To Use This Product Safely

Be sure to read this before use.

For general cylinder information, see Intro 39, and for cylinder switches, see P. 628.

Individual Precautions: Hand (Gripper)

During Design / Selection

1. Common

Warning

■ If the moving workpiece poses a risk to personnel or if fingers could be caught in the finger, etc., install a protective cover, etc.

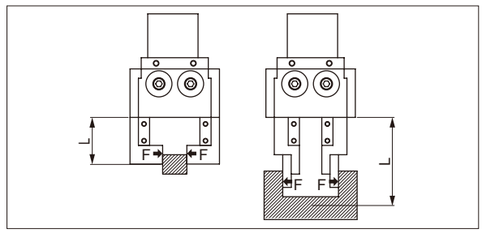
■ If circuit pressure drops due to a service interruption or problems in the air source, gripping force drops and the workpiece could drop. Provide position locking measures, etc., so that personnel are not injured or machines damaged.

■ The position of the high-precision positioning hole is based on the center of the finger, while the main body mounting hole is based on the main body, so misalignment will occur. When mounting using through holes, the pitch may shift depending on the mounting pitch with the customer, so mounting with the gripper chuck body screws is recommended.

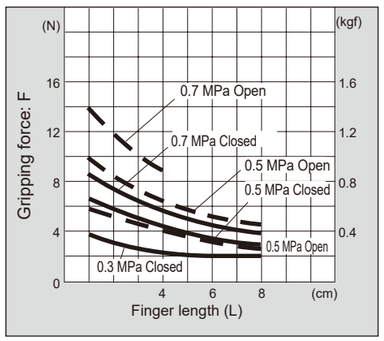
Caution

■ Precautions Regarding Gripping Force

- Gripping force represents the force when gripping a workpiece as shown in the figure below.

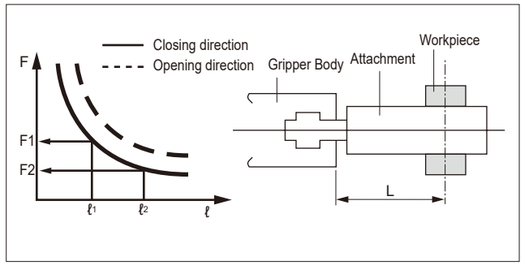


- The performance data shows the gripping force at Finger length L of the gripper at a supply pressure of 0.15 to 0.7 MPa.



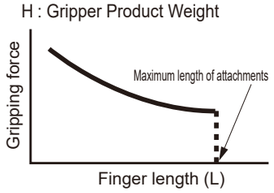
- When determining the gripping force from performance data, if L is the distance to the workpiece's center of gravity when the attachments are manufactured, the gripping force F is as follows
  When L = L1, F = F1
  When L = L2, F = F2 Refer to the lower left figure
  Expressed as.
- For the length when L-shaped attachments are included, select as follows.
  Example: For an L-shape, 30 mm in the finger direction and 30 mm bent at 90 degrees, the attachment length is considered to be 60 mm.
- Use attachments with a length within the values in the gripping force performance data table for each model.
- The maximum length of the attachments should be within the performance data. When transporting a workpiece (weight W_L), use the following as a reference.
  W_L x 9.8 x 5 < (F x N) [Holding only]
  W_L x 9.8 x 10 < (F x N) [Normal transport]
  W_L x 9.8 x 20 < (F x N) [Rapid acceleration transport]

  W_L : Workpiece Weight [kg]
  F : Gripping Force (N)
  N : Number of fingers [Qty.]



■ Use as short and light an attachment as possible.
If they are long and heavy, the inertial force during opening and closing will be large, which may cause play in the fingers or accelerate wear on the finger sliding parts, adversely affecting the service life.

- Keep the length of the attachments within the values in the performance data.
- The weight of the attachments affects the service life. Please keep it at or below the following.
  W < 1/4H (for one attachment) W: Weight of finger
  H : Gripper Product Weight



■ Avoid using only the spring force of the single-acting type to grip workpieces as much as possible. The gripping force will become unstable and may cause malfunction.

