KOSMEK
Harmony in Innovation

November, 2016

Announcement of Model Change of Expansion Locating Pin

Dear Valued Customers,

This notice is to inform our customers "Expansion Locating Pin" has been updated and modified based on overall improvements.
Also there are more options such as seating surface, release confirmation, etc.
Please consider the revised expansion locating pin in future designs.
We thank you for your understanding.

Notes

1. Changed Points
   - Overall improvements based on the new flanged design which allows easy arrangement.
   - New Options：With Seating Surface, Release Confirmation
   - The following is the comparison of previous model and new model.

Classification Locating Repeatability	Control	Previous Model No.	New Model No.
High Accuracy Model 3μm	Hydraulic Single Action (Spring Lock / Hyd. Release)	VL	VFL
High Accuracy Model 3μm	Hydraulic Double Action (Hyd. Lock / Hyd. Release)	VM	VFM
Multi-Purpose Model 10μm	Hydraulic Single Action (Hyd. Lock / Spring Release)	VJ	VFJ
Multi-Purpose Model 10μm	Hydraulic Double Action (Hyd. Lock / Hyd. Release)	VK	VFK
High Accuracy Model 3μm	Pneumatic Double Action (Air Lock / Air Release)	WM	VWM
Multi-Purpose Model 10μm	Pneumatic Double Action (Air Lock / Air Release)	WK	VWK

2. Compatibility
   - External Dimensions ：Not Compatible
   - Mounting Dimensions ：Not Compatible

   ※ Please contact us when requiring previous model due to breakage, etc.

3. Replacement Period

   Completely replaced beginning from November, 2016.
   Please refer to our website (http://www.kosmek.co.jp) or contact our salesman for further information of specifications and dimensions.

Yours Sincerely
Kosmek LTD.

Pneumatic Expansion Locating Pin

Model VWM
Model VWK

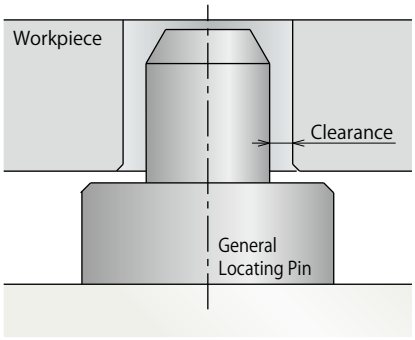
Locating Repeatability　VWM：3μm　VWK：10μm

Zero Clearance between Reference Hole and Expansion Locating Pin

PAT.

Pneumatic expansion locating pin locates workpiece with high accuracy by expanding and releasing diameter.

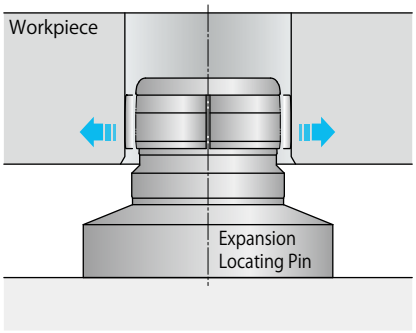
The general locating pin has some clearance between pin and reference hole.



General Locating Pin

Expanding locating pin has zero clearance between pin and reference hole!!

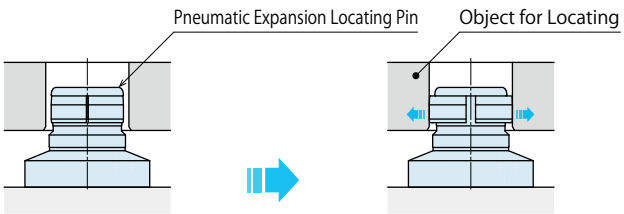
High Accuracy, Setup Time and Total Cost Reduction



The World's First Locating Mechanism

When expanded: The clearance between pin and reference hole get become zero and it leads to locate with high accuracy.
When released: At the time when the work piece is loaded and unloaded, reducing diameter makes enough clearance for changeover and makes it easier.

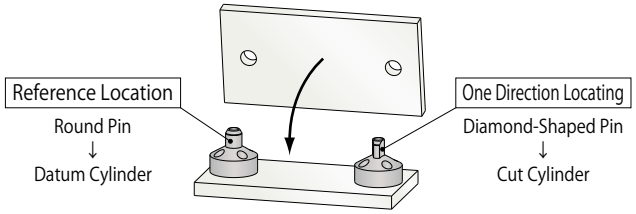
Action Description



＜ Released State ＞　　＜ Locked State ＞

※ VWM is used in the picture above.

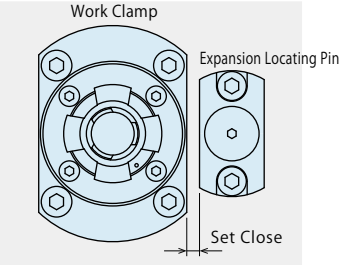
Two types of locating pins (Cylindrical and Diamond shaped pins).
Expansion Locating Pin consisting of Datum-D and Cut-C cylinder.



Features

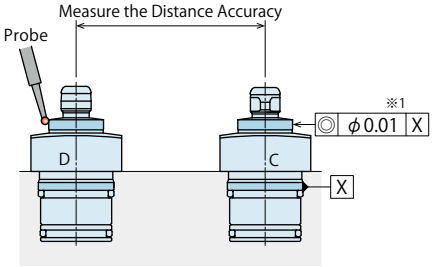
Simple Arrangement

The compact body can be installed close to the clamp, so fixture design is more simple.



Easy to Check the Accuracy

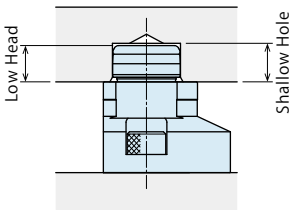
The same core part with X on the flange top allows to determine the origin and measure the distance accuracy.



※1. It is ϕ0.02 for VWK.

For Shallow Workpiece Hole

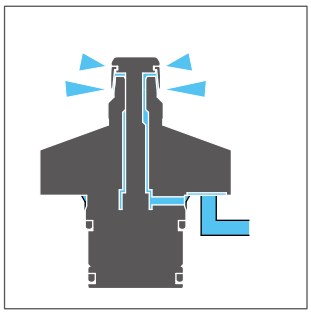
The low head pin can be used for shallow workpiece hole.



Function

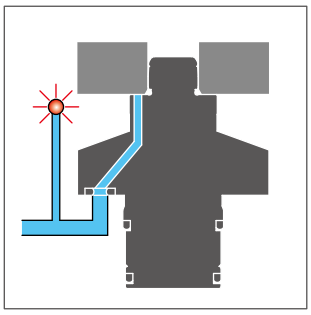
Air Blow Function
Equipped to All Options

Air blow prevents foreign substances from coming in.



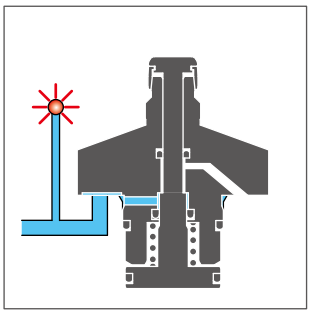
With Seating Surface (Seat Check)
-B：With Seating Surface Only

Seat check is available by using the gap sensor.



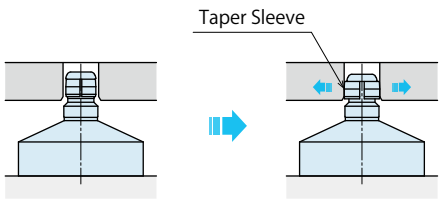
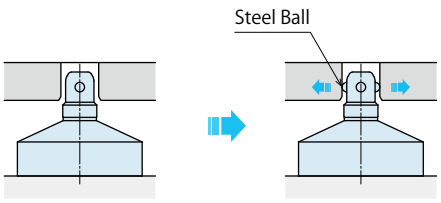
Release Confirmation
-M：Release Confirmation Only

Release confirmation is available by using the gap sensor.



※ VWM is used in the picture above.

Variation

	 Model VWM → P.287	 Model VWK → P.299
Type Locating Repeatability	High Accuracy Model 3 μm	Multi-Purpose Model 10 μm
Control Method	Double Action (Air Pressure＋Spring Lock / Air Release)	Double Action (Air Lock / Air Release)
Operating Pressure Range	0.35 ～ 0.7 MPa	0.35 ～ 0.7 MPa
Action	 Taper sleeve expands.	 Steel balls come out from the pin.
Sample Reference	Finishing Line / Dividing Line	Locating Casting Core Holes

PAT.

Pneumatic Expansion Locating Pin

Model VWM

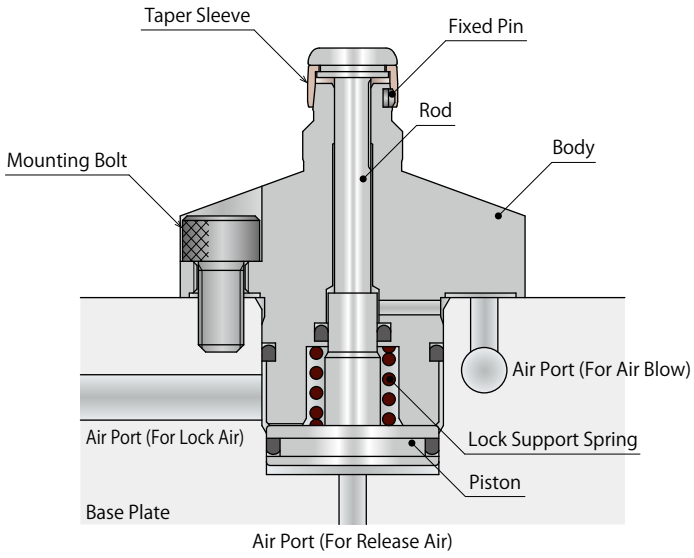
Pneumatic • Double Action

Locating Repeatability : 3μm

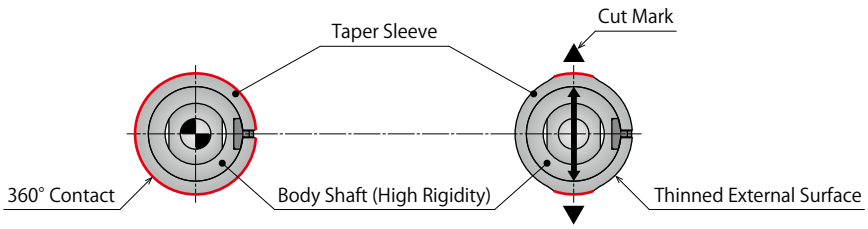
Index

Action Description

This is a simplified drawing of VWM (Standard).

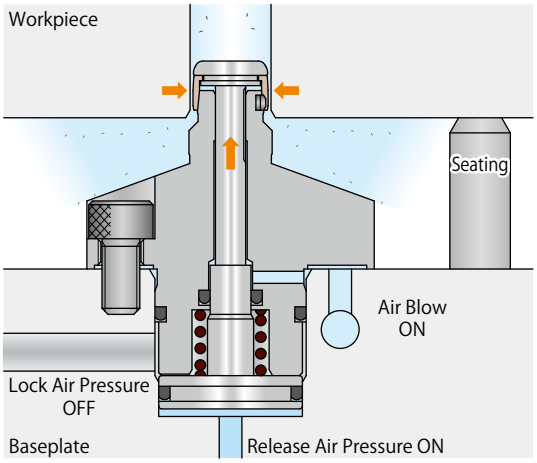


About Reference Locating and Orientation



VWM-D:Datum
Reference Locating

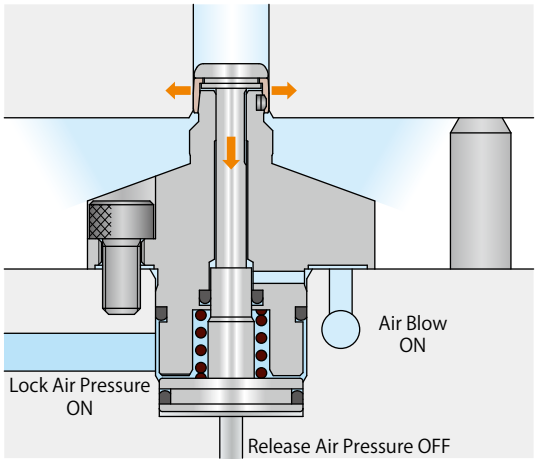
VWM-C:Cut
One Direction Locating



When loading workpiece

When unloading workpiece

- When lock air pressure is OFF and release air pressure is ON, the taper sleeve ascends with piston/rod and shrinks with its own elasticity.
- Air blow prevents debris contamination.
- Rod head and taper sleeve are designed to load workpiece smoothly and prevent scratches.



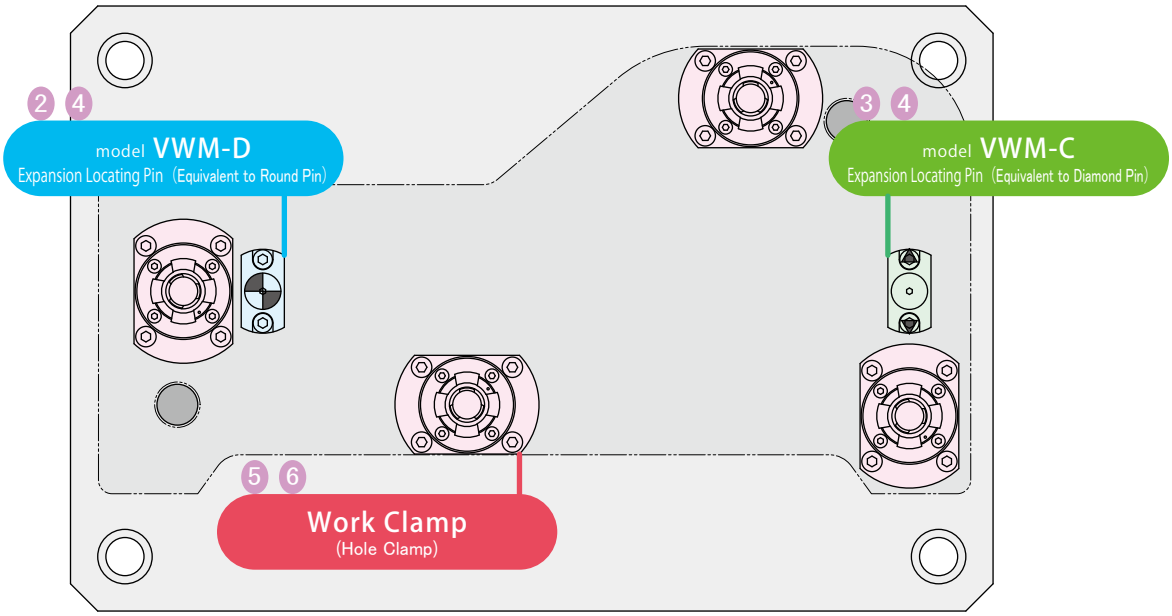
When locating

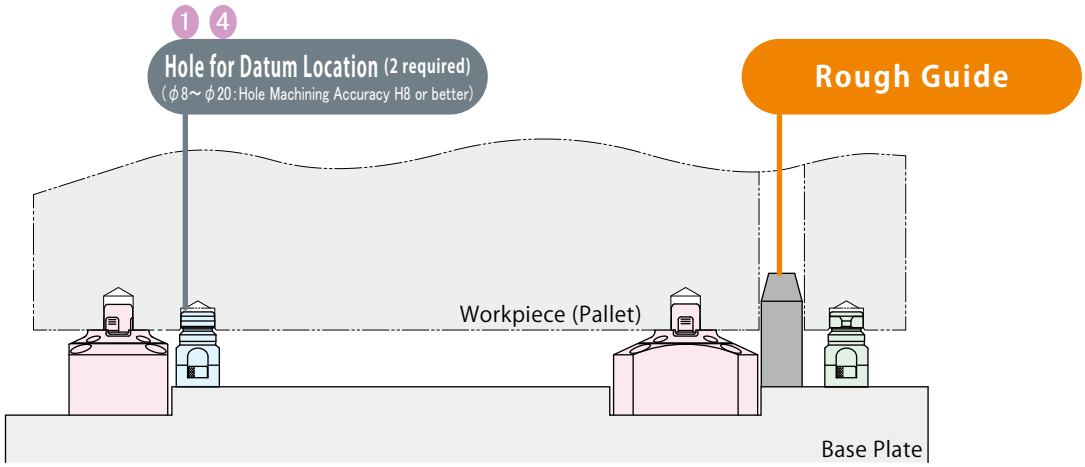
- When release air pressure is OFF and lock air pressure is ON, the piston/rod descend and the taper sleeve is expanded to locate the workpiece with high accuracy. (Seating is required for standard and release confirmation model.)

※When release pressure is OFF, it moves to the lock direction only with internal spring force so locating is not stable.

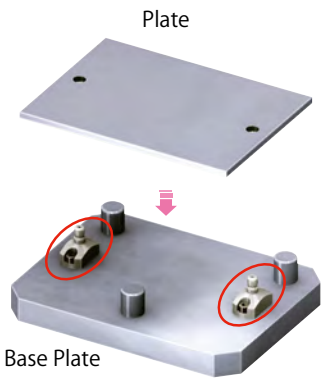
System References

- Repeated locating accuracy of 3 μm (One step locating **reduces setup time!**)
- **Avoid deterioration of workpiece accuracy** when changing pallets to perform multiple operations.
- Using with hole clamp allows for 5-face machining, **minimum setup and more compact fixture!**



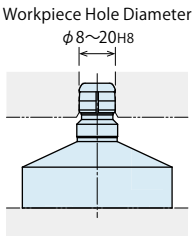


Application Examples



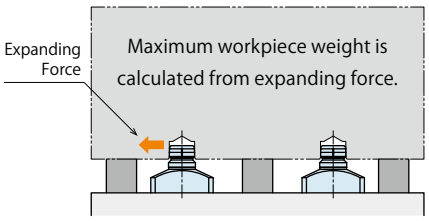
Essential Points

1 Workpiece Hole for Locating



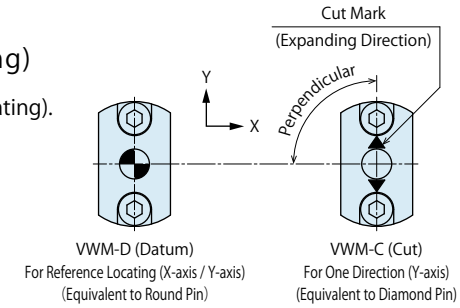
- Workpiece hole diameter is ϕ8～ϕ20 (in 1mm increments).
- Hole machining accuracy for locating hole (two holes) is H8 or better.

2 Workpiece Weight



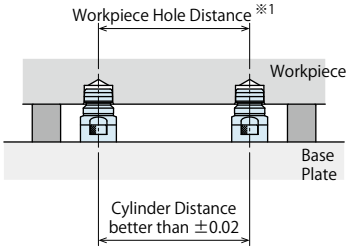
- Workpiece weight that expansion locating pin is able to locate with is calculated from expanding force.
- Expanding force is the force with which the expansion locating pin pushes out (expands) against the workpiece.
- Refer to the specification page for each model's calculation method of expansion force and allowable workpiece weight for locating.

3 Mounting Phase of VWM-C (Cut：For One Direction Locating)



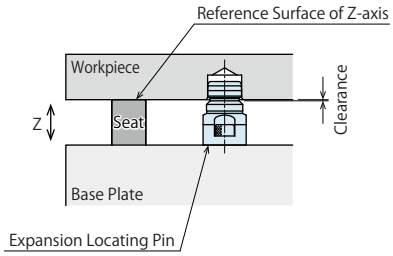
- The reference position (origin) is determined by VWM-D (Datum: for reference locating).
- VWM-C (Cut: for one direction locating) locates in one direction (Y-axis), so phasing is necessary. When mounting, ensure the VWM-C (cut) cut mark is perpendicular to VWM-D (datum).
  (There is a cut mark (▲) on top of the flange on the VWM-C unit that shows the locating direction.)

4 Distance Accuracy between Expansion Locating Pins and between Workpiece Holes



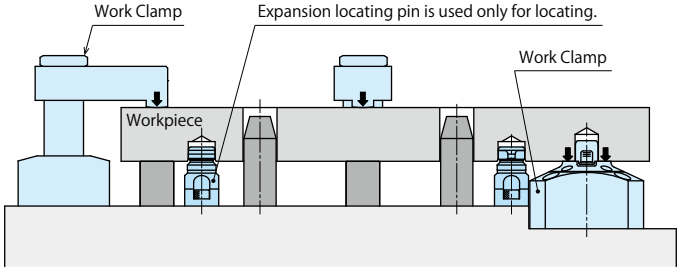
- The distance accuracy for the expansion locating pin should be within ±0.02mm.
- ※1. The distance accuracy of workpiece holes (pallet holes) should be within allowable difference. (Refer to “Notes for Design”.)

5 Seat Setting



- Standard and -M：Release Confirmation model have no seating surface (reference surface towards Z-axis). Please prepare the seat separately.

6 Setting Additional Work Clamps



- Expansion locating pin has no clamping function.
- Additional clamps should be added to clamp workpiece.

Model No. Indication

VWM 2 00 0 - 080 - D - H20 - M R

1 2 3 4 5 6 7

1 Body Size

2 : Select from Workpiece Diameter φ8 / φ9 / φ10 / φ11 / φ12 / φ13 / φ14 / φ15

3 : Select from Workpiece Diameter φ16 / φ17 / φ18 / φ19 / φ20

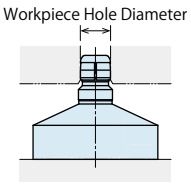
2 Design No.

0 : Revision Number

3 Applicable Workpiece Hole Diameter

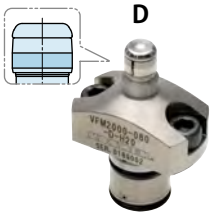
Contact us for workpiece diameters not listed below.
(Workpiece hole machining accuracy should be H8 or more.)

080 : φ8 H8 $^{+0.022}_{0}$ mm
090 : φ9 H8 $^{+0.022}_{0}$ mm
100 : φ10 H8 $^{+0.022}_{0}$ mm
110 : φ11 H8 $^{+0.027}_{0}$ mm
120 : φ12 H8 $^{+0.027}_{0}$ mm
130 : φ13 H8 $^{+0.027}_{0}$ mm
140 : φ14 H8 $^{+0.027}_{0}$ mm
150 : φ15 H8 $^{+0.027}_{0}$ mm
160 : φ16 H8 $^{+0.027}_{0}$ mm
170 : φ17 H8 $^{+0.027}_{0}$ mm
180 : φ18 H8 $^{+0.027}_{0}$ mm
190 : φ19 H8 $^{+0.033}_{0}$ mm
200 : φ20 H8 $^{+0.033}_{0}$ mm

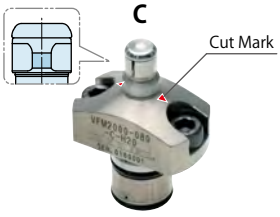


4 Functions

D : Datum (for Reference Locating)
C : Cut (for One Direction Locating)



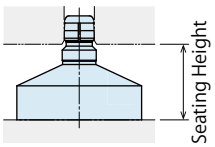
Datum



Cut

5 Seating Height

H15 : 15mm
H20 : 20mm
H25 : 25mm



Note :
Prepare the seat separately for 6 Option **Blank** : Standard and **M** : Release Confirmation Model.

6 Options

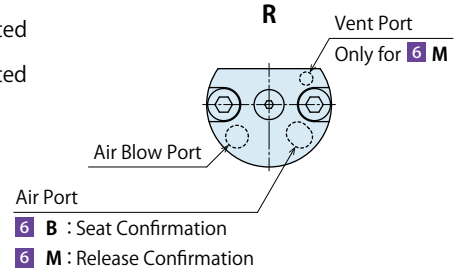
Blank : Standard
B : with Seating Surface
M : Release Confirmation Model

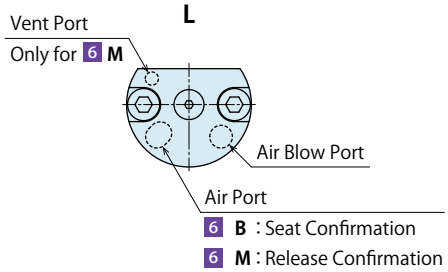
Note :
Contact us for combined use of **B** : With Seating Surface and **M** : Release Confirmation model.

7 Port Position

Only for 6 Options : **B** (with Seating Surface), and **M** (Release Confirmation Model)

R : As Illustrated
L : As Illustrated





Specifications

(mm)

Model No.		VWM2000								VWM3000				
3 Applicable Workpiece Hole Diam.		080	090	100	110	120	130	140	150	160	170	180	190	200
Workpiece Hole Diameter (Standard Diam.) mm		$\phi 8_{H8}^{+0.022}_{0}$	$\phi 9_{H8}^{+0.022}_{0}$	$\phi 10_{H8}^{+0.022}_{0}$	$\phi 11_{H8}^{+0.027}_{0}$	$\phi 12_{H8}^{+0.027}_{0}$	$\phi 13_{H8}^{+0.027}_{0}$	$\phi 14_{H8}^{+0.027}_{0}$	$\phi 15_{H8}^{+0.027}_{0}$	$\phi 16_{H8}^{+0.027}_{0}$	$\phi 17_{H8}^{+0.027}_{0}$	$\phi 18_{H8}^{+0.027}_{0}$	$\phi 19_{H8}^{+0.033}_{0}$	$\phi 20_{H8}^{+0.033}_{0}$
Locating Repeatability mm		0.003												
Allowable Offset (C : Cut) mm		±0.05	±0.05	±0.10	±0.10	±0.10	±0.10	±0.10	±0.10	±0.15	±0.15	±0.15	±0.15	±0.15
Expanding Force (F) ※1 N	at 0.35MPa	140	150	170	150	150	170	150	150	180	190	190	190	200
	at 0.5MPa	220	230	250	230	220	250	230	220	280	290	290	290	300
	at 0.7MPa	330	330	350	330	330	350	340	330	420	430	430	430	440
Allowable Thrust Load ※2 N		1500	1500	2000	2000	2500	2500	2500	2500	3000	3000	3000	3000	3500
Cylinder Capacity (Empty Action) cm³	Release side	0.18				0.21				0.38				
	Lock side	0.17				0.20				0.34				
Operating Pressure Range MPa		0.35 ～ 0.7												
Withstanding Pressure MPa		1.0												
Recommended Air Blow Pressure MPa		0.3 ～ 0.4												
Operating Temperature Range ℃		0 ～ 70												
Usable Fluid		Dry Air												

Notes：

※1. Expanding force shows the calculated value when coefficient friction is μ0.2. Refer to the following chart for the relative equation of expanding force and allowable workpiece weight for locating.

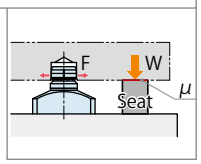
※2. Exceeding allowable thrust load leads to accuracy failure and/or damages on the product.

1. This product locates with air pressure + spring and releases with air pressure. (Air Pressure Double Action Model)
2. This cylinder is used only for locating and does not have a clamping function.

Relative Equation of Expanding Force and Allowable Workpiece Weight for Locating

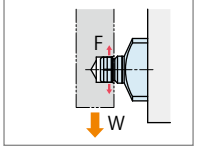
For Horizontal Attitude

$$\text{Workpiece Weight (W)} \leqq \frac{\text{Expanding Force per One Piece of Expansion Locating Pin (F)} \times \text{Efficiency } 0.5}{\text{Friction Coefficient of Workpiece Seat Face } (\mu)}$$



For Vertical Attitude

$$\text{Workpiece Weight (W)} \leqq \text{Expanding Force per One Piece of Expansion Locating Pin (F)} \times \text{Efficiency } 0.5$$



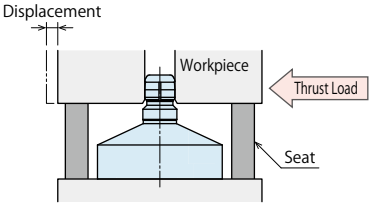
Thrust Load/Displacement Curve

This graph shows the relationship between load and displacement. Thrust load is the perpendicular load on the center of the VWM (Pneumatic Expansion Locating Pin) axis.

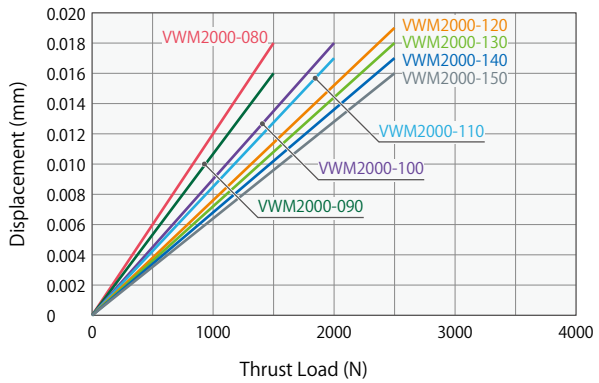
Note：This graph shows the thrust load (static load) on a single datum (VWM-D) cylinder that is not used with any clamp cylinders.

【How to Read the Thrust Load/Displacement Curve】

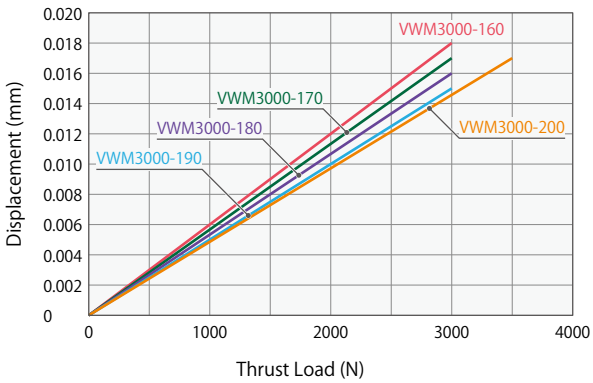
ex.) When using VWM2000-010 Requirement : When a 2000N thrust load is placed on an expanded VWM2000-010 the displacement will be about 0.018mm.



VWM2000

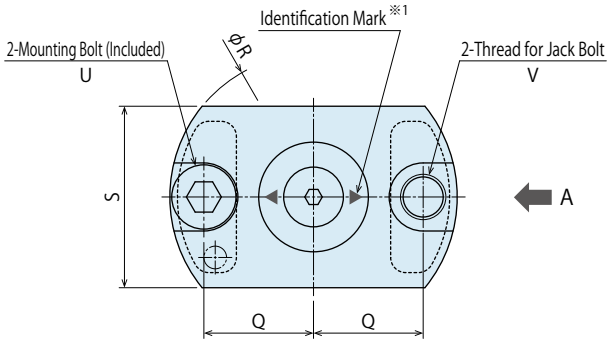


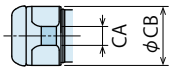
VWM3000



External Dimensions

※The drawing shows the released state of VWM.

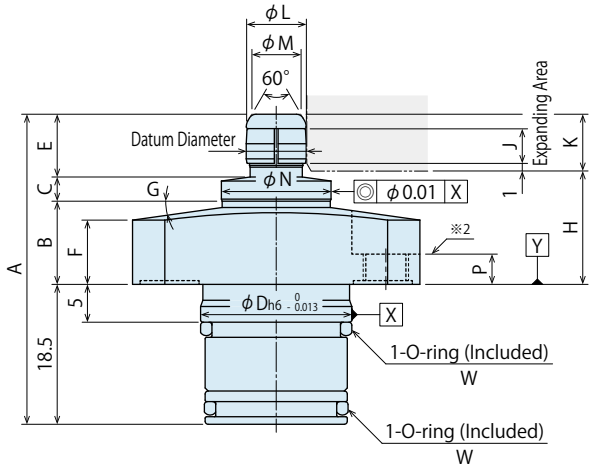




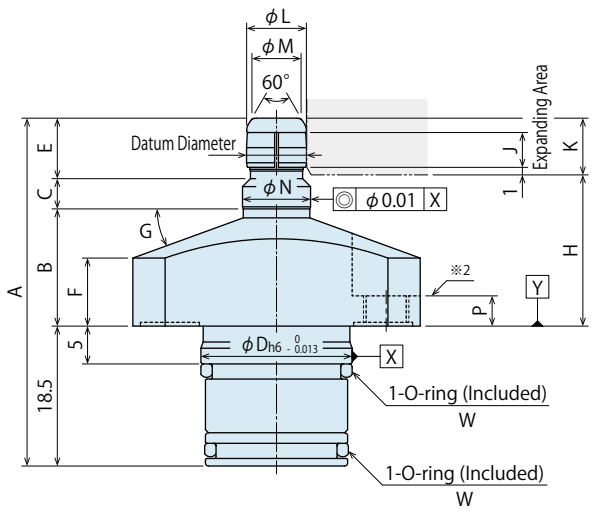
VWM-C
(Cut : One Direction Locating)

View A

5 Seating Height : **H15**

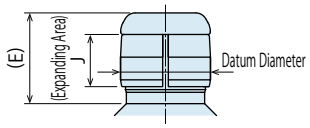


5 Seating Height : **H20 / H25**

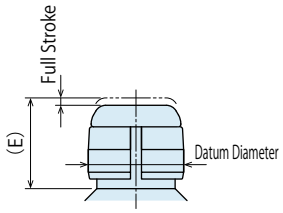


Expanding Area Detail

When Releasing

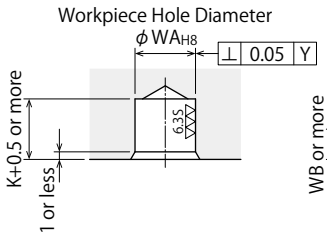


When Locking (At Full Stroke)

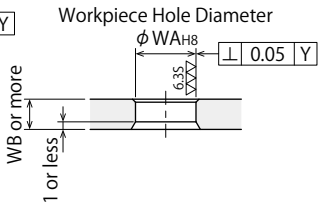


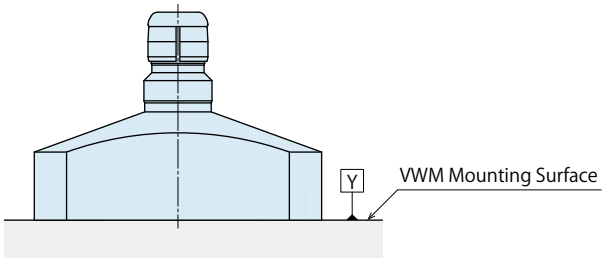
Workpiece Hole Dimensions

Stop Hole



Through Hole





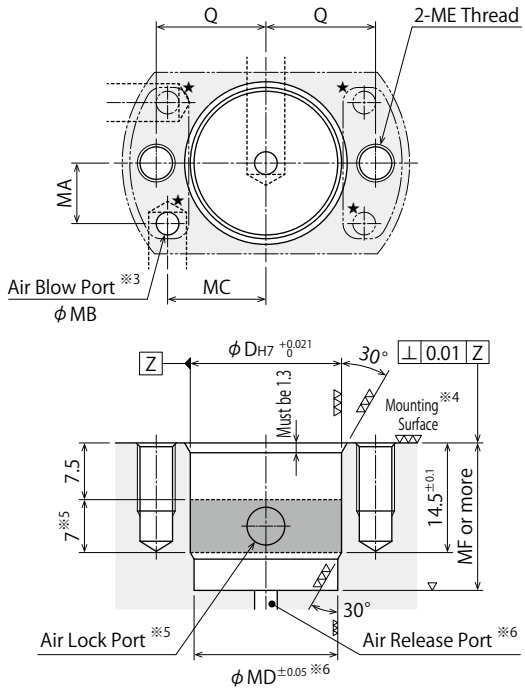
Notes :

※1. Identification mark is only marked on **-C** : Cut (for one direction locating). ◀ ▶ indicates the locating direction.

※2. Do not use spring washer or toothed lock washer.

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly. Use jack screw and remove them parallel to mounting surface.
2. This product has no seat. Choose option **-B** : with Seating Surface or prepare another seat if requiring.

Machining Dimensions for Mounting



Notes：

※3. Install the air blow port choosing one port from four ★ parts.
※4. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.
※5. Prepare the air lock port within ▭ .
※6. Prepare the air release port on the bottom within the range of ϕMD.
1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.311.)

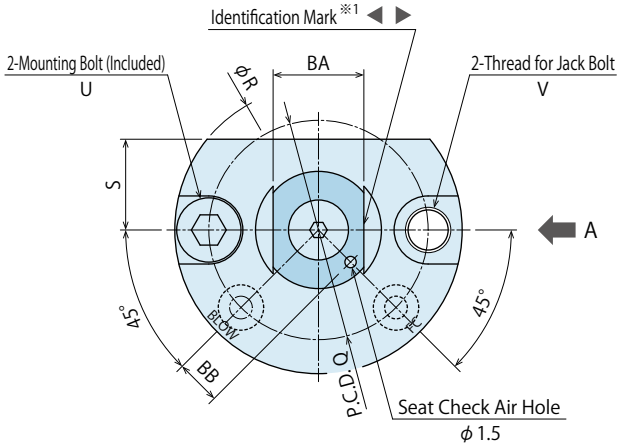
External Dimensions and Machining Dimensions for Mounting

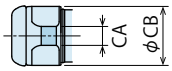
(mm)

Model No.		VWM2000-□-□-□																						VWM3000-□-□-□														
3 Applicable Workpiece Hole Diam.		080			090			100			110			120			130			140			150			160			170			180			190			200		
5 Seating Height		H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter (Standard Diam.)		ϕ8H8			ϕ9H8			ϕ10H8			ϕ11H8			ϕ12H8			ϕ13H8			ϕ14H8			ϕ15H8			ϕ16H8			ϕ17H8			ϕ18H8			ϕ19H8			ϕ20H8		
Datum Diameter	At Releasing	ϕ7.94 or less			ϕ8.94 or less			ϕ9.94 or less			ϕ10.94 or less			ϕ11.92 or less			ϕ12.92 or less			ϕ13.92 or less			ϕ14.92 or less			ϕ15.89 or less			ϕ16.89 or less			ϕ17.89 or less			ϕ18.89 or less			ϕ19.89 or less		
	At Full Stroke	ϕ8.05 or more			ϕ9.05 or more			ϕ10.05 or more			ϕ11.05 or more			ϕ12.05 or more			ϕ13.05 or more			ϕ14.05 or more			ϕ15.05 or more			ϕ16.07 or more			ϕ17.07 or more			ϕ18.07 or more			ϕ19.07 or more			ϕ20.07 or more		
Full Stroke		0.65												0.75												1.0														
A		41	46	51	41	46	51	41	46	51	41	46	51	41.5	46.5	51.5	41.5	46.5	51.5	41.5	46.5	51.5	41.5	46.5	51.5	43	48	53	43	48	53	43	48	53	43	48	53	43	48	53
B		11	15.5	20.5	11	15	20	11	15	20	11	15	20	11	14.5	19.5	11	14.5	19.5	11	14.5	19.5	11	14.5	19.5	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5
C		3.2	4	4	3.2	4.5	4.5	3.2	4.5	4.5	3.2	4.5	4.5	3.2	5	5	3.2	5	5	3.2	5	5	3.2	5	5	3.7	4	4	3.7	4	4	3.7	4	4	3.7	4	4	3.7	4	4
D		20												20												23														
E		8.3	8	8	8.3	8	8	8.3	8	8	8.3	8	8	8.8	8.5	8.5	8.8	8.5	8.5	8.8	8.5	8.5	8.8	8.5	8.5	10.3	10	10	10.3	10	10	10.3	10	10	10.3	10	10	10.3	10	10
F		8.5	9	9	8.5	9	9	8.5	9	9	8.5	9	9	8.5	9	9	8.5	9	9	8.5	9	9	8.5	9	9	8	11	11	8	11	11	8	11	11	8	11	11	8	11	11
G		8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°
H		15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25
J		4.6												5.1												6														
K		7.5												8												9.5														
L		7.9			8.9			9.8			10.8			11.8			12.8			13.8			14.8			15.7			16.7			17.7			18.7			19.7		
M		6.5			7.5			8.5			9.5			10.5			11.5			12.5			13.5			14			15			16			17			18		
N		14.5	9	9	14.5	10	10	14.5	11	11	14.5	12	12	18.5	13	13	18.5	14	14	18.5	15	15	18.5	16	16	22.5	17	17	22.5	18	18	22.5	19	19	22.5	20	20	22.5	21	21
P		4												4												5														
Q		14.5												14.5												17.5														
R		38												38												47														
S		24												24												27														
U		M5x0.8x12												M5x0.8x12												M6x1x16														
V		M6x1												M6x1												M8x1.25														
W		AS568-016 (90)												AS568-016 (90)												AS568-018 (90)														
CA		2.5			2.5			3			3			3.5			3.5			4			4			4.5			4.5			5			5			5		
CB		7.8			8.8			9.7			10.7			11.7			12.7			13.7			14.7			15.5			16.5			17.5			18.5			19.5		
MA		8												8												9.5														
MB		3												3												4														
MC		13												13												15														
MD		19												19												22														
ME		M5×0.8 Thread Depth 9 or more												M5×0.8 Thread Depth 9 or more												M6×1 Thread Depth 12 or more														
MF		19.5												19.5												20														
WA		8 +0.022 0			9 +0.022 0			10 +0.022 0			11 +0.027 0			12 +0.027 0			13 +0.027 0			14 +0.027 0			15 +0.027 0			16 +0.027 0			17 +0.027 0			18 +0.027 0			19 +0.033 0			20 +0.033 0		
WB		4												4.5												5.5														
Weight g		110	120	140	110	120	140	110	120	140	110	130	140	110	130	140	110	130	140	110	130	150	110	130	150	160	180	210	160	180	210	160	190	210	170	190	210	170	190	210

External Dimensions

※The drawing shows the released state of VWM-BR.
The ports of VWM-BL are placed to the symmetrical positions of this drawing.



