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Find the *Oriental Motor CSD2112-P-C8* at our website: *Click HERE*

Common Specifications

Driver Specifications

Driver Model		CSD2109-P	CSD2112-P	CSD2120-P	CSD2120P2	CSD2130P	CSD2140P	CSD2145P
Power Source Input*1		24 VDC±10%1.4 A or 36 VDC±10%1.4 A	24 VDC±10%1.6 A or 36 VDC±10%1.6 A	24 VDC±10%2.8 A or 36 VDC±10%2.8 A	24 VDC±10% 2.5 A	24 VDC±10% 3.5 A	24 VDC±10% 5 A	24 VDC±10% 5.5 A
Output Current	A/Phase	0.95	1.2	2.0	2.0	3.0	4.0	4.5
Excitation Mode	At Full Step	●Standard, Standard **P**, High-Inertia, **SH** Geared Type: 1.8°(2 phases excitation) ●High-Resolution Type: 0.9°(2 phases excitation)			1.8°(2 phases excitation)			
	At Half Step	●Standard, Standard **P**, High-Inertia, **SH** Geared Type: 0.9°(1-2 phases excitation) ●High-Resolution Type: 0.45°(1-2 phases excitation)			0.9°(1-2 phases excitation)			
Indicators (LED)		Power Source Input (Green)			—			
Cooling Method		Natural ventilation						
Mass	kg	0.12			0.2			
Ambient Temperature		0°C～+40°C (nonfreezing)						
Input Signals	Input Mode	Photocoupler input, Input resistance: 220 Ω, Input current: 10 ～ 20 mA Photocoupler ON: +4.5 ～ +5 V, OFF: 0 ～ +1 V (Voltage between terminals)						
	CW Pulse Signal (Pulse Signal*2)	CW direction operation command pulse signal (Operation command pulse signal when in 1-pulse input mode) Pulse width: 5 μs minimum; Pulse rise/fall: 2 μs maximum, Pulse duty: 50% and below The motor moves one step when the pulse input is switched from photocoupler ON to OFF. Maximum input pulse frequency: 10 kHz (When the pulse duty is 50%) Negative logic pulse input 20 kHz for CSD2120P2, CSD2130P, CSD2140P, CSD2145P (When the pulse duty is 50%)						
	CCW Pulse Signal (Rotation Direction Signal*2)	CCW direction operation command pulse signal (Rotation direction signal when in 1-pulse input mode Photocoupler OFF: CCW, Photocoupler ON: CW) Pulse width: 5 μs minimum; Pulse rise/fall: 2 μs maximum, Pulse duty: 50% and below The motor moves one step when the pulse input is switched from photocoupler ON to OFF. Maximum input pulse frequency: 10 kHz (When the pulse duty is 50%) Negative logic pulse input 20 kHz for CSD2120P2, CSD2130P, CSD2140P, CSD2145P (When the pulse duty is 50%)						
	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 output current set by the RUN potentiometer is supplied to the motor.						
Output Signals	Output Mode	Photocoupler, Open-Collector Output External use condition: 24 VDC maximum, 10 mA maximum						
	Excitation Timing Signal	The signal is output every time the excitation sequence returns to the initial stage "0". (Photocoupler: ON) Full step: signal output every 4 pulses, Half step: signal output every 8 pulses						
Functions		Automatic Current Cutback, Setting Current Monitor Output*2, Step Angle Switch, Pulse Input Mode Switch*2, Power Supply Voltage Switch*2						

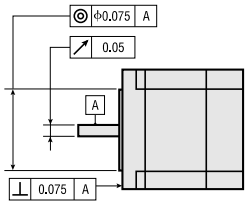
*1 Power source input current is the maximum input current value of the driver. (The value changes with pulse speed.) See Speed-Torque Characteristics for details.
*2 Only for CSD2109-P, CSD2112-P, CSD2120-P