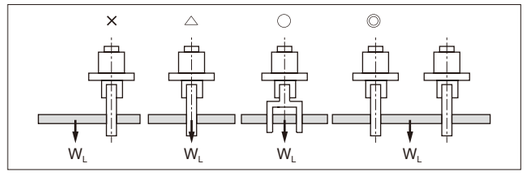
■ For the single-acting type, the spring force is weakest near the stroke end (open end for NO type, closed end for NC type). Due to the structure that operates with spring force, it may not return if operated with a short stroke, so consider the attachment shape to grip the workpiece with sufficient stroke allowance.

■ The rubber cover is a consumable part. Replace as necessary.

■ Usage Environment
In cutting, casting, and welding factories, foreign matter such as cutting fluid, chips, and dust may enter. Prevent these as much as possible with covers, etc. Also, do not use in the following environments.

- Splashing of cutting fluid (because sliding parts are abraded by abrasives or abrasive in the fluid)
- When organic solvents, chemicals, acids, alkalis, kerosene, etc. are contained in the atmosphere
- Exposure to water

■ When gripping long or large workpieces, gripping the center of gravity is a prerequisite for stable gripping, but consider increasing the size or using multiple units to ensure stability.



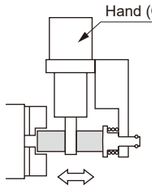
■ Select a model with sufficient gripping force for the workpiece weight.

■ Select a model with sufficient opening/closing width relative to the workpiece size.

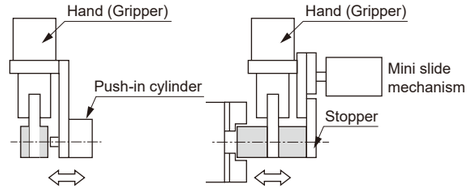
■ When inserting a workpiece directly into a jig with a gripper, design with clearance in mind. The gripper may also be damaged.

Hand (Gripper)

●Pushing against a jig by springing out



●When using a push-in cylinder



Note) Since the workpiece slides on the attachments, there is a risk of significantly reducing the life of the chuck. Sufficient consideration must be given to the shape of the attachments.

■ If the attachment lacks rigidity, deflection may cause the fingers to bind, adversely affecting operation.

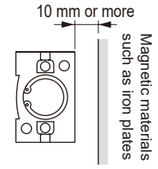
■ For products using finite track linear guides (LSH, LSH-□, LSHL/M-□, LST(M), LHA(G), HLF2), steel balls may become misaligned depending on the operating conditions and individual product, increasing sliding resistance and reducing gripping force. In such cases, by increasing the operating pressure or by inserting a full stroke operation between gripping operations, it can be corrected.

■ Adjust the hand opening/closing speed with a speed controller (optional). If used at high speed, play may occur sooner. Also, the shock during opening and closing may cause the workpiece to vibrate, leading to chucking errors, workpiece insertion errors, or poor repeatability.

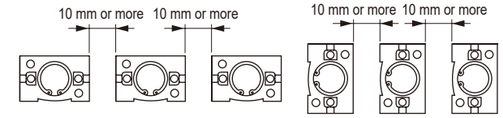
■ Please note that for products using cross rollers (BSA2, BHA, BHG, HKP, BHE), the smoothness of operation may change depending on the usage conditions. (There is no effect on basic performance.)

■ If a lateral or impact load is applied to the finger, it may cause play in the finger or damage. Adjust and check that no external force is applied to the finger.

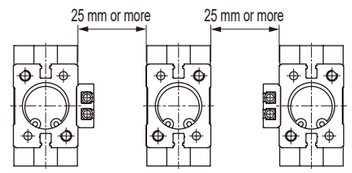
■ If there is a magnetic material such as an iron plate near the cylinder switch, it may cause the cylinder switch to malfunction, so keep a distance of 10 mm or more from the cylinder surface.



■ If cylinders are adjacent, it may cause cylinder switch malfunction, so keep the following distance from the cylinder surface.



[LSH-HP Series]



■ Clamping operations become more accurate when performed as softly and slowly as possible. Also, repeatability becomes stable.

2. Linear Slide Cylinder LSH-HP1 Series

Caution

■ When using small bore/short stroke actuators at high frequency, condensation (water droplets) may form in piping depending on conditions. Take measures to prevent condensation by using a quick exhaust valve, etc.

