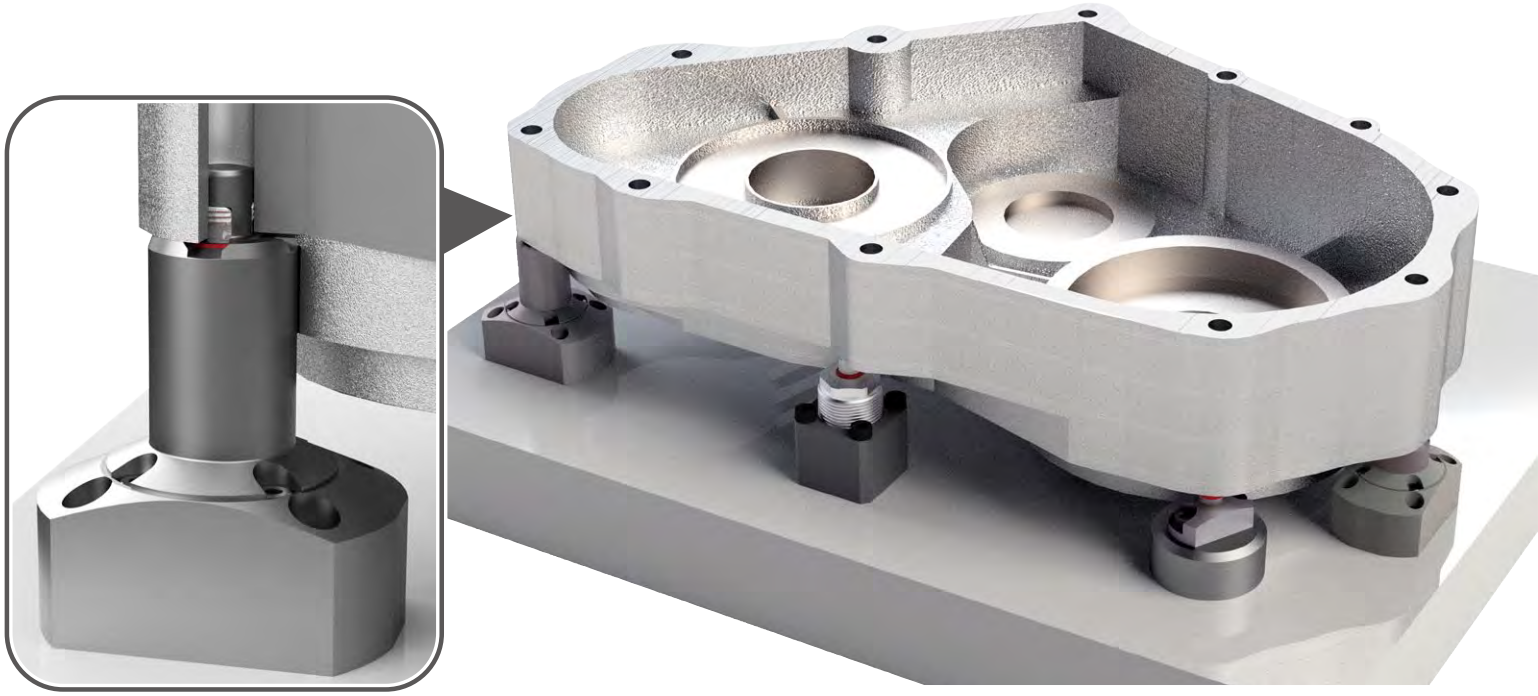
Hydraulic Hole Clamp

Model SFB NEW

Model SFC

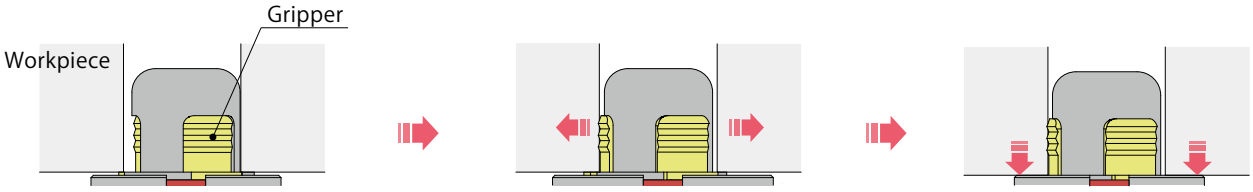
Gripper expands and pulls workpiece down.

PAT.



Gripper expands and pulls workpiece down.

Action Description



< Released State >
Load/Unload Workpiece

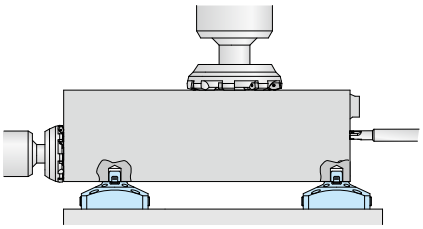
< Clamping State >
Gripper expands to hold workpiece hole.

< Clamping Completed >
Pulls and clamps in workpiece hole.

Advantages

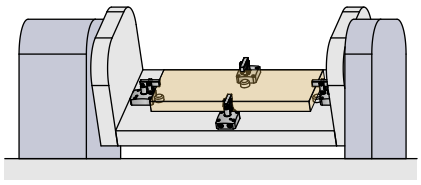
To Workpiece

- Zero interference with 5 faces except clamping face.
- Possible to use standard length tool which provides for better machining accuracy.
- Possible to enhance cutting parameters which leads to shorter cycle times.
- Elimination of multiple setups provides better machining process and zero setup time.

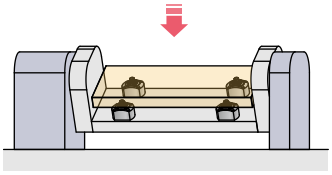


To Machining Equipment

- Fixture could be extremely downsized.
- Turn-table could be downsized.
- The movement of tool could be shorten.
- For saving weight of fixture.
- Machining equipment could be more simple.
- Good design for easy flow of chips and reduction in coolant usage.



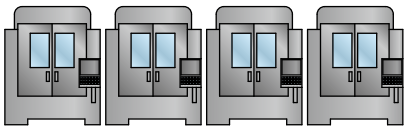
<Before> Clamping around the Workpiece



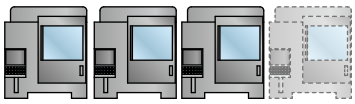
<After> Using the Hole Clamps

To Machining Line

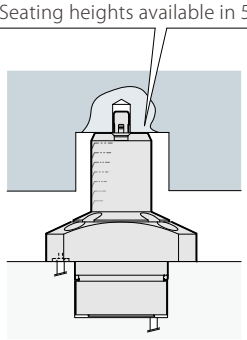
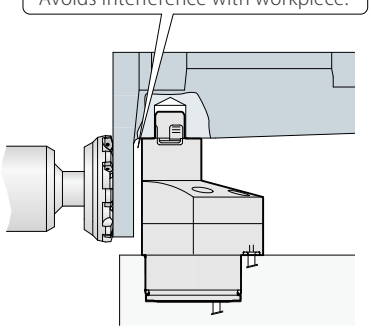
- 5-face machining makes it possible to put process together.
- Machining line is kept small and simple.
- Possible to enhance cutting parameters which allows for shorter cycle times.



<Before> Large Machining Centers and Long Machining Lines



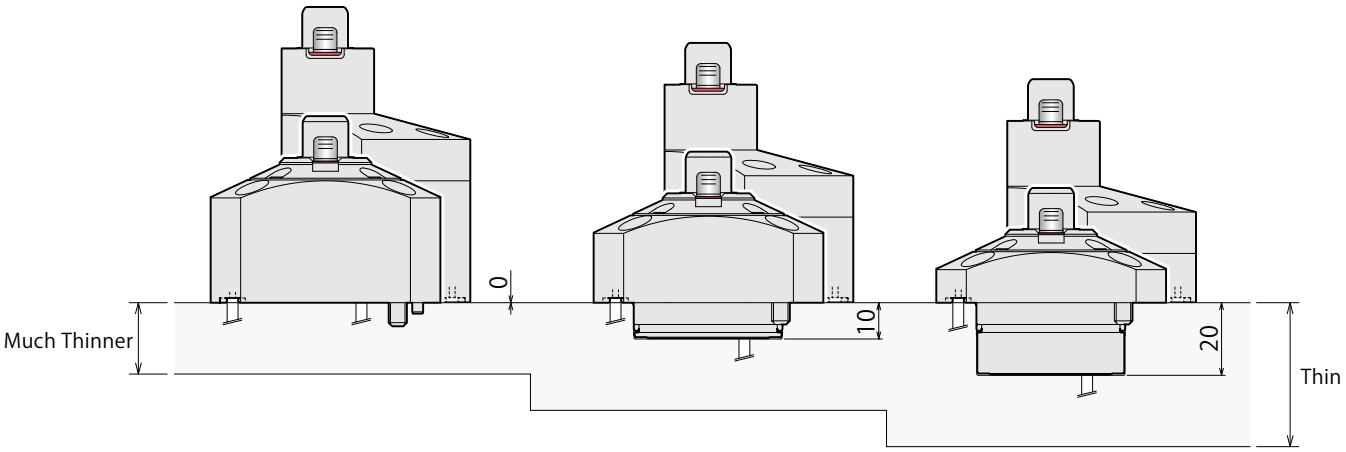
<After> Smaller Machining Centers and Shorter Machining Lines

	 NEW Model **SFB** → P.373	 Model **SFC** → P.397
Classification	**Double Action Standard Model**	**Double Action Offset Model**
Features	Seating heights available in 5mm increments 	Avoids interference with workpiece. 

More Flexible Fixture Design with KOSMEK Hole Clamp

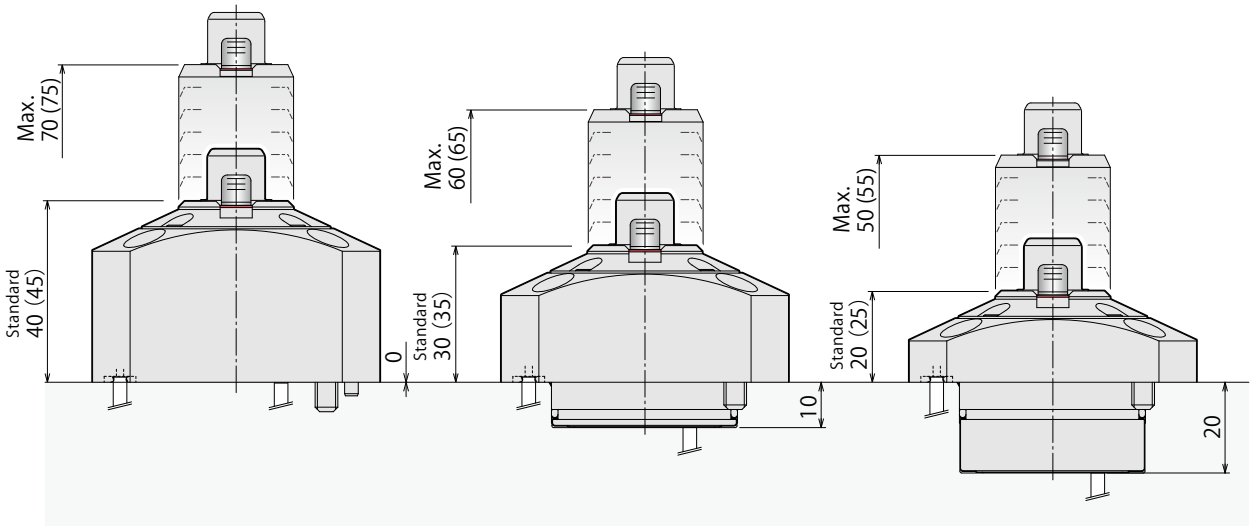
● Variable Mounting Dimensions to Suit the Process

Select appropriate mounting dimension according to the plate thickness.



● Seating Surface Height to Suit Variety of Work

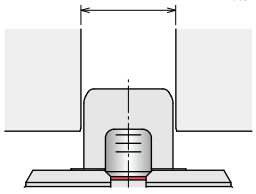
Level the height in 5mm increments according to the phase of workpiece seating surface.



※ The number of ( ) is referred to SFB3000.

Hole Diameter to Suit Variety of Work

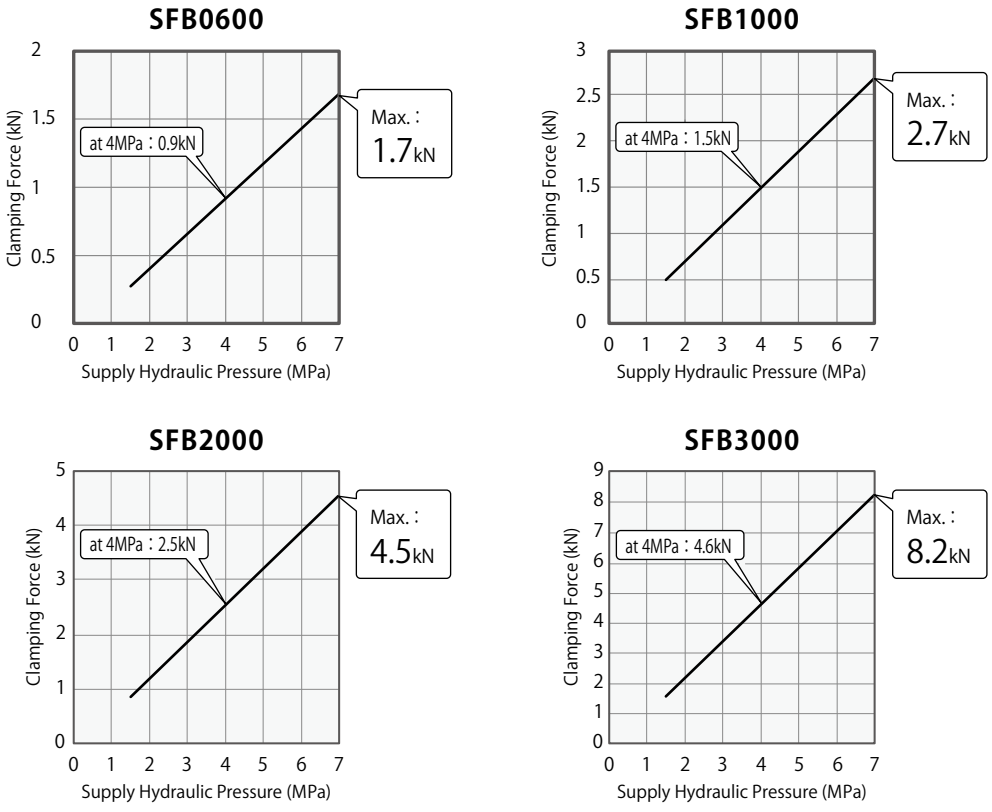
In order to suit different hole diameters and tolerances, hole diameters can be specified in 0.5mm increments.



Model	Cap	Workpiece Hole Diameter (mm)
		6 6.5 7 7.5 8 8.5 9 9.5 10 10.5 11 11.5 12 12.5 13 13.5 14 14.5 15 15.5 16
SFB0600	With Cap	Allowable Range
SFB/SFC1000	No Cap	Allowable Range
SFB/SFC2000	With Cap	Allowable Range
SFB/SFC3000		Allowable Range

More Powerful and Stable Clamping Force

The secure sequential operating structure provides reliable clamping force with a simple circuit structure.



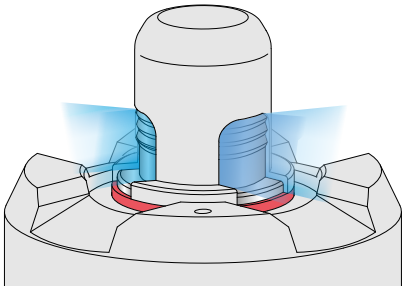
※ Max. operating pressure is 4MPa or 6MPa regarding to some of workpiece hole diameter.

More Safe Operation and Long Operating Life with KOSMEK Hole Clamp

● Cap Structure Available in Any Condition

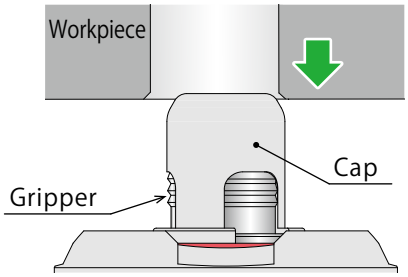
※ SFB/SFC1000 does not have the cap.

NEW
For Body Size：Type 06
Applicable Hole Diameter ϕ6 ~ (SFB)



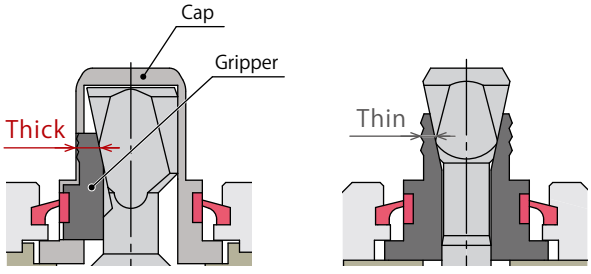
■ Effective air purging

Small clearance leads to effective air purging. It prevents cutting chips and coolant from entering inside the hole clamp.
50% of air flow consumption compared to our previous model.



■ Protects gripper when loading workpiece

Cap protects gripper.
Workpiece does not hit gripper when loading and unloading.



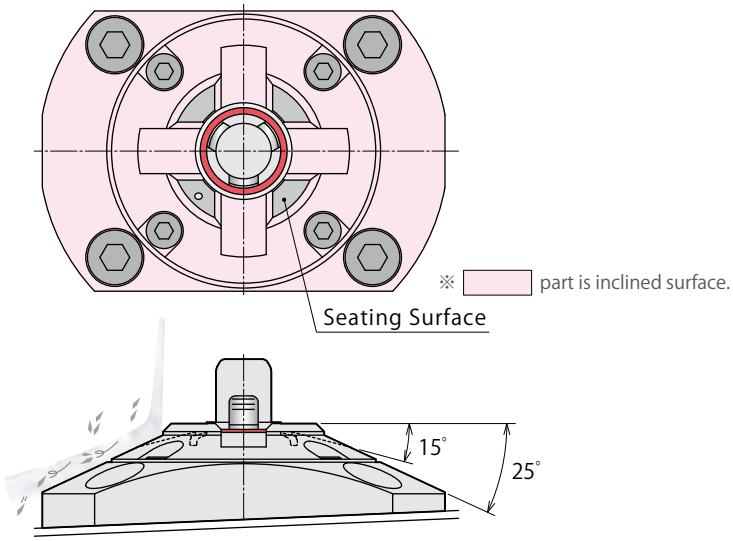
■ Thicker Gripper, Longer Life

No degradation in performance even after **1 million cycles**※ internal tests on A2017 aluminum workpieces.

