

RoHS RoHS-Compliant

2-Phase Stepping Motor and Driver Package

RBK Series

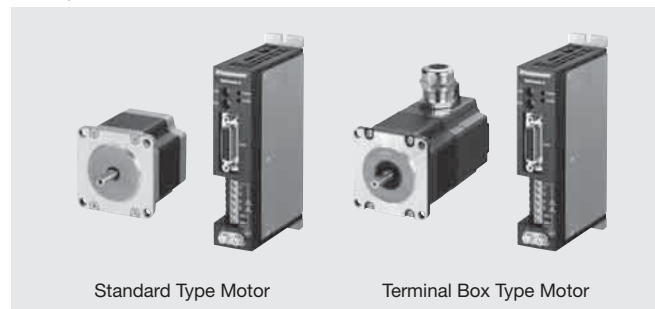
● Additional Information ●
 Technical reference → Page F-1
 Safety standards → Page G-2

The **RBK Series** is a motor and driver package consisting of a 2-phase stepping motor and DC input microstep driver.

Includes Oriental Motor's proprietary Smooth Drive Function to easily achieve low vibration operation.

 (Terminal box type motor only)

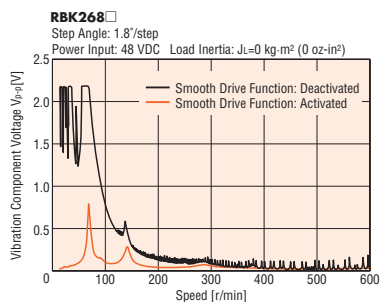
● List of safety standard approved products (Model, Standards, File No., Certification Body)
 → Page G-11



Features

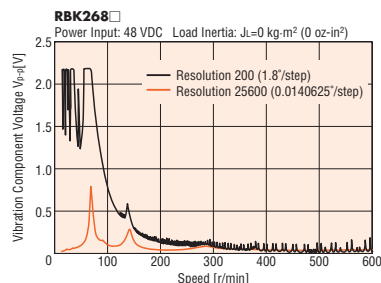
● Smooth Drive Function

The Smooth Drive Function is a function that automatically controls the motor's microstep drive operation at the same travel and speed as in the full-step mode, without the operator having to change the speed settings of the driver's pulse input. It enables low vibration operation available with the microstep drive to be achieved with the flick of a switch.



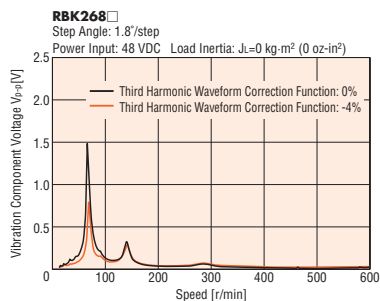
● Microstep Function

The microstep driver electronically divides the basic step angle of the motor (1.8°/step) by up to 128 without the use of a reduction mechanism or other mechanical element. 16 different resolutions are available. The available range of resolution settings is 200 (1.8°/step) to 25600 (0.0140625°/step). The step angle can be easily set using the built-in switches on the driver. This function enables low vibration and low noise operation.



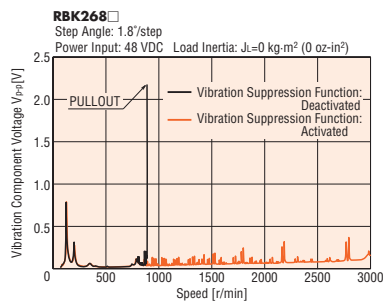
● Third Harmonic Waveform Correction Function

This function corrects motor drive current waveforms. It provides improved angle accuracy and reduced vibration.



● Vibration Suppression Function

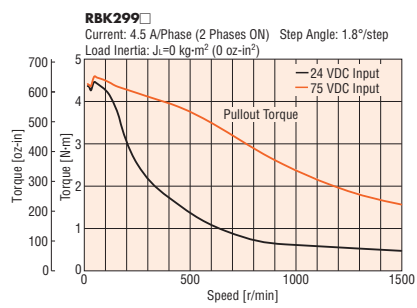
This function improves vibrations in the medium speed range of stepping motors. It enables reduced risk of missteps due to vibrations.



● **Wide Voltage Range Driver**

The **RBK** Series utilizes a constant current driver with a wide voltage range of 20 to 75 VDC and up to 4.5 A/phase effective value (6.3 A/phase peak value). This enables it to support a wide range of power sources.

Comparison of Speed – Torque Characteristics



● Raising the power supply voltage enables increased torque during high speed operation.

● **Conforming to Major Safety Standards***

(Terminal box type motor only)

The **RBK** Series is UL recognized and CSA certified. It also bears the CE Mark as a proof of conformance to the Low Voltage Directives.

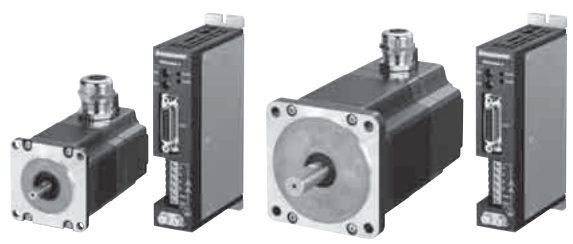
* The **RBK26**□**A(B)** and the **RBK29**□**A(B)A** are currently applying for UL/CSA and EN Standards certification.

● **RoHS** RoHS-Compliant

The **RBK** Series conforms to the RoHS Directive that prohibits the use of six chemical substances including lead and cadmium.

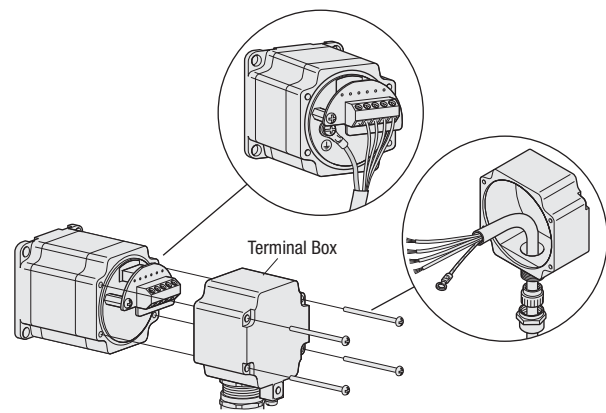
● Details of RoHS Directive → Page G-38

● The terminal box type motor conforms to the IP65 standard of ingress protection against dust and water.



◇ **Terminal-Block Connection Design**

The motor can be wired directly from its terminal block.



Introduction

AC Input *QSTEP AS*

DC Input *QSTEP ASC*

5-Phase Microstep *RK*

AC Input 2-Phase Full/Half *UMK*

5-Phase Microstep *CMK*

DC Input 2-Phase Microstep *RBK*

2-Phase Microstep *CMK*

Without Encoder 2-Phase *PK/PV*

With Encoder 2-Phase *PK*

EMP400

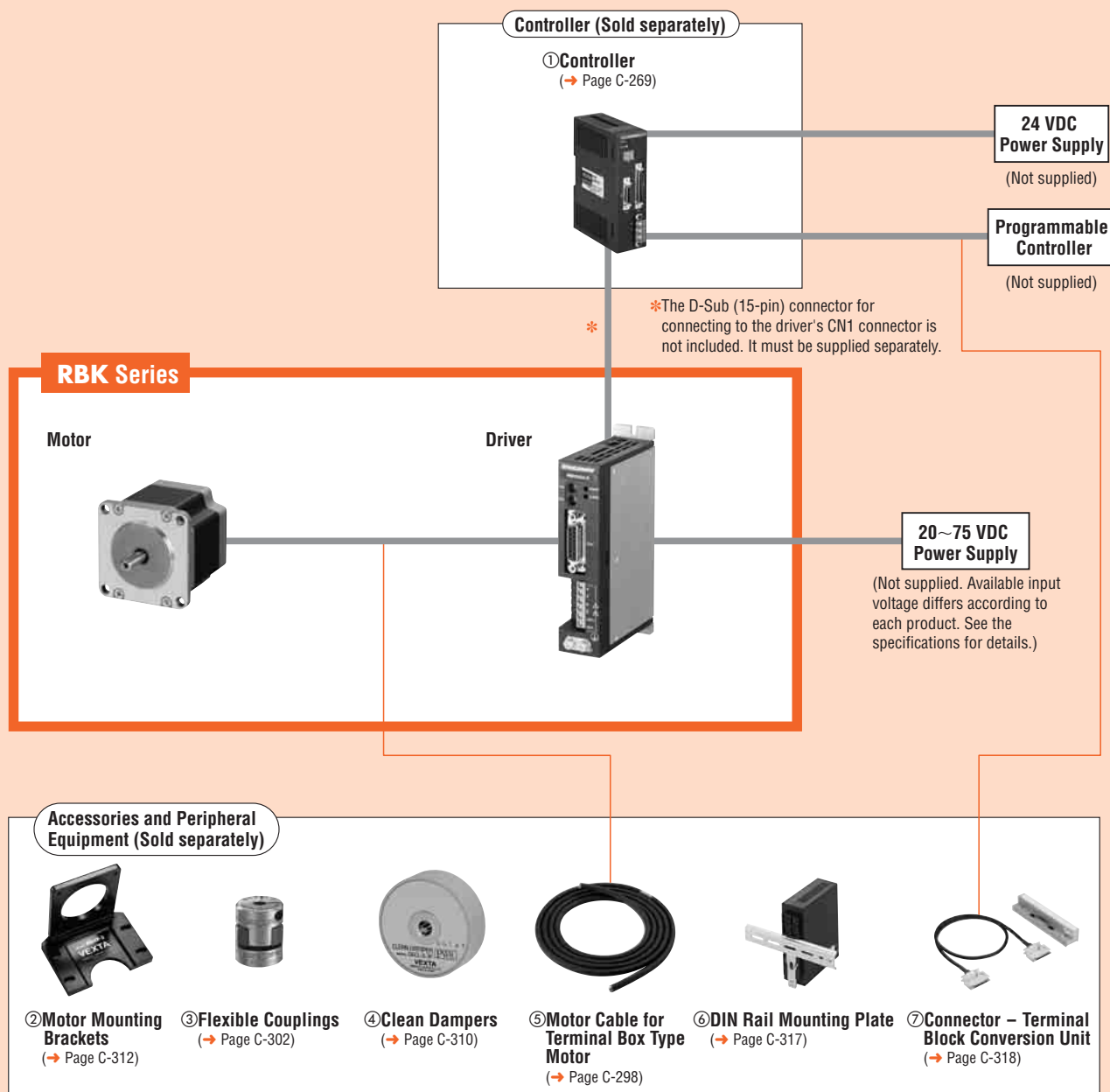
Controllers *SG8030J*

Accessories

Installation

System Configuration

An example of a single-axis system configuration with the **EMP400** Series controller.