■ The rubber cover does not guarantee hermeticity. Since gaps may form between the rubber cover, body and finger, contact CKD if this is a problem.

3. LSHM-HP2, LSTM-HP2 Series

Caution

■ Use a stable DC power supply. Do not connect motors, valves, etc., that generate noise to the power supply used in this device.

■ When wiring, ensure that the sensor/amplifier section is not subjected to induced noise by avoiding shared piping or wiring (e.g., multicore cables) with power lines for motors, etc. Also, pay attention to the inverter power supply and its wiring. (Ensure the frame ground of the inverter power supply is properly grounded so that noise can escape.)

■ If the cable length exceeds 5 m, noise resistance performance may be affected. Please be careful.

■ Wire the connecting cable so that local bending or tensile force is not applied. Also, avoid repeated bending. Do not apply impact load to the lock unit.

■ Do not apply a load of 30 N or more to the M8/M12 connector part.

▪ Cannot be used outdoors or in atmospheres where there is a risk of corrosion.

■ The protection structure of the switch output adapter and IO-Link adapter is equivalent to IP40. Do not install in locations with moisture, salt, dust, or cutting chips.

4. Linear Slide Gripper LSH Series

Caution

■ When installing L-shaped attachments, use them within the range on P. 95.

5. Shockless Type LSH-□-C

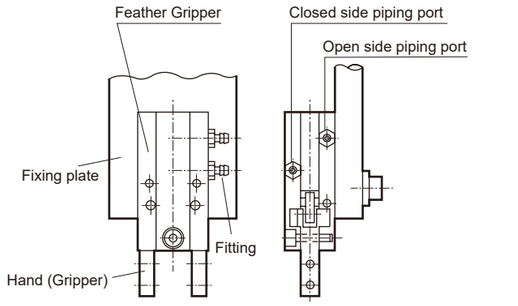
Caution

■ Please note that due to the structure, the closed end position cannot be maintained if the air supply is cut off. When detecting the closed end with a switch, it may be outside the detection range, so measure the switch position while air is pressurized.

6. Feather Gripper FH Series

Caution

■ For the FH series, if there is a restriction in the thickness direction of the main body, the usable piping fittings are limited. Please refer to the fittings below.



Model	FH□10	FH□12	FH□16	FH□20	FH□25
Piping diameter	M3		M5		
Fitting	Model No.	Applicable outer diameter (mm)	Effective cross-sectional area (mm²)	Model No.	Applicable outer diameter (mm)	Effective cross-sectional area (mm²)
Barb Fitting: Straight FTS	FTS4-M3	ø3.2 / ø4	0.4	FTS4-M5	ø3.2 / ø4	2.1
	-	-	-	FTS6-M5	ø6	4.1

7. Wide Parallel Gripper HMC-HP1 Series

Caution

■ When using small bore/short stroke actuators at high frequency, condensation (water droplets) may form in piping depending on conditions. Take measures to prevent condensation by using a quick exhaust valve, etc.

During Use

1. Common

Caution

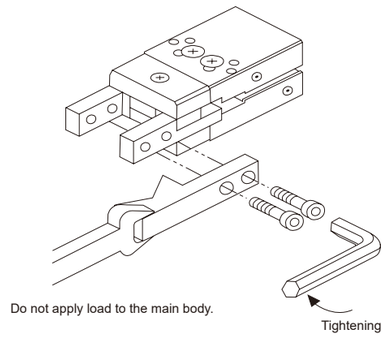
■ Do not disassemble or modify the body.

■ Periodically replenish grease to the sliding parts of the finger. Periodic replenishment can further extend the service life.

Manufacturer	Model No.
THK	AFF Grease

■ Attachment Mounting Method

When mounting attachments to the fingers, consider the impact on the gripper body, and support and tighten with a wrench, etc., to prevent the fingers from twisting. It is recommended to attach the attachments to the outer surface of the fingers. (The accuracy of the inner surface of the fingers is inferior.)



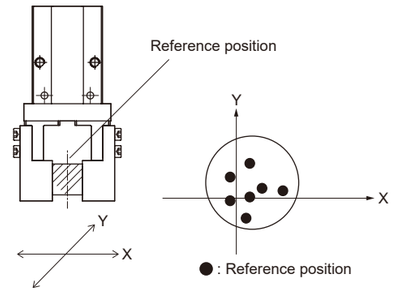
■ Do not retighten or disassemble any screws other than those used by the customer for fixing the main body and attachments. May cause malfunction.