(※ 500,000 cycles test on SCM435 thermal refined steel)

Pursuing Good Design for Cutting Chips

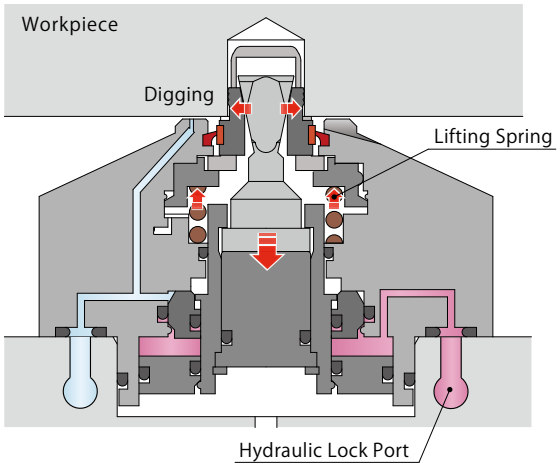
Having smaller seating surface and wide sweep area on the flange enables easy flow of cutting chips and reduction in coolant usage.



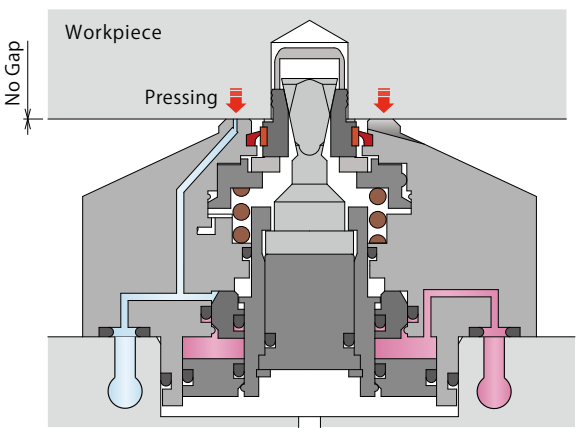
Secure Clamp Action Out of Sight

Built-in spring grips workpiece strongly and pulls it in.
There is no effect by the temperature and/or amount of oil.

Gripper expands.



Pulls on to seating surface.

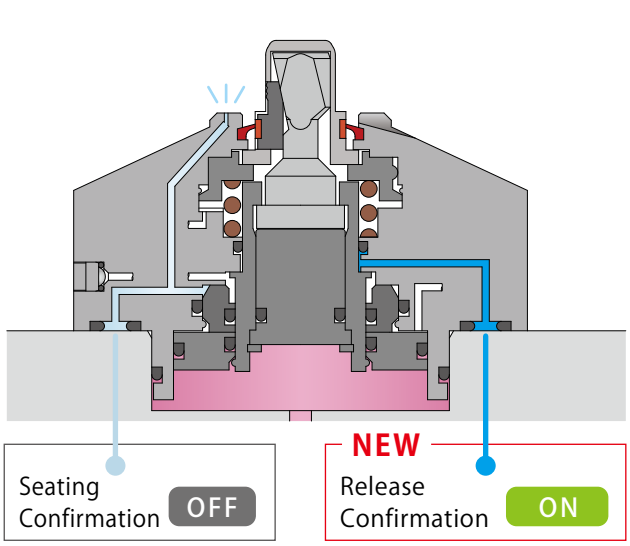


More Safe Operation and Long Operating Life with KOSMEK Hole Clamp

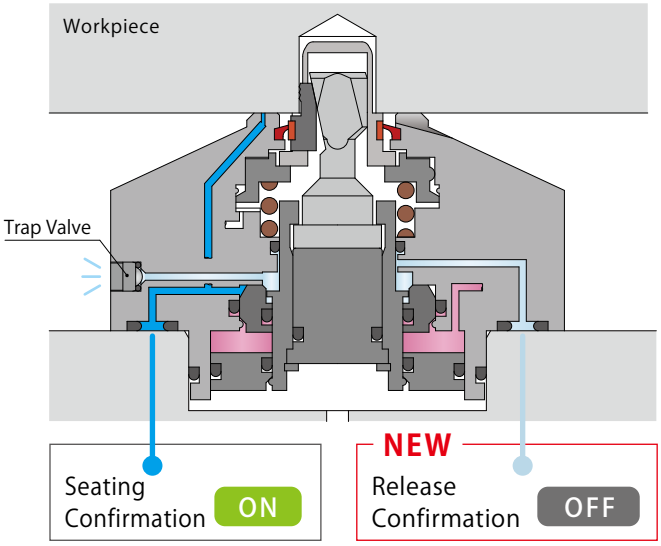
• Clamp action detecting function is in standard

Seat check confirmation and release-end confirmation allow to check the movement of the workpiece. Suitable for automated production line.

※SFC does not have the release-end confirmation.



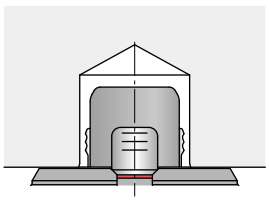
When released



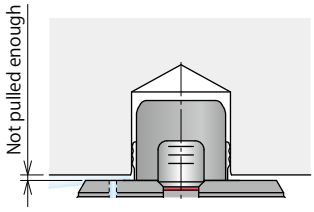
When the workpiece is locked

• Abnormality Detection for Unpredictable Troubles

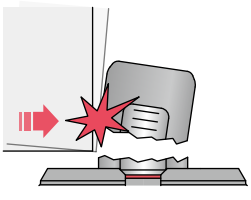
Anomaly detection for unpredictable trouble. It can be used in automated line.



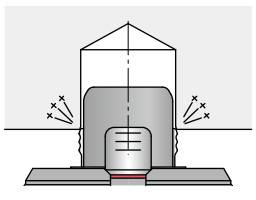
The workpiece with larger hole diameter than specification.



The workpiece is floated more than pulling stroke. (Seating Error)



Rod breakage due to transportation.



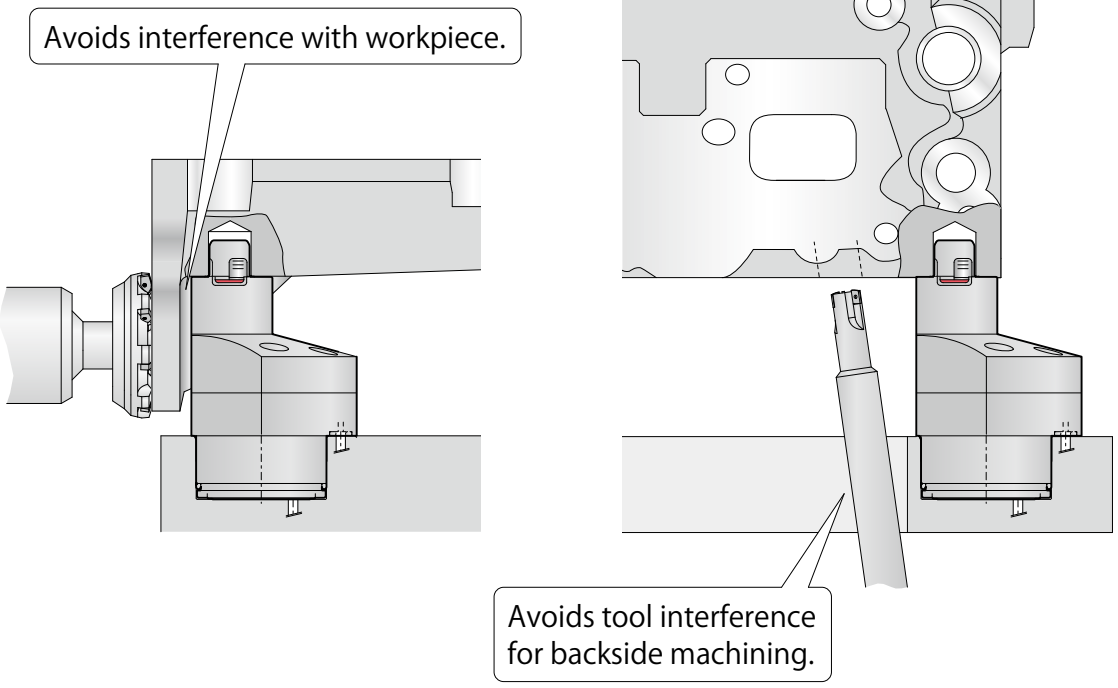
Workpiece loading error due to gripper release malfunction.

Offset Model

Hydraulic Hole Clamp Offset Model

Model SFC

The offset model allows for machining with no interference of workpieces, fixtures, tools, etc. when there is interference by using the standard SFB model.



PAT.

Hydraulic Hole Clamp Offset Model

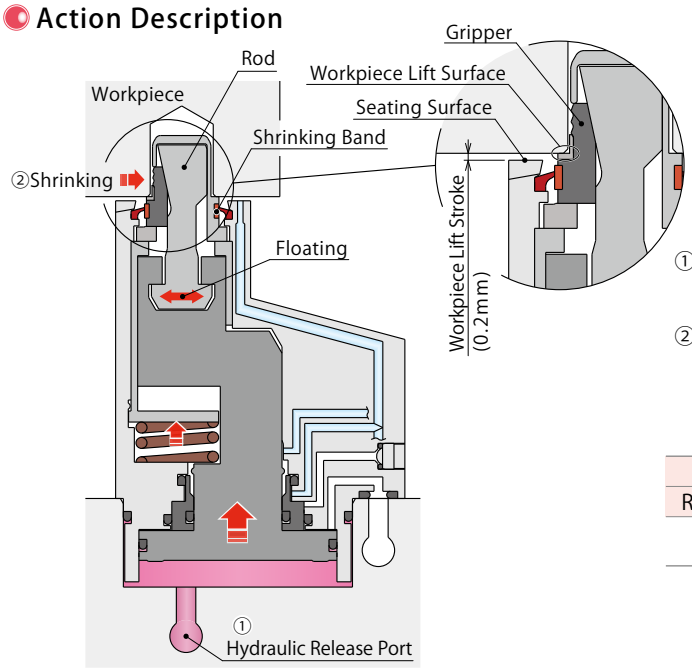
Model SFC

Low Pressure (1.5~7MPa)

Ability to Avoid Interferences

Index

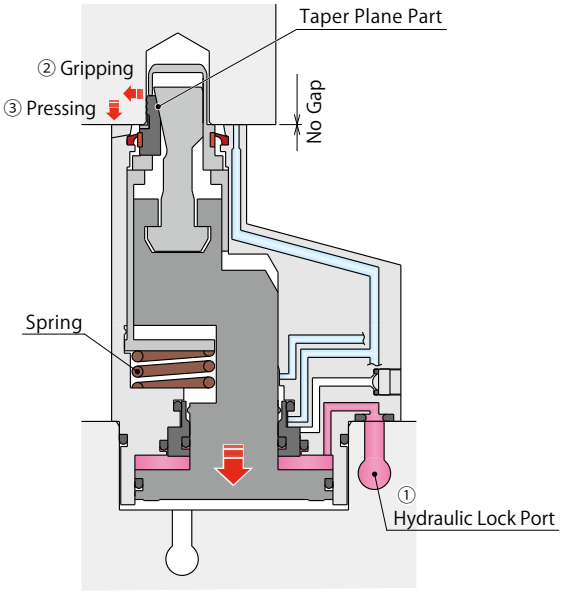
Action Description



■ Released State

①Hydraulic pressure is supplied to the release port.
↓
② The rod is lifted up and the gripper retracts.
(For workpiece lifting option, there is a gap between workpiece bottom surface and seating surface.)

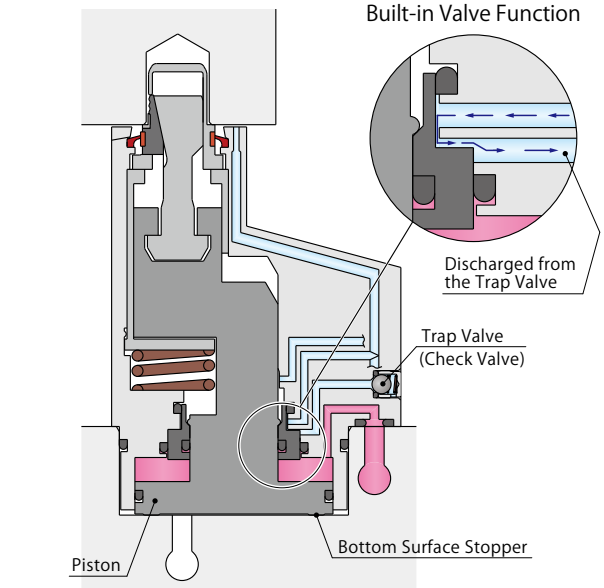
Hydraulic Pressure Switch		Seat Check Detection
Release Pressure	Lock Pressure	(Air Sensor)
ON	OFF	OFF



■ Locked State

① Hydraulic pressure is supplied to the lock port.
↓
② The rod descends and the gripper expands along the taper plane. (Since the gripper is lifted by spring force, it does not pull down.)
↓
③ When pulling force exceeds the spring force for lift up, pulling force works after the gripper digs into workpiece. Then, it presses workpiece onto seating surface.
(Clamping force = Pressing force onto seating surface.)

Hydraulic Pressure Switch		Seat Check Detection
Release Pressure	Lock Pressure	(Air Sensor)
OFF	ON	ON



■ Abnormality Detected State (Clamping without Workpiece)

The built-in check valve function and seating confirmation air pressure detect abnormal condition as follows.

- When clamping workpiece which has larger workpiece hole diameter or clamping without workpiece (In this state the gripper expands but the lifting spring does not have pulling force so the workpiece lifting surface does not descend.)
- When rod or gripper is broken.
- If the piston is fully stroked when it has to stop at the bottom.
- In the case workpiece is floated more than 1mm when setting it.

Hydraulic Pressure Switch		Seat Check Detection
Release Pressure	Lock Pressure	(Air Sensor)
OFF	ON	OFF

Model No. Indication (Workpiece Hole Shape：Straight)

SFC **2** **00** **0** – **G0** **N** – **115** – ☐

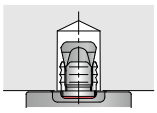
1 2 3 4 5 6

1 Body Size ※ Please refer to the specifications, the performance curve and the external dimensions for details.

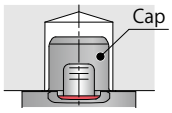
1 ： Available in workpiece hole diameters between ϕ6 and ϕ9 (No Cap)

2 ： Available in workpiece hole diameters between ϕ9 and ϕ13mm (With Cap)

3 ： Available in workpiece hole diameters between ϕ13 and ϕ16mm (With Cap)



SFC1000
(No Cap)



SFC2000/SFC3000
(With Cap)

2 Design No.

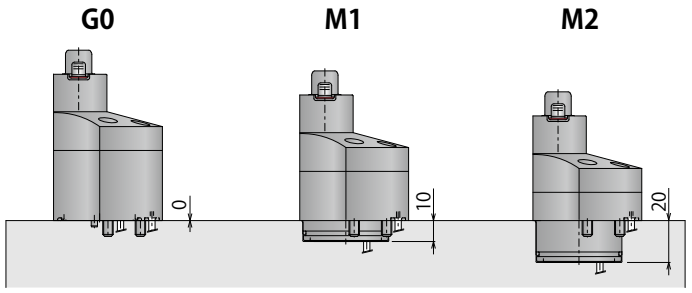
0 ：Revision Number

3 Mounting Methods

G0 ： Mounting Length 0mm

M1 ： Mounting Length 10mm

M2 ： Mounting Length 20mm



Mounting Length 0mm Mounting Length 10mm Mounting Length 20mm

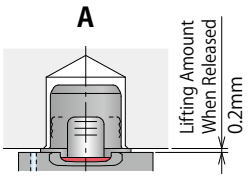
4 Workpiece Lifting Option

A ： With Lifting Function (Workpiece Lifting Option)

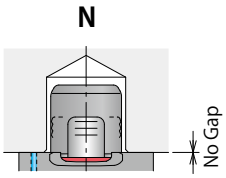
N ： Without Lifting Function

The lifting function lifts the workpiece 0.2mm up from the seating surface when the clamp is released.

Note : When using SFC with expansion locating pin(s) (model VFH, VFL, VFM, VFJ, VFK, VWH, VWM, VWK, VX), please choose **N**：Without Lifting Function.



With Lifting Function
(Workpiece Lifting Option)



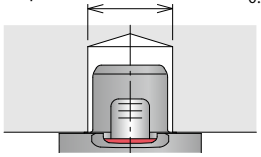
Without Lifting Function

5 Workpiece Hole Diameter (Workpiece Hole Code)

Workpiece Hole Code : Workpiece Hole Diameter $\phi d^{+0.7}_{-0.3}$

※ Workpiece hole diameter should be specified in 0.5mm increments from the allowable range in the table below.

Workpiece Hole Diameter $\phi d^{+0.7}_{-0.3}$



Workpiece Hole Code		060	065	070	075	080	085	090	095	100	105	110	115	120	125	130	135	140	145	150	155	160
Workpiece Hole Diam. $\phi d^{+0.7}_{-0.3}$ (mm)		6	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5	13	13.5	14	14.5	15	15.5	16
SFC1000	No Cap	▲	▲	Allowable Range																		
SFC2000	With Cap							▲	▲	■	■	Allowable Range										
SFC3000	With Cap															Allowable Range						

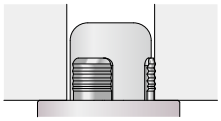
※ Max. operating pressure : 4.0MPa in case of ▲ workpiece hole diameter.
6.0MPa in case of ■ workpiece hole diameter.

6 Workpiece Hole (Gripper) Shape

Blank : With Serration (Workpiece Hole Shape：Straight)

F : Without Serration (Workpiece Hole Shape：Straight)

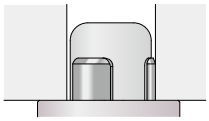
Blank



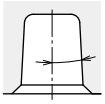
With Serration

Standard (Digs into and powerfully clamps a workpiece.)

F



Without Serration



Slope Angle Less than 3°

Taper Hole

Refer to P.401 ~ P.402 for the taper workpiece hole.

Model No. Indication (Workpiece Hole Shape : Tapered)

SFC **2** **00** **0** – **G0** **N** – **115** – **T**

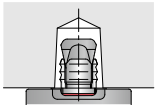
1 2 3 4 5 6

1 Body Size ※ Please refer to the specifications, the performance curve and the external dimensions for details.

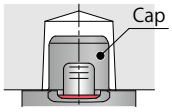
1 : Available in workpiece hole mouth diameters between ϕ6.5 and ϕ9 (No Cap)

2 : Available in workpiece hole mouth diameters between ϕ9 and ϕ13mm (With Cap)

3 : Available in workpiece hole mouth diameters between ϕ13 and ϕ16mm (With Cap)



SFC1000
(No Cap)



SFC2000/SFC3000
(With Cap)

2 Design No.

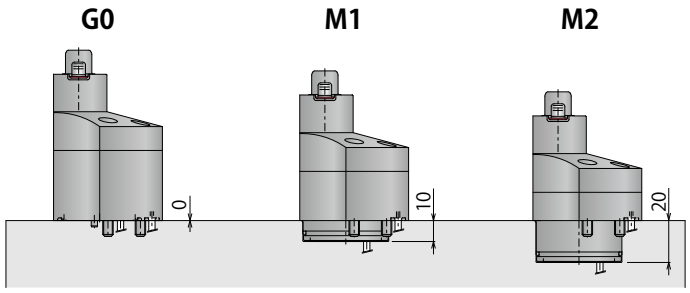
0 : Revision Number

3 Mounting Methods

G0 : Mounting Length 0mm

M1 : Mounting Length 10mm

M2 : Mounting Length 20mm



Mounting Length 0mm Mounting Length 10mm Mounting Length 20mm

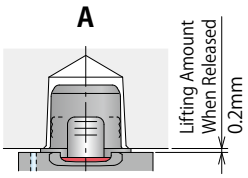
4 Workpiece Lifting Option

A : With Lifting Function (Workpiece Lifting Option)

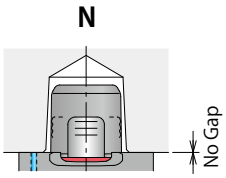
N : Without Lifting Function

The lifting function lifts the workpiece 0.2mm up from the seating surface when the clamp is released.

