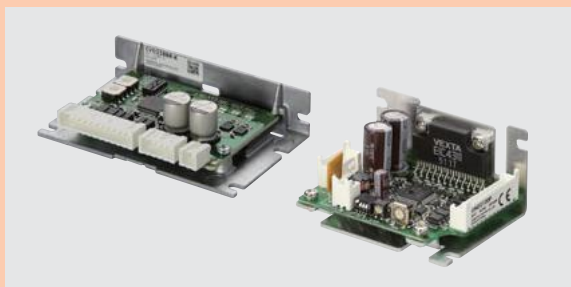


# Bipolar Driver for 1.8°/0.9° Stepper Motors Unipolar Driver for 1.8°/0.9° Stepper Motors Driver for 0.72°/0.36° Stepper Motors

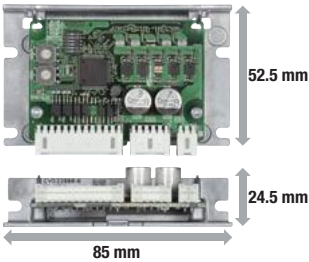



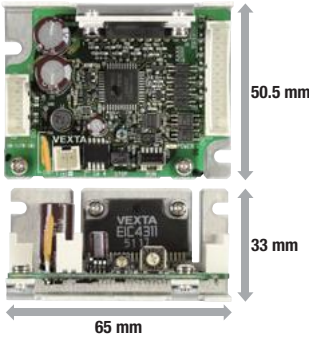

<Additional Information>  
 ● Technical reference → Page H-1  
 ● Regulations & Standards → Page I-2



These are DC power supply input drivers for stepper motors. The bipolar/unipolar driver for 1.8°/0.9° stepper motor and the driver for 0.72°/0.36° stepper motor are available.  
 Using the microstep drive function for a low-vibration driver reduces vibration and noise.

## Features and Types

### ● Bipolar/Unipolar Driver for 1.8°/0.9° Stepper Motor Driver for 0.72°/0.36° Stepper Motor

Driver Type	External View	Introduction	Driver Installation Direction
<p>● Bipolar Driver for 1.8°/0.9° Stepper Motor                      ● Driver for 0.72°/0.36° Stepper Motor                      Page A-439~A-444</p>  <ul style="list-style-type: none"> <li>• Mass 20 g~70 g (The value differs according to the driver type.)</li> <li>● The driver cannot be shared by both a 1.8°/0.9° stepper motor and 0.72°/0.36° stepper motor. Each must use its respective dedicated driver.</li> </ul>	<p>Right Angle Type with Installation Plate</p>  <p>The connector points outward.</p>	<ul style="list-style-type: none"> <li>• Compact and lightweight driver with a full-time microstep</li> <li>• Using the smooth drive function reduces the vibration and noise more than conventional products.</li> <li>• The driver is equipped with a protective function that enables you to find driver errors early.</li> <li>• Running current can be easily set with the digital switch.</li> </ul>	<ul style="list-style-type: none"> <li>• Horizontal direction installation</li> <li>• Vertical direction installation</li> </ul>
	<p>With Installation Plate</p>  <p>The connector points upward.</p>		
	<p>Without Installation Plate</p>  <p>The connector points upward.</p>		
<p>● Unipolar Driver for 1.8°/0.9° Stepper Motor                      Page A-445~A-447</p>  <ul style="list-style-type: none"> <li>• Mass 50g</li> </ul>	<p>The connector points upward.</p> 	<ul style="list-style-type: none"> <li>• Compact and lightweight driver with a microstep</li> <li>• Running current can be easily set with the digital switch.</li> </ul>	

## Bipolar Driver for 1.8°/0.9° Stepper Motor Driver for 0.72°/0.36° Stepper Motor

### Product Number

**CVD 2 23 F B R - K**

①      ②      ③      ④      ⑤      ⑥      ⑦

①	Driver Type
②	<b>2:</b> 1.8°/0.9° Stepper Motor <b>5:</b> 0.72°/0.36° Stepper Motor
③	Rated Current
④	Driver Identification
⑤	Driver Configuration <b>B:</b> With Installation Plate Blank: Without Installation Plate
⑥	Connector Configuration <b>R:</b> Right Angle
⑦	Power Supply Input <b>K:</b> DC Power Supply