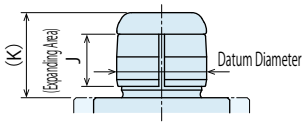


VWM-C
(Cut : One Direction Locating)

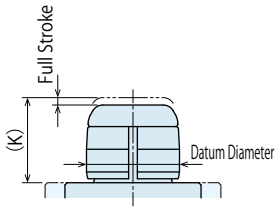
View A

Expanding Area Detail

When Releasing

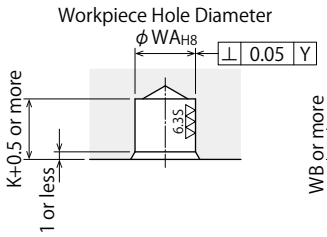


When Locking (At Full Stroke)

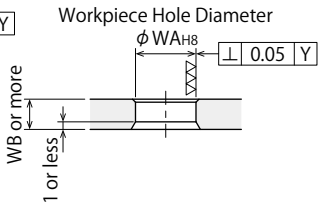


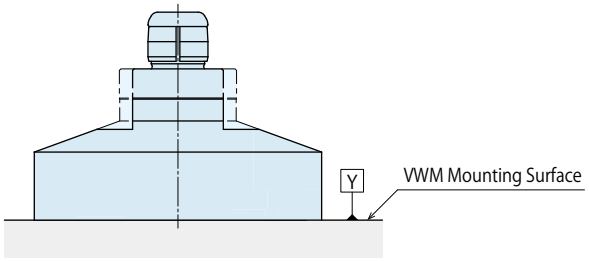
Workpiece Hole Dimensions

Stop Hole

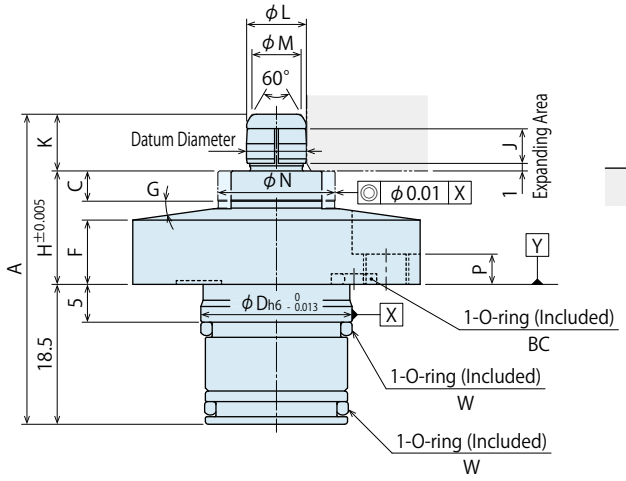


Through Hole

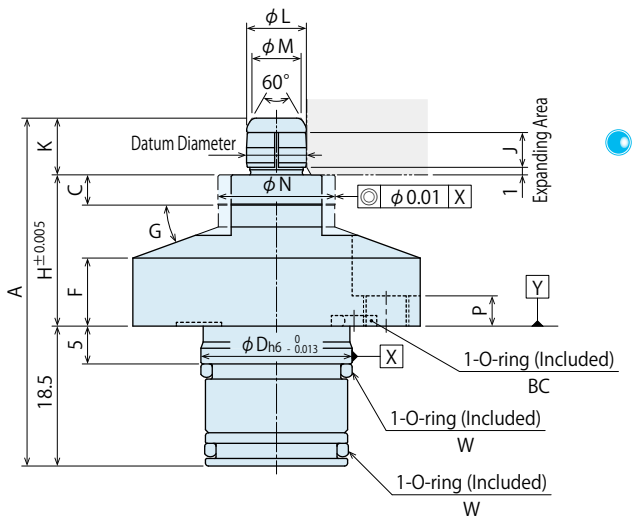




5 Seating Height : **H15**



5 Seating Height : **H20 / H25**



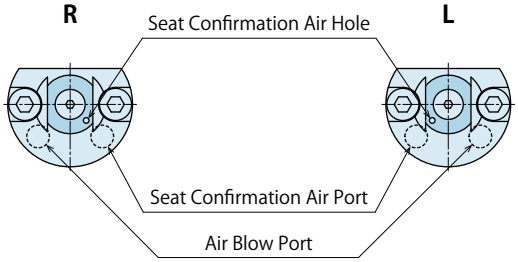
Notes :

※1. Identification mark is only marked on -**C** : Cut (for one direction locating). ◀ ▶ indicates the locating direction.

※2. Do not use spring washer or toothed lock washer.

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly. Use jack screw and remove it parallel to mounting surface.
2. The port name is marked on the product surface. (BLOW : Air Blow Port, FC : Seating Confirmation Air Port) Continuously supply air pressure to the air blow port and seat confirmation port.

Port Position

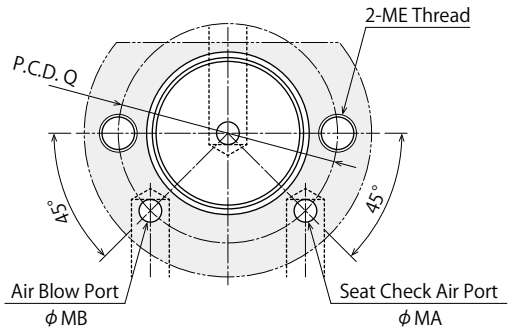


Note :

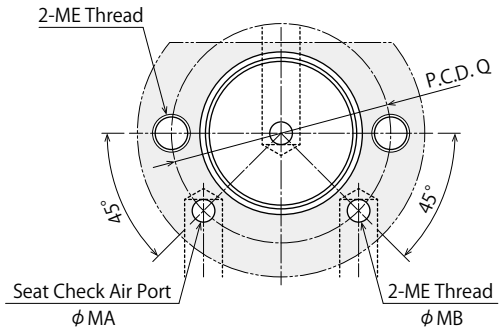
4. Make sure to confirm that the port positions are correct.

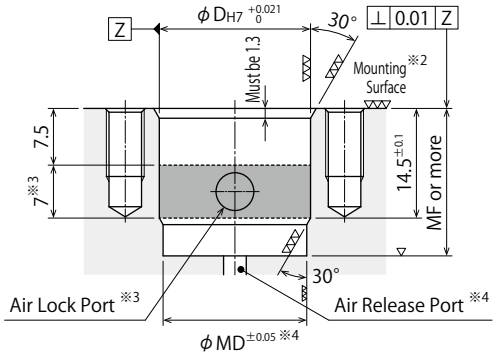
Machining Dimensions for Mounting

7 Port Position : R



7 Port Position : L





Notes :

※2. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.

※3. Prepare the air lock port within ▭.

※4. Prepare the air release port on the bottom within the range of φMD.

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.311.)

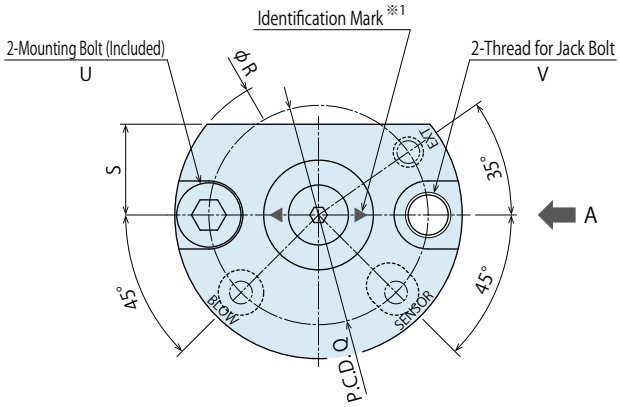
External Dimensions and Machining Dimensions for Mounting

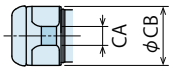
(mm)

Model No.		VWM2000-□-□-□-B□																					VWM3000-□-□-□-B□														
3 Applicable Workpiece Hole Diam.		080			090			100			110			120			130			140			150			160			170			180			190			200		
5 Seating Height		H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter (Standard Diam.)		φ8H8			φ9H8			φ10H8			φ11H8			φ12H8			φ13H8			φ14H8			φ15H8			φ16H8			φ17H8			φ18H8			φ19H8			φ20H8		
Datum Diameter	At Releasing	φ7.94 or less			φ8.94 or less			φ9.94 or less			φ10.94 or less			φ11.92 or less			φ12.92 or less			φ13.92 or less			φ14.92 or less			φ15.89 or less			φ16.89 or less			φ17.89 or less			φ18.89 or less			φ19.89 or less		
	At Full Stroke	φ8.05 or more			φ9.05 or more			φ10.05 or more			φ11.05 or more			φ12.05 or more			φ13.05 or more			φ14.05 or more			φ15.05 or more			φ16.07 or more			φ17.07 or more			φ18.07 or more			φ19.07 or more			φ20.07 or more		
Full Stroke		0.65												0.75												1.0														
A		41	46	51	41	46	51	41	46	51	41	46	51	41.5	46.5	51.5	41.5	46.5	51.5	41.5	46.5	51.5	41.5	46.5	51.5	43	48	53	43	48	53	43	48	53	43	48	53	43	48	53
C		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
D		20												20												23														
F		8.5	9	9	8.5	9	9	8.5	9	9	8.5	9	9	8.5	9	9	8.5	9	9	8.5	9	9	8.5	9	9	8	11	11	8	11	11	8	11	11	8	11	11	8	11	11
G		8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°
H		15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25
J		4.6												5.1												6														
K		7.5												8												9.5														
L		7.9			8.9			9.8			10.8			11.8			12.8			13.8			14.8			15.7			16.7			17.7			18.7			19.7		
M		6.5			7.5			8.5			9.5			10.5			11.5			12.5			13.5			14			15			16			17			18		
N		15.5			16.5			17.5			18.5			19.5			20.5			21.5			22.5			23.5			24.5			25.5			26.5			27.5		
P		4												4												5														
Q		29												29												35														
R		38												38												47														
S		12												12												13.5														
U		M5x0.8x12												M5x0.8x12												M6x1x16														
V		M6x1												M6x1												M8x1.25														
W		AS568-016 (90)												AS568-016 (90)												AS568-018 (90)														
BA		12			13			14			14			15			16			17			18			19			20			21			22			23		
BB		6			6.5			7			7.5			8			8.5			9			9.5			10			10.5			11			11.5			12		
BC		AS568-006 (90)												AS568-006 (90)												AS568-007 (90)														
CA		2.5			2.5			3			3			3.5			3.5			4			4			4.5			4.5			5			5			5		
CB		7.8			8.8			9.7			10.7			11.7			12.7			13.7			14.7			15.5			16.5			17.5			18.5			19.5		
MA		3												3												4														
MB		3												3												4														
MD		19												19												22														
ME		M5×0.8 Thread Depth 9 or more												M5×0.8 Thread Depth 9 or more												M6×1 Thread Depth 12 or more														
MF		19.5												19.5												20														
WA		8 +0.022 0			9 +0.022 0			10 +0.022 0			11 +0.027 0			12 +0.027 0			13 +0.027 0			14 +0.027 0			15 +0.027 0			16 +0.027 0			17 +0.027 0			18 +0.027 0			19 +0.033 0			20 +0.033 0		
WB		4												4.5												5.5														
Weight g		110	130	150	120	140	150	120	140	160	120	140	160	120	140	160	120	140	160	120	140	160	120	140	160	180	200	230	180	210	230	180	210	240	180	210	240	180	210	240

External Dimensions

※The drawing shows the released state of VWM-MR.
The ports of VWM-ML are placed to the symmetrical positions of this drawing.

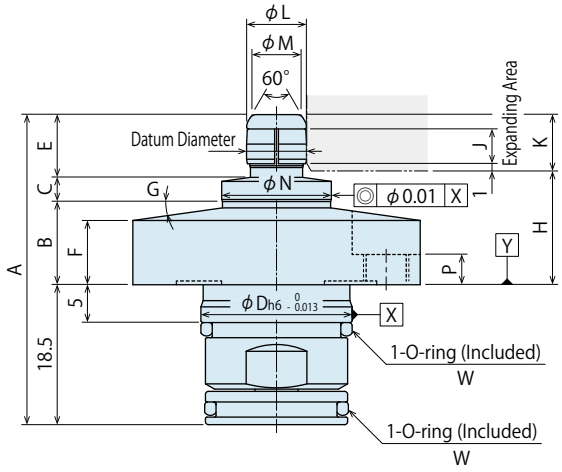




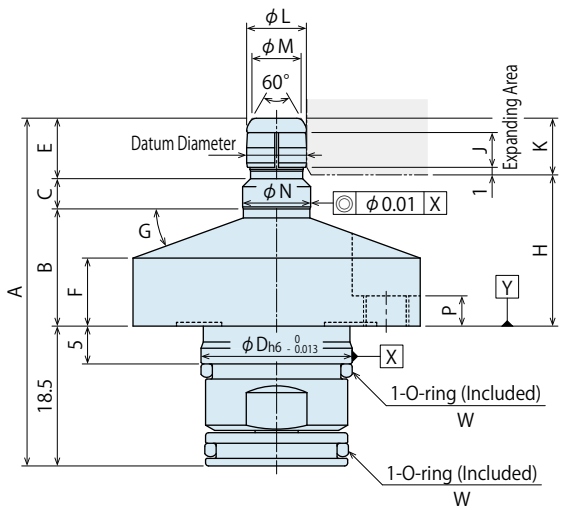
VWM-C
(Cut：One Direction Locating)

View A

5 Seating Height：**H15**

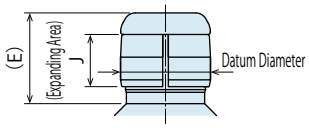


5 Seating Height：**H20 / H25**

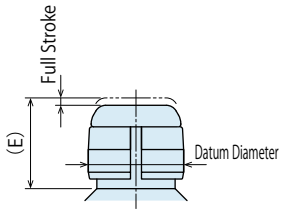


Expanding Area Detail

When Releasing

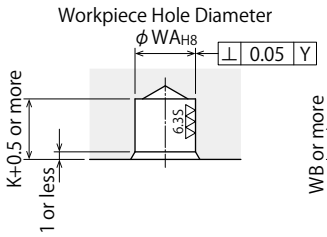


When Locking (At Full Stroke)

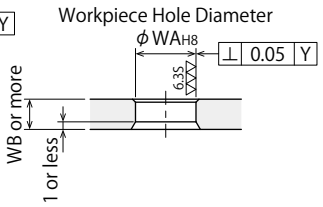


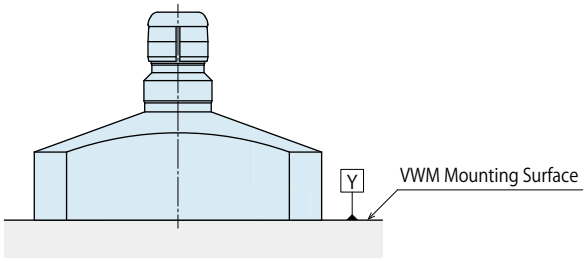
Workpiece Hole Dimensions

Stop Hole



Through Hole



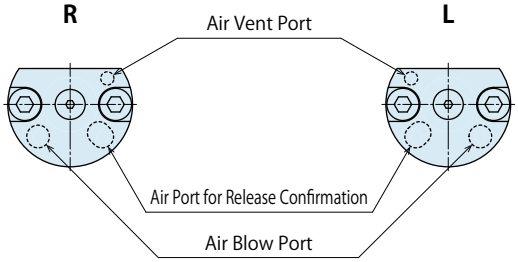


Notes：

※1. Identification mark is only marked on **-C**：Cut (for one direction locating). ◀ ▶ indicates the locating direction.

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly.
   Use jack screw and remove it parallel to mounting surface.
2. The port name is marked on the product surface.
   (EXT：Air Vent Port, BLOW：Air Blow Port,
   SENSOR：Release Confirmation Air Port)
   Continuously supply air pressure to the air blow port and release confirmation port.
3. This product has no seat. Choose option **-B**：with Seating Surface or prepare another seat if requiring.

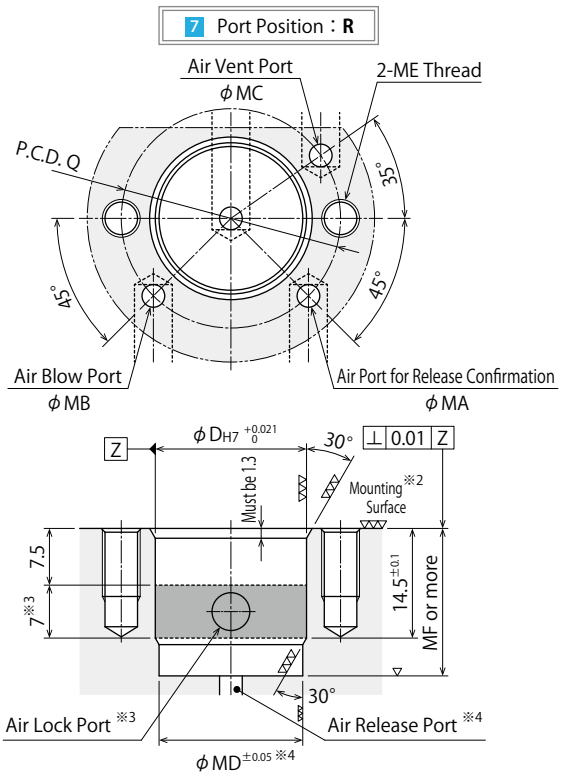
Port Position



Note：

4. Make sure to confirm that the port positions are correct.

Machining Dimensions for Mounting



Notes :

※2. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.

※3. Prepare the air lock port within ▭.

※4. Prepare the air release port on the bottom within the range of ϕMD.

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.311.)

External Dimensions and Machining Dimensions for Mounting

(mm)

Model No.		VWM2000-□-□-□-M□																						VWM3000-□-□-□-M□														
3 Applicable Workpiece Hole Diam.		080			090			100			110			120			130			140			150			160			170			180			190			200		
5 Seating Height		H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter (Standard Diam.)		ϕ8H8			ϕ9H8			ϕ10H8			ϕ11H8			ϕ12H8			ϕ13H8			ϕ14H8			ϕ15H8			ϕ16H8			ϕ17H8			ϕ18H8			ϕ19H8			ϕ20H8		
Datum Diameter	At Releasing	ϕ7.94 or less			ϕ8.94 or less			ϕ9.94 or less			ϕ10.94 or less			ϕ11.92 or less			ϕ12.92 or less			ϕ13.92 or less			ϕ14.92 or less			ϕ15.89 or less			ϕ16.89 or less			ϕ17.89 or less			ϕ18.89 or less			ϕ19.89 or less		
	At Full Stroke	ϕ8.05 or more			ϕ9.05 or more			ϕ10.05 or more			ϕ11.05 or more			ϕ12.05 or more			ϕ13.05 or more			ϕ14.05 or more			ϕ15.05 or more			ϕ16.07 or more			ϕ17.07 or more			ϕ18.07 or more			ϕ19.07 or more			ϕ20.07 or more		
Full Stroke		0.65												0.75												1.0														
A		41	46	51	41	46	51	41	46	51	41	46	51	41.5	46.5	51.5	41.5	46.5	51.5	41.5	46.5	51.5	41.5	46.5	51.5	43	48	53	43	48	53	43	48	53	43	48	53	43	48	53
B		11	15.5	20.5	11	15	20	11	15	20	11	15	20	11	14.5	19.5	11	14.5	19.5	11	14.5	19.5	11	14.5	19.5	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5
C		3.2	4	4	3.2	4.5	4.5	3.2	4.5	4.5	3.2	4.5	4.5	3.2	5	5	3.2	5	5	3.2	5	5	3.2	5	5	3.7	4	4	3.7	4	4	3.7	4	4	3.7	4	4	3.7	4	4
D		20												20												23														
E		8.3	8	8	8.3	8	8	8.3	8	8	8.3	8	8	8.8	8.5	8.5	8.8	8.5	8.5	8.8	8.5	8.5	8.8	8.5	8.5	10.3	10	10	10.3	10	10	10.3	10	10	10.3	10	10	10.3	10	10
F		8.5	9	9	8.5	9	9	8.5	9	9	8.5	9	9	8.5	9	9	8.5	9	9	8.5	9	9	8.5	9	9	8	11	11	8	11	11	8	11	11	8	11	11	8	11	11
G		8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	20°	35°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°
H		15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25
J		4.6												5.1												6														
K		7.5												8												9.5														
L		7.9			8.9			9.8			10.8			11.8			12.8			13.8			14.8			15.7			16.7			17.7			18.7			19.7		
M		6.5			7.5			8.5			9.5			10.5			11.5			12.5			13.5			14			15			16			17			18		
N		14.5	9	9	14.5	10	10	14.5	11	11	14.5	12	12	18.5	13	13	18.5	14	14	18.5	15	15	18.5	16	16	22.5	17	17	22.5	18	18	22.5	19	19	22.5	20	20	22.5	21	21
P		4												4												5														
Q		29												29												35														
R		38												38												47														
S		12												12												13.5														
U		M5x0.8x12												M5x0.8x12												M6x1x16														
V		M6x1												M6x1												M8x1.25														
W		AS568-016 (90)												AS568-016 (90)												AS568-018 (90)														
CA		2.5			2.5			3			3			3.5			3.5			4			4			4.5			4.5			5			5			5		
CB		7.8			8.8			9.7			10.7			11.7			12.7			13.7			14.7			15.5			16.5			17.5			18.5			19.5		
MA		3												3												4														
MB		3												3												4														
MC		3												3												4														
MD		19												19												22														
ME		M5×0.8 Thread Depth 9 or more												M5×0.8 Thread Depth 9 or more												M6×1 Thread Depth 12 or more														
MF		19.5												19.5												20														
WA		8 +0.022 0			9 +0.022 0			10 +0.022 0			11 +0.027 0			12 +0.027 0			13 +0.027 0			14 +0.027 0			15 +0.027 0			16 +0.027 0			17 +0.027 0			18 +0.027 0			19 +0.033 0			20 +0.033 0		
WB		4												4.5												5.5														
Weight g		110	130	150	120	140	150	120	140	160	120	140	160	120	140	160	120	140	160	120	140	160	120	140	160	180	200	230	180	210	230	180	210	240	180	210	240	180	210	240

Pneumatic Expansion Locating Pin PAT.

Model VWK

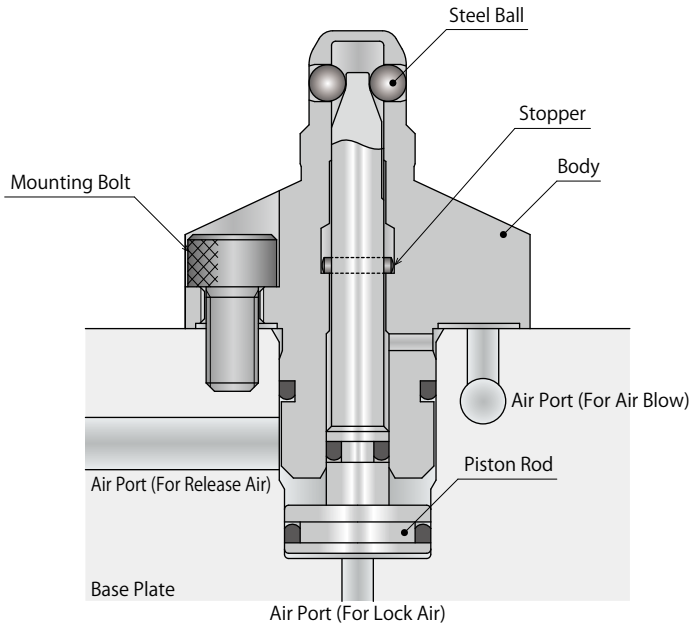
Pneumatic • Double Action

Locating Repeatability : 10μm

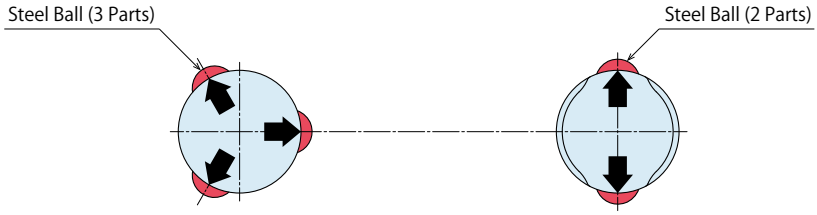
Index

Action Description

This is a simplified drawing of VWK (Standard).

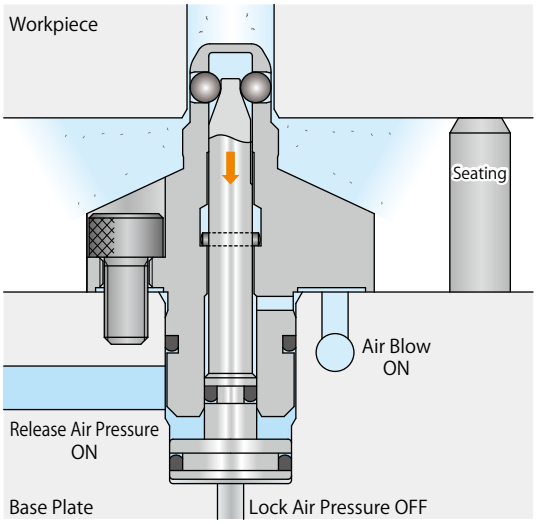


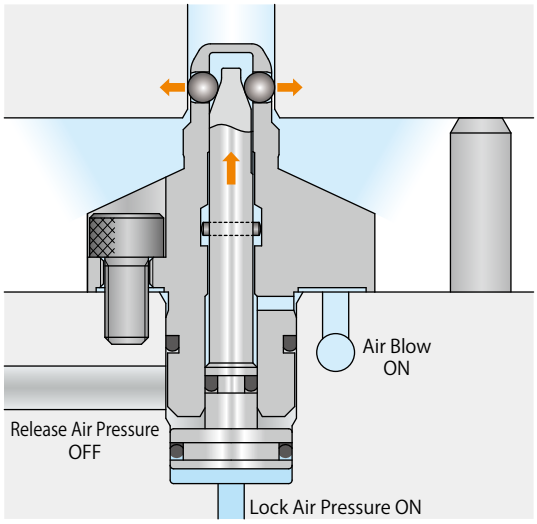
About Reference Locating and Orientation



VWK-D : Datum
Reference Locating

VWK-C : Cut
One Direction Locating





When loading workpiece | When unloading workpiece

- When lock air pressure is OFF and release air pressure is ON, the piston rod descends and steel balls are free to move.
- Air blow prevents debris contamination.

※It is not a malfunction when the steel balls are expanded with air blow pressure.

When locating

- When release air pressure is OFF and lock air pressure is ON, the piston/rod descend and the steel balls are expanded to locate the workpiece (Seating is required for standard and release confirmation models.)

Model No. Indication

VWK **2** **00** **0** - **080** - **D** - **H20** - **M** **R**

1 2 3 4 5 6 7

1 Body Size

2 : Select from Workpiece Diameter φ7.6～φ10.8

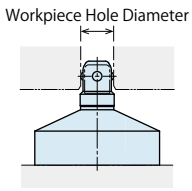
2 Design No.

0 : Revision Number

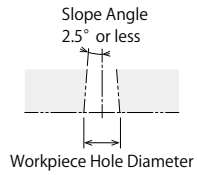
3 Applicable Workpiece Hole Diameter

080 : Straight Hole φ7.6～8.5mm / Taper Hole φ8～8.5mm
090 : Straight Hole φ8.5～9.5mm / Taper Hole φ9～9.5mm
100 : Straight Hole φ9.5～10.8mm / Taper Hole φ10～10.8mm

Straight Hole

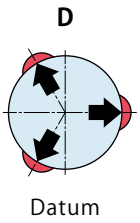


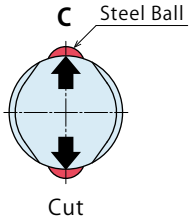
Taper Hole



4 Functions

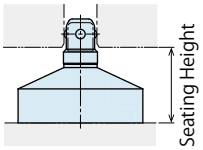
D : Datum (for Reference Locating)
C : Cut (for One Direction Locating)





5 Seating Height Dimension

H15 : 15mm
H20 : 20mm
H25 : 25mm



Note :
Prepare the seat separately for 6 Option **Blank** : Standard and **M** : Release Confirmation Model.

6 Options

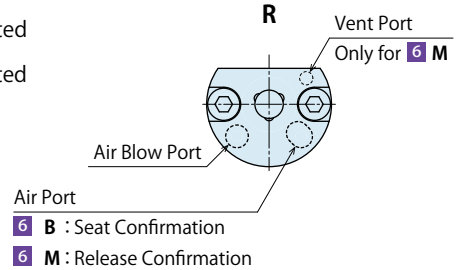
Blank : Standard
B : with Seating Surface
M : Release Confirmation Model

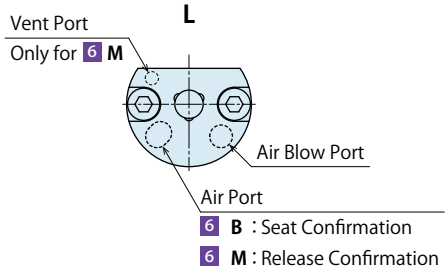
Note :
Contact us for combined use of **B** : With Seating Surface and **M** : Release Confirmation model.

7 Port Position

Only for 6 Options : **B** (with Seating Surface), and **M** (Release Confirmation Model)

R : As Illustrated
L : As Illustrated





Specifications

Model No.		VWK2000-080	VWK2000-090	VWK2000-100
Workpiece Hole Diameter mm	Standard Hole	φ7.6～φ8.5	φ8.5～φ9.5	φ9.5～φ10.8
	Taper Hole	φ8～φ8.5	φ9～φ9.5	φ10～φ10.8
Locating Repeatability ※1 mm		0.01		
Allowable Offset (C：Cut) mm		±0.4	±0.4	±0.5
Expanding Force (F) ※2 N	at 0.35MPa	40		
	at 0.5MPa	50		
	at 0.7MPa	70		
Allowable Thrust Load ※3 N		450	600	800
Cylinder Capacity (Empty Action) cm³	Release side	0.23		
	Lock side	0.28		
Operating Pressure Range MPa		0.35～0.7		
Withstanding Pressure MPa		1.0		
Recommended Air Blow Pressure MPa		0.3～0.4		
Operating Temperature Range ℃		0～70		
Usable Fluid		Dry Air		

Notes：

※1. It shows locating repeatability under the specific condition (no load).

※2. Expanding force shows the calculated value when coefficient friction is μ0.1. Refer to the following chart for the relative equation of expanding force and allowable workpiece weight for locating.

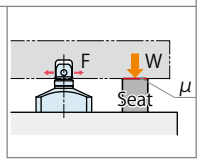
※3. Exceeding allowable thrust load leads to accuracy failure and/or damages on the product.

1. This product locates and releases with air pressure. (Air Pressure Double Action Model)
2. This cylinder is used only for locating and does not have a clamping function.

Relative Equation of Expanding Force and Allowable Workpiece Weight for Locating

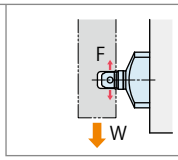
For Horizontal Attitude

$$\text{Workpiece Weight (W)} \leqq \frac{\text{Expanding Force per One Piece of Expansion Locating Pin (F)} \times \text{Efficiency 0.5}}{\text{Friction Coefficient of Workpiece Seat Face } (\mu)}$$



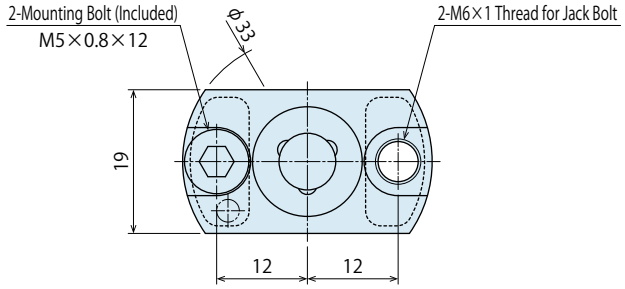
For Vertical Attitude

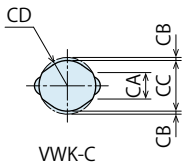
$$\text{Workpiece Weight (W)} \leqq \text{Expanding Force per One Piece of Expansion Locating Pin (F)} \times \text{Efficiency 0.5}$$



External Dimensions

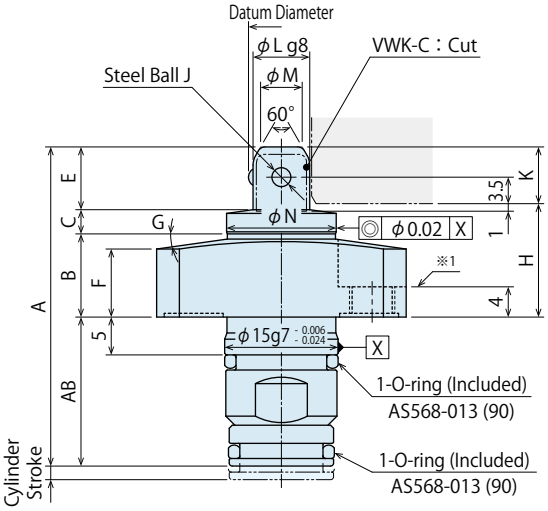
※This drawing shows VWK clamping action without workpiece.



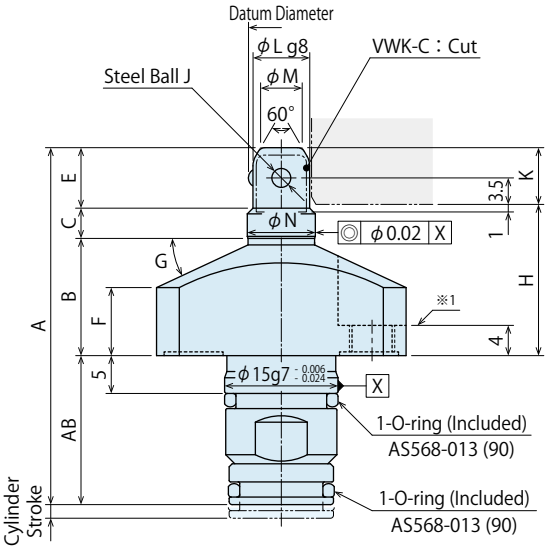


VWK-C
(Cut : One Direction Locating)

5 Seating Height : **H15**

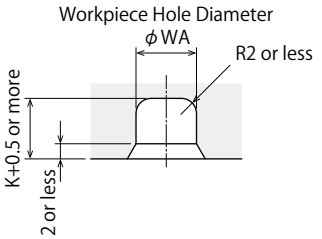


5 Seating Height : **H20 / H25**

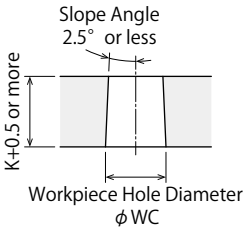


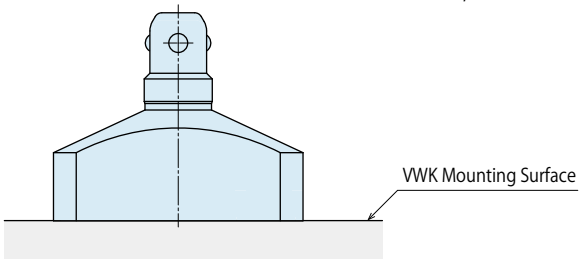
Workpiece Hole Dimensions

Straight Hole



Taper Hole



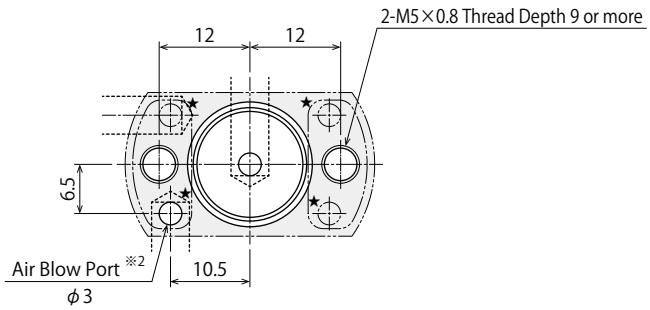


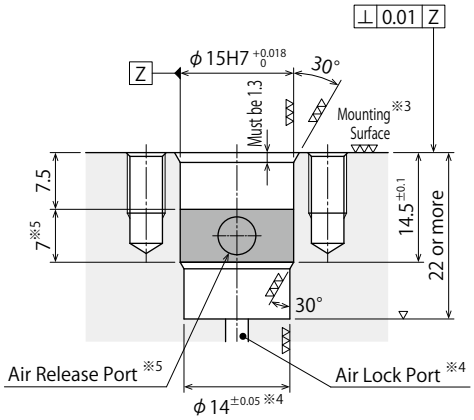
Notes :

※1. Do not use spring washer or toothed lock washer.

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly. Use jack screw and remove them parallel to mounting surface.
2. This product has no seat. Choose option **-B** : with Seating Surface or prepare another seat if requiring.

Machining Dimensions for Mounting





Notes：

※2. Install the air blow port choosing one port from four ★ parts.

※3. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.

※4. Prepare the air lock port on the bottom within the range of ϕ14.

※5. Prepare the air release port within ▭.

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.311.)

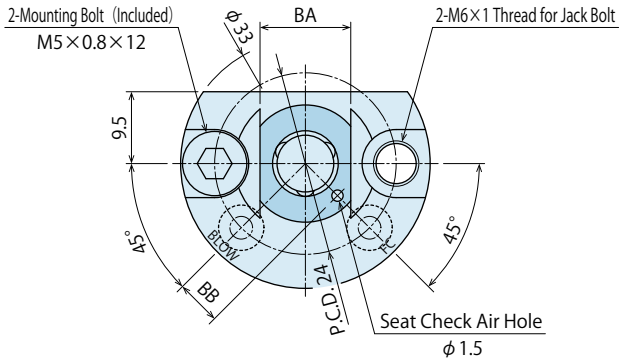
External Dimensions and Machining Dimensions for Mounting

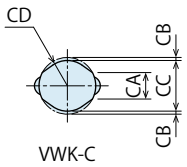
(mm)

Model No.		VWK2000-080-□-□			VWK2000-090-□-□			VWK2000-100-□-□		
	3 Applicable Workpiece Hole Diam.	080			090			100		
	5 Seating Height	H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter	WA (Straight Hole)	7.6 ～ 8.5			8.5 ～ 9.5			9.5 ～ 10.8		
	WC (Taper Hole)	8 ～ 8.5			9 ～ 9.5			10 ～ 10.8		
Datum Diameter	At Releasing	ϕ7.5 or less			ϕ8.3 or less			ϕ9.3 or less		
	At Full Stroke	ϕ8.5 or more			ϕ9.5 or more			ϕ10.8 or more		
Cylinder Stroke		1.8			2.2			2.6		
A		42.2	47.2	52.2	42.3	47.3	52.3	42.4	47.4	52.4
B		11	15.5	20.5	11	15.5	20.5	11	15.5	20.5
C		3.2	4	4	3.2	4	4	3.2	4	4
E		8.3	8	8	8.8	8.5	8.5	9.3	9	9
F		9	9	9.5	9	9	9.5	9	9	9.5
G		8°	25°	40°	8°	25°	40°	8°	25°	40°
H		15	20	25	15	20	25	15	20	25
J		2.5			3			3.5		
K		7.5			8			8.5		
L		7.5 -0.005 -0.027			8.3 -0.005 -0.027			9.3 -0.005 -0.027		
M		5.5			6			6.5		
N		14.5	9	9	14.5	10	10	14.5	11	11
AB		19.7			19.3			18.9		
CA		3.5			4			4.5		
CB		0.4			0.4			0.5		
CC		6.7			7.5			8.3		
CD		R3.35			R3.75			R4.15		
Weight	g	70	80	100	70	80	100	70	90	100

External Dimensions

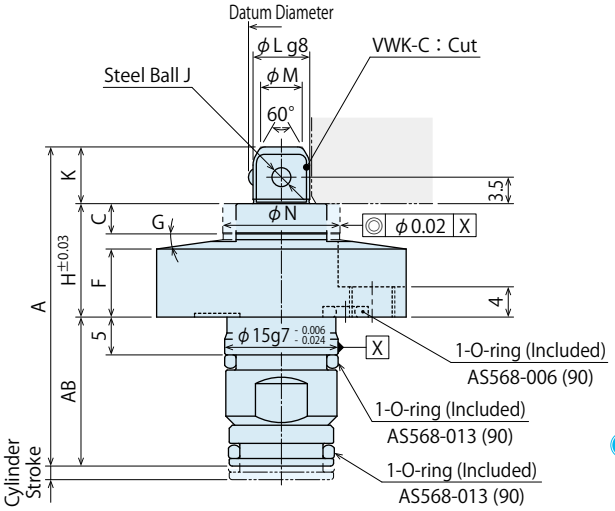
※This drawing shows VWK-BR clamping action without workpiece.
The ports of VWK-BL are placed to the symmetrical positions of this drawing.