Note : When using SFC with expansion locating pin(s) (model VFH, VFL, VFM, VFJ, VFK, VWH, VWM, VWK, VX), please choose **N** : Without Lifting Function.



With Lifting Function
(Workpiece Lifting Option)

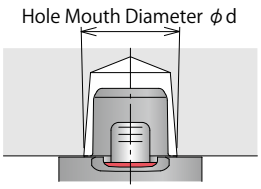


Without Lifting Function

5 Workpiece Hole Mouth Diameter (Workpiece Hole Code)

Workpiece Hole Code : Workpiece Hole Mouth Diameter ϕd

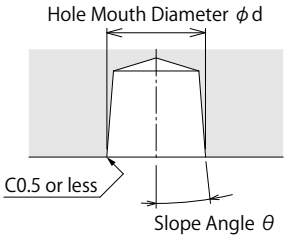
※ Workpiece hole mouth diameter ϕd should be specified in 0.5mm increments from the allowable range in the following table.
※ The allowable tolerance of the hole mouth diameter ϕd differs depending on the slope angle. Refer to the table below.



Workpiece Hole Code		(060)	065	070	075	080	085	090	095	100	105	110	115	120	125	130	135	140	145	150	155	160
Hole Mouth Diam. ϕd (mm)		–	6.5	7	7.5	8	8.5	9	9.5	10	10.5	11	11.5	12	12.5	13	13.5	14	14.5	15	15.5	16
SFC1000	No Cap		▲	▲	Allowable Range																	
SFC2000	With Cap							▲	▲	▲	■	■	■	Allowable Range								
SFC3000	With Cap															■	Allowable Range					

※ Max. operating pressure : 4.0MPa in case of ▲ workpiece hole diameter. 6.0MPa in case of ■ workpiece hole diameter.
※ Taper hole model is not available for Workpiece Hole Code : **060**.

Workpiece Hole Slope Angle and Allowable Tolerance of Hole Mouth Diameter



Model No.	Workpiece Hole Code	Slope Angle θ	Allowable Tolerance of Hole Mouth Diam.
SFC1000	065 ~ 090	$1 \leqq \theta^\circ \leqq 2.5$	$\phi d^{\pm 0.3}$
		$2.5 < \theta^\circ \leqq 3$	$\phi d^{+0.3}_{-0.15}$
SFC2000	090	$1 \leqq \theta^\circ \leqq 2$	$\phi d^{\pm 0.3}$
		$2 < \theta^\circ \leqq 2.5$	$\phi d^{+0.3}_{-0.15}$
		$2.5 < \theta^\circ \leqq 3$	$\phi d^{+0.3}_{0}$
	095 ~ 130	$1 \leqq \theta^\circ \leqq 2.5$	$\phi d^{\pm 0.3}$
		$2.5 < \theta^\circ \leqq 3$	$\phi d^{+0.3}_{-0.15}$
SFC3000	130 ~ 160	$1 \leqq \theta^\circ \leqq 2.5$	$\phi d^{\pm 0.3}$
		$2.5 < \theta^\circ \leqq 3$	$\phi d^{+0.3}_{-0.15}$

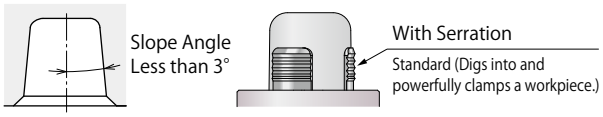
※ Please contact us when the slope angle is less than 1°.

6 Workpiece Hole (Gripper) Shape

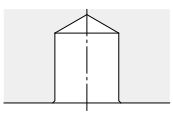
T : Taper Hole (with Serration)

When ordering this model, please inform us of the detailed dimensions of the workpiece hole.

T



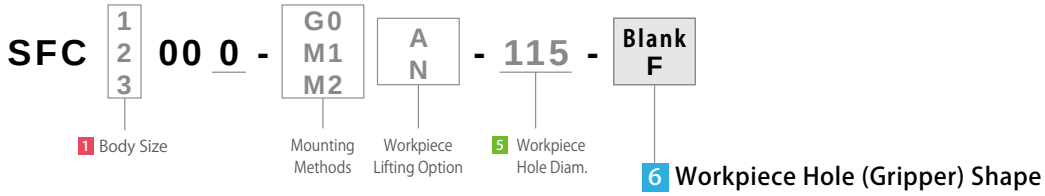
Workpiece Hole Shape : Taper Hole (with Serration)
('No Serration' is not available.)



Refer to P.399 ~ P.400 for the straight workpiece hole.

Specifications (Workpiece Hole Shape : Straight)

Applicable Model No.



Model No.			SFC1000-□□-□ SFC1000-□□-□-F							SFC2000-□□-□ SFC2000-□□-□-F								SFC3000-□□-□ SFC3000-□□-□-F						
	5 Workpiece Hole Code		060	065	070	075	080	085	090	090	095	100	105	110	115	120	125	130	130	135	140	145	150	155	160
Workpiece	Hole Diam. ϕ d $^{+0.7}_{-0.3}$	mm	6	6.5	7	7.5	8	8.5	9	9	9.5	10	10.5	11	11.5	12	12.5	13	13	13.5	14	14.5	15	15.5	16
	Hardness		HB250 or less																						
Allowable Offset (Floating Clearance of Expanding Area) ※1		mm	±0.5																						
Full Stroke		mm	4.2																						
Workpiece Pulling Stroke		mm	1.0																						
Workpiece Lifting Stroke ※2		mm	0.2																						
Workpiece Lifting Force ※2		kN	0.09							0.12									0.21						
Cylinder Capacity (Empty Action)	Release	cm^3	2.4							3.8									6.7						
	Lock	cm^3	1.8							3.0									5.4						
Cylinder Inner Diameter ※3		mm	27							34									45						
Rod Diameter ※3		mm	14							16									20						
Max. Operating Pressure		MPa	4.0	7.0						4.0	6.0	7.0							7.0						
Min. Operating Pressure		MPa	1.5	1.5						1.5	1.5	1.5							1.5						
Withstanding Pressure		MPa	6.0	10.5						6.0	9.0	10.5							10.5						
Recommended Air Blow Pressure		MPa	0.4 ~ 0.5							0.2 ~ 0.3									0.2 ~ 0.3						
Operating Temperature		℃	0 ~ 70																						
Usable Fluid			General Hydraulic Oil Equivalent to ISO-VG-32																						
Weight			Please refer to the external dimensions for the product weight.																						

Notes :

※1. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of single clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with another location clamp / location cylinder, or when using more than two of these products.

※2. Workpiece lifting stroke and workpiece lifting force are functions only for lifting option.

※3. Clamping force cannot be calculated from the cylinder inner diameter and the rod diameter. Please refer to the clamping force curve.

Specifications (Workpiece Hole Shape : Tapered)

Applicable Model No.

SFC [1 2 3] 00 [0] - [G0 M1 M2] [A N] - [115] - [T]

1 Body Size
Mounting Methods
Workpiece Lifting Option
5 Workpiece Hole Diam.
6 Workpiece Hole (Gripper) Shape

Model No.				SFC1000-□□-□-□-T							SFC2000-□□-□-□-T									SFC3000-□□-□-□-T								
	5 Workpiece Hole Code			060	065	070	075	080	085	090	090	095	100	105	110	115	120	125	130	130	135	140	145	150	155	160
Workpiece	Hole Mouth Diam. ϕd	mm		–	6.5	7	7.5	8	8.5	9	9	9.5	10	10.5	11	11.5	12	12.5	13	13	13.5	14	14.5	15	15.5	16
	Allowable Tolerance of Hole Mouth Diam.			–	Please refer to 5 Workpiece Hole Code on P.402.																					
	Hole Slope Angle			–	3° or less																					
	Hardness			–	HB250 or less																					
Allowable Offset (Floating Clearance of Expanding Area) ※4		mm		–	±0.5																					
Full Stroke		mm		–	4.2																					
Workpiece Pulling Stroke		mm		–	1.0																					
Workpiece Lifting Stroke ※5		mm		–	0.2																					
Workpiece Lifting Force ※6		kN		–	0.09						0.12									0.21						
Cylinder Capacity (Empty Action)	Release	cm^3		–	2.4						3.8									6.7						
	Lock	cm^3		–	1.8						3.0									5.4						
Cylinder Inner Diameter ※6		mm		–	27						34									45						
Rod Diameter ※6		mm		–	14						16									20						
Max. Operating Pressure		MPa		–	4.0		7.0				4.0			6.0		7.0				6.0	7.0					
Min. Operating Pressure		MPa		–	1.5		1.5				1.5			1.5		1.5				1.5	1.5					
Withstanding Pressure		MPa		–	6.0		10.5				6.0			9.0		10.5				9.0	10.5					
Recommended Air Blow Pressure		MPa		–	0.4 ~ 0.5						0.2 ~ 0.3									0.2 ~ 0.3						
Operating Temperature		℃		–	0 ~ 70																					
Usable Fluid				–	General Hydraulic Oil Equivalent to ISO-VG-32																					
Weight				–	Please refer to the external dimensions for the product weight.																					

※ 6 **T**: Taper hole option is not available for Workpiece Hole Code : **060**.

Notes :

※4. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of single clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with another location clamp / location cylinder, or when using more than two of these products.

※5. Workpiece lifting stroke and workpiece lifting force are functions only for lifting option.

※6. Clamping force cannot be calculated from the cylinder inner diameter and the rod diameter. Please refer to the clamping force curve.

High-Power Series
Pneumatic Series
Hydraulic Series
Valve / Coupler Hydraulic Unit
Manual Operation Accessories
Cautions / Others
Hole Clamp
SFB
SFC
Swing Clamp
LHA
LHC
LHS
LHW
LG/LT
TLA-2
TLB-2
TLA-1
Link Clamp
LKA
LKC
LKW
LJ/LM
TMA-2
TMA-1
Work Support
LD
LC
TNC
TC
Air Sensing Lift Cylinder
LLW
Linear Cylinder / Compact Cylinder
LL
LLR
LLU
DP
DR
DS
DT
Block Cylinder
DBA/DBC
Centering Vise
FVA
FVD
FVC
Control Valve
BZL
BZT
BZX/JZG
BZS
Pallet Clamp
VS/VT
Expansion Locating Pin
VFL/VFM
VFJ/VFK
Pull Stud Clamp
FP
FQ
Customized Spring Cylinder
DWA/DWB

Clamping Force Curve (Workpiece Hole Shape：Straight)

Applicable Model No.

SFC [1 2 3] 00 [0] - [G0 M1 M2] [A N] - [115] - [Blank F]

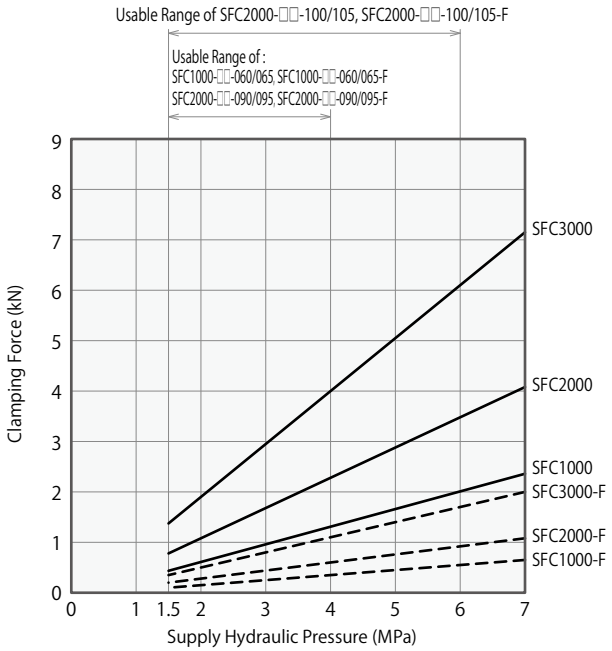
- [1 2 3] 1 Body Size
- [G0 M1 M2] Mounting Methods
- [A N] Workpiece Lifting Option
- [115] 5 Workpiece Hole Diam.
- [Blank F] 6 Shape of Gripper (Workpiece Hole)

6 Shape of Gripper (Workpiece Hole)：**Blank** (With Serration)

Model No.		SFC1000-□□-□							SFC2000-□□-□								SFC3000-□□-□						
5 Workpiece Hole Code		060	065	070	075	080	085	090	090	095	100	105	110	115	120	125	130	130	135	140	145	150	155	160
Clamping Force kN	Hyd. Pressure 7 MPa	–		2.4					–		–		4.1					7.2						
	Hyd. Pressure 6 MPa	–		2.0					–		3.5		3.5					6.1						
	Hyd. Pressure 5 MPa	–		1.7					–		2.9		2.9					5.1						
	Hyd. Pressure 4 MPa	1.3							2.3									4.0						
	Hyd. Pressure 3 MPa	1.0							1.7									3.0						
	Hyd. Pressure 2 MPa	0.6							1.1									1.9						
	Hyd. Pressure 1.5 MPa	0.5							0.8									1.4						
Clamping Force Calculation Formula※1 kN		F = 0.35 × P - 0.08							F = 0.60 × P - 0.12									F = 1.05 × P - 0.20						
Max. Operating Pressure MPa		4.0		7.0					4.0		6.0		7.0					7.0						

6 Shape of Gripper (Workpiece Hole)：**F** (Without Serration)

Model No.		SFC1000-□□-□-F							SFC2000-□□-□-F								SFC3000-□□-□-F						
5 Workpiece Hole Code		060	065	070	075	080	085	090	090	095	100	105	110	115	120	125	130	130	135	140	145	150	155	160
Clamping Force kN	Hyd. Pressure 7 MPa	–		0.65					–		–		1.1					2.0						
	Hyd. Pressure 6 MPa	–		0.55					–		0.95		0.95					1.7						
	Hyd. Pressure 5 MPa	–		0.45					–		0.80		0.80					1.4						
	Hyd. Pressure 4 MPa	0.35							0.60									1.1						
	Hyd. Pressure 3 MPa	0.25							0.45									0.80						
	Hyd. Pressure 2 MPa	0.15							0.30									0.50						
	Hyd. Pressure 1.5 MPa	0.10							0.20									0.35						
Clamping Force Calculation Formula※1 kN		F = 0.10 × P - 0.05							F = 0.16 × P - 0.04									F = 0.3 × P - 0.1						
Max. Operating Pressure MPa		4.0		7.0					4.0		6.0		7.0					7.0						



Notes：

1. The table and graph show the relationship between clamping force (kN) and supply hydraulic pressure (MPa).
2. Clamping force shows a pressing force against the seating surface.
3. Thin wall around the workpiece hole can be deformed by clamping action, and the clamping force will not fill the specification.
4. Clamping force of **F**：Without Serration shows the calculated value when the friction coefficient of workpiece and gripper is μ0.1.
5. Standard model (SFB) has higher clamping force than that of the offset model. (Please refer to P.381 for the clamping force curve when using SFB.)

※1. F：Clamping Force (kN), P：Supply Hydraulic Pressure (MPa)

Clamping Force Curve (Workpiece Hole Shape : Tapered)

Applicable Model No.

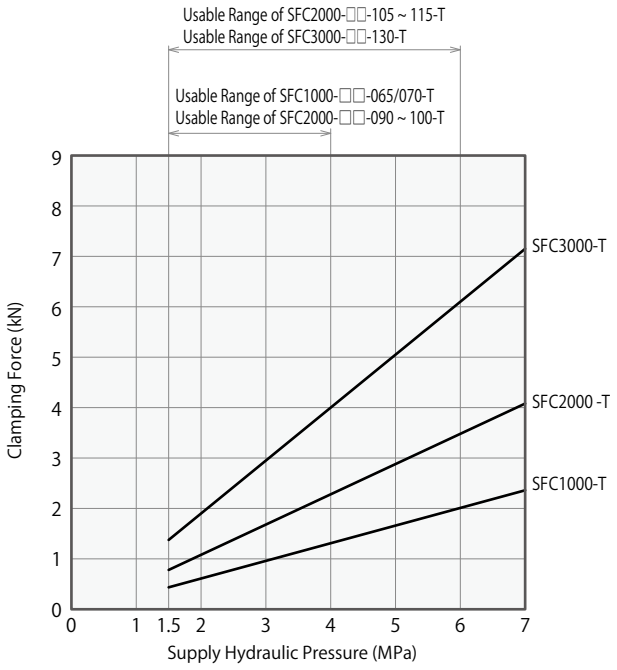
SFC [1 2 3] 00 [0] - [G0 M1 M2] - [A N] - [115] - [T]

- [1 2 3] → 1 Body Size
- [G0 M1 M2] → Mounting Methods
- [A N] → Workpiece Lifting Option
- [115] → 5 Workpiece Hole Diam.
- [T] → 6 Shape of Gripper (Workpiece Hole)

6 Shape of Gripper (Workpiece Hole) : T Taper Hole (With Serration)

Model No.		SFC1000-□□-□-T							SFC2000-□□-□-T								SFC3000-□□-□-T							
5 Workpiece Hole Code		060	065	070	075	080	085	090	090	095	100	105	110	115	120	125	130	130	135	140	145	150	155	160
Clamping Force kN	Hyd. Pressure 7 MPa	–	–		2.4				–			–			4.1			–		7.2				
	Hyd. Pressure 6 MPa	–	–		2.0				–			3.5			3.5					6.1				
	Hyd. Pressure 5 MPa	–	–		1.7				–			2.9			2.9					5.1				
	Hyd. Pressure 4 MPa	–	1.3						2.3									4.0						
	Hyd. Pressure 3 MPa	–	1.0						1.7									3.0						
	Hyd. Pressure 2 MPa	–	0.6						1.1									1.9						
	Hyd. Pressure 1.5 MPa	–	0.5						0.8									1.4						
Clamping Force Calculation Formula ※2 kN		–	F = 0.35 × P - 0.08						F = 0.60 × P - 0.12									F = 1.05 × P - 0.20						
Max. Operating Pressure MPa		–	4.0		7.0				4.0			6.0			7.0			6.0		7.0				

※ 6 T : Taper hole option is not available for Workpiece Hole Code : 060.