### Product Line

#### ● Bipolar Driver for 1.8°/0.9° Stepper Motor

##### ◇ Right Angle Type with Installation Plate

Product Name	List Price
<b>CVD205BR-K</b>	€105.00
<b>CVD206BR-K</b>	
<b>CVD215BR-K</b>	
<b>CVD223BR-K</b>	
<b>CVD223FBR-K</b>	
<b>CVD228BR-K</b>	€120.00
<b>CVD242BR-K</b>	
<b>CVD245BR-K</b>	

##### ◇ With Installation Plate

Product Name	List Price
<b>CVD205B-K</b>	€105.00
<b>CVD206B-K</b>	
<b>CVD215B-K</b>	
<b>CVD223B-K</b>	
<b>CVD223FB-K</b>	
<b>CVD228B-K</b>	€120.00
<b>CVD242B-K</b>	
<b>CVD245B-K</b>	

##### ◇ Without Installation Plate

Product Name	List Price
<b>CVD205-K</b>	€100.00
<b>CVD206-K</b>	
<b>CVD215-K</b>	
<b>CVD223-K</b>	
<b>CVD223F-K</b>	
<b>CVD228-K</b>	

#### ● Driver for 0.72°/0.36° Stepper Motor

##### ◇ Right Angle Type with Installation Plate

Product Name	List Price
<b>CVD503BR-K</b>	€115.00
<b>CVD507BR-K</b>	
<b>CVD512BR-K</b>	
<b>CVD514BR-K</b>	
<b>CVD518BR-K</b>	
<b>CVD524BR-K</b>	€130.00
<b>CVD528BR-K</b>	
<b>CVD538BR-K</b>	

##### ◇ With Installation Plate

Product Name	List Price
<b>CVD503B-K</b>	€115.00
<b>CVD507B-K</b>	
<b>CVD512B-K</b>	
<b>CVD514B-K</b>	
<b>CVD518B-K</b>	
<b>CVD524B-K</b>	€130.00
<b>CVD528B-K</b>	
<b>CVD538B-K</b>	

##### ◇ Without Installation Plate

Product Name	List Price
<b>CVD503-K</b>	€110.00
<b>CVD507-K</b>	
<b>CVD512-K</b>	
<b>CVD514-K</b>	
<b>CVD518-K</b>	
<b>CVD524-K</b>	

### Included

Type	Connector for Driver Connection	Operating manual
Common to All Types	For CN1 (1 Piece) For CN2 (1 Piece) For CN3 (1 Piece)	1 set

Overview,  
Product  
Series

AC Input  
Motor &  
Driver

0.36°/Geared  
*α*STEP  
Absolute  
AZ

0.36°/Geared  
*α*STEP  
AR

0.72°/Geared  
RKII

DC Input  
Motor &  
Driver

0.36°/Geared  
*α*STEP  
Absolute  
AZ

0.36°/Geared  
*α*STEP  
AR

1.8°/0.72°  
/0.36°  
CVK

0.72°/0.36°  
/Geared  
CRK

1.8°/Geared  
RBK

Motor Only  
/Driver Only

1.8°/0.9°  
PKP/PK

Geared  
PKP/PK

0.72°/0.36°  
PKP/PK

Driver

Accessories

## Specifications

### ● Bipolar Driver for 1.8°/0.9° Stepper Motor

Product Name	CVD205□□-K	CVD206□□-K	CVD215□□-K	CVD223□□-K CVD223F□□-K	CVD228□□-K	CVD242B□□-K	CVD245B□□-K
Drive Method	Microstep Drive, Bipolar Constant Current Drive Method						
Motor Drive Current (Factory setting)	0.5 A/Phase	0.6 A/Phase	1.5 A/Phase	2.3 A/Phase	2.8 A/Phase	4.2 A/Phase	4.5 A/Phase
Power Supply Voltage	24 VDC±10%						
Input Current A	0.5	0.5	1.3	2.0	3.0	3.6	3.9
Maximum Input Pulse Frequency	Line driver output by programmable controller: 1 MHz (When the pulse duty is 50%) Open-collector output by programmable controller: 250 kHz (When the pulse duty is 50%) Negative logic pulse input						
Operating Environment (In operation)	Ambient Temperature	0~+50°C (Non-freezing)					
	Ambient Humidity	85% or Less (Non-condensing)					
	Atmosphere	No corrosive gases or dust. The product should not be exposed to water, oil or other liquids.					

