CKD

New Products

Electric actuator

2-Finger Gripper FFLD Series

Optimization of "Gripping with robots"

New High speed added

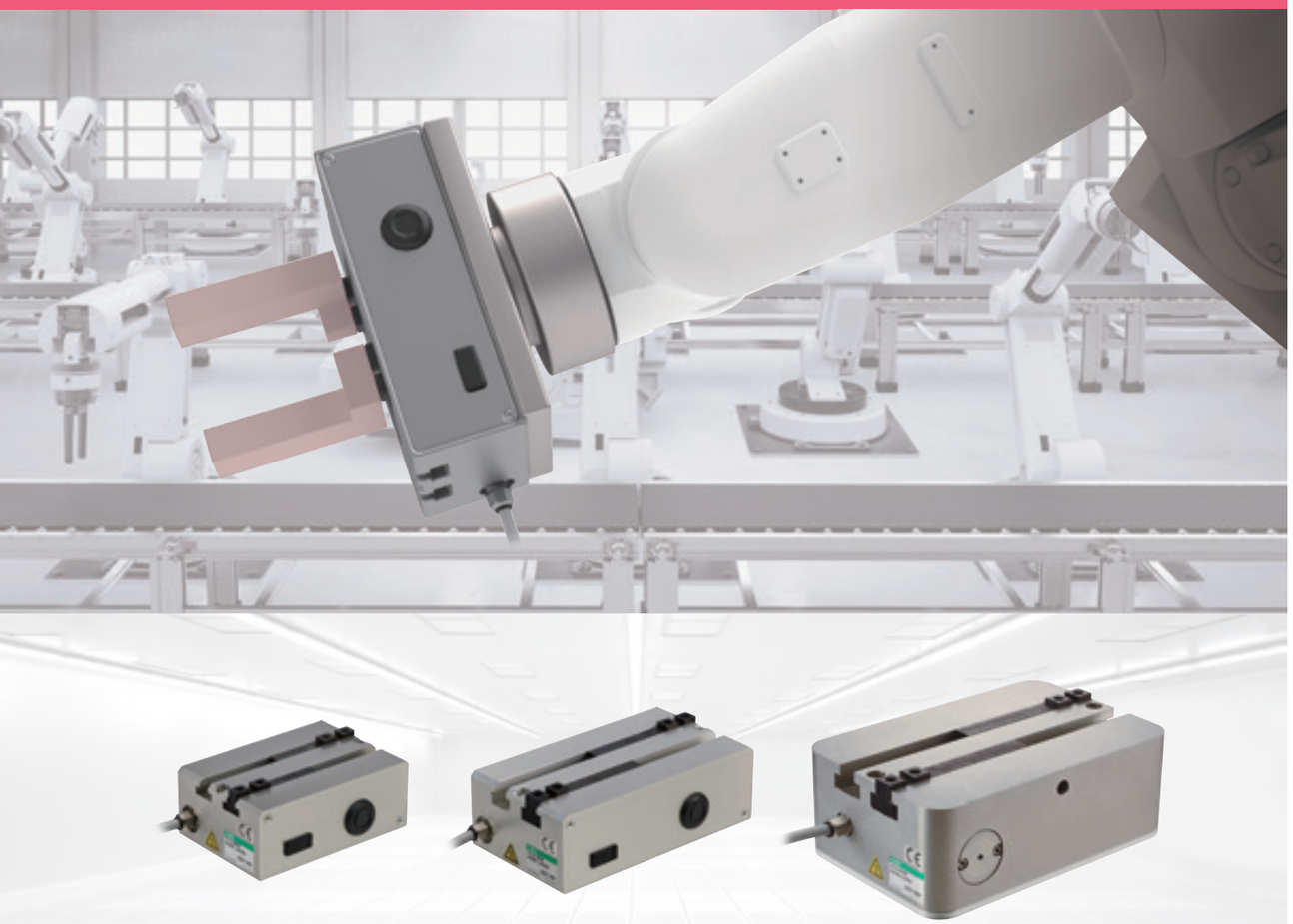
ROBODEX *Pulse*

CKD Corporation

CC-1492AA 3

Integrated controller/high gripping force/ long stroke electric gripper

FFLD Series



Ideal for robotic arm applications

Line-up

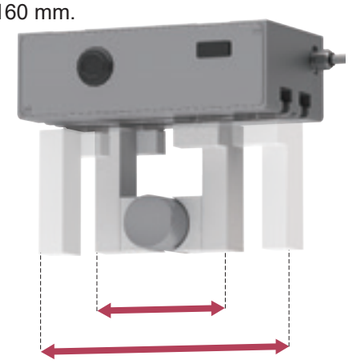
		Gripping force (N)					Maximum operation speed (mm/s)		Catalog page
		40	80	120	300	500	10	30	
Standard	FFLD		●		●	●	●		1
High speed	FFLD-H (New!)	●		●	●	●		●	9

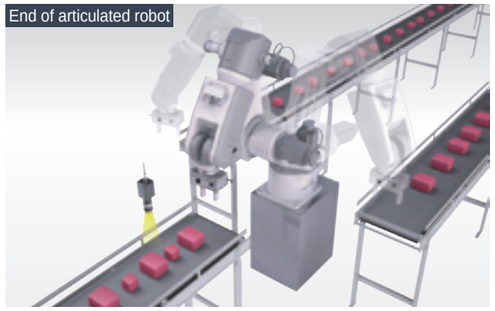
High gripping force, long stroke

High versatility

Realizes gripping force of 500 N (one finger) and long stroke of 160 mm.
It is possible to transport heavy, multi-model workpieces with one tool.

		FLSH	FFLD	
Max. stroke	mm	6 to 14 (3 to 7 per side)	**100 to 160 (80 per side)**	**10X or longer**
Max. gripping force	N	20 to 65 (One side)	**40 to 500 (One side)**	**Approx. 8X higher**

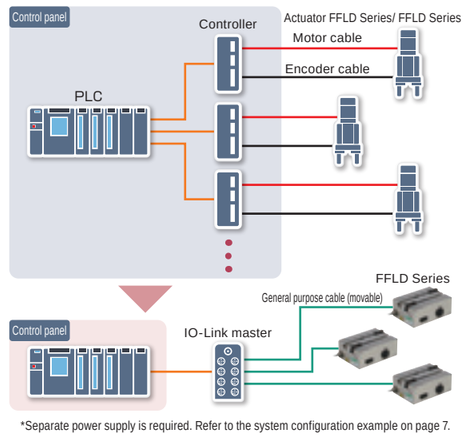




Built-in controller

Safety & Security | Space saving

The controller is built into the body of the electric gripper.
Reduces wiring and space consumption and the risk of disconnection.

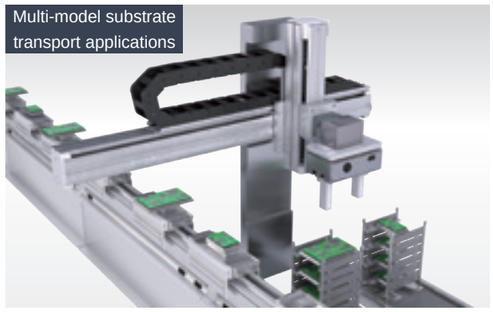


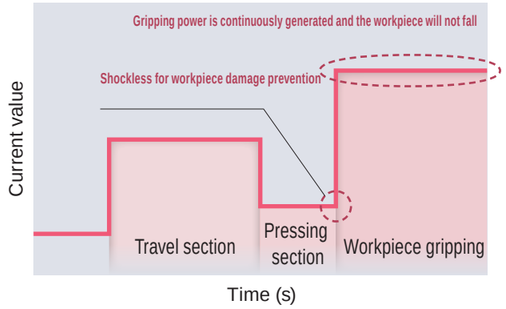
*Separate power supply is required. Refer to the system configuration example on page 7.

Pressing operation

Safety & Security

Gripping the workpiece is done with pressing operation. The gripping force continues to occur, greatly reducing the risk of the workpiece falling. Motor current value is controlled to enable soft handling and long-term gripping.

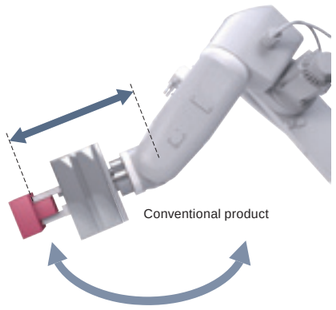


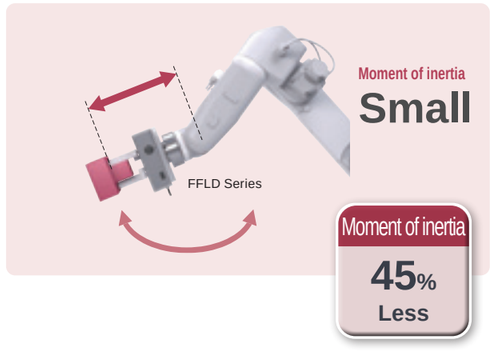


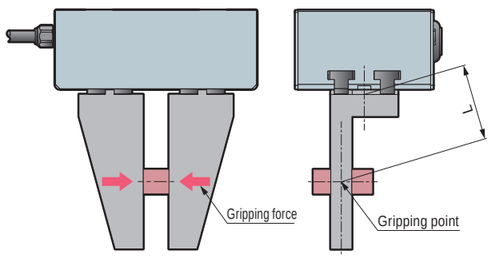
Thin, highly rigid body

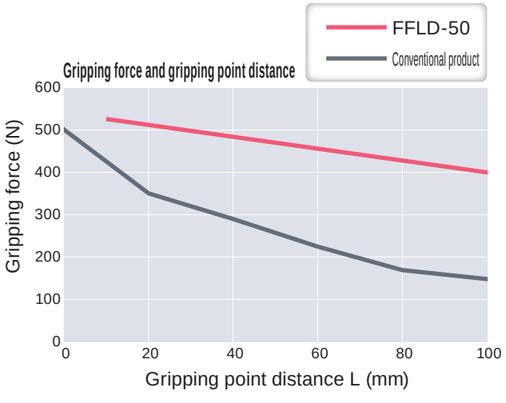
Space saving
High rigidity

Thin body reduces moment of inertia. Robots can be made more compact. It also has a T-slot guide, realizing high rigidity. Decreases in gripping force due to gripping point distance are minimized as much as possible.







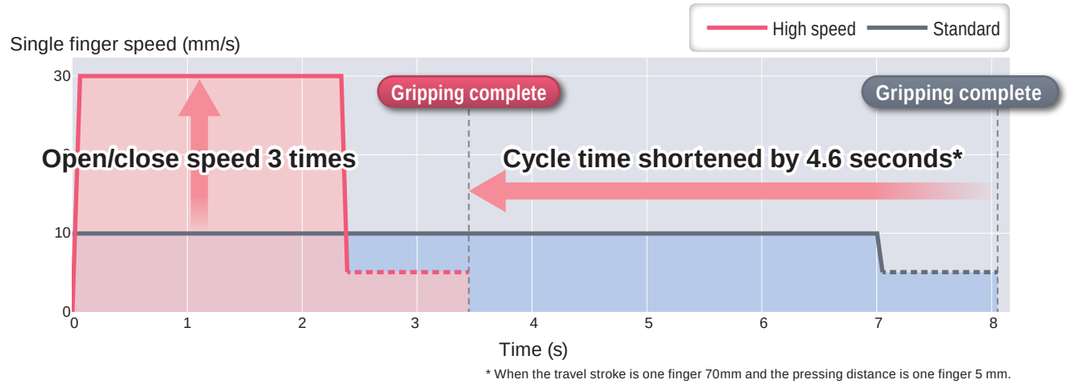


High open/close speed

Now

Productivity improved

Finger open/close speed has been improved. Cycle time of the device can be reduced.

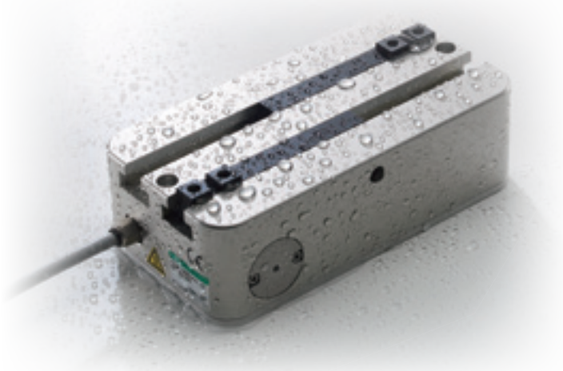


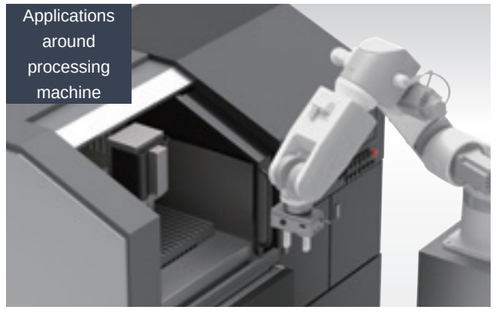
* When the travel stroke is one finger 70mm and the pressing distance is one finger 5 mm.

Available as made to order

High versatility
Special environment

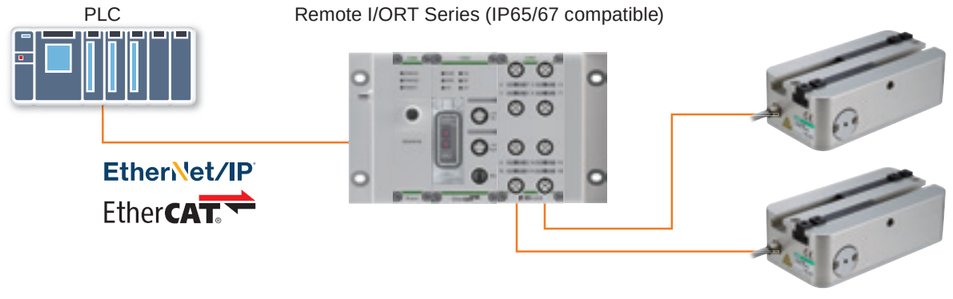
IP54, body blackening, mounting holes and lead-out cable change are possible.





Related products

Can be connected to the PLC via remote I/O RT Series.



* For details, refer to catalog No. Refer to CC-1557A.

CKD

Electric actuator
Motor specification

FFLD

2-Finger Gripper

CONTENTS

Electric Actuator 2-Finger Gripper

FFLD-08

□20 Stepper motor

How to order

FFLD - 08 50 N C N 30 - LK S R00

Ⓐ Ⓑ Ⓒ Ⓓ

ⒶGripping force

08	80N

ⒷStroke

50	100 mm (single side 50 mm)

ⒸInterface specification

LK	IO-Link

ⒹRelay cable

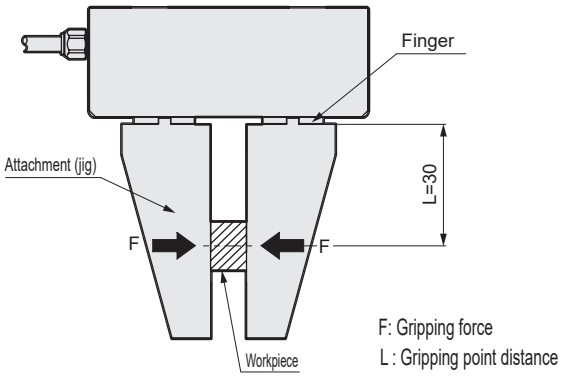
R00	Movable cable

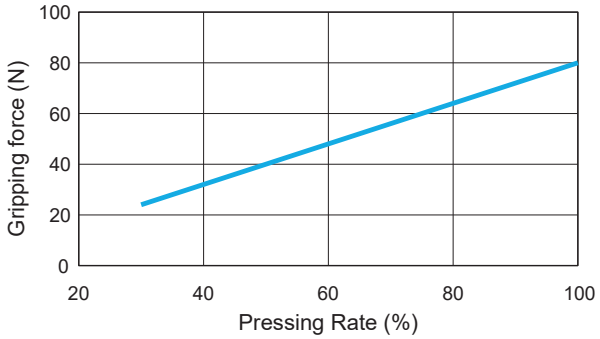
Specifications

Motor		□20 stepper motor
Encoder type		Incremental encoder
Drive method		Rack and pinion, worm gear
Controller		Built in
Stroke	mm	100 (50 per side)
Max. gripping force *1	N	80 (per side)
Open/close speed range	mm/s	1 to 10 (per side)
Gripping speed range *1	mm/s	1 to 5 (per side)
Repeatability *2	mm	±0.02
Positioning repeatability *3	mm	±0.05 (per side)
Lost motion	mm	0.4 or less (per side)
Static allowable moment	N·m	MP: 15, MY: 15, MR: 15
Settings tool		Setting software (S-Tools)
External interface		IO-Link
Power supply voltage	Communication/control	24 VDC ±10%
	Power	24 VDC ±10%
Current consumption	Communication/control A	0.2 or less
	Power A	1.1 or less
Motor section max. instantaneous current	A	1.5
Power capacity		Max. 100 W
Insulation resistance		10 MΩ, 500 VDC
Withstand voltage		500 VAC for 1 minute
Operating ambient temperature, humidity		0 to 40 °C (no freezing) 35 to 80% RH (no condensation)
Storage ambient temperature, humidity		-10 to 50°C (no freezing) 35 to 80% RH (no condensation)
Atmosphere		No corrosive gas, explosive gas, or dust
Degree of protection		IP20
Weight	kg	1.2

*1 Gripping is done with pressing operation.
*2 Repeat accuracy indicates the variation when the same workpiece is repeatedly gripped at the same force, under the same operation conditions.
*3 The stop position will vary if positioning repeatability is checked using the same point.