Notes :

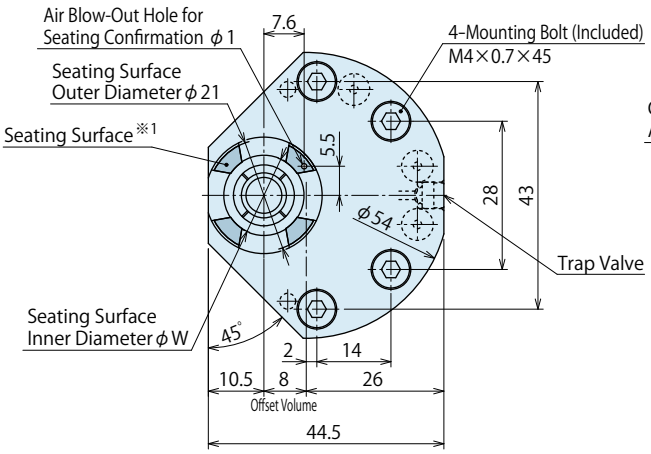
1. The table and graph show the relationship between clamping force (kN) and supply hydraulic pressure (MPa).
2. Clamping force shows a pressing force against the seating surface.
3. Thin wall around the workpiece hole can be deformed by clamping action, and the clamping force will not fill the specification.
4. Standard model (SFB) has higher clamping force than that of the offset model. (Please refer to P.382 for the clamping force curve when using SFB.)

※1. F : Clamping Force (kN), P : Supply Hydraulic Pressure (MPa)

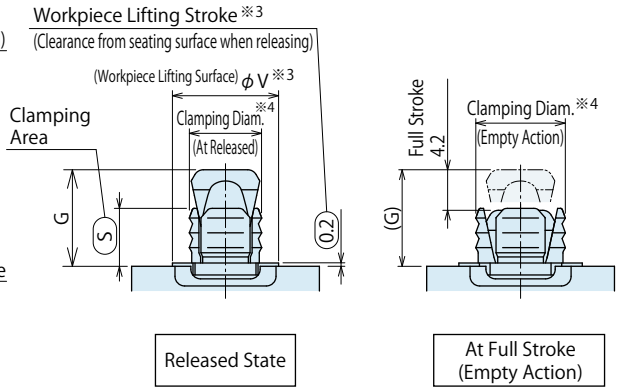
High-Power Series
Pneumatic Series
Hydraulic Series
Valve / Coupler Hydraulic Unit
Manual Operation Accessories
Cautions / Others
Hole Clamp
SFB
SFC
Swing Clamp
LHA
LHC
LHS
LHW
LG/LT
TLA-2
TLB-2
TLA-1
Link Clamp
LKA
LKC
LKW
LJ/LM
TMA-2
TMA-1
Work Support
LD
LC
TNC
TC
Air Sensing Lift Cylinder
LLW
Linear Cylinder / Compact Cylinder
LL
LLR
LLU
DP
DR
DS
DT
Block Cylinder
DBA/DBC
Centering Vise
FVA
FVD
FVC
Control Valve
BZL
BZT
BZX/JZG
BZS
Pallet Clamp
VS/VT
Expansion Locating Pin
VFL/VFM
VFJ/VFK
Pull Stud Clamp
FP
FQ
Customized Spring Cylinder
DWA/DWB

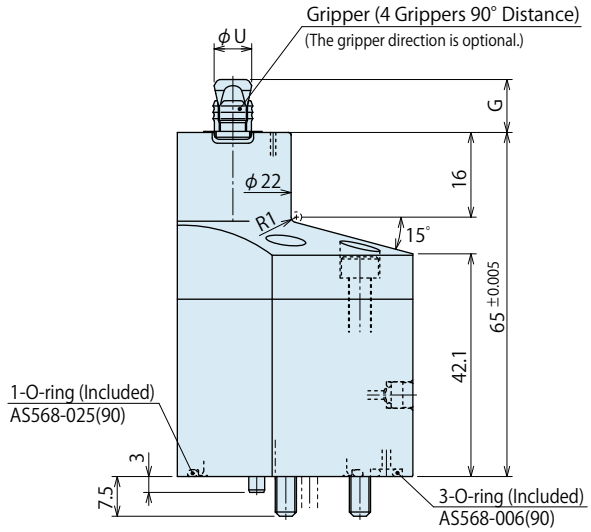
External Dimensions

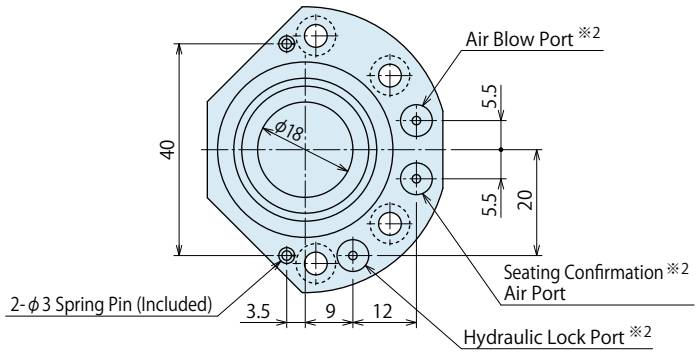
※This drawing shows the released state of SFC1000-G0A-□.



※ Expanding Area Detail







Notes:

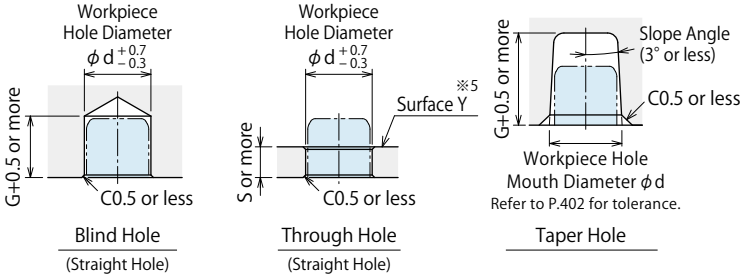
※1. The workpiece must be resting on all seating surfaces when clamping. If this is not done the workpiece can be deformed by the clamping force.

※2. The port names are marked on the product surface. (HYD:Hydraulic Lock Port, FC:Seating Confirmation Air Port, BLOW:Air Blow Port) Continuously supply air pressure to the air blow port and the seating confirmation air port.

※3. The numerical value is only for the workpiece lifting option.

※4. For **-T**:Taper Hole model, the first gripper ridge is the reference diameter.

Workpiece (Pallet) Hole Dimensions

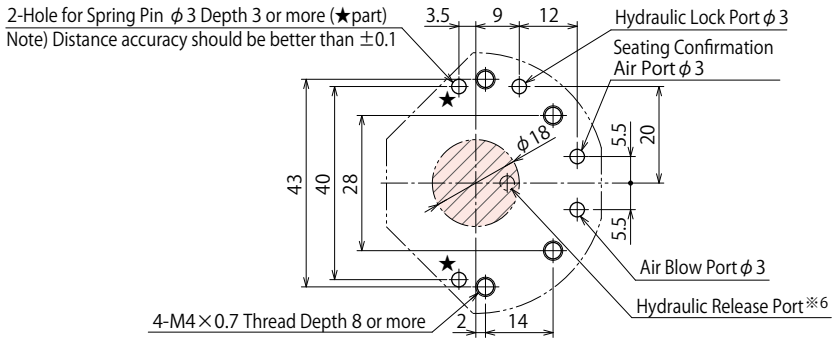


Notes:

1. Thin wall around the workpiece hole could be deformed by clamping action, and clamping force will not fill the specification.
   Please make sure to test the clamping function before using and adjust to the appropriate supply of pressure.

※5. When the clamp head is sticking above the surface Y of the workpiece, please make sure there is no interference with the clamp cylinders during machining.

Machining Dimensions of Mounting Area



Notes :

1. There should be no burrs at the hole contact surface.

※6. Please make a hydraulic release port within the range of ▨.

Model No. Indication

SFC 1 00 0 - G0 A N - 080 - Blank T F

1 Body Size (When selecting 1)
2 Design No.
3 Mounting Methods (When selecting G0)
4 Workpiece Lifting Option
5 Workpiece Hole Diameter (Workpiece Hole Code)
6 Shape of Gripper (Workpiece Hole)

External Dimensions and Machining Dimensions for Mounting

(mm)

Model No.		SFC1000-G0□-□-□						
5 Workpiece Hole Code		060	065	070	075	080	085	090
Workpiece Hole Diam. ϕd 6 Blank, F ※9		$6^{+0.7}_{-0.3}$	$6.5^{+0.7}_{-0.3}$	$7^{+0.7}_{-0.3}$	$7.5^{+0.7}_{-0.3}$	$8^{+0.7}_{-0.3}$	$8.5^{+0.7}_{-0.3}$	$9^{+0.7}_{-0.3}$
Clamping Diameter	Released State	5.5	6	6.5	7	7.5	8	8.5
	Empty Action	7.2	7.7	8.2	8.7	9.2	9.7	10.2
Allowable Offset (Floating Clearance of Expanding Area) ※7		±0.5						
Full Stroke		4.2						
Workpiece Pulling Stroke		1.0						
Workpiece Lifting Stroke ※8		0.2						
6 Shape of Gripper Blank, F	G	9	9	9	10	10	10	10
	S	5.5	5.5	5.5	6	6	6	6
	U	5.55	6.05	6.55	7.05	7.55	8.05	8.55
6 Shape of Gripper T	G	–	9	9	9	10	10	10
	S	–	5.5	5.5	5.5	6	6	6
	U	–	5.45	5.95	6.45	6.9	7.4	7.9
V		8.5	9	9.5	10	10.5	11	11.5
W		12	13	13	14	14	15	15
Weight kg		0.6						

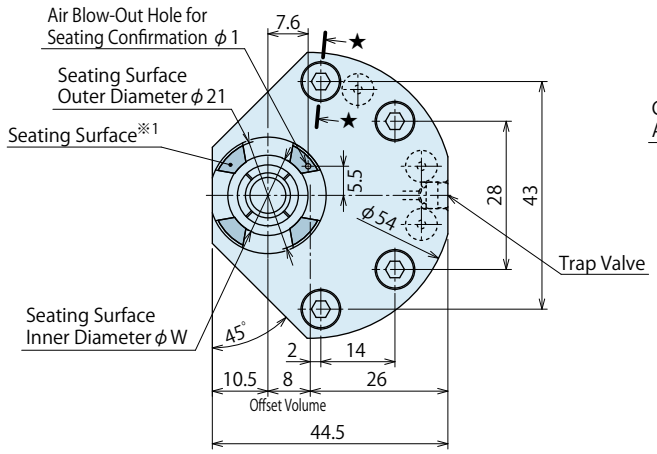
Notes : ※ 7. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of single clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with other location clamps / location cylinders, or when using more than two of these products.

※ 8. Workpiece lifting stroke is the function only for lifting option.

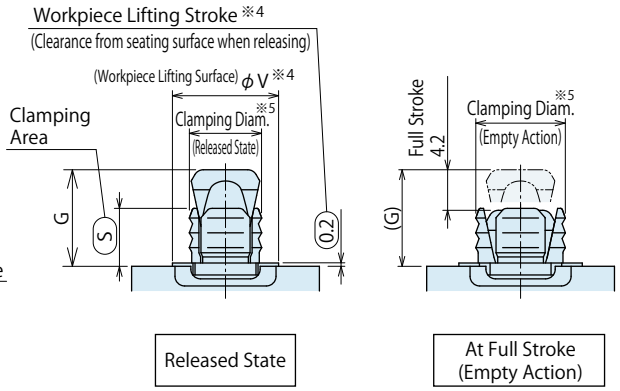
※ 9. For **-T**:Taper Hole option, the allowable tolerance of the hole mouth diameter differs depending on the slope angle. (Refer to P.402.)

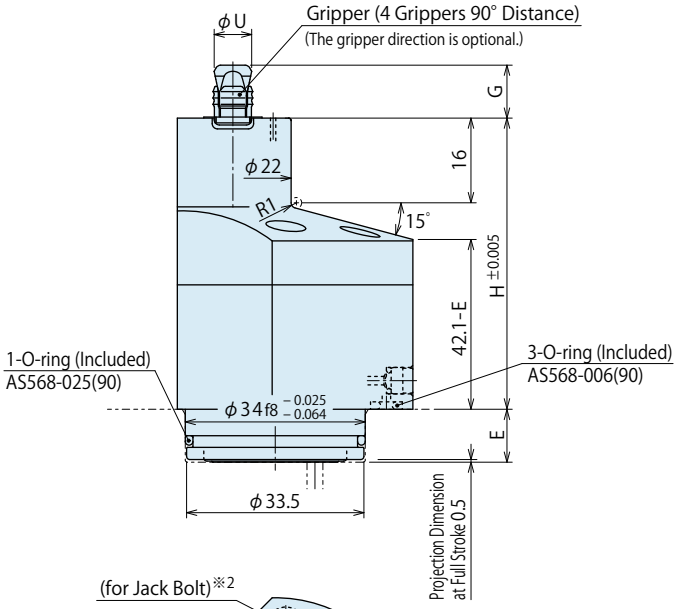
External Dimensions

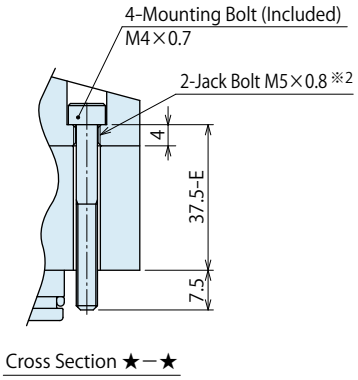
※This drawing shows the released state of SFC1000-M□A-□.

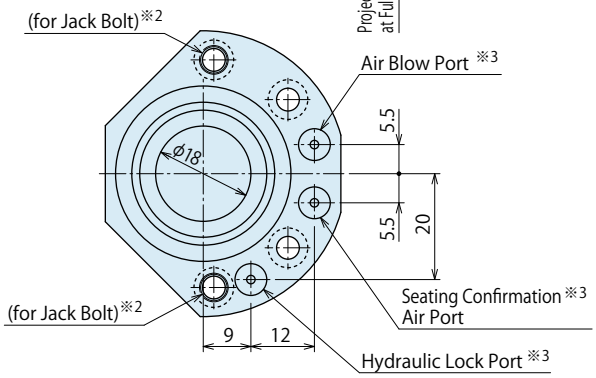


※ Expanding Area Detail









Notes:

※1. The workpiece must be resting on all seating surfaces when clamping. If this is not done the workpiece can be deformed by the clamping force.

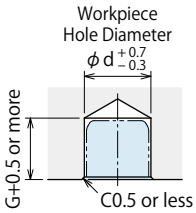
※2. Use jack bolts to remove the product, keeping it parallel to the mounting surface.

※3. The port names are marked on the product surface. (HYD:Hydraulic Lock Port, FC:Seating Confirmation Air Port, BLOW:Air Blow Port) Continuously supply air pressure to the air blow port and the seating confirmation air port.

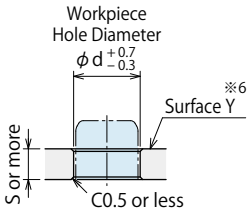
※4. The numerical value is only for the workpiece lifting option.

※5. For **-T**:Taper Hole option, the first gripper ridge is the reference diameter.

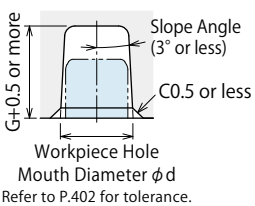
Workpiece (Pallet) Hole Dimensions



Blind Hole
(Straight Hole)



Through Hole
(Straight Hole)



Refer to P.402 for tolerance.

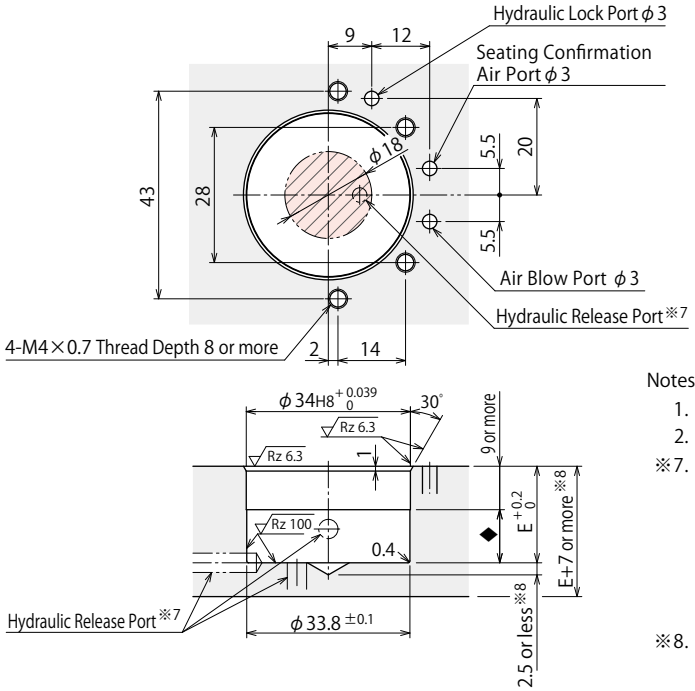
Taper Hole

Notes:

1. Thin wall around the workpiece hole could be deformed by clamping action, and clamping force will not fill the specification.
   Please make sure to test the clamping function before using and adjust to the appropriate supply of pressure.

※6. When the clamp head is sticking above the surface Y of the workpiece, please make sure there is no interference with the clamp cylinders during machining.

Machining Dimensions of Mounting Area



Notes :

1. There should be no burrs at the hole contact surface.
2. Please contact us when adding a spacer.

※7. Release hydraulic pressure can be supplied from the side or bottom surface.
Please make a hydraulic release port within ◆ area in the case supplied from the side.
Please make a hydraulic release port within ▨ area in the case supplied from the bottom.

※8. Base thickness and remaining depth of the lower hole machining (2.5mm) is for when the material is S50C.