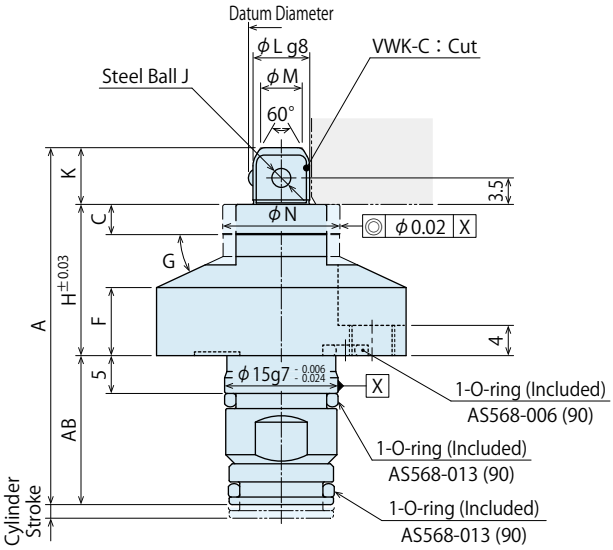


VWK-C
(Cut : One Direction Locating)

5 Seating Height : **H15**

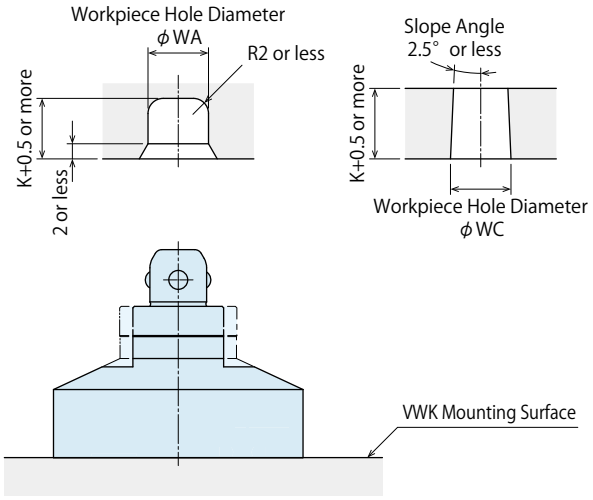


5 Seating Height : **H20 / H25**



Workpiece Hole Dimensions

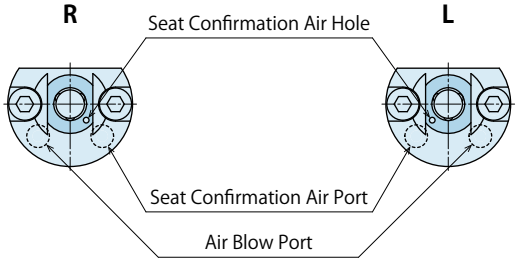
Straight Hole | Taper Hole



Notes :

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly.
   Use jack screw and remove it parallel to mounting surface.
2. The port name is marked on the product surface.
   (BLOW : Air Blow Port, FC : Seating Confirmation Air Port)
   Continuously supply air pressure to the air blow port and seat confirmation port.

Port Position

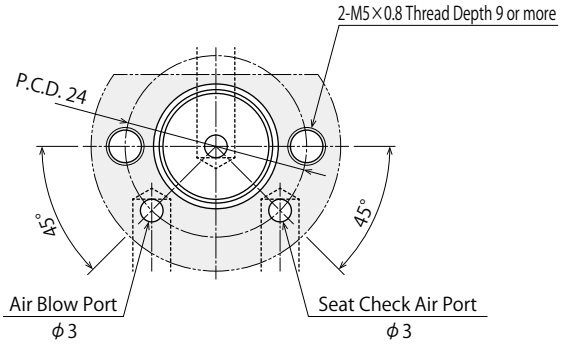


Note :

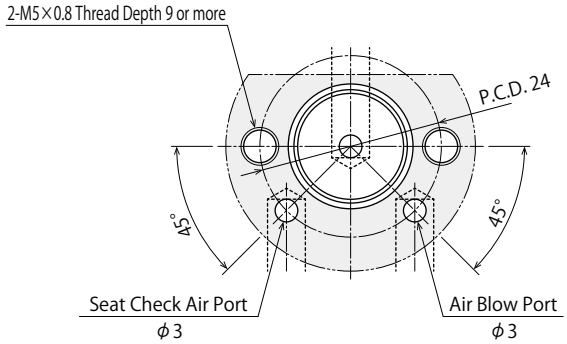
3. Make sure to confirm that the port positions are correct.

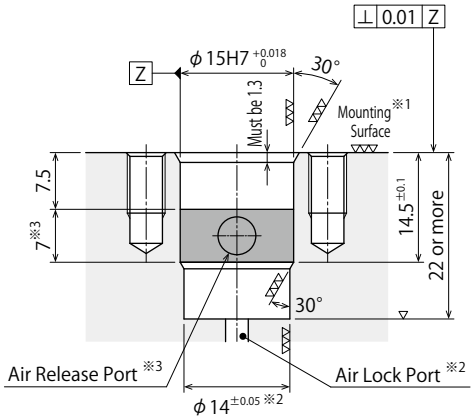
Machining Dimensions for Mounting

7 Port Position : R



7 Port Position : L





Notes :

※1. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.

※2. Prepare the air lock port on the bottom within the range of ϕ14.

※3. Prepare the air release port within ▭.

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.311.)

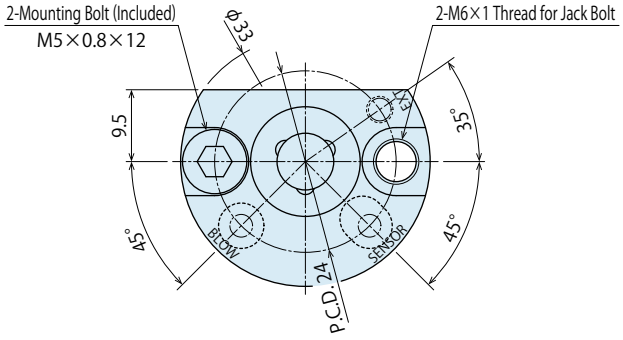
External Dimensions and Machining Dimensions for Mounting

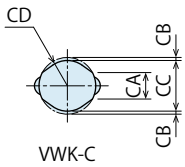
(mm)

Model No.		VWK2000-080-□-□-B□			VWK2000-090-□-□-B□			VWK2000-100-□-□-B□		
3 Applicable Workpiece Hole Diam.		080			090			100		
5 Seating Height		H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter	WA (Straight Hole)	7.6 ~ 8.5			8.5 ~ 9.5			9.5 ~ 10.8		
	WC (Taper Hole)	8 ~ 8.5			9 ~ 9.5			10 ~ 10.8		
Datum Diameter	At Releasing	ϕ7.5 or less			ϕ8.3 or less			ϕ9.3 or less		
	At Full Stroke	ϕ8.5 or more			ϕ9.5 or more			ϕ10.8 or more		
Cylinder Stroke		1.8			2.2			2.6		
A		42.2	47.2	52.2	42.3	47.3	52.3	42.4	47.4	52.4
C		4	4	4	4	4	4	4	4	4
F		9	9	9.5	9	9	9.5	9	9	9.5
G		8°	25°	40°	8°	25°	40°	8°	25°	40°
H		15	20	25	15	20	25	15	20	25
J		2.5			3			3.5		
K		7.5			8			8.5		
L		7.5 -0.005 -0.027			8.3 -0.005 -0.027			9.3 -0.005 -0.027		
M		5.5			6			6.5		
N		15.5	15.5	15.5	16.5	16.5	16.5	17.5	17.5	17.5
AB		19.7			19.3			18.9		
BA		12			13			14		
BB		6			6.5			7		
CA		3.5			4			4.5		
CB		0.4			0.4			0.5		
CC		6.7			7.5			8.3		
CD		R3.35			R3.75			R4.15		
Weight	g	80	90	110	80	90	110	80	100	110

External Dimensions

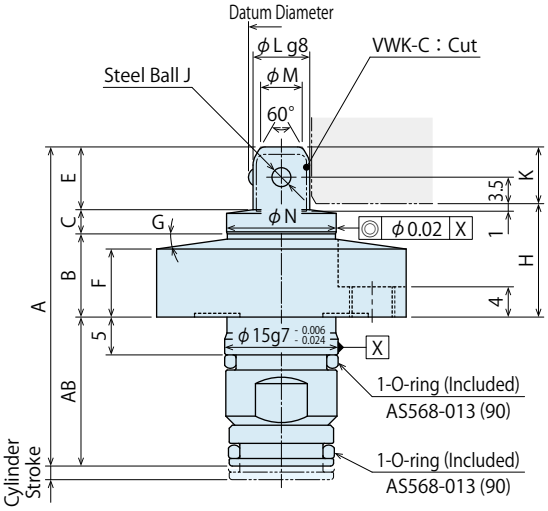
※This drawing shows VWK-MR clamping action without workpiece.
The ports of VWK-ML are placed to the symmetrical positions of this drawing.



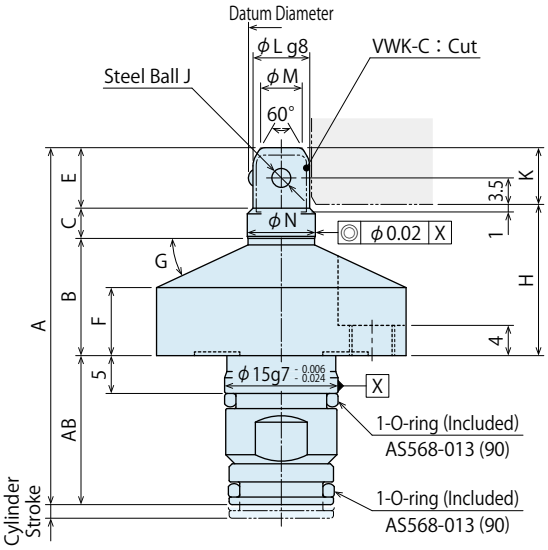


VWK-C
(Cut：One Direction Locating)

5 Seating Height：**H15**

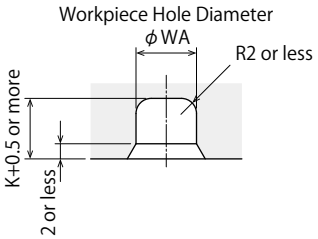


5 Seating Height：**H20 / H25**

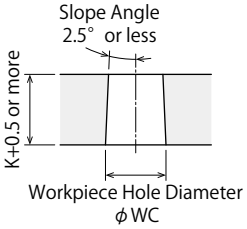


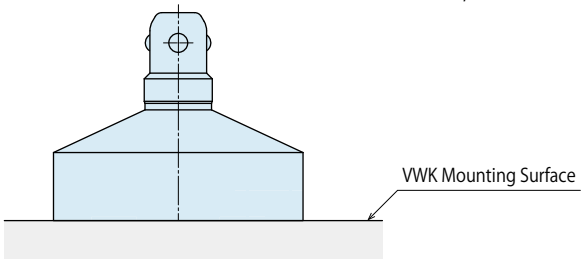
Workpiece Hole Dimensions

Straight Hole



Taper Hole

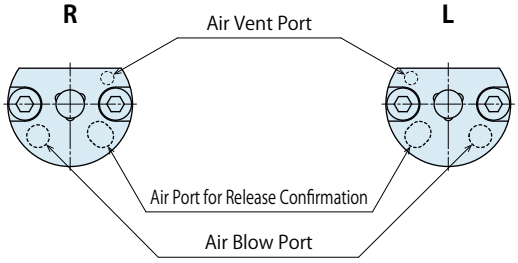




Notes：

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly.
   Use jack screw and remove it parallel to mounting surface.
2. The port name is marked on the product surface.
   (EXT：Air Vent Port, BLOW：Air Blow Port,
   SENSOR：Release Confirmation Air Port)
   Continuously supply air pressure to the air blow port and release confirmation port.
3. This product has no seat. Choose option **-B**：with Seating Surface or prepare another seat if requiring.

Port Position

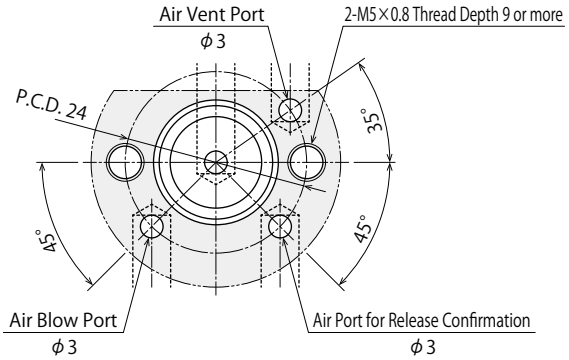


Note：

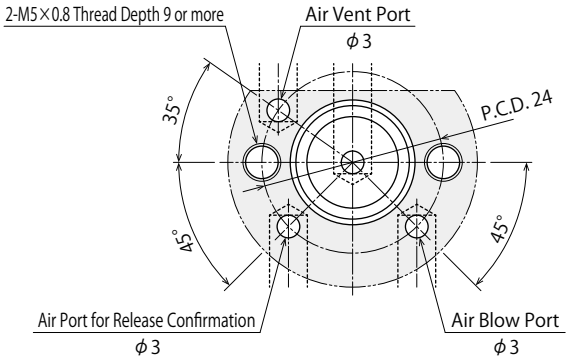
4. Make sure to confirm that the port positions are correct.

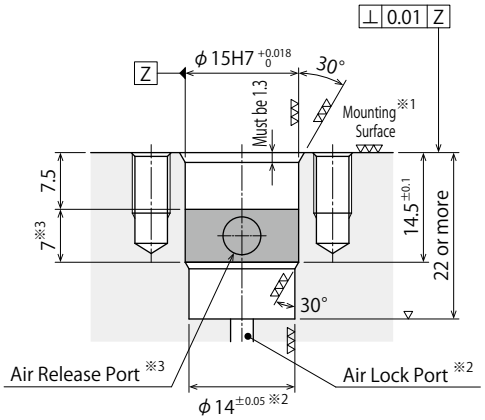
Machining Dimensions for Mounting

7 Port Position : R



7 Port Position : L





Notes :

※1. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.

※2. Prepare the air lock port on the bottom within the range of ϕ14.

※3. Prepare the air release port within ▭.

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.311.)

External Dimensions and Machining Dimensions for Mounting

(mm)

Model No.		VWK2000-080-□-□-M□			VWK2000-090-□-□-M□			VWK2000-100-□-□-M□		
3 Applicable Workpiece Hole Diam.		080			090			100		
5 Seating Height		H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter	WA (Straight Hole)	7.6 ~ 8.5			8.5 ~ 9.5			9.5 ~ 10.8		
	WC (Taper Hole)	8 ~ 8.5			9 ~ 9.5			10 ~ 10.8		
Datum Diameter	At Releasing	ϕ7.5 or less			ϕ8.3 or less			ϕ9.3 or less		
	At Full Stroke	ϕ8.5 or more			ϕ9.5 or more			ϕ10.8 or more		
Cylinder Stroke		1.8			2.2			2.6		
A		42.2	47.2	52.2	42.3	47.3	52.3	42.4	47.4	52.4
B		11	15.5	20.5	11	15.5	20.5	11	15.5	20.5
C		3.2	4	4	3.2	4	4	3.2	4	4
E		8.3	8	8	8.8	8.5	8.5	9.3	9	9
F		9	9	9.5	9	9	9.5	9	9	9.5
G		8°	25°	40°	8°	25°	40°	8°	25°	40°
H		15	20	25	15	20	25	15	20	25
J		2.5			3			3.5		
K		7.5			8			8.5		
L		7.5 $^{-0.005}_{-0.027}$			8.3 $^{-0.005}_{-0.027}$			9.3 $^{-0.005}_{-0.027}$		
M		5.5			6			6.5		
N		14.5	9	9	14.5	10	10	14.5	11	11
AB		19.7			19.3			18.9		
CA		3.5			4			4.5		
CB		0.4			0.4			0.5		
CC		6.7			7.5			8.3		
CD		R3.35			R3.75			R4.15		
Weight	g	80	90	110	80	90	110	80	100	110

Cautions

Notes for Design VWM / VWK common

1) Check Specifications

- Please use each product according to the specifications.
  VWM locates with pneumatic pressure + spring and releases with pneumatic pressure.
  VWK locates and releases with pneumatic pressure.

2) Notes for Circuit Design

- Please read "Circuit Reference" to assist with proper pneumatic circuit design.
  Carry out sufficient advance review as the wrong circuit design may lead to machine malfunctioning and damage.

3) Air Supply

- Continuously supply air pressure to the air blow port.
  If air supply is shut off during operation, contaminants enter into the cylinder leading to malfunctions.
- Continuously supply air pressure to the seat confirmation air port for -B : with seating surface, and to the release confirmation air port for -M : release confirmation model.

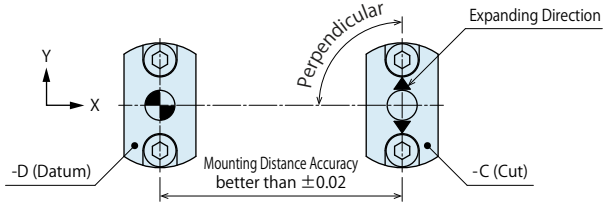
4) Setting Up the Clamps

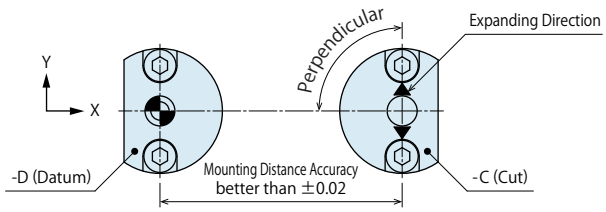
- The expansion locating pin is a positioning cylinder and has no clamping mechanism. A clamp must be provided separately.

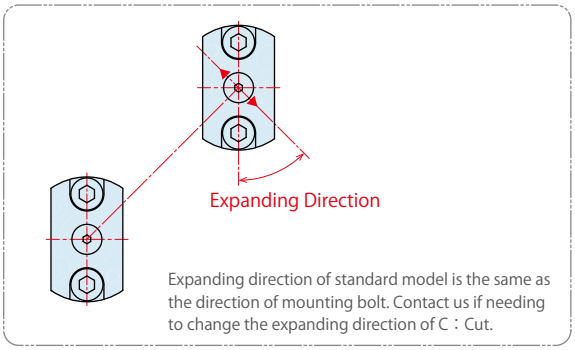
5) Expansion Locating Pin Mounting Direction (Phase)

- The Cut (VWM/VWK-C) locates work piece in the direction of rotation, based on the datum (VWM/VWK-D). VWM/VWK-C (Cut: for positioning in one direction) positions in one direction (Y-axis), so phasing is necessary.

When mounting the product, make sure that expanding direction of -C (Cut) is perpendicular to -D (Datum).



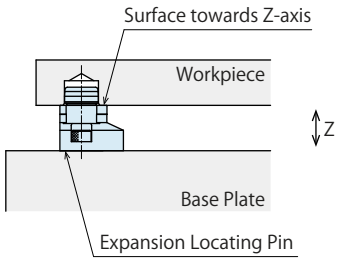




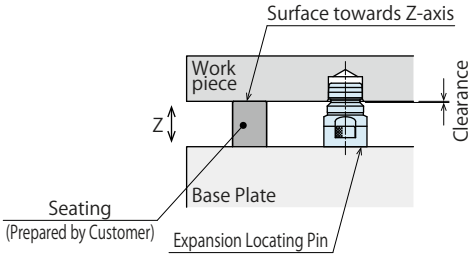
6) Reference Surface towards Z-axis

- -B : with Seating Surface has seating on upper part of the flange, but standard/-M : Release Confirmation model have no seating (reference surface towards Z-axis). Please prepare the seat separately.

-B : With Seating Surface

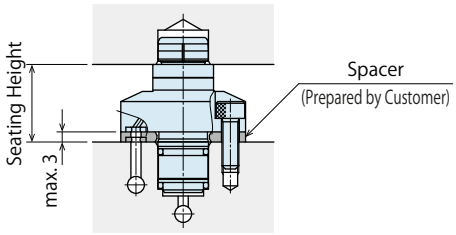


Standard / -M : Release Confirmation Model

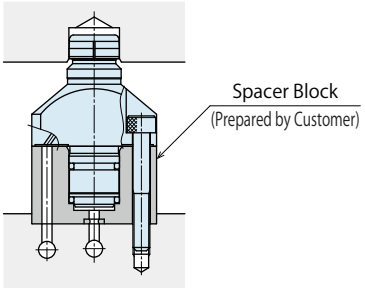


7) Adjusting Height of Expansion Locating Pin

- Seating height can be selected from 15mm / 20mm / 25mm.
- For slight adjustment of seating height and expanding part height, install a spacer (3mm or less) under the flange.

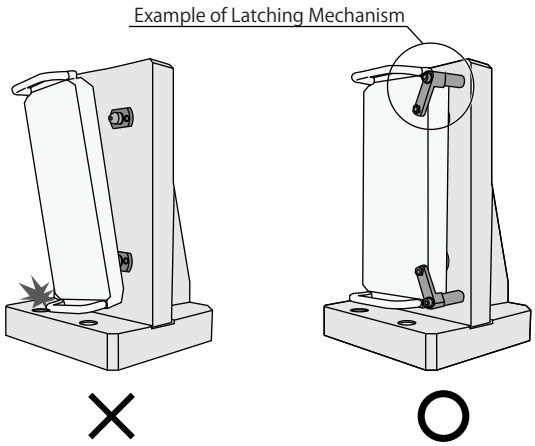


- Install a spacer block under the flange if the height of expansion locating pin is not enough.



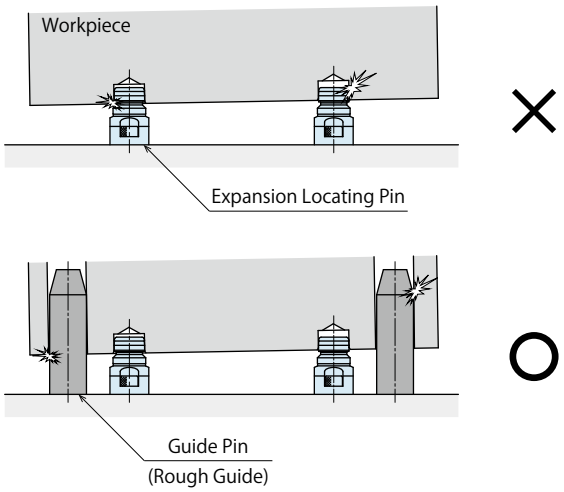
8) When the workpiece is in vertical position.

- When the workpiece is being set, make sure it is in proper proximity and square to the clamps.
  If it is locked out of position, the machine or clamps may be damaged.
- As the workpiece may fall down during releasing, it is recommended to set up the latching mechanism to prevent it from falling down.
- When the workpiece is used in vertical position (hanging on the wall), the internal moving parts tend to wear out.
  Confirm the positioning precision in a regular manner. In case the allowed range is exceeded, change the machine.



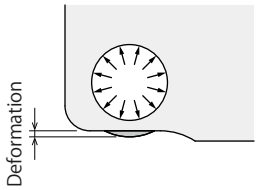
9) Incline in the Z-axis direction.

- If workpiece is loaded/unloaded on tilted condition, expanded part of expansion locating pin and workpiece hole can become stuck and damage to cylinder and workpiece is possible.
  Workpiece should be loaded and unloaded with less than 4/100 ～ 5/100 (approx. 2 ～ 3°) of tilt between workpiece and expansion locating pin plane.
- If necessary, provide guide pins to keep the pallet level during loading and unloading. Please prepare guide pin (rough guide) etc.



10) Thickness around the Workpiece Hole

- In case that the material thickness is thin around locating hole, expansion force may deform the hole. It may cause unsatisfied locating accuracy.
  Please do trial testing and adjust to proper pneumatic pressure.



Cautions

Notes for Design Regarding to VWM

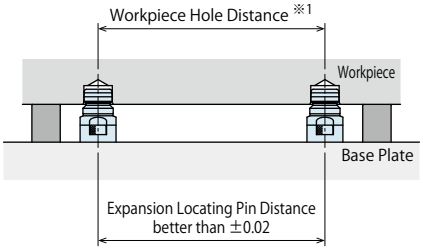
1) Distance Accuracy of VWM

- Distance accuracy of the VWM's mounting hole should be within ±0.02mm.
  The distance accuracy of each workpiece hole should be within the allowable offset.
  Please refer to below table under JIS B 0613 Class 2.

Allowable Offset (C:Cut) ≧ Datum Cylinder Distance Accuracy
+Workpiece Hole Distance Accuracy
(Listed in JIS B 0613)

[JIS B 0613 Except] unit : mm

Center Distance Classification		Center Distance Accuracy
Greater than	or less	class 2
50	80	±0.023
80	120	±0.027
120	180	±0.032
180	250	±0.036
250	315	±0.041
315	400	±0.045
400	500	±0.049
500	630	±0.055
630	800	±0.063
800	1000	±0.070



Notes for Design Regarding to VWK

1) Distance Accuracy of VWK

- Distance accuracy between VWK mounting hole(-D/-C) and between workpiece has to be machined corresponding with the allowable offset (VWK-C:Cut).

Installation Notes

1) Check the fluid to use

- Please supply filtered clean dry air.
- Oil supply with a lubricator etc. is unnecessary.

2) Procedure before Piping

- The pipeline, piping connector and fixture circuits should be cleaned and flushed thoroughly.
  The dust and cutting chips in the circuit may lead to fluid leakage and malfunction.

3) Applying Sealing Tape

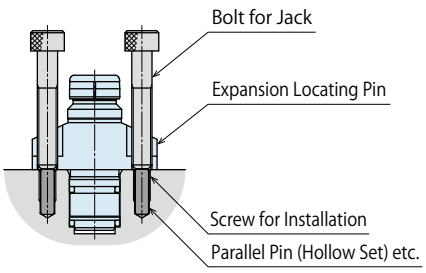
- Wrap with tape 1 to 2 times following the screwing direction.
  Wrapping in the wrong direction will cause leaks and malfunction.
- Pieces of the sealing tape can lead to air leaks and malfunction.
- When piping, be careful that contaminant such as sealing tape does not enter in products.

4) Mounting / Removing Expansion Locating Pin

- Use all bolts with hex holes (grade 12.9) and tighten the body with a torque wrench as shown in the table below.
  Tighten them evenly to prevent twisting or jamming.

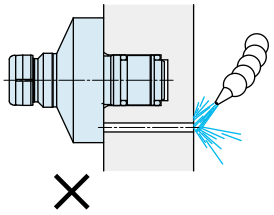
Model No.	Thread Size	Tightening Torque (N·m)
VWM2000	M5×0.8	6.3
VWM3000	M6×1	10
VWK2000	M5×0.8	6.3

- Do not use spring washer or toothed lock washer.
- There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.
- When detaching, please use screw for the jack (the installation bolt hole : two places), and detach without damage to the screw.
  The right picture shows the case in which the parallel pin (hollow set) is put in the screw hole without damage to the screw.



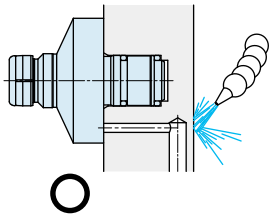
5) Appropriate Measures for the Air Vent Port

- For the air vent port of -M : Release Confirmation model, consider the environment and avoid coolant or any contaminants. If coolant or contaminants enter in the product, it will not function properly.

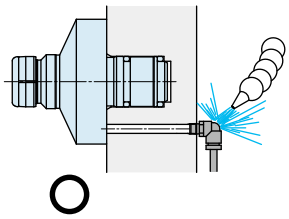


Examples

① Prepare the manifold piping.
Use the manifold piping and prepare the air vent port to the place without the influence of coolant or cutting chips.



② Prepare the external piping.
If it is impossible to prepare manifold piping like the case ①, move the air vent port by using external piping to the place without the influence of coolant or any contaminants.



※ Please refer to P.1237 for common cautions. • Notes on Handling • Maintenance/Inspection • Warranty

Circuit Reference

Notes on Pneumatic Cylinder Speed Control Unit

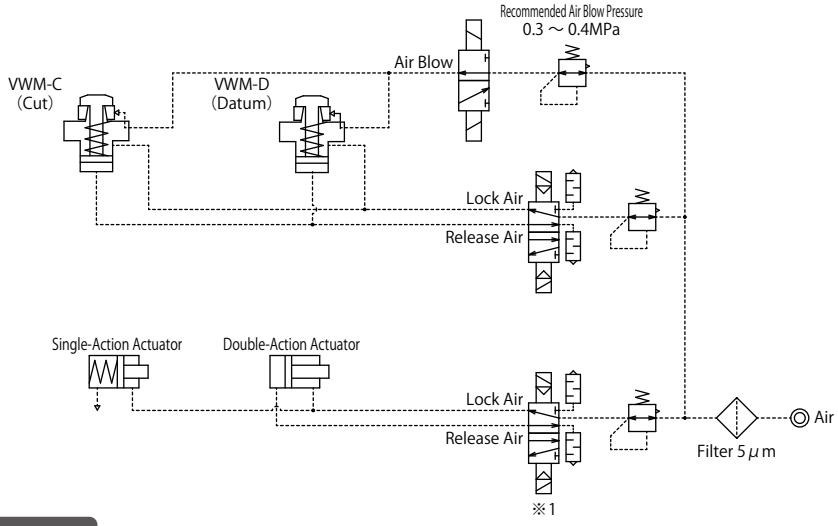
VWM (Standard)

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

Circuit Reference

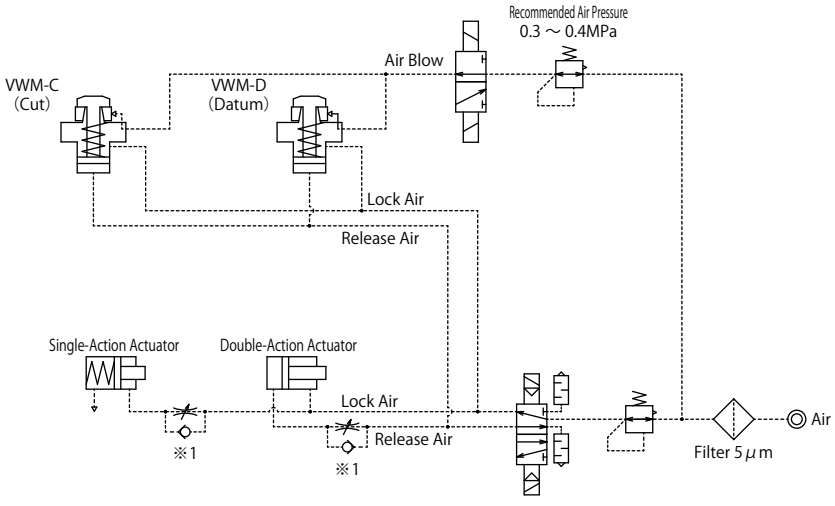
Double Action
model VWM
Standard

Expansion Locating Pin and other actuators on different circuits.



VWM
Locating with Spring and Air Pressure
Releasing with Air Pressure

Expansion Locating Pin and other actuators on the same circuit.



VWM
Locating with Spring and Air Pressure
Releasing with Air Pressure

Notes：

※1. The procedure for lock operation should be "VWM (Expansion Locating Pin)" → "other actuators". Otherwise there might be accuracy failure and/or damages on the product.

1. This circuit reference is one example. It should be prepared depending on the fixture structure.

Notes on Pneumatic Cylinder Speed Control Unit

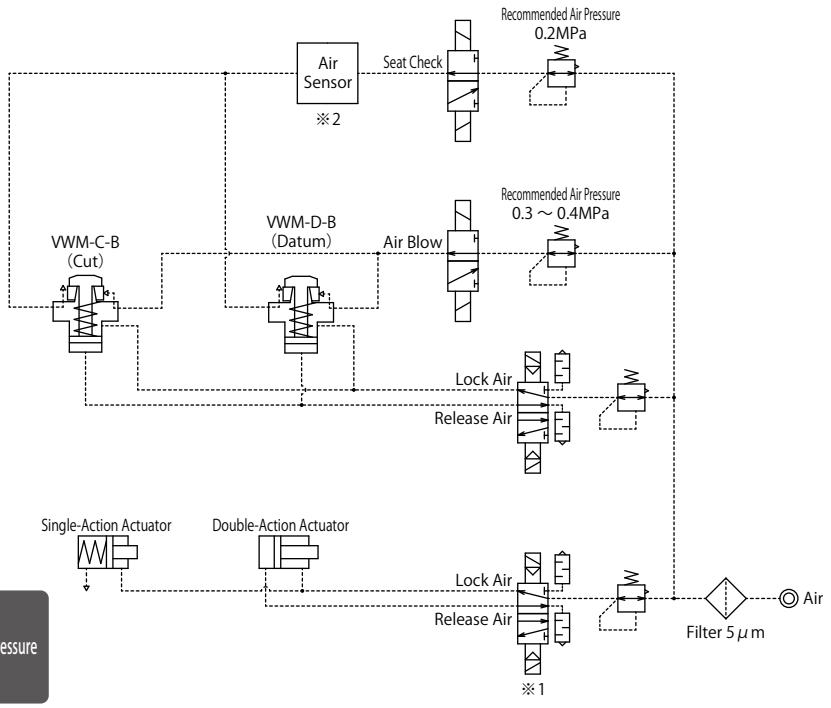
VWM-B (with Seating Surface) | VWM-M (Release Confirmation Model)

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

Circuit Reference

Double Action model VWM-B with Seating Surface

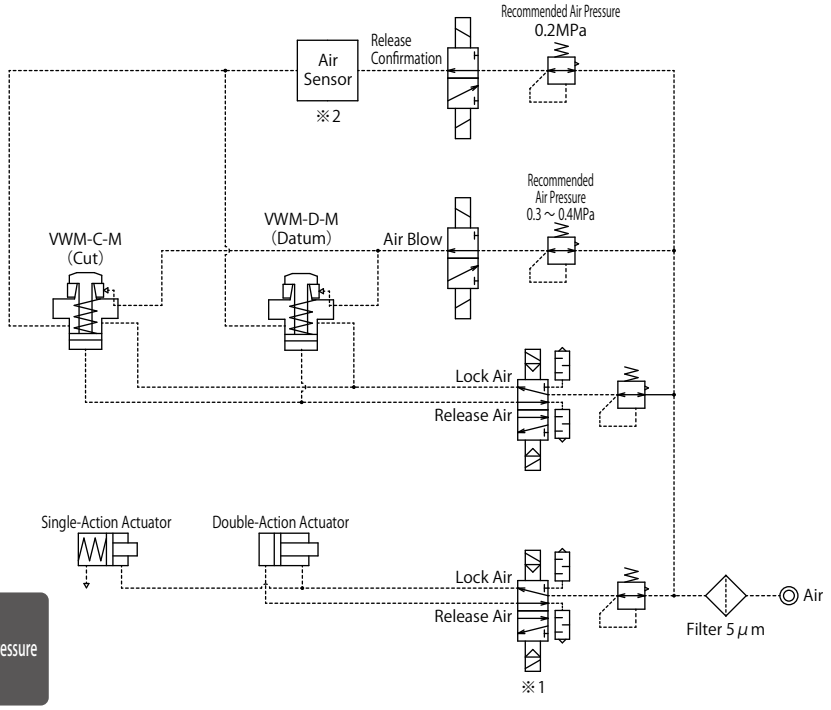
Expansion Locating Pin and other actuators on different circuits.



VWM-B
Locating with Spring and Air Pressure
Releasing with Air Pressure

Double Action model VWM-M Release Confirmation Model

Expansion Locating Pin and other actuators on different circuits.



VWM-M
Locating with Spring and Air Pressure
Releasing with Air Pressure

Notes：

※1. The procedure for lock operation should be "VWM (Expansion Locating Pin)" → "other actuators". Otherwise there might be accuracy failure and/or damages on the product.

※2. Recommended Air Sensor：ISA□-G (SMC), GPS2-05-15 (CKD)

1. This circuit reference is one example. It should be prepared depending on the fixture structure.

Circuit Reference

Notes on Pneumatic Cylinder Speed Control Unit

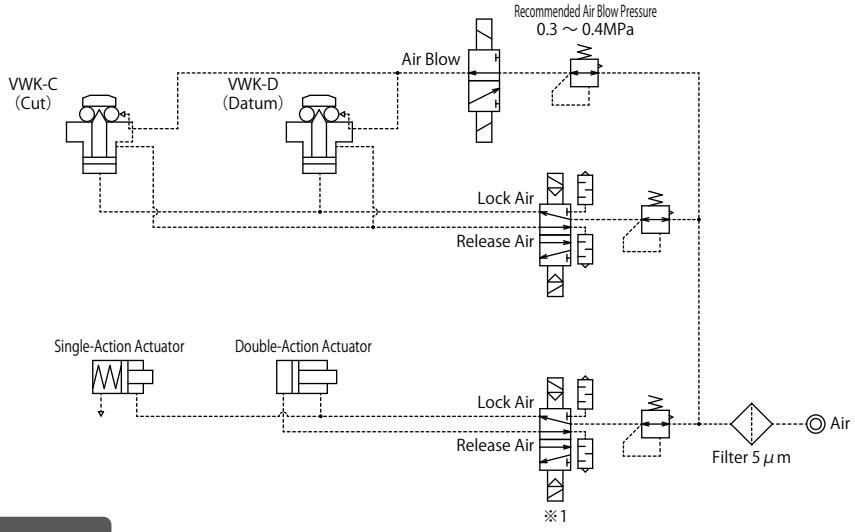
VWK（Standard）

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

Circuit Reference

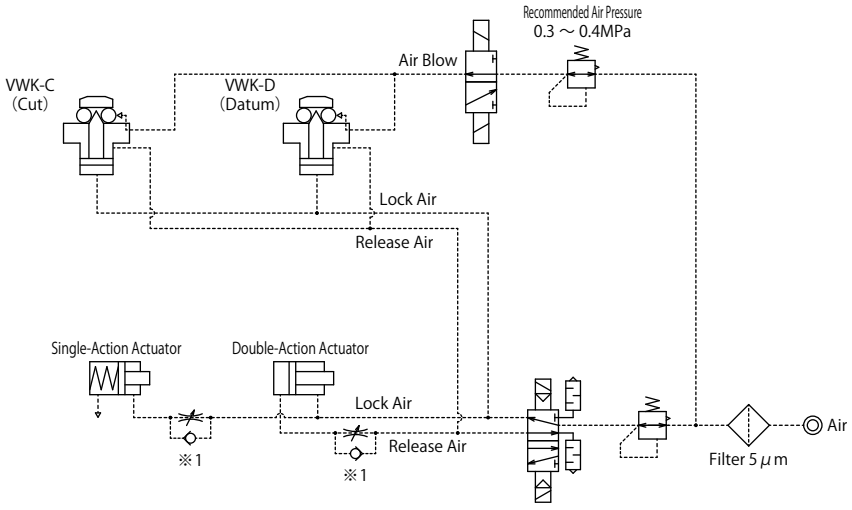
Double Action
model VWK
Standard

Expansion Locating Pin and other actuators on different circuits.



VWK
Locating and Releasing with Air Pressure

Expansion Locating Pin and other actuators on the same circuit.



VWK
Locating and Releasing with Air Pressure

Notes：

※1. The procedure for lock operation should be "VWK (Expansion Locating Pin)" → "other actuators". Otherwise there might be accuracy failure and/or damages on the product.

1. This circuit reference is one example. It should be prepared depending on the fixture structure.

Notes on Pneumatic Cylinder Speed Control Unit

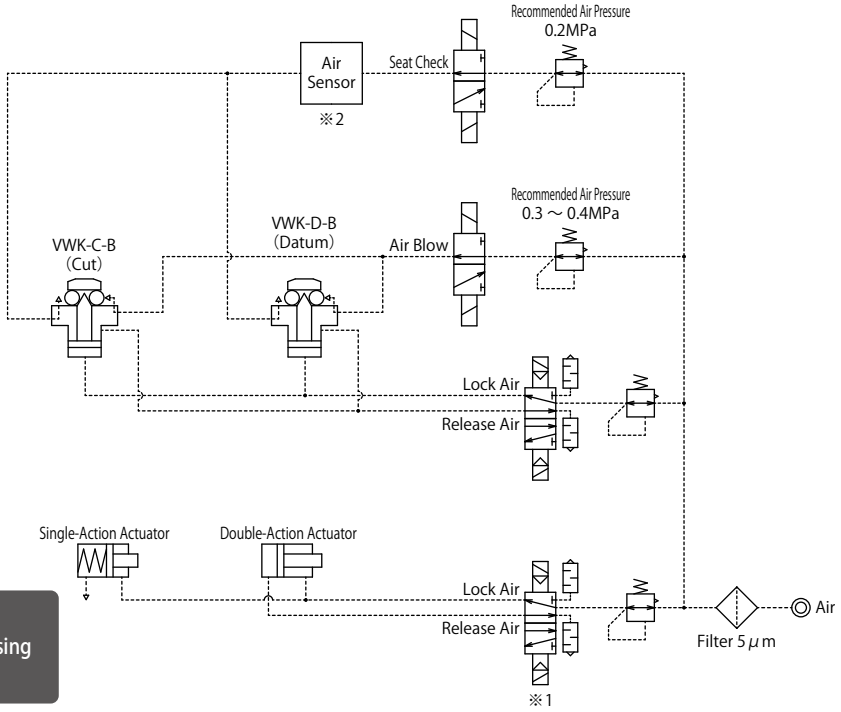
VWK-B (with Seating Surface) | VWK-M (Release Confirmation Model)

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

Circuit Reference

Double Action model VWK-B with Seating Surface

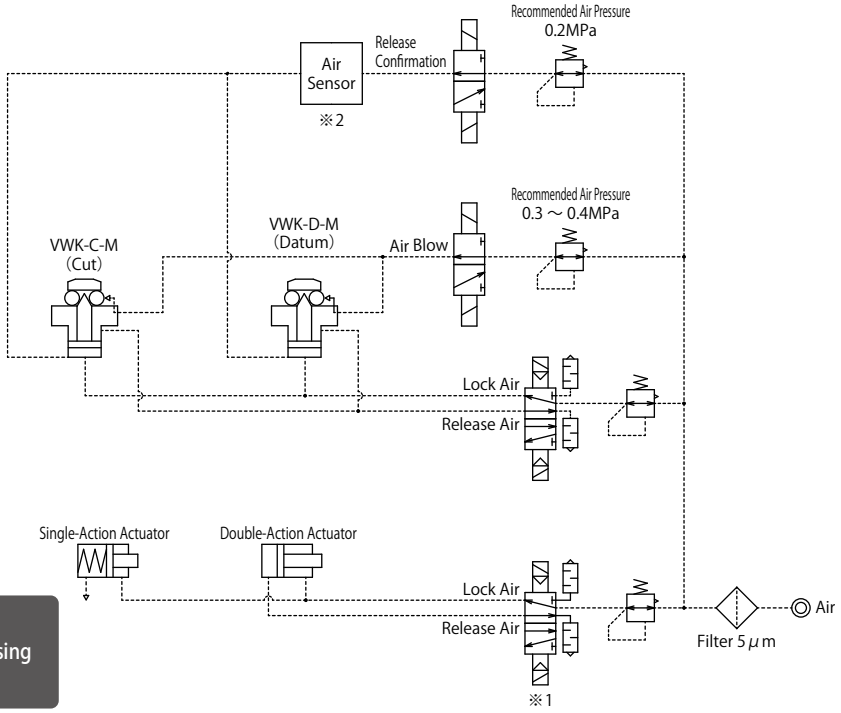
Expansion Locating Pin and other actuators on different circuits.



