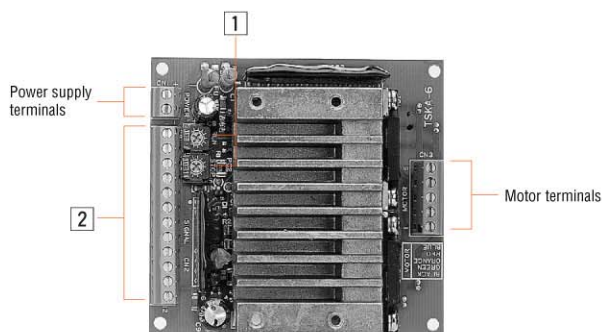


Connection and Operation

Standard Type: **CSK54**□, **CSK56**□

TH Geared Type: **CSK543**□, **CSK564**□

Standard Type: **CSK59**□

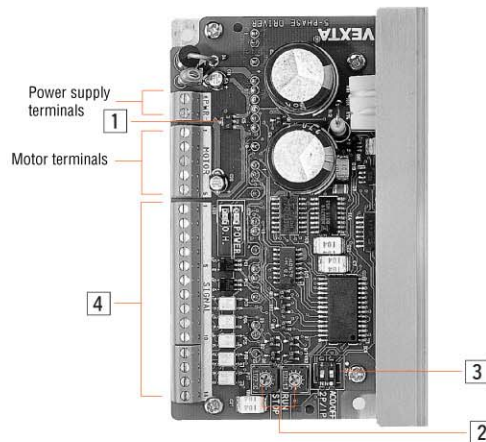


1 Current Adjustment Potentiometers

Indicator	Switch Name	Function
RUN	Motor run current potentiometer	Adjusts the motor running current
STOP	Motor stop current potentiometer	Adjusts the motor current at standstill

2 Input/Output Signal

Connector	Input/Output	Terminal No.	Signal Name
CN2	Input signals	1	Pulse Signal
		2	
		3	
		4	
		5	Rotation Direction Signal
		6	
		7	All Windings Off Signal
		8	
		9	Step Angle Select Signal
		10	
	Output signals	11	Current Cutback Release Signal
		12	



1 Signal Monitor Display

Indicator	Color	Function
POWER	Green	Power input display
O.H.	Red	Overheat output display

2 Current Adjustment Potentiometers

Indicator	Switch Name	Function
RUN	Motor run current potentiometer	Adjusts the motor running current
STOP	Motor stop current potentiometer	Adjusts the motor current at standstill

3 Function Select Switches

Indicator	Switch Name	Function
2P/1P	Pulse input mode switch	Switches between 1-pulse input and 2-pulse input
A.C.O/OFF	Automatic current off function switch	When the heat sink temperature of the driver rises above 194°F (90°C), this function automatically switches the motor current off. Function can be set and released with this switch.

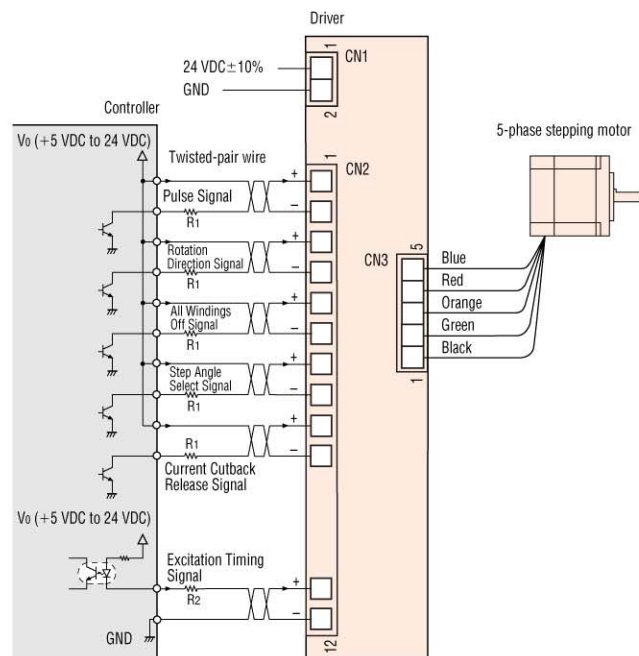
4 Input/Output Signal

Connector	Input/Output	Terminal No.	Signal Name
SIGNAL	Input signals	1	Pulse Signal (CW Pulse Signal)
		2	
		3	Rotation Direction Signal (CCW Pulse Signal)
		4	
		5	All Windings Off Signal
		6	
		7	Step Angle Select Signal
		8	
		9	Current Cutback Release Signal
		10	
	Output signals	11	Excitation Timing Signal
		12	
		13	Overheat Signal
		14	

● Connection Diagrams

◆ CSK54□, CSK56□

CSK543-TG, CSK564-TG



◆ Power Supply

Use an input power voltage of $24\text{ VDC} \pm 10\%$. Use a power supply that can supply sufficient input current.