Model No. Indication

SFC 1 00 0 - M1 / M2 - A / N - 080 - Blank / T / F

1 2 3 4 5 6

1 Body Size (When selecting 1)
2 Design No.
3 Mounting Methods (When selecting M1/M2)
4 Workpiece Lifting Option
5 Workpiece Hole Diameter (Workpiece Hole Code)
6 Shape of Gripper (Workpiece Hole)

External Dimensions and Machining Dimensions for Mounting (mm)

Model No.		SFC1000–M□□–□–□						
5 Workpiece Hole Code		060	065	070	075	080	085	090
Workpiece Hole Diam. φd 6 Blank, F※11		$6^{+0.7}_{-0.3}$	$6.5^{+0.7}_{-0.3}$	$7^{+0.7}_{-0.3}$	$7.5^{+0.7}_{-0.3}$	$8^{+0.7}_{-0.3}$	$8.5^{+0.7}_{-0.3}$	$9^{+0.7}_{-0.3}$
Clamping Diameter	Released State	5.5	6	6.5	7	7.5	8	8.5
	Empty Action	7.2	7.7	8.2	8.7	9.2	9.7	10.2
Allowable Offset (Floating Clearance of Expanding Area)※9		±0.5						
Full Stroke		4.2						
Workpiece Pulling Stroke		1.0						
Workpiece Lifting Stroke※10		0.2						
3 Mounting Method M1	E	10						
	H	55						
3 Mounting Method M2	E	20						
	H	45						
6 Shape of Gripper Blank, F	G	9	9	9	10	10	10	10
	S	5.5	5.5	5.5	6	6	6	6
	U	5.55	6.05	6.55	7.05	7.55	8.05	8.55
6 Shape of Gripper T	G	–	9	9	9	10	10	10
	S	–	5.5	5.5	5.5	6	6	6
	U	–	5.45	5.95	6.45	6.9	7.4	7.9
V		8.5	9	9.5	10	10.5	11	11.5
W		12	13	13	14	14	15	15
Weight kg	3 Mounting Method M1	0.6						
	3 Mounting Method M2	0.5						

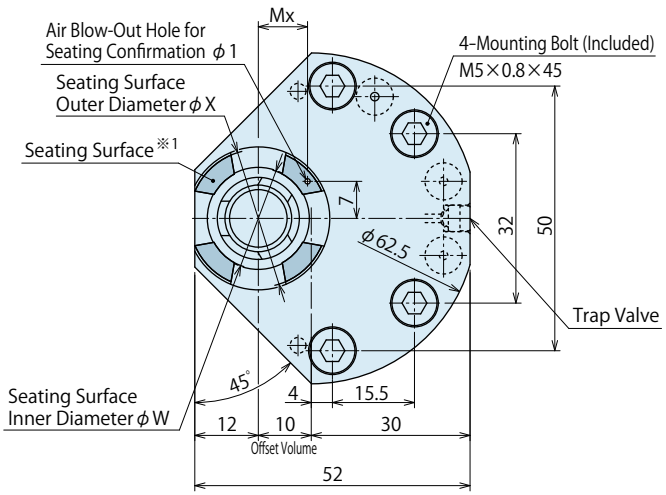
Notes : ※9. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of single clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with other location clamps / location cylinders, or when using more than two of these products.

※10. Workpiece lifting stroke is the function only for lifting option.

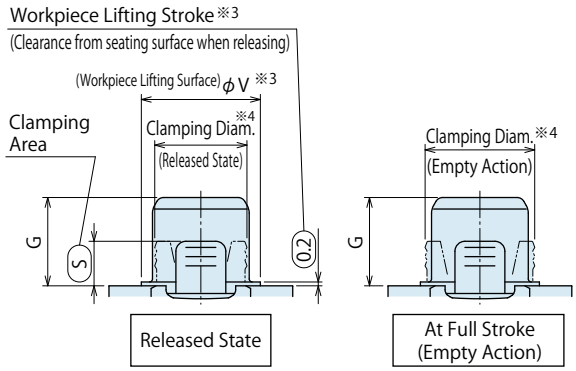
※11. For **-T**:Taper Hole option, the allowable tolerance of the hole mouth diameter differs depending on the slope angle. (Refer to P.402.)

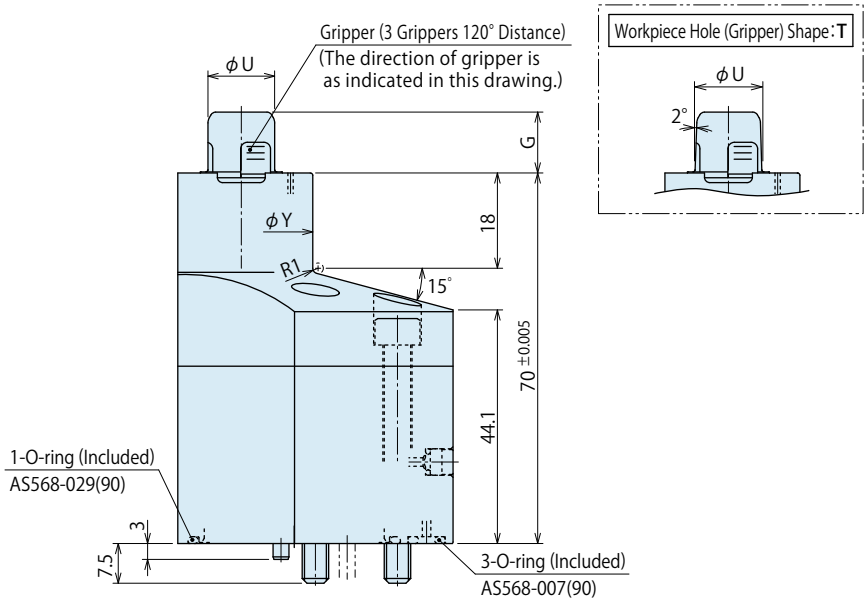
External Dimensions

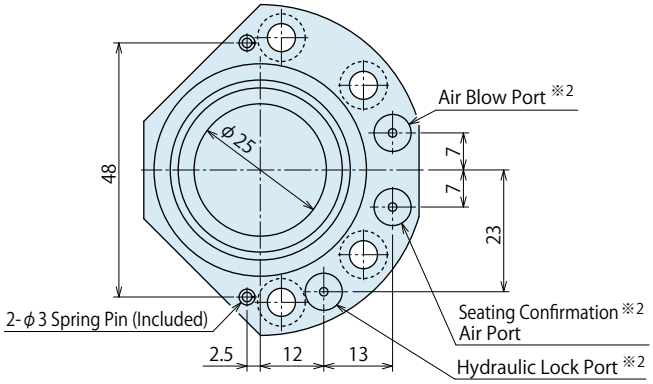
※This drawing shows the released state of SFC2000-G0A-□.



※ Expanding Area Detail







Notes:

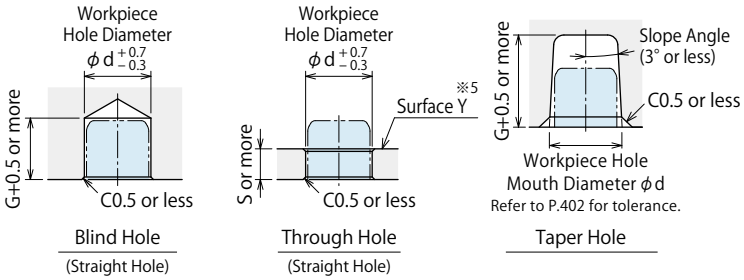
※1. The workpiece must be resting on all seating surfaces when clamping. If this is not done the workpiece can be deformed by the clamping force.

※2. The port names are marked on the product surface. (HYD:Hydraulic Lock Port, FC:Seating Confirmation Air Port, BLOW:Air Blow Port) Continuously supply air pressure to the air blow port and the seating confirmation air port.

※3. The numerical value is only for the workpiece lifting option.

※4. For **-T**:Taper Hole option, the first gripper ridge is the reference diameter.

Workpiece (Pallet) Hole Dimensions

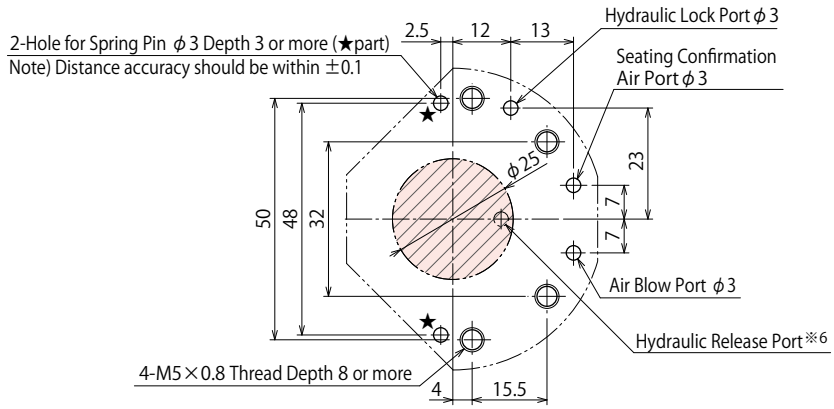


Notes:

1. Thin wall around the workpiece hole could be deformed by clamping action, and clamping force will not fill the specification.
   Please make sure to test the clamping function before using and adjust to the appropriate supply of pressure.

※5. When the clamp head is sticking above the surface Y of the workpiece, please make sure there is no interference with the clamp cylinders during machining.

Machining Dimensions of Mounting Area



Notes :
1. There should be no burrs at the hole contact surface.
※6. Please make a hydraulic release port within the range of ▨.

Model No. Indication

SFC 2 00 0 - G0 A N - 115 - Blank T F

1 Body Size (When selecting 2)
2 Design No.
3 Mounting Methods (When selecting G0)
4 Workpiece Lifting Option
5 Workpiece Hole Diameter (Workpiece Hole Code)
6 Shape of Gripper (Workpiece Hole)

External Dimensions and Machining Dimensions for Mounting

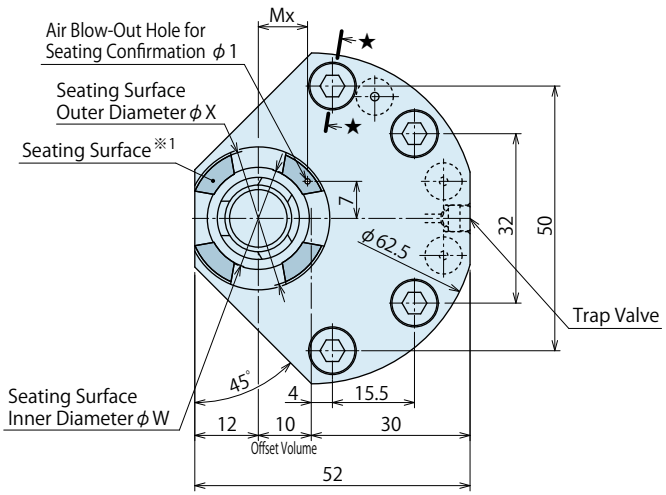
(mm)

Model No.		SFC2000-G0□-□-□								
5 Workpiece Hole Code		090	095	100	105	110	115	120	125	130
Workpiece Hole Diam. ϕd	6 Blank, F※9	$9^{+0.7}_{-0.3}$	$9.5^{+0.7}_{-0.3}$	$10^{+0.7}_{-0.3}$	$10.5^{+0.7}_{-0.3}$	$11^{+0.7}_{-0.3}$	$11.5^{+0.7}_{-0.3}$	$12^{+0.7}_{-0.3}$	$12.5^{+0.7}_{-0.3}$	$13^{+0.7}_{-0.3}$
Clamping Diameter	Released State	8.5	9	9.5	10	10.5	11	11.5	12	12.5
	Empty Action	10.2	10.7	11.2	11.7	12.2	12.7	13.2	13.7	14.2
Allowable Offset (Floating Clearance of Expanding Area)※7		±0.5								
Full Stroke		4.2								
Workpiece Pulling Stroke		1.0								
Workpiece Lifting Stroke※8		0.2								
6 Shape of Gripper Blank, F	G	10	10	10	11.5	11.5	11.5	11.5	11.5	11.5
	S	4.3	4.3	4.3	5.8	5.8	5.8	5.8	5.8	5.8
	U	8.6	9.1	9.6	10.1	10.6	11.1	11.6	12.1	12.6
6 Shape of Gripper T	G	10	10	10	10	11.5	11.5	11.5	11.5	11.5
	S	4.3	4.3	4.3	4.3	5.8	5.8	5.8	5.8	5.8
	U	8.6	9	9.5	10	10.4	10.9	11.4	11.9	12.4
Mx		8	8	8	8	8	8.6	8.6	9.3	9.3
V		11.5	12	12.5	13	13.5	14	14.5	15	15.5
W		15	16	16	17	17	18	18	19	19
X		24	24	24	24	24	25	25	26	26
Y		25	25	25	25	25	26	26	27	27
Weight kg		0.8								

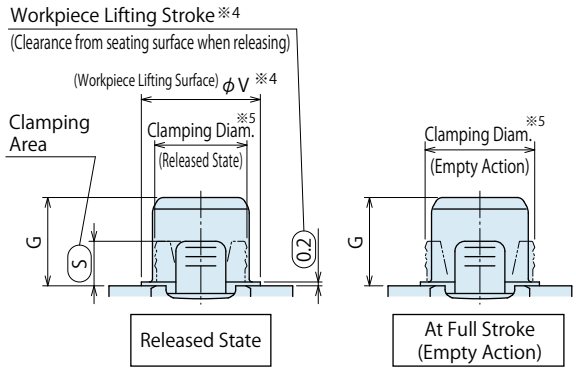
Notes : ※ 7. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of single clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with other location clamps / location cylinders, or when using more than two of these products.
※ 8. Workpiece lifting stroke is the function only for lifting option.
※ 9. For **-T**: Taper Hole option, the allowable tolerance of the hole mouth diameter differs depending on the slope angle. (Refer to P.402.)

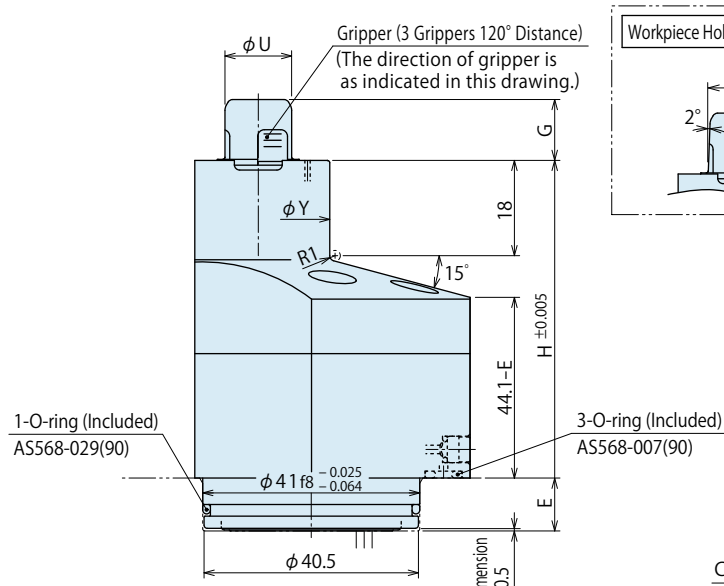
External Dimensions

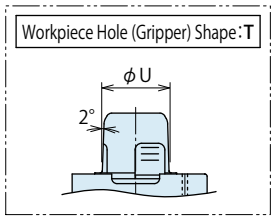
※This drawing shows the released state of SFC2000-M□A-□.

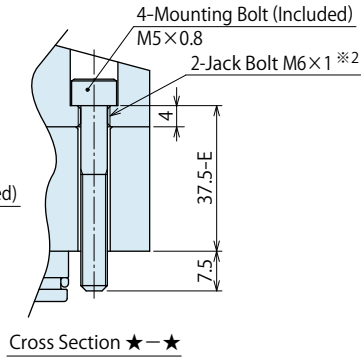


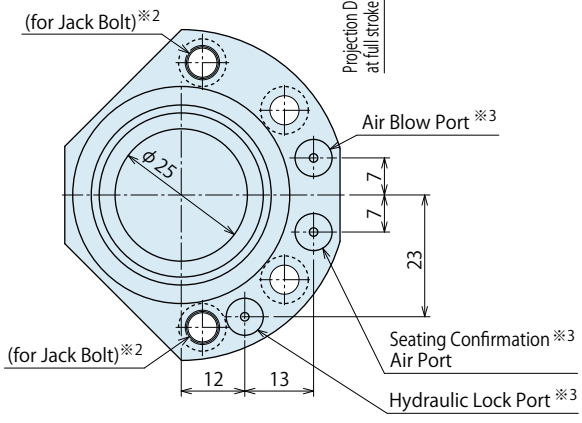
※ Expanding Area Detail











Notes:

※1. The workpiece must be resting on all seating surfaces when clamping. If this is not done the workpiece can be deformed by the clamping force.

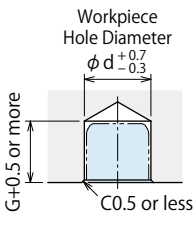
※2. Use jack bolts to remove the product, keeping it parallel to the mounting surface.

※3. The port names are marked on the product surface. (HYD:Hydraulic Lock Port, FC:Seating Confirmation Air Port, BLOW:Air Blow Port) Continuously supply air pressure to the air blow port and the seating confirmation air port.

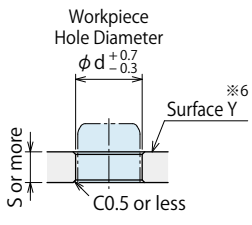
※4. The numerical value is only for the workpiece lifting option.

※5. For -T:Taper Hole option, the first gripper ridge is the reference diameter.

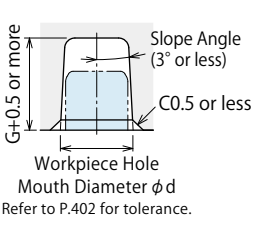
Workpiece (Pallet) Hole Dimensions



Blind Hole
(Straight Hole)



Through Hole
(Straight Hole)



Refer to P.402 for tolerance.

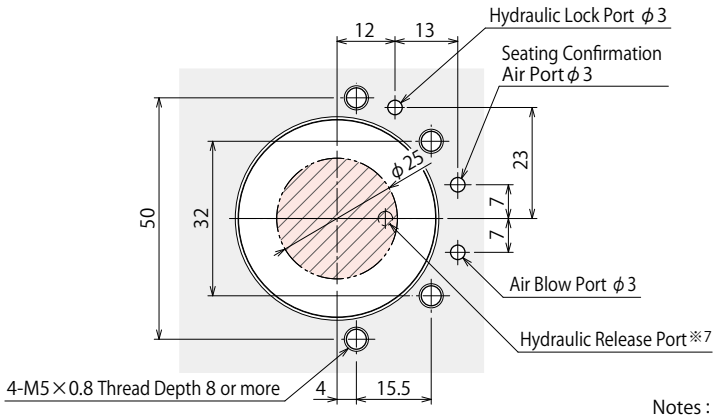
Taper Hole

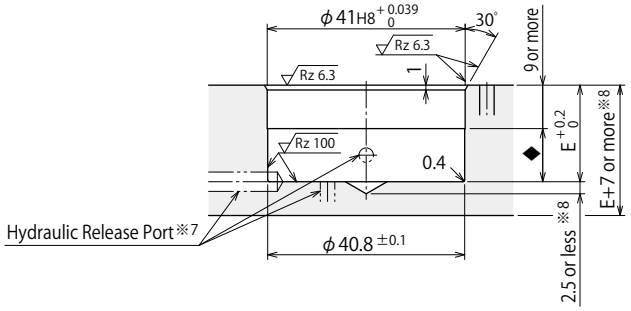
Notes:

1. Thin wall around the workpiece hole could be deformed by clamping action, and clamping force will not fill the specification.
   Please make sure to test the clamping function before using and adjust to the appropriate supply of pressure.

※6. When the clamp head is sticking above the surface Y of the workpiece, please make sure there is no interference with the clamp cylinders during machining.

Machining Dimensions of Mounting Area





Notes :

1. There should be no burrs at the hole contact surface.
2. Please contact us when adding a spacer.

※7. Release hydraulic pressure can be supplied from the side or bottom surface.
Please make a hydraulic release port within ◆ area in the case supplied from the side.
Please make a hydraulic release port within ▨ area in the case supplied from the bottom.

※8. Base thickness and remaining depth of the lower hole machining (2.5mm) is for when the material is S50C.

