

Model selection

STEP 1 Calculating the required gripping power

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

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

F_w : Required gripping power (N)
 n : Number of attachments = 2
 W_L : Workpiece weight (kg)
 g : Gravitational acceleration = 9.8 (m/s²)
 K : Transport coefficient
 5 [holding only]
 10 [normal transport]
 20 [suddenly accelerated transport]

Transport coefficient K

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

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

• Inertial force = $W_L \times (V/t)$

• Gravity = $W_L g$

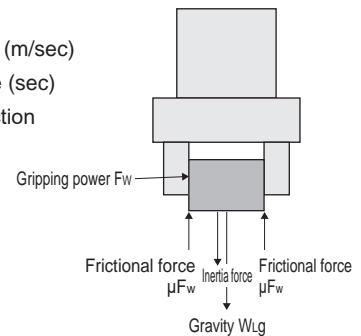
$$\text{• Required gripping force } F_w > \frac{W_L \times (V/t) + W_L g}{n \mu} = \frac{W_L \times (V/t + g)}{n \mu} = \frac{17.3 W_L}{2 \times 0.1} = 86.5 W_L$$

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

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

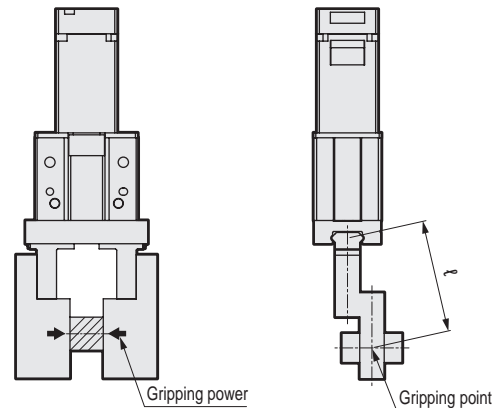
Note) Allowance is required for transport coefficient K due to impacts during transportation, etc. Coefficient of friction μ even when μ is higher than $\mu = 0.1$, set transport coefficient K from 10 to 20 or more for safety.

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

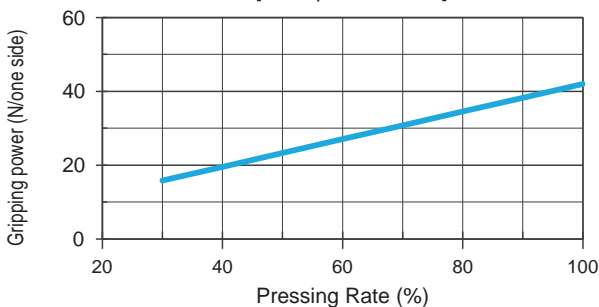


STEP 2 Temporarily select a model from the gripping power graph

Check the conditions at right and temporarily select a model from the gripping power graph. The gripping power 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.

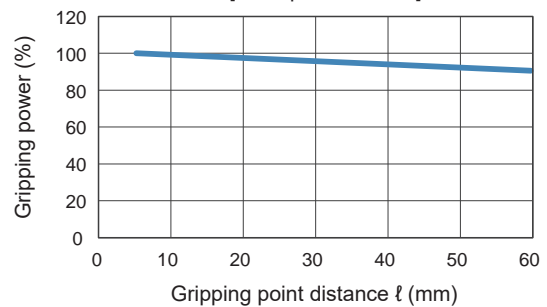


Gripping power and pressing rate
[Example: FLSH-20]



* Refer to pages 1, 5 and 9.

Gripping power and gripping point distance
[Example: FLSH-20]

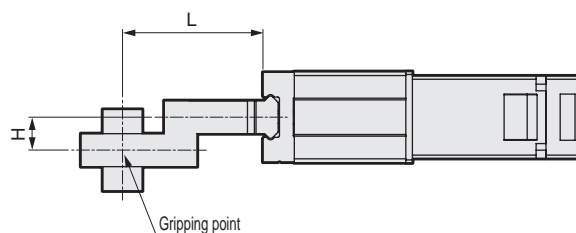


* Refer to page 15.

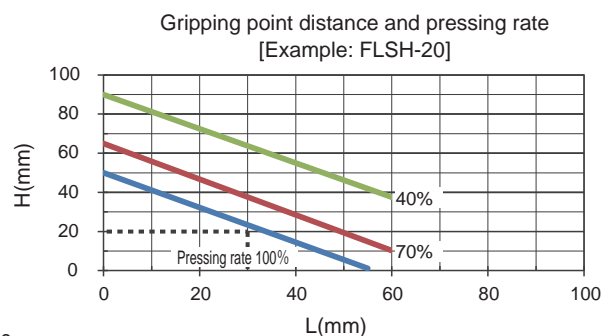
STEP 3 Confirmation of attachment shape

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

Example) L: 30 mm, H: 20 mm



When FLSH-20 is selected, the intersection of L:30mm and H:20mm will be inside the 100% pressing rate line, so it can be used.



* Refer to page 15.

● 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 the service life, 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].