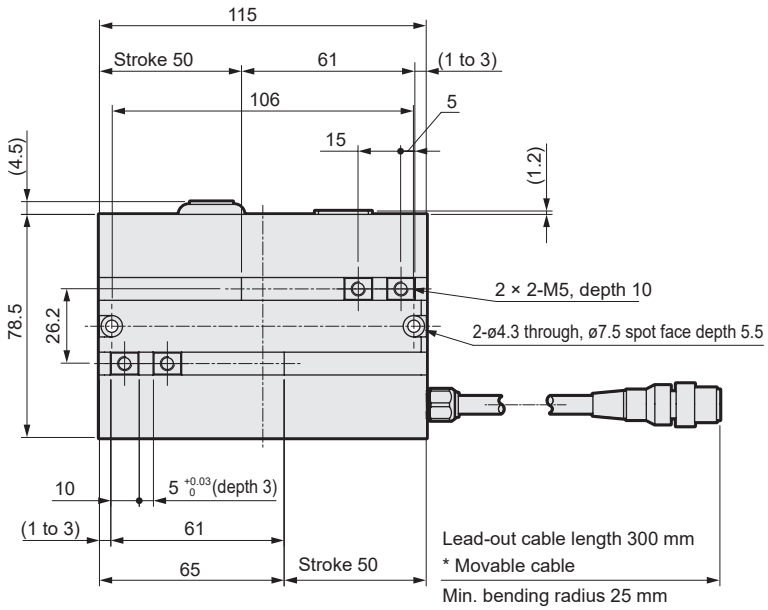
Gripping force and pressing rate

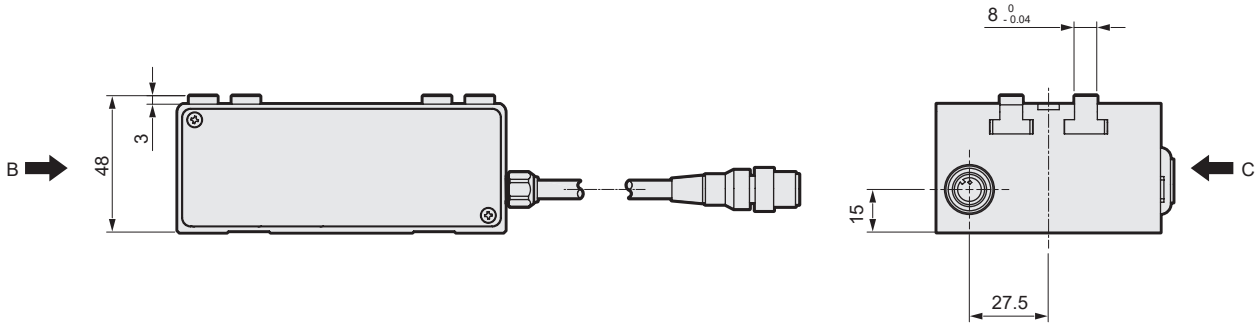


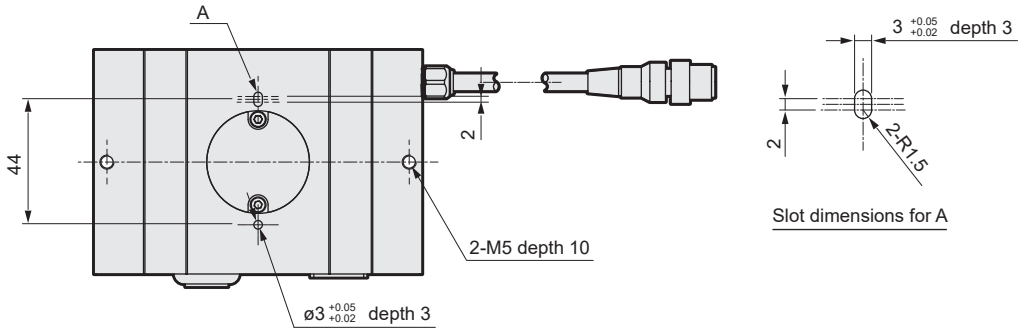


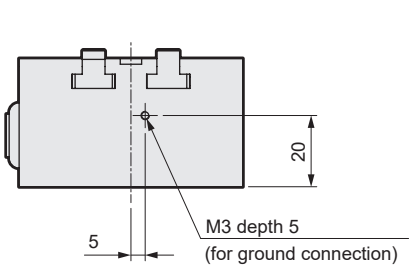
* The correlation diagram of the gripping force and pressing rate shows a guideline. Individual motor differences and variations in mechanical efficiency may result in differing actual values, even at the same pressing rate.
* Gripping speed is for 5mm/s. (L=30)
* The setting range for the pressing rate is 30 to 100%.

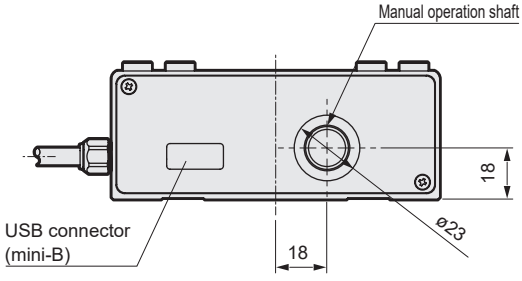
Dimensions

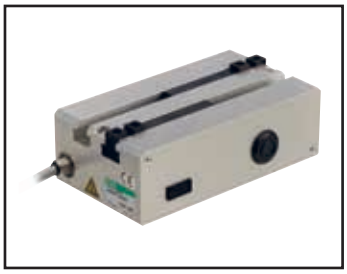

115
Stroke 50
61
(1 to 3)
106
5
15
(4.5)
(1.2)
78.5
26.2
2 × 2-M5, depth 10
2-ø4.3 through, ø7.5 spot face depth 5.5
10
5 +0.03 0 (depth 3)
(1 to 3)
61
65
Stroke 50
Lead-out cable length 300 mm
* Movable cable
Min. bending radius 25 mm


B
48
3
8 0 -0.04
15
27.5
C


A
44
2
2-M5 depth 10
ø3 +0.05 +0.02 depth 3
3 +0.05 +0.02 depth 3
2
2-R1.5
Slot dimensions for A


20
5
M3 depth 5
(for ground connection)
B arrow view


Manual operation shaft
18
USB connector
(mini-B)
18
ø23
C arrow view



Electric Actuator 2-Finger Gripper

FFLD-30

□25L stepping motor

How to order

FFLD - 30 70 N C N 30 - LK S R00

Ⓐ Ⓑ Ⓒ Ⓓ

ⒶGripping force	
30	300 N

ⒷStroke	
70	140 mm (single side 70 mm)

ⒸInterface specification	
LK	IO-Link

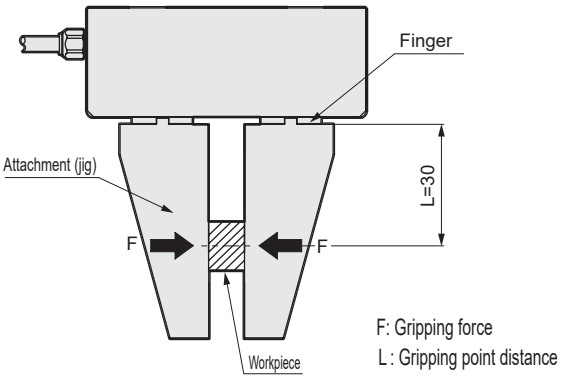
ⒹRelay cable	
R00	Movable cable

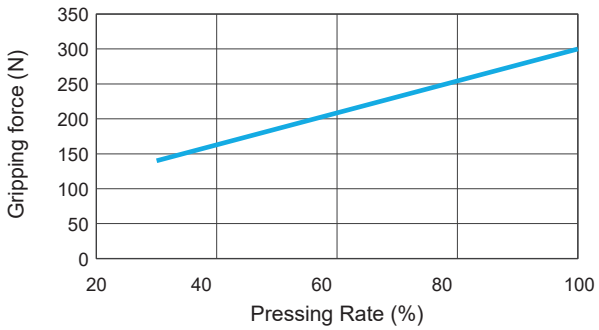
Specifications

Motor		□25L stepper motor
Encoder type		Incremental encoder
Drive method		Rack and pinion, worm gear
Controller		Built in
Stroke	mm	140 (70 per side)
Max. gripping force *1	N	300 (per side)
Open/close speed range	mm/s	1 to 10 (per side)
Gripping speed range *1	mm/s	1 to 5 (per side)
Repeatability *2	mm	±0.02
Positioning repeatability *3	mm	±0.05 (per side)
Lost motion	mm	0.4 or less (per side)
Static allowable moment	N·m	MP: 45, MY: 45, MR: 45
Settings tool		Setting software (S-Tools)
External interface		IO-Link
Power supply voltage	Communication/control	24 VDC ±10%
	Power	24 VDC ±10%
Current consumption	Communication/control A	0.2 or less
	Power A	3.2 or less
Motor section max. instantaneous current	A	4.0
Power capacity		Max. 100 W
Insulation resistance		10 MΩ, 500 VDC
Withstand voltage		500 VAC for 1 minute
Operating ambient temperature, humidity		0 to 40 °C (no freezing) 35 to 80% RH (no condensation)
Storage ambient temperature, humidity		-10 to 50°C (no freezing) 35 to 80% RH (no condensation)
Atmosphere		No corrosive gas, explosive gas, or dust
Degree of protection		IP20
Weight	kg	1.7

*1 Gripping is done with pressing operation.
*2 Repeat accuracy indicates the variation when the same workpiece is repeatedly gripped at the same force, under the same operation conditions.
*3 The stop position will vary if positioning repeatability is checked using the same point.

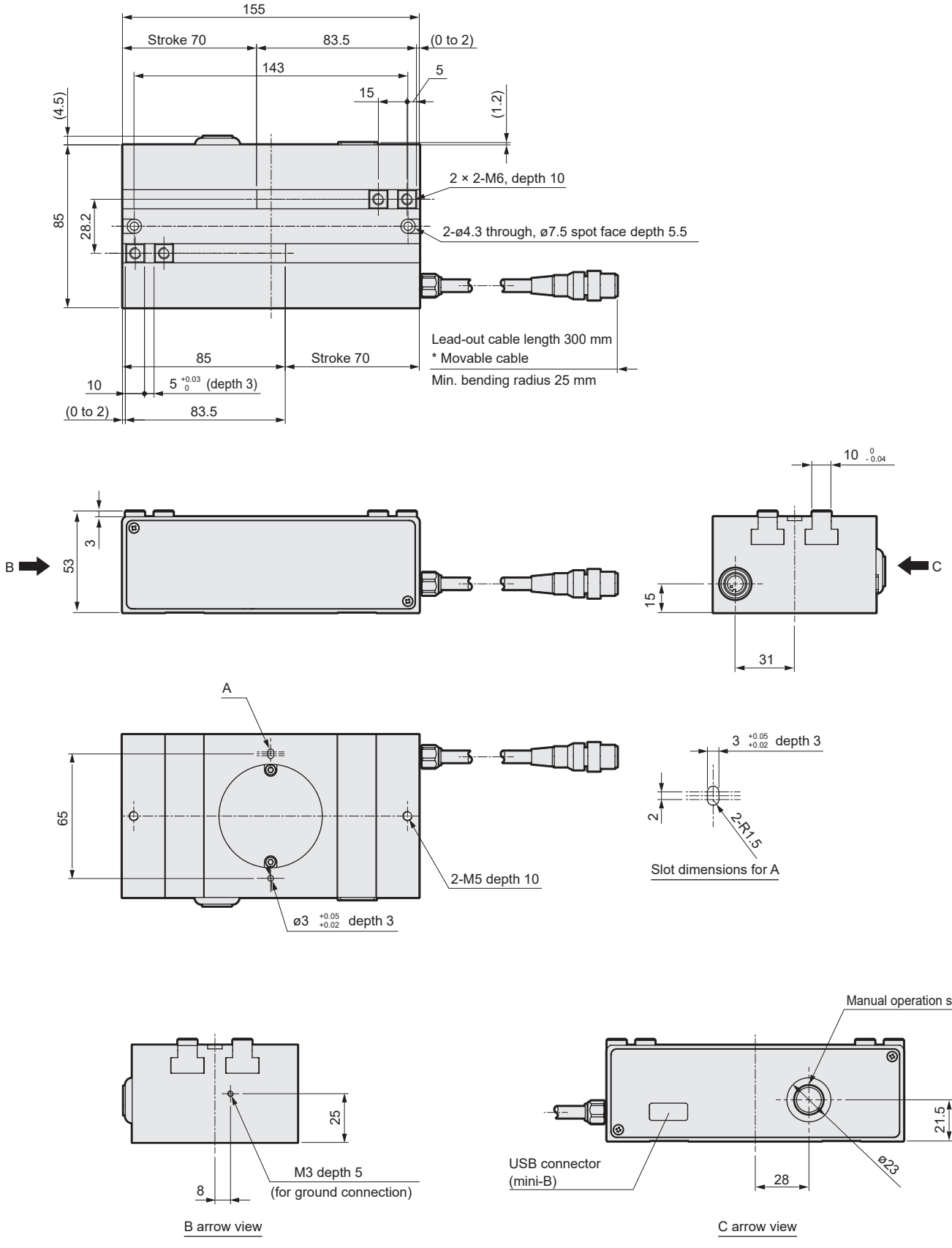
Gripping force and pressing rate





* The correlation diagram of the gripping force and pressing rate shows a guideline. Individual motor differences and variations in mechanical efficiency may result in differing actual values, even at the same pressing rate.
* Gripping speed is for 5mm/s. (L=30)
* The setting range for the pressing rate is 30 to 100%.

Dimensions


155
Stroke 70
83.5
(0 to 2)
143
5
15
(4.5)
(1.2)
2 × 2-M6, depth 10
85
28.2
2-ø4.3 through, ø7.5 spot face depth 5.5
Lead-out cable length 300 mm
* Movable cable
Min. bending radius 25 mm
85
Stroke 70
10
5 +0.03 0 (depth 3)
(0 to 2)
83.5
B
53
3
10 0 -0.04
C
15
31
A
65
2-M5 depth 10
ø3 +0.05 +0.02 depth 3
3 +0.05 +0.02 depth 3
2
2R1.5
Slot dimensions for A
25
8
M3 depth 5
(for ground connection)
B arrow view
Manual operation shaft
21.5
USB connector
(mini-B)
28
ø23
C arrow view

Electric Actuator 2-Finger Gripper

FFLD-50

□25L stepping motor

How to order

FFLD - 50 (A) 80 (B) N C N 30 - LK (C) S R00 (D)

Ⓐ Gripping force	
50	500 N

Ⓒ Interface specification	
LK	IO-Link

Ⓑ Stroke	
80	160 mm (single side 80 mm)

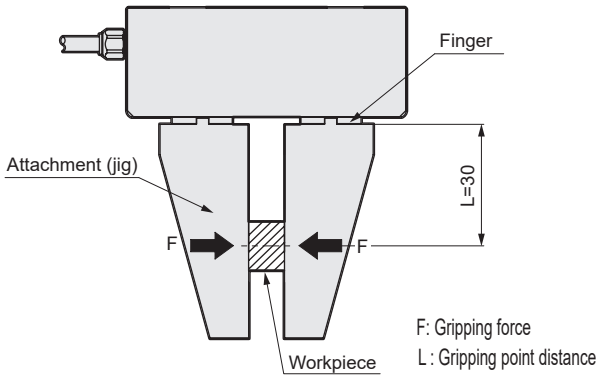
Ⓓ Relay cable	
R00	Movable cable

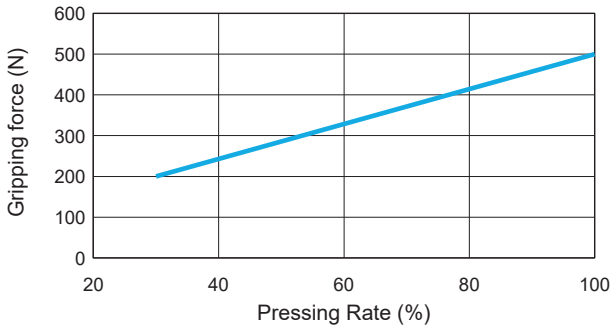
Specifications

Motor		□25L stepper motor
Encoder type		Incremental encoder
Drive method		Rack and pinion, worm gear
Controller		Built in
Stroke	mm	160 (80 per side)
Max. gripping force *1	N	500 (per side)
Open/close speed range	mm/s	1 to 10 (per side)
Gripping speed range *1	mm/s	1 to 5 (per side)
Repeatability *2	mm	±0.02
Positioning repeatability *3	mm	±0.05 (per side)
Lost motion	mm	0.4 or less (per side)
Static allowable moment	N·m	MP: 64, MY: 55, MR: 64
Settings tool		Setting software (S-Tools)
External interface		IO-Link
Power supply voltage	Communication/control	24 VDC ±10%
	Power	24 VDC ±10%
Current consumption	Communication/control A	0.2 or less
	Power A	3.2 or less
Motor section max. instantaneous current	A	4.0
Power capacity		Max. 100 W
Insulation resistance		10 MΩ, 500 VDC
Withstand voltage		500 VAC for 1 minute
Operating ambient temperature, humidity		0 to 40 °C (no freezing) 35 to 80% RH (no condensation)
Storage ambient temperature, humidity		-10 to 50 °C (no freezing) 35 to 80% RH (no condensation)
Atmosphere		No corrosive gas, explosive gas, or dust
Degree of protection		IP20
Weight	kg	2.5

*1 Gripping is done with pressing operation.
*2 Repeat accuracy indicates the variation when the same workpiece is repeatedly gripped at the same force, under the same operation conditions.
*3 The stop position will vary if positioning repeatability is checked using the same point.