Model No. Indication

SFC 2 00 0 - M1 / M2 - A / N - 115 - Blank / T / F

1 Body Size (When selecting 2)
2 Design No.
3 Mounting Methods (When selecting M1/M2)
4 Workpiece Lifting Option
5 Workpiece Hole Diameter (Workpiece Hole Code)
6 Shape of Gripper (Workpiece Hole)

External Dimensions and Machining Dimensions for Mounting

(mm)

Model No.		SFC2000–M□□–□–□								
5 Workpiece Hole Code		090	095	100	105	110	115	120	125	130
Workpiece Hole Diam. φd 6 Blank, F※11		$9^{+0.7}_{-0.3}$	$9.5^{+0.7}_{-0.3}$	$10^{+0.7}_{-0.3}$	$10.5^{+0.7}_{-0.3}$	$11^{+0.7}_{-0.3}$	$11.5^{+0.7}_{-0.3}$	$12^{+0.7}_{-0.3}$	$12.5^{+0.7}_{-0.3}$	$13^{+0.7}_{-0.3}$
Clamping Diameter	Released State	8.5	9	9.5	10	10.5	11	11.5	12	12.5
	Empty Action	10.2	10.7	11.2	11.7	12.2	12.7	13.2	13.7	14.2
Allowable Offset (Floating Clearance of Expanding Area)※9		±0.5								
Full Stroke		4.2								
Workpiece Pulling Stroke		1.0								
Workpiece Lifting Stroke※10		0.2								
3 Mounting Method M1	E	10								
	H	60								
3 Mounting Method M2	E	20								
	H	50								
6 Shape of Gripper Blank, F	G	10	10	10	11.5	11.5	11.5	11.5	11.5	11.5
	S	4.3	4.3	4.3	5.8	5.8	5.8	5.8	5.8	5.8
	U	8.6	9.1	9.6	10.1	10.6	11.1	11.6	12.1	12.6
6 Shape of Gripper T	G	10	10	10	10	11.5	11.5	11.5	11.5	11.5
	S	4.3	4.3	4.3	4.3	5.8	5.8	5.8	5.8	5.8
	U	8.6	9	9.5	10	10.4	10.9	11.4	11.9	12.4
Mx		8	8	8	8	8	8.6	8.6	9.3	9.3
V		11.5	12	12.5	13	13.5	14	14.5	15	15.5
W		15	16	16	17	17	18	18	19	19
X		24	24	24	24	24	25	25	26	26
Y		25	25	25	25	25	26	26	27	27
Weight kg	3 Mounting Method M1	0.7								
	3 Mounting Method M2	0.7								

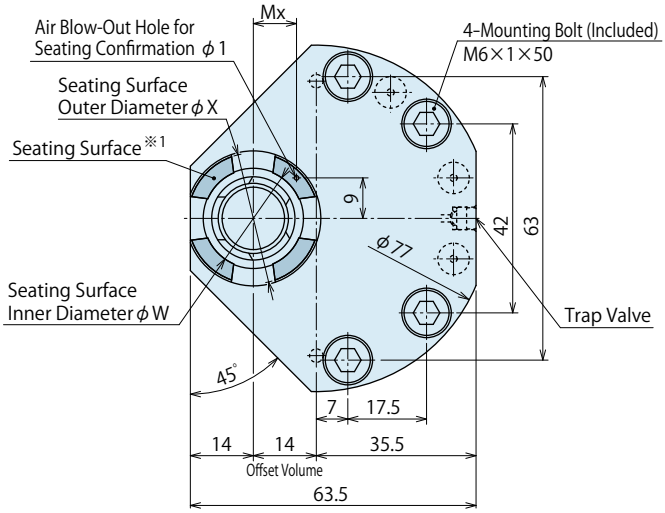
Notes : ※9. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of single clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with other location clamps / location cylinders, or when using more than two of these products.

※10. Workpiece lifting stroke is the function only for lifting option.

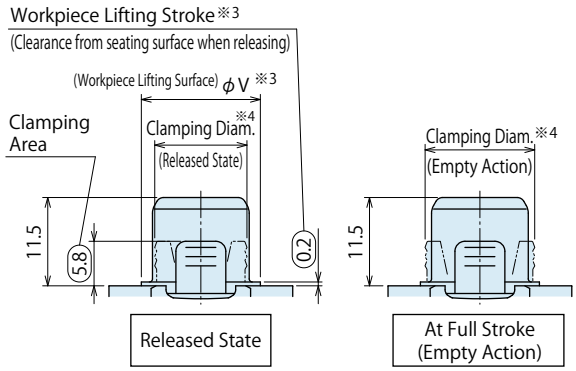
※11. For **-T**: Taper Hole option, the allowable tolerance of the hole mouth diameter differs depending on the slope angle. (Refer to P.402.)

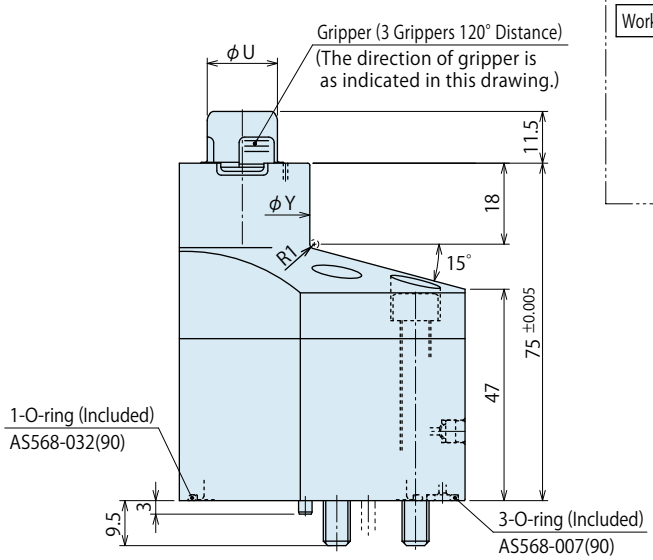
External Dimensions

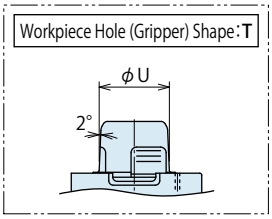
※This drawing shows the released state of SFC3000-G0A-□.

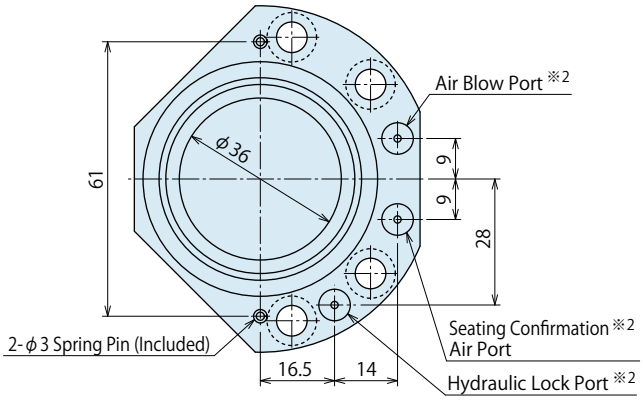


※ Expanding Area Detail









Notes:

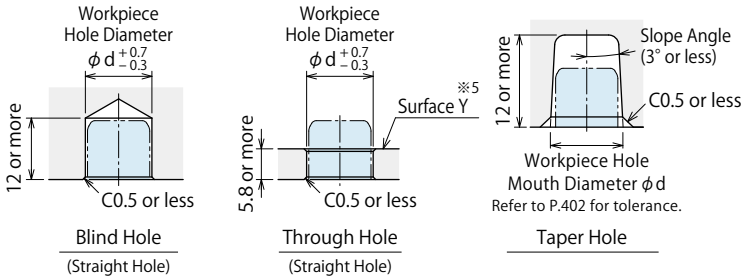
※1. The workpiece must be resting on all seating surfaces when clamping. If this is not done the workpiece can be deformed by the clamping force.

※2. The port names are marked on the product surface. (HYD:Hydraulic Lock Port, FC:Seating Confirmation Air Port, BLOW:Air Blow Port) Continuously supply air pressure to the air blow port and the seating confirmation air port.

※3. The numerical value is only for the workpiece lifting option.

※4. For **-T**:Taper Hole option, the first gripper ridge is the reference diameter.

Workpiece (Pallet) Hole Dimensions

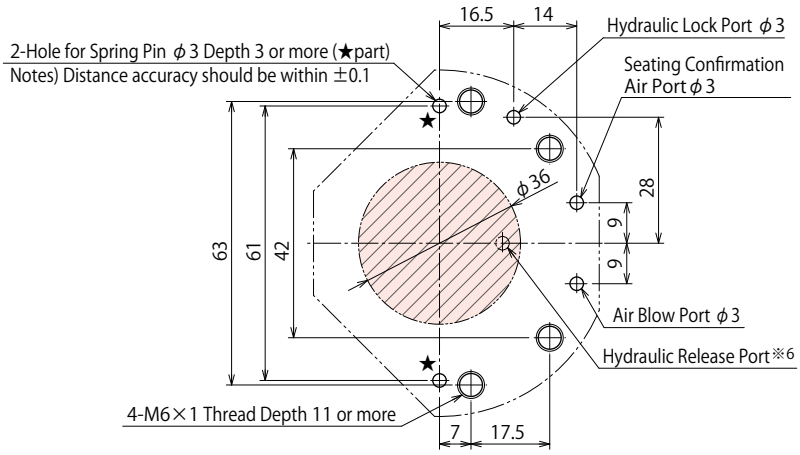


Notes:

1. Thin wall around the workpiece hole could be deformed by clamping action, and clamping force will not fill the specification.
   Please make sure to test the clamping function before using and adjust to the appropriate supply of pressure.

※5. When the clamp head is sticking above the surface Y of the workpiece, please make sure there is no interference with the clamp cylinders during machining.

Machining Dimensions of Mounting Area



Notes :

1. There should be no burrs at the hole contact surface.

※6. Please make a hydraulic release port within the range of ▨.

Model No. Indication

SFC 3 00 0 - G0 A N - 150 - Blank T F

1 Body Size (When selecting 3)
2 Design No.
3 Mounting Methods (When selecting G0)
4 Workpiece Lifting Option
5 Workpiece Hole Diameter (Workpiece Hole Code)
6 Shape of Gripper (Workpiece Hole)

External Dimensions and Machining Dimensions for Mounting

(mm)

Model No.		SFC3000–G0□–□–□						
5 Workpiece Hole Code		130	135	140	145	150	155	160
Workpiece Hole Diam. φd	6 Blank, F※9	$13^{+0.7}_{-0.3}$	$13.5^{+0.7}_{-0.3}$	$14^{+0.7}_{-0.3}$	$14.5^{+0.7}_{-0.3}$	$15^{+0.7}_{-0.3}$	$15.5^{+0.7}_{-0.3}$	$16^{+0.7}_{-0.3}$
Clamping Diameter	Released State	12.5	13	13.5	14	14.5	15	15.5
	Empty Action	14.2	14.7	15.2	15.7	16.2	16.7	17.2
Allowable Offset (Floating Clearance of Expanding Area)※7		±0.5						
Full Stroke		4.2						
Workpiece Pulling Stroke		1.0						
Workpiece Lifting Stroke※8		0.2						
U	6 Blank, F	12.6	13.1	13.6	14.1	14.6	15.1	15.6
	6 T	12.4	12.9	13.4	13.9	14.4	14.9	15.4
Mx		8.8	8.8	8.8	8.8	8.8	9.6	9.6
V		15.5	16	16.5	17	17.5	18	18.5
W		19	20	20	21	21	22	22
X		28	28	28	28	28	29	29
Y		29	29	29	29	29	30	30
Weight kg		1.4						

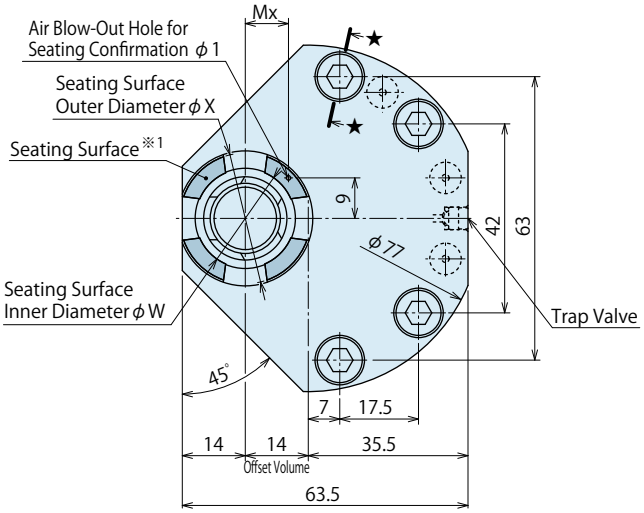
Notes : ※ 7. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of single clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with other location clamps / location cylinders, or when using more than two of these products.

※ 8. Workpiece lifting stroke is the function only for lifting option.

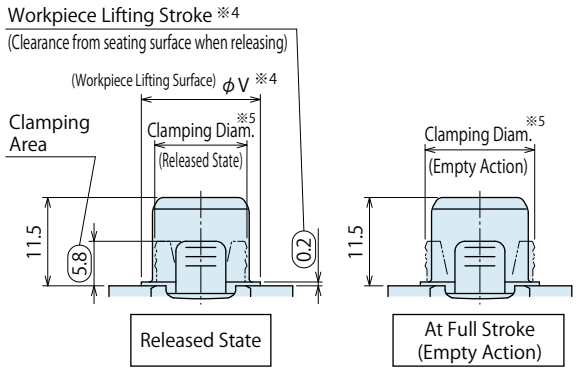
※ 9. For **-T**:Taper Hole option, the allowable tolerance of the hole mouth diameter differs depending on the slope angle. (Refer to P.402.)

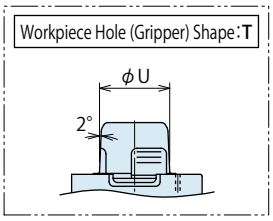
External Dimensions

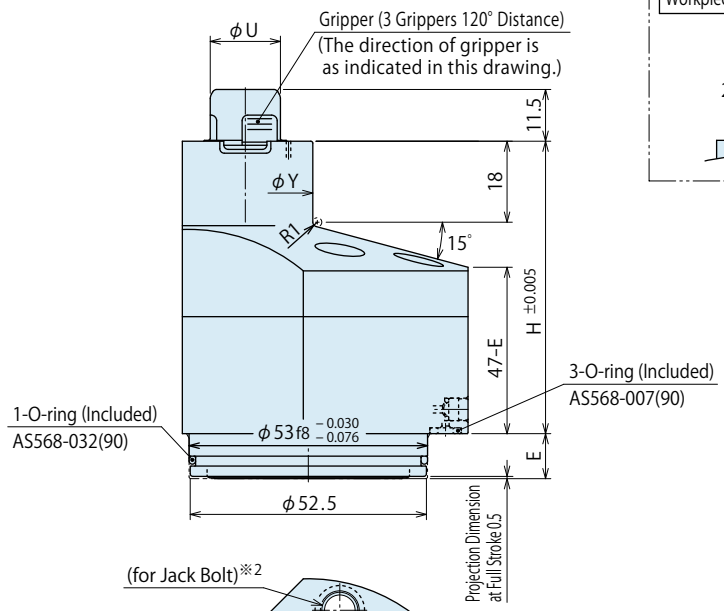
※This drawing shows the released state of SFC3000-M□A-□.

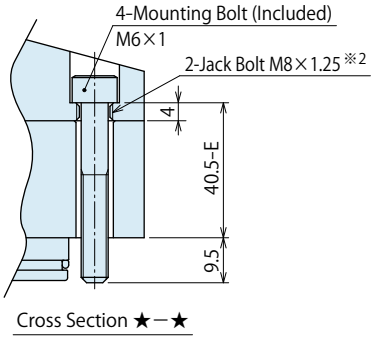


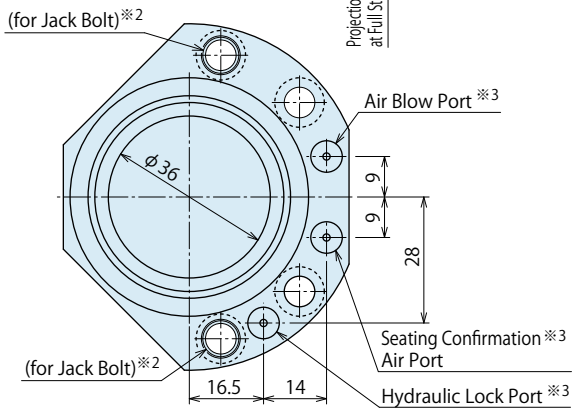
※ Expanding Area Detail











Notes:

※1. The workpiece must be resting on all seating surfaces when clamping. If this is not done the workpiece can be deformed by the clamping force.

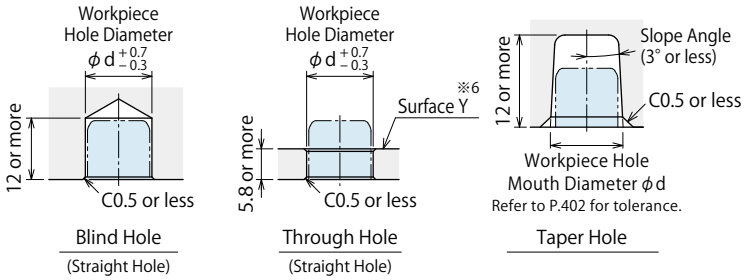
※2. Use jack bolts to remove the product, keeping it parallel to the mounting surface.

※3. The port names are marked on the product surface. (HYD:Hydraulic Lock Port, FC:Seating Confirmation Air Port, BLOW:Air Blow Port) Continuously supply air pressure to the air blow port and the seating confirmation air port.

※4. The numerical value is only for the workpiece lifting option.

※5. For -T:Taper Hole option, the first gripper ridge is the reference diameter.

Workpiece (Pallet) Hole Dimensions

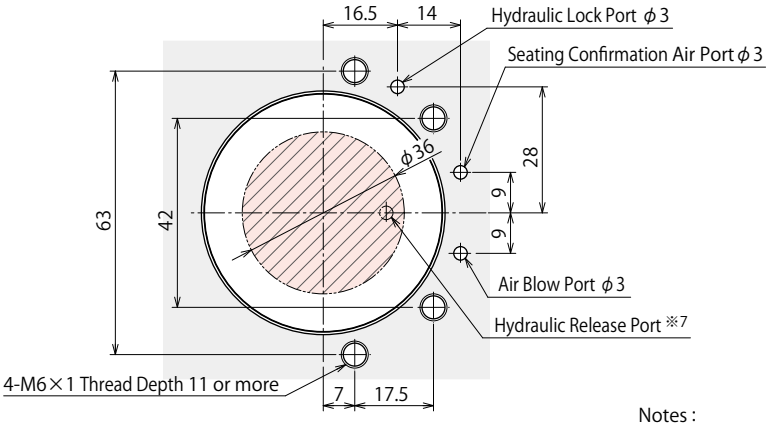


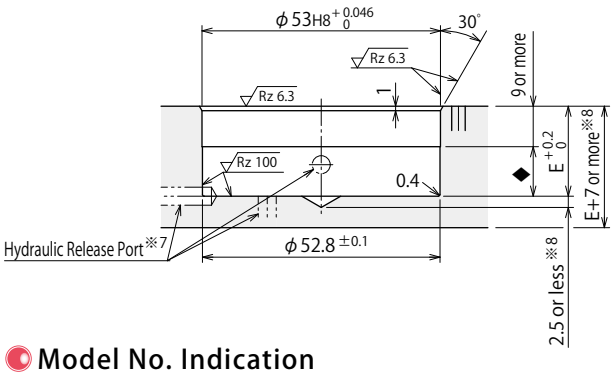
Notes:

1. Thin wall around the workpiece hole could be deformed by clamping action, and clamping force will not fill the specification.
Please make sure to test the clamping function before using and adjust to the appropriate supply of pressure.