VWK-B
Locating and Releasing with Air Pressure

Double Action model VWK-M Release Confirmation Model

Expansion Locating Pin and other actuators on different circuits.



VWK-M
Locating and Releasing with Air Pressure

Notes：

※1. The procedure for lock operation should be "VWK (Expansion Locating Pin)" → "other actuators". Otherwise there might be accuracy failure and/or damages on the product.

※2. Recommended Air Sensor：ISA□-G (SMC), GPS2-05-15 (CKD)

1. This circuit reference is one example. It should be prepared depending on the fixture structure.

Hydraulic Expansion Locating Pin

Model VFL
Model VFM
Model VFJ
Model VFK

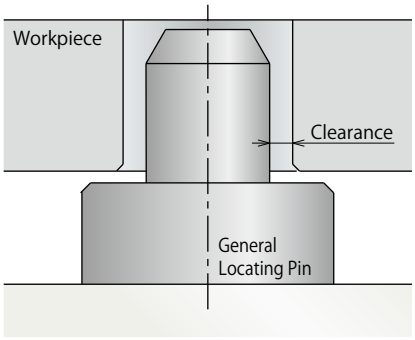
Locating Repeatability　VFL/VFM：3μm　VFJ/VFK：10μm

Zero Clearance between Reference Hole and Expansion Locating Pin

PAT.

Hydraulic expansion locating pin locates workpiece with high accuracy by expanding and releasing diameter.

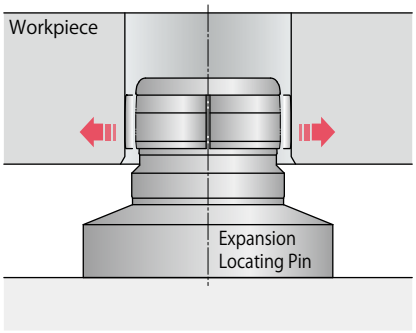
The general locating pin has some clearance between pin and reference hole.



General Locating Pin

Expanding locating pin has zero clearance between pin and reference hole!!

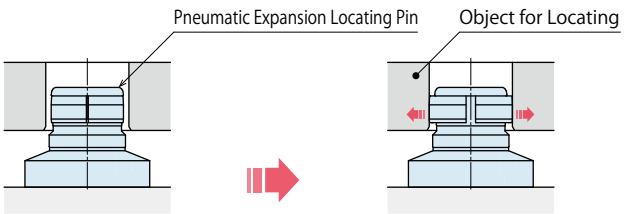
High Accuracy, Setup Time and Total Cost Reduction



The World's First Locating Mechanism

When expanded: The clearance between pin and reference hole get become zero and it leads to locate with high accuracy.
When released: At the time when the work piece is loaded and unloaded, reducing diameter makes enough clearance for changeover and makes it easier.

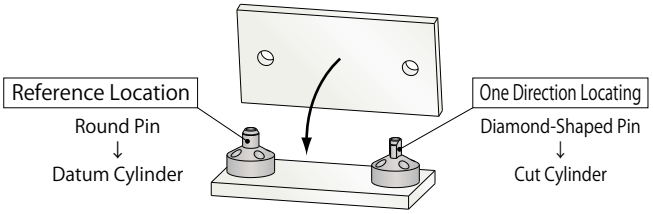
Action Description



＜ Released State ＞　＜ Locked State ＞

※ VFL and VFM is used in the picture above.

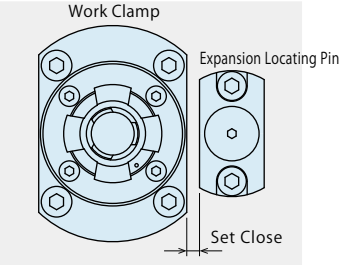
Two types of locating pins (Cylindrical and Diamond shaped pins).
Expansion Locating Pin consisting of Datum-D and Cut-C cylinder.



Features

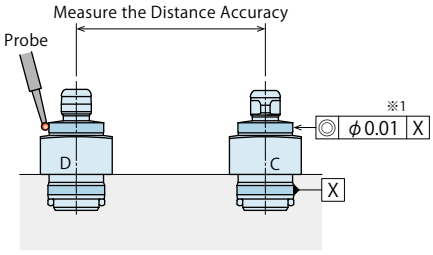
● Simple Arrangement

The compact body can be installed close to the clamp, so fixture design is more simple.



● Easy to Check the Accuracy

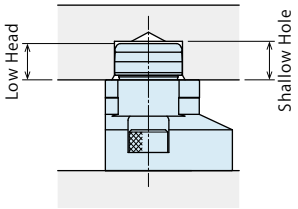
The same core part with X on the flange top allows to determine the origin and measure the distance accuracy.



※1. It is ϕ0.02 for VFJ / VFK.

● For Shallow Workpiece Hole

The low head pin can be used for shallow workpiece hole.

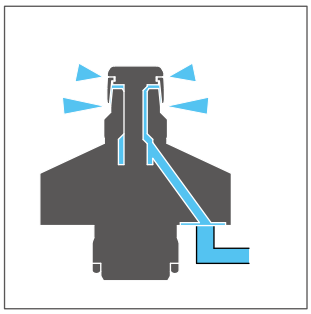


Function

● Air Blow Function

Equipped to All Options

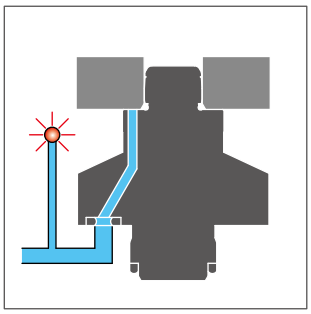
Air blow prevents foreign substances from coming in.



● With Seating Surface (Seat Check)

-B：With Seating Surface Only

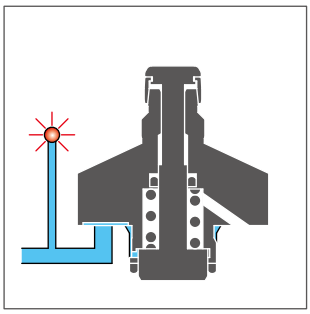
Seat check is available by using the gap sensor.



● Release Confirmation

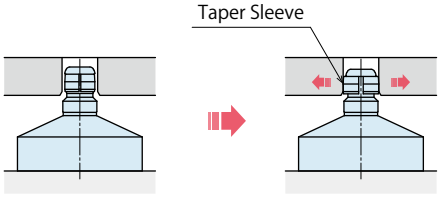
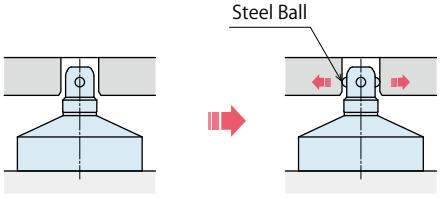
-M：Release Confirmation Only

Release confirmation is available by using the gap sensor.



※ VFL is used in the picture above.

Variation

Low Pressure MAX. 7MPa	 Model **VFL** → P.939	 Model **VFM** → P.939	 Model **VFJ** → P.959	 Model **VFK** → P.959
Type Locating Repeatability	High Accuracy Model 3 μm		Multi-Purpose Model 10 μm	
Control Method	Single Action (Spring Lock/Hydraulic Release)	Double Action (Hydraulic Lock/Hydraulic Release)	Single Action (Hydraulic Lock/Spring Release)	Double Action (Hydraulic Lock/Hydraulic Release)
Operating Pressure Range	2.5 ～ 7 MPa		2.5 ～ 7 MPa	1.5 ～ 7 MPa
Action	 Taper sleeve expands.		 Steel balls come out from the pin.	
Sample Reference	Finishing Line / Dividing Line		Locating Casting Core Holes	

PAT.

Hydraulic Expansion Locating Pin

Model VFL/VFM

Hydraulic • Single Action/Double Action

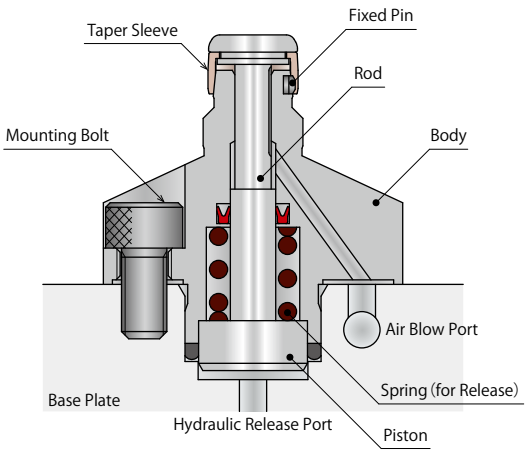
Locating Repeatability : 3μm

Index

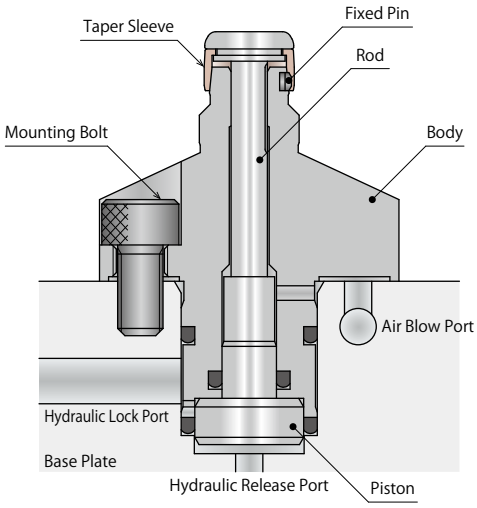
Action Description

This is a simplified drawing of VFL / VFM (Standard).

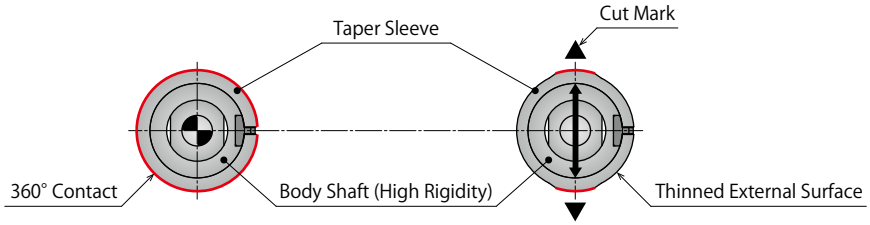
model VFL



model VFM



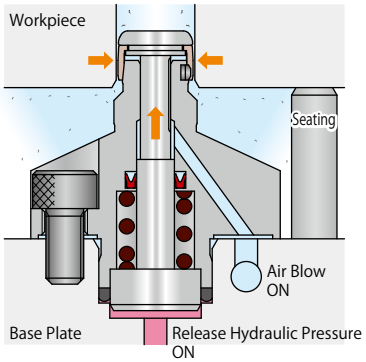
About Reference Locating and Orientation



VFL/VFM-D:Datum
Reference Locating

VFL/VFM-C:Cut
One Direction Locating

model VFL

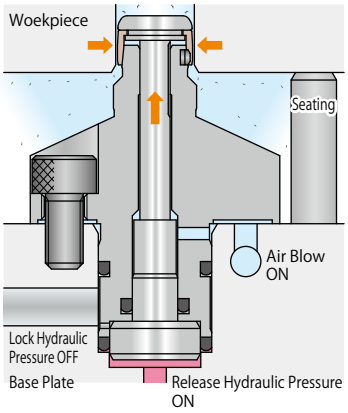


- VFL:When release hydraulic pressure is ON, the taper sleeve ascends with piston/rod and shrinks with its own elasticity.
- VFM:When lock hydraulic pressure is OFF and release hydraulic pressure is ON, the taper sleeve ascends with piston/rod and shrinks with its own elasticity.
- Air blow prevents debris contamination.
- Rod head and taper sleeve are designed to load workpiece smoothly and prevent scratches.

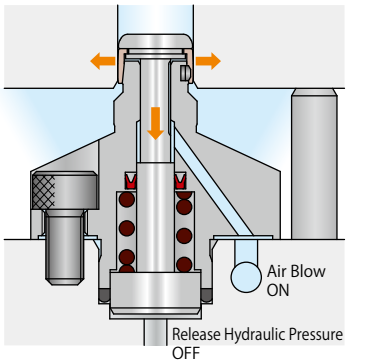
When loading workpiece

When unloading workpiece

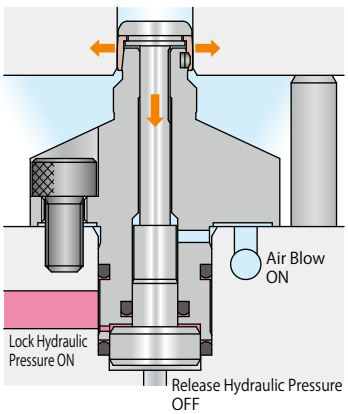
model VFM



When locating

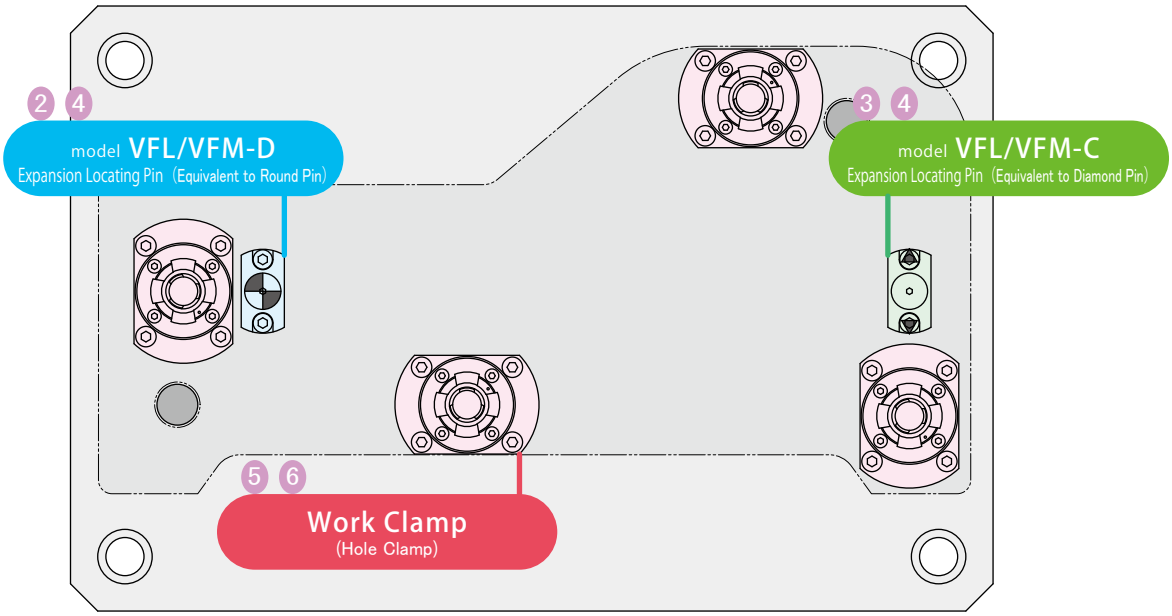


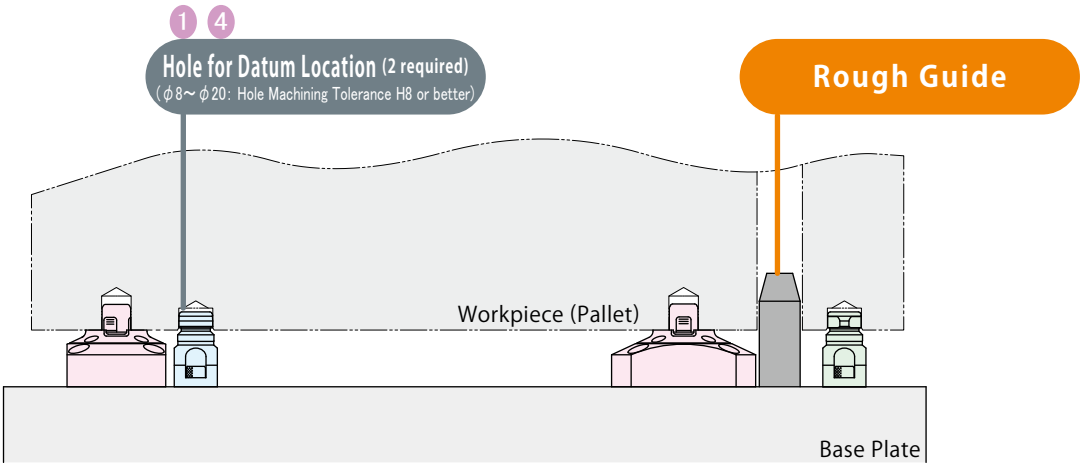
- VFL:When release hydraulic pressure is OFF, the piston/rod descend and the taper sleeve is expanded to locate the workpiece with high accuracy.
- VFM:When release hydraulic pressure is OFF and lock hydraulic pressure is ON, the piston/rod descend and the taper sleeve is expanded to locate the workpiece with high accuracy. (Seating is required for standard and release confirmation models.)



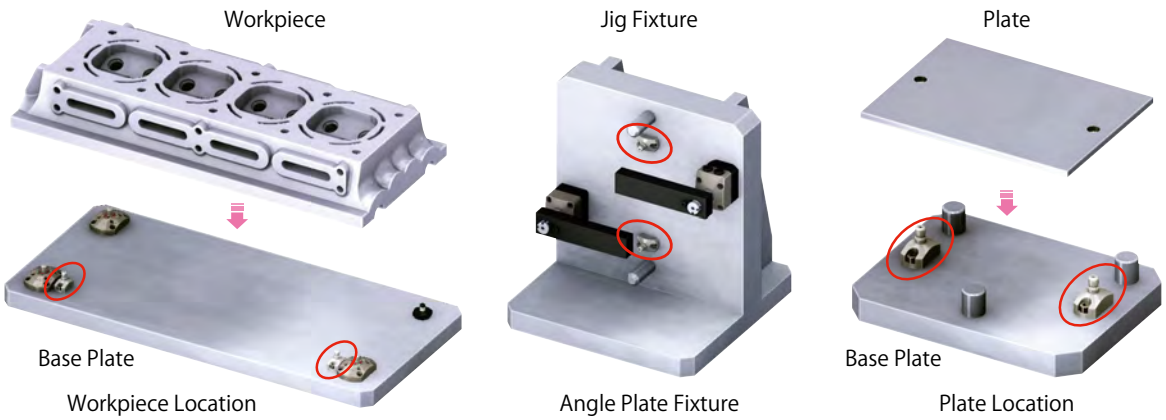
System References

- Repeated locating accuracy of 3μm (One step locating **reduces setup time!**)
- **Avoid deterioration of workpiece accuracy** when changing pallets to perform multiple operations.
- Using with hole clamp allows for 5-face machining, **minimum setup and more compact fixture!**





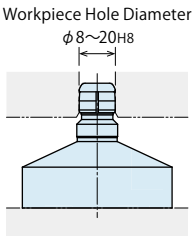
Application Examples



Essential Points

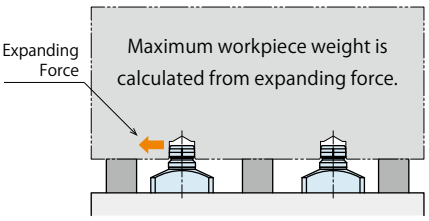
1 Workpiece Hole for Locating

- Workpiece hole diameter is ϕ8～ϕ20 (in 1mm increments).
- Hole machining accuracy for locating hole (two holes) is H8 or better.



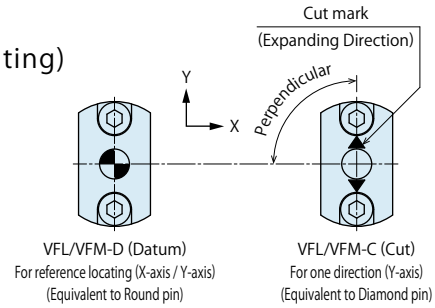
2 Workpiece Weight

- Workpiece weight that expansion locating pin is able to locate with is calculated from expanding force.
- Expanding force is the force with which the expansion locating pin pushes out (expands) against the workpiece.
- Refer to the specification page for each model's calculation method of expansion force and allowable workpiece weight for locating.



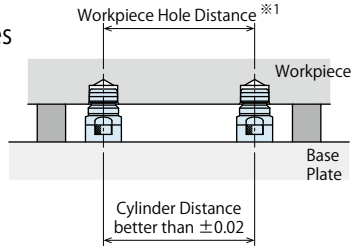
3 Mounting Phase of VFL/VFM-C (Cut：For One Direction Locating)

- The reference position (origin) is determined by VFL/VFM-D (Datum: for reference locating).
- VFL/VFM-C (Cut: for one direction locating) locates in one direction (Y-axis), so phasing is necessary. When mounting, ensure the VFL/VFM-C (cut) cut mark is perpendicular to VFL/VFM-D (datum).
  (There is a cut mark (▲) on top of the flange on the VFL/VFM-C unit that shows the locating direction.)



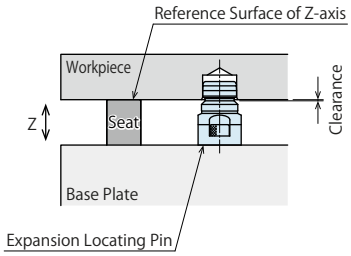
4 Distance accuracy between expansion locating pin and between workpiece holes

- The distance accuracy for the expansion locating pin should be within ±0.02mm.
- ※1. The distance accuracy of workpiece holes (pallet holes) should be within allowable difference. (Refer to “Notes for Design”.)



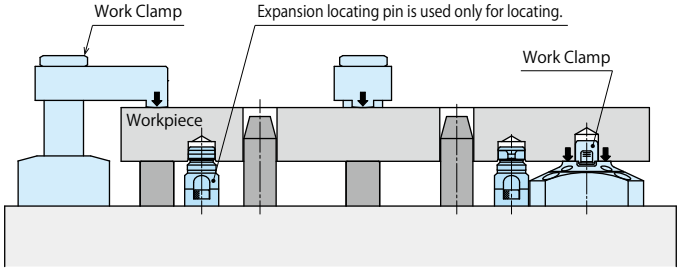
5 Seat Setting

- Standard and -M：Release Confirmation model have no seating surface (reference surface towards Z-axis). Please prepare the seat separately.



6 Setting Additional Work Clamps

- Expansion locating pin has no clamping function.
- Additional clamps should be added to clamp workpiece.



Model No. Indication

VFL 2 00 0 - 080 - D - H20 - M R

1 2 3 4 5 6 7

1 Body Size

2 : Select from Workpiece Diameter φ8 / φ9 / φ10 / φ11

3 : Select from Workpiece Diameter φ12 / φ13 / φ14 / φ15

4 : Select from Workpiece Diameter φ16 / φ17 / φ18 / φ19 / φ20

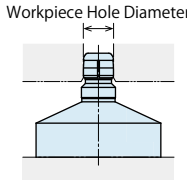
2 Design No.

0 : Revision Number

3 Applicable Workpiece Hole Diameter

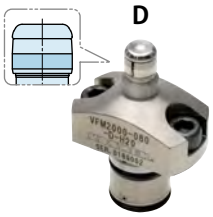
Contact us for workpiece diameters not listed below.
(Workpiece hole machining accuracy should be H8 or more.)

080 : $\phi 8\ H8\ ^{+0.022}_{0}$ mm
090 : $\phi 9\ H8\ ^{+0.022}_{0}$ mm
100 : $\phi 10\ H8\ ^{+0.022}_{0}$ mm
110 : $\phi 11\ H8\ ^{+0.027}_{0}$ mm
120 : $\phi 12\ H8\ ^{+0.027}_{0}$ mm
130 : $\phi 13\ H8\ ^{+0.027}_{0}$ mm
140 : $\phi 14\ H8\ ^{+0.027}_{0}$ mm
150 : $\phi 15\ H8\ ^{+0.027}_{0}$ mm
160 : $\phi 16\ H8\ ^{+0.027}_{0}$ mm
170 : $\phi 17\ H8\ ^{+0.027}_{0}$ mm
180 : $\phi 18\ H8\ ^{+0.027}_{0}$ mm
190 : $\phi 19\ H8\ ^{+0.033}_{0}$ mm
200 : $\phi 20\ H8\ ^{+0.033}_{0}$ mm

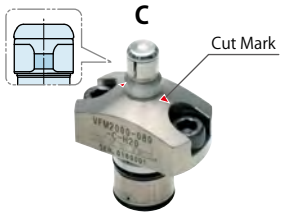


4 Functions

D : Datum (for Reference Locating)
C : Cut (for One Direction Locating)



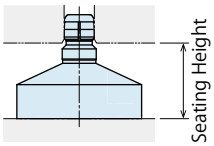
Datum



Cut

5 Seating Height Dimension

H15 : 15mm
H20 : 20mm
H25 : 25mm



Note :
Prepare the seat separately for 6 Option **Blank** : Standard and **M** : Release Confirmation Model.

6 Options

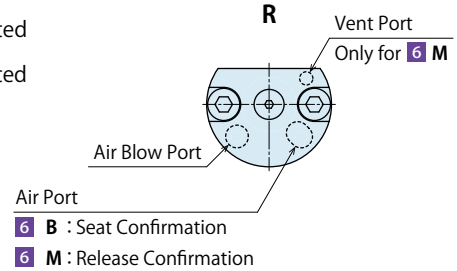
Blank : Standard
B : with Seating Surface
M : Release Confirmation Model

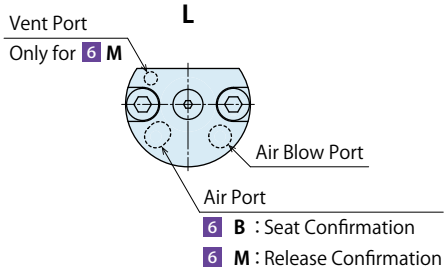
Note :
Contact us for combined use of **B** : With Seating Surface and **M** : Release Confirmation model.

7 Port Position

Only for 6 Options : **B** (with Seating Surface), and **M** (Release Confirmation Model)

R : As Illustrated
L : As Illustrated





Specifications

(mm)

Model No.		VFL2000				VFL3000				VFL4000				
3 Applicable Workpiece Hole Diam.		080	090	100	110	120	130	140	150	160	170	180	190	200
Workpiece Hole Diameter (Standard Diam.)	mm	$\phi 8_{H8}^{+0.022}_{0}$	$\phi 9_{H8}^{+0.022}_{0}$	$\phi 10_{H8}^{+0.022}_{0}$	$\phi 11_{H8}^{+0.027}_{0}$	$\phi 12_{H8}^{+0.027}_{0}$	$\phi 13_{H8}^{+0.027}_{0}$	$\phi 14_{H8}^{+0.027}_{0}$	$\phi 15_{H8}^{+0.027}_{0}$	$\phi 16_{H8}^{+0.027}_{0}$	$\phi 17_{H8}^{+0.027}_{0}$	$\phi 18_{H8}^{+0.027}_{0}$	$\phi 19_{H8}^{+0.033}_{0}$	$\phi 20_{H8}^{+0.033}_{0}$
Locating Repeatability	mm	0.003												
Allowable Offset (C : Cut)	mm	±0.05	±0.05	±0.10	±0.10	±0.10	±0.10	±0.10	±0.10	±0.15	±0.15	±0.15	±0.15	±0.15
Expanding Force (F) ※1	N	190	200	220	200	180	200	190	180	280	290	290	290	290
Allowable Thrust Load ※2	N	1500	1500	2000	2000	2500	2500	2500	2500	3000	3000	3000	3000	3500
Cylinder Capacity (Empty Action)	cm3	0.07				0.08				0.18				
Operating Pressure Range	MPa	2.5 ～ 7.0												
Withstanding Pressure	MPa	10.5												
Recommended Air Blow Pressure	MPa	0.3 ～ 0.4												
Operating Temperature Range	℃	0 ～ 70												
Usable Fluid		General Hydraulic Oil Equivalent to ISO-VG-32												

Notes：

※1. Expanding force shows the calculated value when coefficient friction is μ0.2. Refer to the following chart for the relative equation of expanding force and allowable workpiece weight for locating.

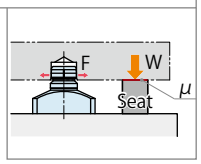
※2. Exceeding allowable thrust load leads to accuracy failure and/or damages on the product.

1. This product locates with spring and releases with hydraulic pressure. (Hydraulic Pressure Single Action Model)
2. This cylinder is used only for locating and does not have a clamping function.

Relative Equation of Expanding Force and Allowable Workpiece Weight for Locating

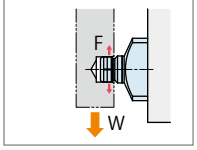
For Horizontal Attitude

$$\text{Workpiece Weight (W)} \leqq \frac{\text{Expanding Force per One Piece of Expansion Locating Pin (F)} \times \text{Efficiency 0.5}}{\text{Friction Coefficient of Workpiece Seat Face } (\mu)}$$



For Vertical Attitude

$$\text{Workpiece Weight (W)} \leqq \text{Expanding Force per One Piece of Expansion Locating Pin (F)} \times \text{Efficiency 0.5}$$



Thrust Load/Displacement Curve

This graph shows the relationship between load and displacement. Thrust load is the perpendicular load on the center of the VFL (Pneumatic Expansion Locating Pin) axis.

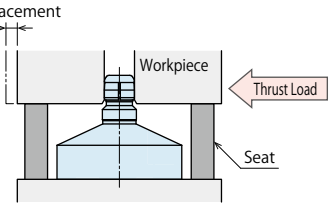
Notes

This graph shows the thrust load (static load) on a single datum (VFL-D) cylinder that is not used with any clamp cylinders.

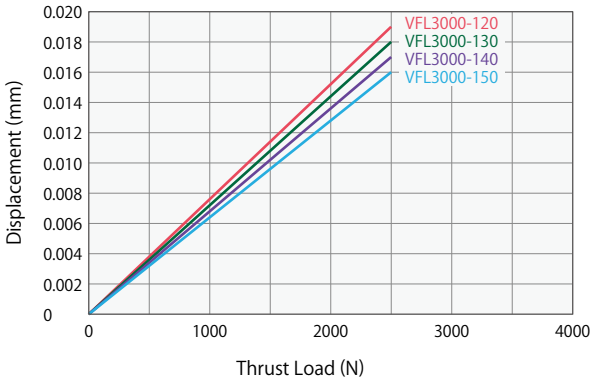
【How to read the thrust load/displacement curve】

ex.) When using VFL2000-010

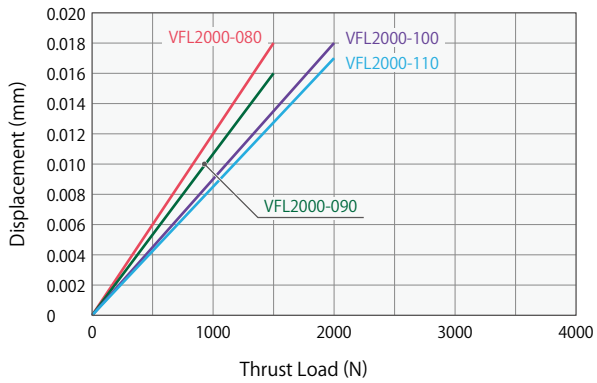
Requirement : When a 2000N thrust load is placed on an expanded VFL2000-010 the displacement will be about 0.018mm.



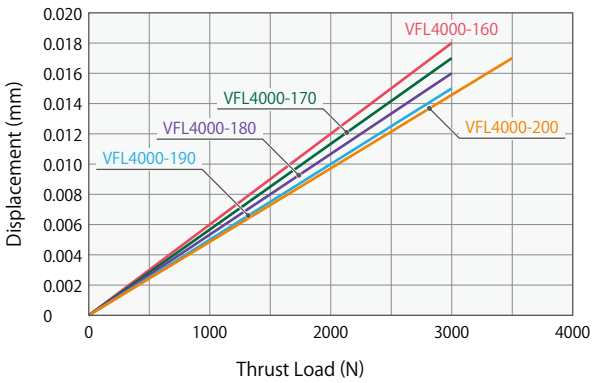
VFL3000



VFL2000



VFL4000

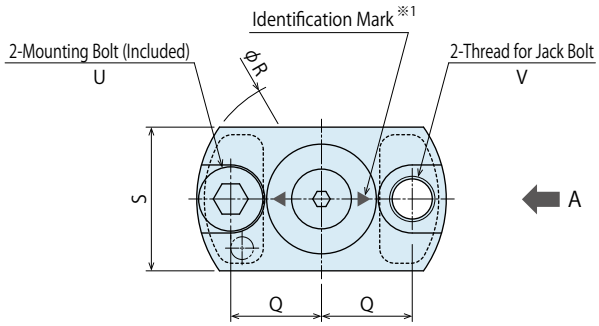


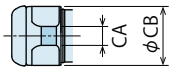
High-Power Series
Pneumatic Series
Hydraulic Series
Valve / Coupler Hydraulic Unit
Manual Operation Accessories
Cautions / Others

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

External Dimensions

※The drawing shows the released state of VFL.

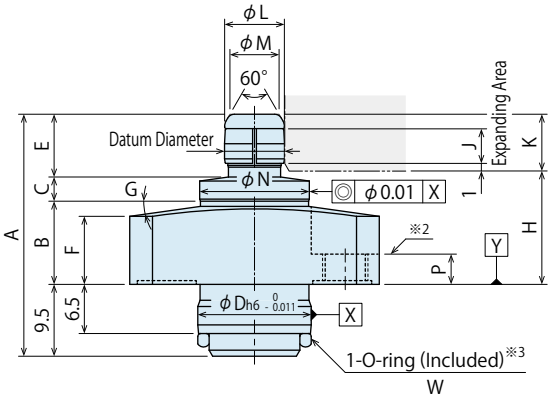




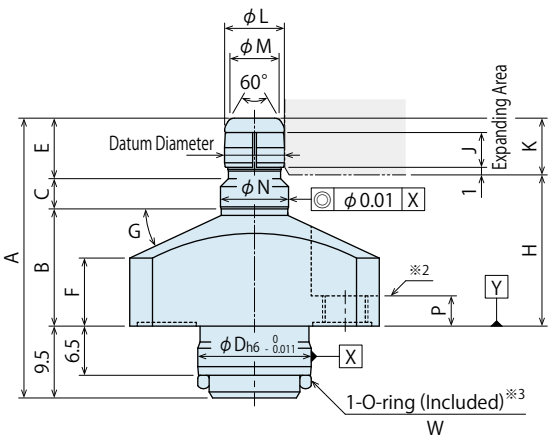
VFL-C
(Cut : One Direction Locating)

View A

5 Seating Height : **H15**

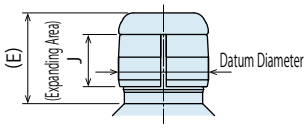


5 Seating Height : **H20 / H25**

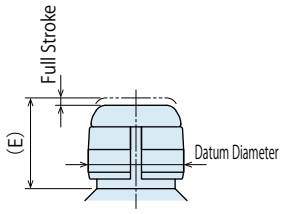


Expanding Area Detail

When Releasing

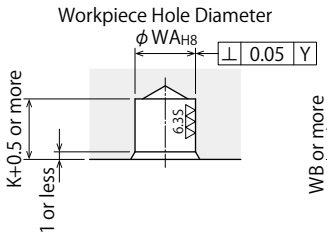


When Locking (At Full Stroke)

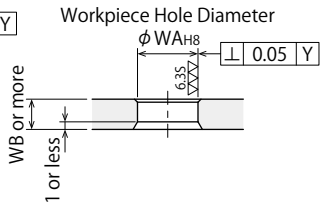


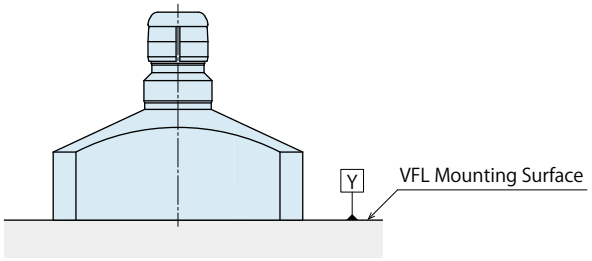
Workpiece Hole Dimensions

Stop Hole



Through Hole





Notes :

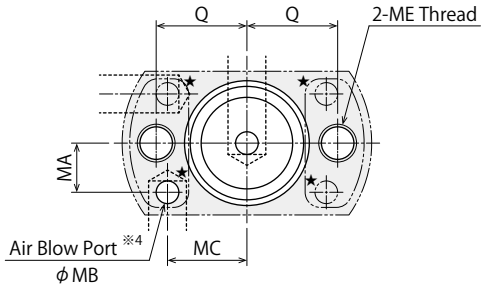
※1. Identification mark is only marked on **-C** : Cut (for one direction locating). ◀ ▶ indicates the locating direction.

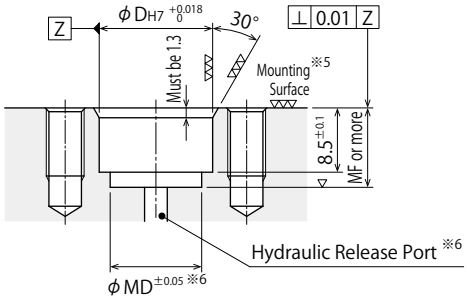
※2. Do not use spring washer or toothed lock washer.

※3. Set the O-ring to the mounting hole side (fixture side) before mounting the body.

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly.
   Use jack screw and remove it parallel to mounting surface.
2. This product has no seat. Choose option **-B** : with Seating Surface or prepare another seat if requiring.

Machining Dimensions for Mounting





Notes：

※4. Install the air blow port choosing one port from four ★ parts.

※5. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.

※6. Prepare the hydraulic release port on the bottom within the range of φMD.

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.979.)

