FFLD

2-Finger Gripper Type

Electric Actuator with Motor Specification

CONTENTS

FFLD System Table

Model No.		Motor Size	Stroke and max. speed (mm/s) 100 mm	140 mm	160 mm	Max. Gripping Force (N)
Standard Type FFLD	FFLD-08	□20	10 mm/s			80
	FFLD-30	□25L		10		300
	FFLD-50	□25L			10	500
High Speed Type FFLD-H	FFLD-04H	□20	30			40
	FFLD-12H	□25L		30		120
	FFLD-30H	□25L		30		300
	FFLD-50H	□35			30	500

FFLD Series

For robot end-effector applications

Lineup

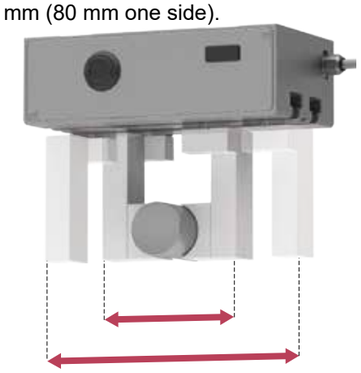
		Gripping force (N) 40	80	120	300	500	Max. operation speed (mm/s) 10	30	Listed Page
Standard	FFLD 		●		●	●	●		300
High speed	FFLD-H 	●		●	●	●		●	306

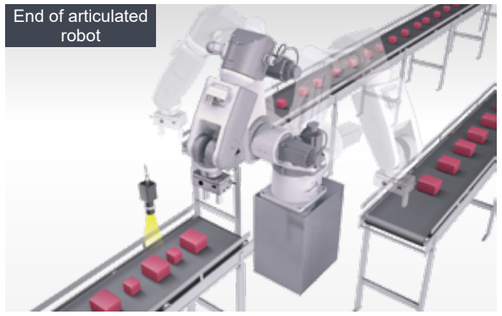
High gripping force, long stroke

High versatility

Achieves a long stroke of gripping force 500 N (one side) and 160 mm (80 mm one side).
Heavy, various workpieces can be transported with one tool.

		FLSH	FFLD	
Max. stroke	mm	6 to 22 (3 to 11 per side)	**100 to 160 (80 per side)**	More than 7 times increase
Max. gripping force	N	20 to 65 (one side)	**80 to 500 (one side)**	About 8 times increase

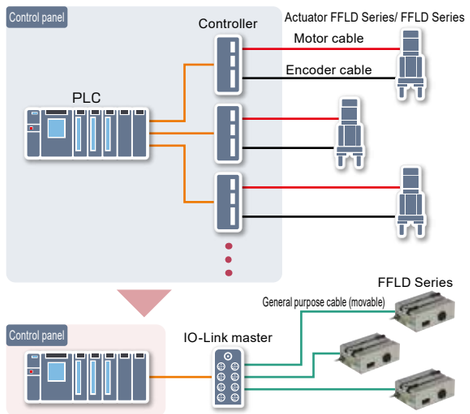




Built-in controller

Safety & Security
Space saving

A controller is built into the main body of the electric gripper. Achieves wiring saving and space saving, and reduces the risk of disconnection.

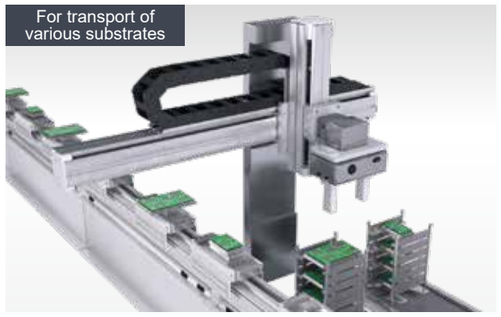


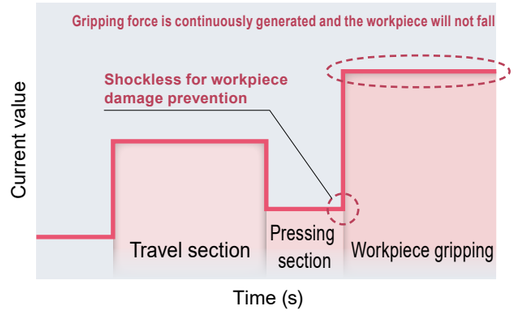
*Separate power supply is required. Refer to the system configuration example on page 314.

Pressing operation

Safety & Security

Workpiece gripping is performed by pushing motion. Gripping force is continuously generated, greatly reducing the risk of the workpiece falling. In addition, by controlling the motor current value, soft handling and long-time gripping are possible.

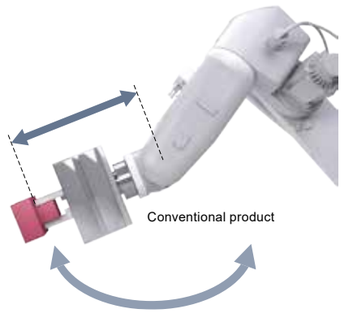


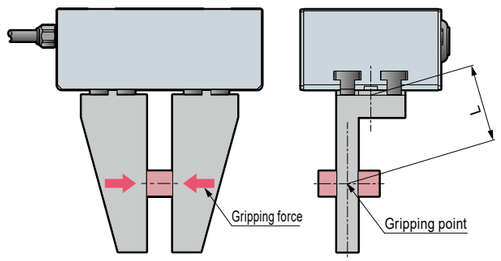


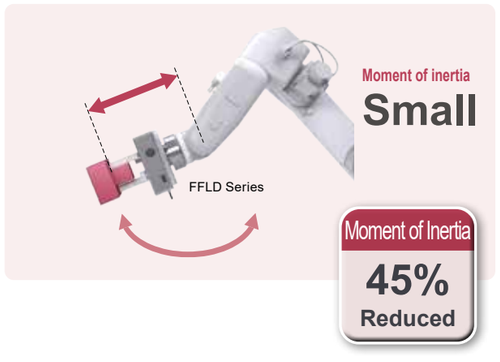
Thin, high-rigidity body

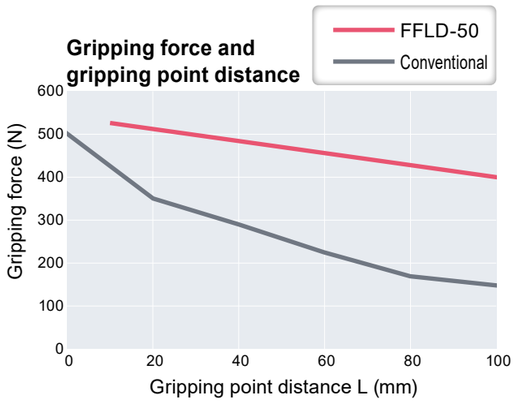
Space saving
High rigidity

Thin body reduces moment of inertia. Miniaturization of the robot is possible. In addition, a T-slot type guide is installed to achieve high rigidity. The reduction in gripping force due to the gripping point distance has been minimized.





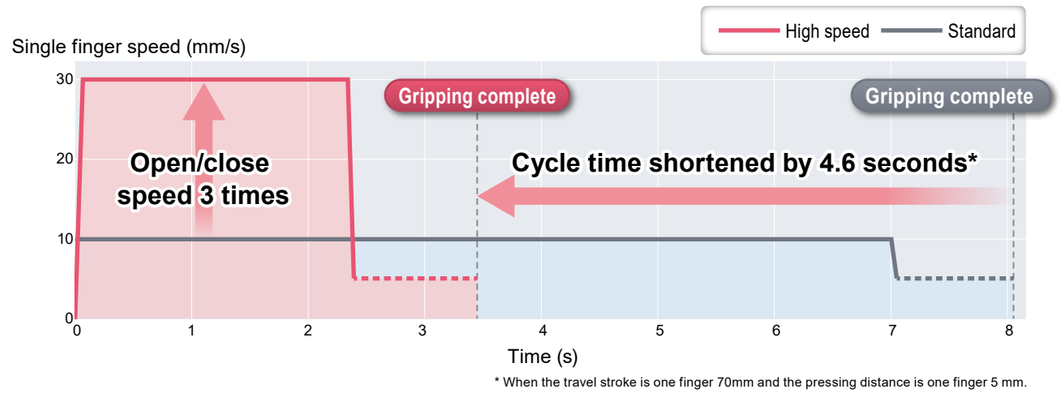




High open/close speed

Improved Productivity

The opening and closing speed of the fingers has been improved. It is possible to reduce the cycle time of the equipment.



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

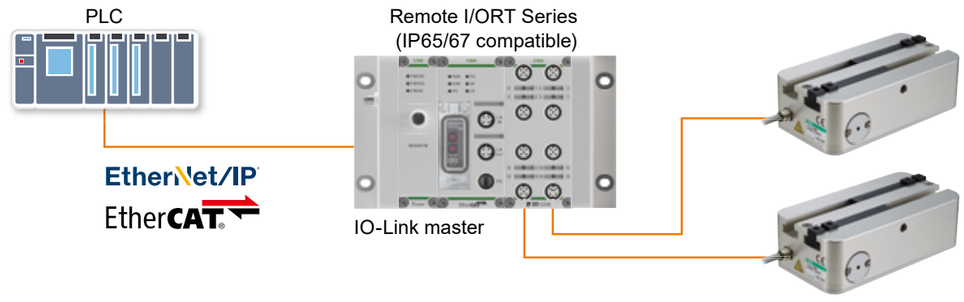
Available as made to order

High versatility
Special environment

IP54, blackening of the body, and changes to mounting holes and lead cables are possible.

Related Products

The IO-Link master unit can be mounted on the series. Can be connected to a PLC via the RT series.



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

Electric actuator 2-Finger Gripper

FFLD-08

□20 Stepping motor

For compatible detailed model Nos., please visit the CKD website.