Notes:

- Keep the voltage V_o between 5 VDC and 24 VDC. When V_o is equal to 5 VDC, the external resistance R_1 is not necessary. When V_o is 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 CN1, CN2 and CN3 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 the 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 DIRECTION—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.

Step Angle Select Input Signal

When the "Step Angle Select" (FULL/HALF) signal is in the "photocoupler ON" state, half step mode has been selected; when the FULL/HALF signal is in the "photocoupler OFF" state, full step mode has been selected.

Current Cutback Release Input Signal

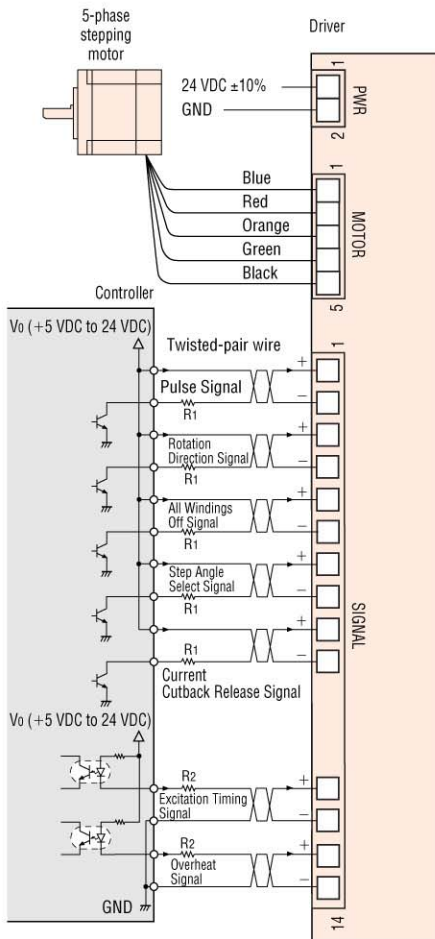
When the "Current Cutback Release" (C.D.INH) signal is in the "photocoupler ON" state, the "Automatic Current Cutback" function is not activated.

Excitation Timing Output Signal

The Excitation Timing signal is output once each time the excitation sequence returns to step "0" in synchronization with input pulses.

The excitation sequence is designed to complete one cycle as the motor shaft rotates 7.2° . A signal is output every 10 pulses in full step mode and every 20 pulses in half step mode. (When the "Excitation Timing" signal is output, the transistor turns ON.)

◆ CSK59



◆ Power Supply

Use an input power voltage of 24 VDC \pm 10%. Use a power supply that can supply sufficient input current.

Notes:

- Keep the voltage V_o between 5 VDC and 24 VDC. When V_o is equal to 5 VDC, the external resistance R_1 is not necessary. When V_o is 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 "PWR", "MOTOR" and "SIGNAL" 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 the power on.

◆ Description of Input/Output Signals Pulse (CW) and Rotation Direction (CCW) Input Signal

1-Pulse Input Mode

Pulse Signal

"Pulse" signal is input to the P./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 Signal

The "Rotation Direction" signal is input to D./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 Signal

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

CCW Pulse Signal

"Pulse" signal is input to the D./CCW-terminal. When the photocoupler state changes from "ON" to "OFF", the motor rotates one step in the 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.

Step Angle Select Input Signal

When the "Step Angle Select" (FULL/HALF) signal is in the "photocoupler ON" state, half step mode has been selected; when the FULL/HALF signal is in the "photocoupler OFF" state, full step mode has been selected.

Current Cutback Release Input Signal

When the "Current Cutback Release" (C.D.INH) signal is in the "photocoupler ON" state, the "Automatic Current Cutback" function is not activated.

Excitation Timing Output Signal

The signal is output once each time the excitation sequence returns to step "0" in synchronization with input pulses.

The excitation sequence is designed to complete one cycle as the motor shaft rotates 7.2°. A signal is output every 10 pulses in full step mode and every 20 pulses in half step mode. (When the "Excitation Timing" signal is output, the transistor turns ON.)

