

Detachable Parallel Linear Gripper (Dust-proof Cover Mount Type)

HP04DF Series

Finger(Long Attachment)Type

One-touch Finger Changer

Detachable bearing with one-touch operation.
New proposal for attachment replacement work.



Sold in three patterns: ①Main body + Bearing, ②Main body only and ③Bearing only

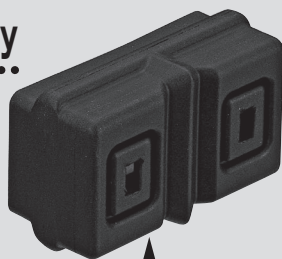
Excellent CENTERING Accuracy

◆ $\pm 0.07\text{mm}$ or less

Piping Port on 2 faces

Positioning Hole

- ◆ Rear Face
- ◆ Bottom Face



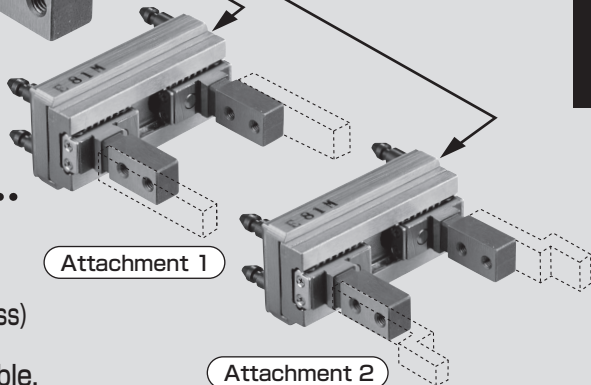
Dust-proof Cover

- ◆ NBR
- ◆ Silicon
- ◆ Fluorine

Sensor Switch Groove

Use of LINEAR GUIDE

- ◆ Withstand load, withstand moment (high rigidity)
- ◆ High accuracy (repeat accuracy: $\pm 0.01\text{ mm}$ or less)
- ◆ Gripping at a long point and overhang gripping are available.



HP04DF Series

Model Code No.

Main Body + Bearing Assy

HP04DF - 10 C ※ JN - HAE - ZE235 A 2

Series Name

Bore Size

10:φ10
16:φ16
20:φ20

Action Type

C : Double Acting

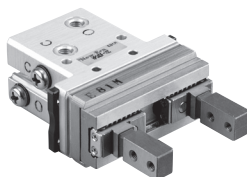
Dust-proof
Cover

JN:NBR
JS:Silicon
JF:Fluorine

Quantity

Lead Wire Length

A:1000mm
B:3000mm



●Gripper Adaptor Type
No Code: No Gripper Adaptor

HAE



HFE

HFE-L : Large Diameter Type (φ16 only)



●Detailed specifications→P.133

●switch Type No Code: No Switch

ZE135

ES13

2 Wire System Solid State Switch, Straight Type

ZE235

ES23

2 Wire System Solid State Switch, L-shaped

ZE155

ES(P)15

3 Wire System Solid State Switch, Straight Type

ZE255

ES(P)25

3 Wire System Solid State Switch, L-shaped



●Switch details→P.521~528

Main Body Assy

DB - HP04DF - 10 C ※ HAE - ZE235 A 2

Series Name

Main Body Assy

Bore Size

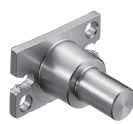
10:φ10
16:φ16
20:φ20

Action Type

C : Double Acting

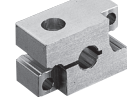
●Gripper Adaptor Type
No Code: No Gripper Adaptor

HAE



HFE

HFE-L : Large Diameter Type (φ16 only)



●Detailed specifications→P.133

●switch Type No Code: No Switch

ZE135

ES13

2 Wire System Solid State Switch, Straight Type

ZE235

ES23

2 Wire System Solid State Switch, L-shaped

ZE155

ES(P)15

3 Wire System Solid State Switch, Straight Type

ZE255

ES(P)25

3 Wire System Solid State Switch, L-shaped



●Switch details→P.521~528

Bearing Assy

DG - HP04DF - 10 ※ JN

Bearing Assy

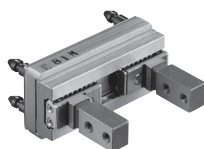
Bore Size

10:φ10
16:φ16
20:φ20

Dust-proof
Cover

JN:NBR
JS:Silicon
JF:Fluorine

Series Name



For Dust-proof Cover only

JN - 04F 10

Dust-proof
Cover

JN:NBR
JS:Silicon
JF:Fluorine

Bore Size

Series Name
(Equivalent HP04F)

