NFSU2 SERIES

NFSU2 (180° opening/closing type air chuck)
Bore size: Ø10, Ø16, Ø20, Ø25

2 times longer life span

Fluorine-based synthetic greaseis applied . Optimal design of seals made NFS 2 series to have 2 times longer life span.

PISTON structure change

Weak points of rod have been strengthened and rigidity is enhanced.

Enhanced FINGER rigidity

By applying high-yield strength alloy steel, the durabillity of NFS2 series has been improved by over 80%, and vulnerable areas have been reinforced.

Positioning pin compatibility

It is compatible not only with the existing NFS2 series but also with products from other manufacturers.

Hard anodizing BODY

Wear-resistance enhancement through hard anodizing

Special packing

By applying special packing materials , ozone resistance has been improved. As a result , it can be used in equipment devices for secondary batteries with ozone generators.

Additional options

Options for secondary batteries compatibility and for penetration holes for opening and closing directions have been added.

NFSU2 Series

Part numbers	
Basic type	Opening and closing penetration holes
NFSU2-10D	NFSU2-10D2
NFSU2-16D	NFSU2-16D2
NFSU2-20D	NFSU2-20D2
NFSU2-25D	NFSU2-25D2

NFSU2 Series

NFSU2 (180° opening/closing type air chuck)
Bore size: Ø10, Ø16, Ø20, Ø25

- ●Compatible with secondary battery specifications
- ● Various installation options available
- ● Finger option selectable
- ●Excellent durability performance achieved through the application of fluorine -based synthetic grease