No.	Product Name	Overview	Page
①	Controller	This controller outputs pulse commands that determine the rotation amount and rotating speed.	C-269
②	Motor Mounting Brackets	Dedicated mounting bracket for the motor.	C-312
③	Flexible Couplings	Coupling that connects the motor shaft to the driven shaft.	C-302
④	Clean Dampers	Dedicated damper for suppressing stepping motor vibration.	C-310
⑤	Motor Cable for Terminal Box Type Motor	A cable for connection between the terminal box type motor and driver (with protective earth wire).	C-298
⑥	DIN Rail Mounting Plate	Use this plate (PADPO1) when installing the driver to a DIN rail.	C-317
⑦	Connector - Terminal Block Conversion Unit	Set of terminal block and cable for connecting the EMP Series controller and host controller [1 m (3.3 ft.)].	C-318

● Example of System Configuration

(Sold separately)

RBK Series	+	Controller	Motor Mounting Bracket	Flexible Coupling	Clean Damper	DIN Rail Mounting Plate	Connector - Terminal Block Conversion Unit [1m (3.3 ft.)]
RBK266B		EMP401-1	PAL2P-2	MCS2005F04	D6CL-6.3F	PADPO1	CC50T1

● The system configuration shown above is an example. Other combinations are available.

Product Number Code

Standard Type Motor

RBK 2 9 6 A A

① ② ③ ④ ⑤ ⑥

Terminal Box Type Motor

RBK 2 6 6 T

① ② ③ ④ ⑦

①	Series	RBK: RBK Series
②	2: 2-Phase	
③	Motor Frame Size	6: 56.4 mm (2.22 in.) 9: 85 mm (3.35 in.)
④	Motor Case Length	
⑤	Motor Shaft Type	A: Single Shaft B: Double Shaft
⑥	U.S.A. Version	
⑦	Motor Classification	T: Terminal Box Type

Product Line

Standard Type Motor

Model (Single shaft)	Model (Double shaft)
RBK264A	RBK264B
RBK266A	RBK266B
RBK268A	RBK268B
RBK296AA	RBK296BA
RBK299AA	RBK299BA
RBK2913AA	RBK2913BA

Terminal Box Type Motor

Model (Single Shaft)
RBK264T
RBK266T
RBK268T
RBK296T
RBK299T
RBK2913T

The following items are included in each product.

Motor, Driver, Operating Manual

- The cable for connecting the terminal box type motor and driver, and the D-Sub (15-pin) connector for connecting to the driver's CN1 connector are not included. They must be supplied separately.

Introduction

AC Input
QSTEP
ASDC Input
QSTEP
ASG5-Phase
Microstep
AC Input
RK2-Phase
Full/Half
UMK5-Phase
Microstep
CRK2-Phase
Microstep
DC Input
RBK2-Phase
Microstep
CMK2-Phase
PK/PV
Without Encoder2-Phase
PK
With EncoderEMP400
5G8030J
Controllers

Accessories

Installation

Standard Type Motor Motor Frame Size 56.4 mm (2.22 in.)

Specifications RoHS

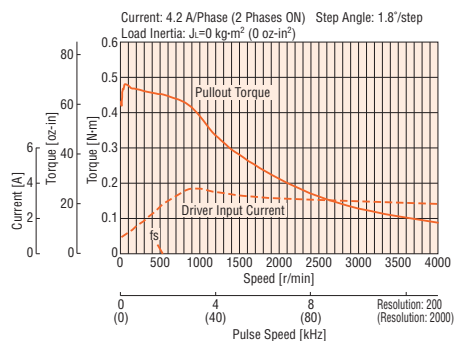
Model	Single Shaft		RBK264A		RBK266A		RBK268A	
	Double Shaft		RBK264B		RBK266B		RBK268B	
Maximum Holding Torque	N·m (oz·in)		0.48 (68)		1.17 (166)		1.75 (240)	
Rotor Inertia J	kg·m ² (oz·in ²)		120×10 ⁻⁷ (0.66)		300×10 ⁻⁷ (1.64)		480×10 ⁻⁷ (2.6)	
Rated Current	A/Phase				4.2			
Basic Step Angle					1.8°			
Power Source					20~75 VDC 4.9 A			
Excitation Mode					Microstep			
Mass	Motor	kg (lb.)	0.45 (0.99)		0.7 (1.54)		1 (2.2)	
	Driver	kg (lb.)			0.35 (0.77)			
Dimension No.	Motor				1			
	Driver				5			

How to read specifications table → Page C-11

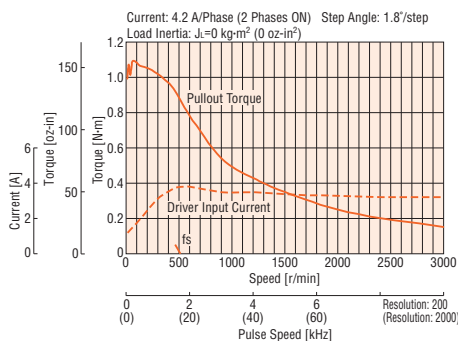
Speed – Torque Characteristics How to read speed – torque characteristics → Page C-12

● 24 VDC Input

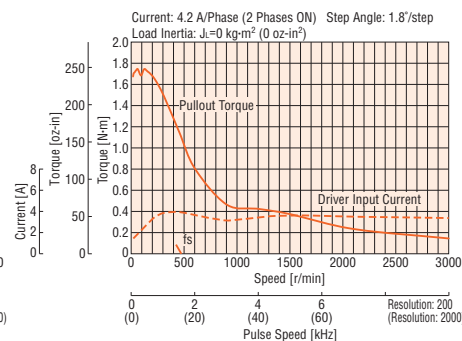
RBK264A/RBK264B



RBK266A/RBK266B

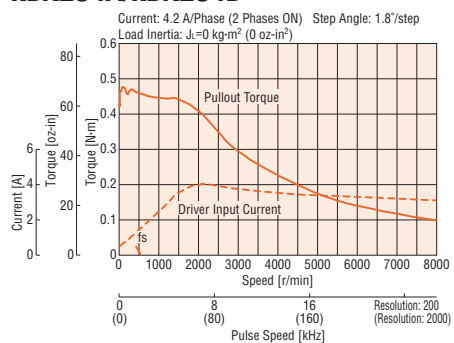


RBK268A/RBK268B

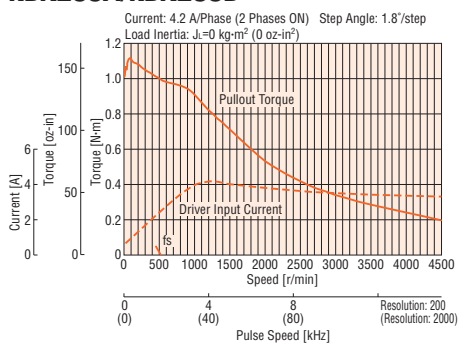


● 48 VDC Input

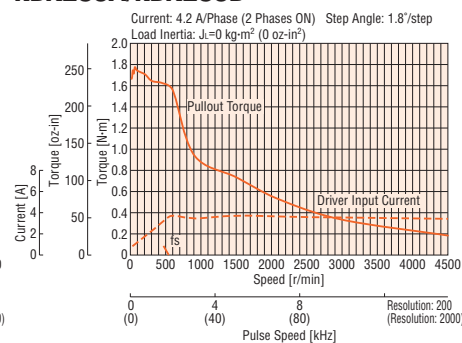
RBK264A/RBK264B



RBK266A/RBK266B

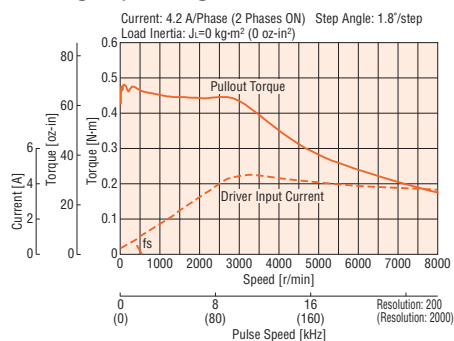


RBK268A/RBK268B

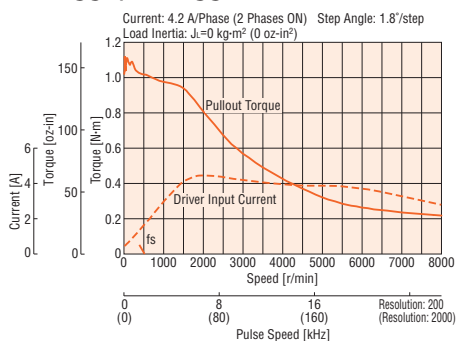


● 75 VDC Input

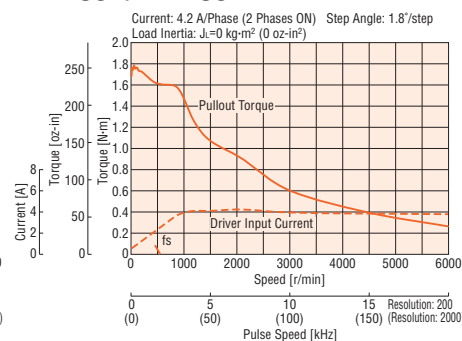
RBK264A/RBK264B



RBK266A/RBK266B



RBK268A/RBK268B



● The pulse input circuit responds to 250 kHz with a pulse duty of 50%.

