LSH-HP selection guide

STEP-1 Select a suitable model by required gripping force

(1) Calculation of required gripping force

Gripping force 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 force [N]
n : Number of attachments = 2
W_L : Weight of workpiece [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 and stopping in 0.1 second from transport speed of V = 0.75 m/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

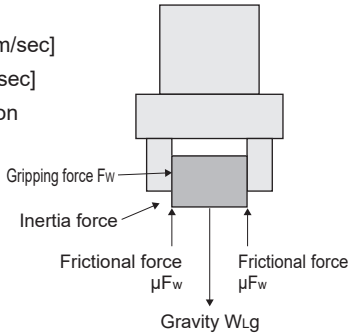
V: Transport speed [m/sec]
t: Deceleration time [sec]
μ: Coefficient of friction

·Inertial force = W_L (V/t)

·Gravity = W_L g

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

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



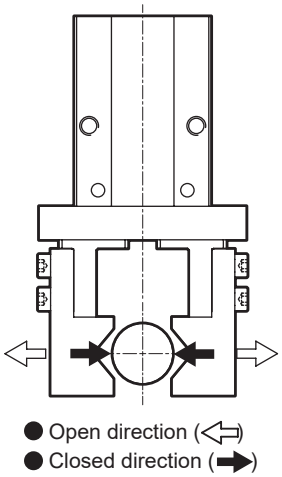
Note) Allowance is required for transport coefficient K due to impacts during transportation, etc. Even when the coefficient of friction μ is higher than μ = 0.1, set transport coefficient K from 10 to 20 or more for safety.

(2) Model selection by required gripping force

The gripping force changes depending on the "grip direction", "attachment length", and "supply pressure". Confirm on the gripping force graph that sufficient force can be obtained under the usage conditions.

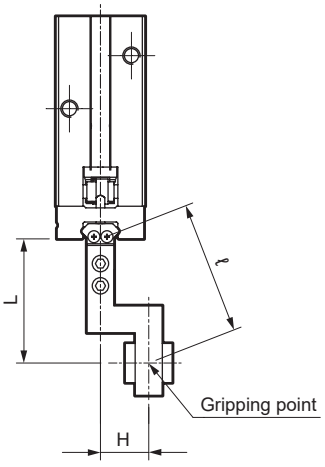
Gripping force graph page	
LSH*-A**D	Page 1570
LSH*-A**S/C	Page 1571
LSH*-G/F**D	Page 1572
LSH*-G/F**S/C	Page 1573

Grip direction



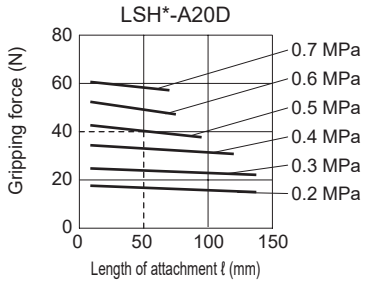
● Open direction (⇦)
● Closed direction (➡)

Attachment length ℓ



Understanding the gripping force graph

(For LSH-A20D closing direction)

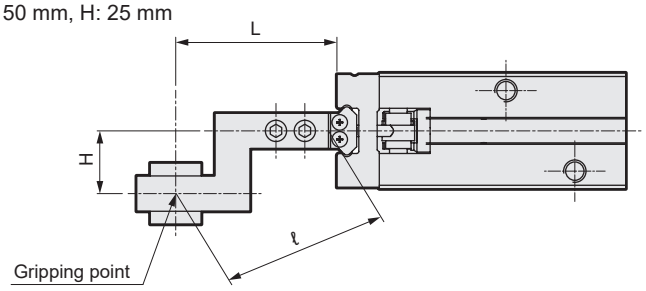


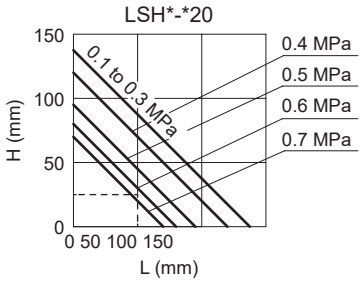
For example, when supply pressure is 0.5 MPa and attachment length is 50 mm, the gripping force is 40 N.