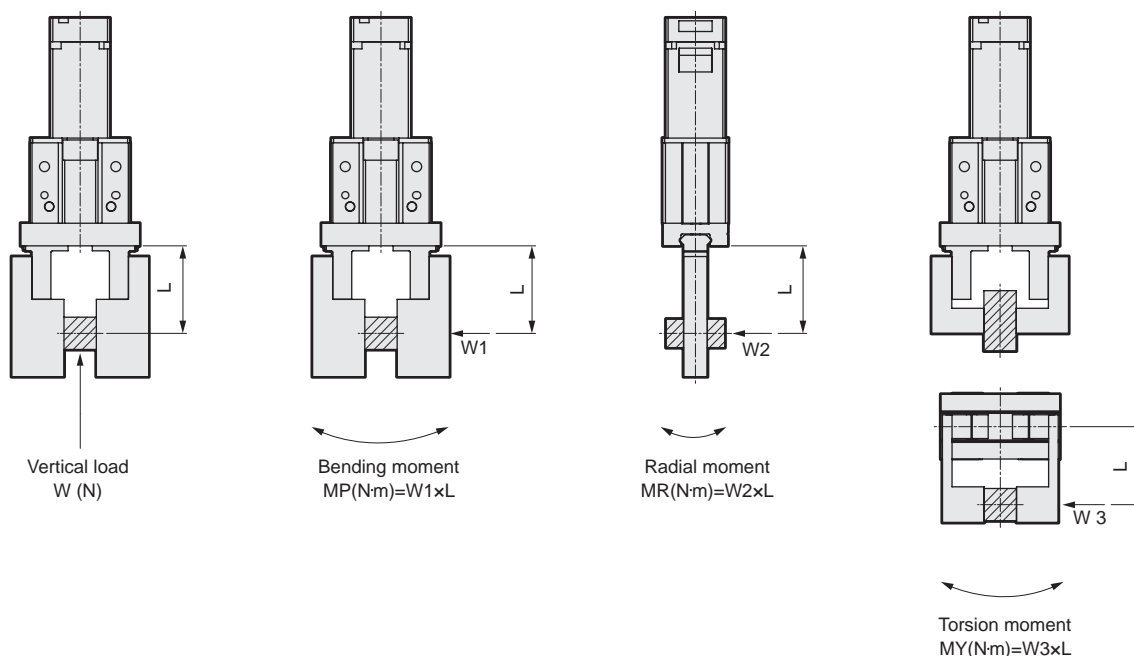


Table 1 Static allowable moment

| Size | Vertical load $W_{\max}(\text{N})$ | Bending moment $MP_{\max}(\text{N}\cdot\text{m})$ | Radial moment $MR_{\max}(\text{N}\cdot\text{m})$ | Torsion moment $MY_{\max}(\text{N}\cdot\text{m})$ |
|---------|---------------------------------------|--|---|--|
| FLSH-16 | 98 | 0.68 | 1.36 | 0.68 |
| FLSH-20 | 147 | 1.32 | 2.65 | 1.32 |
| FLSH-25 | 255 | 1.94 | 3.88 | 1.94 |

Example of calculation:

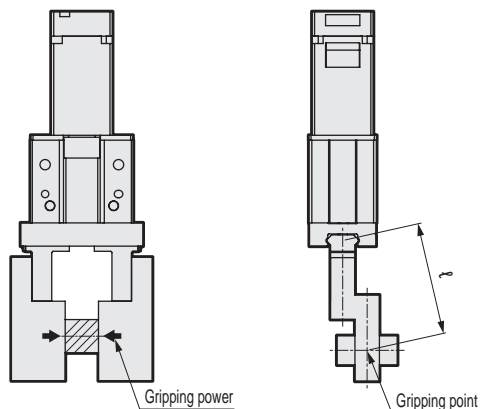
When load $W1:30\text{N}$ is applied to model No.: FLSH-20, $L:40\text{mm}$

$MP = 30 \times 40 \times 10^{-3} = 1.2\text{N}\cdot\text{m} < MP_{\max} = 1.32\text{N}\cdot\text{m}$

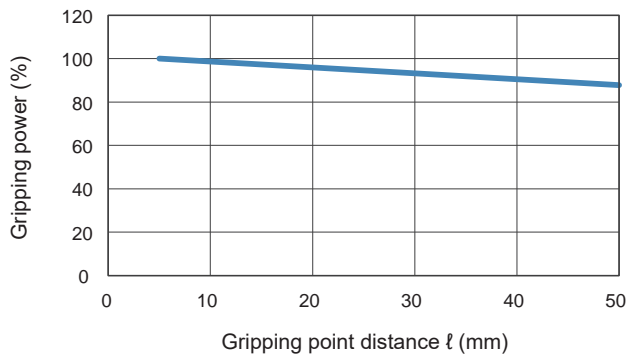
Gripping power and gripping point distance

This indicates the gripping power at gripping point distance ℓ .