General Specifications

Specifications		Motor	Driver
Insulation Class		Class B (130°C)	—
Insulation Resistance		100 MΩ minimum under normal temperature and humidity, when measured by a 500 VDC megger between the windings and motor casing.	—
Dielectric Strength		Sufficient to withstand 1.0 kV, 50 Hz or 60 Hz applied between the motor coils and casing for one minute, under normal temperature and humidity. (0.5 kV for models with frame size 42 mm or smaller.)	—
Operating Environment (In Operation)	Ambient Temperature	−10°C～+50°C (nonfreezing)	0°C～+40°C (nonfreezing)
	Ambient Humidity	85% or less (noncondensing)	
	Atmosphere	No corrosive gases, dust, water or oil.	
Temperature Rise		Temperature rise of the coil measured by the change resistance method is 80°C or less. (at rated current, at standstill, two phases energized)	—
Static Angle Error*1		±3 arc minutes (±0.05°) [**CSK26□J**: ±2 arc minutes (±0.034°)]	—
Shaft Runout		0.05 T.I.R.(mm)*4	—
Radial Play*2		0.025 mm max. of 5 N	—
Axial Play*3		0.075 mm max. of 10 N	—
Concentricity		0.075 T.I.R.(mm)*4	—
Perpendicularity		0.075 T.I.R.(mm)*4	—

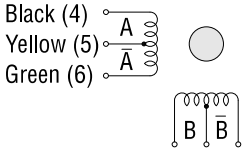
*1 This value is for full step under no load. (The value changes with the size of the load.)
*2 Radial Play: Displacement in shaft position in the radial direction, when a 5 N load is applied in the vertical direction to the tip of the motor's shaft.
*3 Axial Play: Displacement in shaft position in the axial direction, when a 10 N 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.



Inner Connection Diagram for Motor

Connection Diagram (Common)



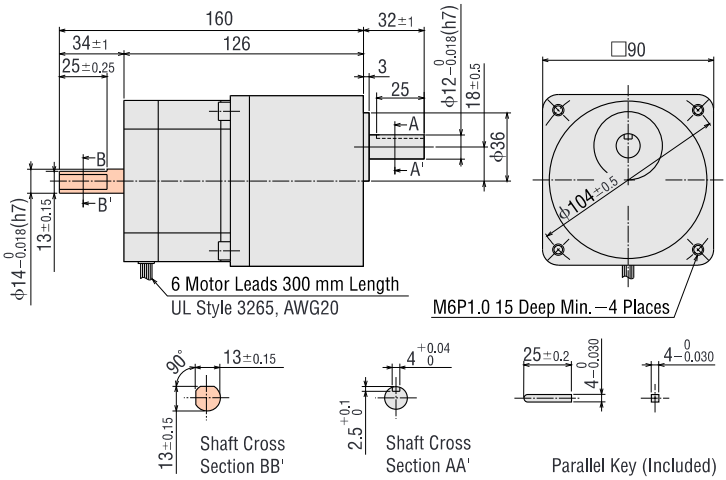
Red	White	Blue	Lead Wire Type	Color of Lead
(3)	(2)	(1)	Connector Type	Pin No.

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12 □90 mm

Model	Motor Model	Mass (kg)	CAD
CSK296AP-SG□	PK296A2-SG□	2.8	B242
CSK296BP-SG□	PK296B2-SG□		

●Screws (Included)
M6 P1.0 Length 18 mm ··· 4 Pieces

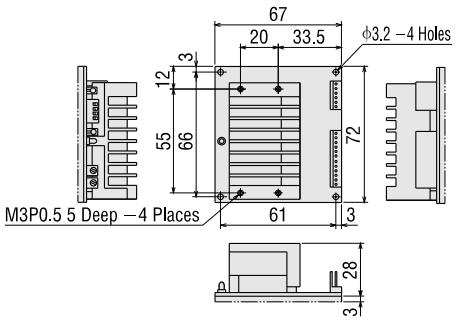


●Enter the gear ratio in the box (□) within the model name.
●These dimensions are for double shaft models. For single shaft models, ignore the shaded areas.