- For the type with installation plate, **B** (with installation plate) indicating the diver configuration is specified where the box □ is located in the product name.  
For the right angle type with installation plate, an **R** (right angle) indicating the connector configuration is specified where the box □ is located in the product name.

### ● Driver for 0.72°/0.36° Stepper Motor

Product Name	CVD503□□-K	CVD507□□-K	CVD512□□-K	CVD514□□-K	CVD518□□-K	CVD524B□□-K	CVD528B□□-K	CVD538B□□-K
Drive Method	Microstep Drive, Bipolar Constant Current Drive Method							
Motor Drive Current (Factory setting)	0.35 A/Phase	0.75 A/Phase	1.2 A/Phase	1.4 A/Phase	1.8 A/Phase	2.4 A/Phase	2.8 A/Phase	3.8 A/Phase
Power Supply Voltage	24 VDC±10%							
Input Current A	0.6	1.4	1.7	1.8	2.8	3.0	4.8	4.8
Maximum Input Pulse Frequency	Line driver output by programmable controller: 1 MHz (When the pulse duty is 50%) Open-collector output by programmable controller: 250 kHz (When the pulse duty is 50%) Negative logic pulse input							
Operating Environment (In operation)	Ambient Temperature	0~+50°C (Non-freezing)						
	Ambient Humidity	85% or Less (Non-condensing)						
	Atmosphere	No corrosive gases or dust. The product should not be exposed to water, oil or other liquids.						

- For the type with installation plate, **B** (with installation plate) indicating the diver configuration is specified where the box □ is located in the product name.  
For the right angle type with installation plate, an **R** (right angle) indicating the connector configuration is specified where the box □ is located in the product name.

## Dimensions (Unit = mm)

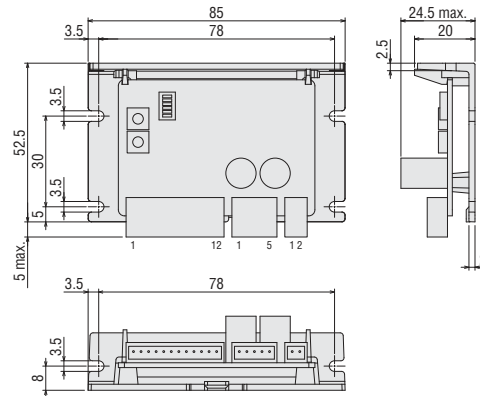
### Right Angle Type with Installation Plate

Product Name	Mass kg
<b>CVD205BR-K</b>	0.06
<b>CVD206BR-K</b>	
<b>CVD215BR-K</b>	
<b>CVD223BR-K</b>	
<b>CVD223FBR-K</b>	
<b>CVD228BR-K</b>	
<b>CVD503BR-K</b>	
<b>CVD507BR-K</b>	
<b>CVD512BR-K</b>	
<b>CVD514BR-K</b>	
<b>CVD518BR-K</b>	
<b>CVD524BR-K</b>	

● Included

Connector Housing: 51103-0200 (Molex)  
51103-0500 (Molex)  
51103-1200 (Molex)

Contact: 50351-8100 (Molex)

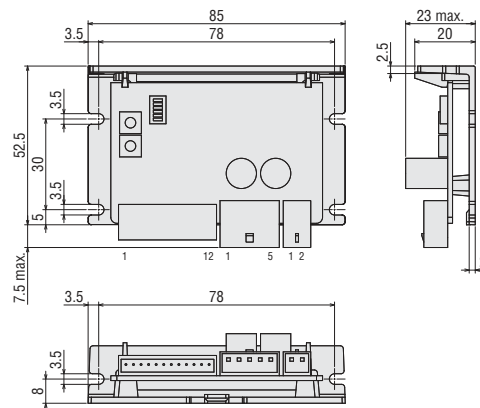


Product Name	Mass kg
<b>CVD242BR-K</b>	0.07
<b>CVD245BR-K</b>	
<b>CVD528BR-K</b>	
<b>CVD538BR-K</b>	

