ESC4

Controller

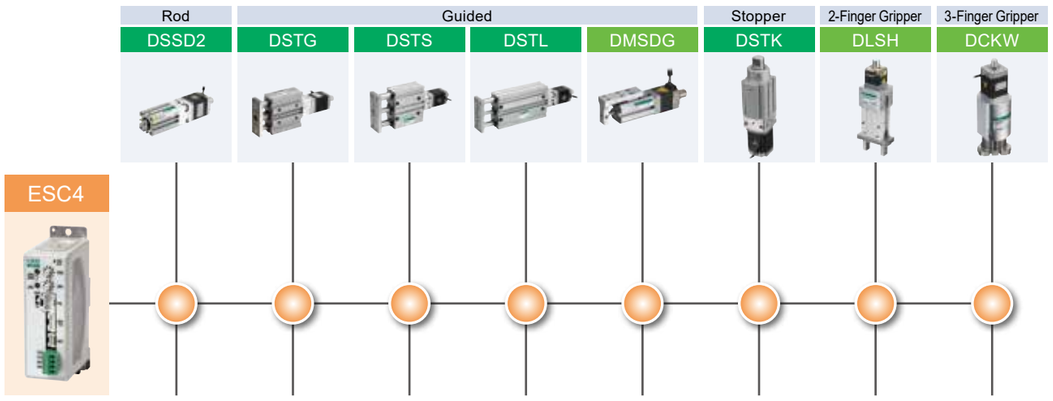
CONTENTS

Controller
ECMG
ECG
ECR
ESC4

Single Axis Controller ESC4 Series

A dedicated controller that pursues simplicity

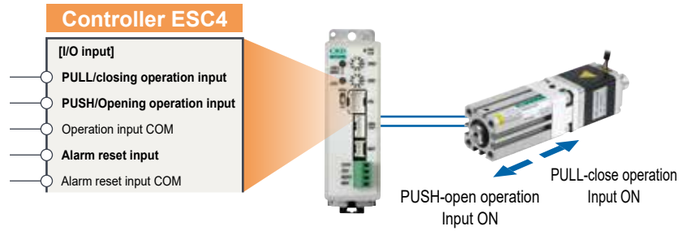
List of Compatible Actuators



Can operate with signals from 3 input points

Easy Controls | Reduced man-hours

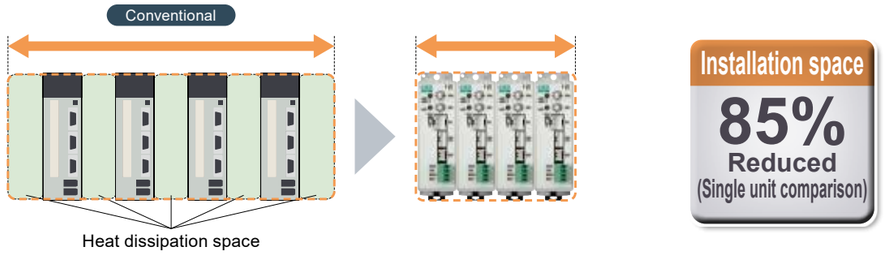
No program is required, and it can be operated with simple wiring. No special tools are required, and it can be used with the same feeling as air equipment, so setting man-hours can be reduced.



Compact, can be installed adjacently

Space saving

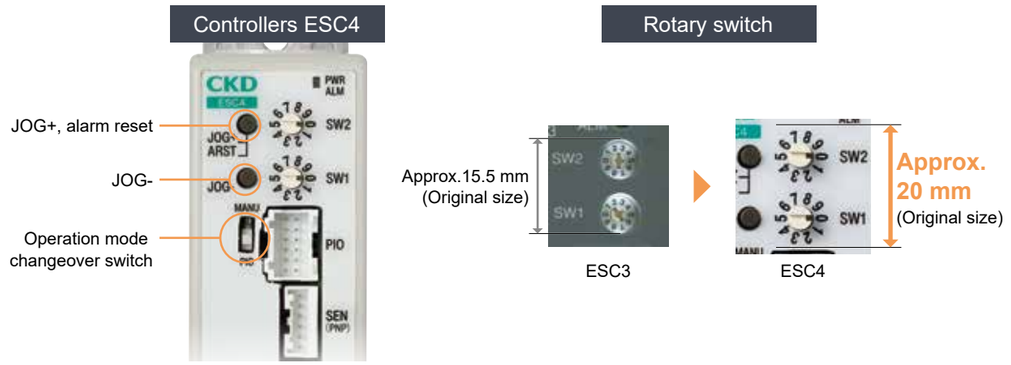
Since heat is dissipated from the top and bottom surfaces, no heat dissipation space is required on the sides. Therefore, controllers can be installed adjacently. In addition, since it is the smallest size controller in the ROBODEX series, it is possible to reduce the footprint.