Order Configuration

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☐ — NFSU2 — 16  D — 2 — W9H  S
1        2        3   4    5     6    7
```

1 Secondary battery option

Blank	Basic type
2B	Secondary Battery compatible

2 AIR CHUCK Series

New
Finger
Swing
Upgrade
2 : # of fingers

3 Bore Size (mm)

Symbol	Bore Size
10	10
16	16
20	20
25	25

4 Operating type

D	Double-acting

5 Mounting option

Blank	basic type (tapped)
2	Through-hole

6 Auto switch option

Blank	No switches
W9H	Solid state (Horizontal)
W9V	Solid state (Vertical)
W10V	Solid state (Vertical)
W20H	Solid state (Horizontal), (2-color display)
MZC1D	Solid state, 2-wired
MZC1N	Solid state, 3-wired (NPN)
MZC1P	Solid state, 3-wired (PNP)

※For 3m lead-wire option, add "L" to the switch option. If blank, 1m. (e.g. W9VL)

7 # of switches

| Blank	2 pcs
S	1 pcs
N	N pcs

⚠The specifications of the 2B series involve aluminum alloy material with small amounts of copper (Cu) and zinc (Zn) included. For detailed information, please request.

※The specifications and external dimensions of the 2B series are the same as standard products.

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NFSU2

Specifications

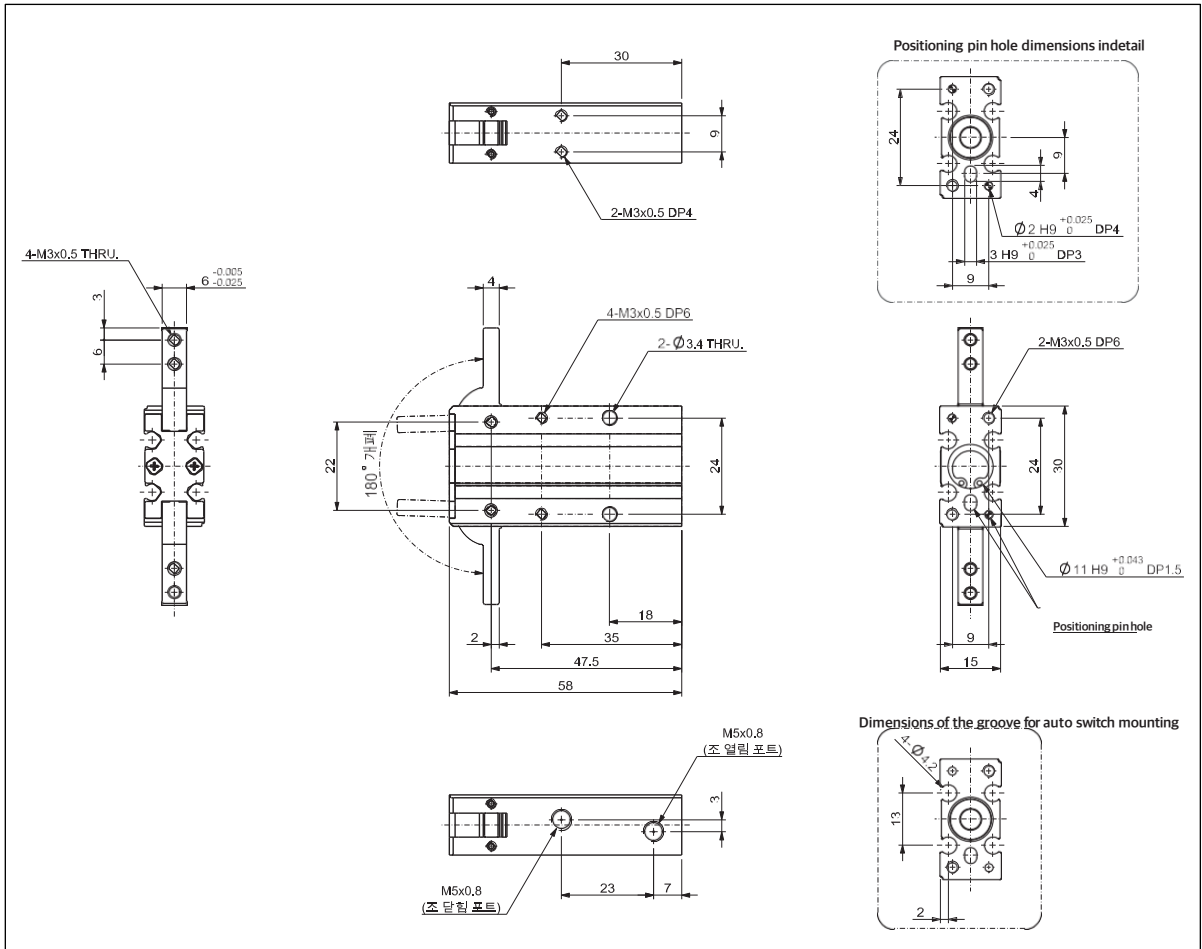| Model	NFSU2-10D	NFSU2-16D	NFSU2-20D	NFSU2-25D
Operating type	Double-acting	Double-acting	Double-acting	Double-acting
Bore Size (mm)	10	16	20	25
Angular range(º)	-3 ~ 180			
Fluid	Air			
