

Parallel Gripper with dust-proof cover and roller bearing style **AIRTAC**

HFKP Series



Specification

| Bore size (mm) | 16 | 20 | 25 | 32 |
|--------------------|---|----|----|-----------|
| Acting type | Double acting | | | |
| Fluid | Air(to be filtered by 40 μm filter element) | | | |
| Operating pressure | 0.15~0.7MPa(22~100psi)(1.5~7.0bar) | | | |
| Temperature °C | -20~70 | | | |
| Lubrication | Not required | | | |
| Repeatability mm | ± 0.01 | | | ± 0.02 |
| Max. frequency | 180(c.p.m) | | | 60(c.p.m) |
| Sensor switches | CMSh、DMSH、EMSh、CMSG、DMSG、EMSG | | | |
| Port size | M5×0.8 | | | |

Note) Refer to P365 for detail of sensor switch.

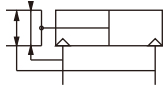
Gripping force and stroke

| Bore size | | 16 | 20 | 25 | 32 |
|---|--------|-----|-----|-----|-----|
| Gripping force per finger Effective value(N) | Closed | 30 | 42 | 65 | 158 |
| | open | 40 | 66 | 104 | 193 |
| Opening/Closing stroke(Both sides)(mm) | | 6 | 10 | 14 | 22 |
| Weight (g) | | 130 | 251 | 475 | 792 |

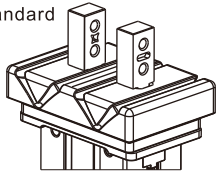
[Note] The gripping force in the above table is at working pressure of 0.5MPa, and with a gripping point of L=20mm.

Add) Please refer to page 295 for the definition of "L".

Symbol

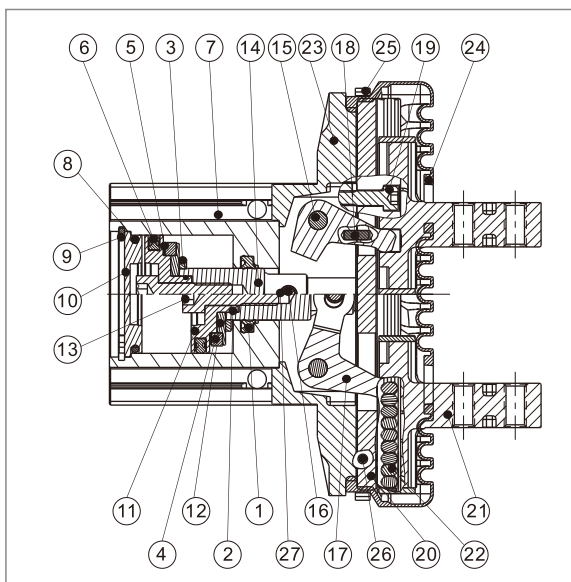


Ordering code

| HFKP 32 □ | | |
|--|----------------------|--|
| ① Model | ② Bore size | ③ Finger type |
| HFKP: Parallel Gripper with dust-proof cover and roller bearing style(Double acting) | 16 20 25 32 | Blank: Standard  |

[Note]:HFKP series are all standard come with magnet. (not includes sensor)

Inner structure and material of major parts



| NO. | Item | Material | NO. | Item | Material |
|-----|--------------------|---------------------------------|-----|----------------------|-------------------|
| 1 | Rod packing | NBR | 15 | Pin | Stainless steel |
| 2 | O-ring | NBR | 16 | Pin | Stainless steel |
| 3 | Bumper | TPU | 17 | Curved bar | Stainless steel |
| 4 | Magnet | Neodymium-iron-boron | 18 | Pin | Bearing steel |
| 5 | Magnet washer | NBR | 19 | Countersink screw | Alloy steel |
| 6 | Piston seal | NBR | 20 | Guide roller | Alloy steel |
| 7 | Body | Aluminum alloy | 21 | Clamping jaw | Bearing steel |
| 8 | O-ring | NBR | 22 | Guide rail | Bearing steel |
| 9 | C clip | Spring steel | 23 | Dustproof cover ring | Resin |
| 10 | Back cover | Aluminum alloy | 24 | Dustproof cover | NBR |
| 11 | Piston | Aluminum alloy | 25 | Fixed rod | Cold rolled sheet |
| 12 | Magnet fixed flake | Aluminum alloy /Stainless steel | 26 | Screw | Alloy steel |
| 13 | Countersink screw | Alloy steel | 27 | Pin bushing | Stainless steel |
| 14 | Piston rod | Aluminum alloy/Stainless steel | | | |