Improved manual operability

Easy adjustment

Manual operability has been improved compared to conventional products. An operation mode has been added, and JOG operation and alarm reset can be operated manually. The visibility of the rotary switch has also been improved.



Controller

ESC4 Series

For compatible detailed model Nos., please see our website.

Model No. Notation Method

ESC4 - D P - 01 20 - 06 100

❶ Controller Mounting Method

D	DIN rail mounting
P	Panel mount

❷ Model Group

01	DSSD2
02	DSTK
03	DSTG
04	DSTS
05	DSTL
06	DMSDG
07	DLSH
08	DCKW

❸ Actuator size

08	8
16	16
20	20
32	32
50	50

❹ Actuator lead *2

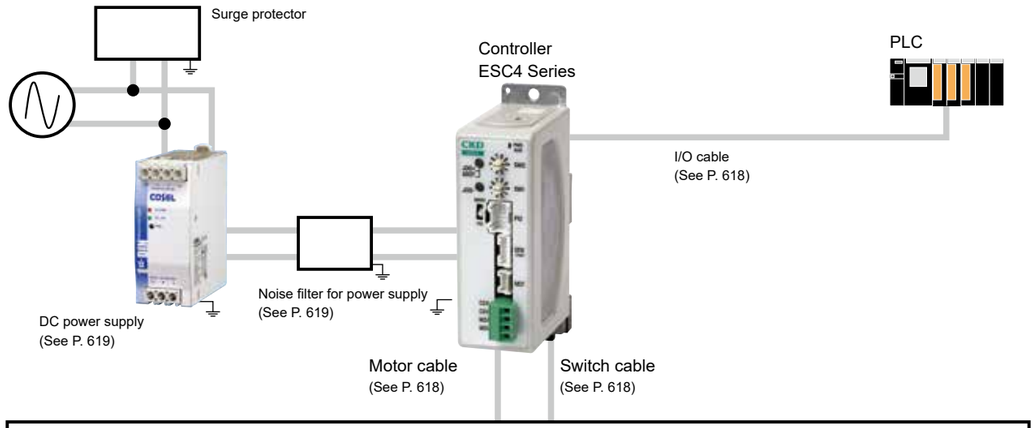
NN	None
06	6 mm
09	9 mm
12	12 mm

❺ Actuator stroke *3

NNN	None
010	10 mm
020	20 mm
025	25 mm
030	30 mm
050	50 mm
075	75 mm
100	100 mm
150	150 mm
200	200 mm

*1 Also selectable by actuator model.
*2 When selecting model group 06 (DMSDG), 07 (DLSH), or 08 (DCKW), please select “Blank".
*3 When selecting model group 07 (DLSH) or 08 (DCKW), please select “Blank".

System Configuration



Connectable actuators


DSSD2 (P. 417)


DSTK (P. 427)


DSTG (P. 439)


DSTS (P. 453)


DSTL (P. 467)


DMSDG (P. 485)


DLSH (P. 499)


DCKW (P. 509)

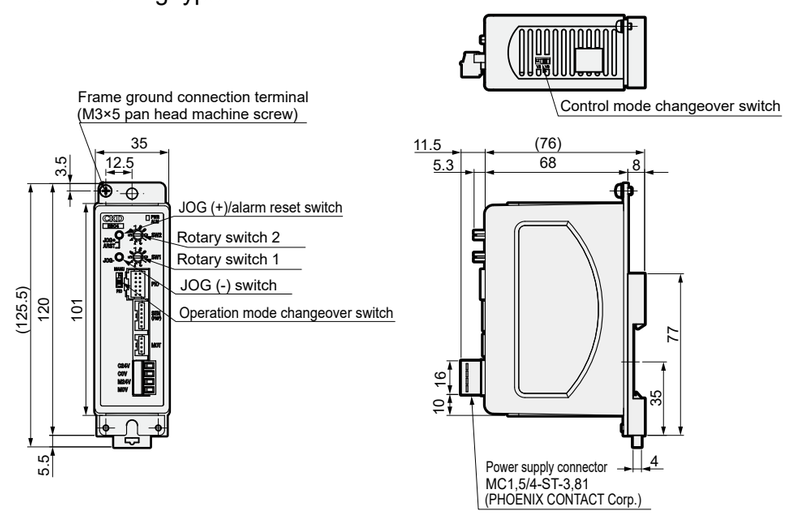
* For installation of noise filters, surge protectors, and wiring methods, please refer to the instruction manual.