Specifications

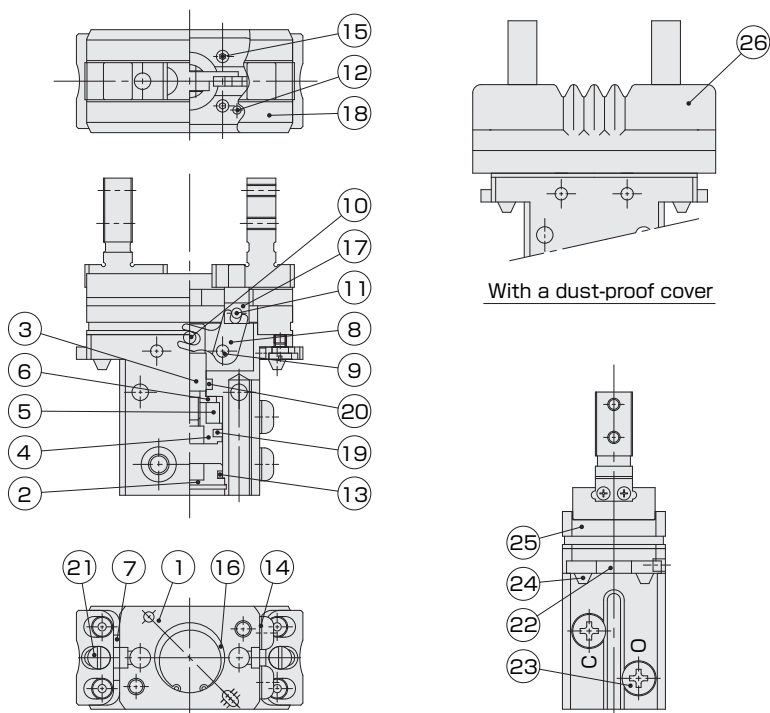
| | 10 | 16 | 20 |
|---|--|--|--|
| Action Type | Double Acting | | |
| Bearing Attachment/Removal Method | Manual | | |
| Bore Size [mm] | φ10 | φ16 | φ20 |
| Opening/Closing Stroke [mm] | 6.5 | 10 | 14 |
| Fluid | Air | | |
| Working Pressure Range [MPa] In (), Dust-proof Cover Attached | 0.2~0.7 (0.25~0.7) | 0.12~0.7 (0.17~0.7) | 0.1~0.7 (0.15~0.7) |
| Proof Pressure [MPa] | 1.05 | | |
| Maximum Operating Cycle [Cycle/min] | 120 | | |
| Operating Temperature [℃] | 0~60 (No Freezing) | | |
| Lubrication | Not Required (Required for sliding parts of the machine) | | |
| Pipe Bore | M3×0.5 | M5×0.8 | |
| Applicable Switch | ZE, ES Type (Solid State Switch) | | |
| Product Mass [g] | 95 -JN:99.5 -JS:99 -JF:101.5 | 185 -JN:191.5 -JS:191 -JF:194.5 | 370 -JN:382.5 -JS:380 -JF:388.5 |
| Centering Accuracy [mm] | ±0.07 | | |
| Repeat Grip Accuracy [mm] | ±0.01 | | |
| Repeat Attachment/Removal Accuracy (Centering Accuracy) [mm] | 0.05 | | |

| Action Type | Model | Bore Size [mm] | Minimum Operating Pressure [MPa] In (), dust-proof cover attached | Opening/Closing Stroke [mm] | Gripping Force*1 [N] | | Outside Dimensions (T x W x L) [mm] |
|---------------|------------|----------------|---|-----------------------------|----------------------|------|-------------------------------------|
| | | | | | Close | Open | |
| Double Acting | HP04DF-10C | 10 | 0.2 (0.25) | 6.5 | 10 | 15.6 | 20×40×67.5 |
| | HP04DF-16C | 16 | 0.12 (0.17) | 10 | 26 | 39 | 25×55×77 |
| | HP04DF-20C | 20 | 0.1 (0.15) | 14 | 45 | 60 | 32×66×97 |

※1) The indicated grip force is measured at the intermediate position of the opening/closing stroke. It is an effective value when the grip point L is 30 mm and the pressure is 0.5 MPa.
See List of Effective Grip Forces (Page 87) for details.
The unit of the allowable load FX is N. The unit of the allowable moments MA, MB and MC is Nm.
When this product is used with an extremely short stroke, it may work badly because of the lack of oil of the guide.