Model No. Notation Method

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

❶ Gripping force

08	80 N

❷ Stroke

50	100 mm (50 mm one side)

❸ Interface Specifications

LK	IO-Link

❹ Relay cable

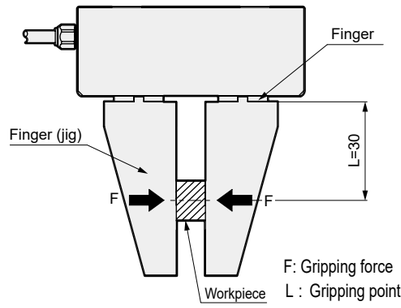
R00	Flexible cable

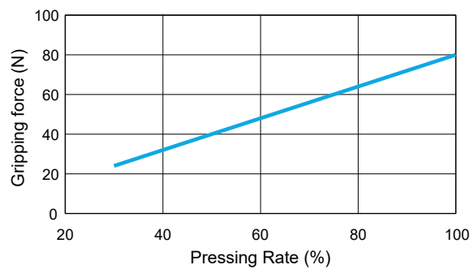
Specifications

Motor		□20 Stepping motor
Encoder Type		Incremental Encoder
Drive Method		Rack and pinion, worm gear
Controller		Built-in
Stroke	mm	100 (one side 50)
Max. gripping force *1	N	80 (one side)
Open/close speed range	mm/s	1 to 10 (one side)
Gripping speed range *1	mm/s	1 to 5 (one side)
Repeatability *2	mm	±0.02
Positioning repeatability *3	mm	±0.05 (one side)
Lost Motion	mm	0.4 or less (one side)
Static Allowable Moment	N·m	MP=15, MY=15, MR=15
Configuration Tool		Configuration software (S-Tools)
External Interface		IO-Link
Power supply voltage	Communication/ Control	24 VDC ±10%
	Motive Power	24 VDC ±10%
Current consumption	Communication/ Control A	0.2 or less
	Power A	1.1 or less
Motor Max. Instantaneous Current	A	1.5
Power capacity		Max. 100 W
Insulation Resistance		10 MΩ, 500 VDC
Dielectric strength		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
Protection Structure		IP20
Weight	kg	1.2

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

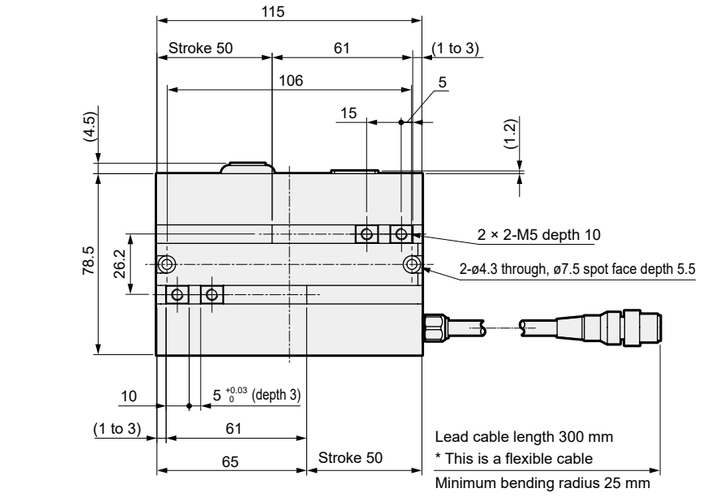
Gripping Force and Pushing Rate

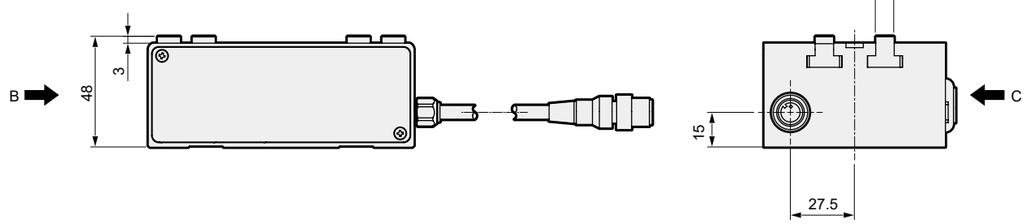


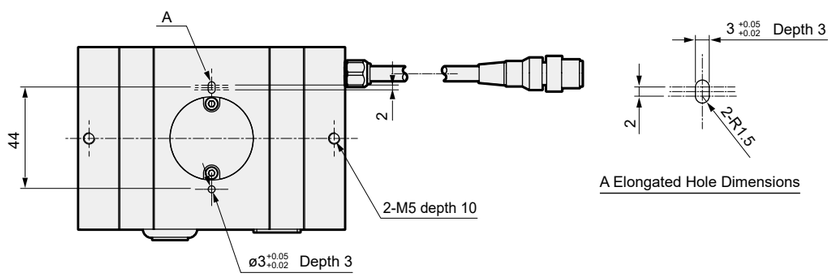


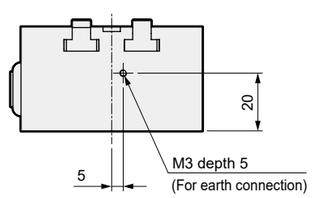
* The gripping force and pressing rate correlation diagram is merely a guideline. Individual motor differences and variations in mechanical efficiency may result in differing actual values, even at the same pressing rate.
* Gripping speed is for 5mm/s. (L=30)
* The setting range for the pressing rate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

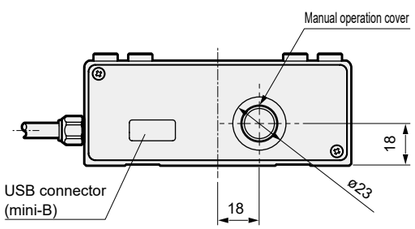
External Dimensions Drawing











Electric actuator 2-Finger Gripper

FFLD-30

□25L stepping motor

For compatible detailed model Nos., please visit the CKD website.

Model No. Notation Method

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

❶ Gripping force

30	300 N

❷ Stroke

70	140 mm (70 mm one side)

❸ Interface Specifications

LK	IO-Link

❹ Relay cable

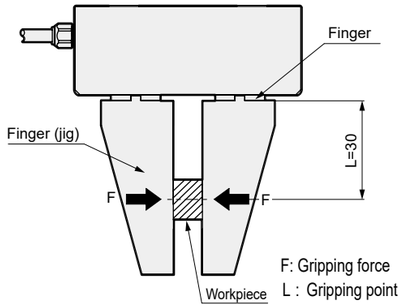
R00	Flexible cable

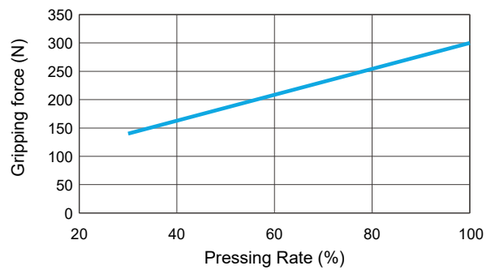
Specifications

Motor		□25L stepping motor
Encoder Type		Incremental Encoder
Drive Method		Rack and pinion, worm gear
Controller		Built-in
Stroke	mm	140 (one side 70)
Max. gripping force *1	N	300 (one side)
Open/close speed range	mm/s	1 to 10 (one side)
Gripping speed range *1	mm/s	1 to 5 (one side)
Repeatability *2	mm	±0.02
Positioning repeatability *3	mm	±0.05 (one side)
Lost Motion	mm	0.4 or less (one side)
Static Allowable Moment	N·m	MP=45, MY=45, MR=45
Configuration Tool		Configuration software (S-Tools)
External Interface		IO-Link
Power supply voltage	Communication/ Control	24 VDC ±10%
	Motive Power	24 VDC ±10%
Current consumption	Communication/ Control A	0.2 or less
	Power A	3.2 or less
Motor Max. Instantaneous Current	A	4.0
Power capacity		Max. 100 W
Insulation Resistance		10 MΩ, 500 VDC
Dielectric strength		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
Protection Structure		IP20
Weight	kg	1.7

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

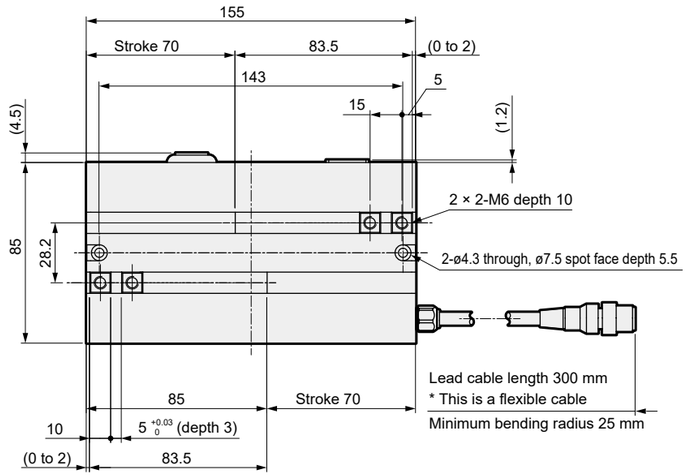
Gripping Force and Pushing Rate

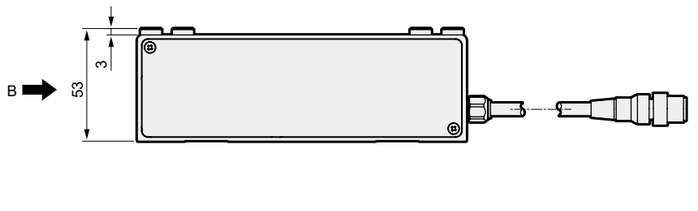


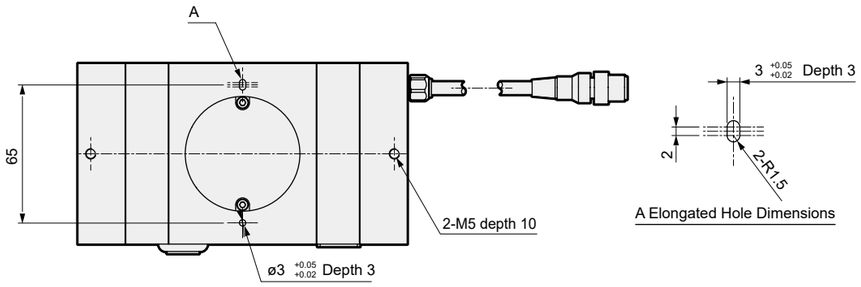


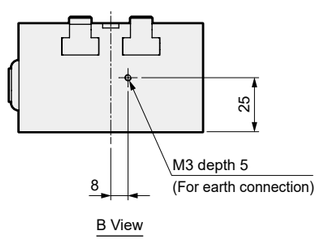
* The gripping force and pressing rate correlation diagram is merely a guideline. Even with the same pushing rate, errors will occur with the actual numbers due to individual differences in motors and variations in mechanical efficiency.
* Gripping speed is for 5mm/s. (L=30)
* The setting range for the pressing rate is 30 to 100%.