Operating pressure	0.1 ~ 0.6MPa			
Operating temperature	5 ~ 60(℃)			
Lubrication	Unnecessary			
Torque (N.m) / Operating air pressure 0.5MPa — Closing	0.14	0.54	1.12	2.03
Maximum orifice length (mm) @ -0.5MPa	60	70	80	90
Repetitive opening/closing position accuracy (mm)	±0.05			
Piping port	M5	M5	M5	M5
Weight (gf)	70	150	320	560
Cycles Per Minute (C.P.M)	60			
Opening/Closing detection AUTO SWITCH	W9H, W9V, W10V, W20H, MZC1D, MZC1N, MZC1P			

Diagram / Component List
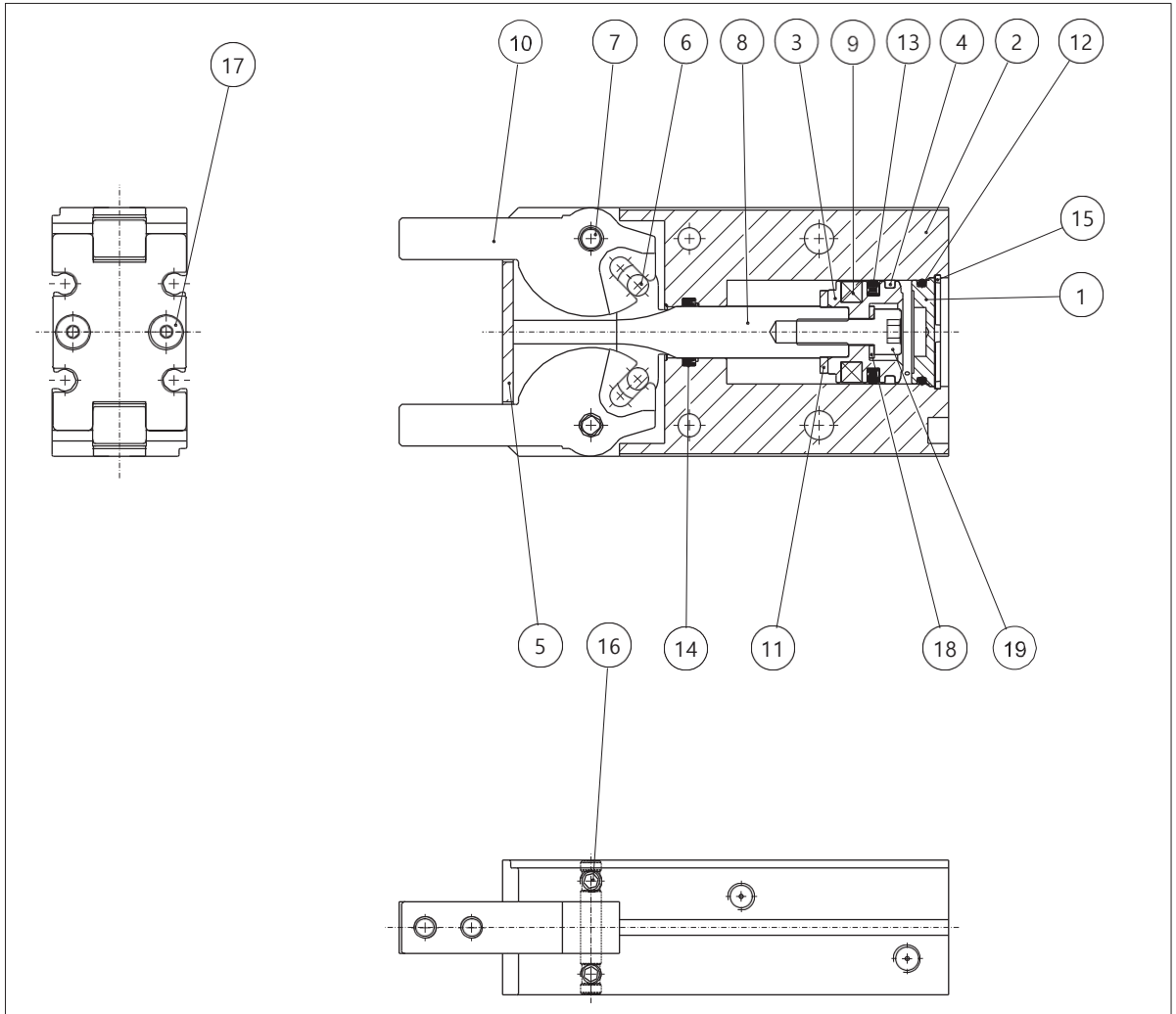
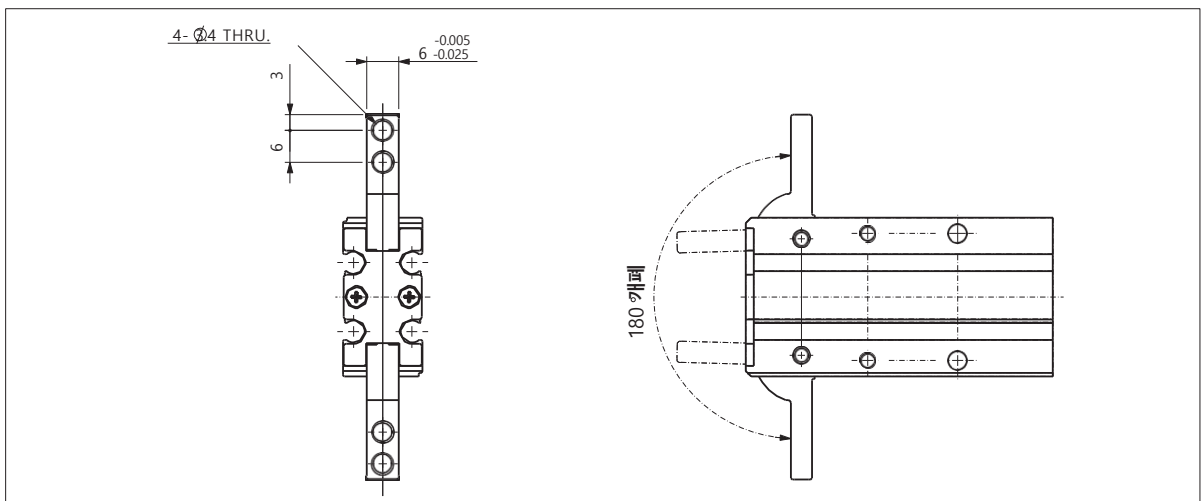※The schematic diagram provided is an example of one specification; there may be variations in specifications.

#	Component	Material	Note
1	HEAD COVER	Aluminum alloy	
2	BODY	Aluminum alloy	Hard anodizing
3	PISTON	Ø10 : Stainless steel Ø 16~25 : Aluminum alloy	
4	WEAR RING	Resin	
5	COVER PLATE	Stainless steel	
6	HINGE PIN	Bearing steel	Heat treatment
7	LINK PIN	Bearing steel	Heat treatment
8	PISTON ROD	Stainless steel	
9	MAGNET	Synthetic rubber	
10	FINGER	Alloy steel	Heat treatment

#	Component	Material	Note
11	BUMPER	Urethane rubber	
12	GASKET	NBR	
13	PISTON PACKING	NBR	
14	ROD PACKING	Synthetic rubber	
15	SANP RING	Carbon steel	
16	SET SCREW	Carbon steel	
17	FLAT-HEAD BOLT	Carbon steel	
18	PLAIN WASHER	Carbon steel	
19	HEX. SOCKET BOLT	Carbon steel	

NFSU2-10D

30

9

2-M3x0.5 DP4

Positioning pin hole dimensions indetail

24

9

4

Ø 2 H9 +0.025 / 0 DP4