HP04DF Series

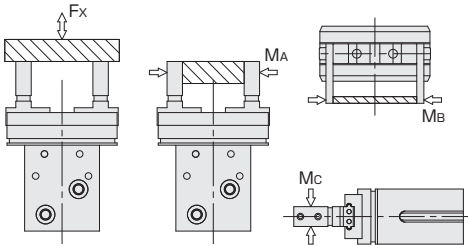
Internal Structure Diagram



Parts List

| NO | Name | Material | NO | Name | Material |
|----|----------------|-------------------|----|---------------------------------|-------------------------|
| 1 | Main Body | Aluminum Alloy | 15 | Hexagon Socket Head Bolt | Chrome Molybdenum Steel |
| 2 | Head Cover | Aluminum Alloy | 16 | Hole Locating Snap Ring | Carbon Tool Steel |
| 3 | Piston Rod | Stainless Steel | 17 | Knuckle | Stainless Steel |
| 4 | Piston | Aluminum Alloy | 18 | Bearing | Stainless Steel |
| 5 | Magnet | Resin | 19 | Packing | NBR |
| 6 | Pressure Cover | Aluminum Alloy | 20 | Packing | NBR |
| 7 | Spring | Piano Wire | 21 | Slotted Head Machine Screw | Stainless Steel |
| 8 | Action Lever | Carbon Steel | 22 | Stopper | Stainless Steel |
| 9 | Fulcrum Pin | Carbon Tool Steel | 23 | Cross-recessed Round Head Screw | Stainless Steel |
| 10 | Press Fit Pin | Carbon Tool Steel | 24 | Pin | Stainless Steel |
| 11 | Roller | Carbon Steel | 25 | Bracket | Aluminum Alloy |
| 12 | Roller | Carbon Steel | 26 | Dust-proof Cover | NBR |
| 13 | O Ring | NBR | | | Silicon |
| 14 | Gasket | Soft Steel + NBR | | | Fluorine |

Allowable Load and Allowable Moment

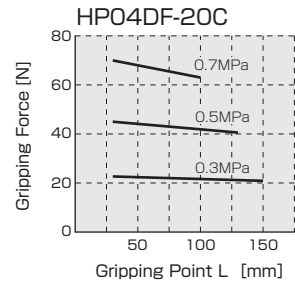
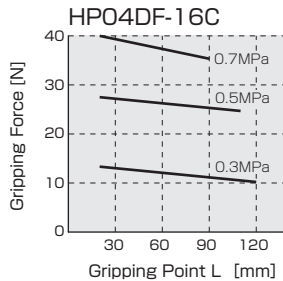
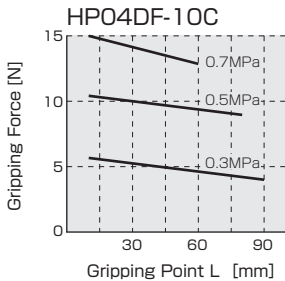


| Model | Load and Moment | Fx [N] | MA [N·m] | MB [N·m] | Mc [N·m] |
|-----------|-----------------|--------|----------|----------|----------|
| HP04DF-10 | | 50 | 0.4 | 0.4 | 0.4 |
| HP04DF-16 | | 120 | 1 | 1 | 1 |
| HP04DF-20 | | 200 | 1.5 | 1.5 | 1.5 |

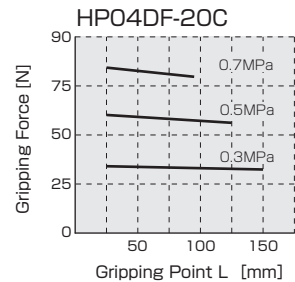
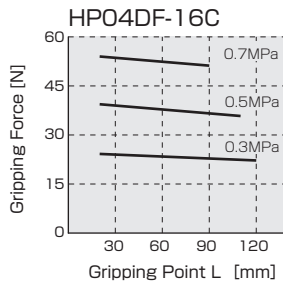
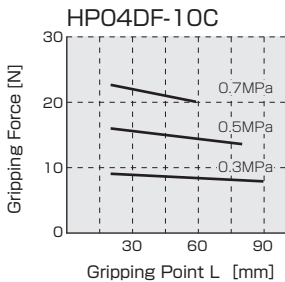
Note) Fx, MA, MB is equivalent to HP04. Mc 50% of the HP04.
(To exceed the holding force due to the spring)

