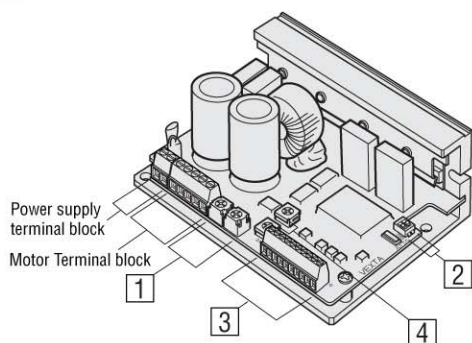


Connection and Operation



1 Current Adjustment Potentiometer

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

2 Function Select Switches

Indicator	Switch Name	Function
2P/1P	Pulse input mode switch	Switch between 1-pulse input mode and 2-pulse input mode.
C.C./OFF	DC check switch	Adjusts the motor's running current. When running current the motor, always have this switch set to OFF. The factory setting is OFF

3 Input/Output Signal

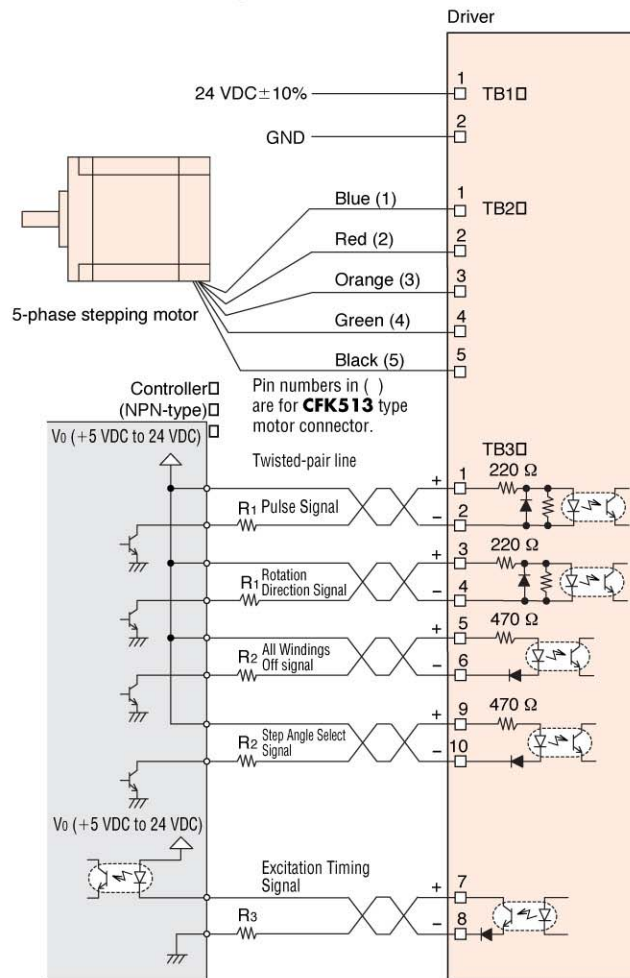
Indicator	Input/Output	Terminal No.	Signal Name
TB3	Input signal	1	Pulse Signal (CW Pulse Signal)
		2	
		3	Rotation Direction Signal (CCW Pulse Signal)
		4	
		5	All Windings Off Signal
		6	
	Output signal	7	Excitation Timing Signal
	Input signal	8	
		9	Step Angle Select Signal
		10	

4 Resolution Select Switches

Indicator	Switch Name	Function
DATA1	Step Angle Select Switch	Each switch can be set to the desired resolution from the 16 resolution levels.
DATA2		

Step Angle	Resolution	Step Angle Select Switch (Common to DATA 1 and DATA 2)
0.72°	1	0
0.36°	2	1
0.288°	2.5	2
0.18°	4	3
0.144°	5	4
0.09°	8	5
0.072°	10	6
0.036°	20	7
0.0288°	25	8
0.018°	40	9
0.0144°	50	A
0.009°	80	B
0.0072°	100	C
0.00576°	125	D
0.0036°	200	E
0.00288°	250	F

● Connection Diagrams



Notes:

- Keep the input single voltage V_o between 5 VDC and 24 VDC.
When V_o is equal to 5 VDC, the external resistances R_1 and R_2 are not necessary. When V_o is above 5 VDC, connect R_1 and R_2 to keep the current as follows:
Pulse, Rotation Direction: 10 mA to 20 mA max.
All Windings Off, Step Angle Select: 10 mA to 15 mA max.
- Keep the output signal voltage V_o between 5 VDC and 24 VDC.
When V_o is equal to 5 VDC, the external resistance R_3 is not necessary. When it is above 5 VDC, connect R_3 to keep the current below 10 mA max.
- Use twisted-pair wire of AWG 24 to AWG 22 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 decreases. (→ Technical Reference Page F-36)
- Suitable wire size for the TB1, TB2 and TB3 terminal block is between AWG20 and AWG26. Use AWG 20 for standard type (DFC5103T, DFC5107T, DFC5114T) and AWG 20 to AWG 18 for high-speed type (DFC5128T) for power supply lines.
- Use spot grounding to ground the driver and external controller.
- 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.
- 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 and Rotation Direction Input

1-Pulse Input Mode

Pulse 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

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 counter-clockwise 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 (A.W. OFF) Input

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 the manual home position.

Step Angle Select (C/S) Input

When the "Step Angle Select" signal is in the "photocoupler OFF" state, the step angle set by step resolution select switch DATA1 is selected, and when the "Step Angle Select" signal is in the "photocoupler ON" state, the step angle set by step resolution select switch DATA2 is selected. This signal can be used to change the motor speed or amount of rotation without altering the input pulses.

Excitation Timing (TIMING) Output

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° .

0.72°/step (resolution 1): Signal is output once every 10 pulses.

0.072°/step (resolution 10): Signal is output once every 100 pulses.

● Step Angle Selection

With the **CFK II** Series, the motor speed and step distance can be changed without changing the input pulse frequency by switching the step angle switch. The step angle is set with step angle setting switches DATA1 and DATA2. DATA1 and DATA2 each have 16 settings from which one step angle each can be selected. The step angles that can be set are shown in the table below.

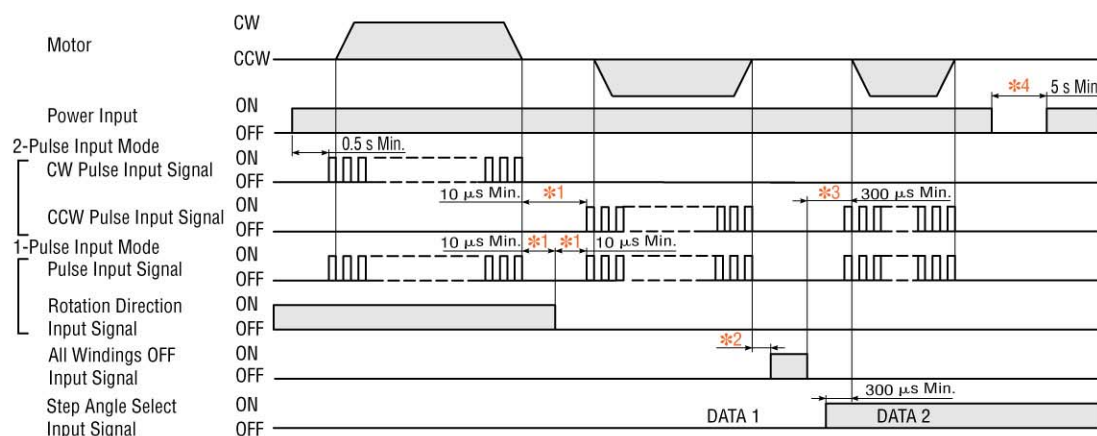
DATA1 and DATA2 are set to the scale corresponding to the step angle selected for each. The step angle is changed with the step angle select signals.

Photocoupler "OFF": The step angle set with DATA1 is selected.

Photocoupler "ON": The step angle set with DATA2 is selected.

Step Angle	Resolution	Step Angle Select Switch (Common to DATA 1 and DATA 2)
0.72°	1	0
0.36°	2	1
0.288°	2.5	2
0.18°	4	3
0.144°	5	4
0.09°	8	5
0.072°	10	6
0.036°	20	7
0.0288°	25	8
0.018°	40	9
0.0144°	50	A
0.009°	80	B
0.0072°	100	C
0.00576°	125	D
0.0036°	200	E
0.00288°	250	F

● Timing Chart



The shaded section indicates that the photocoupler is on. □

- *1 Switching time to change CW, CCW pulse (2-pulse input mode), and switching time to change direction (1-pulse input mode) 10 μ sec is shown as a response time of circuit. The motor may need more time.
- *2 Depends on load inertia, load torque, and starting frequency.
- *3 Never input a step pulse signal immediately after switching the "All Winding Off" signal to the photocoupler off state. The motor may not start.
- *4 Wait at least 5 seconds before turning on the power.