General Specifications

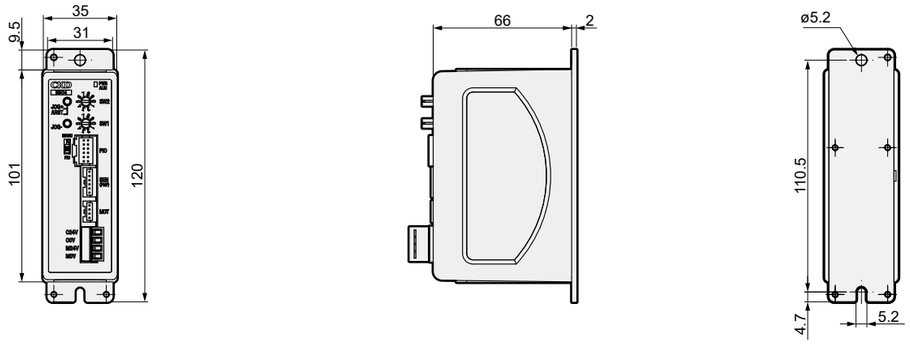
Item		Content				
Applicable Actuators		DSSD2, DSTK, DSTG, DSTS, DSTL, DMSDG, DLSH, DCKW				
Applicable Motor Size		□20	□28	□35	□42	□56
Configuration Tool		Rotary switch 1, rotary switch 2, control mode switch, operation mode switch, JOG (+)/alarm reset switch, JOG (-) switch				
External Interface		24 VDC ±10%, 3 input points, 3 output points, max. cable length 10 m				
Indicator light		Green lit: Motor energized, flashing green: Motor de-energized, or in manual operation mode Red lit Alarm condition (system error), flashing red (operation error)				
Power supply voltage	Control power supply	24 VDC ±10%				
	Motive power supply	24 VDC ±10%				
Current Consumption	Control power supply	100 mA or less				
	Motive power supply	0.8 A or less	2 A or less	3 A or less	3 A or less	3 A or less
Insulation Resistance		10 MΩ or more at 500 VDC				
Dielectric Strength		500 VAC for 1 minute				
Operating Ambient Temperature		0 to 40°C no freezing				
Operating Ambient Humidity		35 to 85% RH no condensation				
Storage Ambient Temperature		-10 to 50°C no freezing				
Storage ambient humidity		35 to 85% RH no condensation				
Operating atmosphere		No corrosive gas, explosive gas, or dust				
Protection Structure		IP20				
Weight		Approx. 180 g				

External Dimension Drawing

● DIN rail mounting type



● Panel mounting type

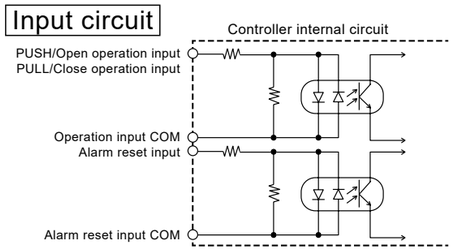


Parallel I/O (PIO) input/output circuit

Input Specifications

Item	ESC4
Number of input points	3 points
Input voltage	24 VDC ±10%
Input current	4 mA/point
ON-state input current	3 mA or more
OFF-state input current	0.5 mA or less

Input circuit

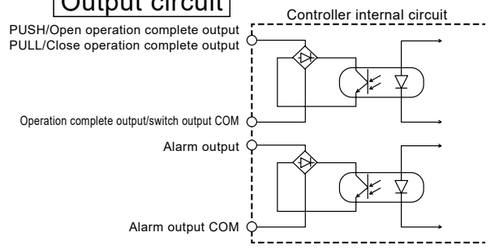


The input is non-polar. (Input COM can be used for both+and -)

Output Specifications

Item	ESC4
Number of output points	3 points
Load voltage	24 VDC ±10%
Load current	9 mA/point
ON-state internal voltage drop	6 V or less
OFF-state leakage current	10 μA
Output short-circuit protection circuit	Yes
Connected load	PLC, etc.

Output circuit



The output is non-polar. (Output COM can be used for both+and -)

Rotary switch setting

Model	Switch 1	Switch 2
DSSD2	PULL speed	PUSH speed
DSTK		
DSTG		
DSTS		
DSTL		
DMSDG	PUSH & PULL speed	Pushing Force
DLSH	Opening/closing speed	Gripping Force
DCKW		