Effective Gripping Force

Closing Force (Double Acting Type)



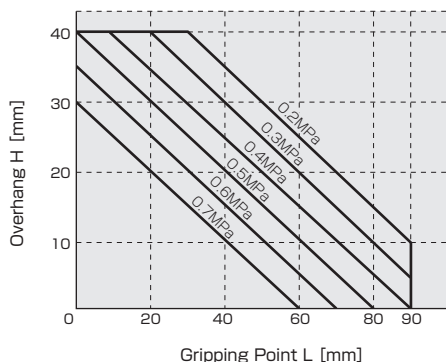
Opening Force (Double Acting Type)



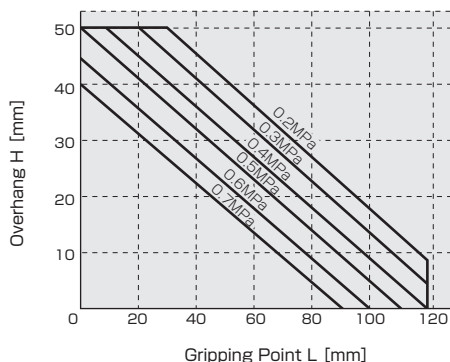
HP04DF Series

Gripping Point Limit Range

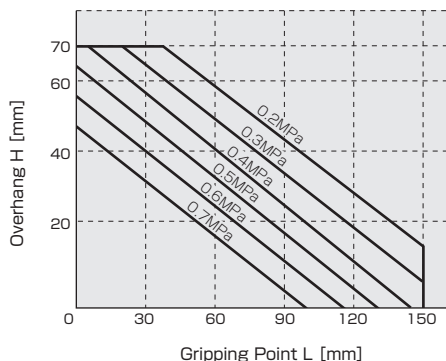
HP04DF-10



HP04DF-16



HP04DF-20

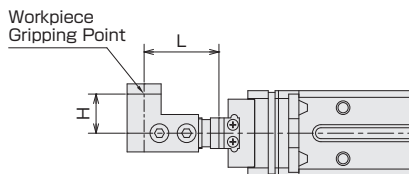


Mounting of the attachment

L (distance gripping point) and H (overhang distance) of the attachment to be mounted to the lever shall be within the range specified in the above drawing (Gripping point limit range). If they exceed the limit range, excess moment will be applied to the guide, causing troubles that have a bad influence on the life and accuracy (e.g. finger backlash). Even if they are within the limit range, the attachment shall be as small and light as possible.

Guide for selecting a model for the workpiece weight

It shall be 5 to 10% of the effective gripping force or any value less than that although it differs depending on the coefficient of friction between the attachment and the workpiece and the shape. It shall be greater than that when great acceleration or impact is applied during workpiece transportation.



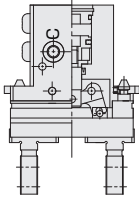
Bearing Attachment/Removal Method

Removal Method (Example)

STEP.1

Air Exhaust

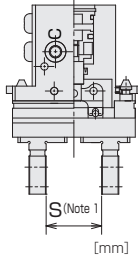
The opening (closing) port exhausts air that is supplied to the inside of the cylinder.



STEP.2

Attachment/Removal Position

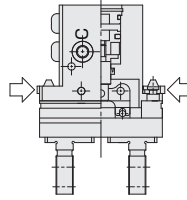
Move the lever to the specified position by external force or the like. This makes the action lever vertical.



STEP.3

Decoupling

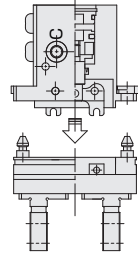
Push the stopper by external force or the like. This makes the hardware free. (Note 2)



STEP.4

Removal

Remove the bearing.



| Model | HP04DF-10 | HP04DF-16 | HP04DF-20 |
|-------|-----------|-----------|-----------|
| S | 16.6 | 22.6 | 30 |

Note 1) The dimension of the attachment/removal position S differs depending on the product size. See the left table.