■ Adjusting the Current

● Adjusting the Motor Current

Use the "RUN" potentiometer to decrease the current and suppress the temperature rise in the motor/driver, or when there is sufficient motor torque and you want to suppress vibration by lowering the current.

Use the "STOP" potentiometer to readjust the current at motor standstill in relation to the holding-brake force of the motor.

Factory settings

Running current: Rated current

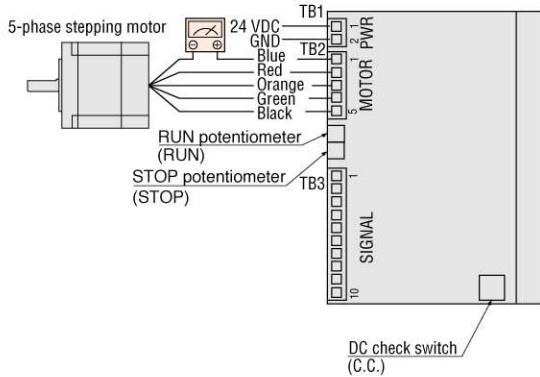
Current at motor standstill: Approx. 50% of rated current

Follow the procedure below to adjust the motor current.

1 Connecting an Ammeter

Connect a DC ammeter as illustrated below.

Connect an ammeter between pin ① of TB2 connector and the motor. Set all driver input signals to the "photocoupler OFF" state.



Note:

- Do not input pulse signals.

2 Adjusting the Motor Running Current

To adjust the motor running current, follow the procedure below:

1. Set the current-checking switch to the "photocoupler ON" state. Keep other signals in the "photocoupler OFF" state.
2. Turn on the power to the driver.
3. Use the "RUN" potentiometer to adjust the motor's running current.
4. When the power is turned on, the value measured by the ammeter represents the total current in two phases through the blue motor lead wire. The current for one phase is equivalent to one-half the ammeter value. (Example: To set the current to 1.0 A/phase, adjust the current level until the ammeter reads 2.0 A.)
5. When the running current has been adjusted, set the current-checking switch back to the "photocoupler OFF" state.

Notes:

- Be sure to use the motor at the rated current or below.
- Adjusting the running current will also change the current at standstill.

3 Adjusting the Current at Motor Standstill

To adjust the current at motor standstill, follow the procedure below:

1. Set the current-checking switch to the "photocoupler OFF" state. Keep other signals in the "photocoupler OFF" state.
2. Turn on the power to the driver.
3. Use the "STOP" potentiometer to adjust the motor's running current.
4. When the power is turned on, the value measured by the ammeter represents the total current in two phases through the blue motor lead wire. The current for one phase is equivalent to one-half the ammeter value. (Example: To set the current to 1.0 A/phase, adjust the current level until the ammeter reads 2.0 A.)

$$\text{Holding Torque [oz-in (N-m)]} = \frac{\text{Maximum Holding Torque} \times \text{Current at Standstill [A]} [\text{oz-in (N-m)}]}{\text{Motor rated current [A]}}$$

Notes:

- Always set the running current first, turn off the driver power and turn it back on, and then set the current at standstill. Setting the running current after current at standstill may change the current setting at standstill.
- Setting the current at motor standstill too low may affect the starting of the motor or the position-holding action.

List of Motor and Driver Combinations

Type	Model	Motor Model	Driver Model
Standard P Type	CFK513P <input type="text"/> T	PK513P <input type="text"/>	DFC5103T
Standard	CFK533 <input type="text"/> T	PMM33 <input type="text"/> H2	DFC5107T
	CFK535 <input type="text"/> T	PMM35 <input type="text"/> H2	
	CFK543 <input type="text"/> T	PK543N <input type="text"/> WA	
	CFK544 <input type="text"/> T	PK544N <input type="text"/> WA	
	CFK545 <input type="text"/> T	PK545N <input type="text"/> WA	
	CFK564 <input type="text"/> T	PK564N <input type="text"/> WA	DFC5114T
	CFK566 <input type="text"/> T	PK566N <input type="text"/> WA	
	CFK569 <input type="text"/> T	PK569N <input type="text"/> WA	
High Speed	CFK566H <input type="text"/> T	PK566H-N <input type="text"/> A	DFC5128T
	CFK569H <input type="text"/> T	PK569H-N <input type="text"/> A	
	CFK596H <input type="text"/> T	PK596-N <input type="text"/> A	
	CFK599H <input type="text"/> T	PK599-N <input type="text"/> A	
	CFK5913H <input type="text"/> T	PK5913-N <input type="text"/> A	

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