※6. When the clamp head is sticking above the surface Y of the workpiece, please make sure there is no interference with the clamp cylinders during machining.

Machining Dimensions of Mounting Area





Notes :

1. There should be no burrs at the hole contact surface.
2. Please contact us when adding a spacer.

※7. Release hydraulic pressure can be supplied from the side or bottom surface.
Please make a hydraulic release port within ◆ area in the case supplied from the side.
Please make a hydraulic release port within ▨ area in the case supplied from the bottom.

※8. Base thickness and remaining depth of the lower hole machining (2.5mm) is for when the material is S50C.

Model No. Indication

SFC 3 00 0 - M1 / M2 - A / N - 150 - Blank / T / F

1 Body Size (When selecting 3)
2 Design No.
3 Mounting Methods (When selecting M1/M2)
4 Workpiece Lifting Option
5 Workpiece Hole Diameter (Workpiece Hole Code)
6 Shape of Gripper (Workpiece Hole)

External Dimensions and Machining Dimensions for Mounting

(mm)

Model No.		SFC3000–M□□–□–□						
5 Workpiece Hole Code		130	135	140	145	150	155	160
Workpiece Hole Diam. φd	6 Blank, F ※11	$13^{+0.7}_{-0.3}$	$13.5^{+0.7}_{-0.3}$	$14^{+0.7}_{-0.3}$	$14.5^{+0.7}_{-0.3}$	$15^{+0.7}_{-0.3}$	$15.5^{+0.7}_{-0.3}$	$16^{+0.7}_{-0.3}$
Clamping Diameter	Released State	12.5	13	13.5	14	14.5	15	15.5
	Empty Action	14.2	14.7	15.2	15.7	16.2	16.7	17.2
Allowable Offset (Floating Clearance of Expanding Area) ※9		±0.5						
Full Stroke		4.2						
Workpiece Pulling Stroke		1.0						
Workpiece Lifting Stroke ※10		0.2						
3 Mounting Method M1	E	10						
	H	65						
3 Mounting Method M2	E	20						
	H	55						
U	6 Blank, F	12.6	13.1	13.6	14.1	14.6	15.1	15.6
	6 T	12.4	12.9	13.4	13.9	14.4	14.9	15.4
Mx		8.8	8.8	8.8	8.8	8.8	9.6	9.6
V		15.5	16	16.5	17	17.5	18	18.5
W		19	20	20	21	21	22	22
X		28	28	28	28	28	29	29
Y		29	29	29	29	29	30	30
Weight kg	3 Mounting Method M1	1.3						
	3 Mounting Method M2	1.2						

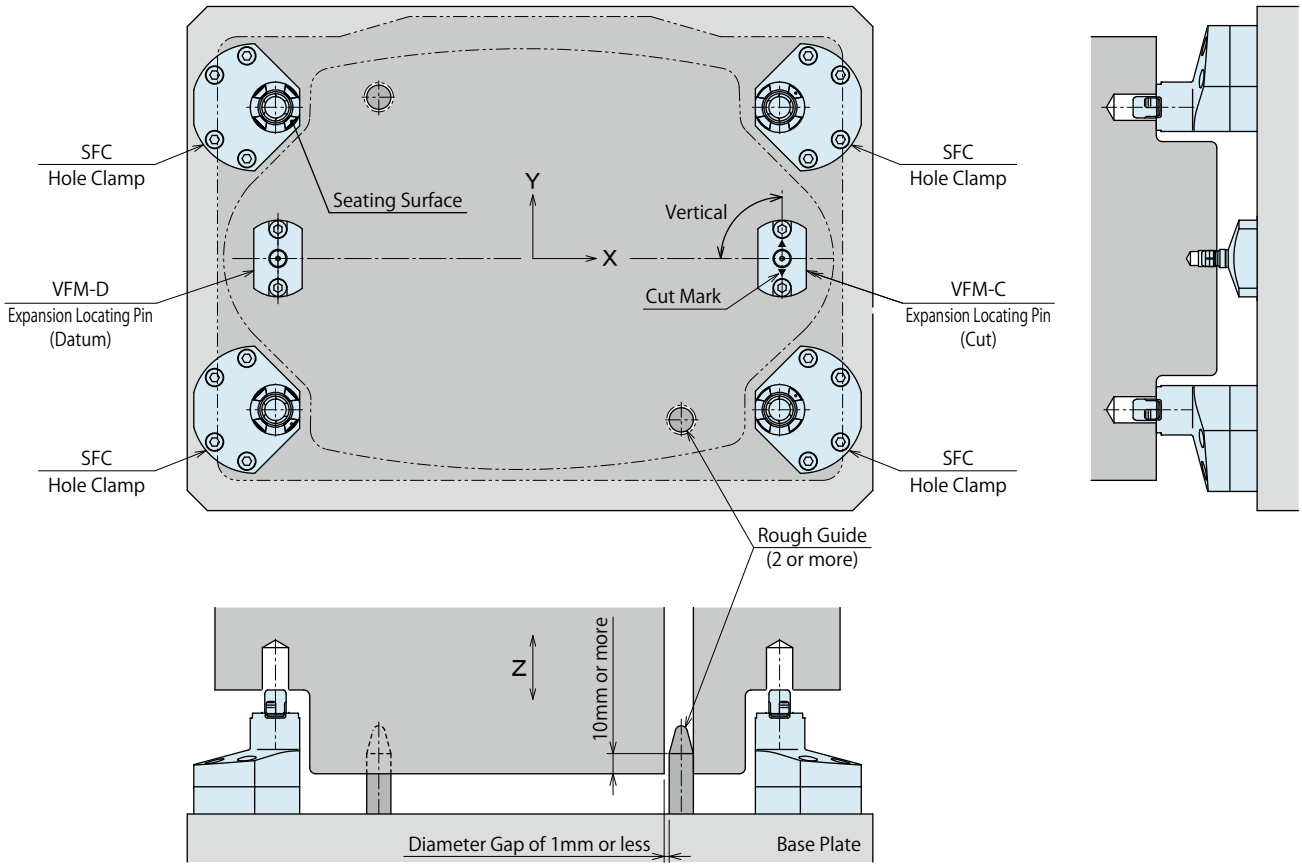
Notes : ※9. The clamping part is an adjusting structure and the clamping operation is done by locating the workpiece hole. The numerical value in the table shows the amount of tolerance value of single clamp. Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with other location clamps / location cylinders, or when using more than two of these products.

※10. Workpiece lifting stroke is the function only for lifting option.

※11. For **-T**: Taper Hole option, the allowable tolerance of the hole mouth diameter differs depending on the slope angle. (Refer to P.402.)

Mounting Layout Sample

※This drawing shows a combination layout sample of SFC (Hole Clamp) and VFM (Expansion Locating Pin).



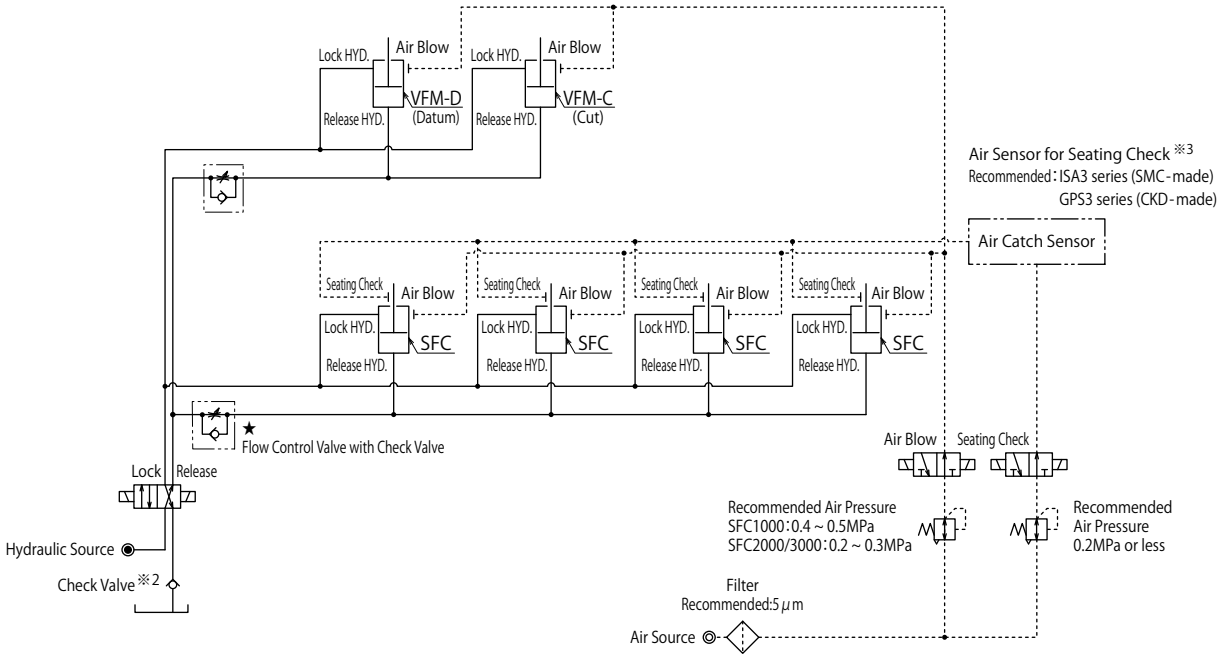
Notes :

1. In order to prevent the clamping part from damage, please set up rough guide of 2 or more when detaching a workpiece.
   Please refer to the above drawing for the length of rough guide and the diameter gap.
   (Use of rough guides depends on the loading / unloading condition of the workpiece.)
2. When using a combination of VFM (Expansion Locating Pin) and SFC (Hole Clamp), please choose N：without lift function.

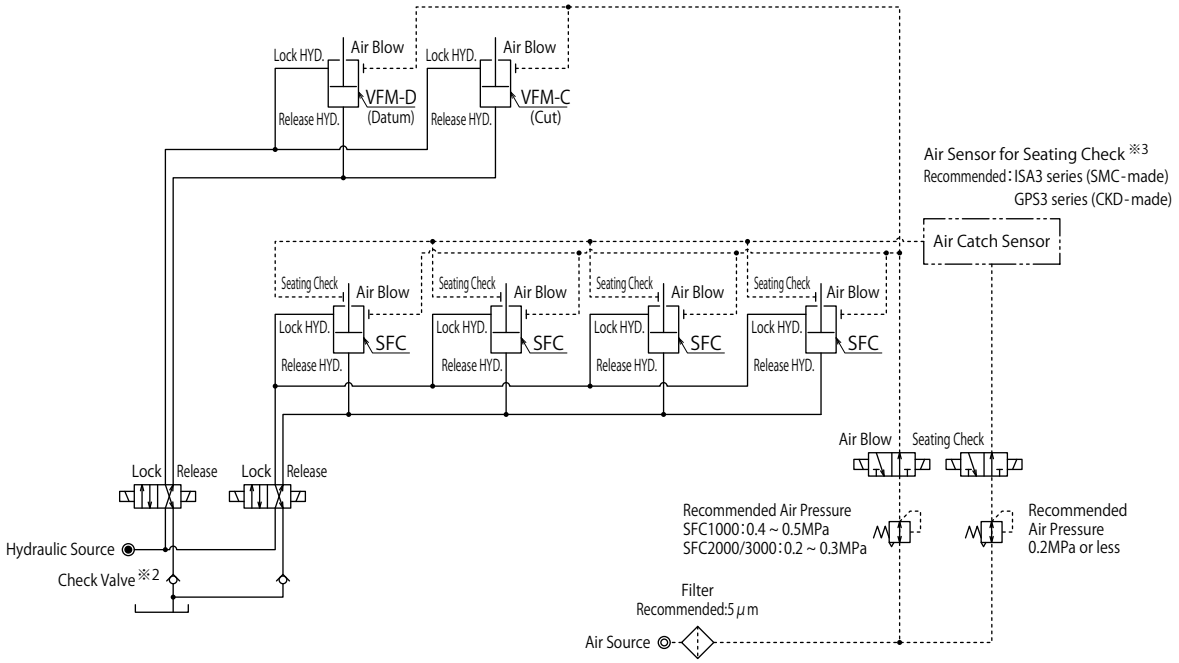
Hydraulic and Pneumatic Circuit Reference

※ This drawing shows a combination circuit reference of SFC (Hole Clamp) and VFM (Expansion Locating Pin).

When controlled with one solenoid valve



When controlled with two solenoid valves



Notes:

※1. Please use solenoid valve to make a sequence operation that SFC (Hole Clamp) starts working after VFM (Expansion Locating Pin) completes the movement. When unable to use solenoid valve, please prepare flow control valve with check valve at ★(1 piece) to adjust sequencing speed. If SFC operates before VFM, there is a possibility for the equipment to be damaged due to a thrust load on SFC.

※2. Expanded VFM cylinder sometimes releases (unclamps) due to a back pressure of tank-port. Please prepare check valve (recommend cracking pressure: less than 0.04MPa).

※3. In case high accuracy is required for air sensor setting, please install an air sensor for individual clamp.

Cautions

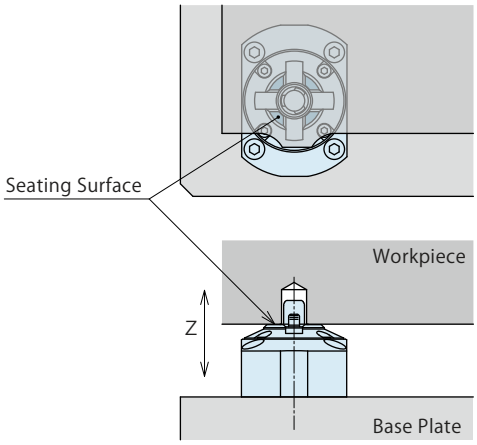
Notes for Design

1) Check Specifications

- Please use each product according to the specifications.
- This product is hydraulic double-acting model which locks and releases with hydraulic pressure.

2) Working Reference Plate (Seating Surface) Z axis.

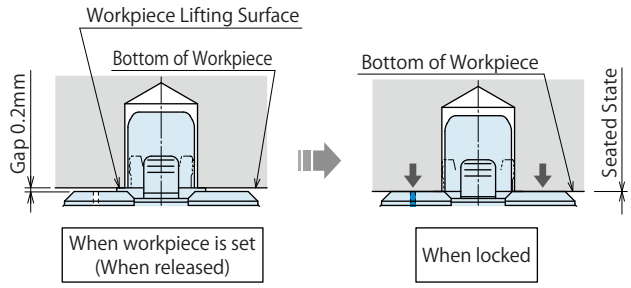
- The upper surface of the flange of this product is the seating surface of workpiece and locates in Z direction.



When clamping, make sure all seating surfaces touch a workpiece. When the workpiece is not touching the seating surface area, please refer to external dimension chart and calculate contacting pressure with clamping force and seating area not to deform the workpiece.

3) Seating Confirmation Mechanism

- It will be detected when a workpiece is pressed against the seating surface by locking (clamping) action.



With lifting function, when workpiece is set (before supplying lock hydraulic pressure), the workpiece is lifted up by built-in spring, and there will be a gap of 0.2mm between workpiece bottom surface and seating surface.

4) Clamp Installation

- The clamping part of this product has floating structure (±0.5mm). Please consider the center distance accuracy of each clamping installation part and each workpiece hole when used with other location clamps / location cylinders, or when using more than two of these products.

5) Clamping Force

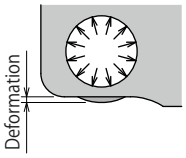
- Clamping force shows a pressing force against the seating surface.
  Make sure to conduct test clamping and adjust supply pressure accordingly. Insufficient clamping force and/or expanding force leads to workpiece detachment.

6) Workpiece hole size, slope angle and workpiece hardness should be within the range of the specification.

When workpiece hole diameter is larger than specification.	Expansion stroke is insufficient and the clamping force will not fill the specifications.
When using it with insufficient clamping force.	Leads to falling of the workpiece.
When workpiece hole diameter is smaller than specification.	Difficult to attach/detach the workpiece leading to damage.
When workpiece hole depth is shallow.	May lead to abnormal seating and damage.
When workpiece hole taper slope angle is larger than specification.	The load concentrates on the gripper point when clamping and could lead to damage.
When workpiece hole is harder than specified.	Gripper does not dig into the workpiece enough and it cannot clamp securely.

7) Wall Thickness around Workpiece Hole

- Thin wall around the workpiece hole could be deformed by clamping action, and clamping force does not fill the specification. Make sure to conduct test clamping and adjust supply pressure accordingly. Insufficient clamping force leads to workpiece detachment.



8) Air Blow Port and Seating Confirmation Port

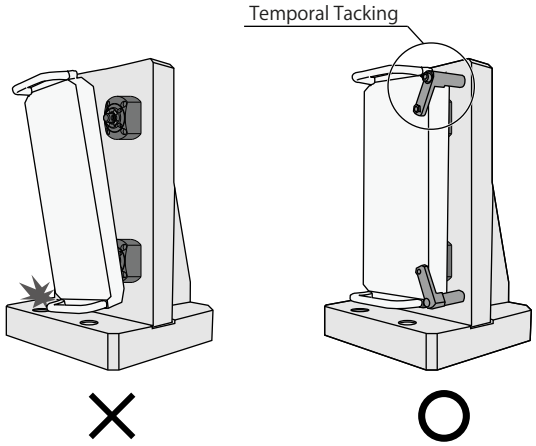
- Continuously supply air pressure to the air blow port and the seating confirmation port.
  If air supply is shut off during operation, contaminants enter into the clamp leading to malfunctions.

9) Release Confirmation Air Port

- The trap valve makes an exhaust sound during the locking (clamping) operation, but this is not abnormal.

10) Release Action

- When releasing, it lifts up a workpiece which is normal. When using in a horizontal application, it is recommended to install a fall prevention of workpiece for temporal tacking.



11) Horizontal Locating

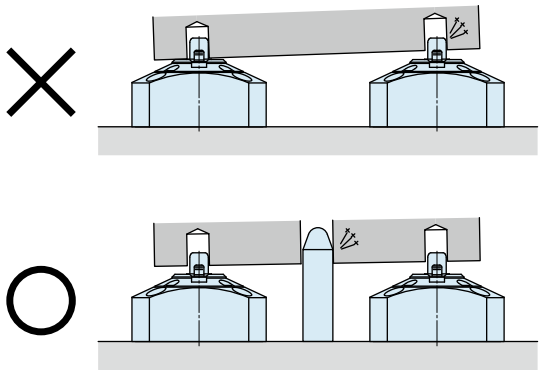
- When a workpiece is set, please make sure there is no lifting or slope of the workpiece. If the clamping operation is done with lifting or slope of the workpiece, it will lead to possible damage of a clamp and deformation of the workpiece hole.