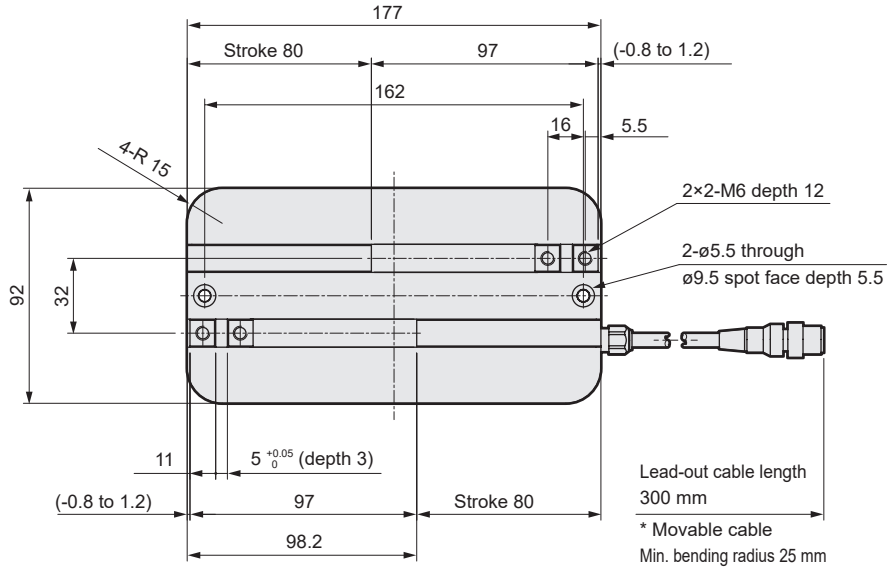
Gripping force and pressing rate

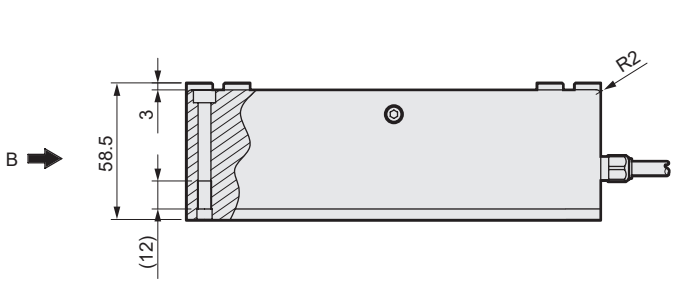


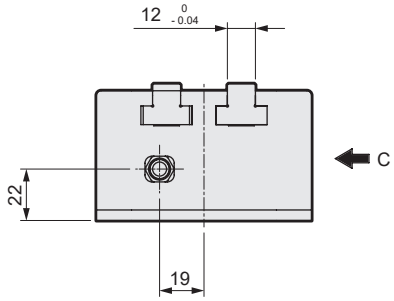


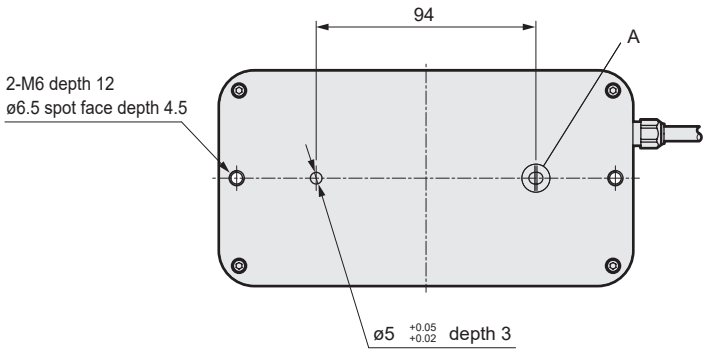
* The correlation diagram of the gripping force and pressing rate shows a guideline. Individual motor differences and variations in mechanical efficiency may result in differing actual values, even at the same pressing rate.
* Gripping speed is for 5mm/s. (L=30)
* The setting range for the pressing rate is 30 to 100%.

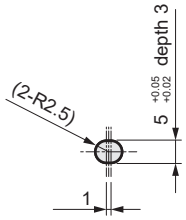
Dimensions



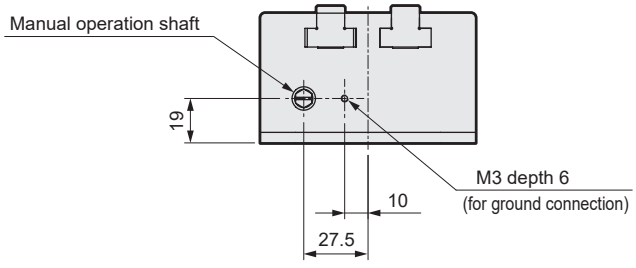




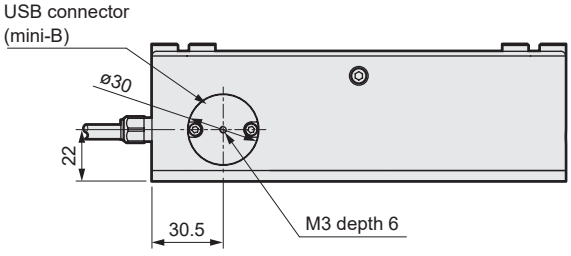




Slot dimensions for A



B arrow view



C arrow view

Electric actuator
Motor specification

FFLD-H

2-Finger Gripper high speed

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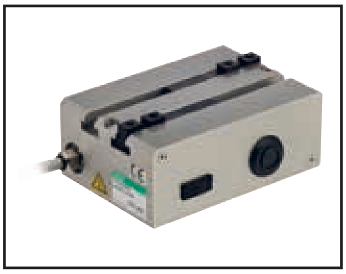


Electric Actuator 2-Finger Gripper High speed

FFLD-04H

□20 Stepper motor

How to order

FFLD - 04 (A) H 50 (B) N C N 30- LK (C) S R00 (D)

(A) Gripping force	
04	40N

(B) Stroke	
50	100 mm (single side 50 mm)

(C) Interface specification	
LK	IO-Link

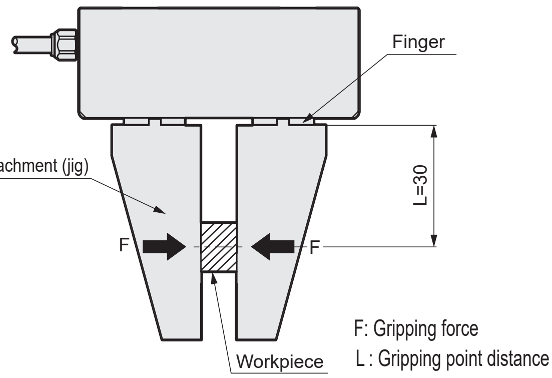
(D) Relay cable	
R00	Movable cable

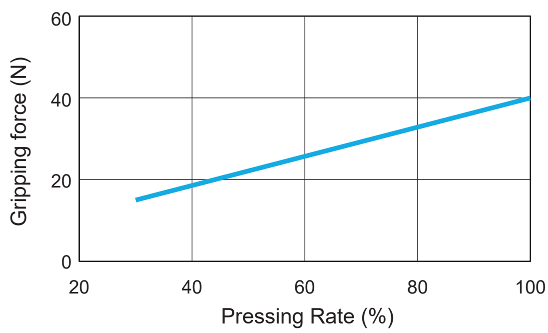
Specifications

Motor		□20 Stepper motor
Encoder-type		Incremental encoder
Drive method		Rack and pinion, worm gear
Controller		Built in
Stroke	mm	100 (50 per side)
Max. gripping force *1	N	40 (per side)
Open/close speed range	mm/s	1 to 30 (per side)
Gripping speed range *1	mm/s	1 to 5 (per side)
Repeatability *2	mm	±0.02
Positioning repeatability *3	mm	±0.05 (per side)
Lost motion	mm	0.4 or less (per side)
Static allowable moment	N·m	MP: 15, MY: 15, MR: 15
Settings tool		Setting software (S-Tools)
External interface		IO-Link
Power supply voltage	Communication/control	24 VDC ±10%
	Power	24 VDC ±10%
Current consumption	Communication/control A	0.2 or less
	Power A	1.1 or less
Motor section max. instantaneous current	A	1.5
Power capacity		Max. 100 W
Insulation resistance		10 MΩ, 500 VDC
Withstand voltage		500 VAC for 1 minute
Operating ambient temperature, humidity		0 to 40 °C (no freezing) 35 to 80% RH (no condensation)
Storage ambient temperature, humidity		-10 to 50°C (no freezing) 35 to 80% RH (no condensation)
Atmosphere		No corrosive gas, explosive gas, or dust
Degree of protection		IP20
Weight	kg	1.2

*1 Gripping is done with pressing operation.
*2 Repeatability indicates variation when the same workpieces are gripped repeatedly with the same operating conditions.
*3 The variation of stopping position when positioning is repeatedly performed to the same point is shown.

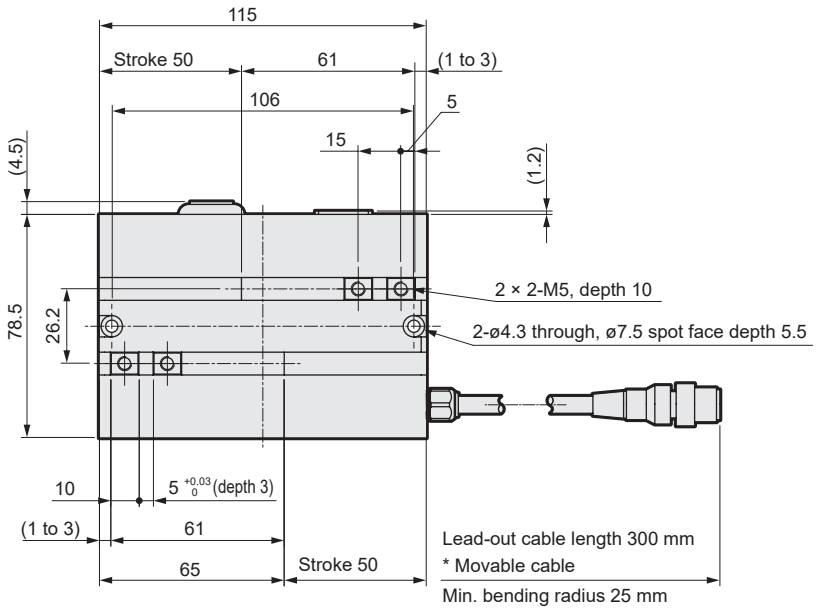
Gripping force and pressing rate

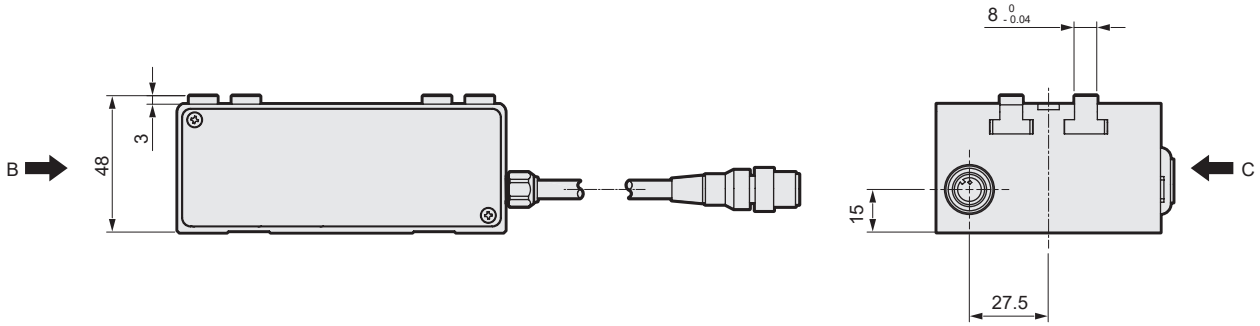


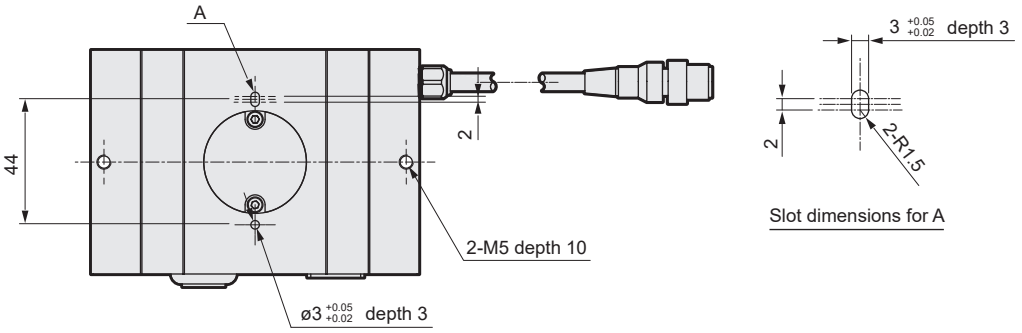


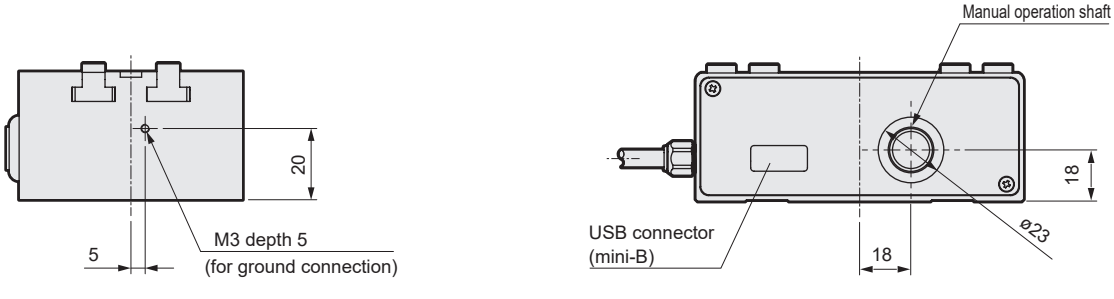
* The correlation diagram of the gripping force and pressing rate shows a guideline. Individual motor differences and variations in mechanical efficiency may result in differing actual values, even at the same pressing rate.
* Gripping speed is for 5mm/s. (L=30)
* The setting range for the pressing rate is 30 to 100%.

Dimensions


115
Stroke 50
61
(1 to 3)
106
5
15
(4.5)
(1.2)
78.5
26.2
2 × 2-M5, depth 10
2-ø4.3 through, ø7.5 spot face depth 5.5
10
5 +0.03 0 (depth 3)
(1 to 3)
61
65
Stroke 50
Lead-out cable length 300 mm
* Movable cable
Min. bending radius 25 mm


B
48
3
8 0 -0.04
C
15
27.5


A
44
2
2-M5 depth 10
ø3 +0.05 +0.02 depth 3
3 +0.05 +0.02 depth 3
2
2-R1.5
Slot dimensions for A


20
5
M3 depth 5
(for ground connection)
B arrow view
Manual operation shaft
18
USB connector
(mini-B)
18
ø23
C arrow view

Electric Actuator 2-Finger Gripper High speed

FFLD-12H

□25L stepping motor

How to order

FFLD - 12 H 70 N C N 30- LK S R 00

Ⓐ 12 · Ⓑ 70 · Ⓒ LK · Ⓓ R 00

ⒶGripping force	
12	120N

ⒷStroke	
70	140 mm (single side 70 mm)

ⒸInterface specification	
LK	IO-Link

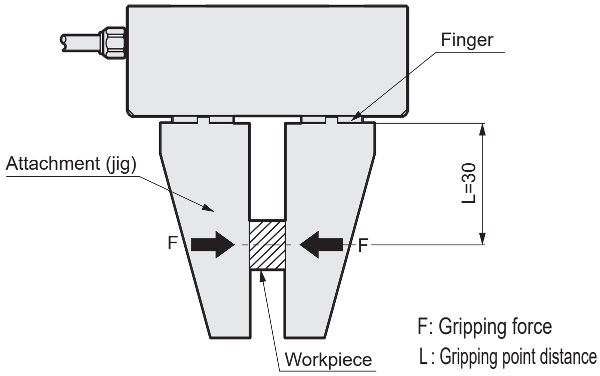
ⒹRelay cable	
R00	Movable cable

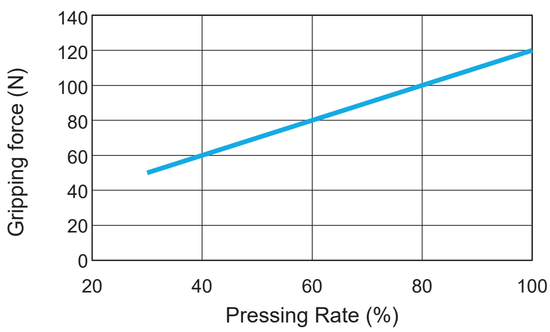
Specifications

Motor		□25L stepping motor
Encoder-type		Incremental encoder
Drive method		Rack and pinion, worm gear
Controller		Built in
Stroke	mm	140 (70 per side)
Max. gripping force *1	N	120 (per side)
Open/close speed range	mm/s	1 to 30 (per side)
Gripping speed range *1	mm/s	1 to 5 (per side)
Repeatability *2	mm	±0.02
Positioning repeatability *3	mm	±0.05 (per side)
Lost motion	mm	0.4 or less (per side)
Static allowable moment	N·m	MP=45, MY=45, MR=45
Settings tool		Setting software (S-Tools)
External interface		IO-Link
Power supply voltage	Communication/control	24 VDC ±10%
	Power	24 VDC ±10%
Current consumption	Communication/control A	0.2 or less
	Power A	3.2 or less
Motor section max. instantaneous current	A	4.0
Power capacity		Max. 100 W
Insulation resistance		10 MΩ, 500 VDC
Withstand voltage		500 VAC for 1 minute
Operating ambient temperature, humidity		0 to 40 °C (no freezing) 35 to 80% RH (no condensation)
Storage ambient temperature, humidity		-10 to 50°C (no freezing) 35 to 80% RH (no condensation)
Atmosphere		No corrosive gas, explosive gas, or dust
Degree of protection		IP20
Weight	kg	1.7

*1 Gripping is done with pressing operation.
*2 Repeatability indicates variation when the same workpieces are gripped repeatedly with the same operating conditions.
*3 The variation of stopping position when positioning is repeatedly performed to the same point is shown.