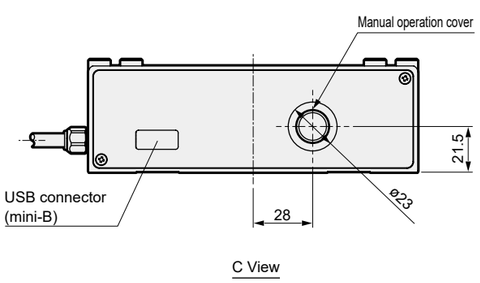
External Dimensions Drawing











Electric actuator 2-Finger Gripper

FFLD-50

□25L stepping motor

For compatible detailed model Nos., please visit the CKD website.

Model No. Notation Method

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

❶Gripping force
50 500 N

❷Stroke
80 160 mm (80 mm one side)

❸Interface Specifications
LK IO-Link

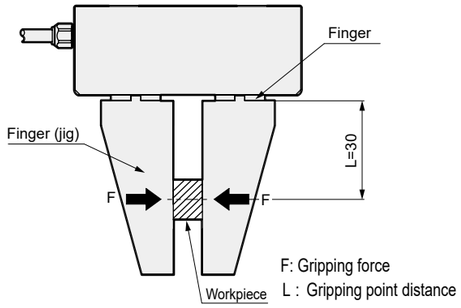
❹Relay cable
R00 Flexible cable

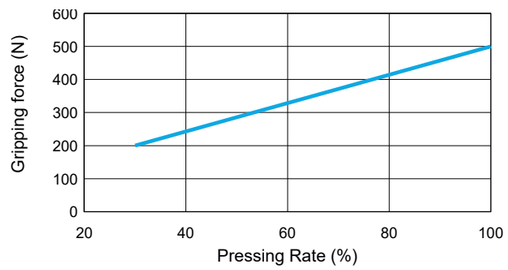
Specifications

Motor		□25L stepping motor
Encoder Type		Incremental Encoder
Drive Method		Rack and pinion, worm gear
Controller		Built-in
Stroke	mm	160 (one side 80)
Max. gripping force *1	N	500 (one side)
Open/close speed range	mm/s	1 to 10 (one side)
Gripping speed range *1	mm/s	1 to 5 (one side)
Repeatability *2	mm	±0.02
Positioning repeatability *3	mm	±0.05 (one side)
Lost Motion	mm	0.4 or less (one side)
Static Allowable Moment	N·m	MP=64, MY=55, MR=64
Configuration Tool		Configuration software (S-Tools)
External Interface		IO-Link
Power supply voltage	Communication/ Control	24 VDC ±10%
	Motive Power	24 VDC ±10%
Current consumption	Communication/ Control A	0.2 or less
	Power A	3.2 or less
Motor Max. Instantaneous Current	A	4.0
Power capacity		Max. 100 W
Insulation Resistance		10 MΩ, 500 VDC
Dielectric strength		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
Protection Structure		IP20
Weight	kg	2.5

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

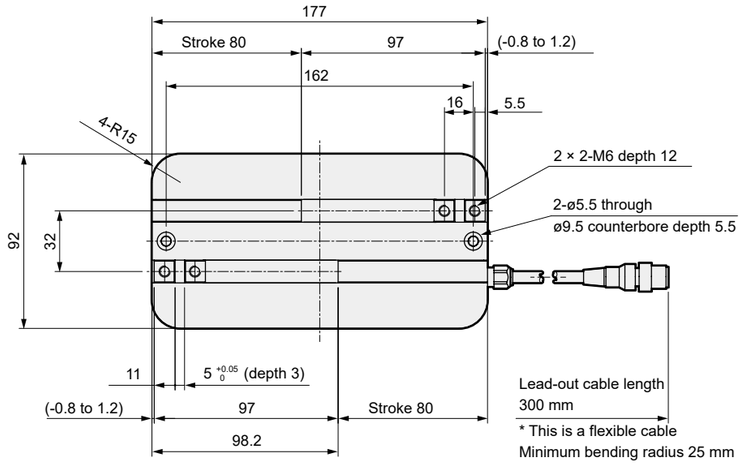
Gripping Force and Pushing Rate

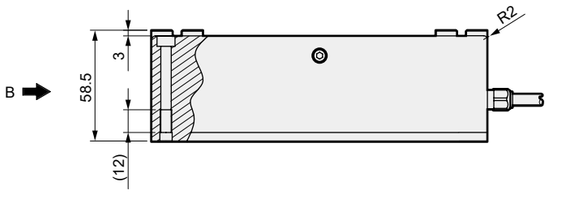


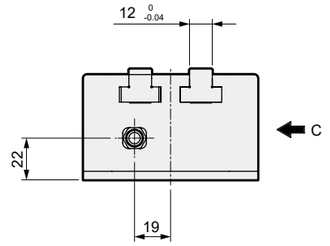


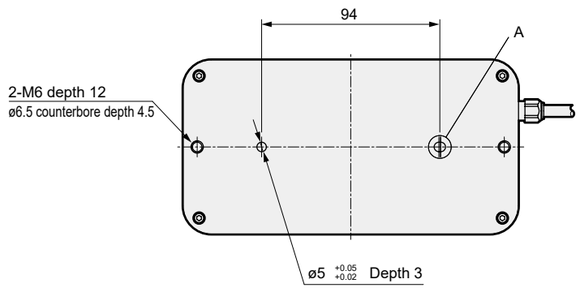
* The gripping force and pressing rate correlation diagram is merely a guideline. Even with the same pushing rate, errors will occur with the actual numbers due to individual differences in motors and variations in mechanical efficiency.
* Gripping speed is for 5mm/s. (L=30)
* The setting range for the pressing rate is 30 to 100%.

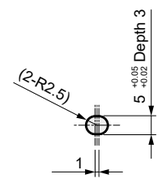
External Dimensions Drawing



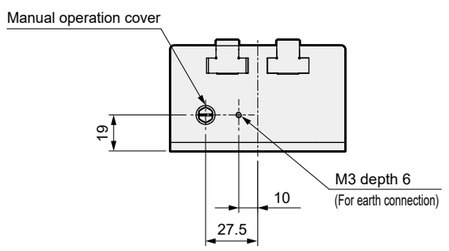




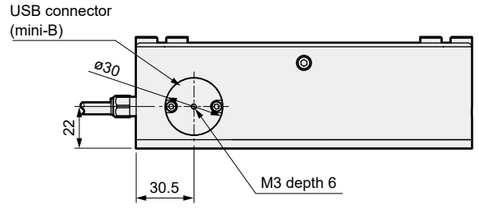




A Elongated Hole Dimensions



B View



C View

Electric actuator 2-Finger Gripper High speed

FFLD-04H

□20 Stepping motor

For compatible detailed model Nos., please visit the CKD website.

Model No. Notation Method

FFLD - 04 H 50 N C N 30 - LK S R00

❶Gripping force

04	40N

❷Stroke

50	100 mm (50 mm one side)

❸Interface Specifications

LK	IO-Link

❹Relay cable

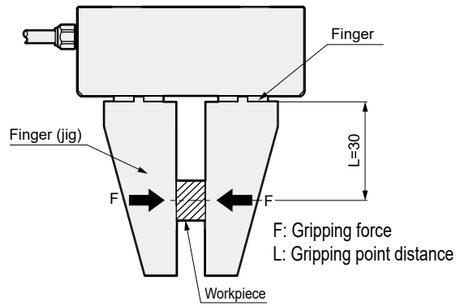
R00	Flexible cable

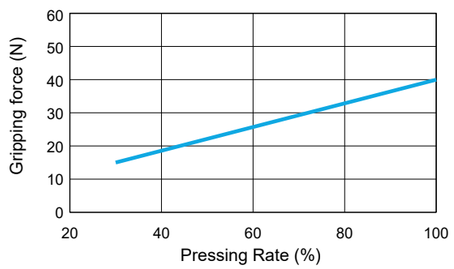
Specifications

Motor		□20 Stepping motor
Encoder Type		Incremental Encoder
Drive Method		Rack and pinion, worm gear
Controller		Built-in
Stroke	mm	100 (one side 50)
Max. gripping force *1	N	40 (one side)
Open/close speed range	mm/s	1 to 30 (one side)
Gripping speed range *1	mm/s	1 to 5 (one side)
Repeatability *2	mm	±0.02
Positioning repeatability *3	mm	±0.05 (one side)
Lost Motion	mm	0.4 or less (one side)
Static Allowable Moment	N·m	MP=15, MY=15, MR=15
Configuration Tool		Configuration software (S-Tools)
External Interface		IO-Link
Power supply voltage	Communication/ Control	24 VDC ±10%
	Motive Power	24 VDC ±10%
Current consumption	Communication/ Control A	0.2 or less
	Power A	1.1 or less
Motor Max. Instantaneous Current	A	1.5
Power capacity		Max. 100 W
Insulation Resistance		10 MΩ, 500 VDC
Dielectric strength		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
Protection Structure		IP20
Weight	kg	1.2