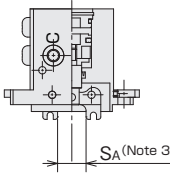
Note 2) If you make the pin free when the lever is attached in the vertically downward direction, the bearing may fall due to the own weight of the lever. So be fully careful to make it free.

Attachment Method (Example)

STEP.1

Attachment/Removal Position

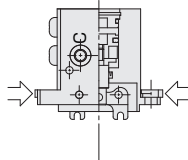
Keep the bearing separated.



STEP.2

Stand-by for Attachment

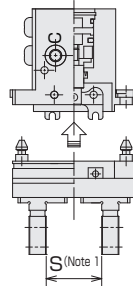
Push the stopper by external force or the like.



STEP.3

Attachment

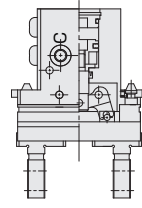
Attach the bearing while keeping the stopper inserted and the levers are in the SA state.



STEP.4

Retention

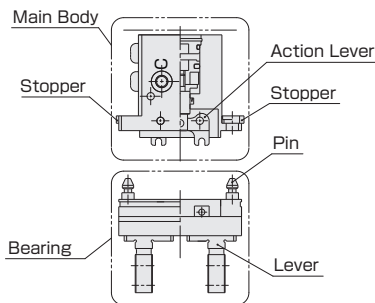
The bearing is retained by releasing the stopper.



Note 3)
When the action lever is not in the specified position, adjust the action lever position with reference to the dimension SA in the table below. [mm]

| Model | HP04DF-10 | HP04DF-16 | HP04DF-20 |
|-------|-----------|-----------|-----------|
| SA | 7 | 11.6 | 16 |

Part Names



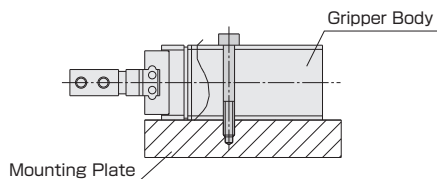
HP04DF Series

Main Body Mounting Method

Mounting Example

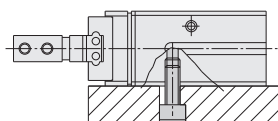
1 When the through-hole of the main body is used

(Switch not attachable in this case)



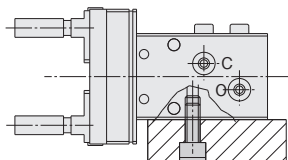
| Model | Bolt to be Used | Maximum Tightening Torque[N·m] |
|-------|-----------------|--------------------------------|
| φ10 | M3×0.5 | 0.59 |
| φ16 | M3×0.5 | 0.59 |
| φ20 | M4×0.7 | 1.37 |

2 When the screw on the back face of the main body is used



| Model | Bolt to be Used | Maximum Tightening Torque[N·m] |
|-------|-----------------|--------------------------------|
| φ10 | M4×0.7 | 1.37 |
| φ16 | M4×0.7 | 1.37 |
| φ20 | M5×0.8 | 2.84 |

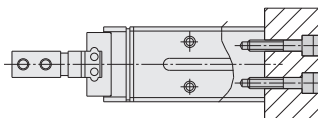
3 When the screw on the side of the main body is used



| Model | Bolt to be Used | Maximum Tightening Torque[N·m] |
|-------|-----------------|--------------------------------|
| φ10 | M3×0.5 | 0.59 |
| φ16 | M4×0.7 | 1.37 |
| φ20 | M5×0.8 | 2.84 |

4 When the screw on the bottom face of the main body is used

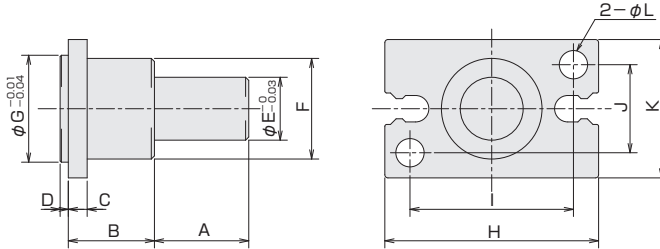
(Only φ8 requires a space such as a relief because the switch protrudes.)