■ Do not make dents or scratches on the body mounting surface and fingers that would impair flatness or perpendicularity.

■ Repeatability

Repeatability here refers to the workpiece positional deviation when clamping/unclamping is repeated under the same conditions (gripper fixed, same workpiece used, etc., see below). Shock during opening/closing may lead to workpiece positional deviation and deterioration of repeatability. Also, be aware that wear or insufficient rigidity of the attachments can also lead to deterioration of accuracy.

Condition
- Workpiece dimensions, shape, weight
- Workpiece transfer position
- Clamping method, length
- Resistance between workpiece and workpiece receiving surface
- Fluctuation of gripping force (air pressure), etc.



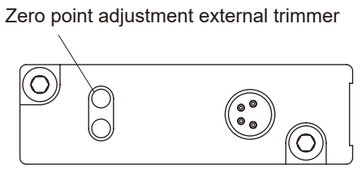
2. LSTM-HP2, LSHM-HP2

Caution

■ The analog output voltage corresponds to the cylinder piston position, and it is conceivable that its value will fluctuate due to deformation/wear of the jig, etc., over the course of use. (In the case of a gripper, backlash in the opening/closing direction of the finger part and deformation/wear of the attachments are contributing factors to variation.) If the analog output voltage fluctuates, make fine adjustments with the zero point adjustment external trimmer as necessary.

Operating Procedure

Remove the attachments, etc., close the fingers, remove the rubber plug included to the zero point adjustment external trimmer, and rotate the trimmer to make fine adjustments so that the output voltage becomes 1 V. Be sure to reattach the rubber plug as it was after operation. At that time, prevent moisture or foreign matter from entering the inside.



■A rubber plug is included to the zero point adjustment external trimmer section to ensure water resistance, so use it with the plug included.

■Do not remove the cap of the correction adapter to ensure water resistance.

■To ensure water resistance, securely tighten the M8 screw part of the cable.

■Repeatability of analog output

Repeatability here refers to the deviation of the analog output when clamping and unclamping are repeated under the same conditions (gripper fixed, same workpiece used, etc., see below), converted to length.

Condition
- Workpiece dimensions, shape, weight
- Workpiece gripping position of attachments
- Clamping method, length
- Resistance at the contact area between attachments and workpiece
- Fluctuation of gripping force (air pressure)

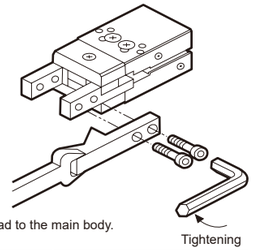
■For LSTM-HP2, when measuring at full scale, use it considering a backlash amount of 0.15 mm.

3. Linear Slide Gripper LSH Series

⚠Caution

■Finger Mounting Method

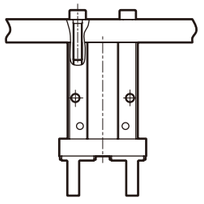
When mounting attachments to the fingers, consider the impact on the gripper body, and support and tighten with a wrench, etc., to prevent the fingers from twisting.



Item	Bolt used	Tightening torque (N·m)
LSH-10	M2.5 x 0.45	0.32
LSH-16	M3 x 0.5	0.59
LSH-20	M4 x 0.7	1.4
LSH-25	M5 x 0.8	2.8

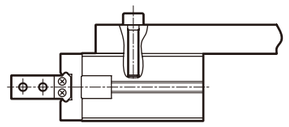
■For main body mounting, refer to the following items.