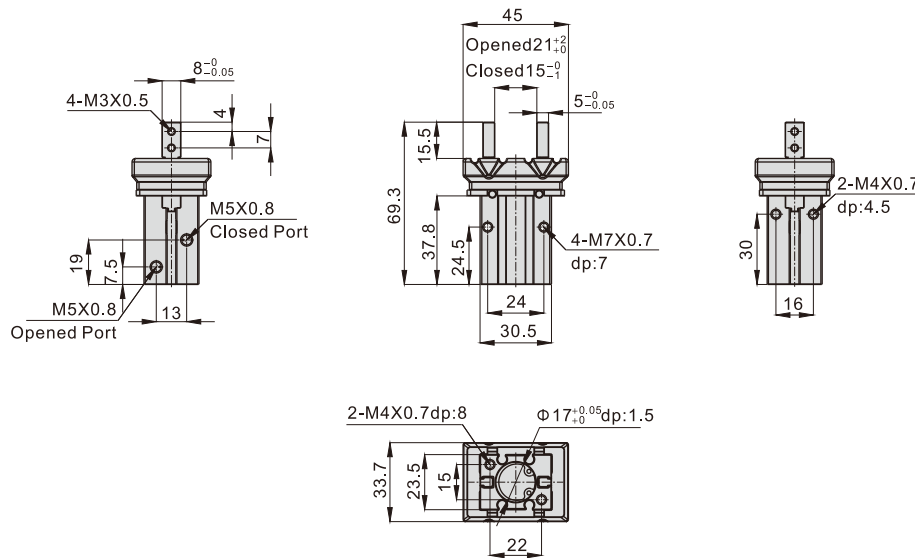
[Note]: No. 25 and No. 26 in the above table are only for HFKP32.