STEP-2 Confirmation of attachment shape

Use the attachment within the range shown on page 1574.

Example) L: 50 mm, H: 25 mm





When LSH-A20D is selected, the intersection of L:50mm and H:25mm will be inside the supply pressure line of 0.5MPa, so it can be used.

●Use attachments that are 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.

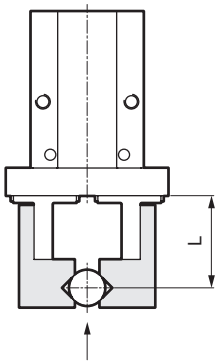
●Even if the attachment shape is within the performance data, by making it as small as possible enables the product to have a longer service life. Also, if ℓ is long, unexpected vibration, etc., could cause erroneous gripping and falling during transport. With "Cylinder diameter x1.3/working pressure" 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)

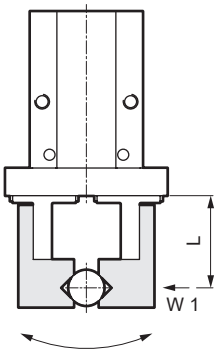
●The weight of the attachment affects the service life, so check that the weight is less than the following value.

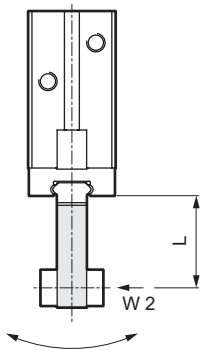
W<1/4H (1 pc.) W: Weight of attachment
H: Product weight of Hand

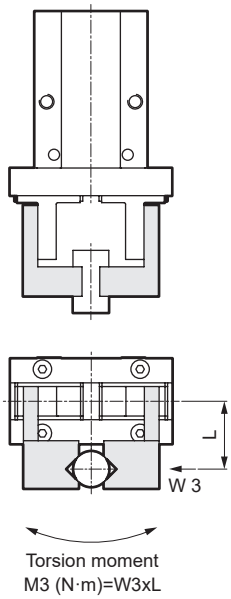
STEP-3 Confirmation of external forces applied to finger

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









L: Distance to the point where load is applied

[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)
ø6	15	0.06	0.06 (0.12)	0.06
ø10	75	0.39	0.39 (0.69)	0.39
ø16	147	1.32	1.32 (2.2)	1.32
ø20	265	2.1	2.1 (4.0)	2.1
ø25	343	3.0	3.0 (6.0)	3.0
ø32	490	4.5	4.5 (9.0)	4.5

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

When using the product with radial moment of ( ) or less, keep L and H dimensions at 2/3 or less of the length stipulated on page 1570.

Sample calculation (1): When conveying a workpiece
Model No.: LSH-A20D, When a workpiece (weight: m=0.8kg, center of gravity: L=60mm) is gripped and transported with an attachment (weight: mk:0.06kg, center of gravity: Lk=30mm)
(g: Gravity acceleration 9.8m/s^2, α: Coefficient of impact generated at end = 3)
M_1= α x W_1xL = αx (m_kxgxL_kx2+mx$g$xL)
= 3 x (0.06 x 9.8 x 30 x 10^{-3} x 2 + 0.8 x 9.8 x 60 x 10^{-3}) ≈ 1.5 N·m, and M_1max = 2.1 N·m or below, and therefore, can be used.

Sample calculation (2): When inserting a workpiece
Model No.: LSH-A20D, L=40mm for load W_1: When 40 N is added
M_1=W_1xL=40x40x10^{-3}= 1.6 N·m and $M1_{max}$= 2.1 N·m or less, so use is possible