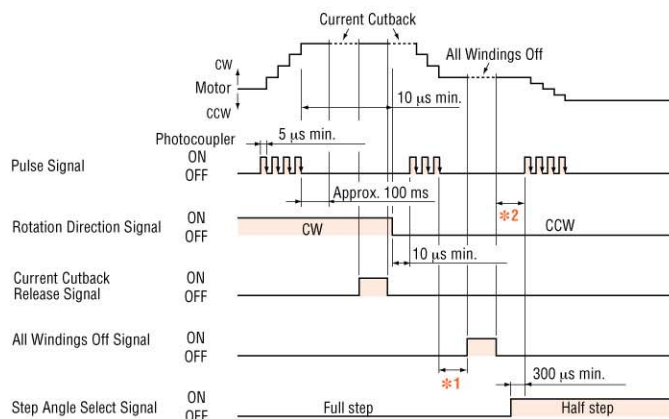
Overheat Output Signal

The Overheat signal is output to protect the driver from heat damage if the internal temperature of the driver rises above 194°F (90°C). At the same time this signal is output, the O.H.LED on the circuit board is lit up. The O.HEAT signal is automatically turned off when the temperature of the driver heat sink falls to below 194°F (90°C). (The O.HEAT signal returns to the "photocoupler OFF" state, and O.H.LED turns off.)

● Timing Chart

◆ CSK54□, CSK56□

CSK543-TG, CSK564-TG



Note:

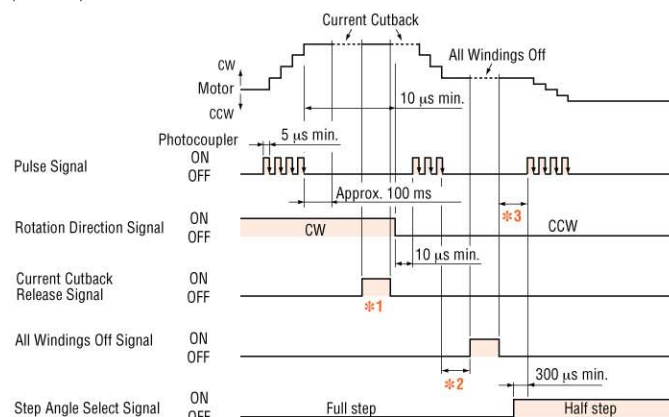
10 μs or more is the standard interval time for switching from CW to CCW. Note that the interval time varies greatly depending on the motor and load inertia.

- *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" signal to "photocoupler OFF" state or the motor may lose synchronism. In general, a minimum interval of 300 μs is required.

The shaded area indicates when the photocoupler is ON.

◆ CSK59□

• 1-pulse input mode

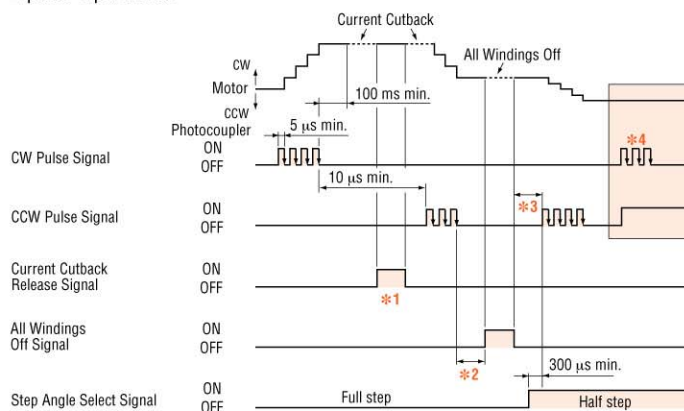


Note:

10 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 When the signal is in the "photocoupler ON" state, the "Automatic Current Cutback" function is deactivated. Always set it in the "photocoupler OFF" state when the pulse signal is stopped.
- *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 μs is required.

• 2-pulse input mode



- *4 The motor will not operate properly if a pulse signal is input when either the CW or CCW input "photocoupler ON" state.

The shaded area indicates when the photocoupler is ON.

● Adjusting the Output Current

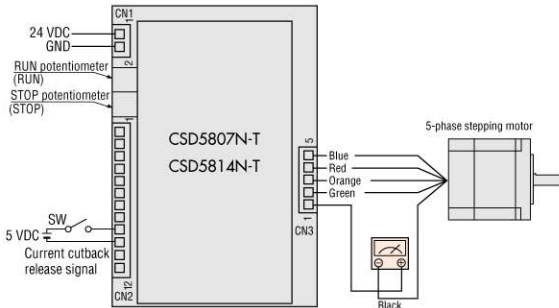
The rated output current is set at the factory. When it is necessary to change the current setting, follow the procedures described below.