Parallel Gripper with dust-proof cover and roller bearing style **AIRTAC**

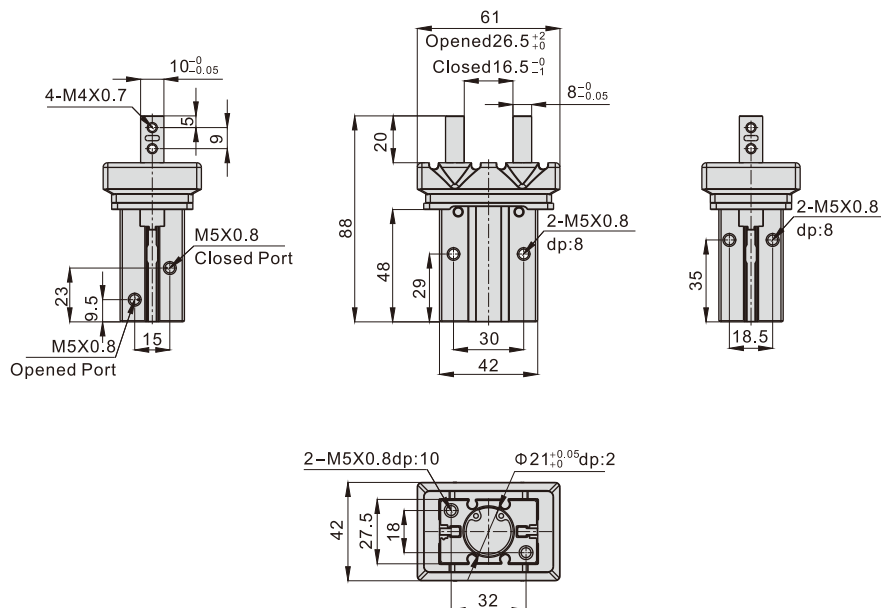
HFKP Series

Dimensions

HFKP16



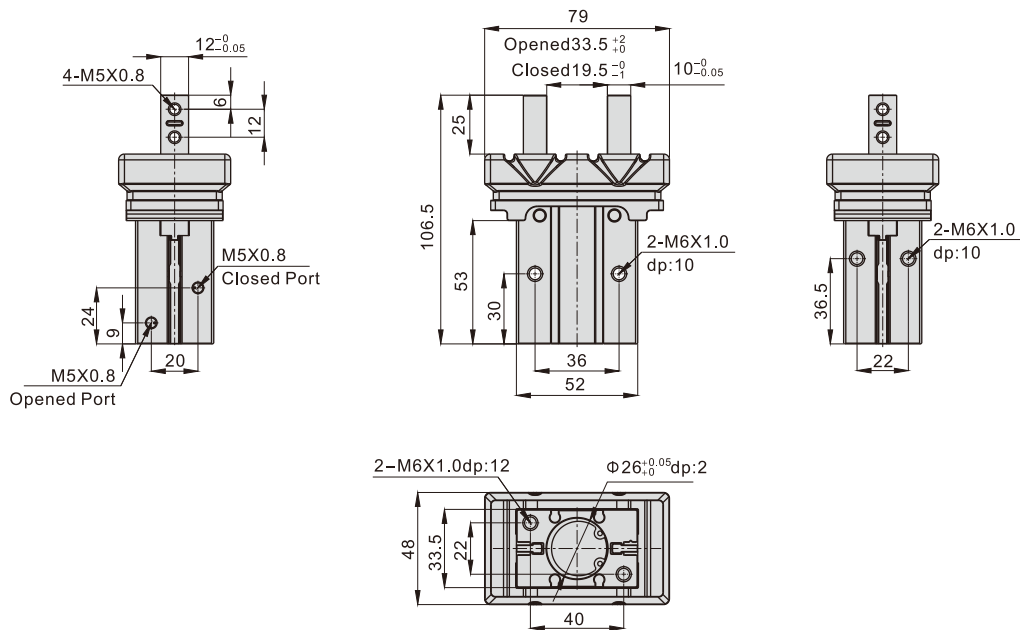
HFKP20



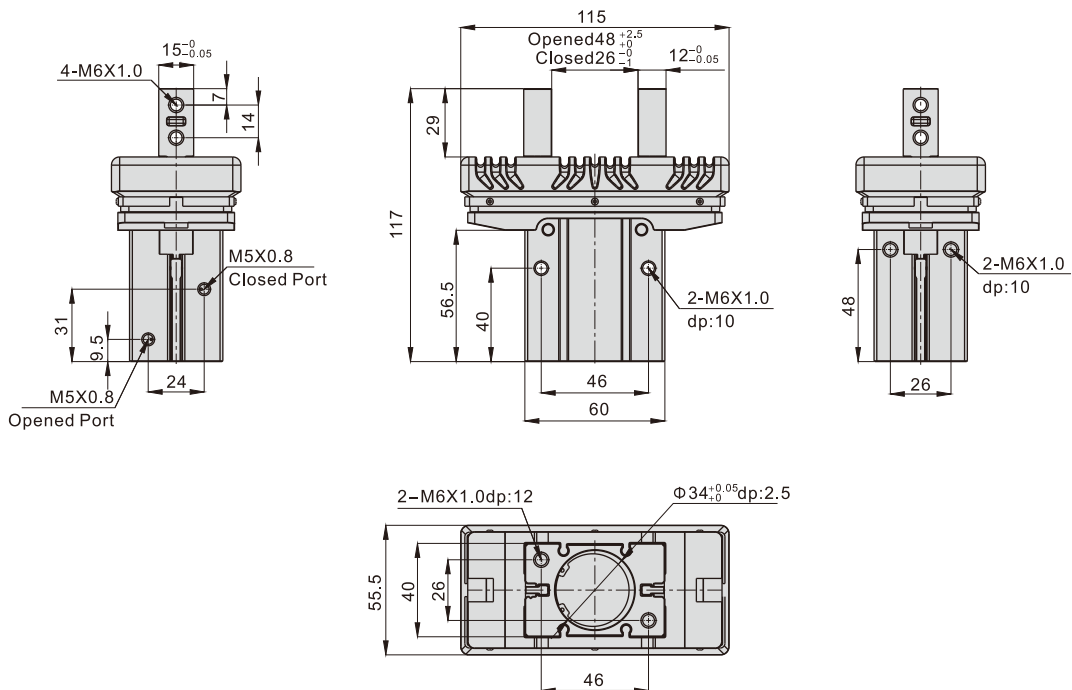
Parallel Gripper with dust-proof cover and roller bearing style **AIRTAC**

