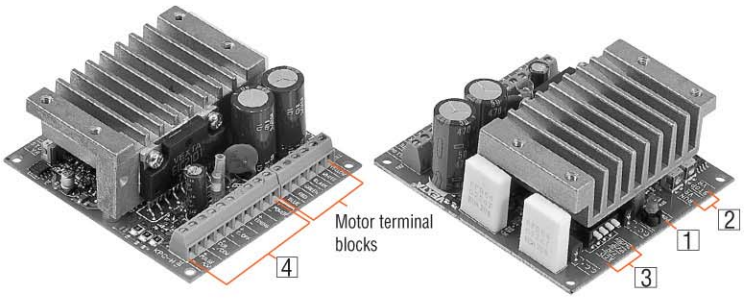
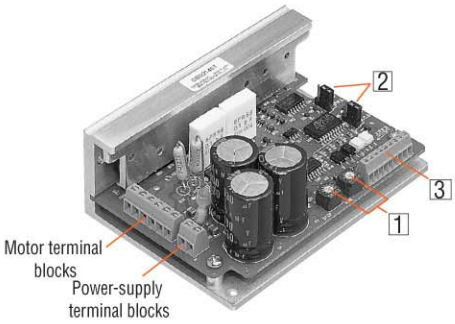
Connection and Operation

CSK24□, CSK26□
CSK24□M, CSK26□M



CSK29□



1 Signal Monitor Display

Indicator	Color	Function
POWER	Green	Power input display

2 Current Adjustment Potentiometers

Indicator	Name of Potentiometer	Function
RUN VR	Motor run current potentiometer	For adjusting the motor running current.
STOP VR	Motor stop current potentiometer	For adjusting the motor current at standstill.

3 Function Select Switches

Indicator	Switch Name	Function
ACD	Automatic current cutback function select	Automatically decreases output current to motor at motor standstill.
F/H	Step angle select	Switches the motor's step angle. F (Full Step): 1.8°/step, H (Half Step): 0.9°/step (F: 0.9°/step, H: 0.45°/step for High-Resolution Type)
1P/2P	Pulse input mode	Switches between 1-pulse input mode and 2-pulse input mode.
24/36V	Power supply voltage select	Changes power supply voltage. For 24 VDC and 36 VDC

4 Input/Output Signals (TB1)

Indication	Input/Output	Signal Name
+POWER	Input	+24 VDC±10% or +36 VDC±10%
−POWER		GND
+TIMING	Output	Timing Signal
−TIMING		
+C.OFF	Input	All Windings OFF Signal
−C.OFF		
+DIR./CCW	Input	Rotation Direction Signal (CCW Pulse Signal)
−DIR./CCW		
+PLS/CW	Input	Pulse Signal (CW Pulse Signal)
−PLS/CW		

1 Current Adjustment Potentiometers

Indicator	Name of Potentiometer	Function
RUN VR	Motor run current potentiometer	For adjusting the motor running current.
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2 Function Select Switches

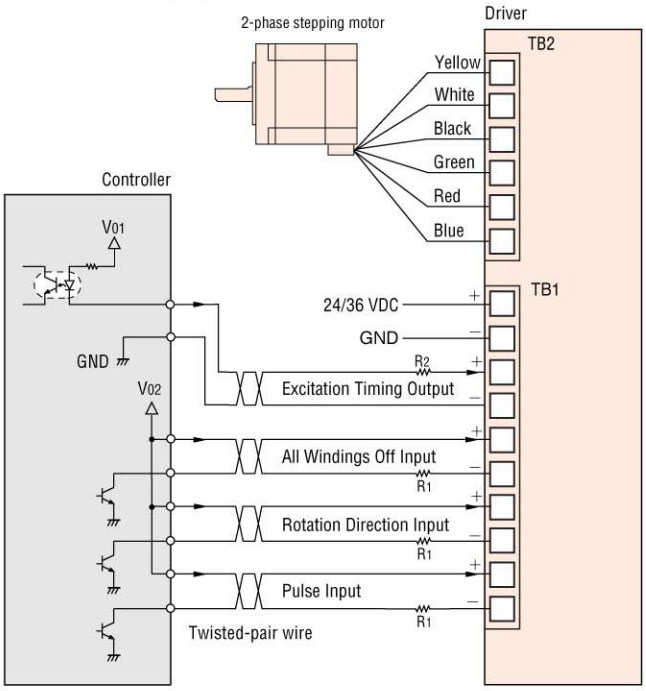
Indicator	Switch Name	Function
ACD	Automatic current cutback function select	Automatically decreases output current to motor at motor standstill.
F/H	Step angle select	Switches the motor's step angle. F (Full Step): 1.8°/step, H (Half Step): 0.9°/step