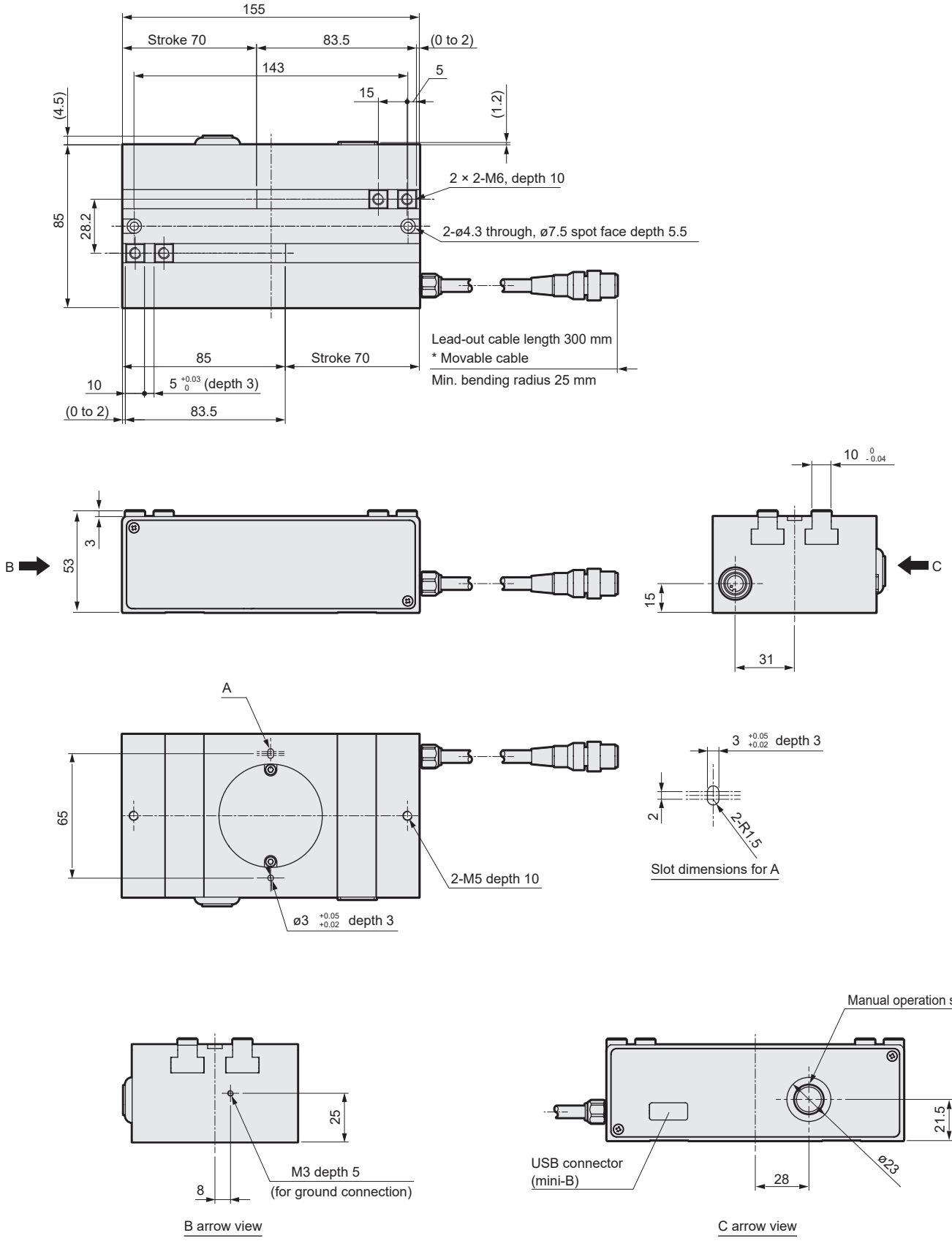
Gripping force and pressing rate

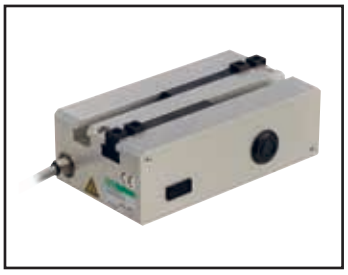




* The correlation diagram of the gripping force and pressing rate shows a guideline. Individual motor differences and variations in mechanical efficiency may result in differing actual values, even at the same pressing rate.
* Gripping speed is for 5mm/s. (L=30)
* The setting range for the pressing rate is 30 to 100%.

Dimensions


155
Stroke 70
83.5
(0 to 2)
143
5
15
(1.2)
(4.5)
85
28.2
2 × 2-M6, depth 10
2-ø4.3 through, ø7.5 spot face depth 5.5
Lead-out cable length 300 mm
* Movable cable
Min. bending radius 25 mm
85
Stroke 70
10
5 +0.03 0 (depth 3)
(0 to 2)
83.5
B
53
3
10 0 -0.04
C
15
31
A
65
2-M5 depth 10
ø3 +0.05 +0.02 depth 3
3 +0.05 +0.02 depth 3
2
2R1.5
Slot dimensions for A
25
M3 depth 5
(for ground connection)
8
B arrow view
Manual operation shaft
21.5
USB connector
(mini-B)
28
ø23
C arrow view



Electric actuator 2-finger Gripper high speed

FFLD-30H

□25L stepping motor

How to order

FFLD - 30 H 70 N C N 30 - LK S R00

Ⓐ 30

Ⓑ 70

Ⓒ LK

Ⓓ R00

Ⓐ Gripping force	
30	300 N

Ⓒ Interface specification	
LK	IO-Link

Ⓑ Stroke	
70	140 mm (single side 70 mm)

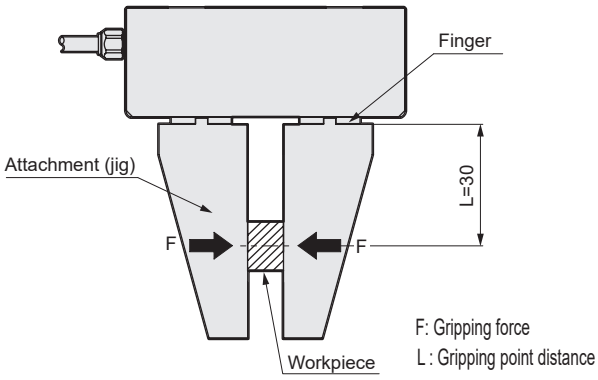
Ⓓ Relay cable	
R00	Movable cable

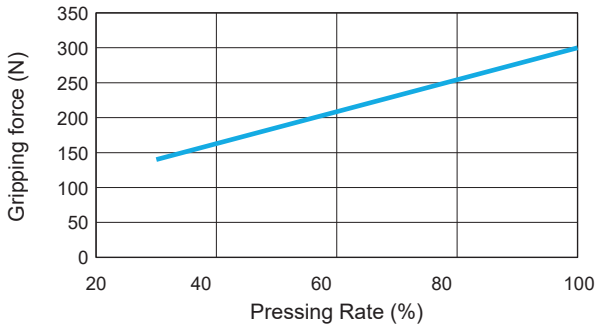
Specifications

Motor		□25L stepping motor
Encoder-type		Incremental encoder
Drive method		Rack and pinion, worm gear
Controller		Built in
Stroke	mm	140 (70 per side)
Max. gripping force *1	N	300 (per side)
Open/close speed range	mm/s	1 to 30 (per side)
Gripping speed range *1	mm/s	1 to 5 (per side)
Repeatability *2	mm	±0.02
Positioning repeatability *3	mm	±0.05 (per side)
Lost motion	mm	0.4 or less (per side)
Static allowable moment	N·m	MP=45, MY=45, MR=45
Settings tool		Setting software (S-Tools)
External interface		IO-Link
Power supply voltage	Communication/control	24 VDC ±10%
	Power	24 VDC ±10%
Current consumption	Communication/control A	0.2 or less
	Power A	3.2 or less
Motor section max. instantaneous current	A	4.0
Power capacity		Max. 100 W
Insulation resistance		10 MΩ, 500 VDC
Withstand voltage		500 VAC for 1 minute
Operating ambient temperature, humidity		0 to 40 °C (no freezing) 35 to 80% RH (no condensation)
Storage ambient temperature, humidity		-10 to 50°C (no freezing) 35 to 80% RH (no condensation)
Atmosphere		No corrosive gas, explosive gas, or dust
Degree of protection		IP20
Weight	kg	1.7

*1 Gripping is done with pressing operation.
*2 Repeatability indicates variation when the same workpieces are gripped repeatedly with the same operating conditions.
*3 The variation of stopping position when positioning is repeatedly performed to the same point is shown.

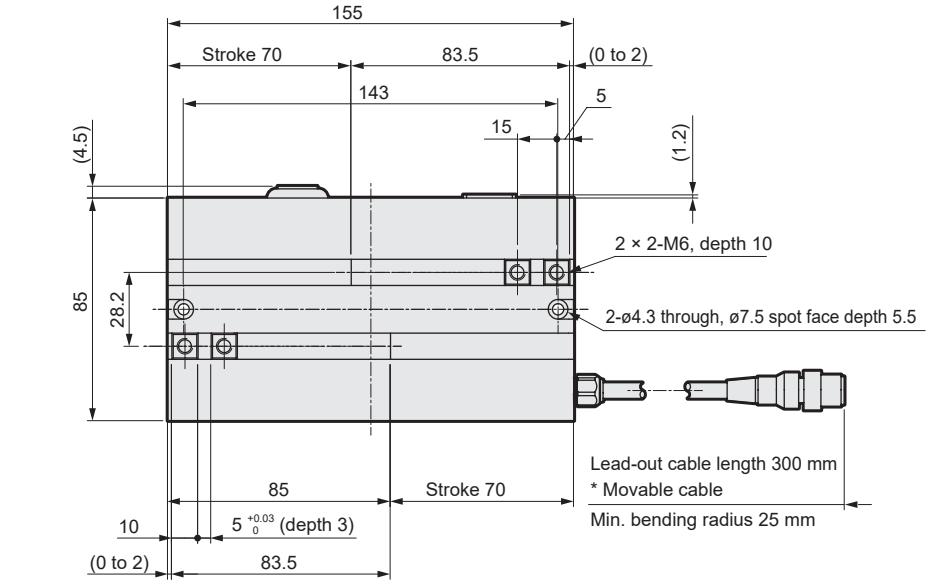
Gripping force and pressing rate

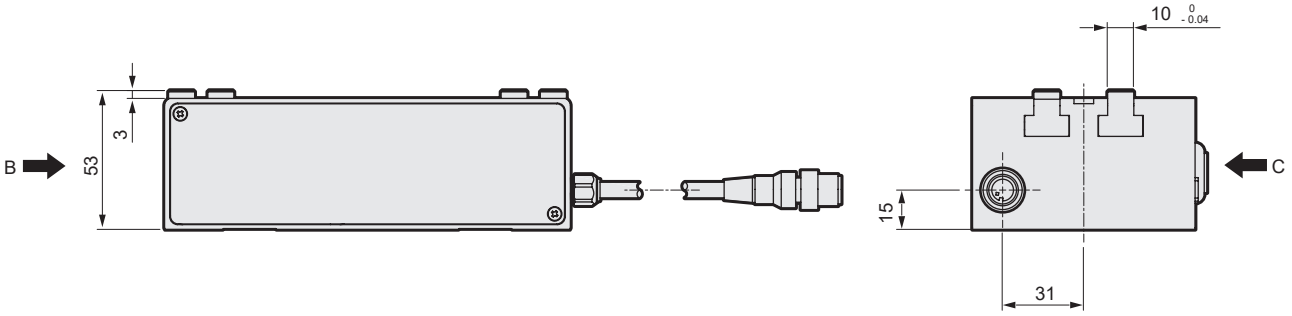


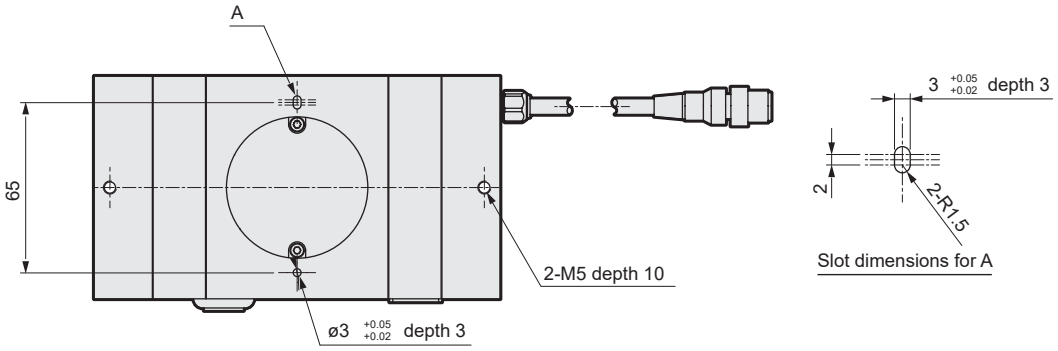


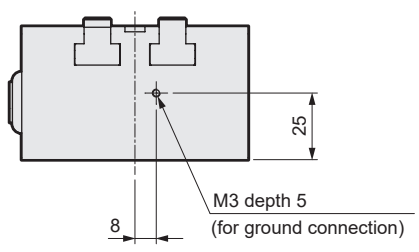
* The correlation diagram of the gripping force and pressing rate shows a guideline. Individual motor differences and variations in mechanical efficiency may result in differing actual values, even at the same pressing rate.
* Gripping speed is for 5mm/s. (L=30)
* The setting range for the pressing rate is 30 to 100%.

Dimensions

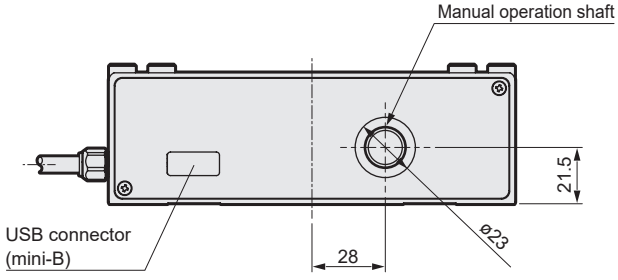








B arrow view



C arrow view

Electric actuator 2-Finger Gripper high speed

FFLD-50H

□35 Stepping motor

How to order

FFLD - 50 H 80 N C N 30- LK S R00

Ⓐ Ⓑ Ⓒ Ⓓ

ⒶGripping force

50	500 N

ⒷStroke

80	160 mm (single side 80 mm)

ⒸInterface specification

LK	IO-Link

ⒹRelay cable

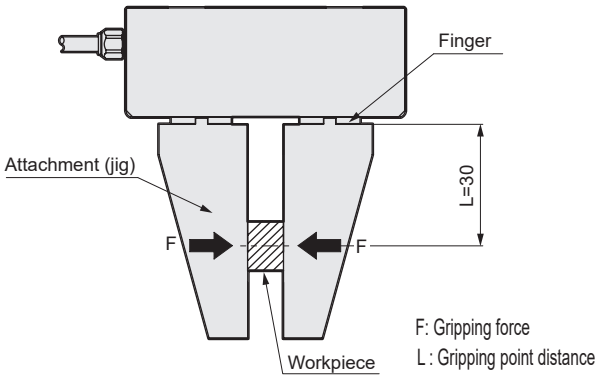
R00	Movable cable

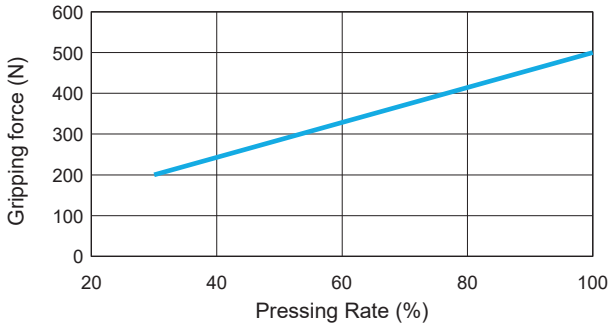
Specifications

Motor		□35 Stepping motor
Encoder-type		Incremental encoder
Drive method		Rack and pinion, worm gear
Controller		Built in
Stroke	mm	160 (80 per side)
Max. gripping force *1	N	500 (per side)
Open/close speed range	mm/s	1 to 30 (per side)
Gripping speed range *1	mm/s	1 to 5 (per side)
Repeatability *2	mm	±0.02
Positioning repeatability *3	mm	±0.05 (per side)
Lost motion	mm	0.4 or less (per side)
Static allowable moment	N·m	MP=64, MY=55, MR=64
Settings tool		Setting software (S-Tools)
External interface		IO-Link
Power supply voltage	Communication/control	24 VDC ±10%
	Power	24 VDC ±10%
Current consumption	Communication/control A	0.2 or less
	Power A	3.0 or less
Motor section max. instantaneous current	A	4
Power capacity		Max. 100 W
Insulation resistance		10 MΩ, 500 VDC
Withstand voltage		500 VAC for 1 minute
Operating ambient temperature, humidity		0 to 40 °C (no freezing) 35 to 80% RH (no condensation)
Storage ambient temperature, humidity		-10 to 50°C (no freezing) 35 to 80% RH (no condensation)
Atmosphere		No corrosive gas, explosive gas, or dust
Degree of protection		IP20
Weight	kg	2.7

*1 Gripping is done with pressing operation.
*2 Repeatability indicates variation when the same workpieces are gripped repeatedly with the same operating conditions.
*3 The variation of stopping position when positioning is repeatedly performed to the same point is shown.