● Included

Connector Housing: 51067-0200 (Molex)  
51067-0500 (Molex)  
51103-1200 (Molex)

Contact: 50217-9101 (Molex)  
50351-8100 (Molex)



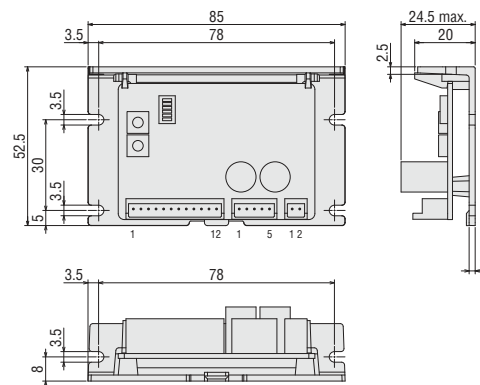
### With Installation Plate

Product Name	Mass kg
<b>CVD205B-K</b>	0.06
<b>CVD206B-K</b>	
<b>CVD215B-K</b>	
<b>CVD223B-K</b>	
<b>CVD223FB-K</b>	
<b>CVD228B-K</b>	
<b>CVD503B-K</b>	
<b>CVD507B-K</b>	
<b>CVD512B-K</b>	
<b>CVD514B-K</b>	
<b>CVD518B-K</b>	
<b>CVD524B-K</b>	

● Included

Connector Housing: 51103-0200 (Molex)  
51103-0500 (Molex)  
51103-1200 (Molex)

Contact: 50351-8100 (Molex)

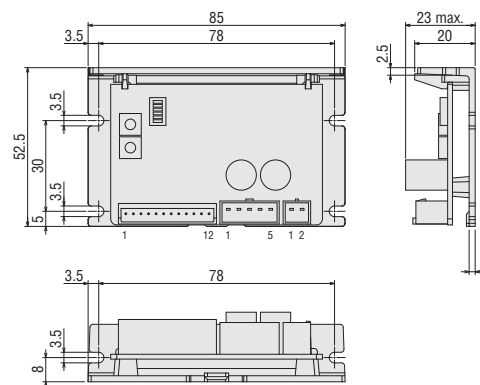


Product Name	Mass kg
<b>CVD242B-K</b>	0.07
<b>CVD245B-K</b>	
<b>CVD528B-K</b>	
<b>CVD538B-K</b>	

● Included

Connector Housing: 51067-0200 (Molex)  
51067-0500 (Molex)  
51103-1200 (Molex)

Contact: 50217-9101 (Molex)  
50351-8100 (Molex)