3 Input/Output Signals (TB3)

Terminal No.	Indication	Input/Output	Signal Name
1	+PLS	Input	Pulse Signal
2	−PLS		
3	+DIR.	Input	Rotation Direction Signal
4	−DIR.		
5	+C.OFF	Input	All Windings OFF Signal
6	−C.OFF		
7	+TIMING	Output	Timing Signal
8	−TIMING		
9	NC	–	–

● Connection Diagrams

◆ CSK24□, CSK26□
CSK24□M, CSK26□M



◆ Power Supply

Keep the input power voltage to 24 VDC±10% or 36 VDC±10%. Use a power supply that provides sufficient input current.

Notes:

- Keep the voltage V_{01} and V_{02} between 5 VDC and 24 VDC. When they are equal to 5 VDC, the external resistance R_1 is not necessary. When they are above 5 VDC, connect R_1 to keep the current between 10 mA and 20 mA, and connect R_2 to keep the current below 10 mA.
- Use twisted-pair wire of AWG 24 or thicker and 6.6 feet (2 m) or less in length for the signal line.
- Note that as the length of the pulse signal line increases, the maximum transmission frequency decrease.
  (→ Technical Reference Page F-36)
- Suitable wire size for the TB1, TB2 and TB3 connector is between AWG 20 and 26. Use AWG 20 or thicker for motor lines (when extended) and power supply line.
- Signal lines should be kept at least 3.9 inches (10 cm) away from power lines (power supply lines and motor lines). Do not bind the signal line and power line together.
- Use spot grounding to ground the driver and external controller.
- If noise generated by the motor lead wire causes a problem, try shielding the motor lead wires with conductive tape or wire mesh.
- Incorrect connection of DC power input will lead to driver damage. Make sure that the polarity is correct before turning power on.

● Description of Input/Output Signals

Pulse (CW) Input and Rotation Direction (CCW) Input Signal

1-Pulse Input Mode

Pulse Input Signal

"Pulse" signal is input to the PULSE/CW−terminal. When the photocoupler state changes from "ON" to "OFF", the motor rotates one step. The direction of rotation is determined by the rotation direction signal.

Rotation Direction Input Signal

The "Rotation Direction" signal is input to the DIR./CCW−terminal. A "photocoupler ON" signal input commands a clockwise direction rotation. A "photocoupler OFF" signal input commands a counterclockwise direction rotation.

2-Pulse Input Mode

CW Pulse Input Signal

"Pulse" signal is input to the PULSE/CW−terminal. When the photocoupler state changes from "ON" to "OFF", the motor rotates one step in a clockwise direction.

CCW Pulse Input Signal

"Pulse" signal is input to the DIR./CCW−terminal. When the photocoupler state changes from "ON" to "OFF", the motor rotates one step in a counterclockwise direction.