Notes:

- Pay attention to heat dissipation from motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F).
- The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

Standard Type Motor Motor Frame Size 85 mm (3.35 in.)

Specifications (RoHS)

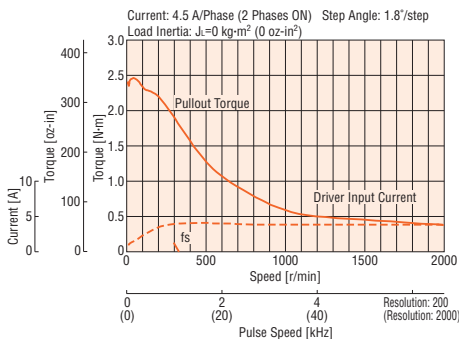
Model	Single Shaft	RBK296AA	RBK299AA	RBK2913AA
	Double Shaft	RBK296BA	RBK299BA	RBK2913BA
Maximum Holding Torque	N·m (oz·in)	2.2 (310)	4.4 (620)	6.6 (930)
Rotor Inertia J	kg·m ² (oz·in ²)	1400×10 ⁻⁷ (7.7)	2700×10 ⁻⁷ (14.8)	4000×10 ⁻⁷ (22)
Rated Current	A/Phase	4.5		
Basic Step Angle	1.8°			
Power Source	20~75 VDC 5.2 A			
Excitation Mode	Microstep			
Mass	Motor	kg (lb.)	1.7 (3.7)	2.8 (6.2)
	Driver	kg (lb.)	0.35 (0.77)	
Dimension No.	Motor	[2]		
	Driver	[5]		

How to read specifications table → Page C-11

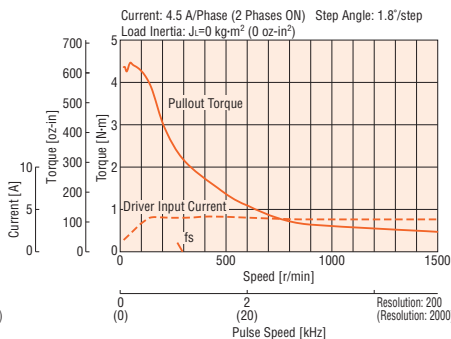
Speed – Torque Characteristics How to read speed – torque characteristics → Page C-12

● 24 VDC Input

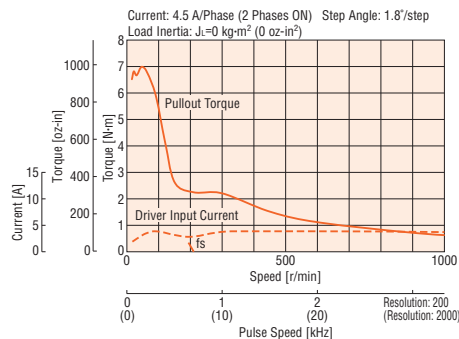
RBK296AA/RBK296BA



RBK299AA/RBK299BA

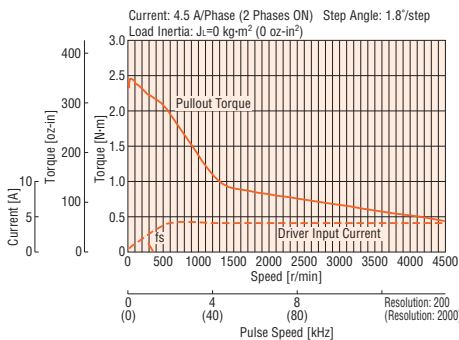


RBK2913AA/RBK2913BA

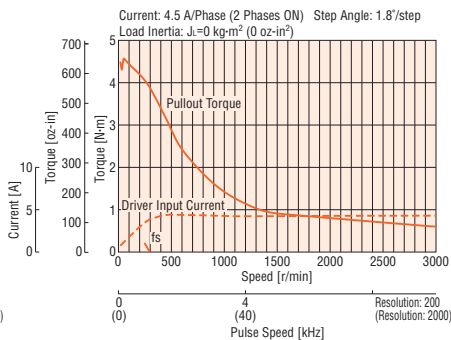


● 48 VDC Input

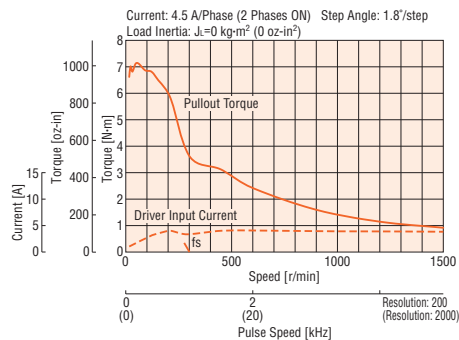
RBK296AA/RBK296BA



RBK299AA/RBK299BA

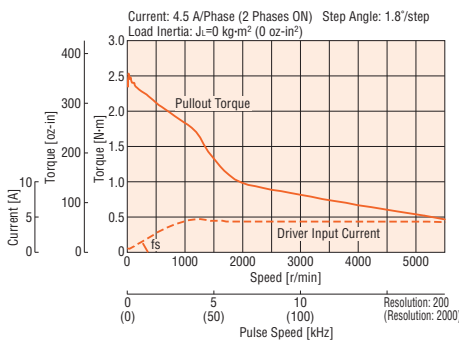


RBK2913AA/RBK2913BA

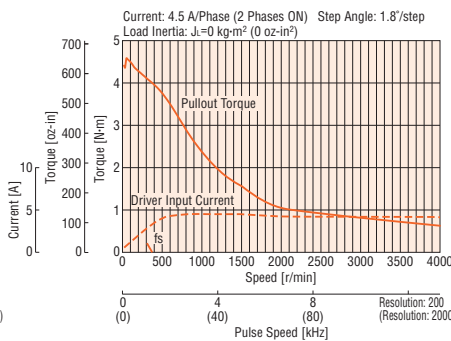


● 75 VDC Input

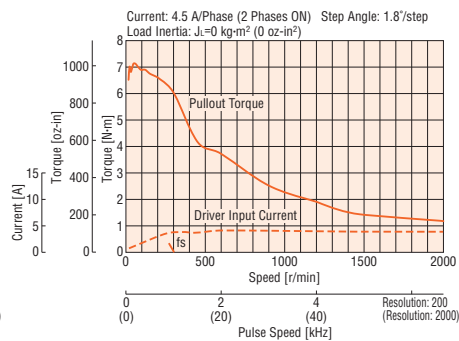
RBK296AA/RBK296BA



RBK299AA/RBK299BA



RBK2913AA/RBK2913BA



● The pulse input circuit responds to 250 kHz with a pulse duty of 50%.

Notes:

- Pay attention to heat dissipation from motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F).
- The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

Terminal Box Type Motor Motor Frame Size 56.4 mm (2.22 in.)

Specifications RoHS



Model	Single Shaft	RBK264T	RBK266T	RBK268T
Maximum Holding Torque	N·m (oz·in)	0.48 (68)	1.17 (166)	1.75 (240)
Rotor Inertia J	kg·m ² (oz·in ²)	120×10 ⁻⁷ (0.66)	300×10 ⁻⁷ (1.64)	480×10 ⁻⁷ (2.6)
Rated Current	A/Phase	4.2		
Basic Step Angle		1.8°		
Power Source		20~75 VDC 4.9 A		
Excitation Mode		Microstep		
Degree of Protection		Motor: IP65* Driver: IP20		
Mass	Motor kg (lb.)	0.6 (1.32)	0.9 (1.98)	1.2 (2.6)
	Driver kg (lb.)	0.35 (0.77)		
Dimension No.	Motor	[3]		
	Driver	[5]		

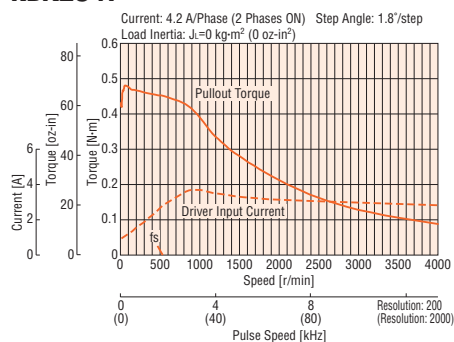
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* Excluding the gap between the shaft and the flange.