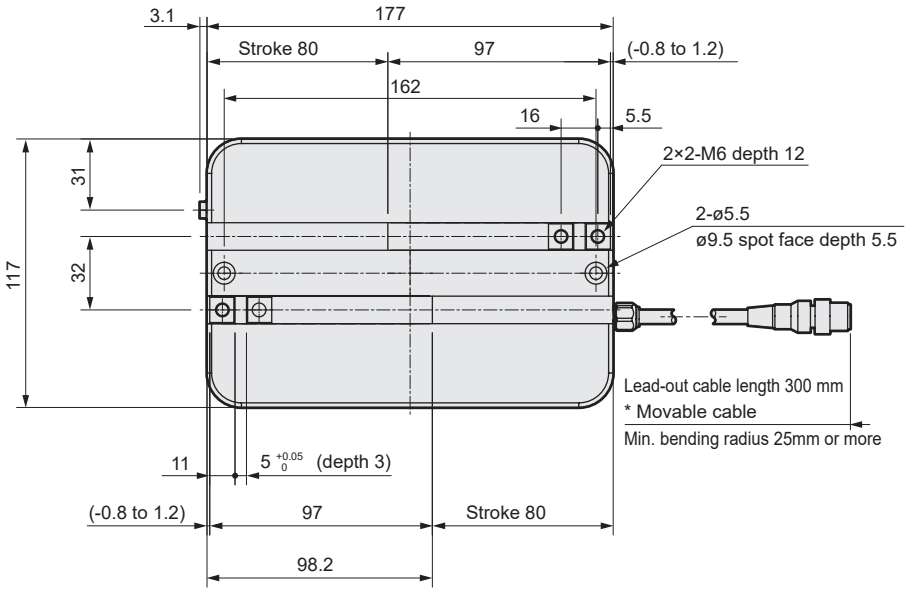
Gripping force and pressing rate

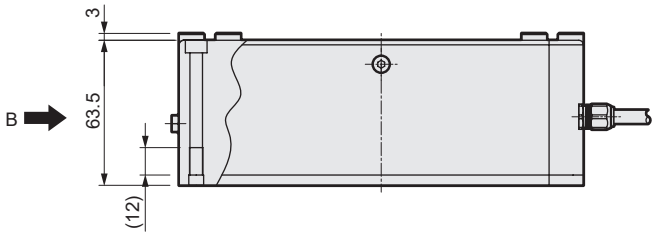


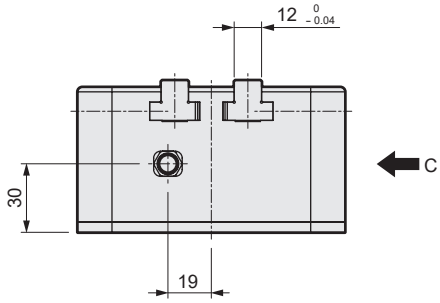


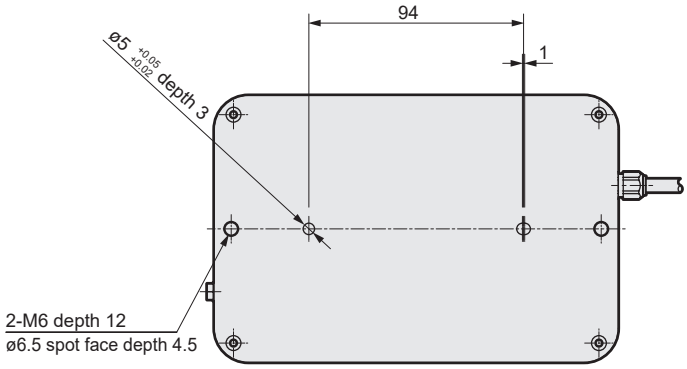
* The correlation diagram of the gripping force and pressing rate shows a guideline. Individual motor differences and variations in mechanical efficiency may result in differing actual values, even at the same pressing rate.
* Gripping speed is for 5mm/s. (L=30)
* The setting range for the pressing rate is 30 to 100%.

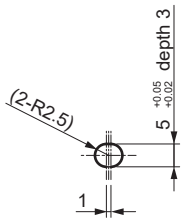
Dimensions



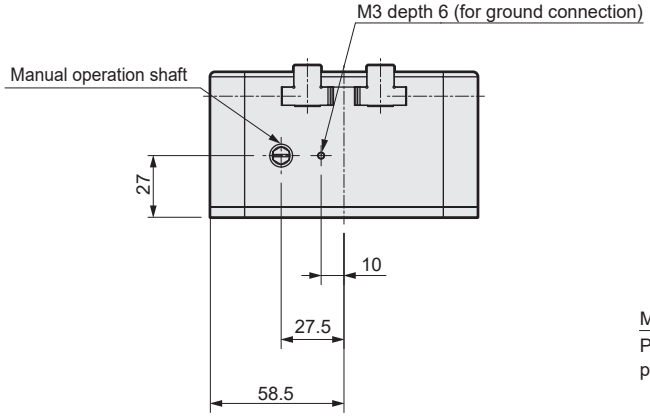




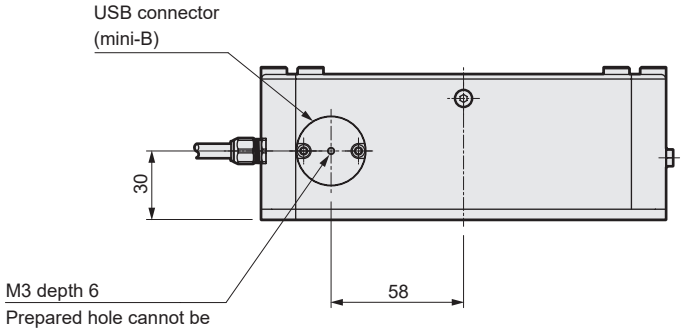




Slot dimensions for A

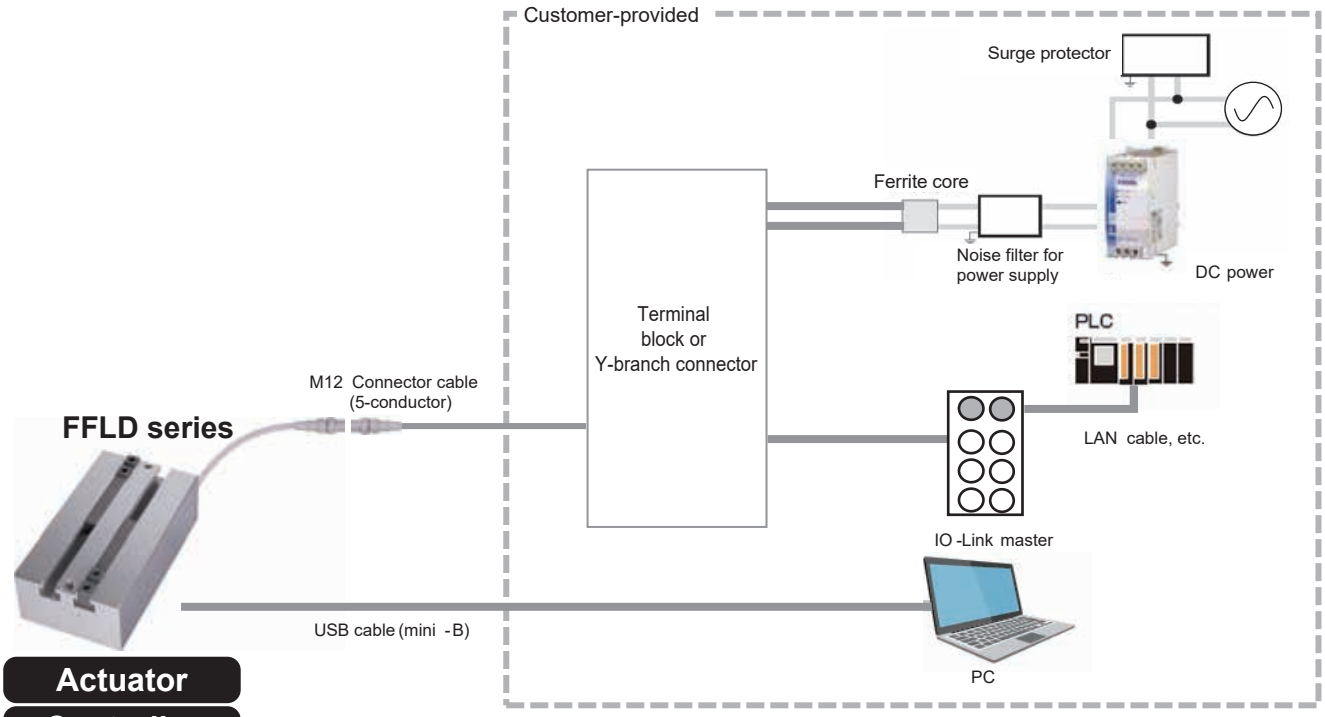


B arrow view



C arrow view

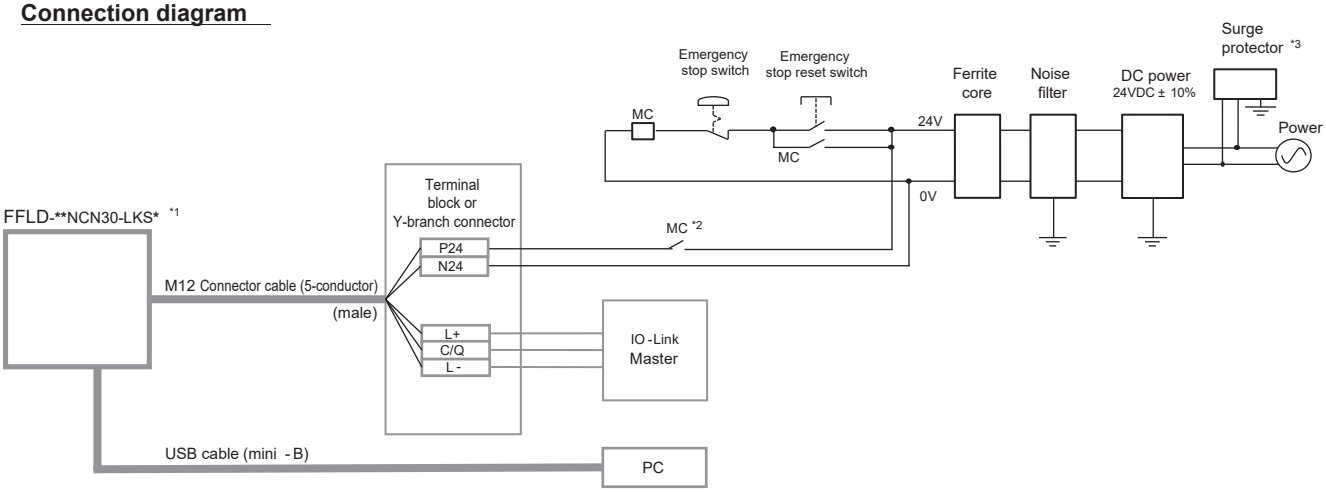
System configuration



Actuator
Controller

PC setting software (free of charge)
Download from the CKD website.
(URL:https://www.ckd.co.jp/en/)

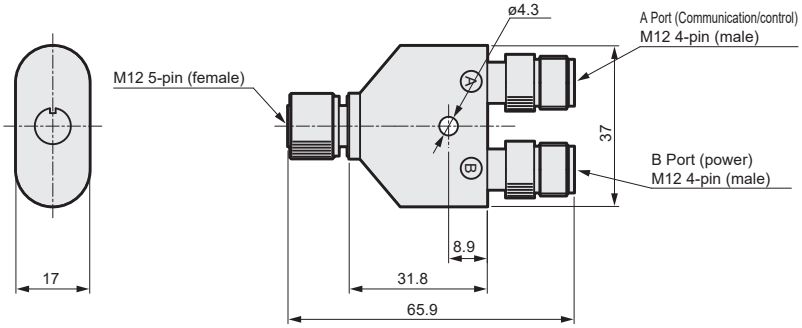
Connection diagram



*1 It is not a IO-Link ClassB-compliant product. It is possible to connect to the IO-Link Class B master, however, communication/control and motor power supplies are isolated, so other equipment may be affected if an error occurs. Refer to the instruction manual before wiring. Incorrect wiring could result in part damage.
*2 If the motor drive source must be shut off for safety category compliance, etc., connect a contact such as an electromagnetic switch.
*3 A surge protector is required to comply with the CE marking.

● Y branch connector

EA-YJOINT-1



Refer to the Instruction Manual for the wiring diagram.

Field Network Description

Overview	
FDP	64 point operation is possible. Switching the direct travel selection signal enables full direct value operation with which the operating conditions can be set to a desired value from the PLC. Monitoring can also be confirmed. Refer to the table below for details.

	Direct value travel selection	Positioning point count	Direct value travel Item									Monitor Item		
			Target position	Speed	Pressing rate	Pressing speed	Position specification method	Operation mode	Stop method	Point zone +	Point Zone -	Position	Current	Speed
FDP	0	64 points	-	-	-	-	-	-	-	-	-	○	▲	▲
	1	No limit	○	○	○	○	○	○	○	○	○	○	▲	▲

*For ▲, use ▲ to select only 1 item to be monitored -: N/A, ○: Yes, ▲: Conditional

[Communication specifications]

Item	Specifications
Communication protocol version	V1.1
Transmission bit rate	COM2 (38.4kbps)
Port	Class A
Process data length (Input) PD (in) data length	5 byte
Process data length (Output) PD (out) data length	15 byte
Minimum cycle time	10ms
Monitor function	Position, current, speed

Cyclic data from master

PD (out)	Bit	Item
0	7	-
	6	Stop
	5	Alarm reset
	4	Servo ON
	3	Origin return start
	2	Travel start
	1	Direct value travel selection
	0	-
1	7	-
	6	-
	5	Point number confirmation bit 5
	4	Point number confirmation bit 4
	3	Point number confirmation bit 3
	2	Point number confirmation bit 2
	1	Point number confirmation bit 1
	0	Point number confirmation bit 0
2 to 3	7 to 0	Position (direct value travel)
4	7 to 0	Speed (direct value travel)
5	7 to 0	Pressing ratio (direct value travel)
6 to 7	7 to 0	Pressing distance (direct value travel)
8	7 to 0	Pressing speed (direct value travel)
9	7	Position specification method (direct value travel)
	6 to 5	Operation method (direct value travel)
	4 to 3	-
	2 to 0	Stop method (direct value travel)
10 to 11	7 to 0	Point zone(+) (direct value travel)
12 to 13	7 to 0	Point zone (-) (direct value travel)
14	7	INCH selection
	6	JOG/INCH(+)Travel start
	5	JOG/INCH (-) travel start
	4 to 3	-
	2 to 0	Monitor selection

Cyclic data from controller

PD (in)	Bit	Item
0	7	Operation preparation complete
	6	Warning
	5	Alarm
	4	Servo ON state
	3	Origin return complete
	2	Travel complete
	1	Moving
	0	Point zone
1	7	Direct value travel status
	6	-
	5	Point number confirmation bit 5
	4	Point number confirmation bit 4
	3	Point number confirmation bit 3
	2	Point number confirmation bit 2
	1	Point number confirmation bit 1
	0	Point number confirmation bit 0
2 to 3	7 to 0	Current position
4	7 to 0	Selection monitor

Model selection

STEP 1 Calculating the required gripping force

Workpiece (weight W_L) Calculate the required gripping force with the following as the reference.

$$F_w] \frac{W_L \times g \times K}{n}$$

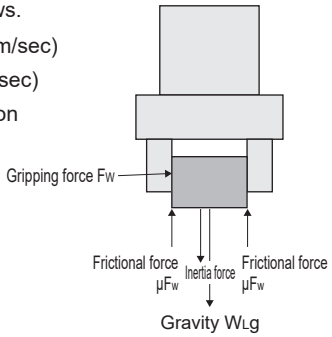
F_W : Required gripping force (N)
n : Number of attachments = 2
W_L : Workpiece weight (kg)
g : Gravity acceleration = 9.8 (m/s^2)
K : Transport coefficient
5 [holding only]
10 [normal transport]
20 [suddenly accelerated transport]

Transport coefficient K

Calculation Example) When decelerating from a transfer speed V = 0.75 m/s to stop in 0.1 s, assuming the coefficient of friction μ between the workpiece and the small finger(s) is 0.1, the calculation is as follows.