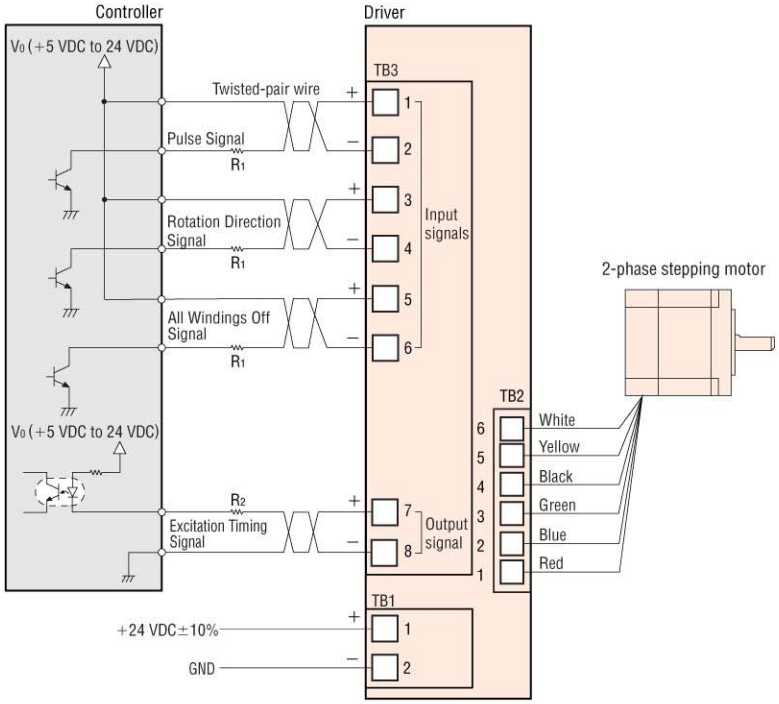
All Windings Off Input Signal

When the "All Windings Off" (A.W. OFF) signal is in the "photocoupler ON" state, the current to the motor is cut off and motor torque is reduced to zero. The motor output shaft can then be rotated freely by hand.This signal is used when moving the motor by external force or to the manual home position.

Excitation Timing Output Signal

The Excitation Timing signal is output once each time the excitation sequence returns to step “0” in synchronization with input pulse. The excitation sequence is designed to complete one cycle as the motor shaft rotates 7.2˚.
A signal is output every 4 pulses in full step mode and every 8 pulses in half step mode. (When the “excitation timing” signal is output, the transistor turns ON.)

◆ CSK29□



◆ Power Supply

Keep the input power voltage at 24 VDC±10%. Use a power supply that provides sufficient input current.

Notes:

- Keep the voltage Vo between 5 VDC and 24 VDC. When Vo is equal to 5 VDC, the external resistance R_1 is not necessary. When Vo is above 5 VDC, connect R_1 to keep the current between 10 mA and 20 mA, and connect R2 to keep the current below 10 mA.
- Use twisted-pair wire of AWG 24 or thicker and 6.6 feet (2 m) or less in length for the signal line.
- Note that as the length of the pulse signal line increases, the maximum transmission frequency decrease.
  (→ Technical Reference Page F-36)
- Suitable wire size for the TB1, TB2 and TB3 connector is between AWG 20 and AWG 26. Use AWG 20 or thicker for motor lines (when extended) and power supply line.
- Signal lines should be kept at least 3.9 inches (10 cm) away from power lines (power supply lines and motor lines). Do not bind the signal line and power line together.
- Use spot grounding to ground the driver and external controller.
- If noise generated by the motor lead wire causes a problem, try shielding the motor lead wires with conductive tape or wire mesh.
- Incorrect connection of DC power input will lead to driver damage. Make sure that the polarity is correct before turning power on.

●Description of Input/Output Signals

Pulse Input Signal

"Pulse" signal is input to the PULSE−terminal. When the photocoupler state changes from "ON" to "OFF", the motor rotates one step. The direction of rotation is determined by the rotation direction signal.

Rotation Direction Input Signal

The "Rotation Direction" signal is input to the DIR.−terminal. A "photocoupler ON" signal input commands a clockwise direction rotation. A "photocoupler OFF" signal input commands a counterclockwise direction rotation.