Control mode switch setting

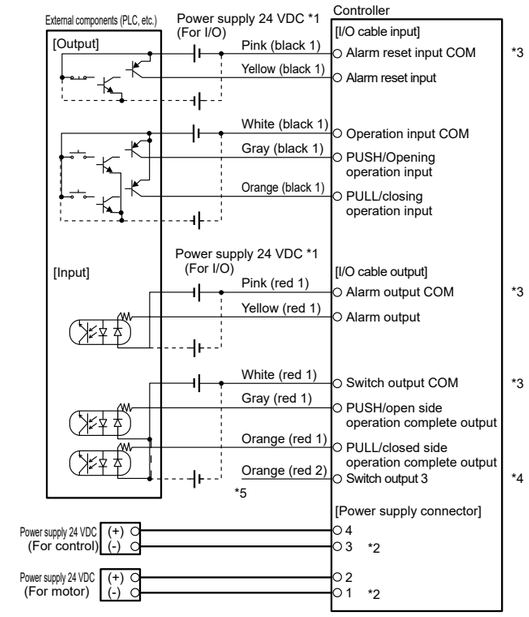
Code	Control mode	Overview
V2	Solenoid valve mode double 2-position	This is a mode equivalent to the 2 positions of a solenoid valve. Moves between 2 points by turning ON the operation input (edge input).
V3	Solenoid valve mode double 3-position	This is a mode equivalent to the 3 positions of a solenoid valve. Moves between 2 points by turning ON the operation input (level input).

Operation mode switch setting

Code	Operation Mode	Overview
MANU	Manual	This is a mode in which the actuator is moved with the JOG (+) and JOG (-) switches on the front of the controller. It is used for trial runs and adjusting the position of the cylinder switch. In this operation mode, input signals from the PLC are not accepted. When an alarm occurs, the JOG (+) switch can be used as an alarm reset switch.
PIO	PIO	This is a mode in which the actuator is moved by an input signal from the PLC. In this operation mode, the JOG (+)/alarm reset switch and JOG (-) switch on the front of the controller are not accepted.

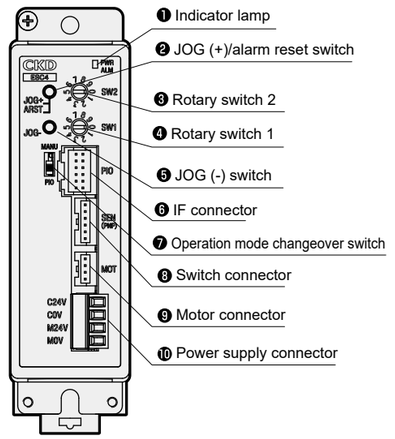
Parallel I/O (PIO) Connection Diagram

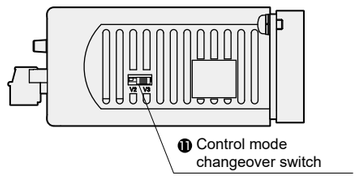
Basic configuration



*1) The polarity of the I/O power supply should be determined by the specifications of the external equipment.
*2) The control power supply (-) and the motive power supply (-) are connected internally.
*3) Each COM is not connected internally. Be sure to wire them.
*4) Switch output 3 is unused, so do not connect anything to it. Also, please perform insulation treatment.
*5) The ( ) in the cable color indicates the color and number of dots on the cable.

[Panel Description]





● Attached items

Power connector (included with controller)

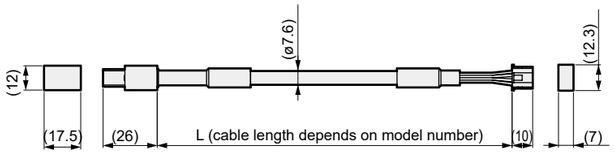
Model No.: MC1,5/4-ST-3,81 (manufactured by PHOENIX CONTACT)
Electric wire size: 0.14 to 1.5 mm² / 28 to 16 AWG
Stripped wire length: 7 mm
Tightening Torque: 0.22 to 0.25 N·m

Pin number	Signal name	Name
1	M0V	Motive power supply (-)
2	M24V	Motive power supply (+)
3	C0V	Control power supply (-)
4	C24V	Control power supply (+)

Relay Cable

● Motor relay cable

* Also selectable by actuator model
* This is a flexible cable
* Can be used with either ESC3 or ESC4.

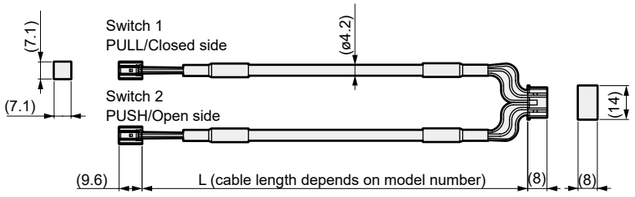


ESC3 - M2 - R ❶

❶Cable Length	
1	1 m
3	3 m
5	5 m
X	10 m

● Switch relay cable

* Also selectable by actuator model
* This is a flexible cable
* Can be used with either ESC3 or ESC4.

