Model selection

STEP 1 Calculating the required gripping force

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

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

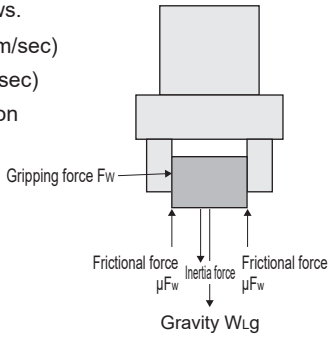
F_W : Required gripping force (N)
n : Number of attachments = 2
W_L : Workpiece weight (kg)
g : Gravity acceleration = 9.8 (m/s^2)
K : Transport coefficient
5 [holding only]
10 [normal transport]
20 [suddenly accelerated transport]

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:

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

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

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

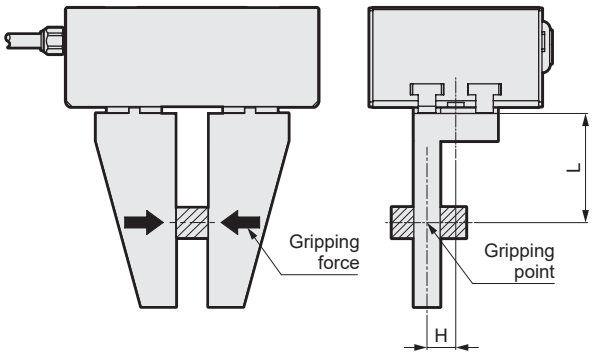
$$\approx 20$$

✳) 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.

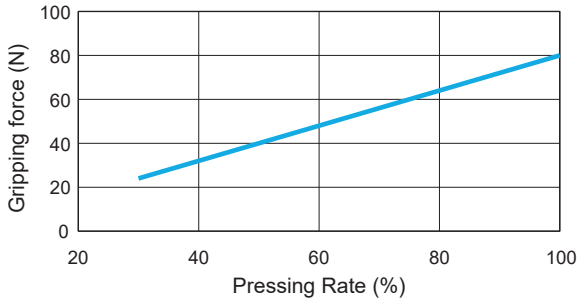
STEP 2 Temporarily select a model from the gripping force graph

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 $L=\sqrt{L^2+H^2}$

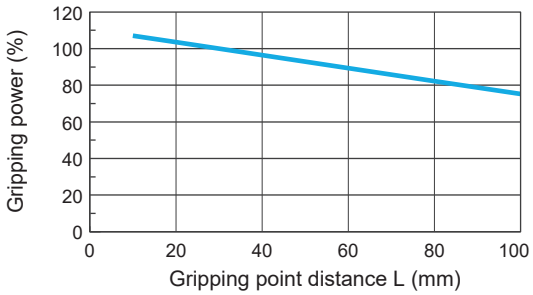


Gripping force and pressing rate
[Example: FFLD-08]



* Refer to pages 2, 4 and 6.

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

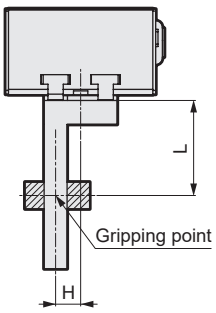


* Refer to page 22.

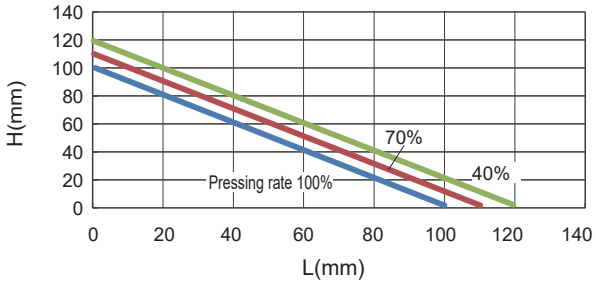
STEP 3 Confirmation of attachment shape

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.