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

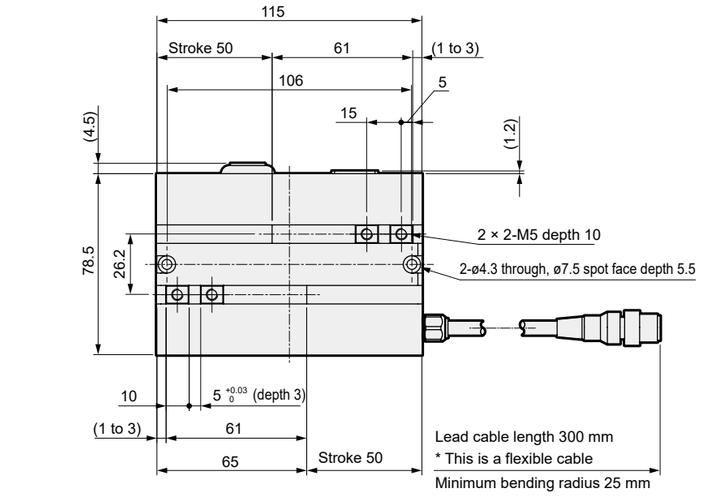
Gripping Force and Pushing Rate

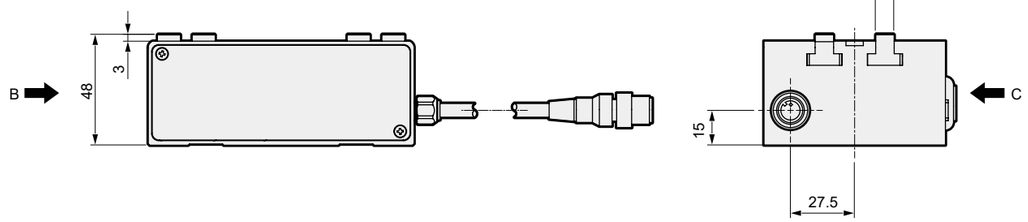


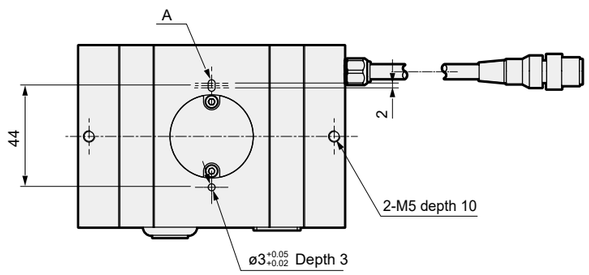


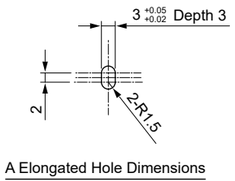
* The gripping force and pressing rate correlation diagram is merely a guideline. Individual motor differences and variations in mechanical efficiency may result in differing actual values, even at the same pressing rate.
* Gripping speed is for 5mm/s. (L=30)
* The setting range for the pressing rate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

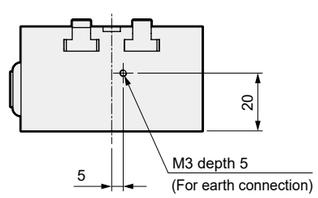
External Dimensions Drawing

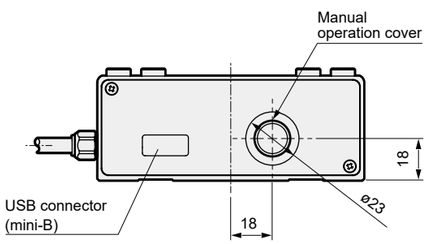












Electric actuator 2-Finger Gripper High speed

FFLD-12H

□25L stepping motor

For compatible detailed model Nos., please visit the CKD website.

Model No. Notation Method

FFLD - 12 H 70 N C N 30 - LK S R00

❶Gripping force

12	120N

❷Stroke

70	140 mm (70 mm one side)

❸Interface Specifications

LK	IO-Link

❹Relay cable

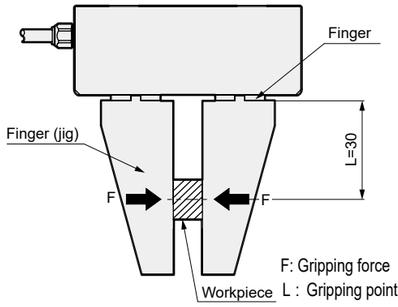
R00	Flexible cable

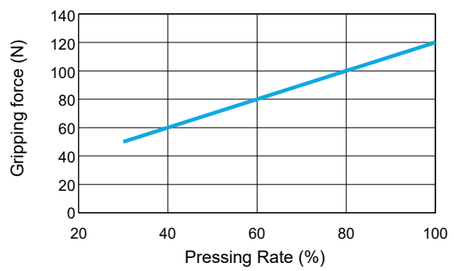
Specifications

Motor		□25L stepping motor
Encoder Type		Incremental Encoder
Drive Method		Rack and pinion, worm gear
Controller		Built-in
Stroke	mm	140 (one side 70)
Max. gripping force *1	N	120 (one side)
Open/close speed range	mm/s	1 to 30 (one side)
Gripping speed range *1	mm/s	1 to 5 (one side)
Repeatability *2	mm	±0.02
Positioning repeatability *3	mm	±0.05 (one side)
Lost Motion	mm	0.4 or less (one side)
Static Allowable Moment	N·m	MP=45, MY=45, MR=45
Configuration Tool		Configuration software (S-Tools)
External Interface		IO-Link
Power supply voltage	Communication/ Control	24 VDC ±10%
	Motive Power	24 VDC ±10%
Current consumption	Communication/ Control A	0.2 or less
	Power A	3.2 or less
Motor Max. Instantaneous Current	A	4.0
Power capacity		Max. 100 W
Insulation Resistance		10 MΩ, 500 VDC
Dielectric strength		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
Protection Structure		IP20
Weight	kg	1.7

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

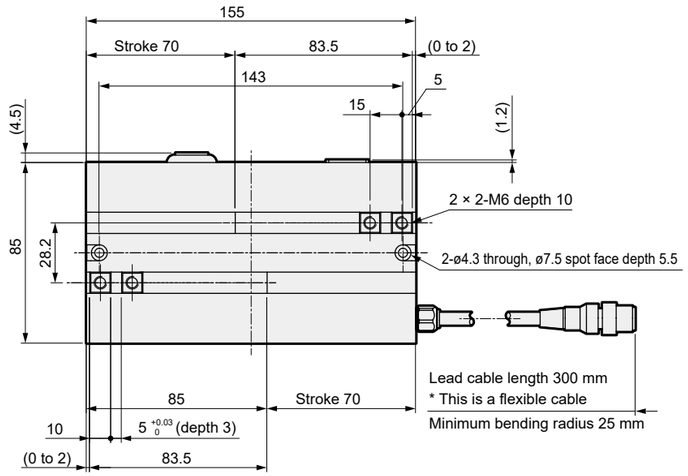
Gripping Force and Pushing Rate

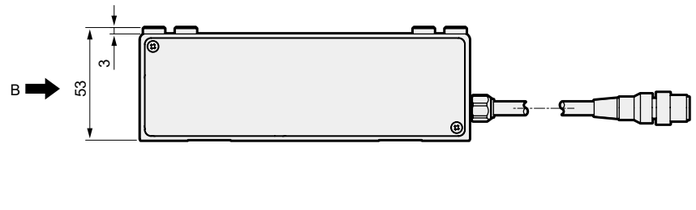


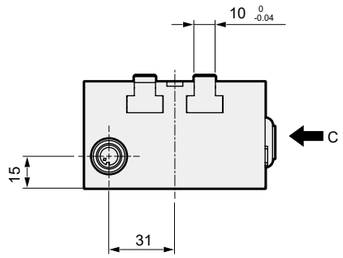


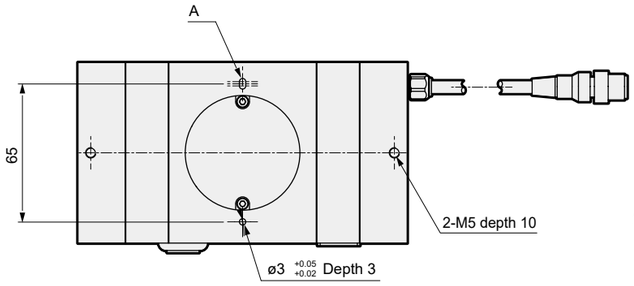
* The gripping force and pressing rate correlation diagram is merely a guideline. Even with the same pushing rate, errors will occur with the actual numbers due to individual differences in motors and variations in mechanical efficiency.
* Gripping speed is for 5mm/s. (L=30)
* The setting range for the pressing rate is 30 to 100%.

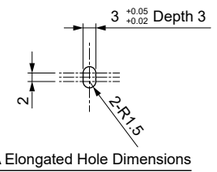
External Dimensions Drawing



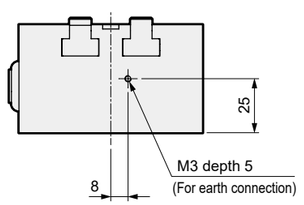




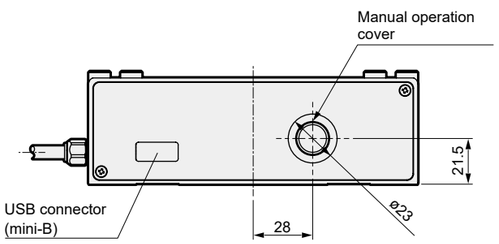




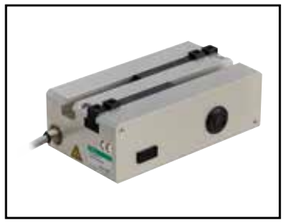
A Elongated Hole Dimensions



B View



C View



Electric actuator 2-Finger Gripper high speed

FFLD-30H

□25L stepping motor

For compatible detailed model Nos., please visit the CKD website.