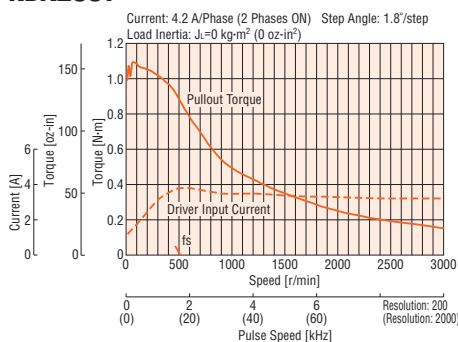
Speed – Torque Characteristics How to read speed – torque characteristics → Page C-12

● 24 VDC Input

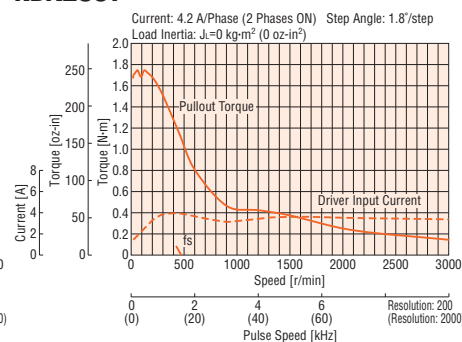
RBK264T



RBK266T

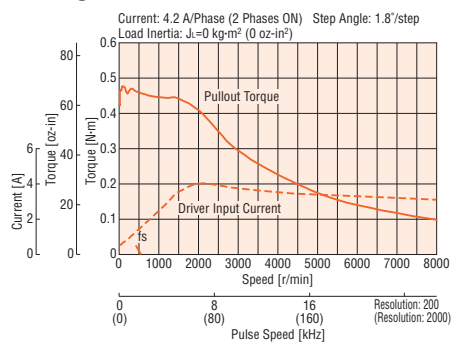


RBK268T

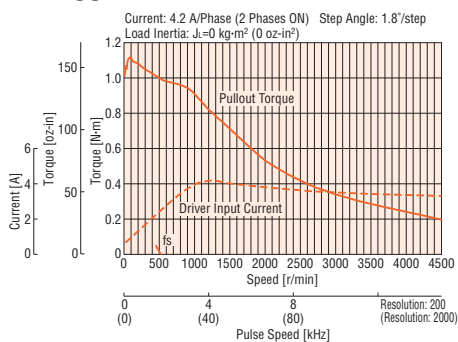


● 48 VDC Input

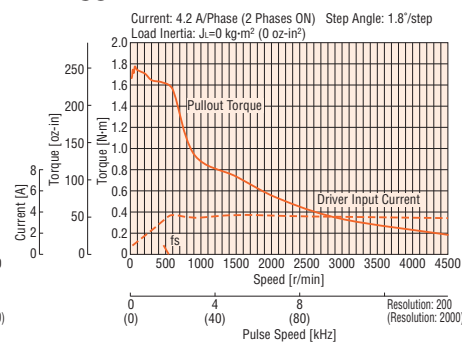
RBK264T



RBK266T

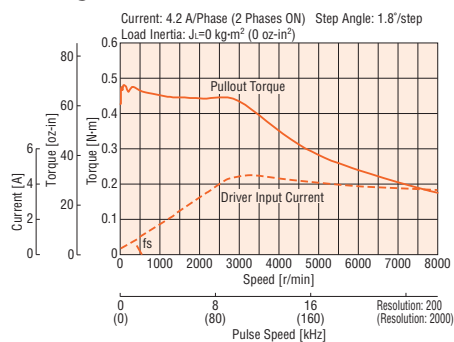


RBK268T

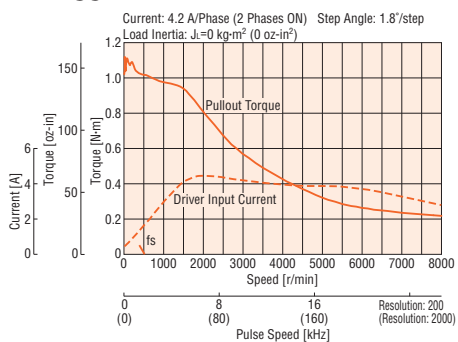


● 75 VDC Input

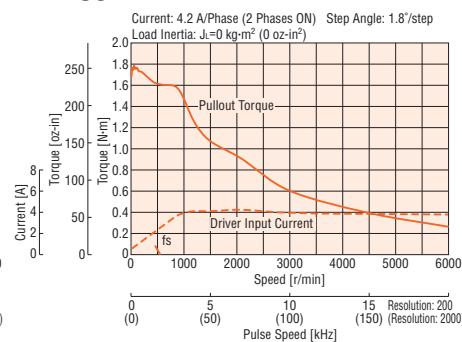
RBK264T



RBK266T



RBK268T



● The pulse input circuit responds to 250 kHz with a pulse duty of 50%.

Notes:

- Pay attention to heat dissipation from motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F). [Under 75°C (167°F) is required to comply with UL or CSA Standards as the motor is recognized as insulation Class A.]
- The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

Terminal Box Type Motor Motor Frame Size 85 mm (3.35 in.)

Specifications RoHS



Model	Single Shaft	RBK296T	RBK299T	RBK2913T
Maximum Holding Torque	N·m (oz·in)	2.2 (310)	4.4 (620)	6.6 (930)
Rotor Inertia J	kg·m ² (oz·in ²)	1400×10 ⁻⁷ (7.7)	2700×10 ⁻⁷ (14.8)	4000×10 ⁻⁷ (22)
Rated Current	A/Phase	4.5		
Basic Step Angle		1.8°		
Power Source		20~75 VDC 5.2 A		
Excitation Mode		Microstep		
Degree of Protection		Motor: IP65* Driver: IP20		
Mass	Motor kg (lb.)	2.1 (4.6)	3.2 (7)	4.3 (9.5)
	Driver kg (lb.)	0.35 (0.77)		
Dimension No.	Motor	[4]		
	Driver	[5]		

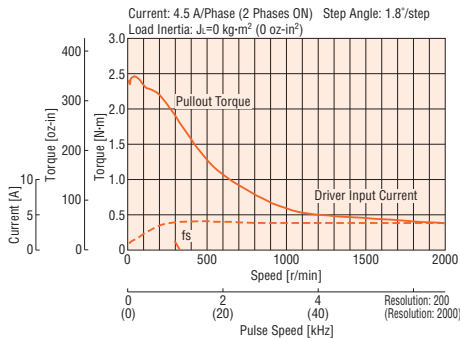
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*Excluding the gap between the shaft and the flange.

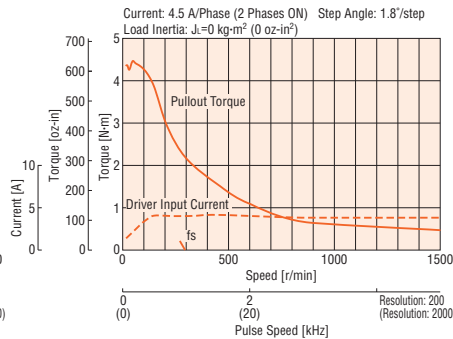
Speed – Torque Characteristics How to read speed – torque characteristics → Page C-12

● 24 VDC Input

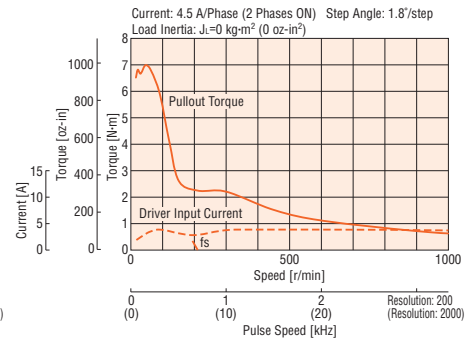
RBK296T



RBK299T

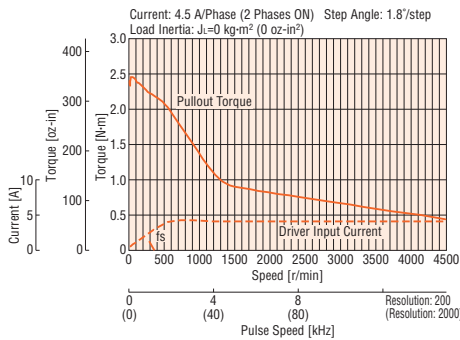


RBK2913T

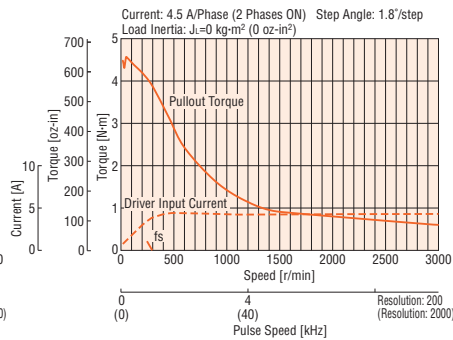


● 48 VDC Input

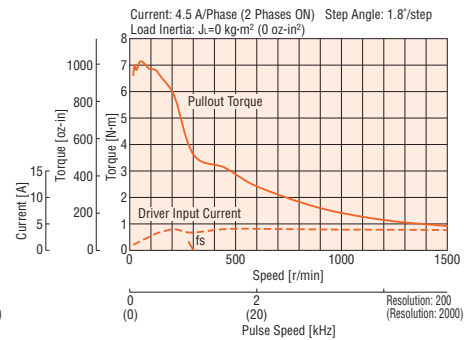
RBK296T



RBK299T

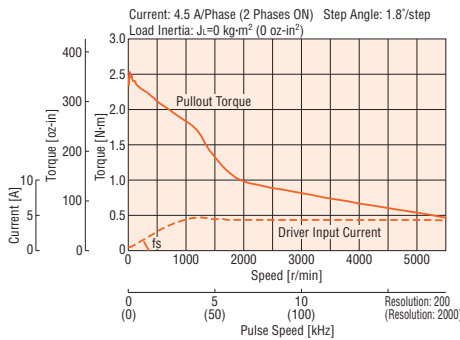


RBK2913T

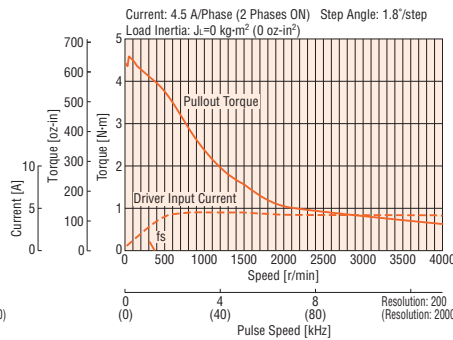


● 75 VDC Input

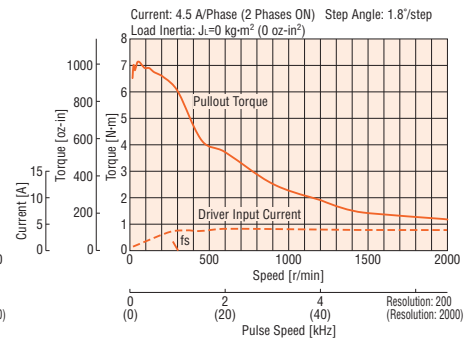
RBK296T



RBK299T



RBK2913T



● The pulse input circuit responds to 250 kHz with a pulse duty of 50%.