3 H9 +0.025 / 0 DP3

9

4-M3x0.5 THRU.

-0.005
6 -0.025

3

6

4

4-M3x0.5 DP6

2- Ø3.4 THRU.

22

180° 기편

24

2

35

18

47.5

58

2-M3x0.5 DP6

24

30

Ø 11 H9 +0.043 / 0 DP1.5

Positioning pin hole

9

15

M5x0.8
(조 열림 포트)

3

M5x0.8
(조 닫힘 포트)

23

7

Dimensions of the groove for auto switch mounting

Ø4.2

13

2

NFSU2-10D2

4- Ø4 THRU.

-0.005
6 -0.025

3

6

180 기편

NFSU2-16D

Positioning pin hole dimensions indetail

33

12

2-M4x0.7 DP5

4-M3x0.5 THRU.

8 $^{-0.005}_{-0.025}$

4

7

30

9

4

$\emptyset$ 3 H9 $^{+0.025}_{0}$ DP4

3 H9 $^{+0.025}_{0}$ DP3

12

4-M4x0.7 DP8

2-$\emptyset$4.5 THRU.

28

180° 개폐

30

2.5

20

41

55.5

69

M4x0.7 DP8

30

38

$\emptyset$ 17 H9 $^{+0.043}_{0}$ DP1.4

Positioning pin hole

12

20

M5x0.8
(조 열림 포트)

8

25

7.5

M5x0.8
(조 닫힘 포트)

Dimensions of the groove for auto switch mounting

16.6

2

NFSU2-16D2

4-$\emptyset$4 THRU.

8 $^{-0.005}_{-0.025}$

4

7

180° 개폐

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NFSU2

NFSU2-20D

Positioning pin hole dimensions indetail

Dimensions of the groove for auto switch mounting

NFSU2-20D2

843
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NFSU2 Series

NFSU2-25D


NFSU2-25D2

844

NFSU2

Effective gripping force (N) according to the length L of the gripper

Gripping point
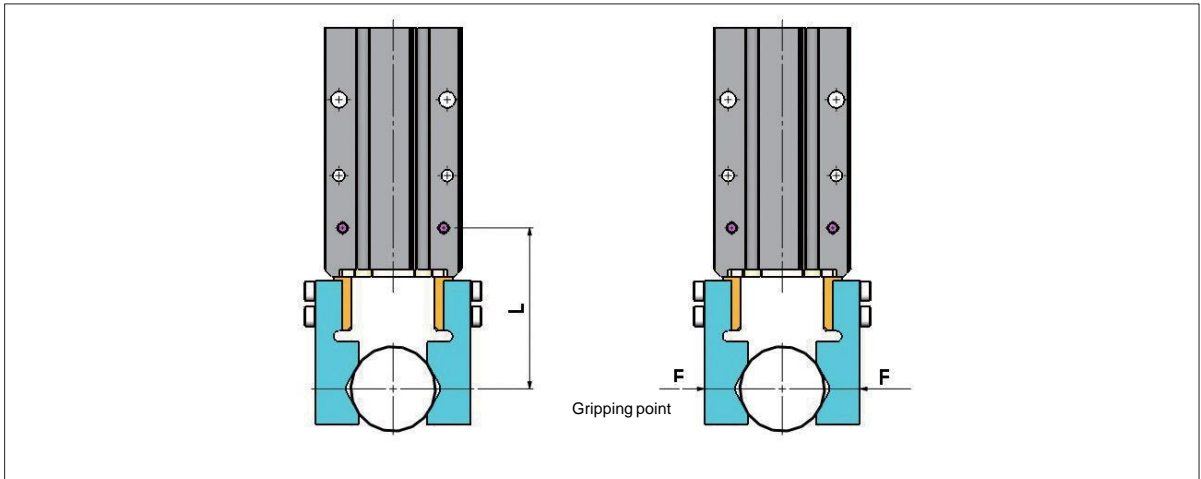
- The graph represents the effective gripping force (N) for one jaw.