Obtain the transport coefficient K from the force applied to the workpiece

V: Transport speed (m/sec)
t: Deceleration time (sec)
μ: Coefficient of friction



• Inertial force = $W_L \times (V/t)$

• Gravity = $W_L g$

• Required gripping force $F_W > \frac{W_L \times (V/t) + W_L g}{n\mu} = \frac{W_L \times (V/t+g)}{n\mu} = \frac{17.3\ W_L}{2 \times 0.1} = 86.5 W_L$

∴ Here, the transport coefficient K is calculated from the above equation:

$$\frac{W_L \times g \times K}{n} = 86.5\ W_L$$

$$K = \frac{n \times 86.5}{g}$$

$$= \frac{2 \times 86.5}{9.8}$$

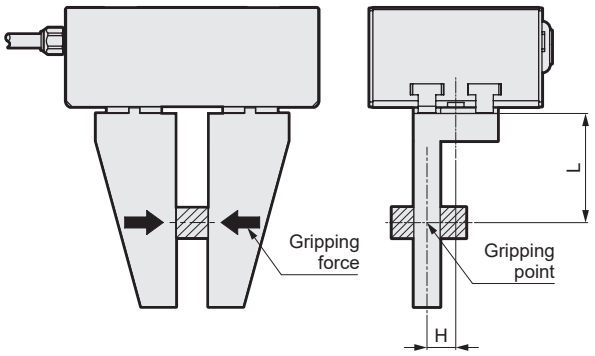
$$\approx 20$$

✳) A margin must be allowed for the transfer coefficient K to account for impacts during transfer, etc. Even if the coefficient of friction μ is higher than μ = 0.1, please set the transfer coefficient K to 10 to 20 or more for safety.

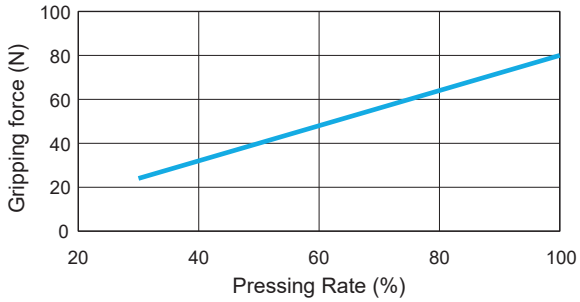
STEP 2 Temporarily select a model from the gripping force graph

Check the conditions at right and temporarily select a model from the gripping force graph. The gripping force varies according to gripping point distance L and the pressing rate. Confirm on the graph that sufficient force can be obtained under the working conditions.

It is calculated by $L=\sqrt{L^2+H^2}$

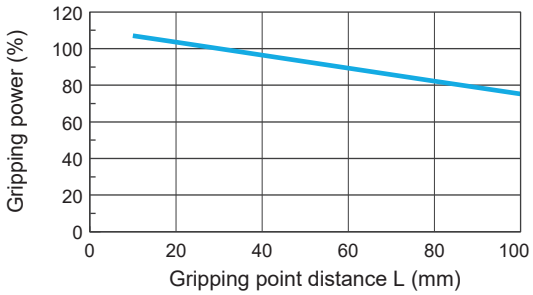


Gripping force and pressing rate
[Example: FFLD-08]



* Refer to pages 2, 4 and 6.

Gripping force and gripping point distance
[Example: FFLD-08]

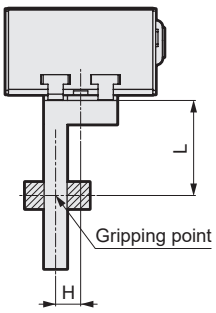


* Refer to page 22.

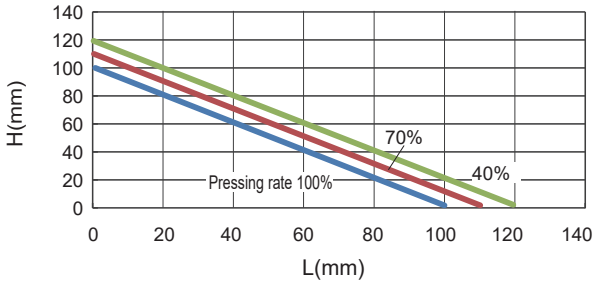
STEP 3 Confirmation of attachment shape

Use gripping point distance within the range of the graph at right.

Example) L: 30 mm, H: 20 mm



Gripping point distance and pressing rate
[Example: FFLD-08]



If FFLD-08 is selected, L:30mm, H:20mm
the intersection point is inside the 100% pressing rate line and can be used.

* Refer to page 23.

●Use attachments as short and lightweight as possible.

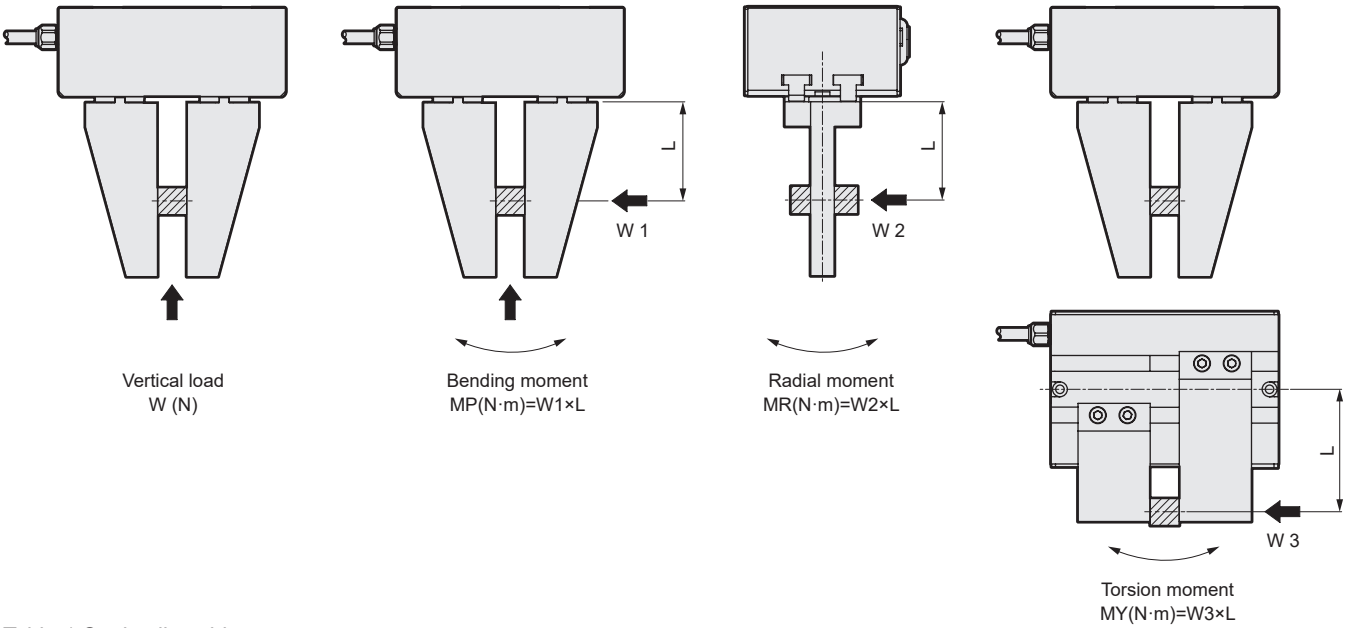
If the attachment is long and heavy, inertia increases when opening and closing, this may cause play in the finger, and adversely affect durability.

- Minimizing the attachment shape as much as possible within the performance data enables the product to be used for a longer time.
- The weight of the attachment affects durability, so check that the weight is less than the following value.

W<1/4h (1 pc.) W: Weight of attachment
h: Product weight of gripper

STEP 4 Confirmation of external forces applied to finger

When external force is applied to the finger, use it within the range in [Table 1].



Vertical load
W (N)

Bending moment
MP(N·m)=W1×L

Radial moment
MR(N·m)=W2×L

Torsion moment
MY(N·m)=W3×L

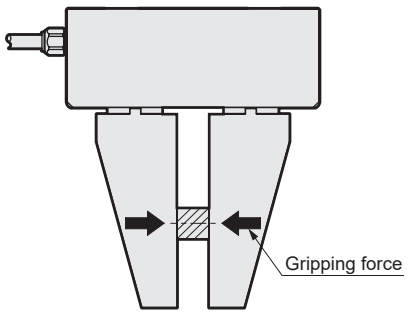
Table 1 Static allowable moment

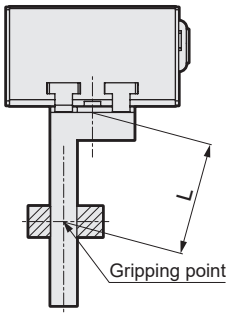
Size	Vertical load Wmax (N)	Bending moment Mpmax (N·m)	Radial moment Mrmax (N·m)	Torsion moment Mymax (N·m)
FFLD-08	120	15	15	15
FFLD-30	390	45	45	45
FFLD-50	485	64	64	55
FFLD-04H	120	15	15	15
FFLD-12H	390	45	45	45
FFLD-30H	390	45	45	45
FFLD-50H	485	64	64	55

Example of calculation:
When load W1:30N is applied to model No.: FFLD-08, L:40mm
$MP=30\times40\times10^{-3}=1.2N\cdot m<MPmax=15N\cdot m$

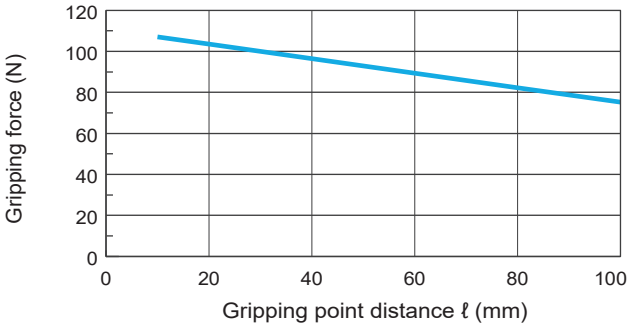
Gripping force and gripping point distance

Indicates the gripping force at the gripping point distance L.

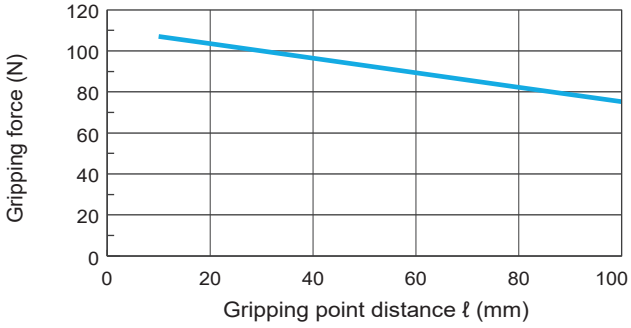




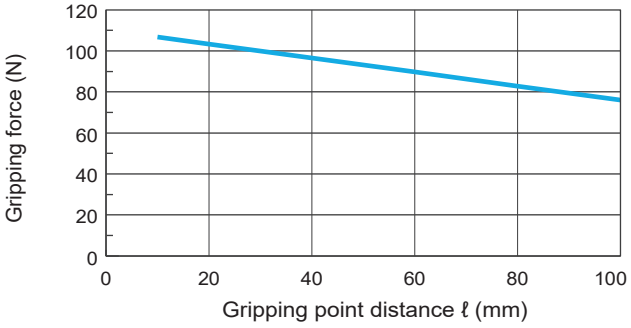
FFLD-04H



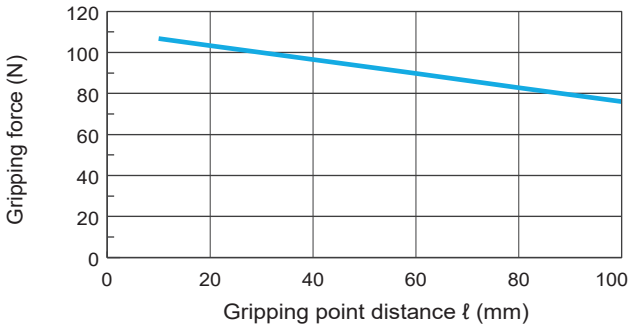
FFLD-08



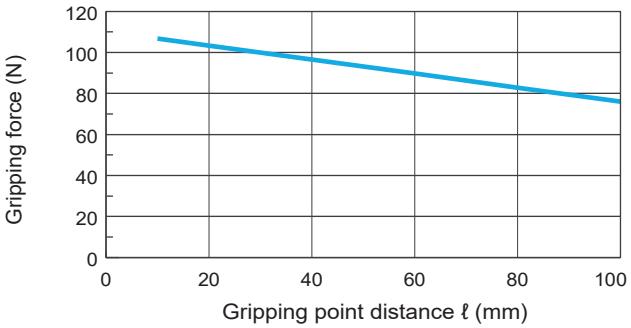
FFLD-12H



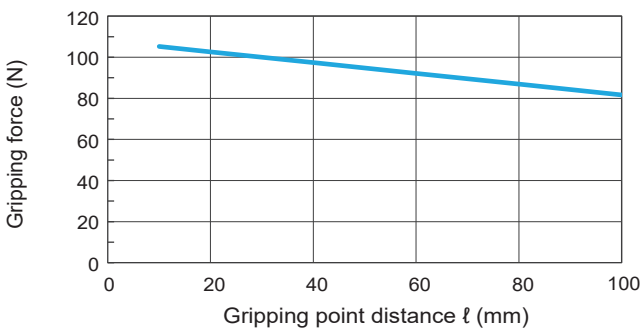
FFLD-30



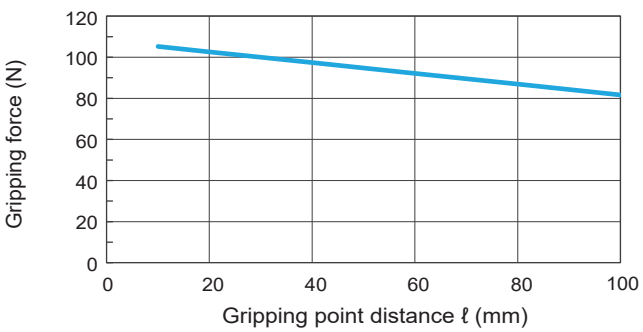
FFLD-30H



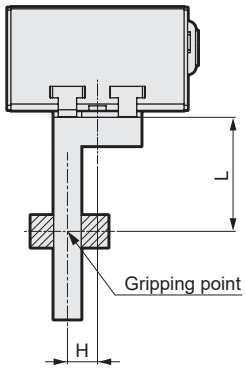
FFLD-50

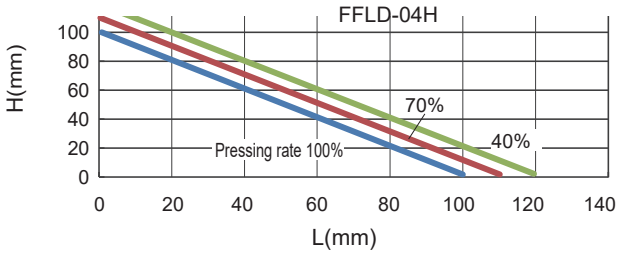


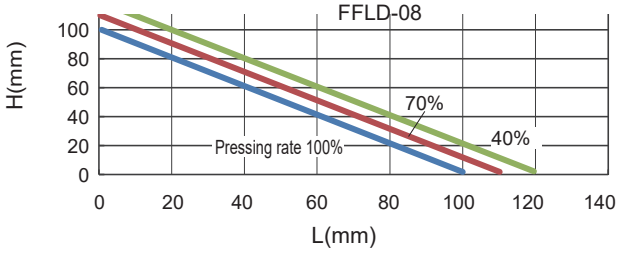
FFLD-50H

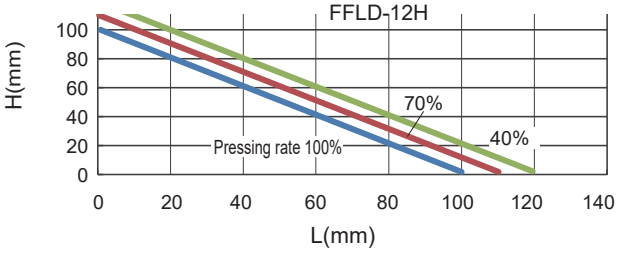


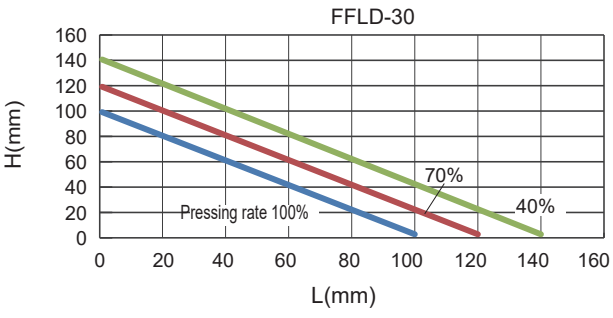
Gripping point distance and pressing rate

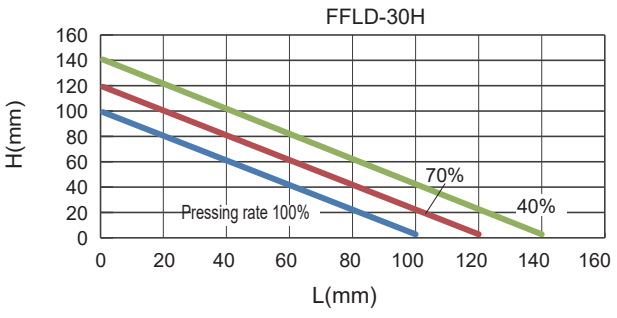


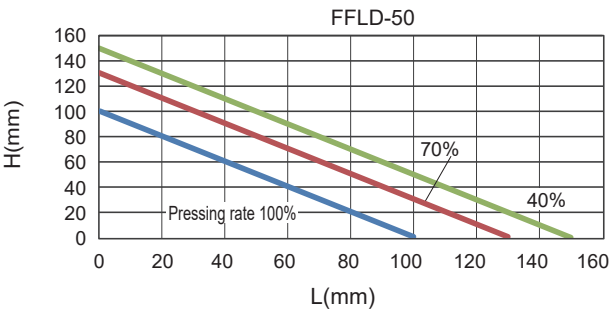


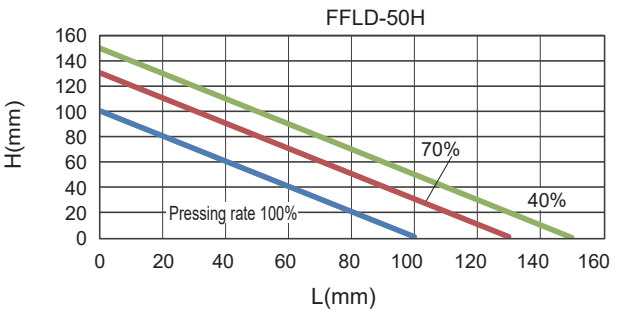












Safety Precautions

Always read this section before use.