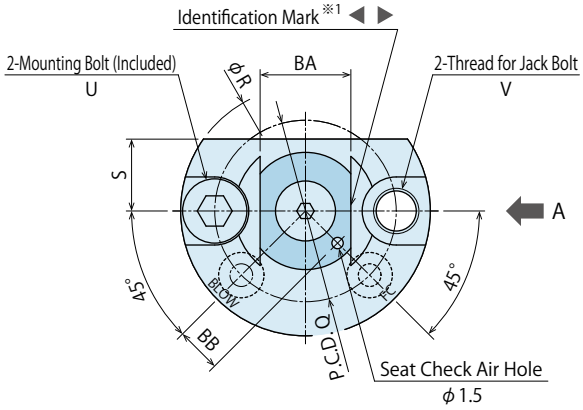
External Dimensions and Machining Dimensions for Mounting

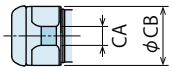
(mm)

Model No.		VFL2000-□-□-□												VFL3000-□-□-□												VFL4000-□-□-□											
3 Applicable Workpiece Hole Diam.		080			090			100			110			120			130			140			150			160			170			180			190			200		
5 Seating Height		H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter (Standard Diam.)		φ8H8			φ9H8			φ10H8			φ11H8			φ12H8			φ13H8			φ14H8			φ15H8			φ16H8			φ17H8			φ18H8			φ19H8			φ20H8		
Datum Diameter	At Releasing	φ7.94 or less			φ8.94 or less			φ9.94 or less			φ10.94 or less			φ11.92 or less			φ12.92 or less			φ13.92 or less			φ14.92 or less			φ15.89 or less			φ16.89 or less			φ17.89 or less			φ18.89 or less			φ19.89 or less		
	At Full Stroke	φ8.05 or more			φ9.05 or more			φ10.05 or more			φ11.05 or more			φ12.05 or more			φ13.05 or more			φ14.05 or more			φ15.05 or more			φ16.07 or more			φ17.07 or more			φ18.07 or more			φ19.07 or more			φ20.07 or more		
Full Stroke		0.65												0.75												1.0											
A		32	37	42	32	37	42	32	37	42	32	37	42	32.5	37.5	42.5	32.5	37.5	42.5	32.5	37.5	42.5	32.5	37.5	42.5	34	39	44	34	39	44	34	39	44	34	39	44	34	39	44
B		11	15.5	20.5	11	15.5	20.5	11	15	20	11	15	20	11	15.5	20.5	11	15.5	20.5	11	15	20	11	15	20	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5
C		3.2	4	4	3.2	4	4	3.2	4.5	4.5	3.2	4.5	4.5	3.2	4	4	3.2	4	4	3.2	4.5	4.5	3.2	4.5	4.5	3.7	4	4	3.7	4	4	3.7	4	4	3.7	4	4	3.7	4	4
D		15												15												18											
E		8.3	8	8	8.3	8	8	8.3	8	8	8.3	8	8	8.8	8.5	8.5	8.8	8.5	8.5	8.8	8.5	8.5	8.8	8.5	8.5	10.3	10	10	10.3	10	10	10.3	10	10	10.3	10	10	10.3	10	10
F		9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	8	11	11	8	11	11	8	11	11	8	11	11	8	11	11
G		8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°
H		15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25
J		4.6												5.1												6											
K		7.5												8												9.5											
L		7.9			8.9			9.8			10.8			11.8			12.8			13.8			14.8			15.7			16.7			17.7			18.7			19.7		
M		6.5			7.5			8.5			9.5			10.5			11.5			12.5			13.5			14			15			16			17			18		
N		14.5	9	9	14.5	10	10	14.5	11	11	14.5	12	12	18.5	13	13	18.5	14	14	18.5	15	15	18.5	16	16	22.5	17	17	22.5	18	18	22.5	19	19	22.5	20	20	22.5	21	21
P		4												4												5											
Q		12												14												17.5											
R		33												37												47											
S		19												19												23											
U		M5×0.8×12												M5×0.8×12												M6×1×16											
V		M6×1												M6×1												M8×1.25											
W		AS568-013 (90)												AS568-013 (90)												AS568-015 (90)											
CA		2.5			2.5			3			3			3.5			3.5			4			4			4.5			4.5			5			5			5		
CB		7.8			8.8			9.7			10.7			11.7			12.7			13.7			14.7			15.5			16.5			17.5			18.5			19.5		
MA		6.5												6.5												7.5											
MB		3												3												4											
MC		10.5												10.5												13											
MD		12.1												12.1												15.1											
ME		M5×0.8 Thread Depth 9 or more												M5×0.8 Thread Depth 9 or more												M6×1 Thread Depth 12 or more											
MF		10.5												10.5												11											
WA		8 +0.022 0			9 +0.022 0			10 +0.022 0			11 +0.027 0			12 +0.027 0			13 +0.027 0			14 +0.027 0			15 +0.027 0			16 +0.027 0			17 +0.027 0			18 +0.027 0			19 +0.033 0			20 +0.033 0		
WB		4												4.5												5.5											
Weight g		60	70	80	60	70	80	60	70	80	60	70	80	70	80	90	70	80	100	70	80	100	70	80	100	110	130	150	110	130	150	110	130	150	110	130	160	120	140	160

External Dimensions

※The drawing shows the released state of VFL-BR.
The ports of VFL-BL are placed to the symmetrical positions of this drawing.

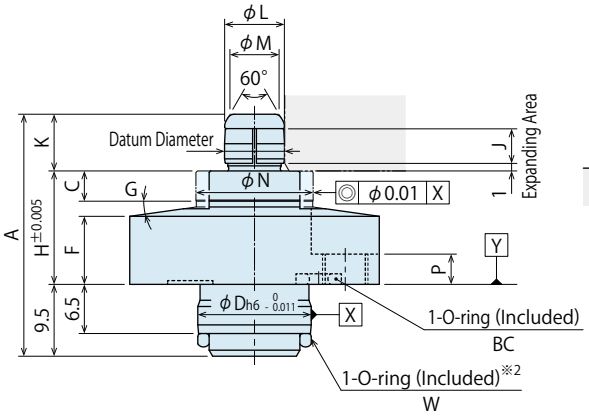




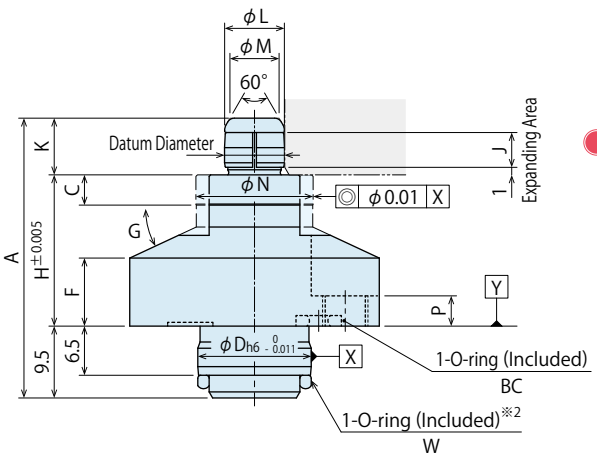
VFL-C
(Cut : One Direction Locating)

View A

5 Seating Height : **H15**

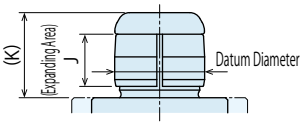


5 Seating Height : **H20 / H25**

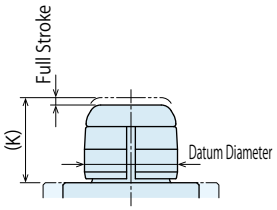


Expanding Area Detail

When Releasing

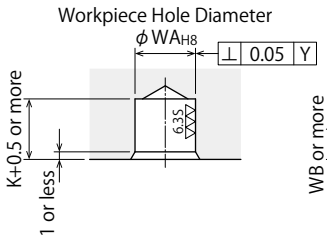


When Locking (At Full Stroke)

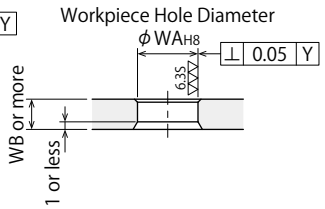


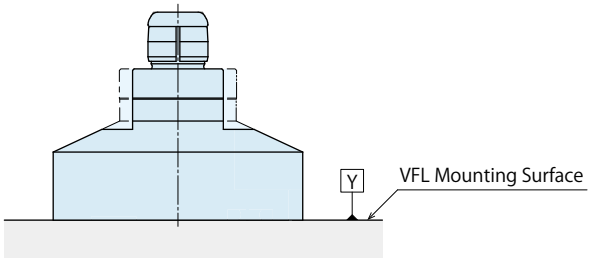
Workpiece Hole Dimensions

Stop Hole



Through Hole





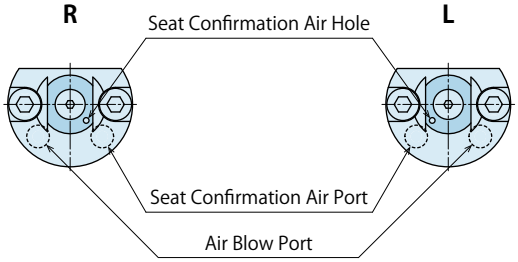
Notes :

※1. Identification mark is only marked on -**C** : Cut (for one direction locating). ◀ ▶ indicates the locating direction.

※2. Set the O-ring to the mounting hole side (fixture side) before mounting the body.

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly.
   Use jack screw and remove it parallel to mounting surface.
2. The port name is marked on the product surface.
   (BLOW : Air Blow Port, FC : Seating Confirmation Air Port)
   Continuously supply air pressure to the air blow port and seat confirmation port.

Port Position

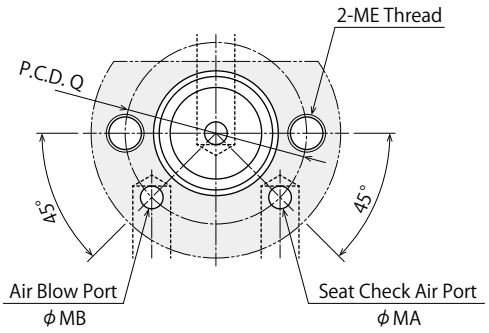


Note :

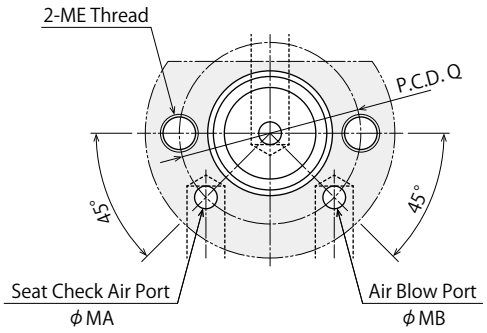
4. Make sure to confirm that the port positions are correct.

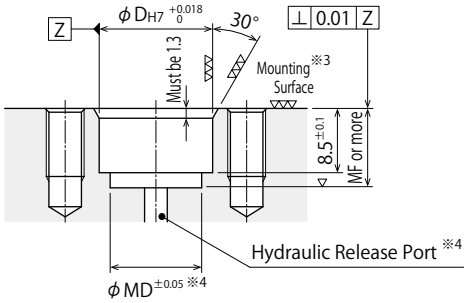
Machining Dimensions for Mounting

7 Port Position : R



7 Port Position : L





Notes :

※3. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.

※4. Prepare the hydraulic release port on the bottom within the range of ϕMD.

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.979.)

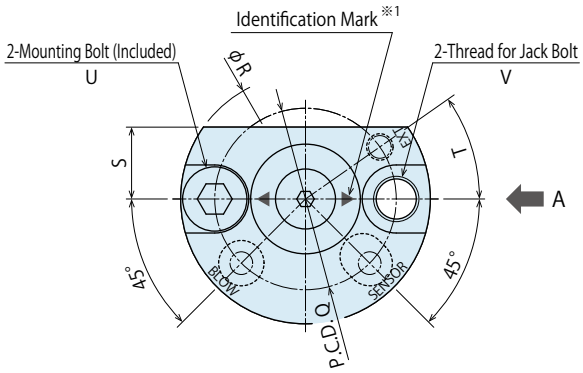
External Dimensions and Machining Dimensions for Mounting

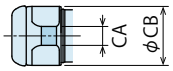
(mm)

Model No.		VFL2000-□-□-□-B□												VFL3000-□-□-□-B□												VFL4000-□-□-□-B□											
3 Applicable Workpiece Hole Diam.		080			090			100			110			120			130			140			150			160			170			180			190			200		
5 Seating Height		H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter (Standard Diam.)		ϕ8H8			ϕ9H8			ϕ10H8			ϕ11H8			ϕ12H8			ϕ13H8			ϕ14H8			ϕ15H8			ϕ16H8			ϕ17H8			ϕ18H8			ϕ19H8			ϕ20H8		
Datum Diameter	At Releasing	ϕ7.94 or less			ϕ8.94 or less			ϕ9.94 or less			ϕ10.94 or less			ϕ11.92 or less			ϕ12.92 or less			ϕ13.92 or less			ϕ14.92 or less			ϕ15.89 or less			ϕ16.89 or less			ϕ17.89 or less			ϕ18.89 or less			ϕ19.89 or less		
	At Full Stroke	ϕ8.05 or more			ϕ9.05 or more			ϕ10.05 or more			ϕ11.05 or more			ϕ12.05 or more			ϕ13.05 or more			ϕ14.05 or more			ϕ15.05 or more			ϕ16.07 or more			ϕ17.07 or more			ϕ18.07 or more			ϕ19.07 or more			ϕ20.07 or more		
Full Stroke		0.65												0.75												1.0											
A		32	37	42	32	37	42	32	37	42	32	37	42	32.5	37.5	42.5	32.5	37.5	42.5	32.5	37.5	42.5	32.5	37.5	42.5	34	39	44	34	39	44	34	39	44	34	39	44
C		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
D		15												15												18											
F		9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	8	11	11	8	11	11	8	11	11	8	11	11
G		8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°
H		15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25
J		4.6												5.1												6											
K		7.5												8												9.5											
L		7.9			8.9			9.8			10.8			11.8			12.8			13.8			14.8			15.7			16.7			17.7			18.7			19.7		
M		6.5			7.5			8.5			9.5			10.5			11.5			12.5			13.5			14			15			16			17			18		
N		15.5			16.5			17.5			18.5			19.5			20.5			21.5			22.5			23.5			24.5			25.5			26.5			27.5		
P		4												4												5											
Q		24												28												35											
R		33												37												47											
S		9.5												9.5												11.5											
U		M5×0.8×12												M5×0.8×12												M6×1×16											
V		M6×1												M6×1												M8×1.25											
W		AS568-013 (90)												AS568-013 (90)												AS568-015 (90)											
BA		12			13			14			14			15			16			17			18			19			20			21			22			23		
BB		6			6.5			7			7.5			8			8.5			9			9.5			10			10.5			11			11.5			12		
BC		AS568-006 (90)												AS568-006 (90)												AS568-007 (90)											
CA		2.5			2.5			3			3			3.5			3.5			4			4			4.5			4.5			5			5			5		
CB		7.8			8.8			9.7			10.7			11.7			12.7			13.7			14.7			15.5			16.5			17.5			18.5			19.5		
MA		3												3												4											
MB		3												3												4											
MD		12.1												12.1												15.1											
ME		M5×0.8 Thread Depth 9 or more												M5×0.8 Thread Depth 9 or more												M6×1 Thread Depth 12 or more											
MF		10.5												10.5												11											
WA		8 +0.022 0			9 +0.022 0			10 +0.022 0			11 +0.027 0			12 +0.027 0			13 +0.027 0			14 +0.027 0			15 +0.027 0			16 +0.027 0			17 +0.027 0			18 +0.027 0			19 +0.033 0			20 +0.033 0		
WB		4												4.5												5.5											
Weight g		70	80	100	70	80	100	70	80	100	70	80	100	80	100	110	80	100	110	80	100	120	80	100	120	130	160	180	130	160	190	130	160	190	140	160	190	140	160	190

External Dimensions

※The drawing shows the released state of VFL-MR.
The ports of VFL-ML are placed to the symmetrical positions of this drawing.

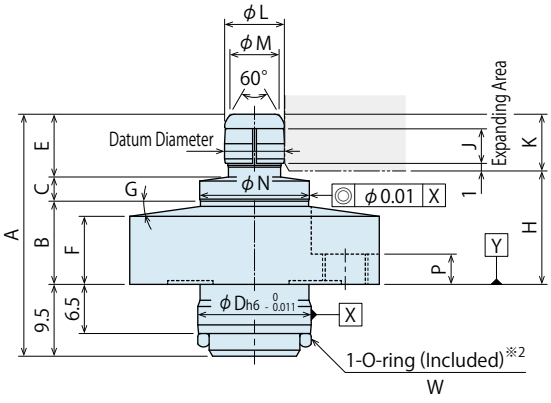




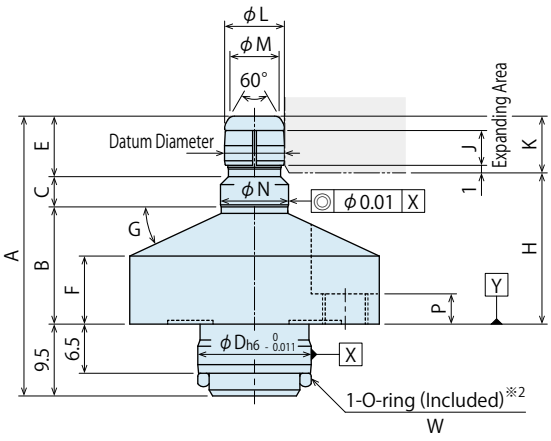
VFL-C
(Cut : One Direction Locating)

View A

5 Seating Height : **H15**

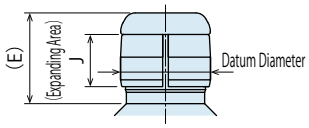


5 Seating Height : **H20 / H25**

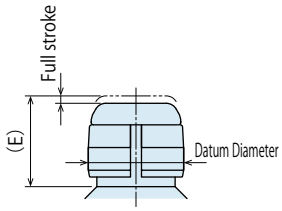


Expanding Area Detail

When Releasing

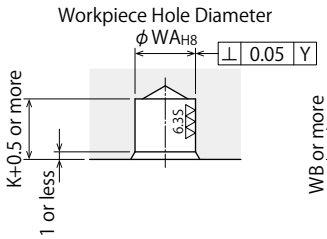


When Locking (At Full Stroke)

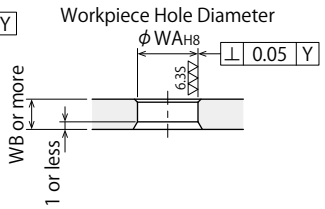


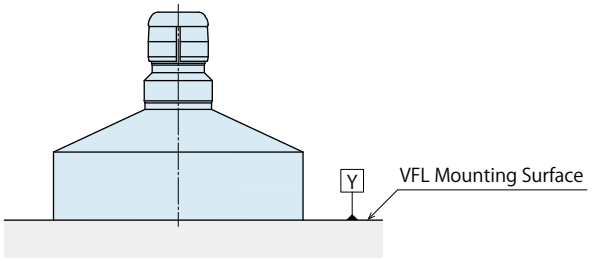
Workpiece Hole Dimensions

Stop Hole



Through Hole





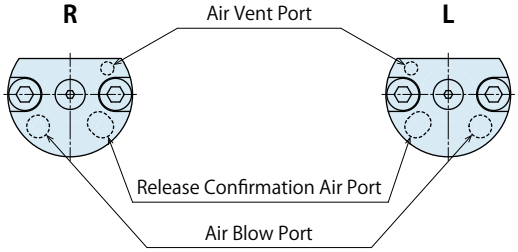
Notes :

※1. Identification mark is only marked on **-C** : Cut (for one direction locating). ◀ ▶ indicates the locating direction.

※2. Set the O-ring to the mounting hole side (fixture side) before mounting the body.

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly.
   Use jack screw and remove it parallel to mounting surface.
2. The port name is marked on the product surface.
   (EXT : Air Vent Port, BLOW : Air Blow Port,
   SENSOR : Release Confirmation Air Port)
   Continuously supply air pressure to the air blow port and release confirmation port.
3. This product has no seat. Choose option **-B** : with Seating Surface or prepare another seat if requiring.

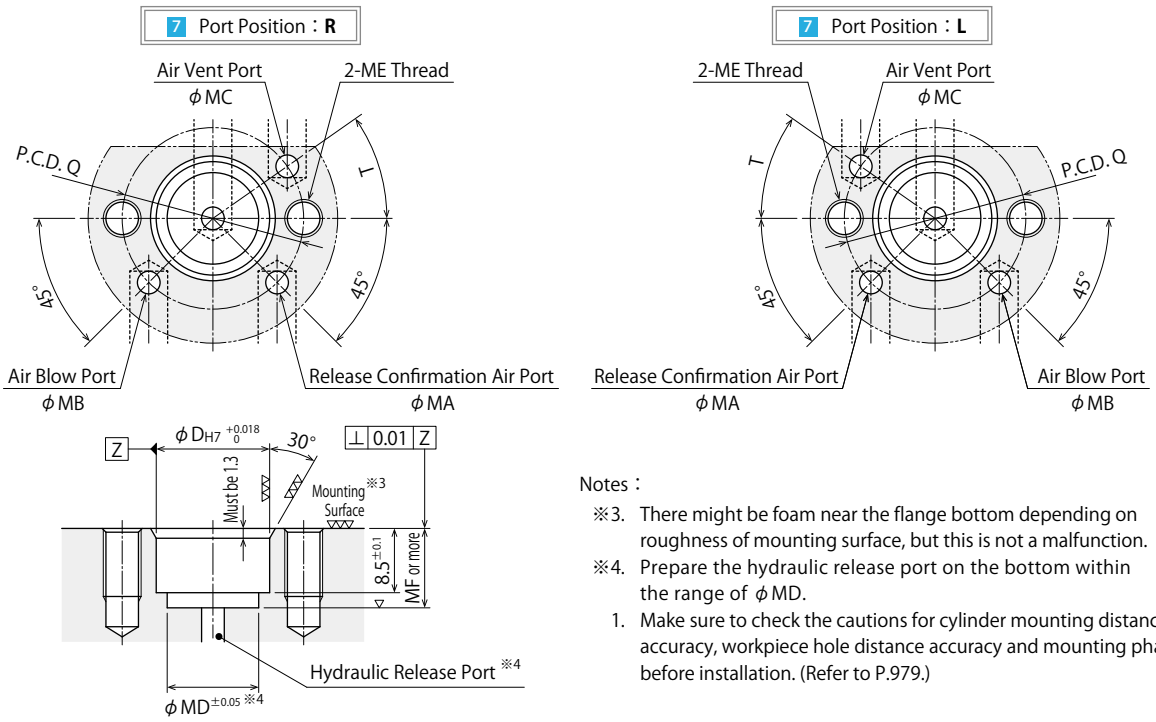
Port Position



Note :

4. Make sure to confirm that the port positions are correct.

Machining Dimensions for Mounting



Notes :

※3. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.

※4. Prepare the hydraulic release port on the bottom within the range of φMD.

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.979.)

External Dimensions and Machining Dimensions for Mounting

(mm)

Model No.		VFL2000-□-□-□-M□												VFL3000-□-□-□-M□												VFL4000-□-□-□-M□											
3 Applicable Workpiece Hole Diam.		080			090			100			110			120			130			140			150			160			170			180			190			200		
5 Seating Height		H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter (Standard Diam.)		φ8H8			φ9H8			φ10H8			φ11H8			φ12H8			φ13H8			φ14H8			φ15H8			φ16H8			φ17H8			φ18H8			φ19H8			φ20H8		
Datum Diameter	At Releasing	φ7.94 or less			φ8.94 or less			φ9.94 or less			φ10.94 or less			φ11.92 or less			φ12.92 or less			φ13.92 or less			φ14.92 or less			φ15.89 or less			φ16.89 or less			φ17.89 or less			φ18.89 or less			φ19.89 or less		
	At Full Stroke	φ8.05 or more			φ9.05 or more			φ10.05 or more			φ11.05 or more			φ12.05 or more			φ13.05 or more			φ14.05 or more			φ15.05 or more			φ16.07 or more			φ17.07 or more			φ18.07 or more			φ19.07 or more			φ20.07 or more		
Full Stroke		0.65												0.75												1.0											
A		32	37	42	32	37	42	32	37	42	32	37	42	32.5	37.5	42.5	32.5	37.5	42.5	32.5	37.5	42.5	32.5	37.5	42.5	34	39	44	34	39	44	34	39	44	34	39	44	34	39	44
B		11	15.5	20.5	11	15.5	20.5	11	15	20	11	15	20	11	15.5	20.5	11	15.5	20.5	11	15	20	11	15	20	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5
C		3.2	4	4	3.2	4	4	3.2	4.5	4.5	3.2	4.5	4.5	3.2	4	4	3.2	4	4	3.2	4.5	4.5	3.2	4.5	4.5	3.7	4	4	3.7	4	4	3.7	4	4	3.7	4	4	3.7	4	4
D		15												15												18											
E		8.3	8	8	8.3	8	8	8.3	8	8	8.3	8	8	8.8	8.5	8.5	8.8	8.5	8.5	8.8	8.5	8.5	8.8	8.5	8.5	10.3	10	10	10.3	10	10	10.3	10	10	10.3	10	10	10.3	10	10
F		9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	8	11	11	8	11	11	8	11	11	8	11	11	8	11	11
G		8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°
H		15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25
J		4.6												5.1												6											
K		7.5												8												9.5											
L		7.9			8.9			9.8			10.8			11.8			12.8			13.8			14.8			15.7			16.7			17.7			18.7			19.7		
M		6.5			7.5			8.5			9.5			10.5			11.5			12.5			13.5			14			15			16			17			18		
N		14.5	9	9	14.5	10	10	14.5	11	11	14.5	12	12	18.5	13	13	18.5	14	14	18.5	15	15	18.5	16	16	22.5	17	17	22.5	18	18	22.5	19	19	22.5	20	20	22.5	21	21
P		4												4												5											
Q		24												28												35											
R		33												37												47											
S		9.5												9.5												11.5											
T		35°												30°												30°											
U		M5×0.8×12												M5×0.8×12												M6×1×16											
V		M6×1												M6×1												M8×1.25											
W		AS568-013 (90)												AS568-013 (90)												AS568-015 (90)											
CA		2.5			2.5			3			3			3.5			3.5			4			4			4.5			4.5			5			5			5		
CB		7.8			8.8			9.7			10.7			11.7			12.7			13.7			14.7			15.5			16.5			17.5			18.5			19.5		
MA		3												3												4											
MB		3												3												4											
MC		3												3												4											
MD		12.1												12.1												15.1											
ME		M5×0.8 Thread Depth 9 or more												M5×0.8 Thread Depth 9 or more												M6×1 Thread Depth 12 or more											
MF		10.5												10.5												11											
WA		8 +0.022 0			9 +0.022 0			10 +0.022 0			11 +0.027 0			12 +0.027 0			13 +0.027 0			14 +0.027 0			15 +0.027 0			16 +0.027 0			17 +0.027 0			18 +0.027 0			19 +0.033 0			20 +0.033 0		
WB		4												4.5												5.5											
Weight g		70	80	100	70	80	100	70	80	100	70	80	100	80	100	110	80	100	110	80	100	120	80	100	120	130	160	180	130	160	190	130	160	190	140	160	190	140	160	190

Model No. Indication

VFM 2 00 0 - 080 - D - H20 - M R

1 2 3 4 5 6 7

1 Body Size

2 : Select from Workpiece Diameter φ8 / φ9 / φ10 / φ11

3 : Select from Workpiece Diameter φ12 / φ13 / φ14 / φ15

4 : Select from Workpiece Diameter φ16 / φ17 / φ18 / φ19 / φ20

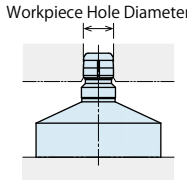
2 Design No.

0 : Revision Number

3 Applicable Workpiece Hole Diameter

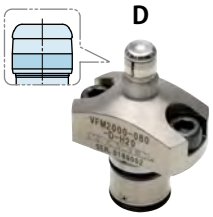
Contact us for workpiece diameters not listed below.
(Workpiece hole machining accuracy should be H8 or more.)

080 : $\phi 8\ H8\ ^{+0.022}_{0}$ mm
090 : $\phi 9\ H8\ ^{+0.022}_{0}$ mm
100 : $\phi 10\ H8\ ^{+0.022}_{0}$ mm
110 : $\phi 11\ H8\ ^{+0.027}_{0}$ mm
120 : $\phi 12\ H8\ ^{+0.027}_{0}$ mm
130 : $\phi 13\ H8\ ^{+0.027}_{0}$ mm
140 : $\phi 14\ H8\ ^{+0.027}_{0}$ mm
150 : $\phi 15\ H8\ ^{+0.027}_{0}$ mm
160 : $\phi 16\ H8\ ^{+0.027}_{0}$ mm
170 : $\phi 17\ H8\ ^{+0.027}_{0}$ mm
180 : $\phi 18\ H8\ ^{+0.027}_{0}$ mm
190 : $\phi 19\ H8\ ^{+0.033}_{0}$ mm
200 : $\phi 20\ H8\ ^{+0.033}_{0}$ mm

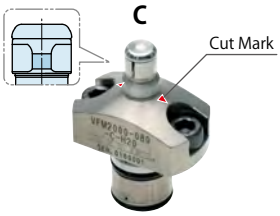


4 Functions

D : Datum (for Reference Locating)
C : Cut (for One Direction Locating)



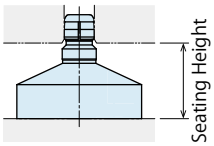
Datum



Cut

5 Seating Height Dimension

H15 : 15mm
H20 : 20mm
H25 : 25mm



Note :
Prepare the seat separately for 6 Option **Blank** : Standard and **M** : Release Confirmation Model.

6 Options

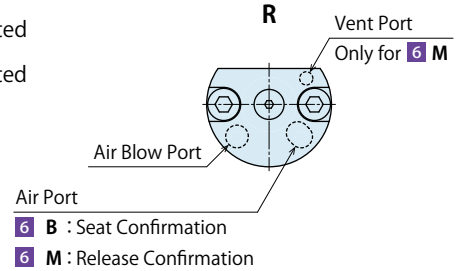
Blank : Standard
B : with Seating Surface
M : Release Confirmation Model

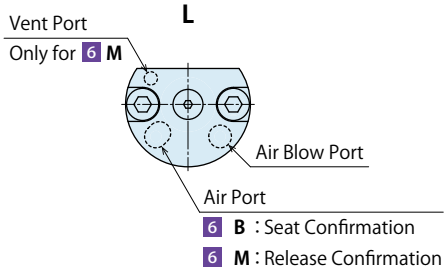
Note :
Contact us for combined use of **B** : With Seating Surface and **M** : Release Confirmation model.

7 Port Position

Only for 6 Options : **B** (with Seating Surface), and **M** (Release Confirmation Model)

R : As Illustrated
L : As Illustrated





Specifications

(mm)

Model No.		VFM2000				VFM3000				VFM4000				
3 Applicable Workpiece Hole Diam.		080	090	100	110	120	130	140	150	160	170	180	190	200
Workpiece Hole Diameter (Standard Diam.) mm		$\phi 8_{H8}^{+0.022}_{0}$	$\phi 9_{H8}^{+0.022}_{0}$	$\phi 10_{H8}^{+0.022}_{0}$	$\phi 11_{H8}^{+0.027}_{0}$	$\phi 12_{H8}^{+0.027}_{0}$	$\phi 13_{H8}^{+0.027}_{0}$	$\phi 14_{H8}^{+0.027}_{0}$	$\phi 15_{H8}^{+0.027}_{0}$	$\phi 16_{H8}^{+0.027}_{0}$	$\phi 17_{H8}^{+0.027}_{0}$	$\phi 18_{H8}^{+0.027}_{0}$	$\phi 19_{H8}^{+0.033}_{0}$	$\phi 20_{H8}^{+0.033}_{0}$
Locating Repeatability mm		0.003												
Allowable Offset (C : Cut) mm		±0.05	±0.05	±0.10	±0.10	±0.10	±0.10	±0.10	±0.10	±0.15	±0.15	±0.15	±0.15	±0.15
Expanding Force (F) ※1 N	at 2.5MPa	260	260	280	260	260	290	270	260	390	400	400	400	400
	at 5.0MPa	680	680	700	680	680	710	690	680	980	990	990	990	1000
	at 7.0MPa	1010	1020	1040	1020	1020	1040	1030	1020	1450	1460	1460	1460	1470
Allowable Thrust Load ※2 N		1500	1500	2000	2000	2500	2500	2500	2500	3000	3000	3000	3000	3500
Cylinder Capacity (Empty Action) cm³	Release side	0.07				0.08				0.18				
	Lock side	0.06				0.06				0.12				
Operating Pressure Range MPa		2.5 ~ 7.0												
Withstanding Pressure MPa		10.5												
Recommended Air Blow Pressure MPa		0.3 ~ 0.4												
Operating Temperature Range ℃		0 ~ 70												
Usable Fluid		General Hydraulic Oil Equivalent to ISO-VG-32												

Notes :

※1. Expanding force shows the calculated value when coefficient friction is μ0.2. Refer to the following chart for the relative equation of expanding force and allowable workpiece weight for locating.

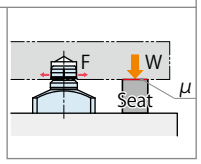
※2. Exceeding allowable thrust load leads to accuracy failure and/or damages on the product.

1. This product locates with spring and releases with hydraulic pressure. (Hydraulic Pressure Single Action Model)
2. This cylinder is used only for locating and does not have a clamping function.

Relative Equation of Expanding Force and Allowable Workpiece Weight for Locating

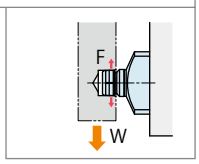
For Horizontal Attitude

$$\text{Workpiece Weight (W)} \leqq \frac{\text{Expanding Force per One Piece of Expansion Locating Pin (F)} \times \text{Efficiency } 0.5}{\text{Friction Coefficient of Workpiece Seat Face } (\mu)}$$



For Vertical Attitude

$$\text{Workpiece Weight (W)} \leqq \text{Expanding Force per One Piece of Expansion Locating Pin (F)} \times \text{Efficiency } 0.5$$



Thrust Load/Displacement Curve

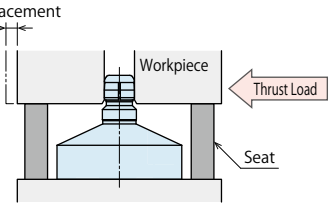
This graph shows the relationship between load and displacement.
Thrust load is the perpendicular load on the center of the VFM (Pneumatic Expansion Locating Pin) axis.

Notes

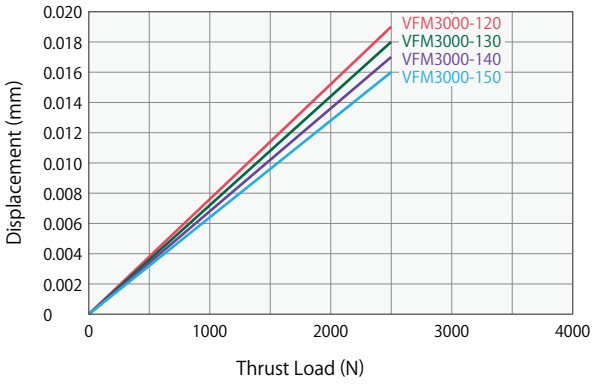
This graph shows the thrust load (static load) on a single datum (VFM-D) cylinder that is not used with any clamp cylinders.

【How to read the thrust load/displacement curve】

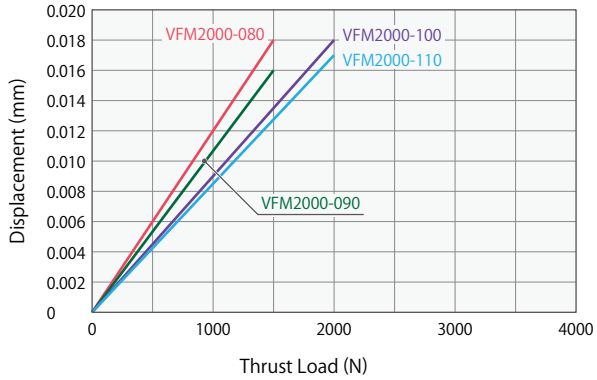
ex.) When using VFM2000-010
Requirement : When a 2000N thrust load is placed on an expanded VFM2000-010 the displacement will be about 0.018mm.



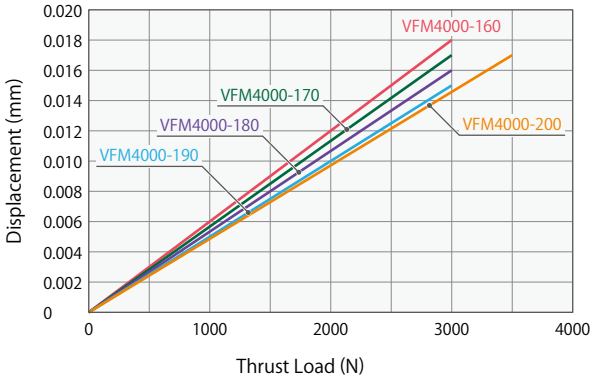
VFM3000



VFM2000

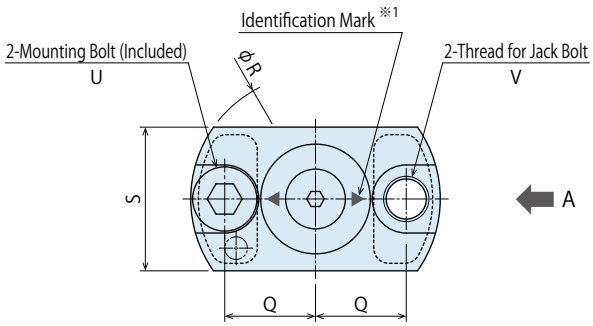


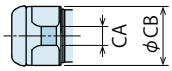
VFM4000



External Dimensions

※The drawing shows the released state of VFM.

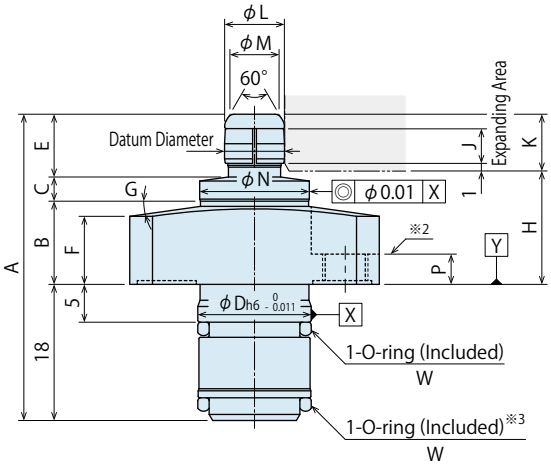




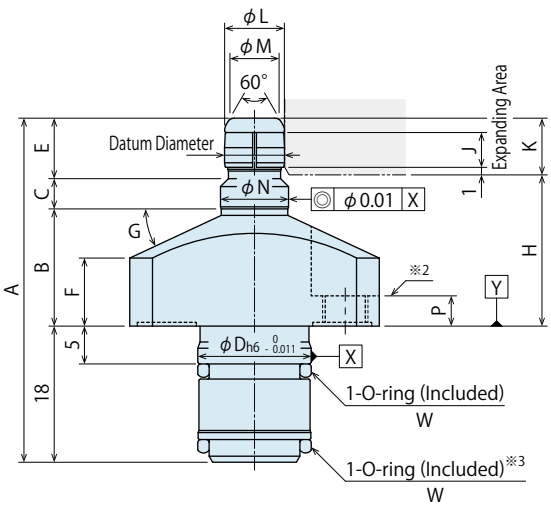
VFM-C
(Cut : One Direction Locating)

View A

5 Seating Height : **H15**

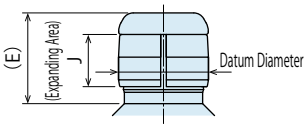


5 Seating Height : **H20 / H25**

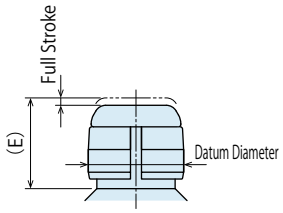


Expanding Area Detail

When Releasing

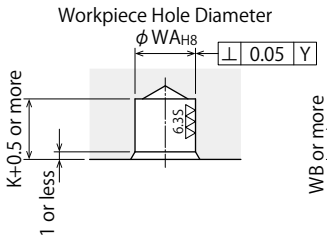


When Locking (At Full Stroke)

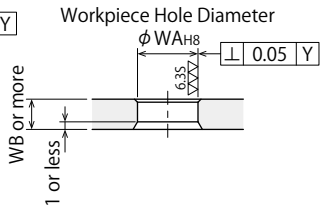


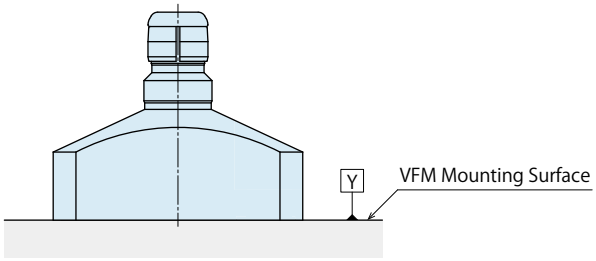
Workpiece Hole Dimensions

Stop Hole



Through Hole





Notes :

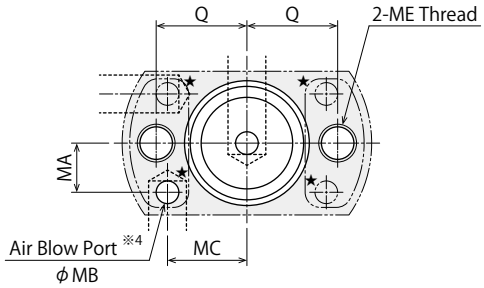
※1. Identification mark is only marked on **-C** : Cut (for one direction locating). ◀ ▶ indicates the locating direction.

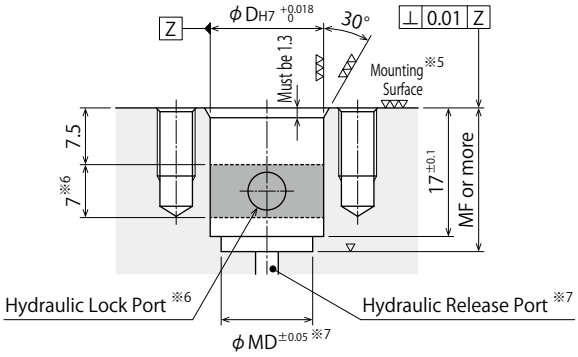
※2. Do not use spring washer or toothed lock washer.

※3. Set the O-ring to the mounting hole side (fixture side) before mounting the body.

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly.
   Use jack screw and remove them parallel to mounting surface.
2. This product has no seat. Choose option **-B** : with Seating Surface or prepare another seat if requiring.

Machining Dimensions for Mounting





Notes：

※4. Install the air blow port choosing one port from four ★ parts.

※5. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.

※6. Prepare the hydraulic lock port within ▭.

※7. Prepare the hydraulic release port on the bottom within the range of φMD.

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.979.)