- Please ensure compliance with the maximum gripping length for each bore size.
- Depending on the coefficient of friction, select a gripping force that is 10 to 20 times the load.
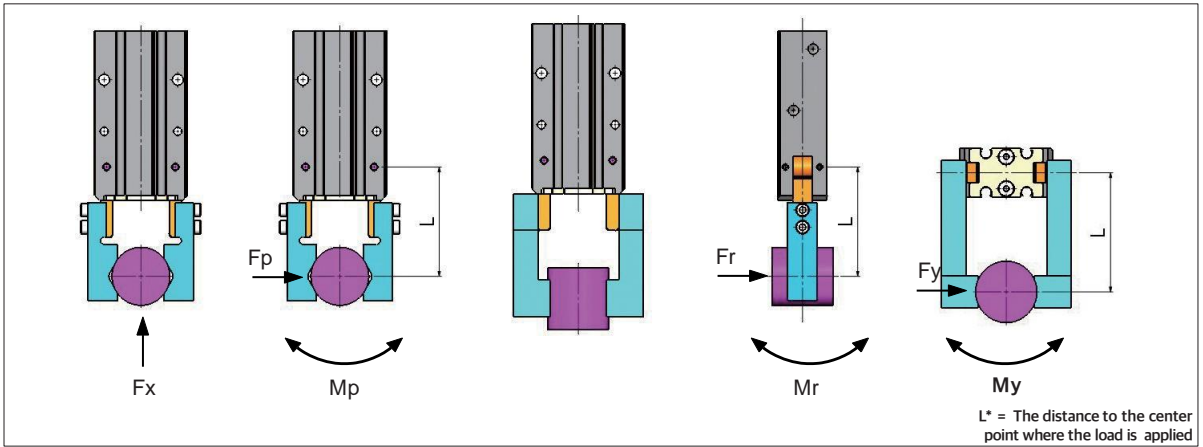

NFSU2-10D□

NFSU2-20D□

NFUS2-16D□

NFSU2-25D□
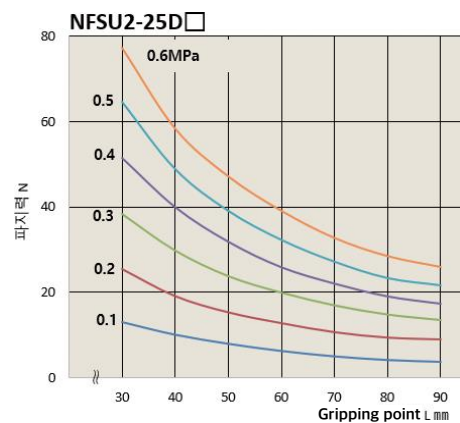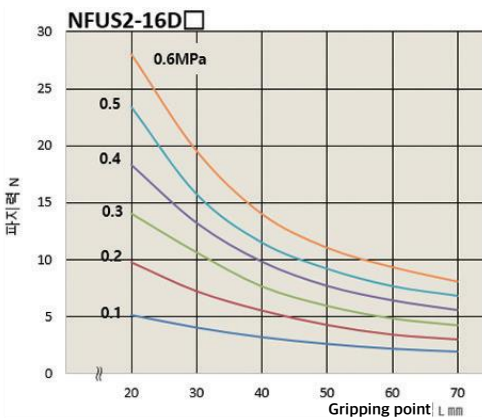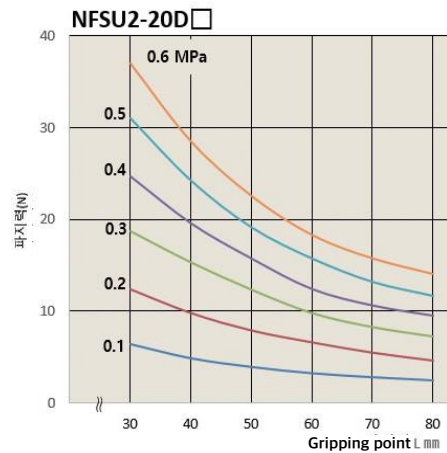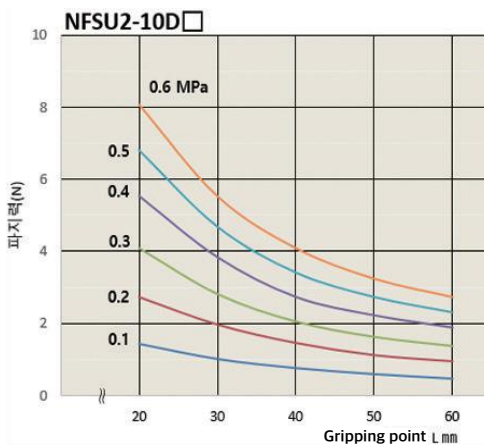
Limit range of gripping point

Note) H = Overhang amount
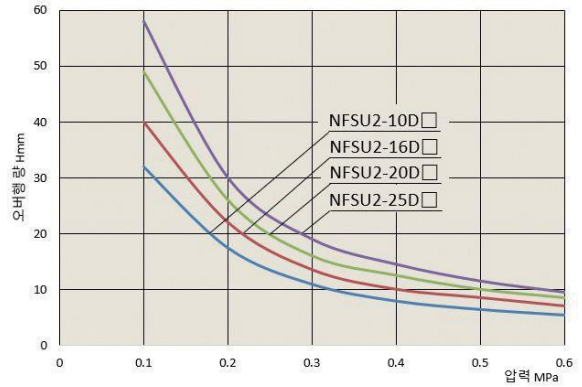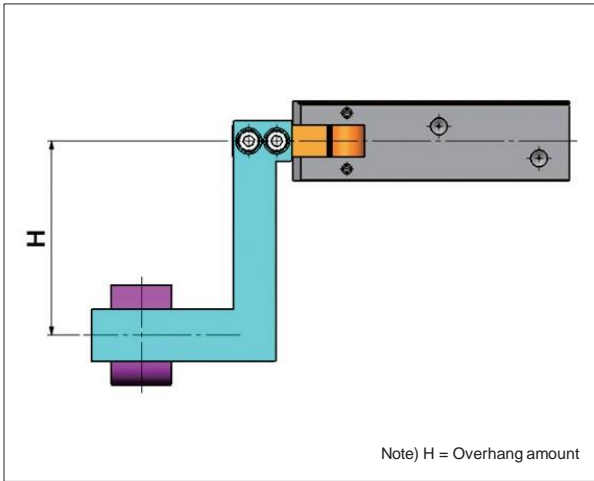
- Please use the overhang amount (H) within the limits shown on the graph according to the operating pressure.
- Exceeding the specified limits may negatively impact the lifespan.

Permissible load and permissible moment

L* = The distance to the center point where the load is applied

Model	Permissible vertical load Fx(N)	Max. permissible moment (N·m)		
		Pitching Moment Mp	Yawing Moment My	Rolling Moment Mr
NFSU2-10D□	35	0.5	0.5	0.5
NFSU2-16D□	60	1	2	2
NFSU2-20D□	100	2	4	4
NFSU2-25D□	140	7	7	7

Calculation of permissible load (when moment load is applied)

Calculation example (NFHSU2-16D): When a predetermined load of 10N is applied at a point where a pitching moment occurs at a length (L) of 50mm

$$\text{Permissible load F(N)} = \frac{\text{Mp(max. permissible moment)(N·m)}}{\text{Gripping position distance L} \times 10^{-3}} \qquad \frac{\text{Permissible load}}{\text{F(N)}} = \frac{1}{50 \times 10^{-3}}$$