◆ Connecting an Ammeter

CSK54□, CSK56□

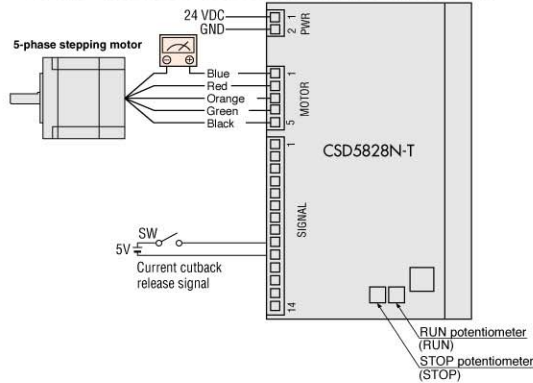
CSK543□A-TG, CSK564□A-TG□

Connect a DC ammeter between the motor and terminal ① of CN3 connector as shown below.



CSK59□

Connect a DC ammeter between the motor and terminal ① of the "MOTOR" connector as shown below.



- After connecting the DC ammeter to the motor, turn on the power. (The excitation status at this point is fixed.)
- When the power is turned on, the motor enters a 4 phase excitation state, and +directional positive current flows through the **CSK54□, CSK56□**-black, **CSK59□**-blue motor lead wire. (Even if 4-5 phase excitation has been selected, the motor enters a 4 phase excitation state when the power is turned on. Adjust the current in this state.)
- The value measured by the ammeter represents the total current in two phases. The current for one phase is equivalent to half of the ammeter value. (When setting the current to 1.0 A/phase, adjust the current level until the ammeter reads 2.0 A.)

Notes:

- Never input pulse signals.
- Select "photocoupler OFF" for "All Windings Off" signal. (Select "photocoupler OFF" when the switch is open.)
- When the RUN current is adjusted, the current at motor standstill also changes.

◆ Adjusting the Motor Running Current

Set the "Current Cutback Release" signal to the "photocoupler ON" state (SW: ON) when adjusting the RUN current.

(1) Adjust the motor RUN current with the RUN potentiometer.

Adjusting range

CSD5807N-T: 0.1 A/phase to 0.75 A/phase

CSD5814N-T: 0.1 A/phase to 1.4 A/phase

CSD5828N-T: 1.0 A/phase to 2.8 A/phase

(2) The motor operating current is set for rated current (CSD5807N-T: 0.75 A/phase, CSD5814N-T: 1.4 A/phase, CSD5828N-T: 2.8 A/phase) at the time of shipping, but it can be readjusted using the RUN potentiometer. The operating current can be lowered to suppress temperature rise in the motor/driver, or lower running current in order to allow a margin for motor torque or to reduce vibration.

Note:

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

◆ Adjusting the Current at Motor Standstill

Set the "Current Cutback Release" signal to the "photocoupler OFF" state (SW: OFF) when adjusting the current while the motor is stopped.

(1) Adjust the current at motor standstill with the STOP potentiometer.

Adjusting range

CSD5807N-T: 0.1 A/phase to 0.6 A/phase

CSD5814N-T: 0.1 A/phase to 1.05 A/phase

CSD5828N-T: 0.7 A/phase to 2.3 A/phase

(2) At the time of shipping, the current at motor standstill is set for half the rated current. (CSD5807N-T: 0.375 A/phase, CSD5814N-T: 0.7 A/phase, CSD5828N-T: 1.4 A/phase). The STOP potentiometer can be used to readjust the current at motor standstill to the current value required to produce enough holding torque.

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

List of Motor and Driver Combinations

Type	Model	Motor Model	Driver Model
Standard	CSK543-N□TA	PK543N□WA	CSD5807N-T
	CSK544-N□TA	PK544N□WA	
	CSK545-N□TA	PK545N□WA	
	CSK564-N□TA	PK564N□WA	CSD5814N-T
	CSK566-N□TA	PK566N□WA	
	CSK569-N□TA	PK569N□WA	
	CSK596-N□TA	PK596-N□A	CSD5828N-T
	CSK599-N□TA	PK599-N□A	
	CSK5913-N□TA	PK5913-N□A	
TH Geared	CSK543□A-TG3.6	PK543N□WA-T3.6	CSD5807N-T
	CSK543□A-TG7.2	PK543N□WA-T7.2	
	CSK543□A-TG10	PK543N□WA-T10	
	CSK543□A-TG20	PK543N□WA-T20	
	CSK543□A-TG30	PK543N□WA-T30	
	CSK564□A-TG3.6	PK564N□WA-T3.6	CSD5814N-T
	CSK564□A-TG7.2	PK564N□WA-T7.2	
	CSK564□A-TG10	PK564N□WA-T10	
	CSK564□A-TG20	PK564N□WA-T20	
	CSK564□A-TG30	PK564N□WA-T30	

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