| Model | Bolt to be Used | Maximum Tightening Torque[N·m] |
|-------|-----------------|--------------------------------|
| φ10 | M3×0.5 | 0.59 |
| φ16 | M4×0.7 | 1.37 |
| φ20 | M5×0.8 | 2.84 |

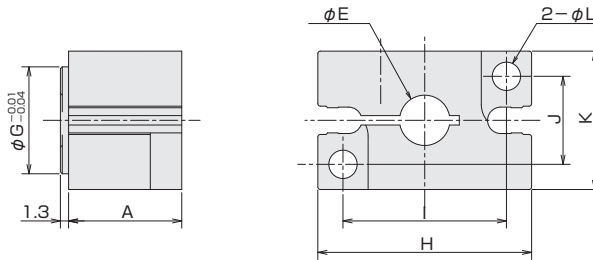
Outline Dimensional Drawing of Gripper Adaptor

HAE Type



| Type | Code | A | B | C | D | E | F | G | H | I | J | K | L | Ancillary Bolt (x2) | Product Mass[g] (Including Bolts) |
|--------|------|----|----|---|-----|----|----|----|----|----|----|----|-----|------------------------|-----------------------------------|
| HAE-10 | | 15 | 15 | 3 | 1.3 | 10 | 11 | 11 | 23 | 17 | 10 | 16 | 3.4 | M3×0.5×8 ^L | 11 |
| HAE-16 | | 15 | 15 | 3 | 1.3 | 10 | 16 | 17 | 34 | 26 | 14 | 22 | 4.5 | M4×0.7×10 ^L | 20 |
| HAE-20 | | 15 | 15 | 3 | 1.3 | 10 | 18 | 21 | 45 | 35 | 16 | 26 | 5.5 | M5×0.8×10 ^L | 28 |

HFE形

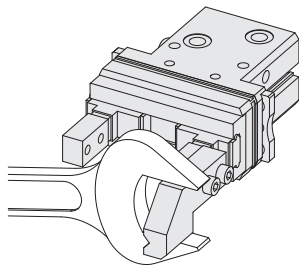


| Type | Code | A | E | G | H | I | J | K | L | Ancillary Bolt (x3) | | Product Mass[g] (Including Bolts) |
|---------|------|----|----|----|----|----|----|----|-----|------------------------|------------------------|-----------------------------------|
| | | | | | | | | | | Gripper Mounting (x2) | Adapter Fixing (x1) | |
| HFE-10 | | 15 | 6 | 11 | 23 | 17 | 10 | 16 | 3.4 | M3×0.5×16 ^L | M3×0.5×12 ^L | 14 |
| HFE-16 | | 18 | 8 | 17 | 34 | 26 | 14 | 22 | 4.5 | M4×0.7×20 ^L | M4×0.7×16 ^L | 35 |
| HFE-16L | | 18 | 10 | 17 | 34 | 26 | 14 | 22 | 4.5 | M4×0.7×20 ^L | M4×0.7×16 ^L | 33 |
| HFE-20 | | 19 | 13 | 21 | 45 | 35 | 16 | 26 | 5.5 | M5×0.8×20 ^L | M5×0.8×20 ^L | 55 |

HP04DF Series

Attachment Design Method

Attachment Mounting Method

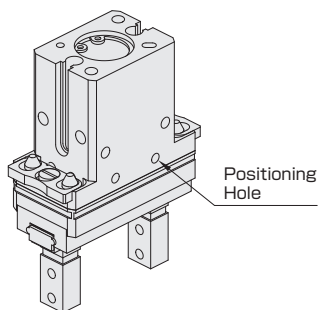


When you mount the attachment, hold the attachment with a spanner or the like to remove load to the lever.

| Model | Bolt to be Used | Maximum Tightening Torque[N·m] |
|-------|-----------------|--------------------------------|
| φ10 | M3×0.5 | 1.14 |
| φ16 | M3×0.5 | 1.14 |
| φ20 | M4×0.7 | 2.7 |