HF KP Series

HF KP25



HF KP32



HFKP Series

How to select product

Please select pneumatic finger according to the following steps:

① The selection of the effective gripping force



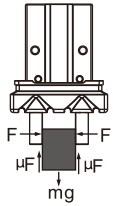
② the confirmation of the gripping point



③ the confirmation of the external force put on the gripping jaw

1. The selection of the gripping force

The gripping work-pieces shown below, on the impact condition of ordinary handling state, taking safety coefficient $a=4$, have a gripping force that is more than 10-20 times of the mass of the gripped objects.



The work-pieces as shown in the left :

F: Gripping force (N)
 μ : friction coefficient between fittings and work-pieces.
 m: mass of work-pieces
 g: acceleration of gravity ($=9.8m/s^2$)

The condition that the work-pieces won't drop is: $2 \times \mu F > mg$

$$\text{so: } F > \frac{mg}{2 \times \mu}$$

Safety coefficient is a, so F is:

$$F = \frac{mg}{2 \times \mu} \times a$$

$\mu = 0.2$

$$F = \frac{mg}{2 \times 0.2} \times 4 = 10 \times mg$$

10 times of the mass of the gripped objects

$\mu = 0.1$

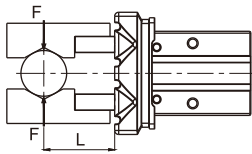
$$F = \frac{mg}{2 \times 0.1} \times 4 = 20 \times mg$$

20 times of the mass of the gripped objects

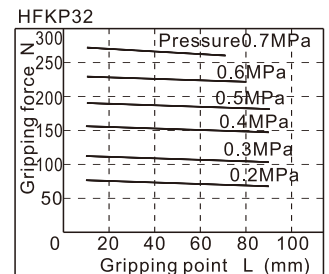
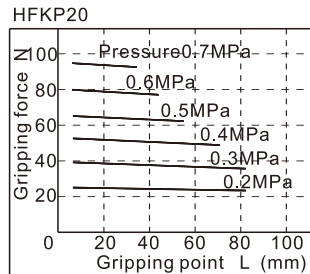
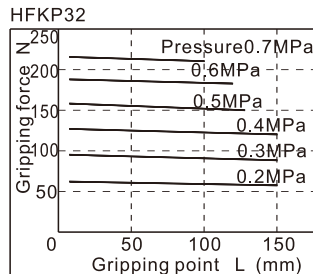
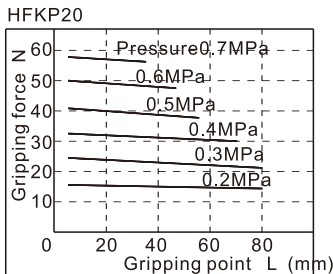
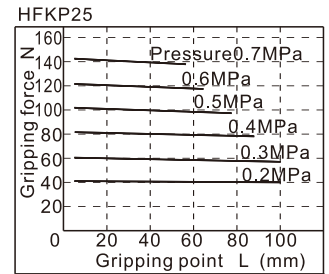
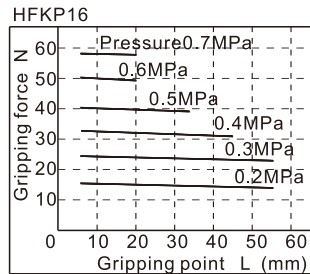
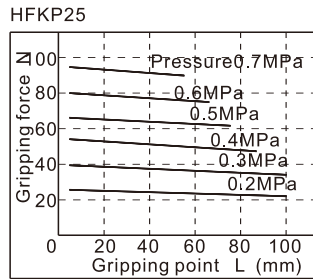
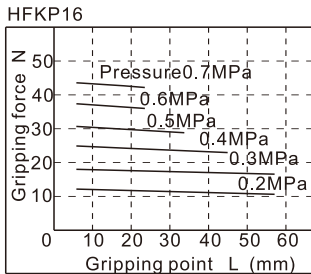
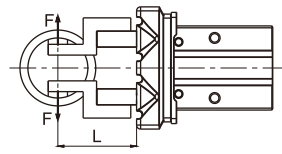
Note) If the friction coefficient $\mu > 0.2$, for safety, please also select clamping force according to the principle of 10~20 times of the mass of the clamped objects. As for large acceleration and shock, it requires for greater safety coefficient.