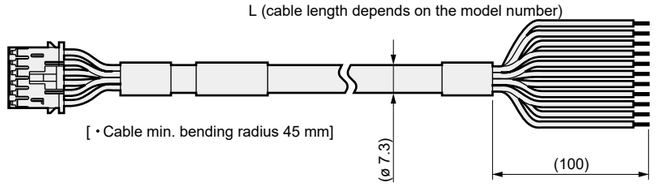


ESC3 - S2 - R ❶

❶Cable Length	
1	1 m
3	3 m
5	5 m
X	10 m

● I/O cable

* Also selectable by actuator model
* Can be used with either ESC3 or ESC4.



ESC3 - NP2 - ❶

❶Cable Length	
1	1 m
3	3 m
5	5 m
X	10 m

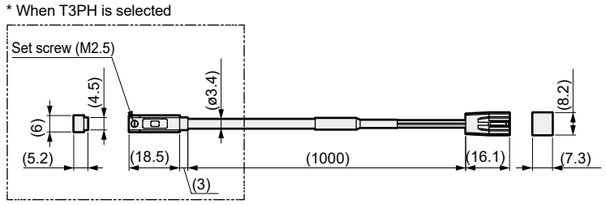
● Cylinder switch cable

* Also selectable by actuator model
* For compatible switch types, please refer to the specifications P. for each actuator.
* Can be used with either ESC3 or ESC4.

ESC3 - SW - T3PH ❶

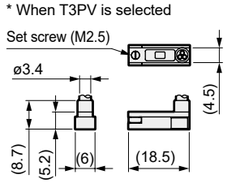
❶Switch type	
T3PH	T-type straight type
T3PV	T-type L-shape type
F3PH	F-type straight type
F3PV	F-type L-shape type

* When T3PH is selected

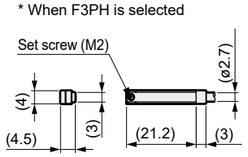


By selecting the switch model number, the dotted line part will be as follows.

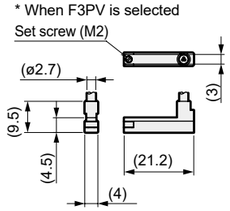
* When T3PV is selected



* When F3PH is selected



* When F3PV is selected



Related parts model number table

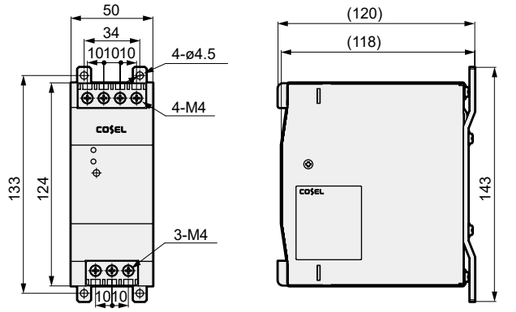
● DC Power Supply

Item		Model No. EA-PWR-KHNA240F-24-N2 (screw mounting) EA-PWR-KHNA240F-24 (DIN rail mounting)
Manufacturer		Cosel Co., Ltd.
Manufacturer model number	Screw mounting	KHNA240F-24-N2
	DIN rail mounting	KHNA240F-24
Input voltage		85 to 264 VAC ø1 or 88 to 370 VDC
Output	Power	240 W
	Voltage/Current	24 V 10 A
	Variable voltage range	22.5 to 28.5 V
Attached functions	Overcurrent protection	Operates at 101% min of peak current
	Overvoltage protection	30.0 to 36.0 V
	Remote control	Possible
	Remote sensing	-
	Other	DC_OK display, ALARM display
Operating temperature/humidity		-25 to +70°C, 20 to 90%RH (no condensation), -40°C Bootable *
Applicable Standards	Safety standards AC input	UL60950-1, C-UL (CSA60950-1), EN62368-1
	Safety standards DC input	UL508, ANSI/ISA 12.12.01, ATEX certified, PSE compliant*
	Noise terminal voltage	UL60950-1, C-UL (CSA60950-1), EN62368-1
	Harmonic current	Compliant with FCC-B, VCCI-B, CISPR22-B, EN55011-B, EN55022-B
Structure	External dimensions (W×H×D)	IEC61000-3-2 (Class A) compliant*
	Weight	50×124×117 mm
	Cooling method	900 g max
		Natural air cooling

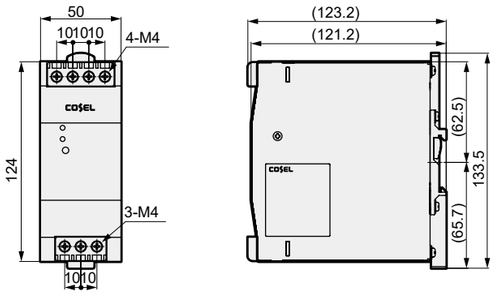
* For details, please refer to the manufacturer's website.
* CE marking and RoHS are obtained by manufacturer model number.