Notes:

- Pay attention to heat dissipation from motor as there will be a considerable amount of heat under certain conditions. Be sure to keep the temperature of the motor case under 100°C (212°F). [Under 75°C (167°F) is required to comply with UL or CSA Standards as the motor is recognized as insulation Class A.]
- The driver's automatic current cutback function at motor standstill reduces maximum holding torque by approximately 50%.

Introduction

AC Input

DC Input

5-Phase Microstep

2-Phase Full/Half

5-Phase Microstep

2-Phase Microstep

2-Phase Microstep

Without Encoder

2-Phase PK/PV

With Encoder

EMP400

SG8030U

Accessories

Installation

Driver Specifications

Input Signals	Input Mode	Photocoupler Input PLS signal, DIR signal: Input resistance 200 Ω, Input current 5~20 mA Photocoupler ON: +3~5.25 V, Photocoupler OFF: 0~+1 V (Line driver input: -5.25~+1 V) (Voltage between terminals) PLS24 signal, DIR24 signal: Input resistance 2.7 kΩ, Input current 5~20 mA Photocoupler ON: +21.6~26.4 V, Photocoupler OFF: 0~+1 V (Voltage between terminals) All windings off signal, Step angle select signal: Input resistance 3 kΩ, Input current 20 mA or less Photocoupler ON: +4.5~26.4 V Photocoupler OFF: 0~+1 V (Voltage between terminals)
	Pulse Signal	Operation command pulse signal, Negative logic pulse input Pulse width: 2 μs minimum (Line driver input: 1 μs minimum), Pulse rise/fall: 1 μs maximum, Pulse duty 50% and below Motor moves one step when the pulse input is switched from photocoupler ON to OFF. Maximum input pulse frequency: 250 kHz (Line driver input: 500 kHz) (When the pulse duty is 50%)
	Rotation Direction Signal	Rotation direction signal, Photocoupler ON: CW, Photocoupler OFF: CCW
	All Windings Off Signal	When in the "photocoupler ON" state, the output current to the motor is cut off and the motor shaft can be rotated manually. When in the "photocoupler OFF" state, the current is supplied to the motor.
	Step Angle Select Signal	When in the "photocoupler ON" state, the motor operates with the basic step angle, regardless of the setting of the step angle setting switch. When in the "photocoupler OFF" state, the motor operates with the step angle set with the step angle setting switch.
Output Signals	Output Mode	Photocoupler, Open-collector output External use condition: 30 VDC maximum, 10 mA maximum
	Current Cutback Signal	When the automatic current cutback function is activated, the output turns on. (Photocoupler: ON)
	Alarm Signal	When one of the driver's protective functions is activated, the output turns off. (Photocoupler: OFF)
	Excitation Timing Signal	The signal is output every time the excitation sequence returns to the initial stage "0." (Photocoupler: ON) 1.8°/step [Microsteps/step: 1 (Resolution: 200)]: Signal is output every 4 pulses. 0.45°/step [Microsteps/step: 4 (Resolution: 800)]: Signal is output every 16 pulses.
Functions	Third harmonic waveform correction, Smooth drive, Vibration suppression, Automatic current cutback, Step angle select, All windings off, Excitation timing	
Cooling Method	Natural ventilation	

General Specifications

Item	Motor	Driver
Insulation Class	Class B [130°C (266°F)] [Recognized as Class A 105°C (221°F) by UL/CSA Standards]	-
Insulation Resistance	100 MΩ or more when 500 VDC megger is applied between the windings and the case under normal ambient temperature and humidity.	-
Dielectric Strength	Sufficient to withstand 1.0 kVAC at 50 Hz or 60 Hz applied between the windings and the case for 1 minute under normal ambient temperature and humidity. (1.5 kVAC for terminal box type motor)	-
Operating Environment	Ambient Temperature	-10~+50°C (+14~+122°F) (non-freezing)
	Ambient Humidity	85% or less (non-condensing)
	Atmosphere	Standard type motor: No corrosive gases, dust, water or oil Terminal box type motor: No corrosive gases
Temperature Rise	Temperature rise of the windings is 80°C (144°F) or less measured by the resistance change method. (at rated current, at standstill, two phases energized) RBK26□ : when equipped with an aluminum heat sink of 250×250 mm, 10 mm thick (9.84×9.84 in., 0.39 in. thick) When using the RBK26□T or the RBK29□T as a UL or CSA recognized component, make sure the temperature rise of the windings is 50°C (90°F) or less, by mounting the motor to a heat sink (material: aluminum) of the following size. RBK26□T : 400×400 mm, 10 mm thick (15.75×15.75 in., 0.39 in. thick) RBK29□T : 200×200 mm, 10 mm thick (7.87×7.87 in., 0.39 in. thick)	-
Stop Position Accuracy ^{*1}	±3 arc minutes (±0.05°)	-
Shaft Runout	0.05 mm (0.002 in.) T.I.R. ^{*4}	-
Radial Play ^{*2}	0.025 mm (0.001 in.) maximum of 5 N (1.12 lb.)	-
Axial Play ^{*3}	0.075 mm (0.003 in.) maximum of 10 N (2.2 lb.)	-
Concentricity	0.075 mm (0.003 in.) T.I.R. ^{*4}	-
Perpendicularity	0.075 mm (0.003 in.) T.I.R. ^{*4}	-

*1 This value is for full step under no load. (The value changes with the size of the load.)

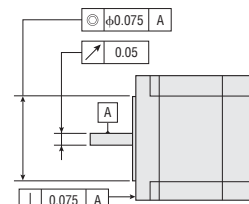
*2 Radial Play: Displacement in shaft position in the radial direction, when a 5 N (1.12 lb.) load is applied in the vertical direction to the tip of the motor's shaft.

*3 Axial Play: Displacement in shaft position in the axial direction, when a 10 N (2.2 lb.) load is applied to the motor's shaft in the axial direction.

*4 T.I.R. (Total Indicator Reading): The total dial gauge reading when the measurement section is rotated one revolution centered on the reference axis center.

Note:

- Do not measure insulation resistance or perform the dielectric strength test while the motor and driver are connected.



Permissible Overhung Load and Permissible Thrust Load

Unit = N (lb.)

Type	Model	Permissible Overhung Load					Permissible Thrust Load
		Distance from Shaft End					
		0 mm (0 in.)	5 mm (0.2 in.)	10 mm (0.39 in.)	15 mm (0.59 in.)	20 mm (0.79 in.)	
Standard Type Motor	RBK264□	54 (12.1)	67 (15)	89 (20)	130 (29)	-	The permissible thrust load shall be no greater than the motor mass.
	RBK266□						
	RBK268□						
	RBK296□A						
	RBK299□A						
RBK2913□A							
Terminal Box Type Motor	RBK264T	54 (12.1)	67 (15)	89 (20)	130 (29)	-	
	RBK266T						
	RBK268T						
	RBK296T						
	RBK299T						
	RBK2913T						

Enter **A** (single shaft) or **B** (double shaft) in the box (□) within the model name.

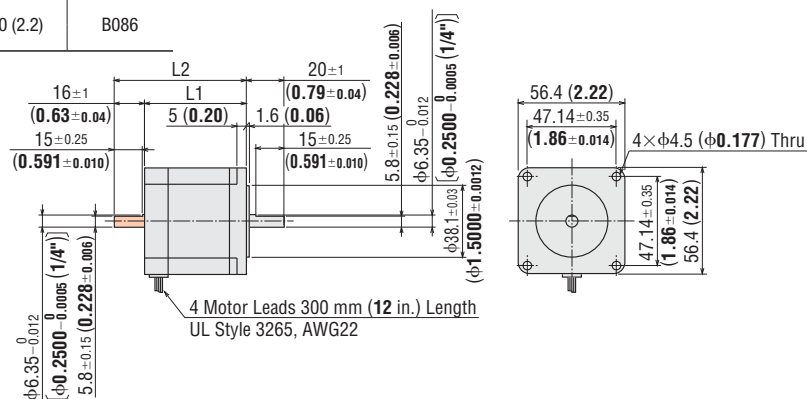
Dimensions Unit = mm (in.)

Motor

◇ Standard Type Motor

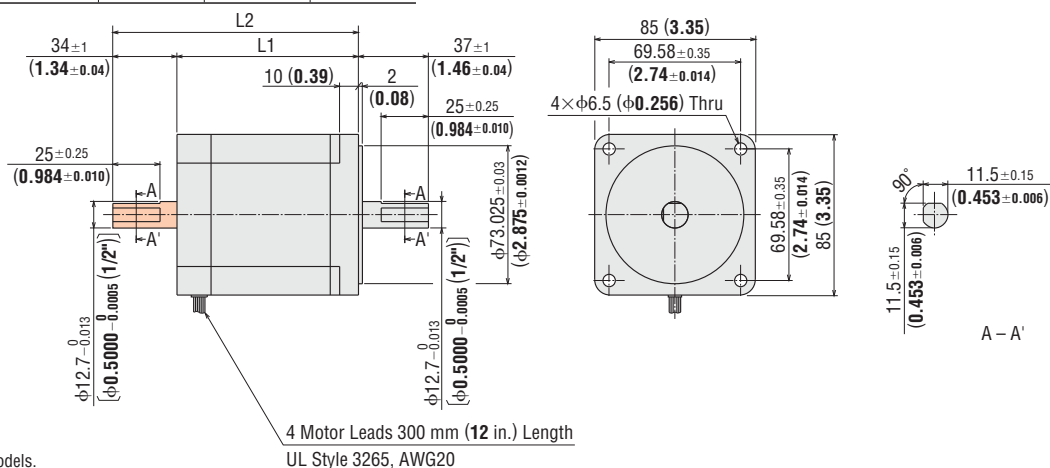
1 □ 56.4 mm (□ 2.22 in.)