$$= 20N \rightarrow \text{applicable}$$

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WARNING

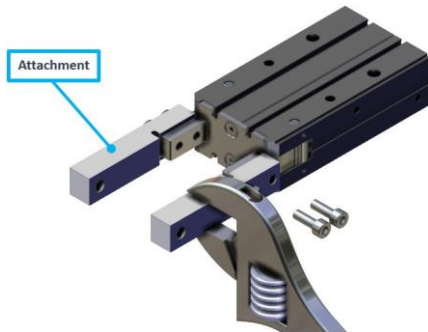### < Please read thoroughly before use >

Precautions for Selection

� Caution:

- **Please use within the range of 1/10 to 1/20 of the effective wave power.**

1. How to place attachment onto the finger

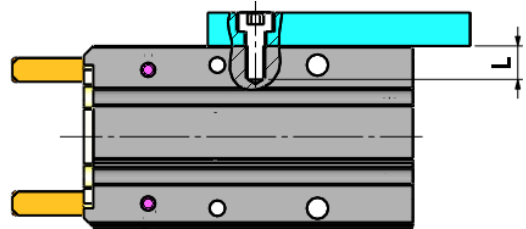| Model	Bolt size	Max. Torque (Nm)
NFSU2-10D□	M3x0.5	0.59
NFSU2-16D□	M3x0.5	0.59
NFSU2-20D□	M4x0.7	1.4
NFSU2-25D□	M5x0.8	2.8

Precautions for installation

🔵 Caution:

- Avoid impacting the attachment surfaces on the finger and body. Impact may lead to finger shaking or malfunction.
- When placing the attachment to the finger, support it with a spanner and tighten it securely.
- Use appropriate screws for product attachment and securely fasten them. Over-tightening beyond the specified range may cause malfunction, while loose attachment may result in misalignment or falling.
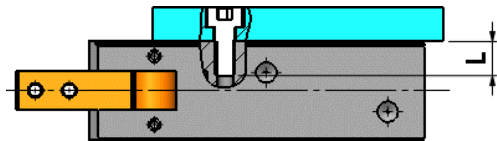
2. Axial installation
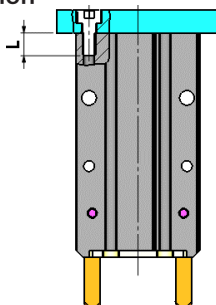
Model	Bolt size	Max. Torque (Nm)	Max. Screw-in Depth (L mm)
NFSU2-10D□	M3x0.5	0.88	6
NFSU2-16D□	M4x0.7	2.1	8
NFSU2-20D□	M5x0.8	4.3	10
NFSU2-25D□	M6x1	7.3	12

3. Longitudinal Installation (Body-tapped)

Model	Bolt size	Max. Torque (Nm)	Max. Screw-in Depth (L mm)
NFSU2-10D□	M3x0.5	0.59	4
