

NFB2 Series

Compact Air Chuck / Bore Size : Ø8, Ø12, Ø16, Ø20

Actuator
Cylinder

NFB2 Series



- Space-saving air chuck cylinder
- Compact design
- Powerful gripping force with double piston
- Various port sizes available
- Various opening & closing strokes
- High mounting flexibility

How to Order

NFB2 — **12** **D** **1** **R** — **W9H** **S**

1
2
3
4
4
6
4

1 Air Chuck Series

New
Finger
Block
2 : Number of blocks

2 Bore Size - Opening & Closing Stroke(mm)

| Title | Bore Size |
|-------|-----------|
| 8 | 8 |
| 12 | 12 |
| 16 | 16 |
| 20 | 20 |

3 Action

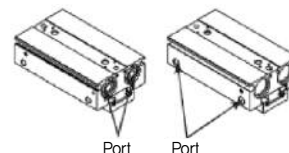
D : Double-acting

4 Stroke

Blank : Short stroke
1 : Mid stroke
2 : Long stroke

5 Body Option

Blank : Axial ported
R : Side ported



6 Auto Switch

Blank : None (built-in magnet)
W9H : Micro solid state switch (horizontal)
W9V : Micro solid state switch (vertical)

7 Number of Switches

Blank : 2 pcs
S : 1 pc
N : N pcs

Specifications

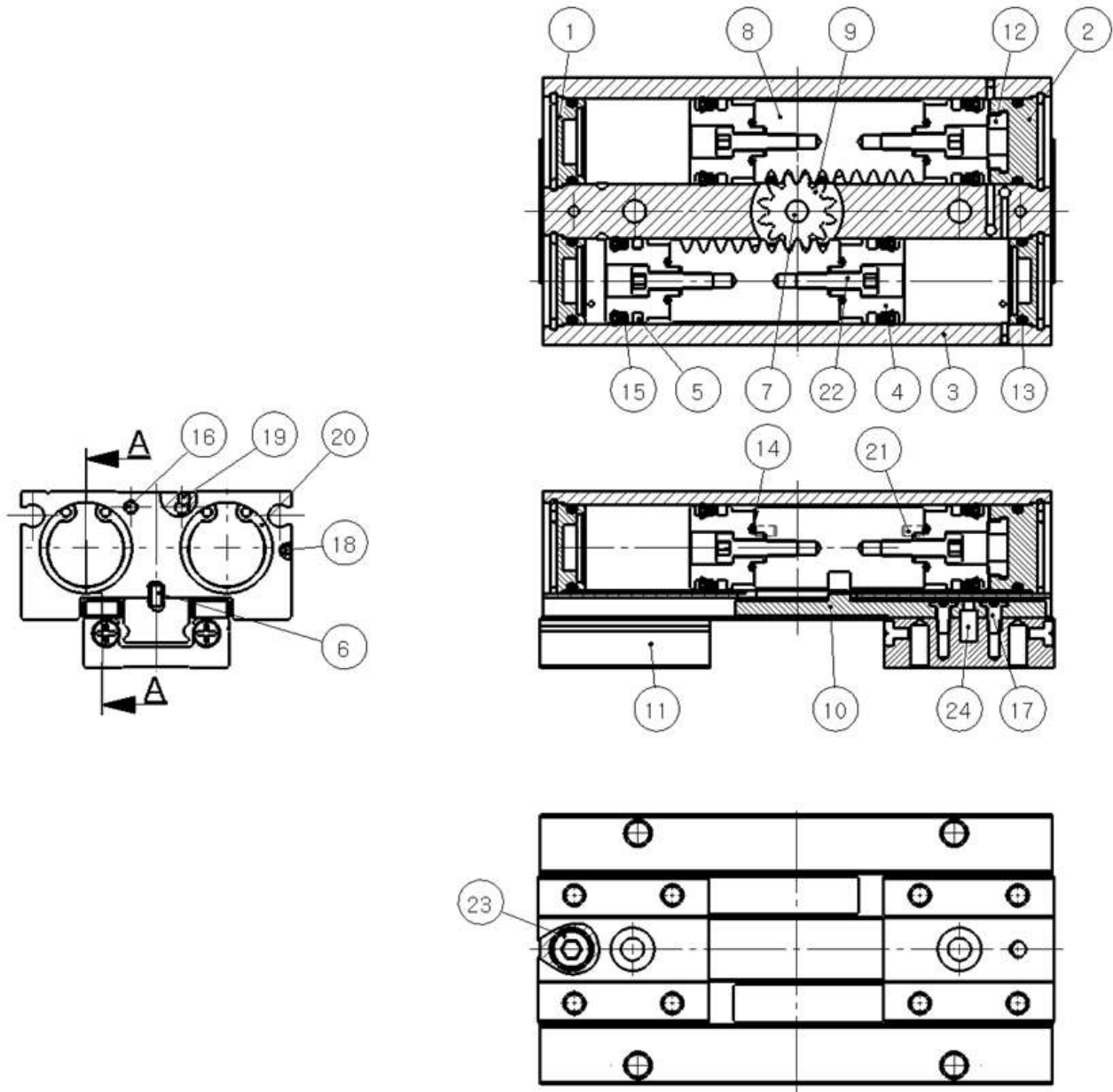
| Model | NFB2-08D | NFB2-12D | NFB2-16D | NFB2-20D | |
|--|--|-----------|----------|----------|-------|
| Bore Size (mm) | 8 | 12 | 16 | 20 | |
| Fluid | Air | | | | |
| Operating Pressure (MPa) | 0.15 ~ 0.7 | 0.1 ~ 0.7 | | | |
| Operating Temp. | 5°C ~ 60°C (40°F ~ 140°F) (Non-freezing) | | | | |
| Repeatability (mm) ¹ | ±0.05 | | | | |
| Critical Performance Measure(C.P.M) | Short | 120 | | | |
| | Mid | 120 | | | |
| | Long | 60 | | | |
| Lubrication | Unnecessary | | | | |
| Action | Double-Acting | | | | |
| Gripping Force ² | 19 | 48 | 90 | 143 | |
| Opening & Closing Stroke (mm) | Short | 8 | 12 | 16 | 20 |
| | Mid | 16 | 24 | 32 | 40 |
| | Long | 32 | 48 | 64 | 80 |
| Main Body Weight (gf) | Short Stroke | 60 | 140 | 330 | 610 |
| | Mid Stroke | 78 | 189 | 424 | 818 |
| | Long Stroke | 112 | 270 | 616 | 1,220 |
| Max. Gripping Length (mm) | 40 | 60 | 80 | 100 | |
| Port Size | M3 | | M5 | | |
| Auto Switch for Opening & Closing Checking | W9H, W9V (Solid state) | | | | |