Model	Motor Model	L1	L2	Mass kg (lb.)	DXF
RBK264A	PK264DA	39 (1.54)	-	0.45 (0.99)	B084
RBK264B	PK264DB	-	55 (2.17)	-	-
RBK266A	PK266DA	54 (2.13)	-	0.7 (1.54)	B085
RBK266B	PK266DB	-	70 (2.76)	-	-
RBK268A	PK268DA	76 (2.99)	-	1.0 (2.2)	B086
RBK268B	PK268DB	-	92 (3.62)	-	-



2 □ 85 mm (□ 3.35 in.)

Model	Motor Model	L1	L2	Mass kg (lb.)	DXF
RBK296AA	PK296DAA	66 (2.6)	-	1.7 (3.7)	B122U
RBK296BA	PK296DBA	-	100 (3.94)	-	-
RBK299AA	PK299DAA	96 (3.78)	-	2.8 (6.2)	B123U
RBK299BA	PK299DBA	-	130 (5.12)	-	-
RBK2913AA	PK2913DAA	126 (4.96)	-	3.8 (8.4)	B124U
RBK2913BA	PK2913DBA	-	160 (6.3)	-	-

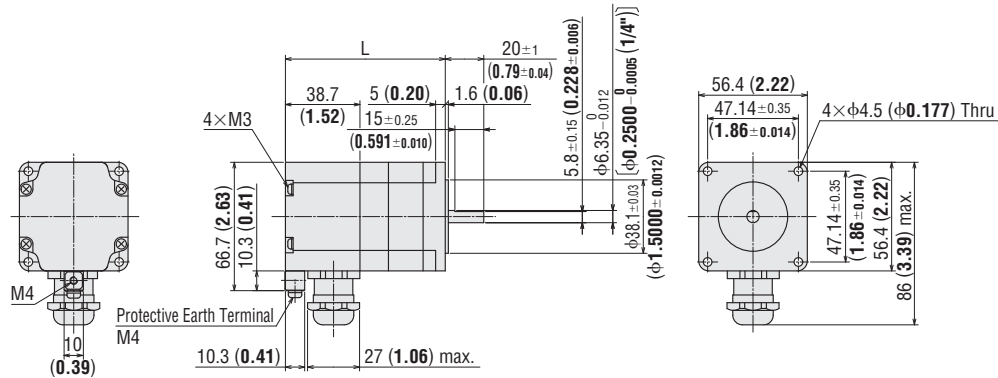


These dimensions are for the double shaft models.
For the single shaft models, ignore the orange () areas.

◇ Terminal Box Type Motor

③ □56.4 mm (□2.22 in.)

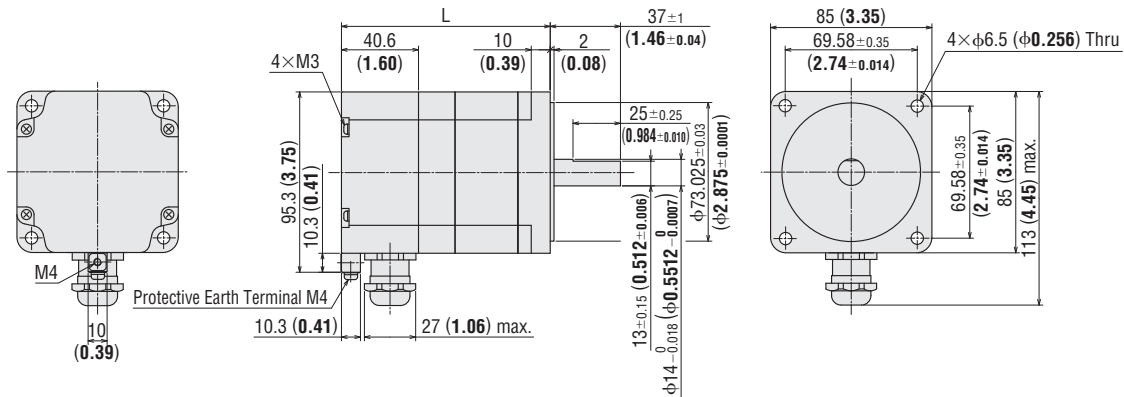
Model	Motor Model	L	Mass kg (lb.)	DXF
RBK264T	PK264D1T	83 (3.27)	0.6 (1.32)	B376
RBK266T	PK266D1T	98 (3.86)	0.9 (1.98)	B377
RBK268T	PK268D1T	120 (4.72)	1.2 (2.6)	B378



● Use cable (VCT) with a diameter of $\phi 7 \sim \phi 13$ mm ($\phi 0.28 \sim \phi 0.51$ in.). A motor cable is available as an accessory (sold separately). → Page C-298

④ □85 mm (□3.35 in.)

Model	Motor Model	L	Mass kg (lb.)	DXF
RBK296T	PK296DT	110 (4.33)	2.1 (4.6)	B379
RBK299T	PK299DT	140 (5.51)	3.2 (7)	B380
RBK2913T	PK2913DT	170 (6.69)	4.3 (9.5)	B381



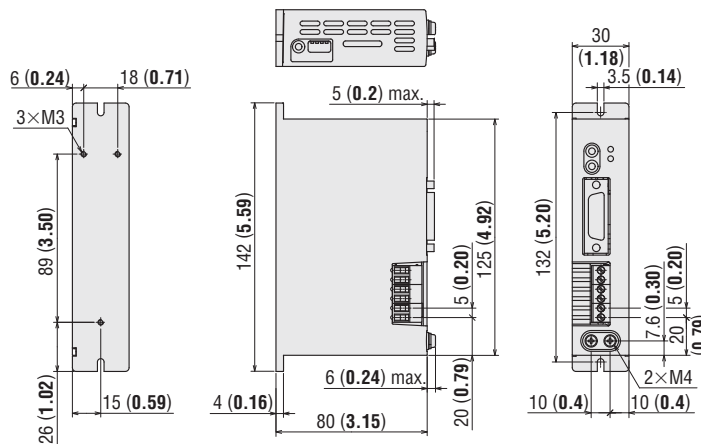
● Use cable (VCT) with a diameter of $\phi 7 \sim \phi 13$ mm ($\phi 0.28 \sim \phi 0.51$ in.). A motor cable is available as an accessory (sold separately). → Page C-298

● Driver

⑤ RBD242A-V, RBD245A-V

Mass: 0.35 kg (0.77 lb.)

DXF B446



Connection and Operation

Names and Functions of Driver Parts

(Top)



②]Function Switches

① Signal Monitor Displays

◇ LED Indicators

Indication	Color	Function	When Activated
POWER	Green	Power supply indication	Lights when power is on.
ALARM	Red	Alarm indication	Blinks when protective functions are activated.

◇ Alarm

Blink Count	Function	When Activated
2	Overheat	The temperature of the driver's internal heat sink exceeds the specified value.
3	Overvoltage	The primary voltage of the driver's inverter exceeds the permissible value.
5	Overcurrent	An excessive current flows to the driver's inverter.

② Function Switches

Indication	Switch Name	Function
SW1	Third Harmonic Waveform Correction Function Select Switch	A function that provides improved angle accuracy and reduced vibrations by optimizing the motor drive current waveforms. You can set the correction value using the select switch.
SW2-1	Smooth Drive Function Switch	Low vibration and low noise operation are available even in the low speed range without changing the step angle setting. The function can be set and deactivated with this switch.
SW2-2	Vibration Suppression Function Select Switch	A function that provides reduced vibrations at medium speed operation. The function can be set or deactivated with this switch.
SW2-3	Not used.	—
SW2-4	Motor Stop Current Switch	For adjusting the motor current at standstill

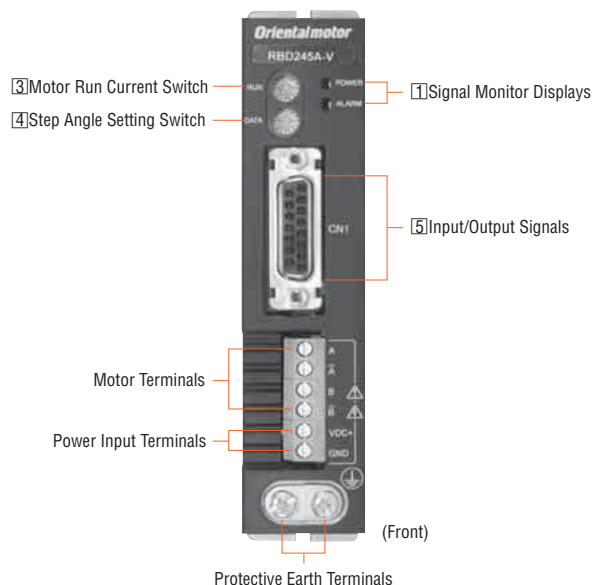
③ Motor Run Current Switch

Indication	Switch Name	Function
RUN	Motor Run Current Switch	For adjusting the motor running current