12) Please detach a workpiece with all clamps fully released.

- When a workpiece is detached during lock or release operation, it will lead to damage of clamp or fall of workpiece.

13) Please set up rough guides.

- When detaching a workpiece with slope it may cause damage of clamp or fall of workpiece.



When using the product with other location clamps / cylinders, please set rough guides considering the center distance accuracy of each mounting hole and workpiece hole of location clamp / cylinders.

Cautions

Installation Notes

1) Check the Usable Fluid

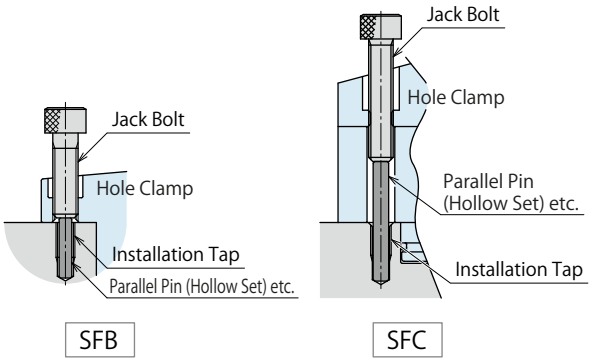
● Please use the appropriate fluid by referring to the Hydraulic Fluid List (P. 1355).

2) Installation / Removal of Hole Clamp

● Use four hexagonal socket bolts for mounting (with tensile strength of 12.9) and tighten them with the torque shown in the table below. Tighten them evenly to prevent twisting or jamming.

Model No.	Thread Size	Tightening Torque (N·m)
SFB0600	M4×0.7	3.2
SFB/SFC1000	M4×0.7	3.2
SFB/SFC2000	M5×0.8	6.3
SFB/SFC3000	M6	10.0

● When removing a hole clamp of mounting length 10mm/20mm, use thread for jack bolt (SFB : 4 mounting bolt holes, SFC : 2 mounting bolt holes), in order not to damage the installation tap. The following shows the case in which the parallel pin (hollow set) is set in the tapped hole so that the installation tap will not be damaged.



3) Port Position of the Hole Clamp

● The port names are marked on the product surface.
Be careful of installation direction.
(HYD：Hydraulic Lock Port, FC：Seating Confirmation Air Port, BLOW：Air Blow Port, SENSOR：Release Confirmation Air Port)
Release pressure is supplied from the bottom of cylinder.

4) Use air piping with outer diameter ϕ6 (inner diameter ϕ4) or larger for air blow.

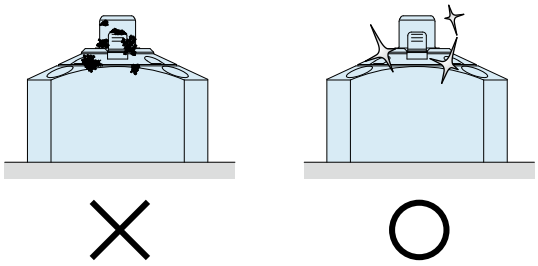
● In order to conduct an effective air blow, it is recommended to use air piping with outer diameter ϕ6 (inner diameter ϕ4) or larger.

Maintenance and Inspection

1) Please refer to P.1357 for general maintenance.

2) Regularly clean the clamping part and the seating surface.

● There is an air blow mechanism in this product, and cutting chips and coolant can be removed. However, as it may be hard to remove clinging cutting chips, sludge, etc., please confirm there are no contaminants when a workpiece is set.
If operating with dirt adhering to the clamping part, it will lead to a workpiece fall due to insufficient clamping force, defective operation, and oil leakage etc.



Even with general cleaning on exterior of hole clamp, there may be contaminants within internal parts of the component.
If necessary, please call us for repair.
If repair or modifications are carried out by anyone other than Kosmek, or without our approval or confirmation, it will void warranty.

3) Clamping force will be decreased by friction of a gripper surface due to repeated operation.
Replacement period differs depending on operating air pressure, workpiece material and shape of hole. When you find friction on gripper surface, the gripper needs to be replaced. Please contact us for overhaul.

Material of Clamping Hole	Gripper Replacement Frequency Guide
A2017 Aluminum	Locking operation 1 million cycles
SCM435 Thermal Refined Steel	Locking operation 500,000 cycles

※ It varies depending on the operating conditions. Please request an overhaul after confirming its suitability for the actual machine.

※ Please refer to P.1355 for common cautions. • Installation Notes • Hydraulic Fluid List • Notes on Hydraulic Cylinder Speed Control Circuit • Notes on Handling • Maintenance/Inspection • Warranty

MEMO

Cautions

Installation Notes (For Hydraulic Series)

1) Check the Usable Fluid

- Please use the appropriate fluid by referring to the Hydraulic Fluid List.

2) Procedure before Piping

- The pipeline, piping connector and fixture circuits should be cleaned by thorough flushing.
- The dust and cutting chips in the circuit may lead to fluid leakage and malfunction.
- There is no filter provided with Kosmek's product except for a part of valves which prevents foreign materials and contaminants from getting into the circuit.

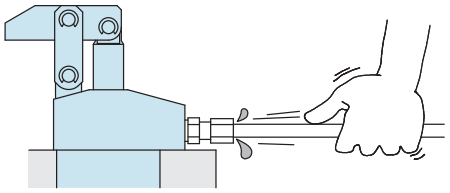
3) Applying Sealing Tape

- Wrap with tape 1 to 2 times following the screw direction.
- Pieces of the sealing tape can lead to oil leakage and malfunction.
- Please implement piping construction in a clear environment to prevent anything getting in products.

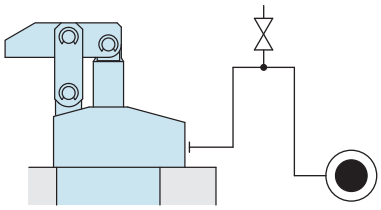
4) Air Bleeding of the Hydraulic Circuit

- If the hydraulic circuit has excessive air, the action time may become very long. If air enters the circuit after connecting the hydraulic port or under the condition of no air in the oil tank, please perform the following steps.

① Reduce hydraulic pressure to less than 2MPa.
② Loosen the cap nut of pipe fitting closest to the clamp by one full turn.
③ Shake the pipeline to loosen the outlet of pipe fitting.
Hydraulic fluid mixed with air comes out.



④ Tighten the cap nut after bleeding.
⑤ It is more effective to release air at the highest point inside the circuit or at the end of the circuit.
(Set an air bleeding valve at the highest point inside the circuit.)



5) Checking Looseness and Retightening

- At the beginning of the machine installation, the bolt and nut may be tightened lightly. Check the looseness and re-tighten as required.

Hydraulic Fluid List

ISO Viscosity Grade ISO-VG-32

Maker	Anti-Wear Hydraulic Oil	Multi-Purpose Hydraulic Oil
Showa Shell Sekiyu	Tellus S2 M 32	Morlina S2 B 32
Idemitsu Kosan	Daphne Hydraulic Fluid 32	Daphne Super Multi Oil 32
JX Nippon Oil & Energy	Super Hyrando 32	Super Mulpus DX 32
Cosmo Oil	Cosmo Hydro AW32	Cosmo New Mighty Super 32
ExxonMobil	Mobil DTE 24	Mobil DTE 24 Light
Matsumura Oil	Hydol AW-32	
Castrol	Hyspin AWS 32	

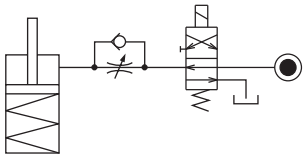
Note : Please contact manufacturers when customers require products in the list above.

Notes on Hydraulic Cylinder Speed Control Unit

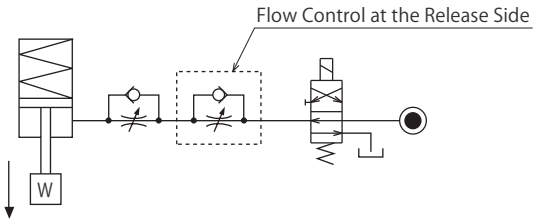
Please pay attention to the cautions below. Design the hydraulic circuit for controlling the action speed of hydraulic cylinder. Improper circuit design may lead to malfunctions and damages. Please review the circuit design in advance.

Flow Control Circuit for Single Acting Cylinder

For spring return single acting cylinders, restricting flow during release can extremely slow down or disrupt release action. The preferred method is to control the flow during the lock action using a valve that has free-flow in the release direction. It is also preferred to provide a flow control valve at each actuator.



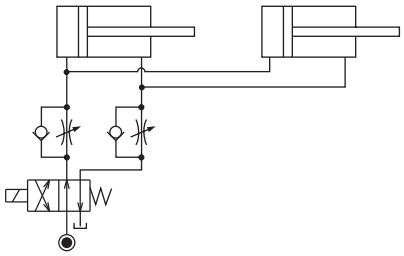
Accelerated clamping speed by excessive hydraulic flow to the cylinder may sustain damage. In this case add flow control to regulate flow. (Please add flow control to release flow if the lever weight is put on at the time of release action when using swing clamps.)



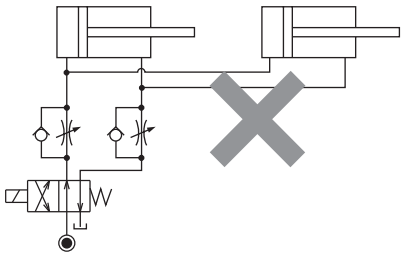
Flow Control Circuit for Double Acting Cylinder

Flow control circuit for double acting cylinder should have meter-out circuits for both the lock and release sides. Meter-in control can have adverse effect by presence of air in the system.
However, in the case of controlling LKE, TMA, TLA, both lock side and release side should be meter-in circuit.
Refer to P.75 for speed adjustment of LKE.
For TMA and TLA, if meter-out circuit is used, abnormal high pressure is created, which causes oil leakage and damage.

【Meter-out Circuit】(Except LKE/TMA/TLA)

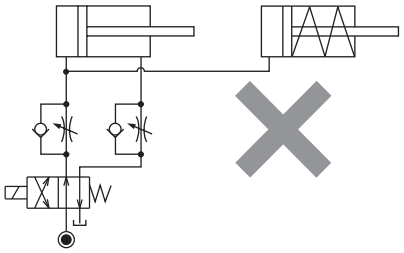


【Meter-in Circuit】(LKE/TMA/TLA must be controlled with meter-in.)



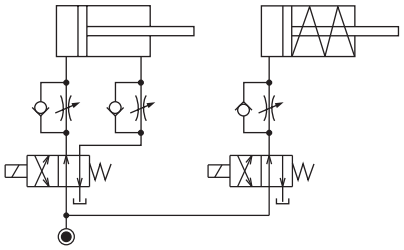
In the case of meter-out circuit, the hydraulic circuit should be designed with the following points.

① Single acting components should not be used in the same flow control circuit as the double acting components.
The release action of the single acting cylinders may become erratic or very slow.

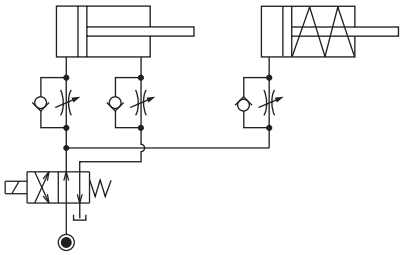


Refer to the following circuit when both the single acting cylinder and double acting cylinder are used together.

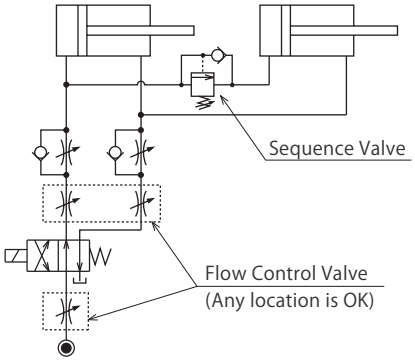
○ Separate the control circuit.



○ Reduce the influence of double acting cylinder control unit.
However, due to the back pressure in tank line, single action cylinder is activated after double action cylinder works.



② In the case of meter-out circuit, the inner circuit pressure may increase during the cylinder action because of the fluid supply. The increase of the inner circuit pressure can be prevented by reducing the supplied fluid beforehand via the flow control valve. Especially when using sequence valve or pressure switches for clamping detection. If the back pressure is more than the set pressure then the system will not work as it is designed to.



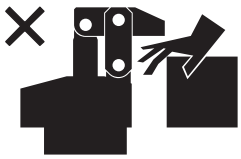
Cautions

Notes on Handling

1) It should be operated by qualified personnel.
- The hydraulic machine and air compressor should be operated and maintained by qualified personnel.

2) Do not operate or remove the product unless the safety protocols are ensured.
① The machine and equipment can only be inspected or prepared when it is confirmed that the safety devices are in place.
② Before the product is removed, make sure that the above-mentioned safety devices are in place. Shut off the pressure and power source, and make sure no pressure exists in the air and hydraulic circuits.
③ After stopping the product, do not remove until the temperature drops.
④ Make sure there is no abnormality in the bolts and respective parts before restarting the machine or equipment.

3) Do not touch a clamp (cylinder) while it is working.
Otherwise, your hands may be injured due to clinching.

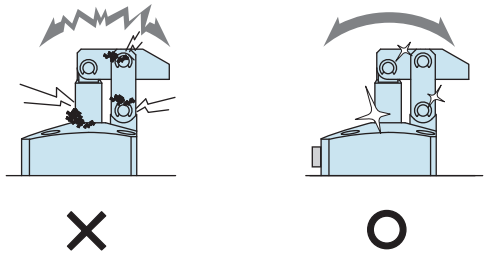


4) Do not disassemble or modify.
- If the equipment is taken apart or modified, the warranty will be voided even within the warranty period.

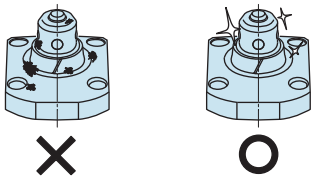
Maintenance and Inspection

1) Removal of the Machine and Shut-off of Pressure Source
- Before the machine is removed, make sure that safety devices and preventive devices are in place. Shut off the pressure and power source, and make sure no pressure exists in the air and hydraulic circuits.
- Make sure there is no abnormality in the bolts and respective parts before restarting.

2) Regularly clean the area around the piston rod and plunger.
- If it is used when the surface is contaminated with dirt, it may lead to packing seal damage, malfunctioning and fluid leakage.



3) Please clean out the reference surfaces on a regular basis (taper reference surface and seating surface) of the locating products. (VS/VT/VFL/VFM/VFJ/VFK/WVS/VWM/VWK/VX/VXE/VXF)
- The locating products, except VX/VXE/VXF model, can remove contaminants with cleaning functions. However, hardened cutting chips, adhesive coolant and others may not be removed. Make sure there are no contaminants before installing a workpiece/pallet.
- Continuous use with contaminant on components will lead to locating accuracy failure, malfunction and fluid leakage.



4) If disconnecting by couplers, air bleeding should be carried out on a regular basis to avoid air mixed in the circuit.

5) Regularly tighten nut, bolt, pin, cylinder, pipe line and others to ensure proper use.

6) Make sure the hydraulic fluid has not deteriorated.

7) Make sure there is a smooth action without an irregular noise.
- Especially when it is restarted after left unused for a long period, make sure it can be operated correctly.

8) The products should be stored in the cool and dark place without direct sunshine or moisture.

9) Please contact us for overhaul and repair.

Warranty

1) Warranty Period

- The product warranty period is 18 months from shipment from our factory or 12 months from initial use, whichever is earlier.

2) Warranty Scope

- If the product is damaged or malfunctions during the warranty period due to faulty design, materials or workmanship, we will replace or repair the defective part at our expense.
  Defects or failures caused by the following are not covered.

① If the stipulated maintenance and inspection are not carried out.
② If the product is used while it is not suitable for use based on the operator's judgment, resulting in defect.
③ If it is used or operated in an inappropriate way by the operator. (Including damage caused by the misconduct of the third party.)
④ If the defect is caused by reasons other than our responsibility.
⑤ If repair or modifications are carried out by anyone other than Kosmek, or without our approval and confirmation, it will void warranty.
⑥ Other caused by natural disasters or calamities not attributable to our company.
⑦ Parts or replacement expenses due to parts consumption and deterioration.
(Such as rubber, plastic, seal material and some electric components.)

Damages excluding from direct result of a product defect shall be excluded from the warranty.

Sales Offices

Sales Offices across the World

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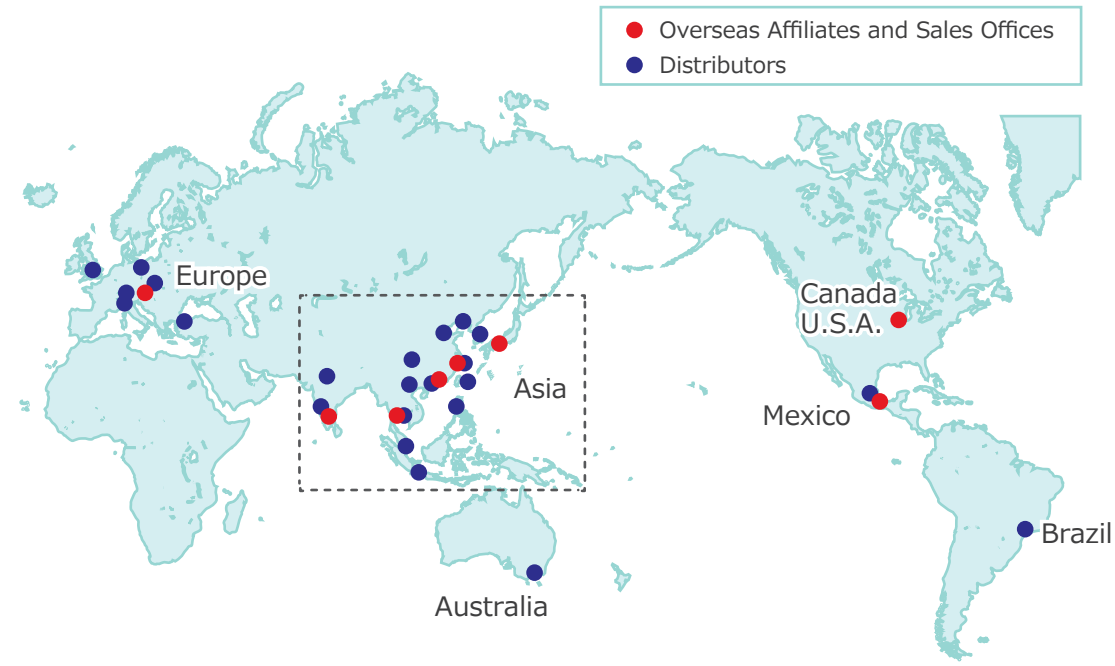
Global Network



Asia Detailed Map

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