Note1) Value measured while no lateral load is applied on the block

If applied, it can go up to maximum ±0.15mm due to rack and pinion backlash effect.

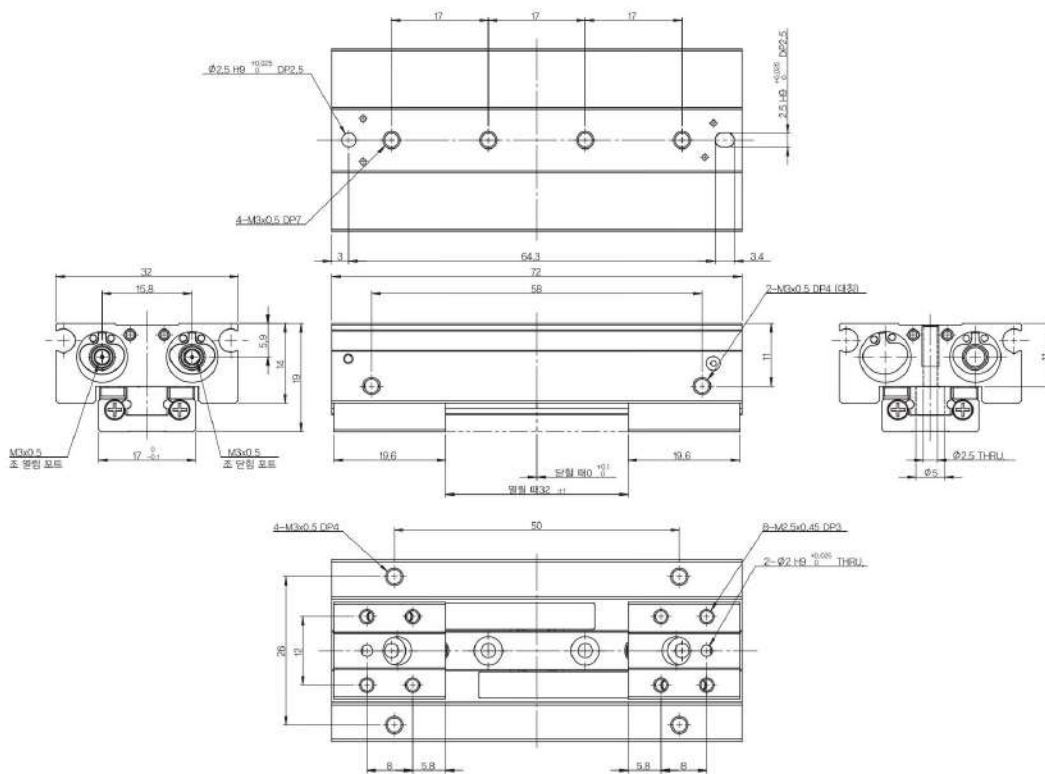
Note2) Value measured when pressure = 0.5MPa and gripping point L = 20mm