●Top mounting



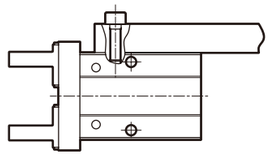
Item	Bolt used	Tightening torque (N·m)	Maximum screw-in depth L (mm)
LSH-10	M3 x 0.5	0.88	6
LSH-16	M4 x 0.7	2.1	8
LSH-20	M5 x 0.8	4.3	10
LSH-25	M6 x 1.0	7.3	12

●Front mounting



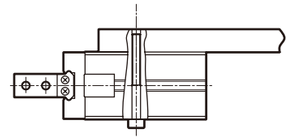
Item	Bolt used	Tightening torque (N·m)	Maximum screw-in depth L (mm)
LSH-10	M3 x 0.5	0.69	5
LSH-16	M4 x 0.7	2.1	8
LSH-20	M5 x 0.8	4.3	10
LSH-25	M6 x 1.0	7.3	12

●Side mounting



Item	Bolt used	Tightening torque (N·m)	Maximum screw-in depth L (mm)
LSH-10	M3 x 0.5	0.88	6
LSH-16	M4 x 0.7	1.6	4.5
LSH-20	M5 x 0.8	3.3	8
LSH-25	M6 x 1.0	5.9	10

●Through-hole mounting



Item	Bolt used	Tightening torque (N·m)
LSH-10	M2.5 x 0.45	0.32
LSH-16	M3 x 0.5	0.88
LSH-20	M4 x 0.7	2.1
LSH-25	M5 x 0.8	4.3

* For types with a switch, through-hole mounting is not possible.

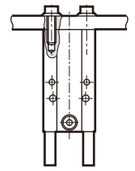
■Do not retighten or disassemble any screws other than those used by the customer for fixing the main body and attachments. May cause malfunction.

4. Feather Gripper FH Series

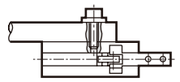
⚠Caution

■For FH series main body mounting, refer to the following items.

●Top mounting



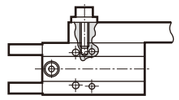
●Front mounting



* For types with a switch, ensure the screw-in amount is below the value in the table below to prevent the bolt tip from pressing the switch.

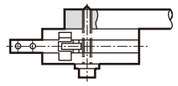
* Ensure the fixing plate does not interfere with the finger fulcrum.

●Side mounting



Model	Bolt size used	Max. screw-in depth (mm)	Recommended tightening torque (N·cm)
FH□10	M3 x 0.5	4.5	70
FH□12	M3 x 0.5	4.5	70
FH□16	M4 x 0.7	6	160
FH□20	M5 x 0.8	7.5	330
FH□25	M5 x 0.8	12	330

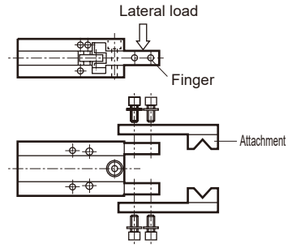
●Using through holes



* For types with a switch, using through holes is not possible.
* Ensure the fixing plate does not interfere with the finger fulcrum.

Model	Bolt size used	Recommended tightening torque (N·cm)
FH□10	M3 x 0.5	32
FH□12	M2.5 x 0.45	32
FH□16	M3 x 0.5	90
FH□20	M4 x 0.7	210
FH□25	M4 x 0.7	210

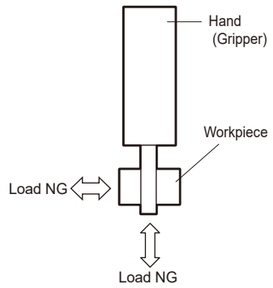
■When attaching the attachment, be careful not to apply a lateral load to the finger.



■When mounting, tighten with the following tightening torque.

Nominal screw size	M3	M4	M5	M6	M8
Recommended tightening torque (N·m)	0.59	1.4	2.8	4.8	12.0

■Do not apply excessive load to the fingers or attachments during workpiece attachment/detachment or transfer. Scratches or dents may occur on the rolling surface of the finger's linear guide, leading to malfunction.



5. Shockless Type LSH-□-C

⚠Caution

■Due to changes in cushion rigidity from being left for a long time, the stroke may be slightly shorter than the reference value at low pressure settings. Perform a break-in operation by operating it several times or by reciprocating it at a high supply pressure.

■Do not rapidly exhaust the air in the cylinder after operating at low speed outside the catalog specification range. Example Removing piping or couplers, etc.) The rubber air cushion may come off. Please be especially careful as this is more likely to occur when the air pressure is high.

For precautions regarding mounting, installation, adjustment, use, and maintenance, please see "Precautions for Use" in this catalog and the CKD Components Product website (https://www.ckd.co.jp/kiki/en/) → "Model No." → Instruction Manual.