Names of Parts and External Dimension Drawings

● EA-PWR-KHNA240F-24-N2 (for 24 V screw mounting)



● EA-PWR-KHNA240F-24 (for 24 V DIN rail mounting)



● Other parts

Product Name	Model No.
Noise filter for power supply (single-phase, 15 A)	AX-NSF-NF2015A-0D

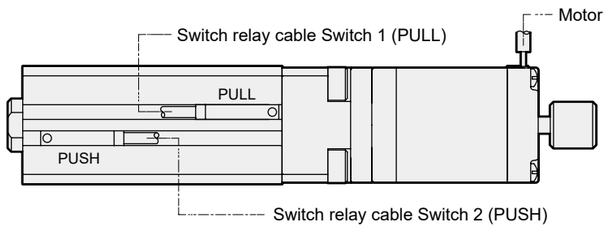
* For the ferrite core to be used, please refer to the instruction manual.

How to Use Electric Actuator D Series

DSSD2, DSTK, DSTG, DSTS, DSTL Series

STEP1 Wiring

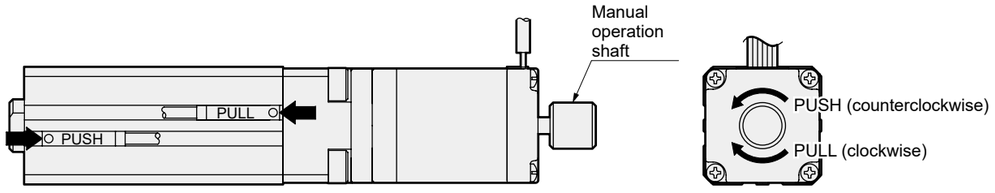
Connect the actuator and controller cables, and turn on the control power with the motive power OFF.



* Slide the cylinder switch and confirm that it lights up.
* Please wire the switch relay cable according to the number on the cylinder switch cable.
  1: Switch 1 (PULL) 2: Switch 2 (PUSH)

STEP2 Cylinder switch position adjustment

With the motive power OFF, rotate the manual operation shaft and move the actuator's movable part to any position. When the motive power is turned on, JOG operation can be performed to any position with the JOG (+) and JOG (-) switches. Pressing the JOG (+) switch moves it in the PUSH direction, and pressing the JOG (-) switch moves it in the PULL direction. Slide the cylinder switch from outside the operating range and fix it where the LED lights up. Please do this for both PUSH and PULL.



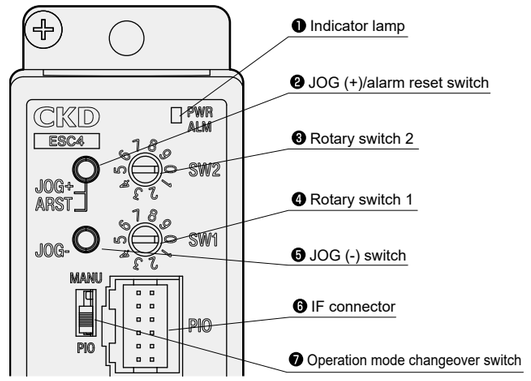
* The actuator detects the rising edge of the cylinder switch and decelerates to a stop. Please set the position of the cylinder switch, taking into account the deceleration stop distance.
* Please set the PULL and PUSH positions of the cylinder switch correctly. If the mounting position is reversed, it will cause a malfunction.
* Please confirm that both cylinder switches are lit. Operating it without the light on will cause a malfunction.
* The lighting range of the cylinder switch changes slightly due to the influence of temperature, etc. Please fix the cylinder switch at a position with a margin for the stroke. There is a risk of colliding with the mechanical end and the motor losing synchronism.
* Do not apply excessive torque to the manual operation shaft. This can cause damage or malfunction.

STEP3 Trial run

After turning on the motive power, turn on the operation input signal and operate the actuator. If it is different from the desired position, adjust the position of the cylinder switch. Switch the controller's rotary switch with a flat-blade screwdriver, etc., and adjust the operating speed of the actuator.

[PUSH, PULL speed setting] (mm/s)

Switch Setting	Size 20		Size 32		Size 50	
	L6	L9	L6	L12	L6	L12
0	15	23	15	30	15	30
1	23	35	23	47	21	47
2	32	48	32	63	28	63
3	40	60	40	80	34	80
4	48	73	48	97	40	97
5	57	85	57	113	47	113
6	65	98	65	130	53	130
7	73	110	73	147	59	147
8	82	123	82	163	66	163
9	90	135	90	180	72	144



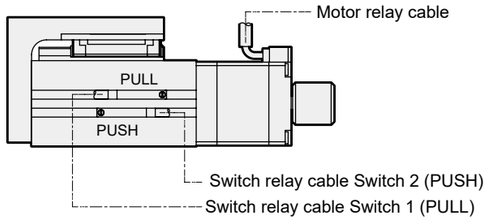
* The speed setting is a guideline. Even with the same setting, errors will occur with the actual numbers due to switch adjustment, power supply voltage, individual differences in motors, variations in mechanical efficiency, and temperature.
* For details, please refer to the instruction manual.
* Does not support pushing operation.