1.1) The actual gripping force must be within the effective gripping forces of different pneumatic fingers specifications shown in the below chart.

Closed gripping force



Opened gripping force

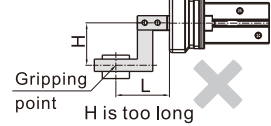
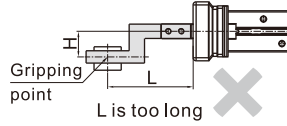
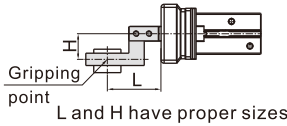


HFKP Series

2. The selection of the gripping point

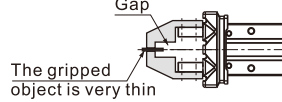
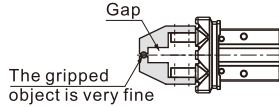
2.1) Please select the gripping point within the limited field shown below.

Over the limits, gripping jaws would be subjected to excessive torque loads, and lead to short life of the air gripper.

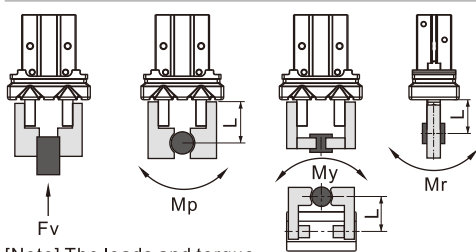


2.2) In the allowable range of gripping point, it is better to design for short and light fittings. If the fittings are long and heavy, the inertia force when the finger is open and close will become larger, and the performance of gripping jaw will be degraded, at the same time it will affect the life.

2.3) When the gripped object is very fine and thin, you have to equip with gap between fittings. If not, there will be unstable clamp, resulting in a position offset and adverse clamping and so on.



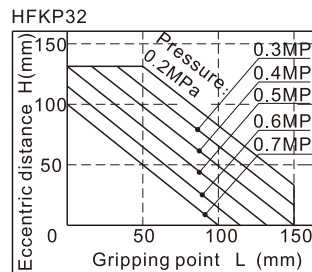
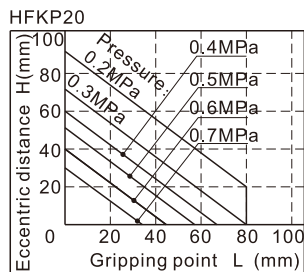
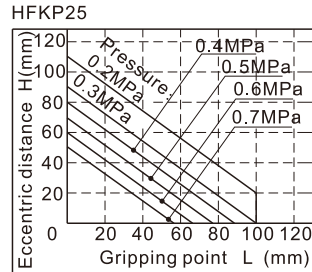
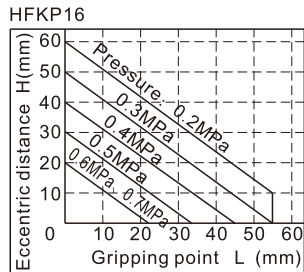
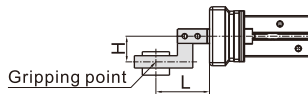
3. The confirmation of the external force put on the gripping jaw.



