LST-HP1·LSTM-HP2 selection guide

STEP-1 Select a suitable model from required gripping power

① Calculation of required gripping power

Gripping power F_W satisfying the following equation is required to transport the workpiece (weight W_L).

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

F_W: Required gripping power [N]
n : Number of attachments = 2
W_L: Weight of workpiece [kg]
g : Gravitational acceleration = 9.8[m/s^2]
K : Transport coefficient
5 [holding only]
10 [normal transport]
20 [sudden accelerated transport]

Transport coefficient K

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

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

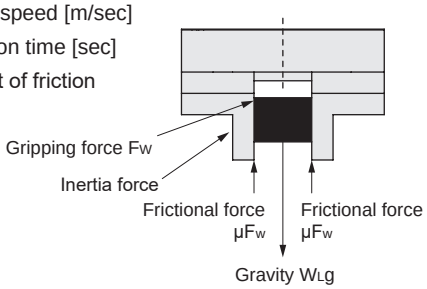
V: Transport speed [m/sec]
t: Deceleration time [sec]
μ: Coefficient of friction

· Inertia force = W_L (V/t)

· Gravity = W_Lg

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

∴Here, the transport coefficient K is calculated from the above equation: $\frac{V/t+g}{\mu g} = \frac{0.75/0.1+9.8}{0.1 \times 9.8} \approx 20$

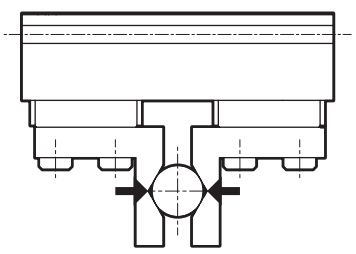


Note) Allowance is required for transport coefficient K due to impacts during transportation, etc. Even when the coefficient of friction μ is higher than μ=0.1, set transport coefficient K from 10 to 20 or more for safety.

② Model selection by required gripping power

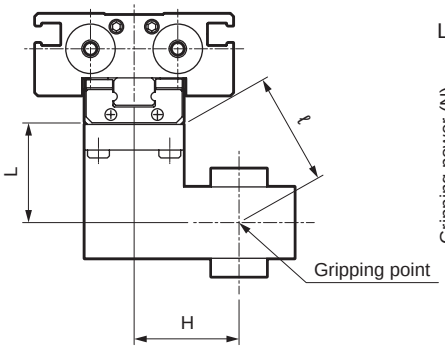
Gripping power varies with "gripping direction", "attachment length" and "supply pressure". Confirm on the gripping power graph that sufficient force can be obtained under the usage conditions. Refer to page 27 for the gripping force graph.

Grip direction

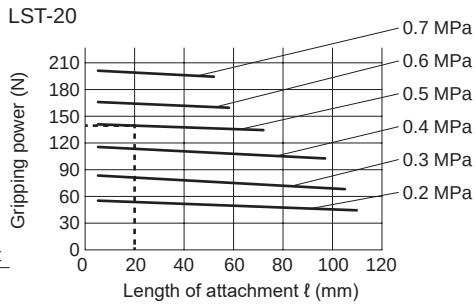


● Close direction (➡)

Length of attachment ℓ



Understanding the gripping power graph
(For LST-20)

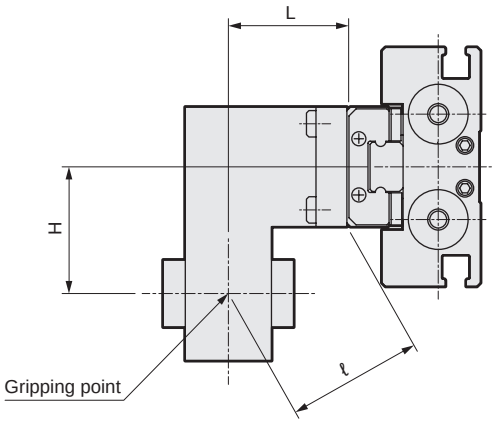


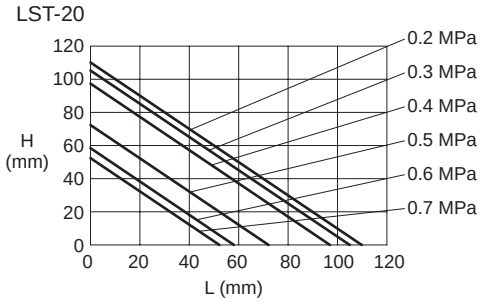
For example, if the supply pressure is 0.5MPa and the attachment length is 20mm, the obtained gripping power is 140N.