●Driver

13 Driver Model: CSD2109-P, CSD2112-P, CSD2120-P

Mass: 0.12 kg CAD B093

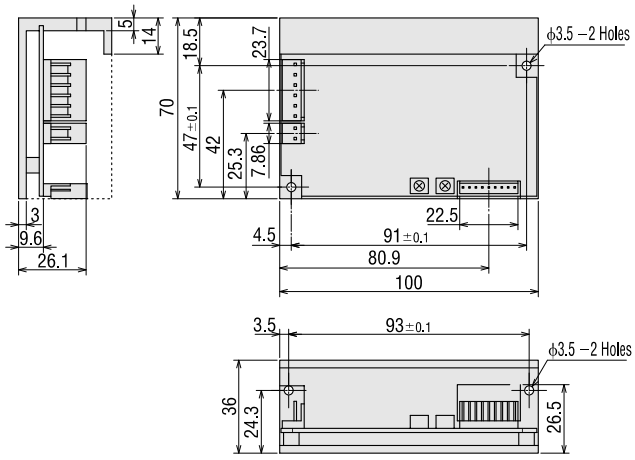


●Connector Housing: 1-171822-2 (AMP) (1 Piece, included)
171822-6 (AMP) (1 Piece, included)
●Contact: 170204-2 (AMP) (20 Pieces, included)
Be sure to use the included connector for signal and motor. When assembling the connectors, use the hand-operated crimp tool for contact 189509-1 (AMP). The crimp tool is not provided with the package.

●Optional cables crimped with connector are available.
Optional cables ➜ Page C-191

14 Driver Model: CSD2120P2, CSD2130P CSD2140P, CSD2145P

Mass: 0.2 kg CAD B336



●Connector Housing: 171822-9 (AMP) (1 Piece, included)
VHR-6N (JST) (1 Piece, included)
VHR-2N (JST) (1 Piece, included)
●Contact: 170204-2 (AMP) (9 Pieces, included)
BVH-21T-P1.1 (JST) (8 Pieces, included)
Be sure to use the included connector for signal and motor. When assembling the connectors, use the hand-operated crimp tool for contact 189509-1 (AMP) and YC-160R (JST). The crimp tool is not provided with the package.

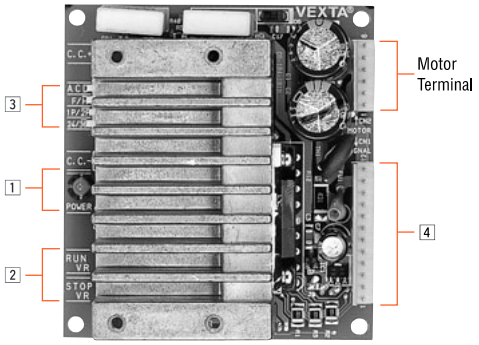
●Optional cables crimped with connector are available.
Optional cables ➜ Page C-191

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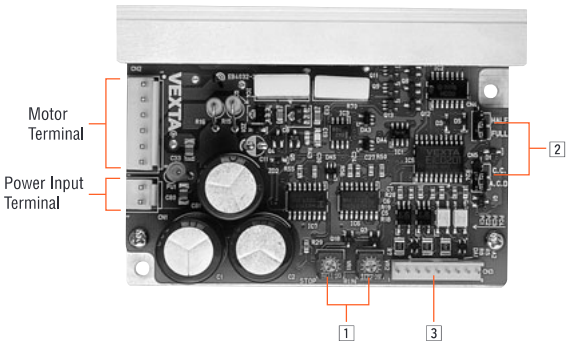
Connection and Operation

Names and Functions of Driver Parts

CSD2109-P
CSD2112-P
CSD2120-P



CSD2120P2
CSD2130P
CSD2140P
CSD2145P



1 Signal Monitor Display

Indication	Color	Name
POWER	Green	Power input display

2 Current Adjustment Potentiometers

Indication	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 current at motor standstill

3 Function Select Switches

Indication	Switch Name	Function
ACD	Automatic Current Cutback Function Switch	Enables or disables automatic current cutback function.
F/H	Step Angle Select Switch	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 Switch	Switches between 1-pulse input and 2-pulse input.
24V/36V	Power Supply Voltage Select Switch	Changes power supply voltage. For 24 VDC and 36 VDC