How to Use Electric Actuator D Series

DMSDG Series

STEP1 Wiring

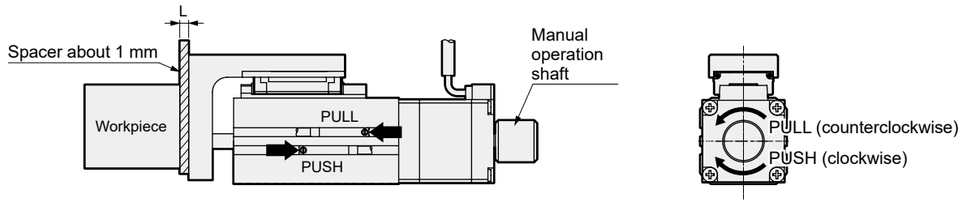
Connect the actuator and controller cables, and turn on the control power with the motive power OFF.



* Slide the cylinder switch and confirm that it lights up.
* Please wire the switch relay cable according to the number on the cylinder switch cable.
  1: Switch 1 (PULL) 2: Switch 2 (PUSH)

STEP2 Cylinder switch position adjustment

Please insert a spacer of about 1 mm between the table and the workpiece. Rotate the manual operation shaft and lightly press the table against the workpiece and spacer. Slide the PUSH side cylinder switch from outside the operating range and fix it where the LED lights up. Rotate the manual operation knob and move it to any position on the PULL side. After moving, slide the PULL side cylinder switch from outside the operating range and fix it where the LED lights up.



* Please set the PULL and PUSH positions of the cylinder switch correctly. If the mounting position is reversed, it will cause a malfunction.
* After pushing against the workpiece, do not turn the manual operation shaft with excessive force. This can cause a failure.
* Please confirm that both cylinder switches are lit. Operating it without the light on will cause a malfunction.
* Pushing operation is only possible during PUSH. Pushing during PULL is not supported.
* The recommended pushing position is the center of the stroke. For details, please refer to the instruction manual.
* The lighting range of the cylinder switch changes slightly due to the influence of temperature, workpiece dimensional errors, etc. Please confirm that the LED lights up in the pushed state.
* Do not apply excessive torque to the manual operation shaft. This can cause damage or malfunction.

STEP3 Trial run

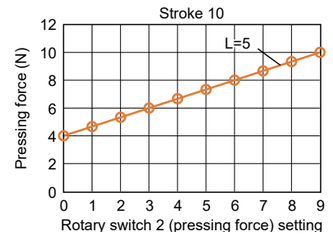
Turn on the motive power, turn on the operation input signal, and operate the actuator. Switch the controller's rotary switch to adjust the pushing force and PULL & PUSH speed.

[PULL & PUSH speed setting] (mm/s)

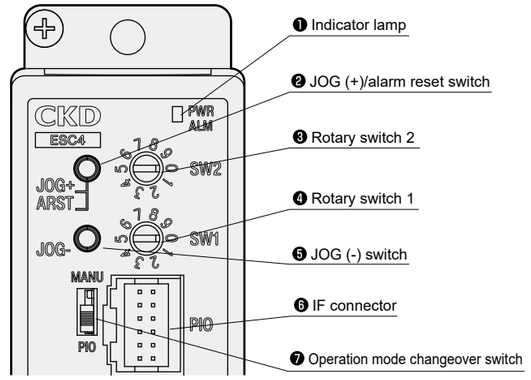
Size	Switch 1 setting									
	0	1	2	3	4	5	6	7	8	9
08	8	13	17	22	27	31	36	40	45	50
16	13	20	27	34	41	48	55	62	69	77

[Pushing Force Setting]

(Ex.: DMSDG-08)



* For other sizes, please refer to P. 487.



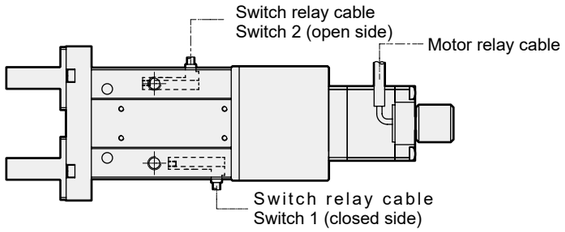
* The speed setting and pushing force setting are for reference only. Even with the same setting, errors will occur with the actual numbers due to switch adjustment, power supply voltage, individual differences in motors, variations in mechanical efficiency, and temperature.
* For details, please refer to the instruction manual.
* If pushing or gripping operations are performed near the stroke end, the motor may lose synchronism, causing a humming noise or reverse operation. In that case, move the pushing or gripping position near the center of the stroke, or reduce the pushing or gripping setting.