Model No. Notation Method

FFLD - 30 ❶ H 70 ❷ N C N 30 - LK ❸ S R00 ❹

❶Gripping force

30	300 N

❷Stroke

70	140 mm (70 mm one side)

❸Interface Specifications

LK	IO-Link

❹Relay cable

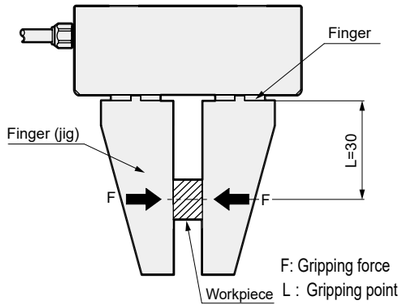
R00	Flexible cable

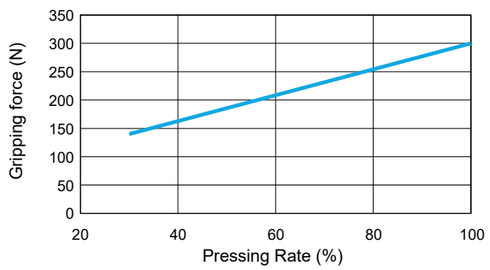
Specifications

Motor		□25L stepping motor
Encoder Type		Incremental Encoder
Drive Method		Rack and pinion, worm gear
Controller		Built-in
Stroke	mm	140 (one side 70)
Max. gripping force *1	N	300 (one side)
Open/close speed range	mm/s	1 to 30 (one side)
Gripping speed range *1	mm/s	1 to 5 (one side)
Repeatability *2	mm	±0.02
Positioning repeatability *3	mm	±0.05 (one side)
Lost Motion	mm	0.4 or less (one side)
Static Allowable Moment	N·m	MP=45, MY=45, MR=45
Configuration Tool		Configuration software (S-Tools)
External Interface		IO-Link
Power supply voltage	Communication/ Control	24 VDC ±10%
	Motive Power	24 VDC ±10%
Current consumption	Communication/ Control A	0.2 or less
	Power A	3.2 or less
Motor Max. Instantaneous Current	A	4.0
Power capacity		Max. 100 W
Insulation Resistance		10 MΩ, 500 VDC
Dielectric strength		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
Protection Structure		IP20
Weight	kg	1.7

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

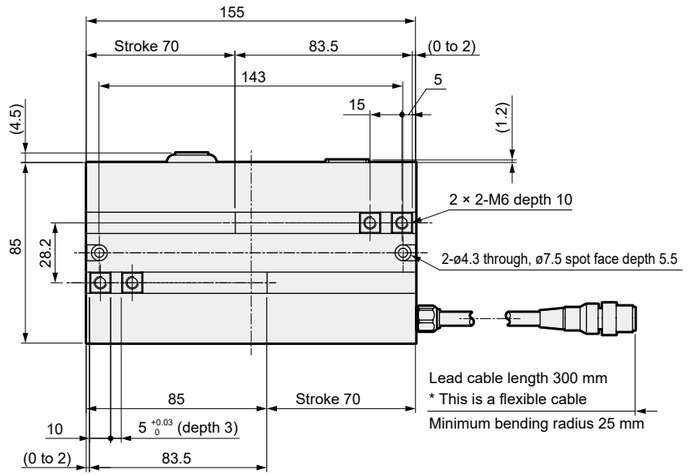
Gripping Force and Pushing Rate

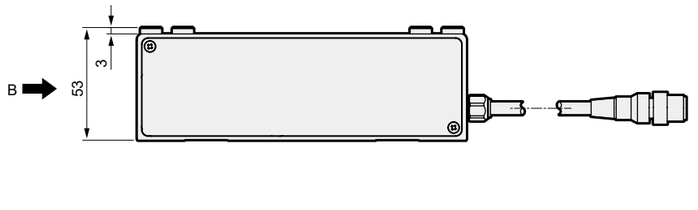


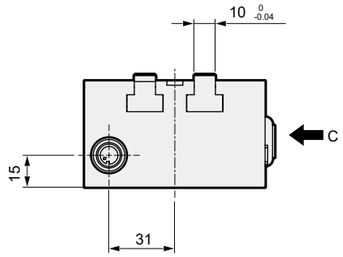


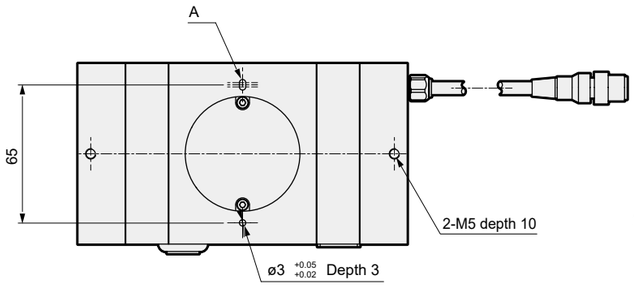
* The gripping force and pressing rate correlation diagram is merely a guideline. Even with the same pushing rate, errors will occur with the actual numbers due to individual differences in motors and variations in mechanical efficiency.
* Gripping speed is for 5mm/s. (L=30)
* The setting range for the pressing rate is 30 to 100%.

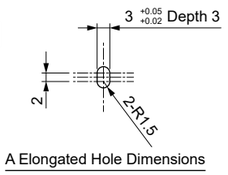
External Dimensions Drawing

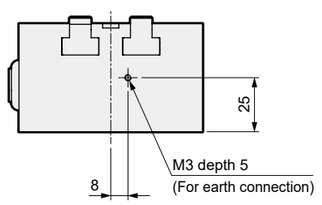


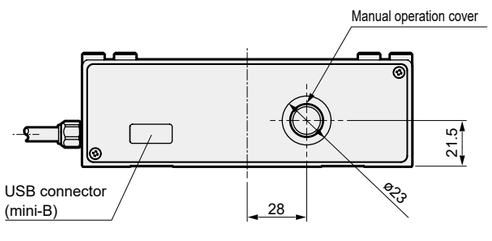












Electric actuator 2-Finger Gripper high speed

FFLD-50H

□35 Stepping motor

For compatible detailed model Nos., please visit the CKD website.

Model No. Notation Method

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

❶Gripping force

50	500 N

❷Stroke

80	160 mm (80 mm one side)

❸Interface Specifications

LK	IO-Link

❹Relay cable

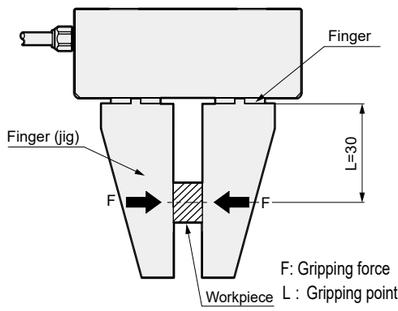
R00	Flexible cable

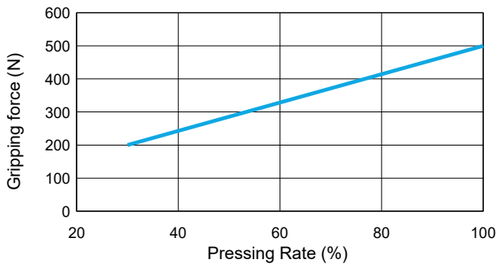
Specifications

Motor		□35 Stepping motor
Encoder Type		Incremental Encoder
Drive Method		Rack and pinion, worm gear
Controller		Built-in
Stroke	mm	160 (one side 80)
Max. gripping force *1	N	500 (one side)
Open/close speed range	mm/s	1 to 30 (one side)
Gripping speed range *1	mm/s	1 to 5 (one side)
Repeatability *2	mm	±0.02
Positioning repeatability *3	mm	±0.05 (one side)
Lost Motion	mm	0.4 or less (one side)
Static Allowable Moment	N·m	MP=64, MY=55, MR=64
Configuration Tool		Configuration software (S-Tools)
External Interface		IO-Link
Power supply voltage	Communication/ Control	24 VDC ±10%
	Motive Power	24 VDC ±10%
Current consumption	Communication/ Control A	0.2 or less
	Power A	3.0 or less
Motor Max. Instantaneous Current	A	4.0
Power capacity		Max. 100 W
Insulation Resistance		10 MΩ, 500 VDC
Dielectric strength		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
Protection Structure		IP20
Weight	kg	2.7

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

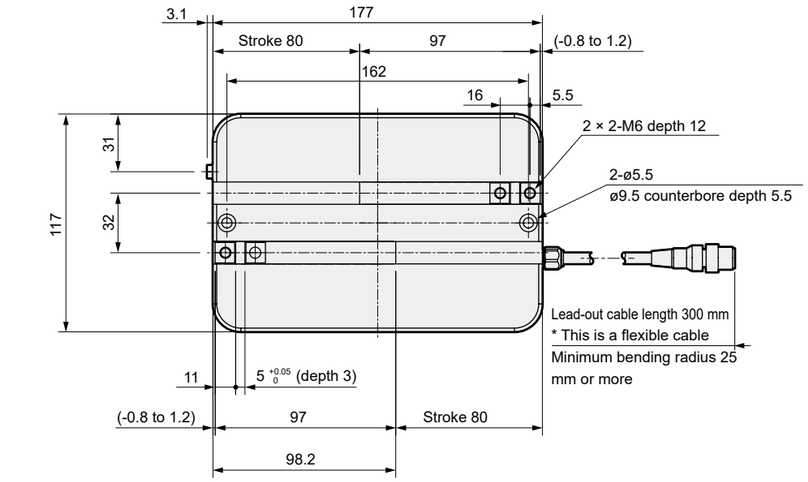
Gripping Force and Pushing Rate

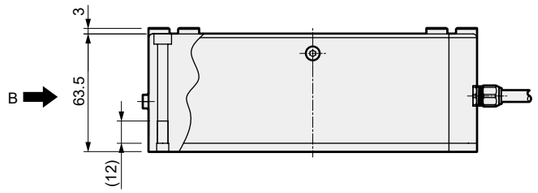


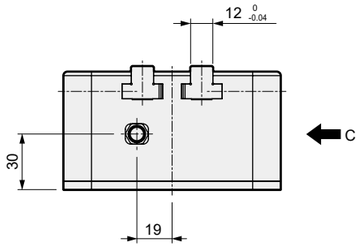


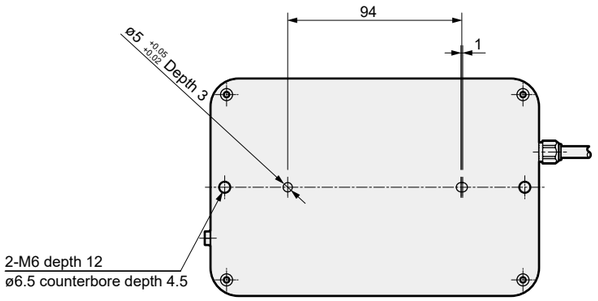
* The gripping force and pressing rate correlation diagram is merely a guideline. Even with the same pushing rate, errors will occur with the actual numbers due to individual differences in motors and variations in mechanical efficiency.
* Gripping speed is for 5mm/s. (L=30)
* The setting range for the pressing rate is 30 to 100%.