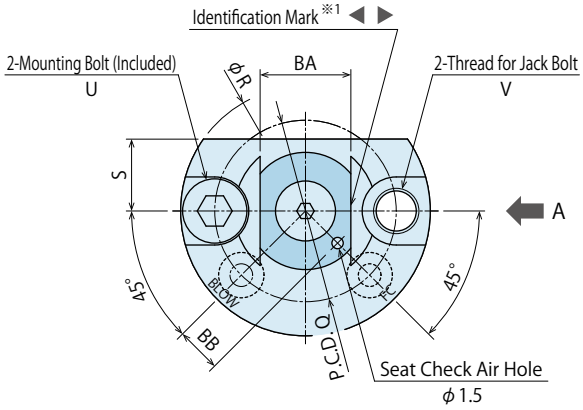
External Dimensions and Machining Dimensions for Mounting

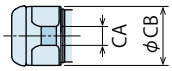
(mm)

Model No.		VFM2000-□-□-□												VFM3000-□-□-□												VFM4000-□-□-□											
3 Applicable Workpiece Hole Diam.		080			090			100			110			120			130			140			150			160			170			180			190			200		
5 Seating Height		H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter (Standard Diam.)		φ8H8			φ9H8			φ10H8			φ11H8			φ12H8			φ13H8			φ14H8			φ15H8			φ16H8			φ17H8			φ18H8			φ19H8			φ20H8		
Datum Diameter	At Releasing	φ7.94 or less			φ8.94 or less			φ9.94 or less			φ10.94 or less			φ11.92 or less			φ12.92 or less			φ13.92 or less			φ14.92 or less			φ15.89 or less			φ16.89 or less			φ17.89 or less			φ18.89 or less			φ19.89 or less		
	At Full Stroke	φ8.05 or more			φ9.05 or more			φ10.05 or more			φ11.05 or more			φ12.05 or more			φ13.05 or more			φ14.05 or more			φ15.05 or more			φ16.07 or more			φ17.07 or more			φ18.07 or more			φ19.07 or more			φ20.07 or more		
Full Stroke		0.65												0.75												1.0											
A		40.5	45.5	50.5	40.5	45.5	50.5	40.5	45.5	50.5	40.5	45.5	50.5	41	46	51	41	46	51	41	46	51	41	46	51	42.5	47.5	52.5	42.5	47.5	52.5	42.5	47.5	52.5	42.5	47.5	52.5	42.5	47.5	52.5
B		11	15.5	20.5	11	15.5	20.5	11	15	20	11	15	20	11	15.5	20.5	11	15.5	20.5	11	15	20	11	15	20	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5
C		3.2	4	4	3.2	4	4	3.2	4.5	4.5	3.2	4.5	4.5	3.2	4	4	3.2	4	4	3.2	4.5	4.5	3.2	4.5	4.5	3.7	4	4	3.7	4	4	3.7	4	4	3.7	4	4	3.7	4	4
D		15												15												18											
E		8.3	8	8	8.3	8	8	8.3	8	8	8.3	8	8	8.8	8.5	8.5	8.8	8.5	8.5	8.8	8.5	8.5	8.8	8.5	8.5	10.3	10	10	10.3	10	10	10.3	10	10	10.3	10	10	10.3	10	10
F		9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	8	11	11	8	11	11	8	11	11	8	11	11	8	11	11
G		8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°
H		15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25
J		4.6												5.1												6											
K		7.5												8												9.5											
L		7.9			8.9			9.8			10.8			11.8			12.8			13.8			14.8			15.7			16.7			17.7			18.7			19.7		
M		6.5			7.5			8.5			9.5			10.5			11.5			12.5			13.5			14			15			16			17			18		
N		14.5	9	9	14.5	10	10	14.5	11	11	14.5	12	12	18.5	13	13	18.5	14	14	18.5	15	15	18.5	16	16	22.5	17	17	22.5	18	18	22.5	19	19	22.5	20	20	22.5	21	21
P		4												4												5											
Q		12												14												17.5											
R		33												37												47											
S		19												19												23											
U		M5×0.8×12												M5×0.8×12												M6×1×16											
V		M6×1												M6×1												M8×1.25											
W		AS568-013（90）												AS568-013（90）												AS568-015（90）											
CA		2.5			2.5			3			3			3.5			3.5			4			4			4.5			4.5			5			5			5		
CB		7.8			8.8			9.7			10.7			11.7			12.7			13.7			14.7			15.5			16.5			17.5			18.5			19.5		
MA		6.5												6.5												7.5											
MB		3												3												4											
MC		10.5												10.5												13											
MD		12.1												12.1												15.1											
ME		M5×0.8 Thread Depth 9 or more												M5×0.8 Thread Depth 9 or more												M6×1 Thread Depth 12 or more											
MF		19												19												19.5											
WA		8 +0.022 0			9 +0.022 0			10 +0.022 0			11 +0.027 0			12 +0.027 0			13 +0.027 0			14 +0.027 0			15 +0.027 0			16 +0.027 0			17 +0.027 0			18 +0.027 0			19 +0.033 0			20 +0.033 0		
WB		4												4.5												5.5											
Weight g		70	80	90	70	80	90	70	80	100	70	80	100	80	90	110	80	90	110	80	100	110	80	100	110	130	150	170	130	150	170	130	150	170	130	150	170	130	150	170

External Dimensions

※The drawing shows the released state of VFM-BR.
The ports of VFM-BL are placed to the symmetrical positions of this drawing.

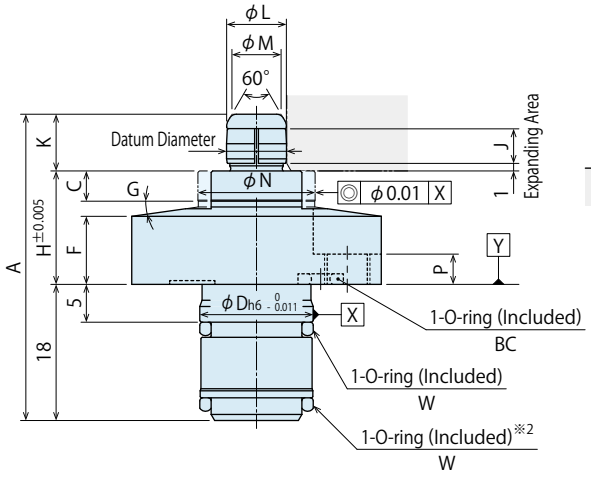




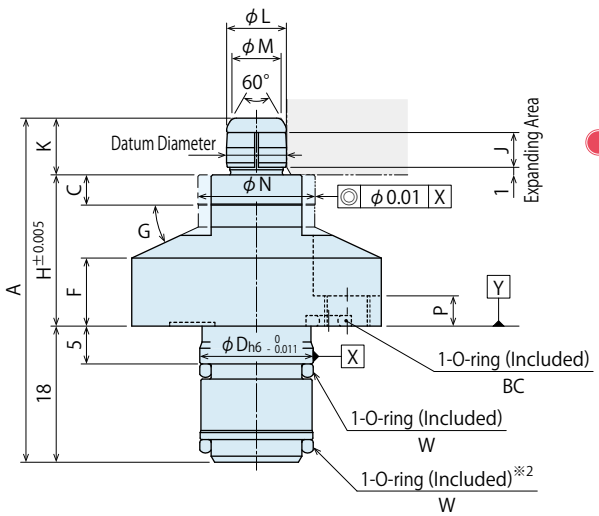
VFM-C
(Cut : One Direction Locating)

View A

5 Seating Height : **H15**

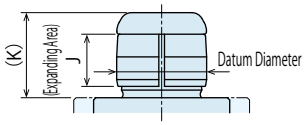


5 Seating Height : **H20 / H25**

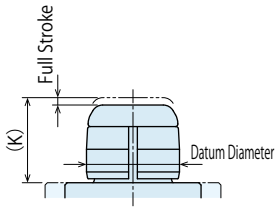


Expanding Area Detail

When Releasing

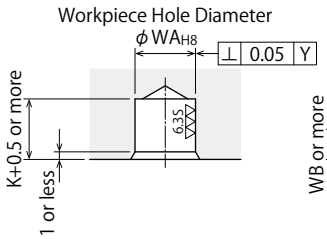


When Locking (At Full Stroke)

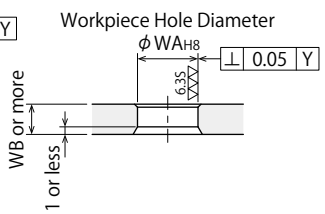


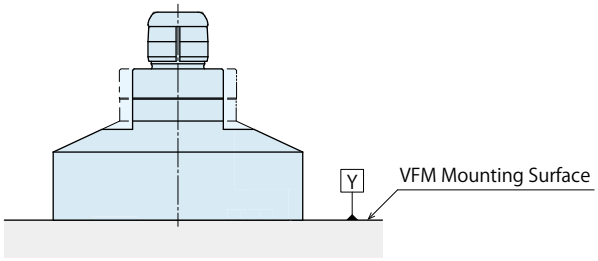
Workpiece Hole Dimensions

Stop Hole



Through Hole





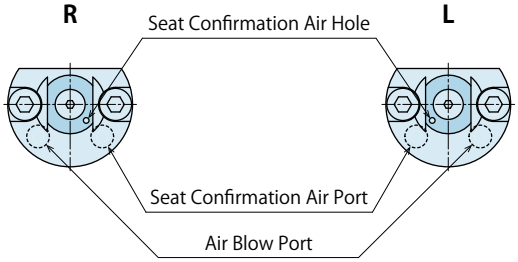
Notes :

※1. Identification mark is only marked on -**C** : Cut (for one direction locating). ◀ ▶ indicates the locating direction.

※2. Set the O-ring to the mounting hole side (fixture side) before mounting the body.

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly.
   Use jack screw and remove them parallel to mounting surface.
2. The port name is marked on the product surface.
   (BLOW : Air Blow Port, FC : Seating Confirmation Air Port)
   Continuously supply air pressure to the air blow port and seat confirmation port.

Port Position

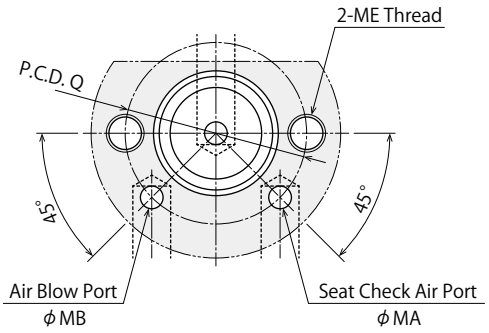


Note :

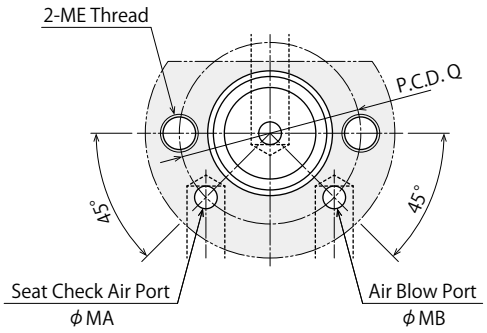
4. Make sure to confirm that the port positions are correct.

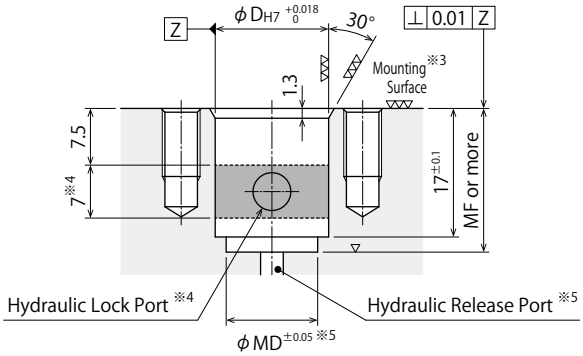
Machining Dimensions for Mounting

7 Port Position : R



7 Port Position : L





Notes :

※3. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.
※4. Prepare the hydraulic lock port within ▭.
※5. Prepare the hydraulic release port on the bottom within the range of ϕMD.
1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.979.)

External Dimensions and Machining Dimensions for Mounting

(mm)

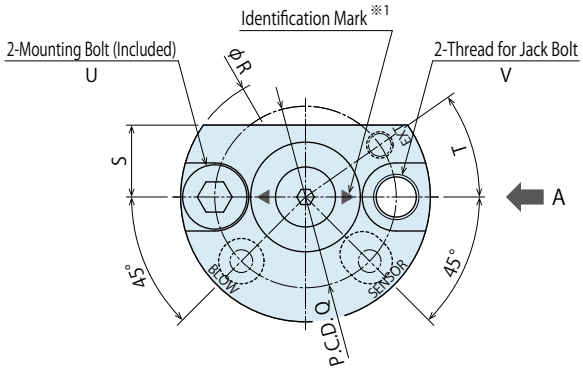
Model No.		VFM2000-□-□-□-B□												VFM3000-□-□-□-B□												VFM4000-□-□-□-B□											
3 Applicable Workpiece Hole Diam.		080			090			100			110			120			130			140			150			160			170			180			190			200		
5 Seating Height		H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter (Standard Diam.)		ϕ8H8			ϕ9H8			ϕ10H8			ϕ11H8			ϕ12H8			ϕ13H8			ϕ14H8			ϕ15H8			ϕ16H8			ϕ17H8			ϕ18H8			ϕ19H8			ϕ20H8		
Datum Diameter	At Releasing	ϕ7.94 or less			ϕ8.94 or less			ϕ9.94 or less			ϕ10.94 or less			ϕ11.92 or less			ϕ12.92 or less			ϕ13.92 or less			ϕ14.92 or less			ϕ15.89 or less			ϕ16.89 or less			ϕ17.89 or less			ϕ18.89 or less			ϕ19.89 or less		
	At Full Stroke	ϕ8.05 or more			ϕ9.05 or more			ϕ10.05 or more			ϕ11.05 or more			ϕ12.05 or more			ϕ13.05 or more			ϕ14.05 or more			ϕ15.05 or more			ϕ16.07 or more			ϕ17.07 or more			ϕ18.07 or more			ϕ19.07 or more			ϕ20.07 or more		
Full Stroke		0.65												0.75												1.0											
A		40.5	45.5	50.5	40.5	45.5	50.5	40.5	45.5	50.5	40.5	45.5	50.5	41	46	51	41	46	51	41	46	51	41	46	51	42.5	47.5	52.5	42.5	47.5	52.5	42.5	47.5	52.5	42.5	47.5	52.5	42.5	47.5	52.5
C		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
D		15												15												18											
F		9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	8	11	11	8	11	11	8	11	11	8	11	11	8	11	11
G		8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°
H		15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25
J		4.6												5.1												6											
K		7.5												8												9.5											
L		7.9			8.9			9.8			10.8			11.8			12.8			13.8			14.8			15.7			16.7			17.7			18.7			19.7		
M		6.5			7.5			8.5			9.5			10.5			11.5			12.5			13.5			14			15			16			17			18		
N		15.5			16.5			17.5			18.5			19.5			20.5			21.5			22.5			23.5			24.5			25.5			26.5			27.5		
P		4												4												5											
Q		24												28												35											
R		33												37												47											
S		9.5												9.5												11.5											
U		M5×0.8×12												M5×0.8×12												M6×1×16											
V		M6×1												M6×1												M8×1.25											
W		AS568-013 (90)												AS568-013 (90)												AS568-015 (90)											
BA		12			13			14			14			15			16			17			18			19			20			21			22			23		
BB		6			6.5			7			7.5			8			8.5			9			9.5			10			10.5			11			11.5			12		
BC		AS568-006 (90)												AS568-006 (90)												AS568-007 (90)											
CA		2.5			2.5			3			3			3.5			3.5			4			4			4.5			4.5			5			5			5		
CB		7.8			8.8			9.7			10.7			11.7			12.7			13.7			14.7			15.5			16.5			17.5			18.5			19.5		
MA		3												3												4											
MB		3												3												4											
MD		12.1												12.1												15.1											
ME		M5×0.8 Thread Depth 9 or more												M5×0.8 Thread Depth 9 or more												M6×1 Thread Depth 12 or more											
MF		19												19												19.5											
WA		8 +0.022 0			9 +0.022 0			10 +0.022 0			11 +0.027 0			12 +0.027 0			13 +0.027 0			14 +0.027 0			15 +0.027 0			16 +0.027 0			17 +0.027 0			18 +0.027 0			19 +0.033 0			20 +0.033 0		
WB		4												4.5												5.5											
Weight g		80	90	110	80	90	110	80	90	110	80	100	110	90	110	130	90	110	130	90	110	130	100	110	130	150	170	200	150	180	200	150	180	200	150	180	210	150	180	210

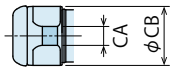
High-Power Series
Pneumatic Series
Hydraulic Series
Valve / Coupler Hydraulic Unit
Manual Operation Accessories
Cautions / Others

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

External Dimensions

※The drawing shows the released state of VFM-MR.
The ports of VFM-ML are placed to the symmetrical positions of this drawing.

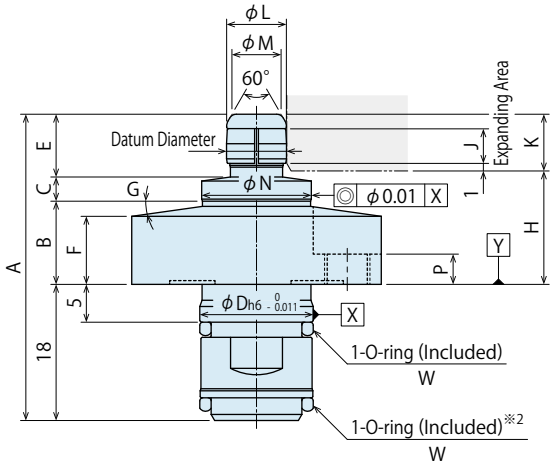




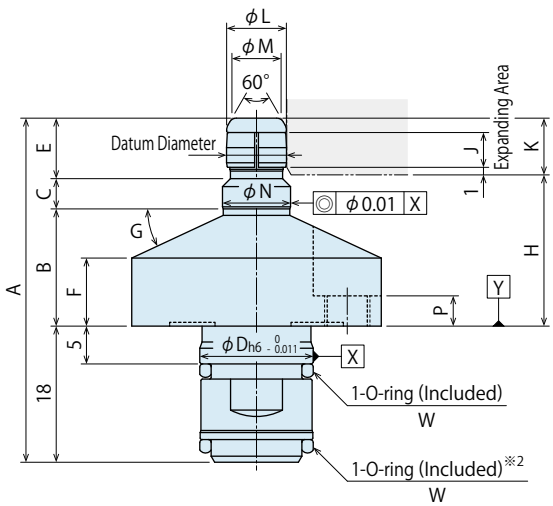
VFM-C
(Cut : One Direction Locating)

View A

5 Seating Height : **H15**

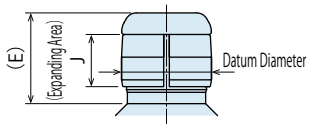


5 Seating Height : **H20 / H25**

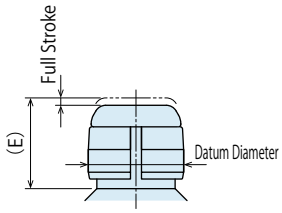


Expanding Area Detail

When Releasing

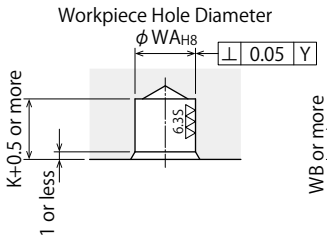


When Locking (At Full Stroke)

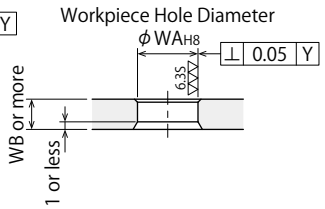


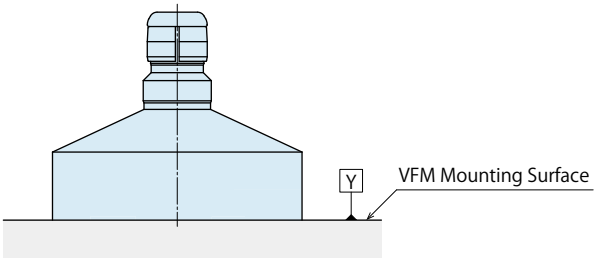
Workpiece Hole Dimensions

Stop Hole



Through Hole





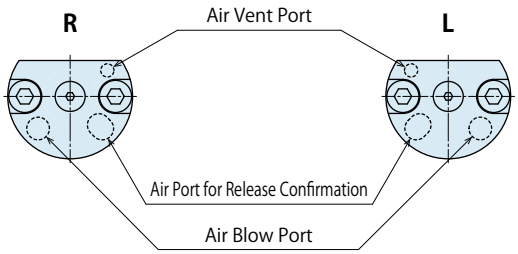
Notes :

※1. Identification mark is only marked on **-C** : Cut (for one direction locating). ◀ ▶ indicates the locating direction.

※2. Set the O-ring to the mounting hole side (fixture side) before mounting the body.

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly.
   Use jack screw and remove it parallel to mounting surface.
2. The port name is marked on the product surface.
   (EXT : Air Vent Port, BLOW : Air Blow Port,
   SENSOR : Release Confirmation Air Port)
   Continuously supply air pressure to the air blow port and release confirmation port.
3. This product has no seat. Choose option **-B** : with Seating Surface or prepare another seat if requiring.

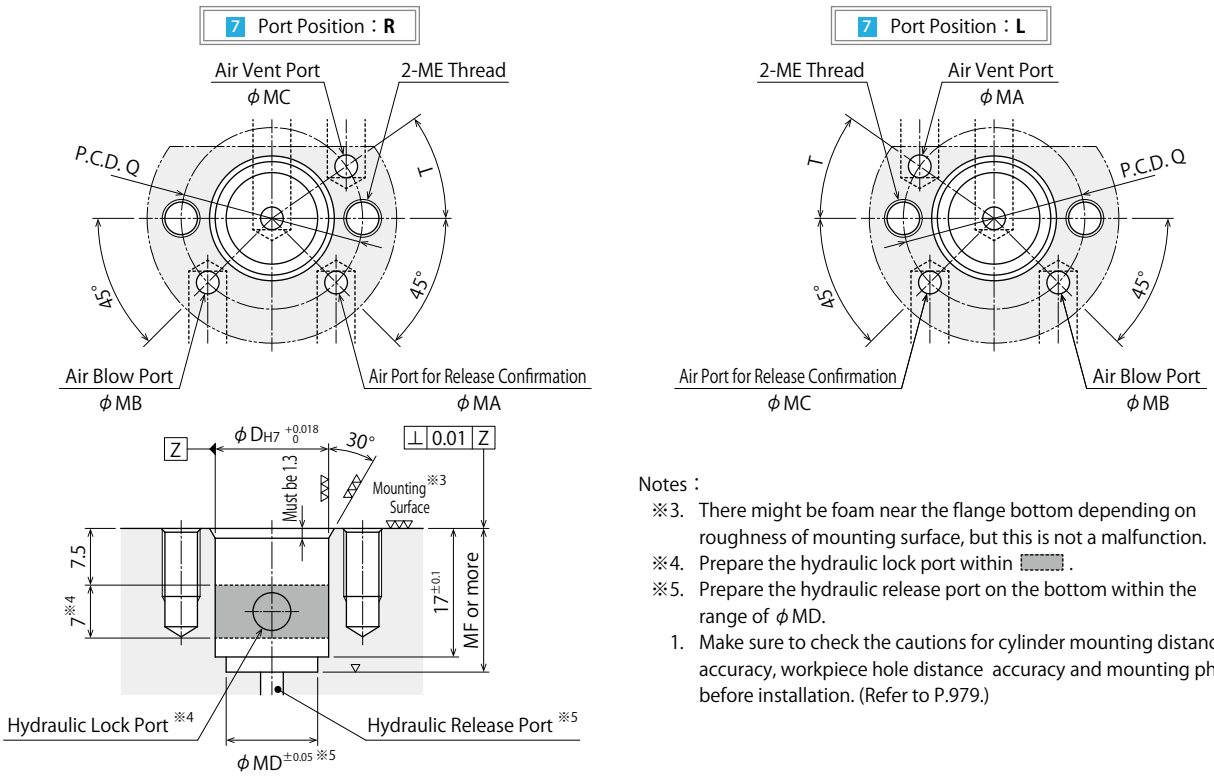
Port Position



Note :

4. Make sure to confirm that the port positions are correct.

Machining Dimensions for Mounting



Notes :

※3. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.

※4. Prepare the hydraulic lock port within ▭.

※5. Prepare the hydraulic release port on the bottom within the range of φMD.

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.979.)

External Dimensions and Machining Dimensions for Mounting

(mm)

Model No.		VFM2000-□-□-□-M□												VFM3000-□-□-□-M□												VFM4000-□-□-□-M□											
3 Applicable Workpiece Hole Diam.		080			090			100			110			120			130			140			150			160			170			180			190			200		
5 Seating Height		H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter (Standard Diam.)		φ8H8			φ9H8			φ10H8			φ11H8			φ12H8			φ13H8			φ14H8			φ15H8			φ16H8			φ17H8			φ18H8			φ19H8			φ20H8		
Datum Diameter	At Releasing	φ7.94 or less			φ8.94 or less			φ9.94 or less			φ10.94 or less			φ11.92 or less			φ12.92 or less			φ13.92 or less			φ14.92 or less			φ15.89 or less			φ16.89 or less			φ17.89 or less			φ18.89 or less			φ19.89 or less		
	At Full Stroke	φ8.05 or more			φ9.05 or more			φ10.05 or more			φ11.05 or more			φ12.05 or more			φ13.05 or more			φ14.05 or more			φ15.05 or more			φ16.07 or more			φ17.07 or more			φ18.07 or more			φ19.07 or more			φ20.07 or more		
Full Stroke		0.65												0.75												1.0											
A		40.5	45.5	50.5	40.5	45.5	50.5	40.5	45.5	50.5	40.5	45.5	50.5	41	46	51	41	46	51	41	46	51	41	46	51	42.5	47.5	52.5	42.5	47.5	52.5	42.5	47.5	52.5	42.5	47.5	52.5	42.5	47.5	52.5
B		11	15.5	20.5	11	15.5	20.5	11	15	20	11	15	20	11	15.5	20.5	11	15.5	20.5	11	15	20	11	15	20	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5	10.5	15.5	20.5
C		3.2	4	4	3.2	4	4	3.2	4.5	4.5	3.2	4.5	4.5	3.2	4	4	3.2	4	4	3.2	4.5	4.5	3.2	4.5	4.5	3.7	4	4	3.7	4	4	3.7	4	4	3.7	4	4	3.7	4	4
D		15												15												18											
E		8.3	8	8	8.3	8	8	8.3	8	8	8.3	8	8	8.8	8.5	8.5	8.8	8.5	8.5	8.8	8.5	8.5	8.8	8.5	8.5	10.3	10	10	10.3	10	10	10.3	10	10	10.3	10	10	10.3	10	10
F		9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	9	9	9.5	8	11	11	8	11	11	8	11	11	8	11	11	8	11	11
G		8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	25°	40°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°	8°	15°	30°
H		15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25	15	20	25
J		4.6												5.1												6											
K		7.5												8												9.5											
L		7.9			8.9			9.8			10.8			11.8			12.8			13.8			14.8			15.7			16.7			17.7			18.7			19.7		
M		6.5			7.5			8.5			9.5			10.5			11.5			12.5			13.5			14			15			16			17			18		
N		14.5	9	9	14.5	10	10	14.5	11	11	14.5	12	12	18.5	13	13	18.5	14	14	18.5	15	15	18.5	16	16	22.5	17	17	22.5	18	18	22.5	19	19	22.5	20	20	22.5	21	21
P		4												4												5											
Q		24												28												35											
R		33												37												47											
S		9.5												9.5												11.5											
T		35°												30°												30°											
U		M5×0.8×12												M5×0.8×12												M6×1×16											
V		M6×1												M6×1												M8×1.25											
W		AS568-013 (90)												AS568-013 (90)												AS568-015 (90)											
CA		2.5			2.5			3			3			3.5			3.5			4			4			4.5			4.5			5			5			5		
CB		7.8			8.8			9.7			10.7			11.7			12.7			13.7			14.7			15.5			16.5			17.5			18.5			19.5		
MA		3												3												4											
MB		3												3												4											
MC		3												3												4											
MD		12.1												12.1												15.1											
ME		M5×0.8 Thread Depth 9 or more												M5×0.8 Thread Depth 9 or more												M6×1 Thread Depth 12 or more											
MF		19												19												19.5											
WA		8 +0.022 0			9 +0.022 0			10 +0.022 0			11 +0.027 0			12 +0.027 0			13 +0.027 0			14 +0.027 0			15 +0.027 0			16 +0.027 0			17 +0.027 0			18 +0.027 0			19 +0.033 0			20 +0.033 0		
WB		4												4.5												5.5											
Weight g		80	90	110	80	90	110	80	90	110	80	100	110	90	110	130	90	110	130	90	110	130	100	110	130	150	170	200	150	180	200	150	180	200	150	180	210	150	180	210

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

PAT.

Hydraulic Expansion Locating Pin

Model VFJ/VFK

Hydraulic・Single Action/Double Action

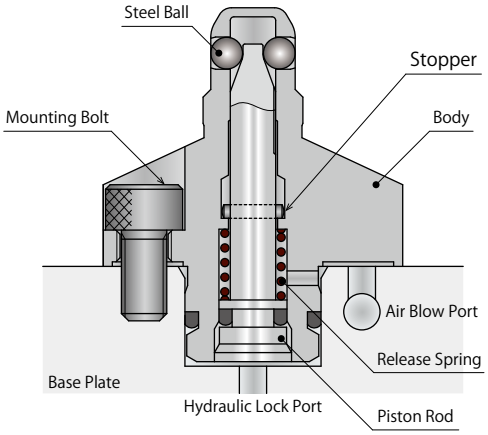
Locating Repeatability : 10μm

Index

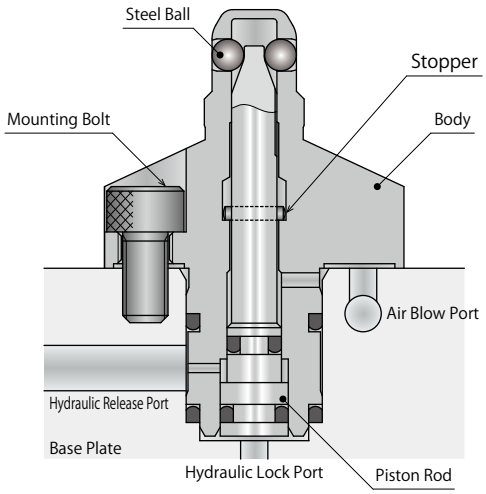
Action Description

This is a simplified drawing of VFL / VFM (Standard).

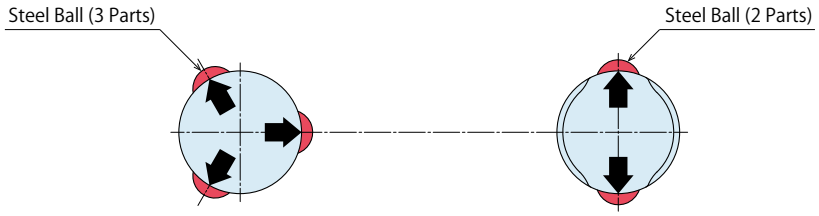
model VFJ



model VFK



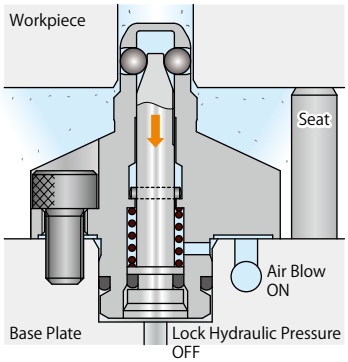
About Reference Locating and Orientation



VFJ/VFK-D：Datum
Reference Locating

VFJ/VFK-C：Cut
One Direction Locating

model VFJ



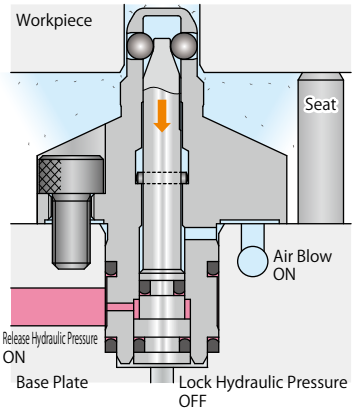
- VFJ：When lock hydraulic pressure is OFF, the piston rod descends and steel balls are free to move.
- VFK：When lock hydraulic pressure is OFF and release hydraulic pressure is ON, the piston rod descends and steel balls are free to move.
- Air blow prevents debris contamination.

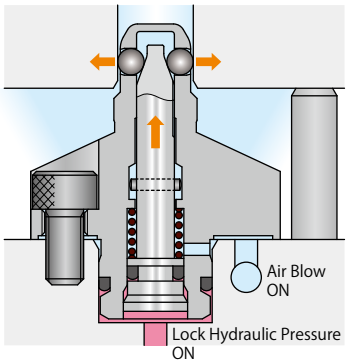
※It is not a malfunction when the steel balls are expanded with air blow pressure.

When loading workpiece

When unloading workpiece

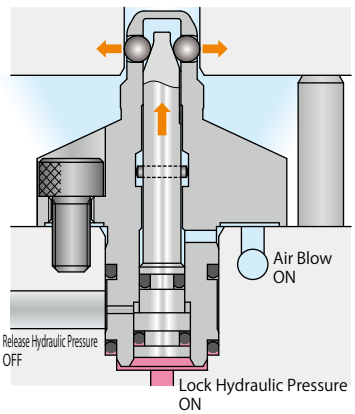
model VFK





When locating

- VFJ：When release hydraulic pressure is OFF, the piston rod is ascended by lock hydrualic pressure and the steel balls are expanded to locate the workpiece.
- VFK：When release hydraulic pressure is OFF, lock hydraulic pressure is ON, the piston rod is ascended by lock hydrualic pressure and the steel balls are expanded to locate the workpiece. (Another seat is required for standard and release confirmation models.)



Model No. Indication

VFJ **2** **00** **0** - **080** - **D** - **H20** - **M** **R**

1 2 3 4 5 6 7

1 Body Size

2 : Select from Workpiece Diameter φ7.6～φ10.8

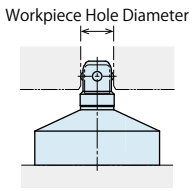
2 Design No.

0 : Revision Number

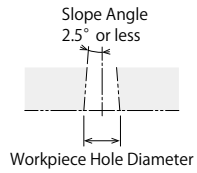
3 Applicable Workpiece Hole Diameter

080 : Straight Hole φ7.6～8.5mm / Taper Hole φ8～8.5mm
090 : Straight Hole φ8.5～9.5mm / Taper Hole φ9～9.5mm
100 : Straight Hole φ9.5～10.8mm / Taper Hole φ10～10.8mm

Straight Hole

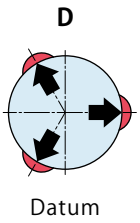


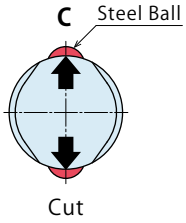
Taper Hole



4 Functions

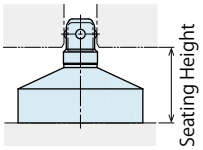
D : Datum (for Reference Locating)
C : Cut (for One Direction Locating)





5 Seating Height Dimension

H15 : 15mm
H20 : 20mm
H25 : 25mm



Note :
Prepare the seat separately for 6 Option **Blank** : Standard and **M** : Release Confirmation Model.

6 Options

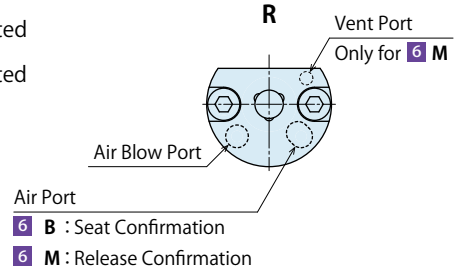
Blank : Standard
B : with Seating Surface
M : Release Confirmation Model

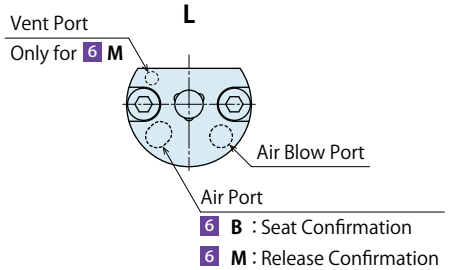
Note :
Contact us for combined use of **B** : With Seating Surface and **M** : Release Confirmation model.

7 Port Position

Only for 6 Options : **B** (with Seating Surface), and **M** (Release Confirmation Model)

R : As Illustrated
L : As Illustrated





Specifications

Model No.			VFJ2000-080	VFJ2000-090	VFJ2000-100
Workpiece Hole Diameter mm	Straight Hole		φ7.6～φ8.5	φ8.5～φ9.5	φ9.5～φ10.8
	Taper Hole		φ8～φ8.5	φ9～φ9.5	φ10～φ10.8
Locating Repeatability ※1		mm	0.01		
Allowable Offset (C：Cut)		mm	±0.4	±0.4	±0.5
Expanding Force (F) ※2 N	at 2.5MPa		50		
	at 5.0MPa		130		
	at 7.0MPa		190		
Allowable Thrust Load ※3		N	450	600	800
Cylinder Capacity (Empty Action)		cm³	0.08		
Operating Pressure Range		MPa	2.5～7.0		
Withstanding Pressure		MPa	10.5		
Recommended Air Blow Pressure		MPa	0.3～0.4		
Operating Temperature Range		℃	0～70		
Usable Fluid			General Hydraulic Oil Equivalent to ISO-VG-32		

Notes：

※1. It shows locating repeatability under the specific condition (no load).

※2. Expanding force shows the calculated value when coefficient friction is μ0.1. Refer to the following chart for the relative equation of expanding force and allowable workpiece weight for locating.

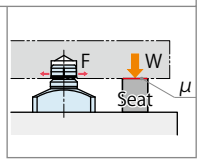
※3. Exceeding allowable thrust load leads to accuracy failure and/or damages on the product.

1. This product locates with hydraulic pressure and releases with spring.
2. This cylinder is used only for locating and does not have a clamping function.

Relative Equation of Expanding Force and Allowable Workpiece Weight for Locating

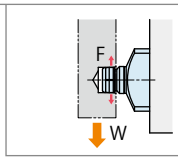
For Horizontal Attitude

$$\text{Workpiece Weight (W)} \leqq \frac{\text{Expanding Force per One Piece of Expansion Locating Pin (F)} \times \text{Efficiency 0.5}}{\text{Friction Coefficient of Workpiece Seat Face } (\mu)}$$



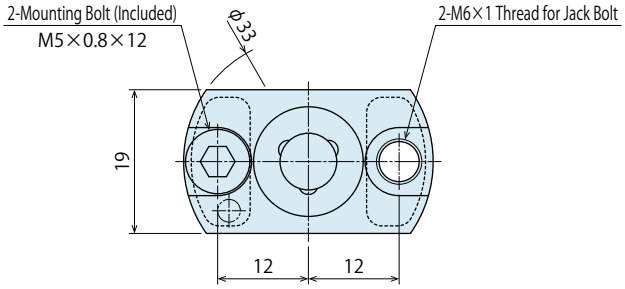
For Vertical Attitude

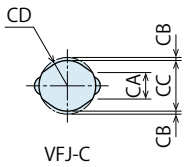
$$\text{Workpiece Weight (W)} \leqq \text{Expanding Force per One Piece of Expansion Locating Pin (F)} \times \text{Efficiency 0.5}$$



External Dimensions

※This drawing shows VFJ clamping action without workpiece.

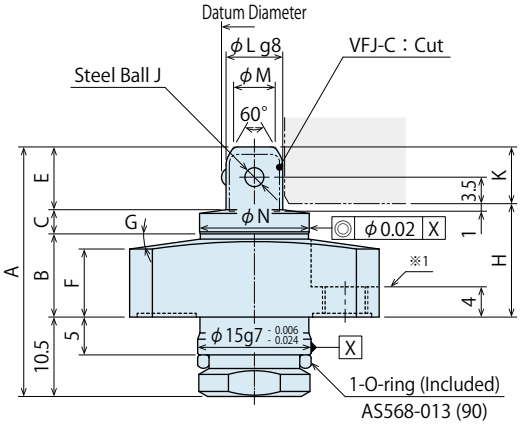




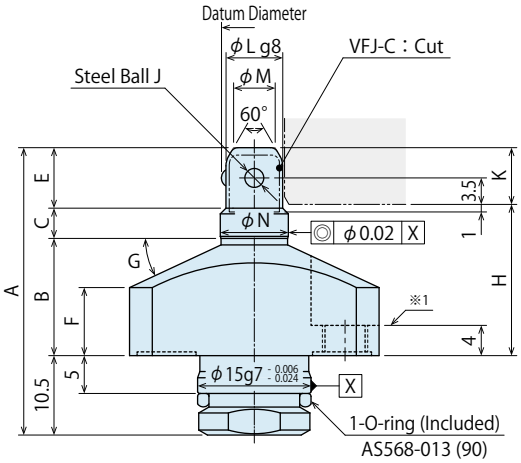
VFJ-C

(Cut：One Direction Locating)

5 Seating Height：**H15**

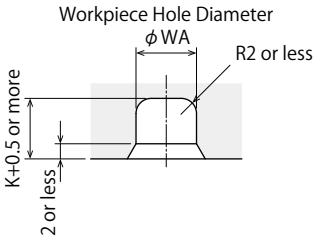


5 Seating Height：**H20 / H25**

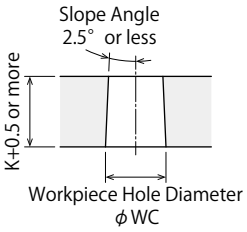


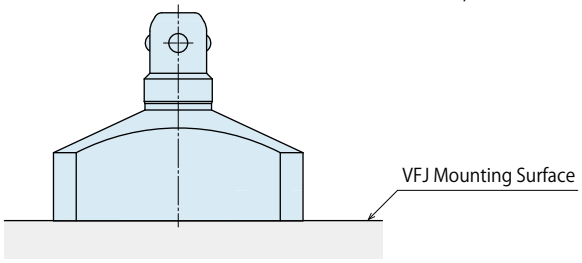
Workpiece Hole Dimensions

Straight Hole



Taper Hole



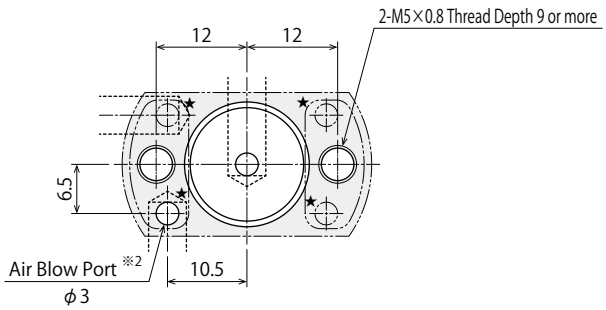


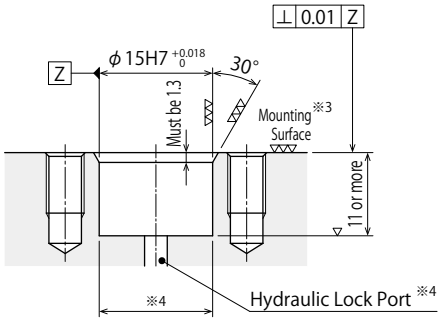
Notes：

※1. Do not use spring washer or toothed lock washer.