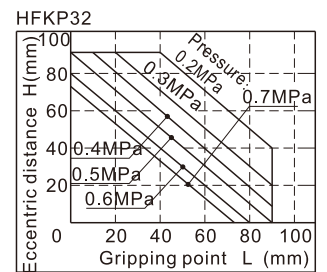
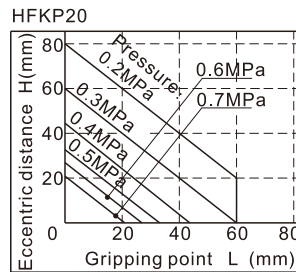
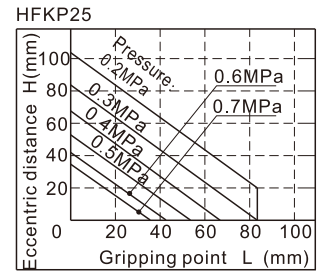
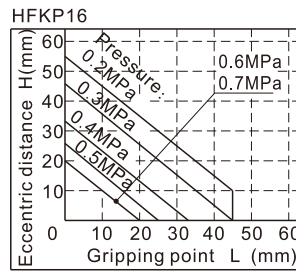
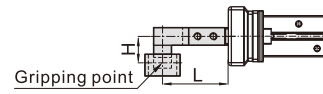
[Note] The loads and torque values of said are all static values.

| Bore size | The allowed vertical loads Fv(N) | Max. permissible torque(Nm) | | | The calculation of allowable forces when moment loads work | Examples of calculation |
|-----------|----------------------------------|-----------------------------|------|------|--|--|
| | | Mp | My | Mr | | |
| 16 | 147 | 0.68 | 0.68 | 1.36 | $\frac{M(\text{Maximum permissible moment})(\text{N.m})}{L \times 10^{-3}}$ Unit conversion constant | In the guide rail of HFKP16, the external force of the pitching moment static loads put on the point of L=30mm is f=10 N, Allowable load F= 0.68/(30×10 ⁻³) = 22.7(N) Actual load f=10(N)<22.7(N) To meet the using requirements |
| 20 | 221 | 1.32 | 1.32 | 2.65 | | |
| 25 | 382 | 1.94 | 1.94 | 3.88 | | |
| 32 | 514 | 3 | 3 | 6 | | |

Closed gripping points



Opened clamping point



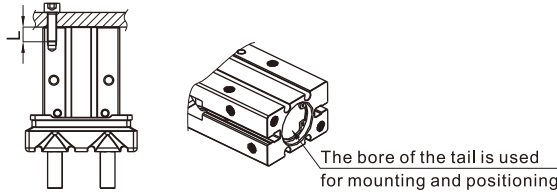
Parallel Gripper with dust-proof cover and roller bearing style **AIRTAC**

HFKP Series

Installation and application

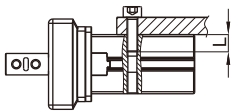
1. Due to the abrupt changes, the circuit pressure is low, which will lead to the decrease of the gripping force and falling of the work-pieces. In order to avoid the harm to the human body and damage to the equipment, anti-dropping device must be equipped.
2. Don't use the air gripper under strong external force and impact force.
3. When install and fix the air gripper, avoid falling down, collision and damage.
4. When fixing the gripping jaw parts, don't twist the gripping jaw.
5. There are several kinds of installation method, and the locking torque of fastening screw must be within the prescribed torque range shown in the below chart. If the locking torque is too large, it will cause the dysfunctional. If the locking torque is too small, it will cause the position deviation and fall.

Tail installation type



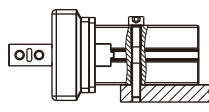
| Bore size | The bolts type | Max. locking moment | Max. screwed depth | The aperture of the positioning bore | The depth of the positioning bore |
|-----------|----------------|---------------------|--------------------|--------------------------------------|-----------------------------------|
| 16 | M4×0.7 | 2.1N.m | 8mm | Φ17mm ^{+0.05} ₀ | 1.5mm |
| 20 | M5×0.8 | 4.3N.m | 10mm | Φ21mm ^{+0.05} ₀ | 2mm |
| 25 | M6×1.0 | 7.3N.m | 12mm | Φ26mm ^{+0.05} ₀ | 2mm |
| 32 | M6×1.0 | 7.9N.m | 12mm | Φ34mm ^{+0.05} ₀ | 2.5mm |

The installation of the front threaded hole

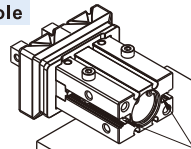


| Bore size | The bolts type | Max. locking moment(Nm) | Max. screwed depth(mm) |
|-----------|----------------|-------------------------|------------------------|
| 16 | M4×0.7 | 2.1 | 7 |
| 20 | M5×0.8 | 4.3 | 8 |
| 25 | M6×1.0 | 7.3 | 10 |
| 32 | M6×1.0 | 7.9 | 10 |