Structure / Part list

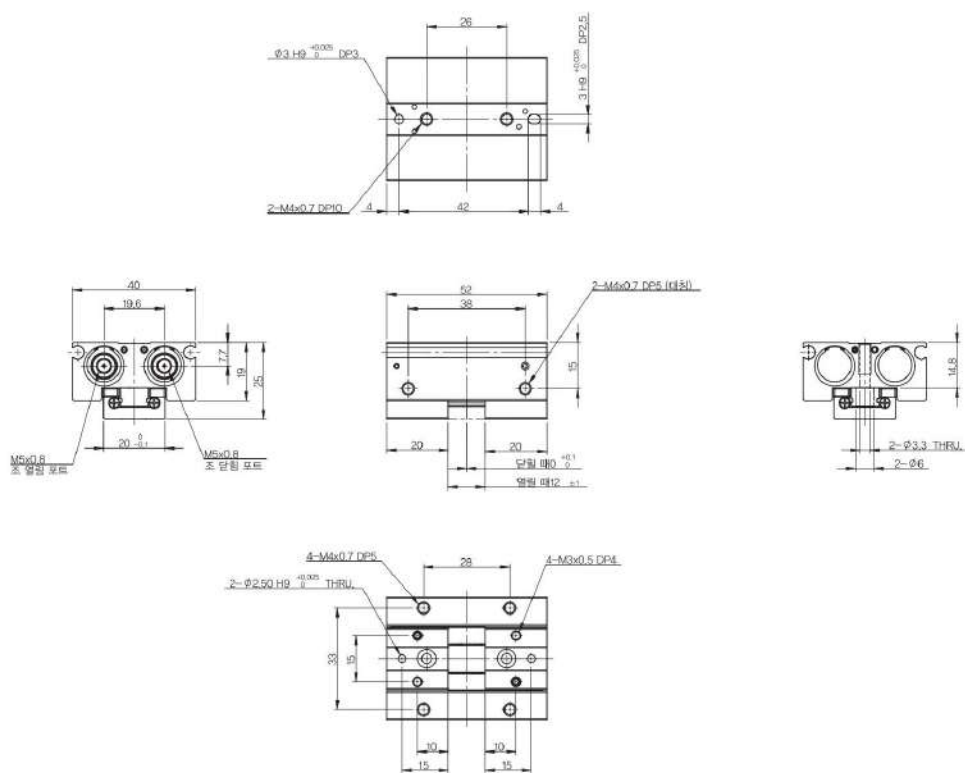


| # | Part Name | Material | # | Part Name | Material |
|----|--------------|-----------------|----|--------------------------|--------------------|
| 1 | HEAD COVER-A | Aluminum Alloy | 13 | GASKET | NBR |
| 2 | HEAD COVER-B | Aluminum Alloy | 14 | GASKET | NBR |
| 3 | BODY | Aluminum Alloy | 15 | PINSTON PACKING | NBR |
| 4 | PISTON | Aluminum Alloy | 16 | SET SCREW | Alloy Steel |
| 5 | WEAR RING | Synthetic Resin | 17 | Flat Head Screw BOLT | Wrought Steel |
| 6 | Parallel PIN | Bearing Steel | 18 | STEEL BALL | Stainless Steel |
| 7 | PINION PIN | Bearing Steel | 19 | STEEL BALL | Stainless Steel |
| 8 | RACK | Stainless Steel | 20 | SNAP RING | Spring Steel |
| 9 | PINION | Carbon Steel | 21 | MAGNET | Rare earth element |
| 10 | JOINT | Stainless Steel | 22 | Hexagon Socket Head BOLT | Alloy Steel |
| 11 | LM RAIL | Stainless Steel | 23 | Hexagon Socket Head BOLT | Alloy Steel |
| | LM BLOCK | Stainless Steel | 24 | DOWEL PIN | Alloy Steel |
| 12 | BUMPER | Urethane | | | |