Overview,  
Product  
Series

AC Input  
Motor &  
Driver

0.36°/Geared  
**αSTEP**  
Absolute  
**AZ**

0.36°/Geared  
**αSTEP**  
**AR**

0.72°/Geared  
**RKII**

DC Input  
Motor &  
Driver

0.36°/Geared  
**αSTEP**  
Absolute  
**AZ**

0.36°/Geared  
**αSTEP**  
**AR**

1.8°/0.72°  
/0.36°  
**CVK**

0.72°/0.36°  
/Geared  
**CRK**

1.8°/Geared  
**RBK**

Motor Only  
/Driver Only

1.8°/0.9°  
**PKP/PK**

Geared  
**PKP/PK**

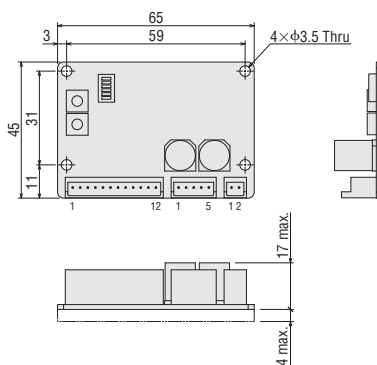
0.72°/0.36°  
**PKP/PK**

Driver

Accessories

● Without Installation Plate

Product Name	Mass kg
<b>CVD205-K</b>	0.02
<b>CVD206-K</b>	
<b>CVD215-K</b>	
<b>CVD223-K</b>	
<b>CVD223F-K</b>	
<b>CVD228-K</b>	
<b>CVD503-K</b>	
<b>CVD507-K</b>	
<b>CVD512-K</b>	
<b>CVD514-K</b>	
<b>CVD518-K</b>	
<b>CVD524-K</b>	



● Included

Connector Housing: 51103-0200 (Molex)  
 51103-0500 (Molex)  
 51103-1200 (Molex)  
 Contact: 50351-8100 (Molex)

■ List of Applicable Motors

● Bipolar Driver for 1.8°/0.9° Stepper Motor

Right Angle Type with Installation Plate	Driver Product Name		Motor Drive Current (Factory Setting)	Applicable Motor
	With Installation Plate	Without Installation Plate		
<b>CVD205BR-K</b>	<b>CVD205B-K</b>	<b>CVD205-K</b>	0.5 A/Phase	<b>PKP213D</b>
<b>CVD206BR-K</b>	<b>CVD206B-K</b>	<b>CVD206-K</b>	0.6 A/Phase	<b>PKP214D</b>
<b>CVD215BR-K</b>	<b>CVD215B-K</b>	<b>CVD215-K</b>	1.5 A/Phase	<b>PKP22□D15, PKP23□D15, PKP24□MD15, PKP262FD</b>
<b>CVD223BR-K</b>	<b>CVD223B-K</b>	<b>CVD223-K</b>	2.3 A/Phase	<b>PKP23□D23</b>
<b>CVD223FBR-K</b>	<b>CVD223FB-K</b>	<b>CVD223F-K</b>	2.3 A/Phase	<b>PKP24□D15■2, PKP24□D23■2</b>
<b>CVD228BR-K</b>	<b>CVD228B-K</b>	<b>CVD228-K</b>	2.8 A/Phase	<b>PKP26□D14■2, PKP26□D28■2, PKP26□MD28</b>
<b>CVD242BR-K</b>	<b>CVD242B-K</b>	-	4.2 A/Phase	<b>PKP26□D42</b>
<b>CVD245BR-K</b>	<b>CVD245B-K</b>	-	4.5 A/Phase	<b>PKP29□D</b>

- A number indicating the length of the motor case is entered where the box □ is located within the names of the applicable motors.
- Either **A** (single shaft) or **B** (double shaft) indicating the configuration is specified where the box ■ is located in the names of the applicable motors.
- The applicable motors are listed such that the available combinations with the driver are distinguishable.  
 Combinations with the encoder type and geared type are also available.  
 For details on the product name, please see the Oriental Motor website.

● Driver for 0.72°/0.36° Stepper Motor

Right Angle Type with Installation Plate	Driver Product Name		Motor Drive Current (Factory Setting)	Applicable Motor
	With Installation Plate	Without Installation Plate		
<b>CVD503BR-K</b>	<b>CVD503B-K</b>	<b>CVD503-K</b>	0.35 A/Phase	<b>PK513</b>
<b>CVD507BR-K</b>	<b>CVD507B-K</b>	<b>CVD507-K</b>	0.75 A/Phase	-
<b>CVD512BR-K</b>	<b>CVD512B-K</b>	<b>CVD512-K</b>	1.2 A/Phase	<b>PKP52□</b>
<b>CVD514BR-K</b>	<b>CVD514B-K</b>	<b>CVD514-K</b>	1.4 A/Phase	-
<b>CVD518BR-K</b>	<b>CVD518B-K</b>	<b>CVD518-K</b>	1.8 A/Phase	<b>PKP54□</b>
<b>CVD524BR-K</b>	<b>CVD524B-K</b>	<b>CVD524-K</b>	2.4 A/Phase	<b>PKP56□FN24, PKP56□FMN</b>
<b>CVD528BR-K</b>	<b>CVD528B-K</b>	-	2.8 A/Phase	<b>PKP56□N28, PK59□H</b>
<b>CVD538BR-K</b>	<b>CVD538B-K</b>	-	3.8 A/Phase	<b>PKP56□FN38</b>

- A number indicating the length of the motor case is entered where the box □ is located within the names of the applicable motors.
- The applicable motors are listed such that the available combinations with the driver are distinguishable.  
 Combinations with the encoder type and geared type are also available.  
 For details on the product name, please see the Oriental Motor website.