All Windings Off Input Signal

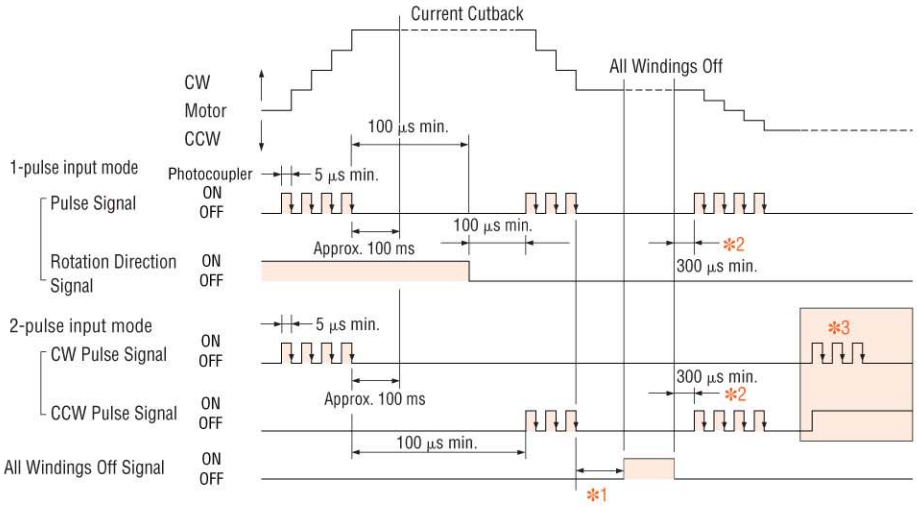
When the "All Windings Off" (A.W. OFF) signal is in the "photocoupler ON" state, the current to the motor is cut off and motor torque is reduced to zero. The motor output shaft can then be rotated freely by hand.This signal is used when moving the motor by external force or to the manual home position.

Excitation Timing Output Signal

The signal is output once each time the excitation sequence returns to step “0” in synchronization with input pulse.The excitation sequence is designed to complete one cycle as the motor shaft rotates 7.2°. A signal is output every 4 pulses in full step mode and every 8 pulses in half step mode. (When the “excitation timing” signal is output, the transistor turns ON.)

● Timing Chart

◆ CSK24□, CSK26□
CSK24□M, CSK26□M

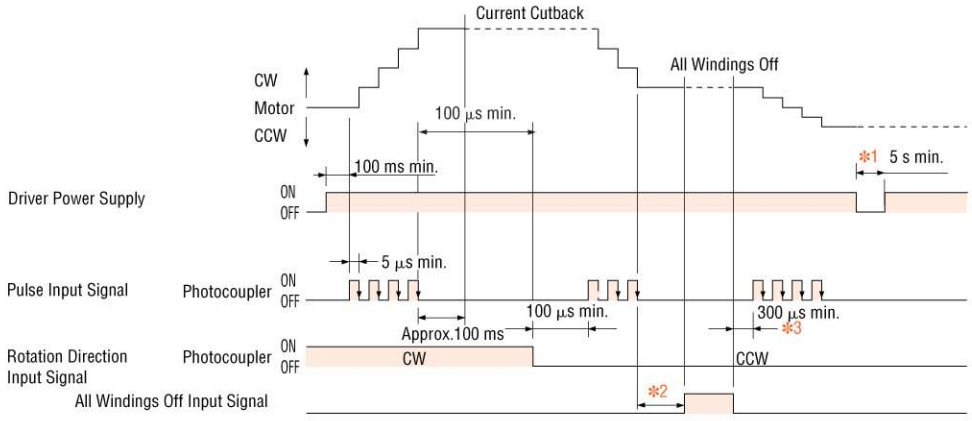


Note: 100 μs or more is the standard interval time for switching from CW to CCW. Note that the interval time varies greatly depending on the motor and load inertia.