NFB2-8D2

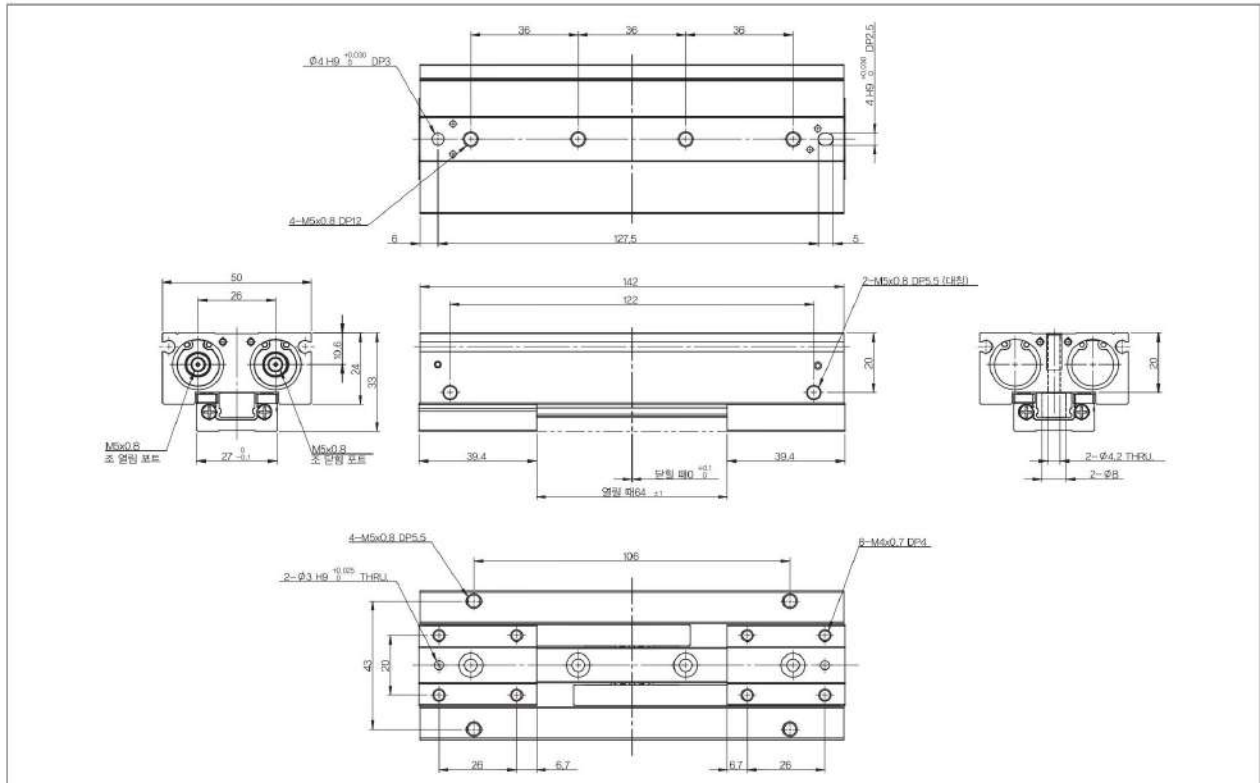


NFB2-12D

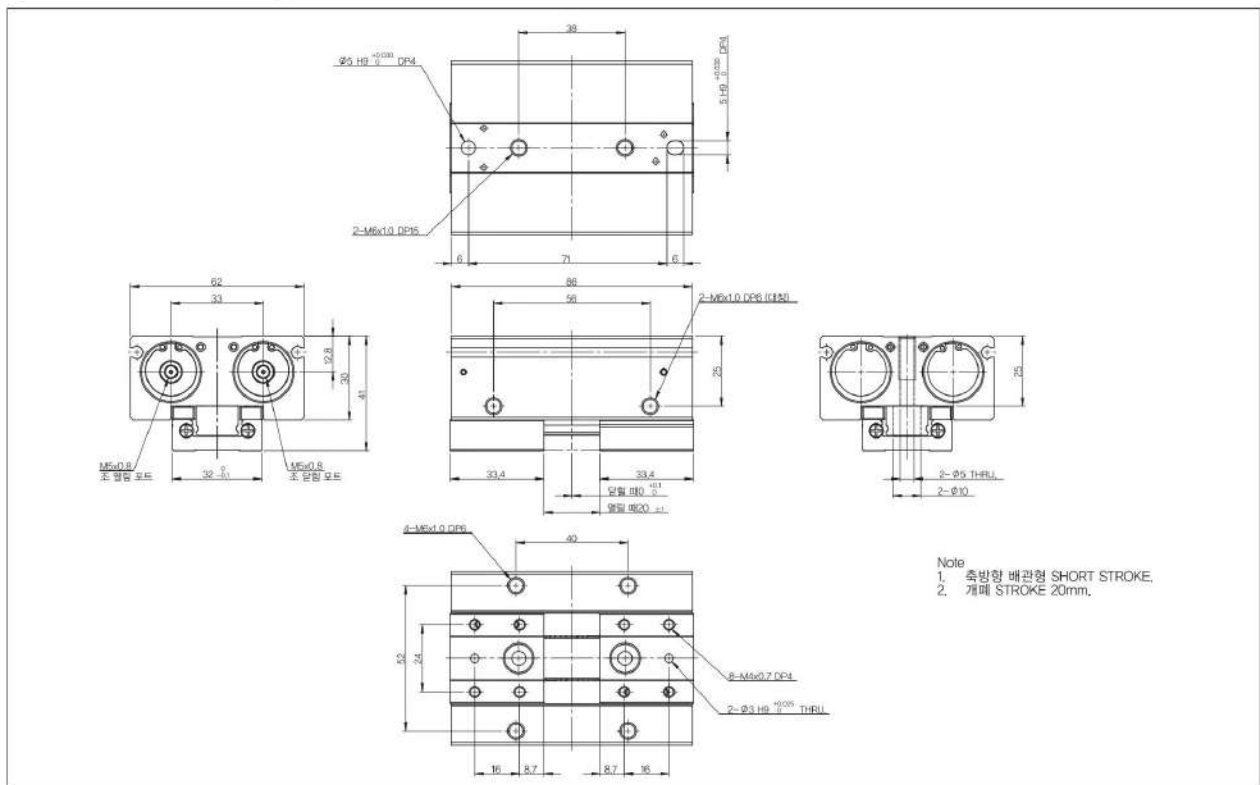


NFB2

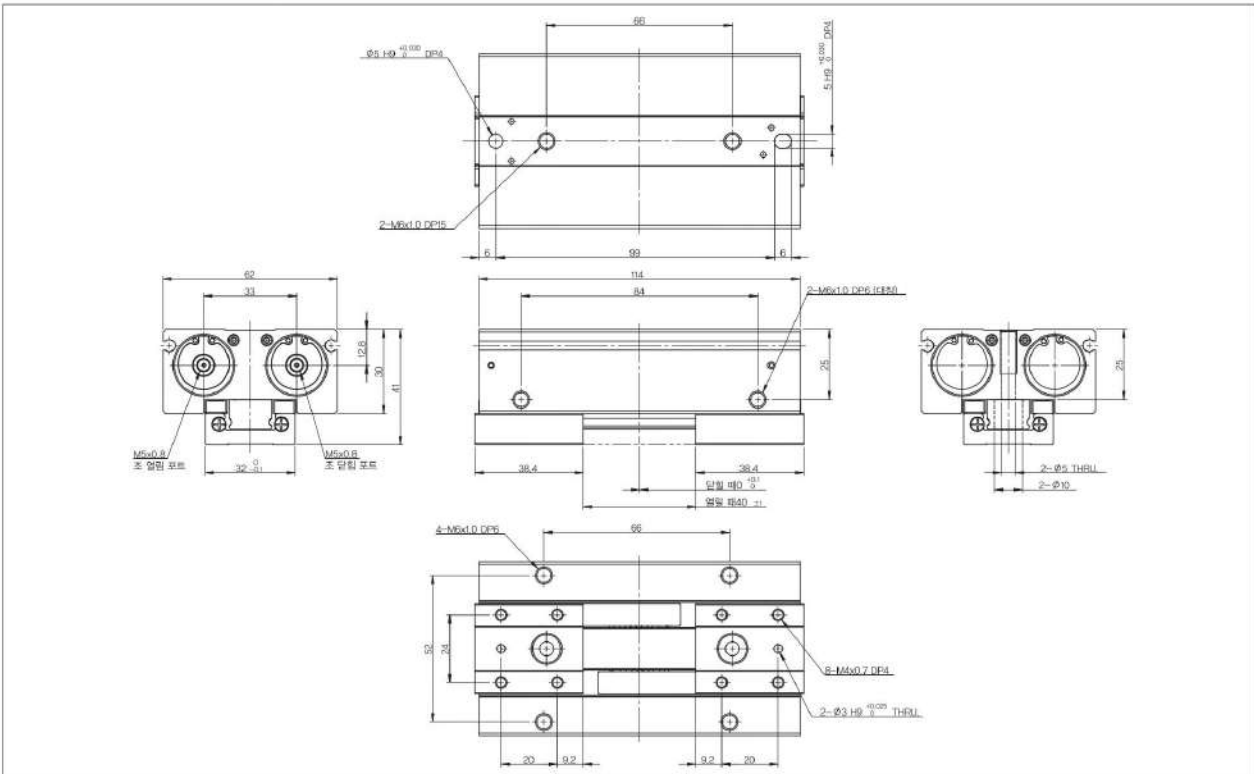
NFB2-16D2