## Connection and Operation (Bipolar Driver for 1.8°/0.9° Stepper Motor and Driver for 0.72°/0.36° Stepper Motor)

### Names and Functions of Driver Parts

#### 1 Signal Monitor Indicators

##### ◇ LED Indicator

Indication	Color	Function	Lighting Condition
PWR/ALM	Green	Power supply indication	When power is applied
	Red	Alarm indication	When a protective function is activated (blinking)

##### ◇ Alarm Contents

Blink Count	Function	Operating Condition
2	Overheat Protection	When the temperature of the driver board reaches 85°C
3	Overvoltage Protection	When the power supply voltage exceeds its permissible value When a large inertial load is stopped suddenly When a large load is hoisted
5	Overcurrent Protection	When an excessive current flows to the motor's output circuit
9	EEPROM error	When data of the driver is damaged
Lighting	CPU error	When the CPU driver malfunctions

#### 2 Function Setting Switch

Indication	No.	Function
1P/2P	1	Switches the pulse input mode between 1-pulse input mode and 2-pulse input mode.
OFF/SD	2	Switches the smooth drive function between enabled and disabled.
R2/R1	3	Use in combination with the step angle setting switch to set the step angle.
STOP	4	Switches the standstill current of motors to 25% or 50%.
OFF/FIL	5	Switches the command filter between enabled and disabled.
-	6	Not used.

#### 3 Step Angle Setting Switch

Indication	Function
STEP	Use in combination with the R2/R1 switch to set the step angle.

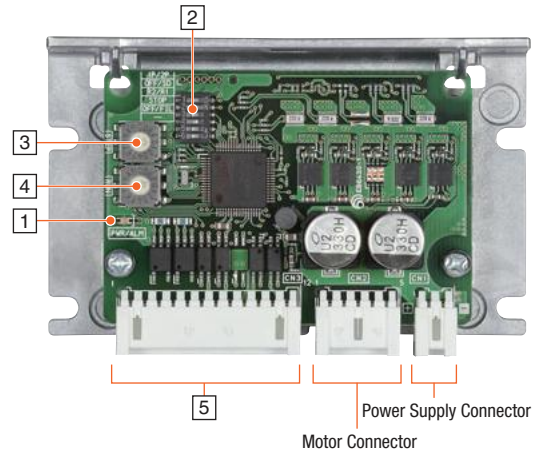
Step Angle Setting Switch (STEP) Scale	R2/R1 Switch: When Set to ON (R1)		R2/R1 Switch: When Set to OFF (R2)	
	Resolution (P/R)	Step Angle	Resolution (P/R)	Step Angle
0	500	0.72°	200	1.8°
1	1000	0.36°	400	0.9°
2	1250	0.288°	800	0.45°
3	2000	0.18°	1000	0.36°
4	2500	0.144°	1600	0.225°
5	4000	0.09°	2000	0.18°
6	5000	0.072°	3200	0.1125°
7	10000	0.036°	5000	0.072°
8	12500	0.0288°	6400	0.05625°
9	20000	0.018°	10000	0.036°
A	25000	0.0144°	12800	0.028125°
B	40000	0.009°	20000	0.018°
C	50000	0.0072°	25000	0.0144°
D	62500	0.00576°	25600	0.0140625°
E	100000	0.0036°	50000	0.0072°
F	125000	0.00288°	51200	0.00703125°

#### 4 Running Current Setting Switch

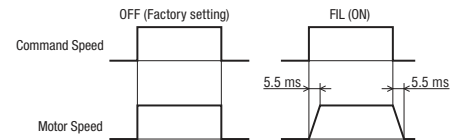
Indication	Function
RUN	Sets the motor running current.