*1 Wait a period of time to allow the motor oscillations to end before inputting the "All Windings Off" signal. This time varies with the load inertia, the load torque and the starting pulse rate. The signal input must be stopped before the motor stops.
*2 Never input a step pulse signal immediately after switching the "All Windings Off" input signal to the "photocoupler OFF" state or the motor may lose synchronism. In general, a minimum interval of 300 ms is required.
*3 The motor will not operate properly if a pulse signal is input when either the CW or CCW pulse is in the "photocoupler ON" state.

The shaded area indicates when the photocoupler is ON.

◆ CSK29□



Note: 100 μs or more is the standard interval time for switching from CW to CCW. Note that the interval time varies greatly depending on the motor and load inertia.

*1 After turning off the power supply, wait at least 5 seconds before turning it on again.
*2 Wait a period of time to allow the motor oscillations to end before inputting the "All Windings Off" signal. This time varies with the load inertia, the load torque and the starting pulse rate. The signal input must be stopped before the motor stops.
*3 Never input a step pulse signal immediately after switching the "All Windings Off" signal to "photocoupler OFF" state, or the motor may lose synchronism. In general, a minimum interval of 300 ms is required.

The shaded area indicates when the photocoupler is ON.

● Adjusting the Output Current

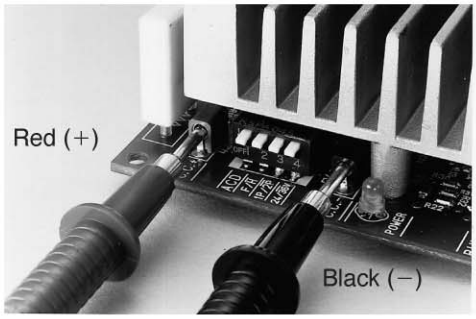
◆ CSK24□, CSK26□
CSK24□M, CSK26□M

♦ Adjustment Method

The rated output current is set at the factory. When it is necessary to change the current setting, follow the procedures described below.

Connecting Voltmeter

Insert the voltmeter test probes [approximately ϕ0.18 inch (ϕ2.1 mm)] as shown below.The current value for one phase is equivalent to the voltage shown by the voltmeter. (ex: voltmeter voltage 1 V = 1 A/Phase)

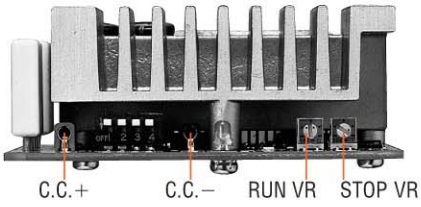


Adjusting the Motor Running Current

To set the "Automatic Current Cutback" function to inactive (SW1: OFF):

(1) Adjust the motor operating current with the RUN potentiometer. It can be adjusted from 0.3 A/phase to the rated value of the driver.

(2) The motor operating current is set for the rated current at the time of shipping. The RUN potentiometer can be used lower the operating current to reduce temperature rise in the motor/driver, adjust torque margin and reduce vibration.



Note:

• The motor RUN current should be less than the motor rated current.

Adjusting the Current at Motor Standstill

To set the "Automatic Current Cutback" function to active (SW1: ON):

(1) Adjust the current at motor standstill with the STOP potentiometer. It can be adjusted from 25% to 50% of the run operating current (0.3 A minimum).

(2) At the time of shipping, the current at motor standstill is set for 40%. The STOP potentiometer readjusts the current to the value required to produce enough holding torque.

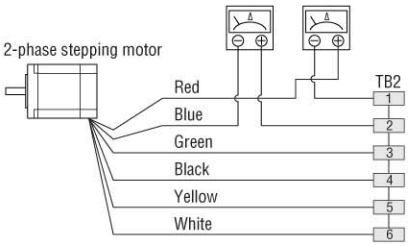
$$\text{Holding torque [oz-in (N·m)]} = \frac{\text{Maximum holding torque [oz-in (N·m)]} \times \text{Current at motor standstill [A]}}{\text{Motor rated current [A]}}$$

◆ CSK29□

♦Adjusting Method

Connecting an Ammeter

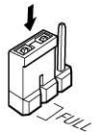
Connect the driver, motor and DC ammeter.