STEP-2 Confirmation of attachment shape

Use the attachment within the range shown on page 28.

Example) L: 40 mm, H: 20 mm





When LST-20 is selected, the intersecting point of L: 40mm and H: 20mm will be inside the supply pressure line of 0.5MPa, and so it can be used.

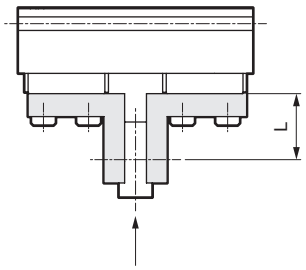
● Use attachments as short and lightweight as possible.

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

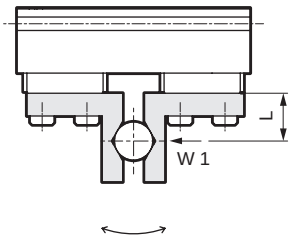
- Even if the attachment shape is within the performance data, by making it as small as possible enables the product to have a longer service life. Also, if ℓ is long, unexpected vibration, etc., could cause erroneous gripping and falling during transport. With "Cylinder diameter ×1.3/working pressure" as a guide, if ℓ is longer than that, set the transport coefficient of STEP-1 to a high value (Guideline: Transport coefficient 20 or more)
- 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: Weight of Hand product

STEP-3 Confirmation of external forces applied to finger

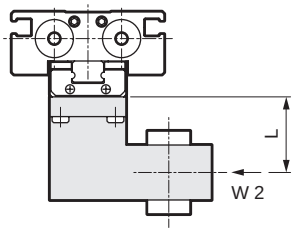
When an external force is applied to a finger such as when conveying and inserting workpieces, use it within [Table 1] parameters.
*When used during conveyance, consider the impact at the end.



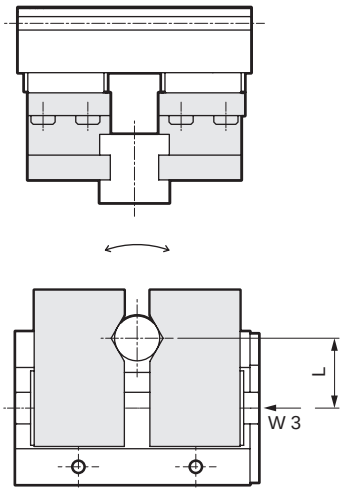
Vertical load
W (N)



Bending moment
M1 (N·m) =W1×L



Radial moment
M2 (N·m) =W2×L



Torsion moment
M3 (N·m) =W3×L

[Table 1] Allowable load value

Bore size	Vertical load Wmax (N)	Bending moment M1max (N·m)	Radial moment M2max (N·m)	Torsion moment M3max (N·m)
ø8	75	0.34	0.34	0.69
ø12	127	0.88	0.88	1.82
ø16	229	1.8	1.8	3.6
ø20	382	2.6	2.6	5.2

Note: ø8 is not available for LSTM.

L: Distance to the point where load is applied

If multiple external forces are applied, the resultant external forces (formula below) must be less than 1.

$WT=W/Wmax+M1/M1max+M2/M2max+M3/M3max<1$

Sample calculation ①: When conveying a workpiece
Model No.: LST-16, attachment (weight m_k: 0.06kg, center of gravity distance L_k=30mm) when gripping and conveying workpiece (weight m=0.8kg, center of gravity L=60mm)
(g: Gravity acceleration 9.8m/s^2, α: Impact coefficient generated at the end = 3)

$M_1= \alpha \times W_1 \times L = \alpha \times (m_k \times g \times L_k \times 2 + m \times g \times L)$

$= 3 \times (0.06 \times 9.8 \times 30 \times 10^{-3} \times 2 + 0.8 \times 9.8 \times 60 \times 10^{-3}) \approx 1.5$N·m and since M1max=1.8N·m or less, it can be used.

Sample calculation ②: When inserting a workpiece
Model No.: LST-16, L=40mm, when load W_1:40N is applied

$M_1=W_1 \times L=40 \times 40 \times 10^{-3}=1.6$N·m and since M1max= 1.8N·m or less, it can be used.