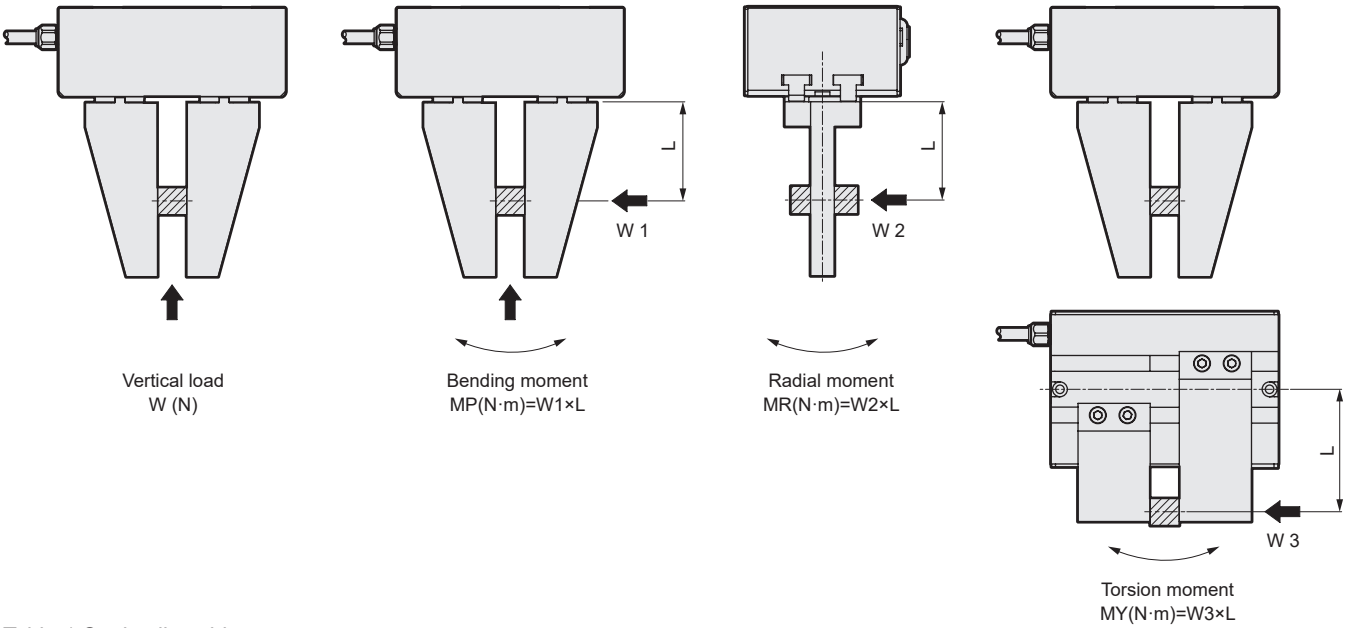
If the attachment is long and heavy, inertia increases when opening and closing, this may cause play in the finger, and adversely affect durability.

- 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

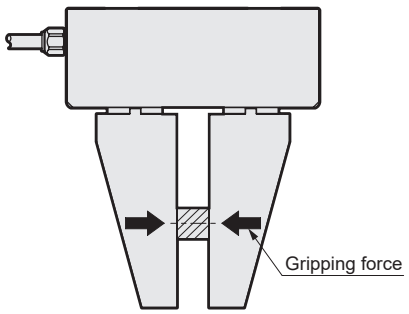
Table 1 Static allowable moment

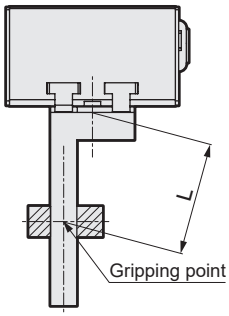
Size	Vertical load Wmax (N)	Bending moment Mpmax (N·m)	Radial moment Mrmax (N·m)	Torsion moment Mymax (N·m)
FFLD-08	120	15	15	15
FFLD-30	390	45	45	45
FFLD-50	485	64	64	55
FFLD-04H	120	15	15	15
FFLD-12H	390	45	45	45
FFLD-30H	390	45	45	45
FFLD-50H	485	64	64	55

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

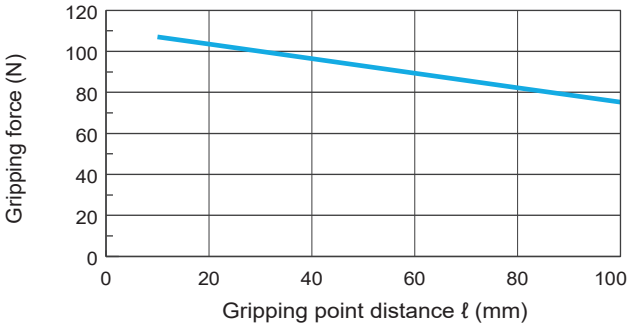
Gripping force and gripping point distance

Indicates the gripping force at the gripping point distance L.