External Dimensions Drawing

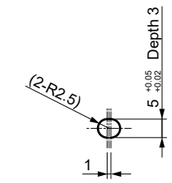




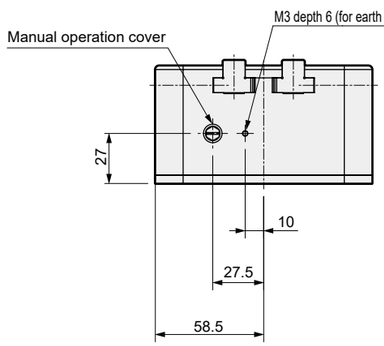




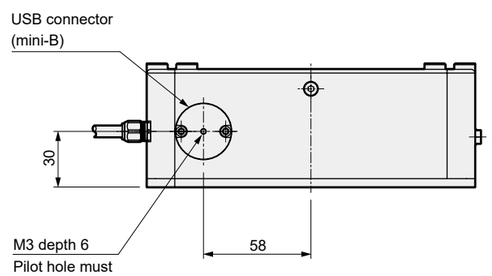
B View



A Elongated Hole Dimensions

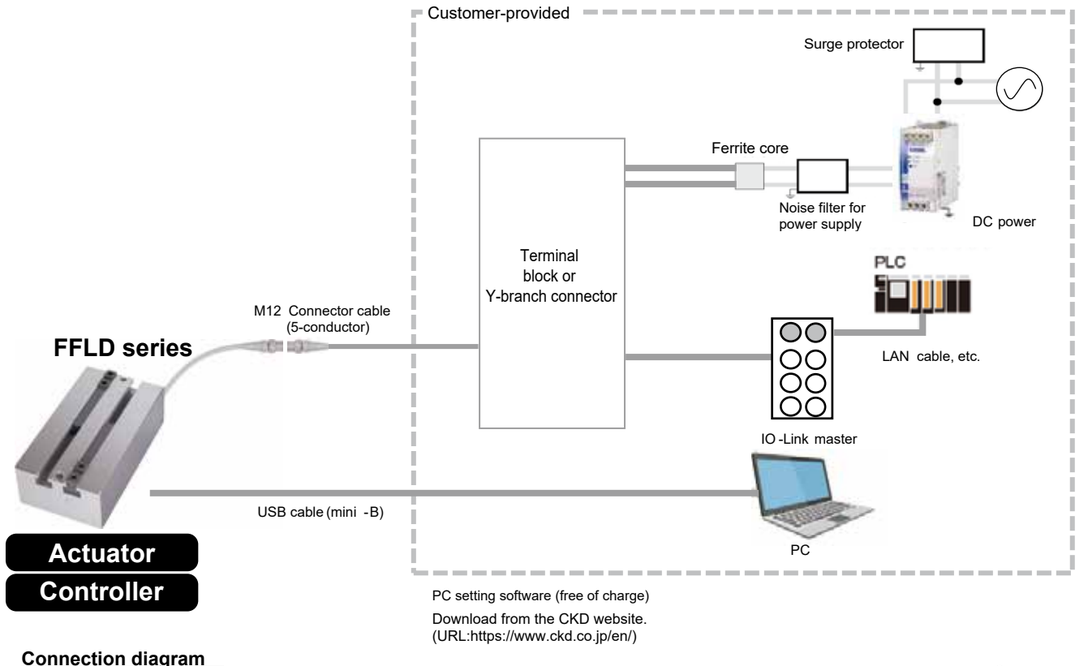


B View



C View

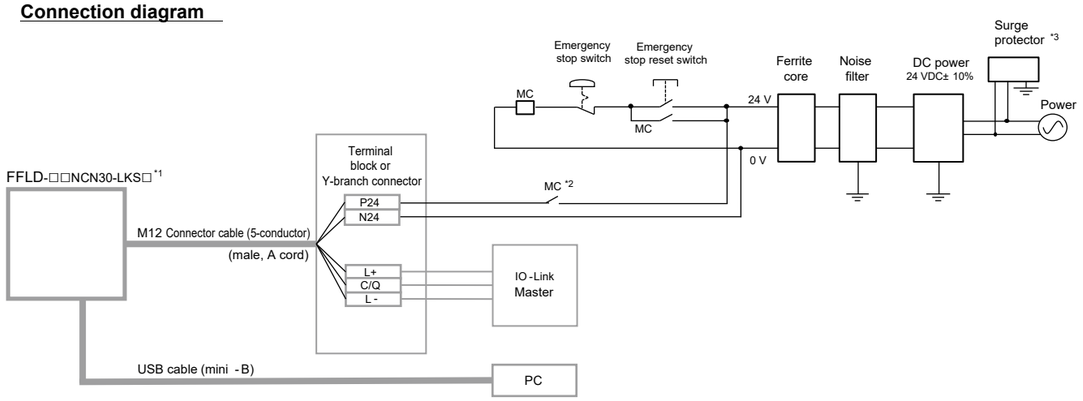
System Configuration



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

Actuator
Controller

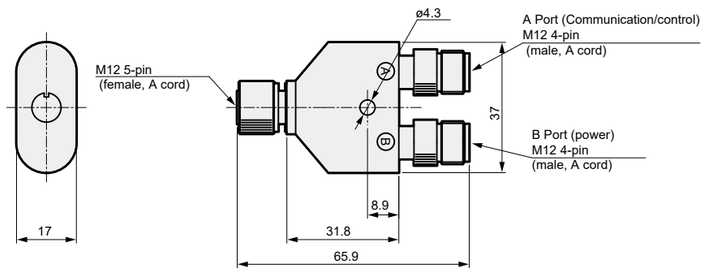
Connection diagram



*1 Product not compatible with IO-Link Class B. Can be connected to IO-Link ClassB compatible master. The communication/Control power supply and power supply are not isolated, If an error occurs, other components may be affected. Also, please wire it after reading the instruction manual. Incorrect wiring may lead to component damage.
*2 For safety category support, connect the contact of an electromagnetic switch or other device when motor drive power must be shut OFF.
*3 A surge protector is required to comply with the CE marking.

● Y branch connector

EA-YJOINT-1



For the wiring diagram, please refer to the instruction manual.

Field Network Description

Overview	
FDP	64-point operation is possible. Full direct value operation, in which operating conditions can be arbitrarily set from the PLC by switching the direct value travel selection signal, is also possible. You can also check the monitor. For detailed items, please refer to the table below.

	Direct value travel selection	Positioning numbers	Direct Value Travel Item									Monitor Item		
			Target position	Speed	Pressing rate	Pressing speed	Position designation method	Operation	Stop method	Point zone +	Point zone-	Position	Current	Speed
FDP	0	64 points	-	-	-	-	-	-	-	-	—	○	▲	▲
	1	Unlimited	○	○	○	○	○	○	○	○	○	○	▲	▲

* In the case of ▲, select from ▲ and monitor only one item

[Communication Specifications]

Item	Specifications
Communication Protocol Version	V1.1
Transmission Speed	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	10 ms
Monitor function	Position, current, speed

Cyclic data from master

PD (out)	Bit	Item
0	7	-
	6	Stop
	5	Alarm Reset
	4	Servo ON
	3	Homing Start
	2	Start moving
	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	Pushing rate (direct value travel)
6 to 7	7 to 0	Pushing distance (direct value travel)
8	7 to 0	Pushing speed (direct value travel)
9	7	Positioning method (direct value travel)
	6 to 5	Operation method (direct value travel)
	4 to 3	-
	2 to 0	Stopping 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 (+) move start
	5	JOG/INCH (-) move start
	4 to 3	-
	2 to 0	Monitor Selection

Cyclic data from controller

PD (in)	Bit	Item
0	7	Ready to operate
	6	Warning
	5	Alarm
	4	Servo ON state
	3	Homing complete
	2	Move complete
	1	Moving
	0	Point zone
1	7	Direct value travel state
	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	Select Monitor

STEP1 Calculation of Required Gripping Force

Calculate the gripping force required to transport the workpiece (weight WL) based on the following.

$$F_W > \frac{W_L x g x K}{n}$$

F_W : Required gripping force (N)
n : Number of Small Fingers = 2
W_L: Workpiece weight [kg]
g : Gravitational acceleration = 9.8 (m/s²)
K : Conveyance Factor
5 [holding only]
10 [normal transport]
20 [suddenly accelerated transport]

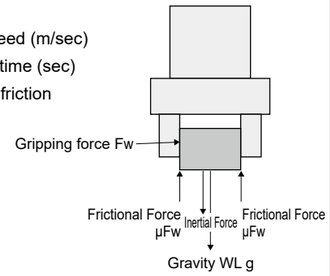
About Conveyance Factor K

Calculation example: When decelerating and stopping in 0.1 second from transport speed of V = 0.75 m/s with friction coefficient μ of workpiece and attachment as 0.1, See below.

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



∴ The transport coefficient K at this time is, from the above formula

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

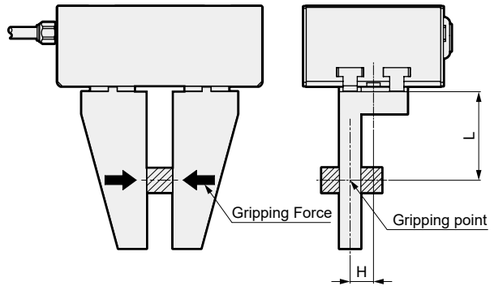
$$K = \frac{n \times 86.5}{g} = \frac{2 \times 86.5}{9.8} \approx 20$$

Note) The transport coefficient K needs to allow a margin for impacts during transport, etc. Even if the friction coefficient μ is higher than μ=0.1, set the conveyance factor K to 10 to 20 or more for safety.

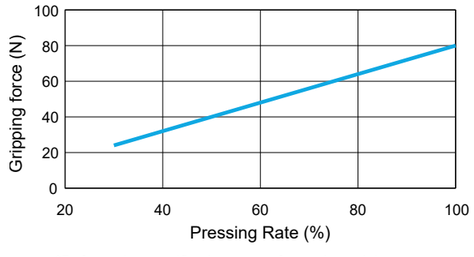
STEP2 Provisional selection of model from gripping force graph

Confirm the conditions on the right and provisionally select a model from the gripping force graph. The gripping force changes depending on the gripping point distance ℓ and the pushing rate. Please confirm that sufficient gripping force can be obtained under your conditions of use from the graph.