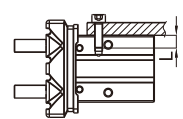
The installation of the front through hole



| Bore size | The bolts type | Max. locking moment(Nm) | Max. screwed depth(mm) |
|-----------|----------------|-------------------------|------------------------|
| 16 | M3×0.5 | 0.88 | 8 |
| 20 | M4×0.7 | 2.1 | 10 |
| 25 | M5×0.8 | 4.3 | 12 |
| 32 | M5×0.8 | 4.3 | 13 |



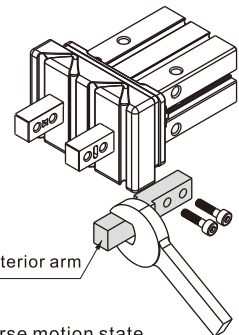
Surface installation type



| Bore size | The bolts type | Max. locking moment(Nm) | Max. screwed depth(mm) |
|-----------|----------------|-------------------------|------------------------|
| 16 | M4×0.7 | 1.6 | 4.5 |
| 20 | M5×0.8 | 3.3 | 8 |
| 25 | M6×1.0 | 5.9 | 10 |
| 32 | M6×1.0 | 5.9 | 10 |

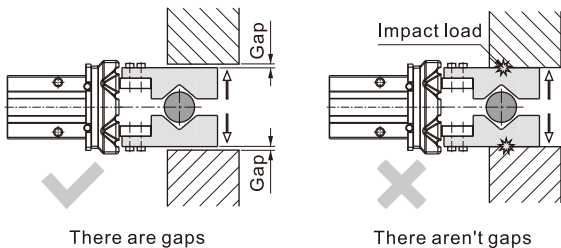
6. The installation method of the gripping jaw fittings. When install the gripping jaw fittings, you have to pay particular attention that you can only hold the gripping jaw by using spanner, and then lock the screws with allen wrench. Never clamp the body directly and then lock the screws, otherwise the parts will be easily damaged.

| Bore size | The bolts type | Max. locking moment(Nm) |
|-----------|----------------|-------------------------|
| 16 | M3×0.5 | 0.59 |
| 20 | M4×0.7 | 1.4 |
| 25 | M5×0.8 | 2.8 |
| 32 | M6×1.0 | 4.9 |

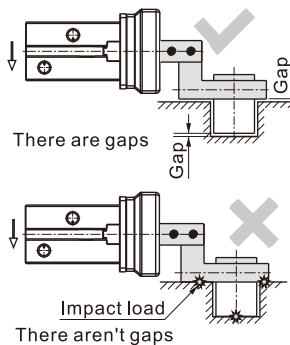


7. Confirm that there is no external forces exerted on the gripping jaw. Transverse load acts on the gripping jaw, which will cause impact load and leads to the shaking and damage of gripping jaw. Equip with gaps so that the air gripper will not crash into work-pieces and accessories at the end of its trip.

7.1) The end of stroke under the open state of air gripper

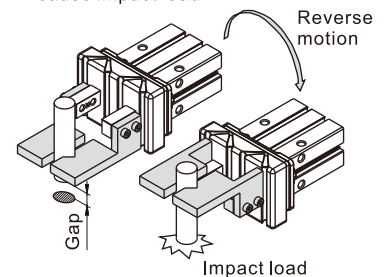


7.2) The end of stroke under the move state of air gripper



7.3) Reverse motion state

When reverse motion state, the gripping point must be precision, otherwise in the reverse motion state the air gripper maybe impact with ambience and will cause impact load.



8. When the work-pieces are inserted, the center line should be coaxial, no offset, in case there are external force generated on gripping jaw. When testing, it is specially required that the manual operation should be reduced, the pressure should be used to run it at a low speed, and guarantee the safety and no impact.



9. Please use the flow control valve to adjust the opening and closing speed of gripping jaw if too fast.
10. People can not enter the movement path of air gripper and articles can not be placed on the path too.
11. Before removing the air gripper, please confirm that it is out of working state, and then discharge of compressed air.