4 Input /Output Signals

Indication	Input / Output	Pin No.	Signal Name	Function
CN1 SIGNAL	Input Signals	1	CW Pulse Signal (Pulse Signal)	The motor will rotate in the CW direction. (Operation command pulse signal when in 1-pulse input mode)
		2		
		3	CCW Pulse Signal (Rotation Direction Signal)	The motor will rotate in the CCW direction. (Rotation direction signal, Photocoupler ON: CW; Photocoupler OFF: CCW when in 1-pulse input mode)
		4		
		5	All Windings Off Signal	Cuts the output current to the motor and allows the motor shafts to be rotated by external force.
		6		
	Output Signal	7	Excitation Timing Signal	Outputs signals when the excitation sequence is at STEP "0".
		8		
	Power Supply Input	11	Power+	
		12	GND	

1 Current Adjustment Potentiometers

Indication	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 current at motor standstill

2 Function Select Switches

Indication	Switch Name	Function
C.C. ACD	Automatic current cutback function jumper socket	Enables or disables automatic current cutback function.
FULL HALF	Step angle select jumper socket	Switches the motor's step angle (Full Step/Half Step).

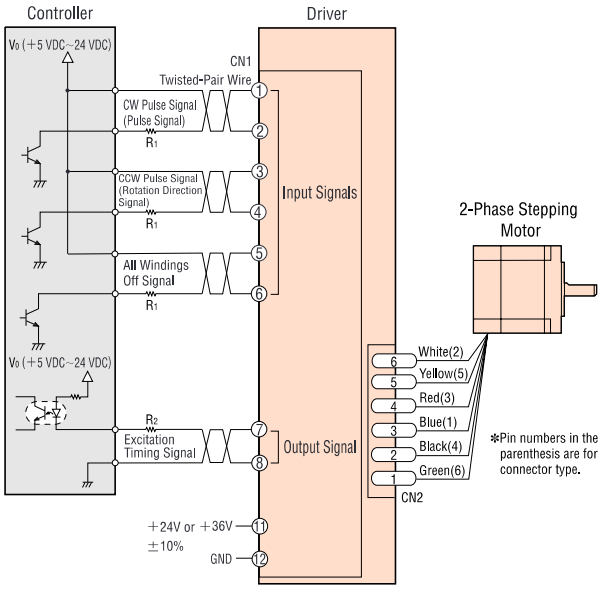
3 Input /Output Signals

Indication	Input / Output	Pin No.	Signal Name	Function
CN3 SIGNAL	Input Signals	1	CW Pulse Signal	The motor will rotate in the CW direction.
		2		
		3	CCW Pulse Signal	The motor will rotate in the CCW direction.
		4		
		5	All Windings Off Signal	Cuts the output current to the motor and allows the motor shafts to be rotated by external force.
		6		
	Output Signal	7	Excitation Timing Signal	Outputs signals when the excitation sequence is at STEP "0".
		8		

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●Connection Diagrams

CSD2109-P
CSD2112-P
CSD2120-P



◇Connecting Input/Output Signal

- Keep the input single voltage Vo between 5 VDC and 24 VDC.
  When Vo is equal to 5 VDC, the external resistances R_1 is not necessary. When Vo is above 5 VDC, connect R_1 to keep the current between 10 mA and 20 mA.
- Keep the output signal voltage Vo between 5 VDC and 24 VDC, current 10 mA or below.
  When Vo is above 10 mA, connect R_2 to keep the current below 10 mA.

◇Power Supply

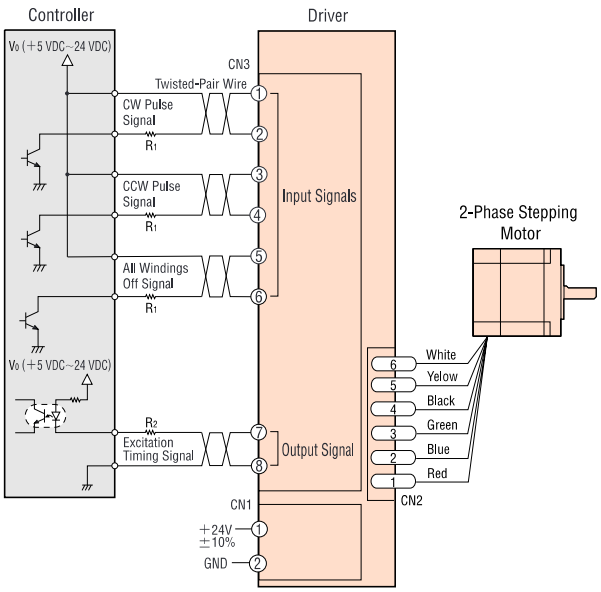
Use a power supply that can supply sufficient input current. When power supply capacity is insufficient, a decrease in motor output can cause the following malfunctions:

- Motor does not rotate properly at high-speed (insufficient torque).
- Slow motor startup and stopping.