Calculated as $\ell = \sqrt{L^2 + H^2}$.

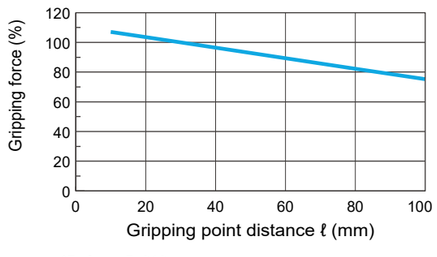


Gripping Force and Pushing Rate
[Ex.: FFLD-08]



*Refer to the specifications page for each model.

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

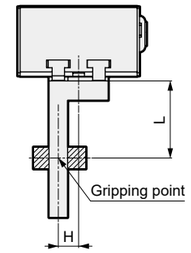


*Refer to P. 318.

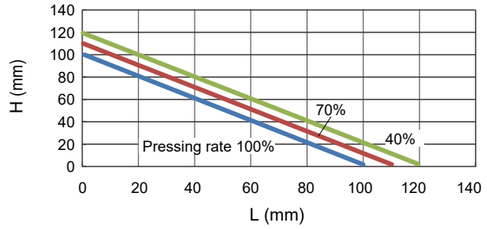
STEP3 Confirmation of Attachment Shape

Please use the gripping point distance within the range of the graph on the right.

Ex) L: 30mm H: 20 mm



Gripping Point Distance and Pushing Rate
[Ex.: FFLD-08]



When FFLD-08 is selected, L: 30 mm, H: The intersection of 20 mm is inside the line with a pressing rate of 100%, so it can be used.

*Refer to page 319.

● Please use fingers that are as light and short as possible.
If they are long and heavy, the inertial force during opening and closing becomes large, which may cause backlash in the fingers or accelerate wear of the finger sliding parts, adversely affecting the service life.
●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-Finger Gripper

STEP4 Confirmation of External Force on Fingers

If external force is applied to the fingers, please use within the limits of [Table 1].

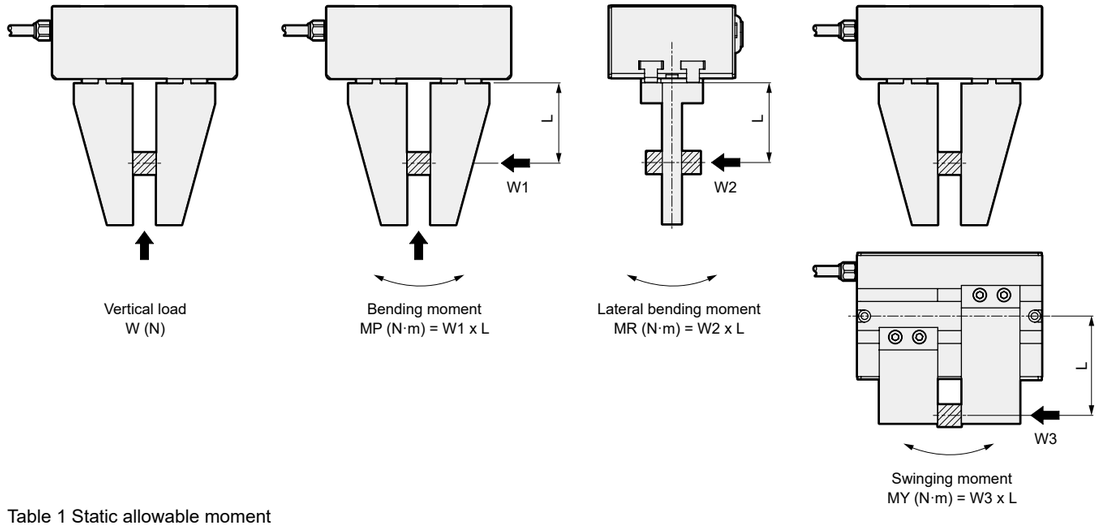


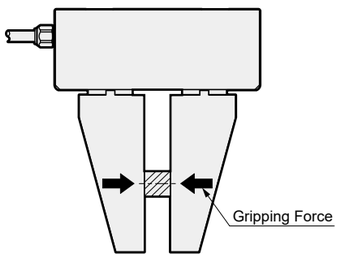
Table 1 Static allowable moment

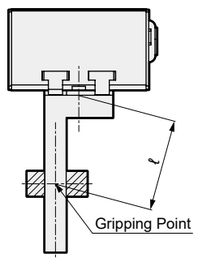
Size	Vertical load Wmax (N)	Bending moment MPmax (N·m)	Lateral bending moment MRmax (N·m)	Swinging moment MYmax (N·m)
FFLD-08	120	15	15	15
FFLD-30	390	45	45	45
FFLD-50	485	64	64	55
FFLD-04H	120	15	15	15
FFLD-12H	390	45	45	45
FFLD-30H	390	45	45	45
FFLD-50H	485	64	64	55

Calculation example)
Model No.: FFLD-08, L: 40 mm when a load W1: 30N is applied
$MP = 30 \times 40 \times 10^{-3} = 1.2\ N{\cdot}m < MPmax = 15\ N{\cdot}m$

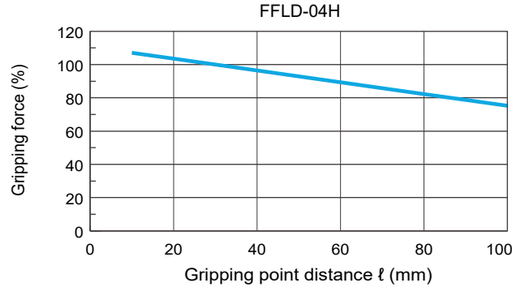
Gripping force and gripping point distance

Indicates the gripping force at the gripping point distance ℓ.

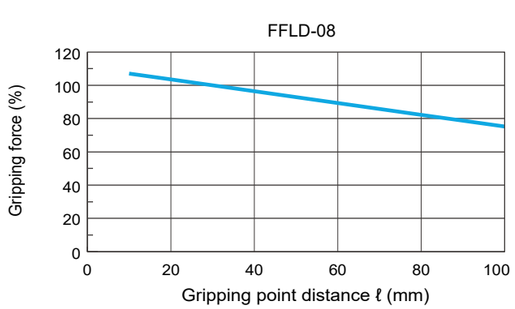




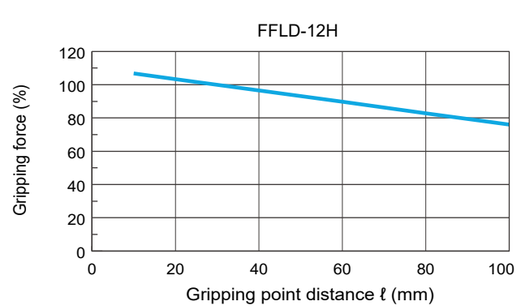
FFLD-04H



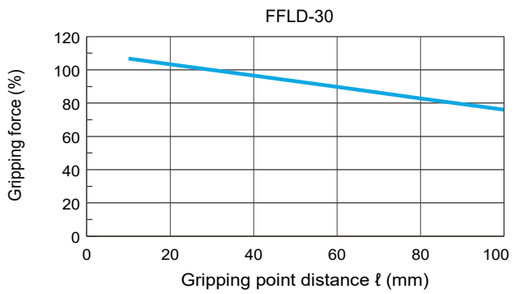
FFLD-08



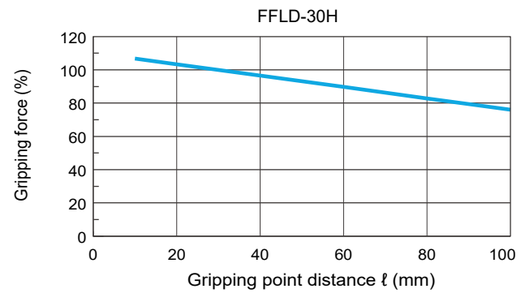
FFLD-12H



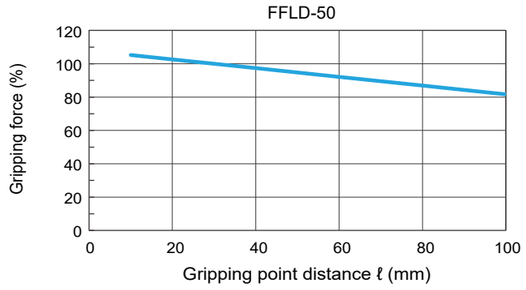
FFLD-30



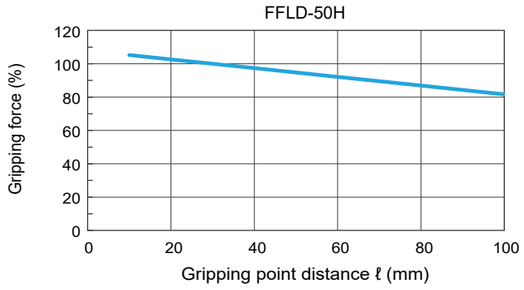
FFLD-30H



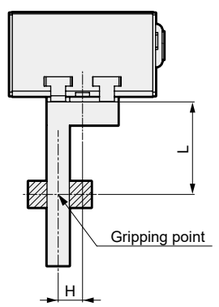
FFLD-50



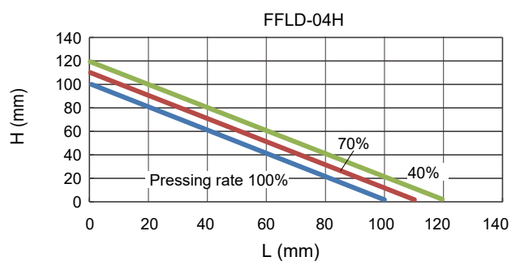
FFLD-50H



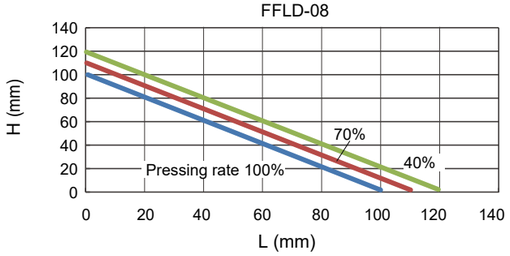
Gripping Point Distance and Pushing Rate