Positioning Hole

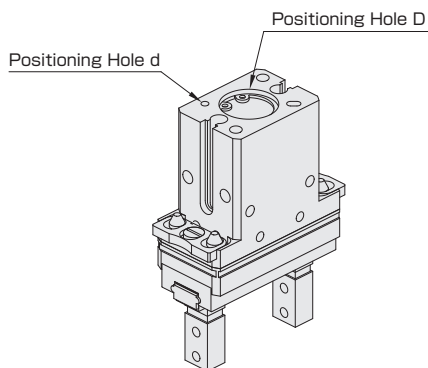
Positioning Hole for Mounting Examples 1 and 2 (P.132)



Use this positioning hole for Mounting Examples 1 and 2.

| Model | Positioning Hole |
|-------|--------------------------------|
| φ10 | $\phi 2.5^{+0.02}_0$ depth 2.5 |
| φ16 | $\phi 3^{+0.02}_0$ depth 3 |
| φ20 | $\phi 4^{+0.02}_0$ depth 3.5 |

Positioning Hole for Mounting Examples 4 (P.132)



Use this positioning hole for Mounting Example 4.

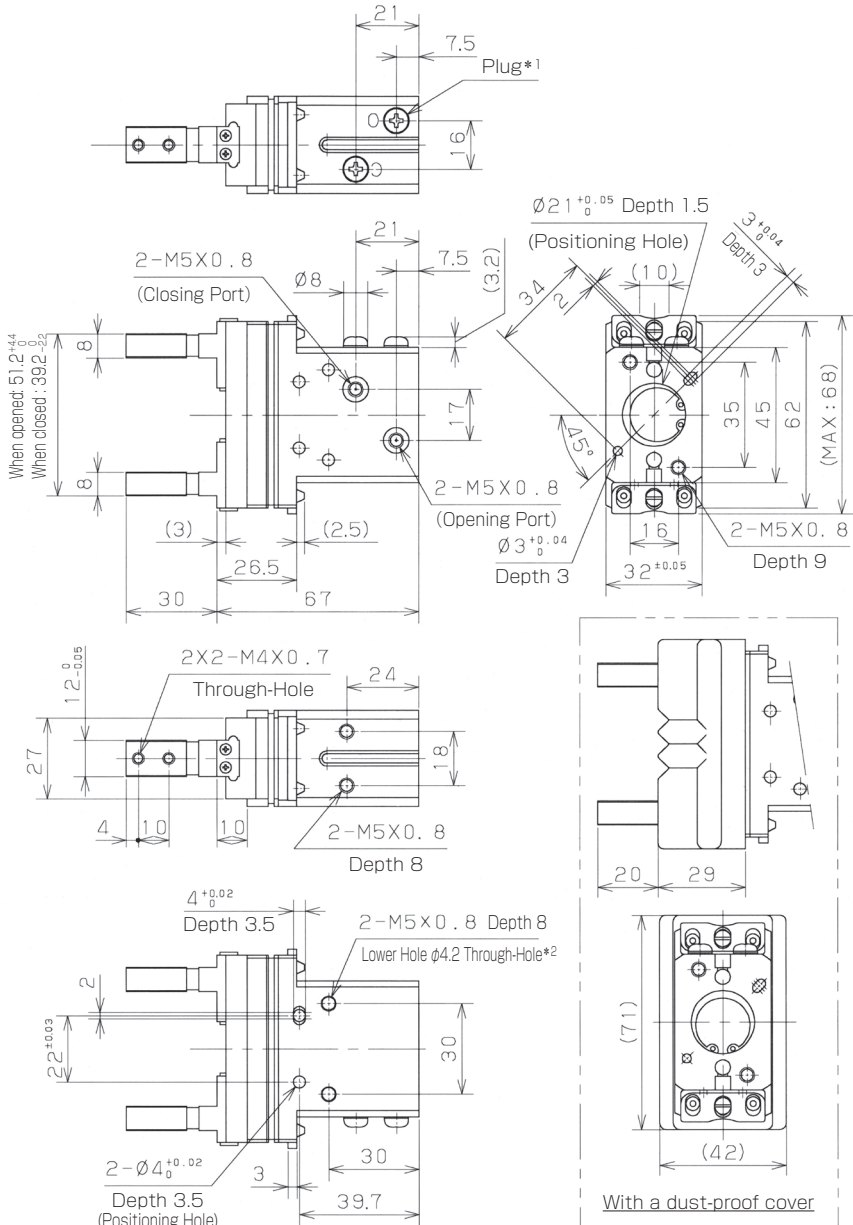
| Model | Positioning Hole D | Positioning Hole d |
|-------|-------------------------------|------------------------------|
| φ10 | $\phi 11^{+0.05}_0$ depth 1.5 | $\phi 2^{+0.04}_0$ depth 2 |
| φ16 | $\phi 17^{+0.05}_0$ depth 1.5 | $\phi 2.5^{+0.04}_0$ depth 3 |
| φ20 | $\phi 21^{+0.05}_0$ depth 1.5 | $\phi 3^{+0.04}_0$ depth 3 |