◇Notes:

- Use twisted-pair wire of AWG 22~20 (0.3 mm²~0.5 mm²) or and 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 G-35)
- Use AWG 22~20 (0.3 mm²~0.5 mm²) or thicker for motor lines.
- When assembling the connectors, use the hand-operated crimp tool for contact or the crimped optional cable (sold separately). The crimp tool is not provided with the package. They must be furnished separately.
- Signal lines should be kept at least 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 power on.

CSD2120P2
CSD2130P
CSD2140P
CSD2145P



◇Connecting Input/Output Signal

- Keep the input single voltage Vo between 5 VDC and 24 VDC.
  When Vo is equal to 5 VDC, the external resistances R_1 is not necessary. When Vo is above 5 VDC, connect R_1 to keep the current between 10 mA and 20 mA.
- Keep the output signal voltage Vo between 5 VDC and 24 VDC, current 10 mA or below.
  When Vo is above 10 mA, connect R_2 to keep the current below 10 mA.

◇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 rotate properly at high-speed (insufficient torque).
- Slow motor startup and stopping.

◇Notes:

- Use twisted-pair wire of AWG 22~20 (0.3 mm²~0.5 mm²) or and 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 G-35)
- Use AWG 20~18 (0.5 mm²~0.75 mm²) for motor lines.
- When assembling the connectors, use the hand-operated crimp tool for contact or the crimped optional cable (sold separately). The crimp tool is not provided with the package. They must be furnished separately.
- Signal lines should be kept at least 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 power on.

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●Description of Input/Output Signals

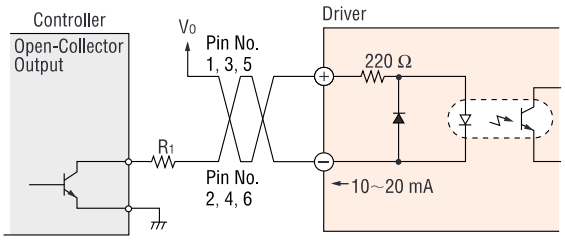
Indication of Input/Output Signal "ON""OFF"

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.

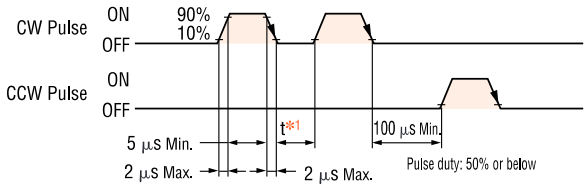
Photocoupler OFF ON

[CW (Pulse) and CCW (Rotation Direction) Pulse /All Windings Off Signal Input Signal]

◇Input Circuit and Sample Connection



◇Pulse Waveform Characteristics



●The shaded area indicates when the photocoupler diode is ON. The motor moves when the photocoupler state changes from ON to OFF.
●The minimum interval time when changing rotation direction is 100 μs. This value varies greatly depending on the motor type and load inertia.
*1 CSD2109-P, CSD2112-P, CSD2120-P: 50 μs Min.
CSD2120P2, CSD2130P, CSD2140P, CSD2145P: 25 μs Min.

◇Pulse Signal Characteristics

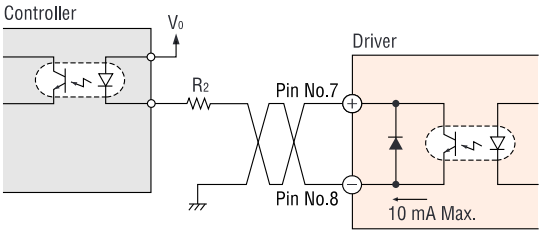
●Keep the pulse signal at the "photocoupler OFF" state when no pulses are being input.
●Do not input a CW pulse and CCW pulse simultaneously.
●In 1-pulse input mode, leave the pulse signal at rest ("photocoupler OFF") when changing rotation directions.