#### 5 I/O Signal Connector

Indication	Pin No.	I/O	Signal Name	Function
CN3	1	Input	PLS+ (CW+)	Operation command pulse signal (Rotates the motor in the CW direction when in 2-pulse input mode.)
	2		PLS- (CW-)	
	3		DIR+ (CCW+)	Rotation direction signal (Rotates the motor in the CCW direction when in 2-pulse input mode.)
	4		DIR- (CCW-)	
	5		AWO+	Stop motor excitation.
	6		AWO-	
	7	CS+	Switches the step angle.	
	8	CS-		
	9	Output	ALM+	Outputs the alarm status for the driver (normally closed).
	10		ALM-	
	11		TIM+	Output when the state of excitation of the motor is the excitation home position.
	12		TIM-	



● Difference in the Motor Responsiveness Depending on the Command Filter (OFF/FIL switch)



● Compared to the standard type, the high-resolution type has 2 times the resolution and 1/2 the step angle.

Example: When the R2/R1 switch is set to ON (R1) and the STEP switch is set to "0"

Resolution of High-Resolution Type:  $500 \times 2 = 1000$

Step Angle of High-Resolution Type:  $0.72^\circ / 2 = 0.36^\circ$

Overview, Product Series

AC Input Motor & Driver

0.36°/Geared  
αSTEP  
Absolute  
AZ

0.36°/Geared  
αSTEP  
AR

0.72°/Geared  
RKII

DC Input Motor & Driver

0.36°/Geared  
αSTEP  
Absolute  
AZ

0.36°/Geared  
αSTEP  
AR

1.8°/0.72°  
/0.36°  
CVK

0.72°/0.36°  
/Geared  
CRK

1.8°/Geared  
RBK

Motor Only /Driver Only

1.8°/0.9°  
PKP/PK

Geared  
PKP/PK

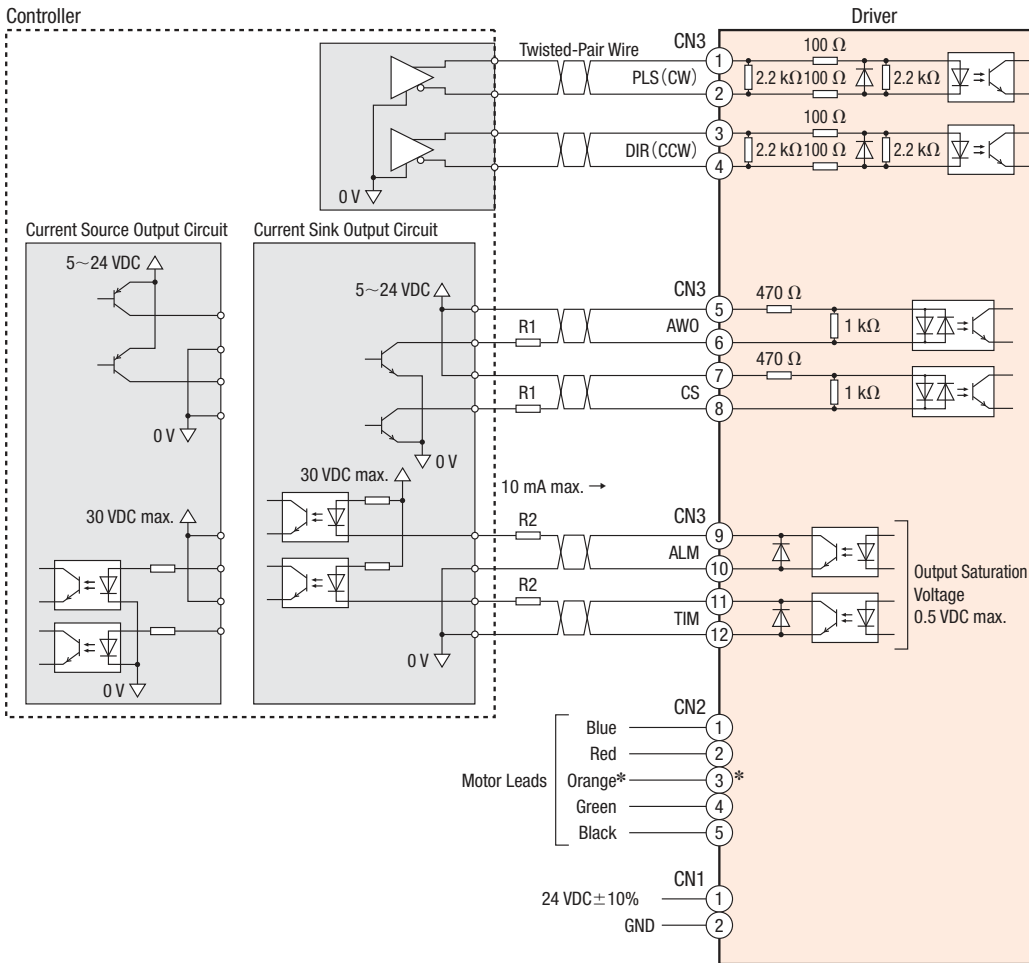
0.72°/0.36°  
PKP/PK

Driver

Accessories

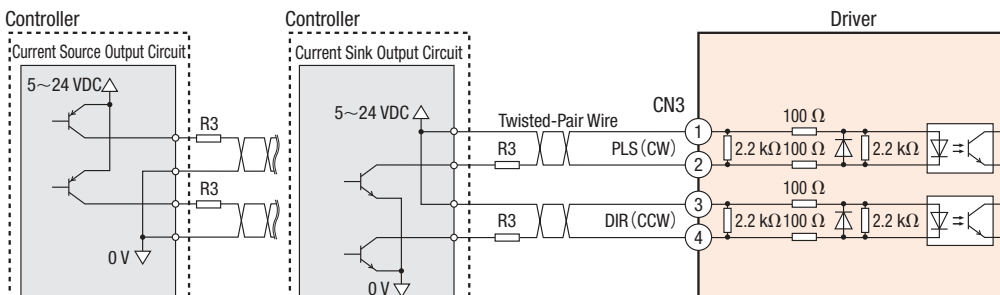
## Connection Diagram

### When the pulse input is the line driver



\*This is not available for 1.8° Stepper Motor. Do not connect anything to pin No. 3.