How to Use Electric Actuator D Series

DLSH, DCKW Series

STEP1 Wiring

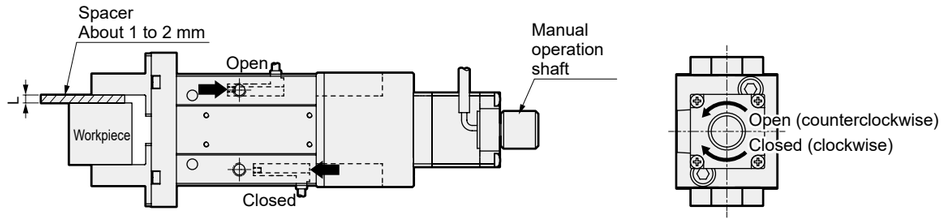
Connect the actuator and controller cables, and turn on the control power with the motive power OFF.



* Slide the cylinder switch and confirm that it lights up.
* Please wire the switch relay cable according to the number on the cylinder switch cable.
  1: Switch 1 (closed side) 2: Switch 2 (open side)

STEP2 Cylinder switch position adjustment

Please insert a spacer of about 1 mm for DLSH and about 0.5 mm for DCKW between the finger and the workpiece. Rotate the manual operation shaft to lightly grip the workpiece and spacer. Slide the closed side cylinder switch from outside the operating range and fix it where the LED lights up. Rotate the manual operation shaft and move it to any position on the open side. After moving, slide the open side cylinder switch from outside the operating range and fix it where the LED lights up.



* Please set the open/closed position of the cylinder switch correctly. If the mounting position is reversed, it will cause a malfunction.
* After gripping the workpiece, do not turn the manual operation knob with excessive force. This can cause a failure.
* Please confirm that both cylinder switches are lit. Operating it without the light on will cause a malfunction.
* This product is for external gripping. It does not support internal gripping.
* The recommended gripping position is the center of the stroke. For details, please refer to the instruction manual.
* The lighting range of the cylinder switch changes slightly due to the influence of temperature, workpiece dimensional errors, etc. Please confirm that the LED lights up in the gripped state.
* Do not apply excessive torque to the manual operation shaft. This can cause damage or malfunction.

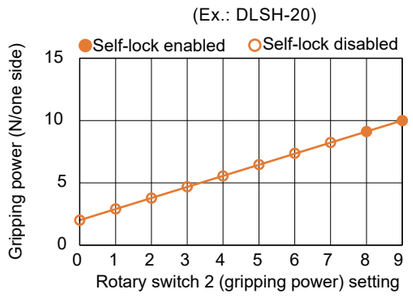
STEP3 Trial run

Turn on the motive power, turn on the operation input signal, and operate the actuator. Switch the controller's rotary switch to adjust the gripping force and opening/closing speed.

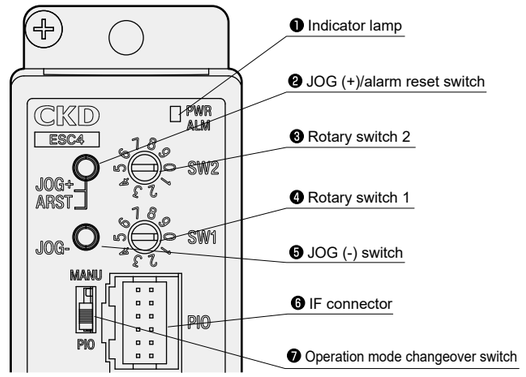
[Opening/Closing Speed Setting] (mm/s)

Size	Switch 1 setting									
	0	1	2	3	4	5	6	7	8	9
20	11	21	32	42	53	63	74	84	95	105
32	15	30	45	60	75	90	105	120	135	150

[Gripping Force Setting]



*Refer to pages 502, 510 and 512 for other models and sizes.



* The speed setting and gripping force setting are for reference only.Even with the same setting, errors will occur with the actual numbers due to switch adjustment, power supply voltage, individual differences in motors, variations in mechanical efficiency, and temperature.
* For details, please refer to the instruction manual.
* If pushing or gripping operations are performed near the stroke end, the motor may lose synchronism, causing a humming noise or reverse operation. In that case, move the pushing or gripping position near the center of the stroke, or reduce the pushing or gripping setting.