◇All Windings Off (C.OFF) Input Signal

●Inputting this signal puts the motor in a non-excitation (free) state.
●This signal is used when moving the motor by external force or manual home position is desired. The photocoupler must be "OFF" when operating the motor.
●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° (Geared Type: ±3.6° /Gear Ratio) from the position set after the "All Windings Off" signal is released.

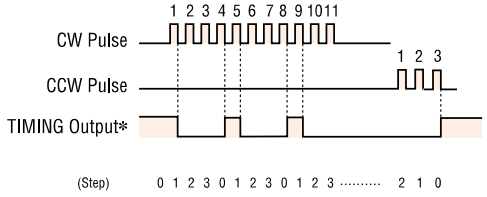
[Excitation Timing (TIMING) Output Signal]

◇Output Circuit and Sample Connection



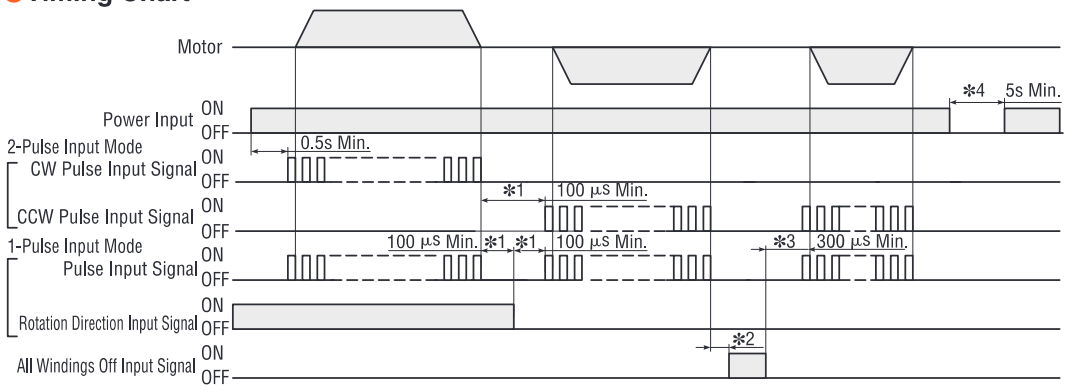
●The "Excitation Timing" signal is output to indicate when the motor excitation (current flowing through the winding) is in the initial stage (step "0" at power up).
●The "Excitation Timing" signal is output simultaneously with a pulse input each time the excitation sequence returns to step "0". The excitation sequence will complete one cycle for every 7.2° rotation of the motor output shaft.
Full Step: Signal is output once every 4 pulses.
Half Step: Signal is output once every 8 pulses.

Timing chart at 1.8°/step
*When connected as shown in the example connection, the signal will be "photocoupler ON" at step "0".



Note:
●When power is turned ON, the excitation sequence is reset to step "0" and the TIMING signal will be output.

●Timing Chart



*1 Switching time to change CW, CCW pulse (2-pulse input mode), and switching time to change direction (1-pulse input mode) 100 μs 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 Windings Off" signal to the "photocoupler OFF" state. The motor may not start.
*4 Wait at least 5 seconds before turning on the power.

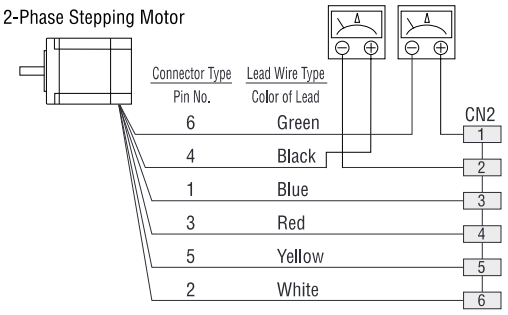
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Adjusting the Output Current

●CSD2109-P, CSD2112-P, CSD2120-P

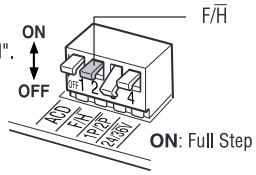
Connecting an Ammeter

Connect the driver, motor and DC ammeter.