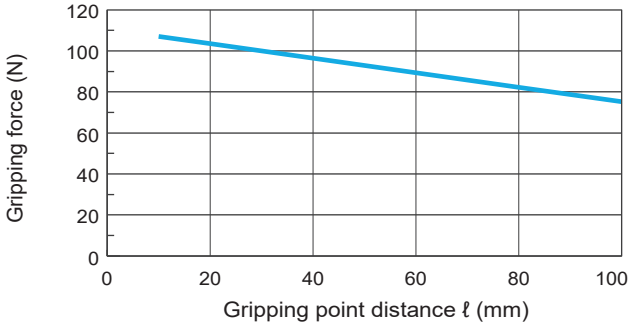




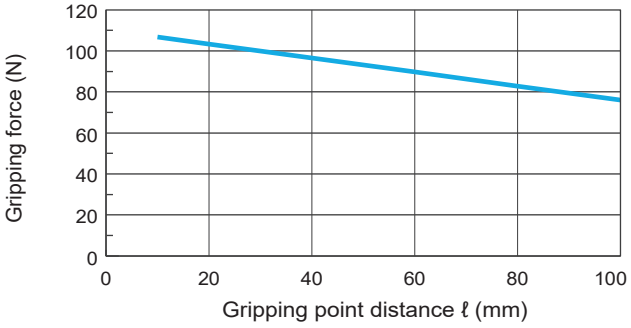
FFLD-04H



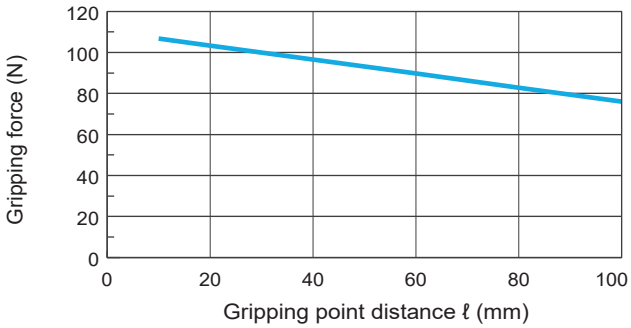
FFLD-08



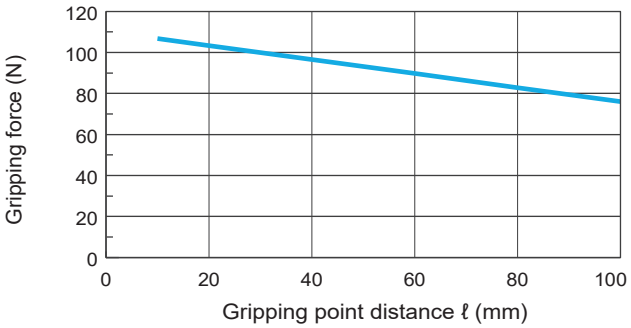
FFLD-12H



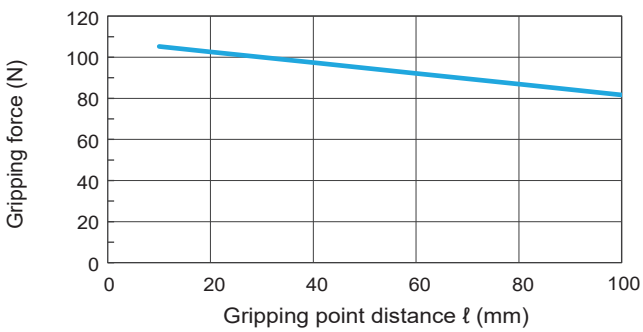
FFLD-30



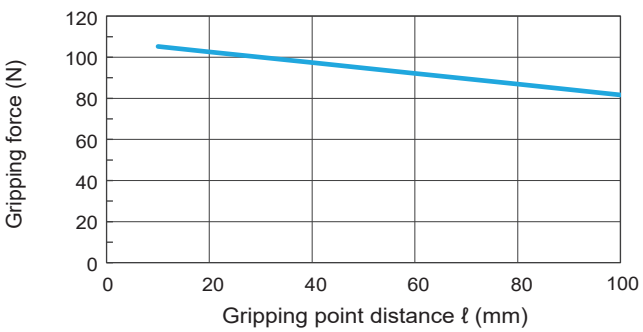
FFLD-30H



FFLD-50



FFLD-50H



Gripping point distance and pressing rate