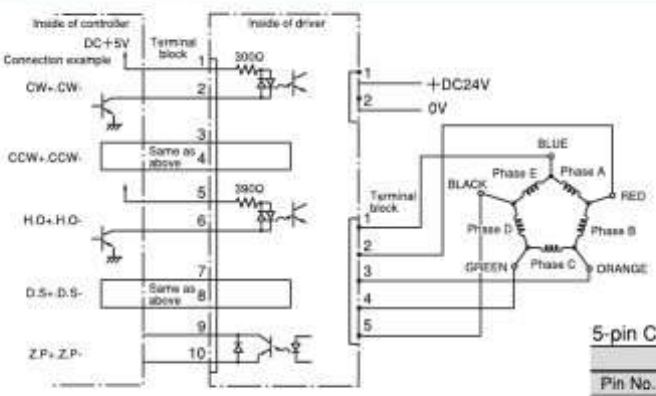
Setting of dip switch (ex factory setting: ALL OFF)

No.	Indicator	Function	ON	OFF
1	TS	Self-testing function	Rotates at approx. 60pps	Normal motion
2	CK	Clock system changeover	1-clock system	2-clock system
3	CD	Automatic current-down	No current-down occurs	Current-down occurs
4	OP	Cannot be used	Switched OFF when in use	

Note 2

Ambient temp./humidity in operation	0～40°C ; 90% RH or lower (Note: Guard against dew condensation.)
Ambient temp./humidity in storage	−10～70°C ; 90% RH or lower (Note: Guard against dew condensation.)
Mass	Approx. 200g

CONNECTION DIAGRAM



Accessories:
Connector housings Made by MOREX Inc.
5102-02, 5102-05, 5102-10 --- one piece each
Contact pin Made by MOREX Inc. 5103 19 pieces

10-pin Connector (5045-10A) Pin Assignment

Pin No.	Signal name
1	CW+
2	CW−
3	CCW+
4	CCW−
5	H.O+
6	H.O−
7	D.S+
8	D.S−
9	Z.P+
10	Z.P−

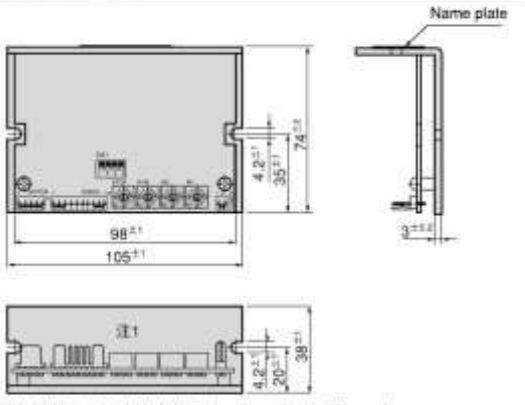
5-pin Connector (5045-05A) Pin Assignment

Motor's Lead Wire		
Pin No.	For 5-wire lead	For 10-wirelead
1	BLUE	BLUE+BLACK
2	RED	RED+BROWN
3	ORANGE	PURPLE+ORANGE
4	GREEN	YELLOW+GREEN
5	BLACK	WHITE+GRAY

2-pin Connector (5045-02A) Pin Assignment

Pin No.	Explanation of functions
1	DC24V power source
2	0V

OUTLINE



Note 1: Keep the height of electronic parts packaging 38mm or less.

Note 1: Micro step angle for 1 step = Basic step angle / No. of splits
Note 2: Approx. 60 pps is generated inside, regardless of splits setting; CCW rotation when the dip switch is ON, and CW rotation when the dip switch is OFF.