⑤ Input/Output Signals

Indication	Input/Output	Pin No.	Signal	Signal Name	Function		
CN1*	Input	1	PLS+	Pulse Signal	Operation command pulse signal		
		2	PLS24+				
		9	PLS-				
		3	DIR+	Rotation Direction Signal		Rotation direction signal Photocoupler ON: CW, Photocoupler OFF: CCW	
		10	DIR24+				
		11	DIR-				
		4	AWO	All Windings Off Signal			Cuts the output current to the motor and allows the motor shafts to be rotated manually.
		12	CS	Step Angle Select Signal			The motor will operate at the basic step angle regardless of the settings of the step angle setting switches.
	5	IN-COM	Input Common	Input common for the "All Windings Off" signal and "Step Angle Select" signal.			
	Output	13	CD+	Current Cutback Signal	Outputs a signal when the automatic current cutback function activates.		
		6	CD-				
		14	ALM+	Alarm Signal		Turns the output off when one of the driver's protective functions is activated.	
		7	ALM-				
		15	TIM+	Excitation Timing Signal			Outputs signals when the excitation sequence is at STEP "0."
		8	TIM-				

* The cable for connecting the terminal box type motor and driver, and the D-Sub (15-pin) connector for connecting to the driver's CN1 connector are not included. They must be supplied separately.
Description of input/output signals → Page C-177



④ Step Angle Setting Switch

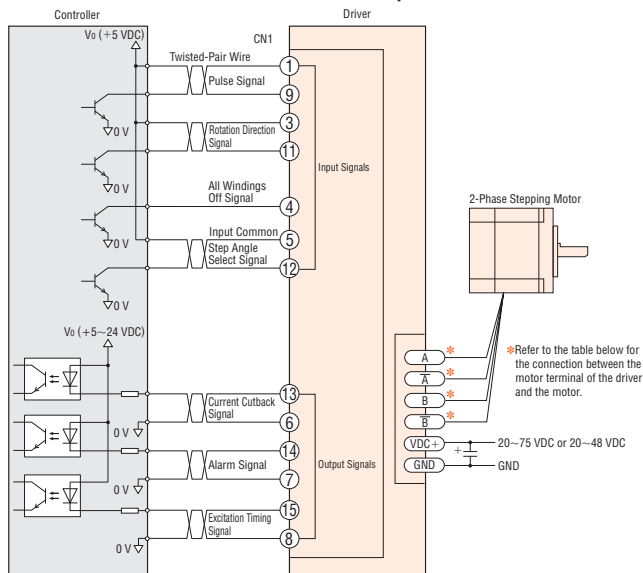
Indication	Switch Name	Function
DATA	Step Angle Setting Switch	The switch can be set to the desired resolution from the 16 resolution levels.

Step Angle Setting Switch	Microsteps/Step	Resolution	Step Angle
0	1	200	1.8°
1	2	400	0.9°
2	4	800	0.45°
3	5	1000	0.36°
4	8	1600	0.225°
5	9	1800	0.2°
6	10	2000	0.18°
7	16	3200	0.1125°
8	18	3600	0.1°
9	20	4000	0.09°
A	32	6400	0.05625°
B	36	7200	0.05°
C	40	8000	0.045°
D	64	12800	0.028125°
E	80	16000	0.0225°
F	128	25600	0.0140625°

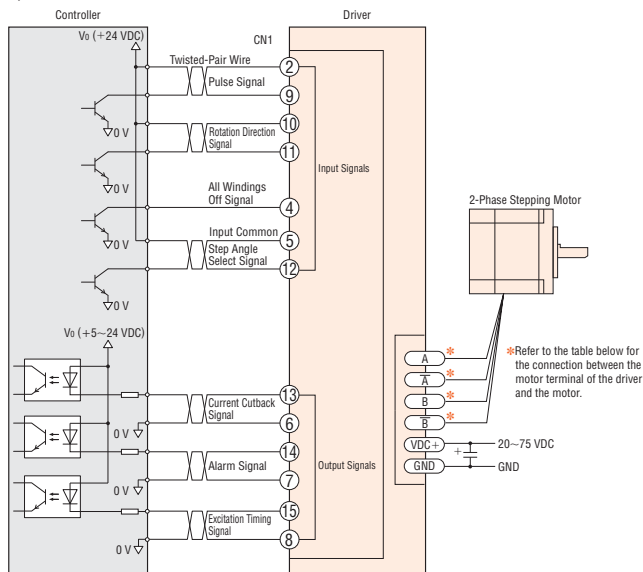
- The step angle set with the step angle setting switch will become effective when the "Step Angle Select" (CS) signal input is OFF.
- Do not change the "Step Angle Select" (CS) signal input or step angle setting switch while the motor is operating. It may cause the motor to misstep and stop. Change the step angle setting switch, when the "Step Angle Select" (CS) signal input is OFF and the "Excitation Timing" (TIM) signal output is ON.

● Connection Diagrams

◇ 5 VDC Connection or Line Driver Input

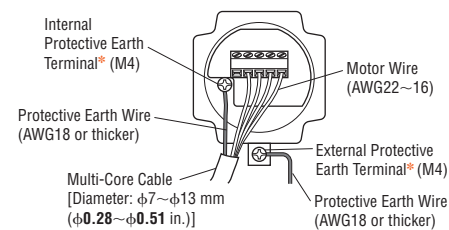


◇ 24 VDC Connection

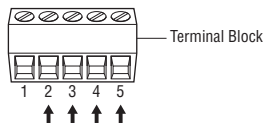


◇ Terminal Box Type Motor Connections

RBK264T, RBK266T, RBK268T

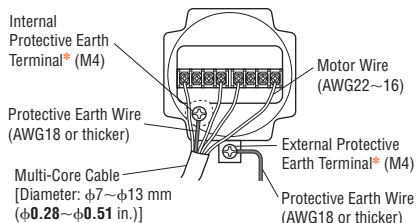


Connect motor lead wires to the terminals 2 to 5.

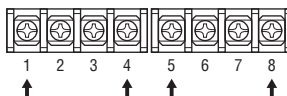


* Connect either the internal protective earth terminal or external protective earth terminal to the ground.

RBK296T, RBK299T, RBK2913T



Terminals 1, 4, 5, and 8 are used. Terminals 2, 3, 6, and 7 are not used. Do not connect anything to them.



* Connect either the internal protective earth terminal or external protective earth terminal to the ground.

◇ Input Signal Connection

- Pulse (PLS) Signal, Rotation Direction (DIR) Signal
You can select either 5 VDC or 24 VDC as the signal voltage. Line driver input is also available. The pin No. to connect differs according to the signal voltage.
- All Windings Off Signal, Step Angle Select Signal
You can select either 5 VDC or 24 VDC as the signal voltage. The pin No. to connect is the same for 5 VDC and 24 VDC.

◇ Output Signal Connection

Keep the output signal voltage and current below 30 VDC and 10 mA respectively.

◇ Power Supply

Use a power supply that can supply sufficient input current. When power supply capacity is insufficient, a decrease in motor output can cause the following malfunctions:

- Motor does not operate properly at high-speed.
- Slow motor startup and stopping.

◇ Notes on Wiring

- Use twisted-pair wires of AWG26 and keep wiring as short as possible [within 2 m (6.6 ft.).]
- Note that as the length of the pulse signal line increases, the maximum transmission frequency decreases. Technical reference → Page F-54
- Use wires of AWG18 or thicker for motor lines (when extended), power supply lines and protective earth line.
- To ground the driver, lead the ground conductor from the protective earth terminal (M4) and connect the ground conductor to provide a common ground point.
- Signal lines should be kept at least 2 cm (0.79 in.) away from power lines (power supply lines and motor lines). Do not bind the signal lines and power lines together.
- If noise generated by the motor cable or power cable becomes a problem due to the wiring and layout, shield the cables or use ferrite cores.
- Incorrect connection of DC power input will lead to driver damage. Make sure that the polarity is correct before turning power on.
- The cable for connecting the terminal box type motor and driver, and the D-Sub (15-pin) connector for connecting to the driver's CN1 connector are not included. They must be supplied separately.

● Driver Motor Terminals and Motor Leads/Motor Terminal Blocks

Signal Name	Signal	Standard Type Motor	Terminal Box Type Motor	
			Terminal Block No. for RBK26□	Terminal Block No. for RBK29□
A	A-phase output	Black	2	1
\bar{A}	\bar{A} -phase output	Green	3	4
B	B-phase output	Red	4	5
\bar{B}	\bar{B} -phase output	Blue	5	8

● Description of Input/Output Signals

Indication of Input/Output Signal "ON"/"OFF"
 Input (Output) "ON" indicates that the current is sent into the photocoupler (transistor) inside the driver. Input (Output) "OFF" indicates that the current is not sent into the photocoupler (transistor) inside the driver. The input/output remains "OFF" if nothing is connected.

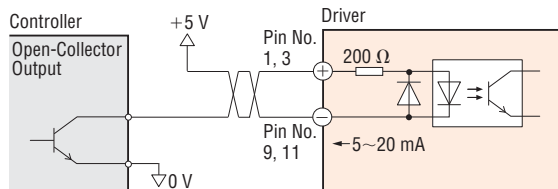
Photocoupler OFF ON

Pulse (PLS), Rotation Direction (DIR) Input Signal

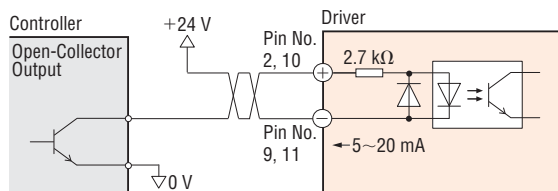
You can select either 5 VDC or 24 VDC as the signal voltage for "Pulse" input and "Rotation Direction" input. Line driver input is also available.