NFSU2-16D□	M4x0.7	1.3	5
NFSU2-20D□	M5x0.8	3.3	8
NFSU2-25D□	M6x1	5.9	10

4. Lateral installation (Body-tapped)

Model	Bolt size	Max. Torque (Nm)	Max. Screw-in Depth (L mm)
NFSU2-10D□	M3x0.5	0.88	6
NFSU2-16D□	M4x0.7	2.1	8
NFSU2-20D□	M5x0.8	4.3	10
NFSU2-25D□	M6x1	7.3	12

5. Lateral installation (Through-hole)
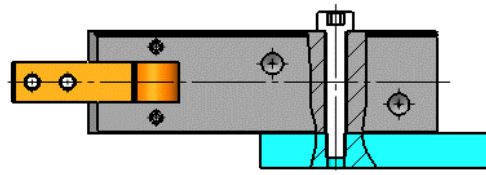
Model	Bolt size	Max. Torque (Nm)
NFSU2-10D□	M3x0.5	0.88
NFSU2-16D□	M4x0.7	2.1
NFSU2-20D□	M5x0.8	4.3
NFSU2-25D□	M6x1	7.3

NFSU2 Series

Guidelines for the selection

Caution: Please use within the specified limits.
Using beyond the specified limits may cause excessive load on the finger, leading to shaking or degradation, which could adversely affect the lifespan.

① Usage Conditions

List up the usage conditions.	• Product type • Work load W (kgf) • Gripping position L(mm) • Operating pressure MPa	• Air chuck : NFSU2-20D • Work load W : 0.15kgf (approx. 1.5N) • Gripping position L : 50mm, H : 0mm • Operating pressure P : 0.5MPa

② Calculation of required gripping force and efficiency verification

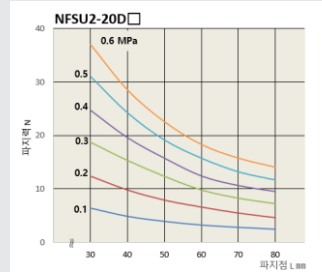|		
- Determine the required gripping force (N) to hold the workpiece. - Obtain the effective gripping force from the graph. - Compare the required gripping force with the effective gripping force.	