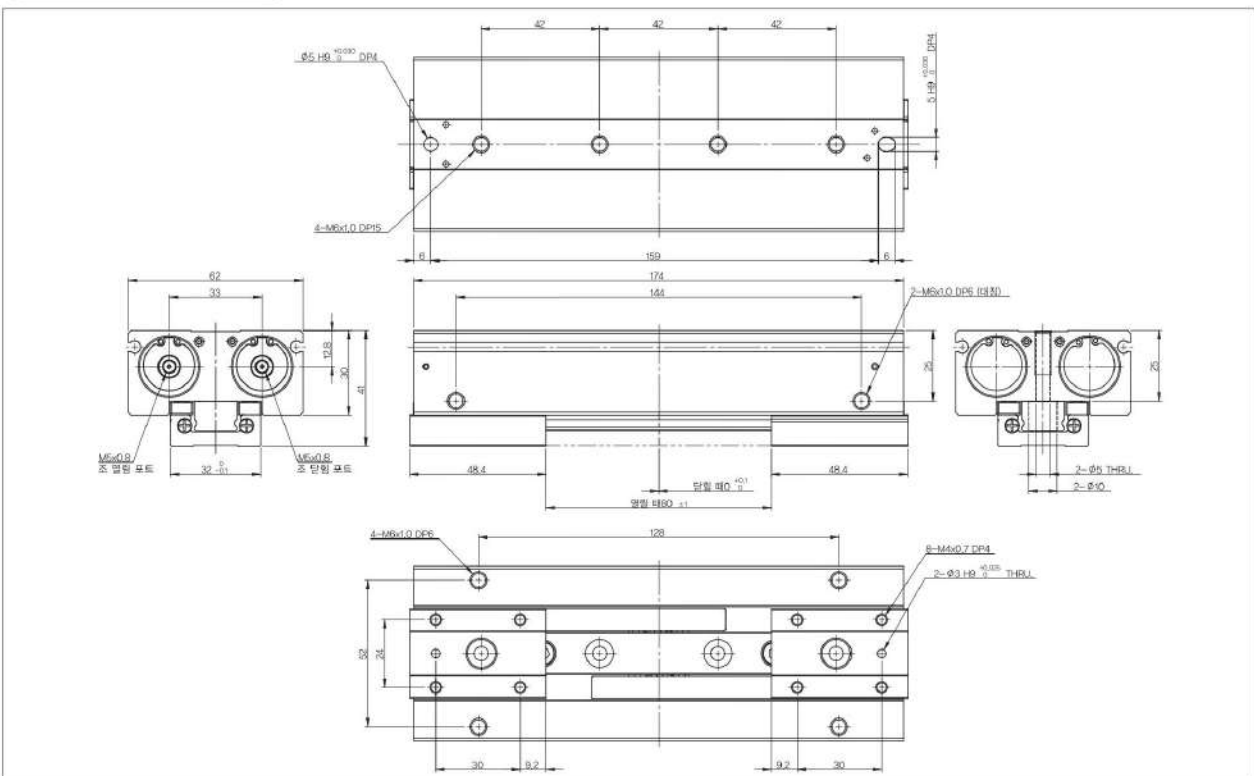
NFB2-20D



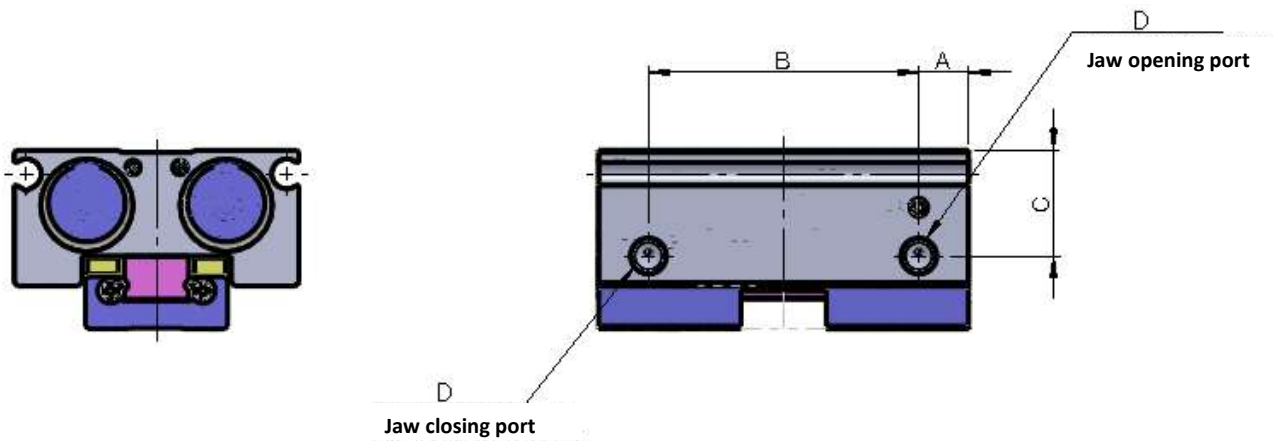
NFB2-20D1



NFB2-20D2



Side Piping Dimensions (R type)