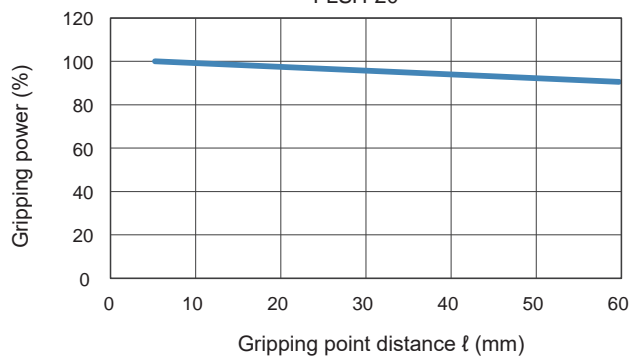
Calculated by $\ell = \sqrt{L^2 + H^2}$.



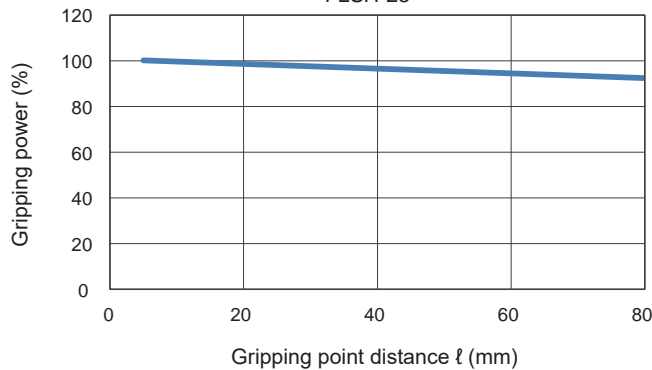
FLSH-16



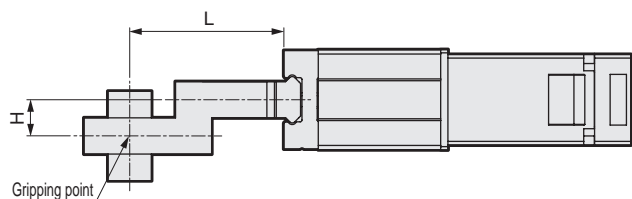
FLSH-20



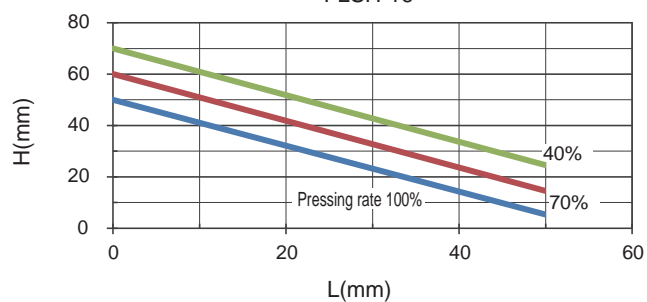
FLSH-25



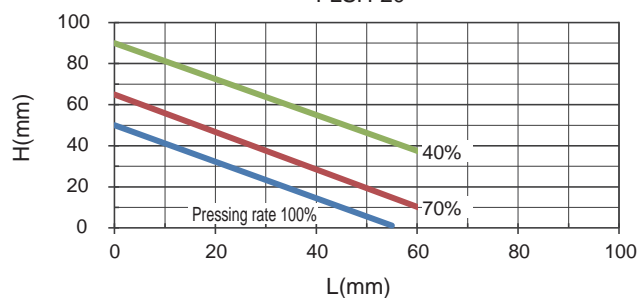
Gripping point distance and pressing rate



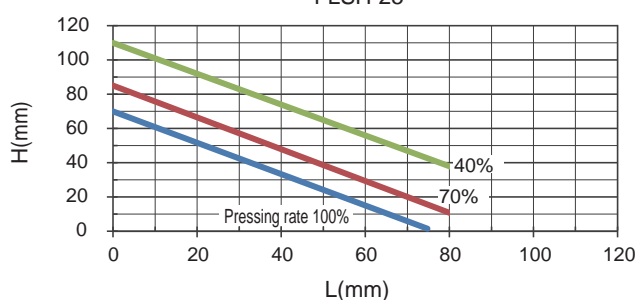
FLSH-16



FLSH-20




FLSH-25



Maintenance parts

■ Maintenance parts (rubber cover)

| Model No. | | Compatibility |
|---|---------------------|---------------|
|  | | |
| Chloroprene rubber | FLSH-16G-06-COVER-G | FLSH-16GH106 |
| | FLSH-20G-10-COVER-G | FLSH-20GH110 |
| | FLSH-25G-14-COVER-G | FLSH-25GH114 |
| | FLSH-16G-12-COVER-G | FLSH-16GH112 |
| | FLSH-20G-18-COVER-G | FLSH-20GH118 |
| Fluoro rubber | FLSH-16G-06-COVER-F | FLSH-16GH106 |
| | FLSH-20G-10-COVER-F | FLSH-20GH110 |
| | FLSH-25G-14-COVER-F | FLSH-25GH114 |
| | FLSH-16G-12-COVER-F | FLSH-16GH112 |
| | FLSH-20G-18-COVER-F | FLSH-20GH118 |