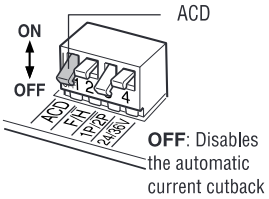


◇Motor Running Current

1.Set the step angle to full step.
Set the step angle switch (F/H) to "ON".

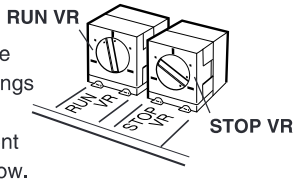


2.Disable the automatic current cutback function.
Set the automatic current cutback function switch (ACD) to "OFF".



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.
When setting with an ammeter, 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.



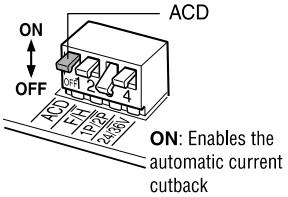
Example: When the DC ammeter readings indicate 0.5 A and 0.45 A respectively, the output current per motor phase is 0.95 A.

When setting with a tester, the tester readings indicate the current per motor phase.

Example: When the tester readings indicate 0.95 V, the output current per motor phase is 0.95 A.

5.Turn off the power supply.

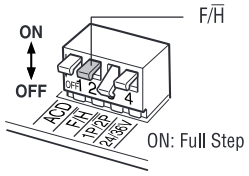
6.Set the automatic current cutback function switch (ACD) to "ON" again.



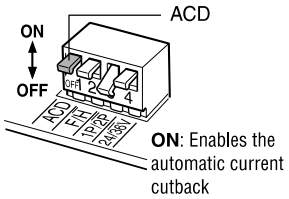
This completes the adjustment of the motor running current.

◇Motor Standstill Current

1.Set the step angle to full step.
Set the step angle switch (F/H) to "ON".



2.Enable the automatic current cutback function.
Set the automatic current cutback function (ACD) to "ON".



3. Turn on the power supply.
Wait until the motor reaches its standstill current.

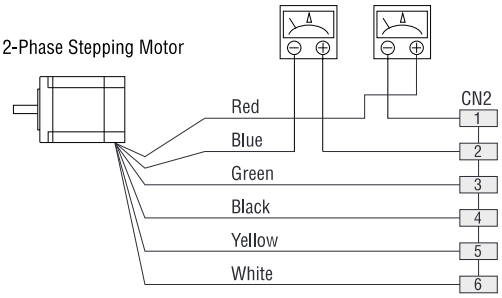
4.Manipulate the potentiometer for adjusting the motor standstill current (STOP VR).
Adjust the potentiometer using an insulated screwdriver.
The sum of the two DC ammeter readings indicates the current per motor phase. Be sure to adjust the current to 40 percent of the motor's rated current or below.

5.Turn off the power supply.
This completes the adjustment of the motor standstill current.

●CSD2120P2, CSD2130P, CSD2140P, CSD2145P

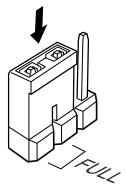
Connecting an Ammeter

Connect the driver, motor and DC ammeter.

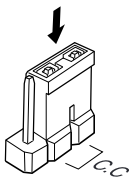


◇Motor Running Current

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



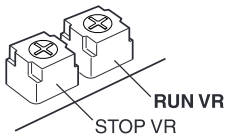
2.Disable the automatic current cutback function.
Set the jumper socket for automatic current cutback function (C.C./A.C.D.) to "C.C.".



3.Turn on the power supply.
Wait until the motor reaches its operating current.

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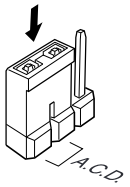
4.Manipulate the potentiometer for adjusting the motor operating current (RUN VR).
Adjust the potentiometer using an insulated screwdriver.
The sum of the two DC ammeter readings indicates the current per motor phase. Be sure to adjust the current to the motor's rated current or below.



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.

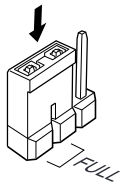
6.Enable the automatic current cutback function.
Set the jumper socket for automatic current cutback function (C.C./A.C.D.) to "A.C.D.".



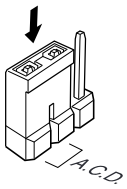
This completes the adjustment of the motor running current.