(unit:mm)

| Model | A | B | C | D |
|------------|-----|-----|------|--------|
| NFB2-8DR | 5.5 | 25 | 11 | M3x0.5 |
| NFB2-8D1R | | 37 | | |
| NFB2-8D2R | | 61 | | |
| NFB2-12DR | 7 | 38 | 14.8 | M5x0.8 |
| NFB2-12D1R | | 54 | | |
| NFB2-12D2R | | 90 | | |
| NFB2-16DR | 9 | 54 | 19 | M5x0.8 |
| NFB2-16D1R | | 76 | | |
| NFB2-16D2R | | 124 | | |
| NFB2-20DR | 10 | 66 | 23 | M5x0.8 |
| NFB2-20D1R | | 94 | | |
| NFB2-20D2R | | 154 | | |

Effective Gripping Force (N) According to the Gripping Length L

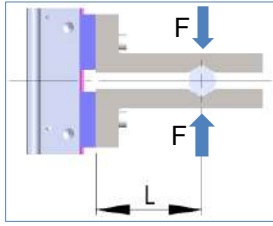
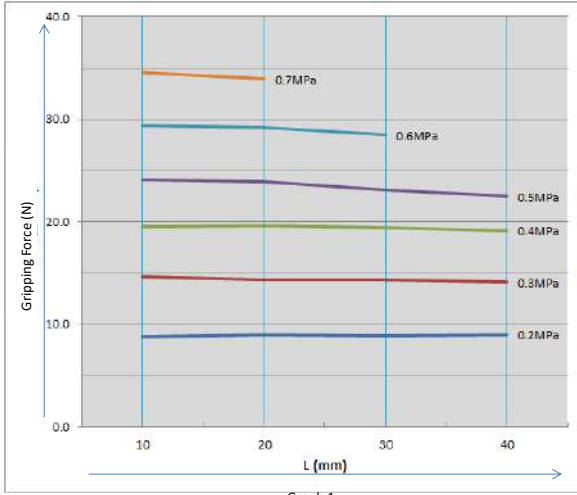
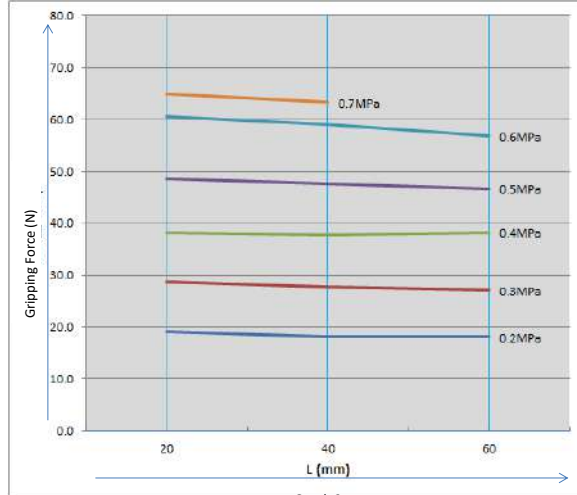


Figure 1.

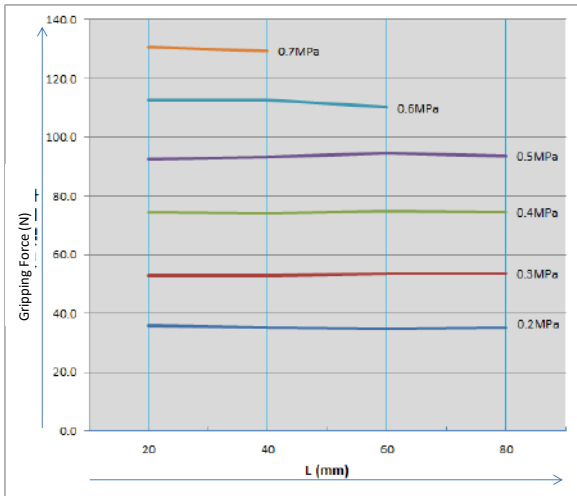
- ▶ The graph shows the effective gripping force (N) of one set.
 - ▶ Gripping force is same as outer gripping force and inner gripping force.
 - ▶ As shown in Fig. 1, please observe the maximum grip length per inner diameter.
(Ø8-40mm, Ø12-60mm, Ø16-80mm, Ø20-100mm)
- Note) L = Gripping point length



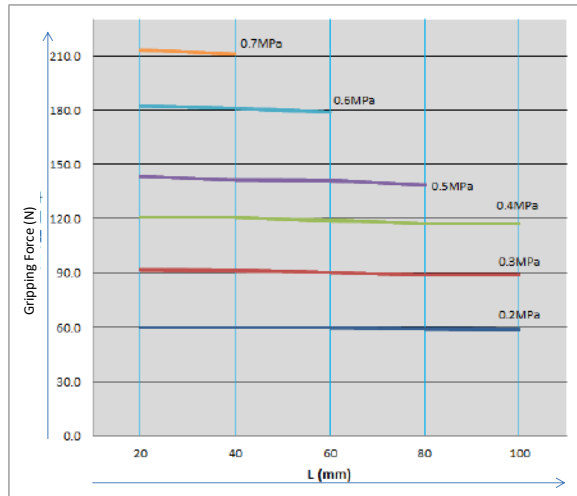
Graph 1



Graph 2



Graph 3



Graph 4

Gripping Point Range Limit

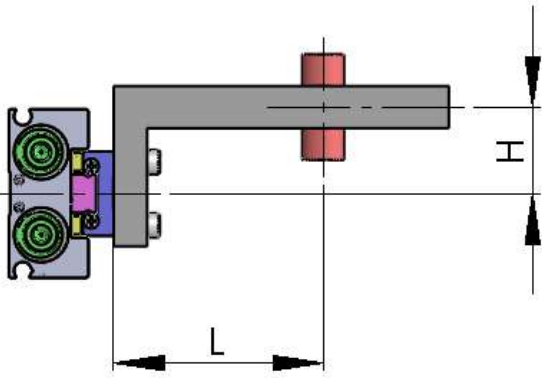


Figure 2.