2-Phase STEP BIPOLAR DRIVER

2035 O
for DC Power

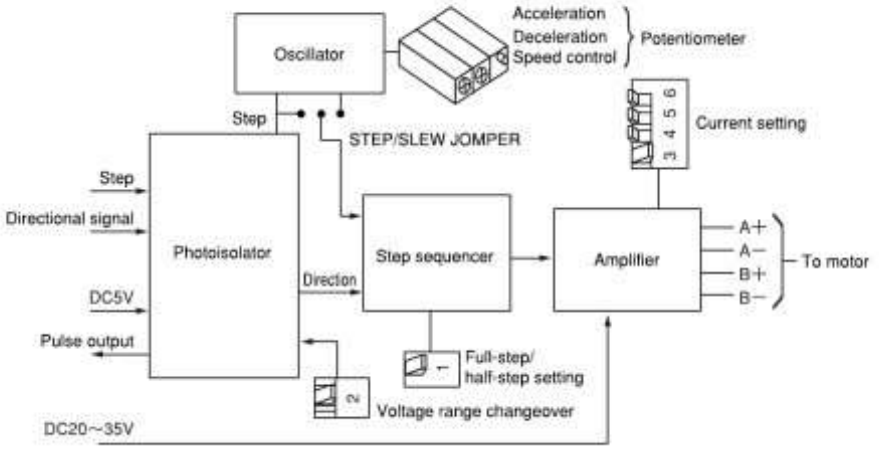
Features:

1. Geared for a wide range of inputs from DC 20 to 35V.
2. Can drive step motors ranging in size from Type 14 to Type 23. Depending on the value of the current, low-speed driving of Type 34 motor is also possible.
3. The built-in amplifier is based on the pulse duration modulation switching system（PMM system）.
4. The setting switch allows phase current to be chosen in any of 16 steps ranging from 0.125 to 2.0A.
5. This driver is protected from noise because the step driving power source and input signals are optically separated.
6. A special switch is provided for changeover between full-step and half-step operation.
7. The automatic current-down mechanism enables current to be automatically reduced by 50%.
   （The current-down function can be suspended, the dip switch having been set on "BYPASS".）
8. Includes an acceleration/deceleration and speed control pulse oscillator.
9. Speed ranges of 10～1,200pps and 100～12,000 have been incorporated.
10. Includes plug-type screw terminal connectors.
11. Includes an aluminum heat radiator plate and a protective structure with a steel cover.

SPECIFICATIONS

Item		Description
Driving capacity（current/phase）		0.125～2.0A （16-step setting with switch）
Automatic current-down function		50%
Power input	For motor driving	20～35VDC
	For logic circuit	5VDC 10mA（photo-coupler input）
Half-step/full step selection		Changeover by switch
Pulse oscillator		Included
Noise prevention		Photo-coupler
Protection against overheating		Output power supply automatically switched OFF
Heat sink		Option

CONNECTION DIAGRAM



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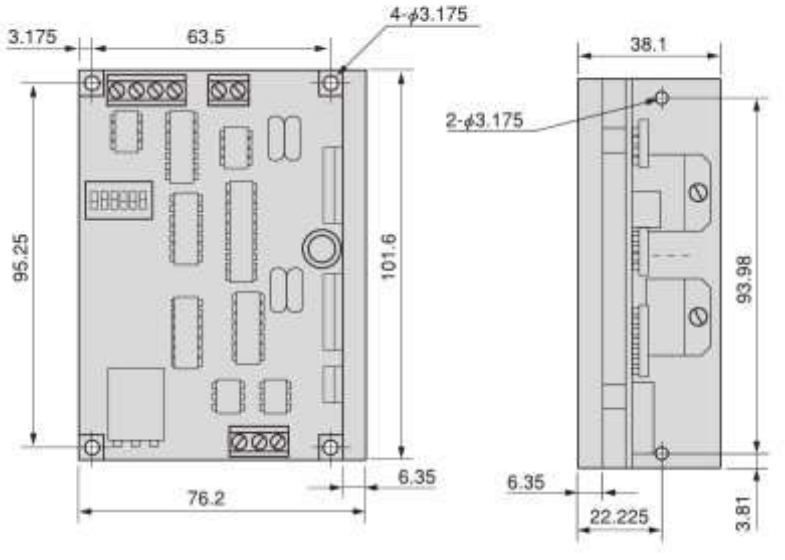


QuinTep

5-Phase STEP DRIVER

AU9226N1
for DC Power

Features:

- Input DC24V (DC40V Max.), 0.35A/phase Max.
- Excitation-based full-step/half-step driving
- Input signal changeover between 1-pulse and 2-pulse systems
- Includes automatic current-down function
- Reasonably priced
- Compact and lightweight

SPECIFICATIONS

Item		Description	
Power source		DC+20~40V 0.8A Max. (total current consumed)	
Output current (0.35A/phase ex factory)		・0.12~0.35A/phase ・Voltage corresponding to output power is applied between CP+ and CP−. (3.5 [V] =0.35 [A/phase]) ・The variable resistance RUN allows current to be set arbitrarily within a range of 0.12~0.35A/phase.	
Excitation system (4-5-phase excitation ex factory)		(Full step: 0.72°/step) 4-phase excitation Dip switch 1 ON / OFF	(Half step: 0.36°/step) 4-5-phase excitation Dip switch 1 ON / OFF
Input signal circuit		Photo-coupler, input resistance 470Ω (SEE CONNECTION DIAGRAM)	
Input signal	1-pulse input PULSE DIR	Dip switch 2 ON / OFF	DIR signal's photo-coupler current and rotational direction ON: CW rotation OFF: CCW rotation
	2-pulse input CW CCW	Dip switch 2 ON / OFF	Note: Make sure that photo-coupler current for non-pulse input is switched OFF. Never simultaneously input pulse to both CW and CCW.
	ENABLE	Motor is not energized when photo-coupler current is ON. Motor is excited when photo-coupler current is OFF.	
(ex factory 2-pluse input)		Pulse duration of 5μsec. or more; rise time of 1μsec. or less Pulse interval of 5μsec. or more; pulse frequency of 70 kpps or less Pulse voltage "1" : 4~8V; "0" : 0.5~−8V Operation starts when photo-coupler current is switched from OFF to ON.	
Automatic current-down function		When not in operation, output current decreases by about 65% compared to the normal operating rate.	
Ambient temp./humidity in operation		0°~40°C ; 85% RH or lower (Note: Guard against dew condensation.)	
Ambient temp./humidity in storage		0°~70°C ; 85% RH or lower (Note: Guard against dew condensation.)	

CONNECTION DIAGRAM

CN1 Pin Assignment

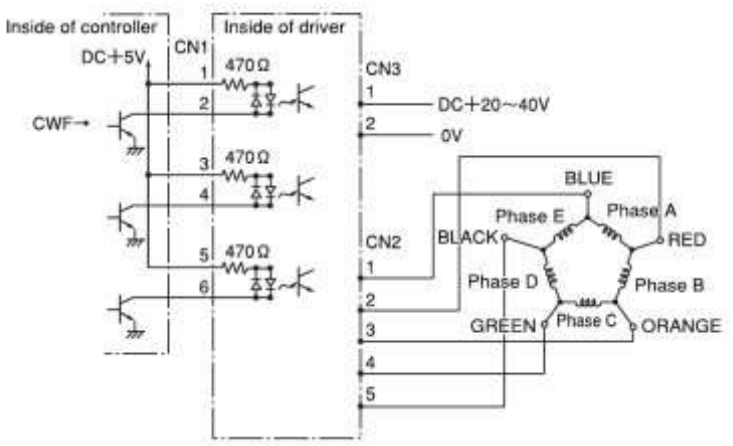
Pin No.	Name	
	For 1-pulse input	For 2-pulse input
1	PULSE+	CW+
2	PULSE−	CW−
3	DIR+	CCW+
4	DIR−	CCW−
5	ENABLE+	
6	ENABLE−	

CN2 Pin Assignment

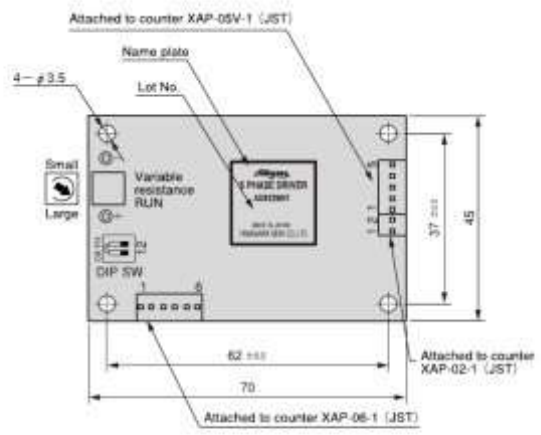
Pin No.	Name
1	Motor wiring BLUE See diagram below
2	Motor wiring RED See diagram below
3	Motor wiring ORANGE See diagram below
4	Motor wiring GREEN See diagram below
5	Motor wiring BLACK See diagram below