### When the pulse input is open collector



### [Notes on Wiring]

#### ◇ I/O Signal Connection

- Input signal
  - Use 5 VDC for the input signals.
  - If voltage exceeding 5 VDC is applied, connect an external resistor R1 so that the current becomes 5~15 mA. (AWO, CS)
  - If voltage exceeding 5 VDC is applied to CW input and CCW input when the pulse input is open collector, connect an external resistor R3 so that the current becomes 7~20 mA.
- Output signal
  - Use output signals at 30 VDC 10 mA max. When the current value exceeds 10 mA, connect an external resistor R2.
- Use twisted-pair cables of AWG24~22 (0.2~0.3 mm<sup>2</sup>).
- Note that as the length of the pulse line increases, the max. transmission frequency decreases, and keep the wiring length as short as possible (2 m max.).
- Provide a distance of 100 mm min. between the signal lines and power lines (such as power supply lines and motor lines).

#### ◇ Power Supply Connection

- Use a wire of AWG22 (0.3 mm<sup>2</sup>). Use a wire of AWG20 (0.5 mm<sup>2</sup>) for **CVD242, CVD245, CVD528** and **CVD538**.
- Incorrect polarities of the DC power-supply input will damage the driver. Make sure that the polarity is correct before turning the power on.

#### ◇ Motor Cable Extension

- Use a wire of AWG22 (0.3 mm<sup>2</sup>) min. Use a wire of AWG20 (0.5 mm<sup>2</sup>) min. for **CVD242, CVD245, CVD528** and **CVD538**.

#### ◇ General

- A separate hand crimp tool is required to crimp the connector and lead wires included with the driver. Connection cables which are available as accessories (sold separately) have already had their lead wires crimped.
- If a specific wiring and layout causes the motor cable or power supply cable to generate a noise problem, shield the cable or use ferrite cores.