Chart 1.

- ▶ Ensure that the sum of the gripping point length and overhang is within the limit range as shown in Table 1
- ▶ If used beyond the limit, this can cause adverse effects on life expectancy.

Note) L = Gripping point length
H = Overhang Amount

Unit : mm

| Model | Classification | Working Pressue (MPa) | | | | | |
|-----------|----------------|-----------------------|-----|-----|-----|-----|-----|
| | | 0.2 | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 |
| NFB2-8D□ | $L + H \leq$ | 40 | 32 | 22 | 17 | 12 | 10 |
| NFB2-12D□ | $L + H \leq$ | 60 | 50 | 40 | 30 | 25 | 20 |
| NFB2-16D□ | $L + H \leq$ | 80 | 75 | 55 | 42 | 32 | 27 |
| NFB2-20D□ | $L + H \leq$ | 100 | 90 | 72 | 58 | 44 | 38 |

Note) When using NFB2-12D □ and 0.5MPa, the sum of the gripping point length (L) and the overhang amount (H) shall be 30 or less.

- ex) L = 30, H = 0
H = 30, L = 0
L = 15, H = 15

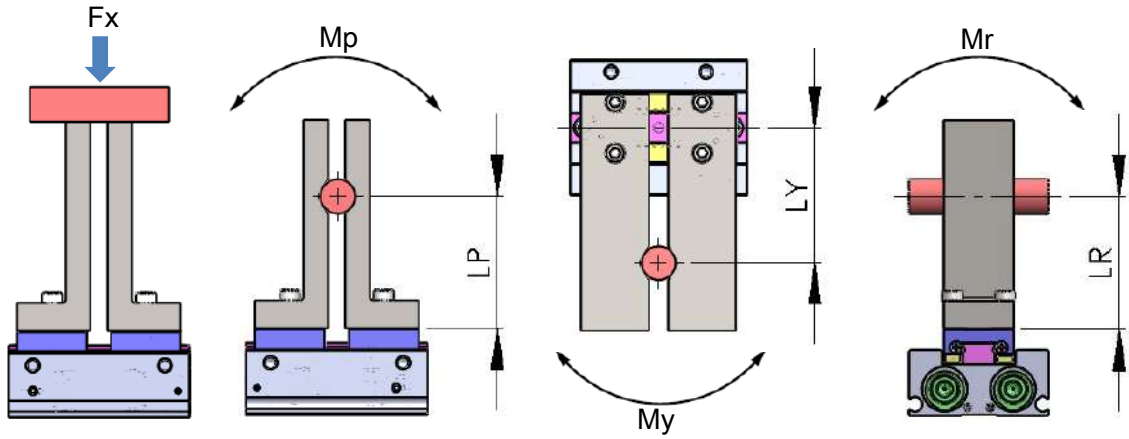


Figure 3.

Chart 2.

L* = Center point distance at which load is applied

| Model | Allowable Vertical Load F(N) | Max. Allowable Load(N-m) | | |
|-----------|------------------------------|--------------------------|---------------|----------------|
| | | Pitch Moment Mp | Yaw Moment My | Roll Moment Mr |
| NFB2-8D□ | 57 | 0.43 | 0.43 | 0.86 |
| NFB2-12D□ | 91 | 0.69 | 0.69 | 1.37 |
| NFB2-16D□ | 170 | 1.29 | 1.29 | 2.57 |
| NFB2-20D□ | 249 | 1.89 | 1.89 | 3.77 |

Allowable load calculation (when moment load is applied)

$$\text{Allowable Load } F(N) = \frac{M(\text{Max. Allowable Moment})(N \times M)}{\text{Gripping Position Distance } L \times 10^{-3}}$$

Calculation Example

NFB2-16D specification, when a static load of 20N acting on the yawing moment is applied at the jig length l = 40MM

$$\begin{aligned} \text{Allowable Load } F(N) &= \frac{1.29}{40 \times 10^{-3}} \\ &= 32.3 \text{ N (Able to Use)} \end{aligned}$$

Precautions

Be sure to read over the precautions before handling.

Precautions for selection

! Caution

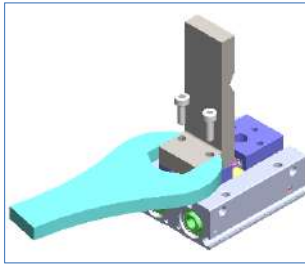
- Use the load within 1/10 to 1/20 of the effective gripping force.

Precautions Before Attaching

! Caution

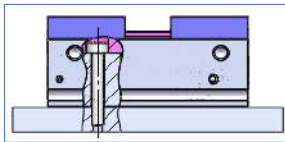
- Do not apply shock to the jaw body attachment surface.
This can cause the Jaw to shake and result in malfunction.
- Be careful that it does not touch your body while it is in operation.
- When attaching the attachment to Jaw, support it with a wrench.
- When attaching the product, fix it using the appropriate screws.
Tightening exceeding the limit will cause malfunction, and the shortage will cause the position to shift or drop.