◇ Input Circuit and Sample Connection

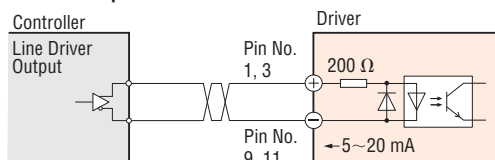
● 5 VDC Connection



● 24 VDC Connection

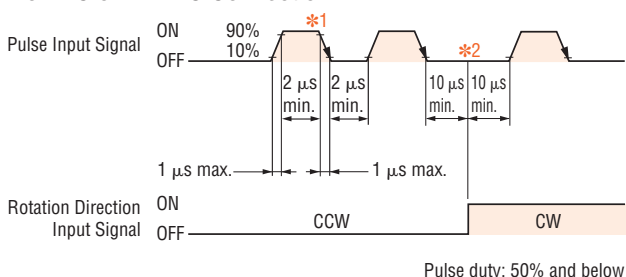


● Line Driver Input

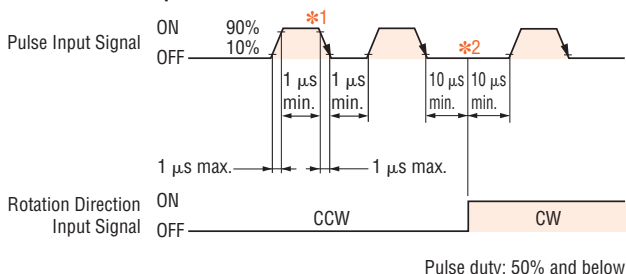


◇ Pulse Waveform Characteristics

● 5 VDC or 24 VDC Connection



● Line Driver Input



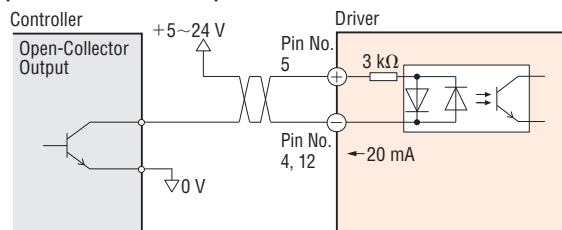
*1 The shaded area indicates when the photocoupler diode is ON. The motor moves when the photocoupler state changes from ON to OFF.
 *2 The minimum interval time when changing rotation direction is 10 μs. This value varies greatly depending on the motor type, pulse frequency and load inertia.

◇ Pulse Signal Characteristics

- Keep the pulse signal at the "photocoupler OFF" state when no pulses are being input.
- Leave the pulse signal at rest ("photocoupler OFF") when changing rotation directions.

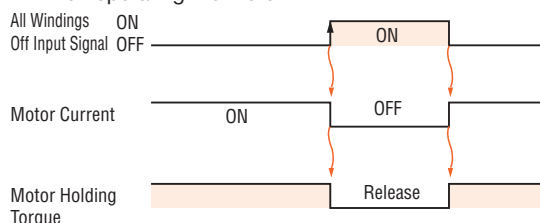
All Windings Off (AWO), Step Angle Select (CS) Input Signal

◇ Input Circuit and Sample Connection



◇ All Windings Off (AWO) Input Signal

- Inputting this signal puts the motor in a non-excitation (free) state.
- This signal is used when turning the motor by external force or manual home position is desired. The photocoupler must be "OFF" when operating the motor.



The shaded area indicates that the motor provides holding torque in proportion to standstill current set by motor stop current switch.

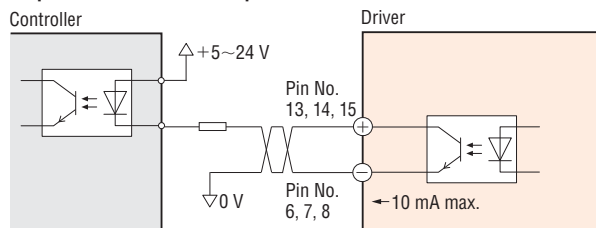
- Switching the "All Windings Off" signal from "photocoupler ON" to "photocoupler OFF" does not alter the excitation sequence. When the motor shaft is manually adjusted with the "All Windings Off" signal input, the shaft will shift up to ±3.6° from the position set after the "All Windings Off" signal is released.

◇ Step Angle Select (CS) Input Signal

- When this signal input is "ON," the motor will operate at the basic step angle regardless of the settings of the step angle setting switches. When the signal input is "OFF," the motor will operate at the step angle set with the step angle setting switch.
- To change the step angle, do so when the "Excitation Timing" signal output is "ON" and the motor is at standstill.

Current Cutback (CD), Alarm (ALM), Excitation Timing (TIM) Output Signal

◇ Output Circuit and Sample Connection



◇ Current Cutback (CD) Output Signal

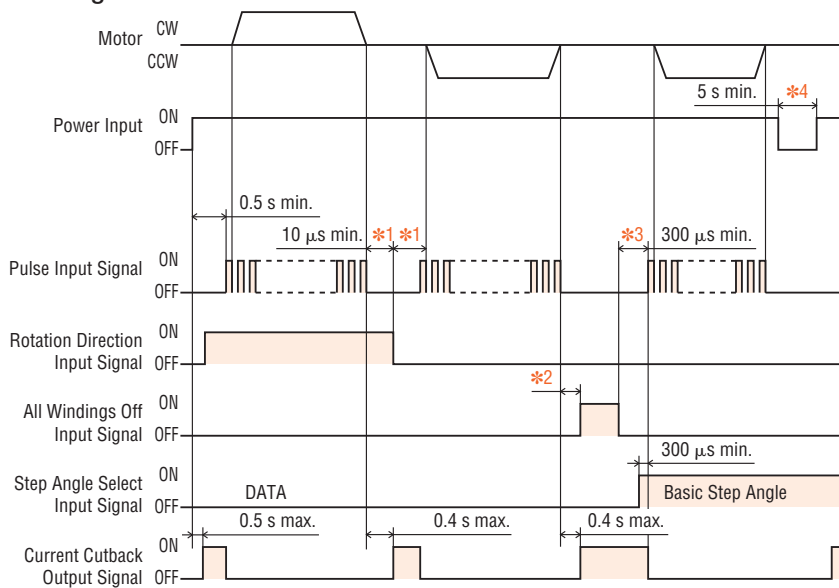
- When the automatic current cutback function is activated, the "Current Cutback" output turns on.

◇ Alarm (ALM) Output Signal

Protective Function	Normal	Fault	Normal
Alarm ON	ON	OFF	ON
Alarm OFF	ON	OFF	ON
ALARM LED		Light	
Motor	Run	Stop	Run

- When the motor is running, if the driver overheat, overvoltage, or overcurrent protective function is detected, the "Alarm" output turns off, and the ALARM LED of the driver flashes. The current to the motor is also cut off to stop the motor.
- You can count the number of times the ALARM LED flashes to confirm which protective function is activated.
- This signal normally stays on, but turns off when a protective function is activated.

● Timing Chart



The shaded section indicates that the photocoupler diode is emitting light.

◇ Excitation Timing (TIM) Output Signal

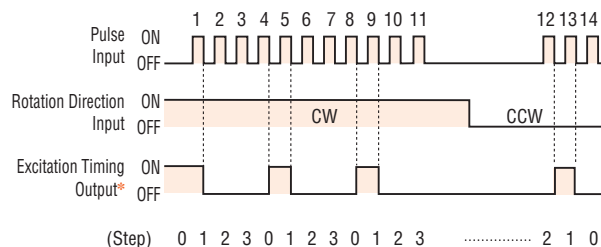
- The "Excitation Timing" signal is output to indicate when the motor excitation is in the initial stage (step "0" at power up).
- The "Excitation Timing" signal is output simultaneously with a pulse input each time the excitation sequence returns to step "0." The excitation sequence will complete one cycle for every 7.2° rotation of the motor output shaft.

Microsteps/step 1: Signal is output once every 4 pulses.

Microsteps/step 4: Signal is output once every 16 pulses.

Timing chart at 1.8/step (Microsteps/step 1)

- * When connected as shown in the sample connection, the signal will be "photocoupler ON" at step "0."



Notes:

- When power is turned ON, the excitation sequence is reset to step "0" and the "Excitation Timing" signal is output.
- When operating the motor using the "Excitation Timing" signal output, make sure the motor output shaft stops at an integral multiple of 7.2°.

- *1 The minimum switching time to change direction 10 μs is shown as the response time of the circuit. The motor may need more time than that.
- *2 Depends on load inertia, load torque, and starting frequency.
- *3 Never input a pulse signal immediately after switching the "All Windings Off" signal to the "photocoupler OFF" state. The motor may not start.
- *4 To cycle the power, turn off the power and then wait for at least five seconds after the POWER LED has turned off.

List of Motor and Driver Combinations

Model names for motor and driver combinations are shown below.

Standard Type Motor

Model	Motor Model	Driver Model
RBK264 <input type="checkbox"/>	PK264D <input type="checkbox"/>	RBD242A-V
RBK266 <input type="checkbox"/>	PK266D <input type="checkbox"/>	RBD242A-V
RBK268 <input type="checkbox"/>	PK268D <input type="checkbox"/>	RBD242A-V
RBK296 <input type="checkbox"/> A	PK296D <input type="checkbox"/> A	RBD245A-V
RBK299 <input type="checkbox"/> A	PK299D <input type="checkbox"/> A	RBD245A-V
RBK2913 <input type="checkbox"/> A	PK2913D <input type="checkbox"/> A	RBD245A-V

● Enter **A** (single shaft) or **B** (double shaft) in the box () within the model name.

Terminal Box Type Motor

Model	Motor Model	Driver Model
RBK264T	PK264D1T	RBD242A-V
RBK266T	PK266D1T	RBD242A-V
RBK268T	PK268D1T	RBD242A-V
RBK296T	PK296DT	RBD245A-V
RBK299T	PK299DT	RBD245A-V
RBK2913T	PK2913DT	RBD245A-V

Introduction

AC Input
QSTEP
ASDC Input
QSTEP
ASCAC Input
5-Phase
Microstep
RK2-Phase
Full/Half
UMKDC Input
5-Phase
Microstep
CRKDC Input
2-Phase
Microstep
RBK2-Phase
Microstep
CMKWithout Encoder
2-Phase
PK/PVWith Encoder
2-Phase
PKEMP400
5G8030J
Controllers

Accessories

Installation