HP04DF Series

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Dimensions HP04DF-20C



Detachable Parallel Linear Gripper (Finger(Long Attachment)Type)

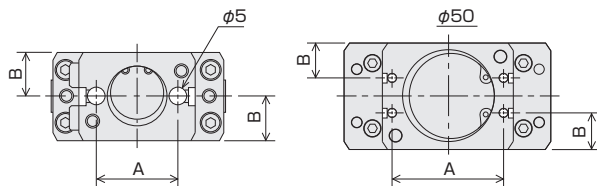
HP04DF Series

*1) Two faces have an air port. Select the one you use according to the mounting condition.

*2) Note that when the main body is mounted using the through-hole, you cannot mount the opening side sensor.

HP04DF Series

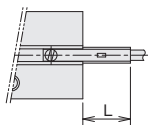
Switch Groove Dimensions



| Code \ Size | 10 | 16 | 20 |
|-------------|----|------|----|
| A | 17 | 24 | 30 |
| B | 10 | 12.5 | 16 |

Switch Protrusion Distance

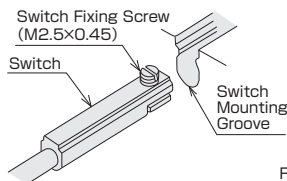
The maximum switch protrusion from the switch body end face (when the levers are full closed) is shown in the table below. Use it as a guide for mounting.



| Cylinder Bore (mm) | φ10 | φ16 | φ20 |
|-------------------------|-----|-----|-----|
| Maximum Protrusion (mm) | 0 | 0 | 0 |

Switch Mounting

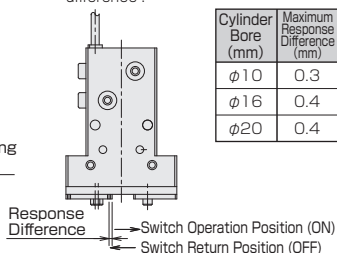
Insert the switch into the switch mounting groove. After setting the mounting position, tighten the switch fixing screw with a precision screwdriver. The tightening torque shall be 0.1 N·m or less.



Switch Response Difference

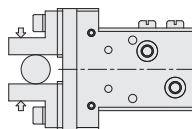
The distance from the position where the levers move and the switch turns on to the position where the levers move in the reverse direction and the switch turns off is called "response difference".

| Cylinder Bore (mm) | Maximum Response Difference (mm) |
|--------------------|----------------------------------|
| φ10 | 0.3 |
| φ16 | 0.4 |
| φ20 | 0.4 |

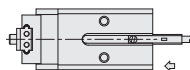


Switch Mounting Position Adjustment Method

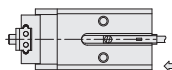
For external gripping



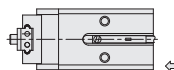
① Check the workpiece external gripping and full close.



② Insert the switch into the switch mounting groove of the main body in the arrow direction.

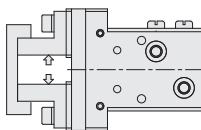


③ The LED lamp lights up by turning on the switch in the arrow direction.



④ Fix the switch by a switch fixing screw at the position where the switch is moved 0.6 mm in the arrow direction from the position where the lamp lights up in [3].

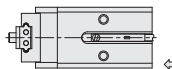
For internal gripping



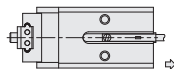
① Check the workpiece internal gripping and full opening.



② Insert the switch into the switch mounting groove of the main body in the arrow direction.



③ The LED lamp lights up by moving the switch in the arrow direction. It goes off by moving it further.



④ Fix the switch at the position that is 0.6 mm moved from the position where the LED lamp lights up when it is returned in the arrow direction (reverse direction) in [3].

① Indicates the position where you need to check if the switch is ON. Mount the switch by adjusting it in the order from ① to ④.