1. Mounting on Jaw



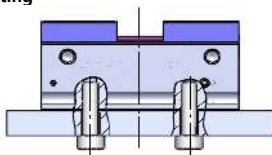
| Model | Bolt | Max. tightening torque N.m | Max. screw-in depth (ℓ mm) |
|-----------|-----------|----------------------------|----------------------------|
| NFB2-8D□ | M2.5x0.45 | 0.43 | 3 |
| NFB2-12D□ | M3x0.5 | 0.84 | 4 |
| NFB2-16D□ | M4x0.7 | 1.96 | 4 |
| NFB2-20D□ | M4x0.7 | 1.96 | 4 |

2. Body Through-Hole



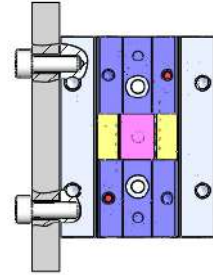
| Model | Bolt | Max. tightening torque N.m | Max. screw-in depth (ℓ mm) |
|-----------|---------------|----------------------------|----------------------------|
| NFB2-8D□ | M2.5x0.45x15L | 0.43 | 4 |
| NFB2-12D□ | M3x0.5x20L | 0.84 | 5.2 |
| NFB2-16D□ | M4x0.7 | 1.96 | - |
| NFB2-20D□ | M5x0.8 | 3.92 | - |

3. Body Bottom Mounting



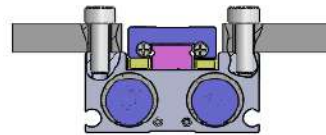
| Model | Bolt | Max. tightening torque N.m | Max. screw-in depth (ℓ mm) |
|-----------|--------|----------------------------|----------------------------|
| NFB2-8D□ | M3x0.5 | 0.43 | 7 |
| NFB2-12D□ | M4x0.7 | 0.84 | 10 |
| NFB2-16D□ | M5x0.8 | 1.96 | 12 |
| NFB2-20D□ | M6x1 | 5.95 | 15 |

4. Body Side Mounting



| Model | Bolt | Max. tightening torque N.m | Max. screw-in depth (ℓ mm) |
|-----------|--------|----------------------------|----------------------------|
| NFB2-8D□ | M3x0.5 | 0.43 | 4 |
| NFB2-12D□ | M4x0.7 | 0.84 | 5 |
| NFB2-16D□ | M5x0.8 | 1.96 | 5.5 |
| NFB2-20D□ | M6x1 | 5.95 | 6 |

5. Body Top Mounting



| Model | Bolt | Max. tightening torque N.m | Max. screw-in depth (ℓ mm) |
|-----------|--------|----------------------------|----------------------------|
| NFB2-8D□ | M3x0.5 | 0.43 | 4 |
| NFB2-12D□ | M4x0.7 | 0.84 | 5 |
| NFB2-16D□ | M5x0.8 | 1.96 | 5.5 |
| NFB2-20D□ | M6x1 | 5.95 | 6 |

Model Selection Method

Caution: Use the load within the limits of use.

If used beyond the operating limits, the offset load applied to the guide portion may become excessive, causing excessive vibration, deterioration of the guide, which may adversely affect the life span.

1 Terms of Use

List the conditions for use.

- Used model
- Workpiece weight W (kgf)
- Workpiece gripping point L (mm)
- Moment load
- Working pressure MPa

- Air chuck: NFB2-16D1
- Workpiece weight W: 2kgf
- Workpiece gripping point L: 40mm, H: 0mm
- Yawing moment load
- Working pressure P: 0.5 MPa

2 Calculation of required gripping force and confirmation of effective gripping force

Find the required gripping force (N) to hold the workpiece.

The effective gripping force is obtained from the graph.

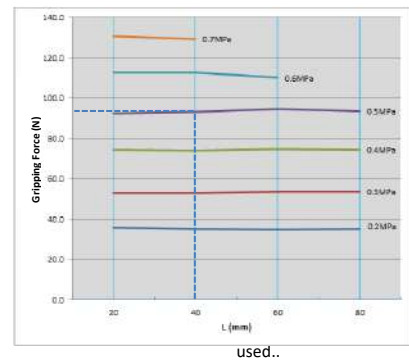
Compare the required gripping force with the effective gripping force.

- Required holding force $F = W / (2 \times \mu) \times a$
- μ = Coefficient of friction between attachment and work 0.2
- a = margin 4

- In graph 3, the gripping point L is 40 mm, Obtain the effective gripping force at the intersection of 0.5 MPa pressure.

Note) Even when the coefficient of friction is greater than 0.2, select 10 to 20 times the workpiece weight for safety.

- Required Gripping Force $F = 2 / (2 \times 0.2) \times 4 = 20N$



3 Locate the workpiece point

Check the gripping point of the workpiece. Check the gripping point length (L) and overhang (H). Make sure it is available within a limited range by specification.

- $L + H \leq$ Gripping point range limit
- In Table 1, find the value of NFB2-16D □, 0.5MPa.

- $L + H \leq 42$, L : 40, H : 0, workpiece gripping point is less than 40, so it can be used.

4 Check the allowable moment

Find the allowable load (N) when a moment load is applied. Compare the allowable load with the work load.

- Allowable Load $F(N) = \frac{My(\text{Max. Allowable moment})}{\text{Gripping Position Distance } L \times 10^{-3}}$

Note) Refer to Table 2. for maximum allowable moment.

- Allowable Load $F(N) = 1.29 / (40 \times 10^{-3}) = 32.3N$
- Work Load $F(N) = 2 \times 9.8 = 19.6N$
- Allowable load is larger than work load, so it can be used.
- (Please use 75% of the allowable load)
- Note) 1kgf = 9.8N