Motor Running Current

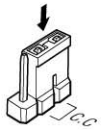
1. Set the step angle to full step.

Set the jumper socket for the step angle switch (FULL/HALF) to " FULL".



2. Disable the automatic current cutback function.

Set the jumper socket for automatic current cutback function (C.C/A.C.D) to " C.C".

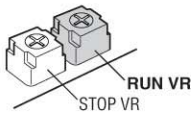


3. Turn on the power supply.

Wait until the motor reaches its operating current.

4. Manipulate the potentiometer for adjusting the motor operating current (RUN VR).

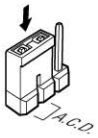
Adjust the potentiometer using an insulated screwdriver. The sum of the two DC ammeter readings indicates the current per motor phase. Be sure to adjust the current to the motor's rated current or below.



Example: When the DC ammeter readings indicate 1.05 A and 0.95 A respectively, the output current per motor phase is 2.0 A.

5. Turn off the power supply.

6. Set the jumper socket for automatic current cutback function (C.C/A.C.D) to "A.C.D." again.

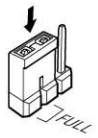


This completes the adjustment of the motor running current.

Motor Standstill Current

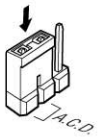
1. Set the step angle to full step.

Set the jumper socket for the step angle switch (FULL/HALF) to " FULL".



2. Enable the automatic current cutback function.

Set the jumper socket for automatic current cutback function (C.C/A.C.D.) to "A.C.D.".

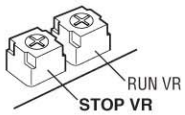


3. Turn on the power supply.

Wait until the motor reaches its standstill current.

4. Manipulate the potentiometer for adjusting the motor standstill current (STOP VR).

Adjust the potentiometer using an insulated screwdriver. The sum of the two DC ammeter readings indicates the current per motor phase. Be sure to adjust the current to 40 percent of the motor's rated current or below.



5. Turn off the power supply.

This completes the adjustment of the motor standstill current.

List of Motor and Driver Combinations

Type	Model	Motor Model	Driver Model
Standard	**CSK243-□TA**	PK243-01□A	CSD2109-T
	CSK244-□TA	PK244-01□A	CSD2112-T
	CSK245-□TA	PK245-01□A	
	CSK264-□T	PK264-02□	CSD2120-T
	CSK266-□T	PK266-02□	
	CSK268-□T	PK268-02□	
	CSK296-□TA	PK296-03□A	CSD2145T
	CSK299-□TA	PK299-03□A	
	CSK2913-□TA	PK2913-02□A	CSD2140T
High-Resolution	**CSK243M□TA**	PK243M□A	CSD2109-T
	CSK244M□TA	PK244M□A	CSD2112-T
	CSK245M□TA	PK245M□A	
	CSK264M□T	PK264M□	CSD2120-T
	CSK266M□T	PK266M□	
	CSK268M□T	PK268M□	
SH Geared	**CSK243□TA-SG3.6**	PK243□1A-SG3.6	CSD2109-T
	CSK243□TA-SG7.2	PK243□1A-SG7.2	
	CSK243□TA-SG9	PK243□1A-SG9	
	CSK243□TA-SG10	PK243□1A-SG10	
	CSK243□TA-SG18	PK243□1A-SG18	
	CSK243□TA-SG36	PK243□1A-SG36	
	CSK264□TA-SG3.6	PK264□2A-SG3.6	CSD2120-T
	CSK264□TA-SG7.2	PK264□2A-SG7.2	
	CSK264□TA-SG9	PK264□2A-SG9	
	CSK264□TA-SG10	PK264□2A-SG10	
	CSK264□TA-SG18	PK264□2A-SG18	
	CSK264□TA-SG36	PK264□2A-SG36	

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