• Required gripping force $F = W / (2 \times \mu) \times \alpha$ • μ = Coefficient of friction between the attachment and the workpiece (0.2) • α = safety factor 4 From the graph, determine the effective gripping force at the intersection point for L: 60mm and pressure of 0.5MPa. Note: Even if the coefficient of friction is greater than 0.2, it is advisable to select a gripping force 10 to 20 times the weight of the workpiece for safety.	• Required gripping force $F = 1.5 / (2 \times 0.2) \times 4 = 15N$ NFSU2-20D□ • Effective gripping force $F = 19.1$ N (suitable for use)

③ Appropriate gripping position

• Find the gripping point of the work piece. • Verify the gripping distance (L) and overhang amount (H) • Ensure that they fall within the specified limits.	• Gripping point limits • Find a value for NFSU2-20□ @0.5MPa from the gripping point graph	• Since the maximum gripping distance is less than 80 and the overhang is less than 10, it is suitable for use.

④ Verification of permissible moment

• Determine the permissible load (N) when a moment load is applied. • Compare the permissible load with the work load.	$\text{Permissible load F(N)} = \dfrac{\text{Mp (Max. permissible moment)}}{\text{Gripping distance L} \times 10^{-3}}$ Note: Refer to the maximum allowable moment table.	• Permissible load $F(N) = 2 / (50 \times 10^{-3})$ $= 40N$ • Work load $F(N) = 0.15 \times 9.8$ $= 1.5N$ • Since the allowable load is greater than the work load, it is suitable for use. (Please use it at 75% of the allowable load level) Note: 1kgf = 9.8N