CN3 Pin Assignment

Pin No.	Name
1	DC+20~40V
2	0V



OUTLINE



※Unspecified dimensional tolerance: ±0.5

20mm-Square 2-Phase STEP MOTOR

The Smallest 2-Phase Step Motor Available on the Market

- High torque, high-speed response, compact and lightweight

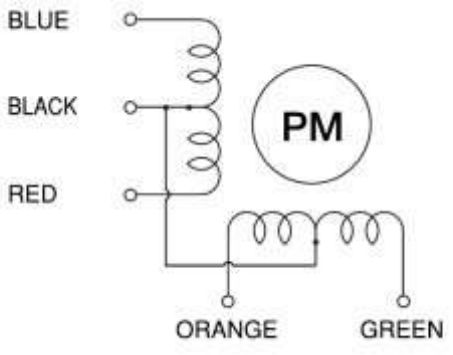
Motor Type	No. of Stacks	Model Number (Single shaft)	Model Number (Dual shaft)	Step Angle (Deg.)	Wiring	Rated Voltage V/Phase	Rated Current A/Phase	Winding Resistance Ω/Phase	Inductance mH/Phase	Holding Torque N·m (kgf·cm)	Motor Length mm	Rotor Inertia 10^{-7}kg·m²	Mass kg
2-Phase	1	TS3692N1	TS3692N11	1.8	(Unipolar)	3.5	0.35	10	2.4	0.013 (0.13)	30	1.9	0.05
		TS3692N41	TS3692N51	1.8	(Bipolar)	3	0.35	8.5	3.4	0.017 (0.17)	30	1.9	0.05
	2	TS3692N2	TS3692N12	1.8	(Unipolar)	7	0.35	20	4.6	0.024 (0.24)	46.5	4	0.085
		TS3692N42	TS3692N52	1.8	(Bipolar)	5.6	0.35	16	7	0.032 (0.32)	46.5	4	0.085

- Shaft runout ——— 0.05 mm T.I.R. Max
- Radial play ——— 0.03mm Max. at the load 4.904N (0.5kgf)
- Thrust play ——— 0.075mm Max. at the load 9.807N (1.0kgf)
- Insulation class ——— Class B (+130℃, except lead wires)
- Insulation resistance — 100MΩ Min. (at DC 500V)
- Dielectric strength ——— AC500V (1min)
- Operating temp, range ——— −20~+50℃
- Operating humidity range —— 5%~95%RH
- Storage temp, range ——— −40~+70℃
- Permissible temp, rise ——— 80°C Max.

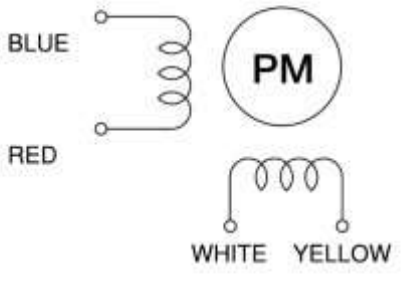
※Note: Do not allow the surface temperature of the motor case to rise above 90℃ during operation.

WIRING DIAGRAM

UNIPOLAR



BIPOLAR



Excitation Sequence

Excitation proceeds in the following sequence in the CW direction as viewed from the mounting end.

Step	0	1	2	3	0
BLUE	ON			ON	ON
ORANGE	ON	ON			ON
RED		ON	ON		
GREEN			ON	ON	
BLACK	+V	+V	+V	+V	+V

2-Phase Excitation

Step	0	1	2	3	0
RED	+	−	−	+	+
YELLOW	+	+	−	−	+
BLUE	−	+	+	−	−
WHITE	−	−	+	+	−