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly. Use jack screw and remove it parallel to mounting surface.
2. This product has no seat. Choose option **-B**：with Seating Surface or prepare another seat if requiring.

Machining Dimensions for Mounting





Notes：

※2. Install the air blow port choosing one port from four ★ parts.

※3. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.

※4. Prepare the hydraulic lock port on the bottom within the range of ϕ15.

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.979.)

External Dimensions and Machining Dimensions for Mounting

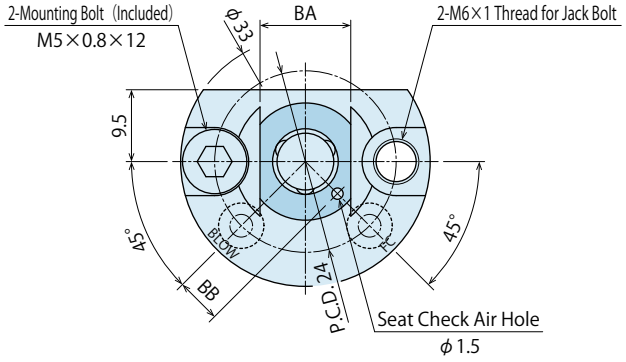
(mm)

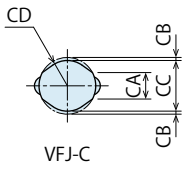
Model No.		VFJ2000-080-□-□			VFJ2000-090-□-□			VFJ2000-100-□-□		
	3 Applicable Workpiece Hole Diam.	080			090			100		
	5 Seating Height	H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter	WA (Straight Hole)	7.6～8.5			8.5～9.5			9.5～10.8		
	WC (Taper Hole)	8～8.5			9～9.5			10～10.8		
Datum Diameter	At Releasing	ϕ7.5 or less			ϕ8.3 or less			ϕ9.3 or less		
	At Full Stroke	ϕ8.5 or more			ϕ9.5 or more			ϕ10.8 or more		
Cylinder Stroke		1.8			2.2			2.6		
A		33	38	43	33.5	38.5	43.5	34	39	44
B		11	15.5	20.5	11	15.5	20.5	11	15.5	20.5
C		3.2	4	4	3.2	4	4	3.2	4	4
E		8.3	8	8	8.8	8.5	8.5	9.3	9	9
F		9	9	9.5	9	9	9.5	9	9	9.5
G		8°	25°	40°	8°	25°	40°	8°	25°	40°
H		15	20	25	15	20	25	15	20	25
J		2.5			3			3.5		
K		7.5			8			8.5		
L		7.5 $^{-0.005}_{-0.027}$			8.3 $^{-0.005}_{-0.027}$			9.3 $^{-0.005}_{-0.027}$		
M		5.5			6			6.5		
N		14.5	9	9	14.5	10	10	14.5	11	11
CA		3.5			4			4.5		
CB		0.4			0.4			0.5		
CC		6.7			7.5			8.3		
CD		R3.35			R3.75			R4.15		
Weight	g	60	70	80	60	70	80	60	70	90

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

External Dimensions

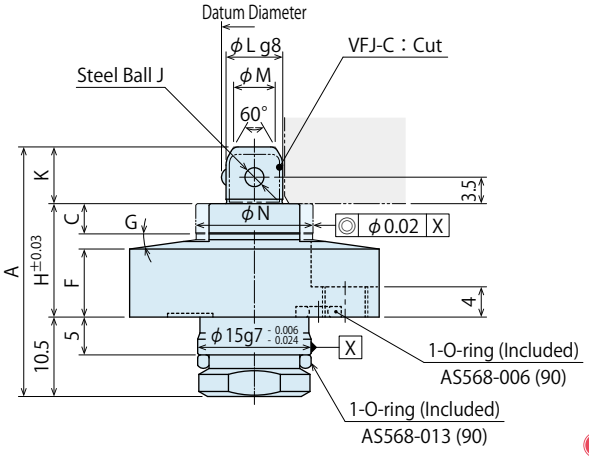
※This drawing shows VFJ-BR clamping action without workpiece.
The ports of VFJ-BL are placed to the symmetrical positions of this drawing.



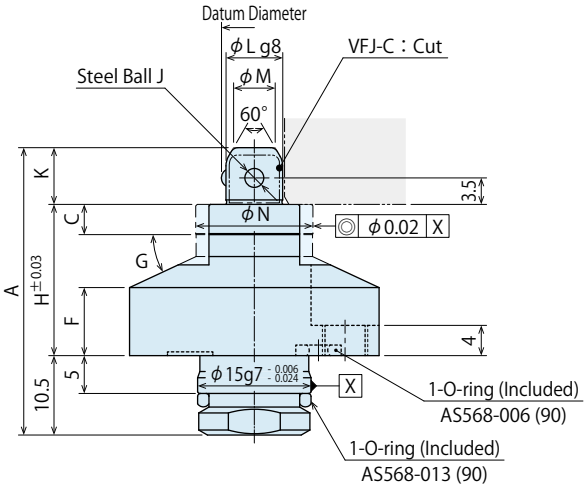


VFJ-C
(Cut：One Direction Locating)

5 Seating Height：**H15**

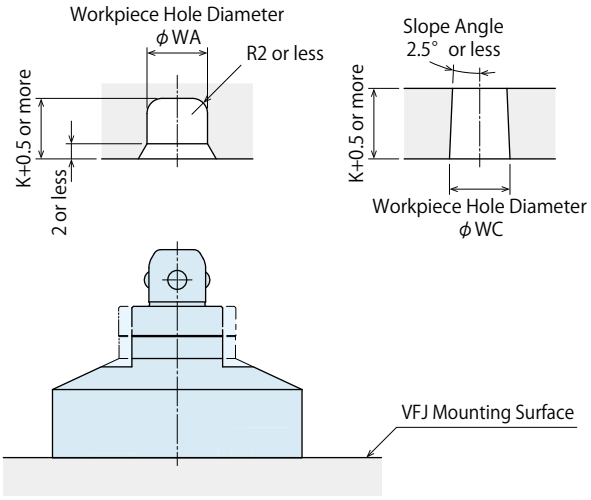


5 Seating Height：**H20 / H25**



Workpiece Hole Dimensions

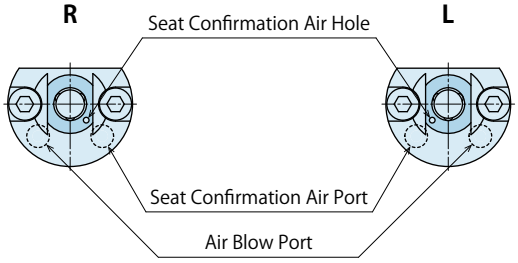
Straight Hole	Taper Hole



Notes：

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly.
   Use jack screw and remove it parallel to mounting surface.
2. The port name is marked on the product surface.
   (BLOW：Air Blow Port, FC：Seating Confirmation Air Port)
   Continuously supply air pressure to the air blow port and seat confirmation port.

Port Position

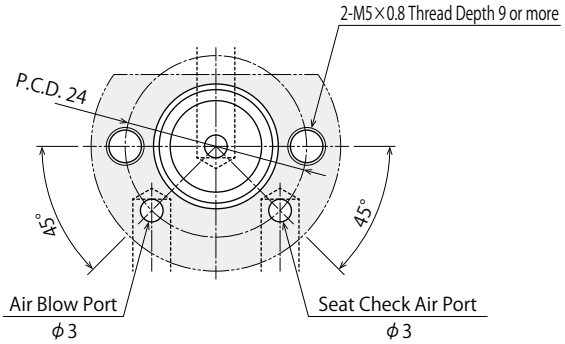


Note：

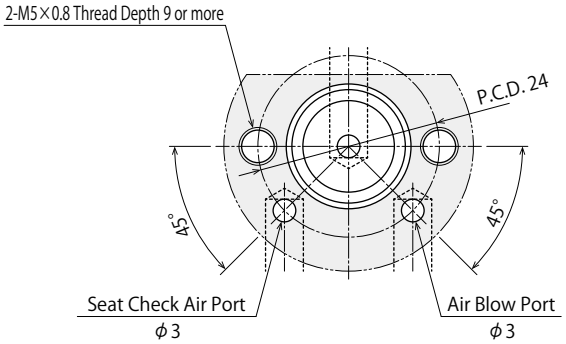
3. Make sure to confirm that the port positions are correct.

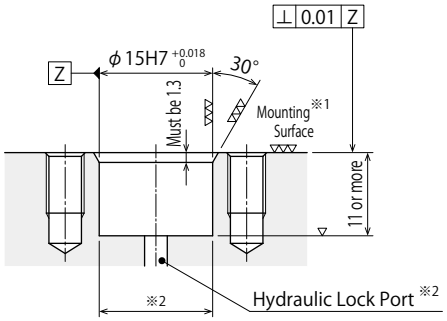
Machining Dimensions for Mounting

7 Port Position : R



7 Port Position : L





Notes :

※1. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.

※2. Prepare the hydraulic lock port on the bottom within the range of φ15.

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.979.)

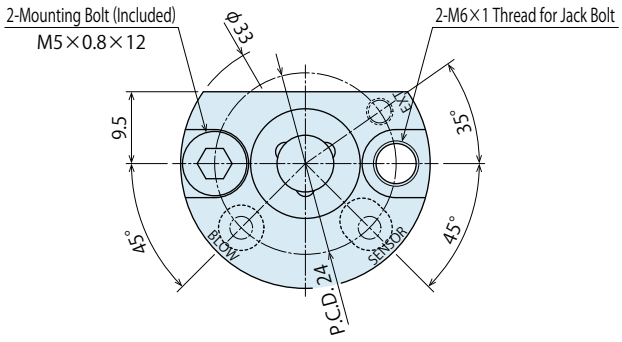
External Dimensions and Machining Dimensions for Mounting

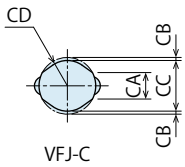
(mm)

Model No.		VFJ2000-080-□-□-B□			VFJ2000-090-□-□-B□			VFJ2000-100-□-□-B□		
	3 Applicable Workpiece Hole Diam.	080			090			100		
	5 Seating Height	H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter	WA (Straight Hole)	7.6 ~ 8.5			8.5 ~ 9.5			9.5 ~ 10.8		
	WC (Taper Hole)	8 ~ 8.5			9 ~ 9.5			10 ~ 10.8		
Datum Diameter	At Releasing	φ7.5 or less			φ8.3 or less			φ9.3 or less		
	At Full Stroke	φ8.5 or more			φ9.5 or more			φ10.8 or more		
Cylinder Stroke		1.8			2.2			2.6		
A		33	38	43	33.5	38.5	43.5	34	39	44
C		4	4	4	4	4	4	4	4	4
F		9	9	9.5	9	9	9.5	9	9	9.5
G		8°	25°	40°	8°	25°	40°	8°	25°	40°
H		15	20	25	15	20	25	15	20	25
J		2.5			3			3.5		
K		7.5			8			8.5		
L		7.5 -0.005 -0.027			8.3 -0.005 -0.027			9.3 -0.005 -0.027		
M		5.5			6			6.5		
N		15.5	15.5	15.5	16.5	16.5	16.5	17.5	17.5	17.5
BA		12			13			14		
BB		6			6.5			7		
CA		3.5			4			4.5		
CB		0.4			0.4			0.5		
CC		6.7			7.5			8.3		
CD		R3.35			R3.75			R4.15		
Weight	g	70	80	100	70	80	100	70	80	100

External Dimensions

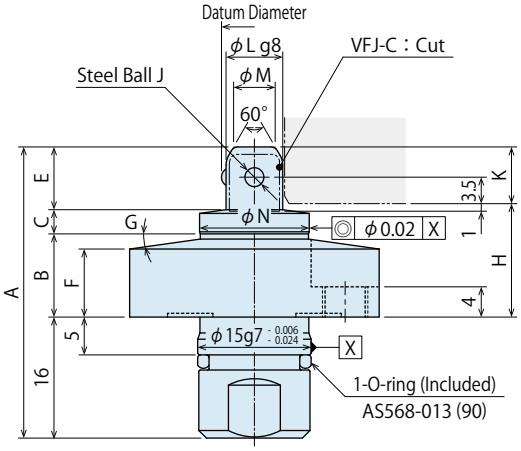
※This drawing shows VFJ-MR clamping action without workpiece.
The ports of VFJ-ML are placed to the symmetrical positions of this drawing.



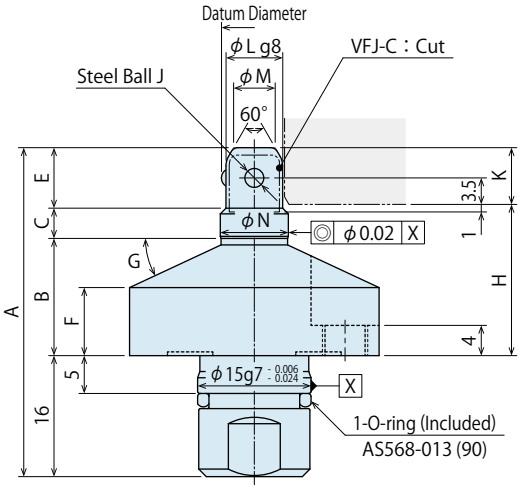


VFJ-C
(Cut : One Direction Locating)

5 Seating Height : **H15**

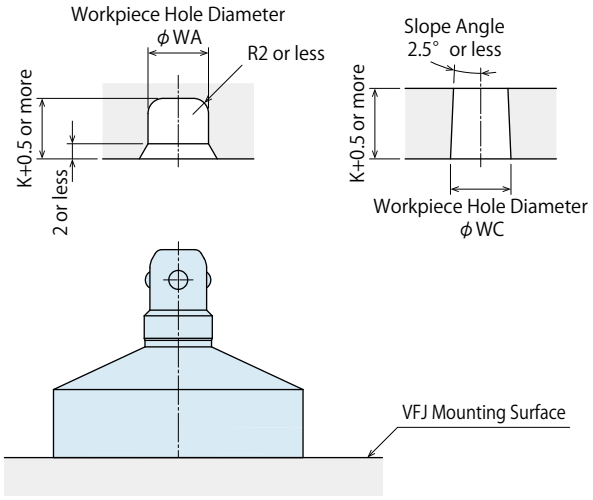


5 Seating Height : **H20 / H25**



Workpiece Hole Dimensions

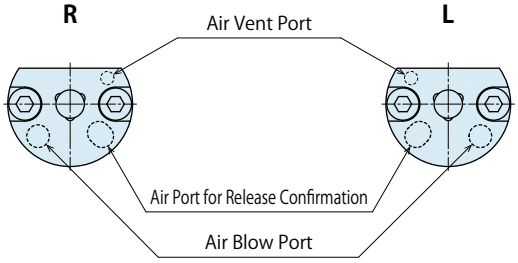
Straight Hole | Taper Hole



Notes :

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly.
   Use jack screw and remove it parallel to mounting surface.
2. The port name is marked on the product surface.
   (EXT : Air Vent Port, BLOW : Air Blow Port,
   SENSOR : Release Confirmation Air Port)
   Continuously supply air pressure to the air blow port and release confirmation port.
3. This product has no seat. Choose option **-B** : with Seating Surface or prepare another seat if requiring.

Port Position

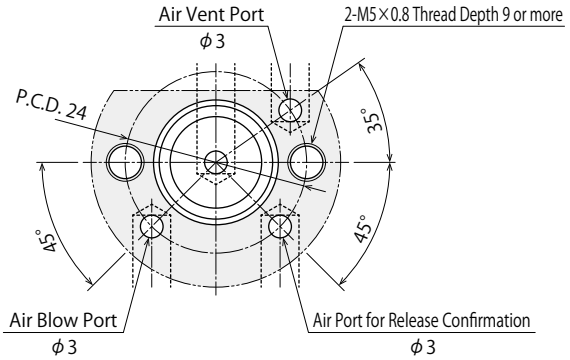


Note :

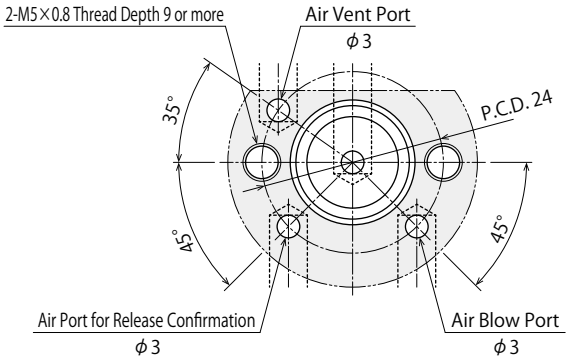
4. Make sure to confirm that the port positions are correct.

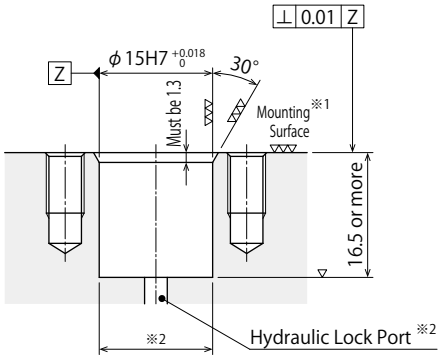
Machining Dimensions for Mounting

7 Port Position : **R**



7 Port Position : **L**





Notes :

※1. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.

※2. Prepare the hydraulic lock port on the bottom within the range of φ15.

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.979.)

External Dimensions and Machining Dimensions for Mounting

(mm)

Model No.		VFJ2000-080-□-□-M□			VFJ2000-090-□-□-M□			VFJ2000-100-□-□-M□		
	3 Applicable Workpiece Hole Diam.	080			090			100		
	5 Seating Height	H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter	WA (Straight Hole)	7.6 ~ 8.5			8.5 ~ 9.5			9.5 ~ 10.8		
	WC (Taper Hole)	8 ~ 8.5			9 ~ 9.5			10 ~ 10.8		
Datum Diameter	At Releasing	φ7.5 or less			φ8.3 or less			φ9.3 or less		
	At Full Stroke	φ8.5 or more			φ9.5 or more			φ10.8 or more		
Cylinder Stroke		1.8			2.2			2.6		
A		38.5	43.5	48.5	39	44	49	39.5	44.5	49.5
B		11	15.5	20.5	11	15.5	20.5	11	15.5	20.5
C		3.2	4	4	3.2	4	4	3.2	4	4
E		8.3	8	8	8.8	8.5	8.5	9.3	9	9
F		9	9	9.5	9	9	9.5	9	9	9.5
G		8°	25°	40°	8°	25°	40°	8°	25°	40°
H		15	20	25	15	20	25	15	20	25
J		2.5			3			3.5		
K		7.5			8			8.5		
L		7.5 $^{-0.005}_{-0.027}$			8.3 $^{-0.005}_{-0.027}$			9.3 $^{-0.005}_{-0.027}$		
M		5.5			6			6.5		
N		14.5	9	9	14.5	10	10	14.5	11	11
CA		3.5			4			4.5		
CB		0.4			0.4			0.5		
CC		6.7			7.5			8.3		
CD		R3.35			R3.75			R4.15		
Weight	g	70	100	110	70	100	110	80	100	110

Model No. Indication

VFK 2 00 0 - 080 - D - H20 - M R

1 2 3 4 5 6 7

1 Body Size

2 : Select from Workpiece Diameter φ7.6～φ10.8

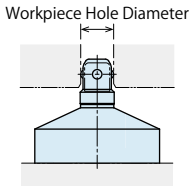
2 Design No.

0 : Revision Number

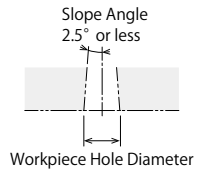
3 Applicable Workpiece Hole Diameter

080 : Straight Hole φ7.6～8.5mm / Taper Hole φ8～8.5mm
090 : Straight Hole φ8.5～9.5mm / Taper Hole φ9～9.5mm
100 : Straight Hole φ9.5～10.8mm / Taper Hole φ10～10.8mm

Straight Hole

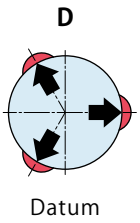


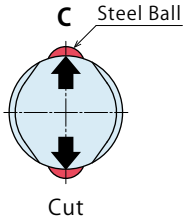
Taper Hole



4 Functions

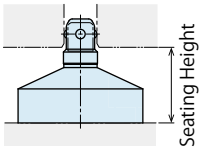
D : Datum (for Reference Locating)
C : Cut (for One Direction Locating)





5 Seating Height Dimension

H15 : 15mm
H20 : 20mm
H25 : 25mm



Note :
Prepare the seat separately for 6 Option **Blank** : Standard and **M** : Release Confirmation Model.

6 Options

Blank : Standard
B : with Seating Surface
M : Release Confirmation Model

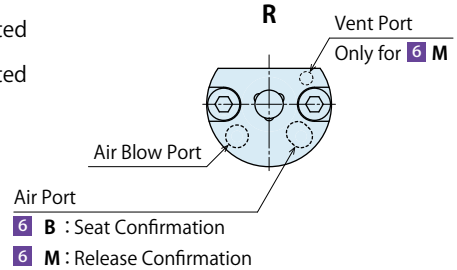
Note :
Contact us for combined use of **B** : With Seating Surface and **M** : Release Confirmation model.

7 Port Position

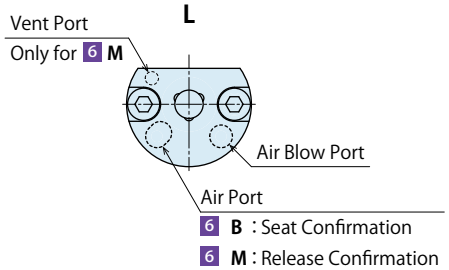
Only for 6 Options : **B** (with Seating Surface), and **M** (Release Confirmation Model)

R : As Illustrated
L : As Illustrated

R



L



Specifications

Model No.		VFK2000-080	VFK2000-090	VFK2000-100
Workpiece Hole Diameter mm	Straight Hole	φ7.6～φ8.5	φ8.5～φ9.5	φ9.5～φ10.8
	Taper Hole	φ8～φ8.5	φ9～φ9.5	φ10～φ10.8
Locating Repeatability ※1 mm		0.01		
Allowable Offset (C：Cut) mm		±0.4	±0.4	±0.5
Expanding Force (F) ※2 N	at 2.5MPa	50		
	at 5.0MPa	150		
	at 7.0MPa	210		
Allowable Thrust Load ※3 N		450	600	800
Cylinder Capacity (Empty Action) cm³	Release side	0.03		
	Lock side	0.08		
Operating Pressure Range MPa		1.5～7.0		
Withstanding Pressure MPa		10.5		
Recommended Air Blow Pressure MPa		0.3～0.4		
Operating Temperature Range ℃		0～70		
Usable Fluid		General Hydraulic Oil Equivalent to ISO-VG-32		

Notes：

※1. It shows locating repeatability under the specific condition (no load).

※2. Expanding force shows the calculated value when coefficient friction is μ0.1. Refer to the following chart for the relative equation of expanding force and allowable workpiece weight for locating.

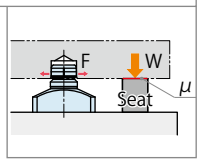
※3. Exceeding allowable thrust load leads to accuracy failure and/or damages on the product.

1. This product locates and releases with hydraulic pressure.
2. This cylinder is used only for locating and does not have a clamping function.

Relative Equation of Expanding Force and Allowable Workpiece Weight for Locating

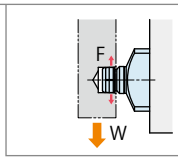
For Horizontal Attitude

$$\text{Workpiece Weight (W)} \leqq \frac{\text{Expanding Force per One Piece of Expansion Locating Pin (F)} \times \text{Efficiency } 0.5}{\text{Friction Coefficient of Workpiece Seat Face } (\mu)}$$



For Vertical Attitude

$$\text{Workpiece Weight (W)} \leqq \text{Expanding Force per One Piece of Expansion Locating Pin (F)} \times \text{Efficiency } 0.5$$

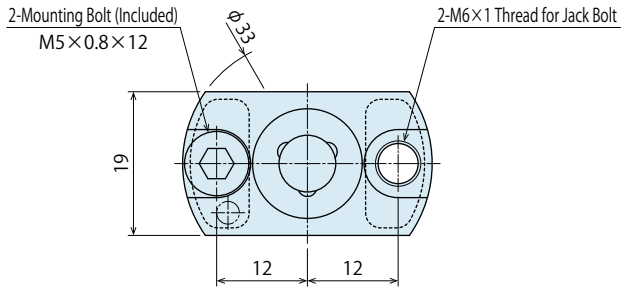


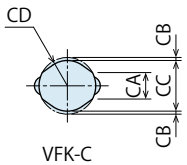
High-Power Series
Pneumatic Series
Hydraulic Series
Valve / Coupler Hydraulic Unit
Manual Operation Accessories
Cautions / Others

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

External Dimensions

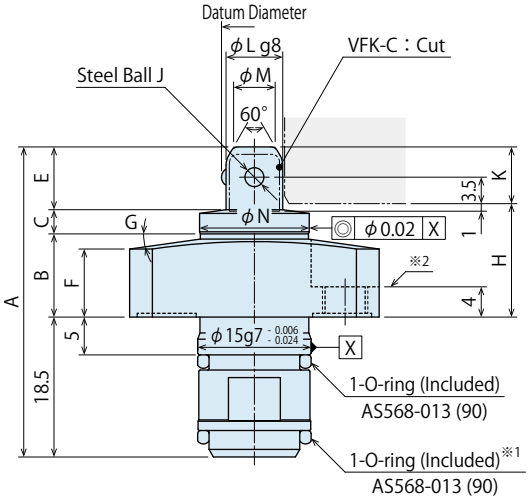
※This drawing shows VFK clamping action without workpiece.



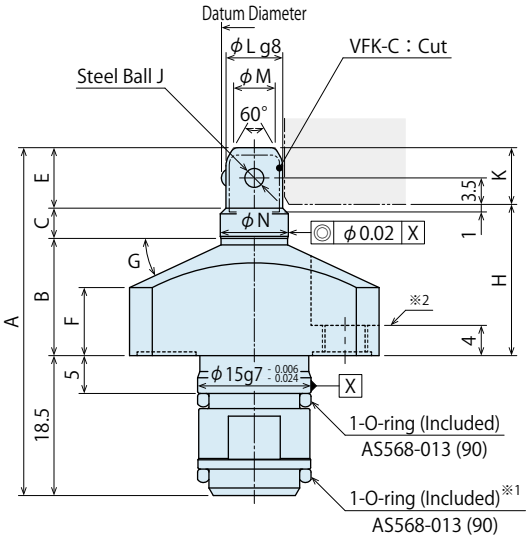


VFK-C
(Cut：One Direction Locating)

5 Seating Height：**H15**

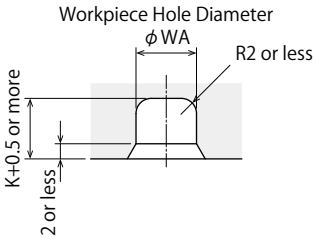


5 Seating Height：**H20 / H25**

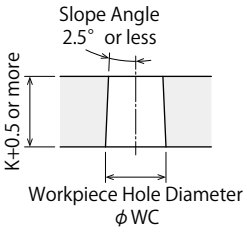


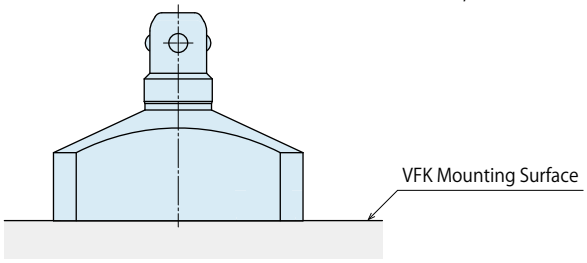
Workpiece Hole Dimensions

Straight Hole



Taper Hole





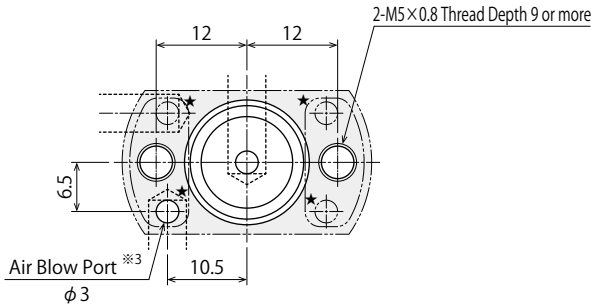
Notes：

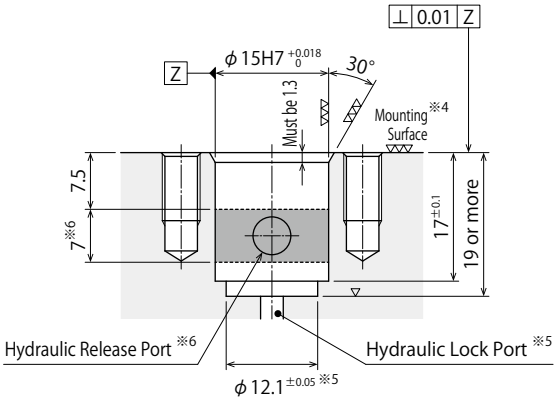
※1. Set the O-ring to the mounting hole side (fixture side) before mounting the body.

※2. Do not use spring washer or toothed lock washer.

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly. Use jack screw and remove it parallel to mounting surface.
2. This product has no seat. Choose option **-B**：with Seating Surface or prepare another seat if requiring.

Machining Dimensions for Mounting





Notes：

※3. Install the air blow port choosing one port from four ★ parts.

※4. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.

※5. Prepare the hydraulic lock port on the bottom within the range of ϕ12.1.

※6. Prepare the hydraulic release port within ▭.

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.979.)

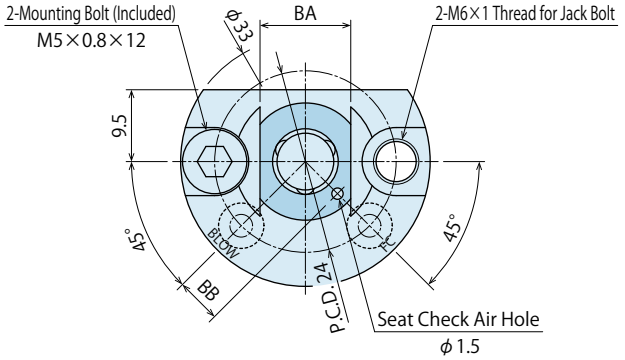
External Dimensions and Machining Dimensions for Mounting

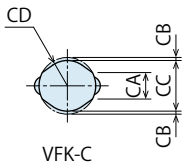
(mm)

Model No.		VFK2000-080-□-□			VFK2000-090-□-□			VFK2000-100-□-□		
	3 Applicable Workpiece Hole Diam.	080			090			100		
	5 Seating Height	H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter	WA (Straight Hole)	7.6～8.5			8.5～9.5			9.5～10.8		
	WC (Taper Hole)	8～8.5			9～9.5			10～10.8		
Datum Diameter	At Releasing	ϕ7.5 or less			ϕ8.3 or less			ϕ9.3 or less		
	At Full Stroke	ϕ8.5 or more			ϕ9.5 or more			ϕ10.8 or more		
Cylinder Stroke		1.8			2.2			2.6		
A		41	46	51	41.5	46.5	51.5	42	47	52
B		11	15.5	20.5	11	15.5	20.5	11	15.5	20.5
C		3.2	4	4	3.2	4	4	3.2	4	4
E		8.3	8	8	8.8	8.5	8.5	9.3	9	9
F		9	9	9.5	9	9	9.5	9	9	9.5
G		8°	25°	40°	8°	25°	40°	8°	25°	40°
H		15	20	25	15	20	25	15	20	25
J		2.5			3			3.5		
K		7.5			8			8.5		
L		7.5 $^{-0.005}_{-0.027}$			8.3 $^{-0.005}_{-0.027}$			9.3 $^{-0.005}_{-0.027}$		
M		5.5			6			6.5		
N		14.5	9	9	14.5	10	10	14.5	11	11
CA		3.5			4			4.5		
CB		0.4			0.4			0.5		
CC		6.7			7.5			8.3		
CD		R3.35			R3.75			R4.15		
Weight	g	70	80	90	70	80	90	70	80	100

External Dimensions

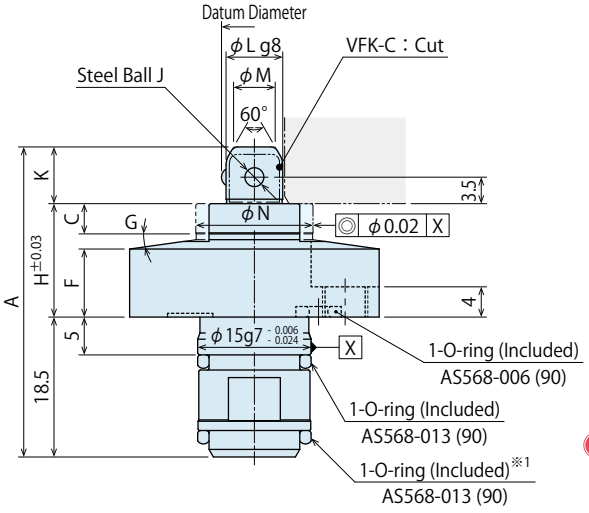
※This drawing shows VFK-BR clamping action without workpiece.
The ports of VFK-BL are placed to the symmetrical positions of this drawing.



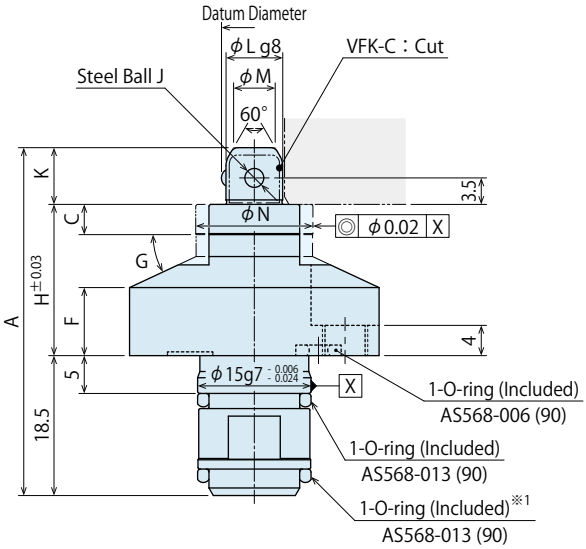


VFK-C
(Cut：One Direction Locating)

5 Seating Height：**H15**

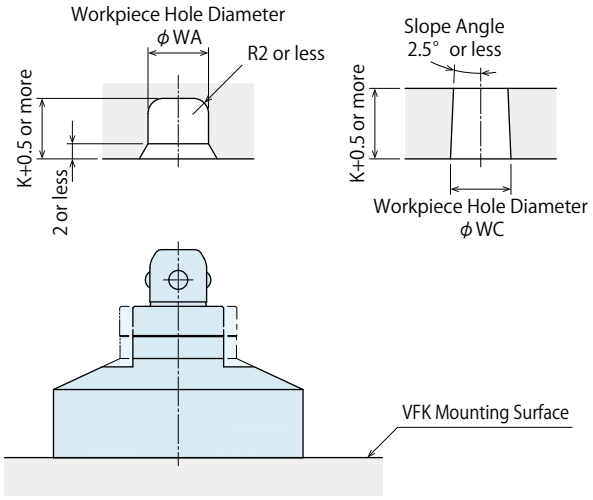


5 Seating Height：**H20 / H25**



Workpiece Hole Dimensions

Straight Hole | Taper Hole

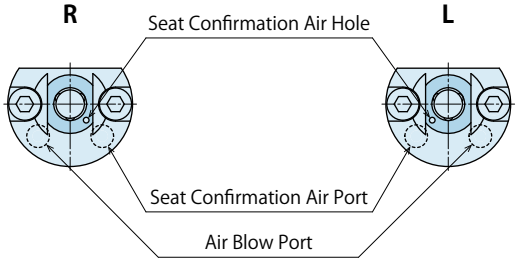


Notes：

※1. Set the O-ring to the mounting hole side (fixture side) before mounting the body.

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly.
   Use jack screw and remove it parallel to mounting surface.
2. The port name is marked on the product surface.
   (BLOW：Air Blow Port, FC：Seating Confirmation Air Port)
   Continuously supply air pressure to the air blow port and seat confirmation port.

Port Position

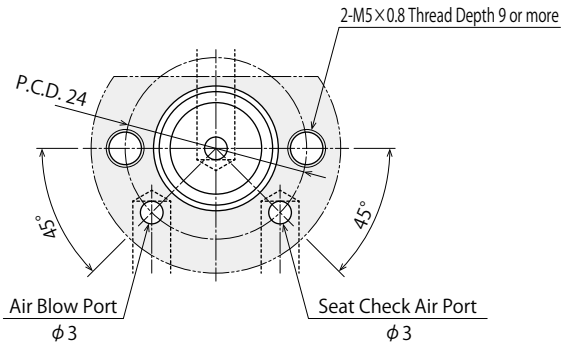


Note：

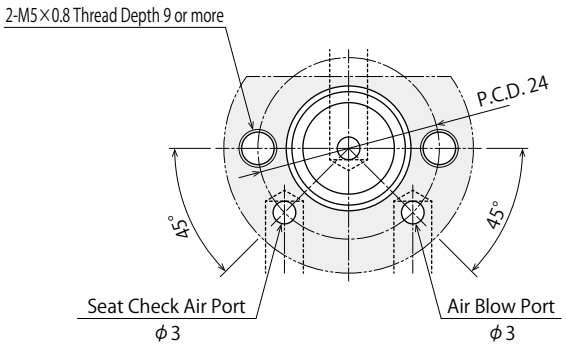
3. Make sure to confirm that the port positions are correct.

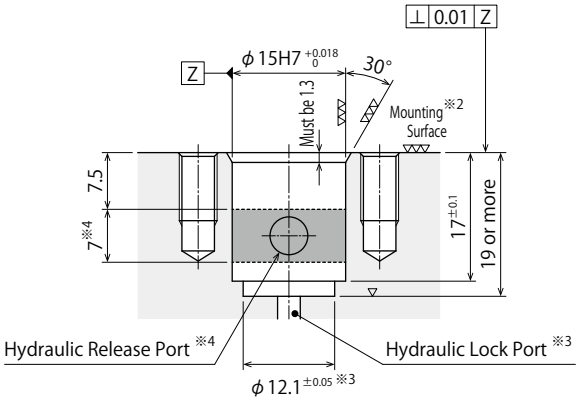
Machining Dimensions for Mounting

7 Port Position : R



7 Port Position : L





Notes :

※2. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.

※3. Prepare the hydraulic lock port on the bottom within the range of ϕ12.1.

※4. Prepare the hydraulic release port within ▭ .

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.979.)