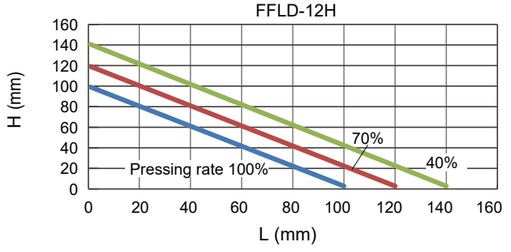
FFLD-04H



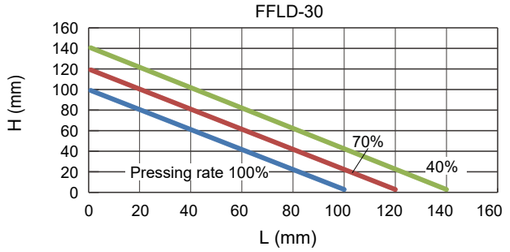
FFLD-08



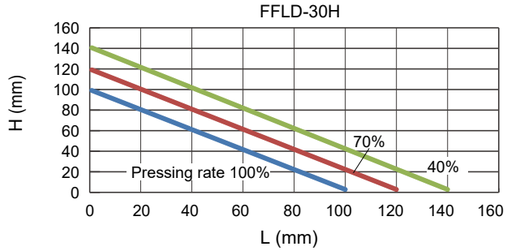
FFLD-12H



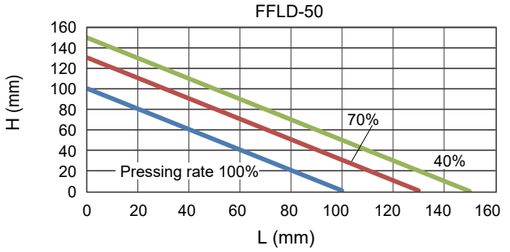
FFLD-30



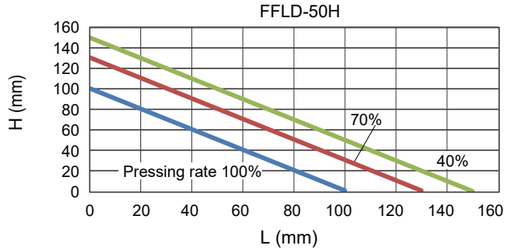
FFLD-30H



FFLD-50



FFLD-50H



Special Specification Product*

● Compatible with protection degree IP54
Any size can be changed to IP54.

● Change in length of lead-out cable
The length of the lead-out cable can be changed.

● Body color change
The body color can be changed to black.

* Contact CKD for Special Specification Product details.

MEMO

F Series
FLCR
FGRC
FLSH
FFLD

To Use This Product Safely

Be sure to read this before use.
Refer to Intro 17 for general information on electric actuators.

Individual Precautions: Electric actuator FFLD Series

During Design / Selection

⚠DANGER

■ Do not use in places where dangerous goods such as ignitable substances, inflammable substances or explosives are present.
There is a risk of ignition, fire, or explosion.

■ Ensure that the product is free of water droplets and oil droplets.
This can cause fire or malfunction.

■ When mounting the product, be sure to securely hold and fix (including the workpiece) it.
There is a risk of injury due to the product tipping over, falling, malfunctioning, etc. As a general rule, please fix the product using all mounting holes.

■ Use a DC stabilized power supply (24VDC ±10%) for the power supply, communication/Control power supply, and the power supply for the I/O circuit. Direct connection to an AC power supply can cause fire, bursting, damage, etc.

■ Through FFLD for common Control power supply (L-) and power supply (N24) Do not connect externally, as the unit is connected with an internal circuit board.
The reverse connection protection function installed in this machine will not operate normally, and there is a risk of fire, bursting, damage, etc.

⚠Warning

■ Use within the product's specified operating range.

■ 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. The emergency stop push button must have a structure and wiring that does not automatically reset and cannot be carelessly reset by a person.

■ If the machine stops in the event of a system failure such as power outage, equipment damage or injury do not occur.Design a safety circuit or device.

■ Install indoors with low humidity.
In places where it is exposed to rainwater or in humid places (humidity of 80% or more, places with condensation), there is a risk of electric leakage or fire. Oil drops and oil mist are also strictly prohibited. Use in such an environment will cause damage and malfunction.

■ Make sure that the product is D type grounded (ground resistance of 100 Ω or less).
If an electric leakage occurs, there is a risk of 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 Temperature: 0°C to 40°C, Operating Humidity: 35% to 80%) It may cause abnormal shutdown of the product or decrease its service life. Ventilate if heat builds 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. In addition, this product has not been considered for chemical resistance.
This can cause malfunction, explosion, or fire.

■ Use and store in locations free from strong electromagnetic waves, ultraviolet rays, or radiation.
This can cause malfunction or failure.

■ Take possibility of power source breakdown into consideration.
Take measures to ensure that even if a failure occurs in the power source, it does not cause injury or damage to people or equipment.

■ Take the operational status into consideration if the machine is reactivated after emergency or abnormal stops.
Design it so that restarting does not cause harm to people or equipment. Also, if it is necessary to reset the electric actuator to the starting position, design a safe control device. Consider the possibility of failure of the installed motor. Take measures to ensure that even if a failure occurs in the power source, it does not cause harm to people or equipment.

■ 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 power may decrease during a power outage or similar. Use a safe design that takes this into consideration. The gripping force may decrease due to power outages, etc., and the workpiece may come off, so please incorporate a safety device that will not cause injury to people or damage to machinery.

⚠Caution

■ Product is per minuteDo not attempt to 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 places where large currents or strong magnetic fields are generated. Do not use the same wiring as the power lines for large motors other than this product. Do not use the same wiring as the inverter power supply and wiring part used for robots, etc., apply a frame ground to the power supply, and insert a filter in the output part.

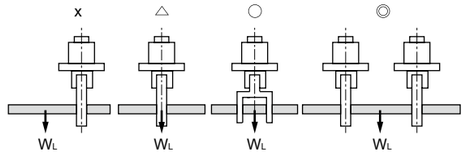
■ Be sure to separate the power supply of the output of this product and the power supply of inductive loads that generate surges, such as solenoid valves and relays.
If the power supply is shared, surge current will flow into the output part, causing damage. If a separate power supply cannot be used, connect a surge absorbing element directly in parallel to all inductive loads.

■ Select a power supply which provides ample capacity based on the number of installed products. If there is not enough capacity, it may malfunction.

■ Fix the cable so that it does not move easily.

■ 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. After turning on the power, please pay attention to the placement of external stoppers, etc., so that the home position can be reliably detected.

■ 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.

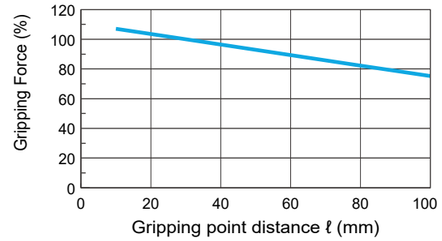


◎: Excellent, ○:Good, △: Conditional, X: Not Applicable

■ Select a model that has sufficient power to grip the workpiece weight.

■ Select a model that has sufficient opening/closing width for the workpiece size. Variations in the opening/closing width and workpieces can cause the gripping position to become unstable. Also, when opening from gripping operation, increase the stroke by the amount of backlash.

■ Jigs that are to be mounted to the finger should be as short and lightweight as possible. If it is long and heavy, the inertial force during opening and closing will be large, which may cause backlash in the fingers or accelerate wear of the sliding parts, adversely affecting the service life.



■ Do not hold the product's movable parts or cables during transportation and installation.
This can cause injury or disconnection.

For precautions regarding mounting, installation, adjustment, operation, and maintenance, please refer to the CKD Equipment Product Site (https: //www.ckd.co.jp/kiki/en/) → 'model No.' → Instruction Manual

FFLD Series Model Selection Checklist → CKD (Contact)

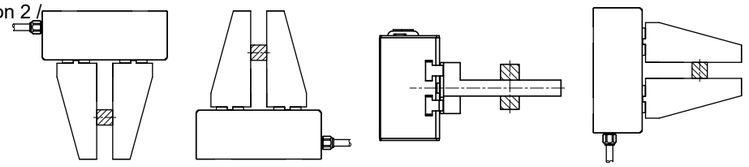
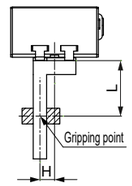
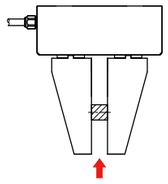
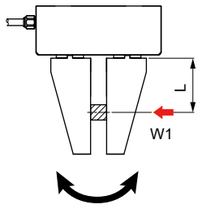
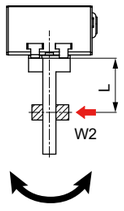
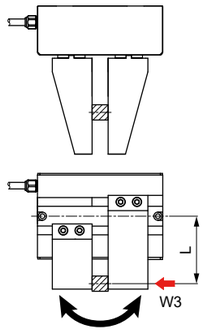
Fill in the form and send to the nearest CKD Sales Office. We will reply with the model selection results.

MEMO

Customer:

Company		Department	
Name		E-mail	
TEL		FAX	

Selection Conditions:

Desired Model	FFLD-
Basic Specifications	Max. stroke length (one side): mm
Operating Conditions	Travel stroke (one side): mm, travel time: s
	Gripping force (one side): N
	Open/close speed (one side): mm/s, gripping speed: mm/s
	Repeatability: ± mm, positioning repeatability: ± mm
Load Conditions	Mounting orientation: Orientation 1 Orientation 2 Orientation 3 Position 1 / Position 2 / Position 3 / Other 
	Weight of workpiece: kg Workpiece material: Finger quantity: Attachment material: Finger length: H: mm L: mm 
	External force on fingers: No / Yes  (Load: N)  Bending moment (Load: N, distance: mm)  Lateral bending moment (Load: N, distance: mm)  Swinging moment (Load: N, distance: mm)
Usage Environment	Ambient Temperature: °C, ambient humidity: %
	Atmosphere:
Interface Specifications	IO-Link
Special Notes	

F Series
FLCR
FGRC
FLSH
FFLD
Ending