When designing equipment using electric actuators, the manufacturer is obligated to ensure that the safety of the mechanism and the electrically controlled system are secured.
It is important to select, use, handle and maintain CKD products appropriately to ensure their safe usage.
Observe warnings and precautions to ensure device safety.
Check that device safety is ensured and a safe device is manufactured.

WARNING

1 This product is designed and manufactured as a general industrial machine part.
It must be handled by an operator having sufficient knowledge and experience in handling.

2 Use the product within specifications range.

This product must be used within its stated specifications. It must not be modified or machined additionally.
This product is intended for use as a device or part for general-purpose industrial machinery. It is not intended for use outdoors (except for outdoor type) or for use under the following conditions or environment.
(Note that this product can be used under the following conditions only when CKD is consulted prior to use and the customer consents to CKD product specifications. The customer must provide safety measures to avoid risks in the event of problems.)

❶ Use for special applications which require the safety, including nuclear energy, railways, aircrafts, marine vessels, vehicles, medicinal devices, devices or applications coming into contact with beverages or foodstuffs, amusement devices, emergency operations (cutoff circuits, opening etc.) circuits, press machines, brake circuits, or safety devices or applications.

❷ Use for applications where life or assets could be adversely affected and special safety measures are required.

3 Observe organization standards and regulations, etc. related to the safety of device design.

4 Never remove devices before confirming safety.

❶ Inspect and service on the machine and devices after confirming safety of the entire system related to this product.
❷ Note that there may be hot or charged sections even after operation is stopped.
❸ When inspecting or maintaining device, be sure to shut down the power supply of the equipment and the relevant power supply, using caution to avoid electric shock.

5 Observe instruction manual and precautions attached the product surely to prevent accidents.

❶ The product could operate unexpectedly during teaching operation or trial operation. Be especially careful not to touch the actuator. If operating the product from a position where the shaft body cannot be seen, be sure to first confirm that the safety is secured even if the actuator moves.

6 Observe precautions to prevent electric shock.

❶ Do not touch the heat sink, cement friction, or motor inside the controller.
These will heat up, and could cause burns. Wait an appropriate amount of time prior to performing inspections or other tasks.
A high voltage is applied until the electrical load stored in the internal capacitors is discharged after the power is turned OFF.
Do not touch for around three minutes after the power OFF.
❷ Make sure to turn the switch on the controller power supply source OFF, before maintenances and inspections.
There is a danger of high voltage electric shocks.
❸ Do not attach or remove connector, while the power is on. Otherwise, this may cause malfunction, failure, or electric shock.

7 Install an overcurrent protector.

The wiring to the driver should be in accordance with JIS B 9960-1:2019 (IEC 60204-1:2016) Safety of Machinery - Electrical Equipment of Machines - Part 1: General Requirements. Install an overcurrent protector (a circuit breaker or circuit protector for wiring) on the main power, control power, and I/O power.

(Reference: JIS B 9960-1 7.2.1 General description)
If there is a possibility the circuit current may exceed the rated value of the component or the allowable current of the conductor, an overcurrent protection must be provided. The details of the ratings or set values to be selected shall be provided in 7.2.10.

8 Observe precautions below to prevent accidents.

■ The precautions are ranked as "DANGER", "WARNING" and "CAUTION" in this section.

DANGER: When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries, and when there is a high degree of emergency to a warning.

WARNING: When a dangerous situation may occur if handling is mistaken leading to fatal or serious injuries.

CAUTION: When a dangerous situation may occur if handling is mistaken leading to minor injuries or physical damage.

Note that some items described as "CAUTION" may lead to serious results depending on the situation.
Every item provides important information and must be observed.

Warranty

1 Warranty period

The product specified herein is warranted for one (1) year from the date of delivery to the location specified by the customer.

2 Warranty coverage

If the product specified herein fails for reasons attributable to CKD within the warranty period specified above, CKD will promptly provide a replacement for the faulty product or a part thereof or repair the faulty product at one of CKD's facilities free of charge.

However, following failures are excluded from this warranty:

1) Failure caused by handling or use of the product under conditions and in environments not conforming to those stated in the catalog, the Specifications, or the Instruction Manual.
2) Failure caused by use of the product exceeding its durability (cycles, distance, time, etc.) or caused by consumable parts.
3) Failure not caused by the product.
4) Failure caused by use not intended for the product.
5) Failure caused by modifications/alterations or repairs not carried out by CKD.
6) Failure caused by reasons unforeseen at the level of technology available at the time of delivery.
7) Failure caused by acts of nature and disasters beyond control of CKD.

The warranty stated herein covers only the delivered product itself. Any loss or damage induced by failure of the delivered product is excluded from this warranty.

Note: For details on the durability and consumable parts, contact your nearest CKD sales office.

3 Compatibility confirmation

The customer is responsible for confirming the compatibility of CKD products with the customer's systems, machines and equipment.

4 Range of service

The delivered product price does not include engineer dispatch service fees. Separate fees will be charged in the following cases.

(1) Instruction of installation and adjustment, and presence on test operation
(2) Maintenance and inspection, adjustment, and repair
(3) Technical instructions and technical education (operation, program, wiring method, safety education, etc.)

Precautions for export

Products and related technologies in this catalog
Those of the products and related technologies in this catalog which are subject to US Export Administration Regulations
(EAR) are marked on the product page as "Product subject to the EAR (EAR99) or (EAR99 and 3A991)". For export or provision of products or related technologies subject to EAR regulations, we request that the US Export Administration Regulations (EAR) be observed appropriately.

Safety Precautions

Be sure to read this section before use.

Common Precautions: Electric actuator FFLDSeries

Design/selection

⚠DANGER

- Do not use in places where dangerous items such as ignitable substances, inflammable substances or explosives are present.
  There is a possibility of ignition, combustion or explosion.
- Ensure that the product is free of water droplets and oil droplets.
  Failure to do so may cause fire or malfunction.
- When mounting the product, be sure to hold and fix it securely (including workpieces).
  If the product falls, is knocked over, or experiences malfunction, it may lead to injury. As a rule, fix the product using all mounting holes.
- Use a DC stabilized power supply (24VDC±10%) for the power supply, communication/control power supply, and input/output circuit power supply. Connecting directly to the AC power supply may cause fire, explosion, damage, etc.
- Do not connect the communication/control power supply (L-) and power supply (N24) externally, as they are connected with the FFLD internal base.
  The reverse connection protection built-in attached to this device may not operate correctly, and may result in fire, explosion, damage, etc.

⚠WARNING

- Use the product in the range of conditions specified for the product.
- Provide a safety fence to prevent entry to the movable range of the electric actuator. In addition, install the emergency stop button switch as a device in a location which is easy to operate in an emergency situation. For the emergency stop button, use a structure and wiring that will prevent automatic restoration or inadvertent restoration by personnel.
- It may take several seconds to stop in an emergency depending on the travel speed and built-in load.
- Design a safety circuit or equipment so that damage to equipment, injury to persons, etc., does not occur when the machine stops in the event of a system failure such as emergency stop or power outage.
- Install indoors with low humidity.
  There is a risk of electric leakage or fire accidents in places exposed to rainwater or where there is high humidity (humidity of 80% or more, condensation). Oil drops and oil mist are also strictly prohibited. Use in such an environment could lead to damage or operation failure.
- Make sure that the product is D type grounded (ground resistance of 100 Ω or less).
  If electrical leakage occurs, it may lead to electric shock or malfunction.
- Use and store in accordance with the working/storage temperatures and where there is no condensation.
  (Storage temperature: 10°C to 50°C, storage humidity: 35% to 80%, operating ambient temperature: 0°C to 40°C, operating ambient humidity: 35% to 80%) Otherwise, abnormal stopping or decreased product service life may result. Ventilate in locations where heat may build up.
- Do not use this product in a location where the ambient temperature could suddenly change and cause dew to condense.
- Install in a location free from direct sunlight, dust, and corrosive gas/explosive gas/inflammable gas/combustibles, and away from heat sources. Furthermore, chemical resistance has not been reviewed for this product.
  Failure to comply may lead to damage, explosion, or combustion.
- Use and store in locations free from strong electromagnetic waves, ultraviolet rays, or radiation.
  Otherwise, malfunction or damage may result.
- Consider the possibility of the power source breakdown.
  Take measures to prevent bodily injury or machine damage even in the event of a power failure.
- Consider the operation status when restarting after emergency or abnormal stops.
  Design the system so that bodily injury or equipment damage will not occur when restarting. In addition, the electric actuator must be reset to the start position, design a safe control device. Consider the possibility of power failure of the mounted motor. Take measures to prevent bodily injury or machine damage even in the event of a power failure.
- Avoid using this product where vibration and impact are present.
- Do not apply a load to the product that is greater than or equal to the allowable load listed in the materials for selection.
- If the moving workpiece poses a possible risk to personnel or if human fingers could be caught in the finger section, etc., install a protective cover, etc.
- The gripping force may decrease during a power outage or similar. Use a safe design that takes this into consideration. The gripping force may decrease during a power outage or similar, dislodging the workpiece, so be sure to install a safety mechanism to prevent injury or mechanical damage.

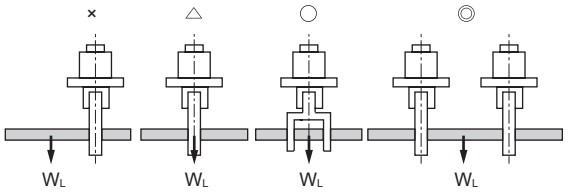
⚠ CAUTION

- Never disassemble or modify the product.
- The customer is responsible for confirming the compatibility of CKD products with the customer's systems, machines and equipment.
- Set up the wiring so as not to apply inductive noise.
  Avoid locations where large currents or strong magnetic fields are generated. Do not use the same wiring as any large motor power lines other than that of this product. Do not use the same wiring as inverter power supplies used for robots, etc. Apply a frame ground for the power supply and insert the filter to the output part.
- Be sure to separate the power supply of the output of this product and the power supply of inductive loads that generate surges, such as solenoid valves and relays.
  If the power supply is shared, surge current may flow into the output and cause damage. If a separate power supply cannot be used, connect the surge absorption element directly to all inductive loads in parallel.
- Select a power supply which provides ample capacity based on the number of installed products. Malfunction may occur if there is no excess capacity.
- Fix the cable so that it does not easily move.
- The origin position is recognized when the power supply is turned ON. If an external stopper or holding mechanism (brake, etc.) is attached, an unintended position may be recognized as the origin position. Be careful with the layout of the external stopper, etc., so that the origin can be properly detected after the power supply is turned ON.

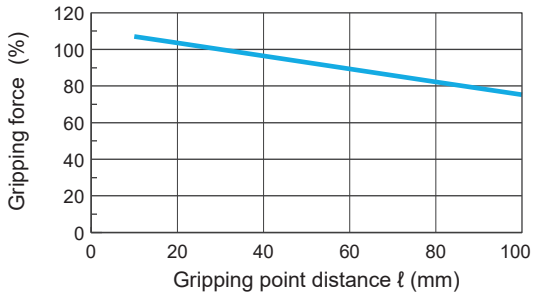
⚠ CAUTION

- When gripping long or large workpieces, stable gripping requires a grip on the center of gravity. Stability is a must when using larger or multiple workpieces as well.

◎: Excellent, ○: Good, △: Conditional, X: NG



- Select a model that has sufficient force to grip the workpiece weight.
- Select a model that has sufficient opening/closing width for the workpiece size. The gripping position may become unstable due to variation in the open/close width or the workpiece. When opening after gripping operation, increase the stroke by an amount corresponding to the backlash amount.
- Use jigs as short and lightweight as possible to mount on the finger. If the attachment is long and heavy, inertia increases when opening and closing. This may cause play in the finger, and adversely affect durability.



Mounting, installation and adjustment

⚠ DANGER

- Do not enter the operating range of the product while the product is operable.
  The product may suddenly move and may result in injuries.
- The wiring should be in accordance with JIS B 9960-1: 2019 Safety of Machinery - Electrical Equipment of Machines - Part 1: General Requirements. Install an overcurrent protector (a circuit protector or a shutoff mechanism for wiring) for the primary side of the power supply.
- Do not operate the unit with wet hands.
  It may lead to electric shock.
- When connecting a computer, do not ground its frame ground (FG).
  When using the FFLD with positive grounding, connecting the FFLD and peripheral components to the PC with a USB cable risks short-circuiting the DC power supply.
- The communication/control power supply and power supply are not isolated. Never connect the + and - of the power supply in reverse.
  Doing so may damage the product.

⚠ WARNING

- Precision parts are built in, so laying the product on its side or applying vibration or impact during transportation are strictly prohibited.
  This may cause damage to the parts.
- For preliminary installation, place horizontally.
- Do not step onto the packaging or place objects on it.
- Avoid condensation, freezing, etc., and maintain ambient temperatures of -10 to 50°C and ambient humidity of 35 to 80% when transporting and carrying.
  Failure to do so may cause damage to the product.
- Mount the product on incombustible materials. Direct attachment or mounting to or near flammable materials may cause fire.
  There is a risk of burns.
- Do not step onto the product or place objects on it.
  This may result in falling, knocking the product over, injury due to falling, product damage and/or malfunctions due therein, etc.
- Take measures to prevent bodily injury or machine damage even in the event of a power outage.
  There is a risk of unexpected accidents.
- If the product generates abnormal heat, smoke or odor, turn OFF the power immediately.
  Otherwise, product may result in damage or fire.
- Stop operation immediately when abnormal noise or major vibration occurs.
  Otherwise, product damage or abnormal operation may result.
- Wire the product securely while confirming with this catalog and the instruction manual and ensuring that there is no miswiring or loose connectors. Check wiring insulation.
  Due to contact with other circuits, ground faults and insulation failure between terminals, overcurrent may flow into the product and damage it. This could lead to malfunction or fire.
- Be sure to insulate unused wires.
  This may cause malfunction, failure, or electric shock.
- Do not damage the cable, snag it, apply excessive stress to it, or place heavy objects on it.
  Otherwise, poor conduction or electric shock may occur.
- Before restarting a machine or device, check that measures are taken so that parts do not come off.
- Check that the servo is turned OFF before manually moving the movable parts of the product.
- The movable parts may fall or otherwise move unexpectedly when the servo is turned OFF. When turning the servo OFF, take steps to prevent danger and operate the equipment with full attention to safety.
- Before operating the actuator, check that it will operate safely.

⚠ CAUTION

- Regarding installing, setting up, and/or adjusting the actuator, read through the instruction manual and operate correctly.
- When installing the product, be sure to secure space for maintenance work.
  Otherwise, it may not be possible to conduct inspection and maintenance, leading to stoppage or damage of the device or injury during operation.
- Do not hold the product's movable parts or cables during transportation and installation.
  This may lead to injury or disconnection.

- When carrying the product, support it from the bottom.
- When transporting and mounting the product, ensure operator safety by supporting the product with a lift or other supporting tools, or working in pairs or more.

■ Do not install in places where large vibration or impact is transmitted.
This may cause malfunction.

■ Do not operate the movable parts of the product with external force or sudden deceleration.
This may lead to malfunction or damage due to regenerative current.

■ When returning to origin, excluding pressing operation, do not hit the mechanical stopper, etc.
This may cause malfunction.

■ Do not apply external force to the actuator during origin return. There is a possibility of misrecognition of the origin.

■ Durability varies with transported load and environment. The transport load, etc., should be at a setting well within the margin.

■ Make sure that no vibration/impact is applied to the movable parts.

■ Install such that no torsion or bending force is applied to the product.

■ When performing electric welding on the equipment to which the product is mounted, remove all F.G. (frame ground) wire connections to the product.
F.G.If electric welding is performed with the connection attached, the product may be damaged by welding current, excessively high voltage during welding, or surge voltage.

■ Do not disassemble or modify the product.
This may cause injury, accident, malfunction or failure.

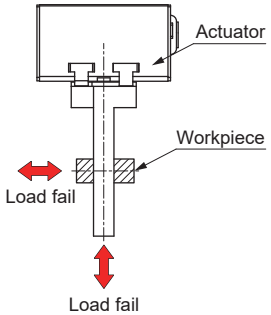
■ Fix the cable so that it does not move easily. Also, use cables with a bending radius of 25mm or more when fixing.

■ Avoid use in locations exposed to ultraviolet rays or with atmospheres of corrosive gas or salt.
Otherwise, degradation of performance, abnormal operation or deterioration in strength due to rust may result.

■ Before adjusting the gain, secure the actuator body to a rigid machine and securely mount jigs and other components as well.

■ When wiring, do not apply excessive force to the connectors.

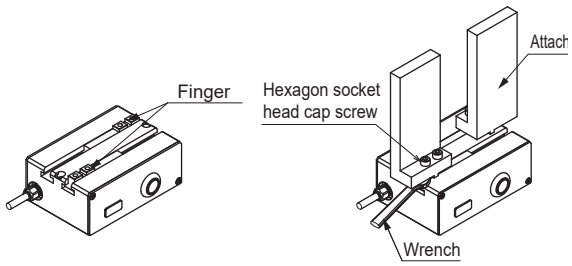
■ Be sure not to apply an excessive load to the fingers and attachment when attaching and detaching or conveying workpieces. Scratches and dents may occur on the sliding surface of the finger guide, possibly causing malfunction.