◇Motor Standstill Current

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

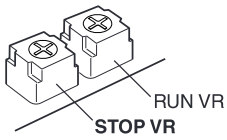


2.Enable the automatic current cutback function.
Set the jumper socket for automatic current cutback function (C.C./A.C.D.) to "A.C.D.".



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

Model names for motor and driver combinations are shown below.

Type	Model	Motor Model	Driver Model
Standard **P** Type	**CSK223PAP**	PK223PA*1	CSD2109-P
	CSK223PBP	PK223PB*1	
	CSK224PAP	PK224PA*1	
	CSK224PBP	PK224PB*1	
	CSK225PAP	PK225PA*1	
	CSK225PBP	PK225PB*1	
	CSK233PAP	PK233PA*1	CSD2112-P
	CSK233PBP	PK233PB*1	
	CSK235PAP	PK235PA*1	
	CSK235PBP	PK235PB*1	
	CSK244PAP	PK244PA*1	CSD2112-P
	CSK244PBP	PK244PB*1	
	CSK246PAP	PK246PA*1	
	CSK246PBP	PK246PB*1	
Standard Type	**CSK243-AP**	PK243-01A	CSD2109-P
	CSK243-BP	PK243-01B	
	CSK244-AP	PK244-01A	CSD2112-P
	CSK244-BP	PK244-01B	
	CSK245-AP	PK245-01A	
	CSK245-BP	PK245-01B	
	CSK256-AP	PK256-02A	CSD2120-P
	CSK256-BP	PK256-02B	
	CSK258-AP	PK258-02A	
	CSK258-BP	PK258-02B	
	CSK264-AP	PK264-02A	CSD2120-P
	CSK264-BP	PK264-02B	
	CSK266-AP	PK266-02A	
	CSK266-BP	PK266-02B	
	CSK268-AP	PK268-02A	
	CSK268-BP	PK268-02B	
	CSK296-AP	PK296-03A	CSD2145P
	CSK296-BP	PK296-03B	
	CSK299-AP	PK299-03A	
	CSK299-BP	PK299-03B	
	CSK2913-AP	PK2913-02A	

Type	Model	Motor Model	Driver Model
High-Resolution Type	**CSK243MAP**	PK243MA	CSD2109-P
	CSK243MBP	PK243MB	
	CSK244MAP	PK244MA	CSD2112-P
	CSK244MBP	PK244MB	
	CSK245MAP	PK245MA	
	CSK245MBP	PK245MB	
	CSK264MAP	PK264MA	CSD2120-P
	CSK264MBP	PK264MB	
	CSK266MAP	PK266MA	
	CSK266MBP	PK266MB	
	CSK268MAP	PK268MA	
	CSK268MBP	PK268MB	
High-Inertia Type	**CSK264JAP**	PK264JA	CSD2120P2
	CSK264JBP	PK264JB	
	CSK266JAP	PK266JA	
	CSK266JBP	PK266JB	
	CSK267JAP	PK267JA	
	CSK267JBP	PK267JB	
	CSK269JAP	PK269JA	
	CSK269JBP	PK269JB	
SH Geared Type	**CSK223AP-SG□***2	PK223PA-SG□*1*2	CSD2109-P
	CSK223BP-SG□*2	PK223PB-SG□*1*2	
	CSK243AP-SG□*3	PK243A1-SG□*3	CSD2109-P
	CSK243BP-SG□*3	PK243B1-SG□*3	
	CSK264AP-SG□*3	PK264A2-SG□*3	CSD2120-P
	CSK264BP-SG□*3	PK264B2-SG□*3	
	CSK296AP-SG□*4	PK296A2-SG□*4	CSD2130P
	CSK296BP-SG□*4	PK296B2-SG□*4	

●Enter the gear ratio in the box (□) within the model name.
*1 If you are purchasing only a motor for maintenance purpose, etc., motor cable with connector and connector will not be supplied.
*2 Gear ratio: 7.2, 9, 10, 18, 36
*3 Gear ratio: 3.6, 7.2, 9, 10, 18, 36, 50, 100
*4 Gear ratio: 3.6, 7.2, 9, 10, 18, 36

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