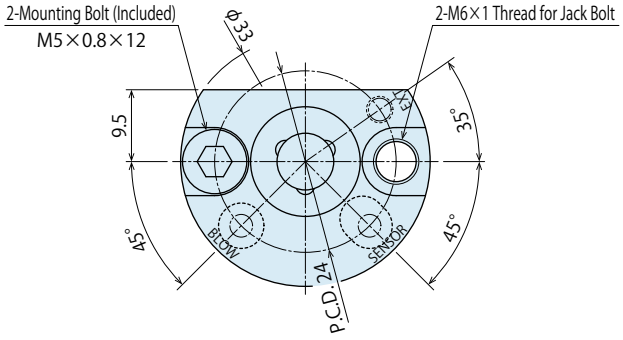
External Dimensions and Machining Dimensions for Mounting

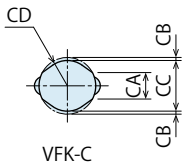
(mm)

Model No.		VFK2000-080-□-□-B□			VFK2000-090-□-□-B□			VFK2000-100-□-□-B□		
	3 Applicable Workpiece Hole Diam.	080			090			100		
	5 Seating Height	H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter	WA (Straight Hole)	7.6 ~ 8.5			8.5 ~ 9.5			9.5 ~ 10.8		
	WC (Taper Hole)	8 ~ 8.5			9 ~ 9.5			10 ~ 10.8		
Datum Diameter	At Releasing	ϕ7.5 or less			ϕ8.3 or less			ϕ9.3 or less		
	At Full Stroke	ϕ8.5 or more			ϕ9.5 or more			ϕ10.8 or more		
Cylinder Stroke		1.8			2.2			2.6		
A		41	46	51	41.5	46.5	51.5	42	47	52
C		4	4	4	4	4	4	4	4	4
F		9	9	9.5	9	9	9.5	9	9	9.5
G		8°	25°	40°	8°	25°	40°	8°	25°	40°
H		15	20	25	15	20	25	15	20	25
J		2.5			3			3.5		
K		7.5			8			8.5		
L		7.5 -0.005 -0.027			8.3 -0.005 -0.027			9.3 -0.005 -0.027		
M		5.5			6			6.5		
N		15.5	15.5	15.5	16.5	16.5	16.5	17.5	17.5	17.5
BA		12			13			14		
BB		6			6.5			7		
CA		3.5			4			4.5		
CB		0.4			0.4			0.5		
CC		6.7			7.5			8.3		
CD		R3.35			R3.75			R4.15		
Weight	g	80	90	110	80	90	110	80	90	110

External Dimensions

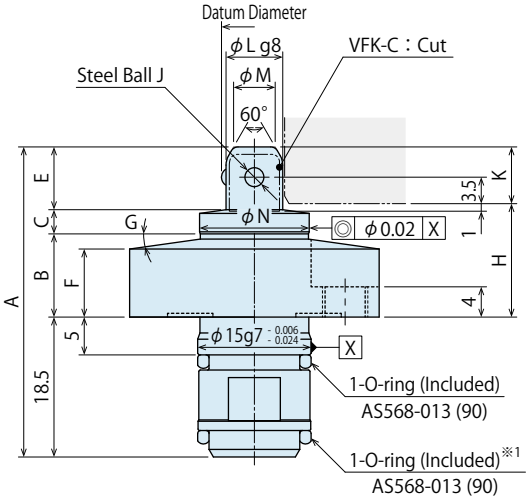
※This drawing shows VFK-MR clamping action without workpiece.
The ports of VFK-ML are placed to the symmetrical positions of this drawing.



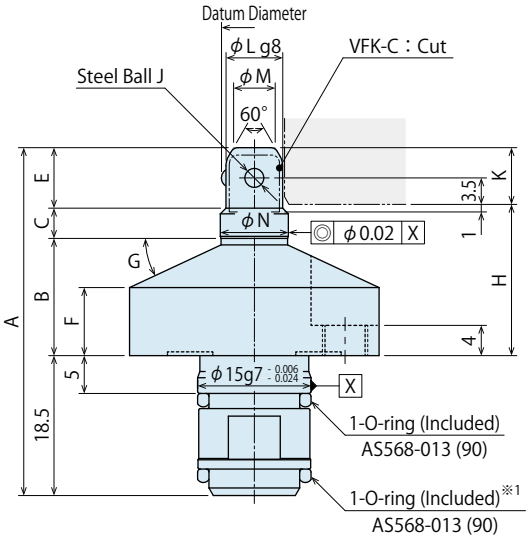


VFK-C
(Cut：One Direction Locating)

5 Seating Height：**H15**

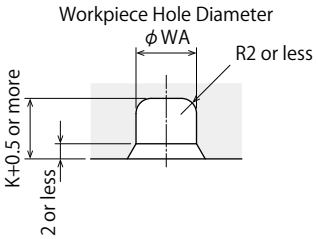


5 Seating Height：**H20 / H25**

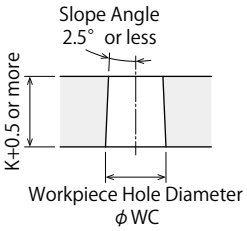


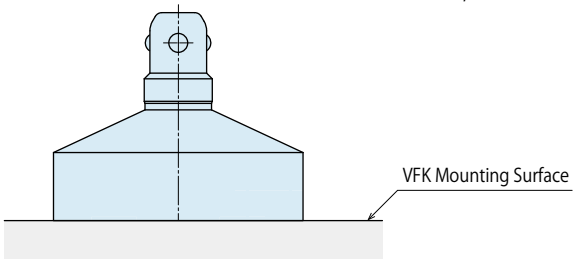
Workpiece Hole Dimensions

Straight Hole



Taper Hole



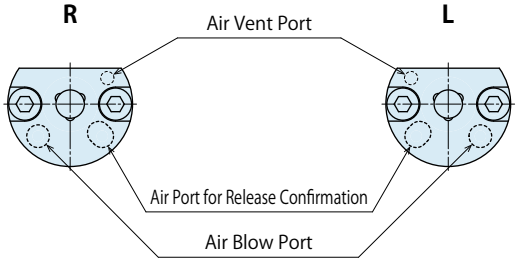


Notes：

※1. Set the O-ring to the mounting hole side (fixture side) before mounting the body.

1. When mounting the product, use two mounting bolts (Strength Grade 12.9) and tighten them evenly.
   Use jack screw and remove it parallel to mounting surface.
2. The port name is marked on the product surface.
   (EXT：Air Vent Port, BLOW：Air Blow Port,
   SENSOR：Release Confirmation Air Port)
   Continuously supply air pressure to the air blow port and release confirmation port.
3. This product has no seat. Choose option **-B**：with Seating Surface or prepare another seat if requiring.

Port Position

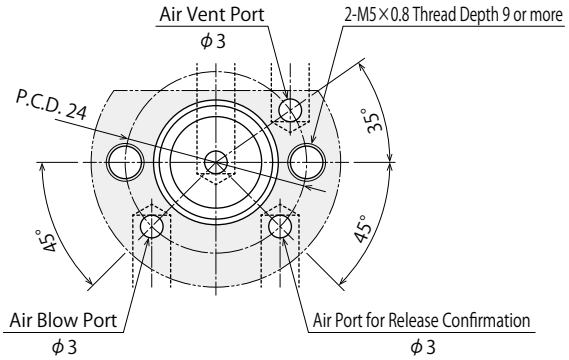


Note：

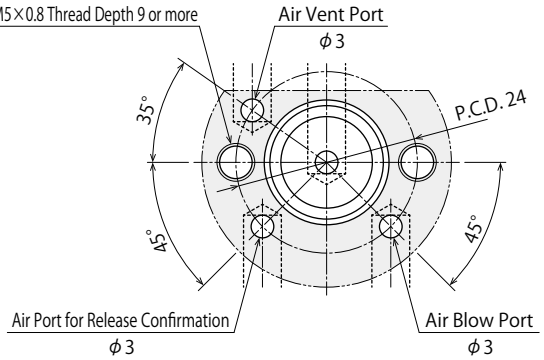
4. Make sure to confirm that the port positions are correct.

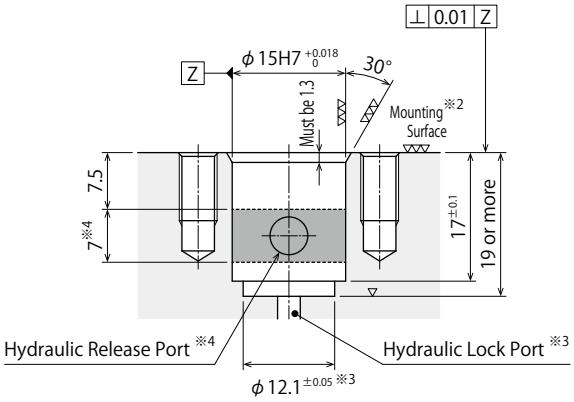
Machining Dimensions for Mounting

7 Port Position : **R**



7 Port Position : **L**





Notes :

※2. There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.

※3. Prepare the hydraulic lock port on the bottom within the range of ϕ12.1.

※4. Prepare the hydraulic release port within ▭.

1. Make sure to check the cautions for cylinder mounting distance accuracy, workpiece hole distance accuracy and mounting phase before installation. (Refer to P.979.)

External Dimensions and Machining Dimensions for Mounting

(mm)

Model No.		VFK2000-080-□-□-M□			VFK2000-090-□-□-M□			VFK2000-100-□-□-M□		
	3 Applicable Workpiece Hole Diam.	080			090			100		
	5 Seating Height	H15	H20	H25	H15	H20	H25	H15	H20	H25
Workpiece Hole Diameter	WA (Straight Hole)	7.6 ~ 8.5			8.5 ~ 9.5			9.5 ~ 10.8		
	WC (Taper Hole)	8 ~ 8.5			9 ~ 9.5			10 ~ 10.8		
Datum Diameter	At Releasing	ϕ7.5 or less			ϕ8.3 or less			ϕ9.3 or less		
	At Full Stroke	ϕ8.5 or more			ϕ9.5 or more			ϕ10.8 or more		
Cylinder Stroke		1.8			2.2			2.6		
A		41	46	51	41.5	46.5	51.5	42	47	52
B		11	15.5	20.5	11	15.5	20.5	11	15.5	20.5
C		3.2	4	4	3.2	4	4	3.2	4	4
E		8.3	8	8	8.8	8.5	8.5	9.3	9	9
F		9	9	9.5	9	9	9.5	9	9	9.5
G		8°	25°	40°	8°	25°	40°	8°	25°	40°
H		15	20	25	15	20	25	15	20	25
J		2.5			3			3.5		
K		7.5			8			8.5		
L		7.5 $^{-0.005}_{-0.027}$			8.3 $^{-0.005}_{-0.027}$			9.3 $^{-0.005}_{-0.027}$		
M		5.5			6			6.5		
N		14.5	9	9	14.5	10	10	14.5	11	11
CA		3.5			4			4.5		
CB		0.4			0.4			0.5		
CC		6.7			7.5			8.3		
CD		R3.35			R3.75			R4.15		
Weight	g	80	90	110	80	90	110	80	90	110

Cautions

Notes for Design VFL / VFM / VFJ / VFK common

1) Check Specifications

- Please use each product according to the specifications.
  VFL locates with spring and releases with hydraulic pressure.
  VFM locates and releases with hydraulic pressure.
  VFJ locates with hydraulic pressure and releases with spring.
  VFK locates and releases with hydraulic pressure.

2) Notes for Circuit Design

- Please read "Circuit Reference" to assist with proper hydraulic circuit design.
  Carry out sufficient advance review as the wrong circuit design may lead to machine malfunctioning and damage.

3) Air Supply

- Continuously supply air pressure to the air blow port.
  If air supply is shut off during operation, contaminants enter into the cylinder leading to malfunctions.
- Continuously supply air pressure to the seat confirmation air port for -B : with seating surface, and to the release confirmation air port for -M : release confirmation model.

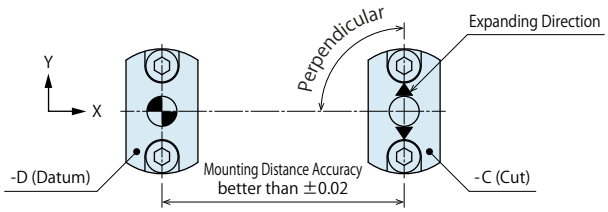
4) Setting Up the Clamps

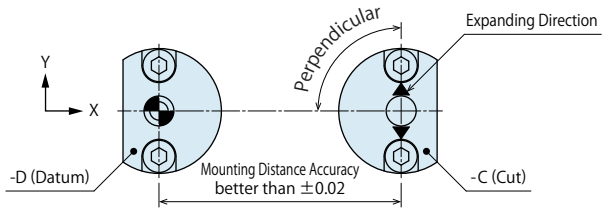
- The expansion locating pin is a positioning cylinder and has no clamping mechanism. A clamp must be provided separately.

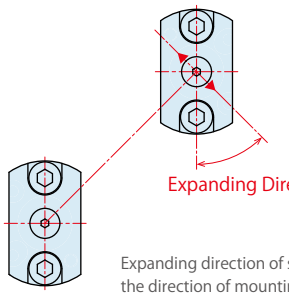
5) Expansion Locating Pin Mounting Direction (Phase)

- The Cut (VF□-C) locates work piece in the direction of rotation, based on the datum (VF□-D). VF□-C (cut: for positioning in one direction) positions in one direction (Y-axis), so phasing is necessary.

  When mounting the product, make sure that expanding direction of -C (Cut) is perpendicular to -D (Datum).





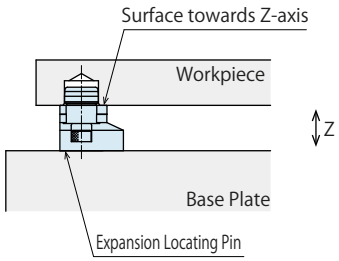


Expanding direction of standard model is the same as the direction of mounting bolt. Contact us if needing to change the expanding direction of C : Cut.

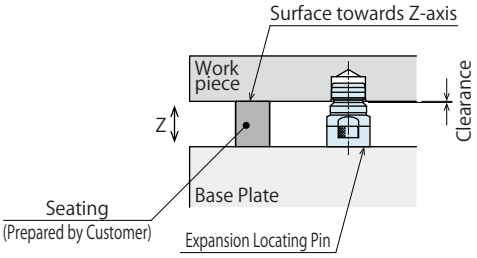
6) Reference Surface towards Z-axis

- -B : with Seating Surface has seating on upper part of the flange, but standard/-M : Release Confirmation model have no seating (reference surface towards Z-axis). Please prepare the seat separately.

-B : With Seating Surface

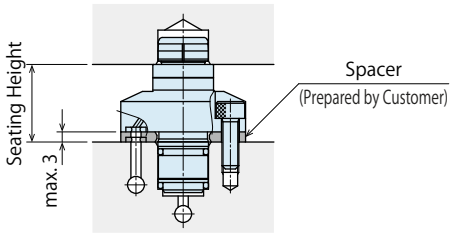


Standard / -M : Release Confirmation Model

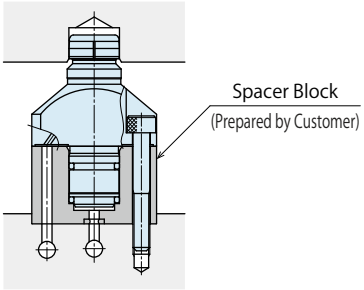


7) Adjusting Height of Expansion Locating Pin

- Seating height can be selected from 15mm / 20mm / 25mm.
- For slight adjustment of seating height and expanding part height, install a spacer (3mm or less) under the flange.

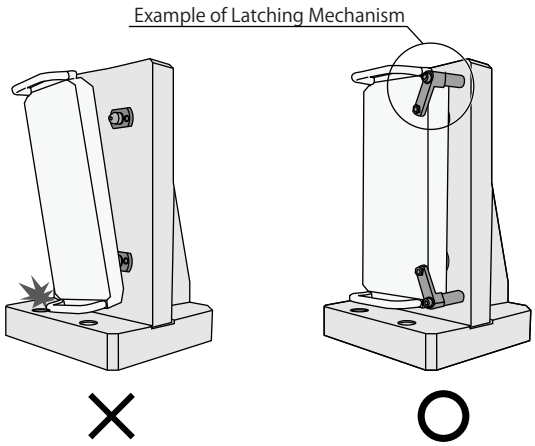


- Install a spacer block under the flange if the height of expansion locating pin is not enough.



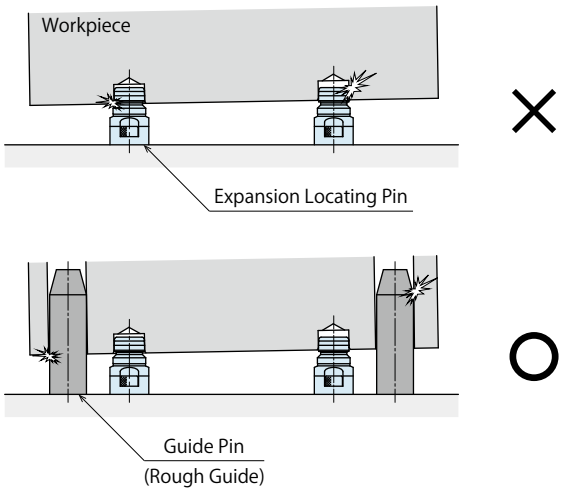
8) When the workpiece is in vertical position.

- When the workpiece is being set, make sure it is in proper proximity and square to the clamps.
  If it is locked out of position, the machine or clamps may be damaged.
- As the workpiece may fall down during releasing, it is recommended to set up the latching mechanism to prevent it from falling down.
- When the workpiece is used in vertical position (hanging on the wall), the internal moving parts tend to wear out.
  Confirm the positioning precision in a regular manner. In case the allowed range is exceeded, change the machine.



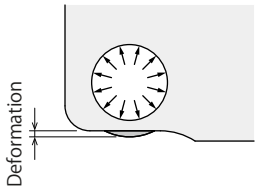
9) Incline in the Z-axis direction.

- If workpiece is loaded/unloaded on tilted condition, expanded part of expansion locating pin and workpiece hole can become stuck and damage to cylinder and workpiece is possible.
  Workpiece should be loaded and unloaded with less than 4/100 ~ 5/100 (approx. 2 ~ 3°) of tilt between workpiece and expansion locating pin plane.
- If necessary, provide guide pins to keep the pallet level during loading and unloading. Please prepare guide pin (rough guide) etc.



10) Thickness around the Workpiece Hole

- In case that the material thickness is thin around locating hole, expansion force may deform the hole. It may cause unsatisfied locating accuracy.
  Please do trial testing and adjust to proper hydraulic pressure.



Cautions

Notes for Design Regarding to VFL / VFM

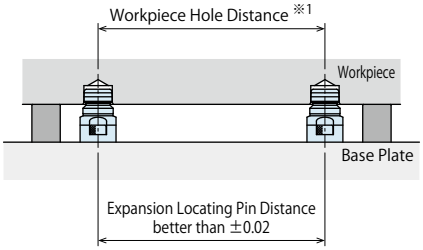
1) Distance Accuracy of VFL / VFM

- Distance accuracy of the VFL / VFM's mounting hole should be within ±0.02mm.
  The distance accuracy of each workpiece hole should be within the allowable offset.
  Please refer to below table under JIS B 0613 Class 2.

Allowable Offset (C:Cut) ≧ Datum Cylinder Distance Accuracy
+Workpiece Hole Distance Accuracy
(Listed in JIS B 0613)

[JIS B 0613 Except] unit : mm

Center Distance Classification		Center Distance Accuracy
Greater than	or less	class 2
50	80	±0.023
80	120	±0.027
120	180	±0.032
180	250	±0.036
250	315	±0.041
315	400	±0.045
400	500	±0.049
500	630	±0.055
630	800	±0.063
800	1000	±0.070



Notes for Design Regarding to VFJ / VFK

1) Distance Accuracy of VFJ / VFK

- Distance accuracy between VFJ / VFK mounting hole(-D/-C) and between workpiece has to be machined corresponding with the allowable offset (VFJ / VFK-C:Cut).

Installation Notes

1) Check the fluid to use

- Please use the appropriate fluid by referring to the Hydraulic Fluid List (P.1235).

2) Procedure before Piping

- The pipeline, piping connector and fixture circuits should be cleaned and flushed thoroughly.
  The dust and cutting chips in the circuit may lead to fluid leakage and malfunction.

3) Applying Sealing Tape

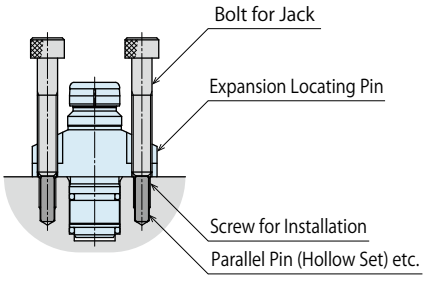
- Wrap with tape 1 to 2 times following the screwing direction.
  Wrapping in the wrong direction will cause leaks and malfunction.
- Pieces of the sealing tape can lead to oil leaks and malfunction.
- When piping, be careful that contaminant such as sealing tape does not enter in products.

4) Mounting / Removing Expansion Locating Pin

- Use all bolts with hex holes (grade 12.9) and tighten the body with a torque wrench as shown in the table below.
  Tighten them evenly to prevent twisting or jamming.

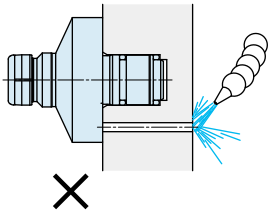
Model No.	Thread Size	Tightening Torque (N·m)
VFL2000	M5×0.8	6.3
VFL3000	M5×0.8	6.3
VFL4000	M6×1	10
VFM2000	M5×0.8	6.3
VFM3000	M5×0.8	6.3
VFM4000	M6×1	10
VFJ2000	M5×0.8	6.3
VFK2000	M5×0.8	6.3

- Do not use spring washer or toothed lock washer.
- There might be foam near the flange bottom depending on roughness of mounting surface, but this is not a malfunction.
- When detaching, please use screw for the jack (the installation bolt hole : two places), and detach without damage to the screw.
  The right picture shows the case in which the parallel pin (hollow set) is put in the screw hole without damage to the screw.



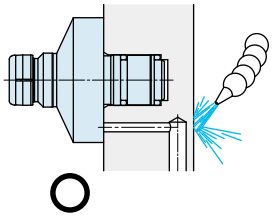
5) Appropriate Measures for the Air Vent Port

- For the air vent port of -M : Release Confirmation model, consider the environment and avoid coolant or any contaminants. If coolant or contaminants enter in the product, it will not function properly.

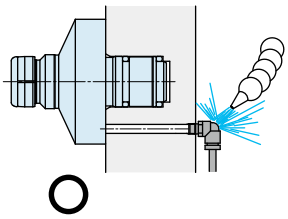


Examples

① Prepare the manifold piping.
Use the manifold piping and prepare the air vent port to the place without the influence of coolant or cutting chips.

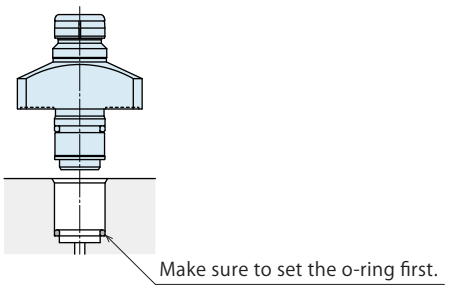


② Prepare the external piping.
If it is impossible to prepare manifold piping like the case ①, move the air vent port by using external piping to the place without the influence of coolant or any contaminants.



6) Installation of O-ring (Included)

- For VFL / VFM / VFK, Set the O-ring to the mounting hole side (fixture side) before mounting the body.



※ Please refer to P.1235 for common cautions.
・Installation Notes ・Hydraulic Fluid List ・Notes on Hydraulic Cylinder Speed Control Circuit
・Notes on Handling ・Maintenance/Inspection ・Warranty

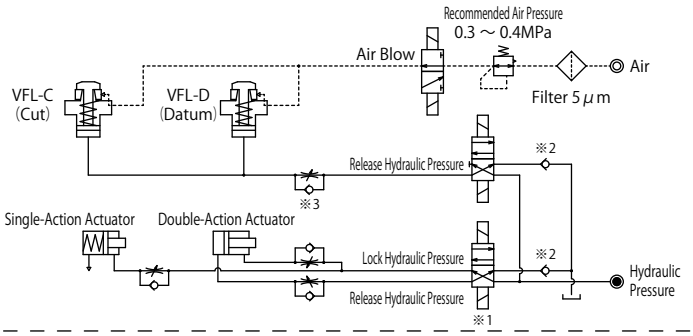
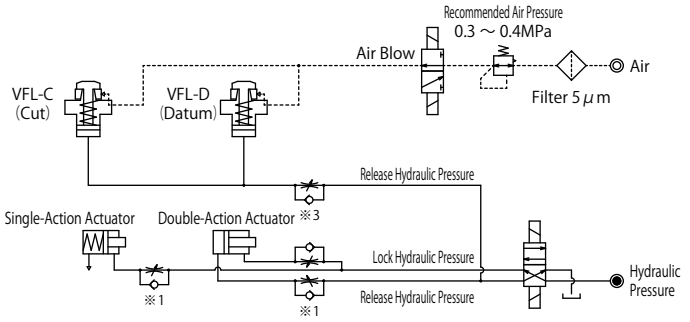
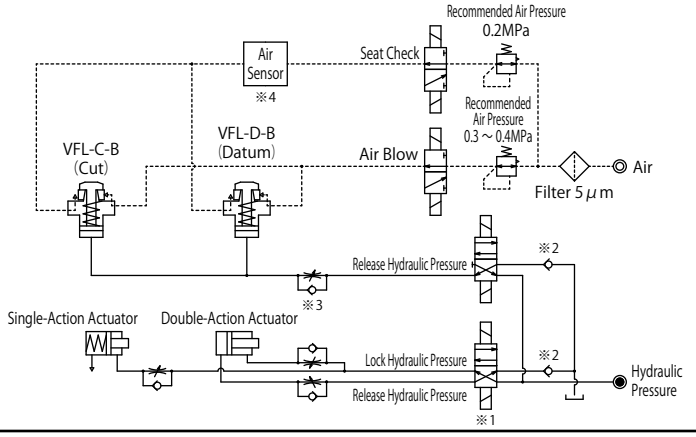
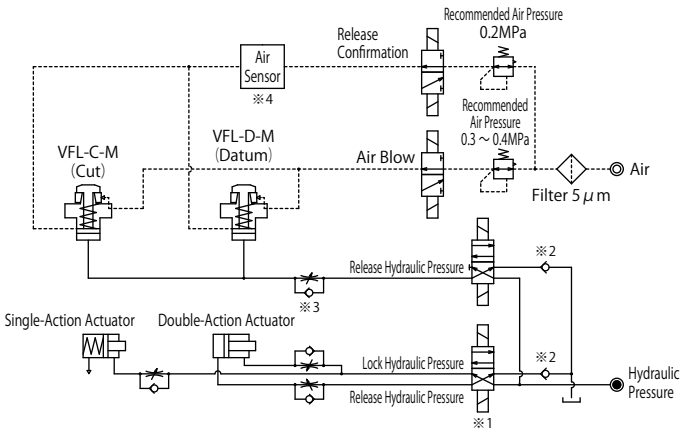
Circuit Reference

Notes on Pneumatic Cylinder Speed Control Unit

VFL (Standard) | VFL-B (with Seating Surface) | VFL-M (Release Confirmation Model)

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

Circuit Reference

Single Action model VFL Standard	Expansion Locating Pin and other actuators on different circuits. **VFL** Locating with Spring Releasing with Hydraulic Pressure	
	Expansion Locating Pin and other actuators on the same circuit. **VFL** Locating with Spring Releasing with Hydraulic Pressure	
Single Action model VFL-B with Seating Surface	Expansion Locating Pin and other actuators on different circuits. **VFL-B** Locating with Spring Releasing with Hydraulic Pressure	
Single Action model VFL-M Release Confirmation Model	Expansion Locating Pin and other actuators on different circuits. **VFL-M** Locating with Spring Releasing with Hydraulic Pressure	

Notes：

※1. The procedure for lock operation should be "VFL (Expansion Locating Pin)" → "other actuators".
Otherwise there might be accuracy failure and/or damages on the product.

※2. Use the check valve (Recommended cracking pressure：0.04MPa or less) if there is back pressure in the tank port.

※3. Adjust the flow rate so that there is no surge pressure.

※4. Recommended Air Sensor：ISA□-G (SMC), GPS2-05-15 (CKD)

1. This circuit reference is one example. It should be prepared depending on the fixture structure.

Notes on Pneumatic Cylinder Speed Control Unit

VFM (Standard) | VFM-B (with Seating Surface) | VFM-M (Release Confirmation Model)

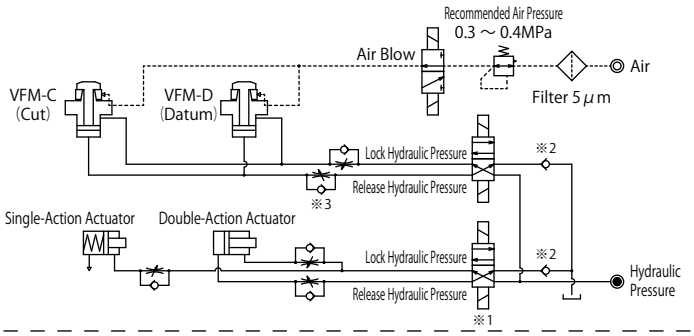
Please pay attention to the cautions below. Design the circuit for controlling the action speed of cylinder.
Improper circuit design may lead to malfunctions and damages. Please review the circuit design in advance.

Circuit Reference

Double Action model VFM Standard

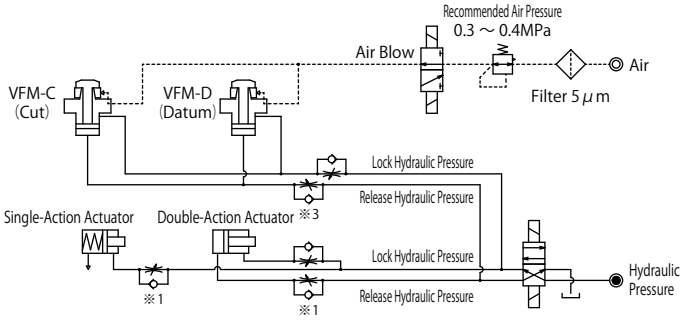
Expansion Locating Pin and other actuators on different circuits.

VFM
Locating and Releasing with Hydraulic Pressure



Expansion Locating Pin and other actuators on the same circuit.

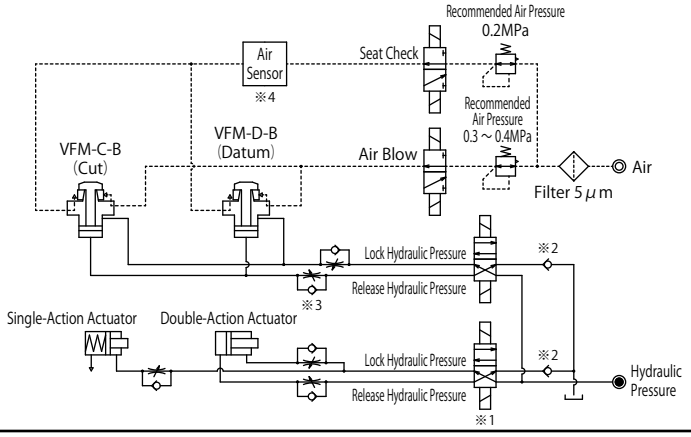
VFM
Locating and Releasing with Hydraulic Pressure



Double Action model VFM-B with Seating Surface

Expansion Locating Pin and other actuators on different circuits.

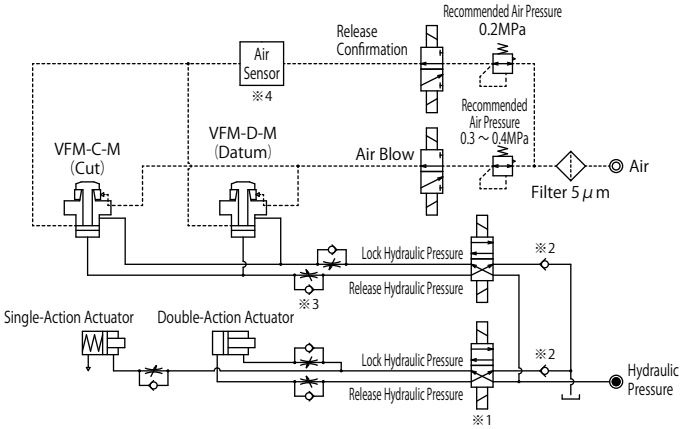
VFM-B
Locating and Releasing with Hydraulic Pressure



Double Action model VFM-M Release Confirmation Model

Expansion Locating Pin and other actuators on different circuits.

VFM-M
Locating and Releasing with Hydraulic Pressure



Notes：

※1. The procedure for lock operation should be "VFM (Expansion Locating Pin)" → "other actuators". Otherwise there might be accuracy failure and/or damages on the product.
※2. Use the check valve (Recommended cracking pressure：0.04MPa or less) if there is back pressure in the tank port.
※3. Adjust the flow rate so that there is no surge pressure.
※4. Recommended Air Sensor：ISA□-G (SMC), GPS2-05-15 (CKD)
1. This circuit reference is one example. It should be prepared depending on the fixture structure.

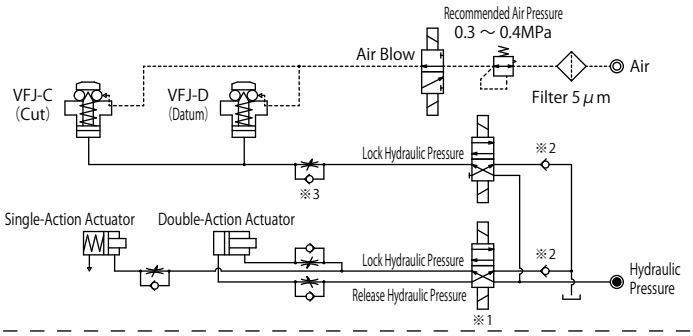
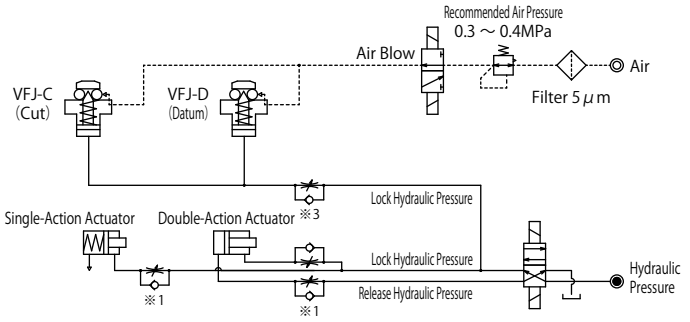
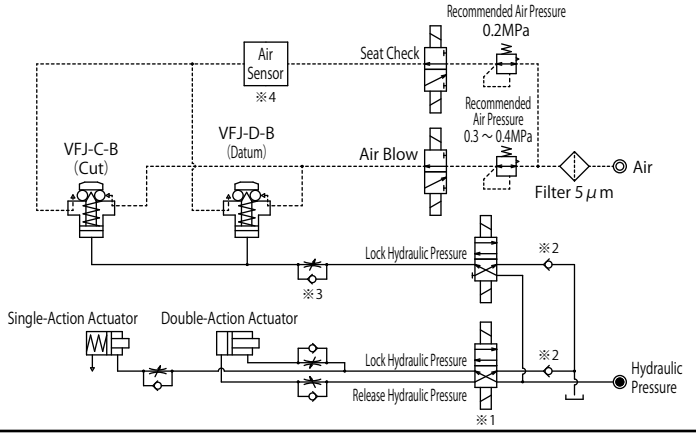
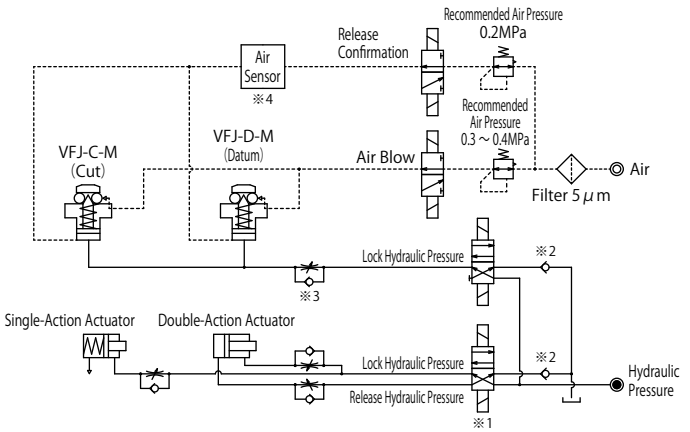
Circuit Reference

Notes on Pneumatic Cylinder Speed Control Unit

VFJ (Standard) | VFJ-B (with Seating Surface) | VFJ-M (Release Confirmation Model)

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

Circuit Reference

Single Action model VFJ Standard	Expansion Locating Pin and other actuators on different circuits. **VFJ** Locating with Hydraulic Pressure Releasing with Spring	
	Expansion Locating Pin and other actuators on the same circuit. **VFJ** Locating with Hydraulic Pressure Releasing with Spring	
Single Action model VFJ-B with Seating Surface	Expansion Locating Pin and other actuators on different circuits. **VFJ-B** Locating with Hydraulic Pressure Releasing with Spring	
Single Action model VFJ-M Release Confirmation Model	Expansion Locating Pin and other actuators on different circuits. **VFJ-M** Locating with Hydraulic Pressure Releasing with Spring	

Notes：

※1. The procedure for lock operation should be "VFJ (Expansion Locating Pin)" → "other actuators".
Otherwise there might be accuracy failure and/or damages on the product.

※2. Use the check valve (Recommended cracking pressure：0.04MPa or less) if there is back pressure in the tank port.

※3. Adjust the flow rate so that there is no surge pressure.

※4. Recommended Air Sensor：ISA□-G (SMC), GPS2-05-15 (CKD)

1. This circuit reference is one example. It should be prepared depending on the fixture structure.

Notes on Pneumatic Cylinder Speed Control Unit

VFK (Standard) | VFK-B (with Seating Surface) | VFK-M (Release Confirmation Model)

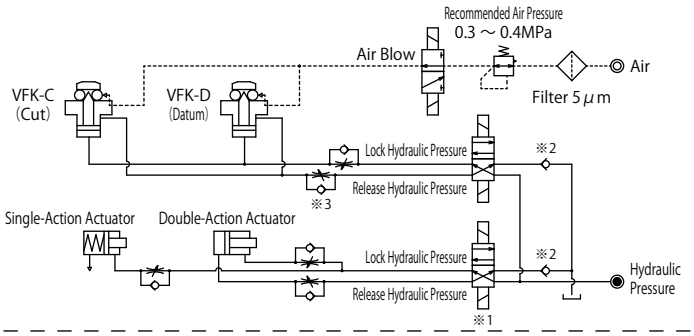
Please pay attention to the cautions below. Design the circuit for controlling the action speed of cylinder.
Improper circuit design may lead to malfunctions and damages. Please review the circuit design in advance.

Circuit Reference

Double Action model VFK Standard

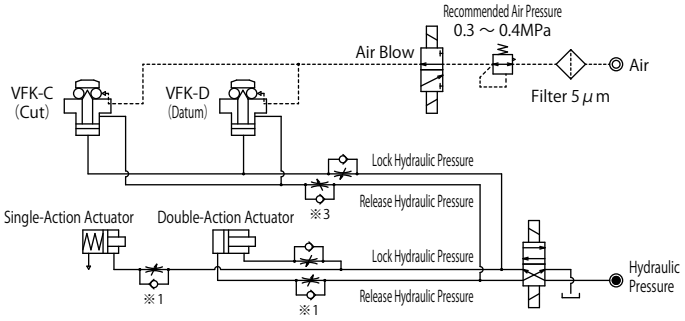
Expansion Locating Pin and other actuators on different circuits.

VFK
Locating and Releasing with Hydraulic Pressure



Expansion Locating Pin and other actuators on the same circuit.

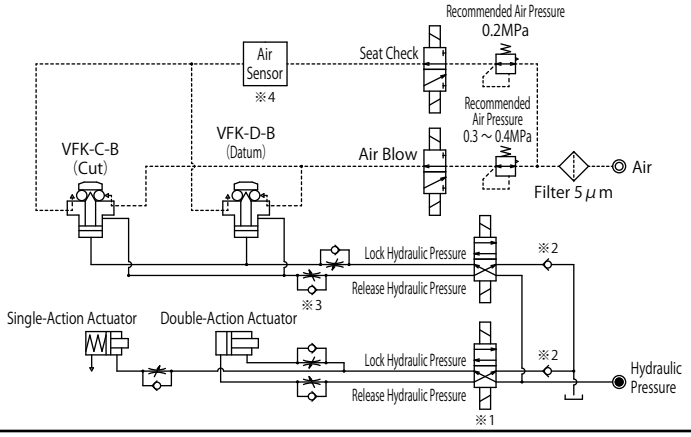
VFK
Locating and Releasing with Hydraulic Pressure



Double Action model VFK-B with Seating Surface

Expansion Locating Pin and other actuators on different circuits.

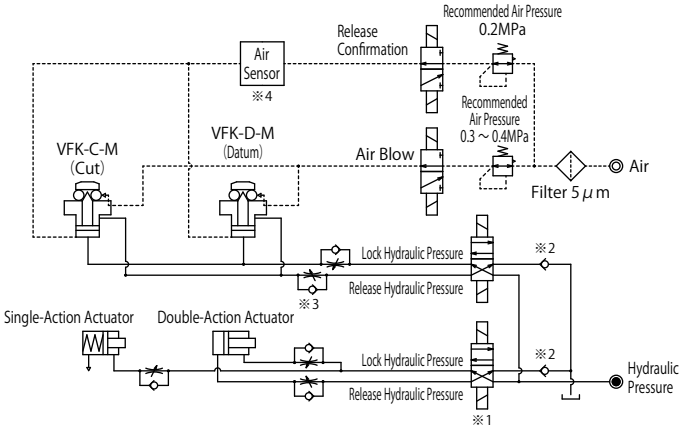
VFK-B
Locating and Releasing with Hydraulic Pressure



Double Action model VFK-M Release Confirmation Model

Expansion Locating Pin and other actuators on different circuits.

VFK-M
Locating and Releasing with Hydraulic Pressure



Notes：

※1. The procedure for lock operation should be "VFK (Expansion Locating Pin)" → "other actuators".
Otherwise there might be accuracy failure and/or damages on the product.
※2. Use the check valve (Recommended cracking pressure：0.04MPa or less) if there is back pressure in the tank port.
※3. Adjust the flow rate so that there is no surge pressure.
※4. Recommended Air Sensor：ISA□-G (SMC), GPS2-05-15 (CKD)
1. This circuit reference is one example. It should be prepared depending on the fixture structure.

MEMO

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