■ Do not cause dents or scratches that may damage flatness or perpendicularity on the body mounting surface and finger.

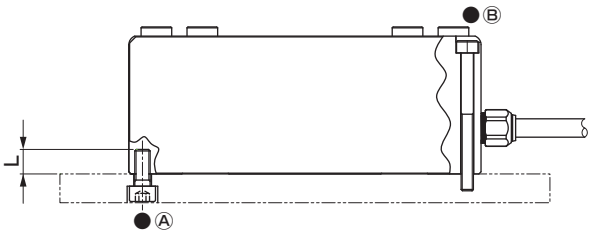
■ Do not retighten or disassemble, other than the screws used for fixing the body and finger.
This could lead to malfunction.

■ Attachment mounting method
When mounting the attachment to the finger, to prevent any effect on the gripper, support with a wrench, etc., when tightening so that the finger is not twisted.



Item	Bolt used	Tightening torque (N·m)
FFLD-08	M5 x 0.8	0.9
FFLD-30	M6 x 1.0	1.3
FFLD-50	M6 x 1.0	2.2
FFLD-04H	M5 x 0.8	0.9
FFLD-12H	M6 x 1.0	1.3
FFLD-30H	M6 x 1.0	1.3
FFLD-50H	M6 x 1.0	2.2

■ Refer to the following section for body mounting.
●Front mounting



Item	A (main body mounting)			B (through hole)	
	Bolt used	Tightening Torque (N·m)	Max. insertion Depth L (mm)	Bolt used	Tightening Torque (N·m)
FFLD-08/30	M5 x 0.8	3.2	10	M4 x 0.7	2.1
FFLD-50	M6 x 1.0	4.0	12	M5 x 0.8	3.2
FFLD-04H/12H/30H	M5 x 0.8	3.2	10	M4 x 0.7	2.1
FFLD-50H	M6 x 1.0	4.0	12	M5 x 0.8	3.2

■ To remove the workpiece when not energized, use the manual operation shaft to open/close the finger, or remove the attachment and then remove the workpiece. Do not apply excessive force to the manual operation shaft. Otherwise it could be damaged or malfunction. (Refer to page 31)

■ When using a positioning hole, use a pin of dimensions that do not require press fitting. The recommended tolerance of a pin is JIS tolerance m6 or less.

Use/maintenance

⚠ DANGER

- Do not operate the unit with wet hands.
  It may lead to electric shock.
- When connecting a computer, do not ground its frame ground (FG).
  When using the FFLD with positive grounding, connecting the FFLD and peripheral components to the PC with a USB cable risks short-circuiting the DC power supply.

⚠ WARNING

- Wiring work and inspection should be done by a specialized technician.
- When performing maintenance, inspection and repair, stop the power supply to this product.
  Caution people in the vicinity that a third party should not turn ON the power inadvertently.
- Do not attach or detach wiring or connectors with the power supply ON.
  Failure to do so may cause malfunction, failure, or electric shock.
- For wiring work and inspection, check the voltage with a tester after more than 5 minutes have elapsed since turning OFF the power.
  It may lead to electric shock.
- Mount the product before wiring.
  It may lead to electric shock.
- Make sure that the electric wire used for the power cable is 0.3mm^2 (AWG#22) or larger.
  Otherwise, heat generation or damage during operation may be caused.
- Do not connect the product's communication connector to other components.
  Doing so may cause failure or damage.
- Turn OFF the power supply in the event of a power failure. When the power is restored, the product may move unexpectedly and cause accidents.
- Perform a safety check of the component's operating range before supplying power to the product.
  Inadvertently supplying power can cause electric shock or injury.
- Do not enter the operating range while the product is operable.
  The product may move unexpectedly and cause injury.
- Do not touch the product with hands or body during operation or immediately after stopping.
  This may cause burns.
- Do not step onto the product or place objects on it.
  This may result in falling, knocking the product over, injury due to falling, product damage, malfunctions due thereto, etc.
- Take measures to prevent bodily injury or machine damage even in the event of a power outage.
  There is a risk of unexpected accidents.
- Before operating from a position where the actuator cannot be seen, confirm that it can be safely operated.
- Check that the servo is turned OFF when manually moving the movable parts of the product.
- If the product generates abnormal heat, smoke or odor, turn OFF the power immediately.
  Otherwise, product damage or fire may result.
- Stop operation immediately when abnormal noise or major vibration occurs.
  Otherwise, product damage or abnormal operation may result.

⚠ CAUTION

- Do not put fingers or objects into the opening of the product.
  This may cause product damage or injury.
- Do not dent or damage the movable parts.
  This may cause malfunction.
- Do not turn OFF the servo with gravity or inertia applied.
  The product may continue to operate or fall at servo OFF. Be sure to turn OFF the servo in a balanced state without gravity or inertia applied, or confirm safety before proceeding.
- Do not issue a stop command while the product is accelerating or decelerating.
  Doing so may result in a dangerous change in speed (acceleration).
- When operation involves vibration, change the set speed so that vibration does not occur.
- Vibration may occur even within the operation speed range depending on the working conditions.
- Do not disassemble or modify the product.
  This may cause injury, accident, malfunction or failure.
- Ensure proper operation through periodic inspections (2 to 3 times per year).
- When disposing of the product, comply with laws pertaining to waste treatment and cleaning. Consign it to a specialized waste disposal company for processing.

■ The circuit board inside the product has capacitors connected between the circuits and the metal body to prevent damage due to static electricity. Avoid withstand voltage and insulation resistance tests on equipment with this product installed. If tests are done, the product will be damaged. If it is necessary for the equipment, remove the product before doing the test.

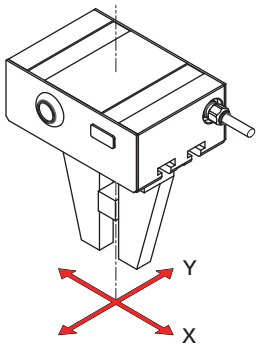
■ Frequently turning the power ON/OFF can cause damage to the elements inside the controller.

■ Use the product in the range of conditions specified for the product. The elements inside the controller may overheat and be damaged.

■ The relationships between pressing force (gripping force) and pressing rate described in this catalog are merely guidelines. Fluctuation in motor torque, etc., may cause errors even at the same set values.

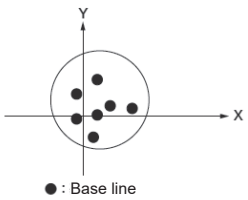
■ Repeatability

The repeatability here indicates the displacement of the finger in the case of repeated clamping and unclamping in the same conditions (gripper fixed, same attachment used: see below). Shock during opening and closing may lead to position misalignment of the workpiece and deterioration of repeatability. Note that wear to the attachment or insufficient rigidity may also decrease repeatability.



Conditions

- Attachment dimensions, shape, weight
- Attachment workpiece gripping position
- Clamp method, length
- Attachment and workpiece contact area resistance
- Fluctuation of gripping force, etc.



■ The amount of backlash has no effect during pressing operation. Backlash may cause misalignment in the position of the finger during positioning operation, so be sure to take the amount of backlash into consideration when setting the position.

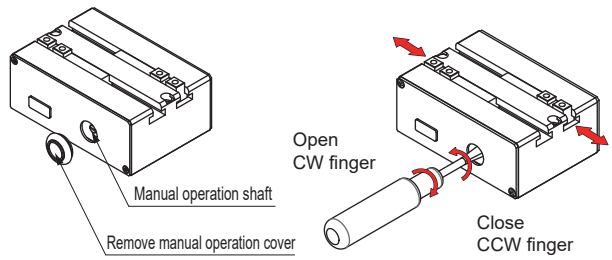
■ When gripping during pressing operation, set the target position with some margin from the stop position. (Include the amount of backlash.)

■ When gripping a workpiece, always use pressing operation. Do not allow the finger or attachment to strike the workpiece during positioning operation or within the positioning range. This may cause malfunction.

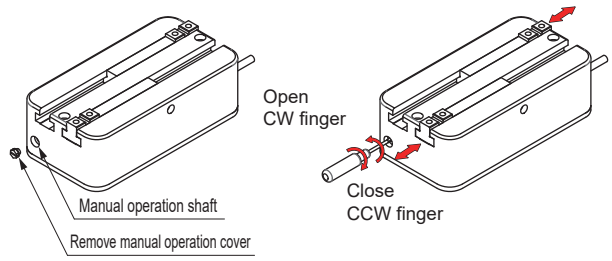
■ Set the current setting when releasing the grip to a value larger than the current setting when gripping. If the current is low, galling may prevent releasing.

■ If the finger suffers galling due to operation setting abnormalities, use the manual operation shaft to open/close the finger. However, do not apply excessive torque to the manual operation shaft. Otherwise it could be damaged or malfunction.

・FFLD-08/30/04H/12H/30H



・FFLD-50/50H



■ Self-lock mechanism

A gear-based self-lock mechanism is included to prevent movement even if an external force is applied to the finger. To move the finger when the power supply is OFF, turn the manual operation shaft to move the finger.

■ This device is not IO-Link ClassB compliant. The communication/control power supply (L+, L-) and the power supply (P24, N24) are not insulated. These have a common GND for the integrated circuit board.

■ It can be connected and operated with the Class B-compatible IO-Link master, but the communication/control power supply and the power supply are not isolated. If an error occurs in the power supply system in the actuator, other components connected to the IO-Link master may be affected.

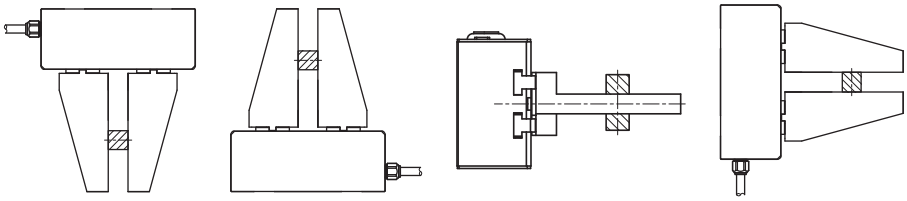
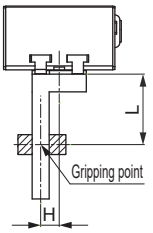
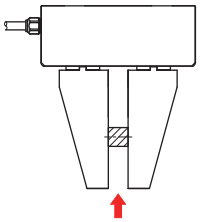
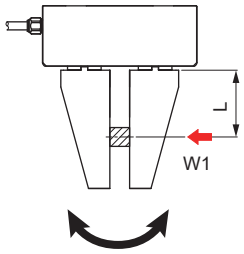
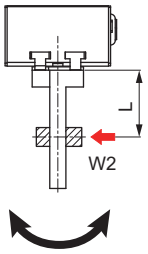
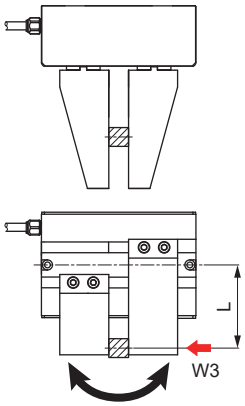
FFLD Series model selection check sheet → **CKD**(Contact)

Fill in the form and send to the nearest CKD Sales Office. We will respond with the model selection results.

Customers:

Company		Department	
Name		E-mail	
Tel.		Fax	

Selecting conditions:

Desired model	FFLD-
Basic specifications	Max. stroke length (per side): mm
Operating conditions	Travel stroke (per side): mm, travel time: s
	Gripping force(per side): N
	Open/close speed (per side): mm/s, gripping speed: mm/s
	Repeatability: ± mm, positioning repeatability: ± mm
Load conditions	Mounting orientation: Orientation 1 Orientation 2 Orientation 3 Orientation 1 / Orientation 2 / Orientation 3 / Others 
	Weight of workpiece: kg Workpiece material: Number of attachments: Attachment material: Attachment length: H: mm L: mm 
	External force on finger: Yes / No  Vertical load W (N) (Load: N)  Bending moment (Load: N, distance: mm)  Radial moment (Load: N, distance: mm)  Torsion moment (Load: N, distance: mm)
Working environment	Ambient temperature: °C, Ambient humidity: %
	Atmosphere:
Interface	IO-Link
Remarks	

Related products

Electric actuator D Series, G Series

Catalog No.CC-1591A

New electric actuator inheriting the DNA of air components

- D Series (Screw driven)
  An actuator specialized for positioning between two points
- D Series (Spring driven)
  Spring integrated actuator specialized for clamp/grip applications
- G Series (Screw driven)
  64-point positioning actuator

Electric actuator FLSH/FLCR/FGRC Series

Catalog No.CC-1444A

- 2-Finger Gripper FLSH Series
  For soft handling of multi-model workpieces
- Table FLCR Series
  For short-stroke workpiece transport and positioning
- Rotary FGRC Series For indexing operation and workpiece inversion
- Controller ECR Series
  One controller that connects to any actuator
- Controller ECG Series
  Simple inventory management, simple design, simple configuration "New controller"

Electric actuator EJSG Series

Catalog No.CC-1569A

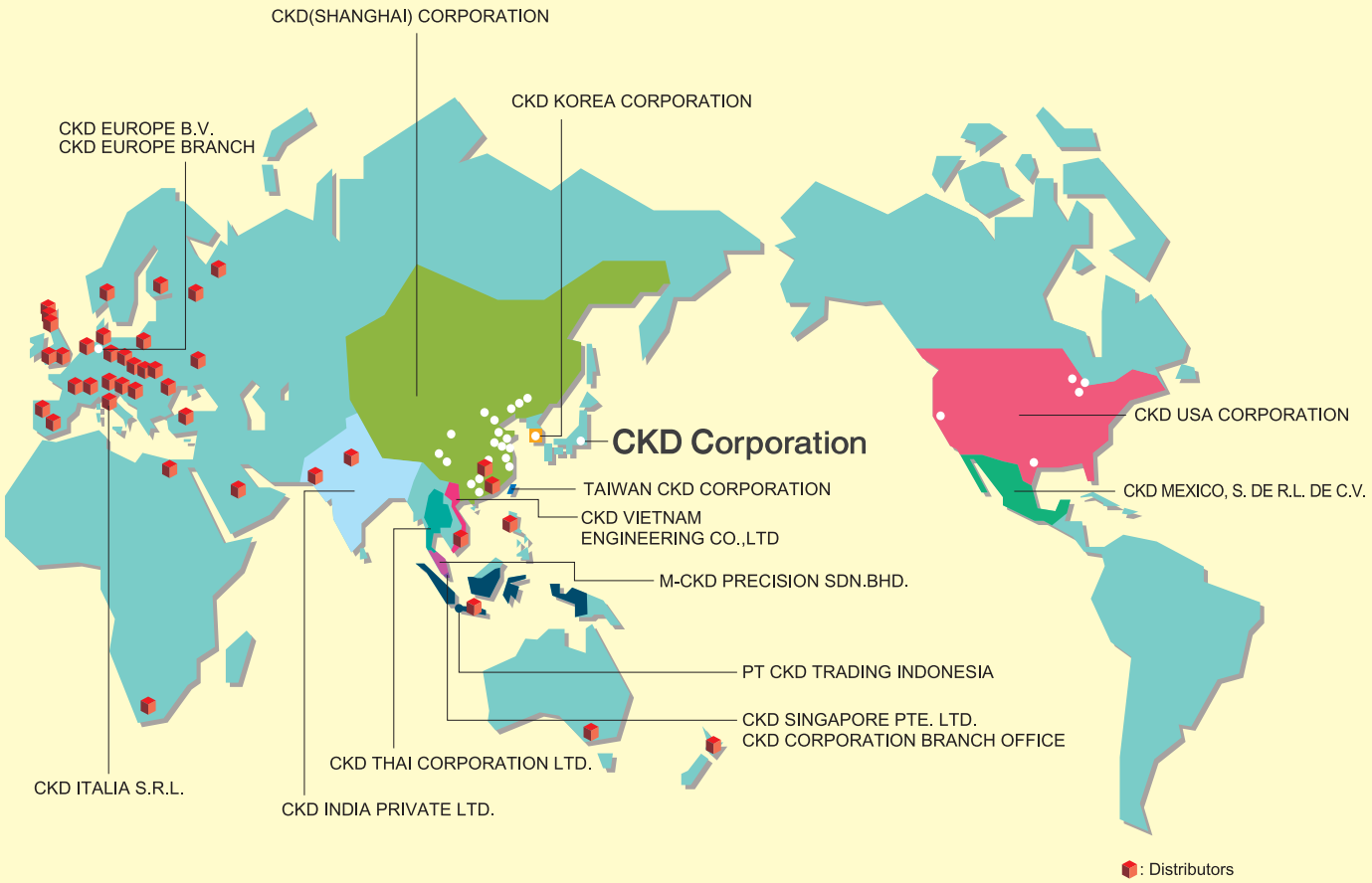
Electric actuator that can be used in various environments

- Full lineup of the environment-resistant series
  Five products in pursuit of ease of use and high rigidity
  Standard, Dust-proof specifications, Low dust Specifications compatible with rechargeable battery manufacturing processes, Compatible with food manufacturing processes
- Compact with a highly rigid body
  High rigidity and space saving are realized simultaneously with the use of a wide guide that is integrated with the body.
- ABSODEX
  AX1000/2000/4000TS/TH Series
  AX6000MU Series
  ●The Direct Drive Actuator is designed to be user-friendly
  From palm-sized to large torques. Conveyance, positioning, and simple construction of various devices

- τ DISC Series
  ●The Direct Drive Servo Motor, which boasts high performance
  A diverse lineup to meet various requirements such as high precision, high speed and speed stability. Achieves one level higher performance.

NIKKI DENSO

WORLD-NETWORK



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Revision details
·High speed added

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